PRINCIPES

Journal of The International Palm Society

October 1992
Vol. 36, No. 4

THE INTERNATIONAL PALM SOCIETY, INC.

THE INTERNATIONAL PALM SOCIETY

A nonprofit corporation engaged in the study of palms and the dissemination of information about them. The society is international in scope with world-wide membership, and the formation of regional or local chapters affiliated with the international society is encouraged. Please address all inquiries regarding membership or information about the society to The International Palm Society, Inc., P.O. Box 1897, Lawrence, Kansas 66044, U.S.A.

PRINCIPES

Manuscripts for PRINCIPES, including legends for figures and photographs, must be typed double-spaced on one side of 8½ × 11 bond paper and addressed to Dr. Natalie W. Uhl for receipt not later than 90 days before date of publication. Authors of two pages or more of print are entitled to six copies of the issue in which their article appears. Additional copies of reprints can be furnished only at cost and by advance arrangement.

THIS PUBLICATION IS PRINTED ON ACID-FREE PAPER.

Contents for October

Cover Picture

Two *Borassus aethiopum* at Fairchild Tropical Garden blown over by Hurricane Andrew. These two specimens were later righted and braced. See letter to Editor. Photo by Will Houghton.

PRINCIPES

JOURNAL OF THE INTERNATIONAL PALM SOCIETY

(ISSN 0032-8480)

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

Annual membership dues of $25.00 in USA and $30.00 to other countries include a subscription to the journal. Dues outside USA include airlift delivery. Single copies $8.00 each or $32.00 per volume. The business office is located at **P.O. Box 1897, Lawrence, Kansas 66044-8897.** Changes of address, undeliverable copies, orders for subscriptions, and membership dues are to be sent to the business office.

Second class postage paid at Lawrence, Kansas

Mailed at Lawrence, Kansas December 30, 1992

Principes, 36(4), 1992, p. 183

Editorial

Reports of the devastation wrought by Hurricane Andrew in southern Florida reached us as we prepared this issue for press. Just as we finished the index, news came that the Biennial has not been cancelled, and that it will run more or less as originally planned. Members who attend will see firsthand the damage to Fairchild Tropical Garden. Others can get a glimpse of Andrew's aftermath from the covers of this issue. Director Bill Klein has written a letter to let us know of the situation a month after the storm and to give us a preview of exciting plans for the future (see pp. 225–226). We feel sure that the IPS will have a role to play in building up the palm collection. We also extend sympathy to all members whose property has been damaged.

In this, the last issue of 1992, the first paper is a beautifully written account of the palms of Canyon Tajo by the late Bill Gunther. Bill had been writing more and more for Principes and the California Journal; we shall miss his carefully researched articles and the cheerful letters that always accompanied them. You'll find an article about Bill in this issue (p. 227). A second obituary (p. 228) honors Jim Degan, also a long time IPS member and palm enthusiast.

By now the long awaited "Chamaedorea Palms" by Don Hodel should be in everyone's hands. The book is beautiful and impressive! Congratulations to Don! He also has a paper in this issue with some additions to the book, which he wanted everyone to have as soon as possible. There seems to be no end to the diversity of this extraordinary genus.

The country of Mexico is particularly rich in palms and many IPS members have been there to hunt for them. A second long paper discusses all of the Mexican palms, their distribution, ecology, and uses. Hermilo Quero has studied the palms of his native country for many years and gives us a complete and up-to-date account.

A study of lethal yellowing as it affects true date palms is presented by Bill Howard and reveals several surprising facts. Finally Jim Cain has done his usual masterful summary of the many activities of the Chapters.

NATALIE W. UHL
JOHN DRANSFIELD

Principes, 36(4), 1992, pp. 184–187

Canyon Tajo

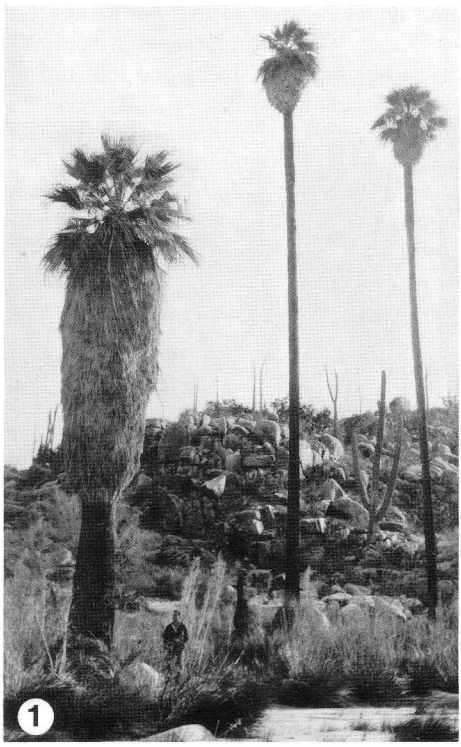
BILL GUNTHER
740 Crest Road, Del Mar, CA 92014 USA

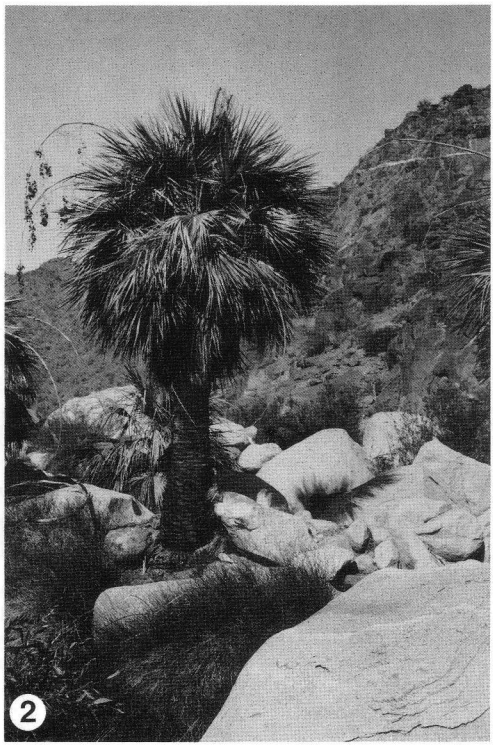
Very few living persons have seen what is probably the largest concentration of native palms in Mexico. Very certainly it is the largest concentration of native palms in the Mexican State of Baja California. These palms are beautiful; there are about 10,000 of them, and they are flourishing in a strikingly spectacular setting. The reason why few modern-day people have seen them is that with time this huge collection of palms is becoming progressively less and less accessible.

These palms are of the species *Washington filifera* and *Brahea armata*. They grow in Canyon Tajo, the largest and by far the most spectacular of the gorges which cut into the eastern slope of the Sierra de Juarez mountain range. The source of this canyon is about 5,000 feet above sea level, a few miles northeast of Mexico's isolated Constitution National Park, which itself can be reached only via sand ruts and only during dry weather. Dominating the head of Canyon El Tajo is a huge block of granite rock called the Cantilla; from the top of the cantilla one can throw a stone and it will fall 3,000 feet before landing in Canyon El Tajo. From the two sides of the cantilla, to its base, run two very steep canyons; their creeks join at its base and then continue their descent through the twisting, rock strewn, and palm-lined Canyon Tajo. At the mouth of the canyon, about nine miles to the east, the stream disappears into the relatively flat desert sand which surrounds Laguna Salada, an isolated salty lake which lies below sea level. At times Laguna Salada is larger than California's famous Salton Sea, but now, due to a five-year drought, Laguna Salada is dry.

From thousands of years ago until about two hundred and fifty years ago this area of Baja California was populated by the Pai Pai tribe of Indians. Thousands of Pai Pai Indians used Canyon El Tajo as their main route of transit from their summer homes, in the pinyon pine forests surrounding Lake Hansen in the present Constitution National Park, to their winter homes, which were located in places where water was available along the lower desert edge of the Sierra Juarez mountains. During their twice a year transit through the canyon, they stopped and visited with others of their tribe who lived continuously in Canyon Tajo.

Living there was good: the palms provided edible seeds, shade, and beams and thatch for their homes; the oaks provided acorns; the stream provided water. Deer, mountain goats, rabbits, and quail provided fresh meat, feathers, and blankets. To members of the Pai Pai Indian Tribe, Canyon Tajo seemed to be the center of the universe—until the arrival of Spanish soldiers and missionaries. The Spaniards brought with them the germs of smallpox and syphilis, to which the Spaniards had some resistance, but to which the isolated Indians were very vulnerable. As a result, the Pai Pai Indians were exterminated, and Canyon Tajo became unpopulated by human beings. It has remained unpopulated to this day. But here and there, through its reaches, shards of Indian pottery, and grinding holes in the granite rock, remain. Also remaining are sections of the



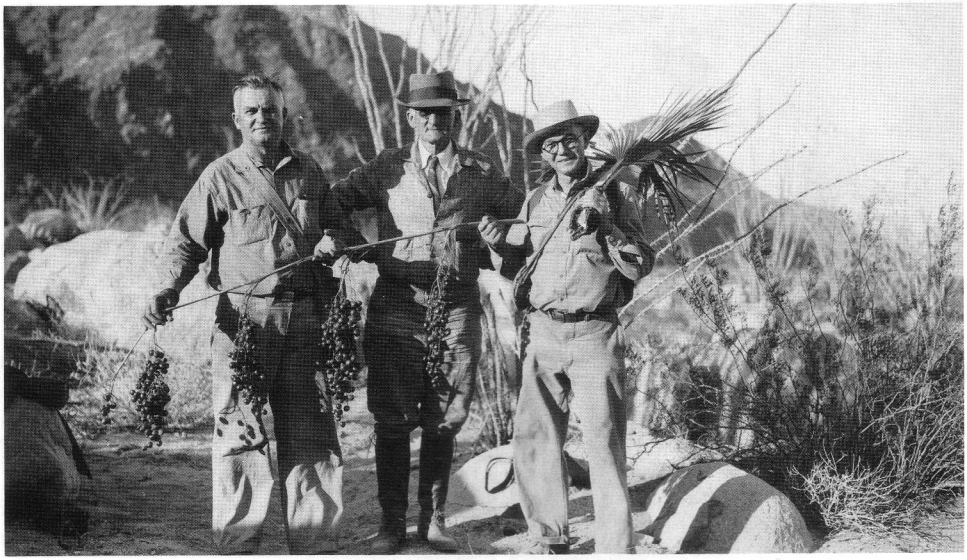


1. This photo, by Carl Ephing, 1942, is from the Cornell University files and titled "*Washingtonia filifera*, Baja California." But are these three palms really all of the same species, or are the two slimmer and taller specimens on the right *Washingtonia robusta*? This question, first posed by Randall Henderson in the *Desert Magazine* 55 years ago is still unanswered. 2. This photo, taken by Randall Henderson in Canyon Tajo in 1936, is titled "*Erythea armata*" (=*Brahea armata*).

wide footpath between the desert and the highlands, through Canyon Tajo, which once was the well traveled Indian equivalent to one of our modern superhighways. Fragments of this old footpath still remain clearly defined and just as easily passable by foot as ever. But during the last 250 years there have been periodic *chubascos*, or hurricanes, the floodwaters of which have gouged out the rock and the earth, completely eliminating most of the old Indian path. Every chubasco which strikes the area does its share to make Canyon Tajo less accessible.

Until 55 years ago, it was still possible, with a Model T Ford, during years when Laguna Salada was dry, to drive from the dry bed of that lake up to the outlet of the old Indian trail and then up that trail to within a short walk to the lowest grove of palms. That is exactly what Randall Henderson did. Henderson was a desert enthusiast and a palm enthusiast; he was also founder and editor of the *Desert Magazine* (Fig. 1). In that magazine he wrote about Canyon Tajo, telling of its thousands of palms, and about how some of the palms were not of the then already well known genus *Washingtonia*, but rather apparently of a different genus, with a blue grey leaf color and much larger seeds (Fig. 2).

To this day, no one knows exactly how Henderson's article reached Dr. Liberty Hyde Bailey, of Cornell University, in Ithaca, New York, who then was the world's authority on palms. But somehow, it did.



3. This historic photo from the Cornell University files is titled "Tajo 1936." It shows Dr. Liberty Hyde Bailey (center), then age 78, with two companions, on April 17, 1936, in Canyon Tajo, Baja California, Mexico, holding the seeds and leaves of *Brahea armata*. Note that Bailey, even in the desert, observed the then tradition that gentlemen should always wear a formal hat, jacket, and tie.

And Bailey was very interested. He was so interested that even at his age of 78 he wrote to Henderson saying that he would like to visit Canyon Tajo, under Henderson's guidance, to see personally and evaluate the palms. Henderson was flattered that a scientist of the stature of Liberty Hyde Bailey should write to him, but at the same time he was worried to think about any person of 78 years of age visiting Tajo canyon. So he replied with a note about the tribulations of getting to Canyon Tajo and thereafter hiking to the palms.

In response to Henderson's very cautious note, Bailey asked for a date to go. Henderson proposed a date, Bailey unhesitatingly accepted, and the trip was scheduled for April 17, 1936.

By all records of Bailey, and also of Henderson, that trip was eminently successful. Henderson's Model T Ford took them so close to the palms that with only seven hours of total time away from the car, Bailey had inspected, photographed, and gathered specimens from both of the palm genera in Canyon Tajo. As shown in one of the accompanying photos (Fig. 3), taken in Canyon Tajo that date, Bailey, alone among those present, maintained the decorum of that day—which prescribed that gentlemen should not appear in public without a coat and tie. In the next day's *Calexico Chronicle*, Henderson wrote that "It was a strenuous trip, even for a desert rat. But the doctor (Bailey) took it all in fine humor—and entertained us along the entire route with stories and experiences and scientific comment which would have been a delight to any lecture audience. I am sure that his muscles were weary when he arrived back at the mouth of the canyon,—but his mind showed no trace of fatigue."

And afterwards, Bailey reported that the two palm species in Canyon Tajo were *Washingtonia filifera* and *Erythea armata*. (The genus *Erythea* has subsequently been merged with the genus *Brahea*.) Also subsequently, Bailey reduced the previously described species of *Wash-*

ingtonia from five to the two which now continue to be recognized.

But that happened 55 years ago.

Since 1936 two more *chubascos* have hit Canyon Tajo with very destructive force. No longer can any motor vehicle approach the lower mouth of Canyon Tajo along the route used by Henderson's Model T Ford, 55 years ago. The way is now completely blocked by gorges and by huge rocks and by trunks of dead palms and by drifts of soft sand.

Canyon Tajo, nowadays, is so isolated that contemporary road maps show no approach either to its source or to its mouth. Because the old Indian trail is now obliterated in so many places, and because neither the approach nor the lower exit are marked, the total length of the hike from the vehicle-access point nearest its source, to the nearest vehicle-access point to its mouth, nowadays amounts to an expedition. To make this trip in a leisurely fashion, and to enjoy thoroughly the palms and the spectacular mountain and desert scenery en route, two nights of camping would be necessary. Extensive planning also would be necessary, and a guide familiar with the area should be along. Were these prerequisites met in advance, this would be a beautiful trip for palm enthusiasts. But without meeting them, it might be fatal.

So for right now, let it live only as a dream.

But if one of these years an organized trip through Canyon Tajo is announced (perhaps as an optional post-biennial trip after some future southern-California IPS Biennial Meeting), sign up very promptly for an experience which would likely provide a lifetime of vivid memories. And at but a fraction of the cost of any alternative trip.

May your dreams come true.

CLASSIFIED

Principes, 36(4), 1992, pp. 188–202

Additions to Chamaedorea Palms: New Species from Mexico and Guatemala and Miscellaneous Notes

DONALD R. HODEL

University of California, 2615 S. Grand Ave., Suite 400, Los Angeles, CA 90007 USA

As *Chamaedorea Palms: The Species and Their Cultivation* (Hodel 1992) went to press, I was aware of several additional but elusive taxa that perhaps represented new species but which I did not include as separate entities in that monograph since sufficient information to describe and name them adequately was lacking. However, during the time the book was being readied for the presses and until it was actually printed, additional information came to light and I am now able to describe and name four new taxa, one of which is cultivated. The new species are named, described, and discussed, and a note is made of where they would key out in *Chamaedorea Palms* in relation to existing species. Also, the distribution of *Chamaedorea elegans*, including the first record of it on the Pacific slope, and a name for a hybrid recently released to the industry are discussed briefly. The new information is presented here to update *Chamaedorea Palms*.

Chamaedorea benziei D. R. Hodel **sp. nov.** (Figs. 1–4).

Subgeneris *Chamaedoropsi* Oerst. inflorescentiis masculis solitariis, floribus masculis solitariis petalis patentibus apicalter. *C. carchensi* Standl. & Steyerm. affinis sed inflorescentiis masculis inter folia, bracteis numerosioribus, rachillis masculis numerosioribus, foliis numerosioribus et brevioribus, petiolis brevioribus et sine tomentiis atis, vaginis majis clausis sine costis prominenter elevatis, pinnis crassioribus differt. *C. woodsonianae* L. H. Bailey affinis sed pinnis paucioribus, crassioribus, nervis paucioribus et minus prominentibus non elevatis et carinatis infra pinnam, petiolis laevibus non foveatis differt. Typus: Cult., *Hodel et al. 1143* (holotypus BH; isotypi CAS, MEXU).

Solitary (Fig. 1), to 5 m tall, erect, ±robust. Stem 2.5–3.5 cm diam., green, prominently ringed, nodes swollen, internodes 3–10 cm long. Leaves 6, pinnate, spreading; sheath 47 cm long, 0.5 cm thick, robust, deeply split in apical half opposite the petiole and there brown-margined, tubular in basal half, densely longitudinally striated, lacking a raised central costa; petiole 33 cm long, 1.5 cm diam., robust, rounded-triangular in x-section, slightly grooved adaxially, rounded with a distinct but pale yellow band abaxially; blade 130 × 100 cm; rachis 125 cm long, round-angled adaxially, rounded with a distinct but pale yellow band abaxially; 20–22 pinnae on each side of rachis, lower middle ones the largest, these to 60 × 5.5 cm, pinnae becoming progressively shorter toward apex of blade and there to 35 × 2.5 cm, end pair often slightly wider, all pinnae straight, only slightly falcate, thick, leathery, slightly drooping, dark nearly bluish green with a slight glaucous bloom, a prominent central midrib light yellow and raised adaxially, abaxially raised and yel-

low only in basal ⅓ of pinna, only slightly raised and greenish in apical ⅔ of pinnae abaxially, all other nerves much less conspicuous adaxially and abaxially, basically 2 lateral primary nerves (1 of these submarginal) on each side of midrib, 3 secondaries between each primary and midrib or 2 primaries, tertiaries inconspicuous, all nerves except midrib translucent yellow when the pinnae are held up to the light, a hard raised swollen knot at point of attachment adaxially.

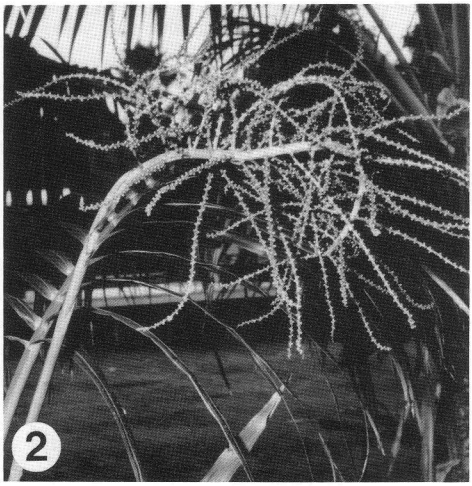
Inflorescences interfoliar, perhaps infrafoliar in fruit, erect to spreading, robust; peduncles to 145 cm long, 5 cm wide at base and there flattened, 1.5 cm diam at apex and there oval in x-section, green where exposed; bracts 10–11, prophyll 9 cm long, 2nd bract 12 cm, 3rd 18 cm, 4th 23 cm, 5th 28 cm, 6th 30 cm, 7th 37 cm, 8th 40 cm, 9th 48 cm, 10th 40 cm, 11th 25 cm, lower ones bifid, apical ones acute-acuminate, tightly sheathing, obliquely open apically, longitudinally striated, apical 18 cm of peduncle exposed and pendulous with 3 visible scars. Staminate (Fig. 2) with rachis to 40 cm long, spiralled-s-downward- or horizontal-pointing, green; rachillae 75, ±radiating in whorls from rachis ca. every 3 cm, whorls mostly of 5 rachillae each, apical 3 whorls of 4 rachillae, basal whorl of 2 rachillae, lower rachillae longest, these to 25 cm long, progressively shorter toward apex of rachis and there to 5 cm long, rachillae reflexed off rachis, ±stiff, spreading, erect but drooping slightly apically at anthesis, mostly simple but a few of basal rachillae 2–3 branched. Pistillate (Fig. 3) with rachis to 28 cm long, green in flower; rachillae 15–50, lower ones longest, to 15 cm long, ±stiff, curved, ascending, parallel, green in flower, longitudinally ridged when dry, upper ones simple but lower ones sometimes branched with up to 4 rachillae per branch.

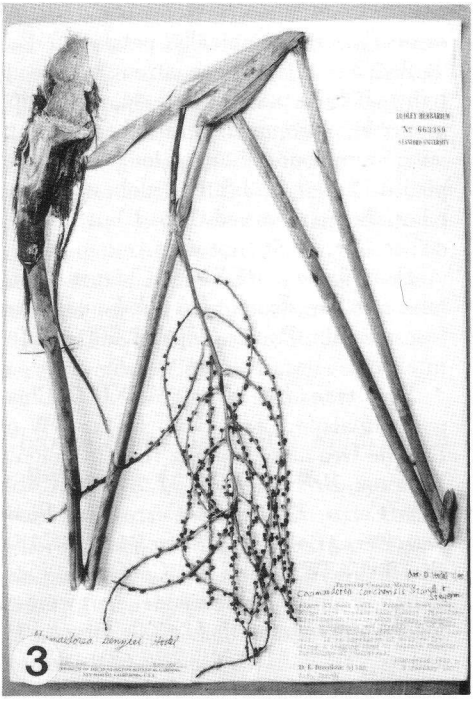
Staminate flowers (Fig. 4) in moderate spirals, 2–6 mm apart, 3.5–3.75 × 2 mm in immature bud (green with corolla closed), at early anthesis 4 × 5 mm, obovoid, yellow, sunken in elliptic depressions 1.5–2.5 × 1–1.5 mm; calyx 1 × 1.75–2 mm, dark brown, sepals free nearly to base or connate in basal ¼, broadly rounded to narrowly rounded apically; petals 4 × 3.5 mm, ovate, valvate, free to base, initially connate apically and there adnate to pistillode briefly, but then eventually spreading slightly, but remaining cupped inward, acute, 0.5 mm thick; stamens 3.5–3.75 mm high, ca. equalling pistillode and petals, filaments 1.5–2 mm long, clear-colored, anthers 2–3 mm long, held ca. as high as pistillode, long-oblong, dorsifixed near base; pistillode 3.5–3.8 mm high, columnar, longitudinally fluted, yellowish. Pistillate flowers in moderate to remote spirals 3–8 mm apart, in bud 1.5 × 2 mm, globose, after anthesis 2 × 3 mm, depressed-globose, in ±superficial oval to elliptic depressions 2 × 1–1.5 mm; calyx 0.75–1 × 2–2.5 mm, moderately to deeply lobed, sepals connate and/or imbricate in basal ¼–½, very broadly rounded to nearly straight apically; petals 1.5–2.5 × 2–2.5 mm triangular, strongly cupped, tightly imbricate in basal ½–¾, acute, tips incurved, a prominently raised costa abaxially; staminodes short to long, toothlike; pistil 1–2 × 1.5–2.5 mm, globose, stigma lobes short, recurved, broad but not too discernible. Fruits not seen.

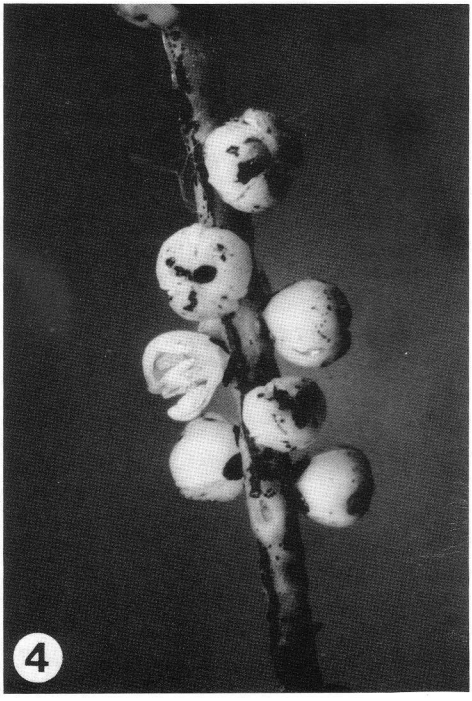
Distribution: MEXICO. Chiapas. Montane rain forest and pine-oak-liquidambar forest on the Pacific slope; 1,500–1,600 m elev.

Specimens Examined: MEXICO. Chiapas: Cintalapa, Cerro Baul, 16 km NW of Rizo de Oro along logging road to Colonia Figueroa, *Breedlove 21731, 31380* (CAS); Villa Corzo, E. base of Cerro Tres Picos near Cerro Bola, *Breedlove 24101* (CAS). CULTIVATED U.S.A. California: San Diego County, Oceanside, Ingwersen Nursery, *Hodel et al. 1143* (holotype BH; isotypes CAS, MEXU), *785* (BH, flowers in FAA only); Los Angeles County, Los Angeles, nursery of D. Barry, Jr., *Barry*


1


2


3


4

s. n. (BH); cultivated material originally collected in southwest Mexico by Tom MacDougall and grown for many years by the late David Barry, Jr. in Los Angeles.

The specific epithet honors James Benzie of Orange, California, my friend and ardent collector and grower of palms for many years, who assisted in collecting the type.

Chamaedorea benziei is an unusual species with pinnae that are among the thickest in the genus. Pinnae and petioles are lightly but noticeably covered with a waxy, glaucous bloom. *C. benziei* appears closest to *C. carchensis* and *C. woodsoniana*. *C. carchensis* differs in its infrafoliar inflorescences with fewer bracts, much fewer staminate rachillae, more membranous and shallowly lobed staminate calyx, shorter anthers, fewer and longer leaves, longer petioles with conspicuous black tomentum, and more open leaf sheaths tubular only near the base and with a prominently raised costa. *C. woodsoniana* differs in its more numerous and more prominently nerved pinnae with five raised, keeled nerves abaxially and petioles with small, densely packed, irregular pits giving living material a rough texture.

Staminate flowers of *C. benziei* are similar to those of *C. seifrizii* and *C. pochutlensis* (both subgenus *Chamaedoropsis*) in that the petals spread apically only slightly, the tips remaining incurved over the stamens and are adnate or nearly so to the tip of the pistillode. In this regard, these three species approach *C. hooperiana*, *C. elatior*, and *C. graminifolia* (all in subgenus *Chamaedorea*), in that the latter three have petals which are connate apically at anthesis but then later often spread slightly. The six species tend to blur the boundaries of these two subgenera; more work is needed to circumscribe subgeneric characters more adequately.

Chamaedorea benziei would key out next to *C. woodsoniana* in the key to the species of subgenus *Chamaedoropsis* and next to *C. linearis* in the vegetative key to the cultivated species of *Chamaedorea* in Hodel (1992). Differences with *C. woodsoniana* were noted above; *C. linearis* differs in its thinner pinnae usually with more primary nerves, thinner sheaths, and, being in subgenus *Morenia*, has multiple staminate inflorescences, staminate flowers arranged in groups, and red fruits.

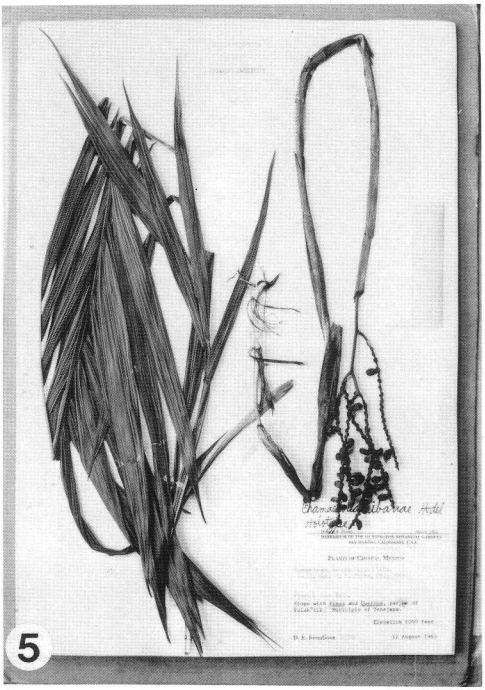
In the 1950s, the late David Barry, Jr. of Los Angeles grew the only plants known in cultivation from seeds that Tom MacDougall had collected in southwest Mexico without a specific locality. Apparently, Barry later sold his only surviving plant to Jack Ingwersen in Oceanside, California, and that specimen from which the type originated still exists in the Ingwersen Nursery.

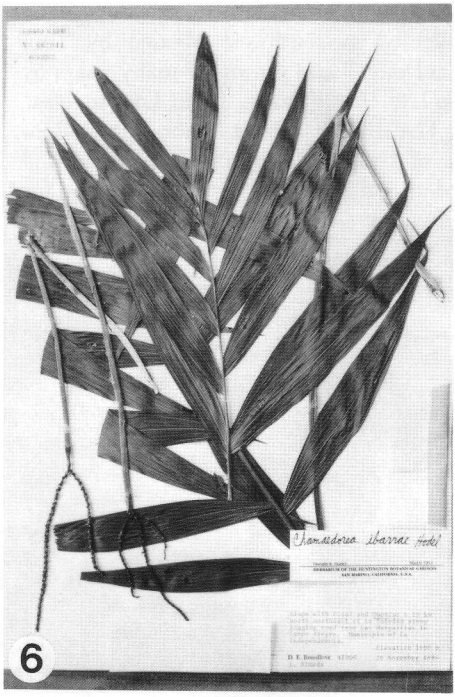
Chamaedorea ibarrae D. R. Hodel **sp. nov.** (Figs. 5,6).

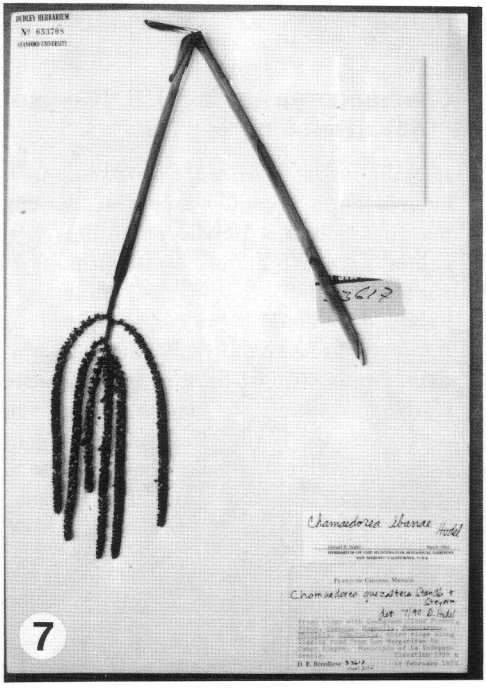
Subgeneris *Chamaedoropsi* Oerst. inflorescentiis masculis solitariis, floribus masculis solitariis petalis patentibus apicaliter. *C. nubio* Standl. & Steyerm. et *C. skutchii* Standl. & Steyerm. affinis sed habitu acaulibus brevioribus differt. *C. nubio* affinis sed habitu solitariis, foliis pinnatis pinnis strictis, floribus femineis sine staminodiis differt. *C. skutchii* affinis sed pinnis strictis, floribus femineis fere contiguis, calycibus femineis lobatis plus leviter, petalis femineis maginibus pallidis. Typus: Mexico, Chiapas, *Breedlove 11706*

←

1. Plant at Ingwersen Nursery, Oceanside, California, from which holotype of *Chamaedorea benziei* was collected, *Hodel et al. 1143*. 2. Staminate inflorescence of *Chamaedorea benziei, Hodel et al. 1143*. 3. Pistillate inflorescence of *Chamaedorea benziei, Breedlove 31380*. 4. Staminate flowers of *Chamaedorea benziei, Hodel et al. 1143*.


5


Chamaedorea ibarrae Hodel
6


DUKE'S HERBARIUM
No 653708
Chamaedorea ibarrae Hodel
7


8

[holotypus CAS (Fig. 5); isotypi BH, F, MICH].

Solitary, short, to 1–1.5 m overall height including leaves. Stem usually lacking but with age to 30 cm tall. Leaves 1–2 m long, pinnate, ascending to spreading, often appearing to arise from the ground, distichously arranged? (*Ton 398*); sheath not seen; petiole to 26 cm long or more, lightly grooved adaxially, rounded and pale abaxially, longitudinally striated laterally; rachis 50 cm long, angled adaxially, rounded abaxially; pinnae (Fig. 6) to 17 or more on each side of rachis, lower ones largest, these to 24 × 2.5–3 cm, becoming progressively shorter especially in apical fifth of rachis to 18–22 × 1–2 cm, terminal pair 15 × 2.3 cm, regularly or occasionally irregularly spaced, all pinnae straight, acuminate, only slightly falcate, plicate when dry and strongly cupped downward or inverted-v-shaped at point of attachment to rachis, a prominent midrib raised and yellow adaxially and abaxially, ±keeled adaxially, rounded abaxially, a prominent primary nerve on each side of the midrib and placed toward margin, 4 secondaries between primary and midrib and 1–2 secondaries outside of primary or 2 primaries on each side of midrib with 1–2 secondaries between each primary and midrib, nerves are more prominent and yellow abaxially than adaxially.

Inflorescences erect from the base, often from the ground or leaf litter, straight, erect, few-branched. Staminate (Figs. 6,7) peduncle at least 40 cm long (only portion seen); bracts as in pistillate; rachis lacking or to 2 cm long; rachillae 3–6, to 15 cm long, 1–1.5 mm diam., ±stiff?, parallel, densely flowered (Fig. 7), slightly flexuous. Pistillate (Fig. 5) with peduncles to 70 cm long, straight, 5 mm wide at base and ±flattened, 3–4 mm diam. at apex; bracts 11–12, prophyll 2–3 cm long, 2nd bract 3 cm, 3rd 5 cm, 4th 6.5 cm, 5th 9 cm, 6th 9 cm, 7th 12 cm, 8th 16 cm, 9th 18 cm, 10th 19 cm, 11th 12 cm, sometimes a rudimentary 12th bract concealed by the 11th one, uppermost bracts not exceeding peduncle, lower ones fibrous, tattered, upper ones tubular, obliquely open, round-acute, bifid, longitudinally nerved; rachis to 4 cm long; rachillae 3–6, to 13 cm long, 1.5–2 mm diam., stiff, parallel, strongly undulate when dry, perhaps downward-pointing when heavily laden with fruits.

Staminate flowers ± densely placed in bud, 0.5–1 mm apart, 1.5 × 1 mm, ovoid-globose or bullet-shaped, contiguous at anthesis and 3 × 3–4 mm, obovoid to oval, distinctly sunken in round-elliptic pits 1.5–2.5 × 1 mm, pits with liplike margins; calyx cupular, 0.5–0.75 × 2–3 mm, membranous, shallowly lobed, sepals connate in basal ½–¾, rounded apically; petals 1.75–3 × 1.5–2 mm, ovate, valvate, free nearly to base, spreading, erect, acute, not nerved; stamens 1.75–2 mm long, filaments 0.5–1 mm long, whitish, anthers to 1 mm long, tightly appressed around pistillode, dorsifixed, pistillode equalling stamens, 2–2.5 mm high, columnar. Pistillate flowers in densely placed spirals, nearly contiguous especially in middle and apical part of rachilla or more loosely spaced basallly, 1.25–2 × 2.5–4 mm, subglobose to depressed-globose (intermediate between hemispherical and shield-like), slightly to deeply sunken in elliptic depressions 3.25 × 1.25–2.25 mm usually with a raised liplike rim around each depression; calyx 0.5–1 × 2.5–4 mm, ca. half as high as corolla, very shallowly lobed, sepals imbricate and or connate in basal

←

5. Holotype of *Chamaedorea ibarrae*, *Breedlove 11706*. 6. Staminate inflorescence (in bud) and leaf of *Chamaedorea ibarrae*, *Breedlove & Almeda 47906*. 7. Densely flowered staminate inflorescence (at anthesis) of *Chamaedorea ibarrae*, *Breedlove 33617*. 8. Plant of *Chamaedorea keeleriorum*, *Hodel & Castillo 988*.

¾, very broadly rounded to truncate (straight) apically, margins membranous; petals 1.5 × 2.5–3 mm, broadly triangular, tightly imbricate nearly to apex, becoming more separated in fruit and then corolla more deeply lobed, acute to nearly straight or broadly rounded, only faintly nerved adaxially, margins membranous; pistil 1.5 × 2.5 mm, depressed-globose, drying and shrinking to ovoid, stigma lobes short, recurved, separated. Fruits 8–10 × 5–7 mm, obovoid black when mature.

Distribution: MEXICO. GUATEMALA. Rocky substrate in montane rain and cloud forest or pine-oak-liquidambar forest mostly on the Atlantic slope, infrequently on the Pacific slope; 1,600–2,600 m elev.; usually on limestone on Atlantic slope.

Specimens Examined: MEXICO. Chiapas: La Independencia, logging road from Las Margaritas to Campo Alegre, *Breedlove 33617, Breedlove & Almeda 47906* (CAS); Tenejapa, Kulak'tik, *Ton 398* (CAS), *Breedlove 11706* (holotype CAS; isotypes BH, F, MICH); Zinacantan, Chivero, *Laughlin 1041* (BH, CAS, F); Motozintla, SW side of Cerro Mozotal, 11 km NW of jct. of road to Motozintla along road to El Porvenir and Siltepec, *Breedlove 41649* (CAS); Escuintla, *Matuda 30180* (MEXU). GUATEMALA. Huehuetenango: Sierra de los Cuchumatanes, Cerro Canana, *Steyermark 49018* (F).

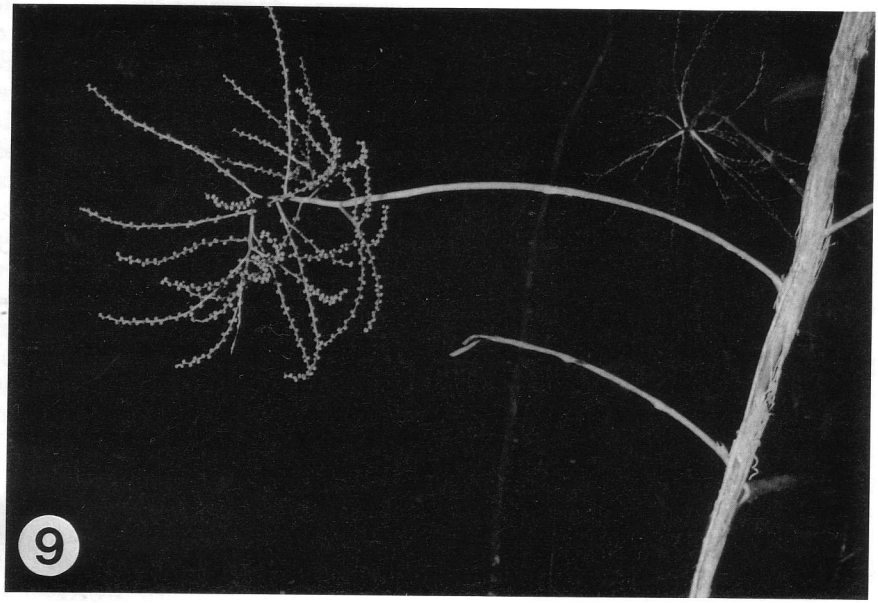
The specific epithet honors Mexican botanist Guillermo Ibarra-Manriquez of the National Autonomous University of Mexico (UNAM). The vernacular name is *cib*, which is also used for other species of *Chamaedorea* in the area. Unfortunately, not much is known about the habit of *Chamaedorea ibarrae* but judging from label data of *Ton 398*, the species is apparently a low, nearly stemless plant with more or less stiff, erect leaves and inflorescences arising from the ground or leaf litter. Only with age does the species form a short, visible, above-ground stem. In habit, *C. ibarrae* appears to be very close to *C. radicalis* but the latter differs vastly in the staminate flowers in short acervuli (lines) of 3–4 flowers each, deeply lobed calyx, outwardly spreading stamens equalling or exceeding the petals, and red fruits.

The Guatemalan specimen referred here differs slightly from the Mexican material in the slightly larger flowers and the shallower floral pits.

Chamaedorea ibarrae is probably closest to *C. nubium* and *C. skutchii* from which it differs in its nearly trunkless habit. Also, *C. nubium* differs in its cespitose habit, low shieldlike pistillate flowers with staminodes, and bifid leaves (if pinnate then slightly sigmoid pinnae). *C. skutchii* differs in the fewer, sigmoid pinnae and loosely arranged pistillate flowers with more deeply lobed calyx and smaller petals drying with a dark margin. In the key to the species of subgenus *Chamaedoropsis* in Hodel (1992), *C. ibarrae* would key out next to *C. carchensis* which differs substantially in the larger habit, much larger leaves with more pinnae, black indument covering the petioles, and larger and more numerous rachillae. *C. ibarrae* also appears close to *C. volcanensis* from the Pacific slope of Guatemala in habit and inflorescence. However, the latter differs in the fewer, much broader, sigmoid pinnae with several prominent nerves drying yellowish and the very prominent, deeply lobed staminate calyx.

Chamaedorea keeleriorum D. R. Hodel & J. J. Castillo Mont **sp. nov.** (Figs. 8–10).

Subgeneris *Chamaedoropsi* Oerst. inflorescentiis masculis solitariis, floribus masculis solitariis petalis patentibus apicaliter. *C. whitelockianae* Hodel & Uhl affinis sed habitu grandioribus, foliis grandioribus, pinnis numerosioribus et grandioribus, inflorescentiis infra folia, rachillis numerosioribus, rhachidibus femineis ramosis, calycibus masculis lobatis prominentibus profundis differt. Typus: Guate-



9. Inflorescence of *Chamaedorea keeleriorum* with lower rachillae branched, *Hodel & Castillo 911* (holotype). 10. Infructescence of *Chamaedorea keeleriorum* with simple rachillae, *Hodel & Castillo 988.*

mala, Quetzaltenango, *Hodel & Castillo 911* (holotypus BH, isotypus AGUAT).

Solitary (Fig. 8), to 5 m tall, slender, erect. Stem 1.5–2.5 cm diam., smooth, green, ringed, internodes to 15 cm long, often covered with old persistent sheaths. Leaves 3–4, ascending to spreading, pinnate; sheath to 35 cm long, tightly clasp-

ing; petiole 40 cm long, rounded abaxially; rachis to 70 cm long, angled adaxially, rounded abaxially; pinnae 12–17 on each side of the rachis, middle ones largest, to 30 × 4 cm, apical ones 10 × 1.5 cm, basal ones to 20 × 1–2 cm, long lanceolate to linear, straight but lower margin falcate, long-acuminate, strongly contracted basally to 5 mm wide, widest in the middle, shining green, drying plicate, slightly prominent midrib, 3–5 much less prominent primary nerves on each side of midrib, 1–2 secondaries between each primary, tertiaries numerous, faint.

Inflorescences (Fig. 9) 3–6 per plant, infrafoliar, breaking through persistent sheaths well below the leaves, ascending to spreading. Staminate with peduncle to 30 cm long, 1 cm wide at base and flattened, 3–4 mm diam. at apex, green in flower where exposed, bracts 6–7, prophyll 2 cm long, 2nd bract 2.5 cm, 3rd 4 cm, 4th 7 cm, 5th 15 cm, 6th 17 cm, 7th 14 cm and concealing 1–2 rudimentary bracts, 7th up to 3 cm long, all acute-acuminate, bifid, brown in flower, obliquely open apically, longitudinally striated, upper one not exceeding peduncle; rachis 10 cm long; rachillae 32, lower ones longest, to 15 cm long, becoming progressively shorter toward apex of rachis and there to 8 cm long, all slender, 1 mm diam., mostly simple but lower ones sometimes furcate or with 3 branches, longitudinally ridged, spreading to slightly drooping, undulating, greenish in flower. Pistillate with peduncle to 48 cm long, 1 cm wide at base and ±flattened, 2–4 mm diam. at apex, green and ascending in flower, orange-red and arching or downward-pointing in fruit where exposed; bracts as in staminate, becoming brownish and tattered in fruit; rachis to 10 cm long, green in flower, orange-red in fruit, lower portions of later inflorescences often with 3–9 lateral axes to 2–3 cm long, each axis containing 2–5 rachillae each; rachillae 8–40, lower ones longest, to 14 cm long, becoming progressively shorter toward apex of rachis and there to 6 cm long, all 1–1.5 mm diam., longitudinally ridged when dry (nearly winged), undulating, green and spreading in flower, orange-red and downward-pointing in fruit (Fig. 10).

Staminate flowers in moderate spirals 2–4 mm apart, 3 × 4 mm at anthesis, obovoid, yellowish, slightly sunken in elliptic depressions 1.5 × 0.75 mm; calyx 1.25 × 1.5–2 mm, deeply lobed, sepals imbricate in basal ¼–⅓, acute to truncate or rounded apically, brown-margined, not or only faintly nerved when dry; petals 3 × 2.5 mm, ovate, free nearly to the base, widely spreading, acute, cupped inward especially apically, lightly nerved when dry; stamens 2 mm high, just shorter than pistillode, filaments 1–1.5 mm long, 0.25 mm diam., anthers 1 mm long, oblong, dorsifixed toward base; pistillode 2.5 mm high, columnar, just shorter than petals. Pistillate flowers in rather lax spirals 3–9 mm apart, ±superficial, leaving oval to slightly elliptic scars 1–1.5 mm long; in fruit calyx 2.5 mm across, deeply lobed, sepals 1.25 × 1 mm, imbricate (and or briefly connate?) in basal ½, acute apically, brown-margined, very faintly nerved adaxially; corolla 4–5 mm across, deeply lobed, petals 3 × 2–3 mm, broadly ovate, imbricate in basal ½–⅔, broadly rounded to acute apically with a small "beak," faintly nerved abaxially, slightly more prominently nerved adaxially; pistil not seen. Fruits 8–10 × 6–8 mm, obovoid-globose, black; seeds 8 × 5 mm, ovoid to oval.

Distribution: GUATEMALA. MEXICO. Moist or wet montane rain forest and cloud forest on the Pacific slope; 1,500–2,500 m elevation.

Specimens Examined: GUATEMALA. Quetzaltenango: southwest slope of Volcan Zunil, *Hodel & Castillo 911* (holotype BH, isotype AGUAT), *988* (AGUAT, BH), *Skutch 926* (GH). Sacatepequez: east of Antigua, *Castillo 1247* (AGUAT, BH), *Harmon 2367* (MO). Solola: SW slope of Volcan Atitlan, *Steyermark 47411* (F). Suchitepequez: south side of Volcan Ati-

tlan, *Skutch 1535* (GH). MEXICO. Chiapas: Escuintla, Mt. Ovando, *Matuda 18281* (MEXU); Angel Albino Corzo, NE slope of Cerro Venado above Finca Cuxtepec, *Breedlove & Bourell 67615* (CAS); Cintalapa, Cerro Baul, 16 km NW of Rizo de Oro, *Breedlove 24928*, *Breedlove & Smith 21381* (CAS).

The specific epithet honors Audrey and Philip Keeler of Santa Ana, California, who have encouraged and supported Hodel's work in *Chamaedorea* for several years and, in particular, supported our field work in Guatemala on numerous occasions.

The Guatemalan specimens cited here as *C. keeleriorum* along with descriptions and dimensions of their various parts were tentatively included in *C. whitelockiana* and illustrated as such in the monograph of *Chamaedorea* (Hodel 1992, p. 218 and plate 95, p. 235). The inclusion of the Guatemalan material in that treatment significantly increased the size of the habit, stem, and leaves, and size and number of pinnae and rachillae over those contained in the original description of *C. whitelockiana* (Hodel and Uhl 1990). However, in the 1992 account I alluded to the possibility that the Guatemalan material may represent a new unnamed species; new information has confirmed this possibility, enabling us to describe and name *C. keeleriorum*.

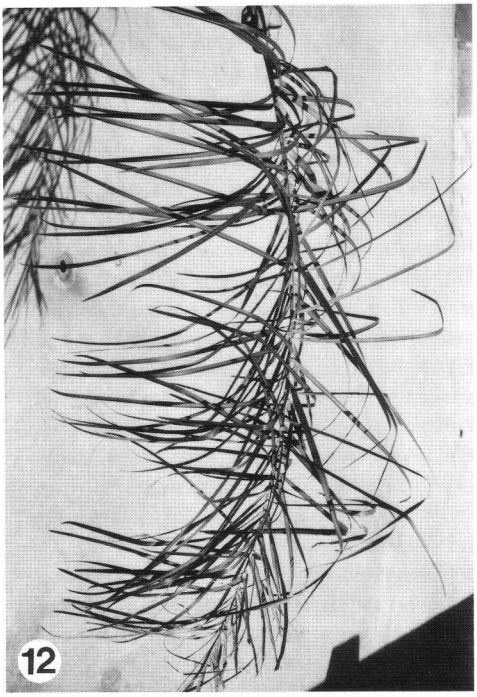
Although close to *C. keeleriorum*, *C. whitelockiana* differs in its smaller habit, stem, and leaves; smaller and fewer pinnae and rachillae; and the only shallowly lobed staminate calyx. *C. keeleriorum* would key out next to *C. whitelockiana* in the key to the species of subgenus *Chamaedoropsis* (Hodel 1992).

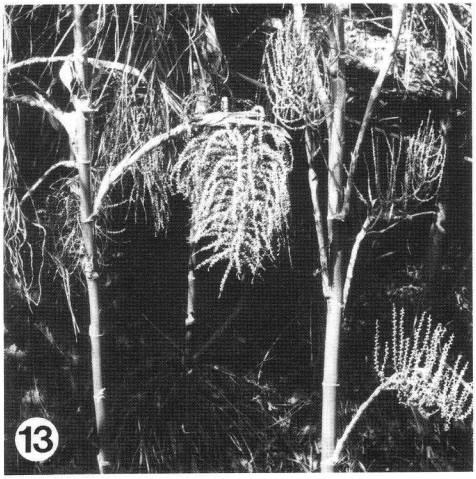
In the initial flowerings, the pistillate inflorescence of *C. keeleriorum* has simple rachillae originating from an unbranched rachis. However, with subsequent flowerings, the basal portion of the rachis becomes branched with several axes, each axis containing up to five rachillae. In Guatemala, *C. keeleriorum* grows with *C. fractiflexa*, *C. pachecoana*, *C. rojasiana*, and *C. volcanensis* among others. *C. keeleriorum* is not known to occur in cultivation.

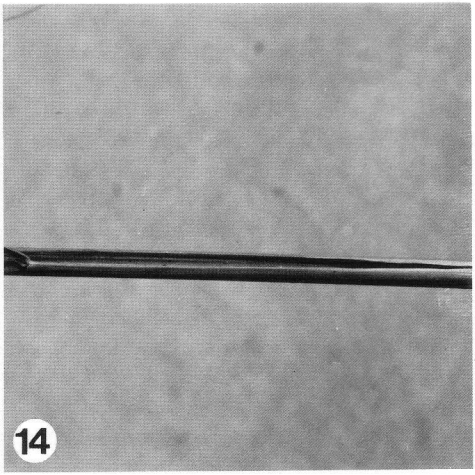
Chamaedorea plumosa D. R. Hodel **sp. nov.** (Figs. 11–19).

Subgeneris *Chamaedoropsi* Oerst. inflorescentiis masculis solitariis, floribus masculis solitariis petalis patentibus apicaliter. *C. woodsonianae* L. H. Bailey et *C. carchensi* Standl. & Steyerm. affinis sed pinnis numerosioribus (ca. 100 versus 36 et 20) longilinearibus maxime graminiformibus exorientibus rhachibus planis et cursibus diversis differt. *C. glaucifoliae* H. A. Wendl. habitu affinis sed subgenere diverso sine indumentio glauco differt. Typus: Cult., *Hodel 1141* (holotypus BH; isotypi AGUAT, CAS, CR, F, HNT, K, MEXU, MO, NY).

Solitary, to 5 m or more tall (Fig. 11), erect, ±robust. Stem 4–6.5 cm diam., smooth, green, ringed, internodes 10–23 cm long. Leaves 7–9, pinnate, erect-spreading, plumose (Fig. 12), dull ±grayish green; sheath to 50 cm long, persistent, obliquely open in apical ¼, tubular and tightly clasping in basal ¾, densely longitudinally striated with a raised central costa extending from petiole; petiole 20–30 cm long, 1 cm diam., oval in x-section, deeply but narrowly channelled adaxially (Fig. 14), the channel extending beyond the first basal pinnae, green, lacking yellow band abaxially, longitudinally striated laterally; rachis to 110 cm long, green and angled adaxially, green and rounded abaxially; pinnae to 85 per side, basal ones longest, these to 54 × 0.6–1.4 cm, pinnae in apical ¼ of blade-tapering to 25 cm long, long-linear, straight, long-acuminate, aggregated in irregular groups along rachis, exiting rachis in several planes and directions (Fig. 12), mostly ascending and spreading but some downward-, foreward-, or backward-pointing to give blade plumose appearance, a hard whitish bump at point of attachment adaxially, a prominent



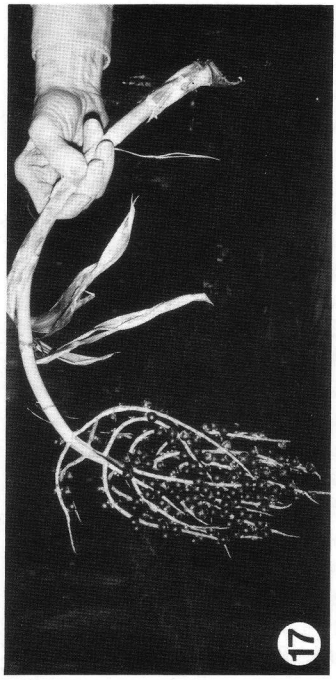




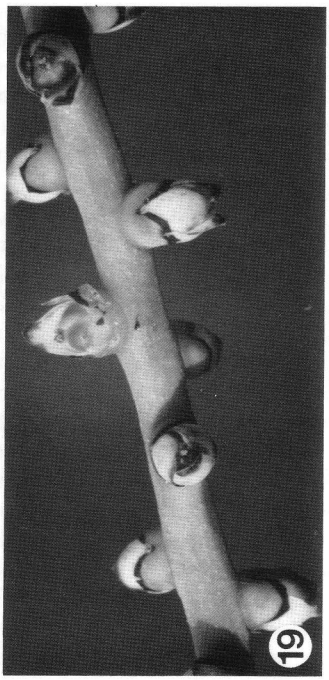
11. Group planting of *Chamaedorea plumosa* in garden of Rae Anderson, Sierra Madre, California. 12. Plumose leaf of *Chamaedorea plumosa* with pinnae exiting rachis in several planes and directions, *Hodel 1141* (holotype). 13. *Chamaedorea plumosa*, inflorescences on staminate plant (left), *Hodel 1141* (holotype), and pistillate plant (right), *Hodel 1142*, garden of Rae Anderson, Sierra Madre, California. 14. Deeply channeled petiole of *Chamaedorea plumosa* is characteristic of the species.

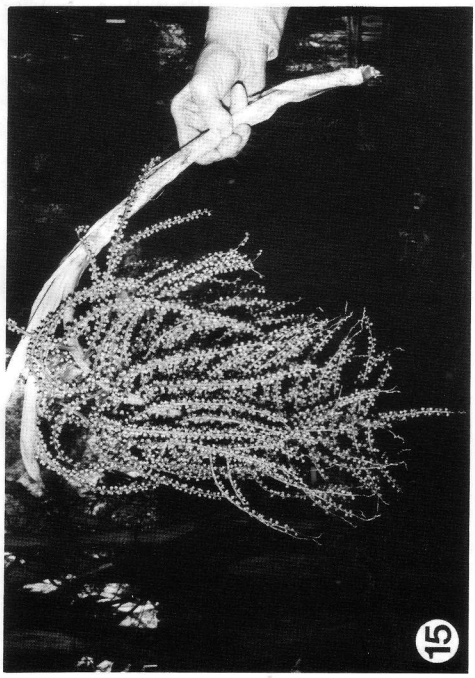
→

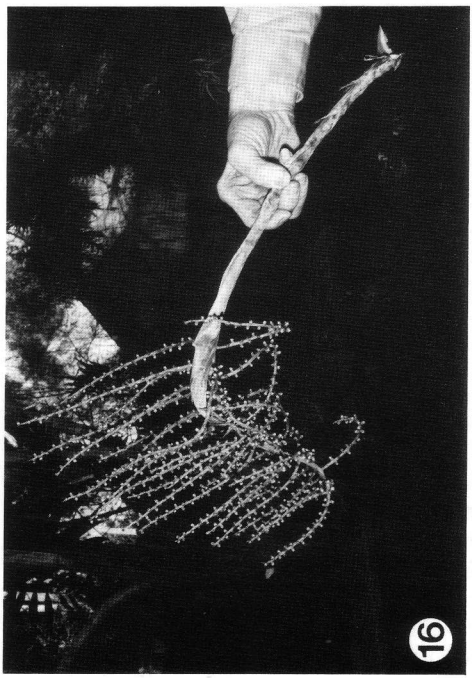
15. Staminate inflorescence of *Chamaedorea plumosa*, *Hodel 1141* (holotype). 16. Pistillate inflorescence of *Chamaedorea plumosa*, *Hodel 1142*. Note stiff, erect rachillae. 17. Infructescence of *Chamaedorea plumosa*, *Hodel 1142*. 18. Staminate flowers of *Chamaedorea plumosa*, *Hodel 1141* (holotype). 19. Pistillate flowers of *Chamaedorea plumosa*, *Hodel 1142*.


17


18


19


15


16

midrib raised adaxially and abaxially, 1–3 much less prominent lateral nerves on each side of midrib adaxially and abaxially.

Inflorescences 6 per plant (Fig. 13), infrafoliar, emerging through old persistent sheaths, erect-spreading. Staminate (Fig. 15) with peduncle to 54 cm long, 2–2.5 cm wide at base and there flattened, 1–1.5 cm diam. at apex and oval in x-section, ascending, green in flower where exposed; bracts 8–9, prophyll 5.5 cm long, 2nd bract 14 cm, 3rd 22 cm, 4th 23 cm, 5th 28 cm, 6th 31 cm, 7th 35 cm, 8th 30 cm, 9th 6 cm and concealed by 8th, bracts brown and dried in flower, acute-acuminate, bifid, not too tightly sheathing, upper one extending well beyond peduncle and onto rachis, longitudinally striate-nerved; rachis to 32 cm long, green and downward-pointing; rachillae ca. 100, lower ones longest, these to 30 cm long, apical ones to 10 cm long, spreading to slightly drooping, green, mostly simple, few of lower ones furcate. Pistillate (Fig. 16) with peduncle to 50 cm long, 1–2 cm wide at base and flattened, 5–8 mm diam. at apex and rounded, ascending, green in flower and orange in fruit where exposed; bracts as in staminate inflorescence; rachis to 32 cm long, green and s-downward-pointing in flower, orange and straight downward-pointing in fruit; rachillae 30–45, lower ones longest, these to 22 cm long, apical ones 8–10 cm long, green and erect in flower, downward-pointing and orange in fruit.

Staminate flowers (Fig. 18) in moderate spirals 2–3 mm apart, 4.5–5 × 4–5 mm at anthesis, ±globose to obovoid, yellow aging with brown tips and margins, slightly sunken in elliptic depressions 3 × 2 mm; calyx cupular, 2 × 3 mm, green with brown margins, sepals connate in basal ½, broadly rounded to truncate and thin apically; petals 4.5–5 × 3 mm, long-ovate, free nearly to base, spreading apically, acute, slightly recurved, thick, fleshy, rounded and faint ridges adaxially, margins thickened, rounded or revolute; stamens 2–2.5 mm high, ½ as high as petals and in tight ring around pistillode, filaments 1.5 × 0.3–0.4 mm, connate basally in ring and there adnate to pistillode, clear-colored, anthers 1 mm long, bilobed, dorsifixed, brownish; pistillode 3–3.5 × 1 mm, broadly columnar, exceeding stamens but shorter than petals, yellow. Pistillate flowers (Fig. 19) in lax spirals 5–8 mm apart, 5 × 3.5 mm, ±ovoid, yellow aging with brown tips, slightly sunken in rounded to elliptic depressions 3 × 2.5 mm; calyx cupular, 2.5 × 3.5 mm, green, sepals connate in basal ⅓, broadly rounded to truncate apically; petals 5 × 3.5–5 mm broadly triangular, tightly imbricate in basal ⅔, acute and slightly recurved apically, fleshy, lateral margins thin, membranous; staminodes 0.8 mm high, toothlike, clear-colored; pistil 3 × 2.5–3 mm, ±globose, 3-lobed, green, stigma lobes short, recurved, separated, clear-colored. Fruits (Fig. 17) 11 × 11 mm, ±globose, black, petals brown in fruit, triangular, to 4 mm long, sepals orange basally in fruit, browning apically and there rounded, to 2.5 mm long.

Distribution: MEXICO. Chiapas. Evergreen seasonal forest of the central depression and plateau; 600–1,200 m elev.; often on limestone.

Specimens Examined: MEXICO. Chiapas: Teran, 4 km N of Juan Crispin along road to San Fernando, *Breedlove & Thorne 30366* (CAS). CULTIVATION. Mexico. Chiapas: Las Rosas, along streets and in yards, *Breedlove & McClintock 23699* (CAS). U.S.A. California: Los Angeles County, Sierra Madre, garden of Rae Anderson, *Hodel 1141* (holotype BH; isotypes AGUAT, CAS, CR, F, HNT, K, MEXU, MO, NY), *1142* (BH, MEXU). Brazil. Rio de Janeiro: Rio Botanical Garden?, *Glaziou 2146* (BR, photo).

Chamaedorea plumosa is quite distinct in its numerous, narrow pinnae arising from the rachis in different planes and directions and giving the leaves a plumose appearance; hence the specific epithet *plumosa*.

In fact, the leaf is not too unlike that of the commonly cultivated *Syagrus romanzoffiana*. Only *C. glaucifolia* and some forms of *C. graminifolia* have numerous, narrow pinnae similar to those of *C. plumosa*. However, the former two species are in a different subgenus (subgenus *Chamaedorea*) and are amply distinct florally, having staminate flowers with the petals connate apically and there adnate to the pistillode and the corolla opening by lateral slits. Also, *C. plumosa* lacks the glaucous indument of *C. glaucifolia* and the cespitose habit of *C. graminifolia*. Neither of the latter two species has pinnae arising from the rachis in the same fashion as those of *C. plumosa*.

Chamaedorea plumosa is actually closest to *C. carchensis*, *C. keeleriorum*, and *C. woodsoniana* but differs dramatically in its numerous, narrow pinnae exiting the rachis in different planes and directions. *C. plumosa* would key out next to *C. woodsoniana* in the key to the species of subgenus *Chamaedoropsis* and next to *C. glaucifolia* in the key to the cultivated species of *Chamaedorea* in Hodel (1992).

Gary Hammer, a plant collector and grower in Los Angeles, introduced *C. plumosa* in the late 1980s. He collected seeds from cultivated plants in Las Rosas, Chiapas but did not see the species in the wild. Local people in Las Rosas told him that the cultivated plants came from a large canyon behind the village. Although I saw immature plants in 1987 that Hammer offered for sale, I assumed they were simply a robust form of *C. glaucifolia*. It was not until February, 1992, that I determined that *C. plumosa* was distinct upon collecting excellent flowering and fruiting material in the garden of Rae Anderson of Sierra Madre, California.

Chamaedorea plumosa is a vigorous, fast-growing, robust plant that appears to have excellent horticultural potential. Rae Anderson has reported that his plants, after only three years in the ground, are more than five meters tall to the tip of the highest leaf and produce six leaves and inflorescences per tree per year. The trunks are now about three meters tall (about a meter of trunk per year once established). The plants tolerate full, hot sun during the middle of the day from 10 AM to 2 PM and withstood sub-freezing temperatures [−10° C (24° F)] with little or no damage in December, 1990.

Miscellaneous Notes

Chamaedorea elegans. *C. elegans*, a highly variable and widely distributed species, has been extensively collected throughout Mexico and Guatemala but, until recently, only on the Atlantic slope. In 1989, I collected several unidentified, pinnate-leaved, juvenile plants of *Chamaedorea* at 1,400 m elevation in oak-pine cloud forest on the Pacific slope of Oaxaca, Mexico. These plants were reestablished in the research collection in Los Angeles and they flowered in 1991. Much to my surprise, an examination of the flowers showed them to be identical with those of *C. elegans*.

It is not unusual for species of *Chamaedorea* to occur on both the Atlantic and Pacific slopes, even in Mexico where the geographic barriers and distances between the two are great. However, it is noteworthy for such a well known and widespread species to escape detection on the Pacific slope until recently. This only recent discovery indicates that the disjunct populations of *C. elegans* on the Pacific slope are isolated and highly localized and/or points out the paucity of collecting in this region. Herbarium specimens, *Hodel 1139* (pistillate) and *1140* (staminate), and flowers preserved in FAA were made from the cultivated material from the Pacific slope of Mexico and deposited at the Bailey Hortorium (BH).

Hybrid in Cultivation. Ingwersen Nursery of Oceanside, California has recently released a new hybrid of *Chamaedorea* with multiple stems. The name given

to the hybrid here is that used by the nursery.

Chamaedorea Hal Moore (*C. hooperiana* × *C. pochutlensis*). Named for the late Harold E. Moore, Jr., this hybrid is a fast and vigorous grower and combines characters of both parents. Ingwersen Nursery had made and marketed another hybrid, *Chamaedorea* Horace Anderson (Hodel 1992), using the same two species as parents as were used for *Chamaedorea* Hal Moore. However, the two hybrids differ slightly since different forms of the highly variable *C. pochutlensis* were used in each hybrid.

Acknowledgments

I thank Dennis Breedlove of the California Academy of Sciences and Gary Hammer of Los Angeles who provided additional information about collection localities in Chiapas, Mexico. Rae Anderson of Sierra Madre and Paul Baylard of Ingwersen Nursery permitted me to collect material at their garden and nursery respectively. I also thank the curators of BH, CAS, F, GH, HNT, and MEXU who lent and/or provided facilities and specimens for study.

LITERATURE CITED

HODEL, D. R. 1992. Chamaedorea palms: the species and their cultivation. The International Palm Society, Lawrence, Kansas.

Principes, 36(4), 1992, pp. 203–216

Current Status of Mexican Palms

HERMILO J. QUERO

Jardin Botanico, Instituto de Biologia, Universidad Nacional Autonoma de Mexico, Apdo Post. 70-614, Mexico, 04510, D.F.

Mexico is a country of approximately 2 million square kilometers. It has one of the world's richest floras due to the great diversity of environmental conditions determined by several factors such as latitude, altitude, and topography, that produce several well defined physiographic regions: Western Sierra Madre, Eastern Sierra Madre, Trans-volcanic Belt, Southern Sierra Madre, High Mexican Plateau, Coastal Plains along both the Pacific and the Gulf of Mexico, and the Lowlands and Plains of the Yucatan Peninsula.

Twenty-two genera of native palms have been recorded from Mexico. It is not possible, however, to give an accurate estimate of the total number of species because some genera are still under revision and there are some nomenclatural and taxonomic problems. It is probable that there are about 100 species in Mexico.

Some of the genera occurring in Mexico are typically Mexican, for all or most of their species are present in Mexico, such as *Brahea*, *Erythea*, *Washingtonia*, and *Sabal*. Some other species are South American, having Mexico as their northernmost distribution limit and being represented there by a few species, as is the case with *Scheelea*, *Orbignya*, *Geonoma*, *Bactris*, and *Acrocomia*. Other genera are mainly Central American, such as *Cryosophila* and *Synechanthus*; while others are typically Antillean, such as *Pseudophoenix*, *Coccothrinax*, *Thrinax*, *Roystonea*, and *Acoelorraphe*, and a few others, such as *Chamaedorea*, have a wide distribution in Tropical America.

Following the classification of Dransfield and Uhl (1986), three of the six subfamilies (Figs. 1–3); six of the 14 tribes, seven of the 36 subtribes, and 22 of the 200 genera for the world occur in Mexico. Each genus is discussed briefly and the ecology of the palms considered in a separate section.

Cryosophila (Fig. 4)

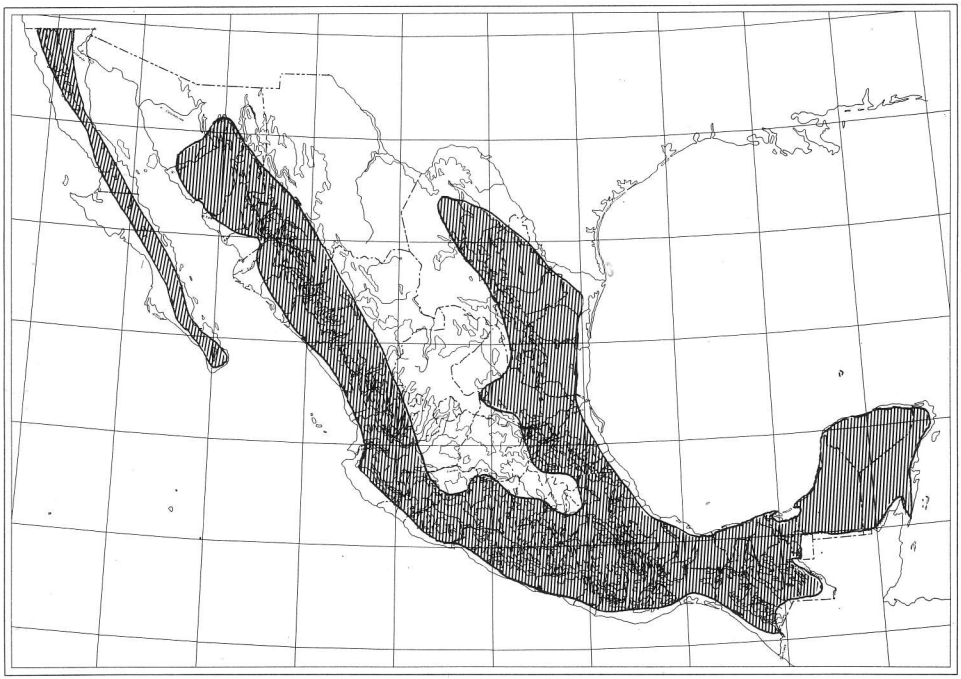
This Central American genus is represented in Mexico by two species: *C. argentea* H. Bartlett and *C. nana* (Kunth) Blume. The former grows in the Yucatan Peninsula and in the states of Tabasco and Chiapas and is an important element of some median evergreen forests. *Cryosophila nana* grows on the Pacific slopes in median evergreen and deciduous forests, as well as in pine-oak forest from Chiapas to Nayarit.

The leaves of both species are used to make brooms.

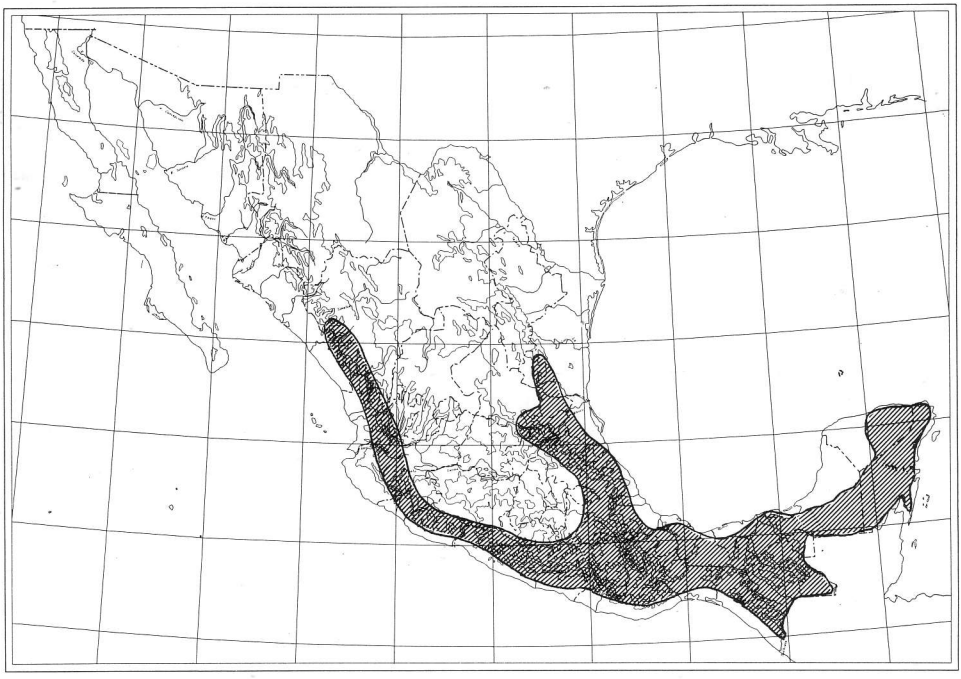
Thrinax (Figs. 5,6)

This Antillean genus has only one species in Mexico: *T. radiata* Lodd. ex J. A. and J. H. Schult., growing only in the Yucatan Peninsula in median evergreen forest of the state of Quintana Roo and in sand dunes forests of Quintana Roo and Yucatan. The former individuals can reach heights of up to 15 m, while in the dunes individuals are no more than 3 m tall.

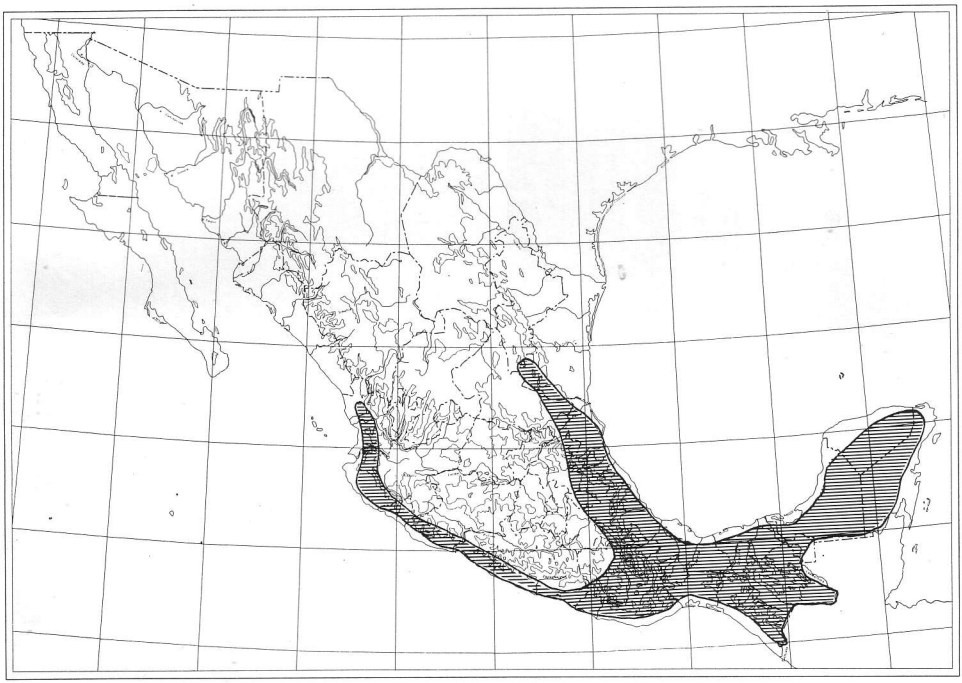
The common name of this species is "chit." Its leaves are used to make brooms and to thatch beach houses, while the trunk is used in the construction of rustic houses and to make lobster traps.



1. Map showing the distribution of subfamily *Coryphoideae* in Mexico.



2. Map showing the distribution of subfamily *Ceroxyloideae* in Mexico.



3. Map showing the distribution of subfamily *Arecoideae* in Mexico.

Coccothrinax (Figs. 6,12,19)

This genus is of Antillean origin, with *C. readii* Quero, the sole species occurring in Mexico and endemic to the Yucatan Peninsula. Curiously, its distribution coincides largely with that of *Thrinax radiata*. *C. readii* mainly grows near the coast, never more than 20 km inland. In the state of Quintana Roo it is found as an important element of the median evergreen forest, where it can attain heights of up to 5 m, and has very thin trunks. It also grows in sand dune vegetation in Quintana Roo and Yucatan, where its trunk is thick and no more than 2 m tall.

The species is known by the common name of "knakas." The trunks are used for making rustic constructions and the leaves to manufacture brooms.

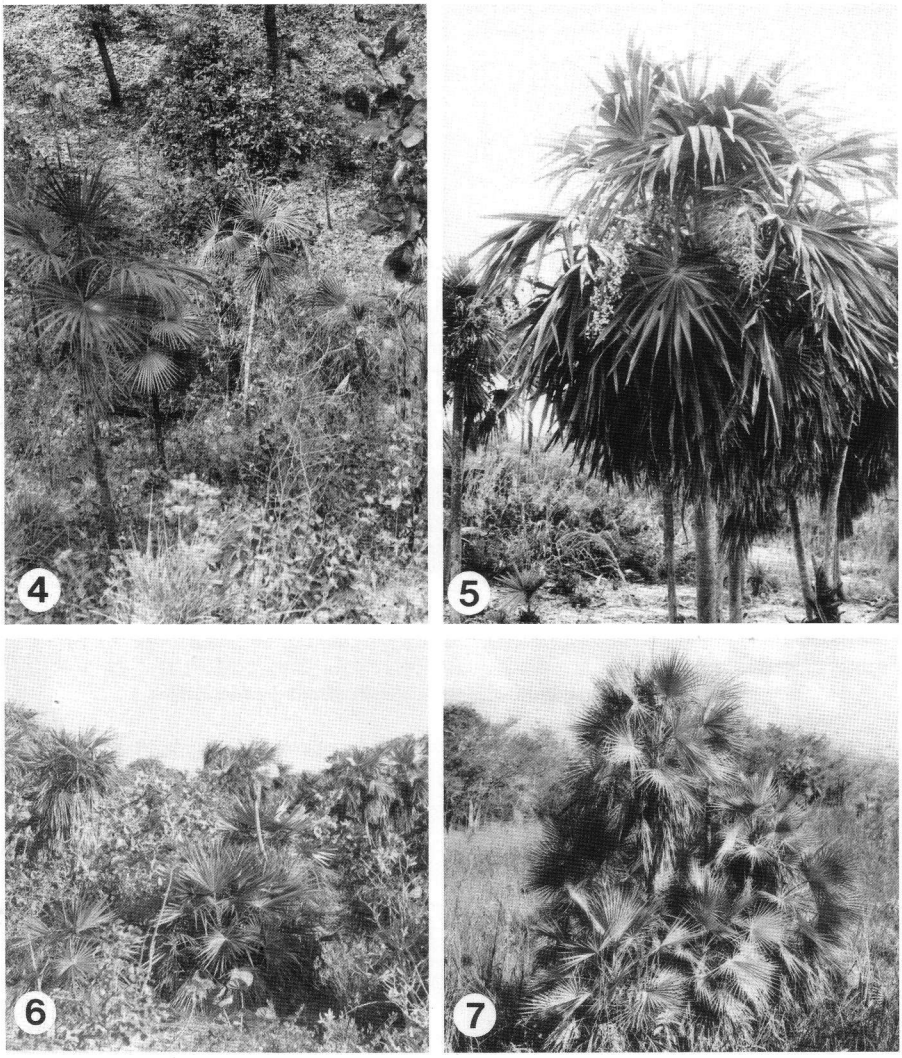
Acoelorraphe (Fig. 7)

A monospecific genus, very abundant in Mexico; *A. wrightii* H. Wendland, grows mainly on terrains flooded with either brackish or fresh water, in the Peninsula of Yucatan and in the states of Tabasco, Chiapas, and Veracruz. This palm grows in clusters. When it grows in soils with abundant water, the individuals are no more than 2 m tall, while in places with good soil and not much water, they can reach up to 4 m.

The common name is "tasiste" and the trunks are used to make rustic houses and fences.

Brahea (Fig. 8)

Typically a Mexican genus, all species growing in Mexico and only *B. dulcis* extending to Guatemala and Honduras. The species are: *Brahea berlandieri* H. Bartlett, in the states of Nuevo Leon, Coahuila, Tamaulipas, and Hidalgo; *B. decumbens* Rzedowski, in San Luis Potosi and Tamaulipas; *B. moorei* L. H. Bailey ex H. E.

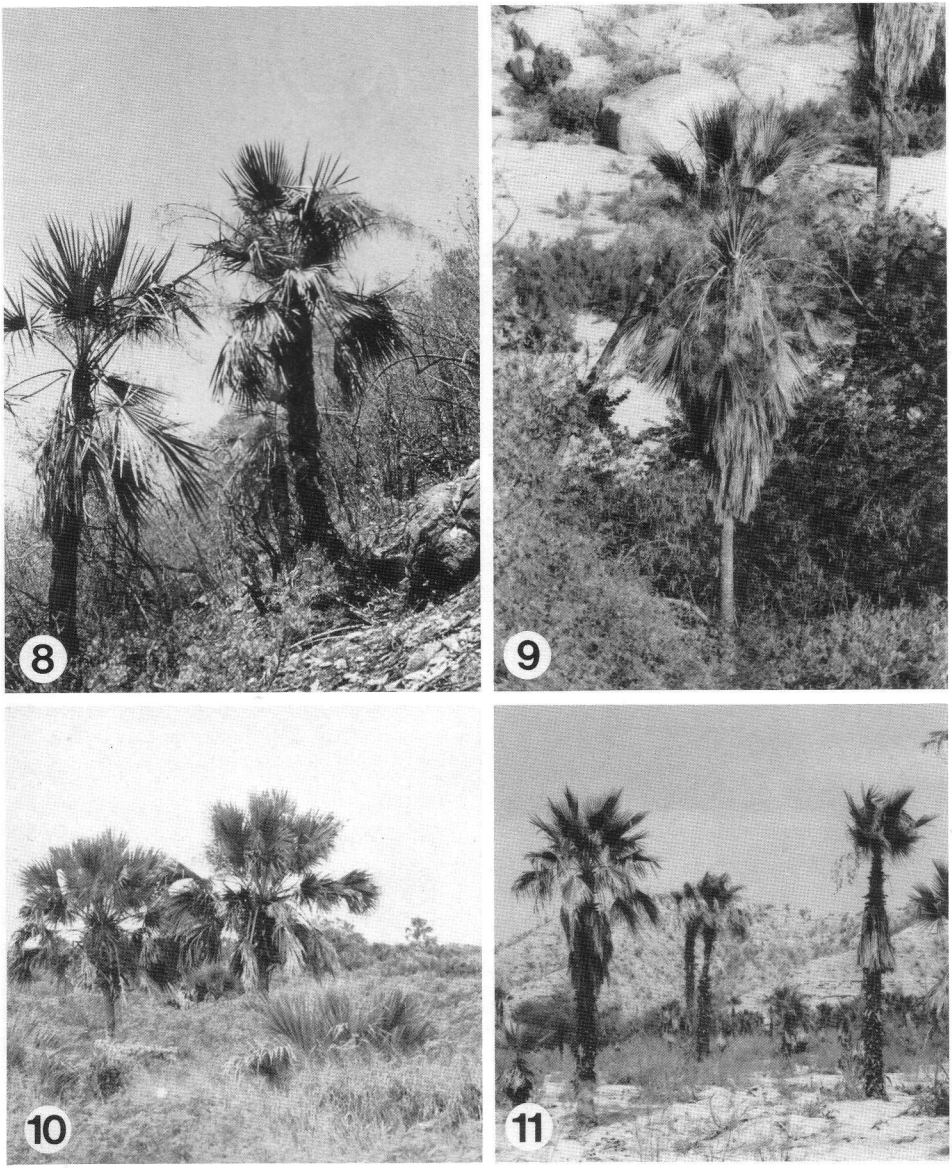


4. *Cryosophila nana* growing in an oak forest of Jalisco. 5. *Thrinax radiata* growing on sands of northern Quintana Roo. 6. Palm grove of *Coccothrinax readii* and *Thrinax radiata* on sand dunes of Yucatan. 7. *Acoelorraphe wrightii* in savannas with terrains flooded of Campeche.

Moore, in Hidalgo, San Luis Potosi and Tamaulipas; *B. nitida* Andre, in Guerrero, Oaxaca, and Chiapas; and *B. dulcis* Martius, the most abundant species with a wide distribution range, from Chiapas to Guerrero on the Pacific slope and to Puebla, Hidalgo, San Luis Potosi, Veracruz, and Tamaulipas on the Gulf of Mexico slope. All the species of this genus grow on limestone soils at elevations of 600–2,000 m.

The leaves of most species are employed for thatching simple houses and to make many kinds of handicrafts such as hats, baskets, fans, etc. The fruits of *B. dulcis* are edible.

I am considering *Brahea* as different from *Erythea* until I finish the study of both genera, including more field explo-

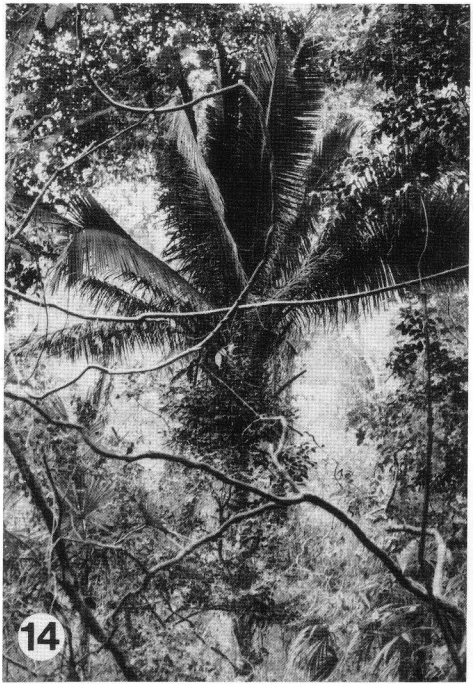


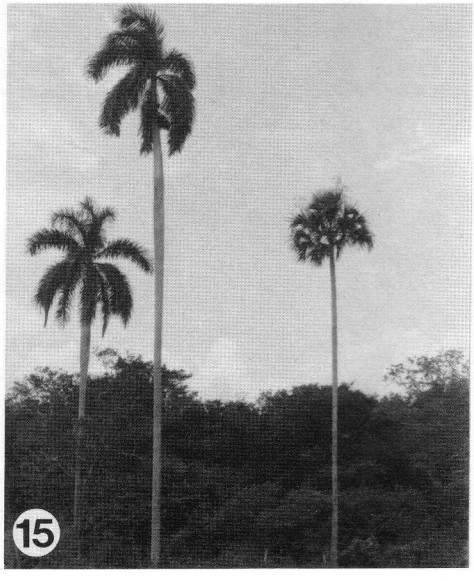
8. *Brahea berlandieri* in disturbed areas of low deciduous forest at Nuevo Leon. 9. *Erythea brandegei* growing near a river bank at Baja California Sur. 10. Secondary palm grove of *Sabal gretheriae* at northern Quintana Roo. 11. *Washingtonia robusta* growing in a dry river bed of Baja California Sur.

ration, as well as chromosome, anatomical, and pollen studies.

Erythea (Fig. 9)

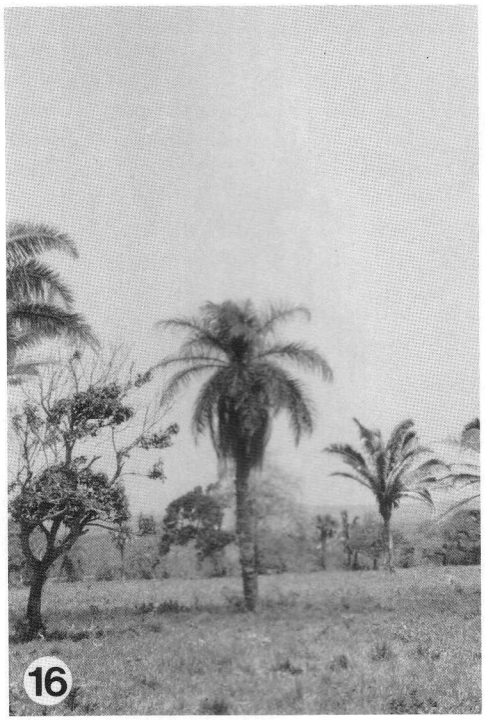
A genus with seven species, all of them occurring in Mexico, with one species extending to Guatemala, Belize, El Salvador, and Honduras. The species are: *Erythea aculeata* T. S. Brandege, in Sinaloa; *E. armata* S. Watson, in Baja California; *E. brandegei* Purpus, in Baja California Sur; *E. clara* L. H. Bailey, in





12. Primary palm grove with *Pseudophoenix sargentii* and *Coccothrinax readii* on sands at northern Yucatan. 13. *Chamaedorea pochutlensis* in a median evergreen forest in Jalisco. 14. *Orbignya guacuyule* growing in a median evergreen forest near Puerto Vallarta, Jalisco. 15. *Roystonea regia* and *Sabal yapa* at northern Yucatan.

Sonora; *E. edulis* (H. A. Wendland) S. Watson, in Isla Guadalupe, Baja California; *E. elegans* ? Franceschi, in Sonora; *E. pimo* (Beccari) H. E. Moore, in Guerrero, Michoacan and State of Mexico; and *E. salvadorensis* (Beccari) H. E. Moore, in Chiapas, Guatemala, Belize, El Salvador, and Honduras. I have found some populations of this genus for which a taxonomic position is not yet clear in Sonora,



16. *Acrocomia mexicana* and *Scheelea liebmannii* in a grassland of Tabasco. 17. *Geonoma oxycarpa* growing in a high evergreen forest of Veracruz. *Astrocaryum mexicanum* in the background.

Sinaloa, and Jalisco. The species of this genus always grow on soils derived from igneous rocks, never in limestone soils as does *Brahea*; the range of *Erythea* is mostly on the northwest Pacific slope.

The leaves of these palms are used for thatching rustic houses and to make some typical handicrafts.

Washingtonia (Fig. 11)

A genus with two species: *Washingtonia filifera* (Linden) H. Wendland and *W. robusta* H. Wendland, both occurring in Mexico; the former grows in Baja California, while the latter occurs in Baja California, Baja California Sur, and Sonora.

Washingtonia robusta is the most widely cultivated ornamental palm in Mexico. It can be found from warm areas at sea level in the Yucatan Peninsula, to high and cool places such as Mexico City.

Sabal (Figs. 10,19)

A genus with about 16 species, seven of them occurring in Mexico. They are: *Sabal mauritiiformis* (Karsten) Grisebach & H. Wendland, occurring in the states of Quintana Roo, Campeche, Tabasco, Chiapas, Oaxaca, and Veracruz; *S. pumos* (Kunth) Burret, in Michoacan; *S. rosei* (O. F. Cook) Beccari, in Guerrero, Jalisco, and Nayarit; *S. uresana* Trelease, in Sonora, and Chihuahua; *S. yapa* Wright, in the Yucatan Peninsula; *S. mexicana* Martius, which is the most widely widespread species, from Campeche to Tamaulipas in the coastal plains of the Gulf of Mexico and, from Chiapas to Guerrero along the Pacific slopes, from sea level to 2,000 m; and *S. gretheriae* Quero, a new species recently described from Quintana Roo.

Sabal dugessii S. Watson ex L. H. Bailey, was described from one cultivated

18. *Bactris balanoidea* growing in terrains flooded at Tabasco. 19. Rustic house built with trunks of *Coccothrinax readii* and thatched with leaves of *Sabal yapa* at Quintana Roo.

individual from Rincon de Bustos, a small town in the state of Guanajuato. This individual is more than 20 m tall and is still growing near a river bank. Zona (1990) considers this species and *S. pumos* as conspecific.

Sabal is one of the most economically important genera of palms in Mexico, mainly for rural people, who use it in different ways. The leaves are used for thatching. Residents of hot humid climates know by experience that roofs made with these palms are superior to those made with any other natural material. Young leaves are used to make different kinds of handicrafts; trunks are used for construction and as poles. *S. mexicana* is also used as a source of edible palm hearts ("palmito") and the fruits are used as supplementary food for pigs.

Pseudophoenix (Fig. 12)

A genus represented in Mexico by one species, *Pseudophoenix sargentii* H. Wendland ex Sargent, which as other members of the genus, is typically an Antillean insular species. Mexico is the only place where this palm grows on continental land. Its distribution is restricted to the Yucatan Peninsula. In northern Yucatan it is very abundant on sand dunes, while in Quintana Roo it occurs as an important element of some median and low forests but is not as abundant as in the dunes.

It is interesting to mention that in southern Quintana Roo, this palm was found growing 30 km inland, the farthest inland record known within its range.

Its common name is "kukA" and it is much appreciated as an ornamental in parks and gardens.

Synechanthus

A palm represented in Mexico by *Synechanthus fibrosus* (H. Wendland) H. Wendland (syn. *S. mexicanus* H. E. Moore). There are very few Mexican collections of this palm, which grows as understory element in high evergreen forest in restricted areas of the states of Oaxaca, Veracruz and Chiapas.

This palm is usually acaulescent.

Gaussia

Gaussia is represented in Mexico by *G. maya* (O. F. Cook) Quero & R. W. Read and *G. gomez-pompae* (Quero) Quero, the former occurring in southern Quintana Roo near the boundary with Belize and Guatemala, while the latter occurs in the states of Oaxaca and Tabasco. *Opsiandra* O. F. Cook has been shown to be congeneric with *Gaussia* (Quero and Read 1986).

The two species are important elements of high and median evergreen forests, where they reach more than 15 m tall, always growing on limestone-derived soils very similar to the Cuban "mogotes."

Chamaedorea (Fig. 13)

This is the genus with more species in Mexico than any other; more than 40 species have been reported. However, it is not possible to establish the exact number, because there are species only known from old descriptions and type specimens and not yet found again, and some species known from Guatemala have now been found in Mexico. Others species have been described recently, and finally the taxonomic position of some species is not clear. Thus far, I have found 35 of the following 51 species reported for Mexico: *Ch. affinis* Liebmann, *Ch. alternans* H. Wendland, *Ch. arenbergiana* H. Wendland, *Ch. atrovirens* Martius, *Ch. cataractarum* Martius, *Ch. concolor* Martius, *Ch. elatior* Martius, *Ch. elegans* Martius, *Ch. ernesti-augusti* H. Wendland, *Ch. erumpens* H. E. Moore, *Ch. ferruginea* H. E. Moore, *Ch. foveata* D. R. Hodel, *Ch. fractiflexa* D. R. Hodel & J. J. Castillo, *Ch. geonomiformis* H. Wendland, *Ch. glaucifolia* H. Wendland, *Ch. humilis* Martius, *Ch. karwinskyana* H. Wendland, *Ch. klotzschiana* H. Wendland, *Ch. lepidota* H.

Wendland, *Ch. liebmannii* Martius, *Ch. lindeniana* H. Wendland, *Ch. martiana* H. Wendland, *Ch. metallica* (O. F. Cook) H. E. Moore, *Ch. microspadix* Burret, *Ch. monostachys* Burret, *Ch. montana* Liebmann, *Ch. neurochlamys* Burret, *Ch. nubium* Standley & Steyermark, *Ch. oblongata* Martius, *Ch. oreophila* Martius, *Ch. paradoxa* H. Wendland, *Ch. parvisecta* Burret, *Ch. pochutlensis* Liebmann, *Ch. pulchra* Burret, *Ch. queroana* D. R. Hodel, *Ch. radicalis* Martius, *Ch. rhizomatosa* D. R. Hodel, *Ch. rigida* H. Wendland, *Ch. rojasiana* Standley & Steyermark, *Ch. sartorii* Liebmann, *Ch. scandens* Liebmann, *Ch. schiedeana* Martius, *Ch. schippii* Burret, *Ch. seifrizii* Burret, *Ch. simplex* Burret, *Ch. stolonifera* H. Wendland, *Ch. tenella* H. Wendland, *Ch. tepejilote* Liebmann, *Ch. tuerckheimii* (Dammer) Burret, *Ch. vistae* D. R. Hodel & N. Uhl, *Ch. whitelockiana* D. R. Hodel & N. Uhl.

Most of the species occur in shaded places, in high or median evergreen forests, or in cloud forests and oak forests. They are much appreciated as ornamentals and the leaves of some species have decorative uses.

Reinhardtia

A genus with two species in Mexico: *Reinhardtia elegans* Liebmann, occurring in small areas of Oaxaca and Chiapas and, *R. gracilis*. The latter has two varieties, *R. gracilis* (H. Wendland) Drude ex Dammer var. *gracilior* (Burret) H. E. Moore, which occurs in Veracruz, Oaxaca, Tabasco, and Chiapas and, *R. gracilis* (H. Wendland) Drude ex Dammer var. *tenuissima* H. E. Moore, that occurs in Oaxaca.

These palms are understory elements of high and median evergreen forests.

Roystonea (Fig. 15)

In Mexico *Roystonea* is cultivated in almost all the tropical areas. In the wild, I have found two species, *Roystonea regia* (Kunth) O. F. Cook, in a small region at the north of the state of Yucatan, and *R. dunlapiana* in the southern Quintana Roo, Campeche, Tabasco, Chiapas, and Veracruz.

Both species grow on flooded soils. The common names are "palma real" and "yaqua." They are much appreciated as ornamentals.

Scheelea (Fig. 16)

Apparently three species occur in Mexico. *Scheelea liebmannii* Beccari has a broad distribution range in the Gulf of Mexico slope from Tamaulipas to Campeche and *S. preusii* Burret appears in a small area of the state of Chiapas. There are some reports of *S. lundellii* H. Bartlett, in Chiapas near the Guatemalan border, but I have not been able to find it.

The species of this genus, mainly *S. liebmannii*, form secondary rather dense palmetto groves on clay areas which are subject to periodic flooding. The fruits are used to make cookies and the leaves for thatching rustic houses. The common names are "palma real," "corozo" and "manaca."

Orbignya (Fig. 14)

This South American genus is represented in Mexico by two species, *Orbignya cohune* (Martius) Dahlgren ex Standley, in Tabasco, Chiapas, and Quintana Roo and, *O. guacuyule* (Liebmann ex Martius) Hernandez-X., on the Pacific slope from Chiapas to Nayarit. Whether *O. guacuyule* is distinct is dubious because it is very similar to *O. cohune*. There are only small differences in the flowers.

Both species occur in high or median evergreen forests, but sometimes form very dense secondary groves. The common name for both is "corozo."

Acrocomia (Fig. 16)

Acrocomia mexicana Karwinsky ex Martius, is the only species of this genus

growing in Mexico. Its populations are not very abundant, but it is widely distributed, mainly in hot-humid regions, occurring always in secondary vegetation. It benefits from human disturbance, mainly by fire. Some authors consider this species synonymous with *Acrocomia sclerocarpa* Martius.

The fruits are used to make candy and as a popular medicine. It is called "coyol" and "cocoyol."

Bactris (Fig. 18)

This South American genus with more than 230 species, is poorly represented in Mexico. Five species have been recorded, but I have found only two: *B. balanoidea* H. Wendland and *B. mexicana* Martius. Both of these grow on flooded soils, on river banks, in ravines or, in very humid soils of tropical regions from Veracruz to the Peninsula of Yucatan.

The stems of these palms are used to make baskets and rustic furniture; the fruits are edible. They are commonly known as "jahuacte."

Desmoncus

This climbing, prickly palm is represented in Mexico apparently by two species: *Desmoncus quasillarius* H. Bartlett in the Peninsula of Yucatan and Tabasco and *D. chinantlensis* Martius, in Oaxaca, Chiapas, and Veracruz. They occur typically in secondary vegetation derived from high or median evergreen forests.

The stems are used to manufacture baskets and rustic furniture. They have the common name of "bayal."

Astrocaryum (Fig. 17)

Astrocaryum mexicanum Liebmann ex Martius is the only species of the genus growing in Mexico. It is very abundant in the tropics, mainly in Chiapas, Tabasco, Oaxaca, and Veracruz, being an important element in the middle story of some high and median evergreen forest.

It is known as "chocho" and "chichon."

Geonoma (Fig. 17)

Several species of this genus have been reported from Mexico however, according to Wessels Boer (1968), only two species occur, *Geonoma oxycarpa* Martius and *G. interrupta* (Ruiz & Pavon) Martius. The former is widely distributed in the states of Veracruz, Tabasco, Oaxaca, and Chiapas, while *G. interrupta* grows only in a small area of Chiapas.

These palms grow in high and median evergreen forest.

Calyptrogyne

A genus represented in Mexico by only one species, *C. ghiesbreghtiana* (Linden & H. Wendland) H. Wendland, which grows in a restricted area of the state of Chiapas in median evergreen forest.

The Ecology of Mexican Palms

The Mexican palms occur at many different altitudes and latitudes, most at sea level or at low altitudes. However, a few species grow at higher levels, for instance *Brahea nitida*, which reaches 2,000 m in pine-oak forests, and *Sabal mexicana* which can grow near 2,000 m in oak forest. Although most palms are found in tropical regions, some species extend beyond the tropics, and reach 32 degrees North latitude on the Pacific slope, as *Washingtonia filifera* and *Erythea* spp., while on the coast of the Gulf of Mexico, *Brahea berlandieri* and *Sabal mexicana* occur up to 28 degrees.

Palms can be important elements of diverse vegetation types. They can also be found as almost pure associations known as "palmares," which in some cases can be of primary origin or may be secondarily derived due to human activities. In both cases the distribution of the "palmares" is almost always in discontinuous stands of variable extension.

An interesting example of a palm association is found in the Yucatan Peninsula, where *Coccothrinax readii* and/or *Thrinax radiata* are abundant in the mid-stratum of median semi-evergreen forests along the Caribbean coast in the state of Quintana Roo. *Cryosophila argentea* is another important element in the physiognomy of high and median evergreen forests of southern Quintana Roo and Campeche. *Gaussia* spp. are important in high evergreen forests, *G. maya* in south Quintana Roo and *G. gomez-pompae* in Oaxaca and Tabasco. *Astrocaryum mexicanum* is very abundant in the median stratum of high evergreen or semi-evergreen forests of different regions of Veracruz, Tabasco, Oaxaca, and Chiapas.

Some palms such as *Sabal* spp., *Scheelea* spp., and *Orbignya* spp., can be important elements of primary associations, mainly evergreen forests, but they can also constitute secondary associations. An interesting case is *Sabal* spp., when growing in undisturbed forests, where the individuals are generally acaulescent, with large leaves; but when the forests are destroyed, mainly by fire in order to make grasslands for cattle, the individuals can reach large sizes and constitute very dense secondary palm groves.

Other palms occur in several different kinds of primary vegetation, but are not important in the physiognomy of the association. The genera are: *Chamaedorea*, *Bactris*, *Reinhardtia*, *Geonoma*, *Calyptrogyne*, and *Synechanthus*. Some species of these palms are small individuals which occur in the lower stratum of different kinds of tropical rain forests, mainly high and evergreen forests, such as cloud and pine-oak forests.

Among the "palmares" as a primary association occurring in Mexico, we can mention those of the Peninsula of Yucatan which grow on sand dunes, where the vegetation can be dominated by one to three species of palms. On the north coast of the state of Yucatan exists a palm grove composed of *Pseudophoenix sargentii*, *Thrinax radiata*, and *Coccothrinax readii*, but in some cases the individuals of the last two genera are the main elements of the association as in the northeast Yucatan and along the coast of Quintana Roo. It is interesting to note that *Thrinax radiata* forms an almost pure stand along the eastern coast of Cozumel island.

Another primary palm community is that formed of *Acoelorraphe wrightii*, which is very abundant in savannas that are periodically flooded either by brackish or fresh water in the Yucatan Peninsula, Tabasco, Chiapas, and South Veracruz. The individuals of this species sometimes constitute dense groups resembling small islands in the savanna and they are resistant to the periodical fires of the areas.

Primary palm groves are also found in northwestern Mexico, those of *Washingtonia filifera* in Baja California and *W. robusta* in Baja California Sur, Baja California, and Sonora; *Erythea* spp., in Baja California and Sonora, and *Washingtonia robusta*, *Erythea clara*, and *Sabal uresana* in Sonora. These "palmares" constitute isolated stands growing on wet soils or in ravines.

Among "secondary palm groves," mainly due to human disturbance, those of *Brahea*, *Orbignya*, *Scheelea*, and *Sabal* are noteworthy.

Brahea dulcis is the most abundant species of the genus and is widely distributed. As all species of the genus, it is always found on limestone soils, at elevations over 800 m and forming almost pure associations in disturbed areas. Other species forming important associations are: *Brahea nitida* in Guerrero, Oaxaca, and Chiapas, which is almost always associated with disturbed pine-oak forests, and *Brahea decumbens* in San Luis Potosi, also appearing in disturbed pine-oak forests.

Orbignya also benefits from human disturbance; *Orbignya cohune* is found in almost pure stands when the natural vegetation has been felled; it grows on deep

and well drained soils in southern Quintana Roo. The same happens with *Orbignya guacuyule* on the Pacific coast from Oaxaca to Nayarit, it forms discontinuous stands and is most abundant in Colima, Jalisco, and Nayarit. Unfortunately the latter "palmares" are being replaced by coconut palms in some places.

Scheelea is similar to *Orbignya*; its species as those of the latter, constitute very extended palm groves mainly of *S. liebmannii*. It is very abundant along the Gulf of Mexico coast, in loamy soils, that can be flooded during part of the year. This palm grows from South Tamaulipas to southwestern Campeche. *Scheelea preussii* does not form extensive palmettos, but only grows in a reduced area of Chiapas.

Acrocomia mexicana is the typical palm of areas disturbed by man, mainly by fire, to establish grazing lands for cattle or for agriculture. It is a species with a large distribution range in several habitats; but does not form dense palmettos.

The species of *Desmoncus* are typical of disturbed areas of the rain forest, but they do not form true palmettos. They are very abundant in south and southeast Mexico.

Present Status of Mexican Palms

The natural populations of some palms have decreased; however, other populations are increasing, but the former situation is the commoner.

The disappearance or depletion of palm populations has occurred due to external rather than internal conditions, mainly because of the activities of man directly overexploiting the populations, or by the destruction or alteration of the natural habitats where the palms grow, so that some species are now vulnerable, threatened, or endangered.

Among the genera whose populations have increased, are *Brahea*, *Scheelea*, *Orbignya*, *Sabal*, and *Acrocomia* in secondary palm groves.

As an example of depleted natural palm populations caused by direct exploitation by man is *Pseudophoenix sargentii*, in the Yucatan Peninsula. This species has been used as an ornamental. Twelve years ago, it was cultivated only in parks and gardens of small towns near its natural population; but at the present time it is possible to find it cultivated in bigger towns and cities very far from its natural population, as in the states of Campeche and Tabasco. Horticulturists do not propagate this palm because of its slow growth. They usually remove adult individuals from natural populations, and as a result this species is now threatened.

Other examples of palm populations decreasing, either by direct exploitation or indirectly by destruction of natural habitats are, *Coccothrinax readii* and *Thrinax radiata*, both growing in the Peninsula of Yucatan. The trunks of the former are used to make fences and build rustic houses, as well as cottages or tourist constructions, or as ornamentals in large hotels. On the other hand, *Thrinax radiata* is used to build rustic buildings. Its trunks are used to make lobster traps and the leaves for thatching and to make brooms, so there is an overexploitation of the natural populations. Furthermore, the natural vegetation where these palms grow, has been cleared in order to open new lands for tourism development. Both species are now seriously threatened.

Something similar occurs with many species of *Chamaedorea*, mainly those appreciated as ornamentals. In some cases the whole plants are massively collected; in other cases, the seeds are overcollected for export or to be cultivated, altering the natural regeneration of new individuals. The leaves of other species have been overcollected in order to export them for ornamental use; as in the case of *Chamaedorea elegans*, *C. neurochlamys*, *C. seifrizii* and *C. oblongata*. The leaf exploitation has been so intensive that many individuals have become depauperate and do not pro-

duce enough seeds to insure the regeneration of natural populations.

The rapid forest clearing in Mexico is evident. Many natural palm populations have been lost because the palms cannot grow on cleared lands and agricultural areas, grasslands, and new urbanized centers. This is the case of *Gaussia maya* and *G. gomez-pompae*, *Cryosophila argentea*, *Chamaedorea* spp., *Calyptrogyne ghiesbreghtiana*, *Geonoma* spp., *Reinhardtia* spp., *Synechanthus fibrosus*, *Bactris mexicana*, *Roystonea regia*, *Brahea moorei*, etc.

In my travels over most of Mexico, I have noticed that, with the exception of some introduced palms like *Cocos nucifera*, *Phoenix dactylifera* and *Elaeis guineensis*, and other ornamentals, there are no plantations of palms in Mexico. Some useful palms are favored but not cultivated, such as: *Brahea* spp., *Roystonea dunlapiana*, *Sabal* spp., *Acrocomia mexicana*, *Cryosophila nana*, and *Scheelea liebmannii*.

Many universities, research centers and government institutions have realized these conservation problems and created biological reserves in different parts of the country. It is necessary to establish policies governing the commercial trade in palms and increase palm cultivation in different parts of Mexico and to avoid the destructive use of natural palm populations.

If we do not make corrective decisions, not only in Mexico but throughout all of the world, we will know many palms only through their descriptions or through herbarium specimens. Others we will never know.

Acknowledgments

I wish to express my appreciation to Dr. Fernando Chiang, for critically reviewing and offering helpful suggestions on the manuscript.

LITERATURE CITED

DRANSFIELD, J. AND N. W. UHL. 1986. An outline of a classification of palms. Principes 30(1): 3–11.

QUERO, H. J. AND R. W. READ. 1986. A revision of the palm genus *Gaussia* H. Wendland. Syst. Bot. 11(1): 145–154.

WESSELS BOER, J. G. 1968. The geonomoid palms. Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 58: 1–202.

ZONA, S. 1990. A monograph of *Sabal* (Arecaceae: Coryphoideae). Aliso 12: 583–666.

Principes, 36(4), 1992, pp. 217–222

Lethal Yellowing Susceptibility of Date Palms in Florida

F. W. HOWARD

University of Florida, Fort Lauderdale Research & Education Center, 3205 College Avenue, Fort Lauderdale, FL 33314 USA

ABSTRACT

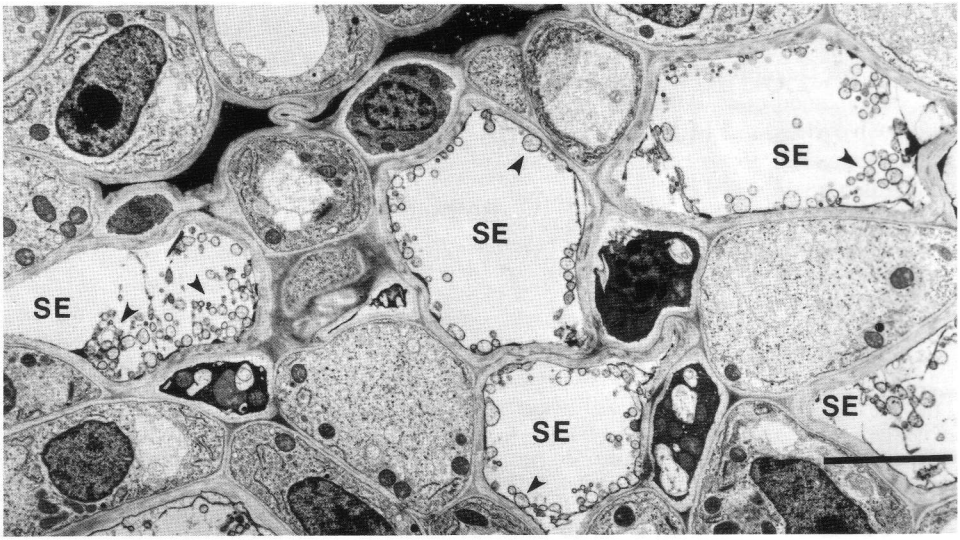
The true date palm, *Phoenix dactylifera*, as well as *P. canariensis*, *P. reclinata*, *P. rupicola*, and *P. sylvestris* have been reported to be susceptible to lethal yellowing (LY) in Florida. Field estimates, but not experimental data, indicating differences in the degrees of susceptibility of *Phoenix* spp. to LY are available and these are assumed to be imprecise because of inherent biases in field observations and uncertain genetics of date palm species in Florida. In a preliminary field trial of cultivars of the true date palm, 94.1% of the palms eventually developed symptoms of LY. However, because 'Halawy' date palms survived longer than individuals of other cultivars, this cultivar is being tested again. Evidence is presented that when true date palms contract LY, the lateral shoots may survive and grow into mature palms.

Lethal yellowing (LY) has been known in parts of the West Indies since the 1800s as a highly destructive disease of coconut palms (*Cocos nucifera* L.). When LY invaded the Florida mainland in the early 1970s, another aspect of the disease began to reveal itself—that LY affects many species of palms in addition to coconut. More than 30 species of palms thus far have been shown to be susceptible. That this became apparent first in Florida, rather than in one of the countries of the West Indies, was probably due to the relatively high incidence of exotic palms planted throughout the urban areas of southeastern Florida.

The list of LY-susceptible species was critical to the work of regulatory agencies charged with the responsibility of curtailing the spread of LY. There was an obvious need to restrict or otherwise regulate the movement of species on the list to areas outside of the quarantine area. Of greater interest to palm growers was the degree of susceptibility of different species and varieties. For example, although the coconut palm is a susceptible species, Malayan dwarf varieties are relatively resistant. The risk of losing a Malayan dwarf coconut palm to lethal yellowing is low enough that green, golden and yellow Malayan dwarf varieties can be recommended for planting in an area affected by LY.

The long-range objective of present research on LY is to develop an integrated pest management scheme involving various components, such as environmentally compatible control of the vectors of the disease, therapy of affected trees by more effective antibiotics than those now available, the use of palms with natural resistance to the disease, and possibly genetically engineered resistant palms.

The use of naturally resistant palm species and varieties is presently the most effective means known for preventing loss of palms to LY, and will probably be the most important component of any integrated pest management method available in the foreseeable future. This has generated a need for data on the relative susceptibility of different species and varieties of palms. The acquisition of such data is difficult. Mycoplasmalike organisms (MLO) are apparently the causal agents of LY. There is no known method of artificially inoculating plants with MLOs. Thus, for



1. Electron micrograph of a sieve tube element from a young leaf base of a date palm infected with mycoplasmalike organisms (arrows). Line = 10 μm.

several decades researchers have tested coconut palms for LY resistance by planting them with a known susceptible species as experimental controls in fields where the palms could be expected to become exposed to the disease (Harries 1973). Since the dynamics of the disease are independent of the experimenter, the period of time that must be allotted for a resistance trial of a variety is unpredictable. Generally it has taken years for results to be obtained from such trial gardens, and even then many questions have remained concerning possible differences in results if the same palm varieties had been grown under different conditions than those of the trial garden. This problem has been partially addressed by planting more than one trial garden. The feasibility of testing small containerized palms by exposing them to insect vectors collected in LY-affected areas was demonstrated (Howard et al. 1984). However, this method was overly labor-intensive. In summary, given present technology, testing palms for LY resistance or susceptibility is extremely demanding of resources.

An alternative method has been to base susceptibility ratings on observations in nonexperimental plantings that have been affected by LY. For example, the 'Jamaica Tall' coconut palm and Manila palm (*Veitchia merrillii* [Becc.] H. E. Moore) were among the most commonly planted palms in the Miami area prior to the epidemic of the 1970s. Observations by researchers and plant protection personnel indicated that, while many Manila palms were lost to the disease, a higher portion of the 'Jamaica Tall' coconut palms were lost, and thus the latter was considered to be the more susceptible. Observations of LY susceptibilities of different palm species in Fairchild Tropical Garden (FTG) were quite consistent with those made in the broader urban areas of southern Florida. Such field observations were useful for developing qualitative estimates of susceptibilities of different palm species without waiting for a trial garden to grow up and become naturally exposed to LY. The flaw in this method is that landscape plantings and botanical gardens were not designed to serve as disease trial gardens. The spe-

cies to be compared are unlikely to be of comparable age, growing under comparable conditions, etc. Nevertheless, in the absence of experimental data, the method is of some value as an imprecise indicator of comparative risk associated with the planting of different species (Howard et al. 1979).

One of the many kinds of palms grown as ornamentals in southern Florida and known to be susceptible to LY is the date palm, *Phoenix dactylifera* L. Like coconut and oil palms, the date palm is of great economic importance in various parts of the world. Thus, we took special interest in the susceptibility to LY of this species and its close relatives. In addition to the true date palm, species of *Phoenix* which have found a place in the landscape of southern Florida include the Canary Island date palm (*Phoenix canariensis* Hort. ex Chabaud), Senegal date palm (*Phoenix reclinata* Jacq.), miniature date palm (*Phoenix roebelenii* O'Brien), cliff date palm (*Phoenix rupicola* T. Anders.) and silver date palm (*Phoenix sylvestris* Roxb.).

LY is not known to affect miniature date palms. Because this palm is very common in southern Florida, we consider that its resistance to LY has been adequately "tested." Senegal date palm is also fairly common. LY was positively diagnosed in one specimen which had phenotypical characteristics of the Senegal date palm but was thought to be possibly a hybrid. We have no other evidence that this species is susceptible.

The cliff date palm and silver date palm have been shown to be susceptible to lethal yellowing. They are relatively uncommon in Florida outside of private and public palm collections.

The Canary Island date palm is commonly grown throughout the Florida peninsula and elsewhere along the coast of the Gulf of Mexico. In some areas of southern Florida, a high percentage of these died from LY during the epidemic of the 1970s and early 1980s, while in other areas of the same region this species was unaffected by the disease. Palms of this species were eliminated from areas of southern Texas by an LY epidemic (McCoy et al. 1980*a*, *b*). McCoy et al. (1983) rated Canary Island date palm as "moderately susceptible" to LY. This rating was based on combined estimates of three LY researchers who had conducted field observations independently during the period of the epidemic.

The true date palm, which was less common in Florida than the Canary Island date palm, was rated by McCoy et al. (1983) as "highly susceptible." More recently, Broschat and Meerow (1991) rated the true date palm as "slightly susceptible" and the Canary Island date palm as "moderately susceptible." These discrepancies are not surprising, when it is considered that different observers made their assessments on different sites and at different time periods.

The uncertainties of the genetics of *Phoenix* species in Florida further confuse the picture. It is well-known that species of *Phoenix* hybridize readily when grown in the same vicinity (Corner 1966), as is the case in Florida. The palms commonly known as Canary Island date palms in Florida often have characteristics, such as a blue-glaucous leaf color and a sympodial (clustering) habit, which may indicate that they are hybrids with true date palms and possibly additional *Phoenix* species. True date palms are less common in Florida than Canary Island date palms, and traditionally have been grown from seeds. Most are probably hybrids between date palm cultivars, if not hybrids of two *Phoenix* spp. Thus, in Florida, field estimates of LY susceptibility of particular species of *Phoenix*, are probably more accurately described as estimates of susceptibility of species and offtypes (i.e., hybrids) of the species, and are apt to be quite variable among plantings of palms grown from different seed sources.

The true date palm is a sympodial palm. For centuries, true date palms have been propagated vegetatively from offshoots, which are young secondary shoots. This

2. The author's daughter, Andrea, indicates one of the 'Halawy' date palms that survived the LY test conducted 1979–1985 at the Fort Lauderdale Research and Education Center.

has maintained the genetic integrity of many cultivars of date palm in North Africa and the Middle East. Eight cultivars, all originally introduced from the latter regions, are of commercial importance in California.

A preliminary test of lethal yellowing resistance of five of the most important

cultivars grown in California was attempted at the Fort Lauderdale research and Education Center from 1979 to 1985. Offshoots shipped from California were planted in a field with coconut palms and other susceptible species, many of which were infected with LY. Some offshoots did not survive the first year due to transplant failure. To simplify observations for LY symptoms, the date palms that were successfully established were maintained as single stem palms by pruning their offshoots periodically. The palms were examined frequently and those with LY symptoms were felled and the bud tissue sampled and examined with an electron microscope for the presence of MLOs.

All of the 12 date palms that developed LY symptoms were found to have MLOs present in the phloem, a verification that they were infected with this disease. Palms that remained free of LY symptoms as of May 1985 included the single 'Medjool' date palm that had survived transplanting and one of three 'Deglet Noor', one of six 'Zahidi', and four of six 'Halawy' date palms. Only one palm of the fifth cultivar, 'Thoory', became established from an offshoot, and this was eliminated by LY. These results were reported earlier (Howard et al. 1985).

Following the publication of these results, by the end of the next growing season, *viz.* in November 1985, the remaining 'Deglet Noor' and 'Zahidi' palms had succumbed to LY, while the four remaining 'Halawy' palms were unaffected. The final results, then, were as follows:

Cultivar	Palms Exposed to LY (Survived Transplanting)	Percent Lost to LY
Deglet Noor	3	100
Zahidi	6	100
Thoory	1	100
Medjool	1	0
Halawy	6	33.3

There was a total of 17 date palms exposed to LY in this test, 70.6% of which succumbed to LY. Thus, discounting possible differences between cultivars, the true date palm could be considered as highly susceptible to LY under the conditions of this experiment, an observation in agreement with the estimate of McCoy et al. (1983). Because of the small numbers of palms of each cultivar tested, these results did not show conclusively any differences in susceptibility to lethal yellowing among these cultivars, although a sufficient percentage of 'Halawy' palms survived to warrant further testing.

Because of proposed widening of a road at the perimeter of our research center, in November 1985 we established another experimental area where we planted young coconut palms and transplanted the four surviving 'Halawy' palms and sole surviving 'Medjool' palm. During the next year, the main stems of the four 'Halawy' palms died with LY symptoms. If these results are pooled with those presented above, 94.1% of the 17 date palms contracted LY.

Interestingly, the lateral shoots of three of the four 'Halawy' palms survived. As of September 1992, these are alive and have produced their own offshoots. The survival of the lateral shoots after the death of the main stem of a date palm affected by LY has been noticed on other occasions in southern Florida, and raises interesting questions about the ability of MLO to move through the vascular connection between the main stem and lateral shoots (cf. Tomlinson 1990).

Although eventually 100% of the 'Halawy' palms contracted LY, four of them survived longer than palms of any of the other cultivars tested, and only showed LY symptoms after having been transplanted. The possible effect of transplanting on LY susceptibility or symptom expression is not known. To further test the 'Halawy' as a possibly resistant cultivar, we are presently conducting observations on a planting of

11 'Halawy' palms and 12 'Zahidi' planted from offshoots in March 1988. The incidence of LY in the vicinity of the research center has declined during the past two years, and none of these date palms has thus far developed LY symptoms. Although the single 'Medjool' palm has survived until the present, we do not feel that this constitutes convincing evidence that the variety is resistant to lethal yellowing. We are interested in obtaining sufficient material to test this cultivar.

Our cumulative observations indicate thus far that the true date palm, when considered as a species, is highly susceptible to LY, at least under some conditions, while under some conditions the risk of a palm contracting LY might be minimal. The conditions that affect susceptibility await elucidation. Given this uncertainty, date-growing countries should take every precaution to prevent the introduction of this disease. The work also indicates the possibility, now under further investigation, that there are varietal differences in this species to LY susceptibility. Given present technology and resources, only a few of these are likely to be tested in the foreseeable future.

Acknowledgments

I thank Mr. Jim DeFilippis for field assistance and Ms. Donna Williams for electron microscopy and Figure 2, and Drs. Alan Meerow and Nigel Harrison for critical review of the manuscript. This is Florida Agricultural Experiment Station Journal Series No. R-02019.

LITERATURE CITED

BROSCHAT, T. K. AND A. W. MEEROW. 1991. Guide to Florida landscape plants. Betrock Information Systems, Inc., Ft. Lauderdale, 428 pp.

CORNER, E. J. H. 1966. The natural history of palms. Weidenfeld & Nicolson, London, 303 pp.

HARRIES, H. C. 1973. Selection and breeding of coconuts for resistance to diseases such as lethal yellowing. Oleagineux 28(8–9): 395–398.

HOWARD, F. W., R. ATILANO, AND D. WILLIAMS. 1985. Experimental establishment of five date palm cultivars in southern Florida. Date Palm J. 4: 91–102.

———, F. W., D. L. THOMAS, H. M. DONSELMAN AND M. E. COLLINS 1979. Susceptibilities of palm species to mycoplasma like organism-associated diseases in Florida. FAO Plant Prot. Bull. 27:109–117.

———, F. W., D. S. WILLIAMS, AND R. C. NORRIS. 1984. Insect transmission of lethal yellowing to young palms. Internat. J. Entomol. 26: 331–338.

MCCOY, R. E., F. W. HOWARD, J. H. TSAI, H. M. DONSELMAN, D. L. THOMAS, H. G. BASHAM, R. A. ATILANO, F. M. ESKAFI, LIZBETH BRITT, AND MARY COLLINS. 1983. Lethal yellowing of palms. University of Florida, IFAS, Bulletin 834.

MCCOY, R. E., M. E. MILLER, AND D. S. WILLIAMS. 1980a. Lethal yellowing in Texas *Phoenix* palms. Principes 24: 179–180.

MCCOY, R. E., M. E. MILLER, D. L. THOMAS, AND J. AMADOR. 1980b. Lethal decline of Phoenix palms in Texas associated with mycoplasmalike organisms. Plant Dis. 64: 1038–1039.

TOMLINSON, P. B. 1990. The structural biology of palms. Clarendon Press, Oxford, 477 pp.

FLORIDA TREES AND PALMS (L. and B. Maxwell, 30 palm species, 120 pp.) 6.00
GENERA PALMARUM (N. W. Uhl and J. Dransfield, 1987, 610 pp.) 79.00
HARVEST OF THE PALM (J. J. Fox, 1977, 244 pp.) 24.00
INDEX TO PRINCIPES (Vols. 1–20, 1956–1976, H. E. Moore, Jr., 68 pp.) 4.00
KEY GUIDE TO AUSTRALIAN PALMS (L. Cronin, 1989, 180 pp., 85 pp. color) 21.00
MAJOR TRENDS OF EVOLUTION IN PALMS (H. E. Moore, Jr., N. W. Uhl, 1982, 69 pp.) 6.00
OIL PALMS AND OTHER OILSEEDS OF THE AMAZON (C. Pesce, 1941, translated and edited by D. Johnson, 1985, 199 pp.) 24.95
PALEM INDONESIA (in Indonesian) (Sastraprdja, Mogea, Sangat, Afriastini, 1978. 52 illustrations, 120 pp. For English translation add $2.00) 5.50
PALMAS DEL DEPARTMENTO DE ANTIOQUIA (Palms of Colombia, in Spanish; G. Galearno and R. Bernal, 1987, 207 pp.) 18.95
PALMERAS DE BOLIVIA, (in Spanish, H. Balslev and M. Moraes, 1989, 107 pp.) 12.95
***PALMIERS, POUR LES CLIMATS TEMPERES** (in French, A. Moinie, 1991, 157 pp.) 45.00
PALMS AND CYCADS AROUND THE WORLD (J. Krempin, 1990, 267 pp., 267 pp. color) 45.00
PALMS OF THE WORLD (Formerly **PALMS,** A. Blombery & T. Rodd, 1982, 192 pp., 212 color photographs) 34.95
PALMS IN AUSTRALIA (David Jones, 1984, 278 pp., over 200 color photographs) 30.00
PALMS IN COLOUR (David Jones, 1985, 93 pp.) 8.95
PALMS OF THE LESSER ANTILLES (R. W. Read, 1979, 48 pp.) 8.00
PALMS OF THE NORTHERN TERRITORY (AUSTRALIA) (A. White, 1988, 41 pp., 21 photographs, some color) 5.95
PALMS FOR THE HOME AND GARDEN (L. Stewart, 1981, 72 pp., some color) 19.95
PALM SAGO (K. Ruddle, D. Johnson, P. K. Townsend, J. D. Rees, 1978, 190 pp.) 10.00
***PALMS OF THE SOLOMON ISLANDS** (G. Dennis, C. McQueen, J. Dove & J. Birch, 1989, 60 pp., 10 pp. color; 30 black and white photos & map.) 8.00
PALMS OF THE SOUTH-WEST PACIFIC (J. L. Dowe, 1989, 198 pp., 33 pp. color) 29.95
PALMS OF SUBEQUATORIAL QUEENSLAND (Robert Tucker, 1988, 91 pp., 12 pp. color, many black and white photographs and maps) 20.00
SECRET OF THE ORIENT DWARF RHAPIS EXCELSA (L. McKamey, 1983, 51 pp.) 3.95
THE GENUS PTYCHOSPERMA LABILL. (F. B. Essig, 1978, 61 pp.) 6.50
THE INDIGENOUS PALMS OF NEW CALEDONIA (H. E. Moore, Jr., N. W. Uhl, 1984, 88 pp.) 12.00
THE STRUCTURAL BIOLOGY OF PALMS (P. B. Tomlinson, 1990, 477 pp.) 99.95
TROPICA (A. Graf, 7000 color photos, 1138 pp.) 165.00
TROPICALS (G. Courtright, 1988, 153 pp., Color Pictorial sourcebook & descriptions, 12 pp. of palms) 34.95
TROPICAL RAINFOREST (A. Newman, 1990, 241 pp., World survey of endangered habitats, all color.) 45.00

PALM PAPERS (Postage Included)

A NEW PRITCHARDIA FROM KAUA'I, HAWAI'I (Reprint from *Principes*, R. W. Read, 1988, 4 pp.) 2.00
FURTHER INFORMATION ON HARDY PALMS (J. Popenoe, 1973, 4 pp.) 2.00
NOTES ON PRITCHARDIA IN HAWAII (D. Hodel, 1980, 16 pp.) 2.50
RARE PALMS IN ARGENTINA (reprint from *Principes*, E. J. Pingitore, 1982, 9 pp., 5 beautiful drawings) 2.75
PALMS FOR SOUTHERN CALIFORNIA (Trish Reynoso, 1990, 11 pp.) 3.00
PALMS FOR TEXAS LANDSCAPES (R. Dewers & T. Keeter, 1972, 3 pp.) 1.25
PINANGA ISSUE OF PACSOA (#16, 1987, 17 pp.) 2.50
***RHAPIS PALMS: CULTIVATED SPECIES AND VARIETIES, CULTURE AND CARE OF THE LADIES** (Reprint from Principes, L. McKamey, 1989, 11 pp.) 2.00
THE HARDIEST PALMS (J. Popenoe, 1973, 4 pp.) 2.00

* New arrival

The palm books listed above may be ordered at the prices indicated plus $2.50 extra per book to cover packaging and postage. (California residents please add 7.25% sales tax.) Foreign checks must be in U.S. dollars and payable on a USA bank. In some countries it is possible to send International Money Orders through the Post Office. No VISA cards. Please include your International Palm Society membership number. Send check payable to The International Palm Society to Pauleen Sullivan, 3616 Mound Avenue, Ventura, CA 93003, U.S.A. ALL SALES FINAL.

NEWS OF THE SOCIETY

International Symposium: "Palms in Tropical Rain Forests" September 18–24, 1991

Iquitos, Peru, an ocean port on the Amazon River, located 3,630 kilometers from the Atlantic, was the site of a unique palm symposium, "Palms in Tropical Rain Forests", convening from September 18–24 at the Hotel Amazonas in that city.

Organized under the auspices of the French Scientific Research Institute for Cooperation and Development (ORSTROM), through its Representative in Peru, Dr. Francis Kahn and Ing. Roger Beuzeville Z., President of the Peruvian Amazon Research Institute (IIAP), fifty-one participants, mostly from the international education and botanical community, attended the week long conference in this tropical setting. Some eleven countries were represented: Austria, Colombia, Costa Rica, Denmark, France, French Guiana, Mexico, Peru, Sri Lanka, U.K., and U.S.A. Although originally there was some hesitation prior to the conference to travel to Peru because of a reported outbreak of cholera, the rumors proved to be unfounded, and the conference was well attended. Fifteen members of the I.P.S. were present.

The program of the meeting was divided into three days of lectures and presentation of papers, followed by three days of field trips up the Peruvian Amazon to the reaches of the Lower Ucayali River. Papers were presented by their individual authors in English or Spanish. Relevant demonstration materials, slides, and diagrams were used throughout. Presentation-lectures were separated by topic into six sessions:

1. Systematics, Evolution, Adaptation of Palms (4 papers)
2. Palm Flora (5 papers)
3. Growth Strategy, Demography, and Population Structures of Specific Palms (4 papers)
4. Palm Phenology (1 paper)
5. Palms and Fauna (4 papers)
6. Palms, Forest Management, and Economy (3 papers)

(Titles of individual papers will be published as "Proceedings.")

In addition, four conferences (seminars) were conducted:

1. Palms of the Guianas
2. Worldwide Palm Conservation
3. Palms of the Forested Ecosystems of Amazona
4. Palms in the Forests of Asia and Madagascar.

While the Hotel Amazonas proved an idyllic location for meetings, many attendees took advantage of the chance to get to know the city of Iquitos, its restaurants, its extraordinary marketplace, and zoo. Located on the Amazon headwaters, Iquitos was once a flourishing city catering to the early 19th century natural rubber trade. Today it retains a musty aura of former and better times.

Iquitos was also the starting point of organized field trips upstream. Boarding the ship M/V Rio Amazonas, built in 1897, we were 30 passengers with a crew of 17, including two river pilots and two Peruvian tourist police. Beginning our cruise up the Amazon into the Ucayali River at night without channel markers or navigational aids, we realized just how important the pilots were, as in this, the dry season, shifting sand bars were a continual problem. If our trip had been in the rainy season (March or April) the river level would have been as much as 13 meters higher. All along its banks, we could see steep cliffs where the river had fallen since April. Nevertheless, we were snug and comfortable on board with air conditioned cabins, bar, library, restaurant, and even outdoor hammocks in which to doze. Eventually, at a distant village, we moored and began hiking to see Amazonian palms in their native habitats. Using the ship as sleeping and eating quarters, we took daily excursions,

by outboard motor craft or on foot to palm locations known to the organizers.

The timing of the conference was well planned during the dry season, otherwise it would have been impossible to pass through many of the roads and trails leading to various palm habitats. With the assistance of knowledgeable local guides who on many occasions virtually hacked their way with machetes through the jungle, we saw many palms which otherwise would have been difficult to locate. Among the many palms seen, the following are the more significant: *Astrocaryum aculeatum*, *A. jauari*, *A. microcalyx*, *Chamaedorea pauciflora*, *Bactris killippii*, *B. simplicifrons*, *Chelyocarpus repens*, *Desmoncus polyacanthos*, *Elaeis oleifera*, *Euterpe oleracea*, *E. precatoria*, *Geonoma spixiana*, *G. acaulis*, *Iriartea deltoidea*, *Lepidocaryum tessmannii*, *Mauritia flexuosa*, *Mauritiella peruviana*, *Oenocarpus bataua*, *Orbignya polystycha*, *Phytelephas macrocarpa*, *Pholidostachys synanthera*, and *Wettinia augusta*.

Of particular interest was a visit to the Peruvian Amazon Research Institute (IIAP) where continuous tropical research is undertaken in the fields of forestry, agriculture, stock breeding, and fisheries. At the village of Jenaro Herrera, IIAP also maintains a meteorological station, herbarium, arboretum, and seed storage chambers.

On one excursion we viewed how thatched roofs of local houses are being made with palms. Using cross braces made of *Wettinia augusta*, we watched while an experienced roofer folded pre-cut fronds of *Lepidocaryum tessmannii*, and tied them into place as overlapping sections of thatch. Each crossbeam supports 200 leaf fronds, which even after weathering reportedly retains its water resistance and lasts 8–10 years before replacement.

On another visit to a typical village home, we watched while a group of ladies weaved *Astrocaryum chambira* into twine, and then from twine into baskets and shopping bags—a home handicraft from which they made a living. Many in our group also took advantage of a night excursion by small boats up the tributaries of the river to see alligators and listen to the jungle's many nocturnal sounds. They were not disappointed.

BILL POSTON

Principes, 36(4), 1992, pp. 225–227

Fairchild Tropical Garden Hit by Hurricane Andrew

October 6, 1992

Dear Natalie:

One month after Hurricane Andrew slammed into South Florida on August 24, 1992, we can see much progress in the restoration of the Fairchild Tropical Garden and I'm pleased to report many specimens and samples have been taken that will be grist for scientific mills for years to come. And while we have an enormous task before us, spirits remain high and our resolve stronger than ever to rebuild the Fairchild Tropical Garden into the premier tropical botanical garden that it can and should be.

From the very beginning, we were determined that this would not simply be a "clean-up operation"; it was seen as an opportunity to bring the Garden to a new level horticulturally while at the same time

retrieving as much scientific data as we could from the collection. Ex-situ collections were on trial here and in the face of a calamity of such enormous proportions Andrew had also brought through these garden gates a substantial opportunity to educate the public to the nature and value of botanical gardens. What we are experiencing here could and should be viewed as a metaphor for the wholesale destruction that is going on in tropical forests throughout the world. It was clear to me that our approach to the monumental task before us had to cut decisively to the educational and scientific goals of the Garden.

We are still estimating between 60 and 70 percent of the collection damaged or destroyed, although because of the redundancy we are anticipating something less than a five percent loss in terms of species diversity in palms (about 700 taxa represented by about 5,500 individuals). Approximately 300 palms have now been put back upright and of those that have fallen, we have collected herbarium specimens, wood and root specimens for anatomical studies and our colleagues from NYBG have collected about 300 bulk samples for screening by the National Cancer Institute and a pharmaceutical firm. Similarly in the dicots, 60 to 70 percent of the collection was damaged or destroyed. Again, the species diversity will remain high because of the redundancy in the collection, less than three percent total loss. The cycads proved their durability and we are anticipating minimal losses, although they're now a little more character laden than before.

Actually the full extent of the damage will not be known for some time. We do not know how many apical meristems of palms have been injured and they will only reveal the extent of their injury slowly. Nor can we know how many of those plants we've put back upright will remain upright and continue to grow. But at least the palms now have a fighting chance and they've been treated with fungicide and there is a new flush of growth out there from which we can propagate again. But more importantly, there is a determined spirit that has followed in the wake of Andrew.

I look across the lawn from my office to a ravaged landscape in the process of healing. The trunks of *Phoenix reclinata* are broken, bent and strewn in bundles like so many "pick-up-sticks." But the structure of the landscape with its live oaks, and a skyline punctured by palms is still intact, and in this lush sub-tropical climate, we can expect that the visual beauty of the Garden will return within a couple of years. And now that the initial shock of it all has subsided somewhat, we are planning the new garden and even more determined to correct past mistakes. The rebuilding of the botanical collection of course will take time. But here again, a stronger sense of purpose pervades the Garden's curators and gardeners and I'm convinced that within five to ten years the Fairchild Tropical Garden will have an even more priceless collection of palms for both research and teaching purposes.

Approximately 100 horticulturists and professional gardeners from 20 institutions throughout this country have come to our aid and contributed their expertise and time to the restoration of the collection. More than 20 scientists from 12 institutions have answered the call and collected hundreds of samples for further study. Almost 500 volunteers have donated their time since the hurricane struck. The Garden staff have been on a seven day work week with staggered days off in order for us to open the Garden to the public on October 3.

Governor Lawton Chiles visited the Garden on September 24 and we showed him the pile of logs that we are milling in preparation for a major auction of tropical wood on October 31. I mentioned our plans to make this wood available to artists to contribute a work of fine art or craft that would become part of a permanent exhibition that we would make available as a

traveling exhibit. We are determined that these trees upon which so much loving care has been lavished over the years will not have fallen unheard in this paradise garden; these trees are now entering their second life or in the words of Jack Fisher, "their tertiary growth forms."

While the *Phoenix reclinata* continues to recline, we know that this *Phoenix* too will rise again. With so much good will and assistance we are managing to harvest a wind named Andrew and we can all believe there will be a new flowering of the Fairchild Garden. It is my most urgent hope and fervent prayer that in the wake of hurricane Andrew the art of the landscape Garden and the botanical sciences will resonate in a new harmony that will truly lead this wonderful place to become the Premier Tropical Botanical Garden.

All contributions to the Restoration Fund will be gratefully received.

Sincerely,

WILLIAM MCK. KLEIN, JR.
Director

Principes, 36(4), 1992, 227–228

Bill Gunther 1920–1992

The International Palm Society recently lost a longtime friend and supporter with the passage of William (Bill) Gunther, who died of cancer at his home in Del Mar, California. As a life member and former director of the IPS, Bill was active in affairs of the organization worldwide. As a resident of California, he played a vital role in the early development and guidance of both the southern and the northern California chapters. And on an international scale, from Costa Rica to Canada, his philanthropic work with palms was known by many and will be missed by all.

Bill Gunther was born in the Seattle area and moved to California at an early age. He enjoyed growing irises and later, true geraniums. These experiences formed the basis for his future interest in tropical plants. Gifted with a talent for melody, Bill became proficient on several instruments, with a special fondness for the cello. After graduating from the University of California at Berkeley, he traveled much of the world as a career U.S. Navy officer. While stationed in South America during World War II, he became interested in tropical flora, particularly the palms. "We were living next to the jungle, with no town around. Nothing to do. I would look around for some sort of distraction. And I kept seeing palms." Soon container palms began appearing in his quarters. The palms took center stage, while the musical instruments took a back seat. As Bill later explained, "Where I was living, cellos rotted, while palms grew well. It seemed like the right hobby."

He took the hobby with him after leaving the Navy and moving to the San Diego, California, suburb of Del Mar. Bill developed an outstanding garden on the grounds of his Spanish-styled hacienda. He terraced much of the property, using large rocks which he personally hauled north from Baja California, Mexico. He landscaped the property with palms, collecting a great number of species at a time when unusual palms in California were extremely difficult to acquire. Today, most of the palms Bill planted are mature. The many *Rhopalostylis* and *Archontophoenix* specimens, together with the dozens of *Chamaedorea* and *Brahea* species, stand and wave in silent splendor, facing the Pacific Ocean.

A gentle and humble soul, Bill shunned the publicity which often necessarily accompanies the promotion of palms. He preferred to work behind the scenes, like

a film producer: networking, coordinating, and often personally funding projects which furthered the Society's primary goal of dissemination of palm knowledge. His energy level was incredible, his enthusiasm contagious. Volunteering for countless assignments, he always delighted in spreading the word on palms. It became almost like a crusade.

During his work in the Navy, and later in state and county civil service positions, Bill refined his skills as a writer and journalist. He authored a number of articles for *Principes* and *San Diego Home and Garden*. He spent many years organizing and editing the western United States' earliest palm periodical: a typed, mimeographed bulletin called *Western Chapter Newsletter*, which has evolved over the past 25 years into the *Palm Journal*, an excellent palm periodical which primarily serves western America.

Bill lobbied hard for a more balanced mixture of material in *Principes*. He reasoned that by appealing to a greater variety of palm lovers, the overall support for the Society would increase. He was right. Bill supported a large number of projects involving the planting of palms in public gardens, including the world-famous San Diego Zoo. "It needs to be done," he would say. "Palms need to be seen and they need to be protected. We can enjoy them now, but who will enjoy them later if they're gone?" Conservation and preservation were high on his list of priorities, as is evidenced by his work with Quail Botanical Gardens near San Diego and Isla Guadalupe in Mexico. His contributions towards the publication of several fine and well-known palm books are largely unknown but deeply appreciated. And his political skills were a key factor in the selection of southern California as the location for the 1986 biennial. He truly loved palms.

Bill Gunther passed away on Palm Sunday, 1992.

MIKE VITKIEVICZ

Principes, 36(4), 1992, 228–229

James L. Degen, Long-Time Palm Society Member

James L. Degen, a long-time member of the International Palm Society and recently retired professor of ornamental horticulture at California State Polytechnic University at Pomona, died March 22, 1992 after a lengthy battle with cancer. Jim, as he was known affectionately by his numerous friends and students, taught at Cal Poly for nearly 33 years and his students have made successful careers in every segment of the horticulture industry in California and elsewhere.

A loyal member of the International Palm Society for over 25 years, Jim was especially fond of palms and companion plants such as cycads. Among the many courses that he taught at Cal Poly was one about subtropical plant material which included identification, growth habits, and cultural needs of nearly 200 species of palms and cycads suitable for the landscape in Southern California. Jim extended his enthusiasm for palms to his students by taking them to local Palm Society meetings, nurseries, and botanic gardens and arboreta which specialized in palms, cycads, and other tropical plant material. Many of these students became faithful members of the Palm Society.

During my first year of college at Cal Poly in 1971, I was one such student with whom Jim shared his enthusiasm while taking his class in palms and subtropicals. I remember distinctly Jim pointing to a fine specimen of *Brahea edulis* in full fruit during one of our on-campus walking labs to view plant material. He gave the name of this magnificent plant, and while

explaining fully its growth habit and uses, struck an undiscovered emotional nerve in me, awakening a latent affinity I had for the remarkable family of palms. So I owe it to Jim for introducing me to palms which have become a major component of my career and studies in horticulture.

During my college years Jim and I made numerous trips to San Diego and Santa Barbara to visit nurseries specializing in palms. I remember returning from many memorable all-day trips to these areas and the car trunk bulging with palms and cycads for our gardens. More recently, I had the pleasure of enjoying Jim's companionship when he accompanied me on trips to Florida and Costa Rica during the course of my work on *Chamaedorea*. In particular I recall an afternoon deep in the palm-rich lowland Pacific rain forest on the Osa Peninsula in Costa Rica. Jim had wandered down a trail and was staring in fascinated wonderment at the wide array of palms so close at hand, including *Asterogyne*, *Geonoma* spp., *Socratea*, *Bactris* spp., *Welfia*, *Neonicholsonia*. *Astrocaryum*, *Scheelea*, *Synechanthus*, *Cryosophila*, and *Chamaedorea*. With a sweeping gesture while looking straight ahead into the palms, Jim muttered, apparently to himself, "I have died and gone to heaven."

Jim is survived by his wife Cherie, his mother, three sisters, and a brother. Memorial contributions to the Jim Degen Scholarship Fund may be sent to Dr. Kent Kurtz, Ornamental Horticulture Dept., Cal Poly, Pomona, CA 91768.

DONALD R. HODEL

Principes, 36(4), 1992, 229–234

CHAPTER NEWS AND EVENTS

We Appreciate the News! Keep it Coming!

Jim Cain of the IPS Chapter Committee would like to express appreciation to the many Palm Societies and IPS chapters throughout the world that are regularly contributing their newsletters or journals to him. With limited exceptions, these local chapter publications form the collective source for the Chapter News section in each issue of *Principes*. Although such news is not always timely, it nonetheless lets all IPS members worldwide know what activities individual active groups are undertaking and hopefully provides the entire readership with some measure of appreciation for the local involvement of the various societies. In addition, groups may get productive ideas from reading about the activities of others.

If your group isn't participating in this program, you are urgently encouraged to do so. To the large majority who do contribute, "Thanks again" for making my job that much easier!

JIM CAIN
IPS Chapter Committee

Sydney (Australia) Chapter News

The group met at the Maiden Theater, Royal Botanic Gardens, Sydney, on Tuesday, September 15 at 7:00 p.m. Judy Marley from Marley's Ferns made a presentation on landscaping with ferns and their use with palms. Judy not only sells ferns at her nursery but also grows plants from spore that she has collected. Particularly interesting were ferns from Lord Howe Island. A number of ferns were available at the meeting.

The previous meeting had featured an informative slide show by Lynette Stewart on materials for her forthcoming book. The

usual palm auction was follows by the raffle drawing. A nice specimen of *Pritchardia hillebrandii* was won by Nola Carr.

Mackay (P.A.C.S.O.A.) Activities

The Mackay Palm and Cycad Society (PACSOM) of P.A.C.S.O.A. July meeting at the Sarina home of Percy and Val Simonsen was attended by 21 members and 7 guests. At the suggestion of Gary Marsh, the group agreed to purchase at least two *Lepidorrhachis moorei* palms from the government agency at Lord Howe Island for the Farleigh Plot. The returns of outstanding library loans were requested. Many handsome plants were awarded during the plant competition. These included *Livistona humilis*, *L. saribus*, *L. rigida*, *L. woodfordii*, *L.* 'Cape York', *L. rotundifolia*, *Arenga undulatifolia*, *A. porphyrocarpa*, *A. pinnata*, *Syagrus sancona*, *Coccothrinax dussiana*, *Calamus* sp. N. G., *Caryota no*, *C. urens*, *C. griffitti* [sic], *C. mitis*, *C. maxima*, and *C. cumingii*. Luncheon on the grounds followed the competition. The plantings look better than expected considering the drought. Nonetheless, progress can be seen. The windmill plot is 8 years old and has a large *Brahea armata* and a very large *Neodypsis decaryi* near flowering and a quite handsome *Schippia concolor* along with *Arenga*, *Phoenix*, *Ptychosperma*, *Chrysalidocarpus* and *Archontophoenix* spp. Nearby is an area of planting 2 years old. All together, the palms total many hundreds. A comprehensive list of "palms to date as of July 31, 1992" in the Farleigh Plot (PACSOM Palmetum) was printed in the PACSOM in their September/October 1992 newsletter (No. 28). Interested parties should contact Ross Willis or Margaret Brown (or Jim Cain in the USA).

PACSOM met in August at the Eimeo home of Russ and Robyn King, attended by 22 members and 2 guests. The four *Lepidorrhachis moorei* purchased following the July meeting arrived in great shape, each 5 years old and really handsome. Three are plotted at various locations in Farleigh Plot, with the fourth held in reserve for a Christmas meeting prize. Purchase approval for a number of rare palms from Bill Beattie (a Freshwater supplier) for Farley Plot was approved. These included *Neodyspis ceraceus*, *N. tsaratananensis*, *Pinanga celebeica*, *Ravenea madagascariensis*, *Dypsis* sp. ? *apperol* and a *Neophologa* species. Members can't wait to see these plants, rather than just their names on a list. Some palm and cycad seeds were distributed and a palm guessing competition was held. A tea party and walk around the boundary rounded out the meeting. Times continue dry with restricted watering, but Ross and Robyn continue to improve their planting area.

At the September meeting PACSOM visited "Decaryi Nursery" (Sharon Berryman) at Cathu on September 20, 1992. This nursery has been established for 3 years and there are 11,000 palms in the ground. The meeting was followed by a stop at the nearby Cathu State Forest picnic area for lunch.

On October 25, the PACSOM group met at the home of Stella and Neville Davey in Septimus for General Meeting and luncheon afterwards. That afternoon the group visited the Finch Hatton Gorge National Park.

News from Southern California

On Saturday, July 25, the Southern California Chapter toured two mature gardens in the San Diego area. The meeting started at the home of Bill and Amelia Clark. Their garden showcased mature specimens of many species. Most notable were the large *Roystonea regia*, *Brahea decumbens*, *Howea belmoreana*, many *Chrysalidocarpus* species, *Sabal mauritiformis*, *Neodypsis decaryi*, *N. baroni*, multiple *Chamaedorea* species, *Coccothrinax* species, and *Trithrinax acanthacoma*.

The afternoon continued at the dramatic gardens of Ski and Peggy Torzeski. With the consent of multiple neighbors on his cul de sac, Ski has managed to turn the whole block into a palm paradise. A recently added *Jubaea chilensis* welcomes visitors to his street. The neighborhood abounds with *Phoenix reclinata*, *Livistona australis*, *Acoelorraphe wrightii*, *Neodypsis decaryi*, *N. lastelliana*, *Chamaerops humilis*, and many other species. Ski's garden highlights *Hyphaene indica*, *Acoelorraphe wrightii*, *Phoenix reclinata*, huge *Chamaerops humilis*, *Vonitra* sp. and many others. Behind the house is a large enclosed solarium with tropical palms and a rainforest environment seldom accomplished by one individual. The meeting was attended by approximately 150 people and ended with a successful raffle and auction.

The September 19, 1992 meeting was held at Ventura College. The meeting began at 8:00 a.m. with a plant sale hosted by Friends of the Ventura College Palm Garden. This was followed by a Chapter Directors' meeting at 10:00 a.m. and the open chapter meeting at noon. Separate meetings rooms were set aside to focus on: rare and unusual palms; seed germination; and cold tolerance. Several mystery palms were set up in one room as an identification contest. Pauleen Sullivan opened one of her properties for a tour, featuring some awesome landscaped specimens.

The November *FIX* meeting of the Southern California chapter will be a public meeting held at the Huntington Botanical Gardens in San Marino, beginning at 1:00 p.m. sharp, in Friends Hall. Two speakers will be featured. First, Loren Whitelock will talk about "Diversity in the World of Cycads," featuring excellent slides of cycads in cultivation and in habitat. The second speaker will be Brad Carter of cycads in cultivation and in habitat. The second speaker will be Brad Carter of the UC Irvine Arboretum. His talk will be a slide travelogue titled "A Botanical Adventure to Robinson Crusoe Island." It should be a very interesting program on the island 400 miles west of Chile. This is the only native home of the palm, *Juania australis*. Immediately after the talks will be a raffle and auction.

Louisiana and Gulf Coast Chapter News

The Louisiana and Gulf Coast Chapters of the International Palm Society held a joint meeting on October 18, hosted at the home of Maxwell Stewart, President of the Gulf Coast Chapter and a Director of the IPS. Maxwell's home at 2557 West Road lies on the west side of Mobile and contains extensive palm plantings. Lunch was served at 12:30 p.m. Maxwell offered several arborescent *Serenoa repens*, 6 to 10 feet tall, which he had transplanted into containers.

The Gulf Coast Chapter's 1992 Summer meeting was held in Panama City, Florida on Sunday, July 12. The festivities began with a luncheon at 12 noon. The main highlight of the meeting was a visit to the multi-headed *Butia capitata* near the meeting site. An auction was held following the meeting.

The Louisiana Chapter's previous meeting was held on August 16 at "The Palms," Danny Braud's residence on Pratt Drive. There were 51 members and guests present. Danny provided a splendid setting and a bountiful lunch. Nature provided an unusually cool day. A lively auction followed the meeting—with 11 palms auctioned, netting the chapter $180. At that meeting Maxwell Stewart requested that anyone with extra tropical palms bring them to the meeting at his place and he would carry them to Miami for donation to the Miami Metro Zoo project of the South Florida Chapter of the IPS. These will be particularly appreciated in the aftermath of Hurricane Andrew.

Central Florida Chapter News

The Central Florida Palm Society (CFPS) Chapter met for a summer meeting on August 9 in Cocoa, Florida, hosted by Bernie Peterson and Rockledge Gardens. Bernie's collection was a real treat to see featuring everything from *Allagoptera* to *Zombia*. The plants were labeled with name, date planted, and source of plant. This was a very nice touch indeed. Bernie gave a guided tour of his collection after an hour or so of free roaming time. Bernie offered a gift to members of *Xanthorrhoea preissi*, an Australian grass-like trunked plant somewhat resembling a palm. *Sabal rosei* seedlings were also available from Bernie. An estimated 50 members attended.

Next the group broke for lunch before heading to Rockledge Garden Nursery. This is a great place to find those hard-to-find palms and cycads. Shortly after arrival, the "Plant Riot" began, with very brisk sales. The sale was followed by a tour of the nursery by Bernie, who also gave the group a demonstration and discussion on potassium deficiency in palms.

The fourth annual 2-day fall meeting of the Central Florida chapter took place on October 10–11, 1992, in the Tampa Bay area. This meeting began with a visit to "Aloha Palms" in the Wimauma–Sun City area, about 20 miles south of Tampa along I-75. This was hosted by Donna and Michelle of Aloha Palms, a retail/wholesale palm tree nursery developed over the past 8 years. There was a general tour of the nursery and palms for sale. From there, the group headed north to Tampa for a visit to Dr. Roy Works' nursery. There was a viewing of Roy's collection of palms, cycads, flowering trees, agaves, bamboo, and banana trees. Again, plants were offered for sale.

A slide presentation on "Palms and Cycads grown in the Tampa Bay area" was given on Saturday evening at 7:00 p.m. at the Holiday Inn on Fowler Avenue. Dr. Merrill Wilcox also gave a presentation on the "Hybridization in the *Syagrus* Alliance."

Sunday took the group to Lutz, about 8 miles north of Tampa. First the chapter visited the garden of James Meyer. James is a landscaper with a variety of plants, including cycads, bamboo, flowering trees, and palms. His garden is in the shade of a high tree canopy, giving a nice feel to his yard. Next, the tour moved to visit the collection of Ted and Aly Langley of Lutz. This is a 1¾-acre property featuring a variety of tropicals. A display of *Butia* × *Syagrus* hybrids were on hand for a discussion of how to identify young hybrids. Another plant sale was held at the end of this garden tour, featuring plants from a number of members' collections.

A 2-day meeting is also tentatively planned for 1993 in the Fort Myers/Cape Coral area. If interested, please contact the local chapter directly.

Hawaii Island Palm Society News

The Hawaii Island Palm Society met on September 25 at 7:00 p.m. in Hilo. The meeting featured Ray Baker of the Lyon Arboretum, Hawaii. Ray presented a slide show and talk that he entitled "Not Your Run-of-the-Mill Palms," focusing on rare and unusual palms (including palms for high altitudes). These are not the sort of palms seen at the malls! Light refreshments were served.

The group also planned a member's garden tour in Hamakua for late October, but no details were available at press time for this issue of *Principes*.

Florida First Coast Palm Society

On Sunday, September 13, the FCPS held a chicken cookout and garden tour at the residence of Jim and Gay Menge at 990 Hagler Drive near Florida Boulevard and Penman in Neptune Beach. The program included a tour of Jim's garden and a slide and video show. A palm auction was also held.

Matt Encinosa reports that the Florida Community College Jacksonville (FCCJ) Palm Garden continues to make good progress. Recent plantings include a tall hybrid (*Butia* × *Syagrus*) and a large *Phoenix dactylifera* as well as two nice, large *Cycas revoluta* (which were donated by Walter Rogers in August 1992). Two successive mild winters and generous rain have really enhanced the garden's appearance.

A field trip is planned to Mexico for February to March 1993, coordinated by Ed Brown. There will be visits to Chiapas, Tabasco, A-1 salso, Oaxaco, and Vera Cruz over a 10- to 14-day period. Approximately 20 sites will be visited, with many palms and cycads present, including *Scheelea liebmannii*, *Chamaedorea stolonifera*, *C. tepijilote*, 5 species of *Sabal*, *Acrocomia mexicana*, *Bactris gasipaes*, *Ceratozamia mexicana*, *Dion mejia*, *D. edule*, and *Zamia* species. The trip will tour the Selva Lacodonia forest deep in Indian territory, the pyramids at Palenque, Misla Ha, and Bonempak; view the Pacific Ocean from Parque Nacional Lagunas de Chacahua; as well as search for cycads near the extinct volcano crater near Jalapa (in a very unique and botanically unexplored area). Estimated cost is US$800 per person. Interested parties should contact Ed Brown.

Texas Chapter News

The Houston Area Chapter of the IPS met on Saturday, September 12 at 3:00 p.m. at the home of Bernard and Grace Green. This meeting was primarily a tour of the Green's Garden, with little business transacted. Bernard's fruiting *Phoenix hanceana* was admired by all, as were has several *Sabal* species, *Livistona* species, and various other plantings. It was determined that the previous *Phoenix* seedlings obtained from Taiwan were definitely *P. hanceana*. Lively discussions were held on the identity of several of the *Sabal* plants, with confusion reigning as it often does with this genus. Bernard and Grace's herd of native tortoises were of great interest to the visiting children, the converse not being true! The garden tour and discussions were followed by a wonderful buffet, hosted by Grace and contributed to by various members.

On October 3, a meeting was held at the home of Horace Hobbs and Cynthia Ford. A "members only" palm sale was held for one hour prior to the scheduled meeting time. A number of nice palms were offered for sale by the Texas Chapter and by Horace. Following the sale, a tour of the Hobbs' garden was given. The garden looked fantastic following two light winters and a relatively cool summer. Many excellent specimen plants were viewed including several which are about to outgrow their greenhouse top (and Horace has a pretty high greenhouse). Plants in this category included a quite large *Neodypsis decaryi*, *Cocos nucifera*, *Carpentaria acuminata*, a very tall trunked *Chamaedorea radicalis*, and perhaps the tallest *C. sartori* in cultivation (per Don Hodel). These are all in containers and any palm enthusiast with sufficient space for them and interest should contact Horace. Outdoor plantings at the Hobbs' include numerous *Sabal* species, *Serenoa repens* (arborescent), *Rhapidophyllum hystrix*, *Chamaedorea radicalis*, *Trachycarpus fortunei*, *T. wagneriana* ('takil'), *Chamaerops humilis*, young *Nannorrhops ritchiana* and *Trithrinax campestris*, as well as other more tropical palms sunk in pots for the warm season. Horace's greenhouse included numerous exotic hothouse palms and cycads, including a nice collection of *Chamaedorea* species, *Licuala grandis*, *Pinanga* spp. and other interesting palms. In addition to the garden, Horace and Cynthia now have their rear deck and siding completed, with internal remodeling proceeding more or less on schedule. The house really looked nice.

Following the meeting, Cynthia served up her usual great Mexican buffet with homemade tamales, enchiladas, guacamole dip, salsas, frijoles a la charra, Mex-

ican rice, etc. This was followed by an assortment of desserts supplied by Gordon Hintz (key lime pie), Kahlua angel food (Grace Green), and a chocolate delight by the chapter's acknowledged Chocolate Consultant, Kelley Burhans. The Cains brought rabbit food (veggies and ranch dip) but seemed to spend an inordinate amount of time at the dessert table!

Journals on Palms for Cold-Weather Palm Enthusiasts

The European Palm Society, with headquarters in the United Kingdom, continues to improve its (A-4 sized) quarterly journal, *Chamaerops*. The July 1992 issue (24 pages) contained an even dozen color photographs, with several diverse articles. These included "Field notes on the Nikau [*Rhopalostylis sapida*], "To Move a [100 ton] *Jubaea*," "Laeken [Belgium]: City of Glass," "Back to Basics [on *Trachycarpus*]," "The Bug Busters [natural pest control with predators]," "Emerald Isle [Irish Gardens]," "Yuccas not Yukkies," and several letters and editorials. The hope of the *Chamaerops* editor is to move to full color printing in the future, if subscriptions and interest run high enough.

The *Hardy Palm* (*International*) published by the Pacific Northwest Chapter of the IPS also addresses the needs of temperate zone palm enthusiasts. This journal is currently in black and white, with various articles on growing palms and other tropical plants in areas with marginal (cold) climatic conditions. Many guest contributors expand the geographic coverage of both of the above two journals.

Le Palmier, the newsletter of the French Chapter of the IPS, Fous de Palmiers, is published in French three times per year. Articles focus on the palm community in temperate Europe of particular interest to French-speaking countries.

See your IPS directory for subscription information on each of the above journals and newsletters.

Note that other local palm journals and newsletters will be reviewed in future issues of *Principes*. The next issue will cover the excellent publication, *The Palm Journal*, Magazine of the Southern California Chapter of the IPS. Other reviews will follow in subsequent issues.

Western Australia Group Meets

The Western Australia Palm & Cycad Society met on Monday, September 21. The meeting featured a talk and slide program on "Palms and Cycads of the Kimberley Region of Western Australia" by Ken Adcock. Western Australia doesn't have many palms or cycads so Ken went out to find and photograph them in the wild to show members just what they look like.

Recent "Busy Bee" days at Gascoyne Park were held on the Saturdays of August 22 and September 26, both starting at 8:00 a.m. Approximately 500 palms were added to the park plantings. Glenn Lee and Tim Erceg planned the planting area with their usual expertise. The August raffle ticket was won by Ivan Erceg and the plant donated to young Will Schouten, always at the park to lend a helping hand.

Members were invited to attend an afternoon tea and garden tour at the home of Peter and Lori Skinner on Saturday, October 17. Pete has a good collection of palms and cycads, planted in a good fertile soil.

The Western Australia Palm Society also has participated in the Horticultural Spectacular at the Royal Show Grounds from November 6–8. A display was arranged and plants made available for sale.

Principes, 36(4), 1992, pp. 235–237

INDEX

NEW OFFICERS FOR 1992–1994 AND BOARD OF DIRECTORS FOR 1992–1996

The following officers were elected at the 1992 Biennial Convention in Miami:

Jim Cain—President, Texas, USA
Phil Bergman—V.P., California, USA
Paul Anderson—V.P., Empire Bay, Australia
Lynn McKamey—Secretary, Texas, USA
Ross Wagner—Treasurer, California, USA

New Board of Directors for 1992–1996 are as follows:

Libby Besse, Kyle E. Brown, Jim Cain, Donn Carlsmith, Martin Gibbons, Lenny Goldstein, Ron Harris, Donald "Jerry" Hunter, Dorothy Henkle, Lynn McKamey, Lester Pancoast, Pauleen Sullivan, William F. Theobald, Ross Wagner, Richard Woo, and Jim Wright.

Further news of the 1992 Miami Biennial will be in a future issue.

Back Cover

Tree of *Scheelea fairchildensis* uprooted by Hurricane Andrew at Fairchild Tropical Garden. Herbarium, wood, and tissue samples for the National Cancer Institute are being collected by scientists from Fairchild Tropical Garden and N.Y. Botanical Garden. Photo by Will Houghton.