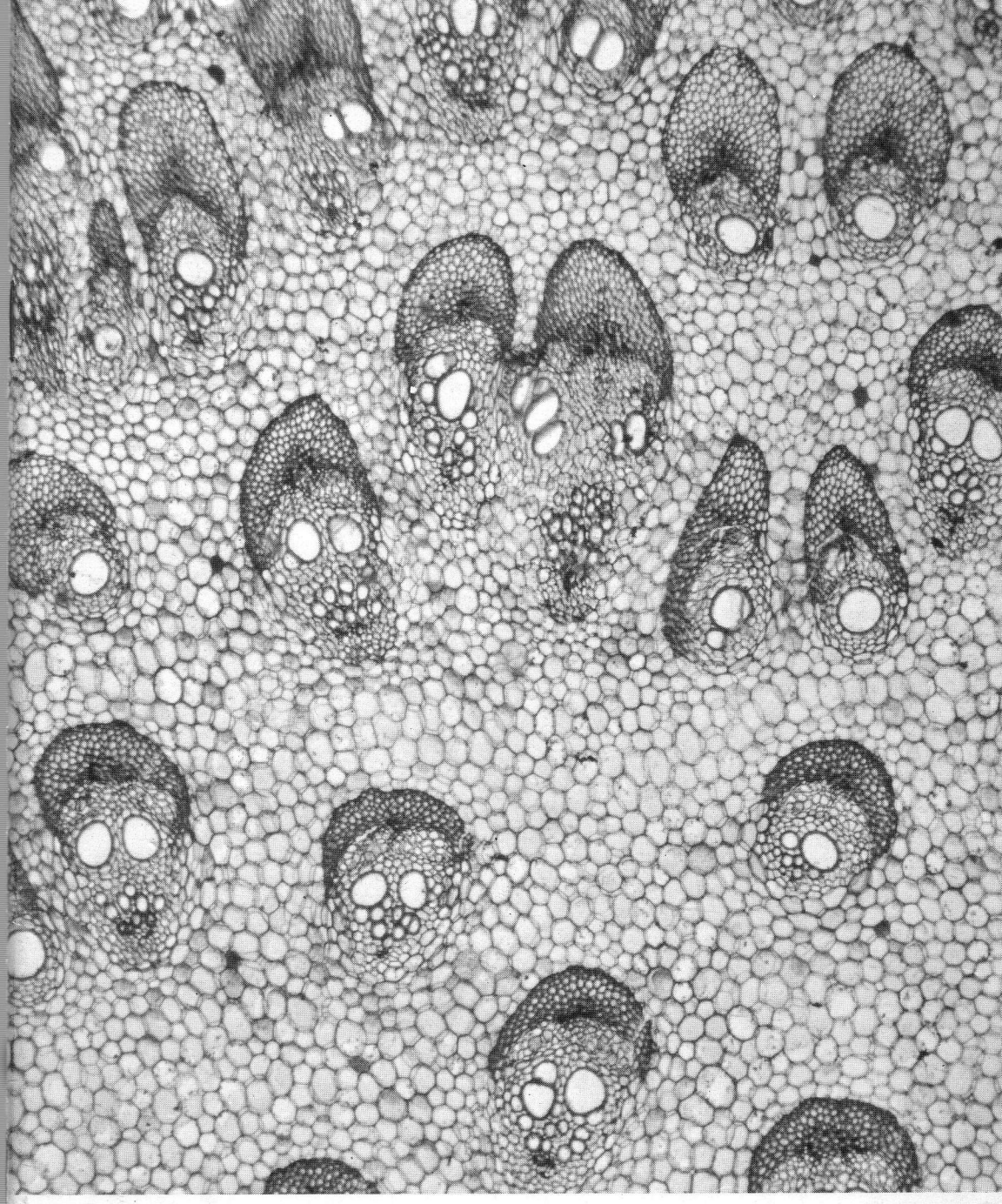

PRINCIPES

Journal of The Palm Society

July, 1965
Vol. 9, No. 3

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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PRINCIPES

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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Cover Picture

Transverse section of stem of *Rhapis excelsa* much enlarged showing vascular bundles (see p. 92). Photo M. H. Zimmermann.

Mailed at Miami, Florida
Aug. 11, 1965

NEWS OF THE SOCIETY

On May 1st the Society began its tenth year as a duly constituted organization. During the past nine years much has been accomplished. Persons who are interested in the Palmae for many different reasons have had a common meeting-ground, where they have been able to find out what others are learning and thinking in the many various fields of interest relating to the palms. Many friendships have been made through this mutual interest, and thousands of plants and seeds have changed hands or traveled half-way around the world. New palms have been discovered, named and described in the journal PRINCIPES, and much has been discovered regarding the anatomy, nomenclature and horticulture of this remarkable plant family. The 425 members, as of the present writing, living in 34 countries, can be justifiably proud of their still young organization.

A Royal Palm Grows in San Diego

They said it couldn't happen, but it did. Members Jim Specht and Jim Wright found an apparently healthy and thriving royal palm (*Roystonea* sp.) growing between the sidewalk and the paved street in a San Diego, California, residential area. Curious about its history, we asked Jim Wright to investigate and report any findings. Here is his answer: "The palm was purchased in 1948 in a gallon can from a nursery that has since gone out of business. The owner called the city [parks department?—Ed.] in 1948 and asked what kind of tree he should plant in the parkway and they said *Cocos plumosa* (now *Arecastum Romanzoffianum*). He asked for this at the nursery and was sold a royal palm under that name. The soil is clay about ten inches below the surface. The only water the palm gets is

66. James Wright stands beside Roystonea in San Diego.

when the grass is watered, about once a week."

Comparing the height of the palm with Mr. Wright in the photograph, one estimates its height at 18-20 feet, with about 8 feet of trunk. If at times ignorance is bliss, at other times it seems to be success!

Abnormalities in Palms

Two or our recently-acquired members are making intensive studies of abnormalities in palms. Mr. Donald Nichols, 4047 S. W. 4th St., Plantation, Fla., has compiled an impressive number of photographs of palms with multiple trunks, unusual shapes and other out-of-the-ordinary characters. He hopes eventually to publish his findings, and begs every member who knows about any abnormal palms to please write or call him.

Professor T. A. Davis, of the Indian Statistical Institute, 208 Barrackpore Trunk Road, Calcutta 35, India, is preparing a book on variation in palms. He writes: "I am planning to compile the available information on the abnormalities in palms, and I shall be grateful to receive addresses of palm scientists (other than those of the coconut)

who may be able to furnish information on the genetical, morphological and anatomical variations in palms." Prof. Davis has been doing research on the coconut for the past fifteen years.

Palms in England

From East Grinstead, Sussex, England, Mr. Michael A. F. Carter writes: "You may be interested to know that I have photographed a 'Canary Island Date' (*Phoenix canariensis*) at Torquay, which was twenty-five feet high — quite something, being over 50° north of the equator! Palms are not a regular feature of the English garden; only *Trachycarpus Fortunei* and *Chamaerops humilis* being offered by a few specialist nurserymen, but some form very handsome trees. They have been severely tested in recent years, the winters of 1961/62 and 1962/63 giving them a difficult time. The winter of 1961/62 gave us six weeks of continuous north winds, except for two days, which according to the weather office was unprecedented. In 1962/63 the winter was even more severe, the worst for one hundred and thirty years, according to official sources, with snow on the ground for ten weeks.

"The majority of palms sustained leaf damage, but survived, and again look healthy. The Chusan palms are now flowering."

LUCITA H. WAIT

Unravelling the Palm Stem

M. H. ZIMMERMANN and P. B. TOMLINSON

Harvard University, Cabot Foundation for Botanical Research, Petersham, Mass., and Fairchild Tropical Garden, Miami, Fla.

One cannot understand the workings of an automobile engine (or any other machine) without a very detailed knowledge of how it is put together. With this knowledge of how a machine works and is constructed, it then becomes possible to repair it if it breaks. As with a machine, so with plants. Unfortunately plants have not been built by human engineers, and the reason we often know so little about their physiology is simply because their anatomy is not known. From a structural point of view, palms are the least understood of large plants. This ignorance of fundamental structures means that our understanding of palm physiology is deficient so that in turn we have little hope of solving practical problems of disease and nutrition.

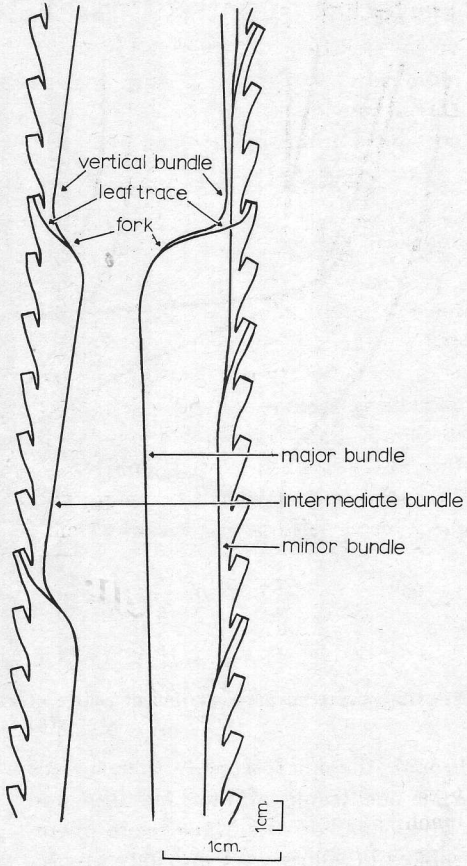
The problem of the palm stem had been tackled but not solved by nineteenth century scientists. More recently, investigators have not shown sufficient interest in the subject to make any helpful contribution. In fact, the original and often essentially correct observations of earlier scientists have been largely misinterpreted on their way to the pages of modern botanical textbooks. The problem has hitherto remained unsolved because it is so complex. Essentially it is a microscopic problem, but nobody has found a convenient way of getting a whole palm stem on the stage of a microscope.

Within the last year, however, we have jointly developed a new approach which suggests that this problem has been overcome and that at last the palm stem has been "unravelled." Like many complex problems in science, the governing principle is found to be very simple. A more detailed and scientific account of these discoveries has been given elsewhere in a more appropriate journal (Zimmermann and Tomlinson,

1965) but we feel that readers of PRINCIPES have reason for being especially aware of these findings.

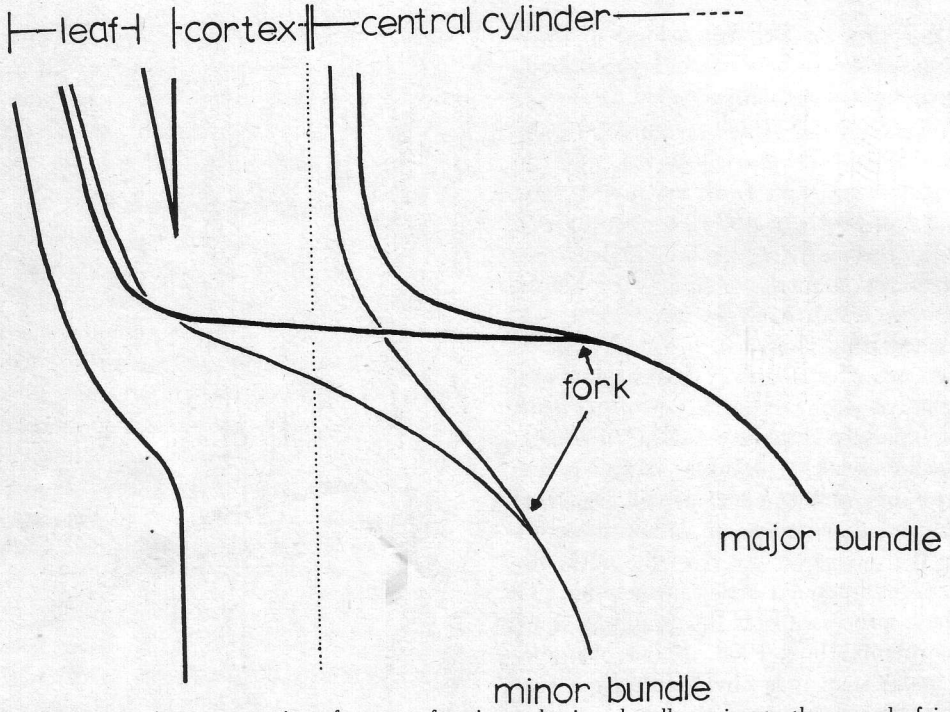
Some of the general features of palm stems, and in particular the ways in which they differ from hardwood trees, are outlined elsewhere in this journal (Tomlinson, 1961). In a dicotyledonous tree, represented by an oak or maple, tissues which conduct water are separated from those which conduct sugars and other nutrients. A tree has a central massive core of wood (xylem) surround by a thin layer of soft tissue in the inner bark (phloem). Water moves upwards in the outer, newest layers of the wood, nutrients in either direction in the innermost layers of the bark. Recent semi-popular articles which describe these processes may be found in Zimmermann, 1961, 1963. If one examines a palm stem it is obvious that the conducting tissues are different. A rotting palm stem, for example, splits into a very large number of narrow strands never more than a few millimeters in diameter. Under the microscope it can be seen that each strand contains fibrous tissue which makes the strand rigid, together with a fine strand of each type of connecting tissue, xylem and phloem. From this construction it is not difficult to see how these strands got their name "fibro-vascular bundle," nowadays abbreviated to vascular bundle. The two types of conducting tissue in a palm are therefore always closely associated, unlike in a hardwood tree. Dissection of a partly decomposed palm stem demonstrates that these bundles are very large and very numerous. It is rather like a telephone cable consisting of a whole cluster of fine wires but differing in that the palm stem must stand erect, supporting its own weight and the leafy crown.

Quite obviously the first step in understanding long distance transport in a palm stem would be to unravel the innumerable strands and find out how they are interconnected. This is, however, just what the botanist has so far been unable to do.



67. Representation to scale of course of vascular bundles in *Rhapis excelsa*. Horizontal dimension expanded 4x.

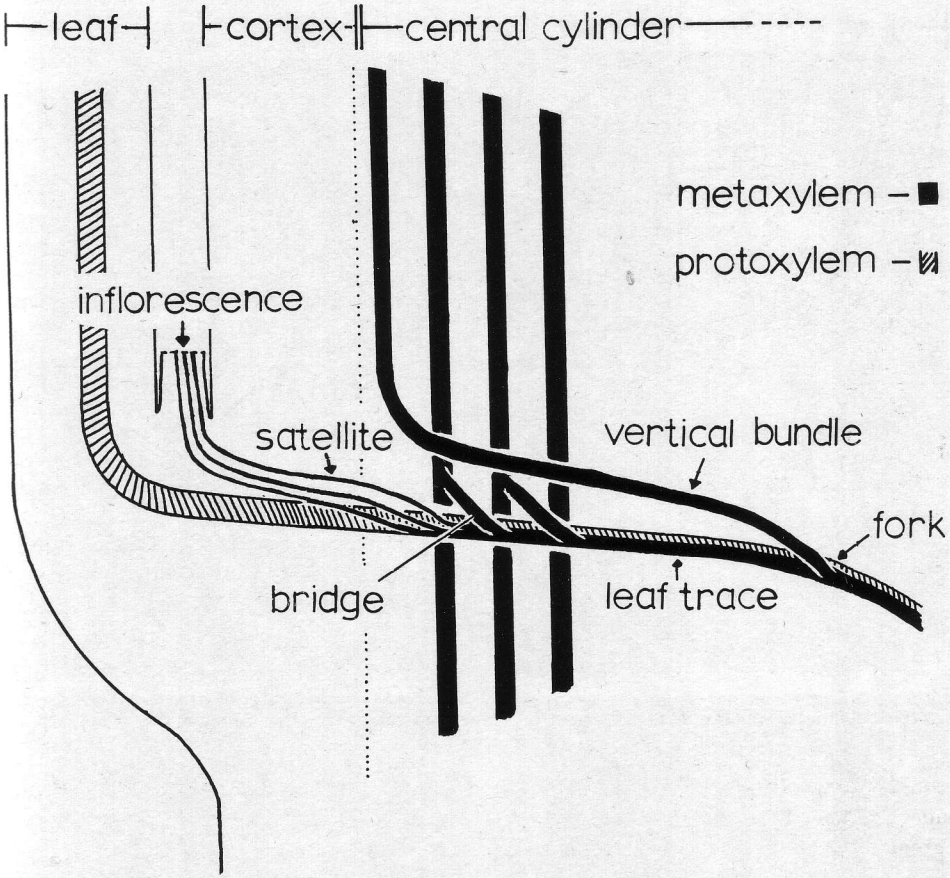
In tackling the problem at first hand, we simplified it in two ways. First we used a small palm, *Rhapis excelsa*, with narrow, cane-like stems 3-4 centimeters in diameter. Even in this small palm one can see about a thousand vascular bundles in a cross-section of the stem. Second we devised a method of using a ciné camera to photograph cut surfaces, either directly or as thin sections seen



68. Diagrammatic representation of course of major and minor bundles going to the same leaf in *Rhapis excelsa*.

through the microscope. Each surface made one frame of the ciné film and a great number of surfaces were photographed in sequence. Ultimately we produced a movie which when projected gave the impression of traveling up or down the palm stem, depending on whether the film was run forwards or backwards. Essentially it was the movie which we analyzed in great detail and which finally gave us the clue to the construction of the *Rhapis* stem. This small palm could have been atypical for palms as a whole, but we have considerable evidence which disproves this and also we are sure that we can ultimately adapt the ciné technique to analyze large stems.

Figure 67 shows the actual path of three of the many bundles we have traced. All bundles behave alike but differ in small quantitative ways. One can follow each bundle more or less indefinitely through the stem. It does not make a straight line. We can only show its outline in one plane in this figure. Actually all bundles describe a uniform, shallow helix, twisting up the stem like a spiral staircase. They are inclined towards the center of the stem as can be shown in Fig. 67, but at regular intervals bend out sharply towards a leaf. As they bend they split, one fork going into the leaf as a "leaf trace." The other fork follows the leaf trace to the periphery of the stem, whereupon it turns erect and once again leans towards the stem center. It is most convenient to refer to this strand as the "vertical bundle" and in terms of growth the vertical bundles continue indefinitely from base to apex of the stem giving off leaf traces at intervals. The basic pattern varies somewhat. One may distinguish, as in Fig. 67, "major" bundles which fork least frequently and reach the cen-

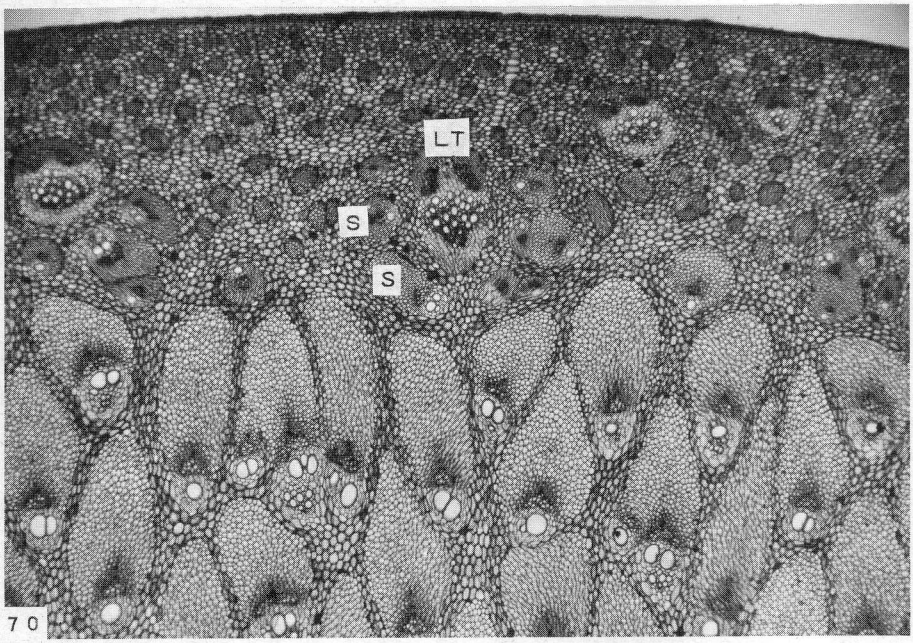


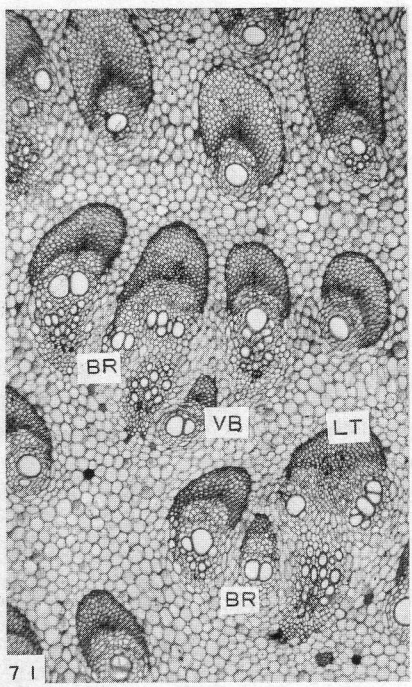
69. Diagrammatic detailed representation of leaf trace complex in *Rhapis excelsa*. Metaxylem (solid black) is that part of xylem which develops later than protoxylem (cross-hatched).

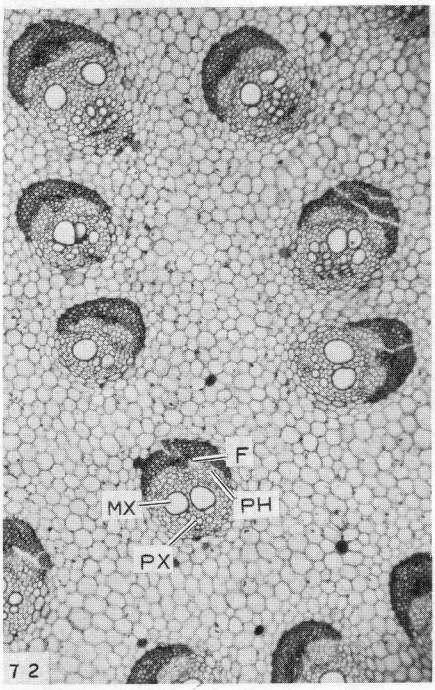
ter of the stem before bending towards a leaf, from "minor" bundles which fork most frequently and move only a little way towards the stem center between each fork. "Intermediate" bundles are common. Each leaf has an encircling insertion and receives several major but more minor and intermediate bundles from around the entire circumference of the stem. This leaf supply bends outwards from the stem at varying heights (Fig. 68) so that there is no plate of leaf-supplying tissue as is so obvious in a vertical section of a corn stem.

The whole arrangement satisfactorally accounts for the crowding of peripheral strands (Fig. 70) since only relatively few major bundles reach the stem center (Fig. 72), although all bundles in turn bend towards the periphery. This crowding is further accentuated because peripheral bundles have well developed fibrous tissue and are wider than central strands (Figs. 70 and 72). Because a palm stem has this peripheral concentration of mechanical tissue, it stands firmly erect. Such an arrangement of strands also explains how fluids are transported long distances through the stem, the leaves supplied by bundles from the main pathway.

Are these strands linked in any way? Experiments suggest that cross-connec-







70-72. *Rhapis excelsa* transverse section of stem (x 40). 70. Peripheral region. 71. Intermediate region. 72. Central region. LT-leaf trace; VB-vertical bundle; S-satellite; B-bridge; F-fibers; PH-phloem; MX-metaxylem; PX-protoxylem; C-cortex; CC-central cylinder.

tions are frequent. Dyes injected via a bore hole spread rapidly above the level of injection. The path of the dye is not a narrow helical band as it would be if there were no cross-connections. Ciné analysis has demonstrated cross-connections and also hitherto unsuspected complexities in the leaf trace (Fig. 69). Beyond the fork which splits off the leaf trace from the vertical bundle, the leaf trace itself gives rise to a number of additional strands, many from major bundles, few from minor bundles. Of the first of these, 1-3 form short "bridge bundles" which link with neighboring vertical bundles. They are the cross-connections suggested by the dye experiments. There are also several (up to 10) narrow branches which we call "satellite bundles" because they cluster around the leaf trace. These satellites do not enter the leaf but pass into the inflorescence. This inflorescence is only developed fully in the upper parts of the stem, but surprisingly in the lower parts, even though there is no external evidence of an inflorescence, satellites are still developed as an anatomical precursor.

From this kind of three-dimensional analysis we now understand the *Rhapis* stem in great detail. We only have to look through the microscope at single sections of other palms, large and small, to see the same sort of features visible in the photographs Figs. 70-72. We can see similar "leaf trace complexes" but are not always sure about the difference between bridges and satellites. These have to be followed in serial sections to be identified with certainty. Nevertheless we are reasonably sure that *Rhapis* is an accurate, small-scale model of all palm stems. Future work with the ciné camera should establish this beyond all doubt.

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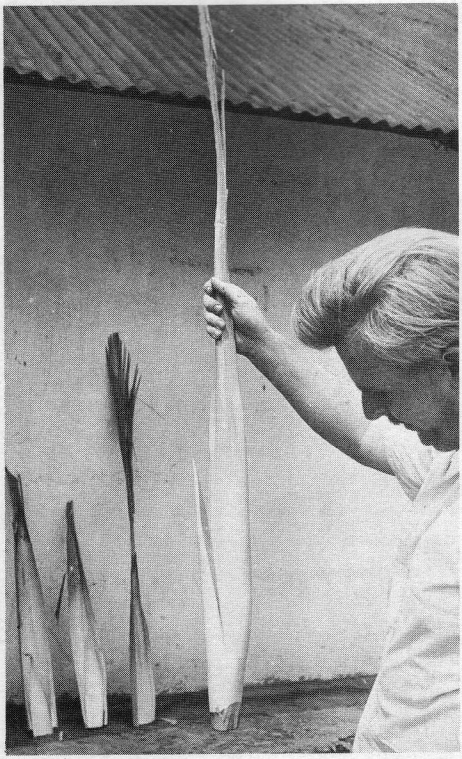
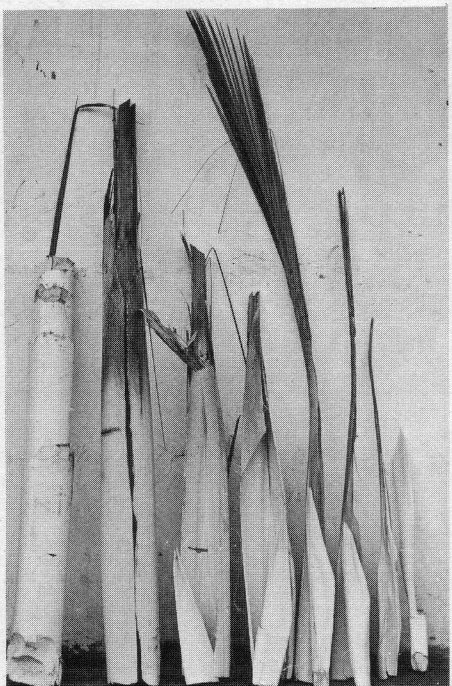
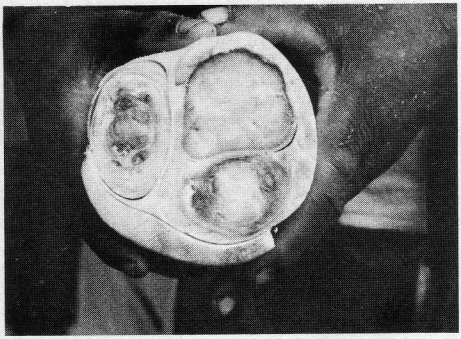
The Inflorescence of Nigerian Lepidocaryoid Palms

P. Tuley

The inflorescence of the *Raphia* palm has been described as a terminal raceme with several branches (Tomlinson, 1962; Russell, 1965). In the course of an investigation into the production of *Raphia* wine (Tuley, 1965), the emergence and size of the terminal leaves was found to be of importance when assessing the readiness of the palms for tapping. The number of reduced leaves is always equal to the number of emerging spadices and as there appeared to be a clear relationship between the two, a mature specimen of *R. Hookeri* was felled and the stem apex dissected. On dissection, the inflorescence primordia were found to be separate structures, arising in the axils of the reduced terminal leaves (Figs. 73-76). The development of a typical group of spadices from just







73. (upper left) The top of the stem of *Raphia Hookeri* with larger leaves pruned away.

74. (upper right), The penultimate leaf with the inflorescence primordium in the axil.

75. (lower left) Complete dissection of stem apex of *Raphia Hookeri*. From left to right: the stem; base of last infertile leaf; five fertile leaves each with its inflorescence primordium, the last primordium at extreme right.

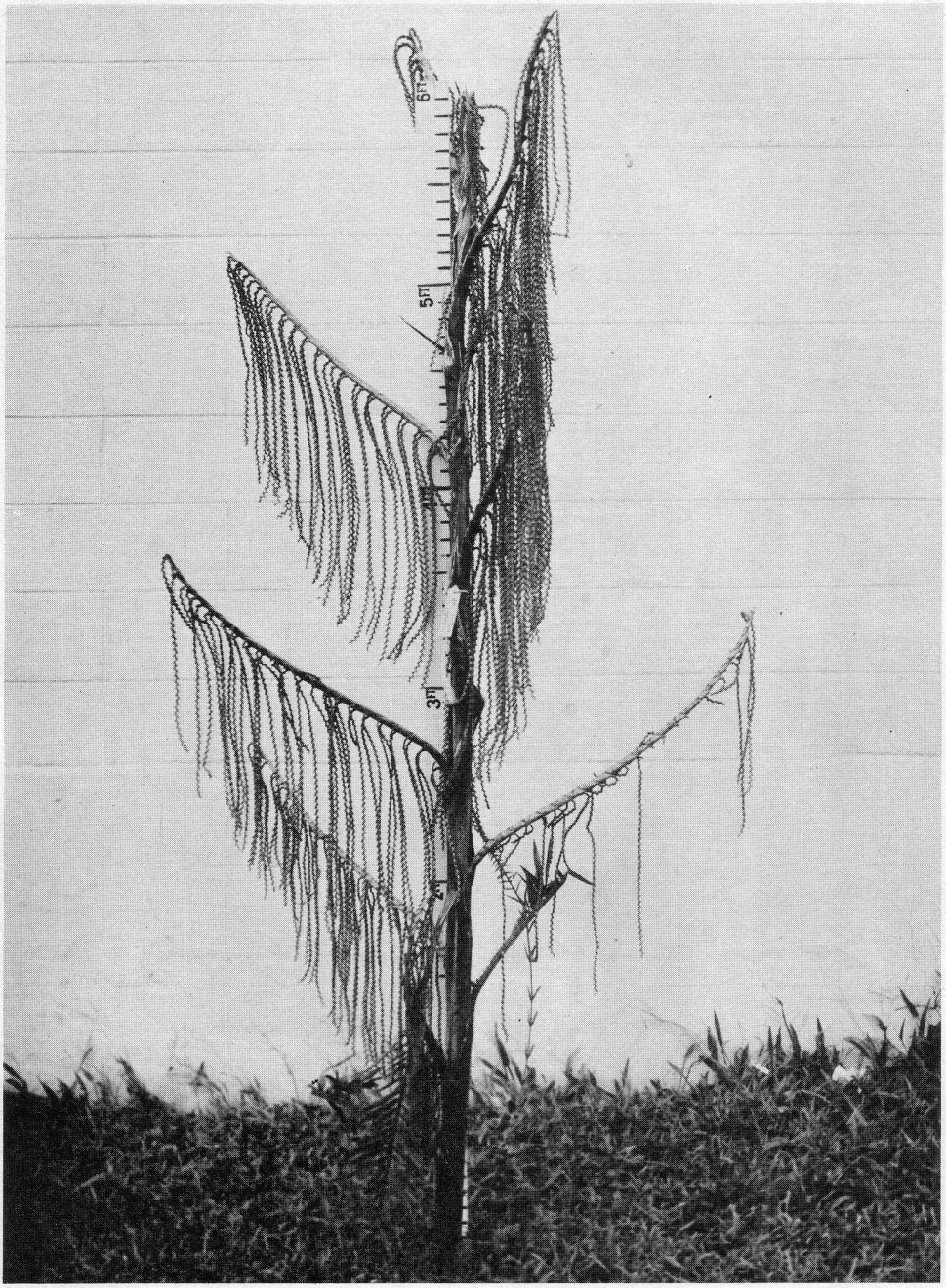
76. (lower right) A cross-section through the stem apex of *Raphia Hookeri* showing two inflorescence primordia and (upper right) the stem.

77. (left) and 78 (right). Development of spadices of *Raphia Hookeri* at weekly intervals from just after emergence (left).

79 (left) and 80 (right). Further weekly stages in development of *R. Hookeri*.

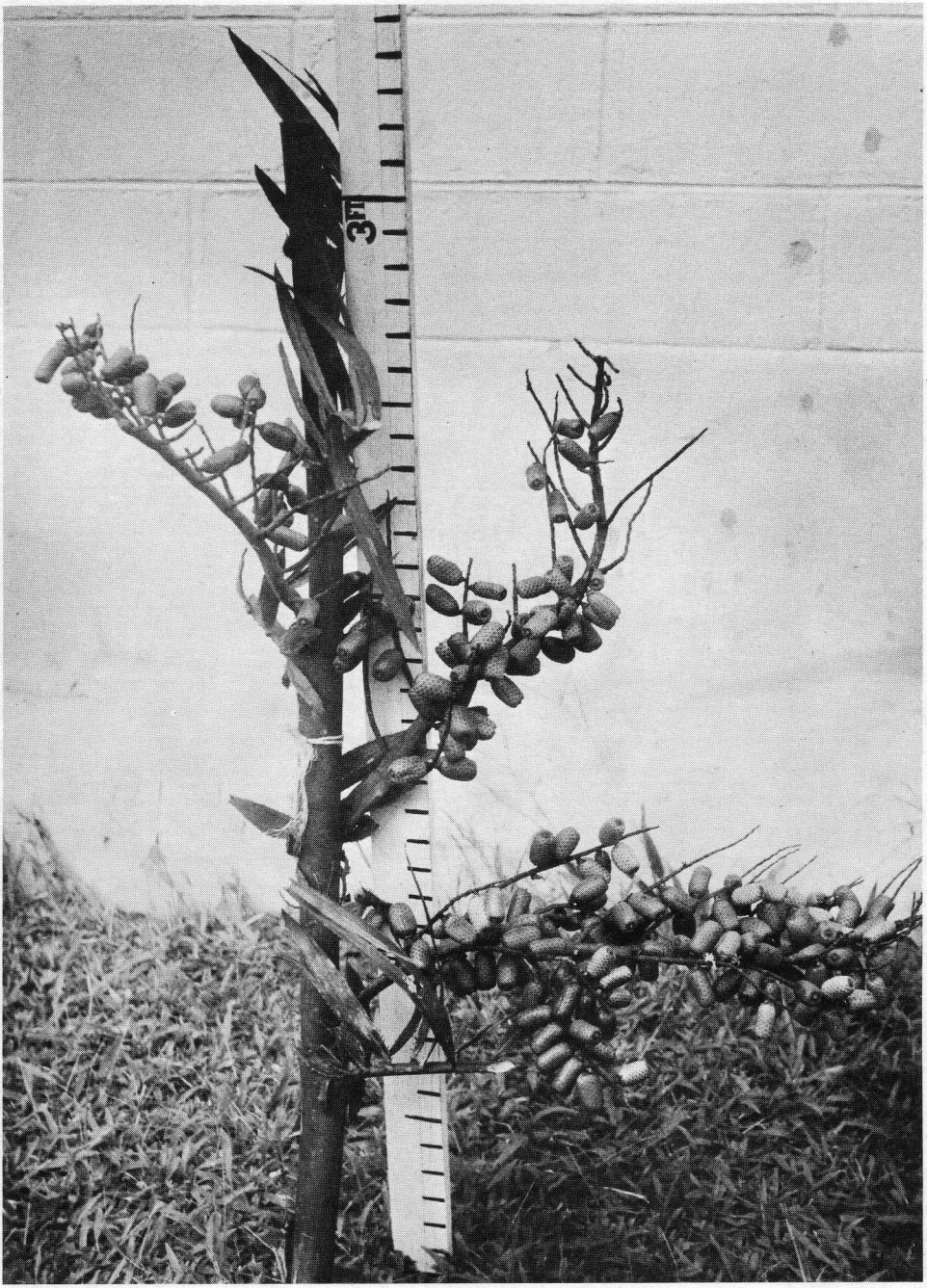
after emergence to the early flowering stage is shown in Figs. 77-81.

In Nigeria, *Ancistrophyllum* is the only other monocarpic genus in this group. Here also a reduction in leaf size is associated with the development



81. A "terminal" inflorescence of *Ancistrophyllum secundiflorum* in flower.

of the inflorescence and the stem can be traced for the full length of the struc-



82. An "axillary" inflorescence of *Eremospatha macrocarpa* in fruit. The stem has been cut at the top and continued for another 10 feet or more when collected.

ture, up to the base of the last branch. The so-called "terminal" inflorescence of *Ancistrophyllum* can be interpreted as a group of axillary spadices arising in the axils of much reduced leaves, represented by the sheathing bases only in the upper parts. It is therefore similar to the so-called "axillary" inflorescences of the other climbing palms (Figs. 82, 83).

All Nigerian members of this group have their spadices, branches and flowers arranged in four rows (sometimes obscured in the more compressed inflorescences but nevertheless recognizable), corresponding to the standard phyllotaxy.

Raphia regalis has only been recorded once in Nigeria and it is described as having a single erect inflorescence with arching side branches. It would be of the greatest interest to study this structure to see if it is truly terminal, an axillary form reduced to a single spadix or possibly an *Ancistrophyllum*-like type.

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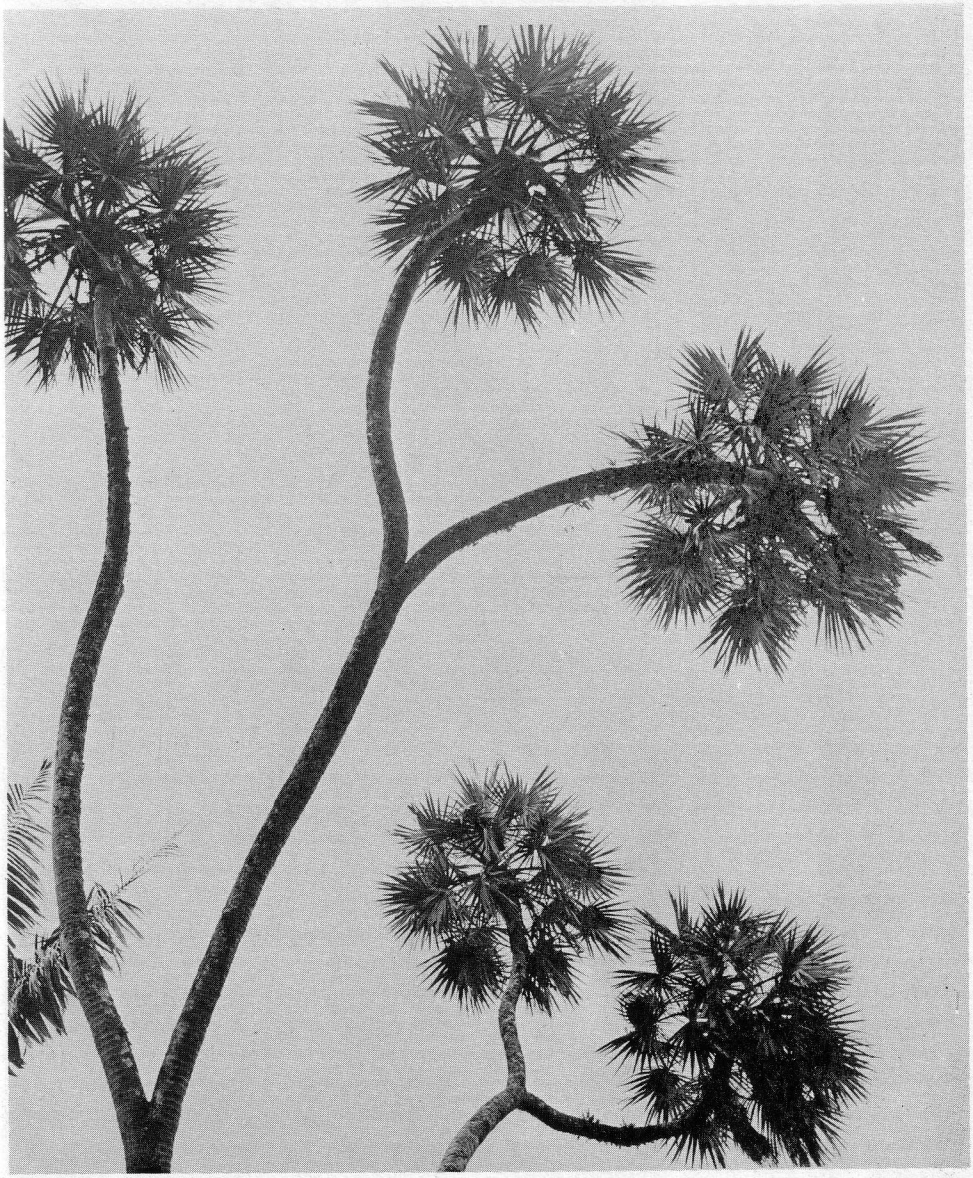
Branching Palms

W. H. Hodge

The generalized picture that most of us have of a typical palm is of a tree with a single unbranched trunk topped by a crown or "head" or radiating leaves. These are produced regularly and successively during the growing season by the activity of the large terminal bud, located at the apex of the trunk. Even cluster palms, with their numerous unbranched single stems, follow this general picture. Species whose aerial stems branch are so rare as to be classed as oddities of the palm world. The best known branching species is the African doum or gingerbread palm *(Hyphaene thebaica)*. In this plant the stems, for some innate reason, branch regularly and dichotomously to form striking candelabra-like trees which make bizarre silhouettes in the landscapes of the Sudan, Ethiopia and adjacent countries in northern Africa. Each doum palm dichotomy has a double head but the trees sport more than one single dichotomy. The doum palm, known to the ancient civilizations of Egypt, is grown as an unique ornamental in tropical gardens throughout the world, including those of subtropical Florida.

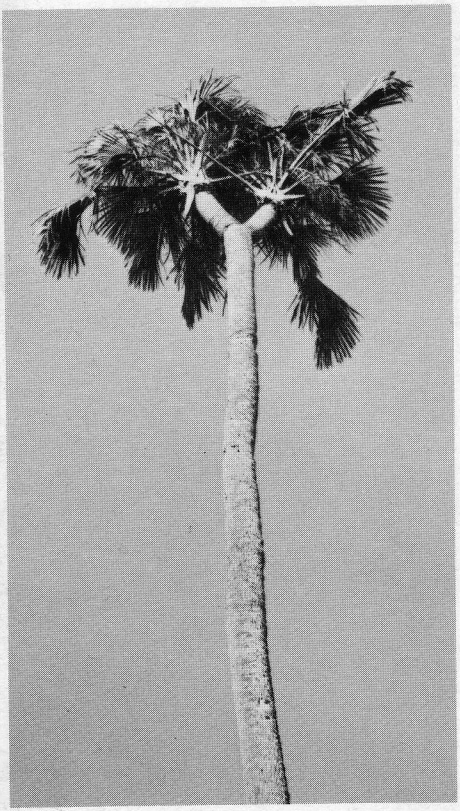
Aerial branching in most other palms is an abnormal condition. Most frequently seen although rare is a single dichotomy giving rise to a so-called double-crowned specimen which is to be considered a freak of nature. These abnormal plants, unlike the doum palm, are presumably caused by some injury to the terminal bud resulting in its division to form two or more separate buds each of which then continues growth on its own giving rise to a double trunk. The injury to the growing point may be due to mechanical damage or the result of activity of insects, disease or the like.

Presumably any single-stemmed palm species, if properly injured could give rise to a double crowned individual. A two-headed royal palm *(Roystonea sp.)* in Haiti was illustrated in an early issue

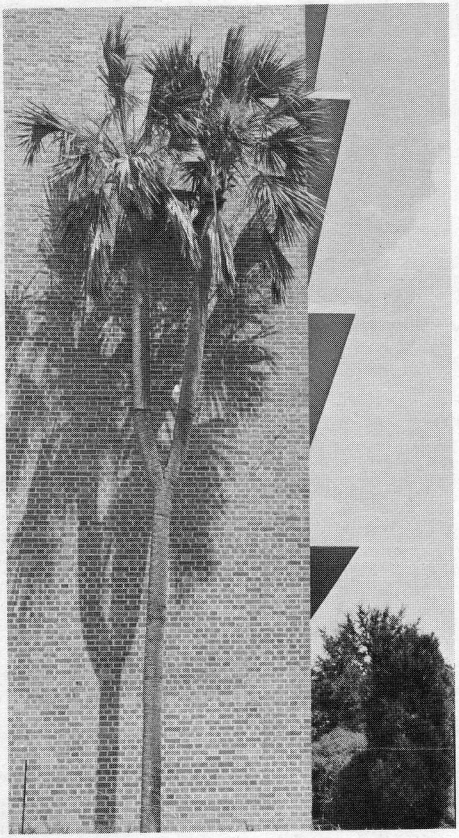


83. Naturally branched stems of *Hyphaene*. Photo W. H. Hodge.

of this journal (*Principes* 1:126.1957). In this case vines, originally growing over the palms, are said to have caused restriction and partial severing of the original single bud to form two growing points. A later cover picture (*Principes* 6:77.1962) shows a branched specimen of *Coccothrinax argentata* growing on Eleuthera Island in the Bahamas. Illustrations accompanying this note show two examples of double-headed cabbage palmettos *(Sabal Palmetto)*. One of these trees is a wild specimen growing along the east side of Florida Route No. 27,



84. Two-headed *Sabal Palmetto* south of Perry, Fla. Photo W. H. Hodge.



85. Branched *Sabal* on Florida State University campus. Photo W. H. Hodge.

about 29 miles south of Perry. The other was undoubtedly also originally a wild plant obtained locally but it has been transplanted to serve as an unusual specimen against one of the new buildings on the Florida State University campus at Tallahassee. To my knowledge this is the first record of the horticultural use of an abnormal two-headed palm.

A New Species of Arenga from Borneo*

H. E. Moore, Jr. and W. Meijer

Arenga (*Arenga*) retroflorescens H. E. Moore et W. Meijer, *sp. nov.*

Caules caespitosi et coloniam constituentes ad 8 dm. alti. Folia longe petiolata regulariter pinnata, eis ad basin exceptis, pinnis utrinque 22-23 anguste obcuneatis. Inflorescentiae spicatae unisexuales, a basi ad apicem caulis adolescentes, bracteis fibrosis pluribus, florum masculorum staminibus ca. 36, florum femineorum ovariis trilocularibus triovulatis, fructu triloculari, seminibus 2 (vel 3?).

*The senior author wishes to acknowledge support from National Science Foundation Grant GB-1354 and assistance from Dr. W. J. Dress with refinements of the Latin description and

86. Plants of *Arenga retroflorescens* at type locality in Sabah.

Caespitose and colonial with rhizomes ca. 2 cm. in diam. and stems, when developed, prominently ridged at the nodes, to 8 dm. high, 3.8 cm. in diam., internodes to ca. 5 cm. long. Leaves several in a tuft from the ground in young plants or apical on older stems; sheaths fibrous, blackish, densely brown-tomentose at least basally, split nearly to the base opposite the petiole and fibrous-margined, produced apically in a fibrous ligule to ca. 25 cm. long between the petiole and the stem; petiole to 1.8 m. long, buff- or brown-tomentose at the base next to the sheath when young and there becoming densely dark-brown puncticulate in age, elsewhere rounded below, channelled above and covered for most of its length when young with brown membranous appressed medifixed narrow scales but at length becoming merely puncticulate; rachis 1.15-1.3 m. long, rounded below and when young densely covered with scales like those of the petiole, flattened with a central ridge and less scaly above; pinnae 22-23 on each side, the lower 3-5 on each side separated from the remainder by ca. 13 cm. and forming a cluster, the remainder more or less evenly spaced at intervals of 5-8 cm., all green above, pale with a thin waxy brown-puncticulate coat and brown-scaly midnerve below, exauriculate at the base, narrowly obcuneate with margins sharply toothed only near and at the irregularly truncate apex, the basal pinnae of a young leaf to 34 cm. long, 1.5-3 cm. wide, median pinnae to ca. 43 cm. long, 2.3 cm. wide, terminal pinna ca. 16 cm. long, 3 cm. wide, those from a mature leaf usually shorter and 1.9-2.5 cm. wide. Inflorescences developing in acropetal sequence, emerging from the leaf bases on young plants and penetrating the sheaths on older stems,

87. Spicate male inflorescence on "stemless" plants of *A. retroflorescens*.

88. Older stems of *A. retroflorescens*.

spicate, erect, apparently unisexual; staminate inflorescence ca. 29 cm. long, enclosed by about 9 bracts, those at the base short, those above progressively longer and soon breaking into black fibers, the uppermost longer than the spike; peduncle 18 cm. long; spike 11 cm. long, 2 cm. in diam., very densely flowered; staminate flowers 9 mm. long, reddish in bud, subtended by prominent sepal-like bracteoles, sepals 3 mm. high, strongly gibbous at the base, the margins rounded, more or less crenulate and minutely ciliate, petals acute but incurved in bud to form an obtuse and slightly depressed apex, 9 mm. long, 5 mm. wide, stamens ca. 36, the filaments very short, anthers linear, acute or even apiculate to emarginate at apex: pistillate spike shorter than the staminate but with bracts extended much beyond it, the whole inflorescence including bracts ca. 35 cm. long; peduncle ca. 9 cm. long; spike 10 cm. long, nearly or quite enclosed by the black bract fibers; pistillate flowers 10 mm. high, red-brown, subtended by a pair of marginally imbricate crenulate bracteoles 3 mm. high, sepals 5 mm. high, 8 mm. wide, corolla 10 mm. high, the tube only 2 mm. high, lobes 8 mm. long, staminodes absent (?), pistil strongly triquetrous, 8 mm. high at anthesis, trilocular, triovulate. Fruit (immature) strongly triquetrous, 1.7 cm. high, 2.2 cm. in diam., trilocular with 2 (-3?) seeds, these 9 mm. high when not fully developed but the locule 10 mm. high, endosperm homogeneous.

MALAYSIA. SABAH: at edge of mangrove along jalan Uchung Tanjong, Sepilok Forest Reserve near Sandakan Bay, 15 miles west of Sandakan, Jan. 15, 1964, *H. E. Moore, Jr. & W. Meijer 9162* (BH, holotype; SAN, isotype).

During a visit to the United States in 1963 and early in planning for joint field work in January, 1964, the junior author had raised questions as to the identity of a strange *Arenga* which he had found in the Sepilok Forest Reserve

near Sandakan. Thus a special effort was made to see it in the field and to secure adequate specimens for study. The result has proved especially rewarding since the species is most unusual.

The Caryotoideae, including *Arenga*, *Caryota* and *Wallichia*, have generally been characterized, among other peculiarities, by the basipetal development of inflorescences commencing from the top of the stem and flowering downward until sometimes the last develops from nodes beneath the surface and emerges through the soil. To find a species of *Arenga* in which this pattern is reversed with acropetal development of inflorescences is both exciting and perplexing as it raises questions for which there is no answer at present. The epithet *retroflorescens* (flowering backward) has been used to point up this seemingly anomalous behavior with respect to its congeners, though not to most other palms.

So unusual is this behavior that the authors spent some time examining plants in the field. Quite apart from our own observations, the stems of those plants which had produced them also provide evidence, for there are inflorescence scars at successive nodes from the base to the new inflorescences among the leaves.

There is some suggestion that an acropetal sequence of flowering may exist in some of the smaller species formerly placed in the genus *Didymosperma*, but unfortunately sufficient material has not been seen in the herbarium or in the wild to verify the suggestion. The whole problem of flowering sequence in the subfamily is one that merits attention.

We found only one rather extensive colony of this palm in Sepilok but the junior author has found it common in the Labuk delta. As to its relationship, it surely belongs in section *Arenga*, both from the habit and the trilocular, triovulate pistil. It differs from all species currently included in that section not only in acropetal development of inflorescences but in the spicate inflorescences. The general aspect is rather that of *Arenga Engleri* from Formosa with which it also agrees in having relatively few stamens. The narrow pinnae at once distinguish A. *retroflorescens* from three other indigenous species of Borneo — A. *brevipes*, A. *undulatifolia*, and Beccari's *Didymosperma borneense* which has not yet been transferred pending study of its relationship to A. *caudata*.

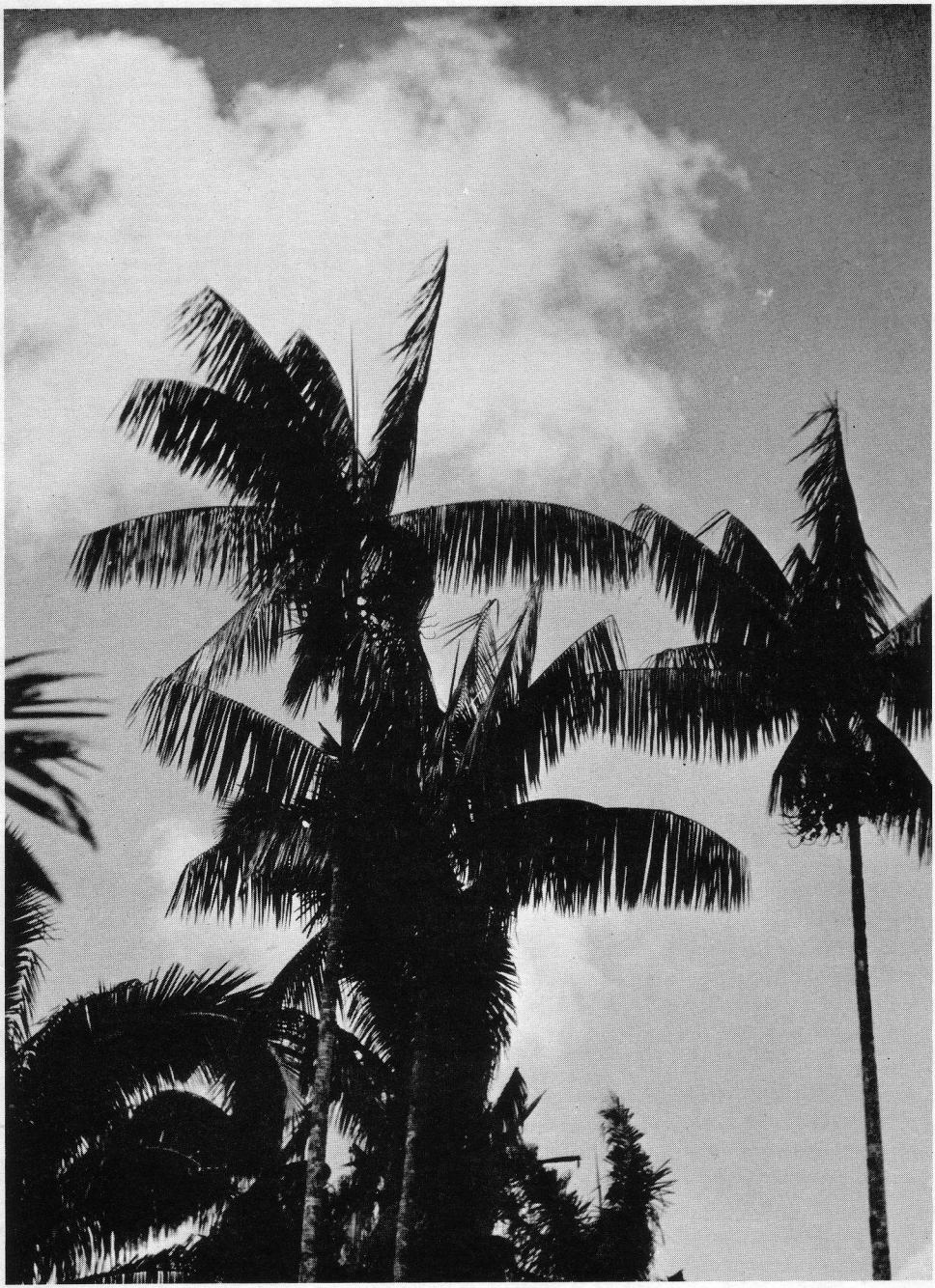
Palm Hunting Around the World

HAROLD E. MOORE, JR.

II. Malaya and Sarawak

Kuala Lumpur, capital of Malaysia, is a busy city seemingly expanding in every direction. Palm country lies nearby, but this first stop in early December was principally to establish contact with forestry officials, to obtain information about and hopefully to make plans to visit the Langkawi Islands before continuing to Singapore to work with the collections and library at the Botanic Gardens.

The scaly-fruited palms (subfamily Lepidocaryoideae) have long interested Dr. Furtado who, though retired, still works at the Botanic Gardens. At one time, there were more of these palms in the garden collections than there are today but there is a wealth of other palm material in mature state — handsome *Rhopaloblaste ceramica*, the curious *Borassodendron Machadonis*, *Orania*



89. *Rhopaloblaste ceramica* outlined against the sky at Singapore Botanic Gardens. Photo G. Addison

Palindan, Oncosperma, Pinanga, Calyptrocalyx spicatus to name only a few. Mr. Burkill, the Director, permitted materials to be taken from these for our

90. *Ptychoraphis singaporensis* is native on the island and also cultivated at Singapore. Photo G. Addison.

anatomical and other studies at Cornell and provided assistants to help with the task of collecting, preserving and drying specimens. The environs of Singapore bolster the garden's collections with local palms of considerable interest including the especially important *Ptychoraphis singaporensis* in the forest reserve at Bukit Timah on Singapore Island.

But I get ahead of my story. For on my first visit to the gardens, Mr. Burkill showed me about and introduced me to staff members including Dr. Chew Wee Lek who was also entertaining a visitor. Introductions were made and the two visitors did a "double take" for T. D. Pennington of the Commonwealth Institute of Forestry at Oxford University and H. E. Moore, Jr., had suddenly become more than signatures at the bottom of letters concerned with palm specimens collected by Mr. Pennington (or

Terry as he soon became) in Ecuador.

This meeting had happy consequences since both visitors had interests in several areas which we managed to visit in concert, sharing expenses for Terry's car. Thus back to Bukit Timah, which we visited for palms and Meliaceae (Mahogany family) on which Terry was writing his doctoral dissertation.

Bukit Timah rises sharply from the surrounding territory and on its slopes I had my first experience with rattans while Terry and his crew were gathering specimens of meliaceous trees. Here

91. *Orania Palindan* stands by the road in the Botanic Gardens.

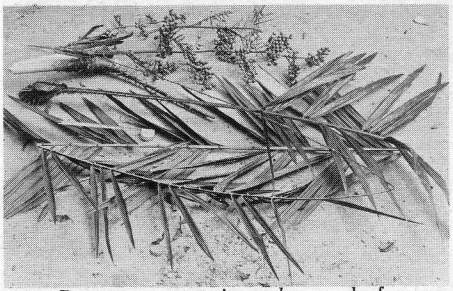
92. The knife-like petiole margins of *Borassodendron Machadonis* make this a difficult tree to collect.

grew several species of *Daemonorops* — *D. grandis, D. didymophyllus, D. periacanthus, D. hystrix* — a species of *Calamus*, and *Korthalsia scaphigera* with the inflated tips of the sheaths housing colonies of ants. On the upper slopes we encountered fine clumps of *Ptychoraphis singaporensis*, the slender stems up to eight feet high bearing neat dark green leaves. The down-curved inflorescences had yellowish male flowers and a few of the older ones bore orange-yellow fruits. We had been given permission to make limited collections so got some practice in handling the sometimes ferociously armed *Daemonorops* in preparation for a trip to the forest reserves in the vicinity of Mersing on the mainland.

The state of Johore, in which Mersing

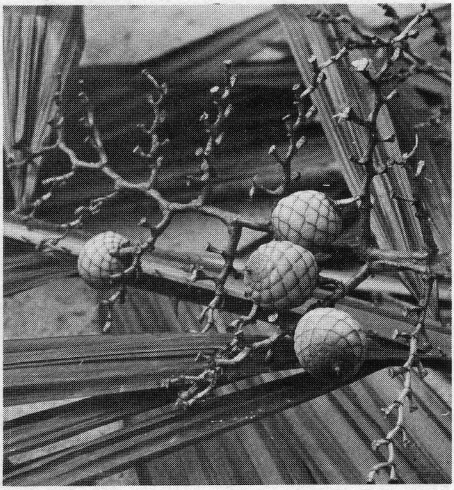
93. An assistant holds the male inflorescence of *Borassodendron*.

lies on the east coast, is reached by a bridge from Singapore. On Sunday, December 15th, Mr. and Mrs. Burkill packed a picnic lunch and accompanied Terry and myself to a halfway point on the road to Mersing. A cholera scare separated our party temporarily when guards at the entrance to Johore required certificates of vaccination for entry, but a reunion of the two cars was only briefly delayed and we lunched on a logging trail in sight of *Oncosperma horridum*, a stiff stately palm with single trunk very different in appearance from the clustered graceful *Oncosperma tigillarium*. The latter grows chiefly near the coast, both here and in Borneo, and despite its unfriendly prickly nature is a handsome ornamental. Clumps of this species in the Botanic Gardens at Singapore are one of the principal ornamental features of the garden, to my mind.



94. *Daemonorops periacanthus* ready for pres-

Collecting was delayed until later, for after-lunch plans necessitated a return for the Burkills and continuation for Terry and myself in order to make arrangements for visits to the several forest reserves near Mersing, which town also provided comfortable quarters in the government resthouse.



95. The fruits of *Daemonorops periacanthus* are light brown and scaly.

Arrangements completed, we spent Monday in a reserve about seven miles to the north on the road to Endau. Highlight of this reserve was the discovery of *Johannesteijsmannia altifrons* in some quantity (and here perhaps a public confession is called for — the overly long name which seemed euphonious enough on proposal has aroused the ire

96. *Oncosperma tigillarium* is a beautiful palm whether wild, as here near Mersing, or cultivated.

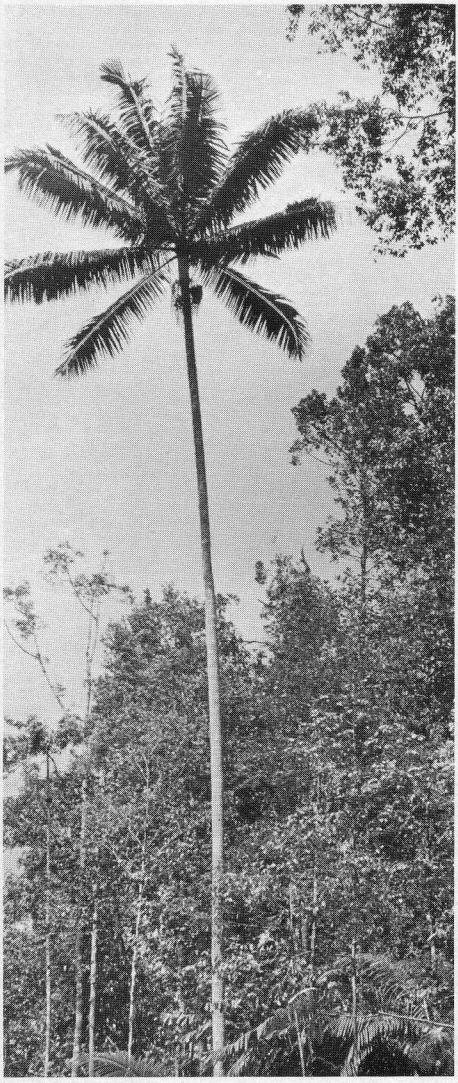
of at least one distinguished botanist who may wish to join Terry and myself in referring to it as Joey's palm!). The leaves of this palm, known as *daum payong* locally, are widely used as thatch (*atap*), both on roofs and as siding, but there have been relatively few recent collections in good flower. Readers can only

imagine the joy which accompanied the discovery of plants with inflorescences partially obscured by the debris that accumulates among the leaves. The bracts of the inflorescence are brown and open on one side; the branches are pale yellow-velvety in contrast to the milk-white flowers which are mildly scented of sewage! Perhaps it is the scent that attracts the numerous thrips or thrips-like insects which were in the flowers. Quite apart from their utility, the leaves of this species, scarcely qualifying for the term palmate, are of exceptional interest to the student of palms as are the strange corky-warted fruits. A complete series of Joey's palm is now available for a detailed study.

A second event was the discovery of *Cyrtostachys Lakka*, the sealing-wax palm. With all respect to the justly famous avenue of this palm in the garden at Singapore, the few plants growing in a sandy acid seep on a hillside seemed far more exotic and when plants are numerous, as they are near Sandakan in Sabah, there are few palms that can match them for beauty.

The reserve also yielded *Licuala longicalycata*, *Nenga*, a little *Pinanga*, ant-inhabited *Korthalsia echinometra*, and *Calamus perakensis*, a short stemmed reclining species with long flat fibers at the sheath-orifice and no entangling cirrhi on the leaf.

A second forest reserve 17 miles from Jemaluang on the road to Kluang showed me why Dr. Furtado had referred to *Eugeissona triste* as a weed. All along the cut-over roadsides one sees the leaves of this palm rising from clumps of a few stems which are so short as to appear absent. At length, an inflorescence terminates the stem, producing short branches with large hard flowers tipped with very sharp pet-



97. We picnicked near *Oncosperma horridum*.

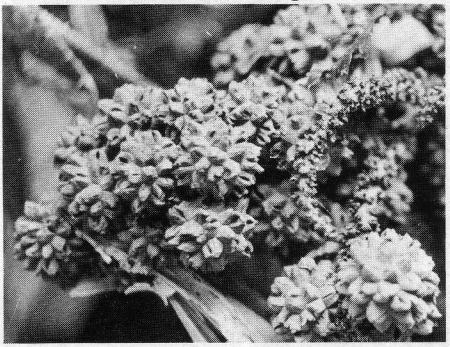
als and, in time, odd egg-shaped fruits covered with myriad tiny scales. Here too, were *Nenga* and such species as the "stemless' *Licuala ferruginea*, a diminutive *Arenga* of the *Didymosperma* alliance, *Pinanga malaiana* in colonies of slender stems to 12 feet high, the black

98. Dr. Pennington and *Johannesteijsmannia.*

fruits striking against the red branches of the fruiting inflorescences. A species of *Iguanura, Daemonorops geniculatus, D. angustifolius* and an odd *Calamus* were also found here, and in another reserve, nearer Jemaluang but five miles off the road, *Iguanura geonomaeformis* — prop-rooted and with dull-red but glistening fruits — *Daemonorops verticillaris,* and more *Nenga* were casualties

99. Leaves of *Johannesteijsmannia* are used for thatch and siding on a forest reserve building

100. Milk-white flowers of *Johannesteijsmannia* smell of sewage.



101. The curious warty fruits of *Johannesteijsmannia* photographed in Sarawak.

to the cause of botany.

These few paragraphs occupied but a short time in the writing but a week in the doing with the assistance of one or sometimes more forest guards. I digress here to express thanks for the many courtesies extended by the Forest Service in all Malaysia and by Mr. Burkill, Dr. Chew, and other staff at the Botanic Gardens. And to interrupt further, an expression of gratitude for the transplanted custom of afternoon tea is due somewhere in these writings. A botanist's day begins early and ends late in the field, but there is usually that refreshing interlude between actual collecting and the tedious job of preparing specimens and of note-writing which replenishes body fluids (I think our record at Mersing was on the order of seven cups of tea each) and allows muscles to slack temporarily.

A final trip away from Singapore led us to Kuala Lumpur again where, on the hills east of the city, one sees *Orania sylvatica*, *Oncosperma horridum* and *Arenga Westerhoutii*. The main objective, however, was *Maxburretia rupicola*, a low fan palm which grows on limestone outcrops similar to the *mogotes* of Cuba. The original locality yielded nothing (much of the area is now a quarry site), but on Gunong Takun, between Kuala Lumpur and Kanching, plants were relatively common in crevices and holes on the sheer lime cliffs. Only a few, none in flower or fruit, were attainable by the steep trail. A real find along the trail at the base was a male plant of *Myrialepis Scortechinii* in full flower. So far as I am aware, the creamy fragrant male flowers of this species have not yet been described and it is thanks to the help of officials at the Forest Research Institute at Kepong and Mr. Yong Fann Chin that they were found.

Return to Singapore on the evening of December 23rd brought into focus the Christmas holidays, which Mr. and

102. *Eugeissona triste* forms a patch by a forest trail in a Mersing reserve.

Mrs. Burkill made bright with an invitation to join them and other guests for Christmas dinner in their spacious home overlooking the Botanic Gardens. For a northerner with southern leanings, it was no great sacrifice to spend a "green" Christmas in sight of the great clumps of *Oncosperma* earlier mentioned, nor to note in passing through the gardens an expanding inflorescence of a *Pinanga* which was burdened the next day with bees visiting the white flowers. Usually male flowers open and fall long before the female flowers on the inflorescence of arecoid palms, so it was of especial interest to note that flowers of both sexes were mature at the same time on this *Pinanga*, the male flowers dropping very early in the day.

Sarawak

December 30th had been set as departure date for a month in Borneo — two weeks in Sarawak and three in Sabah. A beautiful flight from Singapore is routed over the numerous small islands off the coast and then in view of the Borneo mountains to Kuching, capital of Sarawak and former home of the Brooke family, the "White Rajahs." There I was introduced to the hospitality of the Forest Department personnel and installed, appropriately enough but only temporarily, in the Palm Hotel before an afternoon of planning with Mr. Smythies, Chief Conservator of Forests, Dr. Anderson and Dr. Ashton, the forest botanist, who among them had worked out a busy schedule.

Early on the 31st, Mr. Smythies and assistants picked me up for a day on Mt. Matang which rises about 3,000 feet not far from Kuching. For almost any botanist, and especially for one concerned with palms, this mountain is an exciting one. Here Beccari collected many new species of *Licuala, Calamus, Daemonorops, Pinanga, Areca* and an odd little palm, *Gigliolia subacaulis*, of

which I was particularly anxious to collect a full series of specimens and preserved material.

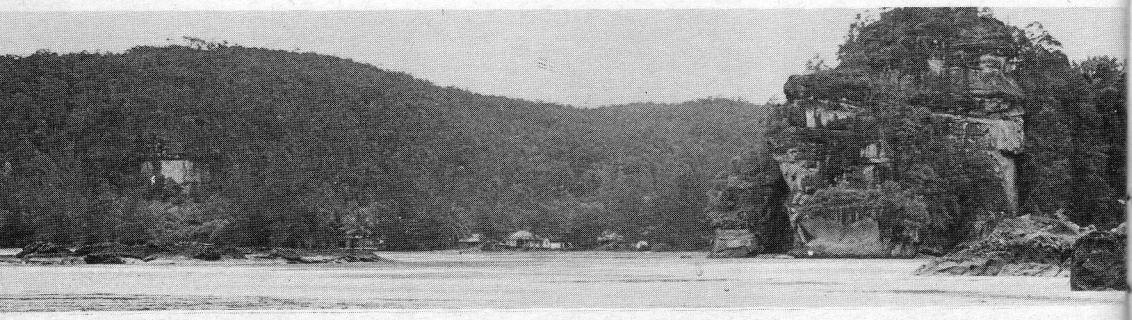
We stopped in the low "heath forest" or *kerangas* forest at the base of the mountain where, growing in the moist acid soil, we collected *Licuala mattanensis*, a single-stemmed species with unbranched inflorescences, what seems to be a form of *Licuala furcata*, *Calamus nematospadix*, appropriately named because of the very delicate inflorescence, and two *Daemonorops*, *D. microstachys* with short stems and ascending leaves and *D. formicarius*, a clumped species the several stems of which are armed with concentric rings of very slender downward-pointing black spines which protect innumerable tiny ants.

At higher elevations on a trail above the water works, we collected the now familiar *Korthalsia scaphigera*, *Daemonorops cristatus*, *D. oxycarpus*, the coarse *Calamus paspalanthus*, inflorescences of which measured 23 feet long, and a handsome slender *Pinanga*, *P. tomentella*, with elongate wedge-shaped leaves.

But of *Gigliolia* we saw nothing, nor did we on a second visit on January 7th when we climbed to the top of the mountain by way of the old road which the rajahs formerly used to reach a bungalow hideaway. The summit was perfectly clear — the first time in Mr. Smythies' many visits — and the view over Sarawak to the sea and to the main mountain mass magnificent. On this trip we got more *Daemonorops* — *D. periacanthus*, *D. collariferus*, another species with strange hair-margined collars on the sheaths housing ants — *Calamus mucronatus*, *C. mattanensis*, the high-climbing *Korthalsia Cheb* with its large sheaths harboring large black ants whose activities were noisy enough to be audible for some distance, a few plants of *Arenga undulatifolia*, a handsome little *Iguanura*, a *Pinanga*, *Areca tenella* and, in mossy forest below the summit, *Calamus pygmaeus*.

Besides these forays to Mt. Matang, Dr. Anderson spent two days with me. We celebrated the New Year by visiting Semengoh Forest Reserve not far from Kuching where a patch of fine forest held so many rattans that by day's end I began to despair and had the feeling that no two plants belonged to the same species. In the 25 acres, more or less, we found *Pinanga crassipes*, a short-trunked but rather stout species with clustered stems, short prop roots, and brilliant crimson fruits, a little *Areca*, *Calamus mattanensis*, *C. hispidulus*, *Daemonorops melanochaetes*, *D. microstachys*, *D. acanthobolus* and two as yet unidentified *Daemonorops* species in collectable condition. A second one-day trip on January 8th took us to the limestone hills near the village of Bau, which had only recently been cleared of

103. Sibat holds *Korthalsia scaphigera* stem with terminal inflorescence.



104. Bako National Park from the sea.

an invading guerrilla party from Kalimantan (Indonesian Borneo). These hills are composed for the most part of much dissected limestone with occasional igneous intrusions. The sharp "dog-tooth" rocks make for difficult travel and heavy rain did nothing to make life easier but the contrast to acid regions was sharp. Here we found palms rare — only *Calamus paspalanthus* and a little *Pinanga* seemed to take to the soil of these hills except for the igneous intrusions where *Licuala mattanensis* and *L. furcata*, seen first on Mt. Matang, occur. The contrast was reminiscent of Amazonian Peru where, collecting palms but also with an eye for relatives of the African violet (Gesneriaceae), one learned not to look for many palms in the few limestone regions where gesneriads abound, and, equally, not to worry about missing many gesneriads in the acid swamps and forests where palms abound.

Distance, weather conditions during January, and lack of time precluded extended visits inland. Thus the major event in Sarawak was a four-day trip to Bako National Park on the coast near the mouth of the Sarawak River. Here, with a little resthouse as base, and with the diverse topography of the trail-dissected park at one's disposal, a visitor can accomplish much in a short time. On the morning of January 2nd, with Paul Chai as assistant and three Iban (Sea Dyak) tree climbers — Banyeng, Benang, and Sibat — to complete the party, a loaded boat left Kuching headed downriver. Along the lower reaches, *Nypa fruticans* is abundant on the river margins but other palms are not obvious. Arriving near the park — for we could not beach the boat but waded ashore and transported gear over mudflats on a hand truck — *Oncosperma tigillarium* is obvious on the cliffs and slopes near the shore, even from a distance. Once established in camp, an afternoon on the southern sector of the Lintang path brought us to *Daemonorops longispathus*, one of the more ornamental species of the genus though not recommended for the average home garden, an interesting *Calamus* and clumps of the handsome *Eugeissona insigne* well deserving its name. The stems cluster with sometimes a short trunk below the leaves which are erect with soft irregularly arranged somewhat pendulous pinnae. The sharp blackish spines on the long petioles are formidable adversaries but yield to one prepared with heavy gloves. The terminal inflorescence is a great stalk up to 30 feet high, 2½ inches in diameter, with spirally arranged short branches on which, at this season, we found an abundance of large-beaked scaly fruit.

On other trails about Bukit Tambi, a hill in the park, *Johannesteijsmannia altifrons* abounds and near it what ap-

105. Rest stop at Bako, left to right are Banyeng anak Ludong, Paul Chai, Sibat anak Bubong, Benang anak Luang.

pears to be an undescribed species of *Gigliolia* with few stiff leaves, though detailed studies must still be made. *Calamus, Licuala, Pholidocarpus, Pinanga* and *Caryota* are other genera which were collected in the park, keeping the party busy on the trail and until light failed at the camp. Then we gathered around a communal pot of rice enriched with salt fish and onions or greens which Sibat prepared over a wood fire in the shelter occupied by the tree climbers. Sometimes Benang would pull out his harmonica and the air was always alive with laughter and the splat of hands attempting to diminish the overabundant population of mosquitos. Once, to turn the tables, the limited talent of the botanist was drawn on by a request for a "native" American dance. Since the frug, etc., were not in my repertoire, I made my debut as entertainer with a solo rendition of a Mexican dance (perhaps modified over the original) which dissolved the audience in shouts of amusement and nearly left us floorless as well. One needs something besides botanical training to keep up with demands of field work!

Since *Gigliolia* had not turned up at Mt. Matang, since I had not then recognized the material from Bako as a probable *Gigliolia*, and since *Gigliolia* was the most important palm in Borneo for my purposes, it seemed advisable to travel to Sabah by way of the little town of Bintulu where Beccari had found a second species, *Gigliolia insignis*. Some rearranging of plane tickets and a visa for an overnight stop at Brunei proved no real problem and Air Borneo's local service deposited me on January 9th at the airstrip in Bintulu where Mr. Joseph Yong of the Forest Service met me to arrange a trip by outboard motor boat to a presumed certain locality for *Gigliolia* not far from the Kidurong Lighthouse and to show me a few of the palms — *Daemonorops, Pinanga, Areca* — in the immediate vicinity of Bintulu.

The sea off Bintulu and especially off Kidurong Light is apt to be too rough for travel at times so on the morning of the 10th two forest guards and myself waited at the dock prepared for an overnight stop at the lighthouse if necessary and prepared also for cancellation of the trip. Fortune was kind, however,

106. *Eugeissona insigne* by the trail at Bako.

and we were soon speeding downriver in clouds of spray and breasting the heavy swells at the river's mouth headed for the smoother sea off shore. Forest guards also make capable boatmen in Bintulu, following the swells and currents seemingly as easily as a forest trail. By mid-morning we had tied up near the lighthouse and were afoot along the beach stopping here and there for a quick look into forest patches, one of which yielded *Cornera conirostris*, an unusual relative of *Calamus*, but with the heath forest (*kerangas*) by a slow stream called Sungei Gerais as our objective.

Palms were not rare — *Cyrtostachys Lakka*, in fact, is abundant back of the beach in wet acid sands, *Pinanga*, *Licula*, *Areca*, *Calamus* and *Daemonorops* are frequent — but *Gigliolia*, if there, eluded us. Having traversed the forest reserve to its boundaries and a trail in-

107. Banyeng is dwarfed by the apex of *Eugeissona insigne* inflorescence.

land back to the lighthouse, we came to an unexpected calm sea. With the thought that another area closer to Bintulu and accessible by bicycle down the beach might be rewarding, the decision to take advantage of the sea for a return trip was quickly made. Though the sea was less calm by far at Bintulu, we "sprayed" through to the dock before the light was gone.

Next day, perched atop a rented bicycle (soon found to have brakes in name only), I joined my guides to pedal down a dirt road to, and then along, the beach for some miles to the water works at Nyabau. Close by the pumping station we paused for a splendid specimen of *Daemonorops longispathus*, then commenced to circle the base of the slopes of a low hill, Bukit Nyabau, following a ridge in lowland dipterocarp forest beside the small stream Sungei Nyabau. My assistants were hunting within calling distance for a palm with narrow pinnae, having been shown rough sketches of what to look for. There are times such as this when excitement can mount high — the last

chance to obtain what seems unobtainable — and there is a feeling of wanting to find the thing by yourself that was gratified in this instance when just off the crest of a ridge I spied a low nearly stemless palm with narrow pinnae and then a couple of others nearby. In a moment the sight of the characteristic inflorescences of *Gigliolia insignis* among the leaves had me shouting to the others. It was not long before we had discovered all stages of flower and fruit on adjacent slopes. An even richer assemblage of plants, some with stems up to eight feet high, was later discovered on slopes just above the catchment basin for the water works. Through one of those unfortunate accidents, a large series of duplicate collections prepared for distribution was among three parcels of specimens that have strayed on the postal journey between Borneo and Ithaca, but some specimens and jars of air-mailed preserved material are ready for detailed study and an analysis of the relationship of this odd genus to *Areca* with which it seems closely related. The visit to Sarawak was thus concluded successfully and with an overnight stop at Brunei I headed north for three weeks with Dr. Meijer, the forest botanist in Sabah, formerly North Borneo.

The J. Harrison Wright Palm Collection

David Barry, Jr.

Two young Englishmen, J. Harrison Wright and his brother, Ben, came to Riverside, California, in 1873. They developed adjoining orange groves on twenty acres on the outskirts of the town, living in separate homes on the property. J. Harrison Wright, who never married, shared his home with an unmarried sister, Martha, and when he passed away in 1941, I lost a friend and tutor. I remember his funeral service which was held in a small wooden church built years ago. He had been a part of the Riverside scene for many years, and his death was a great loss.

J. Harrison Wright was a charming and cultured man. He was educated in Europe to which he returned from time to time. His friends and contemporaries who were interested in palms included Odoardo Beccari of Florence, the well known Italian taxonomist who died in 1920, and J. Robertson Proschowsky, the palm collector on the French Riviera (see *Principes* 5: 100-103). Wright and Liberty Hyde Bailey were close friends and Dr. Bailey made the Wright home a port of call when in California.

The Wright home at 2502 Adams Street was about two hundred and fifty feet back from the road. A driveway entered, divided, and encircled the house to join the entranceway. Within and along that encirclement were palms. The rest of the land was in oranges.

The collection of palms was outstanding as one that could endure extremes of temperature from 18° F. to 112° F. or higher. I first saw these palms about thirty-five years ago. Most of the plants had been grown from seed. The glass house that had been used for propagating had disappeared, and no new introductions were being made. I felt that the garden was completed in that Mr. Wright had covered the field in the introduction of palms that could withstand the climate of Riverside with the resources, transportation and knowledge available at the time.

Wright's palms were well grown with the advantage of deep, fertile soil,

months of interior valley heat, and an abundance of water. When the orange grove was flooded by irrigation, so were the palms. The driveway that encircled the house was about a foot higher than the orange grove and where the palms were planted. It served as a dike, and against it Wright flooded the palms as well as his orange trees. This practice may have explained why his arecastrums carried twice the number of fronds generally found on such plants in Southern California.

The collection comprised species of *Phoenix*, *Washingtonia*, *Erythea*, *Sabal*, *Livistona*, *Rhapis*, *Butia*, *Brahea*, *Trachycarpus* and varieties of *Chamaerops* and *Arecastrum*. In addition to *Trithrinax acanthocoma* was *T. campestris* which every few years produced three or four seeds. One clump of *Chamaedorea* named *C. Arenbergiana*, growing in back of the house with considerable protection from nearby trees, endured the winter cold when protected by a tubular frame covered with jute sacking.

Wright believed that palms could be grown close to each other without stunting. As long as he was able to care for his palms, and to give them ample water, no evidence of deterioration of the plants by reason of age was apparent. As an example, the crowns of sixty-year-old *Phoenix Roebelenii* were abundantly full with many long fronds. In general the collection served to refute any contention that palms have life spans that can be specified, or predetermined, and that after reaching a certain maturity, they decline and die. What is the life span of a palm? In the Jardim Botanico in Rio de Janeiro is the "palma mater," planted in 1806 by the Emperor of Brazil, remaining today in healthy condition and producing seed regularly. The soil there is like Wright's, deep and fertile.

The deterioration in the appearance of palms, sometimes attributed to age, may be due to the roots reaching a hard substratum, or to general neglect, including so often lack of sufficient water. Also, the erroneous contention that after a palm is established it requires little attention may be blamed for a decline in the appearance of a palm that is not due to age.

It should be kept in mind that the Wright collection was assembled in the horse and buggy days, mostly before the turn of the century. Certain palms were obtained from the Southern California Acclimatization Society of Santa Barbara of which Francesco Franceschi was the proprietor. Included were the first plants of *Phoenix Roebelenii* grown in California. Two of these palms dug from Ben Wright's adjoining property were brought to me a few years ago by a plant peddler. They must be seventy years old and the bare trunks are twelve feet tall.

Miss Wright outlived her brother by twenty years. During this time the palms were maintained and the collection kept intact. After she died in 1961 the property was sold to Mr. Hy Rose, a real estate developer. Fortunately, he appreciated the value and the importance of the palms and gave many of them to the City of Riverside for use in public parks. Several of the tall *Washingtonia* have been removed for such purpose. As the preservation of the entire collection did not fit into the plan for the subdivision of the property, the Wright garden is being broken up and is passing from the scene.

In *Principes* 1: 57, a giant specimen of *Jubea chilensis* is illustrated. Wright grew it from seed and waited forty-six years for it to produce its own seed. This venerable palm was donated by the new owner, Hy Rose, to the City of

108. *Jubaea chilensis* is made ready for removal. Photo courtesy Tetley Nurseries.

Riverside. The Park Department wanted to plant it in Newman Park, a small triangular plot at the head of Magnolia Avenue, already planted to a variety of palms that Wright had given to the city many years ago. Mr. Charles A. Hallberg, a Palm Society member, when in charge of the palm collection at the Los Angeles State and County Arboretum, appraised the value of the palm at $2,500.00. The cost of moving the palm was placed at $1,000.00 by F. A. Tetley III, head of Tetley Nurseries, of Corona, California, and another Palm Society member. In addition to the great physical problem of moving such a large and

109. Trimmed, loaded, and on the move. Photo courtesy Tetley Nurseries.

heavy plant, no funds were available to pay the cost. Fortunately, the public interest in preserving for posterity this plant, the largest Chilean wine palm in the United States, was such that the Riverside High-Twelve Club solved the problem by raising the money.

The palm was expertly dug, removed and replaced in one day by the Tetley nurseries. As illustrated, sections of posts were used to prevent the marring of the silver-grey trunk by the cables.

The palm is now in its new location joining there the other Wright palms planted years ago. The plant was moved at the beginning of September, 1964. It would have been better to do so at the beginning rather than at the end of summer, but the circumstances did not make such a choice possible. At this writing, in the summer of 1965, the palm is reported to be in good appearance.

The Los Angeles State and County Arboretum is indebted to Mr. Rose for the gift of other significant palms, including *Trithrinax campestris* and *Erythea Brandegeei* var. *spiralis*, the latter illustrated in *Gentes Herbarum* 4: 103. 1937. It is fortunate that in this way a number of J. Harrison Wright's fine palms are being preserved.

110. The giant is raised in its new location. Photo courtesy Tetley Nurseries.