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Contents for January

Cover Picture

This black-and-white reproduction of a colored travel poster for the Ryukyu Islands portrays *Satakentia liukiuensis*. For complete poster, see page 12.

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Satakentia–A New Genus of Palmae-Arecoideae

HAROLD E. MOORE, JR.

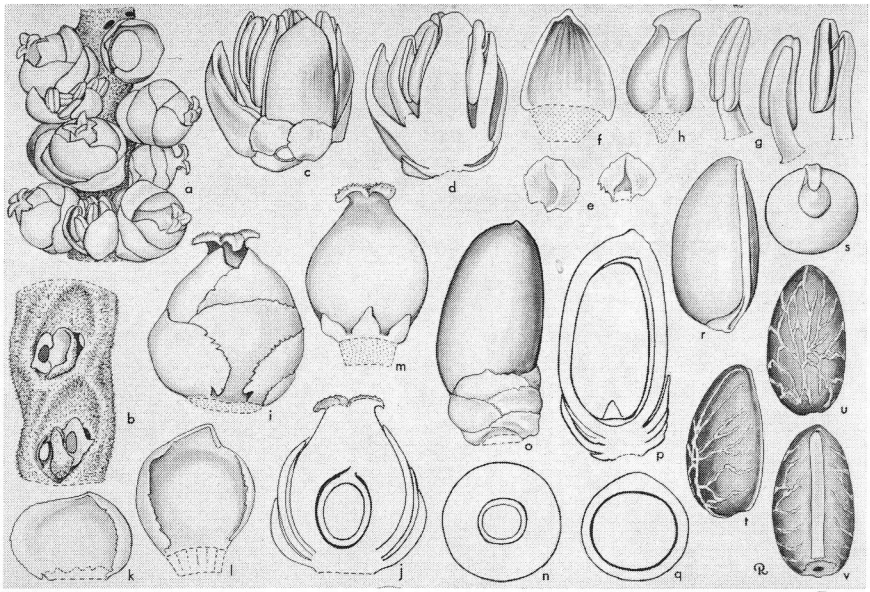
L. H. Bailey Hortorium, Cornell University, Ithaca, New York

The presence of an arecoid palm in the Ryukyu Islands has been known for many years. It had generally been thought to be the same as *Clinostigma Savoryanum* of the Bonin Islands (Sakaguchi, 1924 as *Cyphokentia Savoryana*; Sonohara, Tawada & Amano, 1952, Walker, 1954, Masamune, 1957 as *Exorrhiza Savoryana*; Hatusima & Amano, 1958, 1959 as *Bentinckiopsis Savoryana*) until Professor Sumihiko Hatusima, who had collected material himself in 1955 and 1958, provided a complete and well illustrated description of the palm as a new species which he called *Gulubia liukiuensis* (1964). This name appears in the current edition of the *Flora of Okinawa* (Hatusima and Amano, 1967).

My own interest in this palm had begun independently in late 1958 when photographs and loose fruits were received from the Ryukyu Islands courtesy of Mr. Toshihiko Satake of Saijo-machi near Hiroshima, Japan, and Mr. Nat J. De Leon of Miami, Florida. The fruits were clearly not those of *Clinostigma Savoryanum*, but equally clearly did not seem to fit well with any described palm. Thus, over a period of years, various attempts were made to obtain a complete series of specimens culminating in a personal visit to the islands in September, 1966, following the Eleventh Pacific Science Congress in Tokyo.* Then, thanks to the assistance of many individuals, it was possible to collect flowering and fruiting specimens as well as preserved material for anatomical study.

The arecoid palms in the Pacific Islands comprise a group of genera in which tribal and generic limits and relationships have not been and sometimes still are not clear. The tribe Kentieae, as delimited by Beccari and Pichi-Sermolli (1955), to which *Gulubia* belongs is characterized in part by a distinctive type of staminate flower in which the acute to acuminate petals are markedly asymmetric, the stamens have short filaments which are always erect, and the pistillode is minute or not evident. Staminate flowers of *Gulubia liukiuensis* do

* This paper stems from work relating to National Science Foundation Grant GB-3528. The field work, however, could not have been accomplished without assistance from the National Research Council and National Science Foundation Grant GA-239 which made the trip to Tokyo possible. Many individuals have assisted in one way or another. It is a pleasure to acknowledge my indebtedness to Mr. De Leon, Mr. Satake, Dr. Sumihiko Hatusima and Dr. Hiroyuki Murata for information. The success of the visit to the Ryukyu Islands was due largely to the efforts of Dr. E. H. Walker of the Smithsonian Institution, who paved the way and put me in touch with his many acquaintances there. Mr. Tomoharu Higa, Natural Resources Division of the United States Civil Administration, was responsible for many arrangements in the Ryukyu Islands. Mr. Motohide Yamakawa, Chief, Yaeyama District Forestry Office, was most helpful on Ishigaki and Iriomote Islands. Mr. Kanko Teruya, Agriculture and Forestry Department, Government of the Ryukyu Islands, smoothed my way in many places as guide and interpreter. I am also indebted for help to many others from the Government of the Ryukyu Islands, from the U. S. Civil Administration of the Ryukyu Islands, from the University of the Ryukyus on Okinawa, and on Ishigaki Island from the government of Ishigaki City.



1. *Satakentia liukiuensis*. a, portion of rachilla with staminate and pistillate flowers × 2; b, triads, flowers removed, to show bracteoles × 2; c, staminate flower × 4; d, staminate flower in vertical section × 4; e, staminate sepals, exterior and interior views × 4; f, staminate petal, interior view × 4; g, stamens in 3 views × 4; h, pistillode × 4; i, pistillate flower × 4; j, pistillate flower in vertical section × 4; k, pistillate sepal, interior view × 4; l, pistillate petal, interior view × 4; m, pistil and staminodes × 4; n, pistil in cross-section × 4; o, fruit × 2; p, fruit in vertical section × 2; q, fruit in cross-section × 2; r, endocarp with operculum × 2; s, operculum × 2; t, u, v, seed in lateral, dorsal, and ventral views × 2. Figures a, i–n from preserved material of *Murata s.n.*; b–h from preserved material of *Moore et al. 9382*; o–v from fresh material of *Yamakawa s.n.* (all BH).

not fit this pattern and a place must be sought elsewhere for the species. Comparison with other alliances shows that it is most closely related to genera in the tribe Clinostigmateae (Beccari and Pichi-Sermolli, 1955, as "Clinostigmeae").

Among these genera, the relationship of *Gulubia liukiuensis* seems clearly closest to *Clinostigma* and at one time I was ready to include it in that genus. The finding of new species of *Clinostigma* in the Solomon Islands (Moore, 1969) substantially extends the range of the genus, yet shows it to be a very homogeneous one so far as the staminate flower, inflorescence structure, and, to a large extent, habit are concerned. Fruit varies but within limits which do not include the fruit of the Ryukyu Islands palm. There are two choices to be made: to extend the circumscription of *Clinostigma* to include *Gulubia liukiuensis*, or to erect a distinct genus for the last and leave *Clinostigma* as a readily definable and, to me, obviously natural taxon.

It is too soon to consider in any detail a broadened circumscription of the tribe and the fascinating manner in which the Clinostigmateae appear to have evolved, chiefly in the Melanesian region and Oceania. It is safe to say, however, that the staminate flower and fruit are of paramount importance as indicators of evolution in this group. Relying on these criteria and on my understanding of *Clinostigma*, I choose to erect a new

genus for the palm of the Ryukyu Islands. The name *Satakentia* is proposed to honor my longtime correspondent and an ardent student of palms, Mr. Toshihiko Satake.

Satakentia has doubtless evolved with *Clinostigma* from a common stock. It differs, however, in having a densely and a finely stellate-tomentose rather than glabrous inflorescence, staminate flowers with the pistillode well developed and subcapitate at the apex rather than minute and trifid, and in having fruit with an excentrically apical stigmatic residue. In habit, *Satakentia* seems to resemble most closely some of the Samoan species of *Clinostigma* which apparently lack the stilt roots so characteristic of *C. exorrhiza* of Fiji and some other species in the New Hebrides and Solomon Islands.

Satakentia H. E. Moore, *gen. nov.*

Clinostigmati valdi affinis sed inflorescentia tomentosa, floris masculi pistillodio subcapitato antheras aequante, fructus residuo stigmatico apicali differt.

Solitary, unarmed, monoecious palms of moderate size, the trunk usually enlarged and with a mass of adventitious roots at the base, columnar above. Leaves reduplicately pinnate; sheaths tubular, forming a prominent crownshaft; petiole short; rachis elongate with pinnae regularly arranged, these acute, with one principal nerve, thickened marginal nerves, usually 2 (–3) secondary nerves, and numerous tertiary nerves on each side of the midnerve. Inflorescences infrafoliar, densely and minutely stellate-tomentose, paniculately twice-branched basally, once-branched apically; first peduncular bract (prophyll) complete, terete with ancipitous margins and rostrate in bud, enclosing the complete, terete, rostrate second peduncular bract and inflorescence in bud, both splitting abaxially and caducous at anthesis, sometimes a prominent third, and even a fourth, incomplete peduncular bract developed; peduncle prominent, essentially terete near the base, angled above as is the rachis. Flowers borne in triads of two staminate and one pistillate in the lower one-fourth to one-third of the rachillae, paired to solitary staminate above: staminate flower slightly asymmetric; sepals 3, distinct, imbricate, more or less rounded; petals 3, valvate, more than twice as long as the sepals; stamens 6, filaments distinct, subulate, inflexed at the apex in bud, anthers oblong in outline, dehiscent by lateral slits; pistillode as long as the stamens, cylindric with obliquely subcapitate apex: pistillate flower ovoid; sepals 3, broadly imbricate; petals 3, imbricate with shortly valvate apices; staminodes 3, dentiform, on one side of the pistil, this ovoid, with 3 recurved stigmas at anthesis, unilocular, uniovulate, with a pendulous, anatropous ovule. Fruit ovoid-ellipsoid with excentrically apical stigmatic residue; exocarp smooth but drying longitudinally lined; mesocarp with numerous flat longitudinal fibers in thin flesh and some red-brown stone cells near the apex next to the thin, fragile endocarp; endocarp operculate at base of elongate hilar seam, not adherent to the seed; seed ellipsoid, with elongate hilum, anastamosing rapheal branches, homogeneous endosperm, and basal embryo.

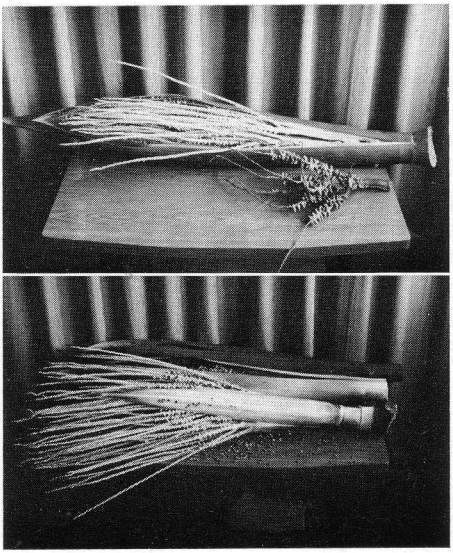
Type: *Satakentia liukiuensis*

Satakentia liukiuensis (Hatusima) H. E. Moore, *tr. nov.*

Gulubia liukiuensis Hatusima, Memoirs of the Faculty of Agriculture, Kagoshima University 5(1): 39. Mar. 1964.

Trunk to 15 or 20 m. high, ca. 20–30 cm. in diam. at base, light brown to gray-brown, irregularly and closely ringed. Leaves about 14, to 5 m. long

(fide Hatusima); sheath ca. 8 dm. long, reddish-green to mahogany-green at maturity, with numerous, small, medifixed, shining, castaneous, membranous scales; petiole 8–10 cm. long in mature individuals, longer in juvenile plants, rounded below, concave above, both surfaces with shining, membranous, brown, medifixed scales when young, the dark bases persistent and impressed (when dry) in age; rachis ca. 2.94 m. long, rounded below, progressively concave to flat to angled above, both surfaces more or less densely brown scaly or brown puncticulate in age; pinnae ca. 93 on each side, regularly arranged, basal pinnae very narrow, to ca. 24 cm. long, 3.5 mm. wide, subbasal pinnae (6th) ca. 38 cm. long, 11 mm. wide, median pinnae ca. 55–70 cm. long, 3–4 cm. wide, apical pinnae ca. 15 cm. long, 1 cm. wide, midnerve elevated above, less prominent below where clothed with numerous minute brown scales and scattered, medifixed, brown, membranous scales to 10 mm. long, the secondary and tertiary nerves with minute brown or pale scales. Inflorescences several (ca. 6), stiff, horizontal; first peduncular bract (prophyll) dark green, densely ferrugineous-scaly, ca. 9.9 dm. long, second peduncular bract green-lilac-cream with pale scales, 9.1 dm. long, third peduncular bract (on one individual, *Moore et al. 9382*) like the second but incomplete, divided into 2 parts respectively 57 and 36 cm. long, fourth peduncular bract (*Moore et al. 9382*) 16 cm. long; peduncle 7 cm. wide at insertion of prophyll, 20 cm. or more long, chocolate-brown (in life) and densely scaly between prophyll and first bract, lilac (in life) and densely ferrugineous scaly above the first bract; rachis ca. 3.6 dm. long, angled, densely tomentose with pale and ferrugineous stellate hairs; branches pinkish-purple or lilac in bud, once-branched (ca. the lower 14) or undivided (ca. the upper 12), lowest to 68 cm. long including flattened peduncular base 15.5 cm. long, upper to 40 cm. long, all densely tomentose with ferrugineous and/or pale stellate hairs; bracts subtending lower branches acute and ca. 2 cm. long, progressively reduced and rounded on upper branches, bracts subtending triads very low and rounded, bracteoles surrounding pistillate flowers low and rounded, pu-



3. *Satakentia liukiuensis.* Above, inflorescence in bud with the bracts split along the natural line of cleavage, the first enclosing the second, and a portion of a fruiting branch; below, the same inflorescence with the first and second bracts removed to expose the unusually large but incomplete third bract (*Moore et al. 9382*).

←

2. *Satakentia liukiuensis.* Above, trees on slopes near the Nakama River, Iriomote (*Moore et al. 9385*); lower left, Mr. Teruya kneels beside the mass of adventitious roots at the base of a tree near the Nakama River; lower right, a small part of the grove at Yonehara Village on Ishigaki viewed from the picnic stand.

berulous, the bracteoles of paired staminate flowers irregular, often partially puberulous. Staminate flowers cream-colored, slightly fragrant, 5 mm. long; sepals 1–2 mm. high, rounded; petals 3.5–4 mm. high; stamens as long as the petals in bud, the anthers exserted versatile at anthesis; pistillode as long as the petals and stamens (in life). Pistillate flowers 5–6 mm. high in bud; bracteoles surrounding them 1.5–2.5 mm. high; sepals 3–4 mm. high, 4–5 mm. wide, the margins ciliolate; petals ca. 5 mm. high, the margins ciliolate; pistil ovoid with short, spreading stigmas. Fruit (including perianth) ca. 13 mm. long, 6–7 mm. in diam., black at maturity; seed 9–10 mm. long, 5 mm. in diam. First leaf of seedling bifid.

Lectotype. *S. Hatusima 18500* (KAG).

Vernacular name. This palm is referred to by the people of the Yaeyama District (Ishigaki and Iriomote) simply as *noyashi* in Japanese, meaning "field palm." It has been suggested that a more apt name would be *Yaeyama-yashi* or "Yaeyama palm" as used by Hatusima and Amano (1967) and I have received a leaf under the name *Sakishima-yashi* or "Sakishima palm," the southwestern end of the Ryukyu Islands having been known previously as the Sakishima Gunto. The Okinawan name has been reported as *binro*.

Distribution. On slopes of hills or more rarely nearly at sea level (where cultivated?) on Ishigaki Island (Yonehara) and Iriomote Island (Hoshitate, Nakama River, Sonai), Yaeyama Group of the Ryukyu Islands.

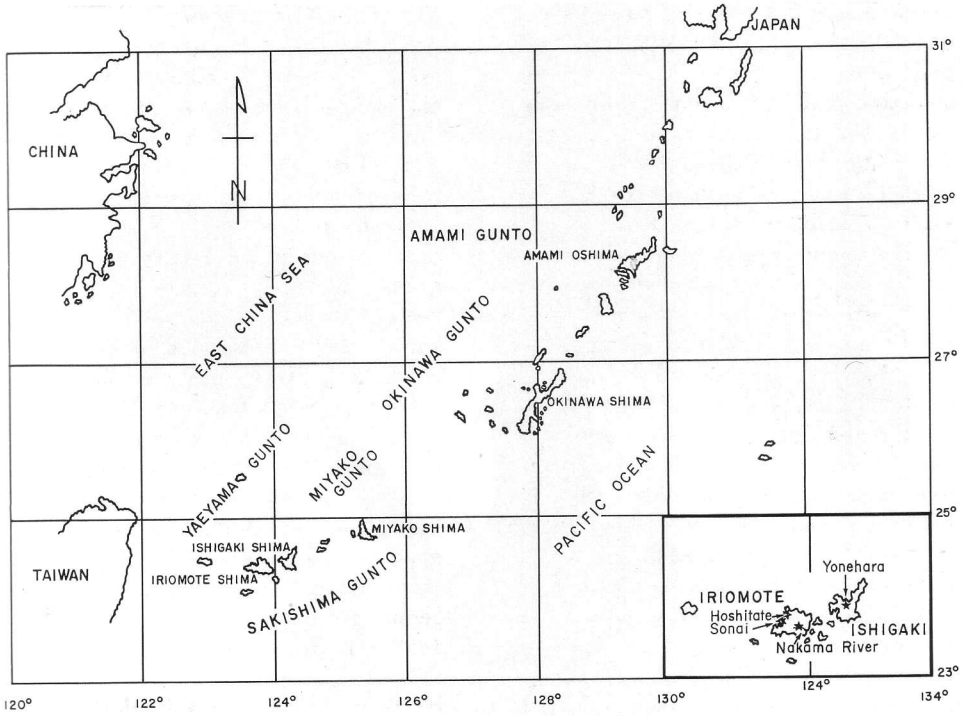
Specimens examined. RYUKYU ISLANDS. Iriomote Jima: cultivated (?) in the hamlet of Sonai, alt. 1 m., 9 July, 1955, *S. Hatusima 18500* (lectotype, KAG; photo, BH); Nakama Kawa (Nakama River), on clayey sandstone slopes upriver from Ohara and Otomi, alt. 0–100 m., 9 Sept. 1966, *H. E. Moore, Jr., K. Teruya & M. Yamakawa 9385* (BH). Ishigaki Jima: on gentle slopes near road at Yonehara Village, alt. ca. 100 m., 8 Sept. 1966, *H. E. Moore, Jr., K. Chinen, K. Teruya & M. Yamakawa 9383* (BH). Okinawa: Shuri, cultivated in yard of private residence, 7 Sept. 1966, *H. E. Moore, Jr., S. Moromizato, H. Nakasone & K. Teruya 9382* (BH).

The descriptions have very largely been drawn from my own collections and notes amplified from Hatusima's description. Hatusima cited two collections as types: *Hatusima 18500* (flowering type) and *Kuroshima s. n.* (fruiting type). It would appear under Article 7 of the *International Code of Botanical Nomenclature* (1966) that one of these must be designated as lectotype. Since the staminate flower is diagnostic for the genus, I would so designate *Hatusima 18500* (KAG).

Notes on a Visit to the Ryukyu Islands

Satakentia is a native, so far as I am aware, only on Ishigaki and Iriomote, two of the larger islands that compose the Yaeyama Gunto (Yaeyama Group) and, with Miyako and associated smaller islands, the larger Sakishima Gunto (Fig. 4). These islands lie to the southwest of Okinawa in the Ryukyu Archipelago which stretches between southern Japan and Formosa. The mean temperature for the Okinawa Prefecture, which includes the Sakishima Gunto and the Okinawa Gunto, is 71.62° F. according to Sonehara et al. (1952) and the mean rainfall 84.46 inches. The climate of Okinawa compares well with that of southern Florida, for a rare frost may damage tropical elements of the flora, while the Yaeyama Group apparently does not suffer temperatures so low.

My own experience with the palms was limited, regrettably, to three days. Arriving in Naha City, Okinawa, from Tokyo on September 6, 1966 on the



4. The Ryukyu Islands adapted from map in Walker (1954). Iriomote and Ishigaki are included at a larger scale in lower right insert.

heels of a typhoon, I was met by Mr. Higa of the U. S. Civil Administration and settled comfortably in the Rainbow Hotel. After making further arrangements the next morning, I spent a very pleasant afternoon with Mr. Teruya, my translator, and Professors Moromizato and Nakasone of the Department of Forestry, University of the Ryukyus, looking at palms in Shuri, adjacent to Naha, where we saw three mature plants of *Satakentia* in cultivation. One, in the small yard of a private residence, had an inflorescence in bud but essentially ready to expand (Fig. 5). This we were able to cut with the aid of a bamboo pole to which my folding pruning saw was crudely attached. Although the inflorescence branches become green as the fruit matures, they are a handsome pink-purple or lilac with cream-colored flowers at the time of release from the subtending bracts, and the staminate flowers are faintly fragrant. The tree itself is reminiscent of a coconut but the columnar trunk is usually straight at first and ringed below the crownshaft with stiffly spreading inflorescences, though old trees may have trunks bent as in Fig. 2, upper right or in the photograph of plants at Hoshitate reproduced by Hatusima (1964, Fig. 3).

To see *Satakentia* growing naturally, Mr. Teruya and I flew in 90 minutes to Ishigaki Island on the morning of September 8th. At Ishigaki City we were met by Mr. Kosei Chinen, Forest Department, Ishigaki City, and Mr. Motohide Yamakawa, who is the Chief of the Yaeyama District Forestry Office and a dedicated member of The Palm Society. Following lunch, we spent the afternoon

5. Inflorescences of *Satakentia liukiuensis* surround the trunk of this specimen at Shuri. The inflorescence in bud at upper right is that shown dissected in Fig. 3.

driving mostly near the coast to Yonehara Village where a grove of perhaps a thousand trees is protected as a natural monument (Fig. 2). These trees appear to be essentially the same age and have probably grown from seedlings left when mature palms were cut for the "cabbage" or edible bud during World War II. The recent typhoon had done us a favor by uprooting a fairly large individual which we were able to cut up, thereby obtaining good anatomical material and at the same time clearing the path which winds through the grove. This same grove is featured in an attractive colored postcard which forms part of a series available in Ishigaki. Presumably trees from the same grove are subjects for the travel poster featured in part on the cover of this issue and in its entirety in Fig. 10, where, in the lower left hand corner, the tip of a leaf of what is thought to be *Arenga Engleri* can also be seen. This *Arenga* was abundant on

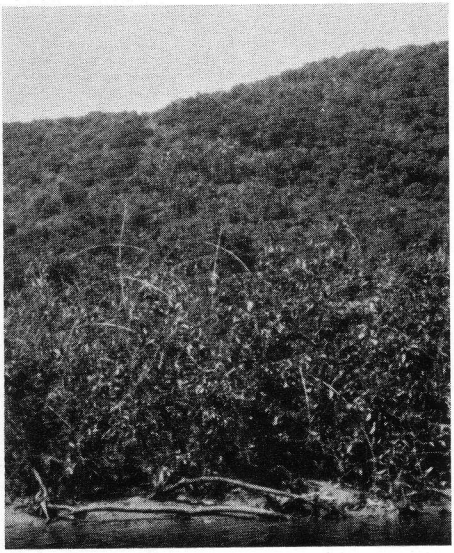
6. Companions on the trip to Yonehara Village: left to right, our driver, Mr. Chinen, Mr. Yamakawa, Mr. Teruya.

the slopes and even in swamps, growing with *Pandanus*, along the road from Ishigaki City to Yonehara, which largely follows the coast along the western and northern part of the island. Here is another palm problem for there are said to be small- and large-fruited forms of the species in the archipelago.

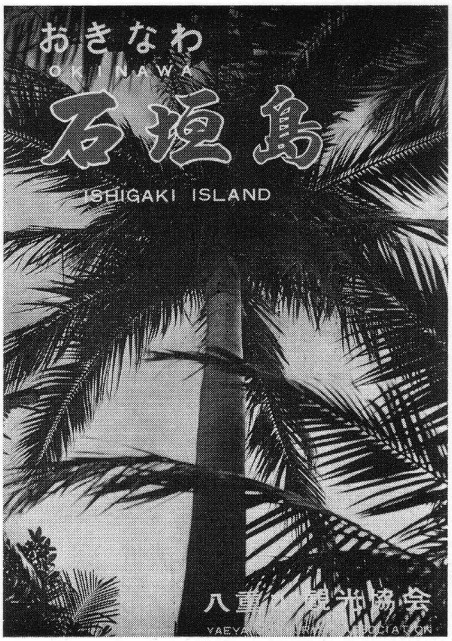
7. Mr. Yamakawa holds a leaf of *Satakentia liukiuensis* collected at Yonehara.

8. Our transport up the Nakama River and part of the crew.

Mr. Yamakawa had arranged a visit to another stand of *Satakentia* on Iriomote Island the next day. We crossed in the morning on the passenger ferry which left us at Ohara on the eastern coast where the Forestry Office is located, lunched, and then went up the Nakama River by canoe (Fig. 8) to a small landing from which we able to scramble along the course of a small stream to the slopes on which the palm grows (Fig. 9). Here the trees were



9. The grove of palms on slopes near the Nakama River may be made out about half an inch below the crest of the hill at center photograph.



10. The "Yaeyama-yashi" graces the travel poster partially portrayed on the cover. Courtesy Yaeyama Tourist Office.

larger than those at Yonehara and very impressive, being in an undisturbed habitat away from any evidence of human activity (Fig. 2). Two other localities on Iriomote are at Sonai and Hoshitate on the opposite side of the island.

Mr. Yamakawa has set out an avenue of seedlings lining the road from the river to the Forestry Office at Ohara and has forwarded seed to The Palm Society which has distributed them as *Clinostigma*. Ultimately, perhaps others will have an opportunity to see this fine ornamental palm without the need to hurry away. We, however, had to hurry away from Iriomote on the Forest Department launch to get out of the harbor before the falling tide made passage to the open sea and Ishigaki impossible. Seedlings are now growing in the United States and a plant grown from an earlier sending is already developing a trunk at the home of Mr. and Mrs. A. C. Langlois in Nassau, Bahama Islands.

On the morning of September 10th, Mr. Teruya and I spent a pleasant hour with Mayor Ishigaki, Assistant Mayor Makino, and Mr. Chinen in the offices of Ishigaki City. It was during this brief period that a messenger was sent to locate a copy of the "Yaeyama-yashi" travel poster which I had admired in the lobby of the little Miyahira Hotel where I had stayed. Most happily, one was available at the Yaeyama Tourist Office, so I left Ishigaki by air for Okinawa and the long trip home carrying, as a reminder of friendly and helpful people and an unusual palm, the poster which today greets the visitor who enters the palm herbarium at the Bailey Hortorium.

Literature Cited

Beccari, O. & R. E. G. Pichi-Sermolli. 1955. Subfamiliae arecoidearum palmae gerontogeae. Webbia 11:13.

Hatusima, S. 1964. A new palm from the Ryukyus. Memoirs of the Faculty of Agriculture, Kagoshima University 5: 39–42, figs. 1–6.

——— & T. Amano. 1958, 1959, 1967. Flora of Okinawa ed. 1, 134; ed. 2, 134; ed. 3, 147.

Masamune, G. 1957. Enumeratio tracheophytarum Ryukyu Insularum IX. Science Reports of the Kanazawa University 5:86.

Moore, H. E., Jr. 1969. New palms from the Pacific, II. Principes 13: in press.

Sakaguchi, S. 1924. General index to the flora of Okinawa 91.

Sonohara, W., S. Tawada & T. Amano, ed. E. H. Walker. 1952. Flora of Okinawa 200.

Walker, E. H. 1954. Important trees of the Ryukyu Islands 313, excl. fig. 204.

Colpothrinax Cookii–A New Species from Central America

ROBERT W. READ

*National Research Council Visiting Research Associate, Department of Botany, Smithsonian Institution, Washington, D.C.**

In an unpublished manuscript found among some palm specimens in the United States National Herbarium, Dr. O. F. Cook, formerly of the Bureau of Plant Industry, wrote: "An unknown fan palm was found in March, 1902, in a very mountainous district in the department of Alta Vera Paz in eastern Guatemala. The same place was visited again in May, 1904, when additional specimens and photographs were secured. . . . The new palm proved difficult to classify and seemed to have very little affinity with any other group of palms previously described from North America." Dr. Cook considered the new palm as representing a distinct genus and was preparing to publish this new monotypic genus in the year 1913. Although the paper reached the page-proof stage in one journal it was withdrawn from publication for some unknown reason and recommended for a different journal. Dr. Cook then revised his manuscript, added an analytical key, and elaborated on what he considered related genera. This second manuscript was scheduled for publication in 1914 but, again, did not appear and has thus remained among the specimens of this undescribed species for the past 55 years.

Critical studies of the Guatemalan collections and manuscript, and comparisons with other known taxa have left no doubt that an undescribed species is involved. However, it does not represent a distinctly new genus as was thought by Dr. Cook; rather it is a second species of the formerly monotypic Cuban genus *Colpothrinax*, a genus which Cook himself maintained as quite distinct from the Polynesian genus *Pritchardia* as do I, in opposition to the conclusions of Beccari and Rock (Memoirs of the Bernice P. Bishop Museum 8(1):1–77. 1921). A comparison of some of the more obvious differences to be seen in herbarium material is given in Table 1.

Colpothrinax Cookii R. W. Read, *sp. nov.*

Palma 7–8 m. alta, trunco erecto columnari ca. 35 cm. in diam.; foliorum vaginae apex adversus petiolum longissimus linguiformis (ca. 75–100 cm. longus), in fibras tenues pendulas tandem solutus; rachillae dense hirsutae; florum calyces hirtelli, petala persistentia; fructus ca. 20–22 mm. in diam.

Trunk columnar, 7–8 m. high, ca. 35 cm. in diam. above the base, tapering just below the crown to about 10 cm. in diam., "increasing gradually in thickness with age" becoming "attenuate, longitudinally ridged and fissured" (O. F. Cook), clothed when young with an abundance of persistent, coarsely woven fibers derived from deterioration of the leaf sheath; youthful but mature plants with the upper trunk obscured by exceedingly long, fine, pendulous sheath fibers: crown of 20–30 leaves; leaf sheath of young plants tubular, 50–75 cm. long, with the apical margin very

* All photographs courtesy of the U. S. National Herbarium, Smithsonian Institution.

1. An immature plant of *Colpothrinax Cookii* R. W. Read, in the forest of Alta Vera Paz, Guatemala.

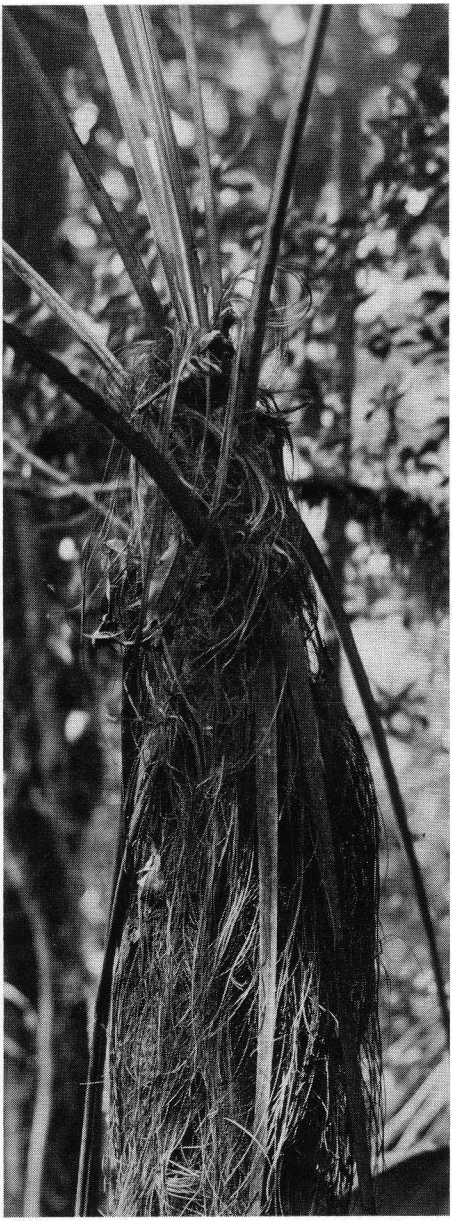
TABLE 1. *A comparison of some of the more obvious differences between* Colpothrinax *and* Pritchardia *exhibited by herbarium specimens.*

	Colpothrinax	*Pritchardia*
Petal lobes	Persistent or tardily deciduous, fleshy, lightly lacunate inside, attached across entire width of the stamen-tube.	Deciduous at anthesis, coriaceous, deeply lacunate inside, attached only partially across width of the stamen-tube, with free basal lobes.
Calyx	Fleshy, nerves lacking.	Coriaceous, nerves conspicuous.
Stamen-tube	Equalling or only slightly exceeding the corolla-tube in height.	Greatly exceeding the corolla-tube in height.
Anther connective	Very narrow, light-colored when dry.	Broad, dark-colored when dry.
Carpels	Completely free.	One-half connate externally.
Seed	With more or less thickened or intruded integument.	Without thickened or intruded integument.
Embryo	Lateral.	Basal.
Number of primary inflorescence branches	4–7.	1–2 (–4).

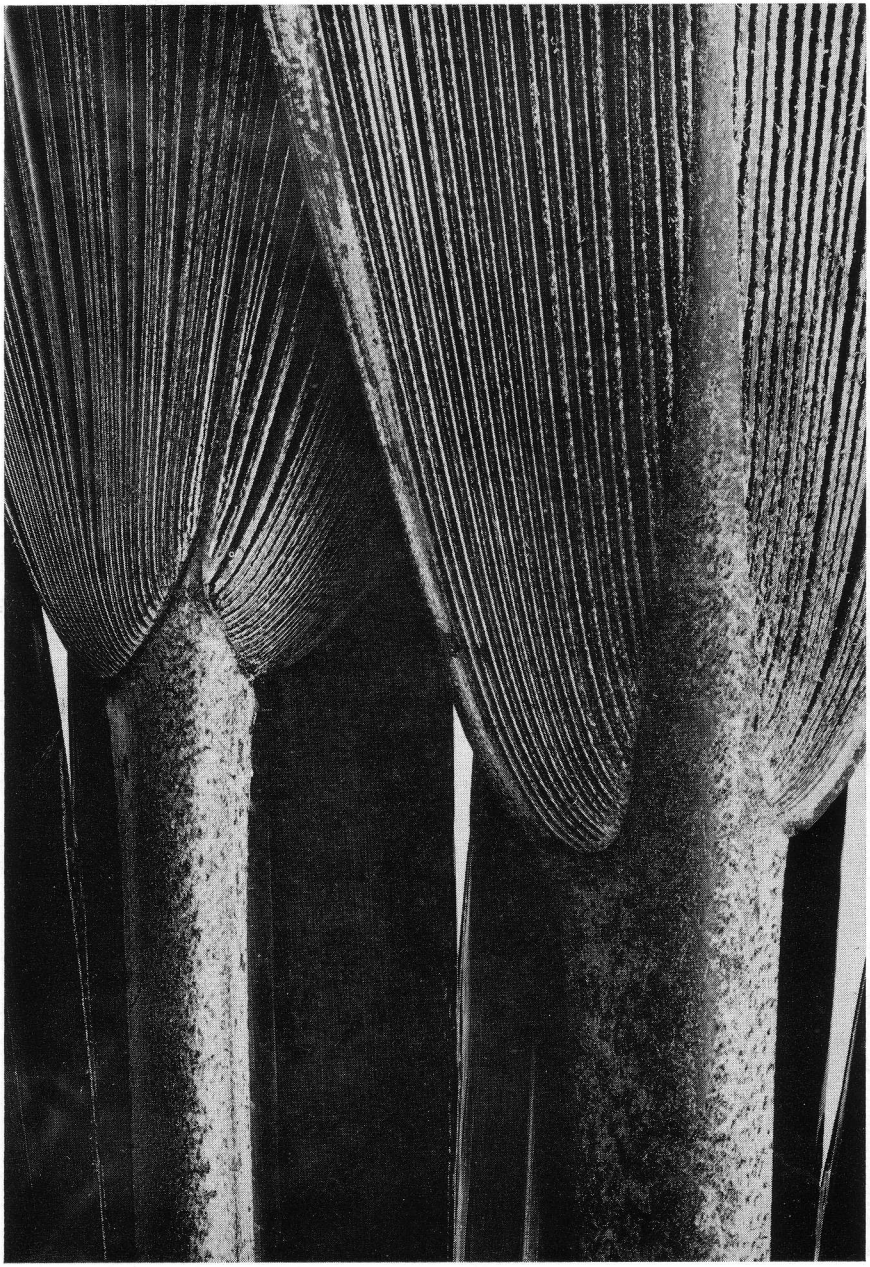
slightly (ca. 3–4 cm.) linguiform opposite the petiole, densely lepidote with large, coarse, spreading, ferrugineous, basifixed scales intermixed with lighter-colored, closely appressed, peltate scales, the former restricted to the sheathing portion and the latter continuous around the thickened petiolar portion, the sheath glabrous inside except below the insertion of the petiole where large ferrugineous scales occur, sheaths of mature plants with progressively longer linguiform apices, these fraying into loose fibrous strands 75–100 cm. long which are pendulous among the leaf bases, sheaths of very old plants much shorter, shaggy; petiole 3–4 m. long on young plants, ca. 1.3 m. long on mature plants, free portion usually ca. 60–70 cm. long, 2.7–3.0 cm. wide at the junction with the sheath, ca. 2–3 cm. wide at the base of the hastula, shallowly concave and densely lepidote adaxially with mixed scales like those of the sheath, convex and densely lepidote abaxially, glabrescent in age but minutely puncticulate from the bases of the fallen scales, margins acute, apex continuing into the blade abaxially as a short, abruptly narrowed costa ca. 18–32 cm. long, and adaxially as a hastula; hastula triangular, acute to sharply apiculate, 2.3–3.0 cm. long and slightly broader than the petiole, margins thinly chartaceous to coriaceous, overlapping the blade slightly; blade shortly costapalmate, divided into 50–60 segments connate basally for ca. ⅓–½ their length, each trullate in outline, 4.0–5.5 cm. wide (measured at the broadest point) centrally, and ca. 125 cm. long, entire or bifid at the apex, lacking fiber strands in the sinus between the segments, densely appressed lepidote when unexpanded, the scales somewhat persistent on the major nerves as the blade expands

to an almost flat but strongly plicate orbicular form, surface, exclusive of major nerves, glabrous adaxially, densely hyaline-lepidote abaxially.

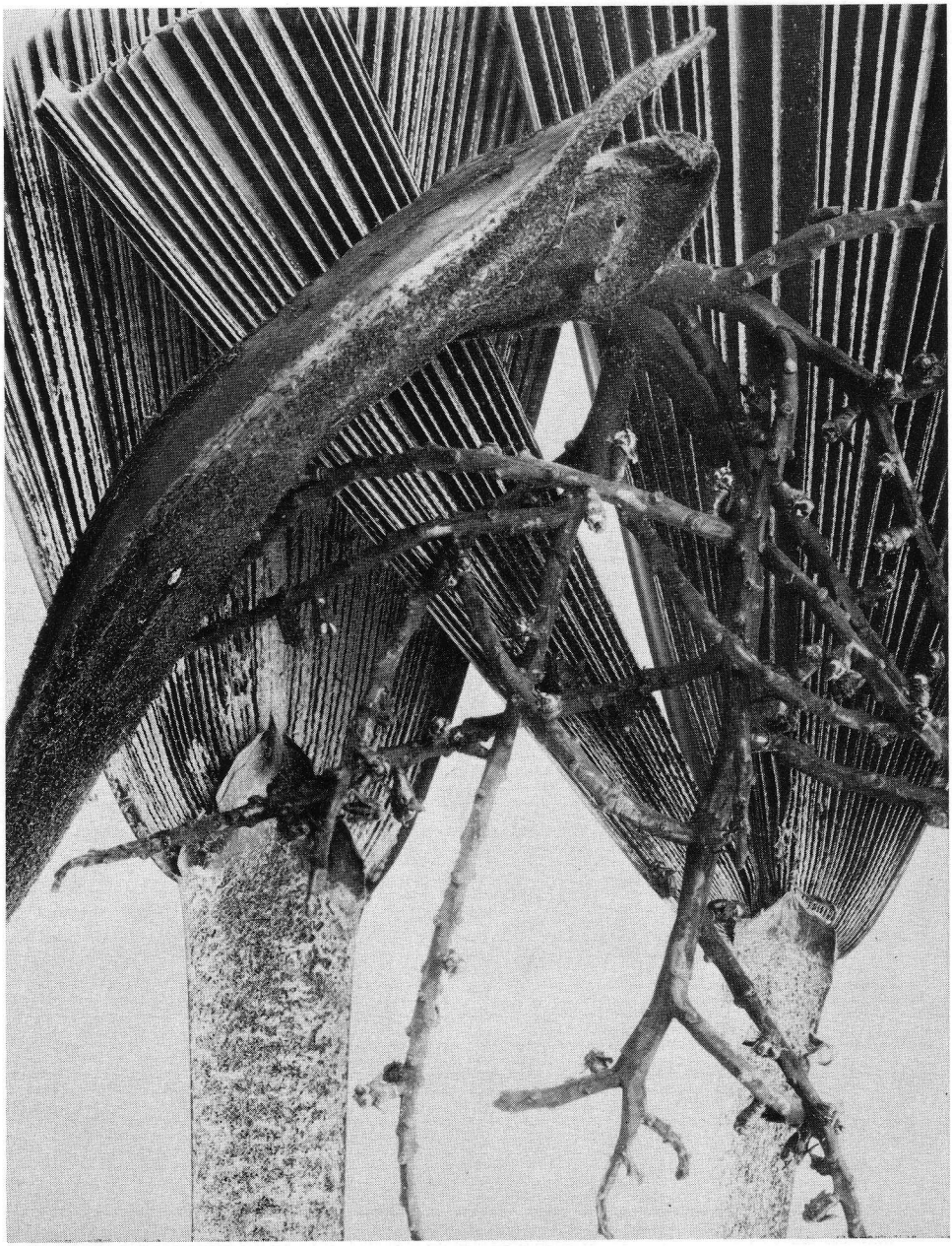
Inflorescences numerous per tree, interfoliar, arcuate from the axils of the lower living leaves, robust, shorter than the petioles, ca. 90–100 (–120) cm. long, the peduncle densely ferrugineous-velutinous, ca. 6 cm. broad at insertion, abruptly narrowed to ca. 2 cm. and then gradually smaller beyond each node of which there are 15–20, internodes short basally, becoming progressively longer toward the apex, ca. 2–8 cm. long, each node bearing a ferrugineous-squamate tubular bract which encloses the lower portions of the next higher bract and the base of the primary branch including its bracts; lowermost bract (prophyll) of the inflorescence bicarinate, ca. 21 cm. long, glabrous or glabrescent adaxially; the second bract inserted about 2 cm. above the insertion of the first, tubular with an oblique aperture, sharply pointed and carinate below the point, equally squamate on all sides, the next 5–6 bracts similar to the second but the carina becoming progressively reduced; the first 9 bracts empty and the remainder each enclosing a primary branch: primary branches 3–7, ca. 35–40 cm. long, twice-branched with about 15 rachillae, peduncles of the primary branches free from the main rachis nearest the base of the inflorescence but becoming progressively more adnate to the rachis toward the apex of the inflorescence, each peduncle bearing 1–3 tubular secondary bracts (the peduncles and their bracts almost entirely enclosed within the primary bracts), the first secondary bract bicarinate, glabrous adaxially, squamate abaxially, much inflated above, acutely pointed apically, almost completely enclosing the second (and third when present) tubular, terete, slightly carinate bract which is usually



2. A closeup of the bud region of a young plant of *Colpothrinax Cookii* R. W. Read, showing the long pendulous fibers from the leaf sheath.

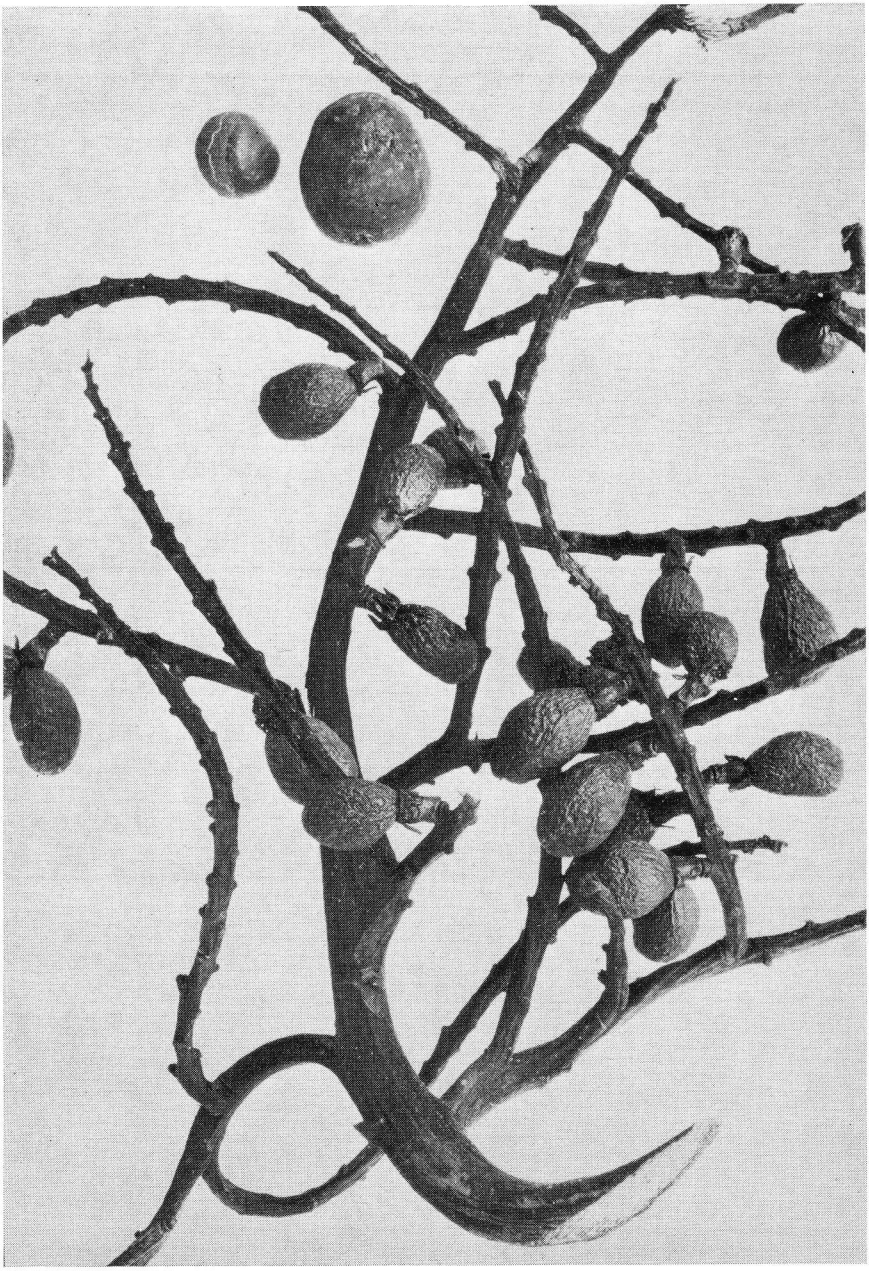


3. Unexpanded leaf blades of *Colpothrinax Cookii* showing the short costa extending into the abaxial surface; leaf from a young plant on the left.



4. A single primary branch, post anthesis, and the adaxial surface of an unexpanded leaf blade showing the hastula. The inflorescence and the leaf on the left are from the type collection, *Cook & Griggs 116.*

5. Inflorescences from the type collection of *Colpothrinax Cookii* R. W. Read, the one on the left with all the bracts and primary branches removed.



6. Immature fruit still attached to the primary branch of *Cook & Doyle 163*, collected two years later but in the same locality as the type of *Colpothrinax Cookii*.

more densely squamate abaxially, or if the ultimate then densely squamate on all sides, each division of the primary branch subtended by a smaller non-sheathing bract but the division sometimes adnate to the rachis of the branch for some distance above the bract, all axes densely ferrugineous-hirsute, each rachilla 6–15 cm. long, 3–4 mm. thick, with 15–30 widely spaced flowers ca. 3–4 mm. apart, the floral scars conspicuous when dry as slightly raised areas subtended by a minute, narrowly triangular or lanceolate bracteole: flowers solitary, bisexual; pedicels inconspicuous, ca. 0.5 mm. long; calyx of 3 connate sepals, fleshy, densely hirtellous, solid and stipitate basally, tubular and cupulate above with three short acute or attenuate prominances or lobes extending to about ¼ the length of the petals; petals 3, fleshy, connate basally into a tube equalling the calyx, free and valvate above, then boat-shaped, acute and slightly apiculate at the apex, only slightly lacunate inside, reflexed at anthesis, persistent on developing fruit, lacking an abscission line, attached to stamen-tube across entire base; stamens 6, filaments connate basally into a tube where adnate to the petal tube, narrowly subulate above, not incurved at the apex, anthers tetrasporangiate and introrse, linear, retuse apically, bifid basally, dorsifixed, erect in bud, versatile at anthesis, connective inconspicuous, light-colored, narrow; pollen monocolpate with a strongly reticulate exine; carpels three, completely free except the slender filiform connate styles, stigmatic region simple, apparently smooth: fruit "2 or 3 from the same flower, . . . dark brown" (ripe?), subpyriform, slightly flattened apically, ca. 22 mm. long, 17–20 mm. in diam., stigmatic remains apical, "surface rimose, outer layer corky, becoming pulpy underneath,"; seed dark brown, subglobose, lighter greyish-brown along the raphe, which extends from the base to apex (Cook wrote that the raphe was "strongly fibrous" but only weak fibers, when rarely present, have been seen); endosperm homogeneous; embryo lateral opposite the raphe, indicated by a distinct prominence on the testa.

Vernacular name. In the original manuscript Cook wrote: "The native name of the palm in the Kekchi language is '*xan*', or '*shan*', the letter 'x' being the usual equivalent of 'sh' in Spanish transliterations of the Mayan languages. At Cahabon, only a few miles to the north of the Senahu, the same name '*xan*' is applied by a different branch of the Kekchi people to a true palmetto palm, a species of Inodes." The generic name proposed by Cook in 1913, was translated by him as meaning literally, "head-of-hair fiber," alluding to the unusual development of hairlike fibers arising from the sheath apex and hanging among the leaf bases.

Specimens examined. GUATEMALA. Dept. Alta Vera Paz: Sepacuite coffee estate, a few miles north of Panzos, on the northern slope of the principal range of mountains crossed in leaving the Polochic Valley, at an altitude of nearly 1,200 meters, March 22, 1902, *O. F. Cook & R. F. Griggs 116* (holotype, US: isotype, BH); March 22, 1902, *O. F. Cook & R. F. Griggs 115 & 117* (US); May 9, 1904, *O. F. Cook & C. B. Doyle 163 & 166* (US). PANAMÁ. Prov. Panamá: Cerro Jefe, March 14, 1964, *R. L. Dressler 2898* (US).

According to Cook's manuscript, "This new fan palm was growing in company with a pinnate leaved palm, . . ." and "Unlike most of the species that inhabit the surrounding forests, these . . . are not undergrowth palms, but occupy exposed summits and the crests of narrow ridges. There the forest is somewhat open, and the shade is not so dense as to keep the young palms

from growing. Eventually they emerge above the other trees and secure full exposure to the sun."

The two species of *Colpothrinax* are contrasted below, using characters normally found in descriptions or herbarium specimens. The information for *C. Wrightii* is taken from the following Cuban specimens, all at the U. S. National Herbarium: *A. H. Curtiss 364, N. L. Britton & Percy Wilson 14548,* and *J. G. Jack 8269.*

	Colpothrinax Cookii	*Colpothrinax Wrightii*
Petal lobes	Persistent without a line of abscission.	Tardily deciduous with a clear line of abscission.
Calyx	Hirtellous.	Glabrous.
Stamen-tube	Equalling connate portion of petals.	Exceeding connate portion of petals.
Rachillae	Densely hirsute.	Glabrous.
Fruit size	20–25 mm. in diam.	10–15 mm. in diam.
Apex of leaf sheath	Extremely long-linguiform, breaking up into long (75–100 cm.), fine, pendulous strands.	Short-linguiform, breaking up into coarse, interwoven, non-pendulous fibers.
Trunk form	Columnar.	Strongly fusiform.

WHAT'S IN A NAME?

Neophloga (knee o fló ga) is derived from the Greek prefix *neo* (new) and the generic name *Phloga*, thus meaning "new *Phloga*." Presumably this name was used because of a resemblance to *Phloga*, but the author of it provided no explanation.

Phloga (fló ga) was taken from the Greek *phlox* (with the genitive form *phlogos*) meaning a flame. The name was proposed by Noronha without an accompanying description and was later validly published by Martius. Neither writer gave any reason for applying the name to a palm of Madagascar.

Sindroa (sin dró a) is modified from the Malagasy vernacular name *sindro* which means, according to information received by Toshihiko Satake at the National Museum in Paris, "a sprout which cannot be eaten" perhaps because the bud is not edible.

Syagrus (sigh ág russ) was the name of a kind of palm tree in Latin and was apparently used by Pliny though certainly not for the Brazilian genus of Martius.

Vonitra (vo née tra; voo née tra) was taken from the common name for *Vonitra Thouarsiana*, which is known as *vonitra* in the Malagasy language. *Vonitra* is defined as "a palm, from the stem of which a kind of potash is obtained" in James Richardson's *A New Malagasy-English Dictionary*, Antananarivo, Madagascar, 1885.

Looking Back on the Florida Freeze of 1962*

JOSEPH KELLETT

The freeze of December 12–13, 1962, brought the lowest temperatures experienced in central Florida in this century. Readings of below 20° F. were general throughout the area. Damage to plants was extensive. Not only were tropical plants, for which this had always been considered a fringe area, affected, but many species that had formerly been considered hardy for this region were severely frozen back or even killed. In this paper an attempt will be made to describe the extent of damage to some representative species, particularly on South Merritt Island, long considered an especially protected locality. In addition, an attempt will be made to compare the damage to that suffered in previous major freezes.

The coldest previously recorded official temperature reading on South Merritt Island was 26° F. at Georgianna during the February, 1917 freeze. This is at a locality that has somewhat less cold protection than the extreme southern end of the island. During the freezes of December, 1957, and February, 1958, temperatures probably reached about the same minimums. Other major freezes occurred in 1926, 1934 and 1940. My personal observations cover only those that have occurred in this area since 1946. Severe freezes in February, 1947, and a year later in January, 1948, did considerable damage to tropical plants on the mainland as far south as Fort Pierce but had little or no effect on those on Merritt Island. The 1957–58 winter was probably the most severe of the century prior to 1962, as far as central Florida is concerned, and the mean temperature was lower than during 1962–63. Dent Smith recorded minimums of 32° F. or less on three mornings in December, 1957 (with a low of 25° F.), on one morning in January, 1958, and on seven mornings in February, 1958. Of the latter, four were consecutive, from February 17 through 20, and on both the 18th and 19th temperatures reached lows of 26° F. During these four days the maximum was only 54° F. This was on the peninsula at Daytona Beach, between the Halifax River and the ocean. While somewhat colder than South Merritt Island this area has similar protection from surrounding salt water and many tropical species have been cultivated there (6). Actual minimum temperatures reached on Merritt Island during the freeze of December 13, 1962, are unfortunately not available, at least not for the

* In May of 1963 I prepared a report on the effects of the freeze of December, 1962, on native and exotic plants on South Merritt Island, Florida, with notes on some other locations and effects of previous freezes. Nearly five years have elapsed since that time, but possibly the portion of the report dealing with the palms may be of some value to members of The Palm Society. In that report I quoted freely from Dent Smith's report on the effects of the 1957–58 freezes on his collection on the peninsula at Daytona Beach, as included in *Principes* 2: 116–126, 1958. His reports on the 1962 freeze had not been published at the time that I prepared the paper. I have extracted information from my 1963 report as it pertained to the cycads and palms, emending it by adding some brief notes on the current status of the specimens discussed. At the time of this writing (January, 1968) there have been no subsequent killing freezes at this location. Numbers appearing in the text are keyed to the literature cited at the end of the report.

TABLE 1. *Readings for December, 1962, from Brevard County and some examples of inland locations.*

Location	*Date*	*Minimum in degrees F.*	*Hours below 32° F.*
Kissimmee	Dec. 11	24	11.0
"	Dec. 13	21	15.2
"	Dec. 14	22	13.4
Orlando	Dec. 11	29	6.8
"	Dec. 13	20	?
"	Dec. 14	26	11.0
Orsino (N. Merritt Island)	Dec. 11	30	8.5
"	Dec. 13	26	10.0
"	Dec. 14	29	7.6
Cocoa	Dec. 11	28	7.0
"	Dec. 13	22	13.1
"	Dec. 14	25	11.5
Merritt Island	Dec. 11	31	4.0
"	Dec. 13	24	11.0
"	Dec. 14	29	7.0
Malabar	Dec. 11	27	8.0
"	Dec. 13	23	10.5
"	Dec. 14	25	9.5

specific locale that is the subject of the bulk of this report, but it is certain that they were at least as low as 26° F. (see supplement). This was probably two or three degrees colder than minimums reached in 1957–58, although total hours of freezing weather in the earlier freeze were much greater. Later in this report it will be shown that this repeated freezing weather caused more damage to a few species than did the one extreme low reached in 1962, which was not followed by extreme lows during the remainder of the winter. During the 1957–58 freeze, hundreds of coconut palms were killed on South Merritt Island and on the peninsula east of the Indian and Banana Rivers. Many of these had been planted prior to 1930 and had survived the freezes of 1934 and 1940. Nearly all coconut palms on the mainland north of Vero Beach were killed. However, perhaps about 25 percent of those on the peninsula and Merritt Island survived.

Merritt Island, especially the two or three southernmost miles, has long been of interest to botanists as a sort of outpost of the tropics located in the temperate zone. While several miles wide at its northern end, it tapers southward to a long, narrow, knifelike projection until near the extreme southern tip it is only a few yards across. Lying as it does between two tidal lagoons known as the Indian and Banana Rivers, it receives the protection of surrounding salt waters. The Indian River on its west affords the greatest protection, being several miles wide and of greater depth than the Banana River. Since freezing winds almost invariably come into this area from the northwest, they must cross several miles of salt water, warmer than the air or the land areas, before striking the island. The island itself, especially

the southern tip, is underlain by coquina rock formations. The dominant vegetation of the southern two miles is almost exclusively West Indian in character, the only noticeable warm-temperate zone exception being the cabbage palm, *Sabal Palmetto*. It is a remnant of a flora that was undoubtedly at one time much more extensive over coastal Florida but now survives only in specially protected areas. It extends over most of the Florida Keys, the Cape Sable area, the Ten Thousand Islands and around the shores of Florida Bay and Biscayne Bay northward to Lake Worth. North of this, traces remain in scattered spots as far as Cape Kennedy (Cape Canaveral), which is the northermost limit for most species (9). Typical trees are the gumbo limbo, *Bursera Simaruba*; strangler fig, *Ficus aurea*; mastic, *Mastichodendron foetidissimum* (*Sideroxylon foetidissimum*); satin leaf, *Chrysophyllum oliviforme*; sea grape, *Coccoloba Uvifera* and pigeon plum, *Coccoloba diversifolia* (*C. laurifolia*). Smaller shrubs of West Indian origin include the marlberry, *Ardisia escallonioides* (*Icacorea paniculata*); myrsine, *Rapanea guianensis* (*Myrsine Rapanea*); ironwood, *Krugiodendron ferreum*; wild coffee, *Psychotria undata*; necklace bean, *Sophora tomentosa*, and several "stoppers" of the genus *Eugenia* (4). During a one-afternoon walk on South Merritt Island in the 1920's, Charles T. Simpson identified more than fifty trees and shrubs native to the West Indies, including all of those listed above. He remarked on the fact that they were of large size with none of the appearance of plants growing near the limit of their range (5). Early settlers on Merritt Island took advantage of its protected location and planted many tropical fruit trees and ornamentals. Early in the century, extensive pineapple plantings were cultivated here. It was obviously ideally suited for citrus cultivation and much of the fame of Indian River citrus was due to the superior fruit grown on Merritt Island. In addition, such exotic fruits as mangos, avocados, sapodillas, tamarinds, bananas, papayas and the various annonas were planted and thrived. Commercial plantings of mangos and avocados grew to produce large crops of excellent fruit. Such tropical ornamentals as the various banyans, royal palm, *Roystonea*, coconut palm, *Cocos nucifera*, royal poinciana, *Delonix regia*, candle nut, *Aleurites moluccana*, crotons, *Codiaeum*, *Hibiscus* and many others were planted around the homes and grew into fine specimens. Some of these were occasionally injured by the rare freezes but not severely and recovery was rapid. The 1957–58 winter, however, did serious damage, though not as severe as on the adjacent mainland. But in December, 1962, came the worst freeze so far in this century and it brought the worst damage seen on the island. Oddly enough, neither this freeze nor the ones of 1957–58 did serious damage to coastal areas south of St. Lucie County, although in earlier freezes it had been noted that some localities south of Miami had been injured more than the Merritt Island area. An attempt will be made to describe this damage in some detail.

It was previously mentioned that during this freeze some plants heretofore considered fully hardy in at least the warmer parts of central Florida suffered severely. Examples include the queen palm *Arecastrum Romanzoffianum*, and *Melaleuca quinquenervium* (misidentified in Florida horticulture as *M. Leucadendron*). Thousands of the former were killed in the colder localities and many more were defoliated. The latter were defoliated, in some cases frozen to the ground and in the case of smaller examples killed outright.

Native vegetation that received injury

consisted mostly of the remnants of West Indian flora. The mangroves, being disseminated by water, are continually extending their range northward along the coasts during warm periods and then being destroyed at their northern limit by freezes. Recovery was noted, however, as far north as the lagoons north of New Smyrna, of the red mangrove, *Rhizophora Mangle*, usually considered the tenderest of the mangroves occurring in Florida. Since the native West Indian flora had already been destroyed in all but the most protected locations by previous freezes, damage to it was not as extensive as to the exotic species planted by man. Most of the West Indian species on South Merritt Island were defoliated with loss of branch ends but are making a good recovery. With the passage of two or three years, barring another major freeze, damage to the native vegetation will not be apparent. (Note: This was written in May, 1963, five months after the freeze. Now, in January, 1968, this forecast is essentially borne out. Most signs of the freeze are gone, although to one who knows what happened, dead trees can still be seen here and there that were victims of the 1962 disaster.) The case of the exotic species is quite different, as is outlined below.

A brief description of the writer's property and of the plantings on it may be of value before going into the list of damage by species. In 1950 I obtained a piece of property on South Merritt Island, about three miles north of the southern tip, and with the acquisition of adjacent property in 1953 have about two acres. The property is midway between the Indian and Banana Rivers but does not touch either. At this point the island is approximately 1100 feet wide. The greater part of the property was covered by a stand of sand pine, *Pinus clausa*, with a heavy undergrowth of scrub hickory, saw palmetto, red bay, *Smilax* and other plants typical of the dry Florida "scrub." The easternmost side is somewhat lower and was covered with dense saw palmettos and some live oak, *Quercus virginiana*. In contrast to the portion of the island just to the south, where coquina rock is at or near the surface, it is an area of deep sand, probably an inland dune from an old shoreline. It is very dry but larger trees seem to extend their taproots into the water table and grow vigorously. The plantings were begun in 1950. Specimens were secured from commercial nurseries, as gifts in the form of seeds, small plants or cuttings, or from collecting of wild plant materials. No large specimens were secured, and the only large trees now present that were originally there are one Haden mango and two oaks. All others have grown from seeds or small plants since 1950. Artesian water has been used for irrigation. Generous amounts of commercial fertilizers, as well as such organic materials as seaweed, poultry manure, leaf mulch and compost have been applied. Most of the plants have responded well. A list of species, with notes on the cold damage, follows arranged alphabetically under the two families Cycadaceae and Palmae.

CYCADACEAE

Cycas circinalis. Queen Sago. Tropical Africa. This specimen was set out as a small plant in 1956 and had made rapid growth with a dense crown of leaves about 12 feet high and a spread of 14 feet in 1962. It showed no damage in the 1957–58 freezes. Notes taken after the 1962 freeze follow: "Dec. 15: no apparent damage. Dec. 30: Some outer fronds burned. April 16: same. A rapid recovery from these slight effects is being made and all traces of damage will soon disappear as the older fronds are replaced. At other locations

damage to examples of this species was much more severe, with loss of the entire crown of leaves in some interior Central Florida locations." By November, 1964, the plant had fully recovered and was in vigorous growth with no evidence of freeze damage. The plant in January, 1968 is considerably larger than at the time of the 1963 notes and shows no trace of the freeze damage. This specimen has never been "pruned" and has a number of large offshoots.

Encephalartos sp. South Africa. This specimen was grown from a seed obtained from Edwin Menninger of Stuart, Florida, in 1957. It grew slowly as a potted plant and was set out in 1962. It was about one foot tall in 1962. It showed no effect of the freeze, but was protected by covering with a cardboard box. This is still a slow grower but now, in 1968, it has about doubled the size noted above.

Zamia integrifolia. Coontie. Native. Set out in 1950, this plant had made a clump about four feet across in 1962. It was undamaged by the freeze. Five years later the clump is about six feet across.

PALMAE

Acoelorrhaphe Wrightii (*Paurotis Wrightii*). This is a native palm, being found in the southern Everglades in the transition zone betwen fresh and brackish water. It is also native to Cuba, Mexico, the Bahamas and Honduras. It is a clustering fan palm, extensively used in recent years in landscaping around homes, motels, restaurants, etc. This example was set out as a small plant in 1958, and is now about three feet in height and spread. It showed no damage from the freeze. It was noted that landscape specimens in other, colder areas also escaped injury; it must be included among the hardier palms despite its native habitat at the extreme southern end of the state. It was also undamaged at Dent Smith's collection in 1957–58.

Butia capitata. Pindo palm. Brazil and Argentina. This specimen was planted in 1951 as a small plant from a collection in Jacksonville. It is a slow grower, but in 1962 had about three feet of trunk and an overall height of about ten feet. It is one of the hardiest of palms, being grown outdoors as far north as North Carolina, and as to be expected, showed no damage from this or previous freezes. Examples observed in North Florida were also seen to have suffered no apparent damage. At present (1968), this palm has about four feet of trunk. It fruits profusely and seedlings are abundant around its base and even in the "boots."

Butia hybrid. (× *Arecastrum* ?). This is an example of a natural hybrid, apparently between *Butia capitata* and *Arecastrum Romanzoffianum*. A number of these have been found in Florida, many in the Leesburg area, and are prized by palm collectors. They show the persistent leaf bases of *Butia* but the pinnae are not as stiff, being more like those of *Arecastrum*. Both parents are members of the subfamily Cocoideae, and were at one time referred to as *Cocos australis* and *Cocos plumosa*, the two names persisting among nurserymen. This specimen was received as a small potted plant in 1960 and set out in 1962. It showed no damage from the freeze. Several large examples of *Arecastrum* growing on the place were also undamaged, but as previously noted this species was severely damaged at many inland locations. At present (1968), this palm has grown to a height of over five feet. The *Butia* characteristics are dominant and its actual status as a hybrid is somewhat in doubt.

Chamaedorea. These are small, shade loving palms from Mexico and

Central America. One is the palm commonly sold in curio shops as a souvenir of Florida, and known by nurserymen as "Neanthe bella." Its correct botanical name is *Chamaedorea elegans*. Examples of several species are growing in this collection. None showed any damage.

Chrysalidocarpus lutescens. Madagascar. Two specimens of this clustering palm were planted in 1950. They showed diversity of growth, one producing a large number of slender stems and the other three larger stems. They had reached a height of some 20 feet. They were moderately damaged by the freezes of 1957–58, with loss of outer fronds on the higher stems, but made a rapid recovery. Damage from the 1962 freeze was much more serious. The example with the larger number of stems exhibited severe damage to the higher stems but the lower ones were undamaged and should eventually replace the others. The example with only three large stems showed no evidence of recovery in May, 1963, all fronds being dead and no growth appearing from the center.

Note dated November, 1964: "One of the three large canes sprouted almost a year after the freeze, but then died. Vigorous growth from the lower canes on the other example." Present (1968): growth of smaller stems had practically obliterated all evidence of the freeze on the multiple stemmed specimen. The other showed signs of recovery through feeble growth but died after about a year. Attempts to save it by sawing off below the damaged terminal portion of the stems produced initial growth but apparently the damage was too severe.

Coccothrinax argentata. Silver palm. Native to the rock pinelands of south Dade County, Florida. This is a notoriously slow growing palm. The example in this collection was obtained from a Homestead nursery as a small plant in 1953, and was then several years old. It was about four feet tall in 1962 with about a foot of trunk, and had flowered for several years. It showed no damage from either freeze. This specimen is now over six feet tall with three feet of trunk.

Coccothrinax crinita. Another very slow grower, this Cuban palm is noted for the long, hairlike fibers that cause the trunk to appear to be clothed with long, light-colored fur. The example here was received as a very small potted plant in 1960 and set out in 1962. It was unaffected by the freeze. At the present time, six years after being set out, this palm is only 11 inches tall. However, it appears healthy and hopefully will accelerate its growth at a later stage.

Cocos nucifera. Coconut. Prior to the 1957 freeze, there were 28 coconut palms on the property and several had flowered for the first time and were developing fruit. That freeze killed 23 of the 28. Some appeared to be recovering in the spring, new fronds emerging, but succumbed either to damage deeper in the bud, to insect attack or to a combination of the two. To the five that survived was added a specimen of the 'Golden Malay Dwarf' variety planted in 1958. This had grown rapidly and was fruiting for the first time in 1962, as were two of the survivors of the earlier freeze. In May, 1963, it was not possible to be sure of the damage done by the 1962 freeze. It appeared likely that three would recover; two, including the Malay Dwarf, were doubtful and one, the largest, seemed almost certainly killed. The last three showed signs of recovery but the new frond that emerged fell over. The rotted part of the bud in the dwarf variety was cut away and the area treated with an insecticidal dust, and a green stub emerged. The same thing was done with the other two and green growth was found in the bud of

one but not the other. It is perhaps noteworthy that the three that showed definite evidence of survival in May, 1963, were all growing in the lower, eastern portion of the property, which would be expected to be colder than the higher portion nearer the Indian River. Two of these were grown from coconuts produced by trees growing in the island. It seems possible that these parents had a somewhat greater than average cold tolerance, having survived previous major freezes. In the southernmost mile of the island nearly all coconuts seemed to be recovering by May, 1963. At the Dent Smith collection at Daytona Beach nine *Cocos nucifera* to 13 feet tall were growing in 1957. All were killed by the 1957–58 freezes. (6)

By November, 1964 the coconut nearest the house (the largest example referred to above) recovered after seemingly having died. One of three in the lower end of the property died during the second summer following the freeze. The other two made good recovery and the larger was flowering. Four smaller ones (sprouts at time of freeze and not mentioned above) had been set out and were growing rapidly. By the present, in January, 1968, three of the specimens described eventually recovered, including one that appeared hopeless. This, the largest one, was given a severe treatment by sawing off the entire terminal end of the trunk to several inches below the emerging growth. It has made a complete recovery and has added about two feet of trunk. The 1957–58 and 1962 freeze damage is easily seen in the two constricted areas in the trunk which is now about 16 feet tall. Of the three referred to as showing the clearest indication of recovery, one, as indicated in the 1964 note, died about a year and a half after the freeze. The other two are now vigorous and are bearing. The 'Golden Malay Dwarf,' although it produced some new growth, eventually died. It should be noted that a freeze-injured coconut palm, if it had developed a trunk at the time of the freeze, will always bear the evidence of the injury in the smaller size of that portion produced from growth made immediately after that period. This is in contrast to *Roystonea*, which at least at this location, shows little evidence of freeze damage.

Copernicia macroglossa (*C. Torreana*). This palm from Cuba is interesting for its extremely short petioles and persistent leaves, arranged spirally so that it is clothed to the ground while young and superficially resembles a *Pandanus*. It is another extremely slow grower. The specimen in this collection was set out in 1959 and has grown only two or three new leaves since that time. It was unaffected by the freeze. In 1968, still small although nine years old, this specimen is showing signs of accelerated growth as new leaves are developing more frequently and each new one is noticeably larger.

Dictyosperma album. Hurricane palm. Mauritius. This specimen was set out in 1954 and at the time of the freeze had grown about a six-foot clear trunk. Notes on different dates after the 1962 freeze follow: "Dec. 15: light damage noted, some outer fronds discolored. Dec. 30: very severe, all fronds brown. Feb. 3: center fronds emerging green, April 16: recovery seems likely, center fronds green." In May, 1963, it appeared certain to recover and show little effect of the freeze within a few months. Notes on the 1957–58 freezes show that it suffered minor foliage damage at that time. At Dent Smith's collection at Daytona, all four specimens that he had were killed by the 1957–58 freezes. He noted that one persisted until May when killed by insect larvae. (6) In 1968, this palm

had recovered completely and now has ten feet of trunk below the crown shaft. It flowers but has produced no fruit.

Howeia Forsteriana. Forster's sentry palm. Lord Howe Island. This palm was a favorite in conservatories during the nineteenth century because of its soft, dark green, graceful leaves. The specimen in this collection was received as a small potted plant in 1954 and set out in 1957. Notes on damage are as follows: "Dec. 15, no damage noted. Dec. 30, slight browning of oldest fronds. Feb. 3, same. Very slight foliage burn." It showed little effect of the freeze in May, 1963. This specimen recovered completely from the freeze and never showed serious injury. At present, in 1968, the new fronds show signs of bud damage, either caused by physical injury to the emerging leaf portion from a large frond or spathe falling from an overhanging *Arecastrum*, or from insect damage.

Latania lontaroides (*L. borbonica*). Red latan palm. Mascarene Islands. This is a very showy palmate palm with red petioles and midribs. Two specimens were growing here in 1957, having been grown from seed received in 1950 and set out in 1953. After the 1957–58 freezes the two specimens, which were growing within ten feet of each other, at first showed no injury. In a few weeks, however, the fronds of one became discolored and died, and it was found to be rotted in the bud with heavy infestation of insect larvae. The other specimen showed no damage. By 1962, while having formed only a short trunk, it had huge "fan" leaves over six feet in diameter. Again it showed no damage and in May 1963 was growing vigorously. At Dent Smith's collection there were five, to five feet tall. All were killed, the last one by insect larvae in July. (6) My specimen recovered completely and is very impressive in 1968 with leaves over eight feet across. It is probably inhibited somewhat by being excessively shaded by taller *Sabal* palms and a *Kigelia* tree.

Livistona. Several species. Southeast Asia and Australia. These are the popular "fountain" or "fan" palms, the best known being *Livistona chinensis*, the Chinese fan palm. Two of this species, grown from seed and set out in 1958 and 1959, some three and four feet tall, were undamaged by the 1962 freeze. A specimen of *L. australis*, the Australian cabbage palm, was set out in 1960 and had reached about the same size. It is considered the hardiest of this genus and as to be expected suffered no damage. A specimen of *L. Saribus* (*L. Hoogendorpii*), was set out in 1960 and had made much more rapid growth, with a height and spread of five feet. It was also undamaged. A specimen of *Livistona rotundifolia*, however, set out in 1960 had made slow growth and after showing severe foliage burn it died with the bud area rotted. This appears to be the tenderest of the commonly cultivated livistonas. Dent Smith's experiences with this genus in 1957–58 were parallel, with no damage to the first three species and loss of one of two specimens of *L. rotundifolia*; the larger of the two lost its foliage but recovered. (6)

The specimen of *Livistona Saribus* is probably the most rapidly growing palm in this collection in 1968. The specimen of *L. australis* died, not from the effects of the freeze but apparently from building materials that were left piled around it when a garage was built near it.

Mascarena lagenicaulis. Mascarene Islands. This specimen of the "spindle palm" group was set out in 1958, and had reached a height of three feet. Notes taken after the 1962 freeze: "Dec. 15, light foliage burn. Dec. 30, outer fronds burned. Two opened and one unopened frond still green. Feb. 3, same." Dam-

age to this palm was slight, it made a complete recovery and has grown well since but rather slowly.

Mascarena Verschaffeltii. Mascarene Islands. Another spindle palm. There are two specimens, grown from seed and set out in 1953. They had reached a height of about eight feet by 1962. Notes taken after the 1962 freeze: "Dec. 15: no damage noted. Dec. 30: all but center fronds dead. Feb. 3: center fronds emerging green." The same effect occurred in 1957–1958, with loss of all outer fronds but quick recovery with emergence of healthy center fronds. Seven specimens of this palm in Dent Smith's collection to eight feet tall were all killed in the 1957–58 freezes. One made a partial recovery but died in June from insect larvae attack. (6)

Phoenix. Various species. Old World tropics and subtropics. Since there are at least five species of *Phoenix* in this collection, they will be grouped together, although varying in hardiness and size. This genus includes the date palm, *P. dactylifera.* The largest specimen on my place is an example of *P. reclinata.* It was first planted in Eau Gallie in 1949 after being found uprooted and thrown on a trash pile. It was transplanted to its present location in 1950, and in 1962 was about 12 feet tall with a spread of 20 feet or more, consisting of numerous stalks. It had flowered for several years. It was totally unaffected by the freeze. Specimens growing in Orlando and Tampa showed severe injury with loss of most of the outer fronds. This palm is grown as far north as Jacksonville but is only semihardy there. A small example of the Canary Island date, *P. canariensis*, was set out in 1962. It was undamaged. This palm is considerably hardier than *P. reclinata* and is used extensively for landscaping in European countries bordering the Mediterranean. *Phoenix Roebelenii*, the pigmy date, is another very popular small palm for patios but is one of the tenderest of the genus. My example, set out in 1959 and about five feet tall and flowering in 1962 had only a hint of browning of the outer fronds but specimens on the mainland in Eau Gallie were severely injured and others in Orlando and Clearwater appeared to have been killed. A small example of *P. "tomentosa,"* set out in 1960, showed no damage. Most severely injured was a specimen of an unknown species, of small size, set out in 1960. Notes on this example: "Dec. 15: no damage noted. Dec. 30: all but the two center fronds burned. Feb. 3: center bud pulled out, apparently dead." By May, however, healthy new leaves were emerging from the center. This has been noted in other palms, when at times the center bud has been pulled out but new leaves have still emerged from deeper in the bud. Removal of the damaged tissues in the bud appears to facilitate recovery. Dent Smith noted no injury to *P. canariensis*, *P. Roebelenii* or *P. reclinata* in 1957–58. Some of his hybrids of unknown parentage lost their outer fronds but recovered. (6) Palms of the genus *Phoenix* hybridize readily and it is impossible to make definite identification in the case of some specimens. All the phoenix palms made complete recoveries including the one referred to above as having the center leaf pulled out.

Ptychosperma Macarthurii. New Guinea. This is a clustering palm with slender stems. My specimen was set out in 1954, but made poor growth, being in excessive shade. It was transplanted to its present location in 1956 and there made rapid growth. At the time of the 1962 freeze the older stems were some ten feet tall and were flowering. Notes taken after this freeze: "Dec. 15, no damage noted. Dec. 30, all fronds on higher stalks burned. Leaves on lower

stalks green. Feb. 3: same." It appeared in May, 1963, that all the taller stems had been killed but that those of two or three feet would survive. In 1957–58 this palm suffered only light damage. Dent Smith had two specimens in 1957, three and four feet high. Both were killed. It may be noted here that the only palm, other than one *Latania* and the coconuts, killed at my collection in 1957–58, was an 8-foot specimen of *P. elegans*, a single-stemmed member of this genus. Its death was possibly caused, at least in part, by insect larvae in the bud.

By November, 1964, the taller stems had died but lower clusters had recovered. The plant had not regained its original height. In January, 1968, growth from undamaged smaller stems has now recovered the former size of this specimen but it has not flowered again to date.

Roystonea. Royal palm. Caribbean region. There are several species of *Roystonea* cultivated in Florida and positive identification is difficult. I suspect that all of my specimens are *R. regia*, the Cuban royal palm, the one most commonly grown here. The native Florida royal palm, *R. elata*, is similar and by some botanists considered identical. It is native to the hammocks of the southern Everglades. *Roystonea oleracea*, the Caribbean royal, is also occasionally seen in Florida. The oldest specimen on my place was obtained as a very small seedling in 1947, and is now some 40 feet tall. Six more were obtained as small plants from the L. M. Crowder place on South Merritt Island in 1950. These were voluntary seedlings that had grown at that place. Another was grown from seed from another South Merritt Island specimen. These examples in 1963 ranged from 20 to 40 feet tall but none had fruited. During the 1957–58 freezes they suffered only minor damage with loss of some of the outer fronds but made quick recovery. Notes taken after the 1962 freeze: "Dec. 15: very severe, all fronds burned brown. Dec. 30: same. Some unopened center fronds appear green. Feb. 3: center fronds emerging green on all." In May, 1963, all were making a good recovery with several green fronds having emerged on each.

Damage to this genus on the mainland was much more severe, but many specimens were recovering. Its usual northern limit of cultivation on the mainland is in the Cocoa area, although there have been examples in Orlando and New Smyrna. These latter were almost certainly killed by this freeze. Dent Smith had a total of 27 of three species in his collection in 1957: eight were *R. elata*, four feet tall, and all were killed; two were *R. oleracea*, three and five feet, and both were killed; 17 were *R. regia*, from 5 to 24 feet tall. Of these, all were killed except one 12-foot specimen, one of 14 feet and one 24 feet tall. These lost all foliage but by late fall were flourishing. The smallest of the three was growing under oak foliage and possibly received some protection from this. Dent Smith feels that hardiness of this genus, and of many others, is definitely related to size (6).

It may be of interest to note that the royal palm once had a much wider native range in Florida. William Bartram unmistakably described specimens growing in the forests along the St. John's River in the vicinity of the present city of Deland in the late eighteenth century (2). Very severe freezes occurred in the 1840's and again in the 1890's, and it seems likely that at these times the genus was exterminated in localities north of its present range. Native royal palms, some over 100 feet tall, can be seen now in the Everglades National Park at Royal Palm Hammock

and a few other places, at Collier Memorial State Park near Marco and at a few other localities in southern Collier County (4).

Of my eight specimens described above, all but one had made full recovery by November 1964. One died after Hurricane Cleo almost two years after the freeze. Weakened center growth may have been further damaged by the hurricane winds. Four of the larger specimens are now fruiting in 1968, have been fruiting for several years, and seedlings have been grown from them.

Sabal causiarum. Puerto Rico. This is a much more massive relative of our native *S. Palmetto*. My example was set out as a small plant in 1960. It had made very rapid growth and was over nine feet in May, 1963. It was unaffected by the freeze. The palm has continued its rapid growth. It now has about four feet of very heavy trunk and an overall height of about 15 feet. It fruits heavily and a number of seedlings have been grown.

Sabal Palmetto. Peninsular Florida, coastal Georgia and South Carolina. No effect was noted, here or in more northern areas, on the native cabbage palm. Since it has been used in landscaping as far north as North Carolina and grown to maturity out of doors in Japan, it must be considered one of the hardiest of palms.

Thrinax. Several species of the thatch palms, natives of the Bahamas, Florida Keys and West Indies, are in this collection. None were seriously affected by the cold. One unidentified species had some discoloration of the outer fronds while an example of *T. Morrisii* and one of *T. parviflora* were completely uninjured. However, the specimen of *T. Morrisii* was very small and was protected by covering with a cardboard box. This is in contrast to Dent Smith's experience at Daytona Beach, some ninety miles to the north, since he lost all of his *Thrinax* species in 1957–58. He noted, however, that the genus is much hardier when mature (6). My specimens have all made good growth since 1963, with *T. Morrisii* the slowest grower. The unidentified specimen mentioned in the report is probably *T. microcarpa*.

Trachycarpus Fortunei. Fortune's windmill palm. East Asia. This is considered the hardiest of all palms, having been grown out-of-doors on Vancouver Island, in Edinburgh, Scotland and in Virginia. As to be expected, my small specimen, set out in 1962, was unaffected by the freeze. Unaffected by the cold, this palm has nevertheless been a very slow grower and in January, 1968, is only 32 inches tall.

Veitchia Merrillii. Philippine Islands. This palm, formerly known as *Adonidia*, is one of the most popular landscape subjects in south Florida. It resembles a small *Roystonea*, and bears large clusters of brilliant red fruit. It is, however, quite tender. My collection included two examples set out in 1950 and about 15 feet tall, two about four feet and one about two feet, the latter a seedling from one of the older ones. The three smaller ones were killed in 1962. All fronds on the two larger specimens were killed but green center fronds had emerged in May, 1963, and recovery seemed likely but not certain. This palm tends to show permanent scars from freeze injury in its stem, with that part developed during and soon after injury much reduced in size and scarred or furrowed. This is also typical of *Cocos nucifera*. It also tends to be susceptible to attack by boring beetles after being injured: one of my specimens suffered severely after the 1957–58 freezes and was saved only after elaborate treatment. A small seedling that had voluntarily sprouted from a seed dropped from one of the two larger examples was unaf-

fected by the last freeze. Apparently temperatures at ground level were considerably higher, as several coconut sprouts were similarly unaffected and some germinated after the freeze. Dent Smith had 19 specimens of *V. Merrillii* from three to nine feet tall. All were killed by the 1957–58 freezes (6).

In November, 1964, one of the two large specimens had made fair recovery but the top was much reduced. The other large one made poor recovery and the center leaf fell out. Apparently the new growth was too weak to be self-supporting. This was cut off but recovery seemed doubtful. Three smaller specimens had been set out and are growing well. Two of these survived the freeze.

The larger specimens, although growing a few new center fronds, eventually died although one survived for more than three years. However, one of the smaller specimens, apparently dead at the time of the 1963 report, recovered and now in January, 1968, is about 12 feet tall. As noted, the damage inflicted in 1962 is apparent in its trunk.

Before leaving the palms note is made of the numerous cases where insect larvae damage to injured bud tissues was a contributing if not decisive factor in the ultimate death of the specimen. It appears that prompt removal of all dead or damaged fronds and injured bud tissue, and application of an insecticide, might save some specimens that would otherwise be lost.

Conclusions

While most species showed greater damage from the freeze of 1962 than from those of 1957–58, there were a few that seemed to suffer more from the latter. This would seem to indicate that these species are capable of withstanding one extremely low period better than a continuous, repeated series of freezes during which the minimum is not as low but the mean and maximum are lower. Examples of these as observed at this location include the following: *Cocos nucifera* (while damage to coconut palms was again very severe, the percentage of total kill in May, 1963, appeared to be less, and at the extreme south end of Merritt Island all seemed to be recovering), *Latania lontaroides*, *Mascarena Verschaffeltii*.

All of the other species noted were more severely damaged by the later freeze, when they were exposed to a temperature of 25° F. or possibly even less, than by the series of freezes of 1957–58 when they were exposed to a minimum of 27° F. but to many more hours of sub-freezing temperatures intermittently over a period of three months. For the majority of these species, however, temperatures of below 32° F. repeated each winter would prevent their ever producing normal growth or fruiting. It must also be noted that for the species listed above, the minimum reached in December, 1962, was probably very near to the absolute minimum to which they could be exposed even for a short time and survive.

One species was omitted from the original report of 1963, largely because identification was then and still is in doubt. There are two specimens, both grown from seed, one planted in 1953 and the other in 1960. They are either *Attalea*, *Orbignya* or *Scheelea*; I feel that it is most likely that they are *Orbignya Cohune*. At any rate, only minor damage in the form of leaf burn of the older fronds occurred in either freeze. Both have grown fairly rapidly. The larger has fronds over 20 feet long and still no indication of formation of a trunk.

SUPPLEMENT

Data on freezes of 1957–58 and December, 1962, from Federal-State Frost Warning Service Publications, received after preparation of the report in May, 1963.

The average temperature for December, 1957 and January and February, 1958, was the coldest ever recorded in Florida for any three consecutive months. Lower minimum temperatures had, however, been recorded in previous seasons. Lowest of the season, at stations in the central districts, occurred on the morning of December 13, with readings of 15° F. to 22° F. January 9 through 11 had readings of 20° F. to 27° F. in colder locations in the central districts, and from the 8th to the 23rd of February temperatures were below freezing each night in these locations. The Indian River District had a minimum of 22° F. on December 13, with 33 nights below 36° F. and 19 nights below 32° F. These readings were from colder, low ground locations.

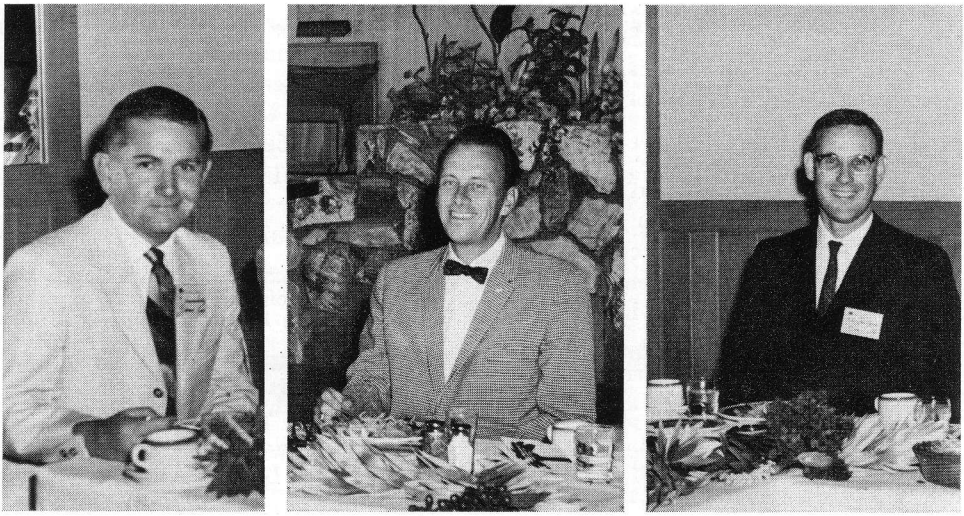
For the northern portion of Florida, and for the high ground and other so-called "warm locations" of central Florida, the freeze of 1962 was the most severe freeze of the twentieth century (see Table 1). Some representative readings at colder locations, all occurring on the morning of December 13, 1962: at Glen St. Mary, 9° F. Here the temperature was below 32° F. for 20.4 hours. This is in the Gainesville District of north central Florida. Waldo and LaCrosse had readings of 11° F. and McClenny, Starke, Orange Lake and Williston had 13° F. These are all in the Gainesville District. Umatilla in the Orlando District had 16° F. and Lake Alfred, in the Ridge District, 18° F. Lowest in the Indian River District was 20° F. at Cocoa 2, where readings were below 22° F. for 4 hours, below 26° F. for 8 hours and below 32° F. for 14 hours. It is certainly worthy of note that the lowest temperatures reached in 1957 and in 1962 were on the same date, December 13 (11, 12).

Literature Cited

1. Barrett, Mary Franklin. Common exotic trees of South Florida. University of Florida Press, Gainesville, Florida. 1956.
2. Bartram, William. Travels through North and South Carolina, Georgia, East and West Florida. Philadelphia. 1791.
3. Chandler, William Henry. Evergreen Orchards. Lea & Febiger, Philadelphia. 1950.
4. Davis, John H., Jr. The natural features of southern Florida, especially the vegetation, and the Everglades. Florida Geological Survey, Bulletin 25. 1943.
5. Simpson, Charles Torrey. In lower Florida wilds. G. P. Putnam, New York. 1920.
6. Smith, Dent. Cold tolerance of cultivated palms. Principes 2:116–126. 1958.
7. Sturrock, David & Edwin A. Menninger. Shade and ornamental trees for South Florida and Cuba. Stuart Daily News, Inc., Stuart, Florida. 1946.
8. Watkins, John V. Your guide to Florida landscape plants. University of Florida Press, Gainesville, Florida. 1961.
9. West, Erdman & Lillian Arnold. The native trees of Florida. University of Florida Press, Gainesville, Florida. 1946.
10. Various Authors: Cultivated Palms. Special Issue of the American Horticultural Magazine, Washington, D. C. January, 1961.
11. Federal-State Frost Warning Service: Seasons report, 1957–58. Lakeland, Florida. May, 1968.
12. Federal-State Frost Warning Service: The big freeze of December, 1962. Lakeland, Florida. January 4, 1963.

In verifying the botanical names of the palms included in the original report, I referred "An annotated checklist of cultivated palms" by Harold E. Moore, Jr., in *Principes* 7(4) for October, 1963.

NEWS OF THE SOCIETY



1. New officers of The Palm Society photographed at the Biennial Meeting banquet in Arcadia, California, August 10, 1968. Left to right, Prof. Warren Dolby, Assistant Editor, Dr. Jerome Keuper, Vice President, Dr. John Popenoe, President. From photograph by Ken Foster.

A very successful meeting was held in Arcadia, California, on August 10th–11th, marking the end of another two-year period in the Society's life. We are most grateful to the management and personnel of the Los Angeles State and County Arboretum for being our hosts. The Arboretum looks even more beautiful than it did when we met there four years ago. Dr. William S. Stewart, Mr. Duane O. Crummett and Mr. Francis Ching were cordial hosts.

Mr. Burton Greenberg was convention chairman, and he ran the meeting like clockwork, so smoothly that no one was aware of all the time, thought and labor that was involved, unless he has had experience along those lines.

Close to one hundred members and their guests registered during the morning of the 10th, and took the guided tour of the Arboretum grounds. A buffet luncheon was served, followed by the business meeting.

The reports of the President, Secretary and Treasurer were read. They will be found elsewhere in this issue.

Mr. Billings McArthur, chairman of the nominating committee, proposed the following slate of officers and directors for the coming biennium:

President: Dr. John Popenoe
Vice President: Dr. Jerome P. Keuper
Secretary: Mrs. Lucita H. Wait
Treasurer: Mr. Wallace E. Manis

Directors for the period 1968–1972:

Mr. Otto Martens
Mr. David Barry, Jr.
Mr. Walter J. Murray
Mr. Dent Smith
Mr. Harrison Yocum
Robert N. Smith, Jr., M.D.
U. A. Young, M.D.

There being no nominations from the floor, the slate was unanimously elected.

Following the business meeting, short illustrated talks were given by Dr. Joseph A. Tuta, on fossilized palms, Mr. Nolan Kiner on palm education in our

colleges, Mr. Paul Saito on use of palms for parks, highways and public places and Mr. Billings McArthur on the new palmetum and Dent Smith trail at Florida Institute of Technology, Melbourne, Florida.

During the coffee break, courtesy of Mr. and Mrs. Sydney E. Jones, members enjoyed examining the exhibits of palm publications—books, bulletins, papers and nursery catalogs old and new—coordinated by Mr. Nolan Kiner, the fascinating display of petrified palms and cycads shown by Dr. Joseph Tuta, and the many beautiful and rare palms in containers belonging to various members of the western chapter, and arranged by Mrs. Evelyn Ching. Mr. and Mrs. Jones presented the secretary with a very fine painting of the washingtonias in Palm Canyon, painted by Mrs. Jones.

Dr. M. E. Darian had planned a palm guessing game, but due to shortage of time he simply showed the slides, much to the relief of the audience, which did not want to show its ignorance.

That evening a banquet was held at Eaton's Restaurant. The featured speaker was Dr. Harold E. Moore, Jr., who gave an illustrated talk on "A Scientist Looks at Palms." The audience gained an insight into the methods of study used by botanists in determining palm species, and was spellbound by the beauty of the minute palm parts when enlarged on the screen.

On the following day members and guests were entertained by Madame Ganna Walska, whose estate, "Lotusland," is more lavish and beautiful than ever. After a tour of the many specialized gardens and areas, our gracious hostess served refreshments and accepted our thanks for a delightful afternoon.

All of us felt the absence of the Society's founder, Mr. Dent Smith, who was out of the country and unable to attend.

And so begins a new biennium, which we hope will be even greater than those behind us.

LUCITA H. WAIT

* * *

Report of the President

As is customary at the end of tenure of presidency a report must be made. And so, while pondering it, it seems to me it would be much more in order to report on things, projects and ideas left undone than on those which took form in the previous two years.

The remarkable fact with us palm people is that we never cease to plan, to plant, to see, to study, to admire those individual palms for which we take long trips to Florida, California, Mexico—even to the farthest corners of the earth, as 18 of our members are going to do the day after tomorrow. So, as we are driven by an uncontrollable force within us to strive for wider vistas, so are there things in our Palm Society which remain to be done: in organization, public relations, promotion, especially, of course, in palm education, education by self-study not less than by helping others to learn to know this wonderful family of plants better.

Palms have entered a period of distinct landscape esteem during the last 20 years in the world of professional beautification; so much indeed, that palms today (and I talk of California because I know it) are the backbone of many extraordinarily outstanding landscape accomplishments. Due to their quality of beauty, shape, grace, their outspoken individuality, their features of adaptation, low maintenance, they will never lose this priority.

Just as much as this is the outlook on palms, just as much will our society grow and flourish. For palms are the "Principes," the first ones, the best ones. To know them, to know them better, is

a privilege, but it also is a natural consequence that we will grow in true proportion to their importance. So let us get *involved*! Yes, just a bit more involved in our Society, the meetings, the offices to be filled when you are called upon—within our chapter, within our mother group, within PRINCIPES with its articles, its news, write-ups and pictures. It's always so: only to the extent that we give shall we receive.

The well-being, struggles, growth, success of the past two years have been brought to our attention by the reports of our Secretary and Treasurer. Suffice it for me to touch briefly on two events during my time of tenure which will permanently influence the work and life of The Palm Society in the future. First, to alleviate the burden of editorship of PRINCIPES, carried solely and unselfishly by our editor Dr. Hal Moore, Jr., for the unbelievable period of 12 years, we have created the position of Assistant Editor. Benevolent fate would have it that Mr. Warren Dolby of Contra Costa College at San Pablo has accepted the responsibility. His influence has been seen by us in the last two issues of PRINCIPES. Warren's profession is geography. Not only does he know palms, as we can talk of knowing palms as laymen without being an authority like Hal, but he cannot be fooled by anybody's quiz as to where the land lies that produces the palm. Warren, take a bow!

We are sure that the arrangement of assistant editorship with division of certain departments and innovations in PRINCIPES will greatly enhance our magazine which already is enjoying worldwide reputation.

The second change concerns the biennial convention. It took a change of the By-laws to bring it about. It was proposed and officially voted upon by the Board of Directors in a meeting in Miami, September 1967. The essence of it is that "biennial meetings shall be held during even-numbered years at such time and place as the President shall indicate subject to the concurrence of a majority of the Board of Directors."

Reason for the change from the previous date of the third Tuesday in April was the consideration that a greater number of members will be able to attend conventions during three months of summer vacation than in April, and that members could be enticed to bring their families for vacation travel at the same time.

Other minor changes were concluded by the By-laws committee under chairmanship of Mr. Dent Smith, founder of The Palm Society and were duly processed by the Board of Directors. Copies of the new By-laws may be obtained upon request from our Secretary.

Finally, I come to turn over the presidency to my successor with a lump in my throat and the nostalgic sadness in my heart of leaving something behind which gave me such wonderful inspiration and uplift during the two years which you allowed me to serve you. I must think of the many friendships made, of the warm, sincere associations encountered with so many in our society. I wish to thank all those who were of help and encouragement. I do so without naming them—they know who are meant.

Only one I must single out. You know who it is: Lucita, thank you for your help, for making our society run as smoothly as it does, and for making my two years of presidency of this fine enthusiastic group two years of deep inner satisfaction.

With this, I turn the gavel over to our new president—Dr. John Popenoe—with all my wishes for success and growth.

OTTO MARTENS
August 10, 1968

Dr. Jerome P. Keuper— Vice President*

Dr. Jerome P. Keuper was born in Ft. Thomas, Kentucky, in 1921 and graduated from Highlands High School, Ft. Thomas, in 1938. He enrolled in Eastern Kentucky State College, but left in 1941 for active duty with the U. S. Army in World War II as a field artillery officer. Later he was transferred to the Office of Strategic Services (O.S.S.). After intensive training and study in Washington, D.C. and Catalina Island, California, he served as an O.S.S. intelligence officer in the China-Burma-India theater.

Following World War II, Dr. Keuper returned to school at the Massachusetts Institute of Technology, where he was graduated with honors in 1948, with a B.S. degree in Physics. While working on his bachelor's thesis at MIT, Dr. Keuper conceived and designed the first nuclear scintillation counter. In the following year, he received the M.S. degree in Physics, at Stanford University. In 1949, he returned to Washington, D.C. and served a one-year appointment as Research Associate at the Carnegie Institution of Washington. He reentered graduate school at the University of Virginia in 1950, and was awarded the Ph.D. degree in Physics in 1952.

From 1952 to 1958, Dr. Keuper was employed as a Senior Research Physicist with the Remington Arms Company in Bridgeport, Connecticut. While at Bridgeport, he also served as Chairman of the Mathematics Department at the Bridgeport Engineering Institute. Later, as a member of the Executive Committee of that institution, he developed a program of special graduate courses to meet the advanced educational needs of industry in southeastern Connecticut.

Dr. Keuper joined the Radio Corporation of America at the Missile Test Project in early 1958. From 1960 to 1962, he was Manager of RCA Systems Analysis, which is the group of scientists and engineers who have the responsibility for evaluating the accuracy of all tracking instrumentation on the Air Force Eastern Test Range.

Late in 1957, Dr. Keuper explored the feasibility of establishing a college to serve the needs of the Cape Kennedy area. Early in the following year, he founded the Brevard Engineering College and served as President of the institution. In 1962, Dr. Keuper assumed the Presidency of the college on a full-time basis.

In August of 1962, Dr. Keuper was selected by the Orlando Sentinel as Man-of-the-Week. He has been a guest on various television programs, including "Central Florida Showcase" and "Digest."

Dr. Keuper is a member of the Beach Lodge F. & A. M., the Melbourne Shrine Club, and a Kentucky Colonel. He is listed in "American Men of Science" and "Who's Who in the South and Southwest." He is a member of the American Physical Society, American Society for Computing Machinery, Operations Research Society of America, The British Interplanetary Society, American Ordnance Association, National Aero Space Education Council, Marine Technology Society, Sigma Xi, and has published a number of scientific papers.

He is a member of the Executive Committee of the Florida Association of College and Universities, a member of the Council of Presidents of the Independent Colleges and Universities of Florida, a member of the Board of Directors of National Education Associates for Research and Development, and a graduate of the Executive Management Pro-

* Biographical notes on the President, Treasurer and Secretary have appeared in *Principes* 10: 41, 1966, and 1: 75, 1957.

gram of the American Management Association.

Dr. Keuper lives with his wife, Natalie, and two children, Philip and Melanie, on Banyan Way in Melbourne Beach, Florida.

* * *

Report of the Secretary

The Society has survived for another two-year period in good financial condition, and with unflagging interest on the part of most of its members. Our president, Mr. Otto Martens, has been an enthusiastic leader and an able director of the Society's policies. The Vice President and the Treasurer also have been very helpful. Your Executive Secretary is most grateful to them, and to the Board of Directors, who have responded whenever called upon.

Membership. The number of members varies almost daily, as new members are added while others drop out for one reason or another. The average number is between 450 and 500 active members, plus over 100 institutional subscribers to the quarterly, PRINCIPES. During the two-year period we added 128 new members, which is a bit over one every week. Considering the youth and specialized interest of the Society, this is quite encouraging. Unfortunately, we lose almost the same number every two years, so that the average number remains about the same. We welcome any suggestions as to how we can retain the interest of the drop-outs.

Seed Bank. The Seed Bank has had a phenomenal growth during the biennium. A total of almost 3000 packets of seeds was sent out. There are two thick notebooks filled with requests from members, some of which seem almost impossible to fill; however, due to the interest and generosity of members in various parts of the world, some very rare seeds have been received and distributed. We welcome these donations, and are very pleased when we receive reports from the recipients about their success or non-success in raising plants from them, with methods of germination, number of days between planting and first growth, etc., etc. The members have been very generous in sharing seeds, which arrive from Africa, Asia, South America and from many places in the United States. The chief sources of supply still are the three large palm collections in southern Florida: Fairchild Tropical Garden, the USDA Plant Introduction Station and the Alvin R. Jennings estate. We continue to owe them a debt of gratitude. Our members in California have also been very kind in sending quantities of seeds of the palms which thrive there.

Those of us who are leaving in a few days to visit the great tropical botanical gardens of the world have hopes of making new contacts and finding new sources of rare palms. A report will be made in a future issue of PRINCIPES.

Other Activities. In the parts of the world where there is a large enough number of members, groups or chapters have been formed, chiefly in central and southern Florida, and in the western states, principally southern California. Meetings have been held at times when a good program can be arranged, and field trips to interesting palm collections have been made. A good deal of trading of palm seedlings and of information takes place at these meetings, and the members learn to know each other. The Society's slide collection, made up of 35 mm. transparencies donated by members, is available on loan to members who send me a $10.00 deposit, which is refunded when the slides are returned.

Publicity. The Society has been rather weak in this respect. We need a good publicity committee that can spread the word about our aims and activities.

Members have been good about inviting interested persons to join, and sending names of prospects to me so I can send them a kit with information and an invitation to join. We could do much more along these lines, however. Mr. Kenneth Foster has designed and made up some very appealing folders and letters of invitation for us lately, and we wish to express our gratitude to him for this volunteer work. Let's spread the word about the Society even more than we have done so far.

Publications. Our two editors deserve the greatest praise for the long hours they give to producing one of the outstanding botanical publications, our quarterly magazine, PRINCIPES. It is truly amazing that for twelve years enough unpaid-for material has come in to fill the 36 pages each quarter, and that Dr. Moore and Mr. Dolby have created such an attractive journal from it. From my slight experience in helping them I can tell you that it is *not easy.* Each of us should take the responsibility of sending Mr. Dolby items of horticultural interest, and photographs of good quality, even though we are not qualified to write scientific articles. Instead of criticizing, let's help!

I, personally, want to thank all of you for your delightful letters and visits, and to ask you to continue giving me your support. If you will do so, we will have another happy two years.

LUCITA H. WAIT

* * *

A Letter from the Outgoing President

To all the nice people who attended the 7th Biennial Convention in Southern California, we hope you had a good convention.

As your hosts we hope that you had a good time and were not disappointed in any of our arrangements. We can report that total registered attendance was nearly 100 people, but that more attended the special event of the Lotusland tour to Santa Barbara.

Financially, we are happy to say, we are in a better position than we expected to be.

We would like to thank all active participants who helped to make the convention a success. So many details, so much good will go into a convention that it is nearly impossible to thank each one separately. A big hand goes to the plant exhibitors under the chairmanship of Evelyn Ching. This includes the special decorations with cycads by the Los Angeles State and County Arboretum under the direction of Francis Ching, superintendent (no relationship to Evelyn). The Palm Society is greatly indebted to the Arboretum for all facilities of room, light, mike, projection and seating as well as special jeep train tours.

Thanks also to Mr. and Mrs. Sidney Jones for the coffee break; to Prof. Nolan Kiner for attending to the book and catalog table (what an attraction this feature turned out to be!); to Dr. Tuta for his fossil collection the like of which nobody had seen before. We have thanked our fine speakers by separate letters.

Our special thanks go to Mme. Ganna Walska of Lotusland and to her associates for making our tour through this wonderland such an outstandingly enjoyable one—horticulturally and socially—ending with a champagne party on the spacious lawn.

Our thanks go to Dr. Vance of Beverly Hills and Mrs. Loran Whitelock for opening their grounds to our members' visits.

We hope we will be forgiven if we have omitted anyone, but if we have, our thanks to you, too. Let us close by

saying it was a lot of work for us, but it was also fun, and now, that you are gone, we miss you. Till we meet in two years, wherever it will be, so long and have a pleasant time ahead.

Sincerely,
OTTO MARTENS
Past President

* * *

Report of the Treasurer

The Palm Society Inc., a non-profit organization, has successfully completed another ficsal biennium from May 1, 1966 to April 30, 1968. Success for our non-profit organization may be termed as an addition to our existing funds brought forward from previous years.

The beginning of our biennial fiscal year, May 1st, is a time at which the Society's funds reach their lowest ebb. Immediately afterwards membership contributions rebuild the account depleted by the publishing of PRINCIPES and the necessary operating costs.

From the inception of the society until April 30, 1966, funds had slowly accumulated to produce a checking account considered too large to continually carry forward, thus $2,000.00 was withdrawn and deposited in the South Miami Federal Savings account. As of April 30, 1968, the $2,000.00 investment had produced $138.85 in interest redeposited.

During the 1966–68 biennium, income was $12,485.90, and expenses were $11,999.27 leaving a balance of $486.63 for the two-year period. This sum, together with previous accumulation left in the current checking account provided a $1,513.48 bank balance as of April 30, 1968.

A financial statement and bank reconciliation statement are attached.

As Treasurer for The Palm Society, I regret not being able to inform you personally of our successful financial biennial. It is with satisfaction that I report that we continue solvent through your contributions.

As treasurer, my check signing has been ably directed by our guiding force, Lucita. Without her help and cooperation, I could not have survived the rigors of the office. Our cooperative efforts were reinforced by the welcome addition of Mrs. Harry Grant, the Society's employed bookkeeper. She has truly taken our interests to heart and I wish to thank her personally and extend to her the Society's appreciation for a job well done.

As a member now in good standing, I also regret not being able to join in the wonderful California palm experiences our President and you enthusiastic California members are so thoughtfully providing at this 1968 Biennial meeting.

WALLACE E. MANIS

THE PALM SOCIETY, INC.
FINANCIAL STATEMENT AS OF APRIL 30, 1968

INCOME:		
Contributions	$9,925.82	
Publications and subscriptions	1,603.98	
Seeds	778.78	
Interest earned	138.85	
Income from biennial meeting (1966)	35.50	
Bank refunds	2.97	
Total		$12,485.90

EXPENSES:		
Printing PRINCIPES (does not include January 1968)	$5,504.67	
Postage for PRINCIPES	265.00	
Salary of Executive Secretary (includes April '66 salary)	2,708.25	
Salary of Bookkeeper-Assistant	828.29	
Petty cash	560.74	
Office rental	480.00	
Stationery	148.72	
Printing and mimeographing	425.25	
Office postage	173.00	
Office maintenance	40.39	
Expenses of biennial meeting (1966)	377.00	
*Miscellaneous	340.31	
Social Security taxes	147.65	
Total		$11,999.27
*MISCELLANEOUS EXPENSES:		
Entertainment	$ 30.00	
Editor's expenses (petty cash)	50.00	
Assistant editor (petty cash)	25.00	
Memorial	5.00	
Bank charges	25.83	
Seed refund	18.50	
Reference books	10.60	
Travel expenses (Wait)	25.00	
Back issues of PRINCIPES	25.00	
Miscellaneous labor	5.00	
Refund PRINCIPES	3.00	
Mailing bags for seeds	92.38	
Publicity folders	25.00	
Total	$ 340.31	
SURPLUS AT END OF BIENNIUM		$ 486.63

BANK RECONCILIATION STATEMENT—
TWO-YEAR PERIOD ENDING APRIL 30, 1968

Funds received from former treasurer (Bank of North Miami)		$ 2,699.52
Total income—5/1/66 to 4/30/68		12,485.90
Total in ledger		$15,185.42
Less expenses	$16,698.79	
Checks listed		
Withdrawals, North Miami		
South Miami	4,699.52	
Balance expenses		11,999.27
		3,186.15

Savings account (South Miami Fed. S. & L.)	2,138.85
	1,047.30
Checks issued on Bank of North Miami	466.18
Balance in First National Bank of South Miami	$ 1,513.48

PHOTO GALLERY

Phoenix Loureirii with silvery fronds growing at the Gillespie Estate in Santa Barbara, California. Photo by Ken Foster, Orange, California.