Palms

Journal of the International Palm Society Vol. 62(3) Sep. 2018

THE INTERNATIONAL PALM SOCIETY, INC.

The International Palm Society

Founder: Dent Smith

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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 Inc., 56 Autumn Oaks Drive, The Hills, Texas 78738 USA.

Guidelines for authors are available on request from the Editors, or on-line at: www.palms.org/palms_author_guidelines.cfm

Annual membership dues are US$55.00 for Individuals (or US$150 for three years) and include a subscription to the Journal. Donor memberships are US$500 per year. Individual Lifetime memberships are available for a one-time fee of US$1000. Benefactor memberships require a one-time payment of US$2500. Subscription price is US$55.00 per year for libraries and institutions. Dues include mailing of the Journal by airlift service to addresses outside the USA. Dues may be paid on-line at www.palms.org.

Change of Address: Send change of address, phone number or e-mail to The International Palm Society Inc., The International Palm Society Inc., 56 Autumn Oaks Drive, The Hills, Texas 78738 USA., or by e-mail to info@palms.org.

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 Austin, TX, USA and additional mailing offices. Postmaster: Send address changes to The International Palm Society Inc., The International Palm Society Inc., 56 Autumn Oaks Drive, The Hills, Texas 78738 USA.

PALMS (ISSN 1523-4495)

Mailed at Lawrence, Kansas 14 Sep. 2018

The full text of PALMS is available on EBSCO Publishing's database.

This publication is printed on acid-free paper.

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Features

Donated by IPS member Tim Gregory, a *Ceroxylon parvifrons* opens a new leaf in the Andean Cloud Forest section of the SFBG. This species has great potential as an ornamental for gardens on the Northern California and southern Oregon coast, given its modest size and preference for cool temperatures. See article by J. Dewees, p. 109. Photo by Caitlin Atkinson.

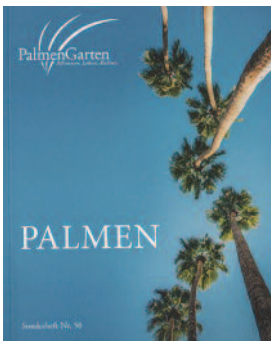
FRONT COVER

Two *Parajubaea cocoides* in the Entry Garden of the San Francisco Botanical Garden planted in 1998 have been flowering and fruiting for several years. See article by J. Dewees, p. 109. Photo by Caitlin Atkinson.

BACK COVER

Native to temperate forest in the Himalayan foothills in the Kumaon division of Uttarakhand, India, *Trachycarpus takil* has grown vigorously in the SFBG's cool climate. This solitary specimen has recently reached flowering age. See article by J. Dewees, p. 109. Photo by Caitlin Atkinson.

PALM NEWS

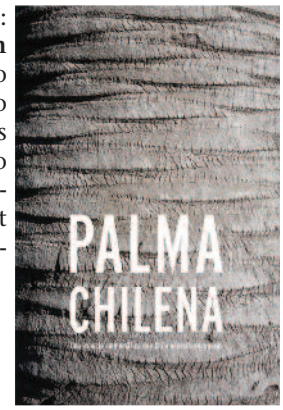


To coincide with an exhibition on palms, **the Palmengarten in Frankfurt, Germany, has produced an excellent guide to palms**, published as Sonderheft 50 of the long-running occasional series of the Palmengarten. Over a dozen authors have contributed to this 104-page, profusely-illustrated booklet, with chapters ranging from palm characteristics to classification and uses, and includes detailed accounts of several charismatic or particularly important species, among these the African oil palm (*Elaeis guineensis*) and the controversy surrounding its cultivation. The guide is in German. The ISBN number is 978-3-931621-42-1, and the booklet can be obtained directly from the Palmengarten (www.palmengarten.de).

The city of Orihuela, Alicante, Spain, and Miguel Hernández University (UMH) have signed an agreement to create **a national collection of date palm (*Phoenix dactylifera*)**. Twenty specimens have already been planted, this agreement involves the proposed planting of more than 2000 palms. The city will plant and maintain the palms, and UMH will provide the plants and develop the interpretive materials. The purpose of the collection will be to foster research on the date palm and educate school children on the importance of the date palm in Spain, the Mediterranean and the Middle East. This agreement will be valid for five years, and the city council is committed to maintaining the collection for at least 50 years. The site was officially inaugurated on 5 June 2018 by representatives from the city and UMH.

Sara M. Edelman and Jennifer H. Richards have just published **a comprehensive account of vegetative branching in palms**. They tabulated five kinds of branching, analyzed the distribution within the family of the different kinds and hypothesized on the branching condition of ancestral palms. Their study can be found in *The Botanical Review*. 2018: 1–38. https://doi.org/10.1007/s12229-018-9200-2.

Palma Chilena: Una especie emblemática que Chile necesita recuperar (ISBN: 978-956-316-190-8) is the title of **a beautiful new book in Spanish on the Chilean Wine Palm, *Jubaea chilensis***, written by Luis Alberto González Rodríguez, Manuel Toral Ibáñez and Rafael Navarro Cerrillo and published by Minera Los Pelambres, Facultad de Ciencias Forestales y Conservación de la Naturaleza de la Universidad de Chile and Origo Ediciones. The book is lavishly illustrated with high quality photographs, and IPS members can download it in electronic format at http://www.aminerals.cl/media/5322/palma-chilena-una-especie-emblematica-que-chile-necesita-recuperar.pdf.



Palms of the San Francisco Botanical Garden

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All photographs by
CAITLIN ATKINSON

Palms have achieved new significance at the San Francisco Botanical Garden (SFBG) since the 2015 registration of its high-elevation palm collection with the Plant Collections Network of the American Public Gardens Association. The developing collection represents species from cloud forest and other high-altitude areas of the tropics, as well as subtropical, mild-temperate, and Mediterranean-climate regions of the world.

First developed under former associate curator David Kruse-Pickler and curator emeritus Don Mahoney, the collection surprises and delights visitors. Ryan Guillou, the current curator, says, "Everyone thinks of palms as being from hot, steamy, tropical places. We are displaying groups of palms from a unique climatic niche that few other botanical gardens can grow well. We can be a refuge for them – it's important for conservation. And they are pretty plants."

Two Colombian wax palms (*Ceroxylon quindiuense*) (Fig. 1) planted in 1983 are exemplars of the SFBG's exceptional collection. They have thrived in the Garden's cool climate, their crowns 20 m (66 ft) high on white, wax-coated trunks, luminous in the Garden's swirling fogs. The enormous pinnate leaves of these still-immature palms stand in a shuttlecock form, showing off the satin texture of their abaxial surfaces. In the breeze, their silvery undersides alternate with glossy green adaxial surfaces. Behind the monumental pair grows a smaller, solitary *Ceroxylon vogelianum*, planted in the same year, its leaf scars canted at an eye-catching diagonal to the trunk axis. This planting is one of the very few displays of trunking wax palms in North America accessible to the public. It offers a rare glimpse of the glory of Colombia's national tree outside its habitat (a chief attraction on the 2018 International Palm Society Biennial tour to Colombia).

A new generation of two dozen young ceroxylons grows in the shade of the botanical garden's craggy Monterey cypress (*Cupressus macrocarpa*) and pine (*Pinus radiata*) trees and rustling blue gum eucalyptus (*Eucalyptus globulus*). In two or three decades these wax palms will turn their saxophone stems upward and rise as a gleaming grove of nine species – *Ceroxylon alpinum*, *C. amazonicum*, *C. ceriferum*, *C. echinulatum*, *C. parvifrons*, *C. parvum*, *C. quindiuense*, *C. ventricosum* and *C. vogelianum* – a sight easy to envision with the example of the three trunking ceroxylons already at hand.

The *Ceroxylon vogelianum* is now producing its fourth year of inflorescences amid its crown of plumose leaves, and is one of three specimens of this species to reach sexual maturity in the San Francisco Bay Area. The other two grow 24 km (15 mi) away in Oakland, at the Gardens at Lake Merritt's Lakeside Palmetum, established in 1982 by the Northern California Chapter of the International Palm Society and

open to the public; the Palmetum contains the Bay Area's other significant collection of trunking *Ceroxylon* species. These increasingly prominent trees at SFBG, like their contemporaries at the Palmetum, grew from seeds collected in Colombia and Ecuador in the 1970s and 1980s by the late Garrin Fullington, a key member of the Northern California Chapter of the International Palm Society and later the Hawai'i Island Chapter. Perhaps because of cooler temperatures, less competition, greater humidity or more irrigation, the SFBG plants of *Ceroxylon quindiuense* have grown taller than those planted at roughly the same time at the Palmetum.

Founded in 1937 and opened to the public in 1940, the San Francisco Botanical Garden at Strybing Arboretum occupies 22.3 ha (55 acres) in San Francisco's Golden Gate Park, 3.6 km (2 mi) from the Pacific Ocean. It is a city institution in partnership with the non-profit San Francisco Botanical Garden Society. It is known by botanists particularly for its *Magnolia* collection, ranked fourth in the world for conservation value, and is cherished by local residents for its beautiful gardens and extraordinary plants.

I have been a volunteer there since 1994, with much of my first two decades of work focused on propagating trees and palms and selling them to benefit the Garden. Many of the palms planted during the past two decades came from my propagation (and lobbying) efforts from seeds acquired from the International Palm Society Seed Bank, the late Inge Hoffmann (The Seed Lady), and Rare Palm Seeds. Volunteering at the Garden has significantly informed my new book from Timber Press, *Designing with Palms*, as well as my current work in horticulture at Flora Grubb Gardens and East West Trees.

The garden has a complete collection of *Parajubaea* and *Rhopalostylis* taxa, and aims for comprehensive collections of *Trachycarpus* and *Ceroxylon*. Collections in other genera focus on cool-growing species, often from mid- and high-altitude habitats, such as *Plectocomia himalayana* (Fig. 2), *Chamaedorea costaricana* (Fig. 3), *Caryota maxima* (the Himalayan strain) (Fig. 4) and *Arenga micrantha*. Genera with cool-growing species that the Garden has not yet collected include *Geonoma* and *Aiphanes*.

The site would not have appeared a likely home for a botanical garden at the time of the city's founding. The peninsula where the city of San Francisco exploded into being in the 1850s Gold Rush was once home to one of the largest coastal dune systems in California. Strewn on the Pacific Ocean side of the city and blown by prevailing winds 11 kilometers across the peninsula to San Francisco Bay, these sands were home to a dynamic dune scrub community, including well-known species first described from material collected here, like the California poppy (*Eschscholzia californica*). Groves of coast live oak (*Quercus agrifolia*), one of the city's handful of native tree species, dotted hills and stabilized-dune hollows, and willow thickets followed watercourses. Now these sands underlie much of the second-most densely populated large city in the United States, including its largest municipal park, Golden Gate Park, a sylvan 412 ha (1018 acres) of exotic trees and plants (with remnant native oak woodland).

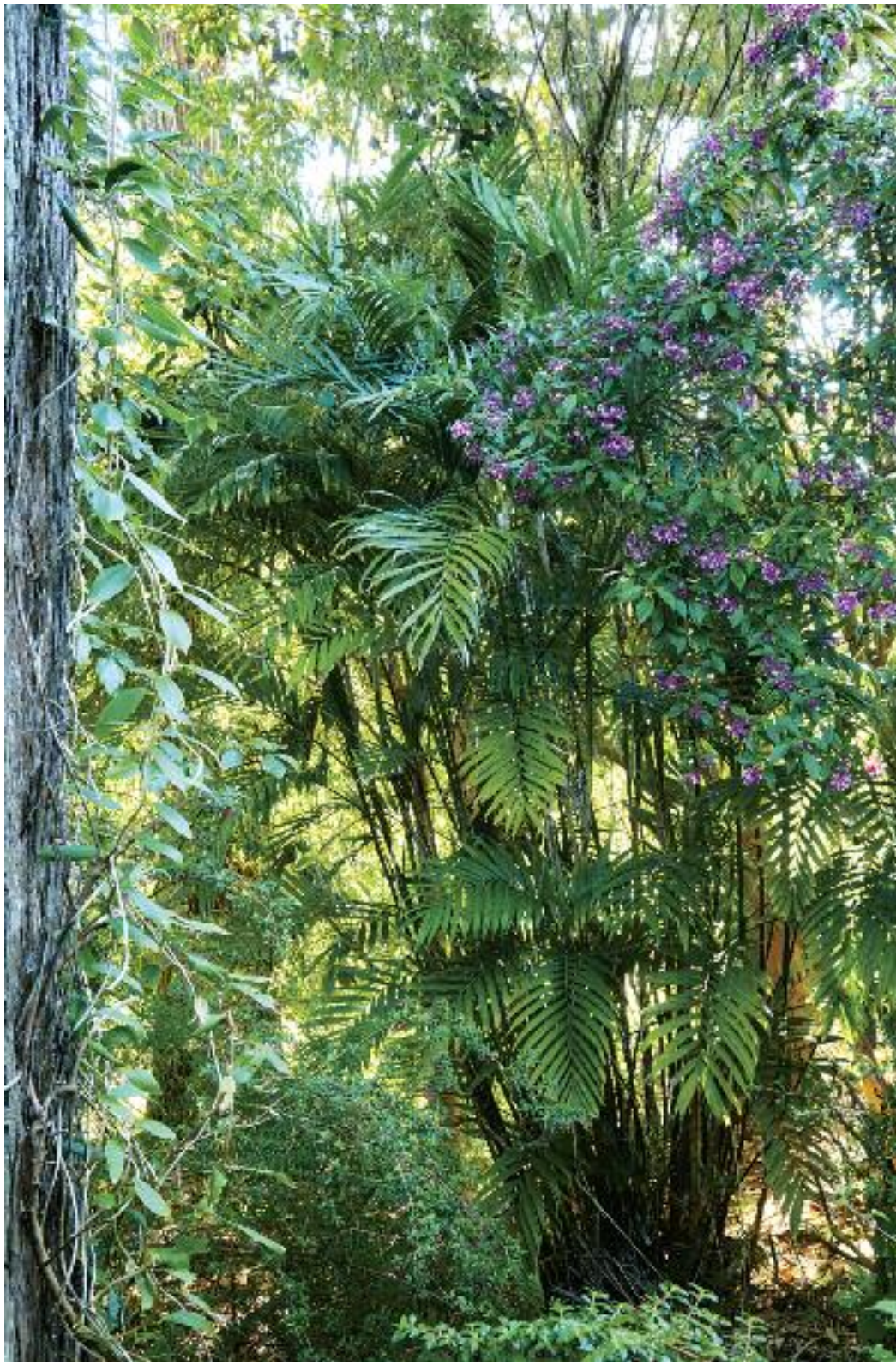
Bathed almost nightly in maritime low clouds and fog from May to September, the Botanical Garden – formerly known as Strybing Arboretum – sees average annual rainfall of around 635 mm (25 in), 80% of which falls between November and March. Average temperatures in July range from a high around 18ºC (64ºF) to a low around 12ºC (54ºF); in January daily highs average around 13ºC (55ºF) and lows around 7ºC (45ºF). Mostly, the weather is cool, humid, rainless and blustery (summer) or chilly, rainy, but mild (winter). The warmest months are September and October, when daily highs reach 20ºC (68ºF). Lows dipped below -7ºC (19ºF) in December, 1990, the extreme cold record for the Garden, itself the coldest place in San Francisco by far. Record high temperatures – fostered by brief outflows of dry, continental air – approach 38ºC (100ºF).

Hardly any other sizable cities share such climate conditions – perhaps Hobart, Australia, or Valparaiso, Chile, come close. Given the aquifer beneath the park tapped for irrigation, the mild climate, and neutral-pH, well-drained substrates, it is possible to cultivate an enormous range of plants here.

For such a young palm collection, a number of notable plants besides the older ceroxylons can be found in the Garden. Two immature, suckering specimens of *Plectocomia himalayana* (Fig. 2), the rattan occupying forests at 1500–2500 m (4921–8202 ft) above sea level scattered from Nepal and Bhutan to Thailand and Laos, clamber vigorously, even menacingly – thanks to their armature – high into large

1. Two immature *Ceroxylon quindiuense* planted ca. 1983 in the San Francisco Botanical Garden (SFBG) have developed spectacular white, wax-coated trunks now tall enough to be seen from outside the garden boundaries. In the background between them grows a flowering staminate specimen of *Ceroxylon vogelianum*. Immediately in front of them is a *Juania australis*, while in the foreground are several *Jubaea chilensis* in their rosette phase.

2. The Himalayan rattan palm *Plectocomia himalayana* grows next to and climbs on nearby *Photinia bodinieri* (trunk at left) and *Magnolia doltsopa* (foliage across the top). Inset: *Plectocomia himalayana* sheath detail.



3. *Chamaedorea costaricana* grows in the Mesoamerican Cloud Forest section of SFBG surrounded by other plants from Central America and Mexico like *Bomarea* sp. (left, on trunk), *Fuchsia paniculata* (upper right, lavender flowers), *Fuchsia thymifolia* (lower left, pink flowers), and *Begonia fuchsioides*.

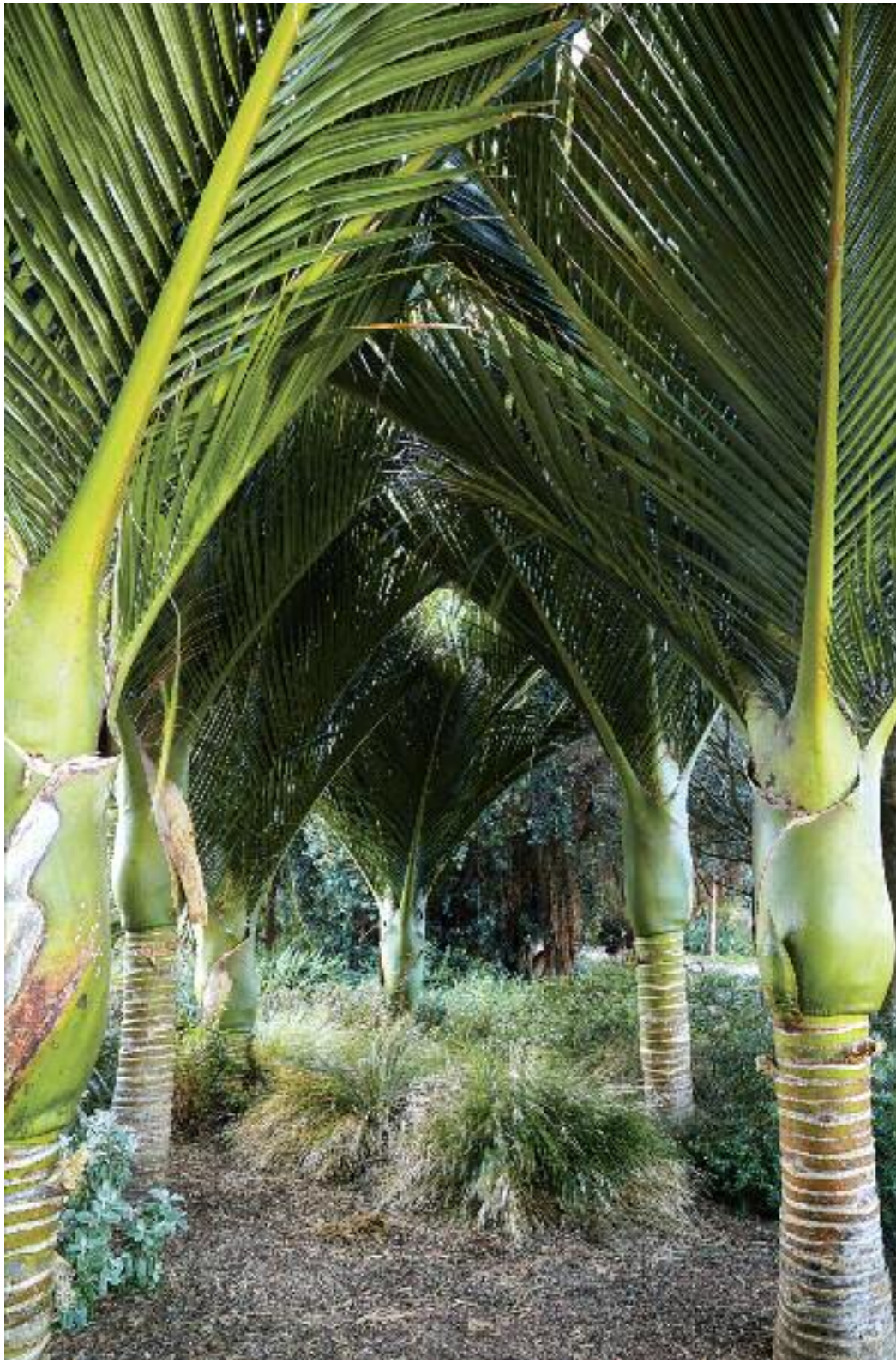
4. The Himalayan form of *Caryota maxima* has reached its terminal fruiting phase in a section of the SFBG now being planted with Southeast Asian cloud forest plants.

5. An immature *Juania australis* grows near two large *Ceroxylon quindiuense*. It is the sole survivor of a half-dozen specimens planted in hopes of developing a reproductively viable group of this notoriously difficult-to-cultivate species from a Mediterranean-climate cloud-bathed habitat on Masatierra in the Juan Fernandez Islands of Chile. Apart from constant mild leaf discoloration, this surviving plant appears healthy and grows steadily.

6. The waxy, bluish-green tones and regular pattern of leaf-blade splitting on young *Trachycarpus princeps* make it one of the most sought-after of frost-tolerant palms. It is threatened by hydroelectric projects along its Nu (Salween) River canyon habitat in Yunnan, China.

Magnolia doltsopa trees native to the same region (Fig. 2). Bulbils fork off the palms' aerial stems. An immature *Juania australis*, the very difficult-to-cultivate palm from Chile's Juan Fernandez Islands, represents the sole survivor of a planting of a half-dozen, its four-meter, apple-green ringed trunk setting it apart from its cousins nearby, the white-trunked ceroxylons (Fig. 5). Unusual species of *Trachycarpus* (Figs. 6 & Back Cover) also grow vigorously in the Garden, particularly *T. oreophilus*, *T. princeps*, *T. ukhrulensis* and *T. takil*, as well as *T. latisectus* and *T. martianus*. *Trachycarpus geminisectus* will likely be the next species planted out in the Garden.

A dense grove of *Rhopalostylis sapida* is growing into maturity and becoming a spectacle (Fig. 7) alongside a huge old *Pohutukawa* (*Metrosideros excelsa*) draped with aerial roots. Nearby, a dense planting of young *Jubaea chilensis* (Fig. 8) promises (in a century or so) to rival Ganna Walska Lotusland's renowned groves in Santa Barbara. Two *Brahea edulis* anchor opposite ends of a long, narrow bed edging the Garden's central lawn. To this bed dedicated entirely to plants from the five major Mediterranean-climate regions of the world the braheas contribute an accent of their native Baja California portion of the California Floristic Province, the Isla Guadalupe Biosphere Reserve, from which a number of other plants in the SFBG originate, like *Pinus radiata* var. *binata* and *Cupressus guadalupensis*. Curious visitors will discover many young palms in the



7. A grove of mature *Rhopalostylis sapida* planted at the initiative of former director Scot Medbury in the 1990s has become an attractive wandering place for visitors. Robust flowering specimens of *Rhopalostylis baueri* also grow in the SFBG.

8. More than a dozen *Jubaea chilensis* densely planted in the San Francisco Botanical Garden's Chilean section are on their way to becoming one of California's most significant public groves of this monumental, Mediterranean-climate species. Illuminated behind them is a Monterey cypress, one of a trio of tree species planted in the 19th century to help transform coastal dunes into Golden Gate Park, home to the botanical garden. In the foreground a bed contains terrestrial Chilean bromeliads in the genera *Fascicularia*, *Puya* and *Ochagavia*.

various geographic collections of the garden — the Mesoamerican Cloud Forest, the Andean Cloud Forest, the Southeast Asian Cloud Forest, Australia, New Zealand, East Asia, Chile, even the Mediterranean and Ancient Plants collections.

The Entry Garden, designed and installed in 1998 by Roger Raiche and Dave McCrory of Planet Horticulture, features plenty of palms – notably a pair of maturing *Parajubaea cocoides* (Front Cover) – amid other key plants representing the collections. Behind the cozy, densely shelved bookstore is a kiosk where visitors can shop from plants grown by volunteers in the Garden's nursery. Monthly plant sales from March through November, peaking in a big, festive May sale and auction, distribute some of the Bay Area's rarest and most interesting plants to gardeners and landscapers. Just off the Entry Garden, a serene courtyard leads to the Helen Crocker Russell Library of Horticulture, Northern California's preeminent reference collection of books and other printed material related to gardens and plants.

Trees are the largest living things that we humans can comprehend (i.e., their above-ground portions) as discrete organisms. The awe they inspire is at the heart of our love of plants and a profound motive for establishing arboreta and botanical gardens and the work done in research and conservation. At the SFBG, not only does the world's tallest (and now understood to be largest) conifer species, California's coast redwood, *Sequoia sempervirens* (to 115.6 m [379 ft]), grow, but so too do two of the world's tallest flowering trees, *Eucalyptus regnans* (mountain ash, 99.8 m [327 ft]), and *Ceroxylon quindiuense* (60 m [197 ft]), the tallest palm and monocot. I hope people visiting Golden Gate Park in San Francisco will be lured into the Garden by the sight of these beautiful palms, now but a third of their potential height, swaying in the near-constant breeze, their silvery-green cast a glinting, expressive complement to the foggy skies.

Acknowledgments

The author thanks Darold Petty and Richard Turner.

Palm species planted at the San Francisco Botanical Garden as of April 14, 2017.

Archontophoenix cunninghamiana 'Illawarra'
Archontophoenix purpurea (listed as "sp.")
Arenga engleri
Arenga micrantha
Brahea armata
Brahea calcarea
Brahea dulcis
Brahea edulis
Butia odorata (listed as *Butia capitata*)
Caryota obtusa
Caryota maxima "Himalayan"
Caryota "mystery"
Caryota "solitaire"
Caryota urens
Ceroxylon alpinum
Ceroxylon amazonicum
Ceroxylon ceriferum (listed as *Ceroxylon interruptum*)
Ceroxylon echinulatum
Ceroxylon parvifrons
Ceroxylon parvum (possibly *Ceroxylon pityrophyllum*)
Ceroxylon quindiuense
Ceroxylon sp.
Ceroxylon ventricosum
Ceroxylon vogelianum
Chamaedorea anemophila
Chamaedorea costaricana
Chamaedorea hooperiana
Chamaedorea sp. 'Horace Anderson'
Chamaedorea microspadix
Chamaedorea pochutlensis
Chamaedorea radicalis
Chamaedorea sp.
Chamaedorea sp. aff. *graminifolia*
Chamaedorea tepejilote
Chamaedorea woodsoniana
Chamaerops humilis
Chamaerops humilis var. *argentea*
Guihaia argyrata
Howea forsteriana
Juania australis
Jubaea chilensis
Linospadix monostachyos
Livistona australis
Livistona chinensis
Livistona jenkinsiana
Livistona lanuginosa
Livistona mariae
Syagrus hoehnei
Oraniopsis appendiculata
Parajubaea cocoides
Parajubaea sunkha
Parajubaea torallyi var. *torallyi*
Parajubaea torallyi var. *microcarpa*
Phoenix canariensis
Phoenix roebelenii
Phoenix sylvestris
Phoenix theophrasti
Plectocomia himalayana
Pritchardia minor
Rhapidophyllum hystrix
Rhapis excelsa
Rhapis multifida
Rhapis robusta
Rhopalostylis baueri
Rhopalostylis sapida
Rhopalostylis sapida (Chatham Islands)
Sabal minor
Syagrus romanzoffiana
Trachycarpus fortunei
Trachycarpus fortunei 'Wagnerianus'
Trachycarpus latisectus
Trachycarpus martianus
Trachycarpus oreophilus
Trachycarpus princeps
Trachycarpus takil
Trachycarpus ukhrulensis
Trithrinax acanthocoma
Trithrinax campestris
Wallichia oblongifolia
×*Jubautia splendens* (likely 'Dick Douglas')

Coccothrinax acunana Rediscovered in Cuba after 80 Years

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Brother Leon (born Joseph Sylvestre Sauget in France, 31 December 1871 and died in La Habana, Cuba, 20 November 1955) is considered the most prominent and accomplished plant collector and botanist in Cuban history. Indeed, he is often referred to as "the Father of Cuban Botany." His botanical fame extended to palms and an account of Cuban palms could not be written without consulting his numerous collections and extensive publications.

León authored treatments of *Copernicia* (1931, 1936), *Coccothrinax* (1939a & b), *Hemithrinax* (1941), *Roystonea* (1943,) and *Calyptrogyne* (1944) in Cuba. He named and described nearly half (45%) of Cuban palm taxa. León frequently collaborated with other Cuban workers who collected specimens for him, and two of them, Julián Baldomero Acuña Galé,

1. Holotype of *Coccothrinax acunana*, *Leon 16749*, at HAC. © National Cuban Herbarium (HAC). Photo by C.E. Moya.

an agronomist, botanist and former director of the Agronomic Experimental Station of San Antonio de las Vegas, and José Pérez Carabia, botanist and assistant to León, figure prominently in this account of *Coccothrinax acunana*, which was rediscovered after 80 years of botanical oblivion.

Acuña and Carabia first collected *Coccothrinax acunana* in July 1937 in forest at 1000 m elevation near Cueva del Aura, south-southwest of Pico Turquino, in the Sierra Maestra, at the far southern end of Cuba. León (1939a) named and described *C. acunana*, basing it on Acuña and Carabia's collection, which is in in the Cuban National Herbarium (HAC, *León 16749*) (Fig. 1). It was never collected again; in fact, Jestrow et al. (2017) explained that four *Coccothrinax* species have not been collected since they were originally named and described, and *C. acunana* is the one that had disappeared for the longest time.

Since its publication in 1939, the name *Coccothrinax acunana* has appeared in numerous publications, where it was considered an accepted species, including León (1946), Glassman (1972), Muñiz and Borhidi (1982), Moya and Leiva (2000); Govaerts and Dransfield (2005), Govaerts et al. (2011), and Acevedo-Rodríguez and Strong (2012). Only Henderson et al. (1995) considered it a synonym of *C. miraguama*.

On April 3, 2017, as part of field work in support of a major treatment of Cuban palms we plan to publish, two of the authors (Suárez

2. Dense mixed mesic/cloud forest on the south-soutwest flank of Pico Turquino where we found *Coccothrinax acunana*. Here is a juvenile plant with curved trunk on a rock outcrop. Photo by D.R. Hodel.

3 (top). The leaf blade of *Coccothrinax acunana* is bright green adaxially. 4 (bottom). With only a thin layer of grayish indumentum, abxially leaf surfaces of *C. acunana* are not prominently silver. Photos by D.R. Hodel.

and Hodel) made a grueling trip up the south-southwest flank of Pico Turquino to try to relocate *Coccothrinax acunana*. Leaving Santiago at 2 a.m., they traveled west along the southern coast, arriving about 4 a.m. at the small coastal village of Las Cuevas at the base of Pico Turquino. There, they hired guides, horses and mules to carry them up the steep

5 (left). Leaf base fibers of *Coccothrinax acunana* are connate at their tips. 6 (right). Inflorescences of *Coccothrinax acunana* have two, close-set, primary branches with bracts that extend at least to the first rachilla. Photos by D.R. Hodel.

forested slopes. Through the darkness they traversed dry, deciduous thorn forest and then disturbed, mesic forest. By daybreak they had arrived at about 700 m elevation, where they left the horses and continued on foot for another two hours, finally arriving in moist, cool mixed cloud forest at about 984 m elevation in the vicinity of Pico Limones, a sub-peak of the Turquino massif, where after 80 years, they rediscovered *C. acunana*.

They observed and collected *Coccothrinax acunana* for only the second time (as *MR 1706*) and photographed it for the first time in history as it occurred as widely scattered individuals in moderately dense, mountain forests that contained mesic and cloud forest elements (Fig. 2). Also for the first time, they were able to observe and report on the palm's habit and other features in its living state (Fig. 3), which, heretofore, were known only from a few dried herbarium specimens, and report a new locality for this species.

Suárez and Hodel were unsure if they were at the type locality of *Coccothrinax acunana*, although they feel that they were near it. The type locality was reported by León (1939) as Cueva del Aura (Cave of the Aura), but Suárez and Hodel saw no cave. Nicasio Viña Dávila and Arturo Salmerón López of the Eastern Center of Ecosystems and Biodiversity say that it is not a cave as such, but a grotto where stones break off a steep cliff and give the appearance of a cave. Nonetheless, Suárez and Hodel failed to find the latter formation either, but it easily could have been close to where they were. The steep, forested terrain made exploration difficult and blocked line-of-sight viewing. Later, detailed checking of maps showed that they were about 1.5 km from the type locality.

We compared *Coccothrinax acunana* with other species of the genus occurring in the Sierra Maestra in southeastern Cuba. It differs from *C. gundlachii* in the abaxial leaf blade surface not prominently silver (Fig. 4), the mostly connate tips of the sheathing leaf base fibers (Fig. 5), and the inflorescences with only two primary branches (Fig. 6). It differs from *C. elegans* in the leaf blades with more than 40 segments, the abaxial leaf blade surface not

7. *Coccothrinax acunana* grows to at least 15 m tall. Photo by D.R. Hodel.

8. In *Coccothrinax acunana* the most distal two m of trunk just below the leaves is densely covered with persistent leaf base fibers. Photo by D.R. Hodel.

9. Leaf segment tips of *Coccothrinax acunana* are unevenly bifid. Photo by D.R. Hodel.

covered with a deciduous tomentum, and the much narrower trunk, less than 10 cm in diam. It differs from the remainder of the species in the genus in its flowers with filaments connate in the proximal ½ to ¾, forming a conspicuous tube covering more than half of the ovary.

Based on the geographical and botanical evidence, we are confident that the palms found on the south-southwest flank of Pico Turquino are *Coccothrinax acunana*.

Using our recent observations and collections, we can add to the original description of *Coccothrinax acunana* as follows: solitary tree palm to 15 m tall (Fig. 7); trunk densely covered with persistent leaf base fibers in the distal 2 m just below the leaves (Fig. 8), the remainder of the trunk clean, smooth, only faintly ringed; leaf base fibers loose, coarse, with connate tips (Fig. 5); leaf blade bright green adaxially (Fig. 3), pale or opaque green with only a thin layer of grayish indumentum abaxially (Fig. 4); leaf blade segments with shoulder at ca. 80% of the distance from hastula to segment tip, segment tips enevenly bifid (Fig. 9), midrib and one submarginal secondary nerve on either side conspicuous on juvenile leaves, only midrib conspicuous on adult leaves; the two primary branches of the inflorescence very close together, the rachis bracts tubular in proximal ½, opening and expanding distally until covering the base of the primary branches and at least to the first rachilla (Fig. 6).

Occasional juvenile plants growing on rocks had short, curved trunks with horseshoe-shaped bases and aerial roots sprouting from the fibers at the proximal end, indicating a lack of secure rooting in its unstable substrate (Fig. 2)).

Specimens collected: CUBA. Santiago de Cuba province, Guamá municipality, vicinity of Pico Limones, SSW of Pico Turquino, 984 m elev., 3 April 2017, *MR 1706,* collected by Suárez and Hodel (ULV).

Phenology: Flowering of *Coccothrinax acunana* likely occurs in July.

Distribution: CUBA. Santiago de Cuba: Municipality Guamá, Sierra Maestra. Endemic.

Biogeography: Eastern Cuba subprovince, sector Maestricum, district Turquinense (Borhidi 1996).

Habitat: *Coccothrinax acunana* is found only in the Pico Turquino region of far southern Cuba, where it occurs as widely scattered individuals in mixed mesic/cloud forest at over 900 m elevation. Seifriz (1943) claimed that it occurred at a higher elevation than any other Cuban palm.

Common name: Sierra palm (Seifriz 1943).

Conservation: González-Oliva et al. (2015) and González-Torres et al. (2016) considered *Coccothrinax acunana* to be Vulnerable with fewer than 1000 mature individuals in less than 20 km^2 and in fewer than five localities. This species is not cultivated.

Acknowledgments

We are grateful to the santiagueros Rosa María Brooks Laverdeza and Nicasio Viña Dávila and to Arturo Salmerón López of the Eastern Center of Ecosystems and Biodiversity (BIOECO) for information about the Cueva del Aura.

Literature Cited

Acevedo-Rodríguez, P. and M.T. Strong. 2012. Catalogue of Seed Plants of the West Indies. Smithsonian Contributions to Botany 98. Washington D.C.

Borhidi, A. 1996. Phytogeography and Vegetation Ecology of Cuba. Akademiai Kiado, Budapest.

Glassman, F. 1972. A Revision of B. E. Dahlgren's Index of American palms. Phanerogamarum Monographiæ, Tomus VI. Cramer, Lehre, Germany.

González-Torres, L.R., A. Palmarola, L. González Oliva, E.R. Bécquer, E. Testé and D. Barrios. 2016. Lista Roja de la Flora de Cuba. Bissea 10 (número especial 1): 1–352.

González-Oliva, L., L.R. González Torres, A. Palmarola, D. Barrios and E. Testé. (Eds.) 2015. Categorización de taxones de la Flora de Cuba – 2015. Bissea 9 (número especial 4): 3–707.

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

Govaerts, R., J. Dransfield, S. Zona, D.R. Hodel and A. Henderson. 2011. World Checklist of Arecaceae. Royal Botanic Gardens, Kew. Online: http://apps.kew.org/wcsp/. Accessed 27 July 2017.

Henderson, A., G. Galeano and R. Bernal. 1995. Field Guide to the Palms of the Americas. Princeton University Press. Princeton, New Jersey.

Jestrow, B., B. Peguero, F. Jiménez, R. Verdecia, L. González-Oliva, C.E. Moya, W. Cinea, M.P. Griffith, A.W. Meerow, M. Maunder and J. Francisco-Ortega. 2017. A conservation framework for the critically endangered endemic species of the Caribbean palm *Coccothrinax*. Oryx. https://doi.org/10.1017/S0030605317000588

León, Hno. 1931. Contribución al estudio de las palmas de Cuba. Revista de la Sociedad de Cuba 4(2): 1–29.

León, Hno. 1936. Contribución al estudio de las palmas de Cuba. II. Género *Copernicia*. Memorias de la Sociedad Cubana de Historia Natural Felipe Poey 10: 203–226, Pl. 9–12.

León, Hno. 1939a. Contribución al estudio de las palmas de Cuba. III. Género *Coccothrinax*. Memorias de la Sociedad Cubana de Historia Natural Felipe Poey 13: 107–132, Pl. 10–15.

León, Hno. 1939b. Contribución al estudio de las palmas de Cuba. III. Género *Coccothrinax*. Memorias de la Sociedad Cubana de Historia Natural Felipe Poey 13: 133–156, Pl. 16–22.

León, Hno. 1941. Contribución al estudio de las palmas de Cuba. III. Novedadas en el género *Hemithrinax*. Memorias de la Sociedad Cubana de Historia Natural Felipe Poey 15: 379–383.

León, Hno. 1943. Contribución al estudio de las palmas de Cuba. VI. Nouveautes dans les palmiers royaux de Cuba. Memorias de la Sociedad Cubana de Historia Natural Felipe Poey 17: 1–14, Pl. 1–3.

León, Hno. 1944. Contribución al estudio de las palmas de Cuba. VII. Género *Calyptrogyne* en Cuba. Contribuciones Ocasionales del Museo Historia Natural del Colegio de La Salle 3:1–2.

León, Hno. 1946. Flora de Cuba 1. Gimnospermas. Monocotiledóneas. Contribuciones Ocasionales del Museo Historia Natural del Colegio de La Salle 8: 1–441.

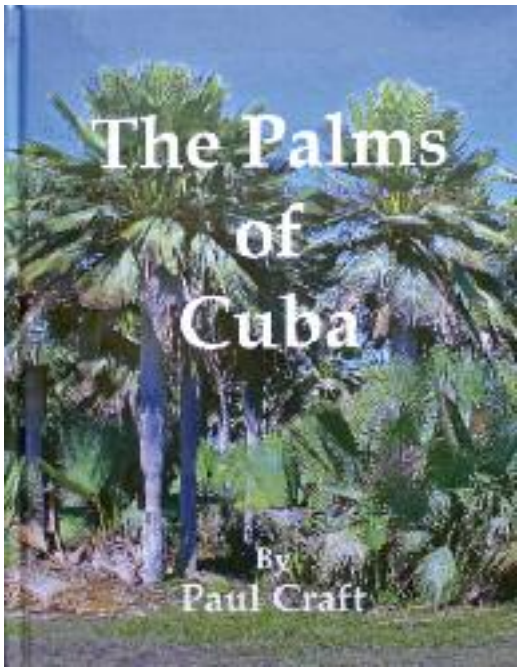
Moya, C.E. and A. Leiva. 2000. Checklist of the palms of Cuba, with notes on their ecology, distribution and conservation. Palms 44: 69–84.

Muñiz, O. and A. Borhidi. 1982. Catálogo de las palmas de Cuba. Acta Botanica Academiae Scientiarum Hungaricae 28: 309–345.

Seifriz, W. 1943. The plant life of Cuba. Ecological Monographs 13: 375–426.

PALM LITERATURE

THE PALMS OF CUBA – P. Craft. Palm Nut Pages, Inc., Sebastian, Florida, USA (www.palmnutpages.com). 2018. ISBN 978-0-692-97732-3. Price: $39.95 (Hardback). 232 pages.



There is nothing quite so pleasurable as opening a new palm book and finding, intermixed among the old, familiar species, exciting, new palms that immediately make me want to know more about them. That is just the thrill I had when I first opened Palm Craft's new book, *The Palms of Cuba*. Paul Craft has many decades' experience looking for, propagating and growing Cuban palms, and he had been talking about putting his experience and knowledge into book form for many years. Luckily for us, he has produced a book that is worth the wait, something that everyone with an interest in Cuban palms will want to have.

The book begins with chapters on the geography of Cuba and palm habitats. Cuba is a geological mosaic of land masses, bedrock types, land forms and soils, and Craft gives careful attention to soil types, elevation and moisture as he discusses the distribution of habitats, name-dropping palms along the way. His chapter on conservation discusses the status and threats to Cuban palms, of which nearly half are in peril. A chapter on the history of palm botany in Cuba introduces the botanists, then and now, who have made or are making contributions to our understanding of the island's palm flora. I found the chapter on palm uses to be especially interesting. We often think of the use of palms (other than as agronomic crops and horticultural subjects) as something out of a bygone era, something seen in anthropology museums or mentioned in the travelogues of long-dead explorers. Craft shows us that palms are used in the daily lives of contemporary Cubans, in both traditional and innovative ways.

Craft's knowledge of his subject really shines in the next two chapters, the cultivation of Cuban palms and the treatment of genera and species. The former draws on his many years as a nurseryman and landscape professional and is replete with lists of Cuban palms suitable for various garden situations, be they shade, high pH soils, poorly drained sites, etc. He gives guidance on cold hardiness and tips on incorporating Cuban palms into landscape designs. The meat of the book, however, is devoted to the treatments of each species. Craft outlines the classification and gives a key to the genera (but, alas, no keys to species) before delving into the species accounts. These accounts include vivid photographs, taxonomic synonyms, distribution maps, full descriptions, common names and notes on similar species. The full-color photographs alone are worth the price of admission: here in one place are authoritatively identified photographs, usually taken in habitat, often with close-ups of diagnostic or important characters. For the two largest (and most difficult to identify) genera, *Coccothrinax* and *Copernicia*, these photos are gold. I was especially happy to see close-ups of the fibrous leaf sheaths of *Coccothrinax*, which are so useful in distinguishing the species but which are often frustratingly obscure in a standard, palm-in-habitat portrait.

Paul Craft has every reason to be proud of this beautiful book. While no book can ever hope to be the last word on a subject – taxonomic changes and new data are almost guaranteed – we have in this book a tour de force account of an intriguing palm flora that is not well known outside of Cuba. The book is nicely produced, attractively laid out and easy to read. I enthusiastically recommend this book for anyone interested in the palms of Cuba.

SCOTT ZONA
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Charles Wright and the Cuban Palms. 2. The Genus *Calyptronoma*

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A review of the nomenclature of the Cuban species of *Calyptronoma* revealed two names, both based on Charles Wright collections and now synonyms of *Calyptronoma plumeriana*, whose authors have been incorrectly cited in the literature. Moreover, additional duplicate types for several Cuban taxa have been located.

The genus *Calyptronoma* was described by Grisebach (1864). It is one of three palm genera endemic to the Caribbean islands, but unlike the other two (*Hemithrinax* of Cuba and *Zombia* of Hispaniola), it has a wide distribution across all four islands of the Greater Antilles. *Calyptronoma* comprises three species: *Calyptronoma occidentalis* (Sw.) H.E. Moore from Jamaica, *Calyptronoma plumeriana* (Mart.) Lourteig (Fig. 1) from Cuba and Hispaniola and *Calyptronoma rivalis* (O.F. Cook) L.H. Bailey from Hispaniola and Puerto Rico. The last revision of *Calyptronoma* was made by Zona (1995).

The first reference to a species from Cuba now placed in *Calyptronoma* was by Grisebach (1862), who proposed the name *Geonoma* (*Calyptronoma*) *swartzii*. More species were added to the Cuban flora when Grisebach (1866) published *Geonoma dulcis* C. Wright and, nearly 80 years later, when León (1944) described *Calyptrogyne intermedia*, *Calyptrogyne microcarpa* and *Calyptrogyne clementis*. Muñiz and Borhidi (1982) added *Calyptronoma clementis* subsp. *orientensis*, which is the most recently described Cuban taxon. Of these six taxa, *G. swartzii* was shown by Moore (1963) to be a superfluous name for *Calyptronoma*

1. *Calyptronoma plumeriana* in Mogote Mi Retiro, Topes de Collantes, Sancti Spíritus province. Photo by Duanny Suárez.

occidentalis of Jamaica and was misapplied to Cuban palms. The remaining five taxa are presently treated as synonyms of *Calyptronoma plumeriana* (Zona 1995). Two of these names, *G. dulcis* and *C. intermedia*, are based on Wright's collections.

The purpose of this paper is to review and update the nomenclature of the Cuban taxa based on Wright's collections and to identify type specimens and the herbaria in which they are housed.

Materials and Methods

A review was made of the protologues of the names used by the different authors, as were the different descriptions available in the main treatments. Particular attention was paid to matters of nomenclature and the designation and disposition of type specimens.

We report a total of 300 specimens of *Calyptronoma plumeriana* for Cuba, of which we have revised 265 specimens of the following herbaria: A, AJBC, BH, BRU, CM, F, FI, FTG, G, GH, GOET, HAC, HAJB, HMC, K, M, MO, NO, NY, P, S, US, VT and YU (acronyms follow Thiers 2016). Another 35 were given by Beccari (1912), León (1944) and Wessels Boer (1968) and by the lists of herbaria CM and US. A total of 85 numbers (including 41 type specimens) of 28 primary collectors was reviewed. Special attention was paid to the study of Wright's duplicate specimens in 16 of these herbaria: A, BRU, F, FI, G, GH, GOET, HAC, K, MO, NY, P, S, US and YU, as well as clarification of the location of 10 type specimens. All the available specimens of this genus collected by Wright in Cuba were reviewed.

Results and Discussion

Geonoma (*Calyptronoma*) *dulcis* C.Wright ex Griseb.

Grisebach (1866) described *Geonoma dulcis* based on the specimen "*Wr. a. 1865*," meaning a specimen collected by Wright in the year 1865. He wrote that it was collected in western Cuba, Hanabana, without indicating the herbarium. As pointed out by León (1944), this designation was mistakenly interpreted by Bailey (1938) as "Province of Habana, western Cuba, *Wright no. 1865*." Wright handwrote "Hanabana June 10" on GOET9325, and Wendland handwrote "Cuba. Hanabana 10.6.65" on GOET9326, GOET9327 and GOET9328. Thus, the exact collection date was 10 June 1865. León (1944) visited the type locality, Hanabana, which is located on the margins of the canal of the same name in the north of the marsh of Zapata, and which belongs to the municipality Calimete of the Matanzas province.

Wendland in Kerchove (1878) transferred *Geonoma dulcis* to *Calyptronoma*, citing it as "*Calyptronoma dulcis* C.Wright." It is nowadays correctly cited as *Calyptronoma dulcis* (C. Wright ex Griseb.) H.Wendl. Bailey (1938) was apparently unaware of the Kerchove (1878) action when he superfluously transferred the name to *Calyptronoma*. Gómez de la Maza (1889) transferred it to *Calyptrogyne*.

Grisebach did not indicate herbarium or sheet as a type of *Geonoma dulcis*, we designate the lectotype the specimen (GOET9325), with a label handwritten by Wright himself and an annotation handwritten by Grisebach on the original label, "*Geonoma* (*Calyptronoma*) *dulcis* Wr." (Fig. 2).

Calyptrogyne intermedia (B.S.Williams) G.Maza

Geonoma intermedia Griseb. & H.Wendl. was first published in Sauvalle (1873), but this binomial lacks any description and must be regarded as a *nomen nudum*. *Calyptronoma intermedia* Wendl. was published in Kerchove (1878), again without a description, and this, as we saw above with *C. dulcis*, was intended by Wendland to be a nomenclatural transfer of *Geonoma intermedia* to *Calyptronoma*. The transfer, however, was not validly published as *G. intermedia* was still lacking a description. A description was finally provided for *G. intermedia* by Williams, a London nurseryman, in his "New and General Plant Catalogue" of 1882. The description is vague ("Leaves pinnate, light green, leaf stalks reddish brown; nerves of leaves very prominent"), but it is sufficient to validate the name and establish Williams as the author. No illustration or type specimen was designated (something required in modern species descriptions). The proper citation for the name is thus *G. intermedia* B.S.Williams.

Calyptrogyne intermedia was published by Gómez de la Maza (1893), who mistakenly based his new combination on *G. intermedia* Griseb. & H.Wendl., a *nomen nudum*, rather on *G. intermedia* B.S. Williams. For new combinations made before 1953, errors in the citation of the basionym or in the author citation do not invalidate the new combinations (Art. 41.3 in Turland et al. 2017). *Calyptrogyne intermedia* (B.S.Williams) M. Gómez is the correct citation for this taxon when treated as a species of *Calyptrogyne*. León (1944) and Bailey (1938) believed that Gómez de la Maza (1893) based *Calyptrogyne intermedia* on a *nomen nudum* and was itself a *nomen nudum*, but the validation of *G. intermedia* by Williams rendered their argument moot. León

2. The type specimen of *Calyptronoma dulcis* (C. Wright) H. Wendl. (GOET009325). © copyright of the Göttingen University Herbarium (GOET).

3. *Wright 3972* (barcode GH00028372) with León's handwritten annotation selected as the type of *Calyptrogyne intermedia*. © copyright of the Gray Herbarium (GH) of the Harvard University Herbaria.

(1944), however, provided the first complete description of the species and compared it with congeners. He also designated a type for *Calyptrogyne intermedia* (see below).

The transfer of *Geonoma intermedia* to *Calyptronoma* has never been validly published. *Calyptronoma intermedia* H. Wend. in Kerchove (1878) is, as we have shown, an illegitimate name, despite being widely used in the literature (Hawkes 1949 [as "nomen"], Muñiz & Borhidi 1982, Zona 1995, Henderson et al. 1995, Moya & Leiva 2000, Govaerts & Dransfield 2005, Govaerts et al. 2018). As the taxon is a synonym of *C. plumeriana*, there is no need for the transfer.

Wright's collection *3972* was associated with *Geonoma intermedia* (*nomen nudum*) by Sauvalle (1861) and with *Calyptrogyne intermedia* by Gómez de la Maza (1893); although, neither author explicitly designated the collection as a type. León (1944) was the first to name *Wright 3972* as a type, and his designation must be taken as a neotype considering Williams did not cite a specimen in his protologue. *Wright 3972* was collected first as *Euterpe* sp. and later labeled *G. intermedia* when specimens were mounted and placed in herbaria. The specimen in the Gray Herbarium, GH28372, has an annotation handwritten by León in April 1945 saying, "type *Calyptrogyne intermedia* (Griseb. & Wendl.) G. Maza" (Fig. 3). Wessels Boer (1968), believing Wendland to be the author of the taxon, erroneously designated as holotype the specimen deposited in GOET, which has not been found; Zona (1995) followed Wessels Boer's decision.

The type locality was La Sabanilla, near Sierra del Rangel, Province of Pinar del Río. León (1944) wrote that the additional locality, the "Banks of the river Taco Taco," was given in Wright's handwritten note accompanying the type from the Gray Herbarium. The river Taco Taco currently belongs to the municipality San Cristóbal of the Artemisa province. It has not been possible to determine the exact date of Wright's collection.

An Additional Wright Specimen from Cuba

Although not a type specimen for any taxon, *Wright 1466* is widely distributed in herbaria around the world. The collection has been identified as *Calyptronoma clementis* (León 1944), a name now placed in synonymy of *C. plumeriana*. The disposition of this specimen is as follows: *Wright 1466* (BRU55596 [photo!], F78912 [photo!], F78913 [photo!], FI!, G25019 [photo!], G192023 [photo!], G428464 [n.v.], GH28209!, GH28210!, GOET19973!, GOET 19974!, GOET19974-a!, GOET19974-b!, HAC-LS4216! ex GH, MO2204537!, NY1663119 [photo!], P725499 [photo!], P725500 [photo!], YU34585 [photo!]).

Taxonomic treatment of *Calyptronoma plumeriana* in Cuba

Calyptronoma plumeriana (Mart.) Lourteig, Phytologia 65: 484. 1989. *Geonoma plumeriana* Mart. in Voy. Amér. Mér. 7: 34. 1843. *Calyptrogyne plumeriana* (Mart.) Roncal, Palms 49: 149. 2005. Type: Type: Plumier's Catal. Gen. Tab. 1, habit excl. details and MSS 7, icones 7, 8, 9 & 10.

Calyptronoma dulcis (C.Wright ex Griseb.) H.Wendl. in Kerchove, Palmiers: 238. 1878. *Geonoma dulcis* C.Wright ex Griseb., Cat. Pl. Cub.: 222. 1866. *Calyptrogyne dulcis* (C.Wright ex Griseb.) M. Gómez, Dicc. Bot. Nombres Vulg. Cub. Puerto-Riqu.: 72. 1889. Type: CUBA. [Provincia Matanzas, municipio Calimete], Hanabana, fl., 10 Jun. 1865, *Wright s.n.*, (lectotype [here designated], GOET 009325!; isolectotypes, GH 28368!, GH 28369!, GOET 9326!, GOET 9327!, GOET 9328!; F 78949 [photo!], HAC-HABA!, K 526415 [photo!], K 526416 [photo!]).

Geonoma intermedia B.S.Williams, Cat. 1882: 27. 1882. *Calyptrogyne intermedia* (B.S.Williams) M. Gómez, Noc. Bot. Syst. 50. 1893. Type: CUBA. [Provincia Artemisa, municipio San Cristóbal], Pinar del Rio, Banks of Taco Taco river, [s.d.], *Wright 3972* (neotype [designated by León 1944], GH 00028372 [photo!]; isoneotypes, A56321!, BRU56868 [photo!], BRU56869 [photo!], F 78943 [photo!], F 78944 [photo!], GH!, GH28371 [photo!], GOET [not located], NY7094!, NY7095!, NY7096!, NY7097!, NY7098!, US65135 [photo!], P 725498 [photo!], US 75616!, US 75617!).

Calyptronoma microcarpa (León) A.D.Hawkes, Phytologia 3: 145. 1949. *Calyptrogyne microcarpa* León, Contr. Ocas. Mus. Hist. Nat. Colegio ''De Le Salle'' 3: 10. 1944. Type. CUBA. [Provincia Sancti Spiritus, municipio Trinidad], Topes de Collantes, Trinidad Mountains, elevation 800 m, Dec.1938, *León 18574, collected by R. Garteiz* (lectotype [designated by Zona 1995], HAC-SV 4209!, HAC-SV!, isolectotypes, GH 28207!, HAC-EEAB!, NY 7092 [photo!], US 87758 [photo!]).

Calyptronoma clementis (León) A.D.Hawkes, Phytologia 3: 145. 1949. *Calyptrogyne clementis* León, Contr. Ocas. Mus. Hist. Nat. Colegio ''De Le Salle'' 3: 11. 1944. Type: CUBA. [Provincia Santiago de Cuba, municipio Santiago de Cuba], Loma de

San Juan de Buena Vista, S. of Hongolosongo, Sierra Maestra, elevation 900 m, Nov. 1940, *León 17964, collected by Clement* (lectotype [designated by Zona 1995], HAC-SV4169!; isolectotypes, GH 28206!, HAC-SV4167!, NY 7091 [photo!], US 87759 [photo!]).

Calyptronoma clementis subsp. *orientensis* O.Muñiz & Borhidi, Acta Bot. Acad. Sci. Hung. 28: 342. 1982. Type. CUBA. [Provincia Holguín, municipio Moa], Monte Centeno, Moa, 12 Nov. 1945, *Acuña 13019* (holotype, HAC-EEAB!).

Acknowledgments

We are grateful to Dr. John Dransfield and anonymous reviewers, who critically examined the manuscript. We are grateful to Walter Kittredge of A and GH, Bonnie L. Isaac of CM, Fred Stauffer and Laurence Loze of G, Marc Appelhans of GOET, James Solomon of MO, Marc Jeanson of P, Meghann S. Tonner and Ingrid Lin of US and Patrick Sweeney at YU for making specimens and/or photos available for study. John Dransfield was instrumental in providing literature from the Library at Kew. Special thanks go to Bertha L. Toscano Silva for her great help during the review of the collection in HAC.

Literature Cited

Bailey, L.H. 1938. Certain palms of the Greater Antilles I. 7. *Calyptrogyne–Calyptronoma*. Gentes Herbarum 4: 152–172.

Beccari, O. 1912. The palms indigenous to Cuba II. Pomona College Journal of Economic Botany 2: 351–377.

Gómez De La Maza, M. 1889. Diccionario Botánico de los Nombres Vulgares Cubanos y Puerto-Riqueños. Habana.

Gómez De La Maza, M. 1893. Nociones de Botánica Sistemática. A. Alvarez y Co., Havana.

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

Govaerts, R., J. Dransfield, S. Zona, D.R. Hodel and A. Henderson. 2018. World Checklist of Arecaceae. Facilitated by the Royal Botanic Gardens, Kew. Published on the Internet http://apps.kew.org/wcsp/ Retrieved 2018-01-05.

Grisebach, A. 1864. Flora of the British West Indian Islands. L. Reeve & Co. London.

Grisebach, A. 1866. Catalogus Plantarum Cubensium. Wilhelm Englemann, Leipzig.

Grisebach, A. 1862. Plantae Wrightianae e Cuba Orientali, pars II (Monopetalae et Monocotyledones). Memoirs of the American Academy of Arts and Sciences, n.s. 8(2): 503–536.

Hawkes, A.D. 1949. Studies in Antillean botany. I. A checklist of the palms of Cuba. Phytologia 3: 145–149.

Henderson, A., G. Galeano and R. Bernal. 1995. Field Guide to the Palms of the Americas. Princeton Univ. Press, Princeton, New Jersey.

Kerchove de Denterghem, O. 1878. Les Palmiers. J. Rothschild, Paris.

León, Hno. 1944. Contributions to the study of the Cuban palms. VII. The genus *Calyptrogyne* in Cuba. Contribuciones Ocasionales del Museo Historia Natural del Colegio de La Salle 3: 1–12.

Moore, H.E., Jr. 1963. The types and lectotypes of some palm genera. Gentes Herbarum 9: 245–274.

Moya, C.E. and A. Leiva. 2000. Checklist of the palms of Cuba, with notes on their ecology, distribution and conservation. Palms 44: 69–84.

Muñiz, O. and A. Borhidi. 1982. Catálogo de las palmas de Cuba. Acta Botanica Academiae Scientiarum Hungaricae 28: 309–345.

Sauvalle, F.A. 1871. Revisio Catalogi Grisebachiana vel Index Plantarum Cubensium. Anales de la Academia de Ciencias Médicas Físicas y Naturales de La Habana 7: 562–563.

Sauvalle, F.A. 1873. Flora Cubana (Sauvalle). Havana.

Thiers, B. 2016. Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. http://sweetgum.nybg.org/science/ih/. Accessed 1 December 2016.

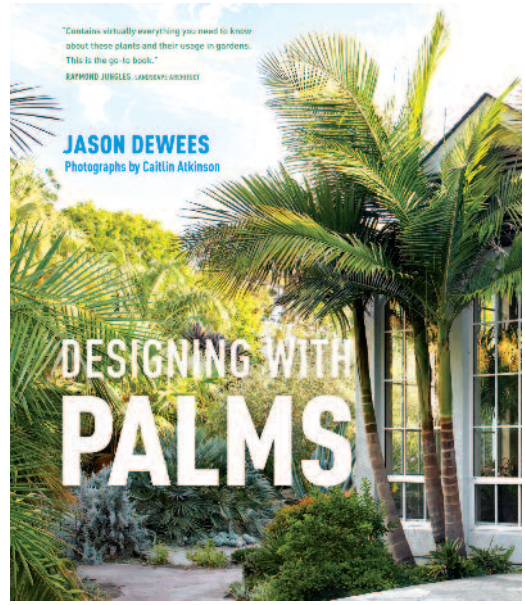
Turland, N.J., J.H. Wiersema, F.R. Barrie, W. Greuter, D.L. Hawksworth, P.S. Herendeen, S. Knapp, W.-H. Kusber, D.-Z. Li, K. Marhold, T.W. May, J. McNeill, A.M. Monro, J. Prado, M.J. Price and G.F. Smith (eds). 2017. International Code of Nomenclature for algae, fungi and plants (Shenzhen Code) adopted by the Nineteenth International Botanical Congress Shenzen, China, July 2017. DOI https://doi.org/10.12705/Code.2018

Wessels Boer, J.G. 1968. The Geonomoid palms. Verhandelingen der Koninklijke Nederlandsche Akademie van Wetenschappen, Afdeeling Natuurkunde, Tweede Reeks 58: 1–202.

Zona, S. 1995. A revision of *Calyptronoma* (Arecaceae). Principes 39: 140–151.

PALM LITERATURE

DESIGNING WITH PALMS – Jason Dewees with photographs by Caitlin Atkinson. Timber Press, Portland, Oregon, USA. 2018. ISBN-10: 1604695439, ISBN-13: 9781604695434. Price: $50.00 (Hardback) 328 pages, 285 color images.



The release of a new book on palms is always good news; today, with "Designing with Palms" by Jason Dewees, the news is even better because this new volume is a beautiful book that should quickly become the reference guide for all those who love and plant palms.

Author Jason Dewees, a prominent member of the IPS, is currently the horticulturist at Flora Grubb Gardens and East West Trees. A contributing editor to Garden Design magazine, he serves on the Horticultural Advisory Committee for the San Francisco Botanical Garden and the Advisory Council of San Francisco's Conservatory of Flowers. His skills and long experience with landscape palms shine forth in this book.

Flora Grubb, owner of Flora Grubb Gardens, tells us how Jason has communicated to the whole team his passion for palm trees and argues that the palm tree is able to transform a space, create an atmosphere and solve a long list of design problems that few other plants can solve.

In the preface, Jason Dewees flirts with poetry: "For most people, the palm hides in plain view. So charismatic, instantly recognizable, they get lost in the glare of their own beauty. Most of us first fall for palms when the shush of waves on the sand mixes with the overhead rustle of their fronds. Relaxed, half-naked, our skin warmed by the sun, we are, for that moment of bliss, in paradise."

Then in his introduction Jason states his goal: "It's time to look clearly at palms, observe their qualities, habits and needs, and-to-bring their many beautiful and useful forms to gardens beyond the tropics. This book aims to release the palm from the prison of iconography so that it can take a natural place in the garden and enrich the other plants in the plant kingdom."

The tone is set, and we can only agree, the author is really in charge of the situation, and we know now that he will take us on a wonderful journey to discover this exceptional plant family that can bring beauty and magnificence to our gardens.

The chapter devoted to the fascinating family of palms begins with the multitude of their origins. They are mainly found in tropical and equatorial regions, but few know that some grow at more than 3000 m of altitude in the Andes Cordillera or in the foothills of the Himalayas. This means that some species are quite able to adapt in temperate regions and withstand negative temperatures. Very many palms come from hot and humid climates, but others are native to much drier, even arid and desert areas.

There are palm trees of all sizes, the smaller ones usually grow in forest undergrowth and the largest ones need full sunlight. Their range of shapes or colors can cover the most diverse or sophisticated requirements in terms of landscape design.

The physical characteristics are presented with morphological description, solitary or multiple stems, pinnate leaves, bipinnate, palmate, costapalmate, even entire. A particularly important point for species identification deals with the insertion of the base of the leaves on the stem, and root systems, flowering, fructifications and propagation are not forgotten. Much good advice is given on planting, fertilization, pruning and watering.

In the chapter "Palm Sensations and Services," Dewees recalls how important the symbolism

of palms is and he tells us about the sensory effects and functional roles produced by palms in successful landscape compositions. He gives us a kit of ideas to inspire our future development based on the sumptuous photographs of Caitlin Atkinson. These highlight great achievements or other specific cases of the use of palm trees such as paths, trails, curbs, sentinels, fixing points, canopy, air volume, building scale, balance, colors, etc.

Another section tells us about the moods and styles that palm trees can generate and stories they tell us through examples such as Persian paradise, Spanish or Asian colonial styles, rainforest or cloud, jungle, etc. Then Jason offers a tour of some remarkable gardens, mostly private, designed by amateur gardeners, landscape architects, horticulturists, botanical curators, landscape designers, collectors and professional gardeners. All have in common to have achieved perfectly accomplished landscape compositions through the judicious use of palm trees and which deserve to inspire us for our future development. It is still the images of Caitlin Atkinson that make us dream in front of these wonderful landscapes combining palm trees and other plants of all sizes, shapes or colors.

The last part of the book is a practical guide describing 117 palm species that can be used in most areas. The author describes for each species its appearance, culture, its tolerance to variation in soil, temperatures, humidity or wind, its use and aesthetic effect. Replacement species are offered depending on their availability. Everyone can find the right palm because there are some for all situations, climates or special requirements.

In conclusion, after presenting the large family of palms, Jason Dewees develops a large inventory of perfectly successful landscape compositions where the palm is king, and he gives the reader a gallery of the most important species with their range of available options. To support his point, he draws on Atkinson's superb photographs that give the book a fabulous cachet.

We now have an essential guide that is full of accurate, practical and useful information for landscaping of our palm gardens. This is the reference book that many have been waiting ages for, and I am convinced that Jason Dewees will transmit the palm-loving bug to readers not yet infected by this beautiful and noble passion.

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Hyphaene thebaica (Doum Palm) in First World War Medicine

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The Doum palm, *Hyphaene thebaica* (L.) Mart., has long been used for local medicinal applications, and phytochemical analyses have provided supporting evidence of therapeutic effectiveness. During the First World War, a novel medicinal use was employed for the powdered fruits of this palm, forming an extension of biocultural knowledge within former French colonies in west Africa, from where it was derived.

Palms have historically been the source of materials used in warfare across the world – from hand-to-hand weapons and shields in South America (Rival 1996, Beckerman & Yost 2007) and bows in the Philippines (Montague 1921) to the world's first military pontoon bridges made from palm wood planks (Gabriel & Metz 1992).

The First World War severed economic links with pre-war sources of materials, triggering a need for substitutes and novel solutions to wartime challenges, both military and social. This led to significant innovation, especially with regard to botanical products (Wearn 2016). Research on plants affected during the course of, or utilized for, military activity (= polemobotany, see Wearn 2016) has led to the discovery of a previously unreported wartime application of the powdered fruits of the Doum palm (*Hyphaene thebaica*), which is evidenced through correspondence and materials held within the Archives and Economic Botany Collection at the Royal Botanic Gardens, Kew.

Hyphaene thebaica is native to tropical Africa, from Senegal in the west through Niger to Egypt in the east, and distinctive in its frequent habit of the trunk branching one or more times (Fig. 1). Parts of the plant have a range of traditional uses in Africa. The leaves were made into hats and mats in Nigeria (Holland 1922) and were crafted into basketry and matting by ancient Egyptians (El Hadidi & Hamdy 2011), while the plant's roots are used in the treatment of bilharziasis and its resin employed as a diuretic and diaphoretic (Boulos 1983). The fruit (Fig. 2) is a source of strong

1. *Hyphaene thebaica* palm growing in Benin, west Africa. Photo by Marco Schmidt, CC-BY.

antioxidants, and a hot water extract infusion (Fig. 3) is commonly consumed as a health tonic. The mesocarp is eaten, especially in Egypt, and is acknowledged as a famine food (Hsu et al. 2006, Seleem 2015).

Wartime endeavors

During the early stages of the First World War, French entrepreneur Madame Jeanne Perchat (Fig. 4) turned her attention to potential

2. Fruits of *Hyphaene thebaica.* Photo by William J. Baker.

3. Powdered fruit mesocarp of *Hyphaene thebaica*, used for creating an infusion in hot water. Photo by Aleksasfi, CC-BY.

applications of palm-derived products to aid the war effort. This was familiar territory for Mme. Perchat, who had already been credited with the first production in Africa (within the French colony of Upper Senegal and Niger in French West Africa) of *aggloméré d'ivoire végétal*, an agglomerate made from palm endosperm, otherwise known as "vegetable ivory" (Librairie illustrée 1914). The first vegetable ivory had begun to be mass-produced around the 1860s, the early product being derived from powdering and processing ripe endosperm of South American *Phytelephas* (ivory-nut palms) imported to Europe (Barfod et al. 1990). Vegetable ivory was so-named because of its similar appearance to elephant ivory and could be produced from several Borassoid and Phytelephantoid palms, including *Hyphaene*, *Borassus* and *Phytelephas* (Holland 1922). Vegetable ivory was used as an alternative to elephant ivory or wood for the manufacture of small decorative objects, buttons, marquetry and building decorations. Indeed, it was reported that a large number of U.S. military buttons produced during the Second World War were made from it (Acosta-Solís 1948). Recently, a resurgence in interest in this alternative botanical product has followed increasing pressure to conserve elephant and rhinoceros populations (e.g., Chu et al. 2015).

On 26 August 1915, a letter was received by Sir David Prain, Director of the Royal Botanic Gardens, Kew, which outlined a novel use of the powdered fruit of the Doum palm, enclosing a sample packaged under the title *Poudre d'Amande d'Afrique* ("Kernel Powder of Africa," Kew EBC Cat. Nos. 35678 and 35699; Fig. 5). Madame Perchat had contacted RBG Kew recognizing that this organization occupied a unique position in Britain – with the greatest botanical expertise and direct connection to the British Government and, through it, the British Empire and its army. In relation to the powder, Perchat outlined the uses that had been found for its application to sores and wounds, stating that she had received "many letters of thanks from our soldiers." As such, she was now offering to render services to the British Army by highlighting and sharing this discovery.

Madame Perchat enclosed a printed sheet reporting the documented applications analyzed by the *Jardin Colonial* (Colonial Gardens) in Paris. The sheet summarized the following uses (translated from French):

1. Against cold feet, put plenty of the powder on the sock.

2. For burning wounds sprinkle them and especially never wet the powder.

3. For toothaches, put the powder on the unwell part.

4. To clean teeth it replaces all toothpaste.

Cases of *le froid aux pieds* (cold or frostbitten feet) and *pied de tranchée* (trench foot) became abundant among soldiers during the winter of

1914/15. During that winter, 20,000 British soldiers were treated for trench foot, and due to the magnitude of cases, the soldiers were instructed to dry their feet and then grease them with whale oil as a protective barrier against the damp (Greene 1945). John Henry Holland, Assistant to the Keeper of Museums at Kew, immediately informed Sir David of the new arrival, retaining a small sample of the powder along with its packaging within the museum and passing the greater part of the sample to his director. Sir David clearly saw some potential in the product because he, in turn, wrote to Lieutenant General Sir Arnold Keogh, Director General of the British Army Medical Services. Although Keogh's reply was swift, he was dismissive of the powder's utility and required "surgical evidence."

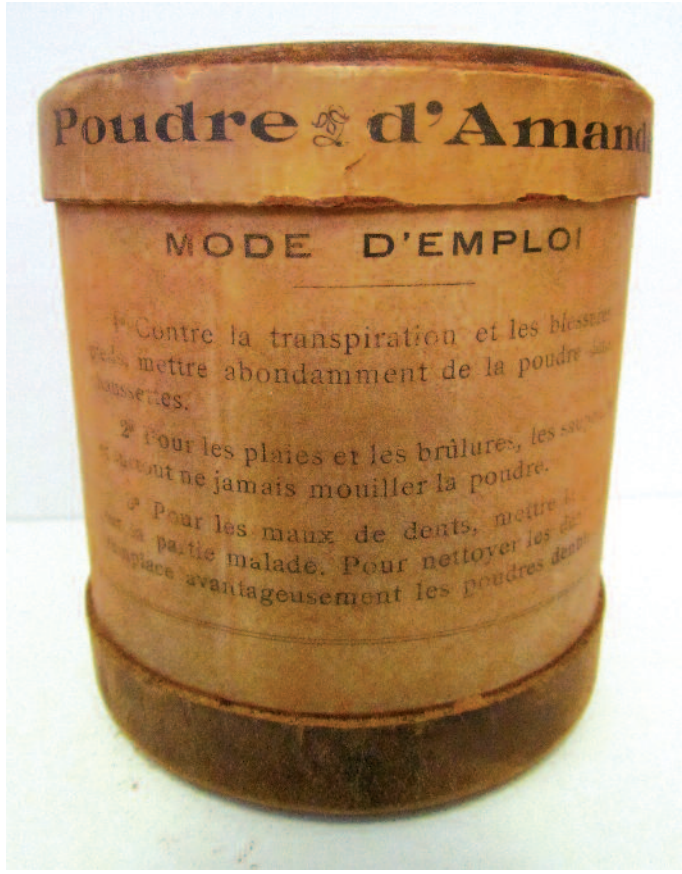
From letters sent by Mme. Perchat to Kew during August and September 1915, it is clear that she had begun distributing her palm product to soldiers in the French Army before January 1915. As testimonial to the perceived efficacy of the powder, she included transcripts of 13 letters, penned by soldiers in several different regiments between 5 January and 1 September 1915. These included Victor Lucombe of 4e Compagnie, 3e Regiment de Ligne, 15e Corps, who was on the frontline (his unit was in the environs of Avocourt and Malancourt, near Verdun, having recently faced strong German opposition) and so was subjected to the cold and wet weather. He wrote on 1 April to say that "*The powder against cold feet* [frostbite] *which you had sent to me through my sister is of an indisputable effectiveness; I send you my thanks as testimony*." The official regimental history provides further evidence stating that during the winter of 1914/15 there were "*numerous evacuations due to cold and frozen feet*" (Rabanit 1920). Louis Josse from 62e Compagnie d'Instruction, 1er régiment de Zouaves, Saint Denis (French-African light infantry training company, based close to Paris), who had heard about the powder, wrote to request a supply on 15 March. A month later he offered a favorable review of the powder, suggesting that "*it was of the utmost necessity to me,*" so much so that he had subsequently distributed it to his comrades to share its healing benefits. French colonial soldiers of Senegalese and Sudanese origin apparently found the powder particularly useful for their frozen feet. A similar powder produced from the fruits of *Borassus flabellifer* L. palms (called *Ronier* or *Rondier*) was also noted to have a similar effect, with a sample also sent to Kew in 1915 (EBC Cat. No. 35132).

4. Madame Perchat and her *Agglomeré d'Ivoire Vegetal* in Senegal, c. 1915. Photographer unknown.

These endorsements, whilst exceedingly positive, did not constitute scientific analyses or offer the empirical proof desired by figures such as Lieut. Gen. Keogh. However, encouraged by the powder's potential and unperturbed by Keogh's negativity, the ever-pioneering Arthur Hill, Assistant Director at Kew, began making enquiries to chemists in England. In May 1916, analytical chemist E.R. Bolton found the powder to contain "*a marked proportion of tannin, which…is a powerful astringent, and as such has styptic properties*" (letter in RBG Kew Archives, 5 May 1916), alluding to its anti-hemorrhagic potential through inducing the sealing of wounds. It was also noted that if it were to be used on raw wounds then sterilization of the product would be recommended, although no bacteriological analysis had been undertaken. Madame Perchat had recognized this in one of her letters to Sir David, explaining that native people in the French colonies attempted to heal wounds by applying soil to the affected area, only to find that often such a procedure aggravated the injury (likely through microbial infection). However, when Doum powder was applied, it did not have such negative side-effects, and so became used as an accepted alternative locally.

A modern perspective

Despite being well received by French soldiers and the lengthy correspondence during 1915–1916 among Madame Perchat, the French Colonial Garden in Paris, RBG Kew, analytical chemists and the British Army Medical Corps, the medicinal application of the powders was never actively promoted in



5. "Poudre d'Amande d'Afrique" container in the Economic Botany Collection at the Royal Botanic Gardens, Kew, EBC 35678. Photo by Director and Trustees of the Royal Botanic Gardens, Kew.

Britain. Post-war, an assessment of useful plants in Nigeria by Holland (1922) did briefly refer to the collection at RBG Kew, noting: "Powdered nuts have been recommended as a dressing for wounds (Perchat, Mus. Kew)," but little more documentary evidence exists for the period. More recent phytochemical analyses of the fruits have confirmed the tannin content highlighted historically by Dr. Bolton in 1916 and have provided further evidence of anti-inflammatory and anti-oxidant properties inherent in the fruit (Eltayeb et al. 2009, Farag & Pare 2013). Similarly, the pericarp extract of *Hyphaene thebaica* has been identified as exhibiting antimicrobial activity (Mohamed et al. 2010, Auwal et al. 2013, Putta & Kilari 2015). Indeed Auwal et al. (2013) concluded that "*H. thebaica* has some important phytochemicals that can be used as therapeutic agents." A review of African palm ethno-medicine recorded 37 medicinal use records for *Hyphaene thebaica*, including in the treatment of pain, inflammation and injuries (Gruca et al. 2015: 230). Laboratory trials of crude mesocarp extract have also provided evidence to validate its traditional use in anti-viral and anti-parasitic applications (Mohammed et al. 2012). Thus, the novel military medical application reported here, which was actively embarked on at least within parts of the French Army, was by no means an inconsistent extension of biocultural knowledge of local populations within the former French colonial countries of west Africa.

The example of the Doum palm cited here is a pertinent reminder that ascribed historical or traditional value and modern use are not entities that stand diametrically opposed and instead offer stimulus for further study.

Acknowledgments

We express our thanks to Dr. Mark Nesbitt for access to the RBG Kew Economic Botany Collection and comments on the manuscript, Lorna Cahill for access to RBG Kew Archive materials, Dr. Bill Baker for useful comments, and Marie-Hélène Weech and Charlotte Couch for aiding translations.

Literature Cited

Acosta-Solís, M. 1948. Tagua or vegetable ivory – a forest product of Ecuador. Economic Botany 2: 46–57.

Auwal, M.S., I.A. Mairiga, A. Shuaibu, A. Ibrahim, I.A. Gulani, B. Wampana, G.I. Lateefat, F.A. Lawan, K.A. Sanda, A.B. Thaluvwa, A.N. Njobdi and K.Z. Yagana. 2013. Preliminary phytochemical and *in vitro* antibacterial evaluation of the crude pericarp extract of *Hyphaene thebaica* (doumpalm). Journal of Medicinal Plant Therapeutic Research 1: 1–7.

Barfod, A.S., B. Bergmann and H.B. Pedersen. 1990. The vegetable ivory industry: surviving and doing well in Ecuador. Economic Botany 44: 293–300.

Beckerman, S. and J. Yost. 2007. Upper Amazonian warfare. Pp. 142–192, in Chacon, R.J. and R.G. Mendoza (eds.). Latin American Indigenous Warfare and Ritual Violence. Univ. of Arizona Press, Arizona.

Boulos, L. 1983. Medicinal Plants of North Africa. Reference Publications Inc., Algonac, Michigan.

Chu, Y., M.A. Meyers, B. Wang, W. Yang, J.-Y. Jung and C.F.M. Coimbra. 2015. A sustainable substitute for ivory: the Jarina seed from the Amazon. Nature Scientific Reports 5: 14387.

El Hadidi, N.M.N. and R. Hamdy. 2011. Basketry accessories: footwar, bags and fans in ancient Egypt. Journal of Archaeological Science 38: 1050–1061.

Eltayeb, E.M., A.A. Abdalla and M.S. Eltohami. 2009. Anti-inflammatory study and phytochemical analysis of *Hyphaene thebaica* (doum plant). Planta Medica 75: 1076.

Farag, M.A. and P.W. Pare. 2013. Phytochemical analysis and anti-inflammatory potential of *Hyphaene thebaica* L. fruit. Journal of Food Science 78: C1503–C1508.

Gabriel, R.A. and K.S. Metz. 1992. A short history of war: the evolution of warfare and weapons. Professional readings in military history, No.5. Carlisle: Strategic Studies Institute, U.S. Army War College.

Greene, R. 1945. The prophylaxis of trench foot. British Medical Journal 1(4390): 270–271.

Gruca, M., A. Blach-Overgaard and H. Balslev. 2015. African palm ethno-medicine. Journal of Ethnopharmacology 165: 227–237.

Holland, J.H. 1922. The Useful Plants of Nigeria, Part 4. Bulletin of Miscellaneous Information, Kew, Additional Series 9. His Majesty's stationery Office, London.

Hsu, B., I.M. Coupar and K. Ng. 2006. Antioxidant activity of hot water extract from the fruit of the doum palm, *Hyphaene thebaica*. Food Chemistry 98: 317–328.

Librairie illustrée. 1914. L'expédition Mawson par Gustave Regelsperger. Journal des Voyages – Adventures de Terre et de Mer. Deuxième série 921: 123–136.

Mohamed, A.A., A.A. Khalil and H.E.S. El-Beltagi. 2010. Antioxidant and antimicrobial properties of kaff maryam (*Anastatica hierochuntica*) and doum palm (*Hyphaene thebaica*). Grasas y Aceites 61: 67–75.

Mohammed, S.A., A. Shuaibu, F.A. Lawan, K.A. Sanda, A.B. Njobdi, A. Ibrahim, I.A. Gulani, B. Wampana, G.I. Lateefat and Y. Kibon. 2012. Effect of crude mesocarp extract of *Hyphaene thebaica* (doum palm) on white blood cells and differential leucocytic count in Wistar Albino Rats. Journal of Medical Science 12: 207–213.

Montague, L.A.D. 1921. Weapons and Implements of Savage Races (Australasia, Oceana, and Africa). The Bazaar, Exchange & Mart Office, London.

Putta, S. and K. Kilari. 2015. A review on fruit pericarp: a rich source of phytochemicals and pharmacological activities. International Journal of Pharmacognosy and Phytochemical Research 7: 960–966.

Rabanit, C. 1920. Historique du 3e Régiment d'Infanterie. Chapelot, Paris.

Rival, L. 1996. Blowpipes and spears: the social significance of Huaorani technological choices. Pp. 145–164, in Descola. P. and G. Palsson (eds.). Nature and Society: Anthropological Perspectives. Taylor & Francis, New York.

Wearn, J.A. 2016. Seeds of change – polemobotany in the study of war and culture. Journal of War & Culture Studies 9: 271–284.

New Finds in New Guinea *Hydriastele*

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Four newly described species of *Hydriastele* from New Guinea are illustrated in this photo feature.

With 39 species, *Hydriastele* is the largest of the arecoid palm genera endemic to the Indo-Pacific islands east of Wallace's Line. Twenty-five species are found in New Guinea, the largest tropical island in the world and the focus of ongoing palm research by an international team of taxonomists (Baker 2002). A monograph of *Hydriastele* in New Guinea has recently been completed (Petoe et al., in press), which includes nine species discovered and described as new to science during our research program (Baker et al. 2000, Baker & Heatubun 2012, Petoe et al. 2018, Heatubun et al. 2018), ranging from slender understory palms to massive canopy emergents.

Here, we profile four of the slender new species, *Hydriastele apetiolata*, *H. divaricata*, *H. simbiakii* and *H. splendida*, which belong to two distinct species groupings within the genus. *Hydriastele apetiolata* (Figs. 1–3) belongs to a group of five species recognized by their slender to moderate habit and protogynous inflorescences (female flowers opening before male flowers) that also includes *Hydriastele kasesa*, *H. rheophytica*, *H. variabilis*, and the widespread *H. wendlandiana* into which the well-known taxon *H. microspadix* has been subsumed. *Hydriastele apetiolata* was first discovered in the vicinity of Timika, Papua province (Dransfield et al. 2000), but has since been found almost 1000km to the east in

1. *Hydriastele apetiolata* in cultivation near Timika, Papua, Indonesia. Note the undivided juvenile leaves. Photo by William J. Baker.

2. *Hydriastele apetiolata* in cultivation near Timika, Papua, Indonesia. Photo by William J. Baker.

3. Fruits of *Hydriastele apetiolata*, in cultivation near Timika, Papua, Indonesia. Note the undivided juvenile leaves. Photo by William J. Baker.

4. *Hydriastele divaricata* in cultivation at Nong Nooch Tropical Botanic Garden. Photo by Scott Zona.

5. *Hydristele splendida* in the wild in heath forest between Timika and Mt. Jaya, Papua, Indonesia.

6 (upper left). *Hydriastele splendida*, female flowers. 7 (upper right). *H. splendida*, fruits. 8. (bottom). *H. splendida*, habit. Cultivated at Floribunda Palms and Exotics, Hawai'i. Photos by William J. Baker.

9. *Hydriastele simbiakii*, a large clump of this rheophytic palm growing on the banks of the Sujak (Eyei) River, Tamrau Mountains, West Papua, Indonesia. Photo by William J. Baker.

10. *Hydriastele simbiakii,* inflorescences with open female flowers (left) and open male flowers (right). Photo by William J. Baker

southern Papua New Guinea. A handsome clustering palm, *H. apetiolata* is distinguished by its upright shuttlecock crowns with leaves that lack petioles and the entire juvenile leaves. In the Timika area, the species was collected from the wild for ornamental use, which raises the possibility that this species may already have appeared in cultivation more widely.

The remaining species belong to a group of seven species (also including *Hydriastele aprica*, *H. flabellata*, *H. montana* and the widespread *H. pinangoides*) previously assignable to the genus *Nengella*, which was subsumed in the genus *Gronophyllum* (Essig & Young 1985), before being transferred to *Hydriastele* (Baker and Loo 2004). This group comprises slender palms of the forest understory and mid-story, with leaves with conspicuously jagged tips and protandrous inflorescences (male flowers opening before female flowers) that are spicate or branched to one order with spirally arranged floral triads and pink to violet male flowers (and sometimes axes). Two of the new species, *H. divaricata* and *H. splendida*, were collected very near to each other on the same expedition as *H. apetiolata* in the heath forest between Timika and Mt. Jaya. *Hydriastele divaricata* (Fig. 4) is a very slender clustering palm with narrow linear leaflets that are widely spreading. It has inflorescences that are spicate or with two rachillae, which most closely aligns the species to *H. flabellata* and *H. montana*, but these two differ in other characters, such as endosperm condition (ruminate in *H. divaricata*, homogeneous in the other two).

Hydriastele splendida (Figs. 5–8) is perhaps the most spectacular of the new species, with its beautiful paddle-shaped, undivided leaf, deeply notched at the apex, with a rounded, jagged distal margin. It is undoubtedly closely related to the common *H. pinangoides* and could be interpreted as an entire-leaved variant thereof, although such leaves have never been observed in any of the other, numerous specimens of that species. This is a highly desirable ornamental palm that is already in cultivation, often incorrectly named *H. flabellata*, seed collections having been made and distributed by Gregori Hambali. We are aware of *H. divaricata* also being cultivated at Nong Nooch Tropical Botanical Garden; it is likely to have been introduced via the same route as *H. splendida*.

The third new species from the *Nengella* group is *H. simbiakii* (Figs. 9 & 10). This is an elegant rheophyte, known only from the banks of the Sujak (Eyei) River in the Tamrau Mountains of West Papua province. It forms large clumps with long flexible stems, and its leaves are unusual in their regularly arranged, linear leaflets. The species was collected during a joint expedition organized by Universitas Negeri Papua (UNIPA) and the Royal Botanic Gardens, Kew, and was named after Victor Simbiak, UNIPA botanist who drew the palm to the attention of the Kew palm team.

It is highly unlikely that New Guinea has given up all of its treasures in *Hydriastele*, but it is hoped that the new monograph will facilitate the further study and discovery of new species in this variable and poorly understood genus.

Literature Cited

Baker, W.J., R.A. Maturbongs, J. Wanggai and G.G. Hambali. 2000. *Siphokentia*. Palms 44: 175–181.

Baker, W.J. 2002. The Palms of New Guinea Project. Flora Malesiana Bulletin 13: 35–37.

Baker, W.J. and A.H.B. Loo. 2004. A synopsis of the genus *Hydriastele*. Kew Bulletin 59: 61–68.

Baker, W.J. and C.D. Heatubun. 2012. New Palms from Biak and Supiori, Western New Guinea. Palms 56: 131–150.

Dransfield, J., W.J. Baker, C.D. Heatubun and J. Witono. 2000. The Palms of Mount Jaya. Palms 44: 202–208.

Essig, F.B. and B.E Young. 1985. A reconsideration of *Gronophyllum* and *Nengella* (Arecoideae). Principes 29: 129–137.

Heatubun, C.D., P. Petoe and W.J. Baker. 2018. A monograph of the Nengella group of *Hydriastele* (Arecaceae). Kew Bulletin 73: (18).

Petoe, P., R. Cámara-Leret and W.J. Baker. 2018. A monograph of the *Hydriastele wendlandiana* group (Arecaceae: *Hydriastele*). Kew Bulletin 73: (17).

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