Palms

Journal of the International Palm Society Vol. 51(2) Jun. 2007

THE INTERNATIONAL PALM SOCIETY, INC.

The International Palm Society

Founder: Dent Smith

The International Palm Society is a nonprofit corporation engaged in the study of palms. The society is international in scope with worldwide membership, and the formation of regional or local chapters affiliated with the international society is encouraged. Please address all inquiries regarding membership or information about the society to The International Palm Society Inc., P.O. Box 1897, Lawrence, Kansas 66044-8897, USA. e-mail palms@allenpress.com, fax 785-843-1274.

OFFICERS:

President: Paul Craft, 16745 West Epson Drive, Loxahatchee, Florida 33470 USA, e-mail licuala@earthlink.net, tel. 1-561-514-1837.

Vice-Presidents: Bo-Göran Lundkvist, PO Box 2071, Pahoa, Hawaii 96778 USA, e-mail bglpalms@earthlink.net, tel. 1-808-965-0081.
Leland Lai, 21480 Colina Drive, Topanga, California 90290 USA, e-mail lelandlai@aquafauna.com, tel. 1-310-973-5275.

Corresponding Secretary: Sue Rowlands, 6966 Hawarden Drive, Riverside, California 92506 USA, e-mail palmyview@earthlink.net, tel. 1-951-780-8771.

Administrative Secretary: Libby Besse, 6729 Peacock Road, Sarasota, Florida 34242 USA, e-mail libbesse@aol.com, tel. 1-941-349-0280.

Treasurer: Randal J. Moore, 15615 Boulder Ridge Ln., Poway, California 92064 USA, e-mail randal.moore@cox.net, tel. 1-858-513-4199.

Directors: 2006–2010: Elena Beare, Uruguay; Norman Bezona, Hawaii; Faith Bishock, Florida; Tim Cooke, California; Larry Davis, Florida; John Dransfield, United Kingdom; Horace Hobbs, Texas; Don Kurth, California; Bo-Göran Lundkvist, Hawaii; Gerald Martinez, France; Randy Moore, California; Santiago Orts, Spain; Jeanne Price, Australia; Fernando Roca, Peru; Toby Spanner, Germany. 2004–2008: Lyle Arnold, California; Bill Baker, Texas; Libby Besse, Florida; Jeff Brusseau, California; Jim Cain, Texas; Paul Craft, Florida; John DeMott, Florida; Garrin Fullington, Hawaii; Haresh, India; Rolf Kyburz, Australia; Leland Lai, California; Leonel Mera, Dominican Republic; Larry Noblick, Florida; John Rees, California; Sue Rowlands, California; Scott Zona, Florida.

Bookstore: Tim Cooke, PO Box 1911, Fallbrook, CA 92088-1911 USA, e-mail books@palms.org

Chapters: See listing in Roster.

Website: www.palms.org

FRONT COVER

Looking into the crown of *Beccariophoenix alfredii*, a species new to science described in this issue. See article by M. Rakotoarinivo et al., p. 63.

Palms (formerly PRINCIPES)

Journal of The International Palm Society

An illustrated, peer-reviewed quarterly devoted to information about palms and published in March, June, September and December by The International Palm Society, 810 East 10th St., P.O. Box 1897, Lawrence, Kansas 66044-8897, USA.

Editors: John Dransfield, Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey, TW9 3AE, United Kingdom, e-mail j.dransfield@rbgkew.org.uk, tel. 44-20-8332-5225, Fax 44-20-8332-5278.
Scott Zona, Fairchild Tropical Garden, 11935 Old Cutler Road, Coral Gables, Miami, Florida 33156, USA, e-mail szona@fairchildgarden.org, tel. 1-305-667-1651 ext. 3419, Fax 1-305-665-8032.

Associate Editor: Natalie Uhl, 228 Plant Science, Cornell University, Ithaca, New York 14853, USA, e-mail nwu1@cornell.edu, tel. 1-607-257-0885.

Growing Palms Editor: Randal J. Moore, 15615 Boulder Ridge Ln., Poway, California 92064 USA, e-mail randal.moore@cox.net, tel. 1-858-513-4199.

Supplement Editor: Jim Cain, 12418 Stafford Springs, Houston, Texas 77077, USA, e-mail palm_dude@pobox.com, tel. 1-281-558-6153.

Manuscripts for PALMS, including legends for figures and photographs, should be typed double-spaced and submitted as hard-copy and on a CD (or e-mailed as an attached file) to John Dransfield, Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey, TW9 3AE, United Kingdom. Further guidelines for authors are available on request from the Editors.

Annual membership dues of US$35.00 for Individuals and US$45.00 for Families include a subscription to the Journal. Subscription price is US$40.00 per year to libraries and institutions. Dues include mailing of the Journal by airlift service to addresses outside the USA.

Change of Address: Send change of address, phone number or e-mail to The International Palm Society, P.O. Box 1897, Lawrence, Kansas 66044-8897, USA, or by e-mail to palms@allenpress.com

Claims for Missing Issues: Claims for issues not received in the USA should be made within three months of the mailing date; claims for issues outside the USA should be made within six months of the mailing date.

Periodical postage paid at Lawrence, KS, USA.
Postmaster: Send address changes to The International Palm Society, P.O. Box 1897, Lawrence, Kansas 66044-8897, USA.

PALMS (ISSN 1523-4495)

Mailed at Lawrence, Kansas June 15, 2007

This publication is printed on acid-free paper.

CONTENTS

63 **A New Species of *Beccariophoenix* from the High Plateau of Madagascar**
M. Rakotoarinivo, T. Ranarivelo & J. Dransfield

77 ***Sclerosperma* and *Podococcus* in Gabon**
J. van Valkenburg, T. Sunderland, L.N. Banak & Y. Issemé

85 ***Ptychosperma macarthurii*: Discovery, Horticulture and Taxonomy**
J.L. Dowe

Features

News from the World of Palms	56
Growing Palms	57
Classifieds	75,98
Palm Literature	76, 99, 101
Obituary	97
Advertisements	84, 102

An object lesson in coconut fruit and nut diversity, from *Coconut: a Guide to Traditional and Improved Varieties* by Roland Bourdeix, Jean Louis Konan and Yavoh Pierre N'Cho. Reviewed in this issue, p. 99.

BACK COVER

A clump of *Sclerosperma walkeri* at a forest fringe at the Waka National Park. See article by J. van Valkenburg et al., p. 77.

NEWS FROM THE WORLD OF PALMS

As this issue goes to press, the manuscript of the second edition of *Genera Palmarum* has just been completed and submitted to the publishers. There are a few loose ends that still need to be finished, but the long slog to complete this new edition is for the most part over. As in the first edition, all palm genera worldwide are covered. The new edition, however, should look very different from the first, being filled with color photographs throughout the book, and the arrangement of genera reflects the latest phylogenetic work based on DNA analyses. In places it is very different from the arrangement in the first edition. It is expected to take about 12 months for the book to appear, and it is hoped that there will be a pre-publication sale of the book with substantial savings for the purchaser.

The final onslaught on the book was complicated by the discovery in Madagascar of a remarkable new palm. Those of you who visit PalmTalk on the IPS website will be aware of the extraordinary story of a massive hapaxanthic fan palm in the northwest of the island. The photographs taken by Xavier Metz and posted by Bruno Leroy on the website showed a palm resembling *Corypha*. Once scientific material collected by Mijoro Rakotoarinivo arrived in Kew, the affinities with *Corypha* were shown to be quite spurious and that the palm is without doubt a new genus! A mad scramble ensued as a description was hurriedly written, and many of the genera in *Genera Palmarum* renumbered in order to slip the new genus into the sequence. Currently the palm is being studied in more detail to form the basis of a separate scientific paper in which the palm will be described and named. This paper will, with luck, be published and the name validated before *Genera Palmarum Ed. 2* appears. What has come out really strongly from the whole incident is the great value of the PalmTalk message board!

A small corrigendum courtesy of Dr. William J. Baker of Kew: In a book review published in the last issue of PALMS, one of us (SZ) noted that the Seychelles, with six endemic genera, must hold the record for the greatest number of endemic genera per square kilometer, a calculated value of one genus per 75 km^2. Dr. Baker reminds us that Lord Howe Island, which is only 12 km^2, is home to three endemic genera (*Howea*, *Hedyscepe* and *Lepidorrachis*), thus legitimately claiming the title for highest density of endemic genera.

THE EDITORS

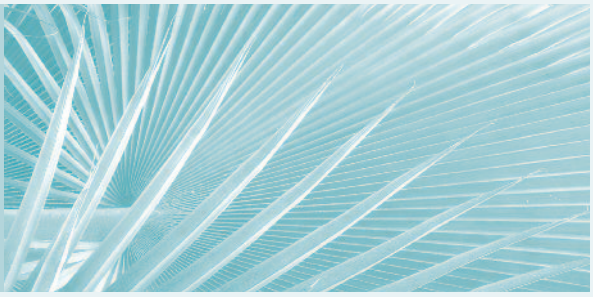
GROWING PALMS

Horticultural and practical advice for the enthusiast

Edited by Randy Moore

Contents

- More on Leaning Crown Syndrome – *Dave Romney*
- Abnormal Branching in Palms – *Mike Marika & Randal J. Moore*



More on Leaning Crown Syndrome

I have had experience with Leaning Palm Syndrome (LCS) in Jamaica. I believe that one of the causes of LCS that we identified in coconuts may apply to certain forms of LCS in other palms.

In two papers published in agronomic journals (Romney, D.H. 1964. Observations on the effects of herbicides on young coconuts. Weed Res. 4: 24–30. and Romney, D.H. 1965. Further experiments with herbicides on young coconuts. Trop. Agric. 42:177–181.), I identified the cause of LCS in coconuts as phenoxyzcetic acids, such as 2,4-D or 2,4,5-T, particularly if in a volatile form. These hormone-like chemicals are used as herbicides for killing broadleaf (dicot) weeds among grasses. Since grasses and other monocots, with their protected growing points, are much more resistant to these chemicals than dicots, my colleagues and I wanted to determine whether palms (in this case coconuts) had any resistance. If resistance should occur, we would have a useful tool for selective weed control around young coconut palms.

We found that coconuts are not resistant to these chemicals. On the contrary, they are sensitive to much smaller doses of 2,4-D, 2,4,5-T and MCPB than are needed to kill weeds (Romney 1964), a finding borne out by the fact that injury caused by 2,4-D or 2,4,5-T is frequently seen on bearing coconuts in Jamaica. The injury consists of excessive fruit-setting by female flowers, the set often being increased from the normal 25% up to as much as 100%. The nuts within the fruit are mostly reduced in size or absent, so that the fruits become distorted to a tri-lobed shape. Such damage could usually be traced to the use of volatile ester formulations on pastures under palms or to spraying nearby weeds under windy conditions.

The trials with young coconut palms showed that elongation of the youngest most actively growing leaf slowed or ceased less than a week after spraying with 2,4-D or 2,4,5-T. The leaflets eventually separated, but the petiole did not lengthen to free itself from sheaths of the older leaves, resulting in a bunched appearance. Palm crowns leaned 5–10° from vertical. In other trials using amine 2,4-D (Romney 1965), I found that young palms leaned 5° from the vertical four weeks after spraying, and the angle increased to 30° by ten weeks. I also noted that the palm usually leaned towards the leaf that, growing more vigorously at the time of spraying, was most retarded by the hormone.

Many of the instances of LCS occur in countries where hormone-based herbicides are commonly used, so herbicide injury may be a possible cause of some kinds of LCS. Volatile formulations of phenoxyacetic herbicides should not be used under or near palms, and spraying should not

be done in windy conditions. I believe that some "weed-and-feed" mixtures intended for lawns should also be used cautiously near palms. – *Dave Romney, Homestead, Florida, USA*

Abnormal Branching in Palms

Dichotomous branching, in which the growing point forks into two equal branches, occurs normally in several species of palm, as does axillary branching. This natural branching is well understood and documented. Dichotomous branching is most commonly seen in species of *Hyphaene* (Fig. 1). Some species of Calamoideae in the genera *Eugeissona*, *Korthalsia* and *Calamus* also produce branches. *Dypsis utilis* and *Nypa fruticans* are other examples of a trait that is rare in palms. Very rarely, one finds branched specimens of palms that are normally unbranched during their growth and development. This branching is abnormal branching.

Abnormal Branching

Our investigation attempted to determine the possible causes of abnormal palm branching at Balboa Park in the City of San Diego, California. Balboa Park is an international tourist destination that includes the city's museums and zoo. Unusual palm branching in the park is disfiguring some palms and distorting their leaves. Some palms have had to be severely pruned and face future removal.

1. Dichotomous branching occurs normally in *Hyphaene* species, as shown in this specimen of *H. thebaica* at Fairchild Tropical Botanic Garden in Miami, Florida.

Two species of palm within Balboa Park are affected. A *Phoenix roebelenii* is making many small branched stems from multiple locations near the top of the main stem. In this species, branching appears to occur later when the palm stem has attained approximately one meter in height (Fig. 2). In addition, many leaves near the branching exhibit distortion, including whorled pinnae.

Abnormal branching is also common in *Livistona chinensis* found in the southeast corner of Park Boulevard and Inspiration Point Place. There are five separate palms located near one another that are all showing similar problems. In addition to branching, there are many small, deformed leaves coming out of the top of the palms. Margins of the leaves are brown and necrotic. Some petioles have become brown, thickened and rough. This condition has spread to other palms in the same planter that previously did not exhibit these symptoms. Herbicide exposure and automobile exhaust are possible causes at this location.

2. A multi-branched *Phoenix roebelenii* named "the menorah palm" because of its candelabra appearance. This palm was grown by Jerry Hunter at Rancho Soledad Nursery in Rancho Santa Fe, California.

Collection of Samples

Samples of *Phoenix roebelenii* were taken from the planter adjacent to the Mingei International Museum located at the corner of El Prado and the Plaza de Panama southwest of the fountain in Balboa Park. Permission was obtained from the Department of Park and Recreation to dissect two palms located within the park and to use the city's horticultural equipment for this purpose. A hand pruning saw was used to dissect the apical stem at the point of branching (Fig. 3).

In another area of the park near the Veterans Museum and Memorial Center housed in the Old Navy Chapel are branching specimens of *Livistona chinensis*. This planter is surrounded by an asphalt parking lot and boulevard. The park's maintenance staff observed that the branching began in younger palms and spread to older palms. Removal of the larger stem for analysis required use of a chain saw (Fig. 4).

Dissection of the Samples

The collected specimens of *Phoenix roebelenii* and *Livistona chinensis* (Fig. 5) were wrapped in plastic bags and stored in a refrigerator for several days. They were subsequently examined under a dissecting microscope at the Kate Sessions Plant Nursery in Balboa Park. The purpose of the examination was to provide a possible entomological diagnosis of the observed abnormal palm branching. The samples were carefully teased apart using dissecting probes.

Eriophyid mites are known to cause deformation of leaves and fruit in a variety of plants and are difficult if not impossible to see with the naked eye. They are minute (less than 200 microns), elongated, cigar-shaped mites with only two pairs of legs. We were looking for evidence of live mites or signs of their cast exoskeletons. It is possible that these mites can cause branching by disrupting the growth process at the meristem and causing it to become askew. However, live mites or their traces could not be found in either sample.

Our samples were taken in late January. This is the season when mites normally overwinter as eggs. At a later date we plan to obtain a fresh sample and to reinvestigate when and if mites are active and present in the warmer months of the year.

3. Removing an abnormal branch of *Phoenix roebelenii* in Balboa Park, San Diego for inspection in the laboratory.

Laboratory Diagnosis

The specimens of *Phoenix roebelenii* and *Livistona chinensis* were submitted to a plant pathologist at the Department of Agriculture in the County of San Diego. The purpose of the laboratory analysis was to provide a possible diagnosis based on plant pathology for the abnormal palm branching. The pathologist confirmed that Eriophyid mites were not present in the samples.

No primary plant pathogens were recovered from either sample. The fungi *Penicillium* sp., *Verticillium* sp., *Cladosporium* sp. and *Fusarium* sp. were recovered in the sample of *Phoenix*

4. A chainsaw was required to remove a section the thick stem of *Livistona chinensis* in a group of these palms where abnormal branching is spreading throughout the population.

roebelenii. However, they were considered secondary invaders in this case. This sample also had some red scale present but not enough to cause the branching symptoms.

Herbicide exposure is another possible cause for the leaf distortion in the samples. Automobile exhaust driven by prevailing winds into the planter could produce similar damage. The next most likely cause is nutrient deficiency, especially manganese or boron deficiency often associated with "frizzle top." Cold soil, wet soil, or alkaline soil can inhibit the ability of the plant to take

5. The excised section of *Livistona chinensis* to be dissected in the laboratory. In addition to abnormal branching, the palm's leaves are deformed and necrotic.

up nutrients. The pathologist could not determine which of these possibilities is causing the problems observed in Balboa Park.

Other Abnormal Branching

There are several instances of abnormal branching that were reported but were not analyzed as a part of our study. A group of *Phoenix dactylifera* growing along Interstate 15 in Escondido, California are all exhibiting aerial branching. We hypothesize that this branching may be due to another cause not documented above. The branching appears to be occurring from axillary buds on these *P. dactylifera*. Normally these buds stay dormant. Is it due to the increased humidity the palms are experiencing or are they relatively young plants still with a propensity to form offsets? Some unknown factor may trigger them to grow and produce aerial branches. It is interesting to note that this phenomenon appears to be very rare in the nearby date palm groves of the Coachella Valley.

A well-known and very attractive specimen of *Hyophorbe lagenicaulis* growing in the collection of the Montgomery Botanical Center in Miami, Florida has branches (Fig. 6). We have also heard reports of branching in *Roystonea* and *Sabal* species in Florida.

There are also reports of induced branching. This is accomplished through intentional mechanical damage of the palm meristem. The method involves driving a wedge into the stem. This type of abnormal branching is intended to modify the appearance of the palm to create an oddity.

6. An unusual and attractive branching *Hyophorbe lagenicaulis* growing at the Montgomery Botanical Center in Miami, Florida. (Photo courtesy of Montgomery Botanical Center)

There are several possible causes of abnormal branching in palms, but making an exact diagnosis of the cause in a particular instance is still quite difficult. – *Mike Marika, Park Arborist, City of San Diego, California and Randal J. Moore, Poway, California USA.*

A New Species of *Beccariophoenix* from the High Plateau of Madagascar

MIJORO RAKOTOARINIVO,
TIANJANAHARY RANARIVELO
Kew House,
Lot 11J 131 B
Ambodivoanjo, Ivandry,
Antananarivo,
Madagascar

AND

JOHN DRANSFIELD
Herbarium,
Royal Botanic Gardens
Kew, Richmond,
Surrey, TW9 3AE,
UK

1. *Beccariophoenix alfredii* in a forested gulley at Manalazina.

A new species of *Beccariophoenix* (Fig. 1) has been discovered in a remote part of the central plateau of Madagascar in an area where palms in general are very rare or absent. Growing in astonishing numbers, the population is even visible on satellite images.

Of all palms in Madagascar, *Beccariophoenix madagascariensis* is perhaps the most majestic and charismatic and is much sought after by palm enthusiasts throughout the world. It is only now, almost a century after its discovery in 1915 by Perrier de la Bâthie at Perinet on the eastern escarpment of Madagascar, that scientists have begun to study the biology and variation of the palm in detail. In fact, *Beccariophoenix* remained very much in the shadows until, 50 years after its discovery in Perinet, a second collection was made near Manentenina, Tolagnaro (Fort Dauphin), far away from Perinet, near the southeastern tip of the island. *Beccariophoenix* was considered by many to be on the verge of extinction, if not already extinct, until Dransfield rediscovered it at Mantadia, near Perinet in 1986 (Dransfield 1988). Since then, another population has been discovered near to Sainte Luce, Tolagnaro (Dransfield & Beentje 1995), and Noblick made a collection from a single tree near to Ranomafana Est, Brickaville (*Noblick 5065*; K).

These different populations of *Beccariophoenix* have provided seed exported throughout the world, satisfying a demand for this ornamental species. Unfortunately, the demand appears to have had a serious effect on the wild populations. There is at least some circumstantial evidence for the felling of trees of *Beccariophoenix* at Mantadia in order to provide easy access to the fruits, but it must be said that the main threats to the survival of this very rare palm are habitat destruction and the felling of palms for palm cabbage.

Seed reaching the growers does so usually without documentation of the location of the source. Most remarkably, in cultivation *Beccariophoenix* displays two completely different seedling morphologies and differing tolerance of growing conditions, leading to the suspicion that there may be more than one species (Dransfield 2002). Unfortunately, herbarium material has been too sparse and incomplete to allow a careful comparison of the adult morphology of the palms from different localities, and this, coupled with the uncertainty of origin of the two seedling types, has emphasized the need for a detailed study. Nevertheless, *Beccariophoenix* continues to be regarded as a monotypic genus with the single species, *B. madagascariensis*. Dransfield (2002) summarized what was known of the variation in this species.

Beccariophoenix madagascariensis is considered to be critically endangered (IUCN 1998) because of the continuing decline of the known populations over the last two decades. Only the population at Mantadia is legally protected by its inclusion in a national park, but even there, it continues to be cut for its heart by local people. The habitat at Sainte Luce is for the most part included in the area that will be affected by the imminent mining of ilmenite in the coastal area of Fort Dauphin.

First suspicions of a new population of *Beccariophoenix*

In 2002, during an expedition to search for a species of *Pachypodium* in the rocky escarpments to the southwest of Antsirabe, on the High Plateau, the collectors of Alfred Razafindratsira (a horticulturist in Antananarivo) took numerous photographs of the vegetation surrounding Andrembesoa. When the collectors showed the photographs to Alfred he was astonished to discover an image of *Beccariophoenix*. He was particularly struck by the fact that this area of Madagascar is far from the other localities of *Beccariophoenix* and is, furthermore, ecologically totally different from the east coast and littoral forests. The photograph of *Beccariophoenix* had been taken near the village of Vilanitelo Andrembesoa. Alfred understandably wanted to know more about the palm and set off himself for Vilanitelo to look for this completely new locality for the genus. Arriving in Vilanitelo he was astonished to discover that the palm was indeed *Beccariophoenix* but that it differed in several aspects from *B. madagascariensis* as it occurs in Mantadia, most particularly in having oblate (flattened spheroid) rather than ovoid fruit. Villagers then told Alfred of a very large population of the palm at Marovato, further to the west of Vilanitelo. Several months later, Alfred's collectors set off to locate the population at Marovato; they were successful, and this population has formed the source of seed sown at Alfred's nursery in Antananarivo.

Alfred told no one of this astonishing discovery until John Dransfield, accompanied by Tianjanahary (Tiana) Ranarivelo, coordinator in Madagascar of Kew's Threatened Plants Project, visited Alfred in November 2003. Alfred showed John and Tiana photographs of the palm and a sample of the unusually shaped fruit. John confirmed that the palm had to be *Beccariophoenix* but was extremely surprised by and almost suspicious of the locality. He was also puzzled by the fruit shape.

2. Road building on the way to Manalazina.

On returning to the Kew House that evening, John informed Mijoro (Joro) Rakotoarinivo, Masters student at University of Antananarivo, who was working on the natural history and demography of *Beccariophoenix* at Sainte Luce, that Alfred appeared to have discovered a new form of *Beccariophoenix* in a place where it should not really be growing. He encouraged Joro to plan an expedition to search for it and, if it existed, make good scientific collections.

Tiana visited Kew in February 2004, and she and John spent some time discussing the mystery population of *Beccariophoenix*. Because *Beccariophoenix madagascariensis* is one of the target species of Kew's Threatened Plants Project, there was absolutely no difficulty in justifying funding a visit to the mystery population, especially as one of the main aims of the project is to establish the distribution of the targeted species and, in particular, to hunt for new populations. Back in Madagascar, Tiana and Joro visited Alfred again and obtained as much information as possible on the location of the palm west of Antsirabe and a copy of the photograph of the palm. They tried to find Marovato on the map. No road was marked, and clearly the place was very remote and isolated. They realized that they would have to walk from Andrembesoa to Marovato, as no road seemed to exist. So, on this basis they decided to plan a trip of 10 days; everyone was optimistic that they would find the population of *Beccariophoenix*. Tiana and Joro tell the story of their expedition to Marovato.

The Expedition

In May 2004, Tiana and Joro, accompanied by Rolland Ranaivojaona and Tatamo A. Ranaivomanana from the national herbarium at Parc Botanique et Zoologique de Tsimbazaza, and Roger, the driver of Kew's Landrover, drove south down the main road to Antsirabe and beyond. On the first day of the search for Marovato we needed to look on the minor road from Alarobia Bemaha for the turn to Andrembesoa. We searched hard with absolutely no luck – not surprising as there were no road signs, and none of us had ever been in the area before. We eventually reached the village of Alatsinainy Ranoafo where we could ask for directions. In fact we had missed the turn, but fortunately the village was a good place to stop as we discovered there was a short cut to the road to Andrembesoa from the

3 (top). Roger looks down into a valley filled with *Beccariophoenix alfredii*. 4 (bottom). *Beccariophoenix alfredii* growing beside the river, Manalazina.

village. En route we were continually astonished by the nature of the terrain. This area lies between the rocky mountains of Ibity and Itremo, in the very center of Madagascar. It was often necessary to remake the road and look for new ways over the difficult terrain for the Landrover, which kept on getting stuck.

On the second day of our expedition we arrived at Manampa, where we tried to obtain information about Andrembesoa. The minute we stopped we were surrounded by a crowd of villagers. Everyone wanted to know if we were buying precious stones, and no one believed that we were interested in a plant! Thanks to the photograph of the palm at Vilanitelo given to us by Alfred, it was much easier to explain what we were after. Almost everyone knew the palm, but the road to get to it seemed to vary depending on the person we asked. Because we had no idea ourselves about the different localities mentioned by the villagers, we asked if anyone was willing to come with us. No one was willing out of fear of bandits, except for two boys.

Finally our plans changed completely. Instead of heading for Andrembesoa or Marovato, we set our sights on a third locality where the villagers said the palm grew – Manalazina near to Maditsaka. Manalazina, the name of the locality where the palm was said to grow, means in Malagasy, the forest with abundant *Beccariophoenix*!

At this moment we felt sure that we would find a population of *Beccariophoenix*. Despite our optimism the road remained our chief source of worry. From time to time it was necessary to haul rocks onto the road to fill in holes produced by the wheels of zebu carts. It seemed as if we had become road menders (Fig. 2). In fact, no motorized vehicles use these cart tracks, and it was often necessary to widen the track so our vehicle could pass. Fortunately, Roger knew what he was doing, and we had every confidence in his driving skills. Roger was very courageous, particularly in certain places where no one else was willing to stay in the vehicle with him.

After being forced to spend a night in a totally deserted place, sleeping on a rocky mountain top, we finally arrived at Maditsaka on the third day of our expedition. Everyone was exhausted but impatient to discover the new population of *Beccariophoenix*, which was said to grow just on the other side of the mountains that dominated the village (Fig. 3). At first sight it looked to be an easy climb up but we were far from realizing that the worst was yet to come.

On the fourth day we had literally to climb up rocks to reach the summit of the mountain chain, the slope being very precipitous. After some time, everyone was out of breath and we rested for a long time even though we had not managed even half the ascent. While climbing the mountain our guide announced that the population of *Beccariophoenix* would be visible once we reached the summit. This spurred us on and provided the incentive to reach the top. Once at the top we could see about 300 m below us what looked like coconuts, not growing along a beach but deep in a valley (Figs. 3 & 4). Everyone was completely staggered by the abundance and dominance of the palm in the midst of the low herbaceous vegetation. In their excitement, Roger, Rolland and Tatomo, together with the guides, raced down the slope. After about an hour of descent, Joro and Tiana finally arrived in the valley of palms.

At first sight there was absolutely no doubt that this was *Beccariophoenix* – all the generic characteristics were present, including the fibrous sheaths, the windows in juvenile leaves and the torpedo shaped inflorescences, but there were also differences from the *Beccariophoenix* we knew (*B. madagascariensis*), differences so striking that we began to think that what we had in front of us was a different variety or species. In our joy at being in the middle of the palm grove, we were totally unaware of the clouds of mosquitoes attacking us in full daylight.

We devoted the rest of the morning and midday in the palm valley preparing collections of the palm and the flora in general. On our return to camp we spent the rest of the afternoon pressing specimens, putting flowers into spirit and putting leaf samples into silica gel for later DNA analysis.

On leaving Manalazina at the end of our expedition, each of us was completely satisfied. We had finally found the population of *Beccariophoenix,* and it seemed to represent a new species. This expedition remains an astonishing experience, especially for the beauty of the landscape dominated by the palm. For those of us lucky enough to be part of the expedition, it was the first time seeing in the wild such an abundant population of a native Madagascar palm. It is possible that this

is the only place in Madagascar where such a palm population exists.

Aftermath of the expedition

Back at the Kew House we downloaded the images we had taken, burned a CD and sent it off, hand carried by another Kew colleague, back to John in Kew. John found the CD unannounced in his pigeon hole one lunchtime and opened up the files on his computer, hardly able to believe his eyes on seeing picture after picture of this wonderful population of *Beccariophoenix*. How he wished he could get on the next plane to Madagascar!

John looked carefully at the pictures. He felt pretty sure that the palm found west of Antsirabe represented an undescribed form of *Beccariophoenix* but, as usual, was reluctant to commit himself without actually seeing the specimens. In November 2004, while spending a short time in the Kew House in Antananarivo to examine a student, he was able to work with Joro and examine the specimens in detail. Everyone was now convinced that the Manalazina palm was not *B. madagascariensis* but an unnamed and undescribed species. In drawing up the description of the new palm, the differences became very apparent. We decided then and there to name the palm *Beccariophoenix alfredii*, recognizing the crucial role played by Alfred Razafindratsira in the discovery of this astonishing palm and acknowledging our debt of gratitude to him.

Beccariophoenix alfredii Rakotoarinivo, Ranarivelo et J. Dransf., **sp. nov.** a B. madagascariensi inflorescentiae infrafoliaribus, pedunculo simper brevissimo, bractea pedunculare coriacea, staminibus 15 vice 18–21 et fructu oblato bene distincta. Typus: Madagascar: Prov. Antananarivo, Andriambesoa, Betafo, Manalazina, 21.5.2004, *M. Rakotoarinivo, T. Ranarivelo, R. Ranaivojaona, T. Ranaivomanana, R. Rajaonarison RMJ136* (Holotypus K, Isotypi MO, P, TAN).

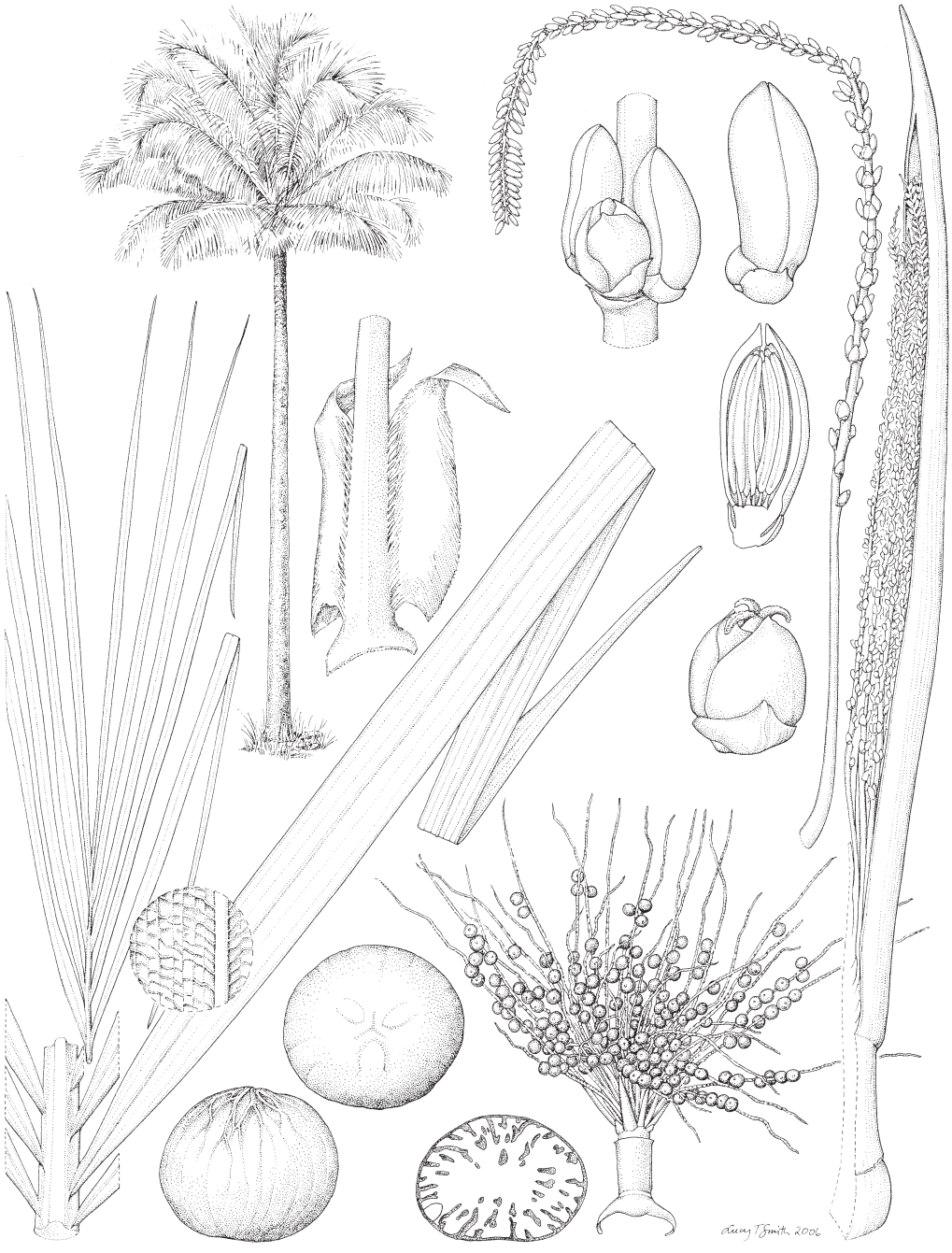
Robust, solitary, unarmed, pleonanthic, monoecious, tree palm. *Stem* erect, to ca. 15 m tall, 28–30 cm diam. at breast height, gray-brown, eventually becoming bare and closely ringed with leaf scars, internodes ca. 2.5 cm. *Leaves* 30–36 in crown, pinnate, marcescent in juvenile palms, abscising neatly in adults; sheath tubular at first, to at least 82 cm long, with two lateral, ± entire, triangular lobes to

5. Leaf of *Beccariophoenix alfredii* harvested from a palm partially felled by flood.

30 cm long, 10 cm wide at the base, tapering to ca. 8 cm, the abaxial surface of the sheath covered with thick caducous gray-brown indumentum, the body of the sheath disintegrating into a mass of robust sinuous gray fibers ca. 3 mm wide, adaxially the sheath glabrous, reddish-brown; petiole very short, ca. 4–5 cm long, to 8 × 2.3 cm wide and deep, with scattered caducous scales; rachis to at least 4.4 m long, to 7 × 2.3 cm wide and deep at the base, tapering gradually distally, adaxially ridged near the base, abaxially rounded, distally with 2 lateral grooves; leaflets ca. 120 on each side of the rachis, ± regularly arranged, very slender and crowded at the base, ± rigid or somewhat pendulous, ca. 47 × 1 cm at the base of the leaf, ca. 112 × 4 cm in mid leaf, ca. 65 × 1.8 cm at the tip, ± acute, easily splitting and becoming bifid, adaxially glabrous, abaxially lacking powdery white wax, transverse veinlets short, conspicuous, minute punctiform scales present on longitudinal veins. *Inflorescences* solitary, infrafoliar, branching to 1 order; peduncle moderate, 8–13 cm long, elliptic in cross-section, 4 × 1.7 cm, with caducous gray-brown indumentum, ± glabrescent in infructescence; prophyll not seen, presumably inserted at the base of the peduncle and included within the leaf sheaths; peduncular bract inserted at the apex of the peduncle, woody, with solid beak, the whole to 90 cm long, 3–5 mm thick, abaxially with conspicuous longitudinal grooves, at anthesis the peduncular bract splitting longitudinally and circumscissile at the insertion, leaving a collarlike scar, the bract curling up on drying after abscission, adaxially the bract smooth, shiny, yellowish green abaxially tomentose and longitudinally shallowly grooved; rachis very short, to 8–9 cm long, to ca. 4 × 2 cm diam., tapering to ca. 0.7 cm at the tip, bearing ca. 30–50 crowded, spirally arranged rachillae, each subtended by a short, triangular, acuminate, coriaceous bract 1.1–7.5 × 1.0–2.8 cm; rachillae glabrous and lacking white wax, yellowish, becoming crimson in ripe fruit, straight, rigid, held at a narrow acute angle to the rachis, 45–66 cm long, ca. 5–8 mm diam. at the base, tapering distally, each with a poorly defined swelling at the very base, proximally with a bare portion 15–18 cm long, distally bearing distichous triads in the proximal 13–19 cm, paired staminate flowers in the middle 11–17 cm and solitary staminate flowers in the distal 13–18 cm, rachilla bracts triangular 1–4 × 1–6 mm; floral bracteoles well developed, broad, rounded, striate, rather coriaceous, shorter than the rachilla bracts. *Staminate flowers* narrow ellipsoid, ca. 13 × 4 mm; sepals to 2 × 2 mm, joined in the basal 1 mm, distally triangular, free and imbricate, glabrous, not striate; petals coriaceous, ca. 12 × 3 mm, tapering to a short acute tip, basally very briefly joined, abaxial surface glabrous, lacking white wax, obscurely striate; stamens 15, filaments 2 mm, anthers elongate 8 × 1 mm, erect, ± basifixed; pistillode absent. *Pollen* not studied. *Pistillate flowers* in bud, irregularly globose to obscurely angled, 9 × 6 mm, perianths persistent and enlarging in fruit; sepals broadly imbricate, 8–9 × 5–6 mm; petals 8 × 7 mm, broadly imbricate with short valvate tips; staminodal ring membranous, ca. 1 mm high; gynoecium ellipsoid, 6 × 4 mm, stigmas pyramidal in bud, 2 mm high. *Fruit* 1-seeded, oblate, 16 × 24 mm, with a short triangular beak to 3 mm long, 4 mm wide at the base, dark purplish-black at maturity, smooth, becoming striate when dry, surface glabrous except the beak where minutely and obscurely scaly; mesocarp thin, fleshy 1 mm thick, with longitudinal fibers, endocarp 15 × 22 mm, very thin, scarcely lignified, pores rather obscure, just below the equator. *Seed* oblate 13 × 20 mm, attached near the base with a broad hilum, with numerous anastomosing raphe branches, endosperm deeply ruminate; embryo lateral below the equator. *Germination*: adjacent-ligular; eophyll entire, lanceolate. (Figs. 1, 3–12 & Front Cover).

Specimen Examined: MADAGASCAR: Prov. Antananarivo, Andriambesoa, Betafo, Manalazina, 20º 12′ 32.1″ S, 46º 30′ 04.3″ E, gallery vegetation, 1072 m alt, 21.5.2004, *M. Rakotoarinivo, T. Ranarivelo, R. Ranaivojaona, T. Ranaivomanana, R. Rajaonarison RMJ136* (Holotypus K, Isotypi MO, P, TAN).

The existence of this population of *Beccariophoenix* on the western slopes of the High Plateau of Madagascar is quite astonishing. This new species grows in a completely different phytogeographic zone from the humid rain forest zone associated with *B. madagascariensis*. Manalazina belongs to the zone of the western slope of the Domaine Centrale defined by Humbert (1955). The primary vegetation is formed of sclerophyll forest with *Uapaca bojeri* and members of Sarcolaenaceae (Humbert & Cours-Darne 1965), but the current vegetation of the area consists mostly of a scrubby savannah. Furthermore, the climate is very different from that experienced by *B. madagascariensis* at Mantadia. In fact, *B. alfredii* experiences a subhumid temperate climate (Cornet 1974),



6. **Beccariophoenix alfredii**: **A.** habit × ; **B.** leaf-sheath × ; **C.** mid and apical leaflets × 3/8; **D.** detail of leaflet surface × 1.5; **E.** part of inflorescence × 1/6; **F.** rachilla × 1/3; **G.** triad × 2; **H.** staminate flower in bud × 3; **I.** staminate flower in section × 3; **J.** pistillate flower × 3; **K.** infructescence × ; **L.** seed in section × 1.5; **M.** endocarp, two views × 1.5 . Scale bar: A = 1 meter, B = 40 cm, C = 8 cm, D, L, M = 15 mm, E = 9 cm, F = 6 cm, G = 1 cm, H, I, J = 7 mm, K = 30 cm. Drawn from *Rakotoarinivo RMJ136* by Lucy T. Smith.

drier than that of the east of Madagascar. The average temperature is 15–20ºC and the rainfall generally less than 1500 mm. The dry season is about five months long. The population of *B. alfredii* occurs at an average elevation of 1050 m above sea level; above that elevation, the palm becomes very rare, as the depressions between two mountains are too infrequent

7. View into the crown of *Beccariophoenix alfredii* showing the narrow leaf bases and a newly opened inflorescence.

8. Specimens of unopened inflorescences of *Beccariophoenix alfredii* split down the middle to show the thin peduncular bract and numerous flowers.

and where there are such depressions they are usually too dry. The soils in general in the region are ferralitic, but *B. alfredii* seems to grow solely on sandy soils on the banks of tributaries of the Mania River.

Beccariophoenix alfredii is the dominant species in the gallery forest and, reaching mostly 10–15 m, constitutes the only canopy species. The species grows so abundantly in the area that we estimated at least 500 mature individuals at this locality. In contrast, regenerating individuals are few. The dominance of this species may be due to the fallen leaves and inflorescences that carpet the ground, completely eliminating any other woody plants. Moreover, seed dispersal seems to be mostly by water. The flattened shape of the fruits allows them to be dispersed easily by water until they are deposited in a site favorable for germination. Sometimes seedlings are found actually growing in water but they mostly occur along the river bank.

Perhaps this explains why the adult palms are restricted to a band along all the valleys.

It could be asked why we consider this palm to be a new species of *Beccariophoenix* when *B. madagascariensis* is itself variable. Dransfield (2202) reported what was known of this variation and highlighted the presence of two distinct seedling morphologies of the palm in cultivation. One type of *Beccariophoenix* has juvenile leaves with a broad terminal pair of multifold segments displaying many windows. In contrast the second type of *Beccariophoenix* has narrow terminal segments composed of few folds and with one or two windows only. After some research in the field and discussion with seed importers and growers we can say that the population of *Beccariophoenix* from the lowlands near to Brickaville (the Ranomafana Est population, currently known with certainly from a single adult tree and, about twenty km away, a few more) produces seedlings with many windows. The population from the general area of Mantadia near the type locality of *B. madagascariensis* and the population at Sainte Luce produce seedlings with few windows. *Beccariophoenix alfredii* has seedlings with narrow terminal segments and few windows.

The habitat of the population at Sainte Luce at near sea level might be thought of as being very different from that of the montane ridgetops at almost 1000 m in Mantadia, but there are in fact considerable resemblances in vegetation – both areas support generally rather small-leaved dicotyledonous trees, growing on humus rich soils overlying extremely nutrient-poor sand or quartzite. The main difference between the Mantadia and Sainte Luce populations is in the length of the peduncle – always elongate at Mantadia, sometimes elongate, sometimes very short at Sainte Luce (incidentally, the one tree at Ranomafana Est is remarkable for it extremely short peduncles.

The main differences between *B. alfredii* and *B. madagascariensis* are listed in Table 1. The most striking differences are in the size and form of the inflorescence and fruit.

At the moment, the only scientifically proven and recorded locality for *B. alfredii* is Manalazina. This population is limited to the west by the Mania River. Individuals become abruptly very rare as soon as one approaches the Mania, the river into which the tributary lined with *Beccariophoenix* flows. Fewer than twenty individuals of *B. alfredii* grow on the banks of the Mania, possibly because of its depth, which is unfavorable to the dispersal and establishment of seedlings. As we climbed

9. View into the crown of *Beccariophoenix alfredii* showing inflorescences at various stages, including ripe fruit.

10. More or less ripe fruit of *Beccariophoenix alfredii*.

11. Carpet of fallen fruit of *Beccariophoenix alfredii*.

up another mountain chain in the hope of finding other populations in further localities, we saw not one palm on the horizon. Because of the extremely difficult access and the time we had already taken to reach Manalazina, we were unable to conduct further searches for the palm. Meanwhile, we are optimistic concerning the existence of more populations further away in the region. Justin Moat, GIS specialist at the Royal Botanic Gardens, Kew, using satellite imagery, has looked for habitats similar to that at Manalazina. After analysing the very distinctive spectrum and relief seen in the satellite images at the exact coordinates of Manalazina, Justin was able to search for similar spectra and relief elsewhere in this part

12. Seedling foliage of *Beccariophoenix alfredii* showing few narrow "windows."

of the plateau. He found similar habitats but much further away from Manalazina. Other populations of *B. alfredii* surely exist in the area – during our visit, we did not have the time to revisit Vilanitelo where the palms was first seen by Alfred's collectors, nor Marovato, the site of the large population mentioned by Alfred.

While we await the discovery of additional populations, we can declare that the population at Manalazina can be considered to be intact and not facing any major threat, thanks to mountain chains that effectively act as natural barriers protecting the population. This palm occurs in one of the most secure localities in the whole island. The area has one of the lowest densities of human population in the whole of Madagascar and this is, of course, very significant for the future survival of the species. Furthermore, no one locally seems interested in utilizing the palm at the moment, because it is virtually impossible to transport the palm or its products up the 300 m of extremely steep slope from the valley bottom, and the locality is inaccessible to any of the usual forms of mechanized transport utilized in Madagascar. It is for these reasons that the locality is so deserted. During our four days camping we five from Antananarivo and our two guides saw no one apart from ourselves in the area.

Of course, the discovery of this new species is of fundamental importance in developing our understanding of the taxonomy and biogeography of the genus, previously thought to be monotypic and confined to eastern Madagascar. The discovery of *B. alfredii* adds impetus to the initiation of an intensive study of the genus throughout its range in Madagascar. It is possible that *Beccariophoenix* comprises more than two species. During the last few years we have heard rumours of several new populations of *Beccariophoenix* but these have not always proved to be the real thing. There is clearly much more survey work to be done!

Table 1. Comparison between *Beccariophoenix madagascariensis* and *B. alfredii*.

Beccariophoenix madagascariensis	*Beccariophoenix alfredii*
Inflorescence interfoliar	Inflorescence infrafoliar
Peduncle to 120 cm long	Peduncle not exceeding ca. 13 cm long
Peduncular bract heavily lignified, 30–40 mm thick, not deforming when abscising	Peduncular bract leathery, 3–5 mm thick, rolling up on itself when abscising
Stamens 18–21	Stamens 15
Fruits ovoid	Fruits oblate

As this paper goes to press, our colleague Alison Shapcott from the University of the Sunshine Coast in Australia, who is working on an analysis of genetic variation within the whole genus and within populations, reports that *B. alfredii* is genetically very distinctive when compared with the other samples of *Beccariophoenix* that she has analyzed, adding support for the decision to recognize it as a distinct new species.

Acknowledgments

We thank Alfred Razafindratsira for having informed the team from RBG Kew of the possible existence of this new species. Our expedition would not have been successful without the cooperation and collaboration of Parc Botanique et Zoologique de Tsimbazaza. We thank Rolland Ranaivojaona and Tatamo A. Ranaivomanana for their help and companionship in the field. We also thank our driver, Roger Randrianarison, for his exceptional driving skills and his help and companionship throughout. We thank Justin Moat at Kew for his GIS analysis of Manalazina. The expedition was funded as part of the Kew Threatened Plants Project, and Mijoro was financed as part of this project in his year long study of *Beccariophoenix*. Lucy Smith prepared the analytical plate.

Literature Cited

Cornet, A. 1974. Divisions floristiques et étages de végétation à Madagascar. ORSTOM. 28 pp.

Dransfield, J. 1988. *Beccariophoenix madagascariensis*. Principes 32: 59–68.

Dransfield, J. 2002. *Beccariophoenix* flowers in cultivation. Palms 46: 130–131.

Dransfield, J. and H. Beentje. 1995. the Palms of Madagascar. Royal Botanic Gardens Kew and International Palm Society. HMSO Norwich. 475 pp.

Humbert, H. 1955. Les territories phytogéographique de Madagascar. Ann. Bio. T. 31. Fasc 5–6: 439–448.

Humbert, H. and G. Cours-Darne. 1965. Notice de la carte internationale du tapis végétale et des conditions écologiques. 3 coupoures du 1/1,000,000 de Madagascar. 162 pp.

IUCN. 1978. The 1997 IUCN Red List of Threatened Plants. IUCN Gland and Cambridge.

Uhl, N.W. and J. Dransfield . 1987. Genera Palmarum. A classification of palms based on the work of Harold E. Moore Jr. L.H. Bailey Hortorium & International Palm Society, Allen Press, Kansas. 610 pp.

PALM LITERATURE

PALMS AND CYCADS: A COMPLETE GUIDE TO SELECTING, GROWING AND PROPAGATING. David Squire. Ball Publishing, Batavia, Illinois. 2007. ISBN 978-1-883052-56-0. Price $29.95. Hardcover. Pp.160.

The appearance of another palm and cycad book begs the question, Is yet another guide to palms and cycads really necessary? What void in the many guidebooks already available is left to fill? The answer is extensive horticultural information. In most of these guidebooks, botanical descriptions and photographs are the focus, and horticultural recommendations are limited to tidbits about the plant's native habitat or length of time until seeds germinate. I commend Squire on his attempt to fill this void in this highly accessible publication. A full one quarter of the book's pages are dedicated to explaining how palms and cycads grow and how to grow them. The remainder of the book profiles 100 palm and 18 cycad species. For each, he includes a photograph, a descriptive paragraph and a "fact file" box, which is the best feature of the book. The box neatly organizes information on each species' overall dimensions, preferred growing conditions, ornamental or practical uses, propagation, place of origin and USA hardiness zone. What Squire has written is a lay person's handbook with minimal botanical terms to complicate the text. In fact, his book is best suited to someone just getting started growing these magnificent plants. In the introductory chapters, topics covered are basic botany, buying plants, planting and caring for them, pests and propagation. He also presents lists of palms and cycads for specific uses: houseplants, hedges, groundcovers, etc.

While I commend Squire on his attempt to fill the horticultural information void, his effort is not altogether a blazing success. Broad horticultural generalizations are made throughout the introductory chapters, but horticultural techniques do not translate the world over. Growing conditions – temperature, rain, soil, seasonality – are just too variable. For example, Squire's recommendation of using a high nitrogen fertilizer to maintain palms may be fine for some soils but could actually be lethal on South Florida's limestone soils. Thus, palm and cycad horticulture is best treated on a regional basis. South Floridians are lucky to have Broschat and Meerow's *Ornamental Palm Horticulture*, which is a comprehensive guide to growing here.

Squire's selection of profiled species is good though not exceptional. The most common species are included, as they should be. The selection is weighted a bit heavily toward some genera (*Arenga* and *Phoenix* in particular), while some important genera are left out (for example, *Veitchia*). The selection of cycad species is altogether displeasing. Some of the most common and easiest to cultivate species are omitted (e.g., *Encephalartos ferox, E. gratus*, *Zamia furfuracea*), and only one *Zamia* species is included.

On a technical note, *Palms and Cycads* is poorly edited. There are tables without any headings, inconsistencies in spelling and outdated nomenclature. The photographs are mediocre for a book which might be considered a "picture book." There are also several glaring errors in the text. For example, the photograph included for *Cycas media* is in fact an image of a *Macrozamia* species. And do not read the back cover if you want to know what the book contains. The back cover boasts of 184 palm and 35 cycad profiles, when really there are only 100 and 18, respectively.

The book has lots of good information, but bad information is peppered among the good. The only way to distinguish between the two is to know which is good and which is bad. If you already know that, then you probably are too advanced for this book. My advice is stick to some of the better guide books already on the shelf.

CHRISTIE JONES
Curator of Palms and Cycads
Fairchild Tropical Botanic Garden

Sclerosperma and *Podococcus* in Gabon

JOHAN VAN VALKENBURG,
Nationaal Herbarium Nederland, Wageningen branch (Herbarium Vadense), Generaal Foulkesweg 37, 6703 BL Wageningen, The Netherlands

TERRY SUNDERLAND
Forests and Livelihoods Programme, Centre for International Forestry Research (CIFOR), P.O. Box 6596 JKPWB, Jakarta 16680, Indonesia

LUDOVIC NGOK BANAK
AND
YVES ISSEMBÉ
CENAREST, Herbier National du Gabon, B.P. 1156, Libreville, Gabon

1. *Podococcus barteri* flowering in the Forêt de Mondah near Libreville.

This paper focuses on some supposedly well known understory palms *Sclerosperma* and *Podococcus*. However, upon closer examination, the forest of Gabon once again reveals two botanical treasures, *Sclerosperma walkeri* and *Podococcus acaulis*, that had remained hidden in some long forgotten French periodicals.

The first two authors decided to attempt a joint palm hunting expedition to the Moukalaba-Doudou National Park in southern Gabon in November 2003. After a rather short but spectacular light aircraft flight from Gamba, where we spotted large groups of forest elephant and buffalo wading in the coastal swamps, we set up camp in an active logging concession under the management of a French family who were developing the site for an ecotourism resort. It was a perfect place to begin palm hunting.

During the next week of field work, rather disappointingly, we found that the southern part of the National Park, north of the Nyanga river, revealed vast stretches of tall terra firma forest that were virtually devoid of any palms at all. Only at the forest fringes where the soil changed to a more sandy texture did we discover *Oncocalamus macrospathus*. We made some excellent collections and photographs of this poorly-known *Oncocalamus* that will be used for a forthcoming field guide to the rattan palms of Africa (Sunderland, in press). In more seasonally inundated forest along water courses, localized pockets of the spectacular understory palm *Sclerosperma mannii* were found, and in high forest some scattered stands of *Podococcus barteri* were also encountered (Fig. 1)

Both *Sclerosperma* and *Podococcus* have for a long time been considered to be monotypic genera, i.e. represented by single species in Central Africa (Uhl & Dransfield 1987). However, because of uncertainty over recently received specimens at Kew, Govaerts and Dransfield accepted three species of *Sclerosperma* in the World Checklist of Palms (Govaerts & Dransfield 2005). These are beautiful palms with considerable horticultural potential, and as such, *S. mannii* and *P. barteri* can commonly be found in popular and

2. Indumentum on the underside of the leaflet of *Podococcus acaulis*.

3. A young inflorescence of *Podococcus acaulis* protruding from the base of a clump at the Waka National park.

4. *Podococcus acaulis,* detail of infructescence, showing immature fruits.

floristic accounts from the region, often accompanied by some fine illustrations.

A nice account by Moore (1971) testifies to their presence in Gabon. *Podococcus* is certainly one of the better-collected palms from the Central African region, primarily due to its size. Often 2 m or less in height and commonly in flower or fruit throughout the year, it fits well on an average size herbarium sheet, so even the most inexperienced palm collector can make relatively good specimens.

In contrast, until recently, *Sclerosperma* was very poorly represented in herbaria. Many field botanists often think that because a genus is thought to be monotypic, they already know what it is so do not often bother collecting it, especially when the large leaves do not fit well on a herbarium sheet and the palm almost always appears to be sterile. Only on closer examination, after digging through the leaf litter at the base of this acaulescent palm, does one come across the inflorescence or fruits.

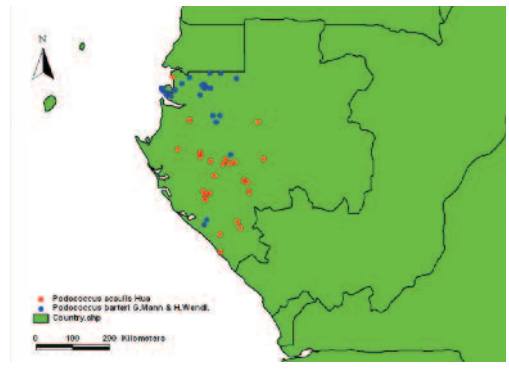
As both authors had been focusing on the poorly collected rattans from Gabon, neither of us had initially paid much attention to either *Sclerosperma* or *Podococcus*. It was only when JvV was working on the Palmae account for the Checklist of Gabon that he stumbled upon some obscure names published in long forgotten French periodicals: *Podococcus acaulis* Hua (1895) and *Sclerosperma walkeri* Chev. (1934). However, these new species were known only from the first, or type collection, and until recently, no further collection of either taxon was known or recognized. The names were included or synonymized under the more common species within each genus, contributing to the continued misconception that they are monotypic. However, as mentioned above, three species of *Sclerosperma* were accepted by Govaerts and Dransfield (2005). It was clear that additional material from the areas where the types were collected, downstream from Lambarene in the case of *Podococcus acaulis* and Sindara (160 km inland) in the case of *Sclerosperma walkeri*, was much needed to clarify the status of these possibly distinct species.

In April 2005 JvV visited Gabon, funded by an NGS grant, to make an inventory of the Moukalaba-Doudou National Park. This time the north-eastern part of the park was the focus of the work, and to reach there we would be passing though the Lambarene Fougamou area in the central region of Gabon. In June 2005, TS visited Gabon within the framework of a CARPE-funded, Smithsonian Institution-led vegetation assessment of the Waka National Park east of Sindara, the reported locality of *S. walkeri*.

The April 2005 visit to the north-eastern part of the Moukalaba Doudou National Park focused on the highest peak in the region, Mount Igoumbi, which is slightly over 800 m altitude and an area hitherto never botanically explored. Although part of a former forestry concession the foothills of the mountain were covered in undisturbed and pristine closed-canopy forest. This lack of exploitation in the area was due to the absence of *okoumé* (*Aucoumea klaineana*), the major export timber from Gabon, and hence, the forest had remained unlogged.

As soon as we started climbing the mountain we stumbled upon clumps of clustering acaulescent palms with praemorse leaflets. Were these juvenile rattans in their establishment phase, or might this be our *Podococcus acaulis*? This unknown palm was sterile, so we continued climbing the mountain for the days to come, once again

5. Distribution map of *Podococcus* in Gabon.



6. *Sclerosperma mannii* in a swampy spot along the road near Fougamou.

witnessing a virtual absence of palms in the forest. Only above 700 m in altitude did we encounter some clumps of *Eremospatha laurentii*. Finally we decided to descend to 200 m altitude and pay closer attention to the sterile clumps with fishtail-like leaflets, which we had seen earlier.

Upon closer examination the undersurfaces of the leaves were densely covered with red brown curly hairs (Fig. 2), matching the description in the protologue of *Podococcus acaulis*. In addition its profusely acaulescent clustering habit did not match any of the clearly non-acaulescent and stoloniferous *P. barteri* plants we had seen before.

The following day we went collecting on some low undulating hills east of Mount Igoumbi and found some wonderful fruiting stands of what turned out unmistakably to be *P. acaulis*. These acaulescent clustering pinnate-leaved palms possess infructescenses protruding form the very base, a fruiting stalk of up to 40 cm and a rachis up to 35 cm covered in red brown tomentum with olive green to purplish fruits (Figs. 3 & 4). *P. barteri* fruits when ripe are orange and slightly curved whereas the fruits of *P. acaulis* remain ovoid and do not appear to be pedicellate.

Upon further examination of existing herbarium collections we have now identified 30 collections of this species in Gabon. In general *P. acaulis* is confined to Gabon south of 0° 12′ S, apart from an errant collection near Cocobeach at 0° 52′ N (Fig. 5). At present a single collection is known from Congo Brazzaville. By contrast *P. barteri* is found from southern Nigeria to Cabinda, Angola.

The search for *Sclerosperma* in the northern part of the Moukalaba Doudou National Park was far less fruitful, and only one juvenile collection was made. In general, the presence of *Sclerosperma* in an area is indicated by the entrance of traditional Bwiti temples that are covered with its leaves, the whitish glaucescent underside of the leaves producing a spectacular appearance to the thatch. Luckily, on the way back just north of Fougamou, we spotted a stand of *Sclerosperma* palms in a swampy spot

along the road. Some fine fruiting collections were then made of *S. mannii* (Fig. 6).

In the Waka field work of April 2005, TS led a multi-institutional team to undertake a preliminary vegetation assessment of the proposed Waka National Park, based on the establishment of a series of 1 ha permanent sample plots. Prior to leaving for the field JvV warned us to look out for some "unusual" species of *Podococcus* and *Sclerosperma*. TS was skeptical given that he had seen many stands of these "monotypic" genera all over West and Central Africa and would have been surprised if additional distinct species existed.

A reconnaissance trip was undertaken by Yves Issembé of the Herbier National du Gabon prior to our visit, and he selected the appropriate sites for plot establishment in as "representative" forest as possible.

When we met up in Libreville prior to the commencement of the field work Yves waxed lyrical about the high densities of understory palms that dominated the forest he had encountered during his preliminary site visit. His descriptions of these palms did not fit either *P. barteri* or *S. mannii*, and TS was intrigued; maybe JvV was on to something.

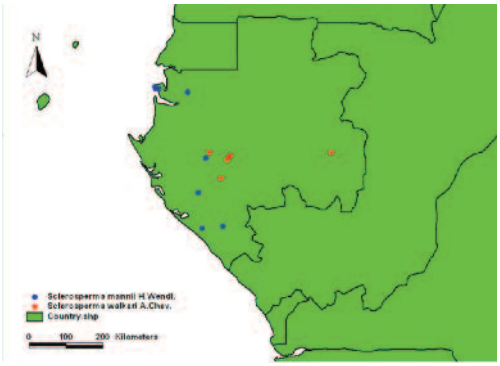
The first day of field work started with a classic discovery. At the site where our first permanent sample plot was to be established, the prevailing species of the understory of the forest, the canopy of which was dominated by the commercially valuable *Aucoumea klaineana*, were the acaulescent palms, *Podococcus* and *Sclerosperma*. However, these were not the same species TS had seen in the field elsewhere in Africa, and fitting the descriptions provided by JvV, these were clearly distinct species. Following extensive specimen collections, the examination of photographs and subsequent review of the literature, it was clear we had discovered two new records for Waka, *P. acaulis* (Fig. 7) and *S. walkeri* (Fig. 8 & Back Cover).

Unfortunately, these forests also possess large numbers of forest elephants. On the final day

7. Yves Issembé taking a break under a vigourous *Podococcus acaulis* clump.

of field work and armed with presses full of these exciting new palm discoveries TS and palm researcher Michael Balinga, whilst trekking back to camp, came across a female elephant and a young calf in dense forest dominated by a large ginger relative, *Aframomum*. Twice we were charged and chased some distance before she gave up and returned to her young offspring. Despite losing a GPS unit and a camera during the chase, we clung on to the presses, and the palm specimens returned safely. However, it was

8. *Sclerosperma walkeri* in dense shade clearly showing the glaucescent underside of the numerous leaflets.



9. Distribution map of *Sclerosperma* in Gabon.

certainly the most terrifying palm collection trip TS has ever been on!

Upon further examination of existing herbarium collections we have now identified six collections of *S. walkeri* in Gabon. In general *S. walkeri* is confined to terra firma, as opposed to the more swampy conditions preferred by *S. mannii*. In Gabon *S. walkeri* to date has been found further inland than *S. mannii*, which appears to be confined to the coastal zone (Fig. 9). The identity of a single record for *S. mannii* at 0°41′ S, 11°54′ E could not be verified. Additional collections of *S. walkeri* are also known from the lower reaches of the Congo river. In contrast *S. mannii* is found from Liberia, and Nigeria southward to Congo Kinshasa.

In terms of conservation and management value, the rediscovery of these species originally described as *P. acaulis* and *S. walkeri* has considerable implications for understanding the patterns of endemism within the landscape of Central Gabon. A list of such endemic and rare plants is also critical for defending parks such as Waka and Moukalaba-Doudou that may be threatened by logging interests in the future.

Acknowledgments

The authors wish to thank the Conseil National des Parcs Nationaux at Libreville for granting us permission to work in both National Parks. The keeper of the Paris herbarium is acknowledged for allowing us to consult type specimens of *P. acaulis* and *S. walkeri*.

The April 2005 fieldtrip to the Moukalaba Doudou National Park was sponsored by National Geographic Society grant 7759-04 entitled "Botanical diversity of altitude zones in the Monts Doudou" (a portion of CABONET, Central African BOtanical NETwork). JvV's visit to Kew to finalize the manuscript was financially supported by the MOABI foundation.

TS is grateful to the Central African Regional Program for the Environment (CARPE), notably Dr John Flynn, for funding the work of the Smithsonian Institution in Central Africa. WCS-Gabon, particularly Brian Curran and Malcolm Starkey, are acknowledged for logistical support in the field. Special thanks are extended to Michael Balinga of FOREP for continued collaboration and field assistance.

Literature Cited

Chevalier, A. 1934. Sur un nouveau *Sclerosperma* du Gabon. Revue de botanique appliquée et d'agriculture tropicale 11: 236–239.

Govaerts, R. and J. Dransfield. 2005. World Checklist of Palms. Royal Botanic Gardens, Kew, United Kingdom. 223 pp.

Hua, H. 1895. Les dernieres collections de M. Dybowski; quelques especes rares ou nouvelles. Bulletin Museum Paris 1: 314–315.

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

Sunderland, T.C.H. [in press]. A Field Guide to the Rattans of Africa. Royal Botanic Gardens, Kew, United Kingdom.

Uhl. N.W. and J.Dransfield. 1987. Genera Palmarum. A Classification of Palms Based on the Work of Harold E. Moore Jr. L.H. Bailey Hortorium & International Palm Society, Allen Press, Lawrence, Kansas. 610 pp.

"A MUST FOR ANY PALM LOVER!"

— Los Angeles Daily News

"PALM LOVERS WILL SWOON AT THE COFFEE-TABLE FORMAT OF PALM TREES: A STORY IN PHOTOGRAPHS."
— Publishers Weekly

"A PHOTOGRAPHIC **TOUR-DE-FORCE** TREKS ACROSS THE GLOBE TO REVEAL THE DIVERSITY AND BEAUTY OF PALMS."
— ForeWord Magazine

"LEASER'S NEW COFFEE-TABLE BOOK CAPTURES THE **WIDE VARIETY** OF PALMS, FROM TOWERING CALIFORNIA FANS TO CUBAN PETTICOATS."
— Los Angeles Times

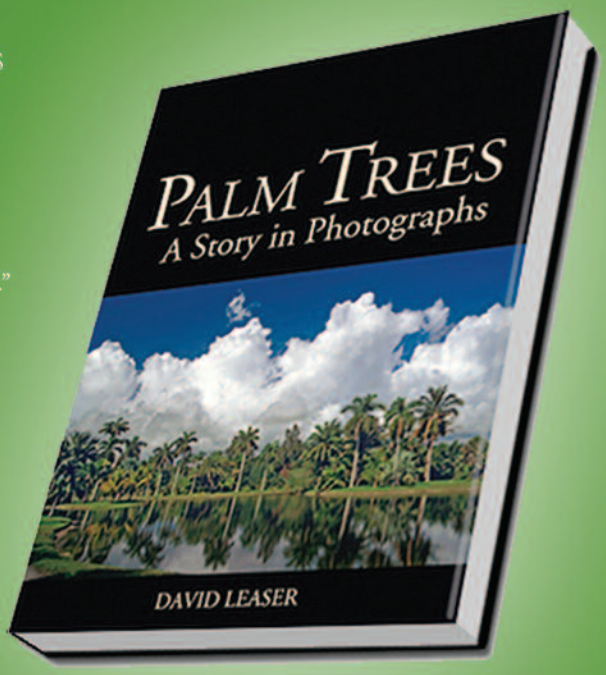
"A LUXURIOUS MINI-VACATION."
— Ohio Record-Courier

"NO OTHER BOOK BETTER ILLUSTRATES THE BEAUTY OF PALMS AND THEIR PLACE IN OUR GARDENS AND IN OUR HEARTS."
— Scott Zona, Palms Journal

"THIS BOOK MAKES IT EASY TO SEE WHY PEOPLE FIND THE PALM THE SYMBOL OF THE TROPICS."
— Paul Craft, President, International Palm Society

"A **BEGUILING** PHOTOGRAPHIC ESSAY."
— Mike Maunder, Director, Fairchild Tropical Botanic Garden

"A **PERFECT GIFT** FOR NATURE LOVERS AND GARDENERS . . . A 'MUST HAVE'."
— Mike Bostwick Department Head, San Diego Zoo



Available through the International Palm Society Bookstore

Also available at:

Alden Lane Nursery • Amazon.com • American Nurseryman • Anawalt Lumber • Bay Books • Bestsellers • Betrocks • Blue Sky Landscaping • Bishop Museum • Books-A-Million.com • Bookends • Borders • Briggs Tree Co. • Diesel • Dutton's Books • Fairchild Tropical Botanic Garden • Fairmont Hotels Orchid and Kea Lani • Foster Botanical Garden • Green Thumb Nursery • Hawaii Tropical Botanical Garden • Huntington Library Bookstore • LA Arboretum • Lotusland • Mission Hills Nursery • National Tropical Botanical Garden • Roger's Gardens • Perez Nursery • Plant Depot • Quail Botanical Garden • San Diego Museum of Photographic Arts • San Diego Natural History Museum • San Diego Zoo • San Diego Wild Animal Park • San Francisco Botanical Garden • Tommy Bahama • Vroman's • Walter Andersen Nursery • Waimea Valley Audubon Society

Call Toll Free 800-928-9098 Westwood Pacific PUBLISHING www.westwoodpacific.com

Ptychosperma macarthurii: Discovery, Horticulture and Taxonomy

JOHN LESLIE DOWE
Australian Centre for Tropical Freshwater Research
James Cook University, Townsville, Queensland 4811, Australia
John.Dowe@jcu.edu.au

***Ptychosperma macarthurii* is one of the world's most popular ornamental palms, proving adaptable to a broad range of climatic and cultural conditions. Contrary to this apparent adaptability, the species is relatively uncommon in its native habitats in southern New Guinea and northern Australia, and otherwise occupies a narrow ecological niche. There are some noticeable differences between wild growing plants and those now in cultivation under this name, a situation often attributed to hybridization with other *Ptychosperma* species. This paper presents an account of the species' discovery in 1875 during William Macleay's *Chevert* Expedition to New Guinea, subsequent introduction to horticulture by Sir William Macarthur and the Veitch Nurseries, and examines taxonomic history and typification.**

Ptychosperma macarthurii is among the most widely grown and popular palm species (McCurrach 1960, Caulfield 1971, Basu 1969, Parham 1972, Bailey & Bailey 1976, Essig 1977, Dransfield 1986, Fosberg et al. 1987, Minter 1991, Lambert 1994, Matthes 1994, Dematté & Castellani 1999, Riffle & Craft 2003, Van der Velde 2003). Although its discovery, introduction to horticulture and taxonomic history are relatively straightforward, though not without some dispute (see Essig 1977, 1978), there are questions about the comparative morphological variation found in wild growing plants and those grown in a horticultural setting (Essig 1978, Tucker 1984). Hybridization between *P. macarthurii* and other *Ptychosperma* species has been invoked to explain this situation (Essig 1978, Jones 1995). This paper presents an account of the discovery and introduction to horticulture of the species,

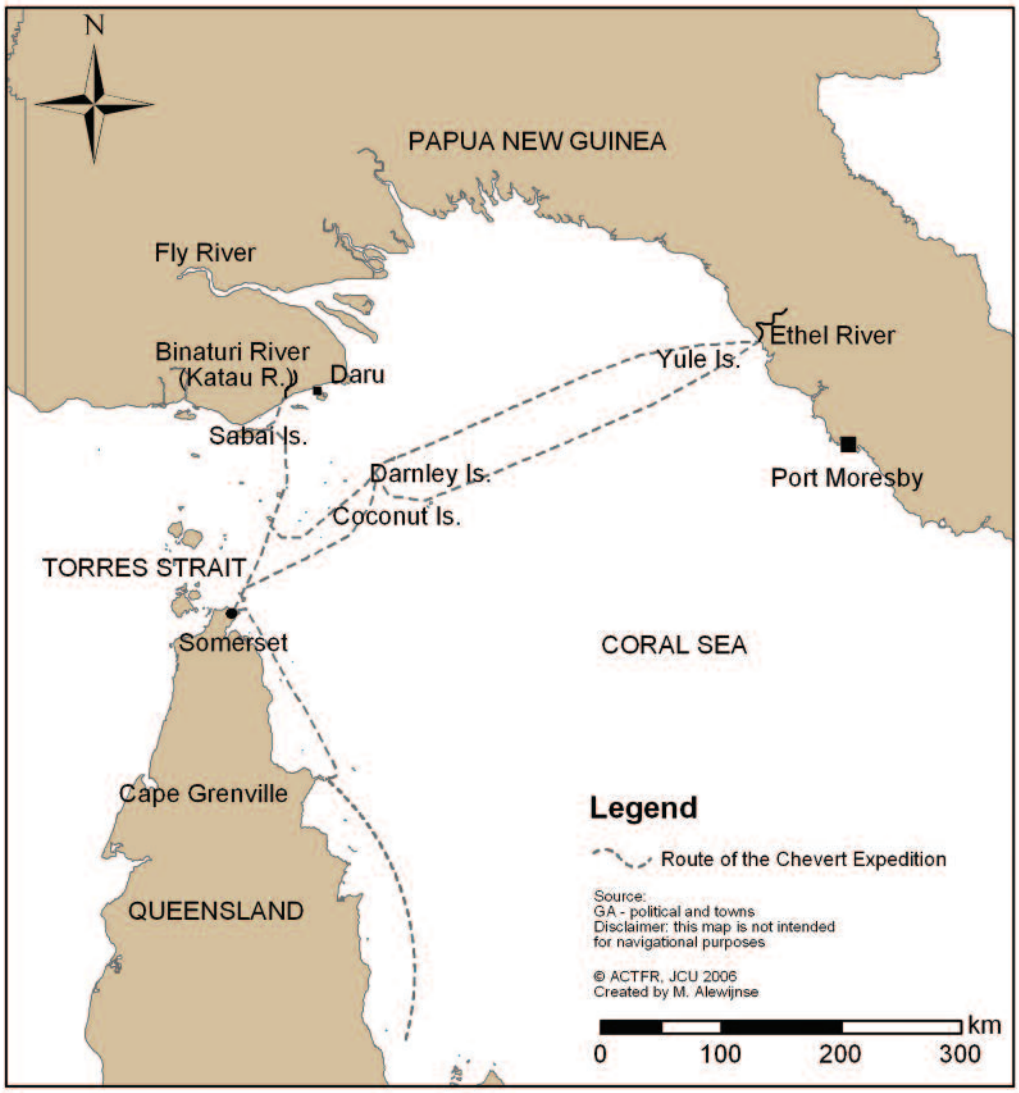
examines its taxonomic history and typification, and discusses the differences between wild growing plants and those found in horticulture.

Discovery: The Chevert Expedition of 1875

The late 1800s was a period of expansive scientific activity in Australia. One of the most productive expeditions around the time was that of the *Chevert* Expedition of 1875 (Stanbury 1975). The expedition was funded, organized and lead by the naturalist and scientific benefactor William Macleay (later Sir), and visited localities in northern Queensland, the islands of Torres Strait, and southern New Guinea (Macleay 1877, Fletcher 1893, Bowen & Bowen 2002) (Fig. 1). The expedition took its name from the 300 ton *Chevert*, a barque built for the French Navy in 1862, and which was subsequently purchased by Macleay and refitted as a scientific vessel (Macleay 1875).

The expedition had a complement of 30 men, including a number of well-regarded scientists and two "gardeners," sponsored by Sir William Macarthur, who were to collect plants for him. Macarthur's gardeners included a "Mr Dingwall," as chief gardener, and Thomas Reedy, as assistant gardener, who was also variously initialed as "J," "M" or "P" in documentation. Nothing is known about Dingwall, although his supposed subordinate

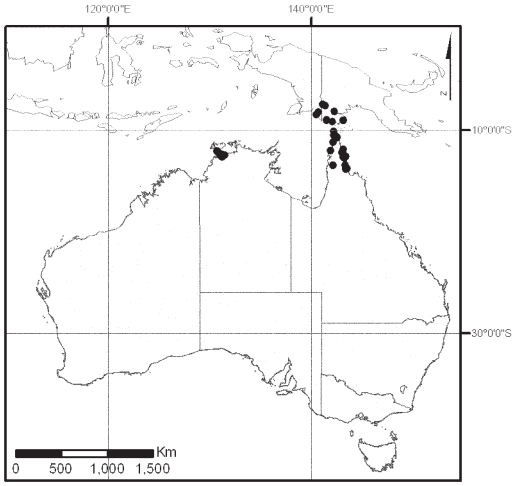
1. Route of the *Chevert* Expedition of 1875 showing places named in the text (after Macleay 1875; Holland & Stanbury 1988). Map prepared by Mirjam Alewijnse (ACTFR).



Reedy is recorded as being the collector of the 160 or so herbarium specimens gathered during the *Chevert* Expedition. When his ultimate contribution to the botany of the expedition is considered, Reedy remains somewhat of a mystery apart from a few personal details in the public records of the district of Camden, New South Wales (Atkinson 1988). In the various accounts of the *Chevert* Expedition, there was occasional mention of "Macarthur's gardeners," including reference to the 100 or so live potted plants that they maintained below decks (Fox 2004). The pots were supported by beams to prevent them falling over in the rough swells encountered in the Torres Strait (Macmillan

2. Illustration (woodcut) of *Kentia macarthuri* in James Veitch & Sons' Catalogue of Plants Including Novelties for 1879.

KENTIA MACARTHURI.



3. Distribution of *Ptychosperma macarthurii* based on herbarium collections. Map prepared by Mirjam Alewijnse (ACTFR).

1957). After the return of the expedition, Macarthur forwarded the herbarium specimens collected by Reedy to the botanist Ferdinand Mueller in Melbourne for identification (Mueller 1875). Presently at least 40 Reedy specimens are accounted for in the National Herbarium of Victoria [MEL] (C. Gallagher pers. comm.), and a small number in the Natural History Museum, London [BM] (V. Papworth pers. comm.). Mueller (1875, 1876, 1877) cited 44 Reedy collections in his accounts of Papuan plants, including one as the type for *Eucalyptus papuana* F. Muell. A Reedy specimen was cited in the description of *Pachygone pubescens* (F. Muell.) Benth. by Diels (1910) in his treatment of the Menispermaceae. Mueller developed a number of biogeographical themes based on Reedy's collections (Frodin 1990), and subsequently named *Elaeocarpus reedyi* F. Muell. (albeit an illegitimate name) to commemorate Reedy's contribution (Mueller 1888, 1890).

The *Chevert* Expedition was able to make only limited land contact in New Guinea because of unfavorable weather conditions, unsatisfactory relations with the native inhabitants and illness among the crew. The places where the expedition landed included the Katau River (known as Binaturi River on modern maps) and coastal areas adjacent to its mouth; Yule Island; the coast opposite Yule Island; and nearby Ethel River. Of the five month expedition, only 23 days (3–14 July and 18 Aug.–1 Sept.) were spent on New Guinea soil. Otherwise, most of the expedition was spent collecting on islands in Torres Strait, provisioning at Somerset on Cape York Peninsula and repairing the *Chevert* on Darnley Island (Holland & Stanbury 1988).

With regards to collections of palms made by Reedy during the expedition, only three specimens have been located, all in MEL (Table 1). Mueller (1875, p. 13) indicated that at least one palm specimen was seen by him, which he identified as a *Licuala* sp., but it was "*not in a state to determine … precise specific position*" and appears not to have survived. There is no indication that Mueller received or studied other palm specimens from the expedition.

Horticulture and nomenclature: Sir William Macarthur's legacy and beyond

Ptychosperma macarthurii was named for Sir William Macarthur (1800–1882), who was one of the most active and influential horticulturists in Australia in the mid to late 1800s. Macarthur was renowned as having the best private collection of plants in New South Wales and was an avid collector and promoter of rare plants (Bligh 1980, Fox 2004). Among the first viticulturists in Australia, Macarthur was a medal-winning wine-maker, as well as a respected amateur botanist and noted plant breeder (Hall 1978). He was appointed as the New South Wales representative at the Paris Exhibition of 1855 and was awarded the Legion of Honor for his services (Maiden 1908). Through his interest in horticulture, Macarthur had established regular correspondence and developed a successful working relationship in both acquiring from,

Table 1. Palm specimens collected by Reedy during the *Chevert* Expedition of 1875 to Torres Strait and southern New Guinea, with collector's number and the National Herbarium of Victoria Herbarium (MEL) accession number.

Ptychosperma macarthurii, *Reedy 36* (MEL 2067108)

Arenga microcarpa, *Reedy 48* (MEL 2067107)

Caryota rumphiana, *Reedy 143* (MEL 2067113)

Licuala sp., not extant (cited by Mueller 1875)

4. *Ptychosperma macarthurii* at Lockerbie Scrub, Cape York Peninsula, Australia, in seasonally inundated swamp forest.

and supplying plants and seeds to the influential Veitch Nurseries in London (Macarthur 1855–1886, Shephard 2003, Fox 2004). Materials collected by Reedy during the *Chevert* Expedition were forwarded to the Veitch Nurseries following the return of the expedition, partly in an effort by Macarthur to recoup the costs of sponsoring his gardeners on the *Chevert* Expedition, and partly to maintain his reciprocal relationship with the Veitches (Fox 2004).

In unpublished correspondence between Harry James Veitch, proprietor of the Veitch Nursery at Chelsea, London, and Macarthur (Macarthur 1855–1886), dated 22 December 1876, the arrival of the first seedlings of *P. macarthurii* was noted: "*The Palms in Case No 1 are as yellow & dried in foliage as if they had been in an oven & been dried. I can only imagine they must have passed through some exceedingly sunny hot weather.*" In an accompanying summary, titled "Report of Cases of Plants from Sir William

5. *Ptychosperma macarthurii*, Pajinka, Cape York Peninsula, in monsoonally influenced littoral forest.

Macarthur received Dec 22 1876," it was recorded that, "*Case No 1. Seedling Palm from Katou River about one half dead.*" Despite this, a number survived and in a letter dated 12 January 1877, the following was noted: "*Of the Palms from Katou, New Guinea, of which you sent off 750, we shall not save 40, if so many. I mentioned in my last that these plants appeared to be as dried in foliage as if they had been in an oven & when we came to examine them we found that both these & the Caryotas in Case 2 had dried at the base of the growth, the hearts being quite decayed and dead in nearly all. It is all the greater misfortune for us that we cannot of course propagate from any plants which may survive so that our stock in any case is too limited to do much with. We sent the seeds on to Mr Wendland at Hannover, our best authority on Palms and we asked him, if new, to associate your name with this plant which he has done, naming it Ptychosperma (not Kentia) Macarthuri. You will thus see our continued desire to identify your name as far as possible with what we may receive from you.*"

Although Harry Veitch appears to have intended to name it originally as a species of *Ptychosperma*, it became known as a *Kentia* in the horticultural trade. Subsequently, plants labeled "*Kentia Mac Arthuri;* Nouvelle-Caledonie" [the place of origin presumably is a mistranslation of New Guinea] were displayed at the Liège Exposition of 1877 in

6. *Ptychosperma macarthurii*, cultivated plant in Queens Gardens, Townsville, Queensland, Australia.

Belgium as "new or rare plants" from the Jacob-Makoy collection (anon. 1877). Soon after, Harry Veitch presented for sale plants of *Kentia macarthurii* in the James Veitch & Sons' *Catalogue of Plants including Novelties for 1879* (Veitch 1879). In this, there was a brief description and an illustration of a juvenile plant (Fig. 2) and reference to the supply of the plants from William Macarthur. It can be assumed that the Veitch Nursery had grown and sold plants labeled with the tag name *Kentia macarthuri* from those materials supplied by Macarthur and that plants had been provided to horticulturists and collectors in Europe using that name. It is of interest to note that the price quoted in the Veitch's *Catalogue of Plants* was 10 s. 6d. to 63s., which, based on currency valuation calculations by Lawrence and Williamson (2005) convert those prices to present-day values of US$80.00 to US$450.00 respectively, thus making the palm a relatively expensive item at that time.

As a taxonomic and nomenclatural technicality, Harry Veitch's description in the *Catalogue of Plants*, though unable to positively characterize the species, otherwise serves as the protologue and therefore is the accepted place of formal publication of the name of the species (Essig 1978). Authorship of the name *Kentia macarthurii* as H. Wendl. ex H.J.Veitch indicates that Hermann Wendland had suggested the name, but that Harry Veitch had indeed written and published the description. A few years later, the combination *Ptychosperma macarthurii* (H.Wendl. ex H.J.Veitch) H.Wendl. ex Hook. f. was published by Hooker

(1884), who listed palms being grown in the Royal Gardens at Kew in 1882. The co-authorship of Hermann Wendland again indicates that the German botanist had suggested the new combination, as acknowledged by Hooker (1884, p. 10), and that Hooker had actually published it.

In a summary of plants introduced by the Veitch Nurseries, Veitch (1906, p. 283) indicated that *P. macarthurii* was one of that nursery's prime "Stove and Greenhouse Plant" introductions and provided a brief description.

In a paper examining cultivated palms in Bogor Gardens, Wigman (1909), then Assistant Curator of the Buitenzorg (Bogor) Botanic Gardens, provided the combination *Actinophloeus macarthurii* Becc. ex Wigman, based on a suggestion from Beccari, but did not elaborate on a description of the species. Subsequently, *Actinophloeus* was synonymized under *Ptychosperma* (Martelli 1935), with *P. macarthurii* being reinstated, the name which it retains at the present (Govaerts & Dransfield 2005).

Early taxonomic works that dealt with *P. macarthurii* indicated distribution to be in New Guinea (Wigman 1909, Radermacher 1926, McCurrach 1960, Moore 1963) but without mention of any distribution in Australia. The first synoptic work examining *Ptychosperma* in Australia (White 1935) did not mention *P. macarthurii* but otherwise recognized two species, *P. elegans* and *P. capitis-yorkii*, and designated a number of synonyms under these names. *Ptychosperma capitis-yorkii* and all the synonyms included in that work are now considered to be synonyms of *P. elegans* (Essig 1978). The recognition that *P. macarthurii* had distribution in Australia, as well as southern New Guinea, was first positively indicated by Essig (1978) is his revision of *Ptychosperma*. Thereafter, distribution in Australia has been noted by many researchers (Covacevich & Covacevich 1978, Hynes & Tracey 1980, Tucker 1980, 1984, 1988, Lavarack & Godwin 1987), and including populations in both Queensland and the Northern Territory (formerly known there as *P. bleeseri*), its distribution in Australia is well documented.

Does *Ptychosperma macarthurii* have an identity crisis?

Palms identified as *Ptychosperma macarthurii* are among the most commonly cultivated in tropical areas of the world. Some reports purport that most plants in cultivation under this name are indeed hybrids between the wild progenitors of *P. macarthurii* and other *Ptychosperma* species (Essig 1977, 1978, Hay 1984, Shapcott 1998). However this situation has not been investigated to any satisfactory degree, and it may well be that the phenotypic variation seen in cultivated plants may be the response to cultural conditions, or possibly an expression of the degree of variation that occurs naturally in wild populations (Tucker 1984). Nevertheless, in areas of southern New Guinea and northern Australia (Fig. 3) there exist populations of what may well be referred to as the "wild provenance" *P. macarthurii* as opposed to the "horticultural provenance." Wild populations are characterized by smallish, thin-stemmed plants with leaves with irregularly disposed or grouped leaflets (Figs 4 and 5), whilst most horticultural forms are robust with thicker stems and have leaves most frequently with regularly arranged leaflets (Fig. 6). There is evidence indicating that the "horticultural provenance forms" are prone to be invasive, with feral populations reported in Australia, Singapore, Fiji, Hawaii and Panama (Dowe 1995, Turner et al. 1996, Fuller 1997, Doyle & Fuller 1998, Staples et al. 2000, Svenning 2002).

The genetic variation between the recognizable phenotypes of *P. macarthurii* has not been examined. However, Shapcott (1998) examined isozyme variation between *P. bleeseri* (now considered a synonym of *P. macarthurii* [Dixon et al. 2003]) in the Northern Territory and *P. macarthurii* and *P. elegans* in Queensland. Lack of variation within the otherwise geographically isolated populations near Darwin (i.e., the population formerly identified as *P. bleeseri*) suggested that the populations there were derived from a common ancestor, possibly from a single founder population. The variation compared to populations of *P. macarthurii* and *P. elegans* in Queensland was otherwise significant. However, the variation within *P. elegans* was significantly greater than the variation within the Queensland populations of *P. macarthurii*, probably the result of the collections of the former covering a wide geographical distribution and the latter from a more restricted location (Shapcott 1998). Shapcott did not examine any of the so-called "horticultural provenance forms" of *P. macarthurii*, but only wild plants.

The identity of *P. macarthurii* was open to misinterpretation from its first description, which was of a juvenile plant in cultivation

7. The specimen of *Ptychosperma macarthurii* collected by Thomas Reedy from New Guinea, National Herbarium of Victoria (MEL).

(Fig. 2). The lack of an acceptable description was recognized by Wigman (1909), but it was not until Radermacher's (1926) description that the species was brought somewhat to a better understanding. However, Radermacher's description, with assistance by H.J. Lam (Assistant at the Buitenzorg [Bogor] herbarium), was based on cultivated specimens in Bogor Gardens, as well as additional specimens of otherwise dubious provenance and identity. Essig (1978), in realizing that the species had an "identity crisis," provided a detailed description based primarily on wild-collected specimens from New Guinea and Australia. In this process, Essig also realized that the name of the species had not been

adequately typified, and thus, in the absence of a holotype, designated a neotype (*Brass 6376*, collected from Daru Island in 1936) based on a wild collection obtained near to where Reedy had first collected the species on the *Chevert* Expedition in 1875. However, with the recent discovery of a Reedy specimen of *P. macarthurii* (as part of the research in preparing this paper) (Fig. 7), the typification of *P. macarthurii* was brought into question. Although the Reedy specimen cannot be implicated in typification, as it was not seen by the original authors and otherwise not cited as part of the protologue, the illustration that accompanied the protologue has priority as a typifying entity in that it was referred to in the protologue and is indeed related to the specimen (albeit a living potted plant) upon which the name was established. With invocation of the rules of priority in assigning types, in accordance with various items in Article 9 (i.e. 9.2, 9.9. and 9.10) in the ICBN (Greuter et al. 2000), the neotype proposed by Essig (1978) should be rescinded and the illustration accompanying the protologue be designated as the lectotype. The revised and updated taxonomy of *P. macarthurii* is as follows:

Ptychosperma macarthurii (H.Wendl. ex H.J.Veitch) H.Wendl. ex Hook.f., Kew Report 1882: 55. 1884; *Kentia macarthurii* H.Wendl. ex H.J.Veitch, Cat. Pl. 1879: 26. 1879; *Saguaster macarthurii* (H.Wendl. ex H.J.Veitch) Kuntze, Revis Gen. Pl. 2: 735. 1891; *Actinophloeus macarthurii* (H.Wendl. ex H.J.Veitch) Becc. ex Wigman, Bull. Dép. Agric. Indes Néerl. 31: 12. 1909. Type: lectotype here designated. Figure of *Kentia macarthuri*, p. 15, James Veitch & Sons' Cat. Pl. 1879. 1879. [rescinds neotype designated by Essig (1978)].

Ptychosperma bleeseri Burret, Repert. Sp. Nov. Regni Veg. 24: 266. 1928; *Actinophloeus bleeseri* (Burret) Burret, Repert. Sp. Nov. Regni Veg. 24: 266. 1928. nom. illeg.; *Carpentaria bleeseri* (Burret) Burret, Repert. Sp. Nov. Regni Veg. 24: 268. 1928. nom. illeg. Type: Australia. Northern Territory. Bankers Jungle, 27 Aug. 1925, *A.K.Bleeser 430* (holotype B, destroyed).

Actinophloeus hospitus Burret, Notizbl. Bot. Gart. Berlin-Dahlem 11: 206. 1931; *Ptychosperma hospitum* (Burret) Burret, Notizbl. Bot. Gart. Berlin-Dahlem 12: 596. 1935; *Actinophloeus macarthurii* var. *hospitus* L.H. Bailey. Fairchild Tropical Garden Occasional Paper 7: 4. 1940. Type: Cultivation. Indonesia. Bogor Botanic Gardens, 1929?, V-H.17 (holotype B, destroyed).

Ptychosperma julianetti Becc., Atti Soc. Tosc. Sci. Pisa Mem. 44: 143. 1934. Type: Australia. Queensland. Torres Strait, Hammond Is. [Keriri Island], Mar.1891, *A.Guilianetti s.n.* (holotype FI).

[*Kentia Mac Arthuri* Hort., Belgique Hort. 27: 241. 1877. nom. nud.]

Acknowledgments

Many people contributed in many ways during the preparation of this paper. I would like to thank the following for their valued assistance: Rita Bisley (James Cook University Library), Melany Chapin (Bishop Museum, Hawaii), Catherine Gallagher (MEL), Megan Martin (Caroline Simpson Library, Sydney), Larry Noblick (Montgomery Botanical Center), Vicki Papworth (BM), Jude Philp (Macleay Museum), Juliet Wege (ABLO, Kew) and Scott Zona (Fairchild Tropical Botanic Garden). The image of the specimen of *Ptychosperma macarthurii* is reproduced with permission of the National Herbarium of Victoria. Mirjam Alewijnse (ACTFR) is thanked for preparing the maps.

LITERATURE CITED

ANONYMOUS 1877. L'exposition du 3 juin à Liège. Belgique Hort. 27: 239–241.

ATKINSON, A. 1988. Camden. Melbourne, Oxford University Press.

BAILEY, L.H. AND E.Z. BAILEY. 1976. Hortus Third: a concise dictionary of plants cultivated in the United States and Canada. New York, Macmillan Publishing.

BASU, S.K. 1969. The Indian Botanic Garden, Calcutta. Principes 13: 115–119.

BLIGH, B. 1980. Cherish the Earth: The Story of Gardening in Australia. Sydney, Daved Ell Press.

BOWEN, J. AND M.BOWEN, 2002. The Great Barrier Reef: history, science, heritage. Cambridge, Cambridge University Press.

CAULFIELD, H.W. 1971. Palms of the Brisbane Botanic Garden, Australia. Principes 5: 107.

COVACEVICH, J.M. AND J. COVACEVICH. 1978. Palms in northeastern Australia I. Species from Iron Range, far northeastern Queensland. Principes 22: 88–93.

DEMATTÊ, M.E.S.P. AND E.D. CASTELLANI. 1999. Seed production of species belonging to the palm collection of the FCAV-UNESP,

Jaboticalbal, State of Sao Paulo, Brazil. Acta Hort. 486: 183-187.

Diels, L. 1910. Menispermaceae. Das Pflanzenreich 46: 334-345. Leipzig, Wilhelm Engelmann.

Dixon, D., I. Cowie, and R. Kerrigan. 2003. *Ptychosperma macarthurii* or *P. bleeseri*? The taxonomic status of *P. bleeseri* reconsidered. The Beagle Northern Territory Museum 19: 81–86.

Dowe, J.L. 1995. News from The Palmetum. Mooreana 5: 37–46.

Doyle, M.F. and D. Fuller. 1998. Palms of Fiji – I. Endemic, indigenous, and introduced species: changes in nomenclature, annotated checklist, and discussion. Harvard Pap. Bot. 3: 95–100.

Dransfield, J. 1986. Palmae. Flora of Tropical East Africa. Rotterdam. A.A. Balkema.

Essig, F.B. 1977. *Ptychosperma* in cultivation. Principes 21: 3–11.

Essig, F.B. 1978. A revision of the genus Ptychosperma Labill. (Arecaceae). Allertonia 1: 415–478.

Fletcher, J.J. 1893. The Hon. Sir William Macleay, KT., F.L.S., M.L.C. In: Fletcher, J.J. (ed), The Macleay Memorial Volume, pp. VII– LI. Linnean Society of New South Wales. Sydney, Angus & Robertson.

Fosberg, F.R., M. Sachet and R. Oliver. 1987. A geographical checklist of the Micronesian Monocotyledonae. Micronesica 20: 19–129.

Fox, P. 2004. Clearings: Six Colonial Gardeners and their Landscapes. Carlton, Miegunyah Press.

Frodin, D.G. 1990. Explorers, institutions and outside influences: botany north of Thursday. In: Short, P.S. (ed.), History of Systematic Botany in Australasia, pp. 193–215. South Yarra, Australian Systematic Botany Society.

Fuller, D. 1997. Conservation status, diversity and systematics of the indigenous palms of Fiji. PhD thesis. Department of Biology, University of the South Pacific, Suva, Fiji.

Govaerts, R. and J. Dransfield. 2005. World Checklist of Palms. Kew, Royal Botanic Gardens.

Greuter, W., J. Mcneill, F. R. Barrie, H.-M. Burdet, V. Demoulin, T.S. Filgueiras, D. H. Nicolson, P. C. Silva, J. E. Skog, P. Trehane, N. J. Turland, and D. L. Hawksworth. 2000. International Code of Botanical Nomenclature (St Louis Code). Regnum Veg. 138.

Hall, N. 1978. Botanists of the Eucalypts. Melbourne, CSIRO.

Hay, A.J.M. 1984. Palmae: In: Johns, R.J. And A.J.M. Hay. (eds), A guide to the monocotyledons of Papua New Guinea, Part 3, 195-318. Lae, Office of Forests.

Holland, J. And P. Stanbury. 1988. William John Macleay (1820-1891). In: Stanbury, P. And J. Holland. Mr Macleay's Celebrated Cabinet: the History of the Macleays and their Museum, pp. 39-56. Sydney, The Macleay Museum, University of Sydney.

Hooker, J.D. 1884. Appendix II. List of palms cultivated in the Royal Gardens, Kew. In: Hooker, J.D. (ed.), Report on the Progress and Condition of the Royal Gardens at Kew, during the year 1882. London, Eyre & Spottiswoode.

Hynes, R.A. and J.G. Tracey. 1980. Vegetation of the Iron Range area, Cape York Peninsula. In: Stevens, N.C. and A. Bailey. (eds), Contemporary Cape York Peninsula, pp. 11-30. St Lucia, Royal Society of Queensland.

Jones, D.L. 1995. Palms Throughout the World. Chatswood, Reed Books.

Lambert, A. 1994. The Palm Collection of the Durban Botanic Gardens. Durban, Durban Botanic Gardens.

Lavarack, P.S. And M. Godwin. 1987. Rainforests of northern Cape York Peninsula. In: The Rainforest Legacy: Australian National Rainforests Study. Volume 1. The Nature, Distribution and Status of Rainforest Types, pp. 201–222. Canberra, Australian Government Publishing Service.

Lawrence, H.O. and S.H. Williamson. 2005. Computing real value over time with conversion from British pounds to US dollars. Economic History Services, September 2005. URL. http//www.eh.net/hmit/exchange/.

Macarthur, W. 1855–1886. Macarthur Papers, Vol. 49. Horticultural correspondence, 1855-1886, with J. Veitch & Sons. Mitchell Library, ML A2945.

Macleay, W. 1875. The Voyage of the Chevert. Sydney Morning Herald, October11 1875.

MACLEAY, W. 1877. Notes on the zoological collections made in Torres Strait and New Guinea during the cruise of the "Chevert". Proc. Linn. Soc. NSW 1: 36–40.

MACMILLAN, D.S. 1957. A Squatter Went to Sea. Sydney, Currawong Publishing.

MAIDEN, J.H. 1908. Records of Australian botanists- (a) General, (b) New South Wales. Jour. &. Proc. Roy. Soc. NSW 42: 60-132.

MARTELLI, U. 1935. La sinonimia delle Palme gerontogee della Tribù delle Areceae. Nuovo Giorn. Bot. Ital. 42: 17–87.

MATTHES, L.A.F. 1994. Palms used in Brazilian landscape planning. Acta Hort. 360: 245-250.

MCCURRACH, J.C. 1960. Palms of the World. New York, Harper and Brothers.

MINTER, S. 1991. The palm house at Kew: a new beginning. Principes 35: 9–18.

MOORE, H.E. JR. 1963. An annotated checklist of cultivated palms. Principes 7: 119–182.

MUELLER, F. 1875. Descriptive notes on Papuan plants 1: 1–16. Melbourne, Government Printer.

MUELLER, F. 1876. Descriptive notes on Papuan plants 2–4: 18–82. Melbourne, Government Printer.

MUELLER, F. 1877. Descriptive notes on Papuan plants 5: 83. Melbourne, Government Printer.

MUELLER, F. 1888. Two hitherto unrecorded plants from New Guinea. Trans. & Proc. Roy. Soc. Victoria 24: 174–175.

MUELLER, F. 1890. Descriptive notes on Papuan plants 9: 53–70. Melbourne, Government Printer.

PARHAM, J.W. 1972. Plants of the Fiji Islands, Revised Edition. Suva, Government of Fiji.

RADERMACHER, A. 1926. Die Gametophyten von *Nipa fruticans* und *Actinophloeus macarthurii* Becc. Msc., sowie ein Versuch die Systematik der Angiospermen durch die haploide Generation zu ergänzen. Ann. Jard. Bot. Buitenzorg 35: 1–54.

RIFFLE, R.L. AND P. CRAFT. 2003. An encyclopedia of cultivated palms. Portland, Timber Press.

SHAPCOTT, A. 1998. The genetics of *Ptychosperma bleeseri*, a rare palm from the Northern Territory, Australia. Biol. Con. 85: 203–209.

SHEPHARD, S. 2003. Seeds of fortune: a gardening dynasty. London, Bloomsbury.

STANBURY, P. 1975. Sir William Macleay: squatter, Member of Parliament and scientist. In: STANBURY, P. (ed.), 100 Years of Australian Scientific Exploration, pp. 1–14. Sydney, Holt, Rinehart & Winston.

STAPLES, G.W., D. HERBST AND C.T. IMADA 2000. Survey of invasive or potentially invasive cultivated plants in Hawai'i. Bishop Mus. Occ. Pap. 65: 1–31.

SVENNING, J.C. 2002. Non-native ornamental palms invade a secondary tropical forest in Panama. Palms 46: 81–86.

TUCKER, R. 1980. Notes on the palms of northwestern Cape York Peninsula. Principes 24: 99–104.

TUCKER, R. 1984. *Ptychosperma macarthurii* in Australia. Palm & Cycad Soc. Australia Mag. 2: 9–10.

TUCKER, R. 1988. Palms of Subequatorial Queensland. Milton, Palm & Cycad Societies of Australia.

TURNER, I.M., K.S. CHUA, J.S.Y. ONG, B.C. SOONG AND H.T.W. TAN. 1996. A century of plant species loss from an isolated fragment of lowland tropical rain forest. Cons. Biol. 10: 1229–1244.

VAN DER VELDE, N. 2003. The vascular plants of Majuro Atoll, Republic of the Marshall Islands. Atoll Res. Bull. 503: 1–141.

VEITCH, H.J. 1879. Catalogue of Plants including Novelties for 1879. London, H.M. Pollett & Co.

VEITCH, J.H. 1906. Hortus Veitchii: a history of the rise and progress of the nurseries of Messrs James Veitch and Sons. London, James Veitch & Sons.

WHITE, C.T. 1935. A few notes on the genus Ptychosperma in Queensland. Proc. Roy. Soc. Queensland 46: 80–82.

WIGMAN, H.J. JR. 1909. Palmiers du Jardin Botanique. Bull. Dép. Agric. Indes Néerl. 31: 1–14.

Teddie Buhler 1910–2006

Teddie Buhler, a founding member and longtime secretary of the The International Palm Society, died December 12, 2006 after a very productive, honorable life.

She was born Theodora Breymeier on September 2, 1910, in East Orange, New Jersey. To understand how much the world changed over the next 96 years, it is helpful to put her birth date into context. In 1910, life expectancy for a female born in the U.S. was about 52 years. William Howard Taft was president of a country that had only 46 states, and no one had heard of The Great War. Marie Curie had not yet won the Nobel Prize, and x-rays would not be discovered for another year and a half. Teddie was already 19 months old when the *Titanic* hit an iceberg and sank, and she was almost four years old when the Panama Canal was opened. Also consider these facts: although the reform-rich Progressive Era was in full swing at the time of Teddie's birth, progress on some fronts was grudging. Only one-third of eligible children in the U.S. enrolled in elementary school, and not even 10% of them finished secondary school. Teddie was 10 years old before the constitutional amendment guaranteeing women the right to vote became federal law. (In fact, her languid adoptive state, Florida, did not get around to ratifying the 19th Amendment until 1969!)

Teddie was raised in Upper Montclair, New Jersey, but went to Neuchâtel, Switzerland to finish secondary school. Afterward, while working as a secretary in the U.S. Consulate in Zurich, she met Theodore "Ted" Buhler, an engineering student from Pennsylvania. They were married in New York City in 1935 but moved to Miami in December of that year to take over a boatyard later renamed Miami Shipbuilding Corp. In 1937 they built a home on San Marco Island, between Miami and Miami Beach, where they raised daughters Barbara and Jeannette. Teddie and Ted resided there until 1980.

Teddie had always liked plants, but the move to subtropical southern Florida presented opportunities on a grand scale. She became one of the early members of Fairchild Tropical Garden and spent a great deal of time volunteering there, particularly on a project to clarify the nomenclature of hoyas. Simultaneously she proceeded to fill her yard with a large variety of exotic plants. Along the way, she also served as president of the Council of Garden Club Presidents, the Metropolitan Miami Flower Show and the Miami Orchid Circle. In her "spare" time, she served on various beautification committees in Miami and Miami Beach.

Teddie was keenly interested in how people could improve the beauty and safety of their lives, and she demonstrated a very forward-looking approach to community planning. In 1948, as postwar home construction in the U.S. boomed, the real estate editor of the *Miami Daily News* asked her to comment on studies conducted by the National Association of Home Builders to guide the development of new neighborhoods. He wrote, "Her view of the ideal community embraces all that touches or affects community life but she puts particular emphasis on recreational facilities for children, and flower and vegetable gardens." Teddie scolded older cities for poor planning, asserting that "'if developers and home builders years ago had planned properly for children, they wouldn't now have to play in the streets."

The Metropolitan Miami Flower Show was long the dominant plant exhibition in southern Florida. During Teddie's presidency in 1950, Col. Robert Montgomery, benefactor of both Fairchild Tropical Botanical Garden and the Montgomery Botanical Center, told *The Miami Herald*'s Nixon Smiley that the show – in just its second year – was one of the best he had seen anywhere, including his longtime hometown, New York City. To carry out the theme "Paths Under the Florida Palms," the show set up an entire park inside an auditorium by moving in some 1,200 cubic yards of soil, more than 150 full-grown hardwood trees and palms, stone walks, grass, flowers, shrubs, and picnic tables. Smiley reported that the display was three times larger than that of the International Orchid Show recently held in the same location.

Yet for all those laudable activities, Teddie's crowning horticultural achievement didn't begin until she became a founding member of The Palm Society. For 30 years she served the organization as its corresponding secretary, bringing extraordinary energy and competence to the position. Meticulously, she maintained

information about each member on individual index cards, and her home became the repository of the Society's quarterly journal, *Principes* (later *Palms*). When members contacted her with questions about palms, her sense of duty, coupled with earnest scientific curiosity, impelled her to go to great lengths to find answers. Accordingly, she would call as many experts as possible to reach the consensus best response to those who had sought her advice. It is only slightly hyperbolic to suggest that if Bell hadn't invented the telephone, Teddie would have done it. It is not at all hyperbolic to say that for thousands of members over the years, she was the face and voice of The Palm Society. So pervasively was her name associated with the Society through various publications that for at least a decade after she moved to East Ridge Retirement Village in 1980, palm inquiries from around the world were still being mailed to her old address.

After 43 years on Biscayne Bay, Teddie did not miss her palm collection – but only because she transplanted most of it to East Ridge. Here was proof that you *can* take it with you! The village allowed her to create the Buhler Palmetum on a long rectangular roadside area about a block from her residence, and she steadily expanded the collection over the next two decades. Although she retired from the secretariat of the International Palm Society, she scarcely slowed down, serving many terms as a board member of the South Florida Palm Society. She also dived into committee work and classes at her new home, quickly becoming a familiar presence as she explored its extensive grounds on a vintage three-wheeler. She continued to attend IPS Biennial and Midterm Meetings until well into the 1990s. Her last such trip was to Kew Gardens in 1997.

In 1995 the IPS recognized Teddie's immense contributions to the organization by conferring upon her honorary membership on its Board of Directors. In 2001, the SFPS undertook to have a rare cultivar of the Sealing Wax Palm named in her honor; *Cyrtostachys renda* 'Theodora Buhler' was formally introduced to IPS membership on the cover of the June 2002 issue of *Palms*.

If I might be allowed a personal observation, it would be about the traits that made Teddie a venerable figure. She and I spoke often over more than 25 years, but I never heard her boast of past achievements. Her interest was always in pushing ahead with current projects. In board meetings, she advocated her opinions enthusiastically but without stooping to antagonize or belittle those on the other side of the issue.

Many individuals leave their mark on the world like those who carve initials in a tree trunk: they diminish whatever they touch. But Teddie Buhler, in her long, full life, preferred to nourish the tree, and by that means left a mark more valuable and indelible on family, friends and nearly three generations of Palm Society members. We are grateful to her for that.

LENNY GOLDSTEIN
Miami, Florida, USA

PALM LITERATURE

COCONUT: A GUIDE TO TRADITIONAL AND IMPROVED VARIETIES [Cocotier, guide des variétés traditionelles et améliorées]. Roland Bourdeix, Jean Louis Konan and Yavoh Pierre N'Cho. Editions Diversiflora, Montpellier, France. 2005. ISBN: 2-9525408-1-0. Price unknown. Pp. 104.

The authors have set out to do more than simply catalogue varieties and the book includes pages on the botany and history of the coconut palm and on the ethnology of those who cultivate this "tree of life, tree of paradise, tree of a hundred uses, symbol of the tropics, the milk bottle on the doorstep of mankind."

The authors are alumni of a coconut research station that was established by the IRHO (Institut de Recherches sur les Huiles et Oléagineux) in 1949 at Port Bouet, Côte d'Ivoire [Ivory Coast, West Africa]. This was one of the research institutes now merged into CIRAD (Centre de Coopération Internationale en Recherche Agronomique pour le Développement) and the Preface to the book is by the former Director General of CIRAD, Michel de Nucé de Lamothe, who was the coconut breeder at the same station when many of the varieties here illustrated and described by his successors were being collected. Now known as the Marc Delorme research station, it is part of a facility belonging to the Ivorian Centre National de Recherche Agronomique and it still produces coconut hybrids and improved varieties coded with the PB (Port Bouet) prefix; for instance PB 121, Lamothe's first hybrid, which became available in Côte d'Ivoire in the mid-1970s. That was when the F1 Maypan was released for commercial planting in Jamaica and, today, seed gardens able to produce all sorts of coconut hybrids exist in many – perhaps most – coconut growing countries. Yet farmers are reluctant to afford these coconut varieties and the Preface, rather sententiously, hopes "that this guide will instill the decision-makers and donors involved in development oriented research with reasons to intervene" and calls for "a greater insistence upon results that favor the designated beneficiaries." It needs to be said that, as a source of improved planting material, the Marc Delorme station would be one major beneficiary.

Whether or not palm enthusiasts can also be designated as beneficiaries they certainly will hope that the descriptions and illustrations provided in this work can help resolve two recurrent problems – how to be sure of the identity of the coconut varieties offered by the commercial nurseries and how to know if what they already have is indeed true to type. There will also be government agricultural officers and plantation managers who will want to know whether the coconut palms in their care are fit for purpose: giving immature fruit to drink and fresh nuts for supermarket buyers; and have the qualities required for desiccation or for virgin coconut oil production. And palm-loving tourists and palm professional landscapers will wish to know if the coconut palms decorating their hotels and golf courses can resist lethal yellowing or other disease infections, if they are liable to suffer attack by scale insects, fruit mites or other pests, and how well they might survive a hurricane or a tsunami. Many of these matters are dealt with in this guide.

The text opens with an introduction to the coconut as the tree of life, offering such information as the fact that two-thirds of the billion coconut palms that grow world-wide are (like this reviewer) more than sixty years old and that around half of the forty billion nuts produced are consumed domestically, despite once being (within living memory) the leading source of vegetable oil on the international market. The authors would reverse this trend by replanting with carefully selected varieties and by unveiling "some of the too closely guarded secrets of coconut research" – presumably including some of their own in the process. They continue their history of the coconut with a sequential account of the initial coast-wise dissemination by floating, the world-wide dispersal by human activity and the introgression of two contrasting types to produce much of the present day diversity. For a lighter touch, they poke gentle fun at the "mild delirium" behind the tongue-in-cheek idea that the wild coconut palm might have been the "legendary tree of the Garden of Eden," but they miss the opportunity to point up a subsequent Noah's Flood scenario in southeast Asia as the origin of the domestic coconut!

Even Linnaeus is made to look a little ridiculous by a photo-montage at the start of the two pages on coconut botany but the text that follows gives a readable account of the subject and pays particular attention to the flowering patterns that are so important to a

plant that is only propagated from seed. Twenty-one photographs fill the next two pages - on coconut morphology – a topic where a picture is certainly worth a thousand words. A sequence of text and pictures over the next six pages deal with the "Ninety-nine uses for the coconut . . .," starting with oil as the most important, including "Kernel, shell, wood and husk . . . tourism and alcohol," and concluding that "the coconut palm is truly a plant of civilization." Then, reaching their own areas of specialization at the Marc Delorme station, the authors devote six pages of alternating text and pictures to "Selection and breeding," "Cultural techniques" and "Scientific research." Especially highlighted is the international approach of COGENT (Coconut Genetic Resources Network) whose Malaysian-based staff are also acknowledged later for defining the content of the variety plates which feature on half of the remaining pages of the book.

The first of these plates, showing the range of coconut fruit colors, shapes and sizes, illustrates the beginning of the next, and major, section of the book, which is the detailed description of thirty-four named coconut varieties from eighteen tropical countries. Twelve of the selected varieties are dwarf forms (including Malayan Yellow Dwarf, Tahiti Red Dwarf, Cameroon Red Dwarf and Brazil Green Dwarf); thirteen are tall types (including Rennell Island Tall, Tagnanan Tall and Sri Lanka Tall Ambakelle); and nine are hybrids (including Maypan, PB 121 (or Mawa), and PCA 15-2 (or Matag)).

The 500-or-so words of text that accompany each plate are unavoidably repetitive because each must contain the same sort of agronomic information: the habit of the palm (stem girth, leaf length etc.); age at key events (first flowering, maximum productivity or maturity); the fruit characteristics (shape size, husk thickness, nut or kernel weight, oil content, etc.); response to diseases or pests; suitability for particular uses, geographical distribution, and so on. But, wherever possible, emphasis is placed on individualities that may help differentiate one variety from another.

By the same token, each full-page plate is composed of almost standardized color photographs that allow comparisons to be made. For each one named there is an open inflorescence, two or three bunches of developing fruit, examples of large, medium and small sized fruit (with centimeter scale) showing entire, polar- and equatorial-sectioned fruit (both fresh color and dry brown) and an entire palm, showing trunk and crown. Unfortunately, it must be said that only two of these include a human figure to indicate the scale, so dwarf palms are in closer focus than tall specimens. And, in what appears to be a publication afterthought, the caption on each plate is adorned with "eye-end" views of three dehusked nuts – a closer look is needed to see that they are different on each page. It would have been better, instead, to show the three nuts in top-, side- and 3/4-profile and with a scale. Surprisingly, there is no picture anywhere in the book that really displays the nut – the agricultural end-product.

The last pages close with the authors' brief biographies, a few contact addresses, some titles of useful books and CD-Roms, a short list of internet sites, acknowledgements for assistance with text and photographs, and the publication details. There are no bibliographic citations or end-notes to give readers access to textual sources when opinions differ. Take, for example, two of the dwarf varieties described and pictured in the guide – the Tahiti Red Dwarf and the Cameroon Red Dwarf. They were given those names when added to the Port Bouet germplasm collection, and are therefore treated separately, but are they really nothing more than selections from another population in an entirely different region? The authors suggest that Polynesian or Melanesian sailors might have introduced the red dwarf to Tahiti from Papua New Guinea because in Tahiti it is known as the "Haari Papua," literally "Papuan coconut." The Cameroon Red Dwarf, in contrast they say, is remembered there as being introduced by American priests but nobody knows from where, and the authors argue that its origin is very probably the Pacific Ocean region, "as shown by recent molecular biology studies." But these unspecified molecular biology studies merely group the two dwarf types with another, the Pemba Red Dwarf from East Africa. That variety was described by Prudhomme, a French agronomist in Madagascar, a century ago (1906) at a time when France, like other colonial administrations, was establishing coconut plantations in overseas territories. What was more likely than agricultural officers, missionaries, or travellers to the Far East going though the Suez canal or returning via the Cape of Good Hope and the Bight of Benin should pick up and ship bags of "selected" coconut seednuts at little cost and with no

quarantine restrictions, whenever their steamship stopped to take on coal? Such an action would considerably improve the chance that these notoriously poor germinating varieties would survive long distance dissemination – journey times that would have been impossible to Polynesians or to Europeans in wooden sailing ships.

So, do the descriptions and illustrations help resolve the identity of coconut specimens or populations, and show if they are indeed true to type? This guide is certainly a good and worthwhile attempt but there are so many synonymous coconut variety names that it may not entirely succeed.

HUGH C HARRIES
Honorary Research Associate (Herbarium)
Royal Botanic Gardens, Kew
Coconut Time Line http://cocos.arecaceae.com/

PALM LITERATURE

PALMS OF CHILE. A DETAILED INVESTIGATION OF THE TWO ENDEMIC PALMS AND A REVIEW OF INTRODUCED SPECIES. Dr. Juan Grau V. Ediciones OIKOS, Santiago de Chile. 2006. ISBN 956-7277-18-4. Price unknown. Hardcover. Pp 203. Available at www.doctorjuangrau.cl

This is lavishly produced privately printed work encapsulating the enthusiasm of the author for palms, and, in particular for *Jubaea chilensis* and *Juania australis*. It is, apparently, produced in three different language editions – Spanish, English and French.

There is a brief introduction to the palm family and characteristics of palms in general. Thereafter follow 20 pages devoted to *Juania* and 94 pages to *Jubaea*. In Section 3 of the book the author discusses ten genera of introduced palms. Section 4 deals with palm cultivation and Section 5 pests and diseases. The book ends with an epilogue, a poem to *Jubaea* and glossaries, references and an index

There are plenty of photographs, drawings and paintings throughout, including some most compelling photographs of *Jubaea* and particularly rare, photographs of *Juania* in the wild. Of considerable interest is a discussion of the extinct palm, *Paschalococos disperta* on Easter Island that Dr. Grau has no difficulty in equating with extant *Jubaea chilensis*, an assumption that this reviewer cannot agree with, while admitting that the extinct palm most closely resembles *Jubaea*. Dr. Grau proposes that *Jubaea* reached Easter Island by floating across the sea from Chile. He briefly reports experiments he performed on the buoyancy of *Jubaea* seeds in sea water and the survival of the embryos. Seed remained buoyant in sea water for four months, this allowing the author to conclude that *Jubaea* could have reached Easter Island by sea dispersal. I believe we need much more rigorous experimentation before such conclusions can be reached.

This is an attractive publication that has been produced as a labor of love.

JOHN DRANSFIELD

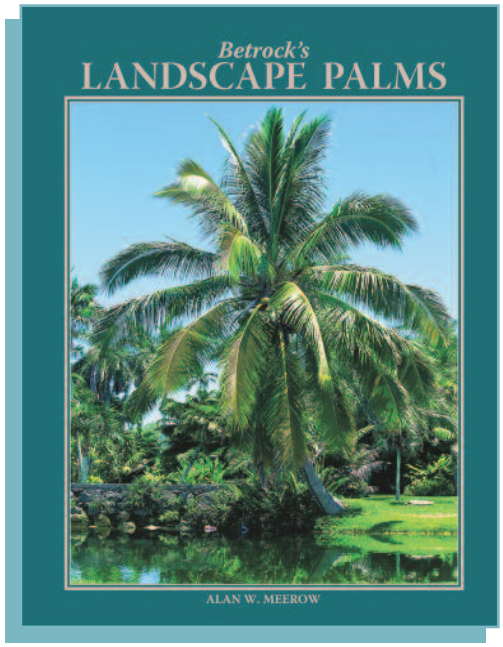
NEW • UPDATED • EXPANDED

Betrock's LANDSCAPE PALMS

Scientific information and color photographs for 126 landscape palms

This book is a revised and expanded version of

Betrock's GUIDE TO LANDSCAPE PALMS



Written by Dr. Alan W. Meerow, this new book features 44 more palms than Betrock's GUIDE TO LANDSCAPE PALMS.

Includes: USDA Hardiness Zones, salt tolerances, drought tolerances, soil requirements, uses, propagation, human hazards (including allergenic properties and irritating fruits), pest problems, disease problems, identifying characteristics and more. It also includes easy-to-use tables that enable readers to locate pertinent information found throughout the book all in one place.

Now only $39.95 + tax & S/H ***(Quantity Discounts Available)***

Betrock's LANDSCAPE PALMS—$39.95 ea + $2.40 FL tax + $6.00 S&H in U.S. ($48.35)
(International shipping & handling: $16.00)

Make checks payable to: ***Betrock Information Systems****, 7770 Davie Rd. Ext, Hollywood, FL 33024*
Phone: (954) 981-2821 Fax: (954) 981-2823 www.betrock.com, www.hortworld.com

Name_____

Address _____

Phone _____ Cell Ph _____

❑ Visa ❑ MasterCard ❑ Amex Expiration date _____

Card # _____

Signature _____ # of copies _____