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Notes on Roystonea in Cuba

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The *Roystonea* palms of Cuba are one of the most conspicuous elements of that flora, yet surprisingly (or perhaps not surprisingly given their size and bulk), they have received little detailed study. In an early revision of the genus, L. H. Bailey (1935) described two taxa from eastern Cuba and brought to three the number of taxa of *Roystonea* known from that island. Bailey's work, however, merely scratched the surface of the floristic richness of Cuba. Shortly thereafter, León (1943) described three species, all from eastern Cuba, and raised the total number of indigenous *Roystonea* to six. León's work brought recognition to the astonishing diversity of royal palms in the remote eastern province of Cuba, then known as Oriente and now known as Guantánamo.

In mid-September of 1990, I traveled to Cuba to spend three weeks studying the common *Roystonea regia* and the poorly known species of Guantánamo which had not been collected since León's original work nearly a half a century ago.

My first stop in Cuba was the Jardín Botánico Nacional, whose director, Dr. Angela Leiva, is actively conducting research in Cuban palms and has supervised the growth of the palm collection at JBN. The collection is extensive, although Angela laments that she still does not have all the native species of palms in cultivation. The only species of royal palm growing at JBN is *R. regia*, which is proving to be something of a weed. I also met with Dr. Miguel Rodríguez Hernández, who helped arrange my itinerary, and Dr. Vladimir Moreno, a specialist in forestry and conservation, who was to accompany me to Guantánamo.

Toward the end of my stay in Havana, I had the great pleasure of spending a morning with Onaney Muñiz, who was well known to me as the author of many new species of *Coccothrinax*. His 1982 catalog of the palms of Cuba, co-authored with Atilla Borhidi, was my guide book to much of the fascinating palm flora of that island. We discussed the status of palm research in the Caribbean, problems in conservation, and causes of diversity in the Cuban flora. His generosity in sharing his ideas on biogeography is much appreciated.

The palm specialist O. F. Cook (1900) created the genus *Roystonea* to accommodate the Cuban royal palm, *R. regia*, first collected by the famed explorers Alexander von Humboldt and Aimé Bonpland around 1800. Carl Kunth, a German botanist working with Humboldt and Bonpland's collections, had placed the species in the genus *Oreodoxa*, a genus now known to be a rejected synonym of *Prestoea*. Cook recognized the Cuban royal's distinctiveness and placed it in *Roystonea*, a genus he named in honor of General Roy Stone, a U.S. Army engineer who served in Puerto Rico. Bailey took up the genus in 1935 and recognized 12 taxa, including two varieties of *R. regia* that he described from Cuba. He again published a revision of the genus in 1949, in which he incorporated the Cuban species described by León just six years earlier, and recognized a total of 17 taxa from South America and the islands of the Caribbean. Allen (1952) added two more taxa to the genus and

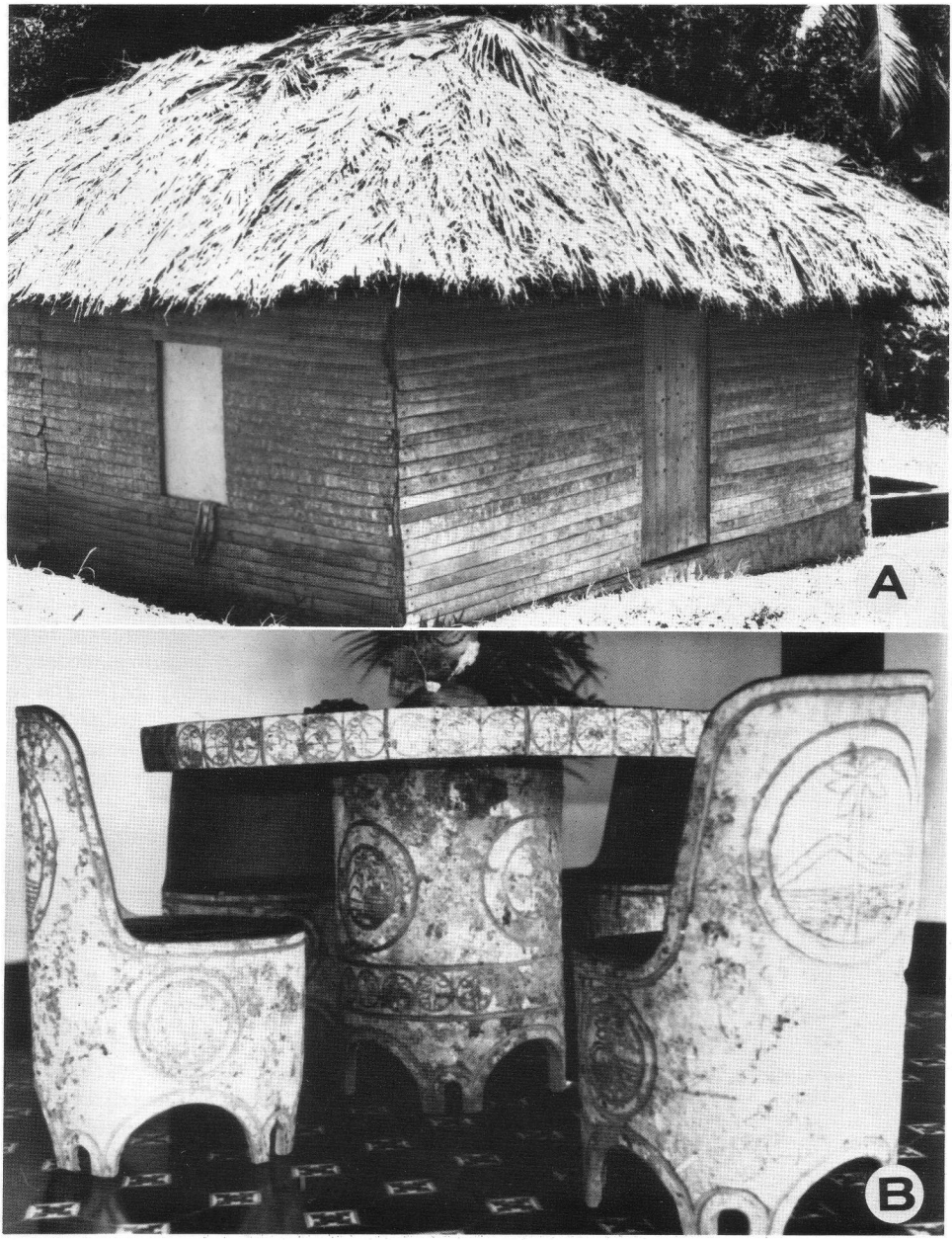
1. *Roystonea regia* var. *regia* on a hillside in the Município de Yateras, Guantánamo.

extended its range to include Central America. At present, the genus includes approximately 12 taxa, with the center of diversity in the province of Guantánamo in eastern Cuba.

Roystonea regia (Kunth) Cook var. **regia**

The most abundant and one of the most useful palms in Cuba is the "palma real" or "palma criolla," the royal palm (Fig. 1). It is the national tree of Cuba, and its likeness appears in official seals and crests as well as in folk art. It grows in fertile, well drained soil throughout the island up to elevations of approximately 1000 m. It is immediately recognizable by its concrete white trunk, which is usually ventricose (slightly swollen) in the middle, but it may be irregularly swollen or constricted anywhere along its length. It bears a full crown of leaves above a green crownshaft, and produces several infructescences throughout the year.

Roystonea regia var. *regia*, as well as other *Roystonea* species, is most commonly used in two non-destructive ways in Cuba: fruits ("palmiche") are used to feed hogs, and leafbases ("yaguas") are used as a waterproof covering for bales of tobacco. Both uses are current in Cuba today and are not dying out or being replaced with other materials. Another common but destructive use of *Roystonea* is for timber. Planks are cut from the trunk



2. Destructive uses of *Roystonea*. A. Wood planks cut from *Roystonea* sp. and used for rural home construction, Vega Larga, near Baracoa. Thatch is coconut, *Cocos nucifera*. B. Furniture at the Jardín Botánico Nacional made from the trunks of *R. regia* var. *regia*. Note the royal palm motif.

and used for siding in rural houses (Fig. 2a). Furniture is also made from the wood (Fig. 2b).

Modern statistics for the use of yaguas are lacking, but La Rosa (1974) reported that in the province of Las Villas alone (now the provinces of Sancti Spiritus, Villa Clara, Cienfuegos, and part of Matanzas) nearly 2.1 million yaguas were used to wrap bales of tobacco. Four yaguas are required to cover one bale. Although 2.1 million may seem incredible, Ruebens (1968) estimated that there are more than 11 million individuals of *R. regia* var *regia* on the island of Cuba!

Palmiche is a valuable commodity all over Cuba. It is the preferred foodstuff for fattening hogs. Ideally, a hog enclosure includes one or more royal palms so that the hogs can feed on the fruits as they drop to the ground throughout the year. If the hog enclosure does not include royal palms, skilled climbers, called *desmochadores* (Fig. 3), cut infructescences while the fruits are still red (i.e., before they turn purple-black and drop off), and the fruits are allowed to ripen in a shaded place before feeding to the hogs. Alternatively, the fruits are allowed to ferment, and the fermented fruits are fed to the hogs as silage.

Palmiche is rich in oil. Ruebens (1968) found that on average, fresh palmiche mesocarp is 10.7% oil and that fresh seeds are 21% oil. Unlike most oils derived from palms, palmiche oil is unusually high in unsaturated fatty acids, the more desirable fatty acids for edible oils. Stillman and Reed (1934) found that the fatty acid composition of palmiche kernel oil is as follows: 16.0% myristic acid, 7.5% palmitic acid, 1.0% stearic acid, 32.0% lauric acid, 28.5% oleic acid, 9.5% linoleic acid, and 5.0% capric acid. By comparison, oleic acid, an unsaturated fatty acid, comprises 13.0–24.4% of the oil of *Bactris gasipaes* kernels and only 10.5–18.5% of the oil from *Elaeis guineensis* kernels (Lleras and Coradin 1988).

According to the Food and Agriculture Organization of the United Nations, Cuba imports virtually all of its vegetable oils, including 400 MT of olive oil and 95,000 MT of sunflower oil annually (FAO 1987). On several occasions, palmiche oil extraction facilities have operated in Cuba to take advantage of this abundant natural resource. Ruebens (1968) provided a detailed description of an extraction facility near Remédios, Villa Clara, which had the capacity to produce 5.8 MT/day of palmiche oil for industrial use. The plant, however, is no longer operational. I suspect that the difficulties in harvesting palmiche and providing the quantity of fruit needed by the plant made the facility economically unfeasible. However, economic conditions in Cuba's future may once again make palmiche oil a profitable proposition.

Onaney Muñiz related to me an interesting anecdote that during the Prohibition Era, the notorious Chicago gangster Al Capone operated a facility in Havana for making laundry soap with palmiche oil. The facility was merely a front for his illegal rum running business, and after Prohibition was repealed, he sold the soap factory. Onaney mentioned that although the soap was of excellent quality, the factory soon went bankrupt without the clandestine support from the rum business.

Roystonea regia var. **maisiana** Bailey and var. **pinguis** Bailey

Bailey described these varieties to accommodate plants that he felt were only slightly different from the common *R. regia* var. *regia*. *Roystonea regia* var. *maisiana* (Fig. 4), endemic to Maisí, where it is abundant, is much more slender and less ventricose than the typical variety. I measured a population of *R. regia* var. *maisiana* and found that the trunk diameter at breast height averaged 36.5 cm (N = 11), compared with an average of 46.9 cm (N = 25) for a population of *R. regia* var. *regia*. This species would be an elegant

3. Julio Escalante, a skilled *desmuchador*, climbing *Roystonea regia* var. *regia* near Baracoa.

palm for cultivation, but virtually nothing is known of its horticultural requirements.

In contrast, *R. regia* var. *pinguis* is, according to Bailey (1935), a more robust palm, described from the Imías River region of the southern coast of Guantánamo. I found the *Roystonea* palms at the type locality to fit the description of *R. lenis* (see below) and suspect that the two taxa may be conspecific.

Roystonea lenis León

This palm is known by the common name "palma de seda," which translates to "silk palm." Some palms, subsequently identified as *R. lenis*, were called "palma conga" and "palma india." The reasons behind these common names were not known to the climbers or to the rural people that I interviewed. In overall appearance, *R. lenis* is very difficult to distinguish from *R. regia*. *Roystonea lenis* differs from *R. regia* by the shape of the sepals of the staminate flowers and by the large, nearly spherical fruits with hard, durable endocarps. The latter characteristic became abundantly clear as we spent many hours cleaning seeds prior to bringing them into the United States.

This species was described from a small village named Vega Larga, southeast of the city of Baracoa on the north coast of Guantánamo province; however, we also collected *R. lenis* in the region of Imías on the southern coast, the type locality for Bailey's *R. regia* var. *pinguis*. The Imías palms have large fruits and reniform sepals and thus answer to the description of *R. lenis*. The palm is apparently abundant in both localities and has been less affected by land clearing since it occurs in more mountainous areas west of the Meseta de Maisí.

Roystonea violacea León

"Palma morada," "palma criolla azul," or "palma roja" is still abundant in the region of the Río Maya in Maisí. Having never before seen this species, we passed by several individuals before noticing that the color of their trunks was not the customary concrete white of *R. regia*, but nor was it the "violet" of León's description. With a covering of algae and lichens, the trunk of *R. violacea* at first does not warrant much attention, but when seen growing adjacent to a specimen of *R. regia*, the difference is immediately apparent. The color is almost a milk chocolate brown with just the hint of violet or mauve (See Front Cover); however, older palms seem to fade or age to a more typical pale gray color. The young palms, with only 3–4 m of clean trunk, are the most colorful. One local coffee grower asserted that "palma criolla azul" is merely the juvenile condition of *R. regia*, but there are technical differences other than color that separate the two species.

The flowers of *R. violacea* are also more colorful than those of other species. The staminate flowers are purple at the base of the petals, filaments, and pistillodes. The staminate flowers open before the pistillate flowers and attract numerous bees of the families Apidae and Hallictidae. No floral fragrance was detected.

Although certainly a palm of great ornamental value, nothing is known of its horticultural requirements.

Roystonea stellata León

This species is one of the most intriguing in the genus. León was so struck by its star-shaped stigmatic scar that he placed *R. stellata* ("palma blanca") in its own section, *Roystonea* section *Astrophora*. I

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4. *Roystonea regia* var. *maisiana* and the author, Puriales Abajo, Maisí. Photo by V. Moreno.

was especially hopeful to find this species, but extensive searches of the type locality and vicinity, as well as interviews with climbers and coffee growers, brought forth no specimens. One older grower recalled seeing a fruit with a star-shaped stigmatic scar but could not remember when or from what tree he had seen such a fruit. The type locality, the vicinity of La Yagruma and Pueblo Viejo, was cleared for coffee plantations shortly after the revolution of 1959. Older residents of the area recalled vast stands of palms in Maisí but admit that now all the palms are gone.

Whether *R. stellata* still exists in some small, isolated population or is already extinct is difficult to say, but in either case, the loss of this species is directly attributable to loss of habitat. Borhidi and Muñiz (1983) listed this species as "rare," but I would say it is probably extinct or in immediate danger of extinction in its native habitat. *Roystonea stellata* may be in cultivation at the Botanical Garden of Cienfuegos (formerly operated by Harvard University). Cultivated individuals, if they exist, may represent the only hope for this little known royal palm.

The IUCN conservation statuses of the royal palms endemic to eastern Cuba were given by Dransfield et al. (1988) as "not threatened" (for *R. lenis*), "rare" (*R. regia* var. *pinguis*), and "indeterminate" (*R. violacea* and *R. stellata*). *Roystonea regia* var. *maisiana* was not included in their report. Although *R. lenis* seems less threatened because it occurs in areas less favorable for agriculture, *R. violacea*, *R. regia* var. *maisiana*, and *R. stellata* occupy restricted ranges, and their habitats have been seriously disturbed. Moreover, seedlings and juveniles of these taxa are not common, so even though adult plants may be abundant, they are apparently not reproducing. On area farms, the seeds of those adult palms which have been spared the axe are often harvested for pig feed, thus effectively preventing any natural reproduction. With the exception of *R. stellata* which is already endangered or extinct and *R. lenis* which is rare, the *Roystonea* endemic to Maisí might best be classified as vulnerable, "taxa believed likely to move into the endangered category in the near future if the causal factors continue operating" (Dransfield et al. 1988).

Seeds of the Cuban royal palms have been distributed to the Jardín Botánico Nacional, Fairchild Tropical Garden, and the Seed Bank of the International Palm Society. Widespread habitat destruction in Maisí means that cultivation may be the best way of ensuring the continued survival of these species and underscores the important role botanical gardens and the IPS play in palm conservation.

The most interesting question about the Cuban *Roystonea* remains: how did so many species evolve in such a small area, eastern Guantánamo, without any geophysical isolation from one another? Despite claims, as yet unsubstantiated, that *Roystonea* taxa hybridize, no hybridization is obvious among the taxa in Guantánamo. The geological history of the area does not suggest that separate land masses (and hence, separate floras) combined to create Guantánamo and the Meseta de Maisí we see today. Did the species evolve elsewhere and somehow migrate to eastern Guantánamo? How do these species maintain their genetic integrity when growing in close proximity? As I continue with my studies of the genus *Roystonea*, I hope to propose answers to these questions.

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greatly appreciate the field assistance of Dr. Vladimir Moreno, without whom I would still be wandering around Guantánamo. Lastly, I salute the climbers, José Manuel Leiva and Julio Escalante.

Literature Cited

ALLEN, P. H. 1952. Distribution and variation in *Roystonea*. Ceiba 3: 1–18.

BAILEY, L. H. 1935. The royal palms—preliminary survey. Gentes Herb. 3: 342–387.

———. 1949. Royal palms: *Roystonea*—new enumeration. Gentes Herb. 8: 114–134.

BORHIDI, A. AND O. MUÑIZ. 1983. Catálogo de plantas cubanas amenazadas o extinguida. Editoria de la Academia de Ciencias de Cuba, Habana.

COOK, O. F. 1900. The method of types in botanical nomenclature. Science, n.s. 12: 475–481.

DRANSFIELD, J., D. JOHNSON, AND H. SYNGE. 1988. The palms of the new world: a conservation census. IUCN, Cambridge.

FOOD AND AGRICULTURE ORGANIZATION. 1987. FAO yearbook. Trade, vol. 41. United Nations, Rome.

LA ROSA, M. 1974. Después que vuela que hacemos con la yagua? Cuba Tabaco 2(11): 16–23.

LEÓN, BRO. 1943. Contribution a l'etude des palmiers de Cuba. VI. Nouveautes dans les palmiers royaux de Cuba oriental. Mem. Soc. Cubana Hist. Nat. "Felipe Poey" 17: 1–14.

LLERAS, E. AND L. CORADIN. 1988. Native Neotropical oil palms: state of the art and perspectives for Latin America. Adv. Econ. Bot. 6: 201–213.

MUÑIZ, O. AND A. BORHIDI. 1982. Catálogo de las palmas de Cuba. Acta Bot. Acad. Sci. Hung. 28: 309–345.

RUEBENS, C. 1968. Industrialización del palmiche en Cuba. Industria Alimentaria 1: 8–25.

STILLMAN, R. C. AND R. M. REED. 1934. Composition and characteristics of Cuban palmiche nut oil. Oil & Soap 11: 208.

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Obituary: T. A. Davis

T. A. Davis was a familiar name within the scientific community for more than four decades, during which he published over two hundred articles in national and international journals on a variety of natural science subjects. Among them were: abnormalities in the coconut and other palms; behavioral studies of the coconut robber crab; the nesting habit of the baya weaver bird; hatching technique of the Australian thermometer birds; a mathematical solution to the structure of the sunflower head; biometric analyses of fruit production in coconut and arecanut palms based on their phyllotaxy; and studies of the manifestation of the Fibonacci numerical sequence in the morphology of plants as well as in animals.

The sudden death of T. A. Davis on 10 November 1989 was a great loss to science. Dr. Davis's approach to studying the plants and animals which he found around him was, to some, unconventional for this day and age because he always tried to see nature in its totality, but the results he achieved made important contributions.

Trupapur Antony Davis was born on 9 February 1923 to a Christian family in Nagercoil, Tamilnadu, near the southern tip of India. According to family tradition, one son was to become a priest. Since his elder brother had opted for the priesthood, Antony went to study agriculture. After graduation from Madras University in 1944, he pursued graduate study in crop physiology at Madras Agricultural Research Institute in Coimbatore, graduating with the equivalent of a M.Sc. degree. Antony began his professional career in 1947 as a research scientist at the then Sugarcane Research Station, at Karnal, Punjab, in northern India. A man born and raised in a palm-tree environment his interests naturally turned toward the coconut palm. In 1952, Antony left Karnal and moved south to join the newly-established Coconut Research Station at Kyangulum, Kerala, as a coconut physiologist. Some of his outstanding research findings on the physiology and morphology of coconut palms were published while at Kyangulum.