

H. E. Moore, Jr. Memorial Volume

# PRINCIPLES

Journal of The Palm Society

January, 1982  
Vol. 26, No. 1

## THE PALM SOCIETY

A nonprofit corporation engaged in the study of palms and the dissemination of information about them. The Palm Society is international in scope with world-wide membership, and the formation of regional or local chapters affiliated with The Palm Society is encouraged. Please address all inquiries regarding membership or information about the society to The Palm Society, Inc., P.O. Box 368, Lawrence, Kansas 66044, U.S.A.

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Harold E. Moore, Jr., 1917-1980. Charcoal portrait by Virginia Chase Earle. See p. 33.

## PRINCIPLES

JOURNAL OF THE PALM SOCIETY

(ISSN 0032-8480)

An illustrated quarterly devoted to information about palms and published in January, April, July and October by The Palm Society, Inc.

Subscription price is \$9.00 per year to libraries and institutions. Membership dues of \$15.00 per year include a subscription to the Journal. Single copies are \$5.00 each, \$20.00 a volume. Airmail delivery \$2.50 a copy or \$10.00 a volume. The business office is located at P.O. Box 368, Lawrence, Kansas 66044. Changes of address, undeliverable copies, orders for subscriptions, back issues, and membership dues are to be sent to the business office.

Second class postage paid at Lawrence, Kansas

Mailed at Lawrence, Kansas

February 2, 1982

*Principes*, 26(1), 1982, pp. 3-8

## Harold E. Moore, Jr.—A Remembrance

DAVID M. BATES

*L. H. Bailey Hortorium, Division of Biological Sciences, Cornell University, Ithaca, New York 14853*

This volume of *Principes*, dedicated to the memory of Harold E. Moore, Jr., appears well after his death, which occurred on October 17, 1980. It is better that way, for the immediacy and shock of the events of that time have been muted, and those of us privileged to record our thoughts here have been given an opportunity to consider, in less hurried fashion, the extent of his contributions to humanity and the nature of our acquaintance with him.

During the past year, I have written other words about Hal, some in collaboration with my colleagues Natalie W. Uhl and Harlan P. Banks, and in this tribute I have borrowed freely from those writings. Yet in August of 1981 as I journeyed across the Pacific, en route to the XIII International Botanical Congress to be held in Sydney, Australia, my thoughts turned to Hal anew, cast, however, against a different backdrop.

The sky was touched with the first light of morning as my flight slipped onto the runway at Nandi in the Fiji Islands. Buildings, people, and in the distance, a single coconut palm took on shape and substance. I had been transported to Hal's world—the islands of the Pacific, which in their exotic beauty and fascinating palm floras had been so enticing and important to him. Had he lived he would have been here, on his way to the Congress and then off again for one more fling at New Caledonia or other islands harboring these wonders of the plant kingdom.

Hal, or Emery as some of his early

botanical cohorts continue to call him, was born in Winthrop, Massachusetts on July 7, 1917. His boyhood, however, was spent largely in Sharon, a rural community to the south of Boston. Seemingly it was uneventful, in keeping with the pace of small towns. Hal was active in scouting, achieving the rank of Eagle Scout, and served as manager of the high school basketball team. Among his memorabilia are awards received for excellence in mathematics and English. The former was not pursued diligently in his later life, but the latter became his forte.

I never knew exactly what drew Hal into botany—whether it was his childhood wanderings in fields and forests, his readings about nature and distant lands, or the lectures in botany of that noted teacher, Raymond H. Torrey of Massachusetts State College (now the University of Massachusetts), in which Hal enrolled in 1935. In all likelihood it was a combination of the three, but in his remembrances of his undergraduate years, he spoke unfailingly of the influence that Dr. Torrey exerted on the careers of so many budding botanists, including his own.

In 1939, having received his Bachelor of Science degree, Hal entered Harvard University, where as a student of Merritt Lyndon Fernald, he completed his Master of Arts and Doctor of Philosophy degrees in 1940 and 1942, respectively. His doctoral thesis was a revision of the Mexican and Central American species of *Geranium*. During its preparation, Hal spent five months in Mexico and Guatemala,

attempting to gain a general understanding of morphological and ecogeographical patterns that could be used to interpret the accumulated herbarium materials of other collectors. This early wedding of field and herbarium studies provides a model for all his subsequent botanical research.

Hal's academic career was interrupted by the second World War. From 1942 into 1946 he served in the United States Army—first as a Private but eventually as a First Lieutenant in the Medical Administrative Corp. For the duration of the war, the flora of Texas was his diversion. Following his discharge, Hal received his first Guggenheim Fellowship. As a result, he was able to spend a full year in Mexico, where he continued his studies of *Geranium* and initiated an ambitious collecting program, which he hoped would lead eventually to the publication of a flora of the State of Hidalgo.

By mid-1947 Hal had returned to Cambridge, taking up residence as a postdoctoral student and technical assistant in the Gray Herbarium of Harvard University, while he sought a more permanent position. In December of that year, at the annual meeting of the American Association for the Advancement of Science, Hal met briefly with Liberty Hyde Bailey, dean of American botany, horticulture, and agriculture, and for the last fifty years or so of his life an avid student of the palms. The chemistry was right and Hal accepted Dr. Bailey's offer of an Assistant Professorship in the L. H. Bailey Hortorium, a unit of the then College of Agriculture of Cornell University. When Hal arrived in Ithaca in the fall of 1948, fresh from three more months of field work in Mexico, the Hortorium was not housed on the campus, as it has been since 1952, but in the lovely old carriage house that had been part of the Bailey homestead on

Sage Place, a quiet street on the hill separating the University from downtown Ithaca. In the unique and close environment provided by that setting, working with Dr. Bailey, Ethel Zoe Bailey, George H. M. Lawrence, and others of the small staff, Hal embarked on a truly remarkable research career that was built around two principal systematic interests—the first centered on the palms; the second on cultivated plants.

Hal's most obvious contributions have been to our knowledge of the palms. He was without question the world's authority on this economically and biologically important group of plants, the "big game," so to speak of the plant kingdom. In total, he spent some five years of his professional life in the field—early in his career primarily in Central and South America, later in Africa, Madagascar, Asia, and the islands of the Indian and Pacific oceans. The field work and his herbarium studies gave him an intimate and unsurpassed knowledge of palms. Hal's interests in the family, however, encompassed far more than traditional taxonomic study. He saw the necessity of integrating all possible approaches in attempting to understand the palms and their evolution. Leaf, stem and pollen morphology, vegetative, floral and fruit anatomy, structure of xylem and phloem, cytology, and pollination biology were all considered by Hal and his associates in research at Cornell University—Frederick B. Essig, Larry H. Klotz, Leonard O. Morrow, Susan G. Murray, Mandayam V. Parthasarathy, Robert W. Read, and Natalie W. Uhl—together with John Dransfield at the Royal Botanic Garden, Kew, Jack B. Fisher at Fairchild Tropical Garden, and P. Barry Tomlinson and Martin H. Zimmermann at Harvard University. Studies of floral anatomy, in particular, carried on in collaboration

with Dr. Uhl, were important in delineating subfamilies of palms and produced new insights into the structure of the palm flower. They have proven relevant not only to understanding evolution of palms, but that of the monocotyledons as a whole. The importance of this work was widely recognized, and Hal's research enjoyed strong financial support from a variety of sources, not the least of which were the National Science Foundation, Cornell University, and The Palm Society.

The long term goal of much of Hal's research with palms was to be the publication of a comprehensive book about them—in a sense, an expansion of his 1973 publication, *The Major Groups of Palms and Their Distribution*. Within *Genera Palmarum*, as the proposed book was to be titled, he hoped to describe in detail all of the genera and suprageneric categories of the family, placing these taxa in a hierarchy that would reflect, as best he understood it, their evolutionary relationships. In addition, he planned to provide general introductory chapters, also set in an evolutionary context, which would summarize the state of our knowledge of the anatomy, chemistry, and ecology of palms, among other subjects, that are relevant to palm systematics. Lastly, he intended to provide keys and other aids that would be useful in the field identification of palms. As conceived by Hal, *Genera Palmarum* would be the most important reference in palm biology and systematics, serving an enormously wide range of individuals with interest in a diversity of subjects ranging from tropical botany to biogeography and agriculture. In recognition of the importance of his dream, the Hortorium is committed to complete *Genera Palmarum*.

The cultivated flora of the world is not bounded geographically and to

deal with it effectively requires knowledge of great breadth. Among Hal's nearly three hundred published papers, over one-third were concerned with the systematics and nomenclature of many horticulturally important families, including members of the geranium, amaryllis, squash, and spiderwort families. For years he held a strong interest in the conifers, and before he was completely overtaken by his studies of the palms, he was the recognized authority on the New World members of the African violet family, authoring the widely used reference, *African Violets, Gloxinias, and Their Relatives*.

Hal was a major contributor to *Hortus Third*, the Hortorium's recently published dictionary of plants cultivated in the United States and Canada. Not only did he produce a significant portion of the manuscript, but also he edited a large percentage of the text, bringing it up to his own high standards for publication. In fact, one of Hal's greatest talents and joys was found in editorial work, an interest that can be traced to his undergraduate days, when he had been editor of the College's newspaper, the *Collegian*. Later, with the encouragement of Dent Smith, he took on the editorship of *Principes* (for the beginnings of this see April 1982). For the next twenty-three years, it was to be his journal. The time and energy he gave to *Principes*, and later to *Gentes Herbarum*, one of the scientific journals of the Hortorium, were reflected in the quality of these publications. He consistently was able to bring clarity to ideas. Only collaborators or authors whose papers had been edited by Hal could know how extensive, objective, and meticulous were his editing and writing.

Hal's professional life encompassed far more than his own research inter-

ests. In 1960, at the same time he was appointed Professor of Botany, he also became Director of the Hortorium. He served in the latter capacity until 1969 when he relinquished the position following a severe heart attack. As Director, and throughout his career at Cornell, Hal was an absolutely unselfish contributor to Hortorium programs. He was always willing to give of himself to insure their success. In fact, when our roles were reversed and I became Director of the Hortorium, I found that his enthusiasm and willingness to take on whatever chore I asked of him, sometimes with good natured grumbling, was one of the joys of administration. As Director, Hal responded to initiative. If individuals justified and pursued their own scientific interests actively, he willingly gave them encouragement and support. He was a man of the times. He recognized the changing nature of the University and the need for the Hortorium also to change. During his tenure, the Hortorium began a transformation from a research organization with a rather narrowly defined research focus to that of a more typical academic department. Teaching responsibilities expanded and individually defined research projects, rather than those of a group nature, became emphasized.

When Hal joined the Hortorium, he had no formal teaching duties, yet he became an outstanding teacher, not because of spell-binding lectures but because he possessed an enormous botanical knowledge that he willingly shared quietly and fully. In the winter of 1980, I had the good fortune to accompany him to Costa Rica, where in the midst of a variety of tropical habitats, he was to teach a course on tropical plant families. The setting was idyllic, especially the rain forest at La Selva, and the students were enthu-

siastic and incredibly hardworking. It was one of those unique opportunities to gain full flavor of another person. All that I had known of Hal came together in that tropical environment. The extent of his knowledge of tropical floras and systematic botany was abundantly evident. His enthusiasm was contagious, and we all became caught up in it.

Most of Hal's teaching involved students at the graduate level, and he dealt with all students majoring in systematic botany with equal concern, whether or not they were his direct responsibility. His interests in botany were catholic, and he served as a rallying point for students in organismic botany by opening his home to them for discussion of fundamental botanical problems as well as for social events. He influenced the careers of many graduate students both at Cornell and elsewhere. He was acutely aware of the importance of helping those beginning their own research careers in botany, and his generous legacy to Cornell will provide oftentimes critical financial support to such students.

Through the years, Hal's interest in tropical botany gave Cornell a resource unavailable in most institutions, even when the needs for such expertise had become widely recognized. He was an active participant and member of the Board of Directors of the Organization for Tropical Studies, situated in Costa Rica. His intimate knowledge of the flora of that country and other unique floras, for example, that of New Caledonia, permitted him to be of assistance both to North American scholars and those residing in the countries that he visited. He never failed to extend a kind and helping hand to those who assisted him in the field, and thus, he was always at home in his world travels.

At Cornell, Hal took an active interest in library development, serving on both the University Library Board as well as the College Library Committee. He was influential in the affairs of the Cornell botanical gardens, known as the Plantations, and was a member of the Plantations Committee for some sixteen years. He served on the Committee to Visit the Arnold Arboretum of Harvard University, was Chairman of the Research Committee of the Pacific Tropical Botanical Garden, and was a member of the Boards of Directors of the Fairchild Tropical Garden and The Palm Society. He was a member of various international committees dealing with problems of botanical nomenclature. In addition to a second Guggenheim Fellowship, he was the recipient of the Founders Medal of the Fairchild Tropical Garden.

Although I was an undergraduate at Cornell during the late 1950's, I did not come to know Hal then. It was only later, as my graduate student days at University of California, Los Angeles, were coming to a close, that I met him. He stopped by on one of his travels to talk to me about a position in the Hortorium. Perhaps, as had been the case in his brief meeting with Dr. Bailey, the chemistry was right. He convinced me to return to Cornell and the Hortorium. That return was delayed while I spent a postdoctoral year in England, during which time my wife and I had the privilege of entertaining Hal in our home. These events marked the beginning of a very special relationship. It's not that our social lives were strongly intertwined, but he was a welcome guest in our home and we in his, and in the context of those more relaxed situations, he often revealed far more of his inner self than he was accustomed to.

Hal was an appreciative and knowl-

edgeable lover of the arts. Regularly he would spend weekends in New York in what may only be termed an orgy of opera—the Friday and Saturday evening performances broken only by the Saturday matinee. Later in his life, he struggled to learn to play the piano, for he felt a need to participate more directly in the world of music. He had an eye for paintings, and he shared with my wife an obsession for the brilliantly hued colors of Dorothy Hoyt Dillingham. His house in rural Ellis Hollow stood above meandering Six Mile Creek, and was designed in such a way that from most windows he had a perpetual landscape of fields, water, and woods. It was his haven, and despite his wanderlust, he found enormous satisfaction in returning to it.

Under other circumstances, Hal might have been an author of popular acclaim. He had an amazing eye for detail, which he enjoyed recording in his correspondence from overseas. Similarly, his more popular writings in *Principes*, for instance, those titled "Wednesdays in Africa," about which I would chide him, were a means of satisfying his desire for self expression. I think that had he been able to complete his magnum opus, *Genera Palmarum*, he might have tried his hand at botanical adventure.

During the course of a lifetime, most people come to know but a few individuals who exert a profound impact on both their personal lives and the development of their professional careers. For many of us, Hal was such a person. His love and respect for knowledge and its wise use, and his enormous competence in systematic botany inspired all who knew him, even if only casually. For me, however, it is the more intimate characteristics of the man that dominate my thoughts. His total commitment to the

ideals of the University, his honesty and compassion, and the encouragement, help, and trust that he gave to me, and which he so generously extended to others through the years, were the mark of the man. His professional accomplishments, as notable as they were, are secondary in the summation of his life.

In 1978, the College of Agriculture

and Life Sciences sought to recognize Hal's contributions to science and the University by naming him the Liberty Hyde Bailey Professor of Botany. It was a fitting honor, for Hal followed in the tradition of Dr. Bailey. In his scientific work and his life he was aware of the dual needs of science and humanity, and he served both of these constituencies equally well.

## 1982 Biennial Meeting

The 1982 Biennial Meeting of The Palm Society will be held in Florida, November 20 to 27th. A tentative agenda is presented here for members who wish to plan ahead. The meeting will have three parts, but Parts I and III are optional.

### Part I.

20 November—Begin in Tampa 9:00 am, U.A. Young garden, then via Sunshine Skyway, Bradenton Beach, and Longboat Key to Selby Gardens, Sarasota for lunch and tour, on to the Bessie home and garden for supper.

21 November—Drive to Fort Myers, for lunch and tour, continue to Thomas A. Edison home and garden, and Sanibel Island for shelling, swimming, and the night.

22 November—Sanibel to Corkscrew Swamp Sanctuary for walking tour on boardwalk, drive to Carnestown on Tamiami trail with lunch stop, and on across Everglades to Miami for Part II.

### Part II.

22 November—6:00 pm: Welcome to Miami cocktail party at Ramada Inn, Dadeland.

23 November—Tour Matheson Hammock Park, beach, and jungle trails to see native palms, walk

to Drummond's for garden tour and lunch, tour Fairchild Tropical Garden; outgoing Board of Directors meeting.

- 24 November—Tour Miami Beach and lunch at Fontainbleu Hilton, or local nurseries with lunch stop, general meeting with program in Fairchild Tropical Garden Auditorium in afternoon, festivities at motel during supper and evening.  
 25 November—Tour, show, and lunch at Parrot Jungle; Jennings estate, Fairchild Tropical Garden, new board of directors meeting; biennial banquet.

### Part III

26, 27 November—Drive from Miami via Florida Keys to Key West for Conch train tour of Key West, Hemingway House, and other attractions; end in Miami Saturday after lunch at Casa Marina.

Our formal tours as outlined above will feature many native as well as cultivated palms and will start in Tampa on Saturday morning, November 20, 1982.

For those who have the time and money to see more of Florida this a fine time to do so because of the paucity of tourists and the usually excellent weather in November. Some

(continued on p. 18)

# Rare Palms in Argentina

EUGENIO JOSÉ PINGITORE

*Relaciones Fitológicas Intercontinentales, Calle Burela 3519—Villa Urquiza  
Capital Federal, Ciudad de Buenos Aires, República Argentina*

The average tourist or palm lover arriving in the Republic of Argentina is usually surprised and delighted by the life style of the ordinary citizen. Buenos Aires is the heart of the political, cultural, economic, and scientific activities of the country. The city resembles other capitals such as Madrid, London, Rome, Paris, and Rio de Janeiro.

Many exotic palms are cultivated in private gardens and public parks—palms such as *Archontophoenix alexandrae*, *Sabal bermudana*, *Washingtonia robusta*, *Howea forsteriana*, and *Syagrus × fairchildensis*—to name a few. The native flora has about ten palms, several representing threatened and endangered species, and most of them unfortunately unknown in cultivation; they include *Trithrinax schizophylla*, *T. biflabbellata*, *T. brasiliensis*, *Butia paraguayensis*, *B. poni*, *Acrocomia chunta*, and *Euterpe edulis*. Descriptions of these species are presented below.

## 1. *Trithrinax brasiliensis* Martius, Hist. Nat. Palm. 2: 150. 1837 (Fig. 2D).

Trunk single or sometimes caespitose, 2–4 m tall, 7–15 cm diam. Leaves 1–1.50 m long; spines of the fibrous bases 7–17 cm long; petiole 70 cm long; blade green above, somewhat glaucous beneath with ca. 30 cm segments, these 45–70 cm long and 1.5–2.5 cm wide, separated to within 10–15 cm of the hastula, bifid for 15–20 cm. Spadix 30–50 cm long, with

6–7 branches; flowers yellow, styles slender, erect, as long as the ovarian portion of the pistil. Fruit ovoid, 8 mm in diam., black.

Vernacular name: none.

Range: ARGENTINA: Province of Entre Ríos: Feliciano.

Also in Rio Grande de Sul (Brazil).

## 2. *Trithrinax schizophylla* Drude in Martius, Flora Brasil. 3: 551. 1882 (Fig. 5A).

Tufted palms with trunk 6 m tall, ca. 15–20 cm diam., fully covered by fibers, spines, and sheaths. Leaves rigid, coriaceous, ca. 15–20 cm wide with ca. 35 grey-green segments, the central 40–60 cm long; petiole long, adaxially concave, abaxially convex; adaxial hastula flat. Inflorescence interfoliar, with bracteoles similar to *T. brasiliensis*; peduncular bracts 5, imbricate; rachilla 8–10 cm long, thin; petals twice as long as the sepals, the style 4 times as long as the ovarian portion of the pistil. Fruit not edible, subglobose, 8 mm in diam., yellowish-green; endocarp woody.

Vernacular name: *saro*, *saho*.

Range: ARGENTINA: Province of Jujuy: Departamento Ledesma, localidad de Chalicán.

Also in Brazil and Bolivia.

## 3. *Trithrinax biflabbellata* Barbosa Rodrigues, Palm. Nov. Parag. 2. 1889 (Fig. 3A).

Caespitose palm with trunk 2–5 m tall, sometimes to 7 m. Leaves 1–2 m

long, sheaths with thick spines; petiole 60–80 cm; blade with ca. 25 segments, the lateral ones 20–24 cm long, the more central ones 40–42 cm long, all divided to the base into 2 rigid sharp-pointed halves without scales. Inflorescence 50–60 cm long, with peduncle 25–30 cm long; peduncular bracts 6, tubular; calyx half as long as corolla, with 3 acuminate lobes. Fruit globose, 1 cm in diam., with thick finely granulate pericarp.

Vernacular name: *carandillo, little caranda-i*.

Range: ARGENTINA: Province of Formosa: Pirané, Pozo del Tigre, Palo Santo, Estanislao del Campo, Las Mochas, Las Lomitas Ibarreta, Pozo Verde, Los Matacos, Potrero Norte, Pozo del Mortero. Province of Jujuy: Viñalito.

Also in Paraguay.

**4. *Butia paraguayensis* (Barbosa Rodrigues) L. H. Bailey in Gentes Herb. 4: 47. 1936 (Fig. 1B).**

Acaulescent palm, sometimes with a short trunk 1–2 m tall, 10–20 cm diam. Leaf with petiole 40–50 cm long, generally with short spines; blade 80 cm long; pinnae up to 45 pairs, more or less glaucous. Peduncular bract 43 × 5 cm, mostly with shallow grooves, brown pubescent on the outside, later glabrous; branched part of inflorescence to 38 cm long. Mature female flowers 10–16 × 9 mm. Fruit ovoid, 37 × 21–23 mm.

Vernacular name: *yatai enano*.

Range: ARGENTINA: Province of Corrientes: Mburucuyá, Loma alta Isla Apipé, Grande, Puerto San Antonio, Arroya Riachuelo.

Also in Paraguay.

**5. *Butia poni* (Hauman) Burret in Notizbl. Bot. Gart. Mus. Berlin-Dahlem 10: 1051. 1930. L. H. Bailey**

in Gentes Herb. 4: 48. 1936 (Fig. 1C).

Very small palm, 1 m tall. Leaves 30–40 cm long with narrow pinnae. Inflorescence small, with 28–30 branches, bearing clusters of edible, ovoid fruits. Juvenile plants often confused with *B. paraguayensis*, *B. arenicola*, and *B. yatai*.

Vernacular name: *yatai enano*.

Range: ARGENTINA: Province de Misiones: San Ignasio.

**6. *Acrocomia chunta* Covas & Ragonese in Rev. Argent. Agron. 8: 2. 1941 (Fig. 4A).**

Tall palm with stem to 15–18 m or more, 25–30 cm in diam., covered in spines. Leaves 3–5 m long, arching and drooping; sheathing base 30 cm long; petiole deeply concave on upper surface, convex beneath, densely covered by black spines; leaflets deep green, to 200 on each side, to 40 cm or more, drooping in several planes, with acuminate tips. Flowers yellowish-cream, fragrant; male flowers 5–6 mm long, female flowers 3 mm long. Infructescence 1.6–1.8 m long; rachillae to 25 cm; fruit globose 28–33 × 16–20 mm, one-seeded.

Vernacular name: *chonto palm*.

Range: ARGENTINA: Province of Salta: Departamento Santa Victoria, Parque Nacional Baritú, Rio Pescado Costas del Tarija, Quebrada Algarrobito.

**7. *Euterpe edulis* Martius, Hist. Nat. Palm. 2: 33. 1824 (Fig. 1A).**

Robust palm, 15–20 m tall, with trunk 10–15 cm in diam. Leaves pinnate 2–5 m long; segments narrow, linear-lanceolate, spreading, deep green; leaf sheaths forming cylindrical crownshaft; petiole 3-angled. Inflorescence simply branched; bracts 2,



1. Misiones Province: A. *Euterpe edulis*; B. *Butia paraguayensis*; C. *B. poni* shown with exotic plants.

membranous, smooth. Fruit globose, embryo near the base, endosperm ruminant.

Vernacular name: *palmito, cabbage palm*.

Range: ARGENTINA: Province of Misiones: Iguazu National Park, Zona Intangible.

Elsewhere in Brazil.

The southern limit of natural palm stands in Argentina is the area called Tigre (a suburb of Buenos Aires). This wonderful place resembles Mekong in Vietnam, but of course with a temperate humid climate. The most southern species is the "queen palm" *Arecastrum romanoffianum*.

From Buenos Aires, the palm lover or tourist has many ways of searching for tropical plants and palms; both to the northwest and northeast are areas with subtropical temperatures. Aerolineas Argentinas has regular flights every day.

### Misiones Province

In this province the climate is subtropical with mild temperatures. In the northeast is found the world famous Iguazu Falls National Park. Here each big tree and shrub is covered with lush epiphytic plants such as bromeliads, orchids, ferns, and mosses. In the zone called Intangible the palm enthusiast will be surprised to see the spectacular *Euterpe edulis*, "palmito" with edible heart. During the past year Hansi and Inge Hoffmann (active members of The Palm Society) visited Iguazu and I served as guide-collector. Now seedlings of *Euterpe* are growing in their home in San Leandro, California.

Iguazu Falls National Park is an area impossible to describe with its luxuriant jungles, rain forests, inexpensive hotels, and charming inhab-

ants. In the forties, Eleanor Roosevelt exclaimed "Poor Niagara!" This says everything about the importance of the falls.

In the southern part of Misiones exist "campos" without tall trees but rich in herbaceous plants. Here can be found groups of *Butia yatay*. Near the San Ignacio Historical Ruins is the habitat of the smaller *B. poni*, sometimes confused with *B. paraguayensis* of Corrientes Province.

### Corrientes Province

This is situated on the Mesopotamic side of Argentina, bounded in the north by Misiones, in the south by Entre Ríos, in the west by Sante Fé, and in the east by the Republic of Uruguay.

This subtropical province is very humid and warm throughout the year. The climate is ideal for palm culture. In the Resistencia Capital elegant *Chrysodocarpus lutescens*, *Caryota urens* etc. are common. Native palm species number four—*Acrocomia totai*, *Arecastrum romanoffianum*, *Butia yatay*, and *B. paraguayensis*.

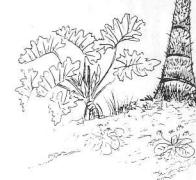
On the north side of Corrientes are found lakes called Ibera (swampy region), the home of interesting ornamental species such as *Victoria cruziana* "Argentinian pond lily" and *Erythrina crista-galli* "seibo" (the national flower of Argentina).

In the Ituzaingó region (the northern part) grow tall *Arecastrum romanoffianum* palms and the spiny *Acrocomia totai*. In the sand areas grows the trunkless *Butia paraguayensis* in small groups. This last palm is considered "threatened and endangered."

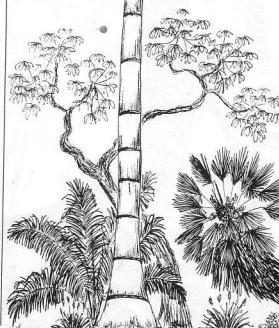
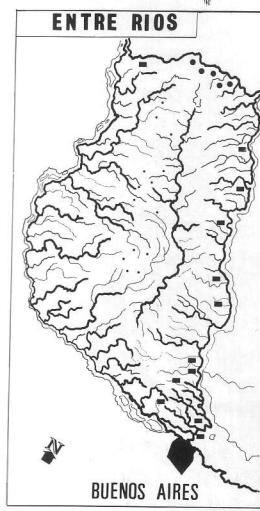
Corrientes Province is indeed a very important place for the botanist and plant collector, because of the different microclimatic regions. Other areas with rare plants are the so-called "Sel-



A



B



C



D

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2. Corrientes Province and Entre Ríos Province: A. *Acrocomia totai*; B. *Arecastrum romanoffianum*; C. *Trithrinax campestris*; D. *Trithrinax brasiliensis*.



3. Formosa Province: A. *Trithrinax biflabellata*.



4. Salta Province: A. *Acrocomia chunta*.

vas en Galerias" (gallery-jungles), relict areas from prehistoric times where grow the most austral tree ferns in continental South America, the rare *Cyathea delgadii*, recently rediscovered, the climbing orchid *Vanilla argentina* (nearly extinct), and a few others.

The most common palm of the Province is the native *Butia yatay* called by the natives "palma yatay." It grows in dense groups forming beautiful stands.

### Entre Ríos Province

Entre Ríos Province is situated in the northern part of Buenos Aires, limited in the north by Corrientes, in the east by Uruguay, and in the west by Sante Fé. This small province is 78,781 square kilometers in area; the climate just at the boundary between temperate and subtropical climates is mild and temperate without severe frosts. The climate is ideal for agriculture and cattle, and the soil is rich in humus. Throughout the province are small rivers and beautiful water courses. The palm flora includes four species—*Arecastrum romanoffianum*, *Trithrinax campestris*, *T. brasiliensis*, and *Butia yatay*.

*Trithrinax campestris* forms great clumps in the center of the province, where many agriculturalists consider this palm a real pest. Its vernacular name is "caranda-y."

*Trithrinax brasiliensis* is nearly extinct and grows only in the area called San José de Feliciano (the northern part of the province).

*Butia yatay* grows in huge groups in the center of the province, in Palmar de Colón National Park which is frequently visited by tourists and botanists.

*Arecastrum romanoffianum* is very much at home in Entre Ríos because

of the many rivers and lakes. Its habitat is the banks of the Paraná and Uruguay rivers, but some of the habitat has been destroyed by timber operations. Fortunately the "queen palm" is widely cultivated in all the cities of Argentina.

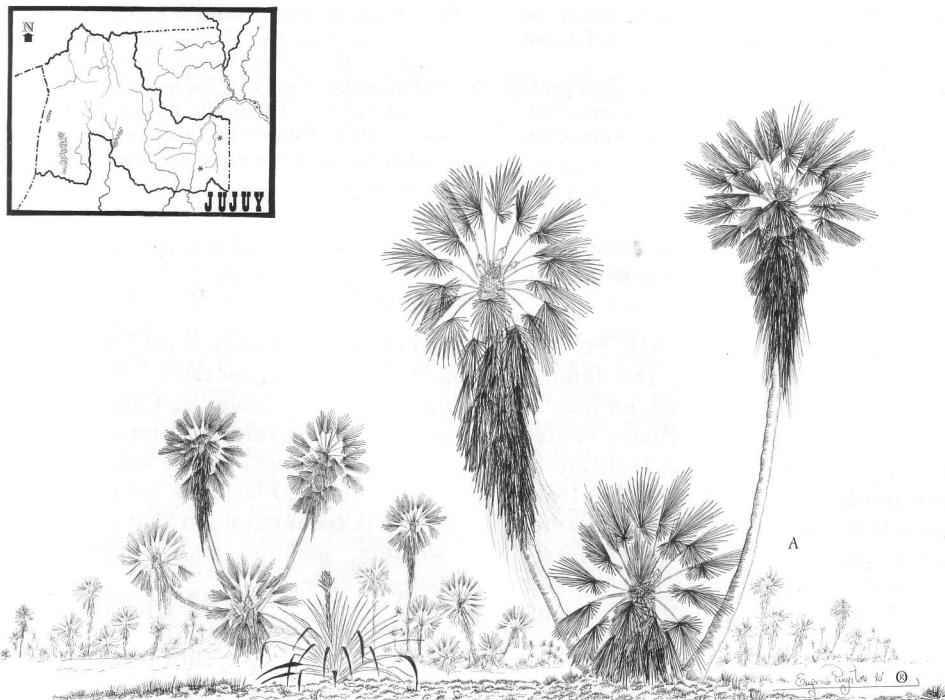
### Formosa Province

Situated in the north of Argentina, this province is little known to international tourism and in many ways resembles Central Africa. Plains with millions of native plants of *Copernicia alba* are a striking feature. The people of the capital city have outstanding ornamentals such as *Heliconia rostrata*, *H. subulata* (Musaceae), *Chrysalidocarpus lutescens*, *Caryota urens*, and *Livistona chinensis*. From the city of Formosa, the palm enthusiast travels to Pirane city about 150 km from the capital. Here growing in natural stands is the very rare *Trithrinax biflabbellata* which is unknown in cultivation; it grows under tall trees of *Schinopsis* and *Prosopis* (Leguminosae). Palm seedlings under parent trees are common and it is easy to obtain small plants and seedlings. The area is semi-dry with saline soils. *T. biflabbellata* is a perfect species for sandy gardens.

### Salta Province

This province is bounded by Bolivia, and the provinces of Jujuy, Formosa, Chaco, and Tucumán. Within the western chains of the Cordillera de los Andes, this area is indeed a paradise for the cactus and succulent collector. The eastern area is more humid and hot with relict areas of rain forest. In the east are Pocitos and Oran city. The palm flora here includes *Trithrinax schizophylla* and *T. biflabbellata*.

In the north of the Salta Province is found the new and little known Baritú



5. Jujuy Province: A. *Trithrinax schizophylla*.

National Park, an area of several green valleys bounded by high mountains. Near the Rio Pescado is the home of the rarest acrocomia, *A. chunta*, a spiny palm with graceful arching leaves. Baritú National Park is ideal for people who love adventure and the wilds. The mountain ridges are botanically very interesting with an association of native *Alunus*, *Podocarpus*, araliads, and *Polylepis* trees. Perhaps Baritú resembles the central Papua New Guinea Highlands.

### Jujuy Province

This is situated to the extreme northwest of Salta Province. The climate in the north is dry and healthy, and a paradise for cacti and succulents. The southern area is very hot and humid with lush forests. The dom-

inant palms here are *Trithrinax schizophylla* and *T. biflabbellata*.

### Acknowledgments

I am deeply indebted to the late Dr. H. E. Moore, Jr. who sent me ten years ago a letter (indeed my most cherished letter) dated 20 September 1971. He impressed me with the importance of the palm flora, and opened the possibility of my becoming a member of The Palm Society. Of course, I give my sincere affection to that most enthusiastic and energetic palm woman, Mrs. Pauleen Sullivan; without her help this work would not be published.

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### 1982 BIENNIAL MEETING (*cont.*)

recommended places to visit: St. Augustine—the oldest city; the family-oriented resort areas of Daytona Beach; Cape Canaveral and the Space center (tours are offered); Florida Institute of Technology Campus and the Dent Smith Trail (great palms) in Melbourne; the Orlando area and the endlessly beautiful orange groves; the number one attraction in the western hemi-

sphere—Walt Disney World; other famous nearby attractions; the Sanctuary and Bok Tower at Lake Wales; and then on over to Tampa for the start of our tours. As we say November weather in Florida is usually great BUT it is recommended that you bring sweaters, jackets, and a light raincoat—in case.

PAUL DRUMMOND

## A Day on the Klingkang Range

JOHN DRANSFIELD

Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AB, U.K.

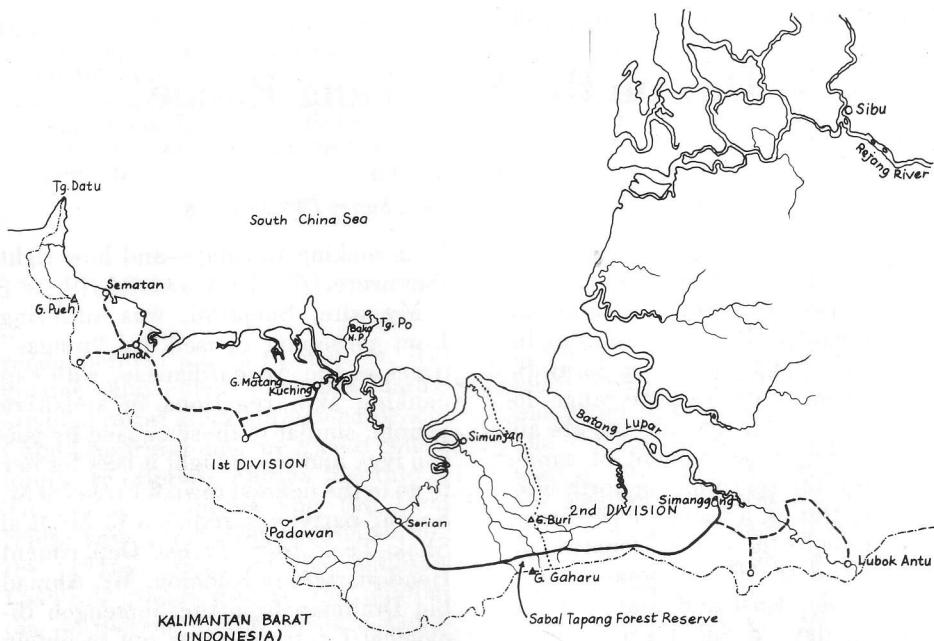
The Klingkang Range is a chain of hills along which runs the international border between Sarawak (Malaysia) and Kalimantan Barat (Indonesia) in the 1st and 2nd Divisions of Sarawak (Fig. 1). The summits of the range do not exceed 1,000 m altitude and are all part of a large escarpment of sandstone, with the scarp facing north into Sarawak. During a palm survey organized jointly by the Forest Department Kuching and the Royal Botanic Gardens Kew in April and May 1981, I spent four days in Sabal Tapang Forest Reserve, which lies at the foot of the Klingkang Range, and on one day we set out to climb to the nearest summit of the Range, Gunung Gaharu (Fig. 2). This day proved to be one of the most exciting palm-hunting days I have ever had.

We had made camp at the edge of logged forest just south of the 68th milestone on the main road between Kuching and Simanggang. The first three days were spent working in the lowlands and foothills of the range—the idea being that on the fourth day we should have seen much of the lower altitude palm flora, enabling us to climb straight to the escarpment without distractions. The plan was admirable, but took no account of the weather; the first three days had been reasonable enough, though we were caught in showers, but the day set aside for the ascent of Gaharu dawned very gloomily. Thick bands of cloud covered the forest and the summits of the escarpment, and despite my optimism, everyone else declared it was to

be a soaking wet day—and how right they were.

My wife, Soejatmi, was suffering from poisoning caused by “rengas” (trees of the Anacardiaceae, with sap causing skin reactions in sensitive people, similar to those caused by poison ivy), and we thought it best for her to go to the nearest town for treatment. So our party was reduced to Mr. Lai Shak Teck from Forest Department Headquarters in Kuching, Mr. Ahmad bin Drahman from the Semengoh Biological Centre (he was out to obtain as much living material as possible for cultivation in the developing botanic garden), and the two skilled plant collectors, Messrs. Banyeng and Salang, and myself. Of the party, only Banyeng had been to the summit of the range, so we relied on him to choose a way through the maze of old logging roads and ridges of primary forest.

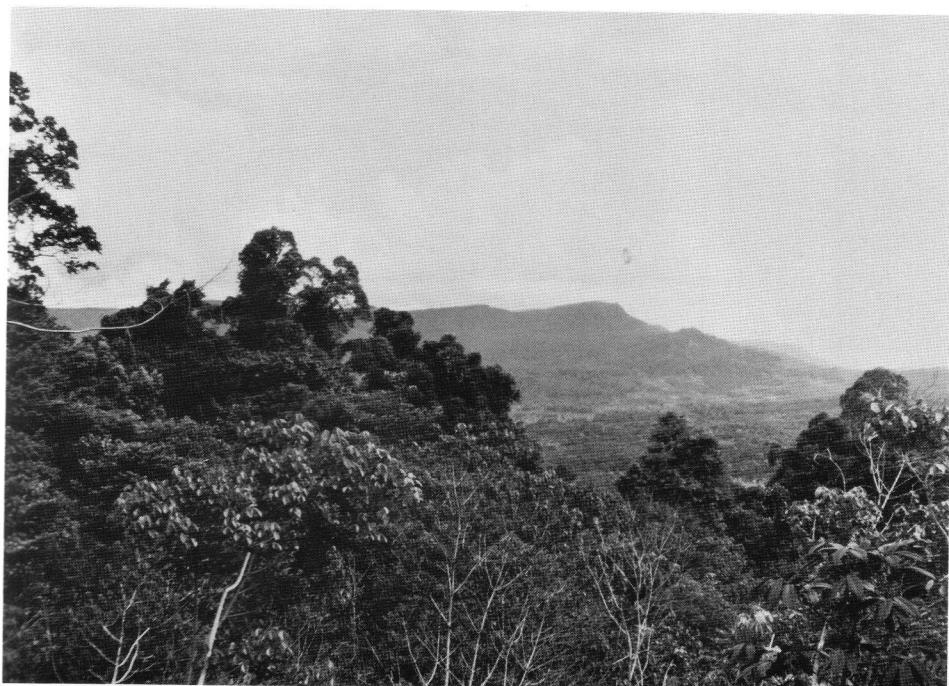
We left our camp in the Forest Department vehicle and drove along the main road towards the east for about 2½ miles and, just beyond Sabal Saw-mill, turned off the road onto a deeply rutted, abandoned logging trail. After half a mile the going proved to be too difficult and we started to climb on foot, the land cruiser returning to camp to take Soejatmi to Serian. Old logging trails can be very useful for access to the forest; although we may bemoan the destruction of the forest, we can still use the trails. About five years after active logging, the trails usually have deteriorated into deep ruts with algal-slime, slippery crests, and an entanglement of secondary for-



1. Map of west Sarawak.

est climbers to trip one up—species such as *Merremia borneensis* may not be too bad, but *Ziziphus* spp. and *Rubus moluccanus* with their thorny stems are a positive menace. Banyeng and Salang set a spanking pace; in the still wet morning air I was soon dripping and panting in the rear. Little of interest was noted in this destroyed forest apart from racket-tailed drongos, mynahs, paradise fly-catchers with their astonishing long white tail feathers, and the continual serenading of Borneo's most beautiful songster, the white-rumped sharma. In a deep valley we caught the sickly smell of two wild durians in flower and further on saw plants of *Korthalsia jala* with its remarkable net-like ocreas (Fig. 3) and *Plectocomiopsis mira* with its very different, tightly sheathing ocreas (Figs. 4, 5). The trail wound steeply up to about 400 m altitude and, where it skirted a ridge, we branched off and

climbed steeply into primary mixed Dipterocarp forest on a very steep ridgeline up to about 500 m. Banyeng suggested we might have taken the wrong path and, as if to endorse this, it began to rain, gently but drenchingly. Before it became too wet, we collected a slender *Calamus* related to *C. pogonacanthus* in old male flower. From our minor summit we cut a trail falling gently through fine forest with an abundance of *Iguanura palmuncula* var. *magna* (Fig. 6A, B), *Pinanga sessilifolia* and *P. crassipes* (Fig. 7), and *Areca minuta*. The *Iguanura* has astonishing fruit with five crests and a basal stigmatic vestige. After dropping down about 50 m in altitude we rejoined a logging trail and entered a superb patch of *kerangas* forest developed on the sandy plateau. *Kerangas* is an Iban word given to the type of forest occurring on extremely poor soils in the lowlands; it has several features (such as trees with low



2. The Klingkang Range seen from Gunung Buri; the peak just right of center is the summit of Gunung Gaharu.

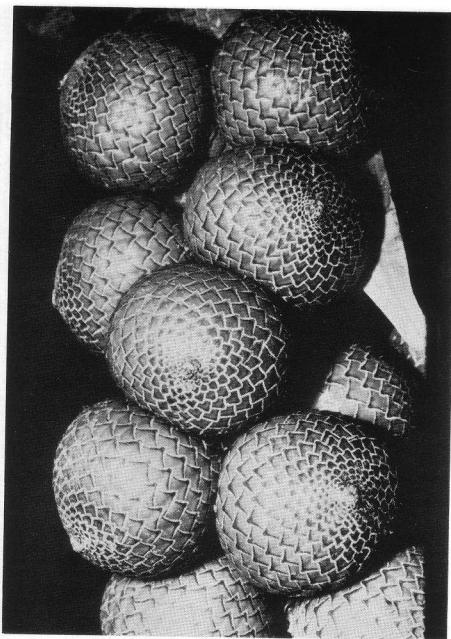
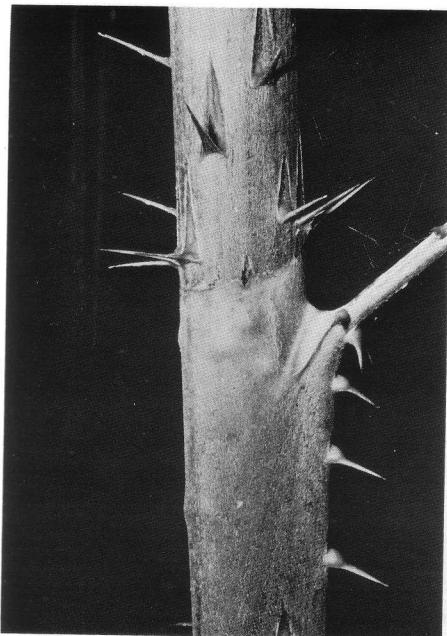
rather even crowns and small leaves, and an abundance of moss in the undergrowth) in common with montane forest, and because of its poor soils, is rarely felled for shifting cultivation. Some facies of *kerangas* are very rich in palms, while others may be palmless; furthermore many of the strangest Bornean palms are confined to this vegetation type. Thus one of the excitements of entering *kerangas* is not knowing beforehand what will be there. The *kerangas* we were about to enter was filled with an abundance of *Licuala orbicularis* (Fig. 8), surely one of the most beautiful palms in Borneo. It has an entire leaf, but, unlike the commonly cultivated *L. grandis*, the leaf of *L. orbicularis* is held stiffly in one plane, not irregularly buckled. Would that this species produced

fruit; day after day in Sarawak we saw this fine stemless palm, but only once saw immature fruit. Could its inability to produce fruit be due partly to the frequent cutting of its leaves for use as umbrellas? Certainly our party quickly cut a few leaves to help keep off the rain. With *L. orbicularis* grew three more species, *L. bidentata* with very slender leaflets, sometimes consisting of a single fold (Fig. 9), *L. furcata* with the central leaflet usually deeply bifid, and *L. petiolulata*; the last is a robust stemless species in which the central leaflet is borne on a separate distinct stalk or petiolule (hence the name).

As we penetrated the *kerangas* we came across a few well-grown but sterile individuals of *Johannesteijsmannia altifrons* and some huge young plants

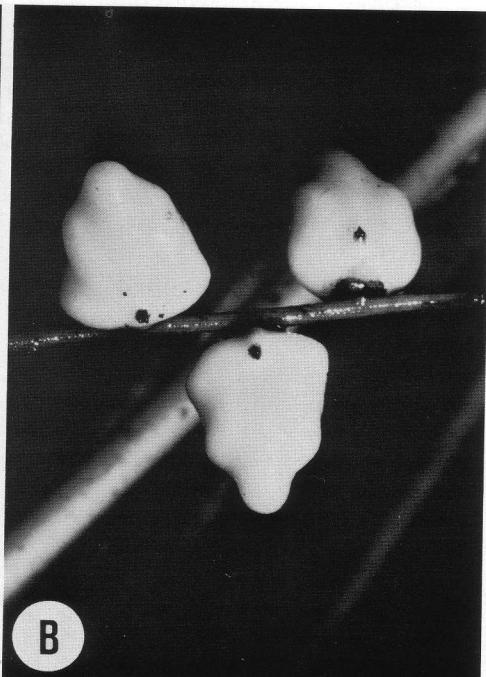


3. *Korthalsia jala* has loose net-like ocreas.

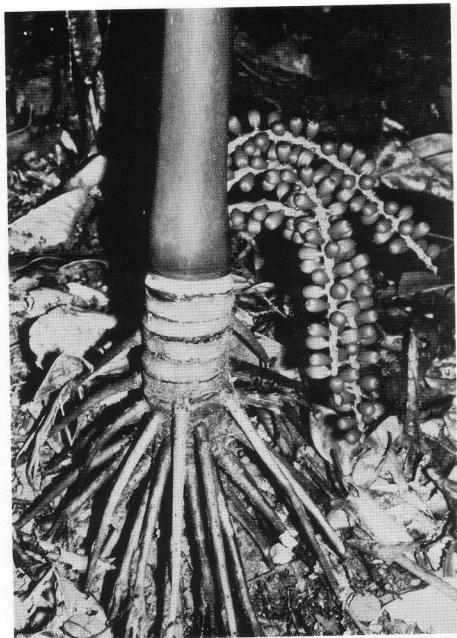


4. The juvenile sheath of *Plectocomiopsis mira* has few spines and a tightly sheathing ocrea.

5. Ripe fruit of *Plectocomiopsis mira*.

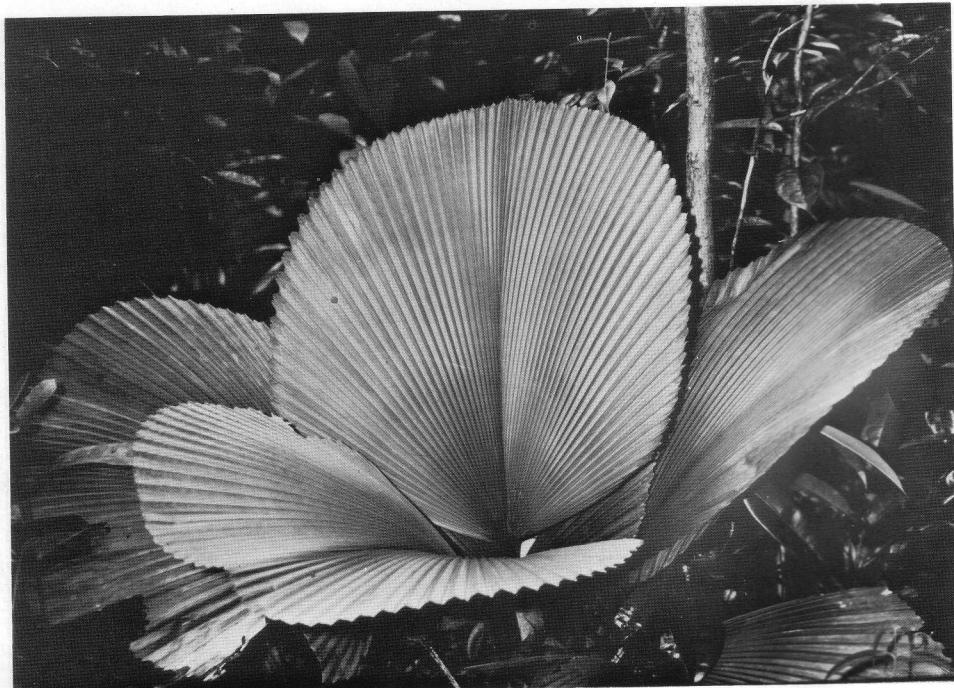


6. *Iguanura palmuncula* var. *magna*. A. The flowers (staminate shown here) are borne on very slender rachillae. B. The fruit are of a most unusual shape; note the basal stigmatic remains.



7. The stem base of *Pinanga crassipes* with its stiltroots.

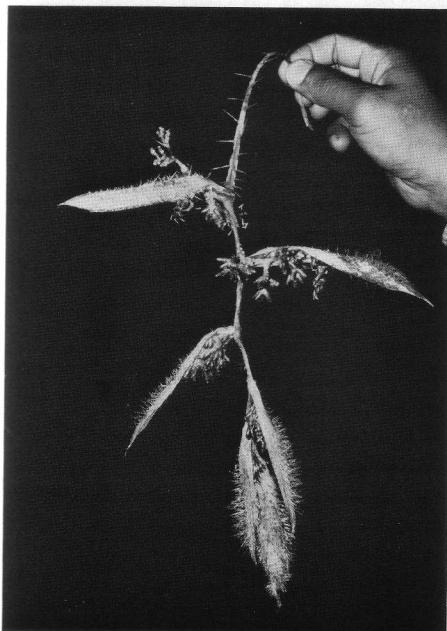
of *Pholidocarpus maiadum*, with dark green petioles brilliantly striped with yellow. Here too was an abundance of rattans such as *Daemonorops collarifera*, *D. lasiospatha* (Figs. 10, 11) and *D. formicaria* with ant galleries (Figs. 12, 13), *Korthalsia rostrata*, *Ceratolobus subangulatus* (Fig. 14), and *Calamus marginatus*. However the most exciting find was an undescribed, massive *Calamus* with a short stout erect trunk, and no climbing organs; its affinities appear to be with Malayan *C. castaneus* but this cannot be confirmed until the material arrives at Kew. We found male and female flowers at anthesis (Fig. 15), but though we plodded around, dodging the spines and coaxing our umbrellas through the thickets, we could find no fruit, except for a few fallen shells. A slender undergrowth *Pinanga* growing in colo-



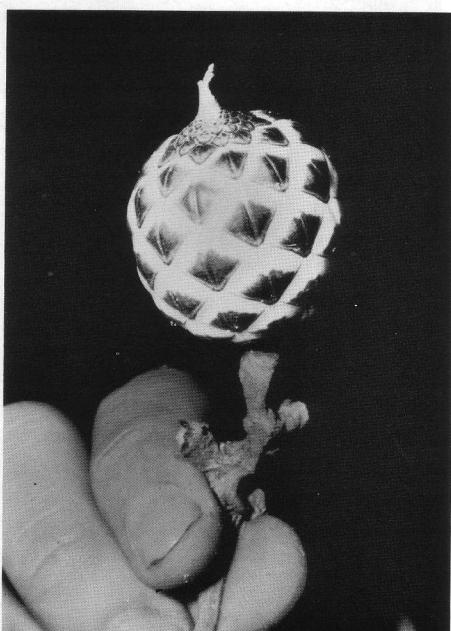
8. *Licuala orbicularis*, one of the finest palms of Sarawak.



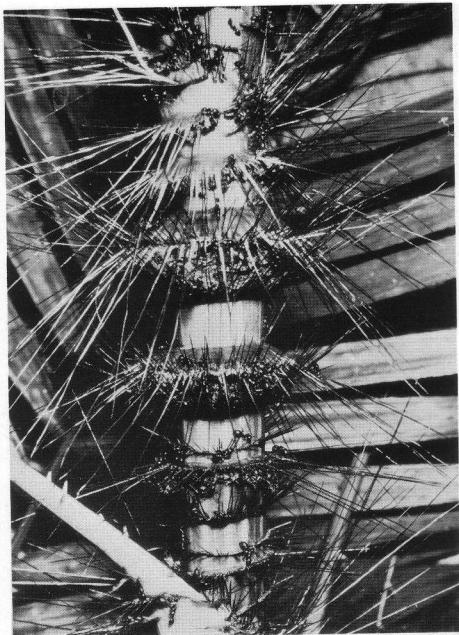
9. The leaves of *Licuala bidentata* are divided into very narrow single-fold segments.



10. The staminate inflorescence of *Daemonorops lasiospatha*.



11. The attractive fruit of *Daemonorops lasiospatha* contains thick sweet flesh.

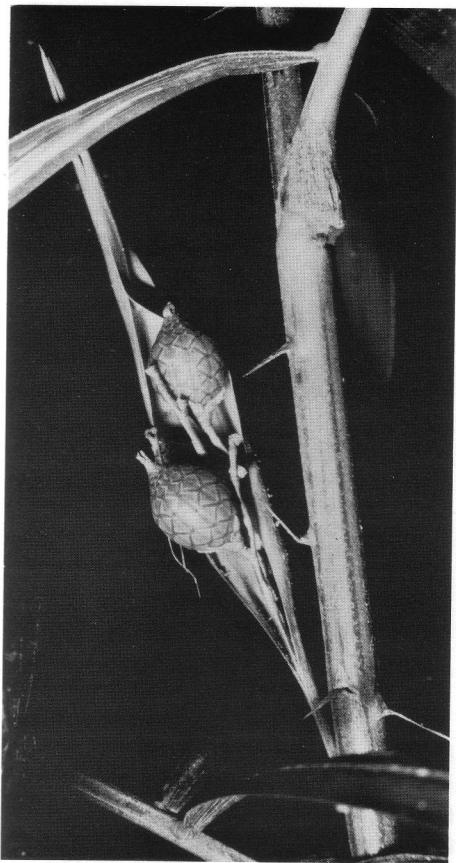


12. *Daemonorops formicaria* is a typical ant-rattan.

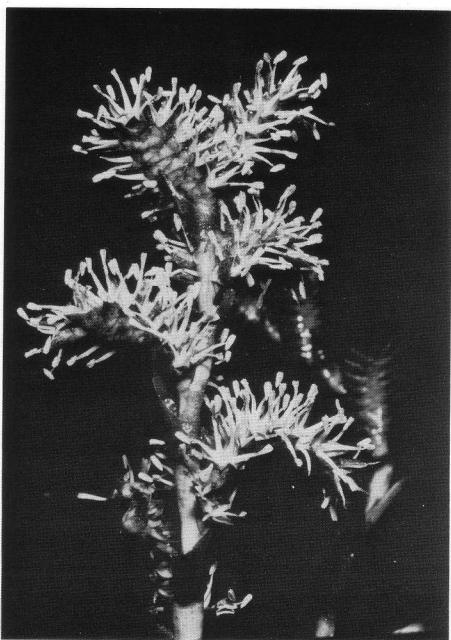
nies has proved to be a new species, quite widespread in *kerangas* forest in the Kuching area. We also found the elegant very slender *Calamus corrugatus*, with its corrugated sheaths and opposite broad leaflets. At a bend in the path we noted sterile *Calamus convallium* and a great thicket of *Retispatha dumetosa* (Figs. 16, 17). *Retispatha* is an endemic monotypic rattan genus I described as new in 1979; it forms thickets of short climbing stems, about the thickness of sugarcane; indeed, bare canes sufficiently resemble sugarcane for the rattan to be called "howi tebu bruang" (bear's sugar-cane rattan) in some parts of Borneo. Of my other new rattan genus, *Pogonotium*, we as yet saw no sign. We kept on leaving the logging trail and following a footpath (probably a hunters' path) through the *kerangas*, and then joining the trail again.



13. Despite the fierce ants and spines of the mature plant, seedlings of *Daemonorops formicaria* would make attractive pot-plants.



14. *Ceratolobus subangulatus* with almost ripe fruit.



15. Staminate flowers of an undescribed species of *Calamus*.

Eventually we came up to a much steeper slope with sandstone boulders and *in situ* rock; here the logging trail turned abruptly away from the slope and joining the footpath again, we scrambled up the slope, using roots as handholds. Ten minutes of scrambling brought us to a short plateau covered with forest transitional between *kerangas* and mixed Dipterocarp forest—time for me to get my breath back while I pretended to examine the palms in detail, though there was little of great interest. Then we reached the main escarpment, and fortunately the rain abated. Forcing our way up the

old hunting path was quite daunting with very little to hold on to, and the path slippery with rain, but after climbing up about 200 m we came out on a marvellous ridgeline covered in submontane *kerangas*. First thing to do was to get my breath back while Banyeng told how orang-utan used to frequent this very spot. We also admired a fine tree of *gaharu*, after which the mountain is named. This curious tree, *Aquilaria malaccensis* (Thymelaeaceae) is of enormous value, but only when diseased; the diseased heart wood is fragrant and is used in the manufacture of incense and joss-sticks. As it is almost impossible to know whether a tree will yield incense before cutting it, much mysticism and divination goes along with searching for *gaharu*.

The very lip of the escarpment was occupied by a thicket of *Pinanga angustisecta*, a clustering species with



16. *Retispatha dumetosa* forming a great thicket.



17. The staminate flowers of *Retispatha dumetosa* are partly covered with net-like bracts.

short erect stems bearing leaves finely divided into stiff dark green, close, single or double fold leaflets—an elegant plant. Away from the lip was an abundance of *Johannesteijsmannia altifrons*, *Licuala orbicularis* and *Daemonorops lasiospatha*, all lending a marvellously varied aspect to the forest. But it was between these obvious beauties that we began to find the choicest palms. Ahmad pointed out a few plants of *Pinanga veitchii* with broad bifid leaves dull liver-colored, mottled with dark brown on the upper surface, and purplish tinged beneath. No seed could we find, but what a fine ornamental this would make. *Pinanga tomentella* formed a great contrast (Fig. 18); its short erect stems bear about six very narrow undivided leaves, dark shiny green with a broad pale line down the middle, and on the undersurface, with a dense felt of pale hairs. We did see flowers and young but

no mature fruit. In 1975 I was successful in obtaining two ripe fruits of this species and one seedling grew at Kew for about 1 year before we lost it. It seems that the palms from *kerangas* are tantalizingly difficult to cultivate. Two more widespread *Pinanga* spp., *P. aristata* and *P. salicifolia* were also present; the former also has mottled leaves, and seems to be easier to cultivate than *P. tomentella*. We collected several Calami and noted an increasing abundance of *Iguanura palmuncula* var. *magna* as we started to walk westwards along the ridgetop.

Within a short distance we began to find seedlings of *Pogonotium ursinum*. This palm was first collected by Beccari who found a specimen in male flower of a most extraordinary, short erect rattan on the summit of Gunung Matang above Kuching; this he named *Daemonorops ursina*, and after Beccari's record it was not collected again



18. Banyeng holds two specimens of *Pinanga tomentella*.



19. *Pogonotium ursinum*, a short erect rattan with beautiful regular leaflets.

until 1975 when I refound it in the type locality. Many aspects of the plant seemed not to fit *Daemonorops* and fortunately I was able to collect more or less complete material. Then I found a second species closely related to *D. ursina* in 1977 in the Gunung Mulu National Park. It was while working up my Mulu material that I realized that *D. ursina* and the Mulu plant could not be included in *Daemonorops* and created the new genus *Pogonotium* with *P. ursinum* and *P. divaricatum* as the two known species. One tends to show a proprietary interest in the genera and species one has described, and I certainly always become excited when finding *Pogonotium*. Not only is the genus rare, but it is morphologically very peculiar; furthermore *P. ursinum* is positively beautiful when young. The most curious vegetative feature of the genus is the presence of two erect ear-like pro-

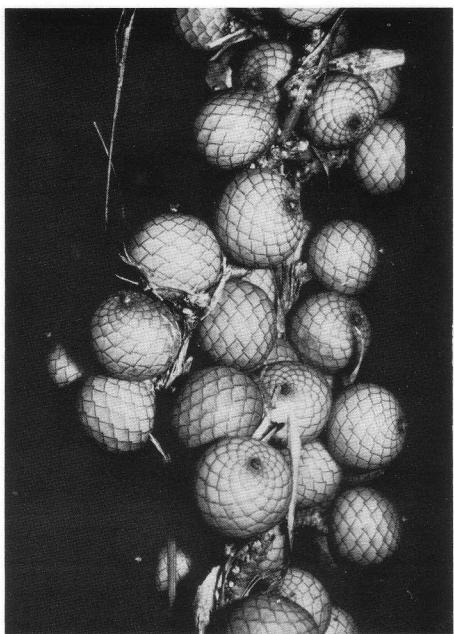
cesses on either side of the petiole base. *P. ursinum* has very many, close fine, delicately hairy leaflets on each side of the rachis; this coupled with the very fine black spines all over the sheaths and the ear-like processes lends a marvellous aspect to the plant (Figs. 19, 20). Here on the summit of the Klingkang Range was a population of this rare rattan much larger than in the type locality. What I wanted more than anything was to find mature fruit for distribution to the Seed Bank and to grow at Kew for a chromosome count. Alas, though we saw a few female plants, the fruit was not ripe. The inflorescence is almost hidden between the two ears, so looking for fruit entails careful searching of plant after plant.

The ridge we were following dropped very gently until we reached a swampy hollow with scattered plants of the rather coarse *Salacca affinis* and *S.*



20. Two erect spiny "ears" are found, one on each side of the base of the petiole in *Pogonotium ursinum*; the inflorescence sits between the "ears."

*vermicularis*, and a great abundance of *Pinanga tomentella* and *Areca minuta* with scattered plants of *P. aristata*. A small stream flowed southwards. Could we be in Indonesia? I suspect we were not, and that the stream merely flowed down to the face of some sandstone cliffs before continuing into Sarawak. At this moment the sun came out briefly and, as it was already after noon, we decided to have lunch. Out of Banyeng's rattan carrying basket (or "selabit") came bundles of rice, bottles of cold coffee, some fried cabbage, and that was all. There was no sign of the curried, fried salt fish which had smelled so delicious when it had been cooking at breakfast time. We had of course forgotten it, and so lunch was frugal indeed. Two packets of fried peanuts discovered in



21. Ripe fruits of *Calamus eriocanthus*.

the bottom of my rattan basket saved the day by helping to get the rice down!

After lunch we abandoned as much of our luggage as possible and climbed steeply up through increasingly mossy forest developed on a slope strewn with great sandstone blocks. Here we saw fine *Pogonotium ursinum* again, but *Johannesteijsmannia altifrons* and *Licuala orbicularis* ceased and the forest took on a more montane aspect. We found our first plants of another new species of *Pinanga* which also grows in the lowlands at Bako National Park; it has curious thick, almost fleshy, narrow opposite leaflets, and a short inflorescence with four branches. At the top of the boulder strewn slope we reached a sheer rock face about 10 m high which, so Banyeng assured us, was the topmost wall of the Klingkang Range. The face was covered with fine gesnerads, *Neckia malayana*, filmy ferns, and bryo-

phytes, with the sunlight sparkling on the drops of moisture on every leaf. On the top of the rock face billowing masses of moss and shrubs leaned over the edge.

Our path followed the foot of the wall, zigzagging north then west, then south, and eventually we reached a steep boulder strewn slope allowing us to climb up on to the summit plateau, noting *Calamus zonatus*, *C. eriocanthus* (Fig. 21), and *Daemonorops atra* on the way. The path ended in a magical area of huge sandstone blocks covered in mossy forest. We could wend our way along ledges, squeeze between two 5 m high walls of sandstone, creep through tunnels beneath the blocks, and come out into mossy glades overlooking small pools, with everywhere the tinkling of underground streams. The sun went in and thunder sounded—over Indonesia? Or were we in Indonesia? By the time we had snaked our way amongst the blocks, it was difficult to be certain where we were. Thanks to the tree slashes Banyeng and Salang had made we were in little danger of losing our way. Besides the palms were so wonderful, it seemed not to matter where we were.

The new species of *Pinanga* was common everywhere as was *Pogonotium*. We noted a slender *Calamus* related to *C. nematospadix* which we had seen two weeks earlier on Gunung Pueh. However the most interesting rattan was an even more slender species with leaves bearing 5 cm long irregular leaflets. The inflorescences of this *Calamus* appear to revert to vegetative shoots quite commonly, so the base of the stem was often surrounded by old inflorescences bearing new plants at their tips. *Calamus pygmaeus* of Gunung Matang is one of the very few species which behave in this way—but this was not *C. pygmaeus*.

(I now have a tantalizing wait while the material is sorted in Kuching and sent sea mail to Kew.) About 2 p.m. we reached a cliff face and were able, after a bit of scrambling and tree climbing, to look out through the forest over the edge. By this time, however, great bands of cloud were massing on all sides and we could see little but mist and tree tops. We never did find out where we were. As the thunder crashed around increasingly, we decided to retreat, admiring on the way flowering *Bulbophyllum uniflorum* with rotten-fish scented flowers, and a truly exquisite *Dendrobium* with delicate salmon-pink flowers about 5 cm across, borne on wiry, grass-like stems.

As we retraced the path between the blocks I realized that a low rattan with very sparse divaricate leaflets (about ten on each side of the rachis) was not the seedling of a *Calamus* but a *Pogonotium*. There at the base of the petiole were two short erect ears, and between the ears the characteristic small inflorescence, bearing unusually pointed fruit. Immense excitement ensued. This was obviously not *P. ursinum*, neither could it be *P. divaricatum*. It was certainly new and I had almost completely overlooked it. We searched and searched but could find only two female plants and several minute seedlings. The seedling leaves with a single pair of opposite divaricate leaflets are quite different from the fern-like seedling leaves of *P. ursinum*. There do seem to be a wealth of differences between the three taxa, but again, nothing further can be done before the material arrives at Kew. It was now 2:45 p.m. and darkening rapidly, and just as we left the plateau I found a solitary palmlet which proved to be a new species of *Areca* related to the recently described *Areca abdulrahmanii*. I dislike finding new things

at the end of the day's trail because I always have the feeling that I may have missed things. Of course we should have spent at least two days on the summit plateau, but time had run out. We began the mad scramble down the block slope to our lunch spot. As we collected up our belongings the heavens opened and not even the leaves of *Licuala orbicularis* could keep off the downpour, let alone my folding umbrella. It became very very wet and the scramble down the main escarpment was particularly nasty; when we reached the logging trail umbrellas and palm leaves could be sported with safety but we were all drenched. Fortunately we found a shorter way back along the trails, avoiding the minor summit we had ascended in the morning.

By the time the downpour changed to a gentle drizzle we had already descended to 300 m altitude, slipping horribly through the tunnels of the coarse fern *Blechnum orientale* on the deserted logging trails. At one point we glimpsed the brilliant blue of the Forest Department land cruiser waiting for us at the bottom, and about ten minutes later we reached it.

By 4:30 p.m. we were back beside the main road in a coffee shop with Soejatmi, drinking beer, enthusing about the palms, and totting up the list of species noted that day. In all we had seen (though not collected) a total of 61 different species since breakfast. There can be few places where a day's walk will produce such a large collection of palms. So rich is the area of Sabal Tapang Forest Reserve, that I have provided a checklist of the palms observed during the four days we worked there.

CHECKLIST OF PALMS OF SABAL TAPANG  
FOREST RESERVE, FIRST DIVISION,  
SARAWAK

- Johannesteijsmannia altifrons*  
(Reichb. f. et. Zoll.) H. E. Moore
- Pholidocarpus maiadum* Becc.
- Licuala bidentata* Becc.
- L. furcata* Becc.
- L. orbicularis* Becc.
- L. petiolulata* Becc.
- L. valida* Becc.
- Korthalsia cheb* Becc.
- K. debilis* Bl.
- K. echinometra* Becc.
- K. furcata* Becc.
- K. jala* J. Dransf.
- K. rigida* Bl.
- K. rostrata* Bl.
- Eugeissonea insignis* Becc.
- Salacca affinis* Griff.
- S. vermicularis* Becc.
- Eleiodoxa conferta* (Griff.) Burr.
- Plectocomia mulleri* Bl.
- Plectocomiopsis mira* J. Dransf.
- Retispatha dumetosa* J. Dransf.
- Daemonorops acanthobola* Becc.
- D. atra* J. Dransf.
- D. collarifera* Becc.
- D. cristata* Becc.
- D. didymophylla* Becc.
- D. fissia* B.
- D. formicaria* Becc.
- D. hystrix* (Griff.) Mart. var. *exulans* Becc.
- D. lasiospatha* Furt.
- D. longipes* (Griff.) Mart.
- D. micracantha* (Griff.) Becc.
- D. microstachys* Becc.
- D. sabut* Becc.
- D. sp. aff. D. didymophylla* Becc.
- D. sp. aff. D. florida* Becc.
- Calamus conirostris* Becc.
- C. convallium* J. Dransf.
- C. corrugatus* Becc.
- C. eriocanthus* Becc.
- C. flabellatus* Becc.
- C. gonospermus* Becc.
- C. hewittianus* Becc.
- C. javensis* Bl.
- C. laevigatus* Mart. var. *laevigatus*
- C. laevigatus* Mart. var. *mucronatus* (Becc.) J. Dransf.
- C. marginatus* (Bl.) Mart.
- C. muricatus* Becc.
- C. optimus* Becc.

- C. paspalanthus* Becc.  
*C. pogonacanthus* Becc.  
*C. pseudoulur* Becc.  
*C. scabrifolius* Becc.  
*C. zonatus* Becc.  
*C. sp. aff. C. ashtonii* J. Dransf.  
*C. sp. aff. C. castaneus* Griff.  
*C. sp. aff. C. nematospadix* Becc.  
*C. sp. aff. C. nielsenii* J. Dransf.  
*Pogonotium ursinum* J. Dransf.  
*P. nov. sp.*  
*Ceratolobus concolor* Bl.  
*C. discolor* Becc.  
*C. subangulatus* (Miq.) Becc.  
*Nenga pumila* (Mart.) H. Wendl.  
*Pinanga angustisecta* Becc.  
*P. aristata* (Burr.) J. Dransf.  
*P. crassipes* Becc.  
*P. dumetosa* J. Dransf.  
*P. salicifolia* Bl.  
*P. sessilifolia* Furt.  
*P. tomentella* Becc.  
  
*P. veitchii* H. Wendl.  
*P. nov. sp.*  
*P. nov. sp.*  
*Areca minuta* Scheff.  
*A. sp. aff. A. abdulrahmanii* J. Dransf.  
*Iguanura palmuncula* Becc. var. *magna* Kiew.

### Acknowledgments

My sincere thanks go to the Director of the Forest Department, Mr. Joseph Yong and the Senior Forest Botanist, Mr. Paul Chai, who invited me to Sarawak and who gave me every facility for collecting palms, and to their staff. Funding for the expedition was partly from Royal Botanic Gardens, Kew and partly from the Sarawak Forest Department.

### Harold E. Moore, Jr.

This volume, PRINCIPES 26, 1982 is dedicated to Harold E. Moore, Jr., the world's foremost student of palms and talented editor of PRINCIPES from July 1957 until his unexpected death in October 1980. The volume will include articles about him and papers in his honor as well as writings that he had prepared but not published.

There is still time to send copy for the July and October issues. We will welcome anecdotes, letters, pictures, and articles of any length pertaining to or in honor of Hal. Send them to: Natalie W. Uhl, 467 Mann Library, Cornell University, Ithaca, N.Y. 14853, USA.

THE EDITORS

## In Search of *Carpoxylon*

DON HODEL

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In 1875, two German botanists, Herman Wendland and Oscar Drude, described *Carpoxylon macrospermum*, a genus of palms based on fruit and seed reportedly from Aneityum, a small island in the New Hebrides. Nothing was known of flowers or of leaves or other vegetative parts of the tree. The fruit as drawn is quite large, perhaps 5 cm long, and has a stylar cap that protrudes to one side like the beak of a bird at the apical end. A photograph of the drawing of this fruit appears in Langlois' *Supplement to Palms of the World* (1976, p. 37). *Carpoxylon* has remained obscure for the last one hundred years. Although a relationship to the tribe Clinostigmataeae has been suggested, the inadequate material led Moore to leave it unplaced among the arecoid palms (1973).

When Ken Foster and I were planning a collecting trip to New Caledonia for April, 1979, it became apparent that due to airline scheduling, routing, and connections in that part of the Pacific, we could have several days to collect in the New Hebrides before going on to New Caledonia. We jumped at the chance and included the New Hebrides in our itinerary. Our main objective was to get to Aneityum and attempt to rediscover *Carpoxylon*, collecting fruit for propagation and gathering herbarium material so that this palm could be placed with confidence in its correct taxonomic position among palms. In addition, and at Dr. Moore's urging, we hoped to locate and collect fruit and herbarium material of another palm, *Veitchia spiralis* (once confused with *Carpoxylon*),

thought to grow at Anelgohaut Bay on Aneityum and also known only from fruit and seed (see Langlois 1976 and Moore 1957 for further accounts of *Veitchia spiralis*).

On Friday, March 23, 1979, Ken, my wife Anne, and I left Honolulu at one a.m. bound for Nadi, Fiji. After crossing the international date line, we arrived in Nadi at five a.m. on Saturday to change planes and arrive about mid-morning at Port Vila, the capital city of the recently independent New Hebrides. The New Hebrides were then unique as the only place in the world governed jointly by two nations. There were two sets of immigration officials, one British and one French, and two police forces, one British and one French. Most signs are in English and French. In one country, one can enjoy the best of French cuisine and British tradition along with the friendly native New Hebridean people and their interesting culture. We were met at the Port Vila airport by Mr. R. M. Bennett, Chief Forestry Officer, with whom we had made previous contact. Mr. Bennett drove us to our quarters at the Hotel Rossi and after we had checked in we were off with him to the Forestry Herbarium to try to obtain more information on New Hebridean palms and, in particular, *Carpoxylon*. Later, Mr. Bennett took us to the local social club where we were introduced to Mr. Michael Giles, chief flight operations officer for Air Melanesiae, the local airline in the New Hebrides. With Mr. Bennett's and Mr. Giles' assistance, an itinerary was put together for our six-day stay in the New Heb-

rides. The emphasis, of course, was placed on getting to Aneityum, which is no easy trick. Aneityum, located about 370 km (229.4 mi) southeast of Port Vila, is serviced by one scheduled flight a week that arrives and departs on Thursday morning. This means that if one wishes to spend time on Aneityum, one must spend at least a full week or charter a flight into Aneityum several days in advance of the regularly scheduled Thursday flight, collect for a few days, and then depart on that Thursday flight. We had commitments in New Caledonia and did not have the time to spend a full week on Aneityum so we choose the latter plan and made arrangements to charter a plane into Aneityum, spend several days there searching for *Carpoxylon*, and then depart for Port Vila on the regular Thursday flight. Unfortunately, due to scheduling and availability of planes with Air Melanesiae, there was no plane free for charter service until Tuesday. This left us with two free days before our departure for Aneityum.

We made the best use of our two free days and wasted no time starting our collecting. After purchasing supplies Sunday morning, we returned to the vicinity of Port Vila airport where upon our arrival Saturday we had observed a tall and stately *Veitchia* growing in partially cleared forest next to the runway. We collected a few seeds of this palm that appears to be *V. montgomeryana*. Beyond the airport at Klem Hill we collected seeds of *Metroxylon warburgii* and observed a *Calamus* sp. growing rampantly in the shrubby undergrowth. Monday morning we flew to Espiritu Santo, a large island about 480 km (297.6 mi) north of Port Vila, where we collected seeds of *Veitchia macdanielsii* and again observed the *Calamus* sp. The same day we flew from Santo south to

Malekula where we collected seeds of *Veitchia winin* and spent the night. Early Tuesday morning we left Malekula for Port Vila where we would pick up our charter to Aneityum. As it turned out, our charter was simply a continuation of our flight from Malekula to Port Vila. After a thirty-minute layover in Port Vila, we were airborne again and headed for the focal point of our trip, Aneityum.

We were full of anticipation as our pilot, Bob Wiley, guided our twin-engine Norman Islander towards the distant island of Aneityum that loomed larger and larger on the horizon. On the way we passed several islands, their dark green, jungle-clad slopes being a perfect foil for the striking blues, greens, and turquoises of the surrounding tropical waters. Our normal approach to Aneityum would have taken us west of the island over the ocean to land on the airstrip located on a reef opposite Anelgohaut Bay. At our urging, Bob changed course so that instead of making our approach over the open ocean to the reef airstrip, we flew over the mountainous interior of Aneityum first in the hope that we would be able to spot *Carpoxylon* from the air. We had it in mind, perhaps erroneously so, that *Carpoxylon* might be a tall, pinnate-leaved, palm with crownshaft that could be spotted easily from the air by its crown above the forest canopy. Bob told us to hang on as the air currents around the steep mountains could make for a rough ride. The plane was buffeted considerably as we flew directly over the middle of the island but our three pairs of eyes keenly searching the forest canopy for the telltale sign of a pinnate-leaved palm crown saw nothing of it. As we descended the other side of Aneityum, though, and crossed Anelgohaut Bay heading for the reef airstrip, we spied a tall *Veitchia* grow-

ing just inland from the beach which we excitedly took to be *V. spiralis* (Fig. 1).

Finally we touched down at the Aneityum Airport which is only a grassy strip situated on a sandy reef. One small building made of coconut palm leaves bordered the airstrip at one end. Upon disembarking, we were greeted by a native New Hebridean man whose main responsibility seemed to be keeping the grass on the airstrip mowed. We unloaded our gear and our plane took off, leaving us standing on the sandy reef with the native New Hebridean, one leaf-thatched hut, and Aneityum Island proper one km (a little more than half a mile) across the lagoon. All three of us looked at each other and said to ourselves, "What do we do next?" At about that time I noticed that the New Hebridean man had started a smokey fire with some driftwood and seaweed. This must have been a signal to natives on the island to send a boat to pick us up for we noticed immediately a bustle of activity on the beach across the lagoon. Several natives had launched a boat and soon the familiar *putta-putta-putta* of a small outboard engine greeted our ears. I am not sure if it was all our supplies and gear or a not-too-seaworthy boat or a combination of both, but as we chugged across the lagoon towards Aneityum, the gunwales were barely above the water line. Often waves would lap over the side. We all pitched in and bailed with whatever we could find that would hold water, but by the time we arrived on the beach at Anelgohaut Bay the boat had a good quantity of water in it. We were met upon landing by Roata Kichikichi, the Forestry Officer of Aneityum, who guided us graciously to his house just back of the beach that would be our headquarters for two days. To our surprise, and delight not more than a

stone's throw from Kichikichi's house was the tall *Veitchia* we had spotted when we flew over. In great haste, we dropped our gear and rushed over to search for seeds but could find none. Although we were disappointed, Kichikichi told us of two other groups of this palm in the vicinity so our hopes were still alive for finding seeds of *V. spiralis*.

After settling in and stowing our gear and supplies, we discussed our plans for the upcoming two days with Kichikichi over tins of meat and fruit. Although Kichikichi knew of no palm with fruit that matched that of *Carpoxylon*, he took us to talk with native hunters who often traversed the interior of Aneityum and knew it well. To our disappointment, none of the hunters knew of *Carpoxylon* and its peculiar fruit. We asked Kichikichi and the hunters about going into the interior of Aneityum to look for *Carpoxylon* anyway. They told us that there were no roads and it would be a difficult trek of several days into and out of the interior. Since we had only one full day, Wednesday, for exploring, this idea was out. The hunters did know, though, of a palm with small, red fruit that grew on the mountainous slopes on the western side of Aneityum. We suspected that this palm with the small, red fruit, if it indeed did exist, was probably either *Physokentia tete*, *Clinostigma harlandii*, or *Gulubia cylindocarpa*. Dr. Moore had informed us that we might expect to find these here since they occur on other islands in the New Hebridean chain. As the natives described further the aerial roots, tall trunk, and inflorescence, we became more confident that we were dealing with a *Clinostigma*. After much discussion with the hunters over the price of a guide to take one of us to this palm and trying to make certain that we were really dealing with a palm



1. A grouping of eight of the remaining thirteen palms of *Veitchia spiralis* found only on Aneityum Island. Photo by Kenneth Foster, reprinted by permission of the Fairchild Tropical Garden Bulletin.

and not a palmlike plant, Ken and I decided that I would accompany a guide the next morning to try to locate this palm. This would at least get me into forested areas where there was an outside chance I might be able to spot *Carpoxylon*. Ken would spend the next day searching with Kichikichi in the vicinity of Anelgohaut Bay for other trees of *Veitchia spiralis* and, we hoped, mature fruit.

We spent what remained of Tuesday afternoon resting and relaxing, saving energy for our upcoming full day. We did manage to look around the native village on Anelgohaut Bay that seemed to be the main village of Aneityum. Even so, very few people were present, giving the island an atmosphere of being abandoned. There was no electricity and we found no roads, only a foot trail along the beach that connected the native huts. There was a small cooperative store in the village we visited in order to replenish our supplies that were dwindling at an alarming rate. We roused the store-keeper, who was sleeping in a hut nearby, and he opened the store to reveal shelves full of baby powder and curry powder! It seemed a supply ship had not visited the island in several months. As we returned to our quarters, we had visions of relaxing under coconut palms and sipping ice cold drinks. Well, there were plenty of coconut palms but a cold drink was not to be found anywhere. Even the water that trickled from the pipe in Kichiki-chi's house was lukewarm.

Later in the afternoon, Kichikichi took us to one of the two remaining groups of *Veitchia spiralis* but again we found no mature fruit; only green immature fruit were seen on the trees. By this time, we were quite discouraged as we had come so far and found not even a rumor of *Carpoxylon*, only immature fruits of *Veitchia spiralis*,

and rumors of a palm with small, red fruit that grew way in the mountains. On that note, we ate dinner from our meager supply of tins and retired early, hoping to get a good night's sleep. It was a nightmarish night, though, as we battled the oppressive heat and humidity and attempted to fend off the swarms of malaria-carrying *Anopheles* mosquitoes that attacked in waves, finding the tiniest holes in our mosquito netting. I spent most of the night with masking tape trying to patch the holes and by morning one could barely see the netting for the tape.

I was more than happy to see the first light of dawn in the east. At six o'clock sharp, I was off with the native guide amid shouts of good luck from Anne and Ken to look for the palm with small red fruit and *Carpoxylon*. We headed out at a brisk pace around Anelgohaut Bay to the northwest and up the coast for several kilometers before turning inland and to the west on a hunting trail. We did not stop once to rest and after about two hours, I was quite winded. The trail rose sharply from the ocean and up the mountains towards a cloudy, misty forest. I was hot and sweaty and pursued relentlessly by hundreds of flies. At night, it was mosquitoes; now during the day it was flies, swarms and swarms of them. Hundreds of flies would alight on the native guide who walked before me, covering his head and shoulders completely. Every time the guide stepped up or down sharply, the flies would swarm off in an angry, buzzing mass, only to land again on his head a few steps later.

We had been ascending steadily for about an hour when I scrambled up a steep slope to reach a ridge top and asked the guide to rest so I could catch my breath. I bent over at the middle with my hands resting on my knees, breathing deeply and trying to catch

my breath. When I straightened up and looked around, I saw to my great surprise and delight the telltale signs of pinnate leaves with drooping pinnae, green crownshaft, green-ringed trunk, and thick, black stilt roots that all spell *Clinostigma* in this part of the world. I was overjoyed and thanked the guide profusely. Initially, we found no flowering material or mature fruit but upon climbing higher we located several trees loaded with reddish-orange mature fruits. The fruit is about the size of a small pea and contains one slightly flattened seed. In addition to collecting fruit, I made herbarium material of this handsome palm for Dr. Moore who later confirmed that the material does agree well with *Clinostigma harlandii*. Although the average height for this stately palm is about 20 m (65 ft), we noted that several individuals towered above the forest canopy to over 25 m (82 ft) tall (Fig. 2). The climbing ability of my guide was evident as he shinned up three of the hard, smooth, slippery trunks to their full height to collect fruit.

I was elated as we began our long and tiring trek back to Kichikichi's house and imagined the happiness it would bring to Anne and Ken when I triumphantly held up my treasure bag of *Clinostigma* seeds. I was hoping that Ken had had good luck; also, in his search for seeds of *Veitchia spiralis*.

I arrived back at Kichikichi's house in the afternoon and upon seeing the large bag full of *Clinostigma* seeds, Anne and Ken broke into happy smiles. But I was the happiest when I saw the large pile of just-cleaned, egg-sized seeds of *Veitchia spiralis* that Ken had been fortunate enough to collect that morning from a group of trees up the coast beyond Anelgohaut Bay. We were lucky to obtain the *Veitchia* seeds since we counted only thir-



2. *Clinostigma* aff. *harlandii*, Aneityum, New Hebrides.

teen specimens of this palm remaining around Anelgohaut Bay, perhaps the entire population! We were a tired, hungry, and thirsty but happy crew that afternoon as we cleaned fruits and pressed and photographed specimens.

Late that afternoon after completing our chores, we wandered back to the village store where we found a group of natives talking excitedly about a radio report of a hurricane that was in the vicinity of the New Hebrides. Our hearts leapt when we heard this for if a hurricane struck Aneityum, airplane service would be disrupted and the once-weekly flight that we were planning to depart on the next morning would be cancelled. This would be disastrous for us since we had a tight schedule to keep in getting to New Caledonia. In addition, we did not relish the thought of being stranded on Aneityum as the heat, humidity, flies, mosquitoes, and low supply of food were beginning to take their toll.

In the flickering light of a kerosene lamp, we huddled around Kichikichi's portable radio that night trying to pick up a progress report of the hurricane

but all we got was static. The wind increased briskly and the waves in the lagoon became stronger. I did not sleep well that night, not because of the mosquitoes or heat but because I was concerned about the hurricane. To our relief, the next morning we awoke to a beautiful sunlit day with no trace of the hurricane. As it turned out, during the night it had changed course and struck Fiji, inflicting heavy damage and taking many lives.

We thought our worries were over that morning as we packed our gear and precious cargo of seeds and herbarium material for departure. But were we ever wrong. We hauled our gear down to the beach but there were no boats around to take us out to the reef to meet the plane that was due to arrive in two hours. The lagoon was completely empty of boats. We asked Kichikichi about it and he went off to round up a boat. He returned a half hour later with the bad news that all the boats were out fishing. Kichikichi had a small rowboat but it was lacking oars. We were quite worried, then, as we pictured ourselves sitting on the beach at Aneityum sadly watching our plane land on the reef and take off again without us, leaving us stranded on Aneityum for another week. About the time we were ready to launch Kichikichi's boat and paddle with our hands, a motorboat appeared on the horizon. Kichikichi flagged it down and we loaded our gear and were finally headed out to the reef to await our plane. We were very relieved to see the yellow speck in the distance grow larger and larger and, when we could finally hear the engines and make out the shape of the plane, to know at last that we were in touch with civilization again.

We bade farewell to the airport maintenance man who was mowing the runway and piled ourselves and

our gear into the plane which was completely full as several natives were making the trip to Port Vila with us. The plane was stuffed to the doors with baggage and other belongings. There were boxes on our laps, between our knees, and under our feet. I had my doubts if the plane would make it off the ground. We rolled down the airstrip, gaining speed ever so slowly. The end of the airstrip terminating a few feet above the ocean came alarmingly fast. I did not think we were going to make it up, and we did not. Our pilot, Doug Baldwin, simply maneuvered the twin-engine plane straight off the end of the airstrip and out over the ocean, landing gear barely above the breaking waves. Our hearts did double time. We had hardly gotten the exclamations of relief off our lips when Doug banked the plane sharply to the left, so sharply that it seemed as if the tip of the left wing was etching an arc across the ocean. I, sitting on the right side of the plane, was above my wife who was sitting on my left side and I could look straight down into the lagoon through her window! The gravitational force of the sharp bank gave me a headache that remained with me to Port Vila. It was certainly a fitting salute to our memorable stay on Aneityum.

The remainder of our return to Port Vila was relatively uneventful except for an unscheduled four-hour stop on the island of Tanna where, to our surprise, we were treated to a wonderful feast of a lunch and cold drinks with real ice in them, all thanks to our pilot, Doug. We made one final stop before arriving back in Port Vila and that was on the island of Erromongo. Here we picked up a half-dozen coconut-leaf baskets full of live lobsters. How we got them into our packed plane, I do not know. But when I jumped out of the plane to assist the natives in get-

ting the lobsters on board, there was suddenly a whole lot of room, my seat. I regretted getting out to help as the large, red claws poked out between the coconut leaves to nip at my ankles for the remainder of the flight. Upon taking off from Erromongo, we saw several *Veitchia* palms in the forest adjacent to the airstrip and wondered what species they must be. It seemed that all the dozen islands we flew over or landed on during the course of our travels in the New Hebrides had tall *Veitchia* palms on them. Certainly, the veitchias of the New Hebrides need to be investigated further as many of the islands in the New Hebridean chain may yield new species. Our final treat after departing from Erromongo was spotting palm crowns of recurved, arching, pinnate leaves thrusting themselves above the forest canopy of the higher mountains. We took this to be *Gulubia cylindrocarpa* since it is reported from Erromongo.

Our only regret as we flew back to Port Vila through the late afternoon rain was that we did not have more time to search for *Carpoxylon* and other interesting palms of these unique islands. It certainly warrants a return trip but there was no time then as our departure for New Caledonia was imminent and further palm collecting adventures awaited us there.

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## PALM RESEARCH

JUDAS TADEU DE MEDEIROS-COSTA, a graduate student at the Empresa Pernambucana de Agropecuaria Recife-Pernambuco Brazil, is engaged in systematic studies of the *Bactris* alliance, in particular the genus *Desmoncus*.

DR. K. AMBWANI of the Birbal Sahni Institute of Palaeobotany, Lucknow, India, is engaged in anatomical studies of the stems of living palms in relation to the tertiary fossil palms of India. So far he has examined variation in the stems of *Caryota mittis*, *Calamus viminalis*, *Rhapis excelsa* and *Ptychosperma macarthurii*.

## PALM BRIEF

*Principes*, 26(1), 1982, pp. 42-43A New Species of *Wettinia*  
(*Palmae*) from Ecuador\*

Specimen material with sections of a leaf and an infructescence together with notes and photographs was recently received from the Marie Selby Botanical Gardens. Although neither staminate nor pistillate flowers are available, the immature fruits are so distinctive that they can be contrasted with those of other species in the subgenus *Wettiniicarpus* to which it belongs. A description is provided here to alert collectors in the hope that a complete series of specimens may ultimately be obtained and to point out differences from another (and perhaps even a third) species that occurs in the general region of Maldonado on the western slopes of the Andes toward the Colombian border.

**Wettinia** (*Wettiniicarpus*) **verruculosa** H. E. Moore, sp. nov. (Fig. 1-3).

*W. castaneae* affinis sed in fructu verruculoso vice spinoso.

Trunk solitary, 3-4 m high, 15 cm in diam., gray-brown, smooth, with internodes to 20 cm long and prominent stilt roots.

Leaves ca. 6, arching-spreading; sheath bright green, ca. 1.2 m long; petiole 25 cm long; rachis 2.5 m long, appressed-pilose beneath; pinnae undivided, praemorse, (20-) 36 on each side of the rachis and drooping in a single plane, middle pinnae ca. 1.1 m long, 8.5 cm wide, densely and minutely hairy beneath.

Inflorescences solitary at the node, in fruit ellipsoid, ca. 23 cm long, 12 cm wide exclusive of curved peduncle; upper peduncular bracts ca. 32 cm long, 11.5 cm wide, minutely hairy or glabrescent, rostrate; rachillae ca. 2 cm long, with 7-12 fruits exposed at tip.

Immature fruits 1- or often 2-seed-

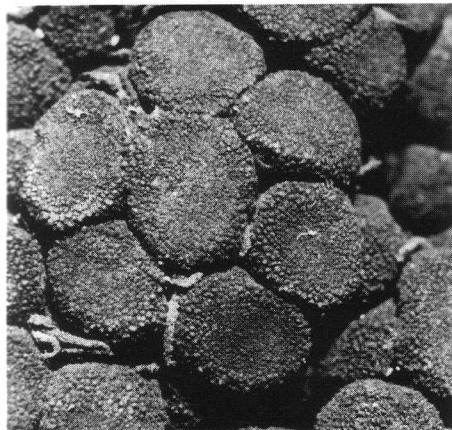


1. Habit of *W. verruculosa*. Photo by Michael Madison.



2. Infructescences of *W. verruculosa*. Photo by Michael Madison.

\* This paper was completed by Dr. Moore during the summer of 1980.



3. Details of fruits. Photo by Howard Lyon.

ed, 1–1.5 cm long, angled by mutual pressure and variously shaped but broadest and essentially truncate at the apex, softly brown-hairy and verruculose; fruiting perianth minutely hairy; sepals triangular, ca. 7.5 mm long, 3–4 mm wide; petals triangular, ca. 1 cm long, 6 mm wide.

**ECUADOR:** Prov. Carchi; in open pasture between Chical and Maldonado, 1,350 m, 4 Dec. 1979, *M. T. Madison & L. Besse* 7290 (BH, holotype; SEL, isotype).

*Wettinia verruculosa* takes its epithet from the distinctive minutely warty surface of the fruit, which additionally is softly hairy. It may be contrasted with species currently included in subgenus *Wettinicarpus* (Moore and Dransfield 1978) as follows:

1. Pinnae undivided.
2. Fruit covered with indurate, straight or uncinate, brown, spineous trichomes. Colombia. ----- *W. castanea*
2. Fruit covered with short soft hairs and small, wartlike protuberances. Ecuador. ----- *W. verruculosa*

1. Pinnae longitudinally divided into numerous sections on mature individuals. Colombia. ----- (*W. cladospadix*, *W. fascicularis*)

A further species of this alliance from Colombia (Galeano-Gardés and Bernal-Gonzaléz in manuscript) differs in having fruits that are less closely packed in the infructescence and attenuate distally into an acute apex. Perhaps still another is represented by preserved staminate and pistillate inflorescences presumably from the Maldonado region of Ecuador but without foliage and associated with a collection of *W. quinaria* (see below).

There is, in addition, a second species of *Wettinia* that occurs in the same general region as *W. verruculosa* but apparently mostly at somewhat lower elevations. *Wettinia quinaria* (Cook & Doyle) Burret, known locally as *gualte*, has similar leaves with undivided pinnae but is readily distinguished by the structure of both staminate and pistillate inflorescences that have few (4–5) elongate axes and usually several inflorescences at a node (cf. Moore and Dransfield 1978, pl. 4). It is represented by *Madison & Besse* 7285 from a pasture left in wet montane forest at El Pailon, ca. 45 km below Maldonado along a footpath to Tobar Donosa, 800 m elevation; and apparently also by *Madison, Plowman, Kennedy, & Besse* 4708 from Peñas Blancas, 20 km below Maldonado where also left in a pasture at 1,100 m. I have seen only photographs of the last. *Wettinia quinaria* seems also to have stems that attain a greater height of 10–15 m.

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*Principes*, 26(1), 1982, pp. 44-48

# Observations on the Natural History of the Cabbage Palm, *Sabal palmetto*

KYLE E. BROWN

*Lake City Community College, Lake City, Florida 32055*

Several articles appeared in *Principes*, Vol. 20, in which the life history of the cabbage palm, *Sabal palmetto*, was explored in depth in an attempt to explain the plant's natural distribution. In the more detailed dissertation (Brown 1973) a number of interesting facts were recorded which were not included in the series of articles. An account of those observations follows.

## Vegetative Habit

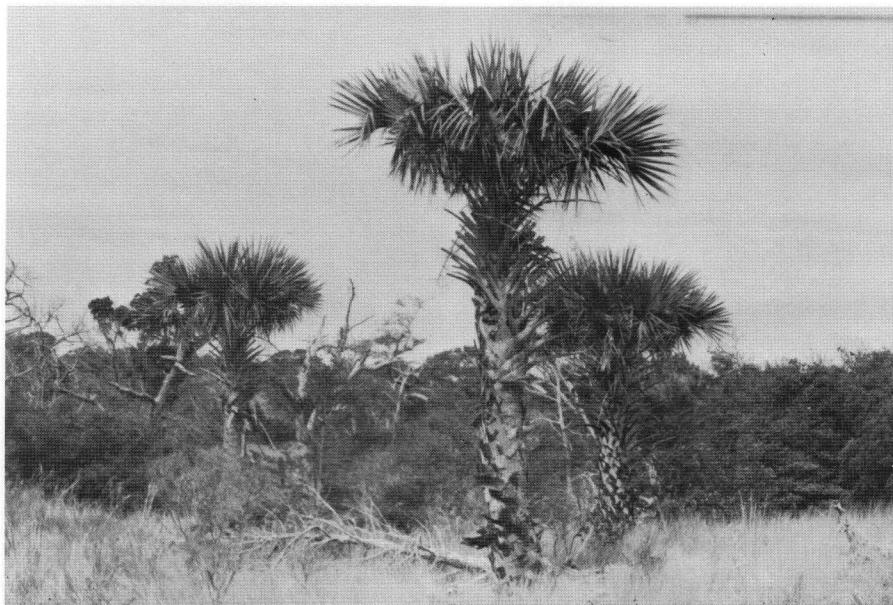
*Sabal palmetto* is normally aborescent attaining heights of 9 to 17 m in coastal populations (Fig. 1) or 20 to 27 m and rarely to 30 m or more at inland sites. The U.S. champion tree grows in Highlands Hammock State Park near Sebring, Florida. The trunk is usually less than 0.5 m in diameter but in rare instances may reach 0.67 m. A large globular crown of deeply cleft, segmented, costapalmate leaves, 2-3 m long, caps the stem. Young trees growing in the shade of forests may attain crowns up to 6 m across, whereas emergent adult trees usually have a crown of 4 m or less. Persistent leaf bases may give the trunk a latticelike appearance, but more often the leaf bases slough off leaving a rather smooth trunk. Adventitious roots arise from the stem base and form a dense, fibrous root system (Fig. 2). Short stubby roots are often found on the trunk above the ground surface. Small (1936) suggests that the upper limit of these roots indicates the maximum water level for the site. Little is known

about the lateral extent of palm root growth (Tomlinson 1962), but I have observed broken lateral roots 12.5 m long on uprooted plants along Florida beaches.

While the trunk is normally unbranched, photographic records of multiple branching do exist (McCurrach 1960, Hodge 1965). I have observed trees in Florida with two branches, generally thought to be due to sublethal damage to the apical meristem (Davis 1969). The same author reports artificial inducement of branching in several palm genera not including *S. palmetto*.

## Morphological Variants

At least two morphological variants occur in the southernmost portions of the range around Miami. One race appears to be acaulescent having leaves and inflorescence normal in appearance but without trunks (Fig. 3). Flowering does not usually occur until trees have at least 2-3 m of visible trunk. These acaulescent plants are found growing in solution pot-holes in lime rock. Although it has been suggested (R. W. Read) that they are stunted as a result of limited root growth, no experiments have been made to determine whether this feature is ecophenic or ecotypic. I have also observed the acaulescent form north of Ormond Beach in Volusia County, Florida, growing on relic sand dunes with *Sabal etonia* Swingle ex Nash and normal *S. palmetto*. One is tempted to



1. *Sabal palmetto* in the maritime scrub on Bald Head Island, N.C.

consider the possibility of hybridization here with the acaulescent *S. etonia*. However, temporal isolation seems effective since *S. etonia* has flowers and sets fruit before *S. palmetto* begins flowering.

The second variant maintains the juvenile leaf characteristics on otherwise normally developed trees. These leaves are more nearly palmate than costapalmate and plants possessing them have been known as *Sabal jamesiana* Small. Observations by Bailey (1944) proved that these plants eventually produce mature costapalmate leaves and thus should not be recognized as belonging to a distinct taxon.

### Natural Enemies

The mature plant is apparently long lived and is subject to very few natural enemies. A few insects are known to feed on mature trees (Wolfenbarger

1961) including the cabbage palm caterpillar, *Lioprosopus futilis* (G & R), and the palm leaf skeletonizer, *Homaledra sabalella* (Chambers). I have observed the leaf beetle, *Hemisphaerota cyanea* (Say), and also the results of feeding by the larvae of the giant palm weevil, *Rynchophorus cruentatus* (Fab.). This last insect is probably the only potentially fatal biotic threat to mature trees. It will attack healthy trees as well as weak or dying ones (Woodruff 1967). In addition to pests, *S. palmetto* is also seriously threatened by an encroaching ocean on the Atlantic coastline. From northern Florida to North Carolina, mature trees are being uprooted and washed away in areas of active beach erosion.

### Inflorescence

The age at which *S. palmetto* begins flowering is unknown. Sub-canopy trees are retarded in flowering as I ob-

served many non-flowering trees in the understory of both maritime and inland forests, which equalled or exceeded in stature, flower-bearing trees exposed to sunlight.

The interfoliar inflorescence of *S. palmetto* is a panicle up to 3 m long with tertiary branching along two-thirds of its length. The panicles are semi-erect and normally exceed the crown on emergent trees. Variable numbers of panicles are borne depending on age and vigor of individual plants, with six to eight panicles per season being a common number.

The production of flowers on a single panicle is prodigious (Fig. 4). I estimated 85,890 flower buds per panicle on one tree at Ft. George, Florida. An average tree at this site, with six to eight panicles, has a potential production of approximately 500,000 to 750,000 flowers per year.

### Phenology

Vegetative events show no clear seasonal routine. New leaves are produced from the apical bud continuously, although most of the leaves will emerge during the warmer portion of the year. The latitudinal range of the species is so broad that in the southernmost portions growth never ceases during most years. Even at the northern limits some growth will occur during winter when plant temperatures are sufficiently above freezing. This phenomenon is not uncommon in trees in general (Perry 1971) and palms in particular (Mason 1914). Just as new leaves are produced in a continuous manner, so also are the old leaves continuously dying.

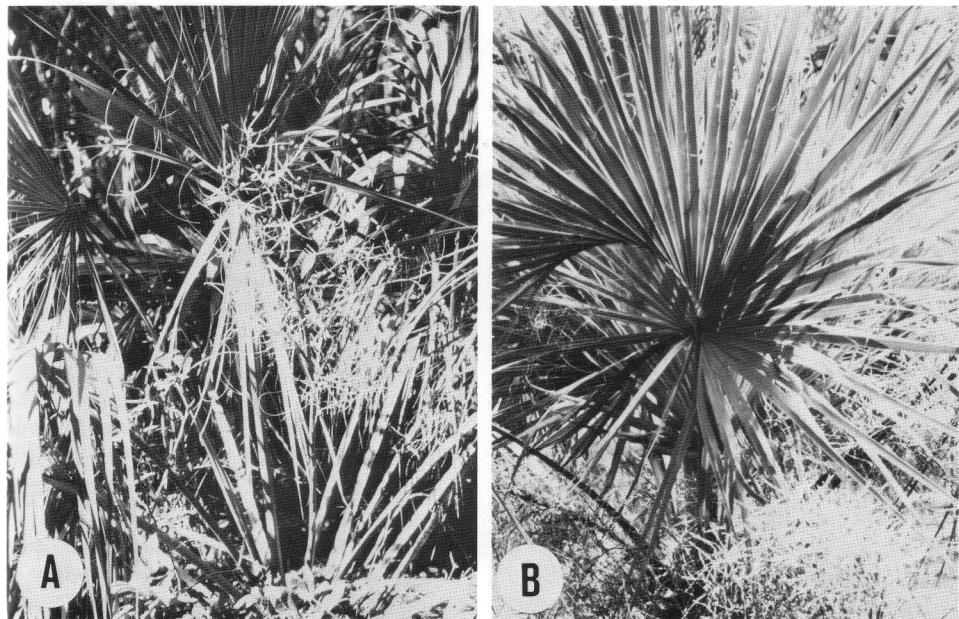
Reproductive events do exhibit seasonal periodicity. The mechanism of floral initiation is unknown but latitudinal differences in both time of first flowering and duration of flowering pe-



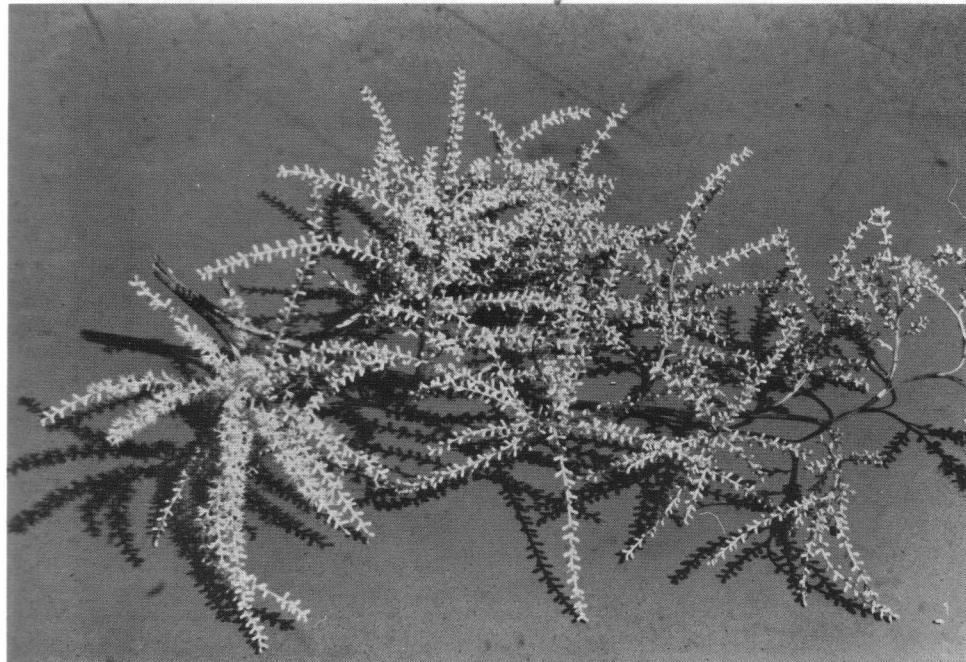
2. Uprooted *Sabal palmetto* showing the dense, fibrous adventitious root system.

riod do exist. Southern populations around Miami may begin flowering as early as April and normally continue until August (Scott Donachie, pers. comm.). Initial flowering activity proceeds up the coast reaching Ft. George (approximately mid-range) about July 1, and finally Smith Island, North Carolina (northern limit of range) in the second to third week of July. The period of flowering is compressed with increasing latitude so that at Smith Island it lasts only 4 to 6 weeks (Fig. 5).

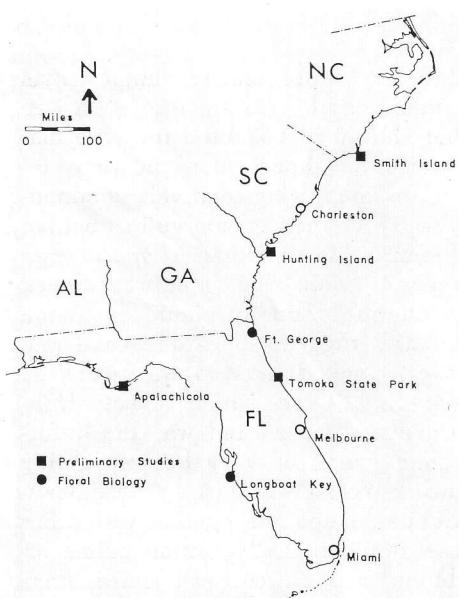
Growth of an individual panicle is basal and rapid. At Smith Island I found no external sign of inflorescence development on May 15. By July 16 panicles were fully expanded but flower buds were immature. First abundant presence of flowers was recorded July 21. Even though inflorescence



3. The morphological variant of *Sabal palmetto* which begins flowering while acaulescent. A. In a limerock pot hole near Miami, FL. B. In relic sand dunes near Ormond Beach, FL.



4. Flowers on a sub-branch of a panicle of *Sabal palmetto*.



### 5. Location of field study sites.

growth is basal, flower opening occurs randomly over the entire panicle for 1 to 2 weeks.

Corner (1966) states that fruit maturation in *Sabal* requires 4 to 5 months. This process, as with flowering, is compressed at the northern limit where it may require as little as 3 months and occurs in the presence of occasional fall frosts. After maturation

fruit may remain viable on the trees for a year or more. Fall from the tree is accomplished by external means such as wind or animal activity.

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## LETTERS

### H. E. Moore, Jr. in the Solomon Islands

I had the great privilege of meeting the late Dr. Harold E. Moore, Jr. and accompanying him on several field collecting trips during his all-too-brief visit of two weeks to these widely scattered, deeply forested, and rugged islands in March 1964, when I was serving as forester with the Forestry Department of the then British Solomon Islands Protectorate government. (Note: The former British protectorate was granted political independence from Britain on 7 July 1978, and is now the self-governed Solomon Islands.) Dr. Timothy C. Whitmore, then the government forest botanist, had organized the visit following the completion of Dr. Moore's field work in nearby Papua New Guinea. Together with a small team of islanders experienced in botanical collecting, they spent the first week making successful palm observations and collections at the southeastern end of the 180 kilometer long island of Santa Ysabel, over 100 kilometers from their base at Honiara, the administrative capital of the Solomons on the northwest coast of Guadalcanal Island.

It was during the second week, following their return to Honiara, that I really became acquainted with Hal Moore—we met as friends, and were on first name terms from the start especially as we shared common interests—and on field trips together into the forested hills behind Honiara, and deep jungle valleys actually within the township area, his easy good humor and ever ready vocal comments in aesthetic appreciation of our native palms and their lush habitats, apart from his always interesting wealth of taxonomic information, endeared him to me as a particularly agreeable, knowledge-

able, and appreciative jungle-travel companion. It was on one such trip that Hal and I collected the type material of an undescribed and very elegant palm growing relatively commonly in the deeper stream gullies behind Honiara; this he named *Rhopaloblaste elegans*. Some days later we enjoyed a delightful Sunday picnic excursion into the rugged, limestone cave and cavern-pocked, headwaters area of the Mataniko River, which bisects Honiara near the sea and was the unfortunate scene of very heavy fighting during World War II; here these beautiful palms abound together with other less common, gully-bottom palms including two stilt-rooted species, *Physokentia dennisii* and *Areca guppyana*. A most attractive pictorial record of this latter palm habitat, which is rather typical of many lowland and lower montane forest areas along northern Guadalcanal, has been permanently captured on page 96 of *Principes* 10, 1966, and other references to Hal's visit appear in the same issue. At that time, the above-mentioned *Physokentia dennisii* had not been completely collected or described, as was the case with several other native palms in this genus, and it was sometime later that Hal very kindly gave my name to this most attractive species (see *Principes* 13: 120–136, 1969).

Following Hal's return to U.S.A., I was delighted, one mail day, to receive an air package containing highly ornamental foliage/flowering plants of episcia hybrids and species, the first of these gesneriads to enter the Solomons—Hal's most thoughtful and generous gift as a token of appreciation and friendship. The now naturalized descendants of these plants have continued to decorate and enhance the

shaded sections of my open garden and shade-house throughout the years since that time. Strangely, it was only 4 or 5 years ago, after becoming a subscriber to *Gesneriad International News*, that I learned that those lovely episcia hybrids had been selectively produced by Hal himself during earlier years when he was an internationally acknowledged expert on this horticulturally valuable family of mainly small plants, before his professional interests and expertise became concentrated on the fascinating family of palms. I deeply admired Hal's modesty in never having informed me of his earlier fame when working with *Gesneriaceae*, in spite of the correspondence that had passed between us throughout the ensuing years.

Before Hal's visit, I had only a casual interest in palms, but had enjoyed supplying seeds and field data on our

native species to former superintendent of Fairchild Tropical Garden, Mr. Stanley Kien, for several years. However, Hal stimulated and encouraged me during his stay here to become a member of The Palm Society, and to contribute my knowledge and seeds to the Society, which I have greatly enjoyed doing up to the present time. Hal frequently expressed his desire, in correspondence with me, to spend further time in the Solomons but sadly this wish was not to be fulfilled, and I unhappily join with his vast number of former friends and colleagues throughout the world to mourn his sudden untimely death and the great loss in our lives.

GEOFFREY F. C. DENNIS  
P.O. Box 653, Honiara  
Solomon Islands

## NOMENCLATURAL NOTES

### An Overlooked Name for the Hybrid between *Arecastrum* and *Butia*

The late Russell B. Kurtz, once a member of The Palm Society, left his library to the University of Akron whence materials on palms ultimately were transferred to the L. H. Bailey Hortorium for disposition through the kindness of Dr. Warren Stoutamire. Dr. Kurtz had accumulated a number of photostatic reproductions of articles of palms which I recently added to the Hortorium's reprint collection. Among the copies was one of an article in which a name apparently meeting requirements of the *International Code of Botanical Nomenclature* was proposed for the hybrid between *Butia*

*capitata* (var. *pulposa*) as seed parent and *Arecastrum romanoffianum* (var. *australe*) as pollen parent produced by a French horticulturist, M. Paul Nabonnand, at Cannes-Eden on the Riviera many years ago. A photographic illustration accompanies the article.

Although Dr. Max Burret wrote about such an intergeneric hybrid in 1940 (*Rodriguesia* 4: 277), he did not propose a name for it. Thus, for those who wish to use a Latin name, the following appear to be permissible, the first for the "genus," the second for the "species."

×**Butiarecastrum** Robertson-Proschowsky, *Revue Horticole* 93: 290. 1921.

×**Butiarecastrum nabonnandii** Robertson-Proschowsky, l.c.

HAROLD E. MOORE, JR.

## NEWS OF THE SOCIETY

### News from California

The Southern California Chapter held its September meeting in Ventura at Ventura College and approximately fifty people attended.

Before the meeting a palm sale was held in the pool area of the college so that members wishing to sell their excess palms could do so. A big selection was available to anyone wanting to increase a collection.

At one o'clock barbecued hot dogs and soft drinks were provided for those wishing a light lunch. Then a tour of the college grounds was conducted by John Tallman and ended at the auditorium where a short business meeting was held. Announcement was made of an open house at Lois Rossten's on Sunday afternoon September 28th honoring Ed and Mary Bunker of Australia. Mr. Bunker is on The Palm Society Board of Directors and owns the Redlands Nursery near Brisbane. Final event of the day was a slide presentation by Don Hodel on pritchardias of the Hawaiian Islands. Don lived in Hawaii for several years and studied the pritchardias. His talk and excellent pictures were very interesting.

Additional notes—Open house for the Bunker's was a big success. Many local chapter members and several Northern California members were present to welcome them. A delicious buffet luncheon was provided by Lois Rossten and Pauleen Sullivan. Mr. Bunker showed us slides of his Redlands Nursery.

Another recent Palm Society visitor to Southern California was Arno King from New Zealand. He spent a week touring gardens in the Los Angeles and San Diego areas.

FRANK KETCHUM

### News from Hawaii

During the November meeting of the Hawaii Island Chapter of The Palm Society, while we were discussing landscaping the Hilo Campus of the University of Hawaii with palms, it was suggested that we dedicate the palms to Margaret Hirose, who died earlier this year. This would be a private commitment of our members not a public sanction by the university.

Margaret Hirose was gracious, charming, and generous besides being an avid palm fancier. All of Hilo is sharing with the Hirose family in her loss.

Those members of The Palm Society who attended the Biennial Meeting in Hilo in 1980 toured her nursery and saw her private collection of rare palms. During that tour she and her family provided refreshments for everyone, and a few days later she also provided all the floral arrangements at the outdoor supper hosted by the Hawaii Island Chapter. She was equally generous with her talents, her time, and her palms.

Her children have taken over the management of the nursery. We hope that in time her children and her grandchildren will also develop an interest in palms.

JUNE F. ROBINSON

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PRINCIPES, JOURNAL OF THE PALM SOCIETY is published quarterly at 1041 New Hampshire Street, Lawrence, Kansas 66044. General Business Offices: 1041 New Hampshire Street, Lawrence, Kansas 66044. Publisher: The Palm Society, 1041 New Hampshire Street, Lawrence, Kansas 66044. Editors: Dr. Natalie W. Uhl, Cornell University, Ithaca, N.Y. 14853 and Dr. John Dransfield, Kew, Richmond, Surrey, England. Managing Editor: None. Owner: The Palm Society, 1041 New Hampshire Street, Lawrence, Kansas 66044.

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