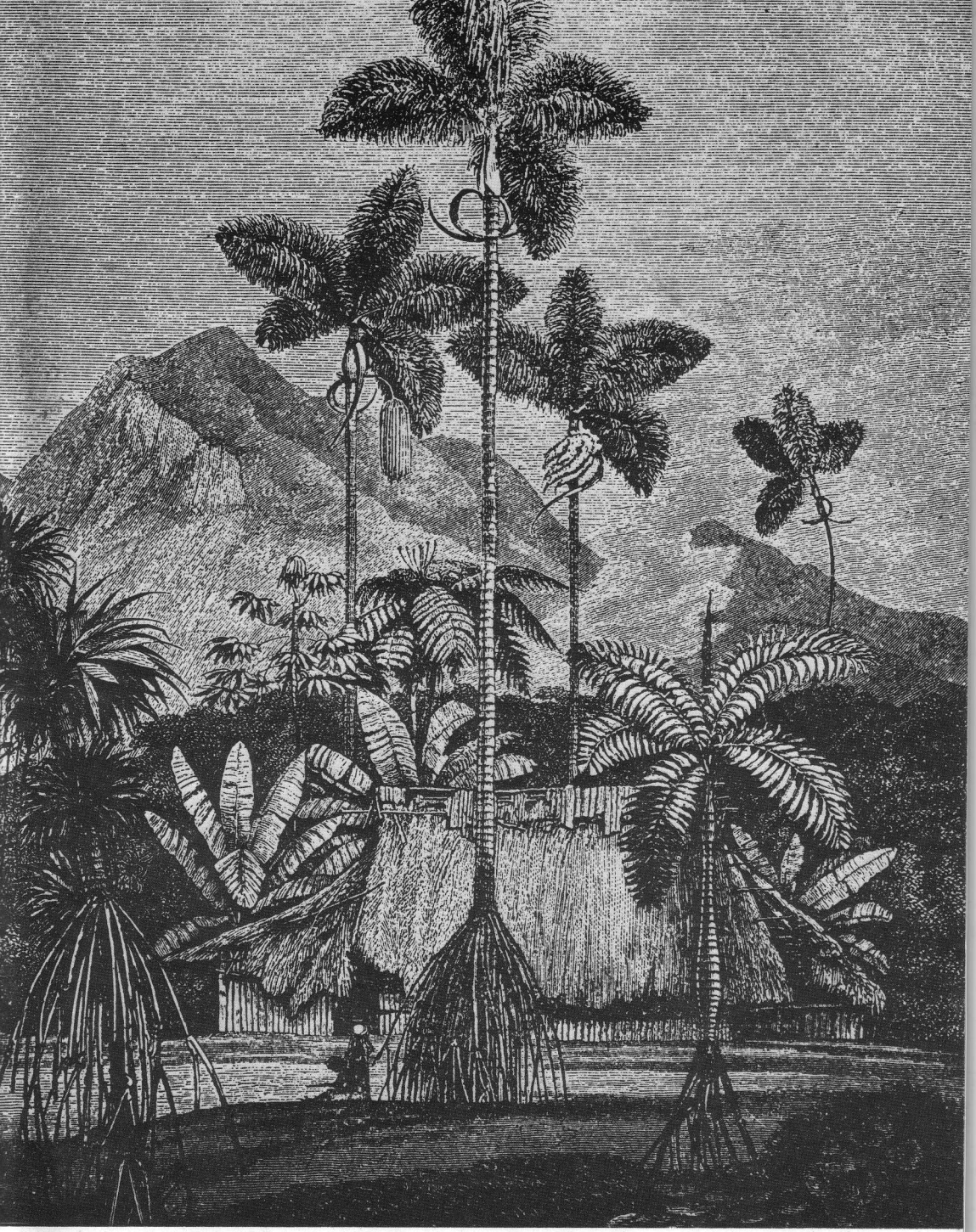


PRINCIPES

Journal of The International Palm Society

October 1985
Vol. 29, No. 4

Contents for October

Cover Picture

"*Iriartea altissima*" at Los Canales, Venezuela, reproduced from Carl Ferdinand Appun, "Unter den Tropen." Vol. I, Venezuela. Jena 1871. Originally described as a species of *Iriartea*, this palm is now considered the same as *Dictyocaryum fuscum*. See pp. 156–159.

PRINCIPES

JOURNAL OF THE INTERNATIONAL PALM SOCIETY

(ISSN 0032-8480)

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

Subscription price is $12.00 per year to libraries and institutions. Membership dues of $15.00 per year include a subscription to the Journal. Single copies are $5.00 each, $20.00 a volume. Airmail delivery $2.50 a copy or $10.00 a volume. The business office is located at **P.O. Box 368, Lawrence, Kansas 66044.** Changes of address, undeliverable copies, orders for subscriptions, and membership dues are to be sent to the business office.

Second class postage paid at Lawrence, Kansas

Mailed at Lawrence, Kansas
December 5, 1985

Principes, 29(4), 1985, pp. 151–155

Further Notes on Livistona carinensis in Somalia

CHRISTINE BARBIER

Laboratoire de Botanique, Institut Botanique, MontPellier, France

I had the opportunity to visit the Northeastern part of Somalia during the winters of 1982 and 1983 (one month in 1982 and three months in 1983). During the last visit, I devoted a part of my time in the Bosaso region to a closer observation of the little-known palm tree, *Livistona carinensis* (Chiov.) J. Dransfield & N. Uhl, previously known as *Wissmania carinensis* (Chiov.) Burret (1943). As reported by Monod (1955) Chiovenda (1929) described the palm in his Flora Somala. There are very few references to this palm in the literature; Moore describes and illustrates it in his article "Wednesdays in Africa" (Moore, 1971). Its conservation status is discussed in the "IUCN Plant Red Data Book" (Lucas & Synge 1978) and Dransfield and Uhl (1983) transferred the species to *Livistona*.

Distribution of Livistona carinensis in Northern Somalia

The oasis described by Chiovenda and Hemming. Concerning the description of the oasis of Uncud near Carin (Chiovenda), I cannot certify its existence because I have not found out where the oasis is. It is probably the better-known oasis of Carin itself.

In 1973, Hemming speaks about 2 oases where *Livistona carinensis* is to be found: Carin and Galgala. He says (p. 21): "Galgala is situated at 900 m and is an oasis in the dry mixed bush. There is a spring of clear sweet water which is used to irrigate small bunded fields. The most characteristic natural vegetation of the oasis is the tall unbranched palm, *W. carinensis*, which attains 30 m. *Wissmannia* palms are also found in the lower oasis at Carin, but it is a rare tree . . ." and p. 24: "In the area of Carin oasis the water table is generally within one meter of the surface, which is stony or gritty, puffed-up and somewhat saline. The oasis, which supports quite dense vegetation, is characterized by the tall unbranched palm *W. carinensis* to 30 m . . . *Wissmania carinensis* is the tallest palm growing in the region and it has an extremely limited distribution. It can provide timber for building but uncontrolled cutting now threatens the species with extinction and its immediate protection is recommended."

My Observations

Stations visited in 1983, Carin. The first oasis I was able to visit is Carin at 49°13′ long./10°59′ lat., 40 km from Bosaso on the northern coast, at an altitude of 340 m. The oasis is small, about 500 m long with 300 date palms owned by private farmers. On the plate no. 7 in his article, Hemming (1973) shows a view of the "oasis seen from the edge of the Carin gap." The *Livistona* palms are clearly distinguished and there are about fifty trees. Ten years after, there were no more adult palms; only young trees, not exceeding 1 m, grew along the irrigation ducts.

Galgala. As quoted by Hemming (1973), Galgala is a mountain oasis, at

1. The mountain oasis at Galgala.

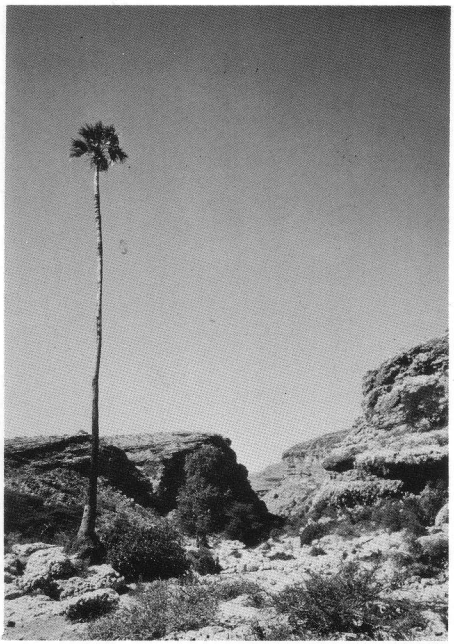
49°03′ long./10°59′ lat. and at an altitude of 875 m, 30 km west from Carin. There are about 3,000 date palms distributed among private gardens and the water comes from a spring. The tall *Livistona* rise above the date palm trees (Figs. 1,2), and as a consequence they are very easy to count: only 15 tall *Livistona* remain. Nevertheless, the regeneration seems to be excellent. In the 30 gardens visited, I counted 120 plants with a minimum height of 20 cm and a maximum of 1.5 m together with hundreds of one-leafed plantlets. Following the information given by the inhabitants of Carin and Galgala, I visited three other oases where *Livistona* still grows, oases that have never been mentioned in literature as far as I know. They are Marajo, Duud Shabeel, and Xamur (pronounced Hamour).

Marajo. Marajo is a little oasis, the same size as Carin, 20 km westward from Galgala at an altitude of 690 m. Thirty adult *Livistona* are still growing among the date palms and a lonely one is dwelling near the spring located in the upper part of the grove (Fig. 3). Many young trees are growing at the foot of the tall ones. Unfortunately, the future of *Livistona* in Marajo is threatened; besides a fire which partly destroyed the oasis some years ago, the water has now settled deeper into the chalk layer and irrigation is no longer possible. The only *Livistona* to survive is the isolated tree just near the water.

Xamur and Duud Shabeel. Xamur, 10 km far from Carin, on the road to Bosaso, 49°06′ long./11°06′ lat. at an altitude of 210 m is a small oasis with 400 date palms. Duud Shabeel is very close to Xamur and almost deserted. In both oases, *Livistona* can no longer be seen but I have found many young trees, especially in Xamur along the canal ducts.

It seems that there are other oases in the region where *Livistona* grows, according to the Somali people, but oases are remote and inaccessible by road. How-

2. *Livistona carinensis* towers above date palms.



3. A lone *Livistona* beside the spring at Marajo.

ever, I assume that *Livistona* trees are neither growing westward in the region of Erigavo nor eastward near Alula (both regions I visited also). *Livistona* seems to be restricted to the Bosaso district and more specially within a 40 km radius of Carin.

The Tree

A close observation of the crown is not easy, due to the tallness of the palm. As a consequence, I was not able to collect either adult leaves or inflorescences. It was not possible to cut a tree because the palms are the farmers' property, nor to climb them because of the strong wind blowing in Galgala in the winter when I visited the grove. I have only collected an old fallen inflorescence, and a young tree, 90 cm high. Nevertheless, I was able to take some pictures of the crown with a telephoto lens. All the adult palms, both in Galgala and in Marajo, have approximately the same height, that is, 25 to 30 m. The trees correspond exactly to the description given by Burret and Monod. Some details that I observed may be added. The trunk is straight and slender with the rings of scars left by the fallen leaf bases. I have observed holes made by a woodpecker on one palm. All the palms growing in Galgala and Marajo present a bulging base and the numerous roots are sometimes apparent (Fig. 3), depending on the place where the tree grows. A transverse cut of the trunk shows its bare longitudinal fibers very closely woven, a quality that makes the palmwood much appreciated by the Somali people as building material. The adult palmate leaves (observed only with a 200 mm telephoto lens), seem to have very well developed spines. Each leaf seems to subtend an inflorescence (Fig. 4). The inflorescence is at first erect but hangs when older to a length of about 2 m (Monod 1955).

As I already mentioned, I had no

4. The crown of *Livistona carinensis* with windblown leaves and inflorescences.

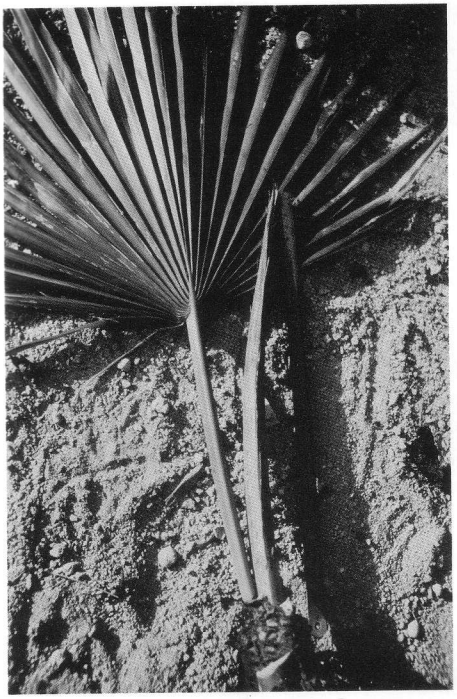
opportunity to get an adult leaf or inflorescence except those fallen to the ground in Galgala. This one corresponds to the description made by Monod and has brown striated bracts. The young uprooted tree was 90 cm high with 13 equivalent roots, 30 cm long and three others a bit longer to 50 cm, with leaves 90 cm long, and petiole to 50 cm (Fig. 5). The description of the leaves corresponds to that in Chiovenda (1929) with a ligule and spines with a swollen basis; the segments are glabrous with a prominent midrib and secondary veins joined by transverse ones. The segment margins are thick, as stated by Chiovenda. The fruits are globose, 7 mm in diameter and brown. As for the flowering time (Fig. 4), old and new inflorescences are to be found on the palm at the same time. The cycle seems to be a little more complicated than that described by Monod. Regarding the fruits, there were many on the soil at the foot of the palms and I have collected some, both in December 1982 and in December 1983. I cannot ascertain that these fruits necessarily correspond to an annual production.

Germination Trials

In the beginning of 1983, I sowed 10 fruits collected in 1982 in petri dishes in a meager supply of water. After 3 months, 4 fruits have germinated and are still growing in the Botanical Laboratory's greenhouse in Paris. I have also sown the fruits collected in December 1983 in the same conditions. Of 10 fruits sown on December 16, 1983, 2 have germinated 3 months after and only one plantlet is still alive in my home in Paris. I sowed 15 other fruits (1983 collection) on March 20, 1984; 3 have now germinated.

In conclusion, germination seems to be good (as seen in the field) and occurs within 2 or 3 months of sowing, a quite normal delay for palms.

Some fruits collected in 1982 have been



5. Leaf of a young *Livistona carinensis*.

sown recently on the 15th of April to test the germination power after one year. It is too early to reach conclusions about their viability. Of approximately 50 seeds planted at Fairchild Garden in March 1984, 41 germinated and the developing seedlings seem to present no cultural problems.

Livistona and Its Future in Somalia

As I have already said, the wood of *Livistona*, reported to be rot and termite resistant, has been overexploited for years by the inhabitants of the groves. They are now aware of the increasing scarcity of the palms and every farmer possessing young trees in his garden protects them and does not allow them to be cut. Cutting down an adult tree is a decision taken by the farmers collectively and concerns only trees which are nearly dead. However, despite the thousands of seedlings seen in the gardens in Galgala, it seems that the rapid replacement of the old trees is not possible due to lack of immediate successors. I think that there is a missing generation, the middle one. Indeed, only old dying trees and young trees (maximum 1.5 m high) grow in the groves which were visited.

Whether high mortality is a consequence of the tree reaching a certain age or due to overexploitation of the middle generation is a problem still to be solved. The Marajo site for *Livistona* is doomed to disappear since the water for the growth of the palm is depleted. Three sites will remain: Xamur and Duud Shabeel with only young trees and Galgala with the last adult specimens, but for how long? Nothing is known of the present status of *L. carinensis* in Arabia.

The future of the tree may lie in its introduction into cultivation; populations have been established in several botanic gardens and private collections.

Literature Cited

Burret, M. 1943. Die Palmen Arabiens. Botanische Jahrbucher 73: 145–190.

Chiovenda, E. 1929. Flora Somala. Vol. 1. Sind. Ital. Arti Grafiche, Rome.

Dransfield, J. and N. Uhl. 1983. *Wissmannia* (Palmae) reduced to *Livistona*. Kew Bull. 38: 199–200.

Hemming, C. F. 1973. An ecological classification of the vegetation of the Bosaso region. Working paper, FAO, Rome, 67 pp.

Lucas, G. L. and H. Synge. 1978. The IUCN Plant Red Data Book. IUCN, Morges, Switzerland.

Monod, Th. 1955. Remarques sur un palmier peu connu: *Wissmania carinensis* (Chiov.) Burret. Bulletin de l'Institut Francais d'Afrique Noire, ser. A, 17: 163–173.

Moore, H. E. 1971. Wednesdays in Africa. Principes 15: 111–119.

Principes, 29(4), 1985, pp. 156–159

Bernardo de Iriarte, of the Palm Genus *Iriartea*

R. A. DEFILIPPS

Department of Botany, Smithsonian Institution, Washington, D.C. 20560

In the last decades of the eighteenth century, the Spanish colonies in the New World were organized into gigantic administrative regions termed "viceroyalties," the government of which was supervised by the Council of the Indies in Madrid with ultimate responsibility vested in the King. These massive domains included, from north to south, the viceroyalty of New Spain (present-day southwestern United States, Mexico, and Central America north of Panama); the viceroyalty of New Granada (today's Colombia, Venezuela, Ecuador and Panama); and the viceroyalty of Peru.

Expecting the discovery of new dimensions in mineral and plant wealth, including mercury, cinnamon and quinine at various times, the kings sent expeditions to New Granada in 1750 (directed by José Mutis); to New Spain in 1787–1803 (commanded by Martin de Sessé and José Mociño); and to the viceroyalty of Peru in 1778–1788, led by the 22-year old botanists Hipólito Ruiz and José Antonio Pavon (Goodman 1972). During Ruiz and Pavon's explorations in Peru, a stilt-palm unknown to science was collected, and subsequently named as the new genus *Iriartea* (Fig. 1). The namesake of this palm, diplomat Bernardo de Iriarte, is the subject of this story.

The Ruiz and Pavon expedition was, in the words of its chronicler A. R. Steele (1964), the "first comprehensively documented study of plant life in the Spanish New World." The first major publication, entitled *Florae Peruvianae et Chilensis Prodromus* (1794), was underwritten by Charles IV who received 41,900 pesos in donations from the fortunate people on his Empire-wide list of "suggested contributors." Ruiz and Pavon followed an understandable procedure, glorifying new plant discoveries by naming several in commemoration of the sponsors and well-wishers of their expedition. Thus, in the *Prodromus* are found newly described, for example, the genera *Carludovica* (Cyclanthaceae, compounded in reference to patrons King Charles IV and Queen Louisa); *Godoya* (Ochnaceae, for Manuel de Godoy, benefactor of Madrid's Royal Botanical Garden, King's Minister and Queen's paramour); and, on page 149 the genus *Iriartea* for Don Bernardo de Iriarte, promoter of the noble arts and sciences, especially botany, and councillor on matters of the Indies.

Iriarte's family was from the Canary Islands, an Atlantic archipelago long colonized by Spain. According to his baptismal certificate, which is fully quoted by Emilio Cotarelo y Mori in *Iriarte y su Época* (1897, primarily about Bernardo's famous literary uncle Don Juan and his poet brother Don Tomás), our subject Bernardo Simeón de Iriarte was born on Tenerife on February 18, 1735, the son of Doña Bárbara Cleta Marcelina de las Nieves y Oropesa and Don Bernardo de Iriarte, whose Christian (given) name he evidently received. He was baptized on March 1, 1735 in Puerto de la Cruz, island and diocese of Tenerife, province of the Canaries.

After a period of schooling he engaged in literary enterprises on a stipend from

1. Bernardo de Iriarte, after the painter, Goya, reproduced with permission of The Metropolitan Museum of Art, N.Y.

the public exchequer, assisting his uncle Don Juan in the production of a Latin-Spanish dictionary during 1754–1756. While still quite young, he proceeded to obtain in 1758 the position of secretary of the Embassy in London. When his mission in England was finished he was appointed to serve as a mediator in the office of the First Secretary of State (of Spain), and he later, in 1773, rose to the office of First Secretary of State. Soon, in 1774, he was elected to membership of the Royal Academy of San Fernando, a high honor.

Iriarte's career was in the ascendancy, and he was promoted to occupy a seat on the Council of the Indies recently vacated by his friend Don Fernando Magallón. With his work as a political dignitary came much lucrative and honorific recognition.

In 1787 he became director of the Compañia de Filipinas (Company of the Philippines); in 1792 Vice-Protector of the Royal Academy of San Fernando (an academy of fine arts; he collected Murillo, Van Dyck, Velazquez); and in 1797 he was made Minister of the Royal Junta of Agriculture, Commerce, and Shipping Beyond the Seas. At some point he married a lady from a distinguished Gibraltar family, Doña Antonia Sáez de Tejada y Hermoso; sources do not record any children from this union.

Iriarte edited an account of the voyage of pursuit made in 1579–1580 by Pedro Sarmiento de Gamboa in search of Sir Francis Drake who had attacked Peru, and this volume was published in 1768 (Braganza and Oakes 1974), but it seems Iriarte's later writings mostly concerned the political turmoil of life in neighboring Portugal: it was the era of Napoleonic venturism throughout Europe.

Recalling that Iriarte was Vice-Protector of the Royal San Fernando Academy, we can appreciate that he numbered among his friends the volatile Aragonese painter Goya (Francisco Goya y Lucientes, 1746–1828), who had long been associated with the Academy and was Director of the Academy's Painting Department as of 1795 (Lepore 1967). Goya made, in 1797, a portrait of his friend Iriarte wearing the decoration of the Order of Charles III (Trapier 1964); it was exhibited at the Academy on November 1, 1797. The canvas presents an Iriarte with aloof and fastidious bearing, yet with the persuasive dignity of an "arrived" man. The original painting is in the Musée de la Vielle, Strasbourg, France, and the one reproduced here (Fig. 2) is a late eighteenth century copy of it after Goya, now kept in storage in the Metropolitan Museum of Art, New York City (Wold, pers. comm.).

In this period Emperor Napoleon Bonaparte (1769–1821) was expanding, in the name of the French Revolution against tyranny, his extensive roster of conquered client-states, often placing his relatives upon the thrones of erstwhile local kings (Putman 1982). A war on Spanish soil was provoked against Portugal for not respecting France's call for embargo of English ships in Portuguese ports. It flared into the Iberian Peninsular War of 1808 to 1814, resulting in the abdication of King Charles IV of Spain who was replaced by Napoleon's brother Joseph as King (in 1808). Due to this atmosphere of turmoil in the peninsula, at various times everyone—Charles IV, his son Ferdinand VII, Goya, and Iriarte—chose exile in France (rather than in England, which ultimately won the war through the Iron Duke of Wellington).

The particular circumstances leading to Iriarte's exile have been summarized by Trapier (1964) as follows: "Iriarte was chosen by the Council of the Indies to welcome Joseph Bonaparte to Madrid in 1809, and at the court of the latter he was made a member of the Council of State. He received from Joseph Bonaparte the Royal Order of Spain and seems to have favored the Frenchman, which placed him under suspicion as an *afrancesado* (Frenchified Spaniard). Like many other Spaniards, after the War of Independence he went to Bordeaux to join the colony of refugees from Spain who had established themselves there." Iriarte died in Bordeaux on August 13, 1814. His wife outlived him, in Germany.

Luciano Bernardi (1977) summed up the era by saying (in translation): "Considering . . . the troubled years undergone by Spain in Ruiz and Pavon's time—the Napoleonic occupation, the clumsily achieved Restoration, the long and vain war in Latin America—the accomplishment of Ruiz and Pavon is quite respectable." In addition to the 1794 *Prodromus* in which *Iriartea* was published, they produced *Systema Vegetabilium Florae Peruvianae et Chilensis* (1798) in which the type species *I. deltoidea* was described, and the 3-volume *Florae Peruviana et Chilensis* in 1798–1802.

LITERATURE CITED

BERNARDI, L. 1977. Hipólito Ruiz, les trois José et la "Real Expedicion." Musées de Genève 174: 8–15.

BRAGANZA, R. L. S. DE AND C. OAKES, eds. 1974. The Hill Collection of Pacific Voyages. University of California, San Diego: University Library.

COTARELO Y MORI, E. 1897. Iriarte y su Época. Madrid.

GOODMAN, E. J. 1972. The Explorers of South America. New York: Macmillan Company.

LEPORE, M. 1967. The Life and Times of Goya. Philadelphia and New York: Curtis Books.

PUTMAN, J. J. 1982. Napoleon. National Geographic 161(2): 142–189.

STEELE, A. R. 1964. Flowers for the King. Durham, North Carolina: Duke University Press.

TRAPIER, E. DU GUÉ. 1964. Goya and His Sitters. New York: The Hispanic Society of America.

WOLD, GRETCHEN. 1984. in Department of European Paintings, Metropolitan Museum of Art, New York City, contacted on my behalf by Patricia Upchurch, Smithsonian Exposition Books, Washington, D.C.

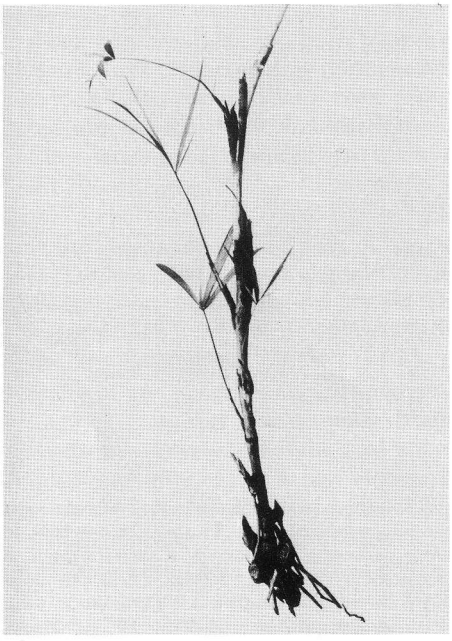
Principes, 29(4), 1985, pp. 160–161

Axillary Shoot Development in the Aerial Stem of Calamus

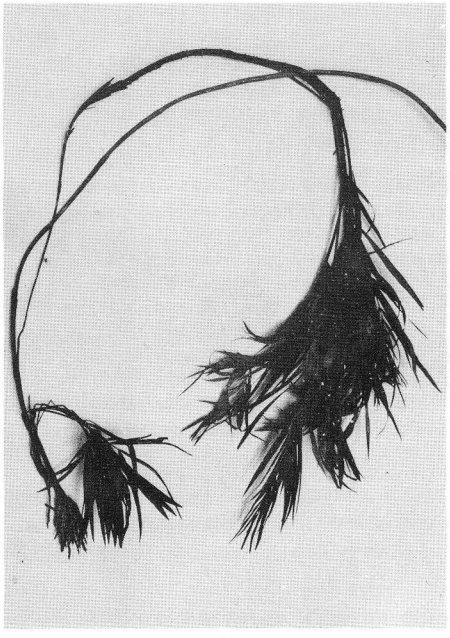
C. RENUKA AND V. P. K. NAMBIAR
Kerala Forest Research Institute, Peechi 680 653, Kerala, India

Though basal branching is an extremely common feature in palms, axillary shoot development in the aerial stem is a rare phenomenon. Vegetative shoots or 'bulbil shoots' as they are popularly known, are reported in a few palms, where the entire inflorescence or part of it develops into vegetative shoots (cf. Davis et al. 1981). Among lepidocaryoid palms vegetative reproduction is reported only in *Plectocomia* and in *Calamus pygmaeus*. In *Plectocomia* small axillary shoots are produced at nodes up to 3 m above the base and will later become separate plants (Dransfield 1977). In *C. pygmaeus* vegetative reproduction occurs where the inflorescence roots at the tip when it comes in contact with the soil and produces new shoots (Ridley 1907).

In South India, Lepidocaryoideae is represented only by *Calamus* with 12 reported species. The usual method of reproduction in this genus is through suckers and seeds. But in *C. gamblei* Becc. and *C. hookerianus* Becc. vegetative reproduction from aerial parts has also



1. *Calamus gamblei.* Axillary shoot development.



2. *Calamus gamblei.* A flagellum transformed into a shoot.

been observed. Both these species are clustering and pleonanthic with a moderately thick stem (up to 1.5 cm in *C. gamblei* and 2 cm in the case of *C. hookerianus*, without sheath). They are found along the Western Ghats in Kerala.

During field trips, at Chandanathodu, Wynad Forest Division of Kerala forests, we could locate a population of *C. gamblei* at an altitude of 725 m. Even though flowering and fruiting occur regularly every year between January and April, vegetative reproduction by means of axillary buds also is seen here. Axillary buds develop from the nodes and they always show adnation to the internode above it as reported in other rattan species (Fisher and Dransfield 1977). These buds develop into new shoots (Fig. 1). After developing 2–3 leaves, roots are produced and if they happen to come in contact with the soil, they develop into new plants.

Likewise many of the distal axillary buds, which would have normally developed into flagella, are also transformed into new shoots (Fig. 2). When a separate root system is not developed, they remain attached to the mother plant and grow. The basal portion of such plants will be very thin, but gradually they attain the normal girth of a mature cane.

In *C. hookerianus*, in many instances, it is observed that roots sprout from the distal nodes which are in contact with the soil.

Calamus, so far, is propagated only from seeds. But most of our canes are cut away before they begin to flower and fruit. Hence, with the increased demand for good quality canes, it is advisable to try artificial vegetative propagation. The axillary shoot development in aerial stems of *C. gamblei* and root production from the nodes of *C. hookerianus* show that the cane has a potentiality for vegetative propagation.

Acknowledgment

The authors are thankful to Dr. S. Kedharnath, Director, Kerala Forest Research Institute for his constant encouragement.

Literature Cited

Davis, T. A., H. Sudasrip, and H. Azis. 1981. Bulbil shoot production from clonally propagated coconuts. Principes 25: 124–129.

Dransfield, J. 1977. The growth forms of rain forest palms. *In* P. B. Tomlinson and M. H. Zimmermann (Eds.). Tropical trees as living systems. Cambridge University Press, N.Y.

Fisher, J. B. and J. Dransfield. 1977. Comparative morphology and development of inflorescence adnation in rattan palms. Bot. Jour. Linn. Soc. 75: 119–140.

Ridley, H. N. 1907. Branching in palms. Ann. Bot. 21: 417–422.

Errata

Volume 28, page 199, column 1, line 23; for "and apex" read "apiculate at apex."
Volume 29, page 15, top; note that Figure 2 is upside down.
Volume 29, page 76, Figure 1, D; for "*Socratea durissima*" read "*Iriartea gigantea.*"
Volume 29, page 131, Figure 3, b; for "*Gronophyllum papuanum*" read "*Gronophyllum leonardii.*"
In Roster 1985; page 13; for "Siam" read "Thailand."

Principes, 29(4), 1985, pp. 162–165

Mortality Rates of Some Rain Forest Palms in Panama

DIANE DE STEVEN AND FRANCIS E. PUTZ

Department of Botany, Duke University, Durham, North Carolina 27706 and Department of Botany, University of Florida, Gainesville, Florida 32611

Palms are good subjects for the study of tropical plant population dynamics because their growth pattern of continuous leaf production allows approximate determination of the ages of individuals (cf. Sarukhan 1978). Growth from a single terminal meristem renders palms especially susceptible to mortality, since generally no resprouting capability exists if the meristem is destroyed. While mortality is an important parameter in the study of the dynamics of populations, there are few published data on the incidence or extent of mortality in natural palm populations with the exception of studies on seed and seedling losses (e.g., Bannister 1970, Janzen 1971, Vandermeer 1977, Bullock 1980). We here report notes on palm mortality obtained during a study of the phenology of an assemblage of palm species in the rain forest of Barro Colorado Island, Panama. We first describe observations of animals as a source of terminal meristem damage and potential plant death. We then report some general mortality rates in different palm species which allow assessment of the relative susceptibility of different species to mortality and comparison with mortality rates of woody dicotyledonous plants in the same community.

Animal-caused Mortality

The climate of the tropical moist forest on Barro Colorado Island is strongly seasonal, with a dry season lasting from late December through early April. The plant and animal communities also show seasonal behavior, and, in particular, there is a period of sparse fruiting from November through February that results in a seasonal food shortage for frugivorous mammals (Foster 1982). The frugivores seek a wider range of foods at this time, and palms, especially the understory species, frequently suffer their apices being torn apart by animals feeding on the succulent developing terminal bud. From various observations, it appears that the major agent responsible for this damage is the white-faced monkey, *Cebus capuchinus* (Oppenheimer 1982; de Leon, pers. obs.), but collared pecaries, *Tayassu tajacu*, have been observed to push over small palms and feed on the terminal buds as well (Putz, pers. obs.). Foster (1982) noted that this damage to palms was especially prevalent in a year that was extremely poor in fruit availability for animals. In the course of a monthly phenology census of 13 palm species, we recorded the incidence of damage by animals to permanently-marked individuals. Other researchers have identified such bud feeding by animals as a cause of mortality in palms (Bullock 1980, Foster 1982). We noticed, however, that despite the destruction of a large proportion of the bud, the apical meristem itself was often left intact and the palm would subsequently continue to produce new leaves, some of which show signs of having been partially chewed off while still in the bud. We also therefore recorded the incidence of recovery of damaged palms.

Table 1. Animal-caused damage to crowns of understory palms.

Species	# Plants/# Damaged/# Recovered			Mean % Damaged	Mean % Recovered
	1981	1982	1983		
**Bactris barronis*	9/6/5	10/4/3	23/3/1	40	64
**Bactris coloniata*	29/23/21	30/11/11	32/1/1	40	97
**Bactris major*	36/1/1	36/0/—	36/0/—	1	100
Chamaedorea wendlandiana	11/0/—	11/0/—	12/0/—	0	—
Geonoma cuneata	22/17/13	16/6/3	11/6/5	56	70
Geonoma interrupta	10/0/—	5/1/1	9/0/—	7	100
Geonoma procumbens	3/3/1	n.d.	n.d.	100	33
Synechanthus warscewiczianus	3/0/—	6/2/1	13/0/—	11	50

* For clonal species, # plants = # stems, n.d. = no data available.

During a three-year observation period, nearly all of the damage to immature and adult understory palms took place between the months of November and February, the usual season of food shortage. It is clear that some species are damaged more frequently and more severely than others (Table 1). It is surprising that the small *Bactris* species are heavily utilized despite the presence of sharp spines on the leaves and stems. Whether the differences among species represent true preferences is unclear. Apart from *Geonoma procumbens*, for which the data are scant, the palms most frequently damaged are clonal (*Bactris*) or occur in dense patches (*Geonoma cuneata*); in both cases, stem densities are locally high and this apparently increases their conspicuousness to animals in contrast to the more scattered solitary species. The higher incidence of attacks on clustering species may also be because these species are particularly palatable. Most striking is the fact that one species, *Chamaedorea wendlandiana*, was never damaged at all and we never encountered such damage to this species anywhere in the forest. This may indicate that the terminal shoot of this species possesses some repellent characteristics.

It is also interesting that many plants do not necessarily die after animals feed on their buds, indicating that the meristem itself often escapes destruction (Table 1). Even plants damaged repeatedly may recover, provided that the destruction is limited each time. Of 15 individuals of three species (*B. barronis*, *B. coloniata*, and *G. cuneata*) that were damaged in two or three successive years, 14 (93%) recovered subsequently as shown by expansion of new leaves.

Levels of damage do vary from year to year. For the susceptible species, rates were higher in 1981, which appeared from other evidence to be a year of low food availability for frugivorous mammals (pers. obs.). Thus the pressure placed on palm populations by animals is in part determined by other events in the community as a whole.

Adult and immature individuals of canopy palm species appear immune to damage from animals presumably because their crowns are too large and the ensheathed terminal buds too massive to be easily torn apart. The one understory species not included in Table 1, *Elaeis oleifera*, also has a massive crown of 20 or more leaves that would be difficult for an animal the size of a white-faced monkey or peccary to damage. Orangutans and wild pigs, however, are known to damage equally massive palms in Southeast Asia (Dransfield pers. comm.). We collected no data on juvenile (rosette-stage) individuals of either canopy or understory species, but it seems likely that animals could tear open the leaf sheaths of canopy as well as understory species because of the less

Table 2. Mortality of immature and adult palms on Barro Colorado Island.

Species	# Plants/# Deaths			Mean Death Rate per Year (%)
	1981	1982	1983	
Understory				
**Bactris barronis*	36/0	37/0	39/3	2.6
**Bactris coloniata*	41/2	45/1	52/0	2.4
**Bactris major*	59/5	53/0	56/2	4.0
Chamaedorea wendlandiana	11/0	13/0	12/0	0
Elaeis oleifera	13/(1)**	12/0	12/0	(2.6)**
Geonoma cuneata	19/0	15/1	13/2	7.4
Geonoma interrupta	10/1	13/1	13/0	5.9
Synechanthus warscewiczianus	7/0	16/2	13/2	9.3
Canopy/Subcanopy				
Astrocaryum standleyanum	19/0	20/0	21/0	0
Crysophila warscewiczii	10/0	13/0	14/0	0
Oenocarpus mapora	298/8	83/0	85/4	2.5
Scheelea zonensis	19/0	19/0	19/0	0
Socratea durissima	12/0	12/0	12/0	0

* For clonal species, # plants = # stems; no clones died during the study.
** Death of individual not certain; treefall obliterated site.

massive proportions of juveniles. One of us (DD) has found this to be the case for small *Oenocarpus* individuals. It should be pointed out, however, that where large mammals such as elephant and rhinoceros occur, even large palm species may suffer from shoot tip feeding.

Other Causes of Mortality

From the permanently marked census plants, we were able to estimate the mortality of adult and immature individuals of all the palm species from factors such as tree falls, drought stress, or unknown causes. For each year, we calculated mortality as the number of individuals dying. Such data are useful as baseline information on turnover rates of individuals in palm populations and they allow comparison of mortality among different species in the same community. The results in Table 2 suggest that, not surprisingly, large canopy palms suffer lower mortality than small understory palms. The one exception would seem to be *Oenocarpus*, but in this clonal species the mortality figure represents stem (ramet) losses, not clone death. In comparison with clonal species with widely separated ramets, clonal species with a tightly clustered growth habit are more likely to be killed by treefalls and other intense localized perturbations. However, the death of entire clones is rare, as we observed no deaths of whole clones in any of the clonal species during the entire three-year study period. The mortality of some species appears especially high, for example, that of *Synechanthus*. The reasons are unclear but may indicate that populations of this species are particularly stressed in the community at this time. *Chamaedorea* individuals are not immune to treefall damage, but prostrate stems have a well developed capacity to re-root and to redirect crown growth upward; no deaths of this species were observed although several fell over or were pulled down by vines.

Conclusion

Published mortality rates of dicot trees on Barro Colorado Island range between

1–3% (Putz and Milton 1982). The mortality rates of some of the palms are within this range, but some appear to suffer much higher mortality. This may reflect the extreme susceptibility of palms to death as a result of their growth form; loss of their single terminal meristems will result in death, whereas damage to dicot trees and shrubs, whether it be from treefalls or herbivory, is not fatal due to their capacity for resprouting and for aboveground branching.

Acknowledgments

This study was supported by Smithsonian Institution fellowships to both authors and by the Environmental Sciences Program of the Smithsonian Tropical Research Institute. B. de Leon and N. M. Holbrook assisted with data collection.

Literature Cited

BANNISTER, B. A. 1970. Ecological life cycle of *Euterpe globosa* Gaertn. *In* H. T. Odum and R. F. Pigeon (eds.). A Tropical Rain Forest. U.S. Atomic Energy Comm., Washington, D.C.

BULLOCK, S. H. 1980. Demography of an understory palm in littoral Cameroon. Biotropica 12: 247–255.

FOSTER, R. B. 1982. Famine on Barro Colorado Island. *In* E. G. Leigh, A. S. Rand, and D. M. Windsor (eds.). The Ecology of a Tropical Forest: Seasonal Rhythms and Long-Term Changes. Smithsonian Institution Press, Washington, D.C.

JANZEN, D. H. 1971. The fate of *Scheelea rostrata* fruits beneath the parent tree: predispersal attack by bruchids. Principes 15: 89–101.

OPPENHEIMER, J. R. 1982. *Cebus capuchinus*: home range, population dynamics, and interspecific relationships. *In* E. G. Leigh, A. S. Rand, and D. M. Windsor (eds.). The Ecology of a Tropical Forest: Seasonal Rhythms and Long-Term Changes. Smithsonian Institution Press, Washington, D.C.

PUTZ, F. E. AND K. M. MILTON. 1982. Tree mortality rates on Barro Colorado Island. *In* E. G. Leigh, A. S. Rand, and D. M. Windsor (eds.). The Ecology of a Tropical Forest: Seasonal Rhythms and Long-Term Changes. Smithsonian Institution Press, Washington, D.C.

SARUKHAN, J. 1978. Studies on the demography of tropical trees. *In* P. B. Tomlinson and M. H. Zimmermann (eds.). Tropical Trees as Living Systems. Cambridge University Press, Cambridge.

VANDERMEER, J. H. 1977. Notes on density dependence in *Welfia georgii* Wendl. ex Burret (Palmae), a lowland rainforest species in Costa Rica. Brenesia 10/11: 9–15.

Principes, 29(4), 1985, pp. 166–169

Palms in New Caledonia

H. S. MACKEE,[1] PH. MORAT,[2] AND J. M. VEILLON[2]

Service Forestier de Nouvelle-Calédonie[1] and Centre O.R.S.T.O.M., Laboratoire de Botanique, B.P. A5, Noumea, New Caledonia[2]

Palms, with their tall, slender and often most elegant silhouettes, have, like orchids, begonias, aroids or cacti, always attracted amateurs of horticulture. Many botanists are, however, discouraged by the difficulty of collecting in the field all but the smallest species. Specimens once obtained are hard to prepare and to pack for shipment. Herbarium workers often avoid the problems involved in their identification. The study of this family thus calls for exceptional determination and perseverance. Workers with such qualities are rare but can often kindle the interest of others for a difficult and neglected group.

Knowledge of New Caledonian palms owes much to E. Vieillard whose field work between 1855 and 1867 was followed by herbarium study around 1870 at Caen (France), the results being unfortunately largely lost. His specimens, together with those collected by I. Pancher between 1855 and 1874, and particularly by B. Balansa between 1868 and 1872, showed the New Caledonian palm flora to be both varied and unusual. Working on these collections, A. Brongniart in Paris between 1864 and 1873, and O. Beccari in Florence (Italy) from 1877 onwards established a sound basis for their classification. Beccari published in 1920 an account of New Caledonian palms which seemed at the time to leave little scope for later studies and was in any case followed by a long period without notable progress. A revival of interest came about 1960 from an amateur botanist, L. Lavoix, a businessman of Noumea, who embarked on a serious study of New Caledonian palms in the field and in cultivation. Lavoix made contact with H. E. Moore of Cornell University, the leading palm specialist of the period, who soon realized that the subject was far from being exhausted. He visited the island five times and by his enthusiastic example aroused among the few resident botanists an interest which added considerably to the earlier collections. Moore completed his extensive field work by a careful examination of the existing collections, including those made in 1950–1952 by the members (M. Baumann-Bodenheim, A. Guillaumin, H. Hürlimann), of the Mission Franco-Suisse de Botanique, and left at his premature death in 1980 a manuscript which though not in final form summarized his own work and took into account all earlier publications on these fascinating plants in New Caledonia (Moore and Uhl 1984).

The palms with 32 species in 17 genera are numerically a minor family in a flora which has about 3,300 known native phanerogamic species. Their number is, however, considerable in relation to the small area (17,000 sq. km) of the Territory. Fiji with a comparable area has only 22 species in 10 genera. The comparatively small number of species reflects neither their importance in the landscape nor their scientific interest; there is a great diversity and almost complete endemism at generic level, and an abundance of archaic forms. New Caledonian palms are generally of modest or medium size. Though rarely emergent (*Chambeyronia macrocarpa*, *Kentiopsis oliviformis*, *Mackeea magnifica*) above the forest, and then only when it is comparatively low, they are often locally common enough to dominate its

appearance: *Burretiokentia vieillardii* and *Chambeyronia macrocarpa* in the forest at 400-600 m altitude around the Nera Valley, *Chambeyronia macrocarpa* alone on the ridge between Bourail and the coast, and in some gallery forests in the foothills near Poya, *Cyphokentia macrostachya* in localized populations at Rivière Bleue and south of Kouaoua, *Cyphophoenix nucele* in a limited area of Lifou, *Cyphosperma balansae* on the southern flank of Mt. Aoupinié.

Geographical Distribution and Local Endemism

Except for *Cocos nucifera*[1] all the New Caledonian palm species are endemic. The only non-endemic genus, *Cyphosperma*, is shared with Fiji and Vanuatu (New Hebrides). Palms are widespread on the main island of New Caledonia but unknown on the isle of Pines and the Belep group, though both seem to offer suitable habitats. The Loyalty Islands have only one endemic species restricted to a small area of Lifou, the ecological conditions of which show no obvious peculiarity.

The distribution of the various species is certainly harder to establish from herbarium records than that of plants more easily collected. There may even be species not yet collected and described. Some known species are probably more widespread than the few existing specimens indicate. Nevertheless the available collections suggest definite geographical limits independent of plant formations or geological substrates.[2] We may distinguish for the main island:

1. Southern species whose known area is largely or entirely south of the line Bourail-Houailou: *Actinokentia divaricata, Basselinia deplanchei, Clinosperma bracteale.* Others (*Brongniartikentia vaginata, Basselinia humboldtiana, B. porphyrea, Campecarpus fulcitus, Pritchardiopsis jeanneneyi*[3] are even more limited, being found only south of the line Bouloupari-Thio, which also marks a northern boundary for many New Caledonian species and genera in other families.
2. Northern species known only in the north or even the far north (*Alloschmidia glabrata, Brongniartikentia lanuginosa, Burretiokentia hapala, Cyphophoenix elegans, Mackeea magnifica, Moratia cerifera, Veillonia alba*).
3. Widespread species scattered over much of the island (*Basselinia gracilis, B. pancheri, B. velutina, Burretiokentia vieillardii, Cyphokentia macrostachya, Cyphosperma balansae*).
4. Species of the central part of the island (*Basselinia sordida, Kentiopsis oliviformis*).
5. Microendemics, very local and apparently restricted to a single valley, slope or mountain even though similar ecological conditions exist elsewhere. These occur:
   a) in the north—*Basselinia iterata* on Mt. Ignambi at 900–1,000 m altitude; *B. favieri* and *Lavoixia*

[1] The coconut, a pantropical seashore species whose controversial origin and natural distribution will not be considered here, is not for the purposes of this article included among New Caledonian native palms. It must however be mentioned as being present at the time of the first European voyages and forming today an essential part of many coastal landscapes. It is often spontaneous near the shore but could come from a pre-European introduction. It is probably near its southern limit but still bears fairly well on the Isle of Pines at about 22°40′S. latitude.

[2] Rain forest, gallery forests and *maquis*, and also varied types of rock, occur throughout the main island from north to south (see vegetation and geological maps in *Atlas de la Nouvelle-Calédonie*, 1981).

[3] Known at present only from three small populations in a single locality but perhaps formerly more widespread.

macrocarpa on Mt. Panié about 500 m;

b) in the south—*Actinokentia huerlimannii* localized in the Humboldt Massif about 900 m;

c) in the center—*Basselinia vestita* known only from Mé Ori about 1,000 m, and *B. tomentosa* from the same altitude on Mt. Nakada;

d) in Lifou—*Cyphophoenix nucele* from a single locality on raised coral.

A given locality, even if palms are abundant, has rarely more than two or three species. The range is wider in two well defined and exceptionally rich areas: Ruisseau Pouai (also known as Creek Tchit) in the north at 10 m altitude on schist, the base of Mt. Panié, where are recorded 6 species representing as many genera: *Alloschmidia glabrata, Basselinia gracilis, Chambeyronia macrocarpa, Cyphosperma balansae, Moratia cerifera, Veillonia alba*; Rivière Bleue in the south at 150-200 m on ultrabasic rocks has also 6 species: *Actinokentia divaricata, Basselinia gracilis, B. pancheri, Brongniartikentia vaginata, Campecarpus fulcitus, Cyphokentia macrostachya.* Ten species (*Basselinia favieri, B. gracilis, B. velutina, Brongniartikentia lanuginosa, Burretiokentia vieillardii, Chambeyronia lepidota, Lavoixia macrocarpa, Mackeea magnifica, Moratia cerifera, Veillonia alba*) have been collected on the eastern slope of Mt. Panié (schists, 500–1,600 m).

Ecology

Palms in New Caledonia characterize rain forests and gallery forest. *Basselinia deplanchei* is the only species found also in open and more or less dry *maquis. Basselinia gracilis* sometimes occurs at the edge of the forest. Forests rich in species and individuals are generally well watered, with an annual rainfall above 1,800 mm. Palms are entirely absent from savanna and mangrove formations. Altitude has little importance. Palms occur from sea level to the summits of the highest mountains, none of which however reaches 1,700 m; they are most abundant at medium elevations between 300 and 1,000 m. They are equally common on ultrabasic and on other rocks but the different species show a marked or complete preference for one or other type of substrate. Fifteen species are thus known only from non-ultrabasic rocks: *Alloschmidia glabrata, Basselinia favieri, B. iterata, B. tomentosa, B. velutina, Brongniartikentia lanuginosa, Burretiokentia hapala, Chambeyronia lepidota, Cyphophoenix elegans, C. nucele, Kentiopsis oliviformis, Lavoixia macrocarpa, Mackeea magnifica, Moratia cerifera, Veillonia alba*; eleven others (*Actinokentia divaricata, A. huerlimannii, Basselinia deplanchei, B. humboldtiana, B. pancheri, B. porphyrea, B. sordida, B. vestita, Brongniartikentia vaginata, Campecarpus fulcitus, Pritchardiopsis jeanneneyi*) only occur on ultrabasics; the remaining six are indifferent to the substrate (*Basselinia gracilis, Burretiokentia vieillardii, Chambeyronia macrocarpa, Clinosperma bracteale, Cyphokentia macrostachya, Cyphosperma balansae*). Several species (e.g., *Basselinia humboldtiana, B. porphyrea, Campecarpus fulcitus, Pritchardiopsis jeanneneyi*) are associated with rocky ground, often on steep slopes.

Biological Types

Most New Caledonian palms have a single straight trunk. Two species only, *Basselinia deplanchei* and *B. gracilis*, can also form clumps with up to a dozen stems. Climbing and liana forms are absent, even though *Calamus*, known from Fiji and from New Hebrides, reaches in Australia 32°S, a latitude well to the south of New Caledonia. None is spiny, unlike palms of other regions often armed on all parts with

ferocious thorns and making formidable obstacles in the forest. This lack of thorns, general in the native vegetation of New Caledonia with few exceptions (a *Carissa*, several climbing species of *Caesalpinia*, the juvenile stages of some *Capparis* species), may perhaps be associated with the absence of herbivorous land mammals. Some species, e.g., *Campecarpus fulcitus*[4] have a cone of exposed roots below the trunk. These roots, though never spectacular, help one to recognize in the field the few species possessing them.

The number of functional leaves is never very large, varying from 4 in *Actinokentia divaricata* to about 20 in *Cyphosperma balansae*. The species of *Basselinia* section *Taloua* have almost all 10 functional leaves. A few palms are monocarpic, flowering only once and dying after ripening the fruits produced by an enormous terminal inflorescence. Such behavior is unknown in New Caledonia where all species have only axillary inflorescences and are pleonanthic. *Alloschmidia glabrata* is unusual in its numerous inflorescences, up to 17 having been observed on a single trunk. Flowering usually begins before the plant has attained its full size and continues throughout its life.

Phenology and Dispersal

Flowering seasons have been little studied; several species bear a number of inflorescences at varying stages of development. Fruiting is often copious and natural regeneration abundant even in very local species, e.g., *Cyphophoenix nucele*. Dispersal mechanisms are poorly known but birds probably play a major part. A *Chambeyronia macrocarpa* in a private garden at Bourail came from a seed found in the gizzard of a pigeon, probably the notou (*Ducula goliath*). In the Upper Tchamba Valley this bird eats the fruits of *Burretiokentia vieillardii*, while at Rivière Bleue the parrot *Cyanoramphus novaezelandiae* feeds on those of *Brongniartikentia vaginata*.[5] Linden (1881) quotes the difficulties of Pancher in obtaining ripe fruits of *Actinokentia divaricata*, eagerly sought after by birds.

Introduced Palms

Cultivated palms are fairly varied in New Caledonia. At present 18 species are known but the list may well be incomplete. Very few of them have become naturalized. *Roystonea oleracea* has spread at Moindou to form a local but very impressive population. *Livistona chinensis* is well established in the native vegetation of some gallery forests on the east coast. The date palm (*Phoenix dactylifera*) which had already fruited (Pancher, 1866) at Noumea in 1866, occurs sporadically in cleared land on the west coast. Though appearing spontaneous it is not common and never forms an important constituent of the secondary vegetation.

Literature Cited

LINDEN, J. 1881. *Kentiopsis divaricata*, Brongn. Illustration horticole, Gand 28: 10.

MOORE, H. E., JR. AND N. W. UHL. 1984. The indigenous palms of New Caledonia. Allertonia 3(5): 313–402.

PANCHER, J.A.I. 1866. Dattier, *Phoenix dactilifera* de Linné. Moniteur de la Nouvelle-Calédonie 2 avril 1866.

O.R.S.T.O.M. 1981. Géologie. Map 9—Atlas de la Nouvelle-Calédonie—Paris—Végétation. Map 51—Atlas de la Nouvelle-Calédonie—Paris.

Note: This article by three botanists who have worked extensively with palms in New Caledonia provides further information on the history, ecology, and biology of the palms on the island. The article was written to augment the recently published taxonomic treatment by Moore and Uhl (1984). See pp. 177–178 for a review.—Eds.

[4] Whose roots are sometimes slightly prickly.

[5] Y. Létocart (personnal communication).

Principes, 29(4), 1985, pp. 170–176

Notes on Phoenix hanceana var. philippinensis in the Batanes Islands, Philippines

WILLIAM SM. GRUEZO AND EDWINO S. FERNANDO

National Plant Genetic Resources Laboratory, Institute of Plant Breeding, University of the Philippines at Los Banos; and Department of Forest Biological Sciences, College of Forestry, University of the Philippines at Los Banos, College, Laguna 3720, Philippines

The Batanes Islands are the northernmost island group in the Philippine archipelago (Fig. 1, inset). They form a group of 10 small islands extending from near the north coast of Luzon to within 160 km of the southern point of Taiwan (Ferguson 1908). The islands are relatively poor in palms, with only five indigenous taxa (three erect, two climbing) thus far recorded (Beccari 1908; Merrill 1908). Of these five, at least three are thought to be endemic to the islands. One interesting endemic is a Phoenicoid palm—*Phoenix hanceana* Naud. var. *philippinensis* Becc. The taxonomic affinity of this taxon has been rather obscure. A recently reprinted article by Guzman-Rivas (1984), in which genera and species have been corrected to conform to currently accepted names, refers to the palm as *Phoenix loureirii* Kunth, with which it is thought to be conspecific. However, no actual and formal taxonomic reduction to synonymy has yet been published.

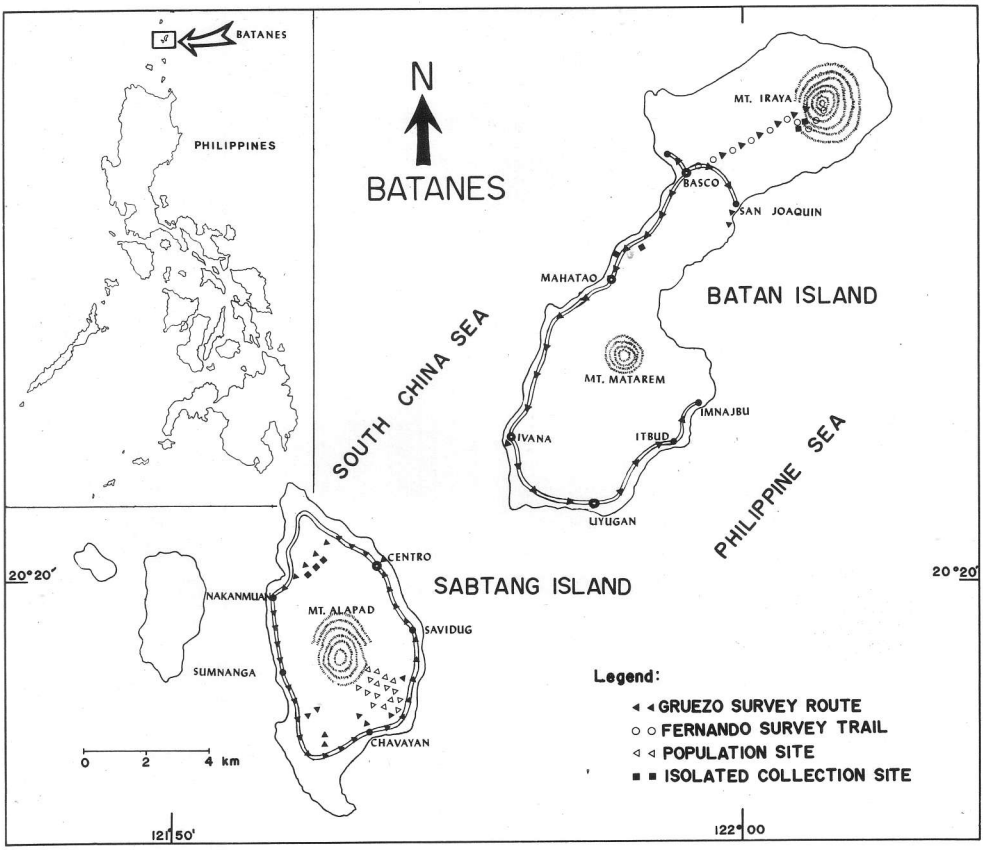
Phoenix hanceana var. *philippinensis* was described by Beccari in 1908 based from a single collection (*B.S. 3744*) made on June 1907 by Mr. Eugenio Fenix of the then Bureau of Science, Manila. The type locality was simply stated as Sabtan (= Sabtang) Island, Batanes—"growing along streams well up on the mountains" (Beccari 1908). Since then there has apparently been no intensive collection of this quite interesting palm resulting in its inclusion in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) as one of the three threatened Philippine palms.

The present paper discusses the ethnobotanical aspects and ecology and conservation status of this reportedly endangered Philippine palm.

In March–April 1983, one of us (WSG) conducted an intensive germplasm survey and collection of crop species and other wild potential food plants on Batan and Sabtang Islands, Batanes Province (Fig. 1). Simultaneously, a floristic assessment was made with emphasis on endemic species or species whose type locality is one of the two islands. In May 1984, palm exploration on Batan Island by E. S. Fernando yielded additional information.

Ethnobotany

Of the three erect palms recorded from the Batanes Islands, *Phoenix hanceana* var. *philippinensis*, locally called "Voyavoy" (Ivatan name) receives special attention from the local people, the Ivatans, because it is the main source of raw materials for making raincoats. The raincoat, known locally as "Suot" (see also Merrill 1908) or "Vakol" (both Ivatan terms) (Fig. 2) is characteristically woven from the shredded, sun-dried juvenile leaves of *Phoenix hanceana* var. *philip-*



1. Survey routes and collection sites of *Phoenix hanceana* var. *philippinensis* on Batan and Sabtang Islands, Batanes, Philippines.

pinensis (see also Brown and Merrill 1920). A full-size raincoat measures approximately 78 cm long and 42 cm wide. In many instances, this coat is also used by the Ivatans on sunny days while working out in the open fields. On the other hand, local travellers and foreign tourists occasionally buy miniature or regular size raincoats for souvenirs.

Ecology and Present Status

In the course of germplasm survey and collection on Batan and Sabtang Islands, Batanes, a sufficiently large but localized population of *Phoenix hanceana* var. *philippinensis* was found between Barangays Chavayan and Savidug (Fig. 1). The population consists of numerous individuals in various stages of development and maturity growing luxuriantly on rolling grasslands, rock outcrops and hillslopes (Figs. 3,4B). The grassland species present in the area and associated with *Phoenix hanceana* var. *philippinensis* are sporadic patches of *Imperata cylindrica* (L.) Beauv. var. *koenigii* (Retz.) Dur. & Schinz. (Fig. 4B), *Miscanthus japonicus* (Thunb.) Anders., *Saccharum spontaneum* L., and a cushionlike growth of *Panicum repens* L., *Eragrostis tenella* (L.) Beauv. *ex* Roem. & Schult., *Ischae-*

2. Native raincoat characteristically made from juvenile leaves of *Phoenix hanceana* var. *philippinensis* worn by the inhabitants of Sabtang and Batan Islands, Batanes, Philippines. A. Dorsal view. B. Lateral view. C. Ventral view showing strapping foundation made from leafstalks of *Musa textilis* Nee. (Photo by Wm. Sm. Gruezo, 6 April 1983).

3. Population of *Phoenix hanceana* var. *philippinensis* growing on rolling grasslands, rock outcrops and hill slopes at Sitio Chamantad, ca. 2.5 km from Barangay Savidug, right side of rough road to Barangay Chavayan, Sabtang Island, Batanes. (Photo by Wm. Sm. Gruezo, 6 April 1983).

4. Fruiting specimens of *Phoenix hanceana* var. *philippinensis*. A. Specimen growing on the slope of Mt. Iraya, Batan Island, alt. ca. 250 m, coll. no. *EF404*. (Photo by E. S. Fernando, 11 May 1984). B. Specimen growing along rough road to Barangay Chavayan, Sabtang Island. (Photo by Wm. Sm. Gruezo, 6 April 1983).

mum indicum (Houtt.) Merr., and *Digitaria sanguinalis* (L.) Scop. (Fig. 3), among others over a considerable tract of open, rugged land. Scattered small fields of corn (*Zea mays* L.), sweet potato (*Ipomoea batatas* L.) or an intercropping of these two species are found on the lower, moderately level grounds, alongside of the rough road and up to near the shores.

In other sites on Sabtang and Batan Islands, only a few isolated individual plants were seen (Figs. 1,4A,5). One large pistillate plant was found growing on the slopes of Mt. Iraya on Batan Island (Fig. 4A), together with some isolated clustering staminate plants (Fig. 5) a few meters away. Some plants were also seen cultivated in home gardens in Basco, the capital town of Batanes Province.

Foresters in Basco also report having seen populations of *Phoenix hanceana* var. *philippinensis* on nearby Itbayat Island (A. Bermudez, Jr., pers. comm.).

The presence of plants of *Phoenix hanceana* var. *philippinensis* in various stages on Sabtang Island (Figs. 3,4B) does indicate natural regeneration. There is also the apparently increasing trend by the native Ivatans to cultivate the palm. Its utilization for making raincoats for the Ivatans' own use, therefore, does not appear immediately incompatible with its survival. There is, however, the need for continued protection of its habitats from conversion to other uses.

Herbarium (voucher) and ethnobotanical materials were collected, with the former items now deposited at the Botanical

5. *Phoenix hanceana* var. *philippinensis*. A. Staminate plant showing inflorescences at various stages of development. B. Staminate inflorescence at anthesis, same as plant A, Mt. Iraya, ca. 250 m alt. (Photo by E. S. Fernando, 11 May 1984, coll. no. *EF403*).

Herbarium (CAHP) and Forestry Herbarium (LBC), Museum of Natural History, University of the Philippines at Los Banos, College, Laguna, while the latter are in the authors' possession.

The herbarium and ethnobotanical specimens are: SABTANG ISLAND: Sitio Tayatuan, along foot trail to Batangay Nakanmuan, alt. ca. 120 m, only juvenile leaves collected and made into Ivatan raincoat (miniature), 5 April 1983, *Gruezo WM10886*; Sitio Chamantad, ca. 2.5 km from Barangay Chavayan, left side of rough road to Barangay Savidug, on rolling grassland associated with *Imperata cylindrica* (L.) Beauv. var. *koenigii* (Retz.) Dur. & Schinz., and other grass species, alt. ca. 5 m, 6 April 1983, plant pistillate, ca. 0.5 m tall, fl. and fr., only immature fruits collected, *Gruezo WM10885* (CAHP).—BATAN ISLAND: Mahatao, along road left side facing the town, near cemetery, alt. ca. 50 m, 30 March 1983, *Gruezo and Hernaez 3820* (CAHP 29349—leaves; CAHP 29350—staminate inflorescence), slide photo taken *in situ*; Mt. Iraya, alt. ca. 250 m, along margins of cleared forest on very steep slope, male plant ca. 60 cm tall, clustering with up to 4 offshoots, inflorescence creamy white at anthesis to 30 cm long, 11 May 1984, *Fernando EF403* (LBC, K); same locality and date, pistillate plant, ca. 2 m tall, 26 cm diameter, infructescence up to 80 cm long, peduncle green, rachillae orangish, fruits yellow-orange

6. *Phoenix hanceana* var. *philippinensis*. A. Newly-fruiting plant. B. Infructescences of A at various stages of development, same locality as Fig. 3. (Photo by Wm. Sm. Gruezo, 6 April 1983, coll. no. *WM10885*).

turning deep purple when ripe, 1.8 cm long × 0.9 cm wide, only infructescence specimens collected with seeds glossy, light brown (1.2 cm × 0.7 cm), *Fernando EF404* (LBC, K).

Acknowledgments

One of us (WSG) thanks Mr. Teodoro Baldemoro for assistance in the collection survey especially on Sabtang Island, Messrs. José Baronia and Marcial Puno for their hospitality and Messrs. Emmanuel A. Panisales (National Research Council of the Philippines), and L. A. Baluyot for assistance in the preparation of Figure 1. E.S.F.'s observations were carried out while on a rattan exploration trip for the International Development Research Centre (IDRC) and Philippine Council for Agricultural and Resources Research and Development (PCARRD)-funded National Integrated Research Project on Rattans; field assistance was provided by B. D. Arizala and staff of the Bureau of Forest Development (BFD) District Office in Basco.

LITERATURE CITED

BECCARI, O. 1908. The palms of the Batanes and Babuyanes Islands. Philipp. J. Sci. 3(Bot): 339–342.

BROWN, W. H. AND E. D. MERRILL. 1920. Philippine palms and palm products. *In* Minor Products of Philippine Forests (W. H. Brown, ed.), Vol. 1, pp. 127–249. Bureau of Printing, Manila.

FERGUSON, H. G. 1908. Contribution to the physiography of the Philippine Islands, II. The Batanes Islands. Philipp. J. Sci. 3(Gen. Sci.): 1–24.

GUZMAN-RIVAS, P. 1984. Coconut and other palm use in Mexico and the Philippines. Principes 28: 20–30.

MERRILL, E. D. 1908. On a collection of plants from the Batanes and Babuyanes Islands. Philipp. J. Sci. 3(Bot.): 385–442.

Know Your Palms

A. *Livistona decipiens*; B. *Oenocarpus mapora*; C. *Prestoea montana*; D. *Chamaedorea brachypoda.*

Principes, 29(4), 1985, pp. 177–180

PALM LITERATURE

MOORE, HAROLD E., JR. AND NATALIE W. UHL. The Indigenous Palms of New Caledonia. *Allertonia* Vol. 3, No. 5, pages 313–402. Pacific Tropical Botanical Garden, P.O. Box 340, Lawai, HI 96765. 1984. $12.00. Available also from the Palm Society Bookstore.

Perhaps of all the places that the late Dr. Harold E. Moore, Jr. visited in the course of his studies of palms, New Caledonia was his favorite. Hal seemed to have a special fondness for New Caledonia and mentioned more than once his desire to have a house on the remote and picturesque northeast coast where he could visit and be among the palms while escaping the harsh winters of the northeastern United States. Dr. Moore was intrigued by the evolutionary trends that had taken place on the island at the generic level among palms in the *Clinostigma* alliance and, to a lesser extent, in the *Archontophoenix* alliance. In addition, he found the *Basselinia* complex to be most interesting and perplexing and, accordingly, much of his time and energy in his later years was devoted to clarifying its specific boundaries.

From 1965 to 1980, Dr. Moore made five visits to New Caledonia in order to unravel the mysteries of its indigenous palms. His studies of the tremendous amount of data resulting from these visits were directed towards a new floristic treatment of the palms of the island, one that he essentially completed before his death in October, 1980. His manuscript was finished and edited by Dr. Natalie W. Uhl, his co-worker and associate in several previous palm studies.

This publication treats taxonomically the seventeen genera and thirty-two species of palms indigenous to New Caledonia as Dr. Moore understood them in 1980. Five species, all *Basselinia*, are described as new and several reductions at the specific as well as generic level are made. In addition to the taxonomic treatment, it contains an introduction and short discussions on evolutionary considerations, exotic palms cultivated in New Caledonia, and the cultivation of New Caledonian palms elsewhere. The publication is visually pleasing throughout with excellent photographs, fine illustrations, and helpful maps depicting the distribution of each species. In several instances, ecological considerations (often lacking in papers of this nature) are discussed which prove useful for those who cultivate the palms. This comprehensive work will not only be of great interest to students and collectors of palms but to all those with an interest in the evolutionary trends that have occurred among angiosperms in New Caledonia. The high quality that students of palms have come to expect in the work of Drs. Moore and Uhl is evident throughout the paper.

Dr. Moore's treatment of the palms contains several important and interesting taxonomic points worthy of special mention since many of the species are becoming more common in cultivation. These points reflect the importance of this work to all students and collectors of palms.

The perplexing *Basselinia* complex was perhaps the greatest obstacle in dealing with the palms of New Caledonia. Dr. Moore was able to put the final touches on the *Basselinia* complex only after his last trip to New Caledonia in 1980 whereas the other genera were more or less treated fully several years earlier. Initially, it was thought that *Basselinia* would be broken down into two or perhaps even three genera. But after several years of intense and exhaustive field work coupled with studies of foliar anatomy and chemistry, Dr. Moore erected two sections within *Basselinia*, section *Basselinia* and section *Taloua*. The former section is composed of generally smaller, more variable, often cespitose, and more widely distributed species as *B. gracilis*, *B. deplanchei*, *B. pancheri*, and *B. vestita*. In contrast, the

latter section, *Taloua*, comprises larger, more robust, less variable, single trunked species of often very limited distribution (usually to a particular soil type on a group of mountains). These are palms that in general habit resemble to a greater extent palms of the other genera encountered in New Caledonia. Included in section *Taloua* are *B. favieri*, *B. humboldtiana*, *B. iterata*, *B. sordida*, *B. porphyrea*, *B. tomentosa*, and *B. velutina*.

Basselinia tomentosa was thought originally to occur on Mt. Panié. In 1980, Dr. Moore collected material from Mt. Nakada that was clearly identical in key characteristics with the isotype of *B. tomentosa* at Paris, thus separating it from material it was confused with from Mt. Panie. Seeds of *B. tomentosa*, known only from Mt. Nakada, were distributed through the Seed Bank in 1980 as *Basselinia sp. nov. Moore et al. 10548*.

Another important point to note within the treatment of the *Basselinia* complex is the reduction of *B. eriostachys* to *B. gracilis*. This is perhaps the most widely cultivated species of *Basselinia*.

Besides *Basselinia*, other important points arising from this treatment worthy of special mention include the reductions of *Chambeyronia hookeri* to *C. macrocarpa*, *Cyphokentia humboldtiana* to *Basselinia humboldtiana*, and *Dolichokentia robusta* to *Cyphokentia macrostachya*. In addition, *Veitchia arecina* is now thought not to be indigenous to New Caledonia but introduced from Vanuata.

Perhaps the most exciting fact to arise from Dr. Moore's work is that of the rediscovery of and confirmation that *Pritchardiopsis jeanneneyi*, the only coryphoid palm native to New Caledonia and long presumed to be extinct, is surviving in three populations totaling one adult and several young plants. Leaf and old inflorescence material were brought to Dr. Moore on his next-to-the-last day of field work in New Caledonia in 1980. After inspection of the material, Dr. Moore confirmed that it was indeed *Pritchardiopsis jeanneneyi*, a fitting and final tribute to his field work and studies of the palms of New Caledonia spanning almost twenty years of his life.

DONALD R. HODEL

HAY, A. J. M. 1984. A guide to the Monocotyledons of Papua New Guinea. Part 3. Palmae. Department of Forestry, P.N.G. University of Technology, P.O. Private Bag, Lae, Papua New Guinea (K 6.00 incl. surface postage).

This foolscap size pamplet, some 125 duplicated pages long, held together with staples, represents an interesting and very useful introduction to the palms of New Guinea. It is Part 3 of a series, "A Guide to the Monocotyledons of New Guinea," developed by Bob Johns and Alistair Hay at the Forestry College, Wau, in Papua New Guinea. Part 3 deals entirely with the palms and is the work of Alistair Hay. Brightly and clearly written, the guide is also enhanced by pleasing and sometimes very elegant illustrations, mostly by Diana Howcroft.

There is a great deal of good and often new information on the palms of New Guinea and their natural history in this book so it is a shame that it is published in a temporary format, which does not allow for wear and tear in the field. However, the pamplet is inexpensive and should do much to bring home an awareness of palms in New Guinea to the students for whom it was written. The genera of palms in New Guinea are described and illustrated, and distinctive species, geographical distribution, uses, and ecology are discussed in detail.

Because of the long time span between completion of the manuscript and final publication, the book is somewhat out of date. There is no mention of the genus *Clinostigma* which occurs in New Ireland, nor of *Daemonorops*, one species of

which just reaches west New Guinea. The incorrect distribution pattern for *Gulubia* cited in Essig's 'Preliminary analysis' is repeated here; readers should note that *Gulubia* does not occur in Malaya. Some of the diagnostic characters cited for genera refer only to New Guinea representatives; this eliminates adding lists of exceptions to the descriptions. However, the reader should be aware of the possibility when extrapolating to other areas. A few other false statements need correcting. *Orania* does indeed occur in the Moluccas; it is also in Java, Sumatra, and Borneo, so the statement that one species is isolated in Malaya does not hold. The isolated species is *O. longisquama* of Madagascar! *Haitiella* (not, of course, in PNG) is referred to as having a warty fruit. In fact, *Coccothrinax* (*Haitiella*) *ekmannii* has pimply pustules on the epicarp, but is certainly not corky-warted. *Sommieria* is now quite widespread in palm enthusiasts' collections.

I believe even the most ardent palm "lumper" would have hesitation in accepting the statement that there is perhaps only one genus in the Caryotoideae. The key to the subfamilies may be short-circuited by a dioecious species of *Livistona* from Irian Jaya (unnamed, cultivated in Bogor). A better dichotomy would be to add information on the presence or absence of the three pyrenes in New Guinea species. The notes on the origin of *Cocos* are superseded by the work of Hugh Harries. Perhaps the most serious omission is the lack of reference to Moore's Major Groups paper.

This guide should be very successful in developing enthusiasm for palms in the people for whom it was written. Palm Society members will also gain much pleasure from it.

JOHN DRANSFIELD

THE DATE PALM JOURNAL. Semiannual. FAO Regional Project for Palm & Dates Research Centre in the Near East & North Africa, P.O. Box 163, Baghdad, Iraq.

This journal began publication in July 1981, as a project of the Food and Agricultural Organization of the United Nations. Its chief objective is to disseminate the results of research on all aspects of date cultivation and fruit processing. One motive for founding the journal was to fill the void left when the *Report of the Annual Date Growers' Institute* (Coachella Valley, California) ceased publication in 1979 after 54 years.

The first issue of 152 pages contains nine major articles, written in English or Arabic with abstracts appearing in translation. The breadth of subject matter is evidenced by contributions on tissue culture of date palms, labor-saving devices in date orchards, and the production of citric acid from date syrup. In addition, the issue has sections of short communications, new records of insect pests, news of the industry, and documentation and publications. Printed on glossy paper, carefully edited, and with some color photographs, *The Date Palm Journal* is a welcome new information source on this oldest of cultivated palms.

TURNER, P. D. Oil Palm Diseases and Disorders. 280 pp. Published for the Incorporated Society of Planters by Oxford University Press, New York. 1981. $59.00, hardcover.

At least two dozen books have been printed since 1966 on the oil palm, making it the most intensively studied of all palms. Although one of the previous works concerned itself with diseases and disorders of the oil palm in Malaysia,[1] the pres-

[1] Turner, P. D. and R. A. Bull. *Diseases and Disorders of the Oil Palm in Malaysia.* 247 pp. The Incorporated Society of Planters, Kuala Lumpur. 1967.

ent book is the first to treat the subject matter on a pantropical scale.[2]

The book is organized into eleven chapters: an introduction, a chapter devoted to seed production problems, three to nursery cultivation, and six to field palms. The latter chapters individually cover root, stem, leaf, and inflorescence diseases; miscellaneous, and nutritional disorders. An effective format is employed giving the occurrence, symptoms, cause, and treatment of each disease or disorder. To aid in making a diagnosis, the book is lavishly illustrated with 187 photographs, two-thirds in color. Intended as a practical manual for oil palm estate operators, the author succeeds in that objective as well as in providing a comprehensive assessment of what remains to be determined about the various diseases. The book lists more than 900 references, the most recent dated 1979. *Oil Palm Diseases* will assuredly become the definitive work on the subject, and new editions may be anticipated to keep abreast of the rapid changes taking place in oil palm cultivation.

DENNIS JOHNSON

[2] Complementing this study are surveys of oil palm pests around the world, being published in the journal *Oléagineux*. Special issues dated July 1978 and April 1981 dealt with, respectively, Latin America and West Africa; Asia will be covered in a future issue.

PALM RESEARCH

Acrocomia

Hermes Cuadros Villalobos, Fundación Jardín Botánico "Guillermo Piñeres," Apartado 5456, Cartagena, Colombia, is conducting research for a master's thesis on the genus *Acrocomia* in Colombia. The study is being done at the Instituto de Ciencias Naturales, Facultad de Ciencias, Universidad Nacional de Colombia, Bogotá. It is scheduled to be completed in May 1986.

Catoblastus and Wettinia

Rodrigo Bernal-Gonzalez, Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Apartado 7495, Bogotá, Colombia, is planning a study of the systematics and reproductive biology of *Catoblastus* and *Wettinia*. He would like to know of all wild populations, and would therefore highly appreciate information on every population spotted, particularly those not vouchered by herbarium specimens. He also encourages all botanists to pay more attention in the field to these poorly known genera.

Caryota

William James Hahn, L. H. Bailey Hortorium, 467 Mann Library, Cornell University, Ithaca, New York, 14853-4301, is studing the evolution and systematics of the genus *Caryota* as a Ph.D. thesis project. He would greatly appreciate seed, particularly of uncommon or unusual species.

Principes, 29(4), 1985, pp. 181–186

NEWS OF THE SOCIETY

Margaret Alice Langlois Dies

Mrs. Arthur C. Langlois of The Retreat, Bahamas, died on July 25th, 1985. Affectionately known to many as "Wumpsie," Mrs. Langlois played a major role in assembling and maintaining a fine collection of palms at the estate (see following article). She also assisted her husband, Arthur C. Langlois, in the preparation of "Supplement Palms of the World."

The Retreat, to become the headquarters of the Bahamian National Trust, will be maintained as a botanic garden. It was dedicated on October 17th with Prince Charles attending.

A Pilgrimage to Nassau

We were a happy, enthusiastic, and expectant group of Florida palm-lovers who gathered early in the morning of March 3, 1984 at Miami International Airport for a 45 minute flight to Nassau. We were going to The Retreat, the Langlois property, to see one of the world's best-known private palm collections. It was made famous by its owners who were avid palm collectors for a period of over 40 years, long before there was a Palm Society.

Our flight was smooth over the brilliant waters. First one crosses the rather narrow continental shelf, then the sudden deep blue of the Gulf Stream which gives way to the shallow waters of the Bahama Bank with their tones of emerald, azure, and blue, a beautiful never-to-be-forgotten sight, especially when viewed from above.

In Nassau, two chartered mini-buses took us to our hotel for a quick check-in before taking off for the 30-minute ride to our real destination. Since most of us were from the Miami area the Bahaman vegetation was rather familiar though our native Dade County pines undergrown with *Serenoa repens* were not a feature of the landscape as they are in southern and central Florida. Bougainvillea was in bloom, papayas as well as bananas were everywhere as well as some akees and, yes, even coconuts. One very different aspect was the topography; Nassau is not at all flat, but has hills!

Suddenly, there we were. A modest entrance in a wall of vegetation which we entered on foot as it was too small even for our mini-vans. Palms were immediately in evidence, mostly self-sown *Ptychosperma elegans*, as we walked the curving road to the old house with its friendly open windows and doors. And there was our delightful, charming hostess, "Wumpsie" Langlois. After greetings were exchanged, we were handed a combination guide and plant list worked out by our hostess. It listed the names of palms as we progressed from the Cathedral area, to the Poinciana Lawn to the Little Green Hell down the Main Coppice path past Hole #2 and Hole #3, the *Licuala* Hole, Green Hell Jr., South of the Path, North of the Path, etc., etc.

The exotic palms were grown mostly in natural sink holes, areas where the coral rock had been dissolved by some natural process, and which were anywhere from 5 to 20′ across, or more. The Langlois had filled the holes up almost to the level of the surrounding land and used these areas to plant their choicest plants. Here, because moisture is retained, the plants did not have to compete with native ones for the thin soil layer covering the coral rock. They were also more protected from the storms and shaded by the surrounding native coppice. Cheek by jowl, we found *Pelagodoxa henryana*, *Satakentia liukiuensis*, *Astrocaryum mexicanum*, *Pritchardia pacifica*, *Aiphanes erosa*, dwarf *Gronophyllum* sp., *Balaka* sp., *Paralinospadix* sp., *P. hollrungii*, *Licuala grandis*, *Neonicholsonia watsonii*, *Drymophleous beguinii*, *D. olivae formis*, *Chrysalidocarpus madagascariensis* var.

lucubensis, Calyptrogyne ghiesbrechtiana, Reinhardtia gracilis var. *rostrata, Normanbya normanbyi, Rhopaloblaste elegans, Neoveitchia storkii* (a handsome plant), a young *Phoenicophorium borsigianum, Chambeyronia macrocarpa, Howea forsteriana* and *Ropaloblaste ceramica.* The list does not name all the palms there were. One came across some of them by chance. One of the most beautiful, though unfortunately not fruiting in March was the *Areca vestiaria* (*A. langloisiana*) with its magnificant orange crown-shafts. It occupies its own pit about two feet deeper than the surrounding terrain, and is at least 15–20′ tall, a beautiful, full plant. I once saw it in fruit in November, a sight never to be forgotten, so rich was the coloring.

Near the house, in an open area where chairs were set up for us and where we ate our box lunches, were several very tall *Rhyticocos amara* but not in seed, and also *Wallichia disticha, Corypha umbraculifera, Nannorrhops ritchiana* and *Chrysalidocarpus madagascariensis.*

Mrs. Langlois had the help of several friends as well as her niece, Janet Brown, so we enjoyed visiting with her while we ate and relaxed. Then it was time to leave, though we were very loath to do so, but out hostess needed some rest. And so we had a fascinating ride through an area with lovely gardens and, as we ascended, views of the ocean. We then arrived at the Paradise Gardens, the home of Mrs. Langlois' niece and husband. We had no idea what was in store for us, an old garden greatly enhanced by its present owners. It was built on a hillside, with several slat houses full to bursting with very healthy orchids, and an astonishing array of tropical plants, growing in the greatest profusion on all sides. The paths were lined with *Adenium obesum* about 18″ tall but unfortunately not yet in bloom. There were many colors of frangipani, fruit trees, and so many others that it just has to be seen to be believed. By the time we had admired all these wonders we were hot and tired, so, arriving at the top of the hill, we sat looking at the view over the garden to the sea beyond while our hosts served refreshingly chilled white wine.

It was a memorable day with many wonderful pictures to cherish. Some of the group then returned to Miami, while the rest went to the hotel. After a brief rest we had dinner in a delightful patio restaurant under a spreading coconut. Since it was Saturday evening all shops were already closed for the weekend. There was only the famous straw market in which to spend one's money for souvenirs.

Sunday we spent in a leisurely exploration of other parts on Nassau, including watching some of the contestants participating in a triathlon. We seemed to meet them at every turn, the local residents holding out cold drinks as they ran by. We saw several running up the Queen's Stairs, which are cut into solid rock in a hill about 40–50′ high. The stairs are quite hidden because they were to serve as an escape route in case the governor's house was ever attacked. Old, exceedingly tall *Ptychosperma elegans* had grown to the top of the chasm and were wonderful to behold towering way above us. We were amused at the expression of dismay when one of the runners first caught sight of the steps he had to ascend.

All in all our trip was a great success and we retain happy memories of a once-in-a-lifetime occasion.

TEDDIE BUHLER

News from Texas

The Houston Area Chapter of the International Palm Society met on April 11, 1985 at the Houston Area Garden Center and made final plans for the annual Palm Show and Sale, April 20th and 21st, at the Houston Arboretum. The Chapter also received formal thanks for a $500

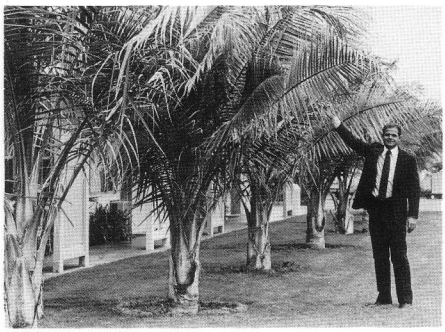
gift to the Revolving Publications Fund. On July 13 the meeting featured a tour of Mike Burnet's lush bog garden, followed by the annual Palm Society picnic at the new home and garden of Elizabeth and Jim Cain. The September 11 meeting was hosted by Grace and Bernard Green. A Fall Fund Raiser Tropical Plant Sale was held at the Houston Arboretum on September 15.

BONNY RUHLAND

News from Southern California

On Saturday, May 18, approximately 50 members of the Southern California Chapter of The International Palm Society met at the hillside home of Dick Palmer in Whittier, California. The 2½ acre garden is on a southwest slope facing the Pacific Ocean 25 miles away. Don Hodel led a tour of the garden and pointed out over 200 species of palms growing both in full sun and under a top story of several different species of *Eucalyptus*. Between the palms were flowering puyas, mango trees, and a huge *Pandanus*. The palm collection included large *Hyophorbe verschaffeltii* and specimens of *Pritchardia*, *Acrocomia*, and *Neodypsis*. Mr. Palmer encouraged all to collect some of the thousands of *Caryota ochlandra* seeds that were on the ground. At least a dozen *Caryota urens*, 60′ tall, lined the driveway where the plant auction featured a *Wodyetia bifurcata* which sold for $50. A plant raffle, the Bookstore by Pauleen Sullivan, and refreshments served by Don's wife Anne were enjoyed by all.

The June 8, 1985, meeting of the Southern California Chapter of The International Palm Society was held at the Bahia Hotel, in San Diego. The Bahia Hotel is situated on a peninsula in Mission Bay, and will be the headquarters of the 1986 Biennial Meeting of The International Palm Society. Mission Bay, with palm-lined beaches and blue water, surrounds the hotel. The hotel grounds are landscaped with varieties of *Phoenix*, *Pritchardia*, *Ravenea*, *Chambeyronia*, *Neodypsis*, and numerous other palm species. The beautiful tropical effect now is being enhanced by planting of additional large rare palms.



1. Bill Evans, manager of the Bahia Hotel, shows off a row of rare *Ravenea* palms newly planted in the complex.

After a tour of the hotel grounds, the meeting was held in the penthouse banquet rooms that offer a spectacular view of Mission Bay. Bill Evans, General Manager of the hotel, welcomed everyone—and provided complimentary drinks. Al Bredeson opened the slide show with shots

2. One afternoon in June 1985—This palm, on a trailer by the Bahia Hotel, is a *Jubaea chilensis*, one of three purchased from an old garden in east San Diego. In the background are *Phoenix canariensis* palms.

3. The next day—The *Jubaea*, reaching up to the fourth floor, is in place at the Bahia Hotel. *Jubaea* has the largest girth of any palm. Photos by Bill Gunther.

of *Brahea* sp. occurring in eastern Mexico. The show continued with Dr. Mardy Darian's slides of many seldom seen palms in exotic locations, and ended with Ernie Chew's pictures of many palms which will grow in southern California but are rarely cultivated here. After the slide shows, the 70 members who attended were treated to a "fun" auction, with the funds raised going to the local chapter.

All who attended this meeting agreed that next year's Biennial Meeting of The International Palm Society could not be headquartered at a better location than the Bahia Hotel. The Biennial dates will be from June 23 to 29, 1986. Enter those dates on your calendar now!

DONALD SANDERS

A Newly-discovered Palm Canyon

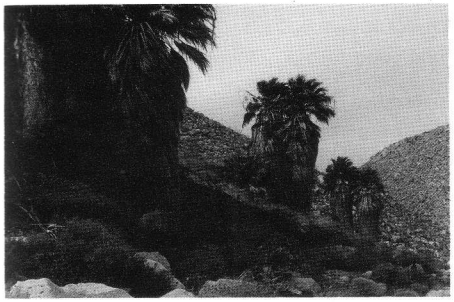
The 1986 Biennial Meeting of the International Palm Society will be centered in San Diego from June 23 to 29. Starting on June 9, those who can afford the time will have a choice of several post-convention field trips. One possible field trip would be to see *Washingtonia filifera*, a native palm of California, in its natural habitat in the desert. If enough persons so request, the site could be a newly-discovered grove in Four Frogs Canyon.

It is of course an exaggeration to say that the very remote palm grove which we have discovered has never before been seen by man. But quite certainly, the hundred palms which thrive there are not indicated on any existing map, nor are they recorded in the old records of the Desert Magazine, or in the new records of the Palm Springs Desert Museum.

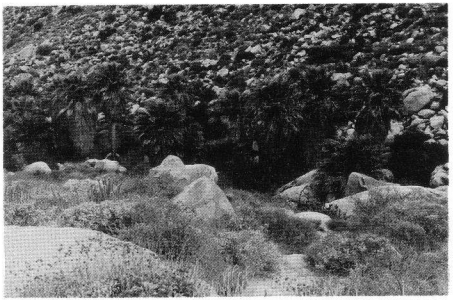
These palms are just outside the southeastern border of Anza-Borrego State Park, in San Diego County. No road or trail reaches them. They are on Federal Government property, under the administration of the Bureau of Land Management, an agency which has not advertised their existence.

In the fall of 1984 Duffy Clemons and I were hiking on Coyote Mountain, in southeastern Anza-Borrego, on a very clear day. The Sombrero Peak and the Bow Willow palms were easy to see. But farther south were more palms which were not indicated on our topographic map. They appeared to be located in "Four Frogs Canyon"—a name also not included on our map.

Four Frogs Canyon is remote and isolated. It took a few exploratory hikes before I finally reached the edge of the In-Ko-Pah Mountain Plateau and could look down on the palms in the canyon. I was alone and it was getting late so I decided not to go down the steep slope of loose decomposed granite, but I counted



1. A line of *Washingtonia filifera* palms runs up the north side of Four Frogs Canyon, following a seepage along a fault-line in the bedrock. Note the full, unburned palm skirts.



2. This view shows the rocky terrain and a portion of the half-mile line of palms which follow the streambed of Four Frogs Canyon. How about a post-biennial "campout" beside the stream which runs in this grove? Photos by Duffy Clemons.

50 palms—and guessed that there were more hidden behind a bend in the canyon, before I turned back across that beautiful plateau with large granitic rocks accentuating the rolling hills covered with soft annual summer grasses.

Then, on November 3, my daughter and I backpacked up the Carrizo Canyon to the mouth of Four Frogs Canyon and turned upward into it. We camped for the night under the lone sentinel palm only half a mile up the canyon, and on the next day, after a couple of miles of rockhopping, especially towards the end, we finally reached the main grove.

This grove is almost a half mile long, and extends from 1700 to 2500 feet in elevation. It includes about 100 living mature palms, all *Washingtonia filifera.* Most of the palms are in the canyon bottom, which is to be expected since that is the course of the stream. However, the most remarkable feature of the grove is a horizontal line of palms on the north side of the canyon, where a seepage along a fault line in the bedrock provides enough water (Fig. 1).

This grove is nowhere as dense as a grove around a spring; the ground is too rocky for that, and perhaps the water supply is insufficient. There are a number of dead or dying palms—especially in the upper part of the grove—but there is also an abundance of immature palms in the middle and lower parts—so the continued existance of the grove is assured. The palms grow amidst huge boulders, between which many stiff and spiny shrubs find shelter, making the area so inhospitable that there truly is no easy way to reach these palms (Fig. 2). The boulders serve as breaks both for wildfires and fire bugs, so most of the palms are full-skirted right down to the ground.

However, this grove may not always be as inaccessible as it is now. In the interest of our children and grandchildren, we should now initiate action toward transferring the land of these palms from the Bureau of Land Management to the custody and protection of the adjacent Anza-Borrego State Park.

ERIK JONSSON

NOMINATIONS AND ELECTIONS

The Bylaws of the Society provide that:

ART. IV, Sec. 2—The slate of candidates prepared by the Nominating Committee shall be made known to the membership in time to permit the nomination of additional candidates to appear on the final ballot. Such additional nominations must be made in writing to the Secretary of the Society by a member in good standing. It must be accompanied by the written consent of the proposed candidate to serve if elected, and must be seconded, in writing, by another member. If the above conditions are met, the Secretary shall forward the candidate's name to the Nominating Committee for inclusion on the final ballot.

Sec. 3—Voting shall be by mail only. Ballots shall be mailed in time for the results to be announced at the Biennial Meeting.

For Directors 1986–1990:

Don Evans, Florida
Jules Gervais, Hawaii
Dennis Johnson, Maryland
Jim Mintken, California
Tamar Myers, Ohio
Bob Paisley, New South Wales (Australia)
Dick Phillips, Fiji
David Tanswell, Queensland (Australia)

For Officers 1986–1988:

Ed McGehee, President, Florida
Pauleen Sullivan, Vice President, California
Scott McGregor, Secretary, Florida
Ross Wagner, Treasurer, California

Properly qualified nominations from the members must be in the hands of the Secretary by January 31, 1986.

The Nominating Committee

Director's Name Omitted

Mr. Tom Pavluvcik of 5364 52nd St. N., St. Petersburg, FL 33709 was elected as a Director of The International Palm Society for 1984–1988. Due to an oversight his name was omitted from the list on the cover of the 1985 Roster of Members.

THE INTERNATIONAL PALM SOCIETY, INC.

STATEMENT OF CASH RECEIPTS AND DISBURSEMENTS
December 31, 1984

Income		
Membership	$39,891	
Interest	4,395	
Subscribers	2,885	
Seed Bank	15,804	
Publications	10,505	
Postage	1,406	
Miscellaneous	342	
Total Income		$ 75,228
Disbursements		
Printing of Catalog	$30,704	
Seed Bank	9,673	
Bookstore	5,328	
Accounting	600	
Travel	1,668	
Rent & Supplies	1,545	
Miscellaneous	1,861	
Total Expenses		$ 51,379
Excess Receipts over Disbursements		$ 23,849

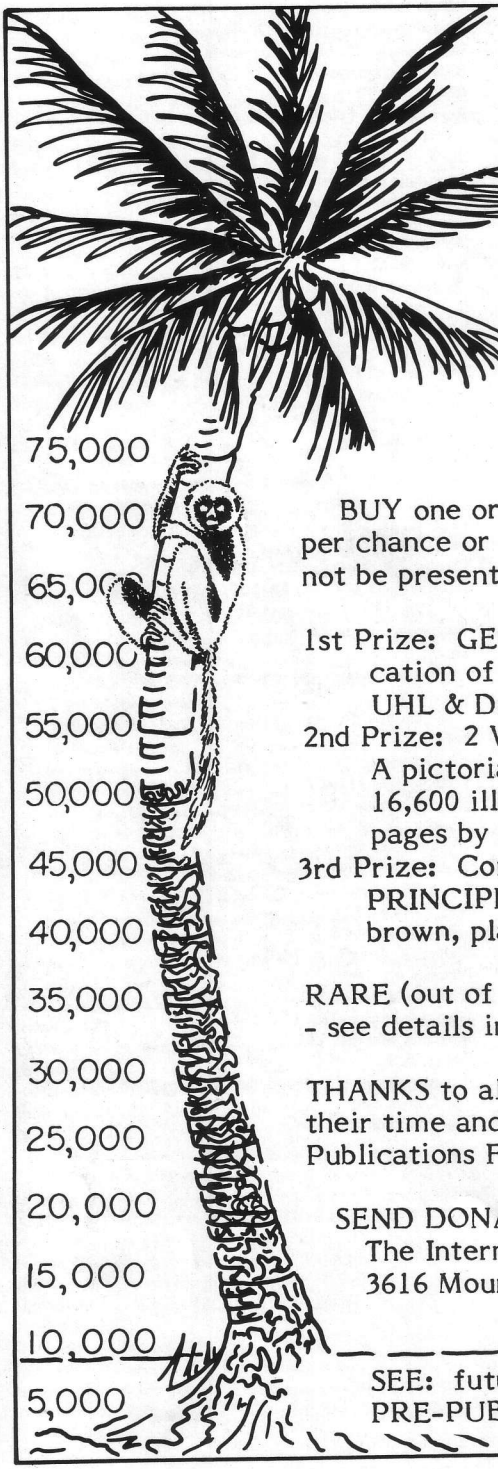
BALANCE SHEET
December 31, 1984

Assets		
Petty Cash	$ 500	
Cash in Banks		
Imperial Savings	13,345	
American Commercial Bank	6,907	
Home Bank	4,499	
Douglas County Bank	26,209	
World Savings & Loan	11,968	
Book Inventory	4,412	
Revolving Publications Fund	36,322	
Total Assets		$104,162
Fund Balance		
Fund Balance—December 31, 1984	$80,313	
Net Receipts over Disbursements	23,849	
Balance		$104,162

Know Your Palms (see p. 176)

Principes, 29(4), 1985, pp. 189–191

INDEX



DONATIONS haven't reached the top of our "Palmeter" for our GENERA PALMARUM Fund, but they can! IF, each member donates $10.00! In return they will have 6 chances for our Biennial major awards, given at our banquet June 28, 1986.

* * *

BUY one or a THOUSAND chances at $2.00 per chance or 6 chances for $10.00. You need not be present to receive awards.

* * *

1st Prize: GENERA PALMARUM, the Classification of Palms, autographed by authors UHL & Dransfield - Value irreplaceable.

2nd Prize: 2 Volume EXOTICA 4, Value $175. A pictorial cyclopedia of plants with 16,600 illustrations, 405 in color, 2590 pages by Dr. A. B. Graf.

3rd Prize: Complete set of back issues of PRINCIPES, 29 volumes bound in neat, brown, plastic binders. - Value $187.00.

* * *

RARE (out of print) Book Raffle the same night - see details in July PRINCIPES.

* * *

THANKS to all members who have donated their time and money to our Revolving Publications Fund.

* * *

SEND DONATIONS TO:
The International Palm Society, Inc.
3616 Mound Ave., Ventura, CA 93003 USA

SEE: future PRINCIPES for our PRE-PUBLICATION SALE