PRINCIPES

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THE INTERNATIONAL PALM SOCIETY

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PRINCIPES

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Contents for January

Cover Picture

Calamus pilosellus in Brunei—even Rattans can make elegant ornamentals. Photo by John Dransfield.

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Editorial

With this issue *Principes* enters its 34th year. The editors wish all members of IPS a very happy 1990. May we all look forward to a new decade of enjoying palms. The last year of the 1980's was our first for color covers on *Principes*. We need your help in portraying palms as they deserve. Please send us your best color slides for possible covers and perhaps win a prize as well. The photography contest will continue until April 1st 1990.

Our authors in this issue provide much of interest. Don Hodel's book on cultivated chamaedoreas is nearing completion. *Chamaedorea* with a hundred or more species is one of the largest genera of palms and many of its species are still poorly known. Don has been doing excellent pioneering work in attempting to locate wild populations of species in cultivation and in obtaining material of flowers and fruits and other parts of the plants that have been previously unknown. Not surprisingly his findings are leading to some revision of the taxonomy. To save space and make the book less technical, some of the taxonomic information, including name changes and the publication of new species, will be published in *Principes*. In this issue we have the first such paper, a circumscription of *C. amabilis* and the placing of *C. coclensis* in synonymy with it. All those interested in chamaedoreas will find useful information in these papers; in addition to pictures and discriptions of the plants, Don discusses their cultivation and history.

Quite a few IPS members have visited The Retreat, the beautiful garden in the Bahamas east of Nassau, developed by Arthur and "Wumpsie" Langlois to accommodate their large collection of rare palms. Their interest and dedication did much to forward knowledge of palms during the middle of the century. Arthur's book "A Supplement to Palms of the World" has also been helpful to many. Leonard Bernstein writes entertainingly of a "new era" at The Retreat, now the headquarters of The Bahamas National Trust, but still important to those interested in palms.

We are proud to present in this issue the first comprehensive survey in 70 years of the palms of the Philippine Islands. Surprisingly there are a large number: 20 genera and some 135 species. Edwino Fernando introduces us to the many beautiful palms and their habitats.

You'll find also in this issue two papers that discuss some of the many uses people find for palms. S. D. Bonde and his co-authors discuss the nutritive value and different substances found in green and ripe fruits of two species of Doum palms. Dr. T. A. Davis and colleagues have explained the making and value of *Nypa* leaflets as cigarette wrappers. Sadly Dr. Davis, a friend of many members, died while this paper was in press. We will have an article on his contributions in a later issue.

NATALIE W. UHL
JOHN DRANSFIELD

Principes, 34(1), 1990, pp. 4–10

Chamaedorea amabilis: an Ornamental Species from Central America

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One of the objectives of field work in Costa Rica and Panama in 1987 in support of a project on the cultivated species of *Chamaedorea* was to locate *C. amabilis* in the wild in order to compare it with material bearing that name in cultivation. Collectors in California and Florida have a highly ornamental, bifid-leaved palm they call *C. amabilis*. Although these cultivated plants appear to match descriptions in the literature (Dammer 1904, Guillaumin 1923, Standley 1937), it was difficult to confirm since the published accounts are so meager and without illustrations. Key detailed information about its habit, inflorescences, and flowers was lacking.

Chamaedorea amabilis was first collected by Hermann Wendland about the middle of the 19th Century along the Río Sarapiquí near the village of San Miguel in Costa Rica. Wendland returned to Germany with living material and grew the palm in his greenhouses at Herrenhausen near Hannover. He prepared a description and name for it which were published a year after his death by his friend Udo Dammer (1904).

In March 1987 I searched for *C. amabilis* in forest remnants along the Río Sarapiquí near San Miguel and along the Río Sucio where it had been reported to occur by collectors. Both the Río Sarapiquí and the Río Sucio are on the wet, Atlantic slope of Costa Rica. The vegetation here is luxuriant and palms of many kinds grow in great abundance. Unfortunately, *C. amabilis* eluded me in both locations and I felt that I was not going to achieve my objective with this species on this trip. Later, however, I was fortunate enough to observe what I assumed to be *C. amabilis* at Jardín Botánico Robert y Catherine Wilson (formerly Las Cruces Tropical Botanical Garden) near San Vito de Coto Brus in Costa Rica (Figs. 1–3). These plants had been collected by the late Mr. Robert G. Wilson, founder of the Garden, on the Atlantic slope of Costa Rica or had been brought to him from Panama. They had been identified as such by the late Harold E. Moore, Jr. during one of his visits to the Garden.

Another objective of this trip was to locate *Chamaedorea coclensis* Bailey, a bifid-leaved species described from near El Valle in Coclé Province of Panama. *C. coclensis* was discovered by Paul Allen in 1939 and described, named, and illustrated by Bailey in 1943. I had been informed by collectors that a dwarf, bifid-leaved species similar, if not identical to, *C. pumila* Wendland ex Dammer was sometimes sold by local people in the market at El Valle. I thought that, perhaps, *C. coclensis* was simply a form of *C. pumila*. Coincidentally, the type of *C. pumila*, like *C. amabilis*, was collected near San Miguel along the Río Sarapiquí in Costa Rica by Hermann Wendland. Wendland's description and name for it were published by Dammer in the same article in which *C. amabilis* appeared.

In April 1987 I visited El Valle in the hope of tracking down *C. coclensis* and other species of the genus named from the

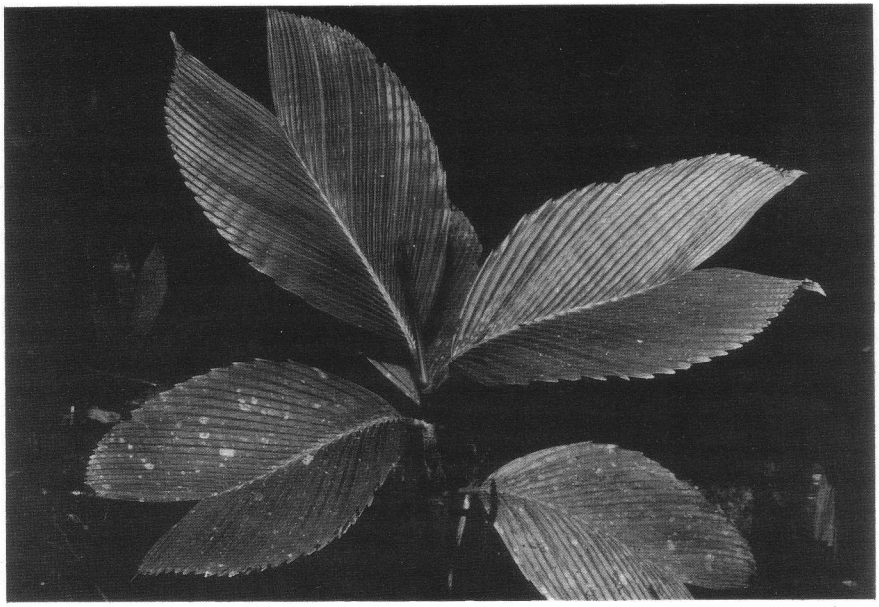
1. *Chamaedorea amabilis* cultivated in Costa Rica at the Jardín Botánico Robert y Catherine Wilson, San Vito de Coto Brus, Puntarenas.

2. A staminate plant of *Chamaedorea amabilis* cultivated at the Jardín Botánico Robert y Catherine Wilson in Costa Rica, *D. R. & M. A. Hodel 625*. This plant was collected originally near El Valle, Panama.

area. After much searching, plants were located that collectors had referred to as *C. pumila* and growing with it, much to my surprise, were plants that matched up very well to what is in cultivation as *C. amabilis*. The two are very distinct, the former being acaulescent and having leaf sheaths longitudinally open and clasping in a circular manner only near the base with leathery, pleated, upright, mottled, bluish-green leaves. The plants assumed to be *C. amabilis*, on the other hand, had a stem to two meters tall and tubular, clasping leaf bases with papery, horizontal, light green leaves (Figs. 4–5).

On a return trip to Costa Rica and Panama in December 1987, I was successful in locating what I assumed to be *C. amabilis* at the type locality near San Miguel along the Río Sarapiquí in Costa Rica (Fig. 6). In addition, I observed it on the Atlantic slope at El Copé, not too distant from El Valle. Later, upon my return to Los Angeles, I was able to examine the type of *C. coclensis* from the Missouri Botanical Garden and the type of *C. amabilis* from Kew. The pieces of the puzzle began to fall into place as it became clear that Bailey's *Chamaedorea coclensis* is identical to *C. amabilis* and is, therefore, synonymous with it. Both types match well with material bearing that name in cultivation and with that encountered in Costa Rica and Panama. They also match specimens identified as *C. amabilis* at the L. H. Bailey Hortorium collected by H. E. Moore, Jr. in Costa Rica. The notion of synonymy of these two taxa was corroborated by Dr. Michael H. Grayum of the Missouri Botanical Garden who is stationed in Costa Rica and who is working on a treatment of *Chamaedorea* for the forthcoming *Flora Costaricensis* (W. C. Burger, ed.).

We returned from Costa Rica and Panama with living material of *C. amabilis* and were successful in establishing it here in the greenhouse in Los Angeles. Fortu-



3. Another view of the plant in Figure 2.

nately, we have plants of both sexes and these have flowered freely, enabling us to gather staminate and pistillate flowers and describe these for the first time. Also, through hand pollination, we have been successful in setting fruit. The formal reduction of *C. coclensis* is made here and an expanded description is provided.

Chamaedorea amabilis *H. A. Wendl. ex Dammer*, Gard. Chron. Ser. 3, 36: 245. 1904; Guillaumin, Journ. Soc. Nat. Hort. France Ser. 4, 24: 225. 1923; Burret, Notizbl. Bot. Gart. Berlin 11: 737. 1933; Standley, Field Mus. Nat. Hist. Bot. 18: 112. 1937; Chazdon, Brenesia, in press. 1989. Type: Costa Rica, Alajuela, Valley of the Río Sarapiquí, *Wendland s.n.* (Holotype K).

Nunnezharia amabilis (H. A. Wendl.) O. Kuntze, Rev. Gen. Plant. 2: 730, 1891.

Chamaedorea coclensis Bailey, Gentes Herb. 6: 236, fig. 123. 1943*a*; Ann. Mo. Bot. Gard. 30: 327–343. 1943*b*. Type: Panama, Cocle, El Valle, *Allen 1815* (Holotype MO).

Stem: solitary, erect but sometimes procumbent for short distances before turning upward, 1–2 m tall, very slender, 7–10 mm diam., conspicuously ringed, internodes 5 cm long, conspicuous adventitious prop roots at the base to 10 cm high.

Leaves: 4–5, horizontal, simple and bifid, rich green; sheath 12 cm long, cylindrical, tightly clasping, green, faintly longitudinally striate-nerved; petiole 3–12 cm long, bright green and flat above and with a raised, light green, triangular knoblike appendage at the base, rounded, striate, and with a somewhat indistinct pale band below; rachis 15–20 cm long, green and angled above, rounded and pale-banded below; blade 30–50 cm long, 15 cm wide at the apex, there 2-lobed to about ¼ or ⅛ the length of the blade, broadly obovate in outline, cuneate at the base, outer margins on the upper half conspicuously serrate-dentate, glabrous, thin-papery, glossy underneath, 25 prominent nerves on each side of the rachis.

Inflorescences: arising from nodes beneath the leaves, closely ascending, slen-

der; peduncles 10–15 cm long, green in flower, 4 mm wide at the base, 5 mm wide at the apex; bracts 4, papery-membranous, greenish but rapidly turning brownish or rotting to nearly transparent by anthesis, longitudinally striate-nerved, the uppermost exceeding the peduncle, acuminate, bifid, the lowermost (prophyll) 1 cm long, the 2nd 3 cm long, the 3rd 7 cm long, the distal one 10 cm long; staminate inflorescence bearing a very short rachis, 1 cm long, green in flower; rachillae 3–7 (or inflorescence rarely spicate or furcate), erect, spreading, 15–25 cm long, 3–4 mm diam., green, minutely white-spotted, rather densely flowered. Pistillate inflorescence spicate or sometimes furcate; rachis or flower-bearing portion if spicate or the rachillae if furcate 15–20 cm long, 15 mm diam., erect, rather densely flowered, green and minutely white-spotted in flower, swollen and reddish-orange in fruit.

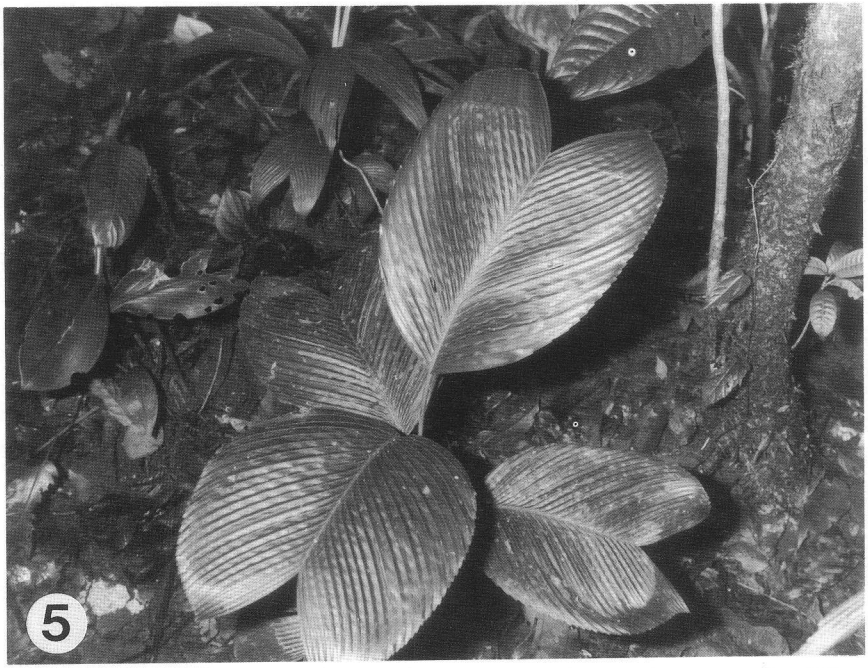
Flowers: staminate arranged in rather dense spirals, slightly immersed in circular depressions 2 mm long, subglobose, obtuse or somewhat flattened, aromatic, 2–2.5 mm high, 2.5 mm wide, greenish at anthesis ageing to brown; calyx low, 0.5–0.75 mm high, cuplike, the lobes barely visible, greenish; corolla with petals connate at their tips and there adnate to the pistillode and opening by very small, basal, lateral apertures, the petals 2.5 mm long, 2 mm wide, valvate, greenish; stamens 6, connate at the base, 1.5 mm high, anthers 0.75 mm long; pistillode obovoid, 2–2.5 mm high, swollen apically, there 1 mm wide, green. Pistillate flowers arranged in rather dense spirals, slightly immersed in elliptical depressions, 2–5 mm distant, depressed-globose, 2 mm high, 3 mm wide, green, swelling with age whether pollinated or not to 4 mm wide and becoming greenish-yellow; calyx low, green, shallowly 3-lobed, lobes to 0.5 mm high, very broadly rounded, 3–4 mm wide at the base; corolla with a terminal triangular opening, 1.5 mm across, petals imbricate, cuplike, more or less thickened, 2 mm high, 3.5–4 mm wide, lime-green, white-margined, apex very broadly truncate; pistil depressed-globose, 1.5 mm high, 2 mm wide, dark green, styles lacking, stigmas short, black.

4. *Chamaedorea amabilis* growing in dense, wet forest near El Valle, Panama. Note the aerial roots at the base of the stem.

Fruit: globose to oblong, 12 mm long, 9 mm broad, black, smooth and glossy.

Distribution: dense, wet forest; 500–1,000 m elevation. Costa Rica, Panama, Colombia.

Specimens Examined. COSTA RICA. Alajuela: near San Miguel along the Río Sarapiquí, *H. Wendland s. n.* (K, holotype); *H. E. Moore Jr. 6610, 6658* (BH); *D. R. Hodel & M. A. Hodel 716A & B* (BH,CR); *L. D. Gomez et al. 23329* (MO); San Carlos, Villa Quesada, *A. Smith H-1659* (MO); north of San Ramón near Balsa, *R. Liesner & E. Judziewicz 14663, 14881* (MO). Cartago: near Pavones, *H. E. Moore Jr. 6742* (BH); near Turrialba, *R. Liesner 14428* (MO). San José: Braulilo Carrillo National Park, La Montura, *L. D. Gomez et al. 20871* (MO). PAN-



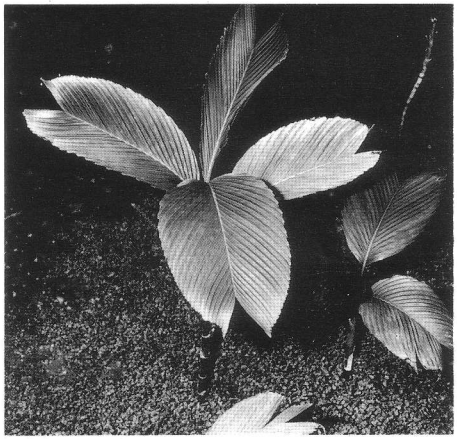
5. *Chamaedorea amabilis* grows near El Valle, Panama, *D. R. Hodel & M. A. Hodel 741A.* The spectacular leaf blades of this individual are nearly 40 cm long and 30 cm wide. 6. *Chamaedorea amabilis* occurs in dense, wet forest near the type locality along the bank of the Río Sarapiquí, Costa Rica, *D. R. Hodel & M. A. Hodel 716A.* Hermann Wendland discovered *C. amabilis* not far from here in the 19th Century.

AMA. Coclé: El Copé, *D. R. Hodel & R. M. Hodel 739* (BH); El Valle de Antón, *P. Allen 1815* (MO, holotype of *C. coclensis* Bailey); *D. R. Hodel & M. A. Hodel 741A & B* (BH,PMA); *A. Gentry 7416, 7421* (MO); *J. D. Dwyer & M. Correa 8857* (MO); *S. Knapp & R. Dressler 4914* (MO); Panama: headwaters of the Río Chagres, Río Esperanza, and Río Piedras, *de Nevers et al. 4060* (MO). COLOMBIA. Choco, *E. Forero et al. 3085* (MO). CULTIVATION. Costa Rica: Jardín Botánico Robert y Catherine Wilson, near San Vito de Coto Brus, originally from El Valle, Coclé, Panama, *D. R. Hodel & M. A. Hodel 625* (BH); California: L. Hooper garden, La Habra, originally from near the Río Sucio, Costa Rica, *Hodel 825* (BH).

Chamaedorea amabilis is distributed in wet forests at middle elevations mainly on the Atlantic slopes in Costa Rica and Panama. It also occurs sparingly in northwest Colombia. In Panama it occurs up to and just over the continental divide at appropriate elevations such as at El Copé and El Valle.

The specific epithet *amabilis* means lovely, an appropriate name for this species, one of the most handsome and striking members of the genus. *C. amabilis* is cultivated in California (Fig. 7), Hawaii, Costa Rica, and Australia although it is not common in any of these places. Although Dammer (1904) reported that all of Wendland's plants had died, the species may still survive in Europe. *C. amabilis* is considered a choice ornamental and is sought after by collectors and hobbyists who do not hesitate to strip plants from the forest in great numbers. This has contributed to its decline in the wild; in fact, near El Valle this situation was strikingly evident (Hodel 1988). *C. amabilis* has been tentatively listed as endangered and threatened (Johnson 1987).

Cultivation: C. amabilis is surprisingly hardy considering its origin and has withstood temperatures of 0° C (32° F) without sustaining damage in the Los Angeles area.



7. *Chamaedorea amabilis* cultivated in the garden of Louis Hooper, La Habra, California. These plants have survived 0° C (32° F) on several occasions.

It is easily propagated by seeds which germinate readily within 100 days.

Acknowledgments

I am grateful to Richard W. Palmer, Pauleen Sullivan, Bill Gunther, and the International Palm Society and its Seed Bank for support and encouragement in undertaking this study of *Chamaedorea*. Also, I extend my thanks to Dr. Michael H. Grayum of the Missouri Botanical Garden and Greg de Nevers of the California Academy of Sciences for sharing their valuable ideas on *Chamaedorea* and to Louis Hooper for permitting me to collect material in his garden. The Organization for Tropical Studies and Luis Diego Gomez assisted me in Costa Rica and were especially helpful at the Jardín Botánico Robert y Catherine Wilson. I thank the keepers of Kew Herbarium and Missouri Botanical Garden Herbarium for the loan of types. Natalie W. Uhl and John Dransfield reviewed and edited the manuscript.

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Principes, 34(1), 1990, pp. 11–20

New Era Ushered in at the Retreat

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The Retreat, 11 acres of Bahamian woodland east of Nassau, is a special garden that International Palm Society members have come to know in bits and pieces over the last 33 years. An article and photos have appeared in *Principes* (1:48, 1957 and 11:139, 1967), and photos of, and references to palms on the property are found in McCurrach's *Palms of the World*. For over half a century, with love, ingenuity, determination, and good humor, Arthur and Margaret (Wumpsie) Langlois personally collected and assembled an impressive group of palms, many of which have become the best specimens of their kind in North America. But in the 1970's, illness turned the couple's attention away from their hobby, and the garden began to decline. When Wumpsie Langlois died in 1985, eight years after Arthur, a fascinating era ended.

But this article does not focus on loss. On the contrary, it bears good news: The Retreat is on the way back. In 1985 the property became the headquarters of The Bahamas National Trust, and Prince Philip of Great Britain traveled to Nassau for ceremonies to dedicate the change in governance (Fig. 7). However, to fully appreciate the value of what is happening now and what is being preserved, it is perhaps best to review a bit of The Retreat's past.

When Arthur and Wumpsie Langlois bought a homestead in 1925, shortly before their marriage, the property already had a long history. As far back as the era of the American Revolution, it was part of a land grant known as The Retreat Estate, most likely settled by Loyalists who came to the Bahamas from the mainland. The wall that surrounds the property dates from about 1780, and two rock-lined wells from the period are still readily identifiable, though no longer in use. The mostly-wooden house is actually a composite of several pods, the oldest a formal dining room (Fig. 1) dating from the 1860's, when the property belonged to the British Colonial Secretary. However, just behind the house is part of an outdoor kitchen (Fig. 2) thought to have been built 25 or 30 years earlier. Atop the house is a red shingled roof whose restoration earlier this decade was funded in part by a donation from the South Florida Chapter of The Palm Society.

Margaret Langlois was a second-generation Bahamian, but apparently had no special interest in palms before meeting Arthur, a native of the British Channel Islands, who had probably become enchanted with the plants as a young man in England. The couple bought The Retreat after deeming it suitable for growing palms, and gradually a hobby became a consuming passion. Certainly the greatest early boost to their collecting zeal came in 1934, when Arthur, a civil servant, was transferred to palm-rich Trinidad to help install a fresh-water system. Many attractive species were collected and crated up for shipment to Nassau when the Trinidadian assignment ended.

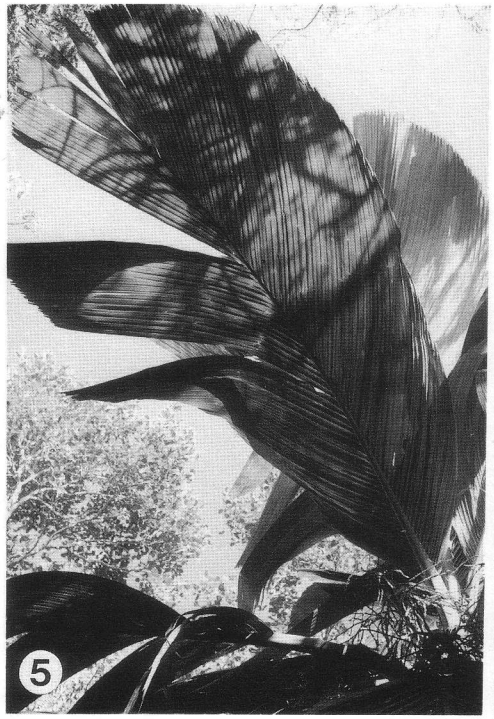
The Langlois' first of many trips exclusively to collect and photograph palms was an expedition to British Honduras (Belize) in 1941. Arthur and Wumpsie not only attained their objective—finding *Reinhardtia latisecta*—but also succeeded in introducing *Schippia concolor* into cultivation. One of the *Shippia* seedlings that

1. Formal dining room, oldest pod of the Langlois house, is separated from living quarters by wood-screened breezeway/breakfast room at left in background. 2. Outdoor stove, circa 1835, stands complete with well-used kettle at rear of dining room. Behind it to the left is cover to one of the cisterns installed by the Langloises to capture rainfall from roof of the main house. 3. Beautiful interfoliar white flowers constitute one of the attractive features of *Schippia concolor*, a slow-growing member of the subtribe Thrinacinae (tribe Corypheae, sub-family Coryphoideae). 4. Young *Synechanthus* occupies one of smallest solution holes in coppice. Surrounding leaf litter proves invaluable in enriching soil.

they brought back (Fig. 3) is now 18 feet tall and thriving in the coppice, or woods, even though it had no trunk until 1963 and Wumpsie once called it the slowest growing of any palm in the garden.

Other rare palms came to the Langloises through their friendship with Dr. David Fairchild. In fact, following Fairchild's famed Cheng Ho expedition to the Far East in 1940, they were the only non-institutional recipients—aside from sponsor Ann Archbold—of seed collected during the six-month trip. One of the seed acquisitions, *Areca* 208, an orange-crownshafted beauty, became known for a time as *Areca langloisiana*, though later research established that it had already been described and named *Areca vestiaria*. But Shakespeare's pronouncement on roses is no less accurate for fine palms, and the Langlois' *Areca vestiaria* now stands as the finest example of its kind in North America.

Following their success in British Honduras, Wumpsie and Arthur undertook another quarter century of collecting trips with characteristic enthusiasm and more



5. Rare *Pelagodoxa henryana*, abaxial surfaces backlighted by sun, is native to one island in Marquesas group 700 miles north of Tahiti. Spent inflorescence is visible in lower right corner of photo. 6. Shaft of sunlight reaches upper level of Green Hell to illuminate imposing teeth of *Myrialepis paradoxa*, a rattan widespread in Southeast Asia.

than a little bit of daring. To finance their travels, they often rented their home to winter vacationers and stayed in the garage apartment on their property. Few individuals today realize the significant niche that they occupied in broadening both hobbyists' and scientists' awareness of palms at mid-century. For aside from augmenting their collection, the Langloises increased the general store of palm knowledge—at a time when there was no Palm Society—by forwarding many specimens to Dr. Max Burret in Berlin and Drs. Liberty Hyde Bailey and Hal Moore at Cornell for addition to their respective collections and herbaria. And as their own palms reached fruiting age, the Langloises provided a source of seed to Fairchild Tropical Garden and The Palm Society Seed Bank. In a conscious departure from the typical practice of hobbyists, they sought to emphasize genera, rather than species, in their collecting. The Retreat, at its peak, was home to about 95 genera, or nearly half those known to botanists.

None of the foregoing information should leave the impression that the hard work ended once plants or seeds were brought to The Retreat. While New Providence Island is blessed with temperatures that seldom dip below 50° F (10° C), its moderate 46.4-inch (1,179-mm) average annual rainfall is rapidly lost from the thin soil overlying dense limestone caprock. The result is an inhospitable environment for many palms, and the problem is exacerbated by great variability in rainfall from year to year. Early plantings in the scant

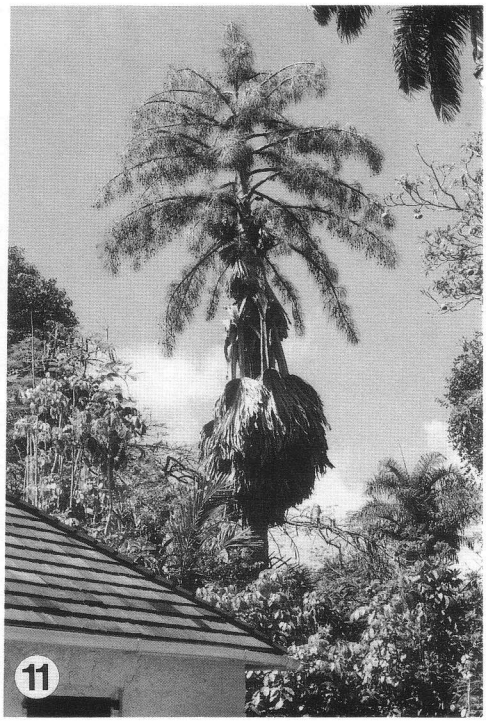
7. Monument dedicated by Prince Philip occupies position opposite front of house. Behind lower wall are leaves of *Heterospathe elata*, which has become naturalized in coppice.

soil on the front third of The Retreat grounds brought mostly disappointment, especially with the more demanding palms.

What made the Langlois garden a success was the fortuitous existence on the back part of the property of sinkholes, depressions etched slowly by the action of rainwater dissolving patches of softer limestone. The sinks, also known as solution holes, provided a healthier environment for exotic rain forest palms by catching rainfall and leaf litter, and the Langloises also had loads of soil brought in to improve them. To augment the meager dry-season rainfall, Arthur eventually installed a fairly extensive system of irrigation pipes around the grounds to tap cisterns constructed next to the house.

The Langloises utilized all sorts of sinkholes. Some accommodate a single small plant, such as a *Synechanthus* (Fig. 4) that apparently was one of Wumpsie's last additions to the garden. But others, much deeper or longer, were chosen to hold a favorite palm, such as *Pelagodoxa henryana* (Fig. 5), or a group of several species. Nevertheless, despite the apparent desirability of any sinkhole, the Langloises were very particular in their choices of which to use. If, after thorough examination, they felt that roots of nearby trees would compete with the exotic palms, they would leave the hole unplanted and look for something more suitable. The most special hole, an erstwhile chicken coop excavated by Arthur, boasts a shallow pool and even a paradoxical name, Green Hell. The descent into the depths by narrow stone steps reveals ferns, heliconias, and more palms, but only the devilishly-armed and fittingly-named rattan, *Myrialepis paradoxa* (syn. *M. scortechinii*) (Fig. 6), appears capable of inflicting everlasting agony. Green Hell, intended to simulate Amazonian forest, later

8. Pavilion dedicated to Godfrey Higgs occupies area between main house, visible in background, and garage apartment. 9. Stanley Kiem administers foliar spray to palms bordering front porch of home. Virtually all the rare palms on the property received a trace element application the same day.



10. Surrounded by a flowering red ginger, *Alpinia purpurata*, *Phoenicophorium borsigianum*, from Seychelles, resides in sinkhole apparently enlarged to a rectangular shape. The palm is probably a replacement in the same spot for the specimen pictured on p. 238 of *Palms of the World*. 11. *Corypha umbraculifera*, entering final stages of fruiting in June 1987, still bears 2,000 or more maturing round seeds. Once spent, inflorescence would collapse against trunk. A nearby second Talipot palm from same seed batch has grown much more slowly and is not even visible in photo.

served as prototype for the Rare Plant House at Fairchild Tropical Garden.

Another aspect of the Langlois' predilection for palms is the systematic accumulation by Wumpsie of information about them. One group of documents consists of meticulous notes tracing the source and development of every palm introduced to The Retreat. To raise a diversity of genera was no simple task; the dearth of reference material meant that palm culture was a self-taught subject for the Langloises. Wumpsie's notes clearly reflect the philosophy undergirding their approach to palm growing: "Try try again," she wrote in November 1943. "This truly applied to the *Bentinckia*. And today, we can say we have succeeded; the three plants we have out are green, healthy and vigorous growers. They thrill me every time I look at them because they stand for more than a plant established. They are a reward for perseverance, for dogged persistency, and for 'holding out to the last man'."

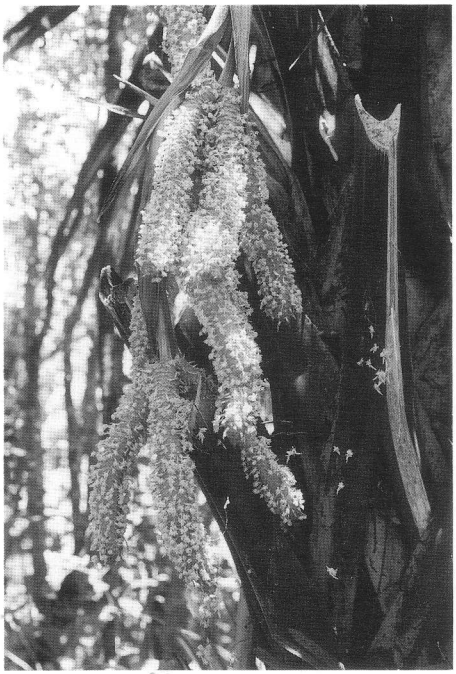
A second set of documents, now in the possession of Fairchild Tropical Garden, is of broader scope. It consists of 20 folders jammed with information intended to provide the substance of a great tome which Arthur hoped to write. Wumpsie evidently maintained a sharp eye for photos showing identifiable palms, wherever they might appear; hence the folders are replete with items clipped from *National Geographic*

12. Seeds sown in spring 1987 from Langlois *Corypha* had produced many healthy seedlings at Palm Society nursery at Dade County Metrozoo by October. Not unexpectedly, the key to good germination was consistently warm temperatures day and night.

and other periodicals. Arthur himself was a deft photographer, and the materials include his photos not only of palms encountered in native habitats in the course of the Langlois' travels, but also pictures of photos they found while examining records at the Royal Botanic Gardens at Kew. And present throughout the documents are typewritten commentaries by Wumpsie in which she pulled together the fragments of knowledge acquired from here and there. The comments are always informative and sometimes brimming with praise for a favorite palm. Of *Syagrus amara* (syn. *Rhyticocos amara*), for example, Wumpsie proclaimed, "The cautious gardener would be careful not to plant it in the close vicinity of any coconut tree as its brilliant greenness would make one think that his poor old coconut was ill."

As time passed, the likelihood of getting the great tome into print diminished, and the Langloises decided to produce a smaller work, *Supplement to Palms of the World.* Even after Arthur's stroke in 1974 diverted attention from their palm collection, the couple continued to assemble the *Supplement*, completing the draft shortly before Arthur's death in 1977.

With advancing years, Wumpsie took steps to insure the preservation of the palm collection and insulate The Retreat from development pressures. In 1977 she sold the land to Bahamian businessman Jack Hayward, who then deeded it to The Bahamas National Trust. Trust member Oris Russell, then Permanent Secretary to the Ministry of Agriculture, was a catalyst in effecting the transaction. Modeled on legislation in Great Britain, The Trust is a non-governmental entity created in 1959 by the Bahamian Parliament to preserve historic properties and manage marine and terrestrial wildlife in the islands. It now



13. *Borassodendron machadonis*, staminate inflorescence with exserted flowers.

administers over 238,000 acres of property. Shortly after transfer of the estate, The Retreat Council passed a resolution declaring the property inalienable, thereby guaranteeing preservation of the palm garden in perpetuity. The Retreat Garden Committee was later created to facilitate that goal.

But the sale did not end Wumpsie's influence on The Retreat. Perhaps stung by an indelicate remark about the condition of some of the collection, she set out to make her entire homestead more orderly, even if that meant occasionally negotiating a rickety ladder to patch holes in the roof of the house. In late 1983 she granted the South Florida Chapter of The Palm Society permission for a visit in March 1984. The thought that so many people wanted to see The Retreat invigorated Wumpsie, and despite a recent serious health setback, she led a tour of the coppice with great relish, navigating roots and rocks with the aplomb that only six decades of familiarity can produce.

Upon Margaret Langlois' death in July 1985, the latest chapter in the history of The Retreat began to take shape. Most significantly, The Bahamas National Trust moved its headquarters from rented space in downtown Nassau to the garage apartment on Retreat grounds. On October 18, 1985, Prince Philip, Royal Patron of The Trust, dedicated a monument (Fig. 7) marking the opening of The Retreat to the public. Since that time, significant changes have taken place on the property. Though a termite-ridden portion of the home has been removed, a large pavilion (Fig. 8) just behind the house was constructed and dedicated in May of 1987 to the memory of The Hon. Godfrey Higgs, a founding member and the first president of The Trust. An active group of guides has been organized and trained by Linda Thompson to lead informative tours of the garden. Also, plans are afoot to construct an additional cistern to assuage the chronic water shortage. And an illustrious deed awaits any local group which might wish to increase color on the grounds by renovating a vine arbor situated on a cleared area in the middle of the coppice.

The coppice itself has seen some steady changes, coordinated by a special palm subcommittee led until 1989 by Sara Bardelmeier and presently by Barbara Pyfrom. In May of 1986, Stanley Kiem, former superintendent of Fairchild Tropical Garden and longtime friend of the Langloises, donated his time to examine the coppice and devise a comprehensive plan for preserving the palm collection without exceeding monetary resources. Among the first accomplishments under Kiem's recommendations was the institution in the fall of 1986 of a fertilization program for the palms. Until that time, none had been fed with anything stronger than manure. In addition, a groundskeeper hired with Trust funds has made noticeable progress in

14. Margaret and Arthur Langlois. Photo by Don Evans.

eliminating the *Sansevieria* that had spread throughout the property, hindering views.

In June of 1987, Kiem returned to The Retreat. In less than three days, he and the author prepared metal identification tags and holders for most of the palms on the property, and there was time to affix many of them with concrete to positions near each plant. (Eventually a number of the more significant palms will be identified by durable anodized aluminum markers to be donated by the South Florida Chapter and inscribed with legends prepared by The Retreat Garden Committee.)

Using equipment lent by a local landscaping company, Kiem was able to reach almost every palm to administer the first foliar trace element application that any had ever received (Fig. 9). He also utilized colored plastic ribbons to differentiate the palms according to moisture requirements, so that rainfall collected in the cisterns could be distributed judiciously. In addition, he began mapping planted holes in order to improve record keeping and simplify identification.

Finally, Kiem took soil cores from several planted holes around the grounds for analysis. The cores contained a heavy clay-like material that seemed to indicate that whatever moisture got into the holes would not quickly percolate out. Subsequent testing revealed a soil devoid of phosphorus and potassium, but fairly high in nitrogen. The nitrogen and water-retention levels may explain the apparent vigor of many of the palms despite years of less than optimum attention. In fact, even the seemingly hostile front portion of The Retreat has proven remarkably kind to many palms. For instance, *Heterospathe elata* and *Ptychosperma elegans* have become naturalized in the area, demonstrating the ability to thrive in the rock without the need for special planting holes.

These days a trip through the coppice

reveals all sorts of palm delights at nearly every turn: *Phoenicophorium borsigianum* (Fig. 10), displaying leaves untattered by Caribbean winds; a tiny *Areca*, contrasting green leaflets with striking deep red petioles; *Borassodendron machadonis* (Fig. 13), bearing spectacular orange inflorescences dotted with yellow flowers. Because Margaret and Arthur Langlois (Fig. 14) were private people, The Retreat perhaps has always been less well known locally than in the world of palm fanciers. Consequently, the greater is the credit due those Bahamians whose judgment and foresight have assured the preservation of the treasure that is The Retreat. It is, to be sure, no vast reserve, but in a world where forests shrink hourly and plants and animals disappear with frightful speed and lamentable finality, what The Retreat symbolizes transcends mere physical measurements. The value and significance of what has been achieved by the Langloises and their successors as stewards of the land are probably best defined in remarks made by Prince Philip at the dedication of the garden:

"I think every community needs someone to be its conscience about what is going to happen in the future. . . . You can't solve global problems, but you can solve your local problems, and if you do it well, it will be an example to people in the rest of the world."

NOTE

Corypha Seed Project

In September 1985 a *Corypha umbraculifera* planted at The Retreat from seed collected in Ceylon (Sri Lanka) in 1940 by friends of the Langloises began flowering. The South Florida Chapter's 1987 project to distribute seeds from this specimen (Fig. 11) proved successful beyond expectations. With shipment of the last quantity of ripe seed in October 1987, the Chapter had distributed over 5,900 seeds, and viability proved to be very good (Fig. 12). The project raised over $1,200 for The Retreat Garden Committee of The Bahamas National Trust to use for upkeep of the property.

LETTERS

Dear Dr. Uhl:

On page 154 of *Principes* (July 1989) the palms in the photograph of the Fulton House in Rockport are referred to as *Sabal mexicana*. They are *Washingtonia filifera*.

In my place across the road from the Fulton House are some large *Sabal mexicana* including one more than fifty feet tall which may be the largest of this variety in Texas.

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Eds' note: for more on this see p. 51.

PALM BRIEF

Coconuts Arrive

PALM BEACH, Fla. (AP)—This winter playground of the wealthy is famous for its towering palm trees, but it once was a barren offshore sand spot with no vegetation.

Then, in 1878, a Spanish ship loaded with coconuts and wine went aground and broke up. The coconuts that floated ashore took root, sprouted and grew into palm trees that transformed the landscape.

Attracted by the palms, climate and isolated beaches, a few wealthy Northern families built winter homes here at the turn of the century. Now, Palm Beach has luxury hotels, expensive shops and restaurants and still attracts the rich and famous. —From Hawaii Tribune Herald article sent in by KEN BANKS, Pahoa, HI.

Principes, 34(1), 1990, pp. 21–23

Nutritional Composition of the Fruits of Doum Palms (Hyphaene) from the West Coast of India

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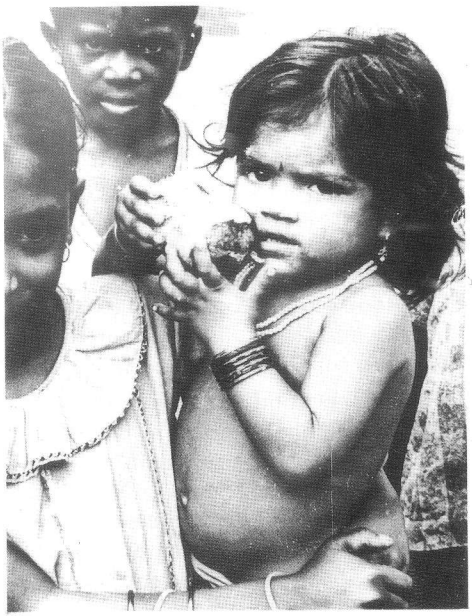
Palms are majestic plants playing a significant role in the life and economy of people residing in the tropics since prehistoric time. They have been providing the basic needs of food and shelter along with supplementary necessities such as oil, sugar, wine, tannins, sago, waxes, fibers and many others. Nearly 2,700 species of palms are distributed in six subfamilies of the family Palmae (Uhl and Dransfield 1987). But only the fruit of species of *Acrocomia*, *Areca*, *Syagrus*, *Astrocaryum*, *Bactris*, *Brahea*, *Butia*, *Calamus*, *Caryota*, *Chamaerops*, *Chrysalidocarpus*, *Cocos*, *Corypha*, *Elaeis*, *Euterpe*, *Hyphaene*, *Jubaea*, *Mauritia*, *Orbignya*, *Phoenix*, *Pseudophoenix*, *Ptychosperma*, *Raphia*, *Salacca*, *Veitchia*, *Washingtonia* and *Zombia* have been analyzed for their nutritional composition by Menon and Pandalai (1957), Wu Leung et al. (1961, 1968, 1972), Earle and Jones (1962), Watt and Merrill (1963), Jones and Earle (1966), Gopalan et al. (1971), Barclay and Earle (1974), C.S.I.R. (1976), Atchley (1984) and Cornett (1987).

The doum palm, *Hyphaene* with about 10 species (Uhl and Dransfield 1987) is widely distributed in Africa, Arabia and islands in the Indian Ocean. Of these, *Hyphaene dichotoma* (White) Furtado (syn. *H. indica*) is indigenous to India growing luxuriantly along the west coast from Porbandar in Gujarat to Goa and probably down south to Kanniyakumari in Tamil Nadu. Recently one of us (Bonde 1988) has noted the occurrence of Egyptian doum palm, *Hyphaene thebaica* Mart. along the west coast at Nagaon near Alibag. From the general habit of the palm it is quite difficult to distinguish these two species. Their fruits, however, are distinct. In *H. dichotoma* the fruits are obovate-pyriform, 8–10 cm long and 5–6 cm broad with rough and cracked epicarp forming polygonal areas of various sizes, whereas in *H. thebaica*, they are ovoid-oblong, 7–9 cm long, 4–6 cm broad with smooth and shining epicarp. The fruits remain persistent on the tree even after ripening. Ripe fruits smell like molasses and are eaten by birds, squirrels, civets and other herbivorous beasts. The aborigines and local inhabitants suck the sweet gingery juice from the mesocarp and eat the tender endosperm or copra of the seed (Fig. 1).

Materials and Methods

The ripe fruits of *Hyphaene thebaica* were collected in the month of January and the young fruits of *H. thebaica* and *H. dichotoma* were collected in June from the west coast at Nagaon near Alibag, Maharashtra State, India. The mesocarp and endosperm were separated from the other parts of the fruits and analyzed for their nutritional composition.

Water, fat, protein and ash contents of the material were determined by the standard method of AOAC (1965) and iron content by its α-α-dipyridyl method.



1. An Adivasi tribal child sucking the juice from the mesocarp of a young *Hyphaene dichotoma* fruit.

Energy was calculated by using Atwaters factors. Fiber percentage was estimated according to the method of Van Soest and Wine (1965), calcium by flame photometry and phosphorus by metavanadate reagent as given by Stuffins (1967).

Results and Discussion

Nutritional composition of mesocarp and endosperm of ripe and young fruits of *H. thebaica* and of *H. dichotoma* are given in Table 1. From present study and the seed analysis of *H. thebaica* made earlier, the following conclusions can be made. (1) There are striking differences between the nutrients of young and ripe fruits. Content of fat and protein decreases and carbohydrate increases in *H. thebaica* as the fruit attains maturity. (2) Total fat, protein and energy content in young fruits of *H. thebaica* is higher than that in the ripe fruits. (3) Fat, protein, carbohydrates and energy content is comparable in young fruits of *H. thebaica* and *H. dichotoma* but calcium content is much higher in the seeds of *H. thebaica* than in those of *H. dichotoma*, whereas iron content in the mesocarp of the latter is more than double that of the former. (4) In the ripe fruits of *H. thebaica*, fat, protein and calcium content of the endosperm (seed) is higher; energy and carbohydrate contents are comparable and phosphorus content is lower in the present material than that of African material (Wu Leung et al. 1968).

Fruits in both the species become dried up after abscission from the tree. The sweet gingery mesocarp juice evaporates and the

Table 1. Proximate analysis of Hyphaene thebaica *and* H. dichotoma *fruits.*

	Hyphaene thebaica Ripe Fruits		*Hyphaene thebaica* Young Fruits		*Hyphaene dichotoma* Young Fruits	
	Mesocarp	Endo-sperm	Mesocarp	Endo-sperm	Mesocarp	Endo-sperm
Energy Cal/100 gm	423	437	421	496	406	482
Water %	0	0	0	0	0	0
Protein %	5.58	7.12	11.04	13.18	9.26	13.30
Fat %	9.17	8.21	7.69	20.7	7.21	17.80
Carbohydrate %	79.84	83.71	77.03	64.27	75.81	66.86
Fibre %	20.37	—	50.20	—	50.07	—
Ash %	5.77	0.94	4.29	1.86	7.69	1.96
Calcium mg/100 gm	97.5	332	263	120	268	47.85
Phosphorus mg/100 gm	185	162	191	104	224	93.5
Iron mg/100 mg	6.5	1.56	18.12*	33.35*	38.24*	39.5*

* High iron values probably are due to the soil type.

endosperm hardens. Buttons and rosary beads with good market value are prepared from this ivory-colored endosperm.

Acknowledgments

The authors are grateful to Dr. M. S. Kumbhojkar for valuable suggestions.

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T. A. Davis 1923–1989

The Society has lost one of its most distinguished members with the death of T. A. Davis on November 10, 1989. A frequent contributor to *Principes*, Professor Davis served on the Board of Directors from 1984–1988. An obituary will be published in a future issue.

Director Paul Mahalik Dies

While this issue was at press Director Paul Mahalik died. Friends are preparing an article about him for the April issue.

Principes, 34(1), 1990, pp. 24–27

Nipah Leaflets as Wrappers for Cigarettes

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The nipah palm (*Nypa fruticans*), known popularly in the Philippines as "water coconut," is a tidal mud palm flourishing especially in the tidal swampy areas of South East Asian countries. The Malays and Indonesians call it "nipah." The Philippines and Indonesia as well as Papua New Guinea have the largest reserves of nipah forests. The palm has considerable economic importance for man; some uses have been highlighted by Fong (1987). Nipah yields plentiful sugary sap when the peduncle of the half-mature inflorescence is tapped. From fresh sap, sugar, alcohol, and vinegar are prepared. Fermented sap is toddy, "tuba" which is a popular drink in the Philippines. It is estimated that normally about 30,000 liters of toddy which is equivalent to 4,000 liters of alcohol can be obtained from one hectare of nipah palm in a year. According to Gibbs (1911), sap yield in the Philippines can go up to 78,500 liters per ha in one year. In the Philippines, the vinegar prepared from nipah sap is valued more highly than the coconut vinegar. In Indonesia and Malaysia, the production of vinegar from nipah sap is not fully utilized. Immature fruits yield a sweet jelly-like endosperm which is a delicacy to consume, especially during warm days. The large pinnate leaves form good thatch for rural homes (Fig. 1). The petioles are very strong and long, and are used as rafters for roofs or for making partition walls for homes. Especially the leaf-mats, woven from nipah leaflets, last on the roof for 3–5 years compared to the one-year life of coconut leaf-mats. Nipah leaf industry is a growing trade in some parts of Indonesia (Davis 1986) as well as in the Philippines and Malaysia.

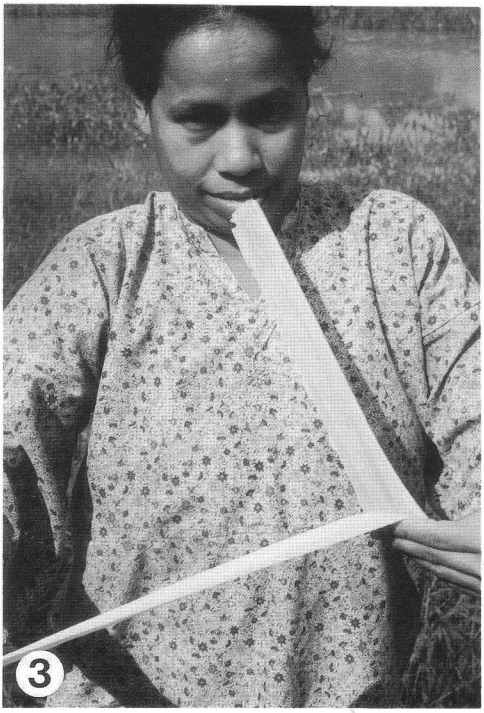
Because of its subterranean nature, the horizontally spreading stem and the numerous radiating strong roots, the plant has a potential use for protecting coastlines and banks of rivers and lagoons from erosion (Davis 1987, De et al. 1987). The underground rhizomatous stem branches frequently, and hence the stem spreads over a large area within a couple of years. The mode of branching (forking) of the stem is dichotomous according to Tomlinson (1971). The copper-colored, persistent bracts on the erect pedcuncle as well as the persisting golden male spikes enhance the value of the inflorescence as a table decoration. The morphology and biology of these reproductive structures have been recorded by Uhl (1972). Above all, the elegant-looking palms with erect pinnate leaves make an impressive landscaping along the tidal areas. In addition, in parts

→

1. Portion of nipah leaf showing the distribution of trichome units on the lower midrib of leaflets. 2. Mr. Raja Hamzah of village Sungai Dulang Dalam, Perak, Malaysia detaches tender leaflets from young leaf of nipah palm. 3. Mrs. Hamzah demonstrates on the peeling of epidermis off the half of a leaflet. 4. Sundrying of nipah leaflets after removing their epidermis layer on one surface.


1


2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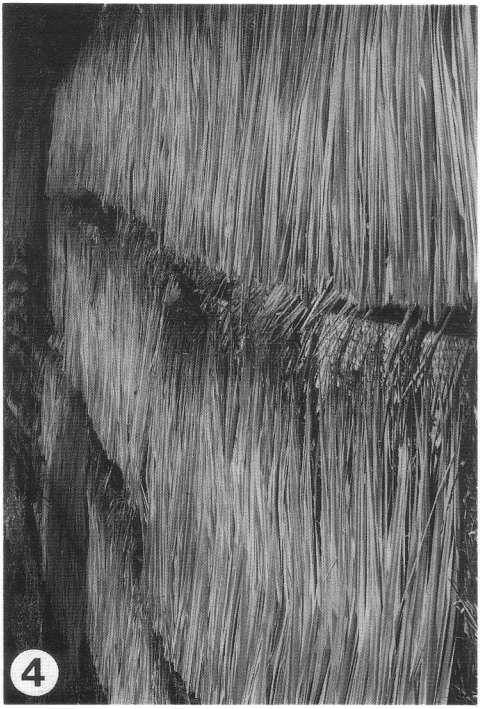
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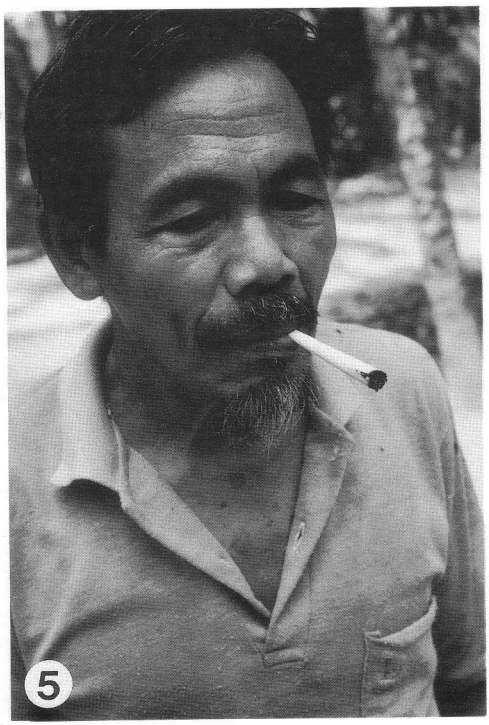

5. Cigarette with nipah leaf wrapper is liked by village folks. 6. Dry nipah leaflets are bundled and graded for sale.

of Malaysia and Indonesia, and perhaps in the Philippines, also, tender leaflets of nipah have been traditionally used by farmers as wrappers for country-made cigarettes (Fig. 5). An account of how the leaves are used as cigarette wrappers is given below.

Nipah leaflets are cut and stitched into mats for thatching homes. In parts of Indonesia, the leaflets are tied into bundles and soaked in brackish water for about ten days before weaving them into mats. To make a mat, a thin stem split of palm *Oncosperma tigillarum*, about 1.5 m long is taken as the base. Leaflets are spread open and the lower about 5 cm length is folded back. Keeping the stem split within the fold of the leaflet, it is stitched with a thin strip of midrib peeled from a tender leaflet of nipah which is pliable. One such mat of 1.5 m length costs half a dollar in Malaysia. A capable person can make about 100–125 mats within a day, earning a fairly good income even after paying for the cost of leaves.

Preparing Cigarette Wrappers

Mr. Raja Hamzah and his efficient wife of Sungai Dulang Dalam village which is situated close to the Malaysian Agricultural Research & Development Institute (MARDI) at Hilir Perak, Malaysia explained and demonstrated to us in May 1988 how they make some additional income by preparing wrappers for cigarettes.

The first step is to select a leaf of proper maturity, that is, about two months before the leaflets spread out. At this stage, the entire leaf looks like a thin green bamboo. By this time, part of the petiole portion of the leaf has also emerged outside the sheath

of the immediate older leaf. The leaflets which are yet to turn green are cut almost flush with the rachis (Fig. 2). Each leaflet whose lamina is double-folded lengthwise, is separated and the halves stripped off the midrib. Also the margins of the leaflet are peeled off. The lamina from the two halves of the same leaflet differ slightly in width. The half that folds over the inner half is wider. This is called the male half, and the other, the female half. The outer margin of the lamina has a thick epidermis. Mrs. Hamzah is an expert in peeling off the epidermis from the rest of the leaflet. She uses both her hands and some teeth (Fig. 3) to peel off the cuticle which comes out a very thin but complete strip. The outer layer is discarded and the rest is sundried (Fig. 4). Peeling off the epidermis of leaflets is the major laborious job in making cigarette wrappers. Because the leaflet halves are deprived of the cuticle on one side, the strip on drying rolls with the surface still covered with the cuticle outside. When sufficiently dry, the rolled leaflet halves are collected, graded and bundled (Fig. 6). Depending on their length, the dry leaflets are sorted into three grades. Usually agents visit villages and buy these materials. One kilogram of the dry leaves fetches $2.60. The longest samples fetch a few cents more than the others. On an average, 10 leaves would yield 5 kg dry leaflets. Usually, villagers who own the nipah clumps and others who could manage to obtain leaves free of cost are involved in this trade. They make a good income as there is practically no investment in the business. Moreover, women and children can also share.

The dry leaf material is cut into pieces the length of cigarettes. Processed tobacco, purchased from shops, is used as filler for the cigarettes. The wrapper is spread open and tobacco pressed in. The dried stuff automatically rolls over the tobacco as soon as the fingers are lifted. Hence, there is no need to paste the margin of the wrapper to make the cigarette. In this way the home-made cigarette is prepared (Fig. 5). For home-made cigarettes, villagers prefer the nipah leaf wrapper over paper wrappers purchased from shops because of its good and uniform burning quality and because of the special aroma it adds to the smoking pleasure.

Acknowledgment

The first author wishes to thank Dr. Mohd. Yusof Bin Hashim, Director General, Malaysian Agricultural Research and Development Institute, Kuala Lumpur for the facilities received to study nipah palm in Malaysia.

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Principes, 34(1), 1990, pp. 28–45

A Preliminary Analysis of the Palm Flora of the Philippine Islands

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ABSTRACT

An account of the status of the taxonomy and phytogeography of the palms in the Philippine Islands is presented. There are 20 genera and about 135 species of palms thus far described and reported from the islands. The Philippine palm flora indicates distinct affinities with that of Sundaic Malesia.

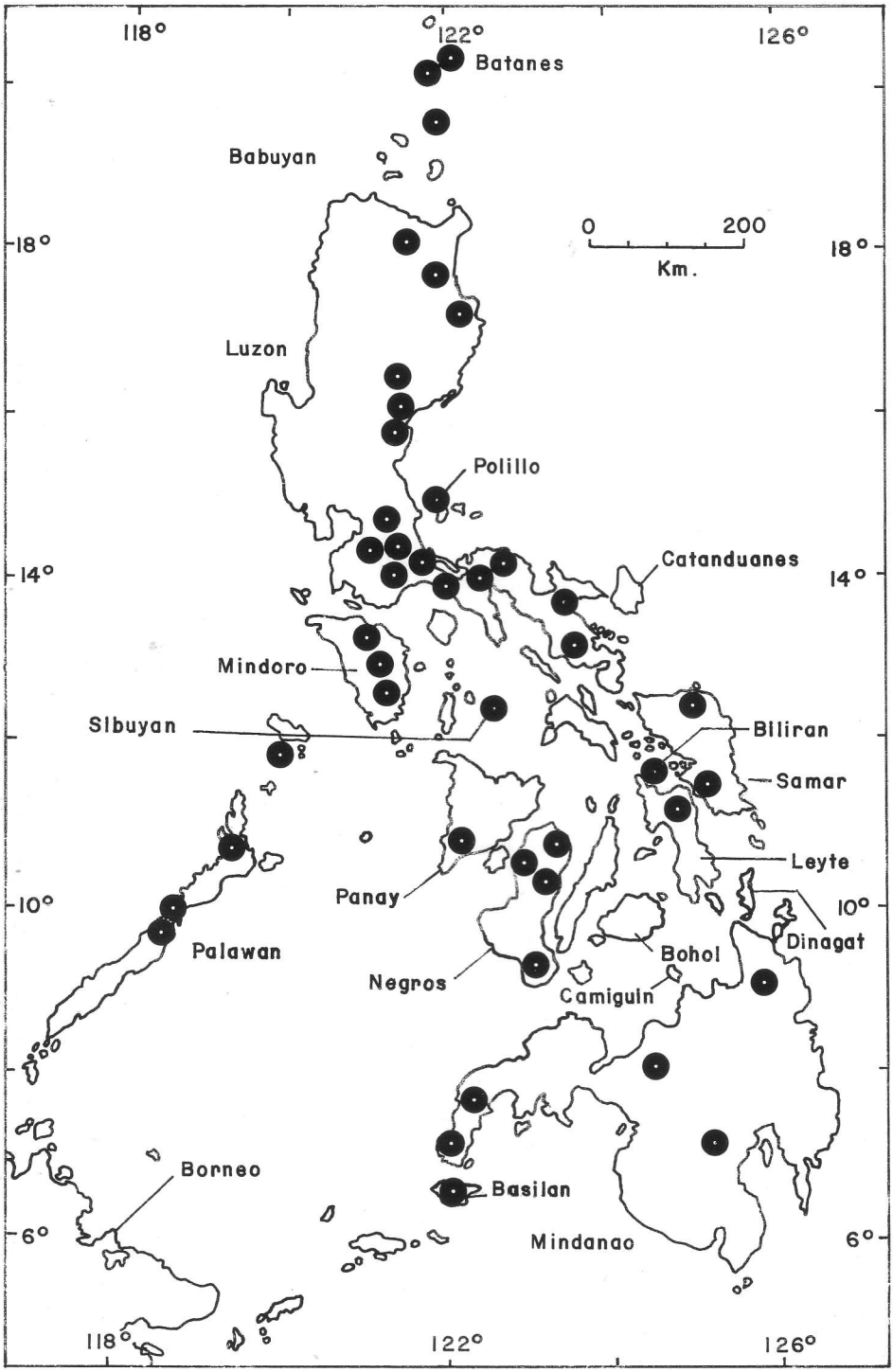
The Philippines, as are other areas in the tropical Far East, are well-represented with palms. The palms are often prominent in the vegetation of almost all the islands. Botanically they have been worked out whole or in part by various authors including Blanco, Beccari, Merrill, and Brown in several papers. The work by Beccari of 1919, however, remains until today, as the most useful treatment of the Philippine palms.

The present paper is largely an account of the status of palm taxonomy and phytogeography in the Philippines based on information from the literature and supplemented by my own herbarium studies and field observations.

The first indigenous palms reported from the Philippines were probably those by Samuel Perrottet in his catalogue published in 1824. Perrottet credited the islands with six palm species, including one described as new and two rattans by common names only (Robinson 1908). Fr. Manuel Blanco later in his *Flora de Filipinas* (first published in 1837) described 14 species and one variety of palms, all except two species, as new. Blanco, unfortunately, did not preserve any herbarium material for the palms he described (Merrill 1903, 1918). Subsequently Martius in 1849 described a few other Philippine species, mostly rattans, in his *Historia Naturalis Palmarum*. One of the species described by Martius was *Calamus siphonospathus* based on a specimen collected by Perrottet near Manila in 1819. Perrottet's collection, preserved in Geneva, is probably the oldest extant herbarium specimen of a palm from the Philippines.

Knowledge of Philippine palms, however, owes much to Odoardo Beccari, the Italian palmologist based in Florence. Beccari first worked on some of the Philippine palm material collected by Hugh Cuming between 1836–1840 and by Sebastian Vidal between 1876–1889 and initially described about eight new species of mostly rattans (Beccari 1885, 1886, 1889, 1902).

With the advent of the Americans in the islands in the early 1900's, Elmer D. Merrill, designated botanist with the then Bureaus of Agriculture and Forestry, initiated extensive botanical explorations in various parts of the archipelago. This brought to light many new forms in the Philippine palm flora. Between 1904 to 1919, Beccari, working on Philippine material sent to him in Florence, described nearly 90 species and several varieties. These were based mostly on collections by E. D. Merrill (ca. 15 types), the Forestry Bureau (ca. 31 types), the Bureau of Science (ca. 20 types) and A. D. E. Elmer (ca. 26 types) (Fig. 1). A few collections by A. Loher, E. Copeland, and M. S. Cle-



1. Type localities of Philippine palms.

mens also served as types for new species described by Beccari. By 1919, Beccari's account of the indigenous Philippine palms showed a total of about 120 species in 20 genera excluding *Cocos*. Shortly before his death in 1920, Beccari added one endemic species to the Philippine list.

The many uses and products derived from the Philippine palms were later summarized by Brown and Merrill (1920) and Brown (1951).

The Palm Flora Since Beccari

For more than half a century since Beccari's work, no new taxa or new records of palms have been reported for the Philippines. In 1979, Dr. John Dransfield, palm specialist of Kew, made his first but short visit to the Philippines and added four new records of rattans from Palawan (Dransfield 1980). Madulid (1981) later described one new endemic variety in *Plectocomia*.

In 1984 a botanical expedition to Palawan yielded several new records (Hilleshog 1985). *Cocos nucifera* is also now generally regarded as a native of the western Pacific including the Philippines (Harries 1978, Gruezo and Harries 1984, Uhl and Dransfield 1987). A second species in *Salacca* has also been added to the Philippine list (Mogea 1986).

The visit of Dr. Dransfield to the Philippines in 1979 has since stimulated further study and more field work on the Philippine palms. Thus far no less than 14 new species and three new varieties belonging to five genera have been discovered mostly from Mindanao and from the southern end of the Sierra Madre Mountain Range along the east coast of Luzon. Nine of these taxa have recently been described (Fernando 1988*a*, *b*, in press).

In all, the Philippine palm flora since Beccari has increased in number of species by about 14 percent. The growth is contributed mainly by the new records from Palawan and by the recently published new taxa, but excluding the still undescribed ones. While new records and new taxa have been discovered, some taxa in Beccari's (1919) work have also now been reduced to synonymy.

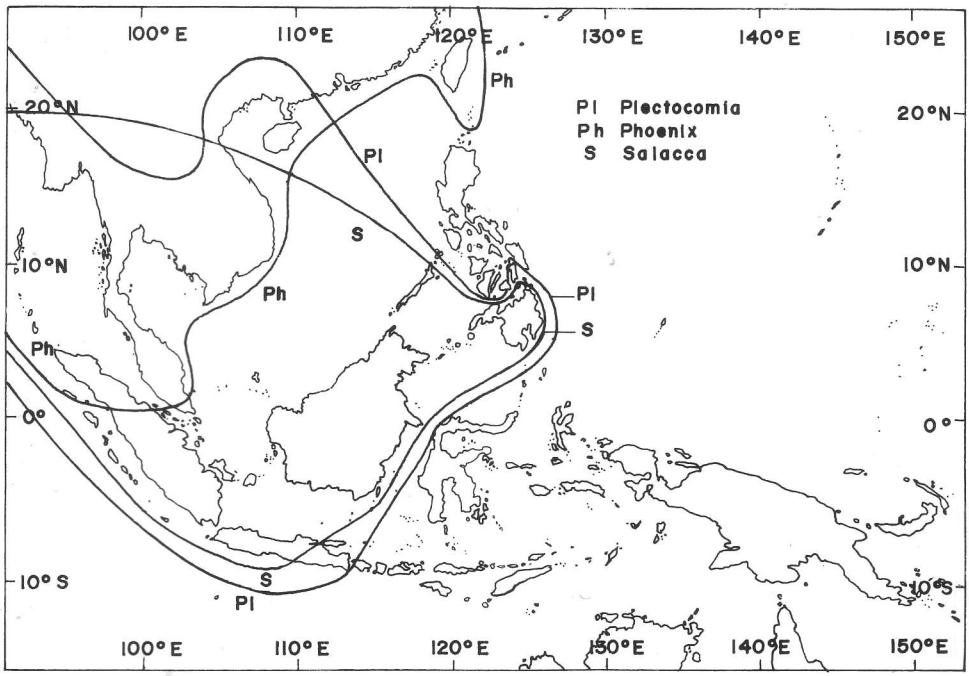
There still remain some undercollected areas in the Philippines as far as palms are concerned. These include the central and northern parts of the Sierra Madre Mountain Range in Luzon, the entire island of Samar, the central and eastern parts of Mindanao, and southern Palawan.

The Palm Flora Today

This paper now puts the Philippine palm flora at 135 species belonging to 20 genera. The figure excludes about 6 species that still need to be formally described and published. No genus is exclusive to the islands, but over 70 percent of the known species are endemic.

Four of the six palm subfamilies (Dransfield and Uhl 1986, Uhl and Dransfield 1987) are represented in the Philippines, viz., Coryphoideae, Calamoideae, Nypoideae, and Arecoideae. Subfamily Coryphoideae has two tribes and four genera represented; Calamoideae, one tribe and six genera; Nypoideae, monotypic; and Arecoideae, three tribes and nine genera. In the list provided (see Appendix 1), the genera and species are arranged by subfamilies and tribes with notes as to number of tribes and genera in subfamilies, and of species in genera in parentheses following the appropriate categories. Distribution outside the Philippine Islands is indicated in brackets. Undescribed and unpublished taxa have been included in the list and are preceded by numbers enclosed in brackets. The list is only preliminary and tentative.

At least three genera, viz., *Phoenix*, *Plectocomia*, and *Salacca* of the Asiatic and West Malesian flora find their eastern limit in the Philippines (Fig. 2). Another genus, *Heterospathe*, of the Papuasian



2. The eastern limit of the ranges of the genera *Phoenix*, *Plectocomia*, and *Salacca* in the Philippines.

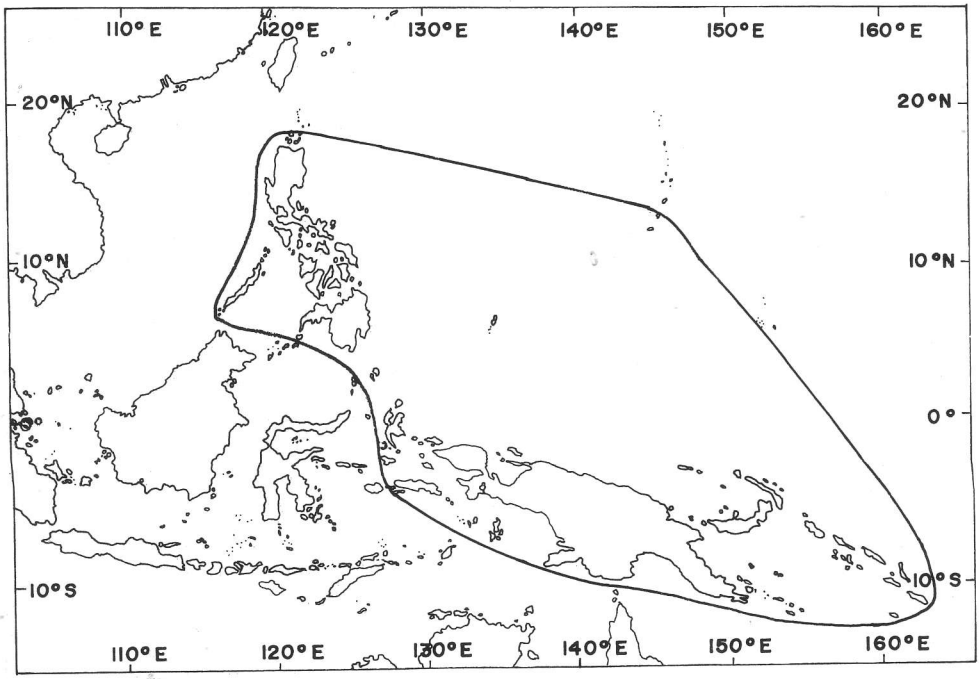
flora has its western limit in the archipelago (Fig. 3). *Veitchia*, on the other hand, which is almost entirely western Pacific in distribution, has one species represented (Fig. 4). *Cocos*, with a single widely cultivated species of western Pacific orgin (Harries 1978, Uhl and Dransfield 1987) is represented by wild-types in the Philippines (Gruezo and Harries 1984).

All the other 14 genera represented are centered largely throughout Malesia. Four of these, *Calamus* and *Daemonorops* among the calamoids, and *Areca* and *Pinanga* among the arecoids composed about two-thirds of the known palms indigenous to the islands. The rattans (i.e., *Calamus*, *Daemonorops*, *Korthalsia*, and *Plectocomia*) altogether comprise nearly half of the entire Philippine palm flora, a pattern also observed in most other parts of Malesia (Dransfield 1981).

Affinity of the Philippine Palm Flora

The affinity of the palm flora of the Philippine Islands is shown in Table 1 illustrating the approximate number of genera and species shared and unshared with adjacent areas. It is apparent that the palm flora of the Philippine Islands is essentially Sundaic with strongest affinity with that of Celebes. This striking Philippine-Celebes floristic pattern has also been noted earlier for several other genera and species of flowering plants (Merrill 1926, Dickerson 1928).

There is also close affinity with Malay Peninsula and Borneo. Of the genera shared at least three have their eastern limits in the Philippines. The other genera tend to have greater representation in Malay Peninsula and Borneo and decreasing towards



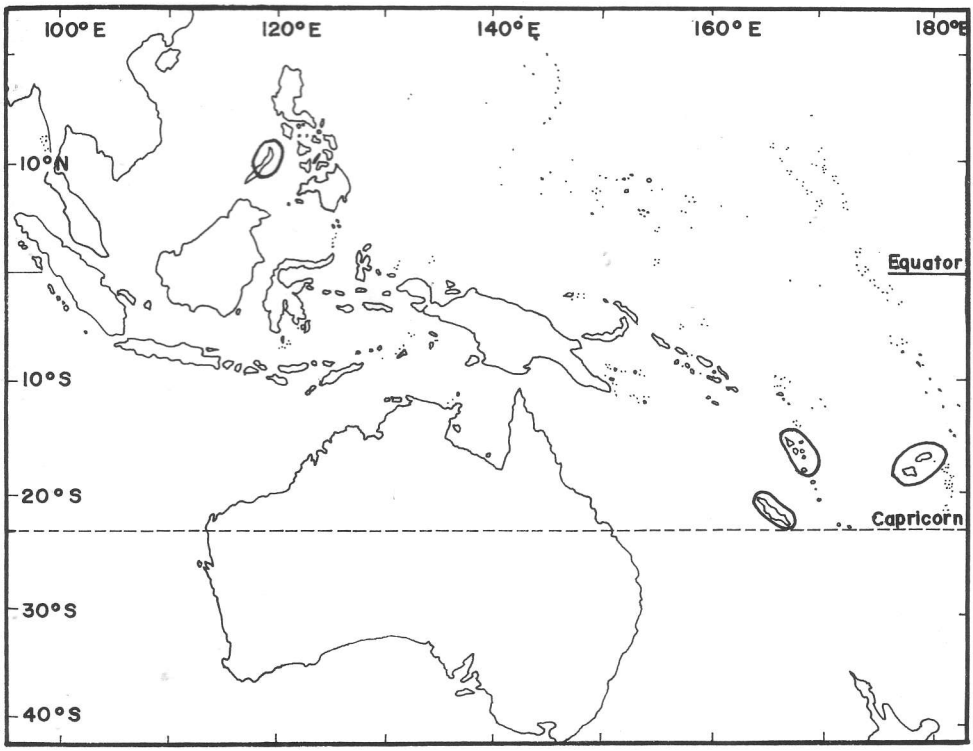
3. Distribution of the genus *Heterospathe* (after Fernando, in press).

the Philippines and farther eastwards to New Guinea. There are in these two Sundaic areas certain genera that are surprisingly unrepresented in the Philippines, even in Palawan, the island with strongest Sundaic affinity. Some of these unexpectedly absent genera include *Nenga*, *Eugeissona*, *Ceratolobus*, *Plectocomiopsis*, and *Iguanura*.

Taiwan appears to have an almost equal degree of affinity at the genus level with the Philippine palm flora as Malay Peninsula despite its poor palm flora. Except perhaps for *Phoenix*, the shared taxa with Taiwan are, however, either direct extensions of the Philippine palm flora or have their closest relatives in the Philippines. In fact, there is no genus of palms in Taiwan that does not also occur in the Philippines.

Between New Guinea and the Philippines the affinity decreases. There are, however, at least two genera with almost equal representation in both areas. *Heterospathe*, for example, is represented by 16 species in New Guinea (Essig 1977) and about 11 species in the Philippines (Fernando, in press). In *Areca* there are 11 species in New Guinea (Essig 1977) and 10 species in the Philippines. Majority of the New Guinean *Areca* species (at least 6) belong to Furtado's sect. *Axonianthe* (Furtado 1933) with a distribution limited from the eastern parts of the Philippines (3 species), Moluccas (1 species) to New Guinea, and the Solomon Islands (3 species) (Fig. 5).

Heterospathe and *Veitchia* are clear exceptions to the West Malesian or Sundaic pattern of the Philippine palm flora. *Heterospathe* is generally regarded as Papuasian, with most generic relatives there. *Veitchia*, on the other hand, has a very odd distribution with the rest of the species in the South Pacific (Fig. 4) and generic relatives in New Guinea and Australia. The case of *Cocos* has already been



4. Distribution of the genus *Veitchia* (after Dransfield 1981).

mentioned earlier; elsewhere wild-types of coconut have so far been found only in Australia (Buckley and Harries 1984).

On the whole the Philippine palm flora indicates distinct affinities with that of Sundaic Malesia. Only two genera represent the Papuasian element. Like Celebes, there are no endemic genera in the Philippines.

Ecology and Distribution of the Palms in the Philippines

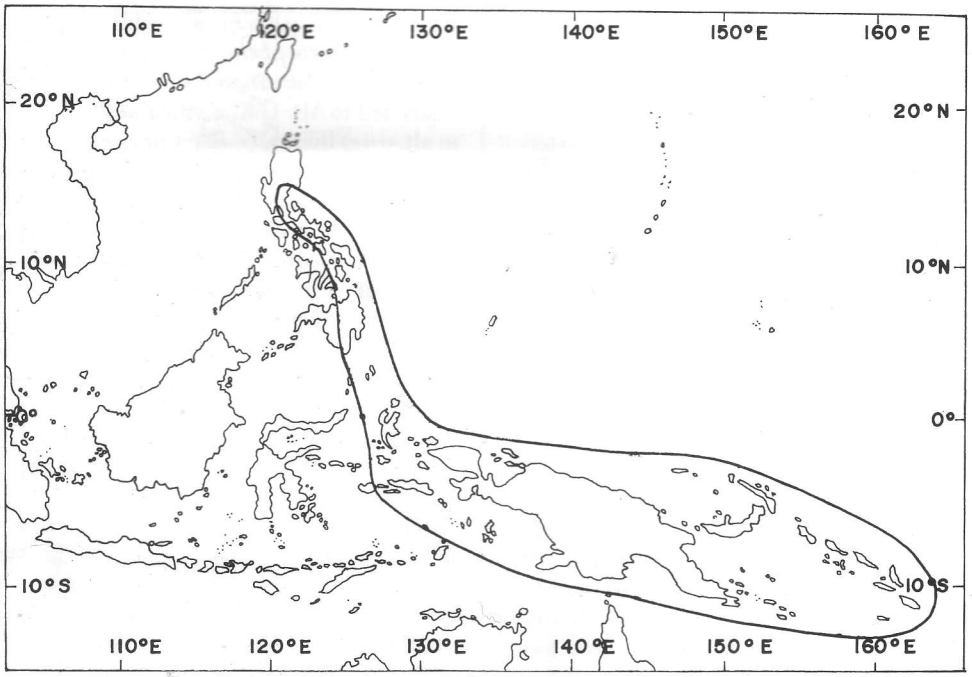
The palms of the Philippine Islands form important components in most forest types occurring from sea level in mangrove swamps up to 2,200 m alt. in mossy forests. In mangrove swamps *Nypa fruticans* often forms dense and extensive colonies. In settled areas palms are usually conspicuous by their size (*Corypha utan*) or their frequent cultivation (*Areca catechu*). In lowland to mid-elevation humid forests, rattans, mostly of the genera *Calamus* and *Daemonorops*, are generally prominent and abundant except where they have been extensively exploited for commercial use. Seedlings and specimens of rattans at their rosette stages are frequently common on the forest floor. The erect, undergrowth palms, such as species of *Pinanga*, *Areca* and *Heterospathe* are usually of local occurrence, but in certain areas, especially dense and humid forests where they grow, they sometimes form large populations. Certain species of *Areca*, like *A. whitfordii* and *A. parens* prefer rather swampy portions of the forest. *Livistona saribus* also prefers swampy but open areas at low altitudes and grows gregariously in large numbers in northeastern Luzon. Most species

Table 1. Affinity of the Philippine palm flora.

	Malay Peninsula (Whitmore 1973, Uhl and Dransfield 1987) 31 Genera 220 Species		Borneo (Uhl and Dransfield 1987) 27 Genera ? Species		Celebes (Dransfield 1981, Uhl and Dransfield 1987) 17 Genera 52 Species		New Guinea (Essig 1977, Uhl and Dransfield 1987) 31 Genera 272 Species		Taiwan (Li 1978) 6 Genera 6 Species	
	Shared	Unshared[b]	Shared	Unshared	Shared	Unshared	Shared	Unshared	Shared	Unshared
Philippines										
20 genera	16	13/4	15	12/4	13	4/7	14	17/6	6	0/14
Kroeber's percent similarity[a]	65.8%		65.2%		70.7%		57.5%		65.0%	
135 species	19	201/116	26	no data	10	no data	4	268/131	2	4/133
Kroeber's percent similarity	11.3%		no data		13.5%		2.2%		17.4%	

[a] Kroeber's similarity = $C(A + B)/2\ AB \times 100$, where A = no. of taxa present in the first area under comparison, B = no. of taxa present in the second area under comparison, and C = no. of taxa common in both A and B areas (after van Balgooy 1971).

[b] The numerator indicates the no. of taxa present in the area under comparison but not in the Philippines; the denominator indicates the taxa present in the Philippines but absent in the area under comparison.



5. Distribution of the genus *Areca* L. sect. *Axonianthe* Scheff. sensu Furtado (1933).

of *Arenga* and *Caryota* are characteristic of light gaps and disturbed portions of forests. In Palawan, *Veitchia merrillii* occurs on sandy soils and limestone formations. A few species such as *Calamus dimorphacanthus* and *Pinanga philippinensis* can occur in mossy forests up to 2,200 m alt.

About half of the known species of Philippine palms occur on the large, main island of Luzon, although only 15 species are strictly confined to the island, excluding the still undescribed ones. Mindanao, the second largest island, has 63 species with 14 endemics. Palawan has 37 species, but only eight are truly endemic; most are Bornean elements that do not extend farther into the archipelago proper.

Available information and recent collections indicate particular distributional patterns of the palms in the archipelago. These are but tentative as some known species may actually be more widespread than they appear to be. The apparent patterns of distribution may be distinguished as follows:

1. **Widespread throughout the Islands.**—*Calamus usitatus*, *C. merrillii*, *Daemonorops mollis* (Fig. 6A), *D. ochrolepis*, *Heterospathe elata*, *Pinanga insignis*, and *P. philippinensis*.

2. **Luzon Pattern** (mostly along the eastern side of the island).—*Calamus arugda*, *C. balerensis*, *C. discolor*, *Daemonorops loheriana*, *Livistona saribus*, *Orania rubiginosa* (Fig. 6B), and *Pinanga isabelensis*.

2a. **N. Luzon–Batanes/Babuyan Pattern.**—*Calamus mitis* (Fig. 6C), and *Pinanga urosperma*.

2b. **E. Luzon–Polillo Pattern.**—*Areca ipot* (Fig. 6D), *Livistona robinsoniana*, and an undescribed species of *Pinanga*.

3. **Luzon–Mindanao Pattern.**—*Calamus cumingianus*, *C. elmerianus*, *C. manillensis* (Fig. 7A), and another undescribed species of *Calamus*.

4. **Luzon–Mindoro Pattern.**—*Areca whitfordii* (Fig. 7B), *Pinanga geonomiformis*, and *Calamus mindorensis*.

5. **Mindanao–Leyte–Samar–S.E. Luzon Pattern.**—*Heterospathe intermedia* (Fig. 7C), *Areca caliso*, and *Calamus aidae*.

6. **Negros–Masbate–S. Luzon Pattern.**—*Heterospathe negrosensis* (Fig. 7D), *Pinanga heterophylla*, and *P. rigida*.

7. **Palawan Pattern.**—*Korthalsia merrillii* (Fig. 8A), *Daemonorops curranii*, *D. gracilis*, and *Orania paraguanensis*.

8. **Mindanao–Basilan Pattern.**—*Areca hutchinsoniana*, *Calamus moseleyanus*, *Pinanga basilanensis*, *P. modesta*, and *P. speciosa* (Fig. 6B).

9. **Narrow Endemics** (restricted to very particular localities).—(a) Luzon: *Areca camarinensis*, known only from two adjacent localities in Camarines Prov.; *Areca parens*, known only from two collections, possibly from same locality in semi-swampy forests, Camarines Prov.; *Pinanga bicolana*, known only from two localities in lowland forests also in Camarines Prov.; several undescribed species of *Pinanga* have also been observed to be very local and restricted to certain localities in Luzon, mostly along the east coast.—(b) Batan Island: *Pinanga batanensis*, localized on the lower slopes of Mt. Iraya along mountain streams.—(c) Mindoro: *Calamus jenningsianus* and *Pinanga sclerophylla*, known only from Mt. Halcon at 1,500 m alt.—(d) Sibuyan Island: *Heterospathe sibuyanensis* and *Pinanga sibuyanensis*, both species restricted to Mt. Giting-giting at 200–600 m alt.—(e) Biliran Island: *Corypha microclada* (Fig. 8C), known only from a single collection from the island.—(f) Samar: *Pinanga samarana*, still known only from the type collected on Mt. Cauayan.—(g) Mindanao: *Plectocomia elmeri* (Fig. 8D), very localized on Mt. Apo and still known only from the type (Madulid 1981) collected at 900 m alt. along streams in dense forest; *Calamus vinosus*, known only from Mt. Hilong-hilong (Mt. Urdaneta) at 1,450 m alt. on deep forested and sheltered ravines.

This account of the palms of the Philippine Islands is certainly not an exhaustive one and is clearly preliminary in nature. Some new taxa need to be described and published, while a number of varieties and perhaps some other species may eventually be reduced to synonymy. Surely, the list will change in time. More complete collections from the currently inaccessible and less-explored areas of the archipelago and specialist study in the field and herbarium is certain to expand our present knowledge of the taxonomy and phytogeography of the palms, provide more details, and maybe even change others.

Acknowledgments

It is with great pleasure to acknowledge my sincere indebtedness to Dr. John

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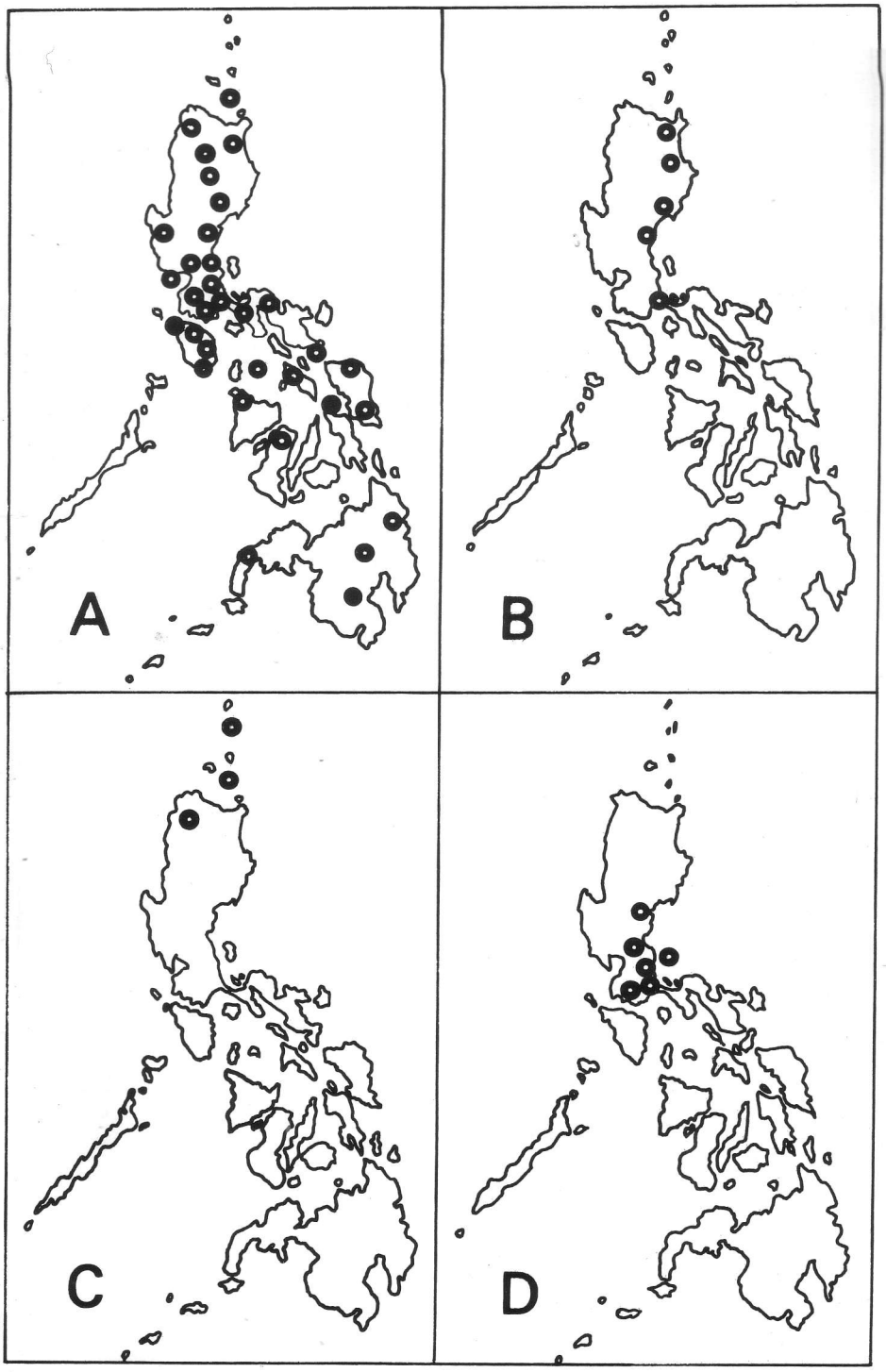
6. Distribution patterns of Philippine palms: A. Widespread throughout the islands (*Daemonorops mollis*). B. Luzon pattern (*Orania rubiginosa*). C. Northern Luzon–Batanes/Babuyan pattern (*Calamus mitis*). D. Eastern Luzon–Polillo pattern (*Areca ipot*).

7. Distribution patterns of Philippine palms. A. Luzon–Mindanao pattern (*Calamus manillensis*). B. Luzon–Mindoro pattern (*Areca whitfordii*). C. Mindanao–Leyte–Samar–S.E. Luzon pattern (*Heterospathe intermedia*). D. Negros–Masbate–S. Luzon pattern (*Heterospathe negrosensis*).

8. Distribution patterns of Philippine palms. A. Palawan pattern (*Korthalsia merrillii*). B. Mindanao–Basilan pattern (*Pinanga speciosa*). C. Narrow endemic (*Corypha microclada*). D. Narrow endemic (*Plectocomia elmeri*).



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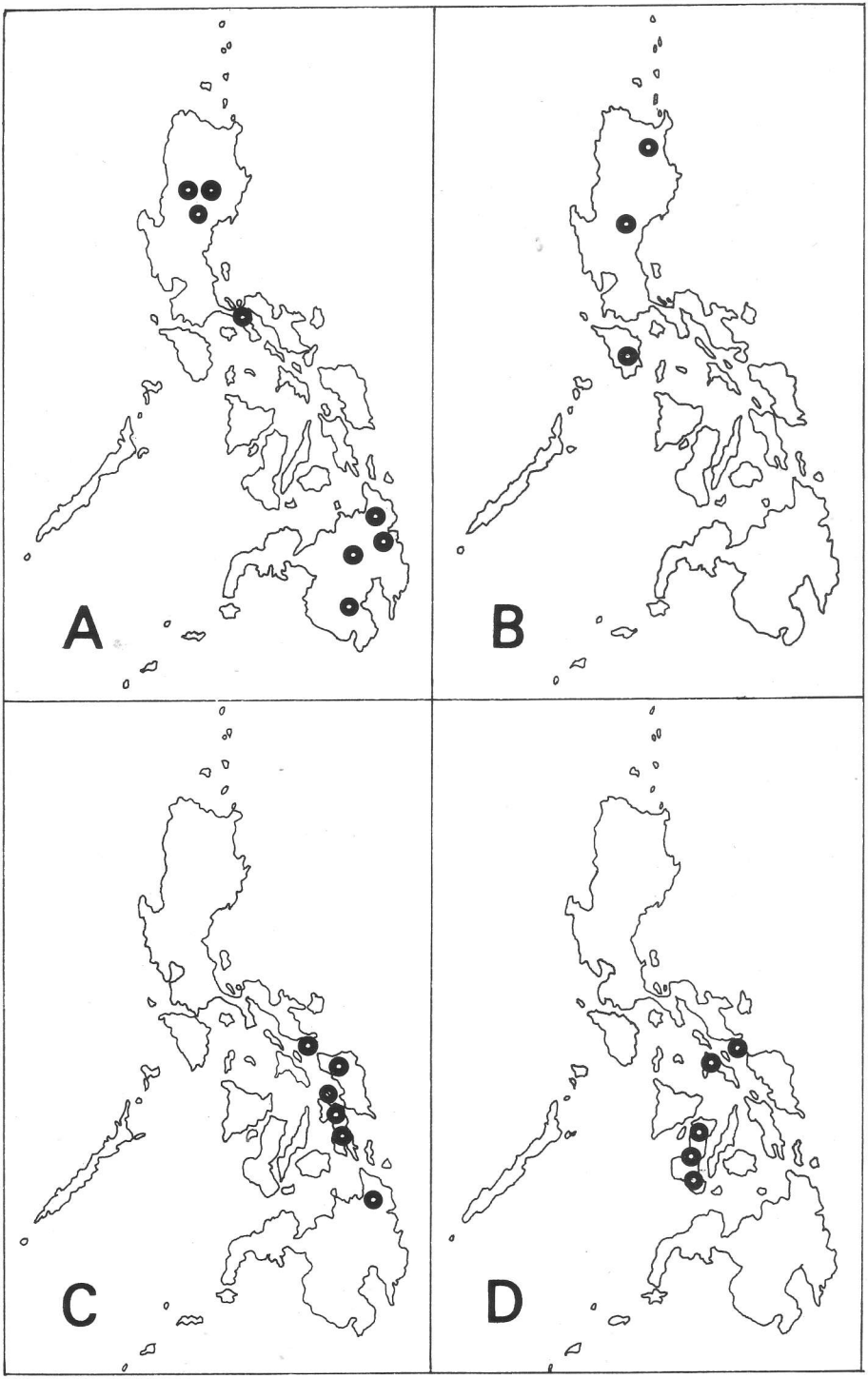
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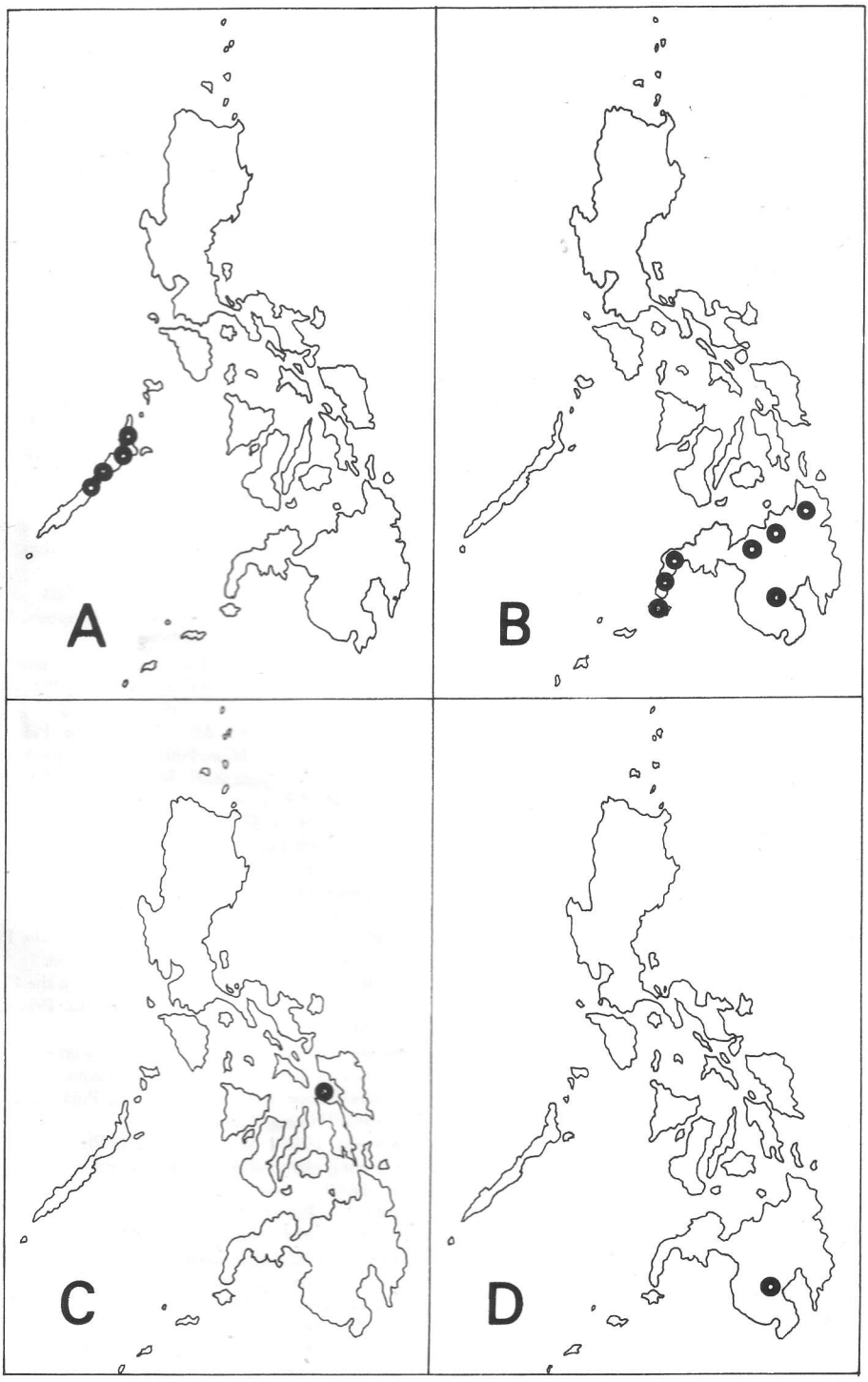

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Appendix 1. Updated Checklist of Indigenous Philippine Palms

I. Subfamily CORYPHOIDEAE (4 of 38 genera and 2 of 3 tribes represented)
  Tribe Corypheae
    1. *Livistona* (ca. 28 spp. S.E. Asia to Australia and Solomon Is.; 4 spp. in the Philippines, 2 endemic)
      1. *L. merrillii* Becc.—Luzon
      2. *L. robinsoniana* Becc.—Luzon, Polillo
      3. *L. rotundifolia* (Lam.) Mart.—[Java, Celebes, Moluccas; 3 varieties in the Philippines]
        3a. var. *luzonensis* Becc.—Luzon, Negros, Mindanao
        3b. var. *microcarpa* Becc.—Palawan, Mindanao
        3c. var. *mindorensis* Becc.—Mindoro
      4. *L. saribus* (Lour.) Merr. ex A. Chev.—Luzon [Indo-China, Malay Peninsula, Java, Borneo]
    2. *Licuala* (ca. 108 spp., S.E. Asia to Pacific, 1 sp. in the Philippines)
      5. *L. spinosa* Wurmb.—Culion, Palawan, Balabac [Andamans, Malay Peninsula, Burma, Thailand, Indo-China, Sumatra, Java, Borneo]
    3. *Corypha* (ca. 6–8 spp., India to N. Australia; 2 spp. in the Philippines, 1 endemic)
      6. *C. utan* Lam.—throughout the Philippines [S. India, Sri Lanka, Andamans, S.E. Asia, N. Australia]
      7. *C. microclada* Becc.—Biliran
  Tribe Phoeniceae
    4. *Phoenix* (ca. 12 spp., Canary Is., Africa, continental Asia to S. China, Malay Peninsula, Sumatra, Taiwan; 1 variety in the Philippines)
      8. *P. hanceana* Naŭd. var. *philippinensis* Becc.—Batanes Is. [The variety endemic, the species in S.E. China]

II. Subfamily CALAMOIDEAE (6 of 22 genera and 1 of 2 tribes represented)
  Tribe Calameae
    5. *Metroxylon* (5 spp., Sumatra, Borneo to New Guinea and Pacific; 1 sp. in the Philippines)
      9. *M. sagu* Rottb.—Mindanao [Sumatra, Borneo, New Guinea; 2 of 4 formas in the Philippines]
        9a. forma *sagu*—Mindanao
        9b. forma *longispinum* (Giseke) Rauwerdink—Mindanao
    6. *Korthalsia* (ca. 25 spp., Andamans to Burma, Indo-China, Thailand and through Malesia, 5 spp. in the Philippines, 2 endemic)
      10. *K. laciniosa* (Griff.) Mart.—Luzon, Polillo, Catanduanes, Leyte, Panay, Mindanao [Andaman and Nicobar Islands, Burma, Thailand, Indo-China, Malay Peninsula, Sumatra, Java]
      11. *K. merrillii* Becc.—Palawan
      12. *K. rigida* Blume—Palawan [S. Thailand, Malay Peninsula, Sumatra, Borneo]
      13. *K. robusta* Blume—Palawan, Balabac [Sumatra, Borneo]
      14. *K. scaphigeroides* Becc.—Mindanao, Basilan
    7. *Salacca* (ca. 18 spp., S. China, Burma, Thailand, Malay Peninsula, Sumatra, Java, Borneo; 2 spp. in the Philippines)
      15. *S. clemensiana* Becc.—Mindanao [Borneo]
      16. *S. ramosiana* Mogea—Palawan, Tawi-Tawi [Borneo]
    8. *Daemonorops* (ca. 114 spp., N.E. Indian to S. China, through Malesia; ca. 13 spp. and 1 var. in the Philippines, all endemic except 1 sp.)
      17. *D. affinis* Becc.—Mindanao
      18. *D. clemensiana* Becc.—Mindanao
      19. *D. curranii* Becc.—Palawan

20. *D. gracilis* Becc.—Palawan
21. *D. longipes* (Griff.) Mart.—Palawan [Malay Peninsula, Sumatra, Borneo]
22. *D. loheriana* Becc.—Luzon
23. *D. margaritae* (Hance) Becc. var. *palawanica* Becc.—Palawan [The variety endemic, the species in S. China]
24. *D. mollis* (Blco.) Merr.—throughout the Philippines
25. *D. ochrolepis* Becc.—Luzon, Polillo, Biliran, Catanduanes, Panay, Leyte, Mindanao
26. *D. oligolepis* Becc.—Mindanao
27. *D. pannosa* Becc.—Mindanao
28. *D. pedicellaris* Becc.—Leyte, Mindanao
29. *D. polita* Fernando—Mindanao
30. *D. urdanetana* Becc.—Mindanao

9. *Calamus* (ca. 370 spp., Africa, India and S. China, through Malesia to New Guinea, N. Australia and Fiji; ca. 45 spp. in the Philippines, including 2 new spp. and 1 new var., 33 spp. endemic)
31. *C. aidae* Fernando—Luzon, Samar, Biliran, Dinagat, Mindanao
32. *C. arugda* Becc.—Luzon
33. *C. balerensis* Fernando—Luzon
34. *C. batanensis* (Becc.) Baja-Lapis—Batanes Is.
35. *C. bicolor* Becc.—Mindanao
36. *C. caesius* Blume—Palawan [Sumatra, Malay Peninsula, Borneo]
37. *C. cumingianus* Becc.—Luzon, Mindanao
38. *C. diepenhorstii* Mig. var. *exulans* Becc.—Palawan, Luzon, Polillo [The variety endemic, the species in Malay Peninsula, Sumatra and Borneo]
39. *C. dimorphacanthus* Becc.
    39a. var. *dimorphacanthus*—Luzon, Sibuyan, Panay
    39b. var. *montalbanicus* Becc.—Luzon
    39c. var. *zambalensis* Becc.—Luzon, Mindoro, Leyte
    39d. var. *benguetensis* Baja-Lapis—Luzon
    30e. var. *halconensis* (Becc.) Baja-Lapis—Luzon, Mindoro, Panay, Mindanao
40. *C. discolor* Mart.
    40a. var. *discolor*—Luzon
    40b. var. *negrosensis* Becc.—Negros, Siargao, Mindanao
41. *C. elmerianus* Becc.—Luzon, Dinagat, Mindanao
42. *C. erinaceus* (Becc.) Dransf.
    42a. var. *erinaceus*—Palawan [S. Thailand, Malay Peninsula, Sumatra, Borneo]
    [42b.] var. nov. (ined.)—Palawan
43. *C. filispadix* Becc.—Luzon, Polillo, Catanduanes, Masbate, Samar, Palawan, Mindanao
44. *C. foxworthyi* Becc.—Palawan
45. *C. grandifolius* Becc.—Luzon, Catanduanes
46. *C. javensis* Blume—Palawan [S. Thailand, Malay Peninsula, Sumatra, Borneo, Java]
47. *C. jenningsianus* Becc.—Mindoro
48. *C. malawaliensis* J. Dransf.—Palawan [Malawali]
49. *C. manillensis* (Mart.) H. A. Wendl.—Luzon, Dinagat, Mindanao
50. *C. marginatus* (Blume) Mart.—Palawan [Sumatra, Borneo]
51. *C. megaphyllus* Becc.—Leyte, Mindanao
52. *C. melanorhynchus* Becc.—Mindanao
53. *C. merrillii* Becc.
    53a. var. *merrillii*—Luzon, Masbate, Palawan, Panay, Mindanao, Basilan
    53b. var. *merrittianus* (Becc.) Becc.—Mindoro
    53c. var. *nanga* Becc.—Mindanao
54. *C. microcarpus* Becc.
    54a. var. *microcarpus*—Luzon, Polillo, Mindoro, Leyte, Mindanao
    54b. var. *diminutus* Becc.—Luzon
    54c. var. *longiocrea* Baja-Lapis—Luzon
55. *C. microsphaerion* Becc.
    55a. var. *microsphaerion*—Luzon, Culion, Palawan [Borneo]
    55b. var. *spinosior* Becc.—Palawan
56. *C. mindorensis* Becc.—Luzon, Mindoro
57. *C. mitis* Becc.—Batanes, Babuyan, Luzon
58. *C. moseleyanus* Becc.—Mindanao, Basilan, Malanipa

59. *C. multinervis* Becc.—Mindanao
60. *C. ornatus* Blume
    60a. var. *philippinensis* Becc.—Luzon, Polillo, Mindoro, Negros, Panay, Leyte, Mindanao, Basilan
    60b. var. *pulverulentus* Fernando—Palawan, Mindanao
61. *C. ramulosus* Becc.—Luzon
62. *C. reyesianus* Becc.—Luzon, Mindoro, Mindanao
63. *C. samian* Becc.—Luzon, Leyte, Mindanao
64. *C. scipionum* Lour.—Palawan [S. Thailand, Malay Peninsula, Sumatra, Borneo]
65. *C. siphonospathus* Mart.
    65a. var. *siphonospathus*—Luzon
    65b. var. *dransfieldii* Baja-Lapis—Mindanao [Celebes]
    65c. var. *farinosus* Becc.—Luzon
    65d. var. *oligolepis* Becc.—Luzon
    65e. var. *polylepis* Becc.—Luzon
    65f. var. *sublevis* Becc.—Luzon, Mindanao
66. *C. spinifolius* Becc.—Luzon, Panay, Mindanao
67. *C. subinermis* H. A. Wendl. ex. Becc.—Palawan [Borneo]
68. *C. symphysipus* Mart.—Luzon, Catanduanes, Bucas Grande, Mindanao [Celebes]
69. *C. trispermus* Becc.—Luzon
70. *C. usitatus* Blco.—throughout the Philippines [Borneo]
71. *C. vidalianus* Becc.—Luzon, Panay
72. *C. vinosus* Becc.—Mindanao
73. *C. viridissimus* Becc.—Mindanao

[74.] *C.* sp. nov. (ined.)—Luzon, Mindanao

[75.] *C.* sp. nov. (ined.)—Masbate

10. *Plectocomia* (ca. 16 spp., India to S. China, Malay Peninsula, Sumatra, Borneo; 1 sp. and 1 var. in the Philippines, both endemic)
    76. *P. elmeri* Becc.—Mindanao
    77. *P. elongata* Mart. ex Blume var. *philippinensis* Madulid—Palawan, Mindanao, Leyte, Biliran [The variety endemic, the species in Thailand, Malay Peninsula, Sumatra, Borneo]

III. Subfamily NYPOIDEAE

11. *Nypa* (monotypic, India through Malesia, N. Australia, Micronesia, and Melanesia)
    78. *N. fruticans* Wurmb.—throughout the Philippines

IV. Subfamily ARECOIDEAE (9 of 124 genera and 3 of 6 tribes represented)

Tribe Caryoteae

12. *Arenga* (ca. 21 spp., India to S. China and Ryukyus, through Malesia and N. Australia; 4 spp. in the Philippines, 1 endemic)
    79. *A. brevipes* Becc.—Palawan [Sumatra, Borneo]
    80. *A. pinnata* (Wurmb.) Merr.—Luzon, Polillo, Biliran, Mindanao [Malay Peninsula, Sumatra, Java, Celebes]
    81. *A. tremula* (Blco.) Becc.—Luzon, Mindoro
    82. *A. undulatifolia* Becc.—Luzon, Palawan, Mindanao, Sulu [Borneo, Celebes]
13. *Caryota* (ca. 12 spp., India to S. China, through Malesia to N. Australia; 3 spp. and 1 var. in the Philippines, 1 species endemic)
    83. *C. cumingii* Lodd. ex Mart.—Luzon, Mindoro, Panay, Palawan, Mindanao
    84. *C. mitis* Lour.—Palawan [Burma, Indo-China, Malay Peninsula, Sumatra, Borneo, Java]
    85. *C. rumphiana* Mart.
        85a. var. *philippinensis* Becc.—Luzon, Mindoro, Negros, Mindanao
        85b. var. *oxyodonta* Becc.—Luzon

Tribe Areceae

14. *Orania* (ca. 17 spp., Madagascar, S. Thailand through Malesia to New Guinea; 4 spp. and 3 varieties in the Philippines, all endemic)
    86. *O. decipiens* Becc.
        86a. var. *decipiens*—Mindoro
        86b. var. *mindanaoensis* Becc.—Mindanao
        86c. var. *montana* Becc.—Mindanao
    87. *O. palindan* (Blco.) Merr.
        87a. var. *palindan*—Luzon, Samar
        87b. var. *sibuyanensis* (Becc.) Merr.—Sibuyan

88. *O. paraguanensis* Becc.—Palawan
89. *O. rubiginosa* Becc.—Luzon

15. *Veitchia* (ca. 18 spp., New Hebrides, New Caledonia, Fiji; 1 sp. in the Philippines, endemic)
90. *V. merrillii* (Becc.) H. E. Moore—Palawan, Calamianes

16. *Pinanga* (ca. 120 spp., throughout Malesia; ca. 25 spp. in the Philippines, including 4 new species, all endemic except 1 sp.)
91. *P. basilanensis* Becc.—Mindanao, Basilan
92. *P. batanensis* Becc.—Batan Is.
93. *P. bicolana* Fernando—Luzon
94. *P. copelandii* Becc.—Luzon, Panay, Negros, Bohol, Leyte, Mindanao, Basilan
95. *P. curranii* Becc.—Palawan, Dumaran, Busuanga
96. *P. geonomiformis* Becc.—Luzon, Polillo, Mindoro
97. *P. heterophylla* Becc.—Luzon, Rapu-Rapu, Negros
98. *P. insignis* Becc.
98a. var. *insignis* Becc.—Luzon, Mindoro, Leyte, Mindanao [Caroline Islands]
98b. var. *gasterocarpa* Becc.—Masbate, Negros
98c. var. *leptocarpa* Becc.—Negros
98d. ssp. *loheriana* Becc.—Luzon
99. *P. isabelensis* Becc.—Luzon
100. *P. maculata* Porte ex Lem.—Babuyan, Luzon, Polillo, Catanduanes, Mindoro, Panay, Siargao, Mindanao
101. *P. modesta* Becc.—Bucas Grande, Mindanao, Basilan
102. *P. negrosensis* Becc.—Negros
103. *P. philippinensis* Becc.—Luzon, Mindoro, Leyte, Negros, Panay, Mindanao
104. *P. rigida* Becc.—Luzon, Negros
105. *P. samarana* Becc.—Samar
106. *P. sclerophylla* Becc.—Mindoro
107. *P. sibuyanensis* Becc.—Sibuyan
108. *P. speciosa* Becc.—Mindanao, Basilan
109. *P. urdanetensis* Becc.—Mindanao
110. *P. urosperma* Becc.—Babuyan, Luzon
111. *P. woodiana* Becc.—Luzon, Mindoro, Mindanao
[112.] *P.* sp. nov. (ined.)—Luzon
[113.] *P.* sp. nov. (ined.)—Luzon
[114.] *P.* sp. nov. (ined.)—Luzon
[115.] *P.* sp. nov. (ined.)—Luzon, Polillo

17. *Areca* (ca. 50 spp., India to S. China, through Malesia to the Solomon Islands; 10 spp. in the Philippines, including 1 new variety, all endemic except 2 spp.)
116. *A. caliso* Becc.
116a. var. *caliso*—Mindanao
[116b.] var. nov. (ined.)—Luzon, Biliran, Leyte, Mindanao
117. *A. camarinensis* Becc.—Luzon
118. *A. catechu* L.—throughout the Philippines, cultivated [widespread in the tropics]
119. *A. costulata* Becc.—Leyte, Dinagat
120. *A. hutchinsoniana* Becc.—Mindanao, Basilan, Siassi
121. *A. ipot* Becc.—Luzon, Polillo
122. *A. macrocarpa* Becc.—Mindanao
123. *A. parens* Becc.—Luzon
124. *A. vidaliana* Becc.—Palawan [Balembangan]
125. *A. whitfordii* Becc.
125a. var. *whitfordii*—Mindoro
125b. var. *luzonensis* Becc.—Luzon

18. *Heterospathe* (ca. 37 spp., Moluccas, New Guinea, Solomon Islands and Micronesia; ca. 11 spp. in the Philippines, all endemic except 1 sp.)
126. *H. brevicaulis* Fernando—Luzon
127. *H. cagayanensis* Becc.—Luzon
128. *H. dransfieldii* Fernando—Palawan
129. *H. elata* Scheff.—Luzon, Mindoro, Masbate, Cebu, Panay, Samar, Siquijor, Dinagat, Bucas Grande, Mindanao [Moluccas, Micronesia]

130. *H. elmeri* Becc.—Negros, Camiguin
131. *H. intermedia* (Becc.) Fernando—Luzon, Samar, Biliran, Leyte, Mindanao
132. *H. negrosensis* Becc.—Luzon, Sibuyan, Masbate, Negros, Panay
133. *H. philippinensis* (Becc.) Becc.—Luzon, Leyte, Dinagat, Bucas Grande
134. *H. scitula* Fernando—Luzon
135. *H. sibuyanensis* Becc.—Sibuyan
136. *H. trispatha* Fernando—Luzon

19. *Oncosperma* (ca. 5 spp., Ceylon to Malay Peninsula, Sumatra, Borneo, Java, Celebes; 4 spp. in the Philippines, 2 endemic)
137. *O. gracilis* Becc.—Luzon, Biliran
138. *O. horridum* (Griff.) Scheff.—Polillo, Mindanao [Malay Peninsula, Sumatra, Borneo, Celebes]
139. *O. platyphyllum* Becc.—Negros
140. *O. tigillarium* (Jack) Ridl.—Palawan [Indo-China, Malay Peninsula]

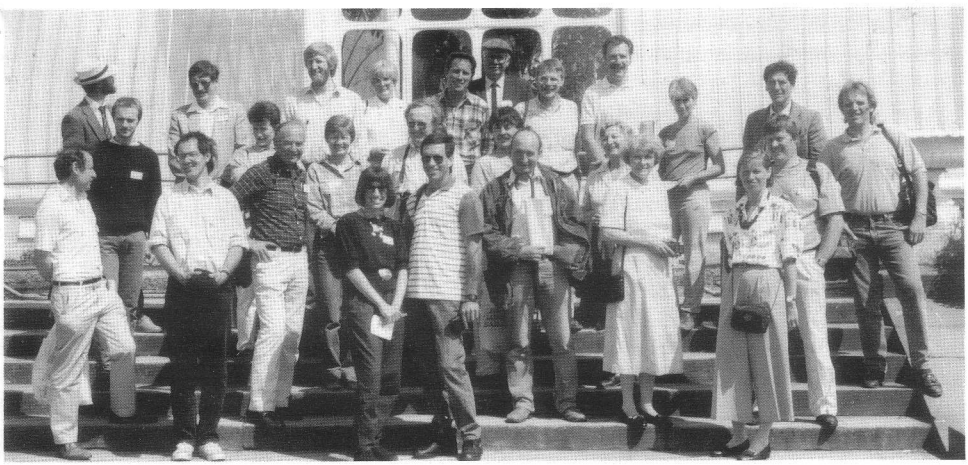
Tribe Cocoeae

20. *Cocos* (monotypic, origin of Western Pacific, widely cultivated throughout tropics and subtropics)
141. *C. nucifera* L.—throughout the Philippines, cultivated; wild-types in eastern Samar [wild-types also in eastern Australia]

Principes, 34(1), 1990, pp. 45–47

NEWS OF THE SOCIETY

Robert W. Read (phone: 813-793-1074), formerly Curator of Botany, The United States National Herbarium (US), Department of Botany, Smithsonian Institution, now Botanist Emeritus, has retired to Naples, Florida. After 22 years at the Smithsonian, the last 16 as a curator, Dr. Read will continue his research on palms and bromeliads in association with The Fairchild Tropical Gardens and The Marie Selby Botanical Garden respectively. He plans to continue monographic studies on the palm genus *Pritchardia*, the native palms of the United States, palms of the Caribbean, and selected genera of palms for the Flora Mesoamerica and Flora Neotropica. Bromeliad research interests



1. European members of IPS stand in front of the main doors of the Palm House at Kew.

2. Inside the newly restored Palm House IPS members view the progress of replanting.

include *Pitcairnia* in the West Indies, *Neoregelia*, *Billbergia* and especially members of the Bromelioideae.

UK and European IPS Members Meet at Kew

May the 6th was a red letter day in the diaries of United Kingdom and European members of the International Palm Society—the first ever chapter meeting, to be held at the Royal Botanic Gardens at Kew.

England has been enjoying something of a heatwave so far this summer so everyone was feeling particularly palmy when we met each other, in many cases for the first time. The day began with coffee and biscuits in the Herbarium at Kew, and the turnout—nearly 40 people—was excellent, some members having travelled long distances, some even from abroad, to be here this day.

We were welcomed by Eric Taylor who then handed over to Dr. John Dransfield who entertained us with, firstly an introduction to Kew and the work that is carried on here, and then a talk, illustrated with slides, on the palms of Madagascar, including exciting species, new to science, which in some cases have only working names as yet.

John ended on a serious and salutary note: a heartfelt warning of the dangers of indiscriminate seed collecting of rare and endangered species. The final slide—a beautiful vista of *Neodypsis decaryi* growing wild on a Madagascar hillside—was a case in point.

Then back into the sunshine for a guided tour of the gardens themselves including areas not open to the general public. We began with the palm nursery where David Cooke does for a living what many of us simply do as a hobby—he grows and raises palms from seed. Many of the palms we were later to see in the main greenhouses began life in his capable hands.

But perhaps the highlight of the day was a visit to the newly refurbished Palm House—that most famous of palm houses, designed by Decimus Burton in 1848 and now completely rebuilt after over a century of the ravages of weather and pollution. The palms were just being moved back in after two years in a temporary house. It is going to look magnificent.

Towards the end of the afternoon, we made our weary way back to our starting point, for tea and cakes at the Herbarium. What a splendid day we had had. Kew really is a Mecca for palm enthusiasts and everyone was talking animatedly about the day's events. Eric gave a farewell and thank you talk bringing this first ever chapter meeting to a happy and successful conclusion.

MARTIN GIBBONS

Color Makes the Difference!

The exciting book on Chamaedoreas by Don Hodel should be completed by the end

of the year and will be available in late 1990. (See pp. 4–10 and Back Cover.)

In researching the Chamaedoreas in their natural habitat and in botanical and private gardens, Don took thousands of photographs. Many species we have heard about but never seen, and some are new discoveries. It was very hard to eliminate any, but we had to! We would like to splurge and include approximately 300 beautiful color photographs of the choice ones. To make this possible, and keep the cost of the book within everyone's budget, we are asking for donations for COLOR. Any amount will be greatly appreciated, but those who wish to donate $250.00 or more, will receive a numbered, autographed copy.

PAULEEN SULLIVAN

Please send donations to: The International Palm Society Publication Fund, Color, 3616 Mound Ave. Ventura, CA 93003 USA

South Florida Chapter, International Palm Society Fall Show and Sale 1989 at Fairchild Tropical Garden

The 1989 Fall Show and Sale of the South Florida Chapter proved to be the most successful in the eleven year history of sales in Dade County. Fifty-four growers sold a record 3,828 containers of one or more palms. The two day event grossed $67,291.50, also a new record. The average price per sale item was $17.58, actually a decrease from the previous year. More than 400 species of palms were represented at the sale, a striking increase above the 150 species offered in 1981.

Over 1800 people passed through the Garden gates during the November 4th and 5th Show and Sale. This figure included 1,055 paid admissions to the Garden. The Garden enrolled 63 new members during the weekend and as co-sponsor of the sale shared in the Chapter's proceeds.

The theme of this year's show was Palms of Madagascar and Islands of the Indian Ocean. In addition to a Show booklet containing articles elaborating on the featured theme, there were prize ribbons awarded for specimen plants brought in for display in the Garden auditorium. These included Best of Show, Most Unusual, Best Madagascar Palm, Best Indian Ocean Palm, and Best Indoor Display. Other facets of the Educational Exhibit included a seed display by botanical classification, seed germination methods, palm nutririon problems, Lethal Yellowing of Palms, Florida Division of Forestry Coconut Breeding Program, Insects and Diseases of Palms, Florida Division of Plant Industry, palm products, palm weaving, photos of Chapter community service projects, herbarium display by the Garden and recent palm research at the University of Florida Agriculture Research and Education Center, Ft. Lauderdale.

In the sale area there was the traditional repotting demonstration by Louise Futch. For the second year, an information table staffed by Chapter volunteers provided buyers with guidance in the grower area, as well as advice on cultivation techniques and other useful topics. Special thanks are due to Mark Levandoski, Sale Chairman, Bill Theobald, Education Chairman and those nongrower Chapter members who have repeatedly volunteered their time and efforts to help make this event a success year after year. We feel that we have succeeded in reaching our goal of acquainting the public with the palm family and making plants available to them at a reasonable cost.

We all look forward to the Spring Show and Sale in Broward County at Flamingo Gardens on May 5 and 6, 1990.

LEONARD GOLDSTEIN

Hurricane Hugo

Dear Dr. Uhl:

Hurricane Hugo appears not to have damaged native coastal S. palmetto in S.C. From personal observations in the hardest hit McClellanville and Bull Island area few of the palms are damaged at all, unless actually undermined by high water or struck by another tree. Most are erect and hold a full head of fronds. The effect is striking amidst the otherwise devastated coastal pine and oak forest in which half to three-fourths of the other trees are stripped of limbs, uprooted or broken off ten feet above ground.

Palmettoes here are an understory tree, prominent to the eye only along the edges of marshes and dune line. Since the storm they are more evident suggesting an answer to a question I have wondered about for years—why is the tree naturally restricted to the coast? It will grow well a hundred miles inland, flowering and fruiting regularly, seldom hurt by the cold. Kyle E. Brown published a series of articles in *Principes* in which he explored the natural history of the species. As he did, I have noted that the tree usually does not fruit when it is in shade. Since it keeps company it is soon shaded out except along the edges of marshes and dunes. Palmettoes in forests might not live long enough to propagate themselves. Unless, of course, a hurricane comes along, removes the taller competition and allows light in and thus, fruiting!

Though Hugo was an exception among hurricanes, flattening forests a hundred miles inland, widespread pine snapping winds usually are restricted to the immediate coastal areas and would occur often enough to allow continued palmetto propagation there, but not inland. I expect the next several summers will see heavy seed production along Hugo's path.

Though there are surely other selective features favoring the strict coastal distribution of the palmetto above north central Florida as noted by Kyle Brown—soil, salt tolerance, insect pollinators, temperature and water transport of seeds—the superior wind tolerance of the plant is impossible to miss in the Charleston area now and could play a role, too.

HILTON P. TERRELL

BOOKSTORE

COCONUT PALM FROND WEAVING (Wm. H. Goodloe, 1972, 132 pp.) 4.95

COCONUT RESEARCH INSTITUTE, MANADO (P. A. Davis, H. Sudasrip, and S. M. Darwis, 1985, 165 pp., 79 pp. color) 35.00

CULTIVATED PALMS OF VENEZUELA (A. Braun, 1970, 94 pp. and 95 photographs.) 7.95

EL CULTIVO DE LAS PALMAS EN EL TROPICO (in Spanish, A. Braun, 1988, 65 pp., some color and line drawings). 9.95

EXOTICA (4) (A. Graf, pictorial encyclopedia, 2 vols., including 250 plant families, 16,600 illust., 405 in color, 2590 pp.) 187.00

FLORA OF PERU (Palms) (J. F. MacBride, 1960, 97 pp.) 8.00

FLORIDA PALMS, Handbook of (B. McGeachy, 1955, 62 pp.) 2.95

FLORIDA TREES AND PALMS (L. and B. Maxwell, 30 palm species, 120 pp.) 6.00

GENERA PALMARUM (N. W. Uhl and J. Dransfield, 610 pp.) 74.95

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

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

PALMAS DEL DEPARTMENTO DE ANTIOQUIA (Palms of Colombia, in Spanish; G. Galearno and R. Bernal, 1987, 207 pp.) 18.95

PALMAS PARA INTERIORES, PARQUES Y AVENIDAS (in Spanish, A. Braun, 1983, 83 pp., 39 pp. color) 8.95

PALEM INDONESIA (in Indonesian) (Sastraprdja, Mogea, Sangat, Afriastini, 1978. 52 illustrations, 120 pp. For English translation add $2.00) 5.50

PALMAS AUTOCTONAS DE VENEZUELA Y DE LOS PAISES ADYACENTES (in Spanish, A. Braun, and F. D. Chitty, 1987, 138 pp., some color) 12.95

***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 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

PALMS OF MALAYA (T. C. Whitmore, 1973, 132 pp.) 31.00

PALM SAGO (K. Ruddle, D. Johnson, P. K. Townsend, J. D. Rees, 1978, 190 pp.) 10.00

PALMS OF SUBEQUATORIAL QUEENSLAND (Robert Tucker, 1988, 91 pp., 12 pp. color, many black and white photographs and maps) 20.00

REVISIONS OF THE PALM GENUS *SYAGRUS* MART. AND OTHER SELECTED GENERA IN THE *COCOS* ALLIANCE (S. Glassman, 1987, 222 pp.) 19.95

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

TROPICA (A. Graf, 7000 color photos, 1138 pp.) 125.00

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

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* New arrival

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Principes, 34(1), 1990, p. 50

Chamaedorea stolonifera

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In 1975 I became very interested in palms, especially the genus *Chamaedorea*; since then I have always looked for different species of *Chamaedorea*. A few years ago Lois Rossten let me have a female plant of *Chamaedorea stolonifera*. What a beautiful palm it is (Fig. 1)! I feel very few palms can compare with it.

For the next couple of years I hybridized *Chamaedorea stolonifera* with pollen from my plant of *C. ernesti-augustii*. The main reason for hybridizing this plant was that there were no male plants of *Chamaedorea stolonifera* available for pollen. The hybrid is beautiful, but does not throw out stolons.

I was very fortunate when I located a male plant of *C. stolonifera* in Dick Palmer's garden, possibly the only one in cultivation. In 1983 I received a small amount of pollen. I was doubtful if I could set any seed with such a small amount, but luck was with me and twelve fruits developed.

Next I wondered if they were going to be hybrid. However, fruits developed in the normal time, about six–twelve months, whereas hybridized fruits stay on the plant for up to two years.

After four months the seeds started to germinate. Out of the twelve seeds, I grew six seedlings (50% to 60% is normal germination for me). Between 1984 and 1987 I had been able to grow six additional plants from seed, again using pollen from Palmer's male plant, bringing the total number of seedlings to twelve.

1. *Chamaedorea stolonifera*, pistillate plant. Photo by L. Hooper.

After two years the seedlings started putting out stolons. After four years they started to flower. It looks like five of the plants will flower this year (1989). The first one was female and the second one was male (hooray!).

I hope that in the next few years, with the possibility of a larger amount of pollen, I can set more seed and distribute this beautiful palm to interested members.

LETTERS

Dr. Natalie W. Uhl, Editor

The row of palms in front of the Fulton Mansion State Historic Structure as illustrated in a recent issue (*Principes* 33: Fig. 2, p. 154) contains several moderate-sized individuals of *Washingtonia filifera*, not *Sabal mexicana* as identified in the caption accompanying the figure. I am sure that other readers in addition to myself noticed the error, but your readers may also be interested in additional information concerning the Fulton Mansion and the palms at the site.

Col. George Ware Fulton came to Texas in 1837 to be part of the Texas Revolution. Construction on the house at Fulton Beach began in 1874 and continued until 1877. Fulton died in the house in 1893 at the age of 83. The house had several owners during subsequent decades. In 1952 J. C. and Evelyn May purchased the house for $25,000 and converted it into a restaurant. The palms still present at the Fulton Mansion were planted around this time, because a commercially-prepared picture post card and the cover of the menu of the Fulton Mansion Restaurant illustrate young palms about two feet tall.

Subsequently, the restaurant closed and the land was developed as a trailer park by a different owner in 1960. After several intervening ownerships the Fulton Mansion was purchased by Texas Parks and Wildlife Department in 1976. Following extensive restoration efforts the house was opened to public visitation in 1984.

The palms planted in the early 1950's have continued to grow and now approach the height of the rooftop of the Fulton Mansion. The original planting contained *Washingtonia filifera* and *Washingtonia robusta*. The extended severe freeze of late December 1983 killed all of the *Washingtonia robusta*. This species is native only to Baja California, Mexico, and is not as cold-tolerant as its only congener, *Washington filifera*, which ranges from northern Baja California northward to southeastern California and southwestern Arizona. None of the *Washingtonia filifera* were killed by the freeze. Thus, from the original mixed planting of the early 1950's, the lawn of the Fulton Mansion is now graced by a sole species of palm, *Washingtonia filifera* (California fan palm).

This information was derived from "Preservation Plan and Program for Fulton Mansion State Historic Structure" (PWD Plan 4000-96, 1978, Texas Parks and Wildlife Department, Austin, Texas, 59 pp+125pp. appendix) and personal communication with James D. Bigger.

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Back Cover

Top: *Chamaedorea tuerckheimii* (Dammer) Burret is exceptionally well grown in the garden of Pauleen Sullivan in Ventura, California. One of the smallest palms known, this species was discovered by Tuerckheim (for whom it was named) in the mountains near Coban, Guatemala and introduced by him to cultivation in European glasshouses in the early 1900s. It is a striking plant due to its dwarf habit and unique leaves which have earned it the name potato-chip palm because of their resemblance to the ruffled-style potato chips. The species ranges into Chiapas, México and a form with lighter green leaves occurs in Veracruz.

Bottom: *Chamaedorea amabilis* H. A. Wendl. ex Dammer growing in dense forest near El Valle, Panama, *D. R. Hodel & M. A. Hodel 741A*. Both photos by Donald R. Hodel.