



# PRINCIPES

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## THE PALM SOCIETY

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

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## PRINCIPES

### JOURNAL OF THE PALM SOCIETY

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## Cover Picture

A robust example of *Caryota ochlandra* in Ventura, California. Photo by Kenneth Foster. See page 3.

Mailed at Miami, Florida  
July, 1968

# The Semi-Hardy Mountain Caryota

DAVID BARRY, JR.

Since the turn of the century many attempts have been made to establish *Caryota* in the semi-tropics. The incentive is the unique beauty of the palm. It stands alone among all the palms in having doubly pinnate leaves. This characteristic enriches the foliage beautifully as the number of leaflets per frond is many times that of other plumose palms. Another attraction is the abrupt severing of the tip of each leaflet, as with a fishtail, so that the palm resembles a giant maidenhair fern.

The Asian *Caryota* is now found wherever tropical palms are cultivated for ornament. This wide distribution in both the New and Old World has without doubt been helped by the durability of its seed, which, unlike that of most palms, keeps viable for months without special care.

The coconut palm is the classical test of a tropical climate. Where it grows, *Caryota* can be grown without difficulty. In the semi-tropics, where the coconut palm will not grow, the rule has been that *Caryota* will survive during mild winters but will die after hard freezes.

A typical experience was that of Robertson-Proschowsky at Nice on the French Riviera. (The struggle to establish *Caryota* outside of the tropics evidently began on the Mediterranean littoral.) Writing in 1906, in the *Bulletin de la Société Nationale d'Acclimatation de France*, Robertson-Proschowsky recorded success in growing *Caryota urens* and *Caryota sobolifera* [= *mitis*] during several mild winters. When a hard winter came along that brought the temperature to  $-2^{\circ}$  C. ( $28.4^{\circ}$  F.), the palms were killed. In spite of this setback he discovered that *Caryota* varies

in tolerance to cold by experiencing the loss of three other species, *C. maxima*, *C. propinqua*, and *C. furfuracea* at the higher temperature of  $0^{\circ}$  C. ( $32^{\circ}$  F.). He mentioned also that he had seen an unidentified *Caryota* at Menton, near Italy, that "had finished its existence by its last flowering," adding that Menton was the most protected place along the coast.

Then years later, in the same bulletin for the year 1916 (vol. 63), Robertson-Proschowsky recorded further experiences with the *Caryota*. Three years before this second article was written, he had received from Hamma, in Algeria, several strong specimens of a *Caryota* with the horticultural name of *Caryota Rivieri*. These plants were able to withstand heavy frosts. During the period until 1916, he had repeatedly tried other plants received under the name *C. urens* and had lost them all from cold. Yet these palms from Hamma withstood frosts that even covered the fronds with snow. Although the identification of these palms remained in doubt, Robertson-Proschowsky believed that they were *C. urens*, and that the other palms previously received as *C. urens* were not of that species. He rejoiced in having at long last found a hardy *Caryota*. But sad to relate, they were all killed in an exceptionally cold winter a few years later.

In this same 1916 article Robertson-Proschowsky spoke of his surprise at finding that young plants of *C. ochlandra* died after having been planted out for three years; that young plants of *C. Rumphiana* did not at the time appear to have suffered. It was evident that some of these trials were inconclusive



1. A Chinese drawing of the Canton fishtail palm, *Caryota ochlandra*.

and not significant, as he had exposed juvenile plants for short periods only.

The two articles about the hardiness of palms on the Côte d'Azur were loaned

to me in the nineteen thirties by J. Harrison Wright, of Riverside, California. At that time Wright had assembled the premier collection of hardy palms in California. During the several decades that it took him to do this he had made several trips to Europe and had become acquainted with Robertson-Proschowsky and his garden. Wright had long ago given up hope of being able to grow such palms as *Howeia*, *Archontophoenix*, and *Caryota* in an interior valley where the mercury went as low as  $-7.7^{\circ}$  C. ( $18^{\circ}$  F.). However, he encouraged me to grow palms in my garden in the milder climate of the coastal plain of West Los Angeles that he could not grow. He first told me that *Caryota ochlandra*, the Canton fishtail, had been found to be hardy somewhere on the French Riviera. When I learned that the mountains around Canton, where the palm was native, reached 3600 feet and were visited by frosts, and that Canton was well inland, 85 miles up the Pearl River from Hong Kong, I became very anxious to try to grow this palm. Shortly before World War II I corresponded with a professor at Lingnan University, Canton, who sent me some seeds. Later I visited Hong Kong and from the palms on Victoria Island obtained a second batch of seeds. Now the source of these seeds has gone. The Chinese Communists will not permit their export from Canton, and the palms in Hong Kong have been destroyed by new construction, or damaged by a series of typhoons.

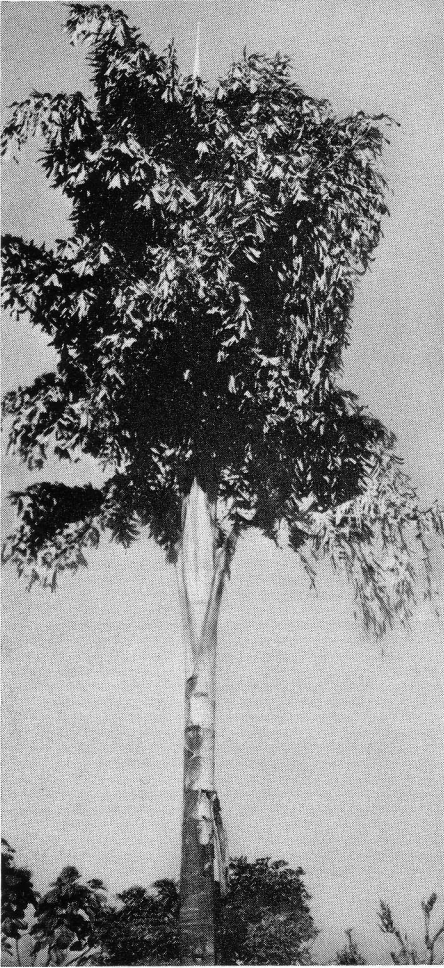
This seed produced several hundred plants of the Canton fishtail which are by now fairly well distributed among the palm fanciers of Southern California. A number of palms have reached the flowering stage. The extent of their seed production has not yet been determined, but in all probability it will be sufficient to meet future demands. In spite of the fact that a very hard freeze has not



2. *Caryota ochlandra* with *Trachycarpus* and *Washingtonia* in West Los Angeles.  
Photo by Wm. Aplin.

visited Southern California since 1949, it seems reasonable to believe that this species is now established in the coastal

belt of Southern California, and that foreign sources of seed will not now be needed. I am careful to restrict the pos-



3. *Caryota urens* in the lower Himalayan foothills of northern India.

sible range of this palm to the coastal belt where proximity to the ocean is essential to avoid the hard freezes.

*Caryota ochlandra* is a single-trunk palm, although three of my seedling plants developed multiple trunks.

Will this palm be useful in other parts of the semi-tropical world outside of Southern California? In my opinion it will not generally be useful because most semi-tropics are periodically visited by killing frosts where growers are not pre-

pared to protect the plants. These hard frosts may not occur frequently. The intervals between them may be ten to fifteen years. When they do occur in the Northern Hemisphere the great masses of Arctic air that range south will kill these palms. These are the kinds of freezes that upset the calculations of Robertson-Proschowsky. His discovery that certain kinds of *Caryota* were more hardy than others was of little use when all were killed. The same situation will obtain on the Florida Peninsula where the coconut palm will not grow. Years may pass and *Caryota* may flourish until a killing "norther" comes. Arrangements to protect the plants during these infrequent yet critical periods would make the difference between success and failure.

The devastating freezes that descend on the French Riviera and the southeast United States, except Florida from Palm Beach south, do not visit the coastal belt of Southern California. When the "historical freezes" do occur there, as they did in 1913, 1921, 1937 and 1949 much damage is done to plants, but not as severe as in the other places. In December, 1967, the freeze that took place in Southern California was not spread generally. It did reach 26° F. (-3.3° C.) in the coastal belt near San Diego where the mountain caryotas were found to be resistant to this amount of cold.

For another example of the usual vulnerability of the more hardy kinds of *Caryota* to occasional, devastating freezes, our fellow society member, Julien Marnier-Lapostolle, grew successfully for eleven years a specimen of *Caryota bacsonensis* in his garden at St.-Jean-Cap-Ferrat, on the French Riviera. This plant was killed in 1956 by the extremely cold winter of that year. It originally came from the massif of Bac-Son in the northern section of Tonkin, in Indochina. I have two plants of this

species under glass in California that will soon be robust enough to test outside.

About twenty-five years ago I learned that a *Caryota* grew among pine trees in the Himalayan highlands. This association with pine trees suggested hardiness. I decided to try this palm in Southern California. In 1962 I traveled there by way of Ceylon. In the mountains of Ceylon where tea plants covered the slopes, I was surprised to see tall fishtail palms that raised their trunks and crowns from narrow watercourses too rough to have been cleared for tea plants. In spite of my interest in the *Caryota*, I did not ask the driver even to slow down, as elevation markers along the road indicated 3500 feet. This I considered too low for development of frost-hardiness in *Caryota*. I admired the English for the use of elevation markers on their roads. Although the English have gone, the markers remain.

A few weeks later I was about 1300 miles north of Ceylon driving on a mountain road in northern India to see the "roof-top of the world." While the car followed the curves in the road, I searched intently for elevation markers and for *Caryota* palms. Finally, at Kio-seong, marked at 4864 feet altitude, I saw a fine specimen of *Caryota urens*. This was in winter. It was cold, and little wonder, as farther up the road and around a few more ridges was Mount Kangchenjunga standing above the other peaks of perpetual snow. In addition to the altitude, the cold reflecting from this white backdrop was a factor in the development of hardiness in this *Caryota*.

Seed collecting was difficult. After a palm was found with ripe fruit, a special ladder had to be constructed of bamboo to reach it. Many months later the seeds reached me in Los Angeles. They were very dry, yet a 10% germination was obtained, which was good under the circumstances of delay. Later I

secured other seeds from Sikkim, farther north, and learned that this species is widely distributed in the Himalayan highlands, including those in Nepal.

I felt satisfied that these *Caryota urens* from the Himalayan highlands would withstand as well as has *Caryota ochlandra* the occasional heavy freezes that descend upon the coastal belt of Southern California, and, perhaps of equal importance, the six months of cool nights from November to May which are characteristic of a region that is basically a desert.

The cold of last December has done much to sustain my belief, as it did not affect these palms in the various gardens of many of our members. In one instance, a palm at Vista was covered heavily with snow and was not damaged.

It has been found that this species of *Caryota* grows two to three times as fast as does *Caryota ochlandra*. So far no relationship between rapidity of growth and hardiness has been noted.

*Caryota ochlandra* and *C. urens* can be distinguished from each other at a glance as the petioles of the former carry leaflets to the trunk, while those of the latter have no leaflets on the section close to the trunk.

It is very likely that the *Caryota urens* which Robertson-Proschowsky thought he had established was from the Himalayan foothills. The cold that destroyed his plants was much more severe than that of the hard freezes that visit Southern California.

In that part of Florida where the coconut palm will not grow, and along the Mediterranean littoral, the palms should be protected in times of extreme cold. If they are too tall to be covered, heaters at the base should be provided.

From central China around Canton to the northern Himalayan highlands is a wide area extending about 1600 miles from east to west, in which other species

of hardy *Caryota* may very likely be discovered and brought to horticultural use.

E. J. H. Corner in *The Natural History of Palms*, writes on page 92 that "the giant fish-tail *Caryota* in the Malayan mountains reaches 120 feet and exceeds the canopy of the oak-laurel forest." I asked Director H. M. Burkill of the Botanic Gardens, Singapore, for more information about this palm. He reports that it occurs around 5000–6000 feet, and will seldom experience temperatures lower than 50° F. (10° C.). The palm is *Caryota aequatorialis*. He doubts very much that Malayan plants would withstand frost. While this opinion is not encouraging, this palm should be tried in the semi-tropics.

Many exotic palms can withstand frost down to, say, 27° F. (–2.6° C.) without injury, provided they come from elevated areas where nights are cool, yet where frosts do not occur. An example is the Ecuadorian *Parajubaea cocoides* which is extensively planted in Quito. There, at an elevation of 9200 feet, the night temperatures descend during every month of the year to about 45° F. (7.2° C.), but not lower. When this palm is planted in California it will withstand several degrees of frost.

Many species of *Chamaedorea* will also withstand such cold, although in their native Mexican or Central American highlands the temperature may never approach the freezing level.

Nature may do a bit of acclimatizing, taking several hundred thousand years and parts of geologic periods to do so, but not man, who does not have the time. The futility of trying to acclimatize plants was demonstrated in an experiment made by the English 150 years ago in India. They thought that if they could take banana plants from the tropics of India to the semi-tropics of the Canary Islands, and cultivate them for a number

of years, the plants might become sufficiently acclimatized there so that they would be able to endure the climate of England. This neat theory did not work out in practice.

Acclimatizing, of course, is not to be confused with hardening a plant by gradual exposure after being forced into soft growth by shelter and heavy fertilization.

The beautiful, multiple-trunk *Caryota mitis* is an Asian species that, like other tropical species of the genus, does not come within the scope of a discussion of the semi-hardy mountain species. However, it has some interesting characteristics when grown in the semi-tropics. These have been recorded by Dent Smith from plants in his garden at Daytona Beach. He discovered that specimens of *Caryota mitis* vary in degree of resistance to cold. After having had one specimen withstand heavy frost that badly damaged others, he dubbed it his hardy form of *mitis*. Nonetheless, he found that all species of *Caryota* are killed by a really hard freeze such as that of December, 1962, so that differences in hardiness between species or individual plants within species become an academic consideration. In that particular freeze during a period of three days, the temperature stayed below 32° F. (0° C.) for an aggregate of 28 hours, reaching a low of 22° F. (–5.5° C.) at one time. Finally, Dent Smith discovered that his *Caryota mitis* plants have remarkable power in being able to develop new stems from the roots. He reports that his hardy form, to quote, "had 12 stems to 20' and as much as 8" diameter when it froze right down to the ground in December, 1962, stems and all. It has been gradually recovering with new growth from the roots ever since; it now has 12 new stems to about 11', and should reach its former proportions in about three more years, barring another very hard freeze."



Another specimen also has made a somewhat similar recovery after having been frozen back level with the ground.

This remarkable recuperative recovery would probably not be possible in many of the sub-tropical regions, such as Southern California where the ground remains cold at nights for months during the winter. In Daytona Beach warm weather may follow on the heels of a "norther" and stimulate the functioning of the underground part of the palm to "recover from the roots."

Since the valiant efforts of Europeans to grow *Caryota* palms along the Medi-

terranean coasts, some of the factors involved can now be defined. While it is clear that the genus is primarily tropical in its requirements, some species and some varieties of species that are native to mountain areas will tolerate several degrees below freezing. With this understanding the usefulness of these beautiful palms has been greatly extended to suitable parts of sub-tropical areas where it was not known until recently that the plants would survive. For the future, other species from the highlands of southeast Asia in all probability will be found and tried with similar results.

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## GARDEN TOUR

# Foster Botanical Garden

The mainland visitor to Hawaii who has more than the average awareness of palms is frequently disappointed at the lack of variety being grown in the benign climate of the islands. Coconuts are everywhere, and there is also an occasional *Veitchia Merrillii* or *Prichardia* or clump of *Chrysalidocarpus*, but few other palms are apparent in this region where so very many species could be grown.

His disappointment can be quickly allayed, however, by a visit to the Foster Botanical Gardens, for here he will find variety in abundance. Located in the heart of Honolulu, adjacent to busy Nuuanu Boulevard and just a few blocks from the center of town, is one of the outstanding collections of tropical palms in the United States. The garden is outstanding not so much because of its size or the extensiveness of its collection, but because of its age and the maturity of the trees.

The garden was begun over one hundred and thirty years ago in 1855 when Hawaiian royalty deeded to William Hillebrand four acres of land which was to become the nucleus of the present garden. A physician by profession, Dr. Hillebrand was an ardent botanist and horticulturist by avocation. He produced the well known botanical treatise, *Flora of the Hawaiian Islands*, and planted many of the tropical trees which have now reached gigantic proportions and give a special character to the entire garden.

In 1867 the land was sold to Captain and Mrs. Thomas Foster who continued to develop the garden, extending it to five and one-half acres. In 1930 they bequeathed it to the city of Honolulu. Since that time, under enthusiastic and able directors such as Mr. Paul Weissich who now heads it, Foster Garden has been enlarged with the introduction of hundreds of new plants.



1. Foster Garden is dominated by huge old trees which give a special character to the garden. Note the very tall *Dictyosperma album* on the left which reaches up through the treetops for light.

The garden is dominated by huge tropical trees of great age such as the banyan, *Ceiba*, *Adansonia* and lesser known trees such as *Cavanillesia*, and *Enterolobium*. These giants create a feeling or mood that only a very old garden can provoke. What were undoubtedly planned as open spaces are now almost covered by great tents of foliage. Palms are found throughout the garden, but three main areal divisions become apparent to the visitor: those

palms growing in the lawn areas among the big trees, those grouped together in the back of the garden around a collection of multiple-trunked palm species, and those planted in a separate rain forest or "jungle" section.

One enters the garden from a spacious parking lot, passing through a small reception center, and is confronted by a great Chinese banyan tree (*Ficus retusa*), its aerial roots fastened firmly to the ground to create a small forest of its



2. Many palms planted among the large trees have developed leaning trunks as the *Livistona* species in the lower left. The slender palm in the center is a *Dictyosperma album* and the palm at the right is *Orbignya Cohune* (formerly known as *Attalea*).

own trunks. On close examination one of these trunks turns out to be that of a royal palm whose identity has been lost in the overwhelming crown of the banyan tree. Ahead and beyond this tree lies the rain forest, a kind of core in the center of the garden that is gradually developed and introduced by a planting of *Pritchardia*. To one's left opens the shady lawn area canopied with the giant trees.

To the far left of the entry, in the front corner of the garden, is the Lyon Orchid Collection comprised of species from the wet tropics. Some are under lath but others are growing naturally in the trees. Many of these plants have only recently been brought in from the wild. And adjacent to the orchid garden is an extensive collection of bromeliads which in themselves would make a visit to Foster Gardens worthwhile. But we are



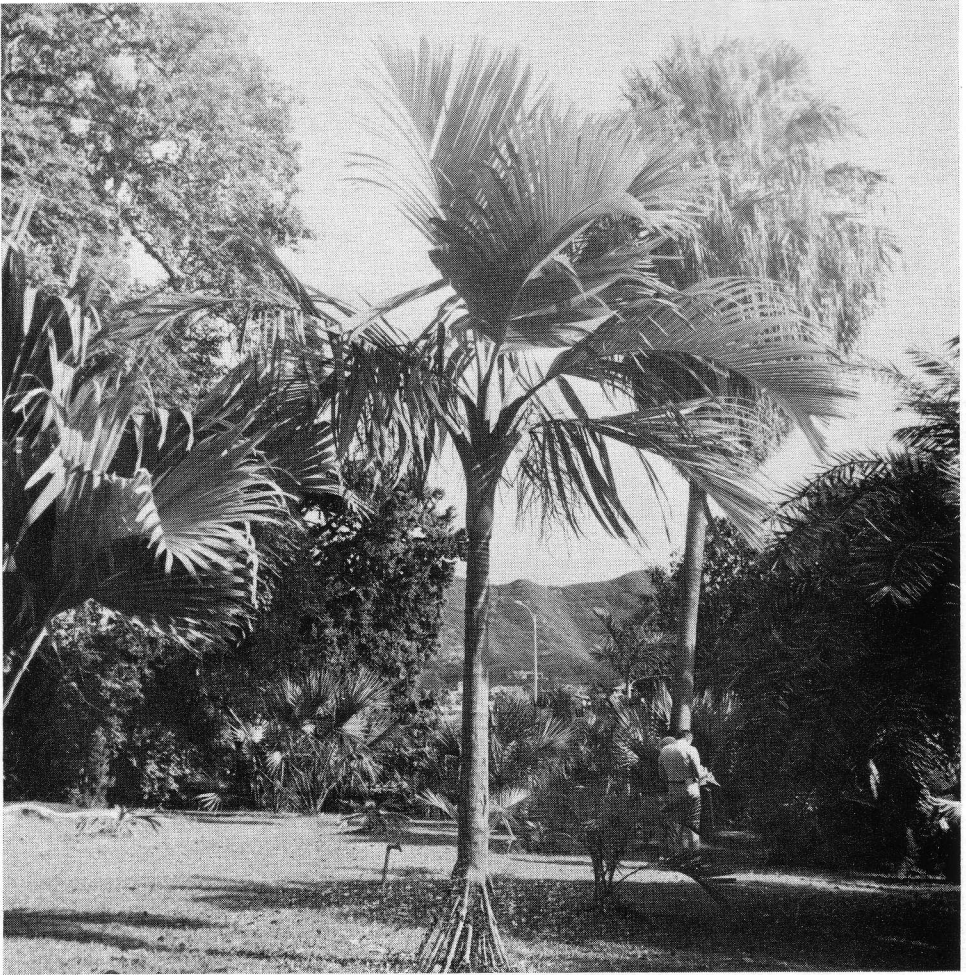
3. It is surprising to discover that this tall, slender palm is a *Sabal*—*S. mauritiaeformis*. The trunk is attractively ringed and a light grey in color. During a December visit to the garden, the ground beneath this palm was heavily littered with small black seeds, removing any doubt that this was indeed a *Sabal*.



4. At the rear of the garden where the giant trees give way to an area devoted solely to palms, one finds the coco-de-mer, *Lodoicea maldivica*. Note the extensive surface root system of the tree at the left, *Ficus Benjaminia*.

here to see the palms so focus attention on the *Chrysalidocarpus madagascariensis* growing near the bromeliads. As the name implies, the palm comes from Madagascar. It is pinnate with a slender but tall bamboo-like stem. Directly in front of the orchid house grows an old *Pritchardi Hillebrandii*, one of an extensive collection of this genus of tropical fan palms that is found in the garden.

Proceeding farther into the garden, the visitor is struck by the curious curve of many palm trunks as they reach upward for light. Many palms originally planted at a comfortable distance from competition and in full sunlight now find themselves in the shade. *Livistona*, *Dictyosperma*, *Howeia* seem determined to emulate the coconut. Several old *Dictyosperma album* have reached much



5. Adjacent to the *Lodoicea* grows this interesting stilt-rooted palm, *Verschaffeltia splendida*. In the background is a new planting of young palms. The collection of suckering or clumping palms is to the right of the picture.

greater heights than the limits usually accorded this palm. They, along with *Archontophoenix Alexandrae*, are encountered mainly as trunks with crowns lost high in the treetops. A surprise in this part of the garden is the discovery that one of these tall slender trunks is that of a *Sabal*, *S. mauritiaeformis*, a palm with none of the gross characteristics so frequently associated with the sabals.

As one walks deeper into the garden, the palm planting increases in interest. A large and rather messy *Orbignya Cohune* contrasts with a beautiful hedge of *Chrysalidocarpus madagascariensis* screening the garden from the adjacent side street. And then, staged on the grass is the legendary coco-de-mer, *Lodoicea maldivica*, the so-called "double coconut" from the Seychelles in the Indian Ocean. It is still a young plant, but its



6. *Ptychoraphis augusta* from Nicobar Island at first glance looks like a *Howeia*. This palm fruits heavily in Hawaii.

robust aspect is already befitting the tree that will bear the fifty-pound seed, the largest and heaviest seed of any plant, said to require ten years to ripen. The garden is proud of this palm and keeps a double coconut seed on the registration desk at the entrance.

The visitor is now near the rear of the left side of the rectangular garden and in an area where the large forest trees have been left behind and where

palms predominate. Here is located the type specimen of *Pritchardia macrocarpa*, protected by a fence. It is over one hundred years old and is the plant from which this species was first described. This is a dwarf species which originally grew in the upper end of the Nuuanu Valley and is now probably extinct in the wild. This *Pritchardia* is one of over twenty species of palms that are native to the Hawaiian Islands and are

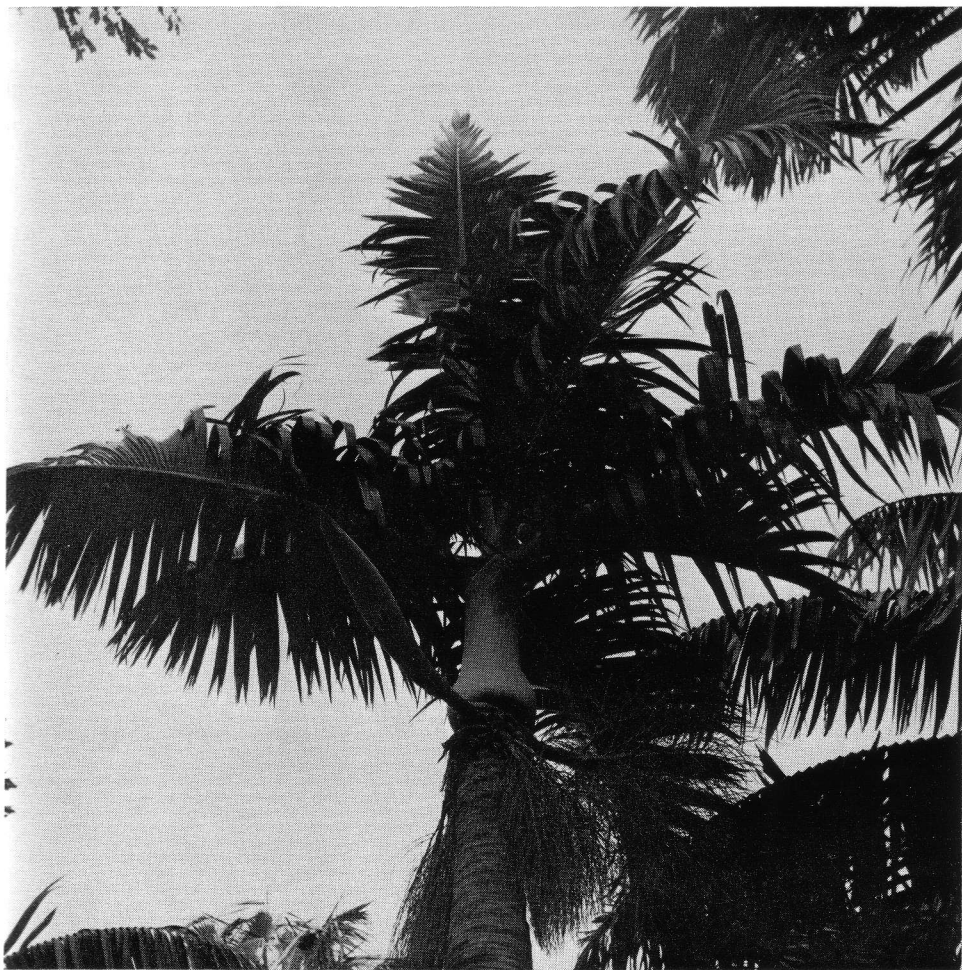


7. An amazingly tall and dense stand of *Acoelorrhaphe Wrightii* creates its own little forest.

found nowhere else in the world. They are found from sea level to over 4,000 feet elevation, and some may be confined to a single island or even to a single valley. The Foster collection contains all but a few of the described species. A visitor to Hawaii cannot help but wonder as he surveys the acres and acres of sugar cane and pineapple how many unique plant species were lost forever in the wanton clearing of native vegetation for commercial agriculture.

Ahead and to the right is an extensive planting of palms including the tall and slender *Gaussia attenuata*, a collection of *Caryota* species, more species of *Pritchardia*, *Copernicia*, a curious putative *Mascarena* hybrid, *Latania*, *Ptychosperma*, *Aiphanes corallina* in fruit and many more. Outstanding, however, is the collection of suckering palms. There is a clump of *Acoelorrhaphe Wrightii* that is unbelievably (to a Californian at least) a full twenty feet across—a small





8. The Foster Garden Bulletin says that this strong-featured palm is a hybrid between *Mascarena Verschaffeltii* and *M. lagenicaulis*. In the opinion of the author this palm is more attractive than either of its putative parents.

forest in itself. Magnificent groves of *Rhapis* grow nearby. There is a beautiful specimen of *Ptychosperma Sanderianum* with slender bamboo-like stems and a well-proportioned stand of *Ptychosperma Macarthurii* consisting of ten tall trunks, all in fruit. One is struck by the great variety of clumping palms, from the dense growth of the *Acoelorrhaphe*, to the open airiness of the *Ptychosperma*, to the robust and larger trunks of *Onco-*

*sperma tigillarum* from the East Indies. This is a beautifully proportioned group of several six-inch trunks growing closely together, terminating in soft pinnate crowns arranged at various heights. The trunks, heavily set with black spines, are vicious to touch but delightful to behold.

A pleasant discovery for the palm enthusiast comes after leaving this palm area and continuing to the right into a



9. These ten soaring trunks of *Ptychosperma Macarthurii* are loaded with ripening fruit, held in pendulous clusters below the crownshaft.

section apparently devoid of palms, but containing many flowering trees. There he encounters what at first appears to be just one more tree with a main trunk dividing into four ascending secondary trunks and branches. It appears to be an ordinary tree, that is, until the eye reaches the top and finds a crown composed of seventeen beautiful separate heads of grey-green palm leaves. The tree is the branching palm from Egypt

and the Sudan—*Hyphaene thebaica*—growing enthusiastically in this Honolulu garden.

The rainforest section in the center of the garden is an entirely different experience. One follows a path and is enclosed by a lush, almost overpowering growth of philodendrons, gingers and heliconias, dieffenbachias, red ti, anthuriums and aloccasias. The visitor feels alone here although others may be only

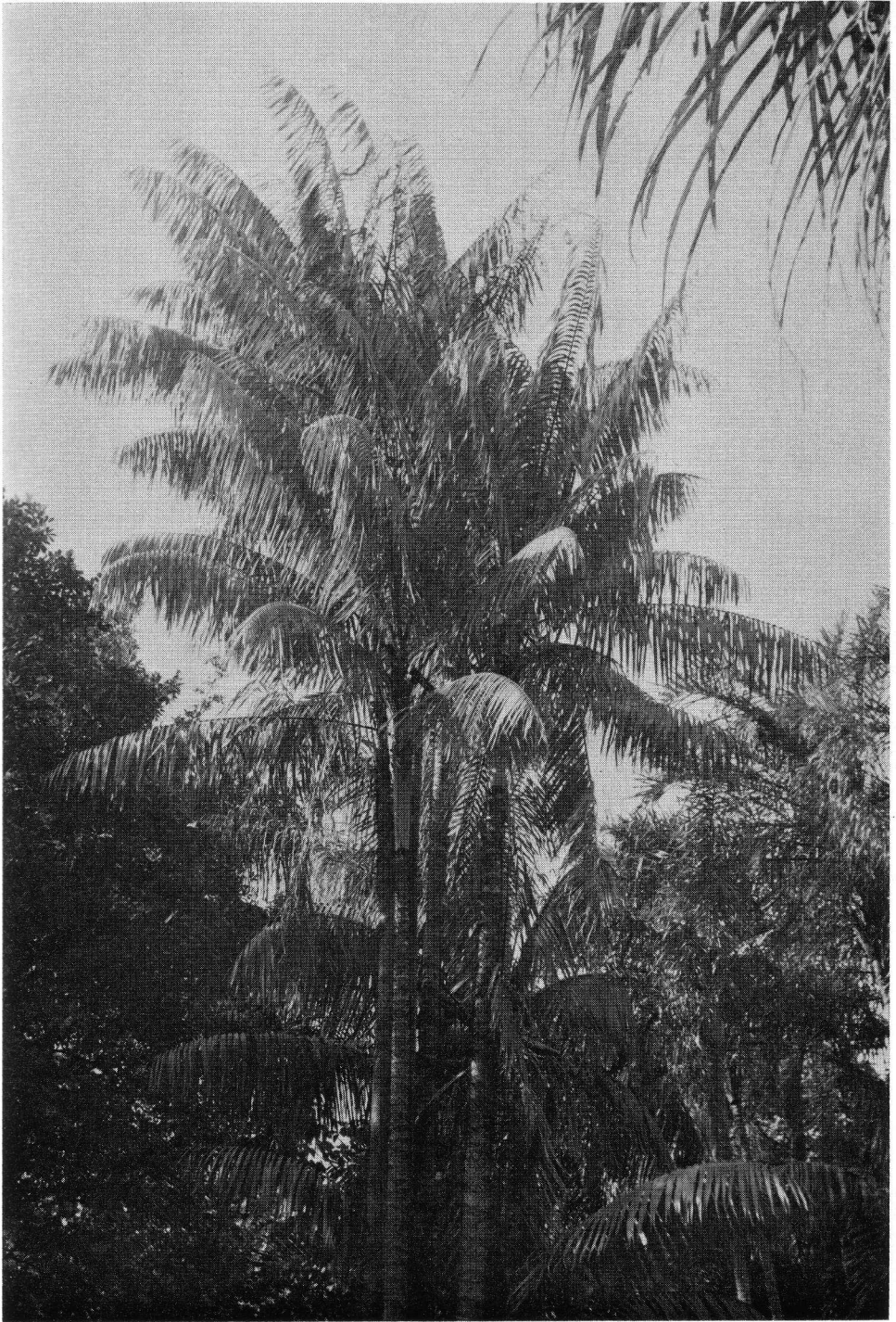


10. The fruit of *Latania Loddigesii* is interesting, looking deceptively like large bunches of green grapes.



11. A *Chrysalidocarpus* from Madagascar, probably *C. madagascariensis* or its variety *lucubensis* but called *Dypsis pinnatifrons* in the garden, raises crowns that look very similar to the much more familiar *Arecastrum Romanzoffianum*.

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12. A multiple-trunked palm of most pleasing proportions is *Oncosperma tigillarum*. Closer inspection reveals a trunk densely set with black spines. →







14. The curious branching palm from Africa, *Hyphaene thebaïca*, is planted apart from the other palms, among the dicotyledonous trees. It is a startling discovery to look up and find a crown composed of palm leaves. Photo by E. Charles Cornell.

←

13. Detail of the trunk of *Oncosperma tigillarum*.



15. This young specimen of *Hyphaene thebaica* shows the costapalmate leaf, similar to that of many of the *Sabal* species. Photo by E. Charles Cornell.

a short distance away. Most of this part of the garden is very informally planted, although in some sections there appropriately are concentrated plantings of related species, for example, a ginger terrace. Of particular interest is the collection of *Chamaedorea* species and other understory palms which thrive in this section of the garden. Probably the most breathtaking palm planting of all is in this area, consisting of a group of perhaps a dozen *Licuala grandis*, their great

many-folded, uncut, palmate leaves held ten or twelve feet high, appearing almost translucent in the filtered light. Across the path from the *Licuala* is a splendid palm, *Rhopaloblaste ceramica*, with a grey trunk, prominently ringed like giant bamboo, and enlarging into a beautiful crownshaft that blends delicately into the trunk.

In this part of the garden is also found the vine-like rattan palm, *Daemonorops mollis*, which clammers through the trees





16. This group of *Licuala grandis* in the rainforest section is one of the loveliest plantings in the entire garden. Photo by E. Charles Cornell.

by its spines and thorns and projections at the end of its leaves. Contrasting sharply to these smaller species—almost as a shock—is a massive specimen of *Metroxylon amicarum* from the Caroline Islands. It dwarfs all else around it with a spread equal to that of the largest *Phoenix canariensis*, yet with an open crown like an *Arecastrum* and with a relatively smooth trunk proportionate to the crown. This rainforest section of the

garden abounds in palms including the sealing wax palm, *Cyrtostachys Lakka*, with its bright scarlet petioles, a large *Kentiopsis* and a *Clinostigma*. Unfortunately many of the palms are not labeled and are of species unfamiliar to the author. Lack of labels, however, is forgivable in this secluded section of a garden which hosts over 100,000 visitors a year.

Foster Tropical Garden is now part of



17. The massiveness of *Metroxylon amicarum* (formerly *Coelococcus carolinensis*) is felt as much as it is seen. Next to the figure in the foreground are two *Howeia*, behind them is *M. amicarum*. Note the huge tree at the far right towering over everything else. These great trees are found throughout the garden. Photo by E. Charles Cornell.

a larger concept known as Honolulu Botanic Gardens which is being developed into an unusual and commendable garden complex. This complex when completed will consist of five sites located in five different climate and ecological environments: Foster Garden in the warm humid zone, Wahiawa Garden in the cool humid tropics at 1,000 feet elevation, Koko Crater Garden for plants

requiring hot dry conditions, Sandy Beach Botanic Garden for tropical shore plants, and Kawainui Swamp for one hundred acres of tropical water gardens. When completed this endeavor, reaching out from the nucleus of Foster Garden, should become one of the world's truly great botanical gardens.

WARREN J. DOLBY

## COLLECTOR'S CHOICE

## A Very Special Livistona

Your favorite palm? Perhaps you know which one it is, and why it is, without pausing to give it a moment's consideration. Seemingly it should be very easy to name that superlative palm and also to dash off a few telling sentences for publication, if requested, to a total of about five hundred words. But when such a request was made of me just recently, I was at first pretty well perplexed and very much surprised to find out there would be some difficulty in making a choice. All God's chillun got wings, and there's the rub. The difficulty stems from admiring too many palms and not actively disliking any of them.

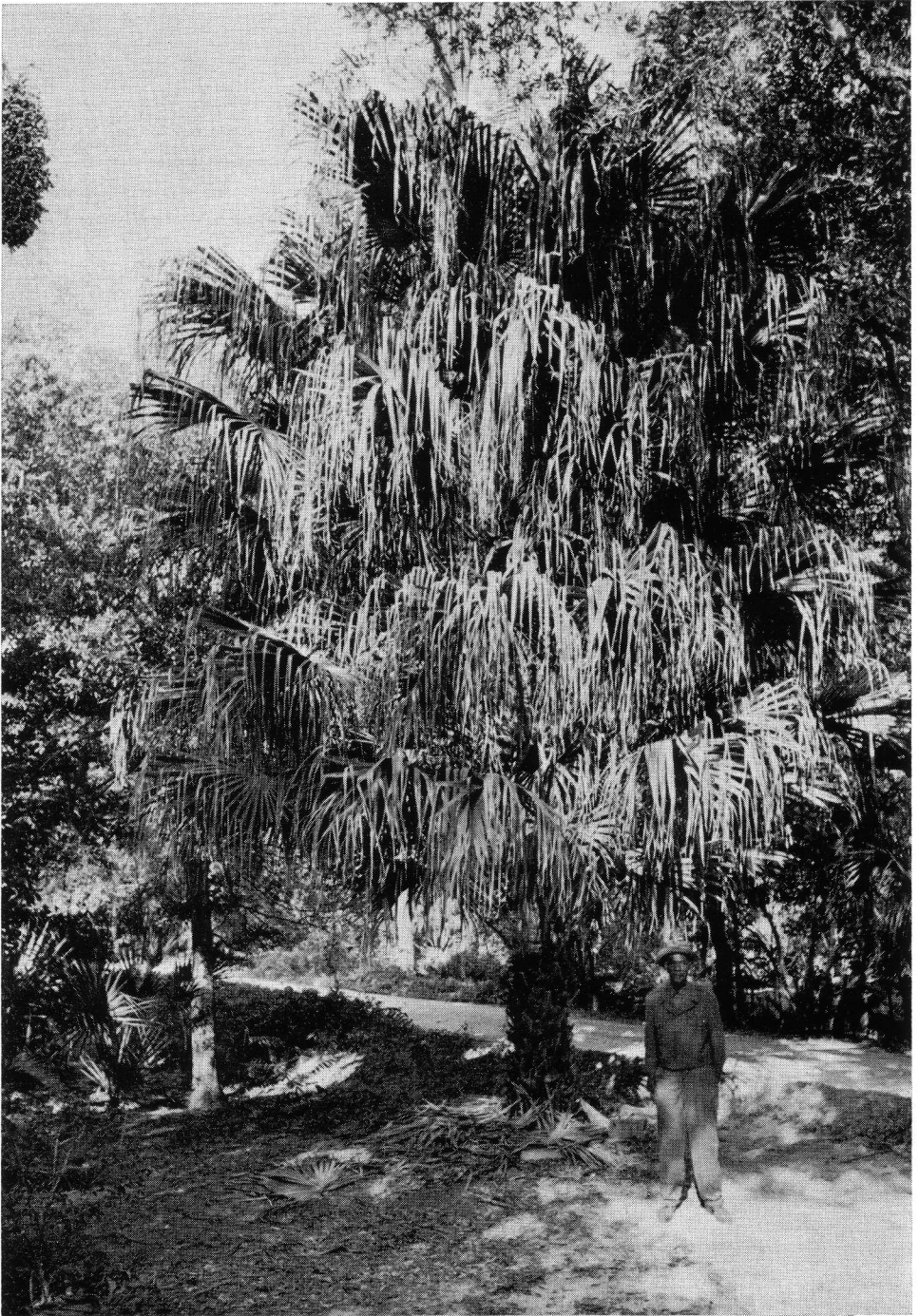
Any question about a choice, I had thought, could be resolved readily enough by electing the *Phoenix rupicola*, often called the handsomest species of its genus; or the *Licuala grandis*, a little honey of a palm; or the *Jubaea chilensis*, a honey palm but massive, not little; or the *Roystonea oleracea*, the *Rhyticocos amara*, the *Cyrtostachys Lakka*, or David Fairchild's special love, the *Pigafetta filaris*; or any other chosen from an elegant infinitude. Upon examining the matter, however, it was clear it would not be easy to find compelling reasons for putting one palm above all the others. Besides it would hardly be cricket to single out a palm I had never so much as glimpsed unless in an illustration—an Andean wax palm, for example, perhaps towering to nearly two hundred feet. Of course there was the temptation to buck the trend and be different by naming the lowly, and usually scrubby, saw palmetto (*Serenoa repens*), or something even less distinguished, the *Sabal Etonia*, which will never win a beauty contest.

With some reluctance, however, I

passed up the opportunity to gain notoriety as a sort of James Joyce of the palm world, whose gibberish would be highly respected because nobody could understand it.

I had to make a choice and stop floundering around, so I decided to confine it to the palms that are growing on my own grounds. I would look at them all again, for about the billionth time, but more objectively than ever before, and then make a decisive choice. This I proceeded to do, and it seemed to me that one stands out above the crowd of about a thousand competitors here and is by all odds, if not the prettiest or most elegant, the most majestic in appearance.

This majesty of a palm belongs to the genus *Livistona*, though its species is uncertain. It resembles most nearly *L. chinensis* when compared with examples of all seven species growing in the same garden, but there are several differences from the palm I take to be good *L. chinensis*. A taxonomist might consider the differences not significant enough to warrant separate specific status for my favorite, but it does differ from *L. chinensis* most noticeably in these particulars: 1) it grows more than twice as fast; 2) there is, on the upper surface of the leaf blades, a sheen or glint that is in wide contrast with the dull green leaf surfaces noted in *L. chinensis*; 3) the petioles are armed with heavier and longer less recurved spines than those of *L. chinensis*, but this factor is not dependable because the petiolar armature is not always constant even in the same palm; 4) it first blooms at about half the age usually observed in *L. chinensis*; 5) it is much more retentive of live leaves than *L. chinensis* is, at least in this



This *Livistona* species holds over one hundred unblemished, vivid green leaves. To measure its great size, note the man in the right foreground.

garden, where fifteen of the latter ranging in age from ten to about forty years may be observed in various stages of growth, and this greater retention of foliage is evident at once, even though *L. chinensis* retains more live foliage, when favorably situated, than most other coryphoid palms.

My favorite is clothed at present with over one hundred unblemished vivid green leaves, to within a few feet of the ground. The lowest and oldest of these still green leaves have been on the palm since 1964 and 1965, quite unchanged by the frosts, freezes, droughts and windstorms of recent years. It would still be clothed quite to the ground if the lowest leaves had not been pruned away before they had become even a little unsightly. It is this unexampled mass of vivid green foliage that awes the beholder and gives the palm its majestic appearance. Added to this is the beauty of the leaf blades with the glint of sunshine or moonlight upon them, though brilliant even when shaded; and the fountain effect of the drooping leaf segments. This effect is heightened by the sheen so readily apparent in the accompanying illustration, but no mere black-and-white photograph can really convey the striking appearance of the green foliage.

Clearly enough, as the illustration suggests, my favorite is one of the "fountain palms," a sobriquet usually applied to *Livistona chinensis*, yet perhaps quite as apt for some of the other species. It may be an unnamed variety of *L. chinensis*, or a form of it not different enough to give it varietal rank. Or it may be the hybrid product of, say, *L. chinensis* and *L. australis*; but I hasten to add this would seem to me farfetched and quite unlikely to say the best of it, for I don't know if these palms cross, and moreover have no doubt, without any assurance to the contrary, that any-one else knows.

Perhaps I should mention, before I forget it, whence came my palm, its height and its age. It is now about fourteen years old. Ten years ago a few young palms of several different kinds had overgrown a small test-area in the lowland marl at the Fairchild Tropical Garden, and this phenomenal plant of mine, then consisting chiefly of roots and four-foot leaves, was dug and extricated from the tangle, placed on the floor of my car and transported to its new home, where it was replanted and at once began to flourish. It is now just over twenty-three feet tall to the top of its topmost leaf, a fact easily determined by using a ruler to relate the height of the palm in the illustration to the known height of the man standing near its base.

Apparently *Livistona*, a genus said to consist of some twenty species, has not yet been exhaustively studied. The species are widely dispersed in regions as far apart as central Australia and south central China, as also in Malaya, New Guinea and the Philippines, and presumably good herbarium specimens of every one do not exist.

If a botanist had compared the flowers of my palm with those of good *L. chinensis*, I daresay he would have found no differences; but up till now, this would have been impossible, for the palm had not reached bearing age. Two days ago, however, or precisely on January 7 of this year, I was amazed to find that it had suddenly come of age. I had gone out to check the number of leaves for this page in my script, and saw, while peering upward through the foliage, that seven long spadices had emerged and the inflorescences were already in full bloom. In January, mind, when at this latitude one often shivers and sometimes wonders if, after all, it might not be well to sharpen that long disused pair of ice skates. But not this season, for the local weather has been ab-

normally warm so far and not much different from a tropical winter, with avocados, citrus, bananas, and many other plants blooming before their time. This prompted an inspection of all the other *livistonas*, of whatever species on these grounds. Not one spadix is visibly emerging as yet from any of a dozen or so palms of flowering age, with the sole exception of that daring performer, which as I have already said, is in full bloom. Could this be significant of a specific difference? I cannot say, and must remain in this respect an agnostic, a word invented by Thomas Henry Huxley from the Greek *agnostos*, meaning "unknown" or "not to know." So I am an I-don't-knower about this as about all else having to do with taxonomy.

To have a favorite palm at all there has to be something outstanding about it. My palm seems to me overwhelmingly beautiful, but if the next hard freeze would turn it into an eyesore and perhaps kill it, I would not knowingly choose it as a favorite to be preferred above all other favorites. Luckily my palm is possessed of virtues more solid than the accident of beauty. It is tolerant of cold, drought and windstorm, and requires no special care of any kind. It is manifestly happy to be where it is, and seems wholly indifferent about whether anybody else besides me loves it or not. I should hope, though, that everybody would.

DENT SMITH

## THE EDITOR'S CORNER

Only through the involvement of every member of the Palm Society can PRINCIPES fulfill its role as the leading journal of the world of palms. We would like every member to consider himself a reporter on the staff of this publication. The section we entitle PALM BRIEFS, for example, should be a lively and interesting part of PRINCIPES, a potpourri of news and observations about palms. We need your ideas, your newspaper clippings and photos, your letters to the editors or to the membership. All communications from you are solicited and welcomed. Send technical communications to Dr. Harold Moore, Bailey Hortorium, Mann Library, Cornell University, Ithaca, New York 14850. Non-technical materials and letters should be

sent to Warren J. Dolby, Contra Costa College, San Pablo, California 94806.

W.J.D.

The Editor regrets the lateness of the current issue which is due in part to a change in printing arrangements, in part to pressures of too many other duties which must take priority. For those readers who become impatient (including the Editors), let it be said that The Palm Society is not the only one whose journal is often delayed. Editing of society journals frequently (as with PRINCIPES) is an extracurricular labor of love and love sometimes has to give way when keeping up with professional obligations requires up to fourteen hours a day.

H.E.M.

## PALM BRIEFS

### A Sideshow *Trachycarpus*

From time to time PRINCIPES has published pictures of unnaturally branching palms, and now I have one of my own. Last August when palms were being dug on the growing grounds of the Tetley Nursery in Corona, California, this two-headed *Trachycarpus* was discovered. It of course was unique among the hundreds of other *Trachycarpus* growing there with it. Fortunately for me, Bud Tetley, who is also a member of The Palm Society, gave in to my amazement and enthusiasm and made me a generous



gift of the two-headed palm. I have had it in a thirty-six-inch box since last fall and intend to plant it as a focal point in my garden this spring.

BURT GREENBERG  
16654 Kelslean Street  
Van Nuys, California 91406

### Experience with Manganese Sulphate

To my chagrin, I learned the hard—and expensive—way about a completely unexpected side effect of the use of manganese sulphate on my palms.

Our south Florida soils are predominantly alkaline, and our city water (which I use for watering) is so alkaline that it will, in time, even turn peat moss alkaline. As a result, manganese sulphate has been an almost magical cure for yellowing of palm leaves as well as for another condition that at first looks like a fungus disease. With this condition there is a reduction in leaf size and an increased browning of new leaves until, at its worst, it appears about to kill the entire bud. This affects *Rhapis* particularly, but also occurs with other palms as well. I have found it not only in potted plants, but also in those palms set out in the ground. A total recovery in an amazingly short time has been achieved by throwing handfuls of manganese sulphate over the affected plant, being sure that some of the material falls into the heart of the palm as well as on the ground. Care should be taken not to handle the chemical with bare wet hands as it can cause quite an unpleasant burning sensation.

If manganese sulphate is used preventatively, the plants remain healthy and a deep green color. Evidently there is not such a thing as an overdose, so I do not hesitate to use generous amounts, even up to twenty-five pounds for a large plant!

The unexpected side effect, about which I so sadly learned, became apparent when I put manganese sulphate on some of the smaller potted palms on my porch. I water these plants almost daily with the hose (I try to keep water in the saucer under my *Licuala grandis*), wetting the whole porch in the process. About three days after the manganese

sulphate treatment, my lovely pale green terrazzo porch began to turn a rusty brown. Though the plants were removed immediately, the stain had set and no amount of daily hosing has reduced it. The porch will have to be repolished after being carefully bleached with acid. Since then I have learned that this stain will also appear on cement walks and

walls if the manganese sulphate is not handled with care.

May my tale help you to more healthy palms with no disfiguring stains on their surroundings.

MRS. THEODORE C. BUHLER  
1320 So. Venetian Way  
Miami, Florida 33139

## NEWS OF THE SOCIETY

The year 1967 was a very good one for the Society. Seventy-nine new members joined, against 31 who did not renew their memberships. Thanks to the good public relations work done by our members, plus the "plugs" given the Society in several books and other publications, it is no longer necessary for us to solicit members—they come to us. Financially, the Society is in good condition; we probably will end the biennium in April with a small surplus.

Due to excellent growing conditions in most palm areas, and to the astonishing generosity of many members, the Seed Bank flourished. At times the routine work of keeping the Society going had to be put aside in order to ship out thousands of seeds, many of them very rare, while they were fresh and viable. Letters from many of the recipients, expressing their delight in receiving long-wanted seeds, were heartwarming. Reports on germination and the various experiences connected with growing seedlings also were welcomed. Many chatty, friendly letters were received and read with interest, and answered to the best of our ability.

We look forward to 1968 with anticipation, knowing that many exciting and valuable experiences lie ahead. Plans for the Biennial Meeting in Arcadia, California, on August 10th are being made, and a fortunate group will leave immediately afterward to visit great botanical

gardens and palm areas of the Pacific and Far East. We hope to meet or renew acquaintance with many members during these occasions.

\* \* \*

Robert William Read, who has been a member of the Society since its beginnings and who has contributed several articles to PRINCIPES, has received his doctor's degree in palm studies.

Dr. Read received his B.Sc. from the University of Miami in 1958, and his M.Sc. at Cornell University, where he worked under Dr. H. E. Moore, Jr. and wrote his Master's thesis on the genus *Pseudophoenix*. He spent two years in Jamaica, studying the genus *Thrinax*, and his Doctor's dissertation is entitled "Thrinax in Jamaica." He received his Ph.D. at the University of the West Indies, Kingston, Jamaica.

Dr. Read spent a number of years working on palms at the Fairchild Tropical Garden, Miami, Florida. He has collected palms in Cuba, Hispaniola, Jamaica, Costa Rica, Mexico and the Bahamas, besides his extensive collecting in Florida. He is now spending a year at the Smithsonian Institution, Washington, D. C., where he will attempt to revise completely the palms of the Caribbean region. Congratulations, Dr. Read! We expect more good articles from you.

\* \* \*

Mrs. Gunter F. Herman, of Los Angeles, called our attention to the lead article in the science section of the Sat-



urday Review (380 Madison Ave., New York, N. Y. 10017), dated June 3, 1967. The article was written by a long-time member of the Palm Society, Mr. Richard B. Murrow, an engineer with the Rand Corporation. In his most interesting article, Mr. Murrow tells of seeing the farmers in Egypt toiling at pumping water from the Nile onto their fields by the most primitive, hand-worked device, called a *shadoof*. His sympathy was aroused, and after returning to his home in California he devised a machine based on the principle of the toy "drinking bird," which automatically dips its bill in a glass of water, then stands erect again. This "robot shadoof" can be built very cheaply, works automatically on an evaporative principle, powered by sunlight and wind, and its use would release the workers who now spend all their time dipping water by hand for other agricultural activities. It is applicable to other primitive agricultural regions where arid climatological conditions prevail, and could be used as a basic low-power source for other tasks now using human labor, and for recharging batteries.

\* \* \*

A letter recently received by the Society presents another problem connected with hand labor. It was written by Mr. Susai Xavier, Mechanical Engineering Department, Annamalai University, Chidambaram, South India.

"Dear Sir: Thanks to the help rendered by the U. S. I. S., Madras, for directing me to your Society. I am interested and engaged in tackling some of the problems which confront the palm societies. I thought fit in contacting you to know more about the activities of your Society in the U. S. A.

"The main problem is on climbing palm trees (coconut, palmyrah, date palms, etc.) easily. It is estimated that 4 *crores* of palmyrah, 2 *lakhs* of coconut

and 5 *lakhs* of date palms are the natural wealth of Tamiland alone. Only about 40 *lakhs* of palms were tapped for sweet juice. The traditional method of tree climbing involves too many hazards. As it requires to climb twice in a day the same tree for tapping sweet juice called *Neera*. (The spathe is sliced little by little every time and juice drops out). The physical strain it involves, the fear of fall caused by slips and exertion, various places in India face shortage of climbers. It is heartening to see the Societies and other organizations in U. S. A. are increasingly participating in developments related to increasing food supplies in India by helping in their research work.

"Since India is facing acute food scarcity and the exploitation of palm trees will supplement the food production to a great extent, the researches which aim at making the palm climbing attractive are vital to this country.

"Such technologically advanced countries like U. S. A. can help us in this matter. If palms are fully exploited it will contribute to partial solution of rural unemployment, economic upliftment and tribes could be gainfully employed and meeting the requirements of palm candy, sugar and *gur*.

"May I request you to kindly send the relevant information and suggest the possibilities of collaborating with your Society in solving this national problem. Thanking you, yours faithfully, Susai Xavier."

Here is a challenge to our technical-minded members!

\* \* \*

Mr. William Rheinfelder, Phoenix, Arizona, has written some observations on the growth of palms, particularly the genus *Phoenix*.

"In transplanted palms, the leaves normally are cut back to where only a few

remain. It is therefore easy to see the emerging leaf. This emerging leaf can easily be marked (scratched) horizontally at the point of emergence. As a reference may be taken the sawed-off top of an old leaf stalk, or a piece of wood attached with wire to the trunk, so that it touches the emerging leaf. The horizontal scratches are made by drawing a pencil (No. 4) across the top edge of this guide. These scratches turn brown and leave readily visible marking on the rachis, blade or petiole, whatever the case may be.

"In such fashion it was determined that the center leaf of a transplanted date palm grew at a rate of  $1\frac{1}{2}$  inches per day if watered every third day, in soil where 6 inches of water would drain in one hour. More water (every second day), or less (every 4th day) slowed growth. This growth rate was achieved during Arizona summer when daily highs are above  $100^{\circ}$  F. (middle of May to middle of September). Similar experiments were made with other palms and the general trend seems to be the same, except for *Trachycarpus fortunei*, which slows down in growth during the summer and grows faster during the Arizona winter.

"Recently, during the treatment of a *Phoenix reclinata* which had a fungus problem, the writer's curiosity was aroused as to how much growth there was in the daytime as compared to night. The emerging leaf was therefore marked both morning and evening at about 6 o'clock. The result was very surprising to me. It was found that growth during the night might be  $\frac{3}{4}$  inch, while from morning to night growth would be so little that the marks would fall right on top of each other. In other words, it appears that growth at night is at least 100 times faster than at daytime. This finding seems to be true for all *Phoenix* palms, maybe all palms in general.

"Another experiment had to do with

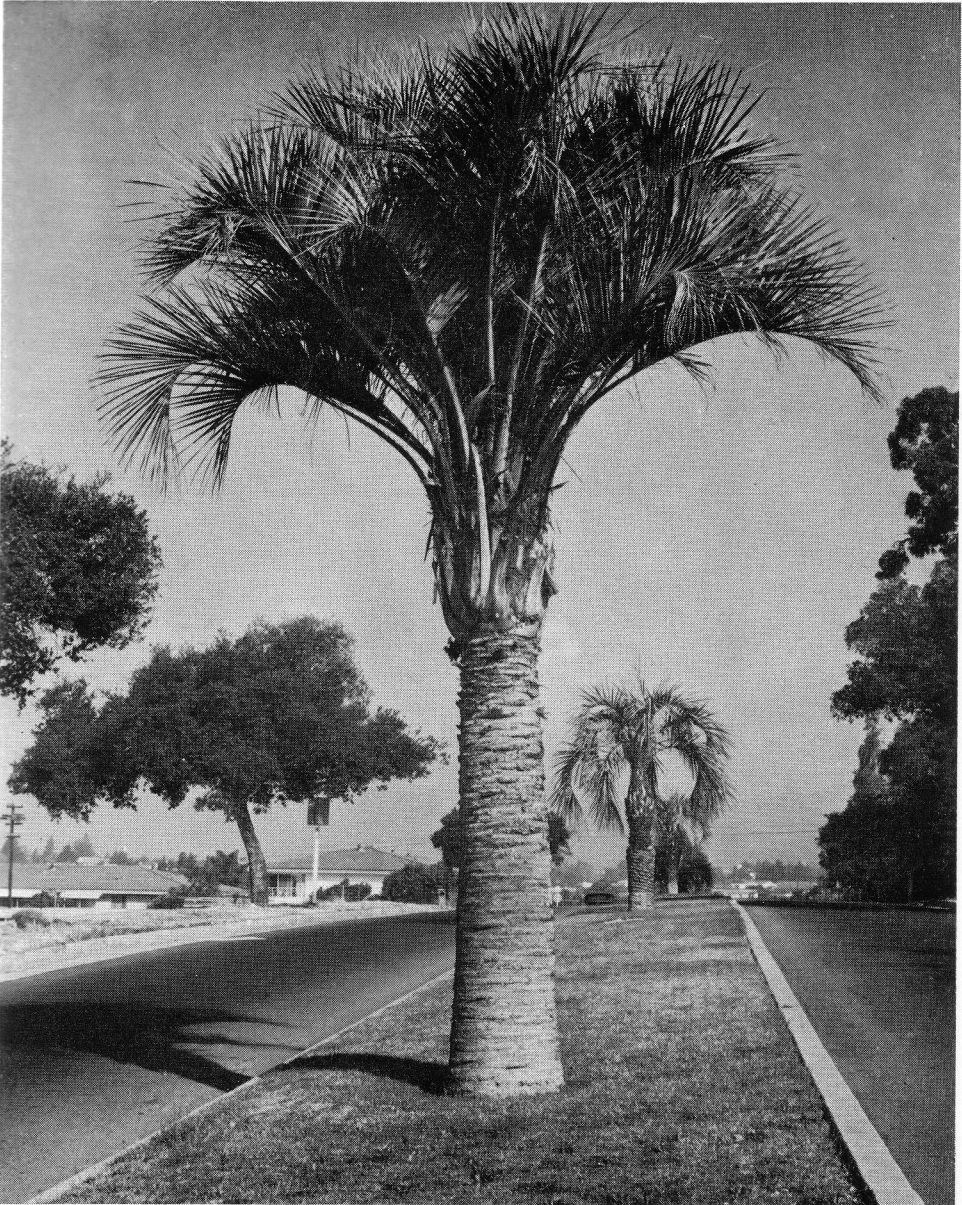
growth fluctuations. After the optimum watering schedule was determined and kept, there was still a rather curious change in daily growth rate, such as markedly slower growth on one day although the day had been just as hot as others. This was now related to night temperature. On a clear day with dry air (R. H. 10% or less), the night temperature is here often  $50^{\circ}$  to  $55^{\circ}$  F. below the daytime high, while with an overcast sky and higher humidity the differential might be only 15 degrees. It was found that growth rate was not affected by daytime temperatures at all, particularly on one specimen of *Phoenix reclinata* which is currently used for tests. These tests were started rather recently and it is not clear if the nightly minimum or average nightly temperature is significant, nor was it determined if soil temperature is more significant than air temperature. There is a decided difference. A few years ago when air temperature was measured at  $35^{\circ}$  F., the temperature right on top of the soil was 15 degrees, both measured with precision chemical thermometers. Also it was not determined during what time of the night growth is most rapid. This would have to be measured during the summer to get a clear indication, since growth rate on a *P. reclinata*, for example, is down from  $\frac{3}{4}$  to 1 inch per night in September to  $\frac{1}{16}$  inch in November.

"There is a considerable amount of knowledge to be gained by measuring the precise daily growth rate of emerging leaves, and perhaps these comments will be interesting to other palm lovers.

"Note: Some of the most luxuriantly growing native *Washingtonia filifera* are found in a nearby desert oasis (Castle Hot Springs) where they grow beside the creek coming out of a hot spring, which keeps the soil warm all year and all night."

LUCITA H. WAIT

## PHOTO GALLERY



*Butia capitata* var. *strictior* growing on the center strip of a boulevard in Santa Barbara, California. Only a few large plants are known to be in existence in California—two are in Santa Barbara, one is in San Diego, and one in Riverside. Two young specimens that have been growing on the campus of Contra Costa College at San Pablo, California (San Francisco area) for five years are beginning to develop trunks and produced an inflorescence for the first time this year. Photo by Ken Foster.



Duster plane in southern Texas has a hard time dodging *Washingtonia robusta* when dusting winter vegetables and citrus trees. Photo by Ronnie Luster; submitted by Dr. Robert N. Smith, Harlingen, Texas.