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DISTRIBUTION AND VARIATION IN ROYSTONEA

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IN A PLANT FAMILY replete with strikingly handsome genera, the *Roystoneas* well merit their name of Royal Palms. Certainly their gigantic size and regal aspect put them in a class apart. Their unquestionable emotional impact on every traveler has led to their wide dissemination throughout the tropics of both hemispheres, where they may be seen as dooryard specimens or in stately avenues. In spite of their frequence in townsites, the group is not well understood, and many perplexing problems present themselves to the most casual observer.

In the Canal Zone and adjacent Panama, and in San José, Costa Rica, for example, one cannot help but notice the often striking differences in the local cultivated specimens. Old stands, such as those planted in front of the Hotel Washington in Colón, and the street plantings from Gorgas Hospital to the post office in Ancón are very mixed, some being tremendously tall, with uniformly cylindric trunks and nearly horizontal fronds, while others are considerably shorter, with bulging trunks and drooping foliage. Spathes and inflorescences vary in length and in profile, and the fruits often vary in color and shape. A particularly mixed group may be seen along Avenida Federico Boyd in Bella Vista, where marked differences are to be noted in height, trunk profile, trunk diameter, number and position of fronds, degree of orientation of the planes of the pinnae, the height at which individual specimens first flow-

er, length and profile of the unopened spathes, length, and degree of ramification of the contained inflorescence etc. In pronounced contrast are other groups of specimens that are almost completely uniform in appearance, such as those fronting the Tivoli Hotel in Ancón, or the quite unusual type bordering the property of Capt. Clifford Payne, in Bella Vista. In San José, in the Costa Rican highlands, Royal palms in parks and dooryards seem to fall into one or the other of two well marked types. In the first of these the trunk is of uniform diameter, or nearly so, throughout its length, and the fronds are borne in a horizontal or rarely somewhat ascending position, leaving the crowshaft fully exposed. The unopened spathes in this sort are short, stout and obovate in profile, with abruptly acute apices, in all averaging about one-third the length of the crownshaft. These short spathes usually twist to one side at maturity and rupture along several irregular lines from the tip downward, freeing the inflorescence. In the second type of San José Royal the trunk has a distinct bulge and the fronds droop, more or less covering the crownshaft. The unopened spathes are relatively long and slender, of uniform diameter throughout most of their length, gradually tapering to an acute apex. These average about three-fourths the length of the crownshaft, do not twist, and rupture when mature along a single straight line, freeing the scape.

Such polymorphism in the cultivated Royal palms is very perplexing, particularly since most wild stands in the West Indies and elsewhere seem to be remarkably uniform. It was my personal opinion at one time that careful investigation of the oldest cultivated groups would probably show them to be uniform, as would be expected from unmixed introduction from areas where they were native, and that their progeny might be hybrids, and hence variable. Unfortunately recent investigation has not borne this out, and another beautiful theory has been destroyed by an ugly fact. In the Canal Zone area at least, some of the oldest stands, notably those fronting the Washington Hotel in Colón, and near Gorgas Hospital in Ancón are badly mixed, while one of the most consistent groups is that on the grounds of Capt. Clifford Payne, in Bella Vista. These last were grown from locally collected seed, and were planted by Mr. Charles Morgan in 1930.

While we do not know what produces such a perplexing situation, we may perhaps be forgiven for trying to guess. It may be possible, for example, that the plants seen in Colón and Ancón are seedlings of much older introductions and are in fact first, or even second or third generation hybrids. Or the seeds or plants may have been brought to the Zone from some botanic garden or private estate in the West Indies, where several races may have been grown side by side. Some of our variable stands may simply be introductions of *Roystonea regia* which is known to be a polymorphic species. Perhaps the uniform groups such as those fronting the Tivoli Hotel and on the Payne property are from seeds collected from an isolated specimen of uncontaminated stock. We shall probably never know with certainty.

While no one can actually prove that *Roystoneas* hybridize, purely circumstantial evidence would seem to be in favor of the probability. We must either conclude that such an unusually mixed lot of specimens as are seen along the Avenida Federico Boyd in Panama City are hybrids, or be prepared to describe fully fifty percent of them as new species, of completely unknown origin, since they answer to no published descriptions.

Until comparatively recently, the genus *Roystonea* was presumed to be principally Antillean in its distribution, with the exception of the small colonies on the mainland of Florida. Discoveries by Dr. Julian Steyermark in northern Venezuela, and by the writer in Colombia and Honduras have considerably extended the known range. Of particular interest are the extensive stands of wild *Roystoneas* which were seen and collected by myself along the Río Meta, in the Llanos of Trans-Andean Colombia, at a point nearly one thousand miles inside the continent of South America! Here, in about as un-Antillean a setting as might well be imagined, were groves of white-trunked giants growing intermixed in the gallery forest with stands of *Sapium tolimense* which we were exploiting for rubber. Since no Royals were seen above the village of Cabuyaro, on the Río Meta, and since they became increasingly common from about the town of Remolino eastward, and have since been collected in the delta of the Orinoco, it is my guess that they may exist throughout much of the Orinoco drainage,

and either have not been previously seen by a botanist, or have been thought too big to collect, a quite natural reaction when one stands beneath one of these giants and gazes skyward. Fragmentary specimens of this species, as yet unidentified, are in the herbarium of the Missouri Botanical Garden, in St. Louis. It may be said in passing that these stands of the Río Meta were remarkably uniform in appearance, all having tall cylindric trunks and horizontal fronds which left the crown-shafts entirely exposed. This find was mentioned to Dr. L. H. Bailey in correspondence in 1946, and he wrote me that he had personally seen wild stands of Royals from the air when passing over the delta of the Orinoco en route to Trinidad.

Specimens of these Venezuelan plants were secured by my good friend Dr. Julian Steyermark, and they have subsequently been described by Dr. Bailey as new, under the name of *Roystonea venezuelana* Bailey (Gentes Herb. 8: 124. 1949). Judging by my field notes, and my recollections of the plants in the field, I should consider it quite possible that my number 3407-A from the Río Meta in Colombia may be referable to this species.

Here my acquaintance with wild Roystoneas stood until 1948, when I visited the north coast of Honduras for the first time. In the vicinity of Puerto Arturo, on the railroad line between Tela and Progreso, I was astonished to find scattering stands of Royals in the coastal swamps, but of a quite different aspect than those collected in the interior of South America. Mr. Paul C. Standley, in his extremely useful "Flora of the Lancetilla Valley" (1931) tentatively listed this species under the earlier name of *Oreodoxa* (*Roystonea*) *oleracea*, but said that his very limited time in the area did not permit him to secure actual specimens for check. Although I realized that

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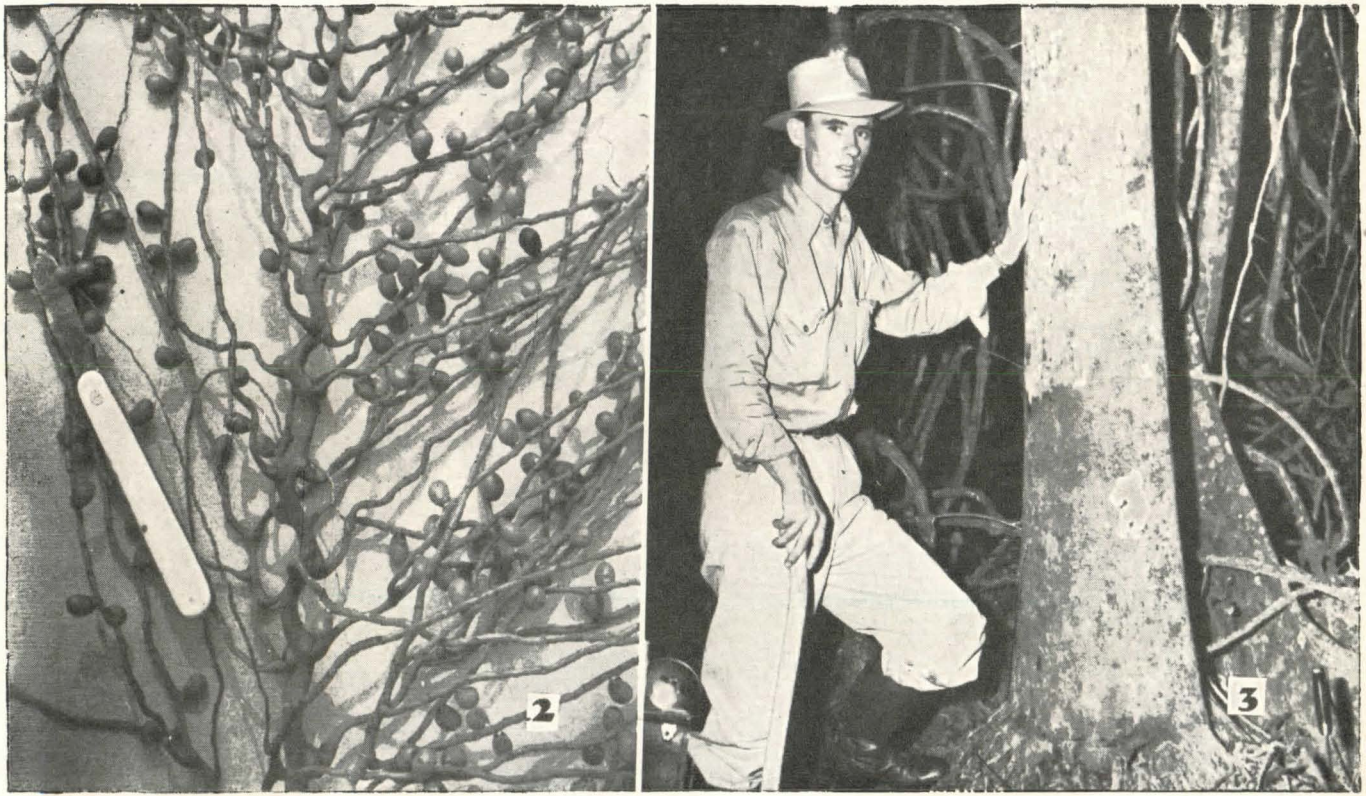
Explanation of illustrations on following pages.

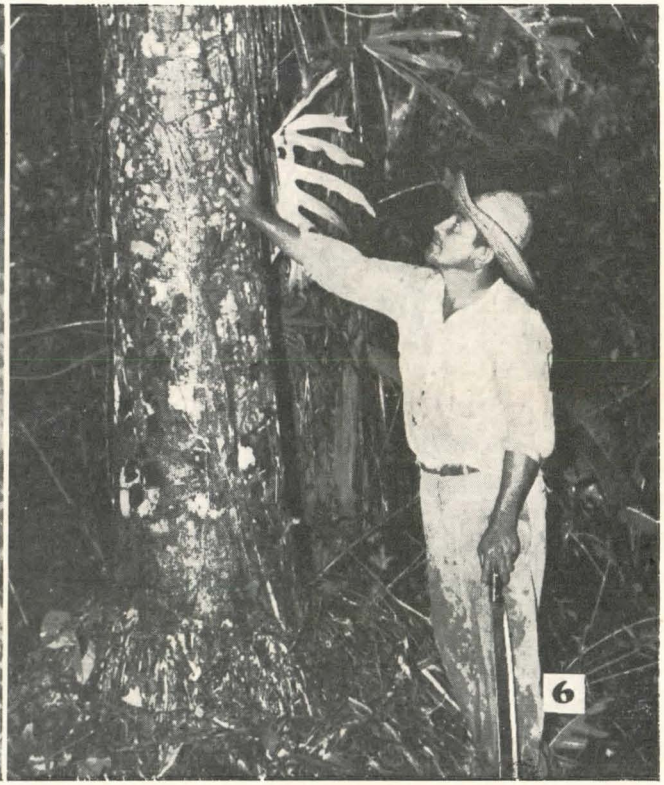
Fig. 1. *Roystonea Dunlapiana.* Shows typical position of the fronds. Tidal lagoons near Puerto Arturo, Honduras.
Fig. 2. *Roystonea Dunlapiana.* Typical undulant rachillae.
Fig. 3. *Roystonea Dunlapiana.* Lower trunk.
Fig. 4. *Roystonea regia* var. *hondurensis.* Growing with Bactris and *Orbignya Cohune* near Villanueva, Honduras.
Fig. 5. *Roystonea regia* var. *hondurensis.* Typical fruiting cluster.
Fig. 6. *Roystonea regia* var. *hondurensis.* Lower trunk.

Roystonea Dunlapiana



Roystonea Dunlapiana

Roystonea regia var. *hondurensis*



Roystonea regia var. *hondurensis*

these Honduras palms were new to me, the opportunity did not present itself to do anything constructive toward solving the problem until April 1951. At that time, in the very pleasant company of Mr. Floyd Avery and Mr. Kergan Davidson of the local United Fruit Company organization, I visited the tidal lagoons near Puerto Arturo and was able to secure adequate flowering and fruiting specimens, as well as photographs. Nor, as it happened, was this to be all! Within 48 hours I had the completely unexpected and stimulating experience of standing beneath the towering shafts of yet another type of Royal at the Modelo Ranch, near Villanueva, where they grew in broadleaf forest in association with *Orbignya Cohune*. These Roystoneas were also collected, measured and photographed. After careful comparison of this material with Dr. Bailey's keys and descriptions in the Gentes Herbarum (3: 342-387. 1935) series I have decided that they both represent undescribed populations.

Whether many of these segregates in Roystonea are species in the usually accepted sense of the word is perhaps open to some question. Dr. Bailey (Gentes Herb. 4: 268. 1939) says: "Whether the Roystoneas, on their various islands, are to be interpreted as species or varieties is of no pertinence to the present discussion. (That of the identity of the Royal palm of Hispaniola). This question I plan to raise at another time. Variation in Roystoneas is not understood, nor can the subject be adequately approached until field observations are made and correlated, and until herbarium methods in palms are vastly improved. Much work must yet be undertaken in the genus."

What one must decide, perhaps, is whether the key characters are constant or variable, whether they apply to individuals or populations, whether taken singly or in combination they are enough to indicate a good species or variety, and whether these seem to be confirmed by having definite geographic ranges or habitats. Much of this can be learned only in the field, and from long and intimate acquaintance with the plants. My only other personal experience with wild stands of Royals has been in the island of Cuba, though observations on other palm genera may have at least a limited application. On the terrace-like rocky heights above Cape Maisi in eastern Cuba there are conspicuous stands of what appear to be a quite

uniform type of Royal palm. Their profile against the sky rather resembles that of *Roystonea oleracea* when seen from a distance, but the position of the leaflets in the frond and other characters place them in the section Regiae. Bailey has tentatively named this population *Roystonea regia* var. *maisiana*. In very pronounced contrast to these are the groves of wild *Roystonea regia* in western Cuba, particularly between Habana and Cienfuegos. These cover considerable tracts, and are often locally the only remaining arborescent vegetation. To one accustomed to the consistent aspect of the wild stands of Royals in Colombia, Honduras and eastern Cuba, these palms proved quite disconcerting. *Roystonea regia* has of course the reputation of being a polymorphic species, and while it is only fair to say that perhaps three-fourths conform to a general type, the remainder are exceedingly variable. It is at least my impression that a very high number of segregates *could* be described from these stands, if anyone cared to take the time to do so.

I have the feeling that in western Cuba we have to deal with a group of entities quite like the supposed hybrid Royals of the Canal Zone. This perplexing situation may actually have a fairly simple explanation. I have noted that those groups of wild Royals that appear to be the most uniform do not occur in pure stands, but are rather a prominent, but by no means exclusive element in areas of relatively undisturbed forest. There are a number of groups of plants, such as *Rubus*, *Crataegus*, *Mauritia vinifera*, *Pinus caribaea*, *Ochroma lagopus* etc. that seem to receive a tremendous stimulus from any marked change in the *status quo*. They thrive on disturbed land. Where extensive clearing, burning and agricultural operations have removed most of the original cover, these, each in its place and situation, manage to spread and to form a sort of fire, or agricultural climax. Since colonies of two distinct types of Roystonea can be found today within fifty miles of each other in northern Honduras, and since we know that there are at least two Roystoneas in eastern Cuba which are different from those in the west, it would seem possible that more such distinct groups (which may have been "species", geographic races, or varieties, as you will) may have existed in former times when the human population was smaller, and the bulk of the area in forest. Extensive clearing and burning over hundreds of

years on the rich, level sugar lands has removed most of the broad-leaved trees, but the Royals, which will not burn, have inherited the earth, much as have the *Mauritias* in the Colombian and Venezuelan llanos, and *Pinus caribaea* in parts of Honduras. These hypothetical, localized, inbreeding colonies may have exploded, in effect, with the changed conditions, and through hybridization produced the polymorphic population we see today.

It should not be necessary to point out that no very useful purpose is accomplished by describing as new chance individuals of unknown origin, or from cultivation, in such a group, or to attempt to give names to all of the vagaries to be found in a hybrid swarm. Fortunately, in Honduras, we seem to be dealing with homogeneous colonies, having amply distinct, reasonably uniform characters and well separated local habitats.

Roystonea Dunlapiana *Allen, sp. nov.*

Section Regiae. Palma excelsa, gracilis, elegans, ut videtur *R. jamaicanae* L. H. Bailey affinis; specie illa foliis magis numerosis, longioribus, costis pinnarum lepidotis, pinnis apice truncatis, floribus minus approximatis, ut quoque characteribus aliis differt.

Slender, single-stemmed, unarmed palms, 15-24 m. in height, the greyish-white, obscurely ringed, columnar trunks averaging 30-40 cm. in diameter B. H. Crownshaft prominently developed, averaging 1.6 meters in length. Crown rather open, composed of 12-15 live fronds, the lower ones usually drooping and partially hiding the crownshaft and inflorescences (see photo). Fronds average about 5 meters in length, the lower rachis somewhat concave on the upper surface, soon merging with the flattened mid-portion, the apical half becoming nearly triangular in cross section, with a sharply developed dorsal keel. Pinnae conspicuously 2-ranked, particularly in the mid-section of the frond, the two rows standing at about a 30 degree angle, one with the other. There are about 195 pinnae on each side of the rachis. Basal pinnae very narrow, averaging about 35-40 cm. long and 3 mm. wide, with long acuminate bifid apices, one segment conspicuously exceeding the other in length. Mid-section pinnae average 65-70 cm. long and 2.75-3.5 cm.

wide, with strongly developed mid-ribs, the undersurfaces of which have a rather sparse covering of lepidote scales. The apices of these pinnae are apparently unique, being roughly and obliquely truncate, and more or less obscurely and unequally bilobed, appearing almost as though they had been bitten off. Terminal pinnae 9-14 mm. wide and 35-40 cm. long, sometimes with the mid-portions of several fused together and forming more or less confluent blocks, the individual units however having separate basal attachments. The apices are subequally bifid, and rather roughly and obliquely acute. Scapes 2-4, produced from the base of the crownshaft. Spathes 2, glabrous, usually soon deciduous, the outer or primary spathe 47 cm. long and 9.5 cm. wide, including the short, lateral, acute auricular appendages. Inner or secondary spathe more or less woody, cymbiform, 1.4 meters long and 16.5 cm. wide, lanceolate in outline with a stout, acute apex. Spadix moderately developed, with arching rachillae, even in fruit. Rachis and rachillae glabrous, the apical portion and upper lateral branches strongly undulate in spathe, a condition which persists in fruit. Flowers small, the staminate buds 3-4 mm. long, the deep lavender stamens not equaling the petals in length. Fruits subincurved, obpyriform, with a rather constricted base, about 14 mm. long and 8-10 mm. wide. Seeds elliptic, flattened, usually somewhat adherent to the shell-like endocarp by their backs.

HONDURAS: "Yagua." Margin of tidal estuary near Puerto Arturo, Dept. Atlántida, April 10, 1951, *Allen, Avery & Davidson 6140* (TYPE in Herb. Escuela Agrícola Panamericana; dupl. Herb. Allen; dupl. Herb. Chicago Nat. Hist. Museum; dupl. Bailey Hortorium.

A slender handsome species, forming small open groves on high land, and occurring as isolated specimens along tidal estuaries near Puerto Arturo, there being a particularly striking colony near Km. 10 on the railroad between Tela and Progreso. Many of the specimens in the mangrove swamps grow with their roots in standing water, in association with plants like *Paurotis Wrightii* and *Annona glabra*. They exhibit a curious combination of characters not hitherto known in any wild species. The 2-ranked pinnae and drooping fronds would seem to place the tree definitely in the section Regiae, yet the fruits in some ways more nearly resemble those found in

the section Oleraceae, as do the undulant strands of the inflorescence. The species will not key out in either section of the genus, as treated by Bailey, and matches no known entity. It seems to be closest to *Roystonea jamaicana* in general aspect, but differs in the greater number of longer fronds, in the scaly mid-ribs of the pinnae and their unique truncate termination, in the wide spacing of the flowers, and in other characters.

It is a pleasure to dedicate this species to Dr. V. C. Dunlap, Director of the Research Department of the United Fruit Company, who has long been interested in the Central American palms, and through whose cooperation these and other collections in Honduras were made possible.

ROYSTONEA REGIA *(HBK.) O. F. Cook*, var. **hondurensis** *Allen, var. nov.*

Section Regiae. Palma robusta, excelsa, trunco columnari; ex affini *R. regia* var. *maisiana* L. H. Bailey insulae Cuba incola, trunco robustiore, fructibus obpyriformibus basi constrictis, seminibus dorso endocarpio adhaerentibus differt.

Robust, handsome palms, averaging 30-35 meters in height. Trunk columnar, without any central bulge, 60-75 cm. in diameter B. H. (see photo). Crownshaft well developed, about 2 meters. Crown full, with about 18 live fronds 4.8-5.4 meters long, the lower fronds carried in a nearly horizontal position so that the crownshaft is fully exposed (see photo). Pinnae conspicuously 2-ranked, there being about 230 on each side of the rachis. In all of the pinnae the midrib is strongly developed, with abundant lepidote scales on the lower surface, which, however, tend to weather away. Basal pinnae 50-60 cm. long and 10-12 mm. wide, with bifid, acuminate apices, one segment conspicuously exceeding the other in length. Mid-section pinnae 1.1-1.2 meters long and 4-4.5 cm. wide, the apices as already described. Terminal pinnae 40-55 cm. long and 0.9-2 cm. wide, commonly with several fused together. Apices strongly recurved, in the form of a hook. Spathes and flowers not seen. Spadix glabrous, strongly developed, the strands pendulous when heavily loaded with fruit (see photo). Fruits obpyriform, with constricted bases, 12 mm. long and 8 mm. wide. Seeds not fully developed, but apparently attached to the shell-like endocarp by their backs.