PRINCIPES

Journal of The Palm Society

October, 1971
Vol. 15, No. 4

PRINCIPES

JOURNAL OF THE PALM SOCIETY

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Contents for October

Cover Picture

A group of *Wissmannia carinensis* stands framed against the forbidding desert hills among which they grow near Ronda, Territoire Français des Afars et des Issas.

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

Subscription price is $6.00 per year to libraries and institutions. Membership dues of $10.00 per year include a subscription to the Journal. Single copies are $1.50 each. The business office is located at **7229 S.W. 54th Avenue, Miami, Florida 33143.** Changes of address, undeliverable copies, orders for subscriptions, and membership dues are to be sent to the business office.

Application to mail at second class postage rates is pending at Miami, Florida 33143 and at Lawrence, Kansas 66044.

Mailed at Lawrence, Kansas
OCTOBER 29, 1971

Wednesdays in Africa

HAROLD E. MOORE, JR.
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The palms of Africa are few compared with those of the American and Asiatic tropics but some of them are of especial interest because their relationships are not yet well understood. The late L. H. Bailey was preparing to undertake their study in 1950 in his 93rd year when a fall and broken hip precluded further field work. Various subsequent attempts to obtain the stages and kinds of preserved materials needed for anatomical and taxonomic studies of three crucial genera have largely failed. Thus, when an opportunity to participate in a symposium in Ghana in early 1971 presented itself, plans were made to look for *Podococcus*, *Sclerosperma*, and *Wissmannia*. The symposium, unfortunately, was cancelled, but a beginning has been made on the projected field program in Africa, subsequently extended to include Madagascar, the Mascarene Islands, Indonesia, and further work in the Pacific.

Technical studies will follow ultimately but a more general account of some of the palms and of the collecting of them may interest those palm enthusiasts less mobile than the writer. The field program was preceded in late February by two days at the Muséum National d'-Histoire Naturelle in Paris where much assistance, acknowledged separately, contributed very largely to what success followed in Gabon, Djibouti (Territoire Français des Afars et des Issas), and Madagascar. Work in Ghana was the realization of plans originally made for but not accomplished in 1969.

Ghana and Sclerosperma

Several years ago, Mr. J. B. Hall and Mr. A. A. Enti of the University of Ghana at Legon, Accra, discovered plants of the strange arecoid genus *Sclerosperma* in the Ankasa Forest Reserve in southwestern Ghana not far from the border with Côte d'Ivoire and some hundreds of miles west of previously known stations in Nigeria, Fernando Po, Cameroun, Gabon, and Angola. Mr. Hall had most kindly sent vegetative material for study as well as a live plant which failed to endure the journey by air, but additional material of *Sclerosperma* was desired as well as material of the lepidocaryoid lianes *Ancistrophyllum* and *Eremospatha*, noteworthy for their perfect flowers. Hence, in planning a study and collecting trip to Africa, Ghana became a logical first stop, and in the early evening of Sunday, February 28th, I stepped off the plane from London at Accra to find Mr. Hall waiting.

A day of preparation followed after which, on March 2nd, four of us—Mr. A. A. Enti, Curator of the Herbarium, a driver, an herbarium assistant, and myself—set off by Land Rover to set up headquarters in the rest house of a government experiment station at Aiyinasi some 215 miles from the university. Much of the trip was across the Accra Plain, a dry savanna with *Phoenix reclinata* and occasional *Elaeis guineensis* in wet or moist areas, now and then an isolated *Borassus aethiopum*. Near Takoradi, however, we drove by a substantial stand of *Borassus*. More than 100 individuals were associated with dry ground and former or present habitation, according to Mr. Enti—for man has apparently played a part in distributing this species, the fruit of which may serve

1. *Ancistrophyllum secundiflorum* stems terminate in an inflorescence on a plant near the Ankasa Forest Reserve.

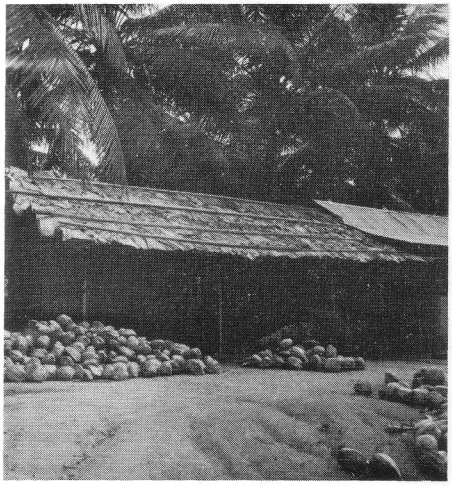
as an emergency food in difficult times. Most of the trees bore ripe orange-brown fruit on pendulous spikes or bore old staminate inflorescences, and all were swollen, usually about or above the middle of the gray trunk.

We stopped at Axim Junction beyond Takoradi for an impromptu lunch and shortly thereafter we encountered our first liane, *Ancistrophyllum secundiflorum*, in thickets of secondary growth near the road. As we continued into the wetter part of the country where cacao and rubber are much cultivated, the *Ancistrophyllum* became more abundant, most often in low wet areas near the road, for the species invades this habitat readily. To find mature fertile individuals, however, we had to wait for primary rain forest near the forest reserve at Ankasa.

Ancistrophyllum and its near relatives *Eremospatha* and *Oncocalamus* are particularly interesting to one familiar with the American cocosoid genus *Desmoncus* because, like *Desmoncus*, the pinnae along the terminal part of the leaf are modified into reflexed hooks which serve as grappling devices for the climbing plant. Stems of *Ancistrophyllum* are clustered like those of many if not all species of *Desmoncus* and most other lepidocaryoid lianes such as the African genera mentioned and *Calamus*, *Daemonorops*, *Korthalsia*, *Plectocomia*. Old growth of the plant we collected at Anagyi between Axim Junction and Axim had been burned but about six new stems were visible. When one was cut for anatomical specimens, the presence of large black ants in the long ocrea or ligule above the petiole became evident through sight and bite. Similarly, prickles in two lines along the ocrea and irregularly along the petiole and sheath made themselves felt. When later we found a fruiting stem with its terminal inflorescence (Fig. 1), the same kind of ants was present. Moreover, by the Ankasa River, similar but smaller ants inhabited the ocrea of *Ancistrophyllum opacum*, this a species smaller in all parts and with more or less sigmoid pinnae borne in groups along the rachis instead of linear and regularly arranged pinnae as in *A. secundiflorum*.

Many of the botanists at Cornell lunch together in one of the laboratories on Wednesdays during school term and I had promised to try to write a note on occasion to keep my colleagues posted. This day of the week, oddly enough, became associated with good luck during the trip, either because a rare palm was actually found or because arrangements for getting to or from such a palm were made on Wednesday. Our first day in the true rain forest of Ghana was Wednesday, March 3rd; our goal was to find flowering and/or fruiting material of *Sclerosperma*; our accomplishment, as may now be anticipated, was positive.

Setting off early from Aiyinasi, we stopped at a little village called Compound, where houses were thatched with



2. Leaves of *Sclerosperma* are used to thatch houses in the village of Compound.

3. A leaf of *Sclerosperma* stands twice as high as Mr. Enti (right) and Abu da Gomba (left).

leaves of *Sclerosperma* (Fig. 2), to pick up a local assistant and guide. The man of Mr. Enti's acquaintance being away from the village, we were accompanied by an older man, Abu da Gomba, who led us to a splendid stand of *Sclerosperma* a little south of Ankasa in a valley-bottom forest on sandy loam in low, undulating country. The soil is usually waterlogged or flooded, but becomes friable when dry and supports an open forest of such dicotyledonous associates as *Uapaca guineense*, *Musanga cecropioides*, *Carapa procera*, *Xylopia Staudtii*, *Tarrietia utilis*, *Libertodendron splendida*, and a vine of the genus *Dicellandra*. Four palms occurred here—*Raphia Hookeri*, *Calamus deeratus* (immediately identifiable by the prickly flagella on the leaf-sheaths and the slender pinnae in clusters), a sterile *Eremospatha*, and *Sclerosperma* in abundance, most frequent in low wet areas but extending up the gentle slopes to drier ground.

The stems of *Sclerosperma* are usually creeping and branch to form clumps up to five feet in diameter with undivided leaves taller than a man on the most vigorous plants in the wettest sites (Fig. 3). One clump, however, grew differently from the rest. Here the stems were erect to a height of about five feet and a diameter of nearly four inches with leaves smaller than usual. Blades as much as 62 cm. across at the middle are elongate-cuneate, cleft at the apex, and with a slender fiber continuing the rachis which itself is about two meters long. Three or four large leaves are often accompanied by considerably smaller, more deeply cleft leaves on sucker shoots. Debris of fallen leaves and water-borne materials accumulates to some height among the petioles and obscures the true bases so that for our first two hours we poked in the crowns of literally hundreds of plants searching for flowers or fruit.

Just when we had independently nearly concluded there was no hope, Mr. Enti discovered one plant with a young inflorescence still covered by bracts in the axil of a leaf. Spurred on by this

4. The inflorescence of *Sclerosperma* emerges from a leaf axil at ground level. Note debris among the leaves.

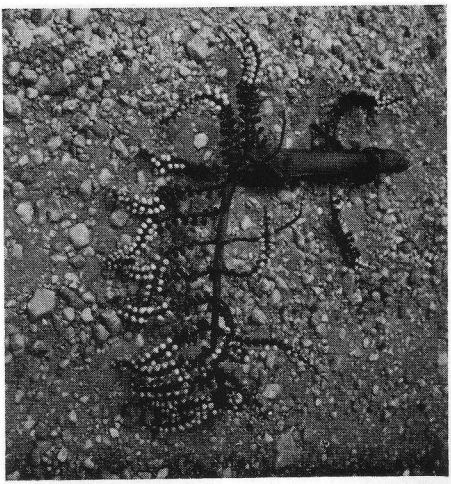
find, we continued our search until Mr. Enti discovered a plant in full staminate flower and then another close by it. The inflorescences, borne in the axil of the most forward leaf, are enclosed at the base by fibrous prophyll and bract which completely obscure the few pistillate buds at the base of the spike (Fig. 4). Staminate flowers are tan with a tinge of red, emitting abundant pollen on touch but without evident scent. Although we searched further, only the two individuals in flower and one in bud were found fertile. Fruit, if present, completely eluded us.

By noon, when I thought of my colleagues lunching at Cornell, we had preserved material and herbarium specimens ready for later study. After our own roadside lunch, we continued to a forest about half a mile south of the Ankasa River where we spent the afternoon gathering a fruiting plant of *Ancistrophyllum secundiflorum* and two sorts of *Eremospatha*, one slender, one stout, both sterile but recognizable by the smooth leaf-sheath and short ocrea.

Thursday saw us back at Ankasa in the vicinity of the Ankasa River, this time with the axeman we had sought the day before. He was to serve a most useful purpose quite apart from cutting a large tree on which Mr. Enti had spotted some orchids which he thought might represent an undescribed species. While the tree was being studied, I wandered down the road, spotted something pale in a tree of *Parkia bicolor* a hundred feet high, and with binoculars determined the source as the inflorescence of *Eremospatha*. Thus that tree was also felled while Mr. Enti, his assistant, and I followed the Ankasa River upstream to a stand of *Raphia Palma-Pinus* which took the rest of the morning to get into notes, photographs, and herbarium material.

There are three species of *Raphia* in Ghana—*R. Hookeri*, *R. Palma-Pinus*, and *R. sudanica*. The last we did not see but the first two grew together near the river in a swampy area. *Raphia Hookeri*, which Dr. Tomlinson had previously collected in an ample series, suckers but develops a prominent trunk with pneumatophores at the base, shorter petioles orangish below, pinnae in several planes, and very prominent greyish coarse fibers which curl away from the leaf-sheath. *Raphia Palma-Pinus* also suckers but develops a less prominent stem and a grooved, elongate, green petiole above which occurs a prominent erect ligule more than a meter long. This ligule disintegrates into straight fibers markedly distinct from the fibers of *R. Hookeri*. The leaves are also less "ragged"—most of the pinnae are borne horizontally with every fourth or fifth at mid-leaf directed upward in a second plane to give a somewhat two-ranked effect. We saw *Raphia Palma-Pinus*

5. *Raphia Hookeri* is abundant in wet places near the road in southwestern Ghana.



6. *Eremospatha* inflorescences are borne in leaf axils unlike those of *Ancistrophyllum*. The flowers are white.

only here but returning to Accra we encountered many stands of *Raphia Hookeri* prominent in swamps along the road (Fig. 5).

Raphia and lunch finished, we returned to the felled *Parkia* in the crown of which the once inaccessible flowers of *Eremospatha* were now within reach (Fig. 6). Unlike *Ancistrophyllum*, the stems of *Eremospatha* do not terminate in an inflorescence but produce axillary inflorescences over a long period, the branches being more or less two-ranked along the inflorescence axis. Those branches obtained by us had creamy white or almost yellow buds and flowers, the last opening by a triradiate cleft to expose yellow anthers. Other flowers, usually toward the base of the branches, were reddish-black and either spent or fertilized.

Following the success with *Eremospatha*, we searched the roadsides of the Ankasa Reserve and as far as the border village of Elubo without further sight of flowering lianes. Time being up, we headed back to Aiyinasi to process materials and pack up for the return to Accra on Friday.

Gabon and Podococcus

Podococcus, a small genus of arecoid palms of uncertain alliance, has been on the list of desiderata for anatomical and other studies for many years. All attempts to obtain material having failed and a good locality in Gabon having been suggested by M. Nicolas Hallé at Paris as a result of his field work, a visit to Gabon was the second project in West Africa.

Again Wednesday was the lucky day, this time March 10th. Four days had been planned for Gabon but a strike on the French airline that was to have started me toward Ethiopia and Djibouti on Saturday made a drastic revision of plans necessary. I arrived in Libreville from Ghana on Tuesday afternoon. When the airline office had been located, was found open, and all alternatives considered it was 4:00 P.M. and I had until 6:00 A.M. on Thursday to find *Podococcus*. I had planned to visit a forestry center for advice on transport and assistants. The center, however, lay well out of town and I knew no one personally.

7. *Sclerosperma* in Gabon has pinnately divided leaf blades.

So, having noted a car-rental agency associated with the airport bus, I found its offices and by closing time had arranged for a car and driver to be ready at 6:00 next morning.

We had been unable to locate any road map of Gabon but with the aid of a small sketch-map prepared by M. Hallé, the driver and I set out at first light to locate the village of Nkam. At Kougouleu on the Kango road, we turned toward Kingalé and, with questioning along the way, found the correct turn toward Mela, Nkam, and Merounden, reaching Nkam about 10:00 A.M. after brief stops to collect anatomical material from vegetative plants of a third lepidocaryoid genus, *Oncocalamus*, and to collect and photograph sterile *Sclerosperma* with dissected leaves in a swamp by the road. (Fig. 7).

At Nkam, my chauffeur undertook to explain my desires without evident success. It turned out, however, that the chief of the village, M. le Chef Martin Ndungn, spoke French and remembered M. Hallé well from his stay of several days a few years ago. Contact thus established, the chief himself served as guide and we set off for the forest behind the village at 10:30, passing through some cultivated plots and down a slight slope to a small stream where we stepped over sterile plants of *Sclerosperma* or *Akora* in the Lofang language. On ascending the opposite slope within the edge of the forest, I saw the distinctive wedge-shaped leaflets of a small palm. Excitedly telling the chief that this was the plant I had come for, I learned that he called it *Atzilim* and that it was common. All along the trail in this beautiful virgin forest we found various stages of fruit and bud but only when we arrived at the border of a small stream were there any plants in flower. There, however, good series in male flower were obtained and I also learned why the chief carried a gun—the holes in the muddy trail were fresh elephant tracks but in a situation far different from my only other experience with elephants in the open spaces of Amboselli Park in Kenya.

No elephants interfered this day and by noon we were back in Nkam where we waited for one of the village women to return from a hunt for *Sclerosperma* fruits. The hunt was a success since three fresh inflorescences with mature or nearly mature fruits almost violet in color were brought in together with a quantity of older fruits that had been collected earlier for the edible seeds. The whole spike is only a few inches long with few closely set fruits and certainly not likely to be obvious to the casual observer. Thus the unsuccessful search for fruit in Ghana was successful here. Palms of the two areas do differ, however, in the leaf as a comparison of Figures 3 and 7 will show. I think it likely that these represent mere leaf forms such as one finds in other species, though popu-

lations have undivided leaves consistently in Ghana (except when torn by wind), pinnate leaves in Gabon. Until the question can be more carefully considered, I refrain from using specific epithets.

Podococcus, our main achievement, is a most attractive little palm, more so than the accompanying poor photograph (Fig. 8) can suggest. The stems are slender, mostly three to four, rarely to five feet high and forming colonies or open tufts by means of slender rhizomes. The cuneate pinnae are green on both sides and pendulous fruiting spikes with stalked orange succulent fruits are prominent among the leaves. Inflorescences in bud or at anthesis are brown, erect, covered with green buds and flowers which are far less conspicuous. It is to be hoped that seeds collected and forwarded to the United States will germinate so that we may examine this interesting palm even more closely.

Mission accomplished, we set out for the return, losing an hour and 50 kilometers on a wrong turn and losing a handsome fruiting stem of *Ancistrophyllum secundiflorum* for lack of man-power to pull it from the trees which it held onto far beyond my ability to pull and haul in swamp mud. These were minor losses for a day so eminently successful despite the odds that had seemed against success the previous day. Thus at 6 the next morning I was on my way to Addis Ababa with three days to spend in Ethiopia rather than a few hours before continuing to a third Wendesday in the Territoire Français des Afars et des Issas (formerly the Côte Français des Somalis.)

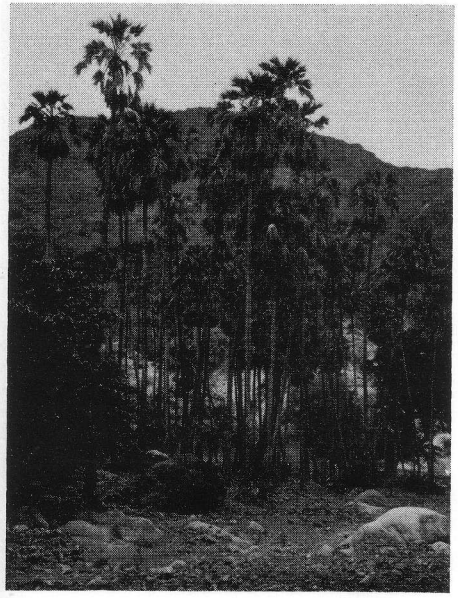
Djibouti and Wissmannia

One of the reasons for stopping in Paris enroute to Africa was to find out, if possible, how one might manage a trip to a place called Bankoualé in the Monts Godats, T.F.A.I., where grows

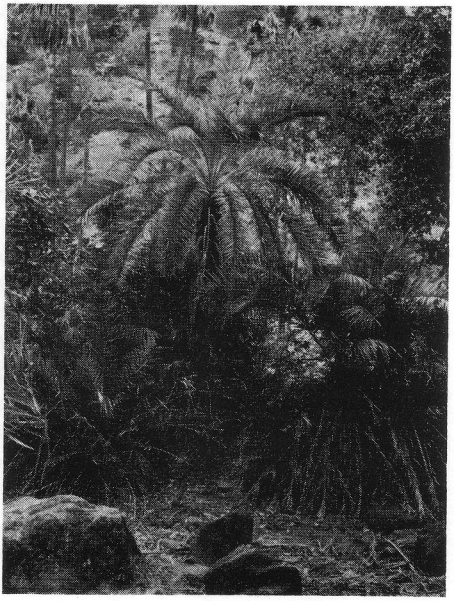
8. A plant of *Podococcus Barteri* grows beside a small stream near the village of Nkam, Gabon.

Wissmannia carinensis, a monotypic genus of considerable interest. Professor Monod wrote about this palm some years ago [Remarques sur un palmier peu connu: *Wissmannia carinensis* (Chiov. 1929) Burret 1943. Bull. Inst. Fr. Afr. Noire ser. A, 17: 338–358. 1955] on the basis of material collected by Colonel Cheddeville. I had failed earlier to get to another area in the Hadramaut region of southern Arabia, where Wissmann had photographed it, because of a local uprising in the Aden area in 1955. By a stroke of great fortune, Dr. Alicia Lourteig at Paris introduced me to Professor Gillet, an ethnobotanist and specialist on Africa, who had recently returned from Djibouti. Professor Gillet, in turn, put me in touch with friends of his and wrote them himself suggesting that I might accompany, M. Germeaux, Director of the Agricultural Service, on one of his inspection trips to Bankoualé.

It was nonetheless a great surprise to



9. Part of the population of *Wissmannia carinensis* at Bankoualé, T.F.A.I.



10. A cespitose *Phoenix* grows with *Wissmannia* at Bankoualé.

be greeted at Djibouti by another friend of M. Gillet who explained that M. Germeaux was occupied but had made plans for me to accompany him on a trip to Bankoualé the next day. I was soon located in a hotel and over dinner that evening learned more of the projected trip.

One gets to Bankoualé by flying across the Bay of Tadjoura to the old Turkish port of Tadjoura, a port much antedating the contemporary port at Djibouti. This we did at 1:00 P.M. on Tuesday, March 16, in a matter of minutes, then proceeded at a very much slower pace in a Land Rover over a rough track in desert country reminiscent of parts of the southwestern United States. By about 3:00 P.M. we had reached the trickle of water in a canyon that marks Bankoualé, passed a cluster of eight palms, and left the Land Rover to walk up the canyon to a stand of 97 *Wissmannia carinensis* (Fig. 9).

The trees are obviously old, of nearly the same size and age, and are effectively prevented from regeneration by the goats and cattle that browse even the fallen dried leaves to say nothing of any seedling that might send up a leaf. *Wissmannia* much resembles *Washingtonia robusta*, though dead leaves do not persist on the trunk, and, like it, grows in surroundings that would be inhospitable to most palms. Accompanying it is a small cespitose *Phoenix* (Fig. 10) which may be *P. caespitosa* Chiovenda—at least the male flowers seem different from those of *P. reclinata*.

Trunks of *Wissmannia* are enlarged at the base, about 65 cm. in diameter, then taper to about 40 cm. in diameter at breast height and 20 cm. in diameter below the crown with leaf-scars sometimes conspicuous. The height of one individual was 18 m. or about 60 ft. Leaves are green on both sides with the blade about 95 cm. long, the petiole 1.2

m. long. Margins of the petiole are armed with retrorsely hooked marginal teeth and the lower surface is bright orange-yellow-green. Slender inflorescences among the leaves extend beyond the blades, reaching a length of 2.4 m. and bearing as many as eight or nine pendulous green branches that are again branched about three times into very slender yellowish rachillae bearing tiny yellow-green flowers. There are ten acute, tubular bracts including the basal prophyll and most subtend a branch which in turn bears a small prophyll, though the succeeding axes are not provided with conspicuous bracts.

It was necessary to fell a tree if anatomical, cytological, and other materials were to be secured. Fortunately, though most trees were in bud, the one individual with open flowers had a trunk that was partially decayed thus our consciences were somewhat salved when, with much labor (for the trunk is extremely fibrous) the tree was cut down. We now have adequate study material, except for ripe fruits which may be obtained in August, and we should be able to place *Wissmannia* with confidence not only among the coryphoid palms where Professor Monod showed it to belong, but in relation to *Livistona* which seems to be its closest relative.

Tuesday night was spent in a camp on the summit of Mont Day surrounded by a relict Mediterranean forest which Professor Gillet is studying. Perhaps the presence of this forest will help in understanding why *Wissmannia* came to be where it is in three known areas of northeastern Africa and southern Arabia. On Wednesday we returned to Djibouti, stopping to photograph a small cluster of *Wissmannia* near Ronda (Cover) where two younger trees occur among the few older ones.

Our conversations during the trip had dwelt on the rarity of this palm and the need for its protection by fencing, as parts of the relictual forest on Mont Day are now being protected. It was, therefore, a pleasure to have an opportunity to present a case for conservation to M. Bourhan, Presidence du Conseil de Gouvernement du T. F. A. I. and to M. Godefroy, Directeur de Cabinet, Presidence de Conseil de Gouvernement. Monsieur Germeaux and I both hope that this remarkable species may be preserved by appropriate action.

Thus Wednesdays in Africa ended. A flight to Madagascar on Thursday introduced a new chapter in the search for rare and poorly understood genera to be reported separately.

Acknowledgments

The work described here is part of a program of study supported by National Science Foundation Grant GB-20348X. Thanks are due to Professors Leroy and Gillet and Drs. Nicolas Hallé and Alicia Lourteig at the Muséum d'Histoire Naturelle, Paris for introductions to several persons. Messieurs Germeaux and Martin and authorities at Djibouti made possible the visit to Bankoualé. In Ghana, Professor G. W. Lawson and Mr. J. B. Hall paved the way over a two-year period and Mr. A. A. Enti accompanied me in the field. Without the aid of these persons, the foregoing account could not have been written.

Chamaedorea elegans (*Neanthe bella*) is a native of Mexico and Central America and is the most popular house palm in America. Here young plants (bottom left) and a well established plant ten years old are shown. Photo by W. H. Hodge. See page 122.

Potted Palms for Interiors*

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Palms are better adapted for interior culture in pots, tubs, and planters than many other foliage plants. The kinds listed in Tables 1 and 2 are mostly dwarf and are offered by growers in the United States and foreign countries. Prices of potted palms may seem higher in comparison to other foliage plants but when their longer life and durability is known they are a good investment and will give greater satisfaction.

The variety of shapes, sizes, and textures obtainable make them adaptable to the many decors of our modern buildings, shopping malls, and outdoor patios. Generally, they will survive under adverse conditions of light, temperature, and atmospheric humidity.

For successful maintenance it is recommended that careful attention be given the cultural notes and references made for individual species in the accompanying tables.

Watering

Watering is the first consideration for palms as well as other plants. It is noted in the tables that all palms should have a moist soil. Drying of the soil ball within small containers can cause injury to the small feeder roots which are characteristic to palms. The result is inability of the roots to supply the leaves with water. Only a few palms can withstand dry soil as indicated in Table 3.

A test to make sure sufficient water is added is to see the excess water emerge from the drainage hole at the bottom of the pot. Experience will result in the application of a measured amount at regular intervals.

Light and Temperature

Palms accustomed to growing indoors and moved to a patio or porch in summer must have protection from the bright sun to prevent sun scorch. Those palms which grow in a greenhouse will benefit from unshaded glass in the winter months in northern climates, but must have protection of shade in the summer months.

A few palms listed have proven cold-hardy as a result of habitat and experience of exposure to freezing weather for brief periods. It is indicated that these palms would be desirable for use in areas where lower temperatures exist. This could include such areas as lobbies or shopping malls.

Potting

A potting mixture for palms as previously reported (*Principes* 11: 52–53, 1967) has been revised and is recommended for palms as well as for foliage plants. The revised formula is outlined in Table 4 of this article. It provides good drainage, permitting aeration between waterings and letting in the oxygen which is essential for good root development. It also has good moisture retention.

In repotting of palms, it is very important to compost the soil with much firmness about the root system. This encourages the feeder roots to penetrate

* Reprinted with permission from New York State Flower Industries Bulletin No. 16, Oct. 1971.

TABLE 1. *Selection of single stem palms. (For specimen plants, put 2, 3 or 4 together in one container.)*

Genus and Species	Common Name	Description	Avg Size Offered
**Caryota urens*	Fish-tail palm	Leaves twice-divided into wedge-shaped leaflets with broad toothed tips like a fish's tail.	6′ – 9′
Chamaedorea elegans (*Neanthe bella*)	Parlor palm	Small dwarf plant with thin dark green, feathery leaves.	1½′ – 2′
Chamaedorea Ernesti-Augusti		Bamboo-like stems bearing gray-green, wedge-shaped leaves widely divided at tip and with prominent rib-like venation.	3′ – 5′
Chamaedorea Klotzschiana		Dwarf palm with bamboo-like stems and feathery leaves. Leaflets dark green and clustered in groups.	2′ – 3′
**Cocos nucifera* (Juvenile stage)	Coconut palm	A conversation piece. Light green coarse, sheath-like, plaited leaves split about half-way from tips, more or less upright on short stalks.	2′ – 3′
Howeia Belmoreana (*Kentia Belmoreana*)	Belmore sentry palm	Hardy decorator palm. Thick leathery, dark-green, feather-like leaves with pointed leaflets arching from the center axis. Leaflets slendering to a pointed tip.	3′ – 6′
Howeia Forsteriana (*Kentia Forsteriana*)	Forster sentry palm	Faster growing and of larger proportion than *H. Belmoreana*. Leaflets not arching but flat to the center axis.	3′ – 6′
Licuala grandis		Small fan palm. Plaited, bright green, undivided, roundish, fan-shaped leaves toothed around the margin. Slender leaf stalks with small spiny teeth.	4′
**Livistona chinensis*	Chinese fan palm	Large fan palm. Thick stem with clasping leaf-stalks of fan-shaped glossy, yellow-green leaves divided into many segments with pendulous forked tips.	4′ – 6′
**Livistona rotundifolia*		Rare, but available and more desirable than *L. chinensis*. Stiff leaves, fan-shaped, divided into short segments.	3′ – 5′
Phoenix Roebelenii	Pigmy date palm	The most graceful of all small palms. Many small flat leathery leaves arising from a central crown.	3′ – 5′
**Veitchia Merrillii* (*Adonidia Merrillii*)	Christmas palm	So-called Christmas palm because of attractive red fruits. Slender stem supporting an arching crown of feathery glossy green leaves with closely spaced leaflets.	8′ – 12′

* Species which when young make good pot plants but will eventually outgrow containers and should be planted in large tubs or in the open ground.

TABLE 2. *Selection of clustered-stem palms.*

Genus and Species	Common Name	Description	Avg Size Offered
**Caryota mitis*	Clustered fish-tail palm	Foliage similar to *C. urens* in Table 1; smaller in size with clustered stems.	6′ – 8′
Chamaedorea cataractarum		Dwarf and compact. Feather-like dark green leaves originating alternately from branching stems.	2′ – 3′
Chamaedorea costaricana		Bamboo-like stems with feather-like dark green leaves arranged from top to bottom.	2′ – 4′
Chamaedorea erumpens	Bamboo palm	Bamboo-like stems with thin feathery dark green recurved leaves loosely distributed from top to bottom.	3′ – 9′
Chamaedorea Seifrizii		Bamboo-like stems supporting feathery bamboo-like leaves giving the plant a lacy appearance.	3′ – 8′
Chamaerops humilis	European fan palm	A dwarf plant. Stems covered with brownish fiber sheaths. Leaves fan-shaped and rough textured divided into narrow segments almost to the base.	2′ – 4′
Chrysalidocarpus lutescens (*Areca lutescens*)	Butterfly palm	Very tropical appearance with yellow feathery foliage, arching widely from tightly clustered leaf bases.	4′ – 8′
**Ptychosperma Macarthurii*	Macarthur cluster palm	Feather-like, dark green leathery leaves. Leaflets arching from center axis; ends obliquely cut as if bitten off.	3′ – 7′
Rhapis excelsa	Broad-leaf lady palm	Coarse, fan-shaped, dark green, leathery leaves divided into segments with blunt ends. Leaves arranged up the clustered brown fibered stems of varying heights giving a bushy bamboo effect.	3′ – 6′
Rhapis humilis	Slender lady palm	Similar to *R. excelsa* but with the fan-shaped leaves divided into narrower segments and more pointed at the tips.	3′ – 5′

* Species which when young make good pot plants but will eventually outgrow containers and should be planted in large tubs or in the open ground.

into the fresh soil. A layer of drainage material in the bottom of the pot, to facilitate drainage of excess water, is essential when the potted palm is plunged inside a planter or large tub and surrounded with peat moss or other filler.

Fertilization

There is no nutrient requirement for palms that is different from other foliage plants. A water soluble fertilizer like 20-20-20 applied at the manufacturers recommendation is adequate. In tem-

TABLE 3. *Handling and care of potted palms.*

Genus and Species	Culture Notes	Water	Temperature	Light
Caryota mitis and *C. urens*	Slightly acid potting mix.	moist	warm	high
Chamaedorea cataractarum	Plant one or more in pot. Will tolerate lower than normal temperature.	moist (dry)	cool	low
Chamaedorea costaricana	Retain in small pots. Will tolerate lower than normal temperature.	moist (dry)	cool	low
Chamaedorea elegans	Plant one or more in a pot. Use for dish garden when small. Flowers produced when plants are 1 foot high.	moist (dry)	warm	low
Chamaedorea Ernesti-Augusti	Requires good drainage.	moist	warm	low
Chamaedorea erumpens	Requires shade on patio.	moist	warm	low
Chamaedorea Klotzschiana	Plant one or more in a pot for effect.	moist (dry)	cool	low
Chamaedorea Seifrizii	Withstands lower than normal temperature. Ideal for outside patio in warm climates.	moist	warm (cool)	high
Chamaerops humilis	pH neutral potting mixture, good drainage. Suckers when young. Is a slow grower. Tolerates lower than normal temperature.	moist (dry)	warm (cool)	high
Chrysalidocarpus lutescens	Size of container regulates growth. Withstands lower than normal temperature.	moist	warm	high
Cocos nucifera (Juvenile Stage)	Retain in small pot to slow growth.	moist (dry)	warm	low
Howeia Belmoreana	Protect from direct sun. Is slow grower. Plant 3 or more in a pot for effect. Withstands drafts.	moist	warm (cool)	low
Howeia Forsteriana	Protect from direct sun. Is faster growing than *H. Belmoreana.* Will resist cold, lack of light, and neglect.	moist	warm (cool)	low
Licuala grandis	Never allow potting mix to become dry. High atmospheric humidity beneficial.	moist	warm	low
Livistona chinensis	Is slow growing. Avoid excessive dryness.	moist	warm (cool)	high
Livistonia rotundifolia	Grow in small container to retain small size. Best suited for interiors.	moist	warm	low

TABLE 3. (Continued.)

Genus and Species	Culture Notes	Water	Temperature	Light
Phoenix Roebelenii	Is a slow grower. Protect from direct sun, wind, and cold. Provide good drainage in pot. Do not overpot. Neutral soil pH.	moist	warm	high
Ptychosperma Macarthurii	Fast grower.	moist	warm	high
Rhapis excelsa	Slow grower. Withstands lower than normal temperature. Usually expensively priced.	moist	warm (cool)	high
Rhapis humilis	Slow grower. Tolerates lower than normal temperature. Makes dense clump.	moist	warm (cool)	high
Veitchia Merrillii	Avoid overpotting. Requires potting material of a neutral pH.	moist	warm (cool)	high

1. Water: *Moist* indicates the palm plant requires frequent watering—the surface of the soil should not become dry as opposed to the *dry* category where the surface of the soil should appear dry before watering. *Dry*, as indicated, identifies those palms which may go from *moist* to *dry* category without serious harm.
2. Temperature: *Cool* temperatures are defined as 60°F with variations from 55° to 70°F. These conditions are commonly found in shopping malls, hotel lobbies, and other entryways. *Warm* temperatures are defined as 75° F with variations from 65° to 85° F. These conditions are commonly found in homes and offices.
3. Light: The classification of *high* and *low* light refers for simplification to the minimum requirements of each species. There are few palms which won't grow better indoors with brighter than existing light. In all interior situations the palms should be placed in as bright conditions as possible exclusive of direct sunlight.

TABLE 4. *Revised Cornell Potting Mixture for Palms.* (*"Cornell Foliage Plant Mix."*)

Material	Amount
Spagnum peatmoss	4 bushels
Vermiculite, No. 2	2 bushels
Perlite, medium-fine	2 bushels
Ground dolomite limestone	3 lbs.
Superphosphate, 20% powdered	¾ lb.
10-10-10 fertilizer	1 lb.
Iron sulfate	4 oz. (¼ lb.)
Potassium nitrate	6 oz. (⅜ lb.)
Peter's Soluble Trace Element Mix	5.6 grams (5.6 grams = 1 level teaspoonful)

perate zones, feeding should be discontinued during the cool weather and then resumed when the warm weather arrives.

Other Maintenance

Insect pests unfortunately can create a troublesome problem for indoor palms as well as outside palms. Red spider mites, mealy bugs, and scale are those most likely to be found. It is advisable to consult with local agricultural extension agents for recommended pesticides.

Little or no pruning is necessary for the maintenance of palms. The cutting of a cane or stem of clustered palms in order to thin the clumps or to reduce the height is sometimes practiced. In the natural process of growth an old leaf may turn yellow and brown and begin to droop. This can be removed. It should be cut rather than torn off. Tearing the leaf sheath from the stem causes a wound, leaving an unsightly scar and may permit fungal infection.

PALM BRIEFS

New Chromosome Counts

Pollen sent back by Dr. Moore on his recent trip yielded chromosome counts for two genera that were previously unknown cytologically. (See Essig, New Chromosome Counts in *Chamaedorea* (Palmae), *Principes* 14: 136–137, 1970, for references to methodology and earlier counts.) Voucher specimens as well as photographs and drawings of the chromosomes are on deposit at the herbarium of the L. H. Bailey Hortorium, Cornell University.

Acanthophoenix sp. (*Moore et al. 9924*) n = 16

Solfia samoensis (*Moore et al. 9980*) n = 16

FRED B. ESSIG

THE EDITOR'S CORNER

The Editor has returned (temporarily) and wishes to thank Fred Essig for his efforts in getting PRINCIPES through the press in his absence. Some experiences in Africa are described in this issue. Readers who are interested in adding their plea for measures to conserve *Wissmannia carinensis* at Bankoualé may write the following:

> Monsieur Ali Aref Bourhan, President du Conseil de Gouvernement du T.F.A.I., Djibouti, T.F.A.I. and/or Monsieur Godefroy, Directeur de Cabinet, Presidence de Conseil de Gouvernement, Djibouti, T.F.A.I.

It is hoped that seed may ultimately be obtained for distribution through The Palm Society Seed Bank. Individual requests are best directed to the Seed Bank.

H.E.M.

Some Notes on Palms of the Genus Copernicia

DENNIS JOHNSON

According to the revision of *Copernicia* by Dahlgren and Glassman (1961, 1963) there are 29 taxa of this genus in tropical America. A number of these have been studied in some detail because of their heavy cuticle wax production, or because they exhibited desirable characteristics for plant breeding experiments aimed at developing a better wax palm.

The carnauba wax palm *C. prunifera*, native of northeastern Brazil, is the only member of the genus which has been commercially exploited for its wax. This exploitation began early in the 19th century when carnauba wax was used for making candles. In the present century, as the wax became an important ingredient in floor polishes, demand increased and it became an important export item from Brazil.

The economic use of this palm was the subject of a recent unpublished thesis by the author entitled *The Carnauba Wax Palm (Copernicia prunifera) and Its Role as an Economic Plant.* This study concluded that establishment of the carnauba wax palm as a plantation tree crop in Brazil was feasible. Competition from synthetic waxes and polymeric resins, however, threatens to reduce further the international market for the wax.

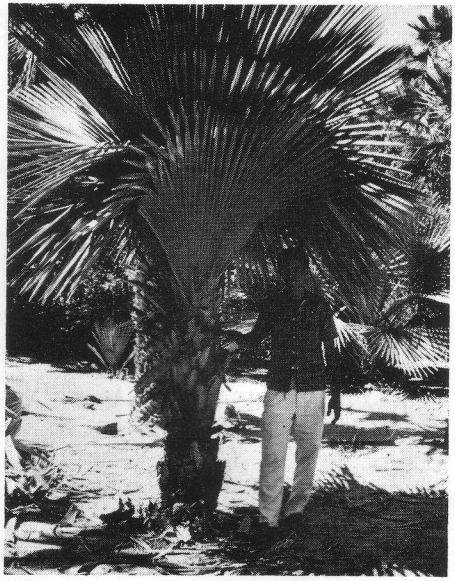
In the late 19th and early 20th centuries, the carnauba wax palm was introduced to Africa, Asia, and India, with the idea of establishing it as a plantation crop, after the successful example of rubber. Although the literature contains a number of references to such schemes, there is no record that the carnauba was planted outside botanical gardens or research stations. Somehow the belief that the wax production of the carnauba palm was a direct result of the semiarid climatic conditions in northeastern Brazil became "common knowledge." It appears that this belief was fostered by reports from botanical gardens outside Brazil that the leaves of their carnauba specimens did not have a heavy wax coat. Such reports were probably made because those examining the leaves were not aware of the necessary procedure of sun-drying the leaves, and then shaking or beating them to dislodge the wax particles.

In the 1950s E. D. Kitzke conducted research on mature carnauba palms at the U. S. Plant Introduction Garden, Coconut Grove, Florida. He found that wax yields of the specimens growing under the very humid conditions of southern Florida were comparable to those of the trees in their native habitat.

An extended botanical research project on *Copernicia* palms was carried out by the S. C. Johnson & Son, Inc. It involved field studies of the palms in their native habitats of Cuba, Brazil, and Paraguay, and the establishment of a research plantation for introduced species at Raposa near Fortaleza, Brazil. The termination of the project and donation of the plantation to the University of Ceará as a research facility was reported by Kitzke (1970).

A terminal report to summarize the research on *Copernicia* was prepared by the author. This included a physical inventory of the introduced palms in the

1. This specimen of *Copernicia Baileyana* at at Raposa is six meters in height and 18 years old, but has not yet reached botanical maturity.



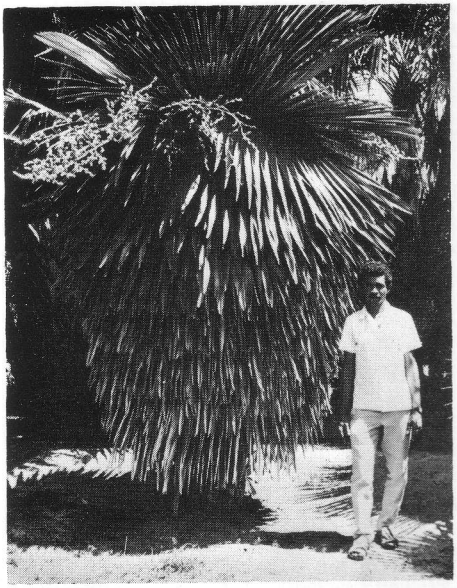
2. A 23-year-old *Copernicia rigida* at Raposa. Note characteristic cuneiform leaf blade.

Raposa collection. The results are presented in Table 1. Of the 14 taxa listed, all except *C. Baileyana*, *C. Burretiana*, and *C. rigida*, are represented by botanically mature specimens. It is expected that these last will shortly begin flowering as they are large well-established specimens (Figs. 1, 2). The specimens of *C. macroglossa* at Raposa (Fig. 3) are handsome palms and appear to have potential as ornamental plants within the semiarid tropical regions. The large number of specimens of *C. hospita* is indicative of its being the highest wax producer of the taxa studied; its potential as a commercial wax source was reported by Kitzke and Wilder (1961).

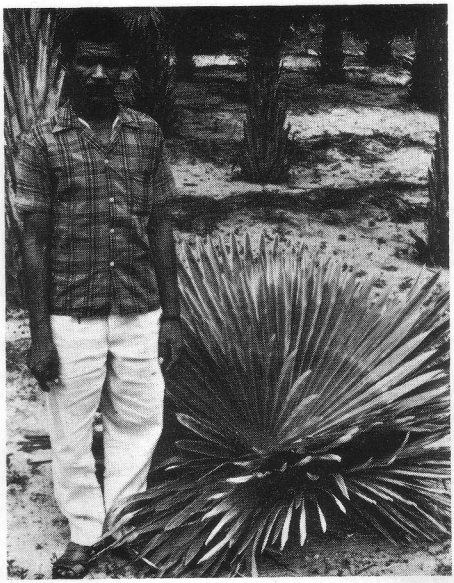
The Raposa collection poses some interesting botanical questions. Kitzke (1970) noted the natural hybrid *C.* × *Shaferi* and its segregation into three types in the F_2 generation: *C. hospita*-like, *C. Cowellii*-like, and an intermediate hybrid type (Figs. 4, 5, 6). From

TABLE 1. *Raposa Palm Collection as of July, 1970.*

Species	No. of Individuals
Copernicia alba	286
C. Baileyana	62
C. Burretiana	2
C. Cowellii	23
C. Curtissii	10
C. glabrescens	41
C. hospita	853
C. macroglossa	47
C. rigida	2
C. × *Shaferi*	28
C. tectorum	2
C. × *textilis*	14
C. × *vespertilionum*	2
C. Yarey	89
Total number of specimens	1,461



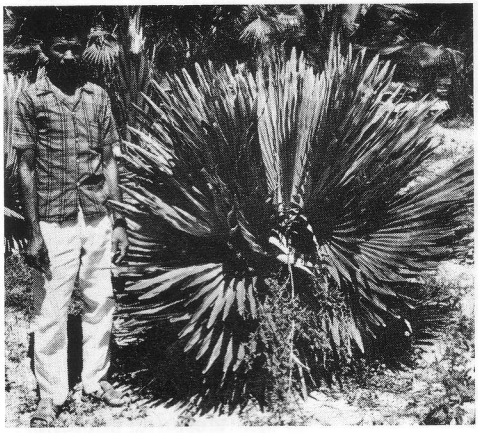
3. *C. macroglossa*, a most attractive ornamental. This tree at Raposa is 18 years old.

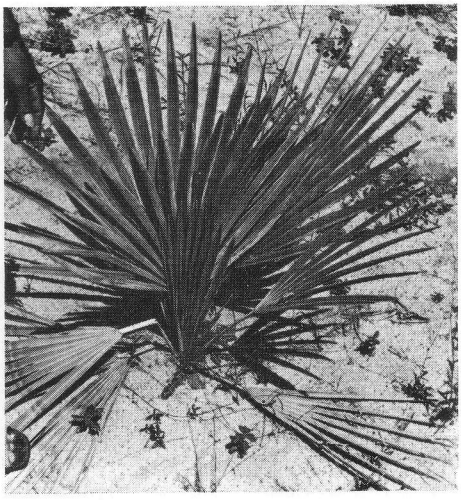


4. *C.* × *Shaferi*, a 16-year-old specimen at Raposa exhibiting *Cowellii*-type characteristics.

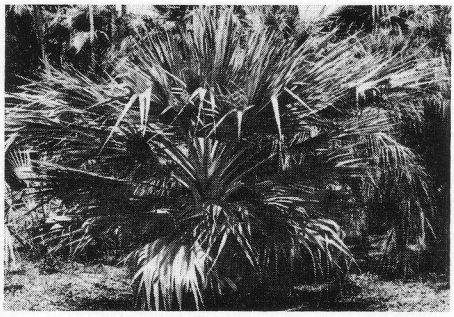
the recent survey it appears that the same segregation may be occurring with *C. Burretiana*, a suspected natural hybrid of *C. hospita* and *C. macroglossa*.

Another aspect of the author's terminal report on *Copernicia* research involved a short period of field study in Haiti of *C. Ekmanii* (Fig. 7). This species was selected because its described habitat is similar to that of several of the 12 Cuban taxa in the Raposa collection, and because travel to Haiti was without political complications.





5 (left). *C.* × *Shaferi*, another specimen of the same age, this is the "Cromo" hybrid type.
6 (right). *C.* × *Shaferi*, a *hospita*-type of uncertain age.



7. *C. Ekmanii*, a nine-year-old specimen at the Fairchild Tropical Garden.

The natural range of *C. Ekmanii* is described by Dahlgren and Glassman (1963) as in the vicinity of Port-au-Prince and in Haiti's northern peninsula. It is also reported that the leaves of the palm are used for making hats.

Attempts to locate specimens of *C. Ekmanii* around Port-au-Prince were unsuccessful. Information provided by those engaged in making and selling hats indicated that the palm is known by name in and around the city, but that it grows only in the northern part of the country. It appears, therefore, that *C. Ekmanii* has become extinct in one of its two former areas of distribution. Given the human population pressure on Haiti's meager natural resources, it may well become totally extinct in the present century.

The information here presented indicates the considerable attention *Copernicia* palms have received. With the published and unpublished data presently available to researchers, additional study of the botany and ecology of these palms could easily be undertaken.

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The Mystery Sabal of Anegada

W. G. D'ARCY
Missouri Botanical Garden, St. Louis, Missouri

The first botanical expedition to Anegada was in 1913 when two palms were reported, *Thrinax Morrisii* and an unknown *Sabal*. Until recently, there has been no further botanical investigation of the island and the unknown *Sabal* has taken on the mystique of an undescribed endemic. In fact, the island Anegada itself has a certain mystique. For those who have heard it, the name conjures up notions of a Caribbean desert beyond the horizon which is better left unexplored.

Anegada is the northeasternmost of the Virgin Islands, and unlike the other hilly or mountainous islands in the region, it is flat. With only a few dozen families who live by fishing and gifts from absentee children, there is little to draw the tourist or commercial traveller, nor apparently, the botanist. Threats of modern development have not so far been fulfilled, and for the time being, the vegetation is in much the same state as it has been for the past one or two hundred years. This tranquility is now near an end for there are plans for "developing" the island into a large and modern retirement colony.

> In the words of the palm's discoverer: "A species of *Sabal* inhabits the sandy plain, West End, Anegada; neither flowers nor fruit have been obtained and the species remains undetermined. It has the appearance there of being indigenous." (Britton & Wilson, Scientific Survey of Porto Rico and the Virgin Islands 5: 116, 1923).

In August of 1970 and again in February 1971, I made the hike to the west end of Anegada and saw both the *Sabal* and the *Thrinax*. Herbarium specimens of the first have now been identified and turned out to be *Sabal causiarum* (Cook) Beccari, a species from Puerto Rico and known in tropical gardens. It is not, after all, a new species as some botanists have speculated. Specimens were taken of the *Thrinax*, and they are indeed *Thrinax Morrisii* Wendl., a species first reported from Anguilla in the next island group to the south. A third palm seen scattered around the island in small numbers is the coconut.

There are three different sites for *Sabal causiarum* at the west end of Anegada, each separated by about half a mile. The central site may be spotted from afar by an emergent tree above the 8–12-foot scrub (see illustration). This tree has two much smaller plants beside it, indicating that the species is reproducing itself there. Residents of the island say that this tree has been there as long as they remember, and it is probably what N. L. Britton saw when he visited the island with W. C. Fishlock in 1913. Steps have been cut into the trunk to allow a climber to see above the scrub, so this tree seems to have served as a lookout post. Perhaps it was used for sighting buccaneers to hide from or wrecks to plunder in an era when the seas were regulated in different ways from now.

Sabal causiarum has not been reported in the wild from the Virgin Islands, but the Anegada trees are only about eighty miles from Puerto Rico where it was believed to be endemic. These trees are now situated well away from human influence, but one cannot say for certain that they were not planted. Knowledge of the vegetation of Anegada before the woods were sold off as charcoal a hun-

The lookout *Sabal* of Anegada. One of the footholds cut in its side can be made out at the arrow.

dred and fifty years ago would help answer the question. In any case, they are an interesting extension to the known range of the species.

Thrinax Morrisii, or "broom tire" as it is called locally, does not now much exceed four feet in height on Anegada, although Britton mentions reports of twenty-foot trees. It may be that the natives whom Britton referred to actually had in mind the sabals as trees of this height. Plants to be seen at present are growing in long swale-like depressions in the sand near the west end, and their tops do not rise above the scrub. They appear to require this little bit of shelter from the severe winds and occasional salt spray that gusts across the flat coral island. Although it is a long walk from the settlement, inhabitants of the island use fronds of these dainty palms for making brooms. In spite of their diminutive appearance, they seem to be in very good health and several were flowering and fruiting abundantly in February.

Both the *Sabal* and the *Thrinax* are unusual natural items for the Virgin Islands, and it would be a noteworthy bit of foresight if the government of the islands set aside the small area of the sabals as a preserve. Except for the need of the present inhabitants of a source of broom thatching, the *Thrinax* should be legally protected too, as these palms will certainly become targets for vandalism as soon as projected development introduces a number of new residents from other areas.

First International Congress of Systematic and Evolutionary Biology

The Society of Systematic Zoology and the International Association for Plant Taxonomy have joined forces to develop this first opportunity for botanical/zoological interaction at the international level. The University of Colorado (Boulder, Colorado) has extended a gracious invitation to meet on that campus August 4–11, *1973*. The diversity of ecological situations in the surrounding countryside makes this one of the most attractive sites in North America, both aesthetically and scientifically. The presence of experienced, enthusiastic biologists on that campus also provides an indispensable ingredient for the success of this Congress.

Program plans at this point encompass interdisciplinary symposia and contributed paper sessions. The botanists will not convene a nomenclatural section but a zoological one on this subject is anticipated. In the next few months the outline of the program and other activities will begin to take form. All suggestions will be gratefully received, carefully considered, and as many adopted as practical or feasible. Correspondence may be addressed to the Secretary: Dr. James L. Reveal, Department of Botany, University of Maryland, College Park, Maryland 20740.

PALM LITERATURE

The Stechert–Hafner Service Agency, Inc., 866 Third Avenue, New York, N.Y. 10022, has announced two works on palms for subscription, one a revision, the other a reprint of a classic study. Subscription requests for the following may be sent direct to the agency.

GLASSMAN, SIDNEY F. A Revision of B. E. Dahlgren's Index of American Palms, about 300–400 pages, royal octavo. Subscription price $27.50, after publication $33.00.

MARTIUS, CARL F. P. von. Historia Naturalis Palmarum, 3 vols., Leipzig 1823–50. Reprint in 2 vols., text and tables. Subscription price $110.00, after publication $137.50.

Germination of Palm Seed

JACK KOEBERNIK
Key West, Florida

One question often asked of me is: "How long does it take a palm seed to germinate?" This is one question I do not know how to answer. Is there an answer? Can you answer it?

For several years I have kept careful germination records. I now submit them to The Palm Society in hopes that they may help someone, someday, to find the answer. Here are my data:

Name of palm*	No. of days
Acrocomia mexicana (2)	440
A. sclerocarpa (3)	878
Actinorhytis Calapparia	71
Aiphanes acanthophylla (1)	91, 43 & 95
A. caryotaefolia (1)	71, 60 & 61
A. erosa (1)	58 & 110
Allagoptera campestre (1)	62 & 62
Archontophoenix Cunninghamiana	90
A. sp.	53
Areca Aliciae	41
A. Catechu (1)	55, 25 & 30
A. concinna (1)	42 & 61
A. Langloisiana	114
A. sp.	31
A. triandra (1)	33 & 41
Arenga Engleri (1, 4)	111, 506, 626, 283 & 83
A. microcarpa	261
A. obtusifolia (1)	374, 232 & 238
A. pinnata	189
A. sp.	181
A. tremula	103
A. undulatifolia	268
A. Wightii	298
Arikuryroba schizophylla (1)	51 & 107
Astrocaryum aculeatum	1044
A. sp.	65
A. Standleyanum (1)	68, 47 & 96
A. vulgare (1)	413 & 334
Bactris Gasipaes	69
B. major	188
B. rhaphidacantha	197
B. sp. (Moore # 9529)	150
Bentinckia nicobarica (1)	85, 82 & 74
Borassus sp. (1)	283, 265 & 273
Brassiophoenix drymophloeoides	245
Butia capitata	149
B. capitata var. *capitata*	161
B. eriospatha (1)	673 & 230
Calamus sp. (1)	107 & 408
Calyptrocalyx spicatus	19
Carpentaria acuminata	78
Caryota Cumingii (1)	142 & 114
C. mitis	149
C. urens	198
Chamaedorea cataractarum	82
C. costaricana	41
C. elatior	118
C. erumpens (1)	235 & 194
C. glaucifolia	244
C. metallica	197
C. microspadix (1)	105, 98 & 65
C. monostachys	148
C. oblongata (1)	40 & 117
C. oreophila	214
C. Seifrizii (1, 5)	138, 203, 220 & 69
C. Tepejilote	41
Chamaerops humilis var. *arborescens*	67
C. humilis var. *humilis*	124
Chelyocarpus sp. (Moore # 9548)	179
Chrysalidocarpus Cabadae (1)	127 & 78
Clinostigma Gronophyllum (1)	113 & 127
Coccothrinax acuminata	49
C. alta	63
C. argentata	76

* Numbers in parens following name refer to key at end of list.

Also:

Note: Some time ago a fellow came into the nursery and handed me a bag of palm seed and told me he had just come from the Amazon the day before. The seeds were all mixed up and I could see 11 different species. He didn't know anything about palms.

KEY

(1) more than one planting.
(2) *Acrocomia mexicana* 440 days total; after removing from the hard shell, 138 days.
(3) *Acrocomia sclerocarpa* 878 days; after removing from the hard shell, 373 days.
(4) *Arenga Engleri* (111, 506, 626) all from the same planting and the same inflorescence.
(5) *Chamaedorea Seifrizii* (203, 220) divided seed in half, planted ½ in muck and ½ in Perlite.* 203 in muck and 220 days in Perlite.
(6) *Geonoma membranacea* 48 days fresh seed, 141 dried seed.
(7) *Hyphaene* sp. (290, 96) both plantings were fresh seed from the same tree.
(8) *Raphia* sp. old seed, all planted together at the same time.
(9) *Scheelea Preussii* (86, 304) all from the same planting; 2 seeds germinated at 86 days, no more until 304 days.

One must recognize that there are many variables which can affect germination: temperature, type of planting medium, humidity, and probably most of all, freshness of the seed. We know that palm seed should be planted as soon as possible after maturity.

In southern Florida we have found that seed appears to germinate more rapidly and in greater numbers if planted in Perlite. Some of the tougher seed such as *Borassus*, *Cocos nucifera*, *Hyphaene*, and *Veitchia* will germinate in soil without much difficulty.

There is much variability in palm seed from the same inflorescence, as noted in *Arenga Engleri*. Is there any reason why there should be a difference of 515 days in the germination of seed from the same inflorescence?** These seeds were fully mature and all planted together at the same time.

A group of *Copernicia macroglossa* seed with pericarp removed germinated and the leaves were in long curls. Seed of the same species without the thin paper shell on them had straight leaves as in *Sabal*. Why would the thin shell make a difference such as this?

Scheelea Leandroana germinated with much confusion. Of the 157 seeds planted 22 seeds germinated double, 8 germinated triple, and 1 quadruple. Multiple germination has been noted here, but nothing compared to this.

It is my hope that some of the many so far unanswered questions may be resolved by members of The Palm Society pooling their information on germination.

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* Perlite is a trade name for a volcanic rock expanded by heating, then ground into tiny white "pearls." Very light and porous, it aids in aeration while retaining some moisture. It may be used alone, mixed with peat moss or soil. Since it contains no nutrients, plantlets should be placed in good soil at an early stage of growth.

** August Braun suggests a reason in *Principes* 12: 54, 1968: "A most peculiar phenomenon and one typical for the palm family is the delayed germination of the seed at certain intervals. Early-germinating seeds, usually few in numbers, are followed at intervals by more groups of germinating seeds. Frequently, but depending on the species, the second batch represents the majority of seedlings. Delayed germination continues, but in reduced numbers. Often the last seedlings appear when the first seedlings have developed into strong young plants. There is an obvious benefit to the plant in delayed germination, especially in the natural habitat. Losses caused by climatic influences or herbivorous animals thus may be replaced by late-germinating seeds." Even assuming this to be a correct analysis, however, the mechanisms controlling the phenomenon seem not yet to be understood. ED.

NEWS OF THE SOCIETY

Dr. Robert N. Smith, Jr.

Dr. Smith died at the age of 53 at his home in Harlingen, Texas, of a severe chronic heart condition. He was born in Memphis, Texas, graduated in medicine from the Tulane Medical School in 1942. He lived and practised radiology in Harlingen for 23 years.

An avid sportsman and hunter, he was also an enthusiastic collector of palms, and the grounds of his home became a showplace, attracting many visitors. He did much to promote interest in palms in southern Texas, and at his death was a member of the Board of Directors of The Palm Society.

Dr. Robert N. Smith, Jr.

Dr. Leonard J. Brass

Dr. Brass, well known to many in the botanical and exploration fields, died at his retirement home in Cairns, Qld., Australia at the age of 71, after a long illness. During the 30s and 40s Dr. Brass was a member of the Archbold Expeditions to inland New Guinea. The expedition flew amphibious planes into hitherto unexplored sections of New Guinea. As the expedition's botanist Dr. Brass discovered many new plants, including a number of palms. One genus, *Brassiophoenix*, was named in his honor. Retiring in 1966 from his position as curator of the Archbold Collections of the American Museum of Natural History, he returned to his native Australia to live. There he acted as volunteer consultant to the Cairns Botanic Gardens and other institutions. As he was preparing to return to the United States on a visit he was the victim of a cerebral accident, and was bedridden for several years.

The Seed Bank

This has been a banner year for the Seed Bank. In southern Florida, from which a large percentage of seeds emanate, there has been a large crop of palm seeds, including some species which seldom or never have fruited before. The copernicias, in particular, have borne unusually well. We have been able to fill many long-standing orders.

Members who have requested any rare seeds have been most happy to receive some extremely rare ones, from Africa, Australia, New Caledonia, Samoa, Thailand and other palm-growing areas, even including a *genus novum*, a newly discovered and as yet un-named genus. We are very grateful to the various persons who have contributed these seeds to the Society.

I am always delighted to receive progress reports from the members who

are growing seedlings, specially of the rarer species, and to learn the various methods of germinating them.

Mr. William Mowry, of Lake Worth, Florida writes: "June 15th. My palms are doing fine. I've transplanted my *Pigafetta* into a 12" pot. Standing in the pot it reaches just shy of my shoulder. I received it (bought from Dr. M. E. Darian, Vista, Calif.) last August 14 and it measured about 6". It has been growing in ¾ peat moss and ¼ potting soil and perlite. It is fertilized every two weeks with 18-18-18 orchid fertilizer. It is a beautiful palm. The seven *Catoblastus* seeds I received from Bob Norris last August have germinated. I am interested in the characteristic leaves of this palm and also the *Vonitra Thouarsiana* seedlings I have."

Mr. William H. Kidd, of Lakewood, Calif. writes: "I now have 100% germination of *Licuala grandis*, had to bury them deeper in the moss and saturate every other day. Nine out ten of the *Caryota mitis* same treatment. Three of six of the *Mascarena Revaughani*, also with more water, still hope for two of the three seed left. As near as I can remember first seed of *Pritchardia Hillebrandii* began germinating in about 18 days, now have eight germinating. That's 80%, this on top of the moss. As of last Friday one seed of *Neodypsis Decaryi*, this on top of the moss and in less than two weeks.

"*Areca triandra*, now about 50% germinating, also had to water more frequently. Complete washout on *Rhopalostylis*, both *Baueri* and *sapida*, also *Archontophoenix Alexandrae*. I think these will have to be placed in a position so that development is above the moss and the hypocotyl reaches for the moisture. Some of these began development but damped off. My fault. This may also apply to *Ptychosperma*, for am using this method with better luck.

"This is the method I use: I soak the seed for a period of three days. I saturate green moss in an all-purpose fungicide, then wring it out. The bottom of a 12" seed pan is covered with about an inch of peat moss, then the green moss is packed loosely until the pan is about ⅘ths full. The seeds are then placed on top. (In the case of waxy-coated hard seed such as *Caryota mitis*, *Opsiandra Maya* and *Sabal causiarum* I found that these need to be buried in the moss and kept much wetter than some of the fibrous-hulled seed). The pans are then sealed inside of plastic garbage bags and checked periodically.

"I won't tell you of the failures I have had using some of the methods described by Mr. McCurrach in the cultural notes in Palms of the World. I will say that I would advise others such as myself against scarification of palm seed. Every seed that I scarified was subject to almost immediate attack by fungus. I would also advise against the removal or parting of fibers on seed such as *Areca triandra*, *Cyrtostachys*, *Archontophoenix*, etc., but you probably already know this."

It is interesting to learn of the different methods used by our various members, as they can be so diametrically opposed. Mr. James Benzie, of Orange, Calif. says that he always removes the hard shell before planting his seeds, and they germinate much faster that way!

Mr. Gordon D. Hintz, of Dallas, Texas, writes: "I would like to share with you an experience regarding *Sabal texana* Last spring I planted a number of seeds which I had obtained from the Parks Dept. in Corpus Christi, Texas. Twenty-nine of these came up last summer in various places in my yard. I gave four of them an extra mulching in the fall. My main interest was to see how these seedlings would come through the winter.

"Now that spring has come I have checked and found, to my delight, that 25 have survived. Three times last winter temperatures went into the "teen", with 15°F. the lowest. There were many nights in the upper twenties and one week in early January when the temperature barely got above freezing during the daytime for several days in a row. To top this off, my seedlings spent one day under two inches of snow.

I also wanted to mention that two *Jubaea chilensis*, which I planted in coffee cans Dec. 12, 1970, sprouted, one on Feb. 15th the other on Feb. 20th, 1971. They were planted in a peat and soil mixture and kept damp. They were placed next to a warm air duct. The other eight have not sprouted yet (March 15th)." Mr. Hintz has blooming-sized *Trachycarpus Fortunei* and *Sabal minor* growing out of doors.

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Mr. Donald Pritchard, of Cairns, Qld., Australia, who has sent the Society numerous seeds, writes that Mr. A. N. Rodd, botanist at the Royal Botanic Gardens & National Herbarium, Sydney, has advised him that seed sent to us under the name *Arenga australis* is really *A. australasica.* Please correct your records accordingly.

California Cold Effects

Extent of damage to palms in garden of Lee Anderson, Orinda, California during freeze of January 3–5, 1971. Temperature reached a low of 25°F. for three nights running. Palms marked with an asterisk are clump-forming.

Arecastrum Romanzoffianum (3) No damage. In open.

Archontophoenix Cunninghamiana (1) Tip burn. Under high trees.

*Arenga Englerii** (1) No damage. In open.

Arecastrum and *Washingtonia* grow in the garden of Lee Anderson at Orinda, California near San Francisco.

Butia capitata (4) No damage. In open.

Chamaedorea costaricana (1) No damage. Under roof overhang.

C. geonomiformis (1) No damage. Under trees.

*Chamerops humilis** (1) No damage. In open.

*Chrysalidocarpus lutescens** (1) Slight reddening of tips. In planter on front porch.

Collinia elegans (3) No damage. Under trees.

Erythea edulis (2) No damage. In open.

Livistona australis (1) No damage. In open.

L. chinensis (1) No damage. In open.

Howeia Forsteriana (1) No damage. Under trees.

*Phoenix reclinata** (2) No damage. In open (protected spot).

*Rhapis excelsa** (3) No damage. Under trees.

Sabal minor (4) No damage. Under trees, and in open.

Trachycarpus Fortunei (2) No damage. In open.

Trithrinax acanthocoma (1) No damage. In open.

Traveling Members

We have heard from two Society members who went to the Seychelles Islands this summer. Mrs. M. Hubert Hilder and her husband sailed last spring from Mombasa, Africa aboard the Lindblad-owned MS "Explorer." Mrs. Hilder writes: "was thrilled to complete my self-appointed mission to bring back to St. Croix a double coconut, the "coco de mer" (*Lodoicea seychellarum*) [*L. maldivica*] from the so-called Garden of Eden in the Vallee de Mai on Praslin Isle. Fortunately the 25-lb. nut did not hit us as it rolled around in the cabin on occasional rough days. When we left the ship at Zanzibar, Norwegian Erling Bumberg of sailing fame took over expediting shipment from Mombasa. He was enthusiastic about the nut—thought it the best he had seen.

"Now all we must have is patience with a capital P. First we await its arrival, then it is said to take 7 years to germinate and finally we won't know for 25 to 30 years if it is male or a nut-bearing female."

June (Mrs. Dale) Bremerman has remarried since Dale's untimely death last year. She and her new husband, Mr. Rex Misner, took a honeymoon cruise on the same ship in July. In a recent telephone conversation she told me that the trip was great, except that she and Rex and most of the passengers and crew were very ill with para-typhoid. They were able to obtain ten *Lodoicea* nuts, which they stored in the ship's corridor. Six of them were purloined and eaten by members of the crew. After many delays and misadventures the remaining four arrived in Naples, Florida, at a cost of well over $100.00 per nut. Let us pray that they survive!

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