PRINCIPES

Journal of The Palm Society

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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. The Society relies on voluntary contribution for support, and membership is open to all persons interested in the family. Requests for information about membership or for general information about the Society should be addressed to the Executive 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

EDITOR: Harold E. Moore, Jr.

EDITORIAL BOARD:

Paul H. Allen, David Barry, Jr., Duncan Clement, Walter H. Hodge, Eugene D. Kitzke, Harold F. Loomis, Nixon Smiley, Dent Smith.

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

Contents for October

Cover Picture

Washingtonias frame a lakeside view at the Los Angeles State and County Arboretum, Los Angeles, California. Photograph by W. H. Hodge.

NEWS OF THE SOCIETY

As will be seen by the supplement to the roster of members, which is enclosed with this issue of PRINCIPES, the Society is showing a healthy increase in numbers. From July 1, 1959 to July 31, 1960, ninety-seven new members have been added to the rolls. This gives us an average of a new member every 3.8 days.

* * *

Activity is at a minimum during summer months; however, there are a few items to report. On May 22nd, thirty members living in the Los Angeles area went to Riverside, California, where they were met by local members. After a picnic lunch and reports of the second biennial meeting in Florida by two members who attended, they saw the palms in White Park, the Wright estate and the Riverside City Nursery.

A few weeks later a smaller group went from Los Angeles to San Diego to visit palm plantings, both public and private, and reported having a most enjoyable time.

Deigaard Nurseries, Monrovia, California, set up an outstanding exhibit: "Palms from Many Lands Are Grown in Southern California", at the Los Angeles eighth annual House and Garden and Do-It-Yourself Show, June 16-26. Mr. Otto Martens, who is associated with this nursery, is one of the Society's first members. The exhibit featured a huge map, from which gold cords radiated outward to bordering pictures, indicating the country of origin of each of several different kinds of palms. In front of the map a path wound through plantings of the king palm (*Archontophoenix Cunninghamiana*, still known in the trade by an invalid name, *Seaforthia elegans*), the fish-tail (*Caryota* sp.) the desert fan palm, (*Washingtonia filifera*), the fountain or Chinese fan palm (*Livistona chinensis*) and *Erythea edulis*, the Guadalupe fan palm.

Mr. Martens also furnished the data for an interesting and well-illustrated article in the Los Angeles Times Home Magazine, July 10, 1960. Photographs and paintings in color as well as black-and-white made easy the identification of the eight most often planted palms in southern California.

Mrs. G. F. Herman, secretary of the California group, her husband and three children are off for an extended visit to Europe, where they plan to meet some members of the Society and see some palms, as well as many other sights.

* * *

The Greater Miami group has held bi-monthly meetings. The July meeting had as hosts Mr. and Mrs. T. R. Baumgartner. Picnic supper was enjoyed on the lawn, followed by a showing of slides of beautiful Costa Rica, by the Society's newly-elected treasurer, Walter Murray. Lou Snyder, chairman of the group, provided a new feature by showing slides of twenty palms and asking members to write their names, the one getting most names correct to receive a prize. H. F. Loomis was the winner. It is proposed that we make this a regular feature of our program, so that more of us can come to know the palms.

* * *

Harold E. Moore, Jr., editor of PRINCIPES, has returned from a "very rewarding" stay of three months in eastern Peru.

Professor Dr. M. Michalowski, who with his wife has made his home in Paraguay for a number of years, has presented the Society with a copy of *Arboles y Arbustos del Paraguay*, (Trees and Shrubs of Paraguay), pub-

lished under the auspices of the Paraguayan ministry of Agriculture and Stock, and of *Servicio Tecnico Interamericano de Cooperacion Agricola* (STICA). Dr. Michalowski states in the introduction that this is the first compilation of the scientific, common and Indian names of the trees and shrubs of Paraguay. Dr. and Mrs. Michalowski (Dra. Eva is a plant pathologist) have now come to the United States to make their home with their daughter and son-in-law, and their two attractive children, at Stead Air Force Base, Nevada.

Your executive secretary is on a three-months' visit to the West Indies, South and Central America, searching for new members, sources of palm seeds and other items of interest, as well as revisiting her native heath, Brasil. She plans to be in Pasadena for the meeting of the American Horticultural Society, with which our Society is affiliated, in early November.

* * *

All members of the Society have been invited to Dent Smith's "palm party" at Daytona Beach on Sunday, October 30th. A mimeographed announcement was sent to the membership in August just past, but the invitation equally applies to everyone enrolled since then. This "party" is essentially a get-together of palm fanciers for the purpose of talking palms, seeing one of the larger private collections of palms, making a field trip, and it should serve as a trial balloon to see if the attendance might justify consideration of an annual convention in a different place each year. Its chief value, according to Dent Smith, would lie in the fact that many members could relate what they will see to their efforts in their own gardens and perhaps derive practical conclusions. He says that upwards of 100 members, probably, will attend. Dr. H. E. Moore, Jr., the principal after-dinner speaker, will deliver an illustrated address on "Palm Collecting in Tropical America."

LUCITA H. WAIT

THE EDITOR'S CORNER

The editor returned from nearly three months of field study of palms in eastern Peru on the last day of June to be greeted by Dent Smith with freshly printed copies of the July issue of PRINCIPES, which he had seen through the press. Private appreciation for this very considerable assistance is hereby made public.

In this issue, we are pleased to welcome three new contributors. Dr. F. R. Fosberg, botanist of the Pacific Vegetation Project with headquarters in Washington, D. C., gives us an account of a recent trip to West Africa. Dr. Richard A. Howard, Director of the Arnold Arboretum of Harvard University, has visited Jamaica several times and reports now on some species of *Thrinax*. Dr. Howard regrets that some of his photographs "taken in a cloud forest in the rain and practically complete darkness" are not as clear as might be desired. We are, however, fortunate to have any photographs of the regal *Thrinax* he writes about

The third contributor, Mr. A. R. Rees is Plant Physiologist on the staff of the West African Institute for Oil Palm Research. Dr. Tomlinson, in commenting on his article, noted it as "a significant and original contribution to our knowledge of palm morphology . . . and indicates that the method of germination is somewhat different from other palms."

Random Notes on West African Palms

F. R. Fosberg

The African palm flora does not nearly equal that of tropical America or of the Indonesian region. Hence, I did not expect to see many of these fascinating plants on a short trip to the Ivory Coast and Nigeria on Unesco business.

Through the courtesy of Professor Mangenot, director of the magnificent O.R.S.T.O.M. laboratory at Adiopodoumé, Ivory Coast, and under the guidance of Mr. Aké Assi, outstanding African local botanist, I was able to get into the field and see a very good sample of the vegetational diversity of the southern Ivory Coast and to see the majority of the palm species found in the newly independent République de Côte d'Ivoire. There were many more species than I had expected to see. A few further observations were made later in an all too brief look at Nigeria.

With no attempt at formality I will try to give The Palm Society members some idea of what they might see of their fascinating group of plants on a visit to west tropical Africa.

Most visitors to the Ivory Coast arrive first at Abidjan, the capital, by air. From the plane they already see that palms form a conspicuous part of the vegetation — groves of coconuts along the coast, abundant oil palms, *Elaeis guineensis*, in the broken forest and thickets, as well as around the villages inland. Indeed, if one tree were chosen to characterize the landscape of this part of the Ivory Coast it would be hard to decide between the enormous *Ceiba pentandra*, or *fromager*, and the ubiquitous oil palm. Rough-trunked and stiffly erect, its long pinnate leaves with globular masses of fruits close among their spiny bases, the oil palm is the indication, everywhere, of the presence of man. It is not known, with certainty, even where it is native, but the botanists in the Ivory Coast regard its presence in the forest as a sure indication of a secondary, or at least a disturbed, forest. Along trails its seedlings spring up from seeds dropped or spat out by passing Africans, to whom the oily flesh is a staple food. Some forests are largely made up of oil palms. In addition to furnishing food in the form of pulp, pulp oil, kernel and kernel oil, it provides quantities of palm wine, the quickly fermented sweet sap. Its leaves are useful for thatch and matting, and its trunk and leaf midribs for construction. It is certainly the most useful of plants to the West African, just as the coconut is to the Polynesian.

In savanna areas near the coast to the west of Abidjan are growing commercial plantations of oil palms. To the east, on beach ridges and sand flats along the coast are similar plantations of coconuts.

The fine research station at Adiopodoumé is built in an old oil palm plantation and the large old palms dominate the station grounds and the surrounding secondary forest. Planted here, also, are the familiar *Chrysalidocarpus lutescens* and *Roystonea oleracea*, seen generally in tropical plantings around the world.

A far more spectacular sight to one interested in palms is the swamp association of the coast dominated locally by *Raphia gigantea*. A normal member of

55. *Elaeis guineensis* in secondary forest north of Dabou, Côte d'Ivoire.

the swamp forest community, probably characteristic of edges and openings, this small tree has become very abundant, forming almost pure stands where the swamp forest has been cleared. The trees are here crowded together, their crowns forming a complete and dense canopy, their dead leaves covering the wet ground, no other plants competing with them in the thicker stands. Their leaves are delicate and feathery and their trunks slender but covered by a thick tangled mass of curved stiff thick sheath fibers. This palm is monoecious and, apparently, monocarpic—at least flowering and fruiting specimens seemed to be dying. The trees produce huge hanging hawserlike inflorescences with female flowers and later clusters of small round fruits close to the axis, male flowers on many slender branchlets.

On coastal and sand ridges near Azu-

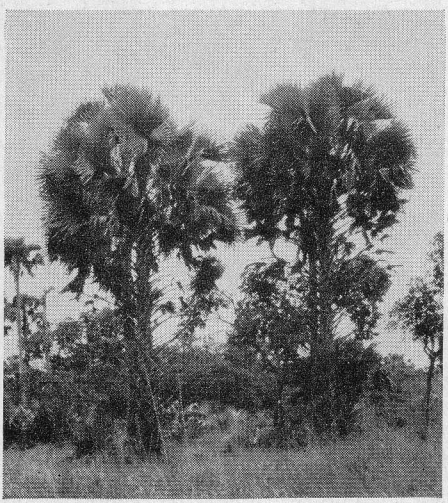
56. *Raphia gigantea* distant in the savanna, Mossou Savanna, Abidjan, Côte de'Ivoire.

retti, as well as in the interior, near Singrobo, at the edge of the savanna country, were seen clumps of another small slender palm. It turned out to be *Phoenix reclinata*, known to me previously as a garden plant, but common and native in West Africa. It is always a satisfaction to see for the first time in its proper habitat a plant long familiar in cultivation.

Several trips were made from Adiopodoumé to the savannas to the west and north, those in the north extending across the continent in a belt between the Sahara and the tropical forest. Here were truly spectacular displays of palms —*Borassus aethiopum*, not visibly different from the palmyra palm of Asia, *B. flabellifer*. *Borassus* exists on the savannas in uncounted thousands. Its fruits are considered edible, but the main importance of this palm to the Africans is as a source of palm wine or *bangui*. We sampled this and found that it resembles a weak hard cider with a very individual flavor. It is secured by decapitating the tree, one tree yielding about 20 litres of sap per day for one or two months. Bare trunks, like electric light poles, are a common feature anywhere near a village in the *Borassus* area. Fortunately the seeds germinate easily and young plants are abundant.

An interesting feature of *Borassus aethiopum* is a swelling in the trunk about two-thirds the way up. There is some argument as to the origin of this, some local botanists suggesting that it results from a season of unusually abundant moisture some years ago. However, its occurrence at about the same height on trees of apparently different ages, as well as the presence of a similar feature, even more exaggerated, in certain other palms, e.g. *Colpothrinax* of Cuba, suggests that it may more likely be a genetic character.

In the rain forests there seem to be no palm trees except the oil palm. However, the unwary visitor may be un-



57. Young trees of *Borassus aethiopum* with petioles and sheaths still persistent, savanna near Singrobo, Côte d'Ivoire.

58. Immature stems of *Raphia gigantea* in swamp east of the Agnéby River showing fibrous sheaths.

pleasantly reminded that the family is not absent if he blunders into a rattan vine. Although these are not abundant, five species belonging to three genera of these climbing palms occur in the Ivory Coast. Usually only one or two

59. Fruiting specimen of *Raphia gigantea* in swamp east of Agnéby River near its mouth west of Adiopodoumé, Côte d'Ivoire.

are found at one place, but in the Yapo Forest all five grow together. They are: *Calamus deerratus, Ancistrophyllum opacum, Ancistrophyllum secundiflorum, Eremospatha Hookeri, Eremospatha macrocarpa.* Why these are dif-

60. *Borassus aethiopum* in savanna east of Bandama River, Côte d'Ivoire.

ferent genera is not immediately obvious. All are climbers with viciously spiny leaves and leaf sheaths. At Agnéby, in a swamp, one of these, the *Calamus*, was collected in fruit. The fruits occur in panicles and are ovoid and covered with stiff overlapping scales like a fish.

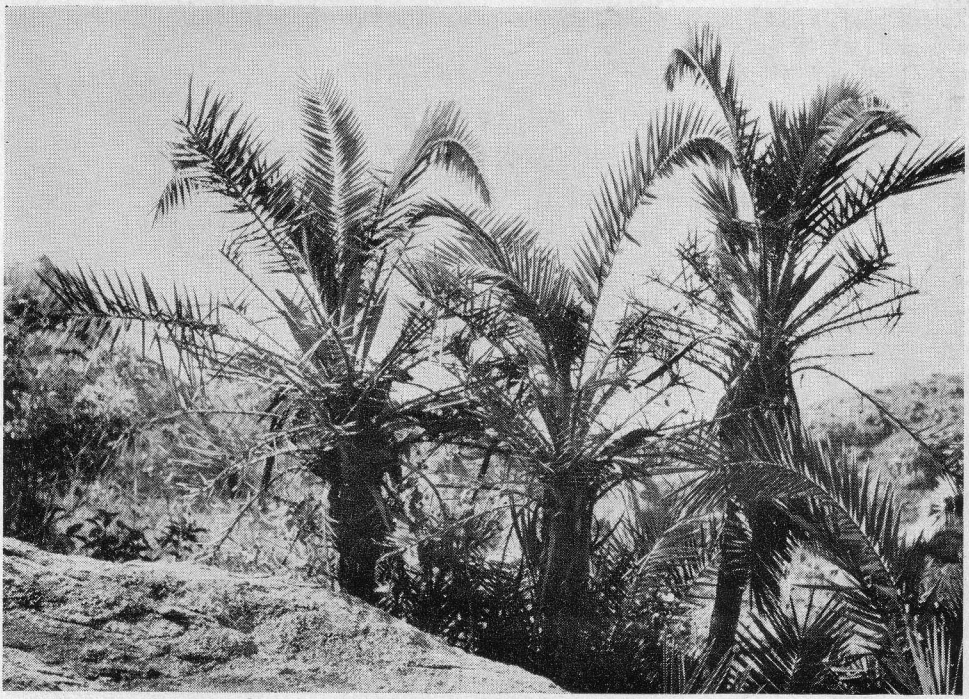
After this all-too-short introduction to the flora and vegetation of the Ivory Coast, I was able to make a short but interesting visit to Nigeria. From the plane approaching Lagos, the principal city, much of the forest appears to be dominated by oil palms. These were seen in abundance along the road to Ibadan, but no other palms were noticed in this forested area. I thought that probably this would be the last of the palms for the trip, as I was going north into drier country.

However, during the flight from Ibadan north-eastward to Jos it was easy to pick out the pale green rosettes of *Borassus* crowns in the savanna and open forest. Here these palms seemed to occur mostly near streams, in and at the edges of the gallery forest, and not nearly so generally in the open savanna.

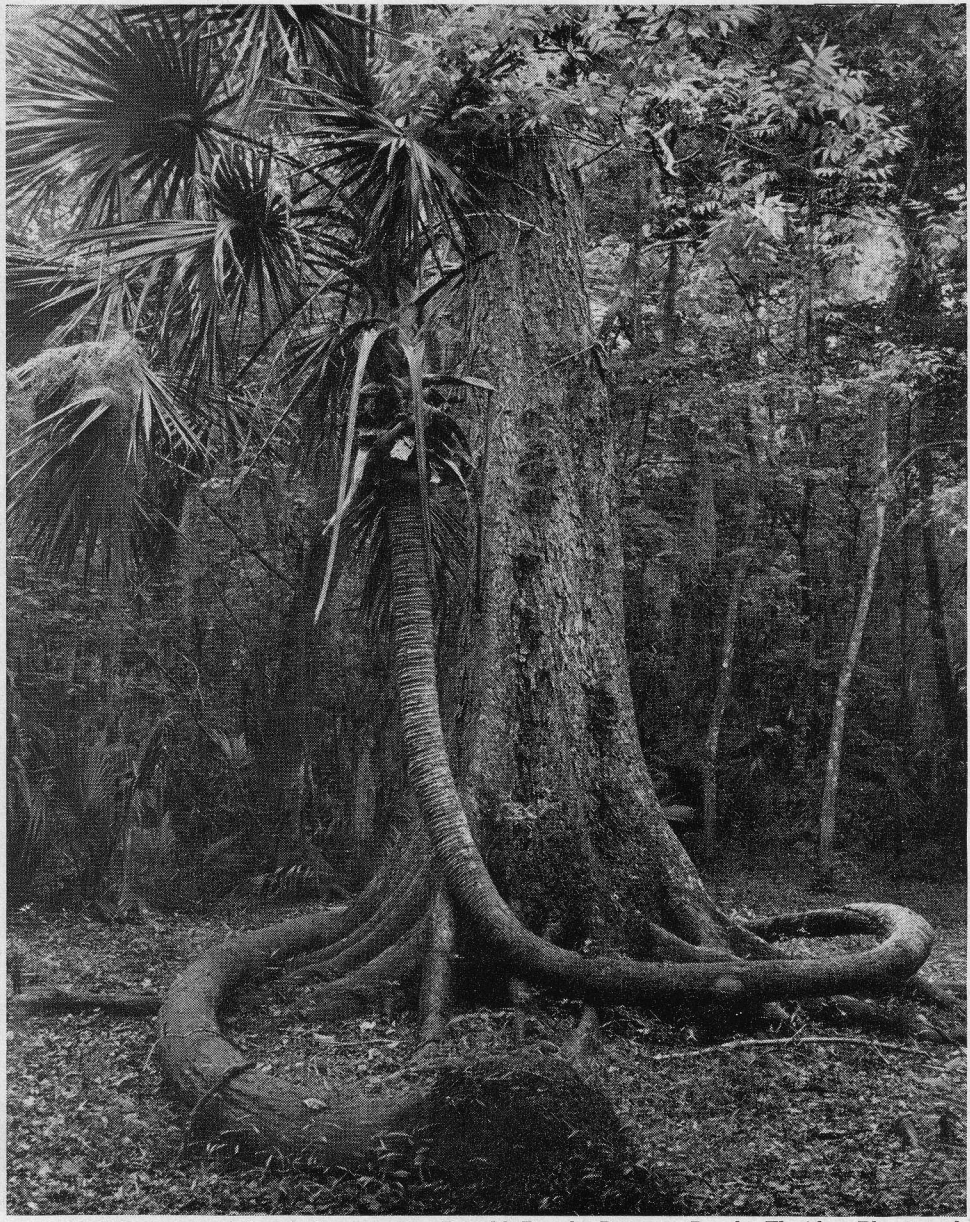
The interesting town of Jos is situated on a large plateau at about 4000 feet elevation. This plateau is mainly grassy, but is studded with small abrupt hills of granite, looking like randomly dropped heaps of great granite boulders. On these is a fascinating flora of plants with curious adaptations to a severe dry season — a bizarre assemblage of cactoid euphorbias, small baobabs, aloes, a geophytic fern, and many more. Here locally, I again found *Phoenix reclinata.* Its vermilion spathes are especially handsome. It grows in bits of soil in crevices between the boulders, along with a wild seedy banana, scarcely expected in this unfavorable niche.

At Kaduna, northwest of Jos, people were carrying great bottles of palm wine on their heads. I assumed it was from *Borassus,* but my guide assured me that it was from another palm which grew a few miles out in the country. It may have been the doum palm, but unfortunately time to investigate was lacking.

At Kano, ancient terminus of caravan routes across the Sahara, and now the air-lane cross-roads of West Africa, occasional date palms, *Phoenix dactylifera,* protrude up among the mud houses of the Old City. And in the open country just outside with huge baobab trees, my last African palm of the trip was a doum palm, *Hyphaene* sp., a fantastically branched tree. Again, time was lacking for a close examination. Even a fleeting look at it, before taking my plane for Europe seemed to add a climax to a very satisfactory palm journey.



61. *Phoenix reclinata* in granite hills west of Mongu, plateau south of Jos, Nigeria.



62. *Sabal Palmetto* in form of a serpent, Ronald Ranch, Daytona Beach, Florida. Photograph by W. H. Hodge.

The Serpent Palm

The palm in Figure 62 is not an obscure species but a venerable cabbage tree (*Sabal Palmetto*) in an unaccustomed form. This odd plant is an inhabitant of the Ronald Ranch, consisting of some fifty acres of citrus and jungle-like hammock on the outskirts of Daytona Beach. Because it is coiled about the base of a huge old

hickory and then vertically raises its head like an outsize boa, the owner William Ronald long ago dubbed it, aptly enough, the "serpent palm."

Walter Hodge and I paid a courtesy call on this curious vegetable last spring. We ogled it, felt it, admired it and measured it. The length of the stem is 44 feet, and adding the crown of foliage the overall length is 50 feet. Dr. Hodge made several time or bulb exposures from different angles, for obviously the massive hickory in the center obstructs some part of the palm from any viewpoint.

This serpent palm may be two centuries old, or even older. Evidently it was blown down when still relatively young, and in its effort to reach the light was forced into its circular form by heavy vegetation growing and dying in a gradually changing pattern—and only rising when dying plants finally permitted enough light to enter.

Wild palmettoes often have been forced by similar contingencies into strange and weird shapes. Indeed in this same Ronald hammock there are several that would seem notable if not so far outdone by our so-called serpent palm. Of all the curious forms to be found, it hardly seems likely that this last is anywhere duplicated.

DENT SMITH

Thrinax rex - A Regal Palm of Jamaica

RICHARD A. HOWARD

The genus *Thrinax* was established by the Swedish botanist Olaf Swartz in his *Nova Genera* and *Species Plantarum, Prodromus* (57. 1788)* with a Jamaican species, *T. parviflora,* the first species described. The generic name was derived from the Greek word for fan. During the next century many species were added to the genus and it was considered homogeneous until Charles Sargent, in 1899, distinguished differences in the fruits and separated certain species as the genus *Coccothrinax. Coccothrinax* fruits have a grooved or fissured endosperm to contrast with the smooth endosperm of species in *Thrinax.* Currently, ten species are recognized in *Thrinax,* all occurring in the Greater Antilles. Two species have ranges extending into the Florida Keys and southern peninsula Florida. The genus has not been encountered in the Lesser Antilles south of Anguilla and records of the genus in Central America, outside of cultivation, are subject to question. Several species are widely cultivated and the country of origin may not be known.

Within the Greater Antilles the island of Jamaica has the greatest representation including the three endemic species, *Thrinax rex, T. tessellata* and *T. Harrisiana.* It is of interest to note that these three occupy isolated ranges in the eastern, central and western mountain ranges of the island. All species occur on areas of broken limestone rocks which are deeply pitted and often eroded into irregularly sharp-surfaced boulders. So hard is the limestone that a boulder often rings when struck. Its many sharp points lend it the name "dog tooth" limestone in many areas. The *Thrinax* species which grow on these boulders germinate from seeds de-

*L. H. Bailey in his monograph of *Thrinax* (*Gentes Herbarum* 4:128-149. 1938) did not recognize this reference, attributing the genus authorship instead to Linnaeus filius (*Gen. Pl.* ed. Schreber 2:772. 1791).

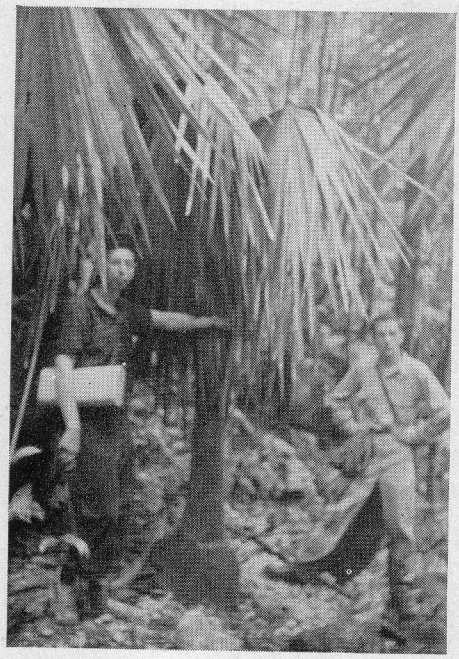
posited in the bubble-like cavities of the rock surface. When still small plants the many fibrous roots may completely surround the supporting rock and penetrate deeply into its crevices. By the time the caudex is a few inches high and thick the root system often appears to be sufficient to fill a bushel basket. These young plants are securely fastened. It is frequently possible to lift the plant, boulder and all, only to find it impossible to separate the rock from the root system. While many fruits are produced, few seedlings are seen. Small wonder, then, that these three species have not previously been introduced into cultivation.

Following the Christmas season of 1959 the author in an attempt to repay the many kindnesses of the staff of the Fairchild Garden made a real effort to secure young plants of two endemic species of Jamaican *Thrinax* for initial trial at the Fairchild Tropical Garden. Young plants of *Thrinax tessellata* were secured in the parishes of St. Anns and St. Elizabeth and *Thrinax rex* from the parish of Portland. Nearly three-quarters of the small plants which appeared to be growing in locations from which they could be removed, were destroyed in the process. Invariably, the caudex broke at the apical end leaving the root system secure in the rock. Plants growing on the top of a boulder seemed octopus-like in also having more tightly fastened roots no matter how carefully visible roots were peeled from the rock surface. Finally, a dozen plants of each species were secured. The older leaves were removed leaving only the folded developing leaves on the plant. As much root system as possible was left intact. When packed in plastic bags and certified by the Jamaica Department of Agriculture the plants were flown to Miami, fumigated by the U. S. Department of Agriculture, received and "canned" at the Fairchild Garden. When examined in May of 1960, a number of each species gave all appearances of dead palms. A few of each species were still green and hope was held for their recovery and growth.

63. George R. Proctor of the Institute of Jamaica with two average-sized leaves of *Thrinax rex*. A typical dogtooth limestone cliff-face shows in the background.

To the botanical collector *Thrinax tessellata* is just another *Thrinax*. It is tall and slender-trunked, quite common and generally undistinguished. *Thrinax rex*, however, lives up to its name and even the most hardened botanical travellers pay quiet homage in looking up to this giant of the genus. No Jamaicans live in the area where it grows and few venture into its realm, the John Crow Mountains. While the crowns of the palm are visible from back roads miles across a broad valley, *Thrinax*

64. The crown of *Thrinax rex* in clouds at 2000 feet altitude in the John Crow Mountains, Jamaica.

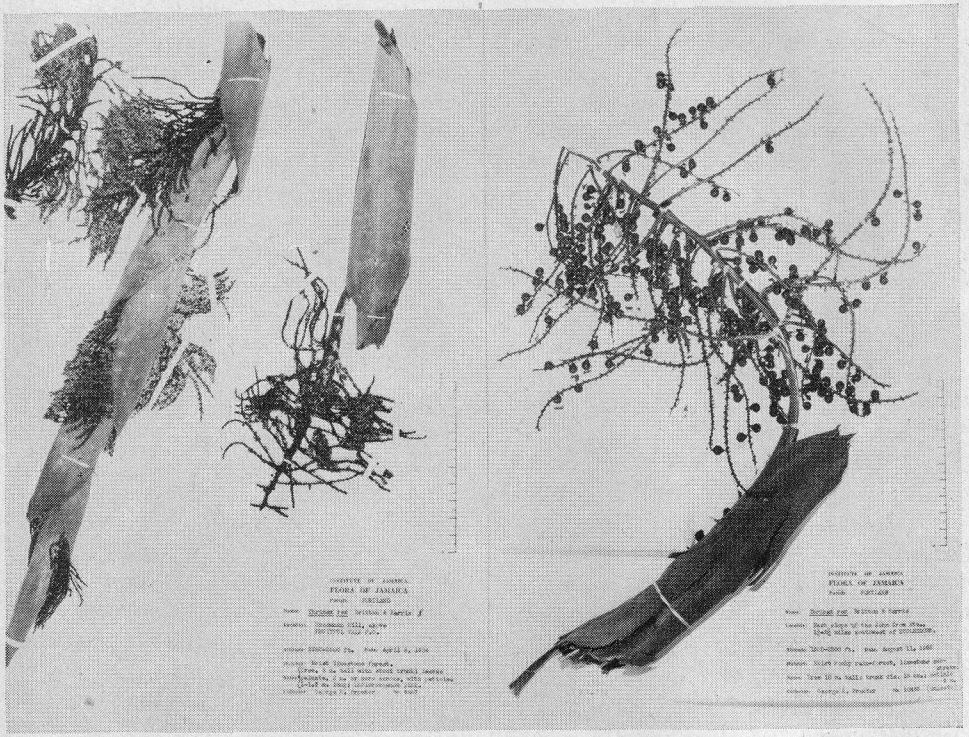


65. The base and trunk of *Thrinax rex* showing a smaller example of the enlarged base of the tree. A few of the drooping persistent dead leaves are shown. Dogtooth limestone substratum supports a scanty herbaceous flora under the palms.

rex exists in isolated splendor in one of the most humanly difficult environments of Jamaica.

The king *Thrinax* was first discovered in early March of 1909 by Nathaniel Lord Britton of the New York Botanical Garden and William Harris, Superintendent of Public Gardens in Jamaica. The area, the John Crow Mountains (supposedly named, in Jamaican fashion, for the vulture called the John Crow which rarely is seen in the area) has been well described by Proctor (*Preliminary Checklist of Jamaican Pteridophytes* 85. 1953). They are a block of oligocene white limestone, uplifted and strongly tilted northeastward. Proctor notes the range to be an irregular parallelogram in shape, fifteen miles long and five miles wide. Its westerly and southerly faces form precipitous escarpments and its highest elevation in the southwestern corner is approximately 3900 feet high. The range is separated by the Rio Grande valley to the west and while it descends gradually to the east, these slopes are dissected by several valleys. Proctor estimates that the rainfall within the mountain range cannot be much less than 300 inches yet surface pools are rarely encountered and travellers must carry drinking water even though continuously soaked by the low hanging clouds, rain and dripping vegetation.

Britton and Harris approached the John Crow Mountains from the southeast corner and collected from a base camp in a forest clearing at about 1600 feet altitude. Their formal description of *Thrinax rex* (*Bulletin of the Torrey Bo-*



66. Herbarium specimens of the inflorescence (April 8) and the infructescence (August 11) of *Thrinax rex*, collected by G. R. Proctor.

tanical Club 37: 352. 1910) conveys none of the excitement they must have felt on finding this palm for the first time. However, Britton in an official report of the expedition (*Journal of the New York Botanical Garden* 10: 109. 1909) reports that "the most noteworthy tree is a magnificent fan-leaved palm of the genus *Thrinax*, with leaves of young plants over ten feet in diameter, the old trees with trunks up to sixty feet high or perhaps even higher and nearly a foot in diameter, truly the monarch of the genus, and a splendid addition to our knowledge of it." So impressed was he that he stated "Camp 'Thrinax Rex' thus becomes of much botanical importance," using the specific name a year before its valid publication. The palm was not collected again for forty-five years so isolated is its location. In 1951, George R. Proctor of the Institute of Jamaica crossed the John Crow Mountains alone on an arduous trip of four days. This venture, called foolish by some for the risks involved, led to the discovery not only of a storm-flushed valley allowing approach to the upper levels of the John Crow Mountains but also of a large stand of *Thrinax rex* and above it a permanent stream, nearly a quarter of a mile in length which collects water from a broad hillside and disappears at a lower level into the limestone mountain mass. A deep pool, now known by its privileged few visitors as "Proctor's Pool" offers water for the naturalist in the area and has allowed repeated exploration of a fascinating stunted mossy forest. The vicinity of Proctor's pool has yielded many species of plants new to science and will serve

as a headquarters for much work still to be done in the area.

We know now that *Thrinax rex* was accurately described by Britton and Harris. Its stately height and canopy are its most striking characteristics. A trunk extends to sixty feet in height and fifteen inches in diameter in the large specimens. The swollen base may have an accumulation of coarse fiber and adventitious roots forming a mass which reaches three feet in diameter and in one specimen to four feet in height. Petioles of the leaves were measured ten feet long and blades twelve feet in diameter were common but larger than the average leaf size. Needless to say single leaves afforded excellent protection against the rain. Specimens of *Thrinax rex* have been collected from the vicinity of "Big Level", Uncommon Hill above Fruitful Vale Post Office, and southwest of Ecclesdown, all in the parish of Portland. The palm can be considered common in these restricted areas. It occurs at altitudes from 1200 to 2500 feet. There appears to be no preference for directional exposure and plants were found on rocky ridges as well as in debris-filled valleys. *Thrinax rex* is known to flower in early April and to have a decidedly pink tone to the inflorescence. It has been seen in full fruit in August. In January, Proctor and I found the palms barren or with old infructescences and rotted fruits.

Thrinax rex may not prove adaptable to cultivation in southern Florida. The high rainfall, continuous high humidity, the cloud cover and the scanty amount of direct sunlight of its natural location may be the limiting factors in its distribution. Fruits will be collected at the first opportunity for a second and a broader attempt at an introduction to cultivation. *Thrinax tessellata* and *Thrinax Harrisiana*, when the latter can be obtained, seem capable of surviving in the comparable environment of southern Florida.

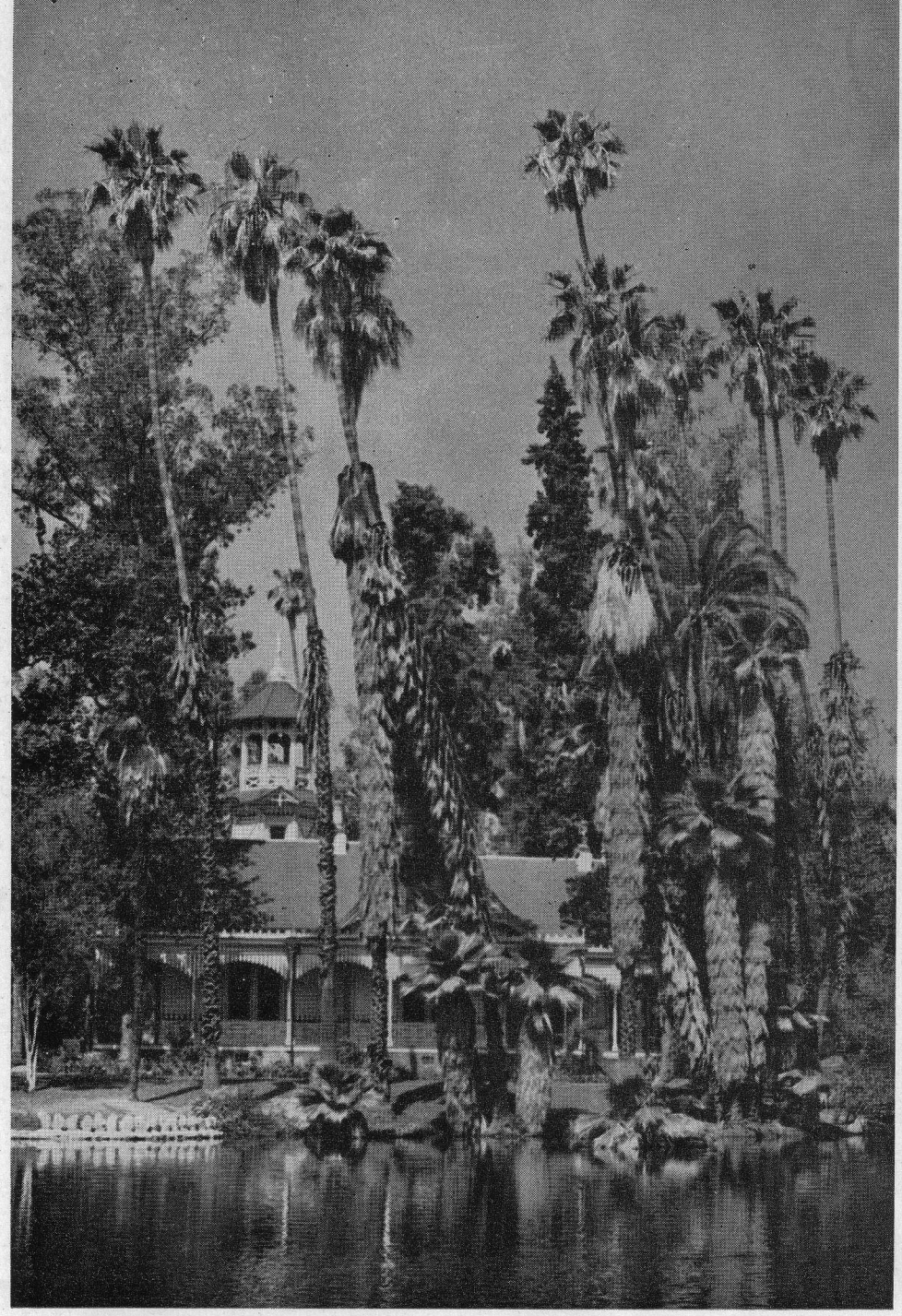
Tallest Palms in the United States?

Quite recently a minor controversy has raged in the daily press about the location of the tallest palms in the United States, excluding Hawaii and of course Alaska. It all started, according to an Associated Press dispatch, when the Chamber of Commerce of San Antonio, Texas, "challenged Florida and California to match a 61-foot palm found in San Antonio."

Miami "came up with a 68-foot specimen," the dispatch goes on to say. This seemed a lame report from Florida, since a few of the wild royal palms in the state have exceeded 100 feet, with the tallest reaching perhaps 110 feet. Moreover, thousands of native cabbage trees *(Sabal Palmetto)* exceed 70 feet, and the trees are reported to attain to 90 feet in rare instances. Armed with a steel tape, Dr. Walter Hodge and the undersigned measured a fallen palmetto at 82 feet this past March in a hammock near Daytona Beach. Even so, Florida cannot begin to vie with California in the matter of tall palms, whether because of hurricanes in the past or other causes.

What may be the tallest living palm in the continental United States is a 140-foot specimen of *Washingtonia robusta* at the Los Angeles State and County Arboretum in California (see fig. 68, p. 139). If taller ones exist elsewhere in the land, it would surely interest Society members to see a report of the facts in this journal. Significantly there are many very tall washingtonias at the Arboretum, according to Charles Hallberg, and at least four of them tower well above 120 feet.

67. The Hispaniolan palmetto, *Sabal umbraculifera*, at Ronald Ranch near Daytona Beach, Florida. It was planted by William F. Ronald as a six-inch seedling about 1928 and is now fifty feet or more tall. During this period the native cabbage palmettoes roundabout have gained scarcely two or three feet of height. In general appearance it chiefly differs from the latter in its much more massive foliage and its heavier, straighter trunk, which is gray in color. Photograph by Dent Smith.



68. *Washingtonia robusta* at Los Angeles State and County Arboretum, Arcadia, California—a group of very old, very tall palms, the tallest approximating 140 feet. The man under the crown of the washingtonia obscured by the eucalyptus measured it at 120 feet and reported that the tallest of the palms in the foreground towered at least 20 feet above it. Photograph courtesy of Charles A. Hallberg.

Great height in the palms may be a phenomenon in the United States, but is not even news in the family; for, after all, one species of *Ceroxylon*, sometimes exceeding 200 feet, was believed for many years to be the tallest living thing on earth—before the immense eucalypts and sequoias were discovered.

DENT SMITH

Essays on the Morphology of Palms

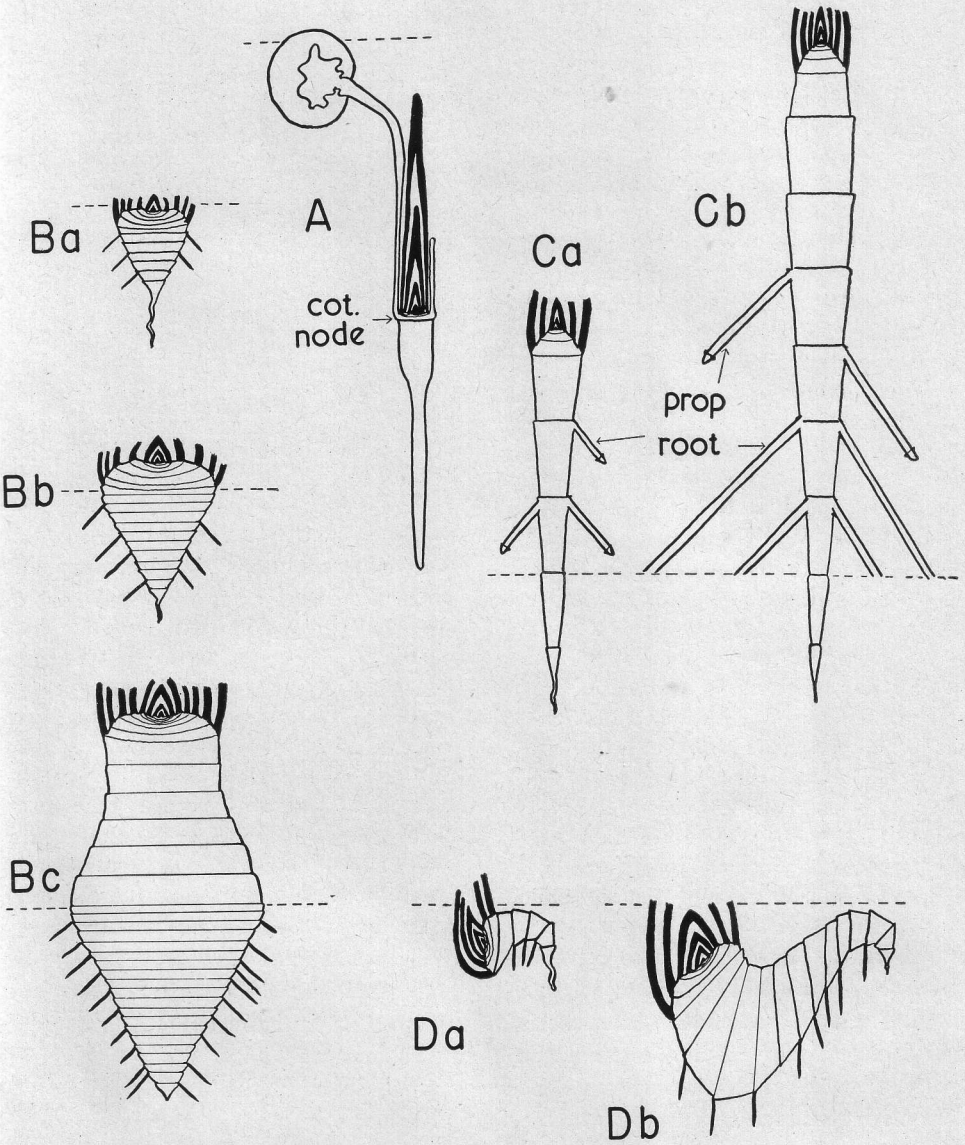
P. B. TOMLINSON

II. THE EARLY GROWTH OF THE PALM

The palm seedling develops an anchoring and absorptive root system together with an assimilating leafy crown and soon becomes independent of the seed as its source of food. The stem usually remains inconspicuous for a considerable time. Botanists familiar with the early stages of growth of the palm after the seedling stage know that its stem grows first in girth and develops a broad woody subterranean stock before the leafy crown is visibly raised above the soil surface. In this predominance of thickening over extension growth, palms contrast remarkably with woody dicotyledons as represented by our common trees. In the latter, primary (elongation) growth always precedes secondary (thickening) growth so that tall but slender saplings are characteristic of the early stages in the life of dicotyledonous trees. This difference is a direct result of the fact that the palm stem has no means of continuous growth in thickness. In contrast dicotyledonous trees have beneath the bark an actively growing region, the cambium, by means of which the trunk continues to grow in thickness throughout the life of the tree. Consequently the slender stem of the sapling is capable of becoming a wide trunk and supporting an increasingly branched crown. The palm stem, on the other hand, has no cambium.

The peculiar growth-limiting characteristics of palms and other monocotyledons are a direct consequence of this lack of thickening growth, as has recently been indicated in an interesting article by Holttum (1955). He points out that in order to support a woody trunk, which in palms may eventually be over 100 feet high, a massive foundation has first to be established. This broad, base begins to develop in the seedling (fig. 69A). The first nodes, at which the seedling leaves are inserted, are not separated from each other by long internodes (fig. 69Ba). Successive nodes are increasingly wider and equally congested so that the base of the stem comes to have the shape of an inverted cone (fig. 69 Bb). Most of this early stem growth takes place underground and all that is visible above the soil surface is the crown of leaves which often persists at this level for several years. Eventually, however, a sufficiently broad base is developed and the later internodes elongate so that the leafy crown is raised above the soil level and a woody trunk becomes visible (fig. 69 Bc). In some palms, particularly those with narrow cane-like stems, the difference in length between the early, basal internodes and the later ones which form the aerial stems may be very considerable. In other palms, such as the oil palm and the date palm, the internodes are always short and the aerial stem is developed by the superposition of a large number of short internodes.

The fibrous root system of palms, like that of other monocotyledons, develops in a way which contrasts with the tap root which is typical of dicotyledons. Holttum suggests that this difference is also related to the absence of a vascular cambium from monocotyledonous roots. The first root is incapable of growth in



69. Early growth of palms. A, diagrammatic vertical section through a seedling of the *Phoenix-type*. The cotyledonary node (cot. node) is the region of insertion of the cotyledon and therefore the first node on the stem; B-D, diagrammatic vertical sections through young palms. Nodes represented by straight lines; adventitious roots by thick single lines; only the bases of the leaves are drawn: Ba-c, three successively older stages in the development of a palm with a solitary erect stem; Ca-b, two successive stages of an *Iriartea*-type stem; Da-b, two successive stages of a *Sabal*-type stem.

thickness so that no matter how much it branches and increases its effectiveness as an absorptive organ, it is limited in its capacity to transmit absorbed water and mineral salts to the expanding stem and leafy crown above. In dicotyledons the first root has a cambium and so in-increases in thickness at a rate which permits it to transmit an adequate supply of water to the aerial parts. In monocotyledons, the first root is replaced very early by many adventitious roots, i.e. roots which grow directly from the stem. It has already been shown that in the *Archontophoenix*-type of seedling the first root is soon replaced by a more dominant adventitious root (*Principes* 4: 57, fig. 33Cc). Adventitious roots are usually only produced at the nodes, although in palms this is not obvious because the basal nodes are so congested. This basal region seems to be an unlimited source of root-producing tissue and palms apparently produce new roots throughout the whole of their lives.

The early stages of stem growth, described above, are fundamentally the same in all palms although they are most easily observed in palms with tall, columnar trunks, such as in the coconut palm. In some palms with solitary stems, such as the royal palms, the stem may be widest at the soil level since the elongated internodes of the aerial stem are somewhat narrower than those which form the broad basal swelling (fig. 69 Bc). The thickness of the stem base is, however, correlated with the final size of the stem and palms with narrow cane-like stems produce only a narrow base. It is therefore obvious that planted palms must be well nourished and cared for in early stages of growth so that a broad foundation can develop; otherwise, if starved early in life, the stem base will not be sufficiently broad to support a tall trunk.

There are a number of exceptional types which, although they have the same fundamental palm construction, are superficially dissimilar. The most striking is that found in the iriartoid palms, the stilt-palms of Central and South America. In these palms, elongation of the first internodes is marked, unlike other palms (fig. 69 Ca), but successive internodes are increasingly wider in the normal way. Consequently the adult stem has a base which tapers gradually to a point at its base (fig. 69 Cb). This type of stem is unstable but it is supported by thick prop roots which arise in an adventitious manner from the lower nodes on the stem (fig. 69 Cb). These roots are very thick. They grow obliquely downwards and normally do not branch until they reach the soil surface. They form very efficient buttresses since they grow out all round the stem.

Sabal is also conspicuously different from most other palms. Here the stem at first grows obliquely downwards instead of erect, so that a short oblique rhizome is first produced (fig. 69 Da). Eventually, however, the stem apex turns erect (fig. 69 Db) and a thick woody trunk is formed in the normal way, as in *Sabal Palmetto*. In *Sabal Etonia* and most plants of *S. minor*, on the other hand, the stem remains as a persistent horizontal woody rhizome. This last growth-habit is not very different from that shown by palms in which the erect stem apex soon grows horizontally so that a subterranean rhizome is developed, as in *Serenoa*. The leaves of these rhizomatous palms always grow erect because of unequal growth of the leaf base, the lower part

of the leaf base growing more than the upper.

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WHAT'S IN A NAME?

Bismarckia (biz már key a), a generic name established by Hildebrand and Wendland, honors the eminent Prussian statesman whose full and resounding name was Prince Otto Eduard Leopold von Bismarck-Schönhausen. It was Prince Bismarck (1815-1898), the "Iron Chancellor", who molded the conflicting kingdoms and principalities of 19th century Germany into a united nation and one of the world's great powers —which accomplishment was destined to provide a goodly measure of color and excitement for the 20th century, to say the least. The genus *Bismarckia* as now interpreted consists of only one species, the *B. nobilis*, a massive fan palm native to Madagascar.

Euterpe (you túr pee), one of the nine Muses of Greek mythology, was the goddess who presided over lyric song and poetry. Her Greek name is made up of the combination *eu* (well) plus *terpein* (to delight). Traditionally, the Muses were the daughters of Zeus, father of the gods, by Mnemosyne, goddess of memory. *Euterpe* is a genus comprising more than forty species of exceedingly graceful, unarmed, tropical American feather palms first described by Joseph Gaertner in 1788. Most of the euterpe palms have edible buds which taste like raw cabbage, and have come to be known rather commonly as cabbage palms.

Geonoma (gee o nó ma) is a genus whose members are typically smallish, graceful, moisture-loving slender palms abounding in the dense shade of tropical American forest floors. The technical name, originated by Willdenow, derives from the Greek prefix *geo* (earth, ground) plus *nomos* (district, province), which combination gives *geonomos* (colonist, in the sense of "one who is a member or an inhabitant of a colony"). The species constituting *Geonoma*, like those of *Bactris* and *Chamaedorea* also of the Western Hemisphere, are very numerous. Well over one hundred fifty species range from Mexico far into South America with a particularly copious representation being found in Costa Rica, Colombia, and Brazil.

Jessenia (jess én ee a), a genus of tropical American pinnate palms with long, erect leaves and drooping leaflets, was established by Karsten to honor Dr. Carl Jessen, a professor of botany at Eldena, Prussia. A total of five species are currently known to science, four in South America and one from the island of Trinidad (*J. oligocarpa*).

Nannorrhops (nán o rawps), a generic name established by Hermann Wendland, is composed of the two Greek words *nannos* (dwarf) and *rhops* (bush, shrub) in allusion to the fact that these fan palms with their prostrate branching stems are commonly low in stature. The double r of *-rrhops* in such compounds is classically proper because of the single vowel which precedes. As now understood, the genus is composed of three species native to lofty, arid, cold regions of northern India. One of these, the *N. Ritchieana*, ranges westward into Afghanistan. Inasmuch as these palms are indigenous to regions

approximating parallel 30 (the latitude of New Orleans, Houston, and St. Augustine in America), it seems reasonable to infer that we have here a genus of palms hardy enough to adapt to much of the South and West in our own country. As for special soil requirements or the adverse effects of our extreme summer temperatures and humidity, it can only be averred that the *N. Ritchieana* specimens, for example, which have been planted in several Florida gardens in the vicinity of Miami have matured and are thriving well. Unfortunately, however, we shall have to obtain seeds from the Old World, for our American immigrants have thus far refused to supply us.

Oreodoxa (o ree o dóck sa) combines the Greek words *oreos* (mountain) and *doxa* (praise, glory). Established by Willdenow for palms not clearly understood, this generic term was long thought applicable to the genus of royal palms. Since several of the known species of royal palms are not particularly happy as "glories of the mountain", it is perhaps just as well that this poetic designation has been supplanted by the name *Roystonea.* J. K. Small in his well-known *Manual of the Southeastern Flora* (1933) misspells the word "Oredoxa" both in the body of the text (p. 238) and in the index (p. 1537).

Rhapis (ráy pis), the genus comprising the so-called Lady Palms, was established in 1789. The name comes from the Greek word *rhapis* (rod), alluding to the rod-like canes or stems. Nine species of *Rhapis* are at present recognized by botanists, of which the *R. excelsa* (*R. flabelliformis*) and the *R. humilis* are perhaps the best known in our country. They are deservedly popular as ornamentals since they are of graceful, modest proportions, unarmed, and easy of culture. There is a genus of grasses, not to be confused with the above, known as *Rhaphis,* Lour. (pronounced ráy fis) which is the Greek word for needle. Both *Rhapis* and *Rhaphis* are valid generic terms, sufficiently distinct to be acceptable under the rules of botanical nomenclature. The palm specialist Burret has indicated that *Rhaphis,* Walp. is in error as a synonym of *Rhapis.*

Rhyticocos (rit i kó kos) is formed from the Greek word *rhytis* (a wrinkle or fold) and the Portuguese and Spanish *coco* (coconut palm). The word *coco,* a Romance language form, comes from the Latin *coccum* (berry, kernel) which was derived from the Greek *kokkos* (berry, seed). *Rhyticocos* alludes to the prominently sulcate or grooved inner spathe, one of the features which segregates the genus from *Cocos.* In *Rhyticocos amara,* the sole species now known to science, the adjective *amara* (bitter, in reference to the liquor within the nut) reflects the feminine gender of the generic name.

BRUCE H. BEELER

IN AND OUT OF THE PALM GARDEN

The notion that the coconut palm has distributed itself by means of its buoyant fruits on tropical sea beaches around the entire globe is so universal that it is still held to be a fact, despite accumulated evidence to the contrary, by most of the botanists who have had no occasion to reflect upon it and much less to investigate it. Encyclopedias, even, have helped to perpetuate this entrenched belief, superficially so very reasonable and ready-made for credence. It is true that coconuts in their husks will float, that they are often sea-borne over great

distances, that they are impervious to salt water for long periods and that, supplied as they are with both food and drink, they may germinate independently of both soil and water. It would seem to follow that their worldwide distribution has been by natural means, but investigations have turned up weighty considerations pointing to the agency of primitive and modern man as having been solely responsible. O. F. Cook wrote at length in an attempt to prove that the coconut palm originated on the South American continent rather than anywhere in the Old World, thus developing a theory that was and still is at odds with the opinion generally held among botanists. Collaterally, however, he attempted to prove that the palms were not established on seacoasts by any natural means, and here he was able to marshal a number of telling facts instead of having to postulate pure theory. Cook was by no means the first scientist to believe that man alone has been accountable for the tropical ubiquity of the coconut palm, but he was at greater pains than anyone else to prove it. (See The Origin and Distribution of the Cocoa Palm, *Contributions from the U.S. National Herbarium*, 7, 1901, and History of the Coconut Palm in America, Vol. 14, Part 2, 1910.) In the 1910 publication several bald statements in this connection would seem to challenge the reader's firmly held beliefs in such a way as to antagonize and prejudice him against the reasoned arguments elsewhere in the text. An example: "The coconut exists in the lowland tropics only as a product of cultivation. It does not plant or maintain or distribute itself on tropical seacoasts, and would entirely disappear from maritime localities if human care were withdrawn." And again: "The idea of wild coconuts planting themselves on tropical seacoasts is strictly the product of the imagination of authors who have written books about the Tropics without visiting such regions, or at least without taking into account the opinions of those who have first-hand familiarity with the habits of the palm." Cook did not let these assertions go unsupported, for obviously when widely-held ideas are challenged something must be said to back up the challenge.

* * *

Cook brought up the heaviest artillery he could muster to show that the ancestral home of the coconut is in the highlands of South America, far from the seacoast. His weapons were many and expertly fired, but they failed to destroy the target. Though his argument was persuasive, it failed to make many converts chiefly for the lack of enough incontestable grounds. He was handicapped to begin with by the fact that the coconut palms were not reported from the New World by the earliest voyagers unless, perhaps, from the Pacific side of Central America. There was some mention of large nuts, but these were not certainly identified as coconuts. Columbus himself, however, found the coconut in Cuba according to Cook, who puts him on the witness stand. The mariners saw "very many tall palms" and "a large nut of the kind belonging to India." It seems unlikely that Columbus had ever seen a coconut, and of course the nut "belonged" to India because he still thought he was in the eastern Indies. At any rate most botanical opinion today does not consider the coconut palm as existing in pre-Columbian times in the Antilles, in Florida or anywhere else in America, for the compelling reason that, had it existed, the earliest Europeans hardly could have failed to notice and

report in some detail upon such a remarkable and conspicuous element of the flora. León, not to refute Columbus, excludes it from the native flora of Cuba, calling it "cultivado y naturalizado" (*Flora de Cuba* 1; 246. 1946); and Bomhard, in the U. S. D. A. publication intended for popular consumption "Palm Trees in the United States," says of the coconut palms in Florida, "Although some of them appear to be native, the coconut was introduced there long ago . . ." Mowry, nevertheless, in "Native and Exotic Palms of Florida," fell in with what Cook believed to be popular fallacy, on two counts: by including it with the native palms and by stating that it was "probably started by nuts washed ashore." Quite significantly Dahlgren, in the 1936 edition of "Index of American Palms," gives *Cocos nucifera* no quarter as an American palm and assigns it to the Old World tropics. In contradistinction to the word "native," few would deny that the palm is at least seemingly spontaneous and now naturalized in various southern sectors of the Florida mainland and on the Keys, though whether or not it could maintain itself there indefinitely in the complete absence of humans must remain matter for speculation since it is not susceptible of proof.

* * *

Received ideas meant very little to O. F. Cook. He flouted them whenever they conflicted with his own convictions, which was not seldom. He erected new palm genera and species whenever and however he saw fit, without the least concern for their chances of being accepted by his fellow scientists—and was sometimes called a "splitter" for his pains. The Palmae constituted not just one family, but many, and his insistence was in no way inhibited by the refusal of his colleagues to agree. Botanical science, however, did not entirely ignore him; one example was his new genus *Paurotis* which finally supplanted *Acoelorraphe* with many if not all palm students. One thing stands out above all others in Cook's botanical writings, namely, that in matters botanical he was a rugged individualist. It was congenitally impossible for him to be a rubber stamp, even when defiance of the established order could gain him nothing. His exploring mind may have sometimes led him along paths that seem wrong-headed, but one need not subscribe in any particular to his published conclusions in order to admire him for having been his own man. The audacity of intellects like Cook's is a stimulant, and his greatest contribution may have been to cause others to re-examine their comfortably held ideas without, certainly, loss to themselves and almost as certainly with profit.

The Ecuadorian Relative of the Chilean Wine Palm

David Barry, Jr.

Quito is a mountain city of 9200 feet elevation, and the capital of Ecuador. A common palm there is *Parajubaea cocoides*. The name signifies a cocoid palm like a *Jubaea*, referring, of course, to *Jubaea chilensis* (*J. spectabilis*) from Chile, a palm that has been a horticultural subject in Southern California and the European Rivieras for about a century. Except for seedlings recently in-

70. *Parajubaea cocoides* in Plaza de la Independencia, Quito, Ecuador.

troduced into California, the Ecuadorian palm does not appear to be grown outside of its native country.

There are many of these palms in Quito. It is widely planted in parks, plazas and private yards. In going from airport to city the palm becomes quickly evident.

It is interesting to speculate upon the failure in the past to introduce such a prominent and beautiful plant to the temperate zone. Seeds are available from the abundant production of the palms in Quito. They ripen in August. The illustrating photograph was taken in the spring when the large bunches of seeds hung well out of reach and with no tendency to fall.

The importance of this palm to horticulture is twofold. First, it is an elegant species. The trunk is more slender than that of its Chilean relative, and it is surmounted by a gloriously graceful crown. Second, it should possess a high degree of resistance to cold. According to temperature ranges of Quito in *New Horizons*, the compendium of travel information published by Pan American Airways, during the year the low temperature ranges from 44° to 47° F., 24.4° to 26° C.; the high from 69° to 72° F., 38.3° to 40° C., and the temperature averages 55° F., 30.5° C., during ten months of the year, and 56° F., 31° C. for two months. From these figures it is evident that this species can probably thrive where the nights are cool during much of the year.

The critical factor in the resistance to cold of many plants from warm countries is often the ability to withstand continued coolness at night rather than

a short but sharp drop in temperature.

The African relative of the Chilean wine palm, *Jubaeopsis caffra* (*Principes*, 1:180.1957; 3:103.1959), is a trunkless species of multiple crowns, and is about as hardy as *Howeia* and *Archontophoenix*. The Chilean species is one of the hardiest of palms.

Early Development of the Oil Palm Seedling

A. R. Rees

West African Institute for Oil Palm Research, Benin City, Nigeria

In the first of a most welcome series of papers on the morphology of palms, Tomlinson (5) has followed the work of Gatin and classified palm seedlings into a number of types on the basis of seed and seedling structure and mode of germination. The main features of the classification are tabulated below.

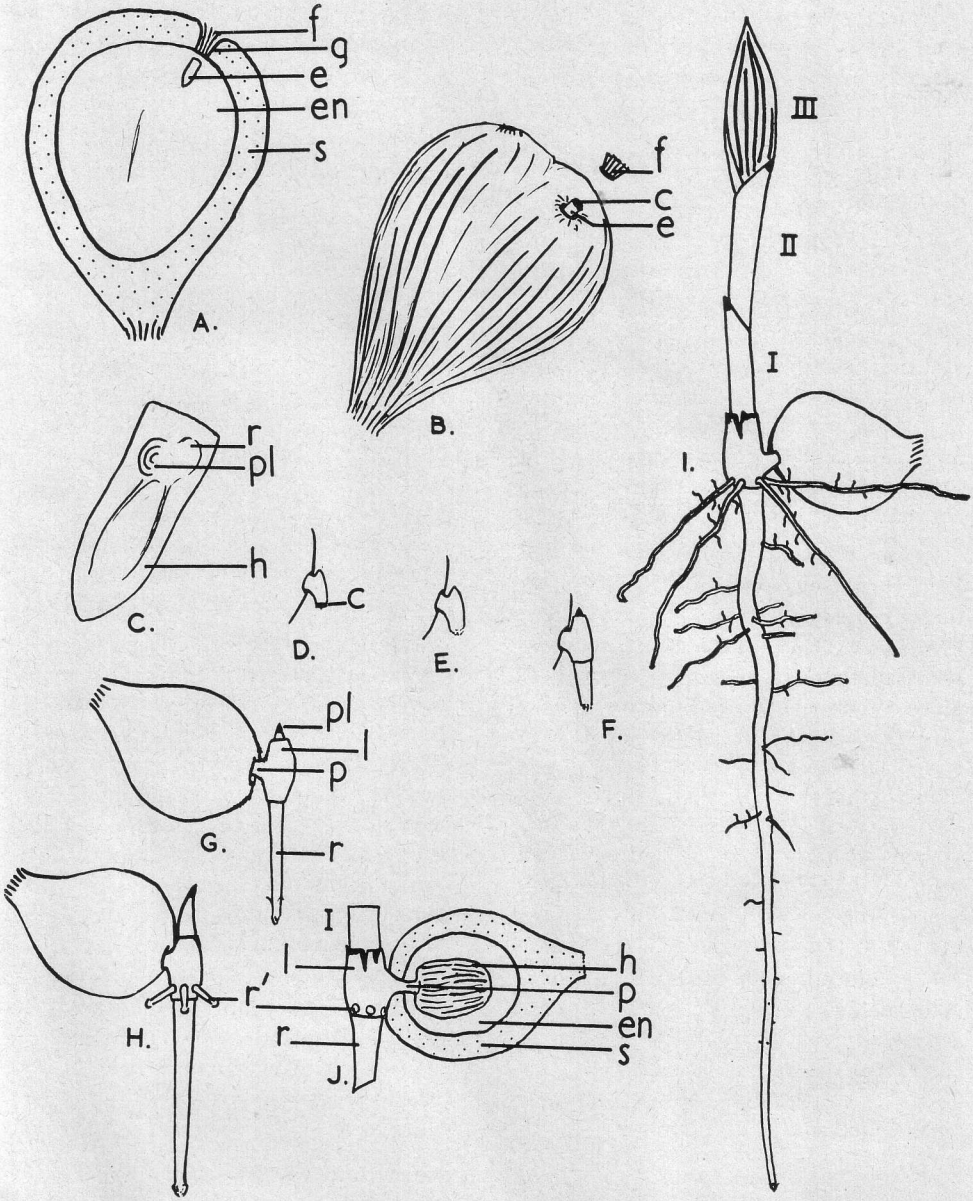
At the West African Institute for Oil Palm Research, work on the germination of seeds of the oil palm, *Elaeis guineensis* Jacq., has been in progress for a number of years. The physiology of germination has been discussed fully by Hussey (1, 2) and Rees (3, 4) and will not be enlarged upon here. It was thought that a brief description of the oil palm seed and early seedling development would prove of interest and serve as a basis for discussing the position of the oil palm in Gatin's classification.

Germination and the early development of the seedling is illustrated in the accompanying figure. The oil palm embryo is short and straight or very nearly so, although it does become curved following germination, apparently due to the growth of the plumule (fig. 71, D). The distal end of the embryo produces a well developed persistent radicle. It is produced later than the plumular projection, although its early growth is more rapid. Development of adventitious roots is extremely regular just above the clearly demarcated radicle-hypocotyl junction (fig. 71, H). The ligule is cylindrical, well developed (fig. 71, H, I) and persistent, although it undergoes some marginal tearing with increased growth of the seedling. Two bladeless sheaths are produced before a leaf with a green blade appears.

The fact that the seedling develops very close to the seed apparently excludes the oil palm from Gatin's types A and B which are characterized by a well developed cotyledonary petiole and sheath. In group C, as exemplified by *Archontophoenix*, the embryo is curved, and the narrow radicle which has a restricted growth is soon replaced by a wide lateral root. Superficially the oil palm resembles type C as there is no elongation of cotyledonary petiole and

Type	Embryo	Plumule & Radicle	Persistence of Radicle	Petiole & Sheath
A	straight	along main axis	persistent	elongates, eligulate
B	straight	oblique	persistent	elongates, ligulate
C	curved	oblique	non-persistent	no elongation, ligulate

Table 1. Characteristics of the three types of palm germination.



71. *Elaeis guineensis* seed and early growth of seedling. A. Longitudinal section of seed through embryo × 2¼. B, Just-germinated seed × 2¼. C, median longitudinal section of embryo × 9. D, E, F, G, successive stages in the early growth of the embryo, all × 1⅛. H, production of adventitious roots × 1⅛. I, 4-week-old seedling × 1⅛. J, section of seed at stage I to show haustorium × 1⅛. C, cap of testa; E, embryo; EN, endosperm; F, fibre plug; G, germ pore; H, haustorium; L, ligule; P, petiole; PL, plumule; R, radicle; R', adventitious root; S, shell; I-III, plumular leaves.

sheath. The embryo, however, resembles that of type B in being straight, with an obliquely placed radicle and plumule, and in producing a persistent primary root.

The basic differences between types A, B and C of Gatin's classification lie in embryo structure and growth rather than in the extent of elongation of petiole and sheath which is an ecological adaptation to the dryness of the normal habitat.

Germination in the oil palm, in Nigeria at least, is physiologically adapted to the natural environment which normally includes a dry season of a few months. Seeds do not germinate during the dry season although a high temperature (38-40° C.) is essential for the earlier stages of the germination process. With the onset of the rains there is a rapid burst of germination and the seedlings develop when the soil moisture supply is adequate.

The oil palm seedling belongs to type B of Gatin's classification although it is not typical of the group because of the poorly developed cotyledonary petiole and sheath. The ecological adaptation to a dry season in the oil palm is a physiological one, germination being delayed until the soil moisture supply is adequate.

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A Note for the Matchless

A. D. E. Elmer, in *Leaflets of Philippine Botany* 8: 3023, 1919, notes the following use for *Arenga Ambong* (under the name *A. tremula*) in Palawan:

"A native who accompanied me in the field carried with him a slender bamboo pole of a *Schizostachyum* species, and as I first thought as a mere cane or staff. But whenever he wanted a light for his cigarette, he would pull out a small but very fine tinder mass from under the sheaths of this palm, would carefully place and firmly hold it over a small piece of porcelain or some other sort of crockery, and strike it against his silica roughened bamboo stick. Invariably he got a light even when it was raining."

LETTERS

I highly recommend to anyone on the oceanfront anywhere to get the English book by Arnold-Foster, *Trees and Shrubs for the Milder Counties,* the milder counties being the southwest English coast. This will give even the most disheartened the needed courage.

Robert L. Bishop
Waldport, Oregon

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

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Errata:
p. 26, col. 2, 2nd line from bottom *for* eastwards *read* westwards; bottom line *for* westwards *read* eastwards.
p. 27, col. 1, line 30 *for* the fruit *faufel* or *faufel read* the fruit *faufel* or *foufol*.
pp. 97 and 99, reverse legends for Figures 44 and 46.

72. Massive inflorescences of *Caryota* sp. on the estate of Mr. and Mrs. Alvin R. Jennings, Coconut Grove, Florida. Ray Vernon, Superintendent, provides scale. This photograph, kindly provided by Nixon Smiley, was omitted from the July issue due to lack of space. It was originally intended to accompany the article on the Caryotoideae which appears on pages 102 to 117 of this volume.