PRINCIPES

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THE PALM SOCIETY

A non-profit corporation primarily engaged in the study of the palm family in all its aspects throughout the world. Membership is open to all persons interested in the family. Dues are $10.00 per annum payable in May. Requests for information about membership or for general information about the Society should be addressed to the Secretary.

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JOURNAL OF THE PALM SOCIETY

An illustrated quarterly devoted to information about palms published in January, April, July and October, and sent free to members of The Palm Society.

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Contents for January

Cover Picture

Crown of *Corypha elata* with old leaves dissected away showing developing leaves (see pages 7-12 for story and additional photographs).

Mailed at Miami, Florida
March 25, 1966

NEWS OF THE SOCIETY

In *Principes* 1:99-103, 1957, Robert L. Bishop wrote an interesting article about palms of the Oregon coast. In a narrow strip along the coast, where temperatures range from a January mean of 45° F. to an August mean of 60° F., a few *Trachycarpus* are to be found growing out of doors, most of them quite old, and their origins unknown.

Farther inland, in a small mountain-ringed valley, are found the towns of Grant's Pass, Medford and Jacksonville. The latter, an early-days gold mining center, until recently was the home of the oldest living palm in Oregon. This tree was planted in 1871 by the son of Peter Britt, pioneer photographer and amateur horticulturist.

Last summer a friend of Mr. Billings McArthur, an enthusiastic palm grower in Winter Park, Florida, wrote to Mr. David C. Graham, a relative living in Grant's Pass, inquiring about this historic palm. The reply was that the Britt palm had died. "A neighbor", Mr. Graham wrote, "told me that the bad winter they had about two years ago finished it off." He sent a color slide of the dead palm which is still standing, and one can see that it had been a very large specimen. He also sent transparencies of some living and healthy *Trachycarpus* growing in Grant's Pass, and stated that they think their palms are "the most beautiful and best cared-for in the world."

We thank Mr. McArthur for passing along the information about the demise of the almost-centenarian Britt palm of Jacksonville, Oregon.

* * *

Mr. Luc Bouchage, a member who divides his time between New York City and Guadeloupe, French West Indies, wrote in October, 1965:

"I have just returned from an extended trip through Europe to the Far East. I spent some of my time in the Orient exploring some of the smaller islands in the Gulf of Siam, including Koh-Samui to which the Swiss magazine *Du* devoted its entire July issue. In case your members have not seen it, it might be worth bringing to their attention as there are some excellent photographs and articles on coconut palms, processing of copra and fiber, etc. Most of the collecting of coconuts on these islands is done by trained monkeys, which reminded me of Harold Nicholson's description of orchid collecting for the Singapore Botanical Gardens in *Journey to Java.* If I remember correctly one monkey would obey fourteen different commands . . . I wish they had not all been killed off on *these* islands in the Caribbean!"

He continues: "It might also interest some of you that upon my return a few days ago I found a seedling of *Mascarena lagenicaulis* (the bottle palm), which had germinated in my absence from seeds given me at Foster Garden in Hawaii in September 1962; also a seedling of *Chamaedorea erumpens* which I had taken (as an unripe seed) from an apartment plant in New York in December of 1963. One should never give up on palm seeds, I suppose. Some of the plants from the same sources, I might add, are by now quite large pot plants in my slat-house. If I can be of any help to any member of The Palm Society down here, please feel free to call upon me — I am here very regularly from Christmas to the end of April every year." Luc Bouchage, Bisdary, Gourbeyre, Guadeloupe, F. W. I.

* * *

A recently-joined member, Mr. Deewan Raggandee, of Amphur Dhonburi, Bangkok, Thailand, sent a photograph of a beautiful little *Rhapis* species, only 12-14 inches tall. Mr. David Barry, Jr., former Palm Society president, visited Mr. Raggandee and obtained some

1. The small *Rhapis* species grown by Mr. Raggandee measures only 12-14 inches in height.

plants from him. This looks to be an outstanding pot plant.

* * *

Mr. Donald Nichols, of Plantation, Florida, is making an intensive study and collection of freak palms. Recently he photographed a large coconut growing in the nursery of the City of Miami Beach, which produces foliage where flowers and fruits should appear. He states: "This palm had foliation of fourteen spadices. Instead of the spadices developing normally into flowers and fruits they have instead grown into branches (if you want to call them that) each 3-4 feet long, in the axils of the leaves. The shoots were enclosed in the spathe, and as they developed a stem appeared which attained a diameter of about five inches. By the curving of the distal end of the growing stem the drooping shoots attained an erect position. These, however, did not persist on the tree but dropped off at a later time. My friends from the Indian Statistical Institute in India tell me that they have come across more than a dozen such palms over the past years." [Ed. Note: Ridley also described this phenomenon in Annals of Botany 21:415-422, 1907]

* * *

Some of our amateur growers are working out ingenious methods of germinating palm seeds. Dr. Robert O. Harvey, of Vista, California, writes: '*Syagrus campestris*: 100% germination today; planted one month ago, about ⅓ buried on fairly wet sand about 5 inches above electric coil (not regulated but on full all the time). Top of pot sealed with polyethylene and an elastic band. Potted each individually in a lighter mix immediately on showing white root and buried about an inch. One seed appears to be sending out two plants. Original sand mix thoroughly wet and allowed to practically dry before planting seed — never any water added after polyethylene placed on pot."

A Florida member, Mr. John E. Turner, plants his seeds in Perl-Lome in coffee cans set in aluminum pie-plates containing water, covers them loosely with the plastic tops which come with some brands of coffee, and when the weather turns cool he sets an electric heating pad underneath to keep them warm. We would like to hear about other successful methods used.

* * *

Member Jack Kobernick, of Key West, Florida, has been keeping records of germination, and sends your secretary a list from time to time. Here are a few data on the number of days between planting and germination:

Acrocomia crispa	66 days
Aiphanes acanthophylla	91 days
Areca concinna	42 days
Arenga Engleri	111 days
Arikuryroba schizophylla	51 days
Chamaedorea elatior	118 days
Chamaedorea Seifrizii	138 days
Chamaedorea Tepejilote	41 days
Copernicia macroglossa	16 days

Desmoncus sp.	45 days
Dictyosperma aureum	102 days
Drymophloeus Beguinii	45 days
Gaussia attenuata	25 days
Geonoma membranacea (fresh seed)	48 days
Geonoma membranacea (dried seed)	141 days
Heterospathe sp.	63 days
Hyphaene crinita	72 days
Licuala grandis	53 days
Linospadix monostachya	54 days
Livistona chinensis	62 days
Livistona rotundifolia	67 days
"Mauranthe lunata" (probably a Chamaedorea sp.)	40 days
Mascarena Verschaffeltii	.84 days
Neodypsis Decaryi	52 days
Opsiandra Maya	31 days
Pinanga Kuhlii	1st lot, 45 days
	2nd lot 66 days
Phoenicophorium (Stevensonia)	21 days
Phoenix sp. (possibly reclinata or hybrid)	12 days
Phoenix canariensis	34 days
Phoenix pusilla (zeylanica)	25 days
Pritchardia sp.	46 days
Rhyticocos amara	1st lot, 53 days
	2nd lot 66 days
Sabal umbraculifera	51 days
Syagrus quinquefaria	63 days
Verschaffeltia splendida	38 days
Veitchia Merrillii	30 days

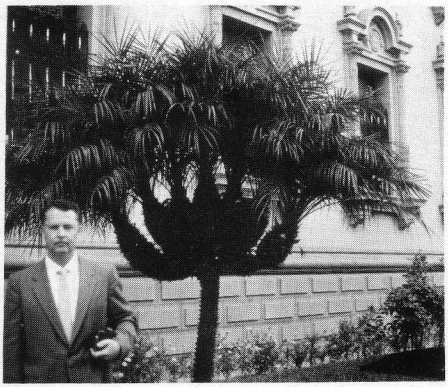
Mr. Kobernick's nursery was inundated with sea water at the time of hurricane "Betsy" (September 7th, 1965). He has been quite surprised in some cases by the effect of the salt water on various species, and is writing up his experience to share with the Society's membership.

* * *

The recently elected chairman of the California chapter (or group) is Dr. M. E. Darian, 2615 So. Santa Fe Ave., Vista, Calif. Those members who want to attend any meetings or field trips arranged by this group should ask Dr. Darian to put their names on the mailing list, so they can be notified.

The recently elected chairman of the Central Florida group is Mr. David R. Besst, 1810 Huron Trail, Maitland, Fla. 32751. Members may request to be put on the mailing list there, also.

LUCITA H. WAIT



1. *Phoenix Roebelenii* by the "Avocado" Palace.

Phoenix Roebelenii in Guatemala

Phoenix Roebelenii, the pigmy date palm from Laos, is widely employed and appreciated around the world as a garden subject and an indoor pot plant. This species is typically a solitary palm with a single crown. It is therefore of particular interest to speculate how the specimen depicted here was produced. This is but one of perhaps a dozen, all approximately matched, which enhance the foreground of the "Avocado" Palace in Guatemala City. The balanced heads, in a single plane, indicate the hand of a skilled plantsman, and although the effect detracts somewhat from the natural grace of the plant it is surprising that the trick has not been attempted more often.

MORGAN EVANS

1. *Corypha elata*, preliminary cuts and trimming.

Collecting — Palm Style

P. B. Tomlinson, M. V. Parthasarathy and G. A. Vargo

Liberty Hyde Bailey defined palms as "the big game of the plant world." Few botanists, however, have either the inclination, the training, or the opportunity to be a big game hunter and so palms remain poorly collected and poorly understood even though they are economically very valuable plants. How little of a large palm can be accommodated on a standard herbarium sheet (about 16 × 11 inches) is all too familiar to those botanists who have collected in the tropics and tried to provide representative specimens of these monsters for the herbarium.

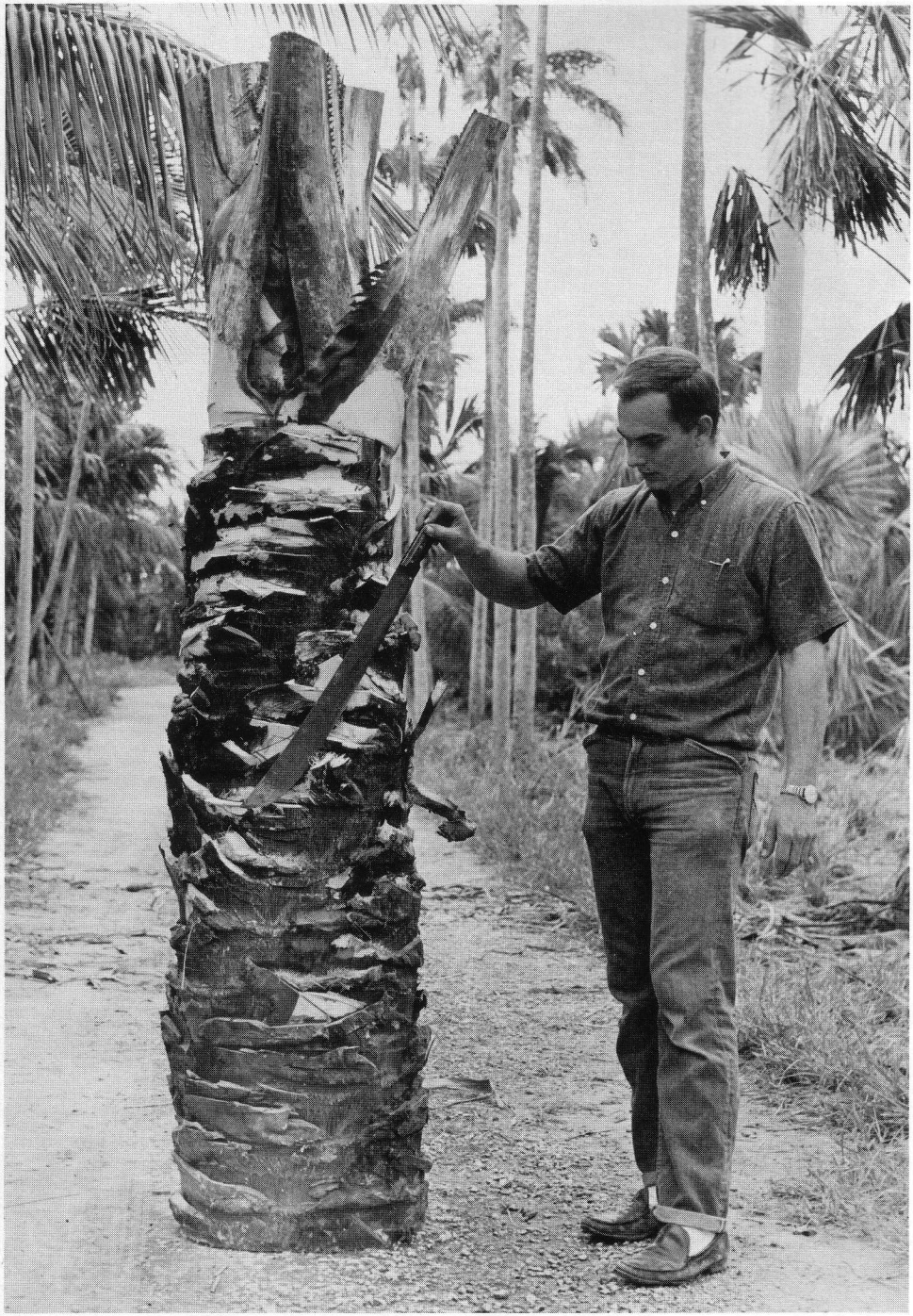
Some indication of the labor involved in preparing palm material for detailed investigation in the laboratory is provided by the photographs which illustrate this article. A similar sort of effort would be involved in making herbarium specimens (Tomlinson, 1965). The photographs were taken during the "dissection" of a large specimen of *Corypha elata* at the Coconut Grove Palmetum, Miami, Florida. This was toppled during Hurricane Betsy in September, 1965, and proved too large to re-erect. It was generously made available for our studies by Mrs. A. R. Jennings.

"Dissection" is something of an euphemism, since the palm was cut up with a chain-saw, but a chain-saw is undoubtedly the best tool for dissembling such a large plant (Fig. 2). All but the base of the leaves were first trimmed with a machete and a saw-cut was made to isolate the crown, well below the stem apex

2. Stem of *Corypha elata* before sampling.

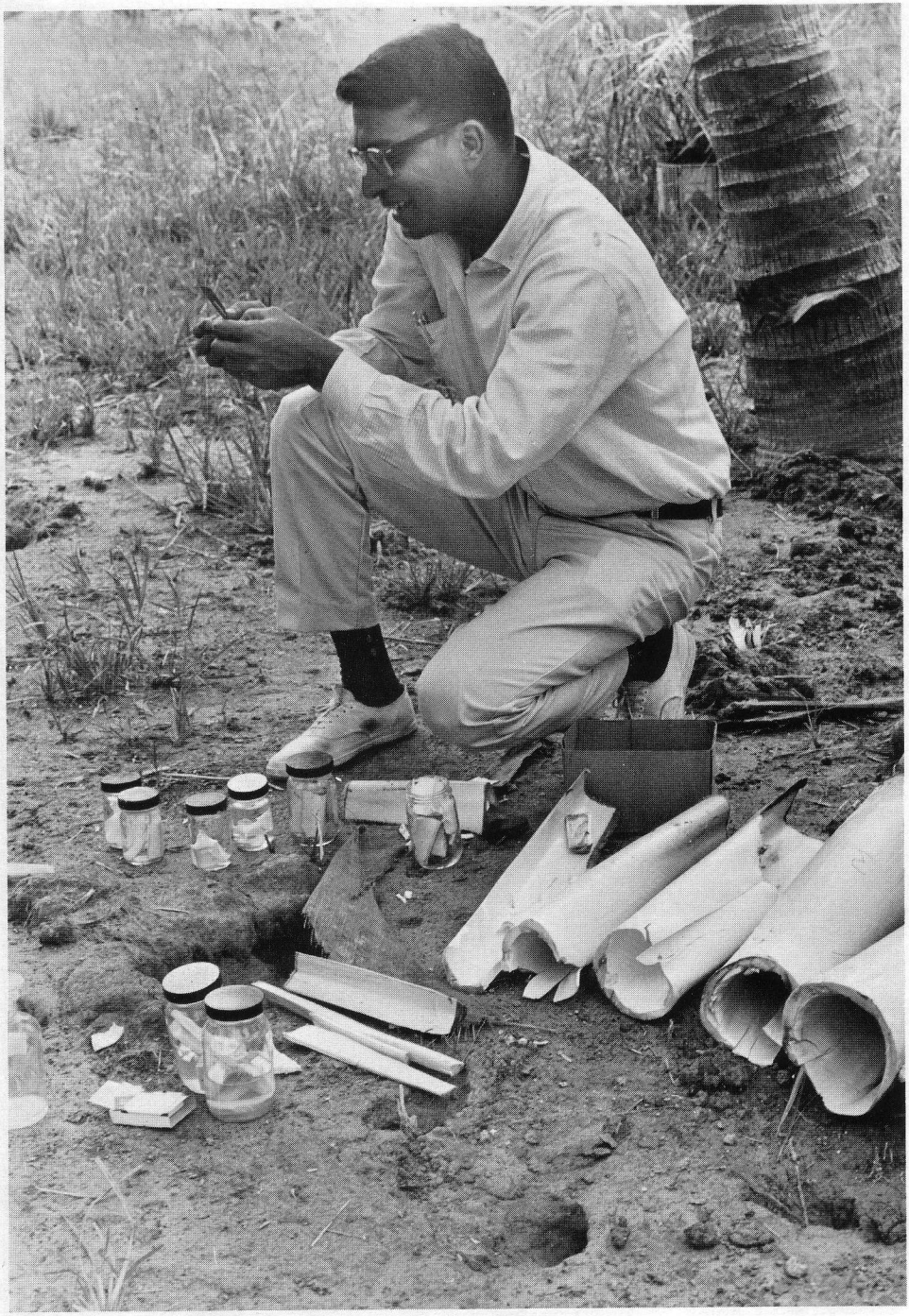
3. Sawn surface of stem of *Corypha elata* showing frayed broken ends of innumerable vascular strands.

4. Base leaves of *Corypha elata* sawn across. Three leaf-contact spirals (parastichies) are conspicuous as also are saw-like margins of petioles.



5. Terminal part of axis divested of most of its leaves; parastichies very evident.

6. Tubular base of young leaf.



7. Fragments of developing leaves going into fixative.

which was required intact for our investigation (Fig. 1). A shorter length of stem was cut out to provide material for the close investigation of the anatomy of the palm stem being carried out at Fairchild Tropical Garden. The complexity of the vascular system revealed by this cross-cut is evident in Fig. 3, although, as has been described earlier, some advance in unravelling it has come from studying diminutive palms like *Rhapis* which can be regarded as models for more massive plants (Zimmermann and Tomlinson, 1965).

Leaf bases had then to be cut one by one from the stem, in order to reveal parts of further interest to us. *Corypha* does not succumb willingly, being armed with saw-like teeth along the margin of the petiole (Fig. 4). These teeth inflicted many a wound before the axis was divested of most of its leaves and could be erected as a stubby totem (Fig. 5). In this position there was least danger of tender young leaves fragmenting as they were cut out. Soon we were within the crown, the woody parts of older leaves discarded, and at last the machete could be laid aside in favor of a sharp scalpel used to cut through the soft bases of immature leaves (Fig. 6). Parts of these successively younger leaves went into fixative for a future examination in the laboratory of the development of their conducting tissues (Fig 7). Finally the youngest developing leaves were revealed (see cover) and they and the shoot apex in turn went into preservative. A whole morning had passed, but from the material we had preserved we hoped soon we could better appreciate how *Corypha* develops and is constructed.

Modern biology is making such great advances at the sub-microscopic and molecular level, using tools of every-increasing refinement, that it seems ludicrous that research needs to be carried out using a chain-saw. Nevertheless investigations on this monster scale are needed so that no imbalance of understanding develops in the science of biology as a whole.

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Tomlinson, P. B., 1965. Special techniques for collecting palms for taxonomic study, in F. R. Fosberg & M.-H. Sachet, Manual for tropical Herbaria, *Regnum Vegetabile* 39: 112-116.

Zimmermann, M. H. & P. B. Tomlinson. 1965. Unravelling the palm stem. *Principes* 9: 88-93.

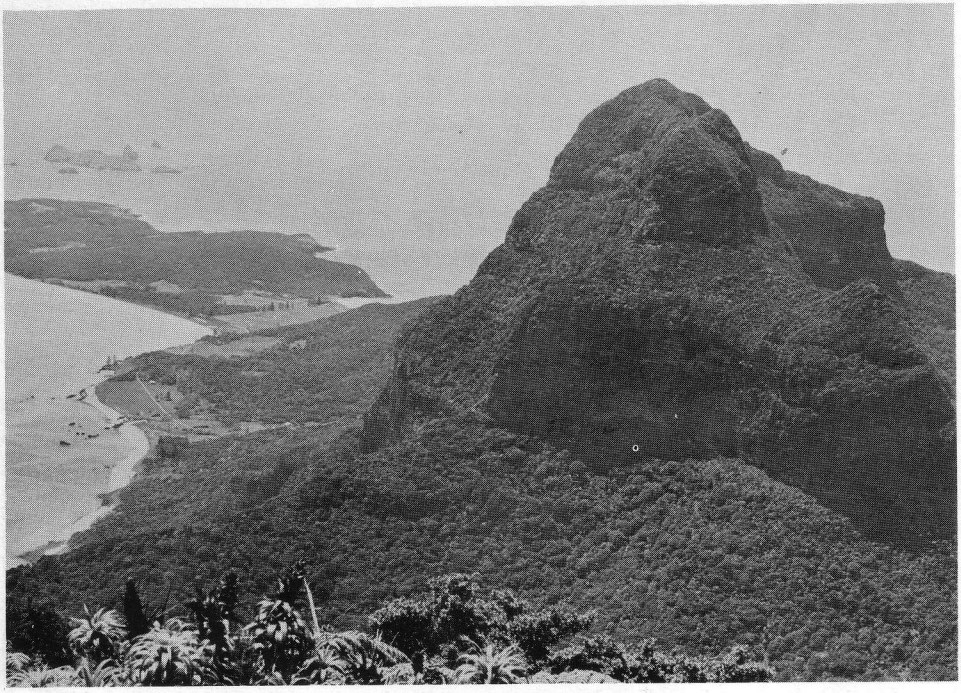
Palm Hunting Around the World

HAROLD E. MOORE, JR.

IV Lord Howe Island

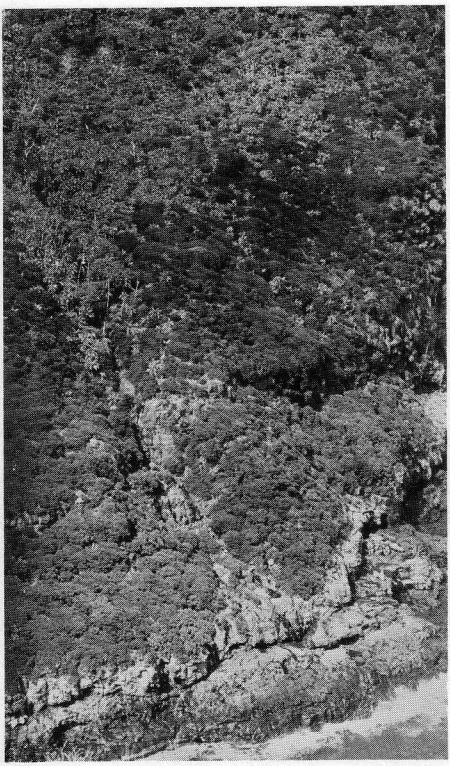
The last palm stop in Australia was, in many ways, the most exciting. Lord Howe Island, from which come the kentias of commerce — *Howeia Belmoreana* and *H. Forsteriana* — has long intrigued me because of two other palms whose relationships are not perfectly clear. Thus I had begun making plans to visit the island many months before. The island is reached today by flying-boat from Sydney and during the summer season is a favored vacation spot for Australians. Reservations often need to be made much in advance; flights depend on the tides and weather and are at intervals of days not hours. As plans to visit Indonesia were changed during the trip, there was much correspondence attempting to arrange a visit to Lord Howe. Finally plans were completed to leave from Sydney on Monday

1. Mt. Gower (right) and base of Mt. Lidgbird with *Howeia Forsteriana* on sands back of beach.



2. Mt. Lidgbird and central Lord Howe Island from trail to Mt. Gower.

3, 4. *Howeia Belmoreana* (above) and *H. Forsteriana* (below and background above) at end of road near base of Mt. Lidgbird.



5. *Howeia Belmoreana* abounds on trail to Gower.

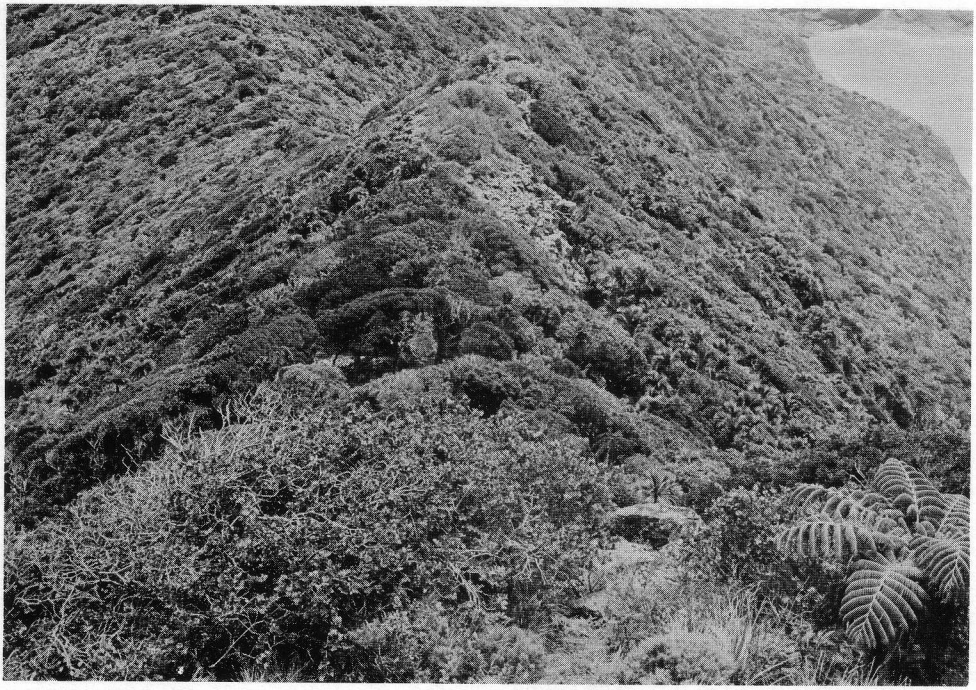
6. *Hedyscepe Canterburyana* on Gower trail.

noon, February 24th, and to return on the 27th.

Rosebay, a suburb of Sydney, is headquarters for the flying boats which take off from Sydney Harbor in clouds of spray in sight of the magnificent bridge so often pictured. Then one is airborne for something over two hours before a speck of land appears to mar the white-capped sea below. Landing is as much of a thrill as taking off, more so perhaps as one steps into a small launch to be carried to the dock where visitors and residents wait to welcome new arrivals.

Mr. and Mrs. Payten, whose pleasant guest-house "Valdon" was my home away from home, helped me get in touch with Max Shick who had agreed to guide me up Mt. Gower on the 25th, as he earlier had guided other botanists including Mr. Peter Green from the Arnold Arboretum of Harvard University to whom I am indebted for the introduction to Max.

Lord Howe Island, lying about 480 miles northeast of Sydney, is about 7 miles long and one and one-half miles wide, the low northerly end with hills to 700 feet, and at the southern end two mountains, Mount Lidgbird and Mount Gower. Mount Gower is higher (2,840 feet) but easier to climb than Mount Lidgbird which is connected to it by ridge about 1,240 feet high at its lowest point. Three sides drop sharply to the sea but the trail, after a sharp ascent from the beach follows the slope between the peaks. *Howeia Forsteriana* is the predominant palm of the lower sandy areas, though here and there one finds *H. Belmoreana* with it. Climbing upward, however, one sees only *H. Belmoreana* which is abundant up to 1,400 feet or so. At about this elevation, an occasional plant of *Hedyscepe Canterburyana* appears but the species does

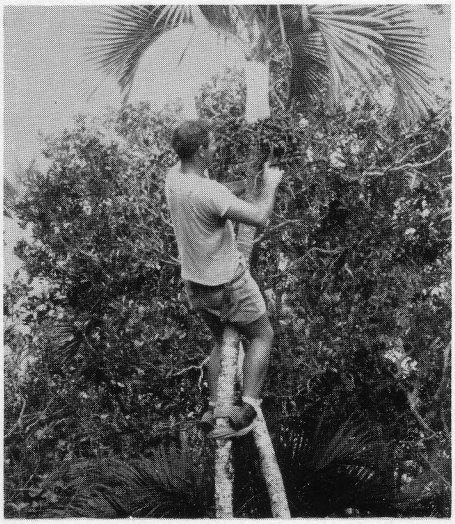


7. *Hedyscepe* crowns rise above low forest on ridge between Mts. Gower and Lidgbird.

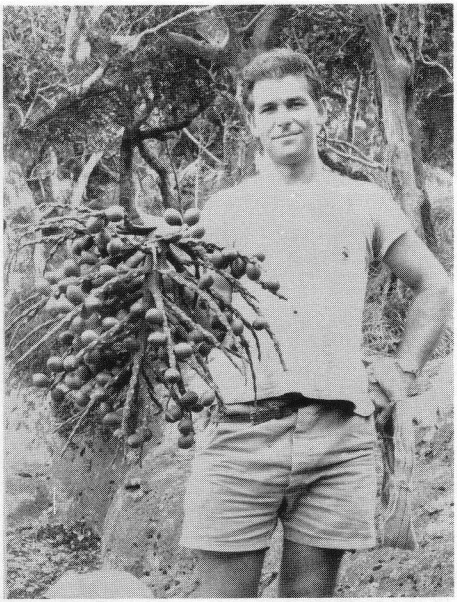
8. A close-up of *Hedyscepe Canterburyana* in fruit.

not become common until one reaches the more exposed ridges at 2,000 to 2,400 feet where scattered individuals with their prominent silver-blue leaf-sheaths, short petioles and stiffly arched green leaves stand out in and above the low montane forest. The trees, when we saw them, bore fruit in various stages. These, when ripe, are ovoid, deep dull red and about an inch long on stiff green inflorescences below the crown-shaft.

It is only on the uppermost slopes and in the low wind-swept wet mossy forest on the flat top of the mountain that *Lepidorrhachis Mooreana* (*Clinostigma Mooreanum*) appears. There is no difficulty in distinguishing it because of the green leaf-sheaths swollen at the base not forming as distinct a crown-shaft and the much lower stature. *Hedyscepe* reaches a height of 20-30 feet but *Lepidorrhachis* only 6-8 feet. The young inflorescences are exerted above the enclosing sheath of the outer leaf in this species, expanding when the leaf falls. The small red fruits on a more branched green inflorescences are also distinctive. Rats seem to have a predilection for these fruits so that today inflorescences are enclosed in wire mesh when seed is desired else none is obtained.



9. Max Shick climbs a *Hedyscepe* using the technique and type of sugar bag climbing rope formerly much more used when collecting seeds of *Howeia* was an industry.

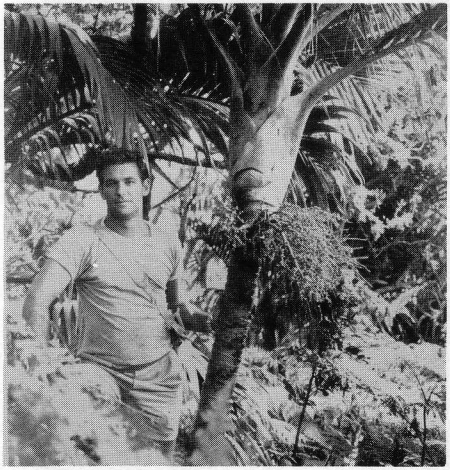


10. Max holds a fruit cluster of *Hedyscepe*.

The palms are thus rather clearly zoned on the mountain: *Howeia Forestericna* along the sandy shores in lowland forest, succeeded by *H. Belmoreana* on the slopes in upland high forest, *Hedyscepe* on the ridges in montane low forest, and *Lepidorrhachis* at the summit in the moss forest. The various forest associations on the island have been described in greater detail by W. R. B. Oliver in "The Vegetation and Flora of Lord Howe Island" (Transactions and Proceedings of the New Zeaeland Institute for 1916, 49: 94-161. 1917). The palms are illustrated there in several photographs (plates X-XVI — the *Hedyscepe* in plate XIII, fig 2 being mislabelled *Howeia Belmoreana*).

The *Howeia* species were once important in the economy of the island, the seeds having been collected and shipped

11. *Lepidorrhachis Mooreana* on Mt. Gower is less imposing than *Hedyscepe*. Note that the leaf sheaths form a much less prominent crownshaft.



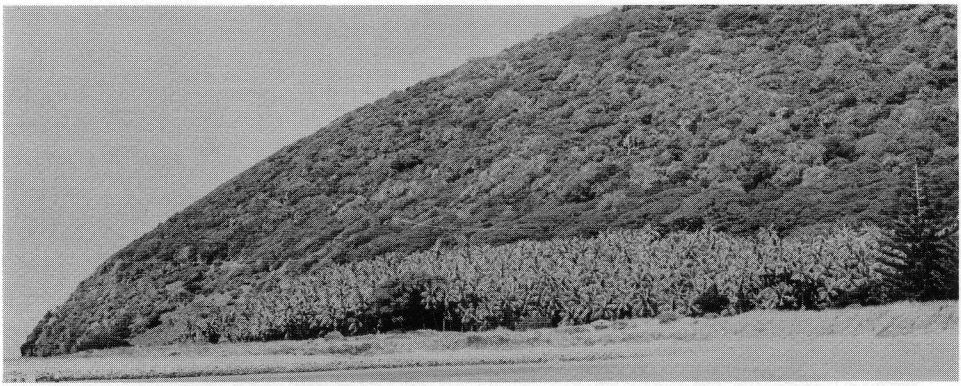
12. *Lepidorrhachis* in young fruit on Mt. Gower.

in quantity under a cooperative "share" arrangement to supply florists with the familiar "Kentia" of commerce. An article in the National Geographic Magazine (H. L. Clark, The Paradise of the

13. Wire netting is needed to keep rats from harvesting fruits of *Lepidorrhachis*.

14. Within the groves of *Howeia Forsteriana*, light and shadow make a beautiful pattern.

Tasman, vol. 68: 115-136. 1935) tells the story of the island and palm collecting at greater length. Though collecting seed is less important today than tourism, many of the older trees are marked with notches on the trunk used by climbers in the past. And my prized "sugar-bag" climbing rope, a gift from



15. A grove of *Howeia Forsteriana*, North Beach at north end of island.

Max Shick which I learned to use on Lord Howe and which proved useful elsewhere in the Pacific, is obviously modelled after the climbing device to be seen in use on p. 119 of the National Geographic article mentioned.

Lord Howe Island deserves the adjectives used to describe it and is understandably a popular place for the vacationer who likes a quiet relaxed uncrowded place. For palm devotees it has its four palms found nowhere else to recommend it as well. One leaves Lord Howe with more than reluctance but the next step for me was the realization of a long-standing dream, a visit to New Guinea and the islands eastward to Fiji completing the palm circuit.

Dichotomous Branching in Palms?

P. B. Tomlinson and H. E. Moore, Jr.

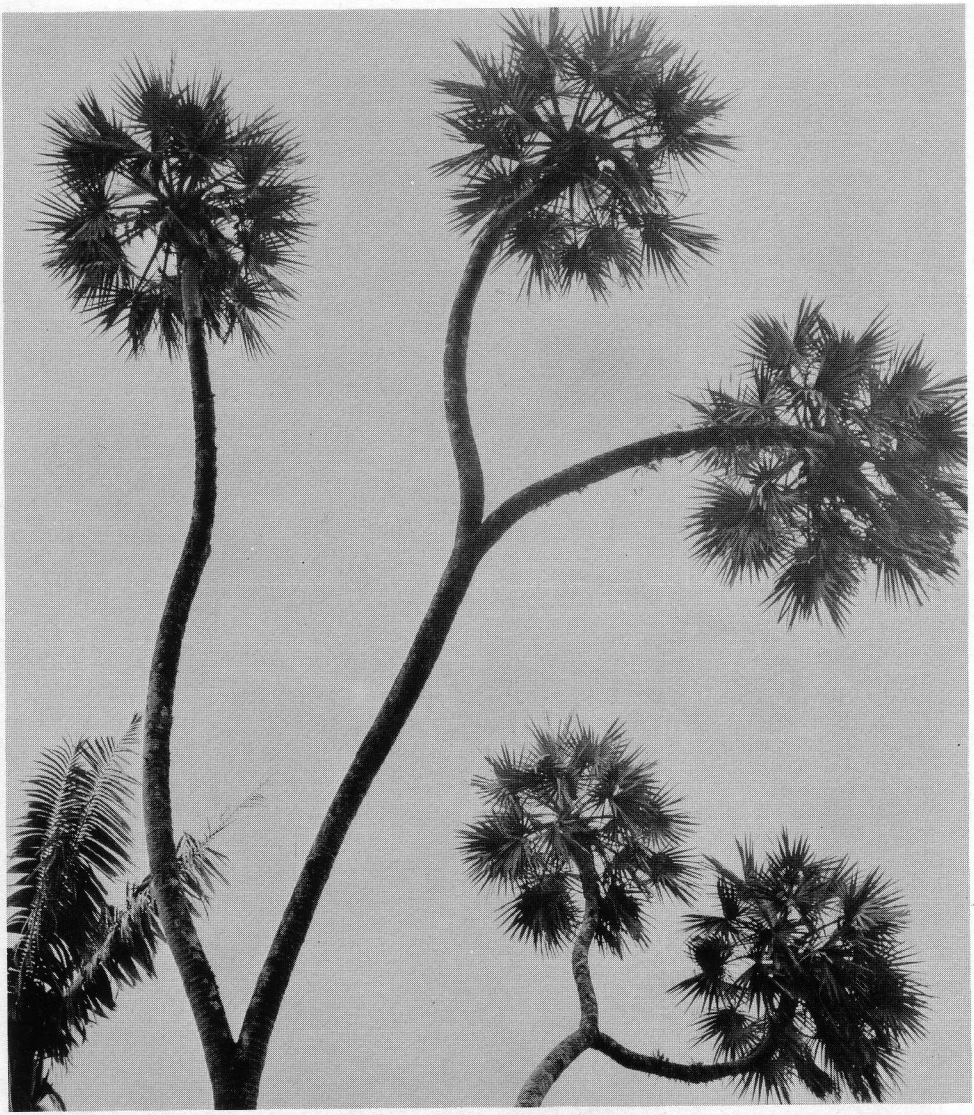
Palms are usually thought of as having solitary or clustered unbranched aerial stems each with a terminal cluster of leaves, though in fact some kind of branching does occur basally to produce clustered or colonial palms (Tomlinson, 1964).

A peculiar type of branching, however, occurs with regularity in some palms. This is an apparently equal forking of the axis which, for descriptive purposes, we refer to in this article as "dichotomy," though we are as yet unable to demonstrate whether it is a true dichotomy in the botanical sense or only an apparent dichotomy. The most striking and familiar example is found in some species of *Hyphaene* from Africa, Arabia and India. It is less widely known that several other palms show the same or a similar type of "dichotomous" branching. We would like to draw attention to some of these examples and to suggest the need for further observation among the palms as well as the need for detailed studies of development to determine the exact nature of the branching pattern or patterns. Because the term dichotomy has a very particular definition botanically, the word and its adjectival derivatives, are placed in quotes in the following paragraphs when used in a more general sense.

That this branching in *Hyphaene* may be a true dichotomy, resulting from an equal division of the crown, and not the result of a precocious development of a lateral branch, is suggested by the observations of a Dutch botanist, Schoute (1909). He had available for study only

1. *Nannorrhops Ritchiana*: early stage in "dichotomy" of crown from a specimen at Fairchild Tropical Garden. Photo by P. B. Tomlinson and M. V. Parthasarathy.

2. *Nannorrhops Ritchiana*: a well developed stem "dichotomy" in a specimen at Fairchild Tropical Garden. Photo by P. B. Tomlinson and M. V. Parthasarathy.



3. *Hyphaene thebaica*: branching stems of a single tree. Photo by W. H. Hodge.

a short segment of the stem of *Hyphaene thebaica* which included a single fork. Despite this limited material, Schoute concluded from a study of the arrangement of the leaves and particularly from the presence of a peculiar triangular scale-like structure at the level of the fork that in its development the bud had bifurcated equally at this level. However, neither Schoute nor any subsequent investigator has had material sufficient to show the development of the dichotomy.

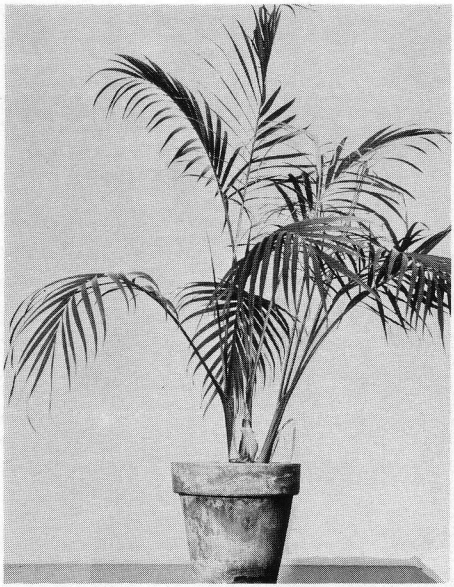
Truly dichotomous branching of the stem is not uncommon among some lower plants, including the seaweeds, hence is assumed to be a primitive feature in evolution. It is certainly rare in higher plants and it is unlikely that the "dichotomous" branching we see in palms is a primitive feature. Rather, it

seems to be a specialized feature occurring constantly in certain genera and species in four subfamilies. It must be emphasized that our records refer to a type of branching exhibited by individuals of a species as a normal property, rather than the occasional branching of isolated individuals of normally unbranched species which is probably always a response to some kind of injury or, as in *Chrysalidocarpus lutescens*, due to development of an axillary bud into a branch.

"Dichotomous" branching is now known from the following palms.

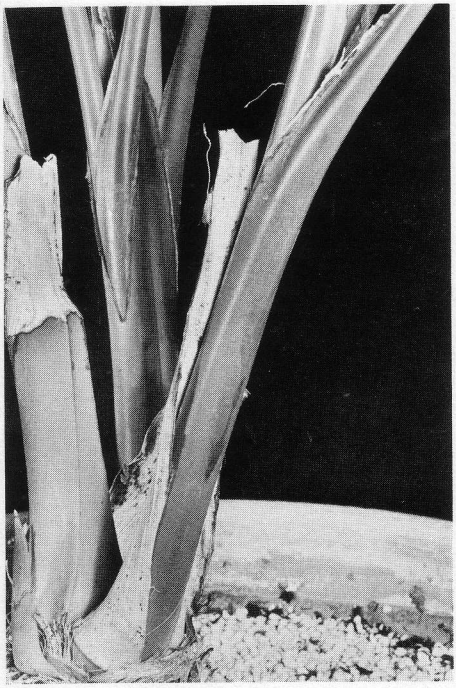
(1) *Nannorrhops Ritchiana* (subfamily Coryphoideae) (Figs. 1, 2). We have not seen this species in its native habitat in N.W. India where it apparently is of rather low growth, almost with the habit of *Serenoa*. We have seen it in the presumably more favorable growing conditions of South Florida where it tends to grow erect as does a wild plant illustrated (as *N. Ritchieana*) by Gupta (1960). This erect habit, incidentally, also occurs in *Serenoa* under certain circumstances. *Nannorrhops* branches profusely, producing suckers basally. The more vigorous aerial axes, however, branch in dichotomous fashion and we have watched the development of "dichotomy" in one specimen at the Fairchild Tropical Garden. "Dichotomy" appears to be equal but there is no triangular scale at the level of forking. In *Nannorrhops*, the resulting branches eventually behave differently. One proceeds to flowering, producing an inflorescence which terminates growth of the branch. The other branch may apparently fork again and repeat the process.

(2) *Hyphaene* (subfamily Borassoideae) (Fig. 3). Beccari (1924) listed 28 species in his monographic study of the genus. According to his key, the first 20 species have branching trunks. Among these are such familiar species as *Hyphaene thebaica*, *H. indica* and *H. Schatan*. Stems of *Hyphaene reptans*, an incompletely understood species from southern Arabia not included in the key, also fork. By contrast, unbranched and often swollen aerial trunks in clusters are usual for *Hyphaene ventricosa* and probably for the few species allied to it. The habit is inferred rather than known for a number of species to which branching is ascribed and it is clear that very considerable field study is required before we know as much about *Hyphaene* as we should.



4. *Chamaedorea cataractarum*: a male plant grown at Cornell University with twin stems at left, shoot dividing at right. Photo by M. V. Parthasarathy and N. Uhl.

(3) *Chamaedorea cataractarum* (subfamily Arecoideae) (Figs. 4-9). Branching of the horizontal rhizomatous axis of this palm was described and illustrated (as *C. Martiana*) by Velenovsky in 1913, presumably from specimens cultivated in greenhouses in Europe. More recently it has been possible to study *C. cataractarum* at Cornell University where plants, male and female, are cultivated in a greenhouse. There leaves



5. *Chamaedorea cataractarum*: close-up of same plant with twin stems in foreground, dividing shoot in background — note the unusual leaf sheath with solid center and two lateral channels surrounding new branches. Photo by M. H. Stone.

6. *Chamaedorea cataractarum*: close-up similar to Fig 5 but from opposite side with branching shoot in foreground. Photo by M. H. Stone.

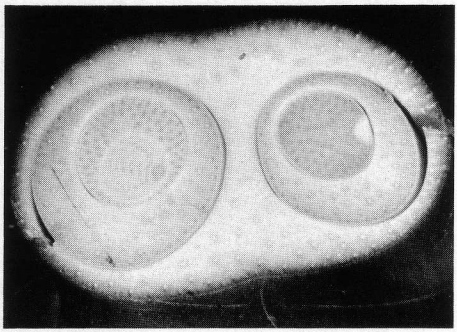
and inflorescences are produced in normal fashion for a time along a procumbent stem which eventually develops a single apparently terminal leaf with fasciated pinnae in the lower half of the blade (a feature noted by Wendland when he described *C. Martiana*). The sheath of this leaf is not tubular but has a solid center and two lateral channels from each of which develops a shoot (Figs. 5, 6, 9). These shoots are nearly equal and superficially almost mirror-images of each other. In the female plant, which had earlier branched into two parts, a third shoot was produced on one half, apparently in place of an inflorescence in the axil of the leaf or one of the leaves just below the locus of branching. The portion of the male plant illustrated (Fig. 8, 9) was dissected to obtain the apex for anatomical investigation of the phenomenon but detailed study has not yet been made nor does it seem likely that an answer will be obtained without the examination of many branched apices.

(4) *Vonitra* (subfamily Arecoideae) (Fig. 10). *Vonitra utilis* occurs infrequently in the remnant of the once extensive forest of Analamazoatra near Perinet, Madagascar. Though several juvenile single-trunked specimens were seen by the junior author, the only two in flower and fruit had each branched in two successive and apparently equal "dichotomies." A plant cultivated near the railroad station at Perinet, however, had flowered while the trunk was undivided. No attempt has been made to study the "dichotomies" other than in their gross aspect.

Vonitra Thouarsiana, a species more

7. *Chamaedorea cataractarum*: dividing shoot removed. The "terminal" leaf with fasciated pinnae in lower part of blade appears at left, leaves from daughter branches tied together at right. Photo by M. V. Parthasarathy and N. Uhl.

8. *Chamaedorea cataractarum*: close-up of shoot in Fig. 7. Note that leaves of branch at left are further developed than those at right. Photo by M. V. Parthasarathy and N. Uhl.



9. *Chamaedorea cataractarum*: cross-section of shoot in Fig 7 with same orientation as Fig 8 to show greater development of branch at left. Photo by M. V. Parthasarathy and N. Uhl.

frequent near the east coast of Madagascar, flowers while still unbranched but eventually does fork at least once, as noted in the wild and in plants cultivated (as *Dictyosperma fibrosum*) at the Botanical Garden in Peradeniya, Ceylon. *Vonitra crinita* is reported to branch but the fourth species of the genus, *V. nossibensis,* is said by Jumelle (1927) to have generally an unbranched trunk at maturity.

(5) *Nypa* (subfamily Nypoideae). The underground creeping stems of this palm form extensive stands in estuarine waters of the Far East. Leaves are spirally arranged, but each leaf base is asymmetric by unequal growth of its somewhat fleshy tissues so that all leaves grow erect at more or less the same angle. Inflorescences are lateral (axillary). Periodically, the creeping stem bifurcates. In our examination of the one shoot available for dissection, from specimens cultivated at the Coconut Grove Palmetum, Miami, Florida,* we could find no triangular scale at the

10. *Vonitra Thouarsiana*: a branched specimen cultivated in Madagascar. Photo by A. C. Langlois.

* We should like to express our thanks publicly to Mrs. A. R. Jennings who generously made available material of *Nypa* and to Mr. W. H. Schulz, Jr. of Polk Nursery Company, Inc. who provided plants of *Chamadorea*.

point of bifurcation corresponding to that seen by Schoute in *Hyphaene*. An interesting feature of this bifurcation is that the daughter axes have the leaves

arranged in contrasted spirals, mirror-images of each other. *Nypa,* in its native environment, grows in such abundance that it would be a favorable subject for detailed study. Our only caution is that the would-be-investigator will have to endure mud, sweat and blisters in digging out his specimens.

Quite clearly "dichotomous" branching is not a unique property of *Hyphaene* and it seems possible that it may be discovered in other groups of palms. Equally clearly, its nature needs investigation.

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Coccothrinax inaguensis — A New Species from the Bahamas

Robert W. Read

While collecting plants with the Allison Armour Expedition to the West Indies in 1932, Drs. David Fairchild and P. H. Dorsett found a *Coccothrinax* growing on rock and on sand dunes along the coast of Great Inagua Island, the southernmost island in the Bahamas. Seeds were sent to the United States Department of Agriculture Plant Introduction Station (Chapman Field) near Miami, Florida. Three individuals from the original introduction are still growing where they were planted many years ago. Mr. Harold F. Loomis, a past Director of the Station, recognized the plants as distinct from any he had seen and brought them to my attention several years ago. Attempts to identify them with known species of *Coccothrinax* have failed.

When it was learned that Dr. John Popenoe was making a collecting trip to Great Inagua in connection with his studies of Bahamian plants, he was asked to bring back specimens of any *Coccothrinax* found on the island. In May, 1964, he brough back leaves and infructescences of a *Coccothrinax* which matched the specimens growing at Chapman Field. It was indeed distinct from *C. argentata,* the only other species of the genus previously recognized from the islands. A month later, another specimen was collected by Dr. Robert Grimm of Florida Atlantic University while he was collecting algae with the research team of the Lerner Marine Laboratory. It too proved to be the same as the plants under study.

The plants grown from seed collected some thirty years ago on this remote island of the Bahamas as well as recent

collections are now considered to represent an undescribed species. The author is presently preparing a manuscript for a manual of the palms native to the United States and the Bahamas. It is therefore felt that the species should be given a name for inclusion in the work, while awaiting a long overdue monographic study of the entire genus.

COCCOTHRINAX INAGUENSIS R. W. Read, sp. nov.

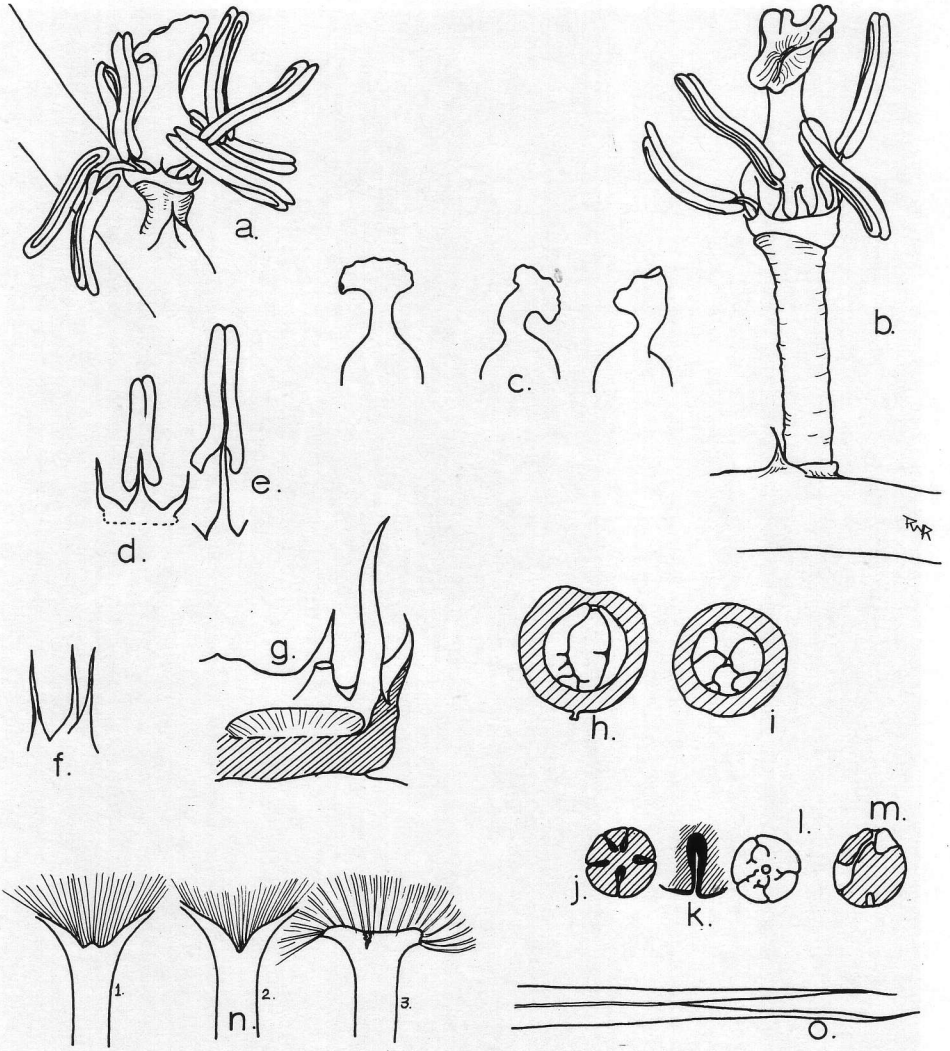
Palmae solitariae caulibus gracilibus 2-5 m. altis; foliis palmatis, viridibus, concoloribus, vaginis ex reti fibroso subtili constantibus; inflorescentiis arcuatis paniculas 4-5 gerentibus, pedicellis florum (1-) 2-3 mm. longis fructuum (2-) 3-6 mm. longis; staminibus 8-10 (-11); antheribus ad apicem retusis ad basim sagittatis (2-) 3-4 mm. longis; fructibus 10-13 mm. diam., purpureonigris, seminibus 6-7 mm. diam. cerebriformibus.*

Coccothrinax inaguensis is a small solitary palm with a very slender trunk 6.0-7.5 cm. in diam. and 2-5 m. high bearing a small open crown of palmate leaves with slender arching petioles. The leaf blades are 65-90 cm. across, with a palman measuring 15-25 cm. from hastula to sinus in the form of an inside-out umbrella and the free portion of the segments either stiff or lax and hanging gracefully, those at the middle 36-49 cm. long, 2.7-2.9 cm. wide at the sinus, all bifid at the apex for 3.5-10.5 cm. Blades are equally dull green on both surfaces, the under surface only inconspicuously flecked with gray waxy scales which soon are lost as the leaf matures. The hastula projects 8-9 mm. and is variously and irregularly shaped, while below, the apex of the petiole forms a deep V at the insertion of the blade. The petiole is 60-75 cm. long, dorsoventrally compressed and elliptic in cross-section, does not split at the base, and ends in a sheath of fine fibrous netting.

The interfoliar inflorescence measures 42-60 cm. from point of emergence from the leaf sheath to the apex of the ultimate primary bract and bears 4-6 pendant simply paniculate branches 20-28 cm. long as measured from the strongly curved main rachis to the apex of the ultimate rachilla. The inflorescence develops very rapidly, the bracts completely obscuring the flowers one day but within 24 hours the branches elongated, flowers expanded and pollen shed. Individual floral parts, such as anthers, pedicels and pistil, change shape and size considerably during this 24-hour period. The flowers are creamy white and fragrant at anthesis with 8-10 (-11) stamens; anthers are sagittate, basally affixed and slightly retuse (not at all bifid) at the apex, measuring 2-2.5 mm. in length on first exposure, enlarging to 3-4 mm. within a few hours or at most the following day as pollen is shed; filaments are strongly dilated at the base and united in a ring around the base of the ovary, the cupule thus formed being adnate for the most part to the perianth cup which has 5-6 slender acute lobes; the pistil is pyriform, enlarging rapidly during and following anthesis, with a variously shaped style and an infundibuliform (funnel-shaped) stigma; pedicels may be (1-) 2-3 mm. long at early anthesis, elongating rapidly to (2-) 3-6 mm. in length the following day.

Mature fruit is purple, (10-) 12-13 mm. in diameter on a stout pedicel (2-) 3-6 mm. long, fleshy with a smooth exocarp, a mesocarp of a thick juicy layer of purple cells over a very thin layer of stony cells surrounding a narrow

*Appreciation is extended to Dr. W. J. Dress of the L. H. Bailey Hortorium for assistance with the Latin diagnosis.



1. *Coccothrinax inaguensis.* a, flower at anthesis showing relatively short pedicel X 5; b, flower a day later with elongated pedicel X 5; c, variation in pistil shape X 5; d, stamen before anthesis X 5; e, stamen a day later X 5; f, stamen filaments fused at their bases X 5; g, staminal ring adnate to perianth cup X 5; h, fruit with half pericarp removed exposing seed in vertical view X 1¼; i, fruit with half pericarp removed exposing intact seed showing attachment end X 1¼; j, seed in cross-section showing infolding of testa into endosperm X 1¼; k, enlargement of infold showing thickening of testa around internal portion of fold X 2½; l, bottom view of seed showing location of embryo X 1¼; m, seed in vertical section showing irregular intrusion of fold into endosperm X 1¼; n, union of petiole and blade, 1 & 2, lower surface, 3, upper surface X ⅜; o, bifid apex of leaf segments X ½.

layer of juicy lighter colored cells next to the thin endocarp which separates readily from the seed. The light brown or tan seed is slightly cerebriform and 6-7 mm. in diameter.

The species occurs naturally in thickets on limestone or sand dunes near the beach on Great Inagua and on San Salvador Island where Dr. John Popenoe also found plants.

2. Cultivated plants of *Coccothrinax inaguensis* growing at the U.S.D.A. Plant Introduction Station, Miami, Fla. Note plant with lax leaf segments to left rear. The species is very variable in "hang" of the leaf segments.

3. A small plant of *C. inaguensis* growing in the walled shade section of the Plant Introduction Station. The petioles are longer and the crown more open than in plants grown in full sun. Note the depressed upper surface of the leaf blade, a characteristic particularly prominent in this species.

Specimens examined*:

BAHAMA ISLANDS. Great Inagua: north shore of Inagua, May 12, 1964, *John*

*Abbreviations for herbaria are BH, L. H. Bailey Hortorium, Ithaca N. Y. and FTG, Fairchild Tropical Garden, Coral Gables, Fla.

4. Close-up of the top of the trunk of *C. inaguensis* to show finely netted sheaths and infructescence with fruit and prominent pedicels.

Popenoe s.n. (FTG); south shore, May 12, 1964, *John Popenoe s.n.* (FTG), *Robert Grimm s.n.* (FTG). Cultivated from seed collected on Great Inagua, U.S.D.A. Plant Introduction Station, Miami, Florida, Feb. 24, 1965, *R. W. Read*

5. *Coccothrinax inaguensis* en route to Salt Pond Hill, Great Inagua, Jan. 15, 1932, A.V.A.E. No. 57736. Photo by P. H. Dorsett courtesy U.S.D.A. Plant Introduction Station, Miami, Florida.

1377 (type, BH; isotype, FTG), June 28, 1965, *R. W. Read 1439* (FTG).

Coccothrinax inaguensis can be distinguished easily from all other species of the genus by one or a combination of the following characters. It is most readily separated from *C. argentata* of Florida and the Bahama Islands as well as a number of other species by the concolorous leaves, the lower or abaxial surface being green like the upper or adaxial surface and lacking completely the dense silvery indumentum of hairs so characteristic of many species. It may also be separated from other species lacking the silvery or whitish lower surface as follows: from *C. Acuñana* Leon and *C. muricata* Leon, with pedicels less than 2 mm. long, by the long conspicuous fruiting pedicels; from *C. saxicola* Leon by the fine rather than very coarse

6. A single specimen of *Coccothrinax inaguensis* in the wild on the sand dunes of Great Inagua, Jan. 15, 1932, A.V.A.E. No. 57737. Photo by P. H. Dorsett courtesy U.S.D.A. Plant Introduction Station, Miami, Fla.

sheath fibers; from *C. Victorinii* Leon by the white or cream-colored rather than violet inflorescences; from *C. Hioramii* Leon by the fewer leaf segments (fewer than 50 versus about 64); and from *C. concolor* Burret by the broader leaf segments, long fruit pedicels, broad palman and large fruit. Further differences between *C. inaguensis* and *C. argentata* are tabulated below.

	C. inaguensis	*C. argentata*
Leaf (adaxial)	dull light green	dark green
Leaf (adaxial)	light green without hairs	silvery, densely hairy
Trunk diameter	ca. 6.0-7.5 cm.	ca. 13 cm.
No. of leaf segments	39-47	(12-) 18-44
Pedicel length at anthesis	(1-) 2-3 mm.	1-2 mm.
Stamen number	8-10 (-11)	(10-) 11-12 (-13)
Anther length	(2-) 2.5-4 mm.	1.5-2 mm.
Anther apex	retuse	bifid
Pedicel length in fruit	(2-) 3-6 mm.	1.5-4 mm.
Fruit diameter	(10-) 12-13 mm.	10-12 mm.

LETTERS

Dr. Walter H. Hodge
Chevy Chase, Maryland

DEAR WALTER,

I enjoyed your article on Palm Cabbage in the recent issue of PRINCIPES.

While in the Gran Chaco in Paraguay, I had opportunity to sample *Copernicia alba* cabbage "out of hand" when collecting herbarium specimens for the late Dr. Dahlgren. The texture and flavor certainly was very much like tinned palmito although crisp instead of flaccid.

Just as you indicate, the source of tinned palmito is somewhat of a mystery. It well could be that the *Copernicia alba* in Brazil, Paraguay and Argentina are fulfilling that role in part at least. We flew over thousands of acres of felled palms whose stems were being readied for export from Paraguay as posts. However, I saw no evidence of canning factories although it would be logical to harvest the cabbages as well.

Copernicia alba occurs as the largest stand of any species in the genus and occupies substantial areas in three countries. Dr. Klare Markley conservatively estimated from aerial reconnaisance photographs that over one billion trees occur in the Gran Chaco region. It is also the fastest growing of the *Copernicia species,* attaining 8 feet in 3 years.

When I was studying this species in Paraguay, I had been told several times of its rapid growth. I disbelieved these as tales because all prior experiences with over a dozen imported species at our experimental plantation in Northeast Brazil showed copernicias to be exceedingly slow growers. However, I soon learned firsthand that indeed *Copernicia alba* develops a handsome crown and aerial stem in a remarkably short time even in Northeast Brazil.

All this information about their vast numbers and rapid growth rate suggests that if there is a single species of palm in Brazil which could supply a stable source of tinned palmito it well could be *Copernicia alba.*

Very truly yours,
s/E. D. KITZKE
Biology Supervisor
S. C. Johnson & Son, Inc.
Racine, Wisconsin

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