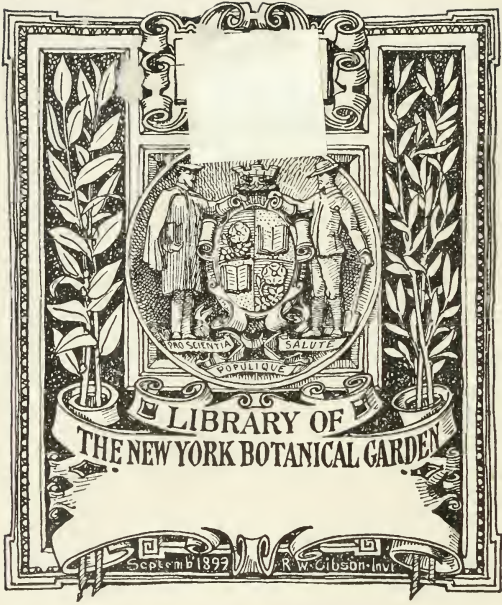


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R. W. Gibson. Inv.

TRINCOMA ALTA
= COCCOTHRINAX ALTA

THRINAX PONCEANA
= THRINAX MICROCARPA

ACRISTA MONTICOLA
= EUTERPE GLOBOSA

AERIA ATTENUATA
= GAUSSIA ATTENUATA (

COCOPS RIVALIS
= CALYPTROGYNE OCCIDENTALE

CURIMA COLOPHYLLA
= ALPHANES ACANTHOPHYLLA

A Synopsis of the Palms of
Puerto Rico.

BY O. F. COOK.

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A Synopsis of the Palms of Puerto Rico

BY O. F. COOK

(WITH PLATES 43-48)

The following systematic notes have been accumulated in connection with economic studies of Puerto Rico* palms, and although the list is doubtless still incomplete, the printing of it may be justified as a means of securing at least provisional names needed for reference purposes in connection with other publications of a non-systematic character.

The palms may well be considered a very refractory group when handled by the conventional methods of systematic botany. Difficult at once to collect or to study from dried material, they are commonly neglected both in the field and in the herbarium, with the result that literature is scanty and unsatisfactory. A very large proportion of the descriptions are entirely inadequate for the identification of species, and there has been much lawlessness and diversity in the application of generic names, as will appear from some of the instances discussed below. Difficulties of description and classification have also been multiplied by the fact that the palms are such peculiar plants that analogies and criteria borrowed from other families are often inapplicable and misleading. Moreover, the terminology of parts and characters has not been developed to the point where the expression of observed differences is easy, and available language often fails completely to suggest the significance of the characters used. Thus the fibers into which parts of the leaf-bases of many palms are resolved afford many

* This spelling and the adjective use of the name in this form are editorial corrections.

diagnostic characters, for which we have no parallels in other groups of plants.

A compensating advantage may be drawn, however, from the definite and often very limited geographical distribution of the species of palms. Thus, although Puerto Rico is a relatively small island, several of the indigenous palms have apparently ranged in nature over but a small part of it, and a locality definitely indicated would often go further toward establishing the identity of a species than much of the descriptive matter prepared for this purpose. For the present, at least, the geographical idea should be kept uppermost in systematic studies of the palms, since it is generally much easier and far more logical to extend the limits of supposed distribution and unite supposed species, than to cope with the confusion caused by the miscellaneous reporting of species far outside their natural ranges.

From the popular standpoint another serious inconvenience of the systematic literature of palms arises from the fact that it is based so largely on floral characters that even the botanical traveler might need to wait months for the blossoms and then climb the trees or cut them down before being able to secure a clue to botanical names or relationships. But however necessary refinements of formal characters may be in presenting classifications or monographs of large groups, more obvious differences may still be adequate for distinguishing between the species, genera and families represented in a limited flora like that of Puerto Rico. In the present paper use is made therefore of obvious external differences, not only because of the greater convenience and utility of such facts in field study but also in the belief that with the palms, at least, the vegetative, habital and ecological features are often quite as important for diagnostic purposes as the more technical and conventionalized characters to which botanists are accustomed in dealing with other natural orders.

As will be apparent from some of the following systematic notes, the generic nomenclature of the palms is in a condition closely comparable to that now known to obtain among the myxomycetes, fungi, hepaticae and ferns. Possibly the palms have suffered more from neglect and carelessness than other groups of flowering plants, but it can no longer be maintained that the practical defects of

former taxonomic methods do not exist in the phanerogams as well as in the cryptogams, and it becomes obvious that the enactment of different nomenclatorial legislation for these two subdivisions of the vegetable kingdom would be unreasonable and inconsistent.

The present list records twenty palms from Puerto Rico, of which three are introduced and seventeen are supposed to be native species. As may also be inferred from many other groups of plants Puerto Rico appears to be a rather remote corner of the Antillean region, which many types present in Cuba and Jamaica did not reach, whether by reason of greater distance from the continent or because of an earlier interruption of land communication. The native palms of Puerto Rico may thus be said to represent a distinctly Antillean or Caribbean series, only *Acrocomia* and *Bactris* being known to have a wider distribution.

The list of introduced palms, consisting of the date, the coconut, and the betel, might have been somewhat increased by canvassing ornamental gardens, but it does not appear that any other introduced species has been put to any useful purpose or has escaped into general culture, certainly a remarkable fact when we consider the number and importance of the economic palms of other tropical countries.

Finally, it may be well to note here that several palms have been reported from Puerto Rico which probably do not exist in the island; at least their occurrence is not supported by adequate evidence. Thus Mr. R. T. Hill, of the United States Geological Survey, mentions (Bull. U. S. Dept. Agric., Division of Forestry, 25 : 1899) as occurring in Puerto Rico seven palms, as follows : *Cocos Mauritia*, *Orcodoxa oleracea*, *Cocos nucifera*, *Martinezia caryotaefolia*, *Mauritia flexuosa*, *Oreodoxa regia*, and *Caryota* sp., of which list only *Cocos nucifera* and *Oreodoxa regia* appear to have been justified.

The reference to *Oreodoxa oleracea* is supported by the botanical authority of Professor Drude, but the specimens identified by him as *Oreodoxa oleracea* (Sintenis collection, no. 1525) and sent from the Berlin Botanical Garden to the National Herbarium and to the New York Botanical Garden are not *Oreodoxa oleracea*, but belong to the new genus *Acrista* described below, while a specimen collected by Sintenis (no. 5749) at Aguadilla and sent

out from Berlin as an *Attalea* or related genus is not even a cocoid palm but *Areca catechu*, the betel nut of the Malay region.

The existence of numerous tubercles on the roots of a young specimen of the royal palm of Puerto Rico is a fact of biological interest and possible economic importance. It was, however, noted so nearly at the end of our last visit that further studies were not practicable, but barring possible nematodes or other pathological causes for the tubercles it appears that we must add palms to the Leguminosae, *Podocarpus*, *Alnus*, and *Cycas* as plants which have, as it were, domesticated nitrogen-collecting soil organisms.

The field notes, specimens and a considerable series of illustrations for publications of the Department of Agriculture were secured during two visits to Puerto Rico, the first in November and December, 1899, the second in June and July, 1901. The photographs are the work of Mr. G. N. Collins.

Key to the Families

Leaves fan-shaped ; branches of inflorescence subtended by spathes.

Family SABALACEAE, p. 529.

Leaves feather-shaped ; spathes few, not subtending the branches of the inflorescence.

Leaf-divisions v-shaped in section, concave above ; trunk rough with leaf-bases or prominent diamond-shaped scars. Family PHOENICACEAE, p. 528.

Leaf-divisions inverted v-shaped in section, convex above ; trunk smooth or the leaf-scars ring-like and not prominent.

Leaf-bases long-sheathing, green and fleshy, finally split down the side opposite the midrib permitting the leaf to fall ; fruits with fleshy, fibrous or woody endocarps. Family ARECACEAE, p. 546.

Leaf-bases sheathing only while young, with maturity separating, except at the midrib, into a dry fibrous network which must tear or decay before the leaves fall ; fruits with a stony endocarp perforated by three foramina.

Family COCCACEAE, p. 558.

Family PHOENICACEAE

This family contains a single genus of old-world palms usually associated with the fan-leaved series, and differing from all other feather-palms by having the concave side of the leaf segments turned upward.

PHOENIX DACTYLIFERA Linn. Sp. Pl. 1188. 1753

The date palm was probably introduced into Puerto Rico in the early part of the Spanish occupation of the island, and isolated trees are to be found in many localities especially in the vicinity of

the larger towns. The climate is, however, too cool and too moist to permit the fruit to ripen properly, and there is apparently no inducement for planting in large quantities.

Family SABALACEAE

Although forming no conspicuous part of the palm vegetation of the island the fan-leaved species seem to be more numerous than those of any other family. It is certain also that further species remain to be discovered, since in addition to the species listed below, young inflorescences supposed to belong to a *Copernicia* were collected by Sintenis (no. 6512) near Utuado, and he also collected two other *Thrinax*-like palms of doubtful identity, one near Cabo Rojo and one at Fajardo.

Key to the Genera of Sabalaceae

Leaves depressed in the middle, with a distinct decurved midrib; a slender fiber rising from each of the notches which separate the leaf segments. INODES.

Leaves flat, midrib rudimentary; segment without alternating fibers.

Leaves chartaceous, naked on both sides when mature, the veinules unequal; fruits nearly sessile; seeds smooth, albumen solid except for a deep basal cavity. THRINAX.

Leaves tough and coriaceous, the lower surface silvery with a persistent, closely appressed pubescence; veinules equal; fruits distinctly pedicellate; seeds deeply grooved or furrowed.

Trunk tapering upward, tall and slender; pedicels short, bracteate at base; seeds subspherical, ruminate with deep narrow grooves; surface with a dull membranous cuticle. THRINCOMA.

Trunk columnar, of equal diameter or enlarged upward; pedicels long, bracteate above the base; seed naked, smooth and shining, cerebriform, the surface irregular with broad furrows and convolutions. THRINGS.

Inodes gen. nov.

In this genus, of which the hat palm of Puerto Rico may be considered the type, it is proposed to accommodate the dendroid palms commonly referred to *Sabal*, the type of which is *S. Adansonii* Guersent. The most conspicuous difference between *Inodes* and *Sabal* is, of course, the fact that the former produces an upright trunk while the latter has only what might be called an underground rootstock, although such a distinction is quite artificial, both groups of species beginning life with a creeping axis which becomes erect in one and remains horizontal in the other. A much more important difference is to be found in the leaves

which in *Inodes* have secured strength by the development of a midrib, a tendency early abandoned by *Sabal* in which the midrib is rudimentary and the middle of the leaf is the weakest part. The leaves of *Sabal* are adapted for standing erect and avoid resistance to the wind by being split down the middle. The leaves of *Inodes* which are held horizontal from an erect axis have attained the unique adaptation of a decurved midrib which braces the sloping sides of the leaf and effectively prevents the breaking above the ligule common in some of the species of *Thrinax*. It is true that leaves of young specimens of *Inodes* stand erect like those of *Sabal* and do not have the curved midrib, but even at this stage the midrib is relatively well developed and the blade opens out to an almost circular form instead of occupying an arc of 180 degrees or less as in the more strictly flabellate leaves of *Sabal*.

Further differential characters might be enumerated, such as the short ligule and the flat petiole of *Sabal*. The inflorescence and seeds also afford differences, but these points are unnecessary for diagnosis, and their proper expression will require careful comparative study of the species of both genera, since *Sabal* is not monotypic but includes at least two species from the Southern States and perhaps *S. Mexicana* Martius. Guersent's *S. Adansonii*, the first binomial species to which the name *Sabal* was applied, is, to judge from the figure, the smaller of our species, while Jacquin's *Corypha minor* may be the larger. Both species were described from hothouse specimens and the plates give no details really adequate for identification, but if there are but two species to be considered there can be little doubt that Jacquin's drawing represents the larger of the two forms commonly referred to *Sabal Adansonii*, since the leaves are nearly four feet long with the mesial divisions united somewhat less than half way up. The basal segments are represented, however, as diverging horizontally and not obliquely as is usual in the living plants in the greenhouses of the Department of Agriculture.

Guersent maintained that he was dealing with the *Sabal* which Adanson had in mind in naming the genus, and made his specific name in accordance with that fact, treating *Corypha minor* Jacquin, *Corypha pumila* Walter and *Chamaerops acaulis* Michaux as synonyms. The relative merits of these names and of *Chamaerops*

glabra Miller, which Dr. Sargent (Silva, 10: 38) has resurrected, are not likely to be easy of determination, but since the last was based on plants grown from seeds which came from Jamaica, it seems unwise to use it for United States species to which the description is inapplicable. Miller's name may, however, replace *Sabal taurina* Loddiges which was also founded on a stemless *Sabal* supposed to come from Jamaica.

The species of *Inodes* are in a similar or even worse state of disorder. There is little use, for example, in transferring to the new genus the traditional name *umbraculifera* which was based by Martius on the *Corypha umbraculifera* of Jacquin, but not on Linnaeus' species of the same name, which is a native of Ceylon. Present taxonomic methods forbid such generic transfers of misapplied names, so that the name **Inodes Blackburniana** (*Sabal Blackburniana* Glazebrook, Gardener's Mag. 5: 52. 1829) should be used instead of the traditional *Sabal umbraculifera* of the conservatories, though the identity and origin of the species still remain in doubt.

Inodes causiarum sp. nov.

Trunk 45-75 cm. thick at base, 5-15 m. tall, columnar or slightly tapering upward; surface narrowly rimose or nearly smooth, light gray or nearly white. Leaf-bases splitting into rather brittle fibers, partly remaining compacted into long ribbons 5-8 cm. wide. Leaves about 4 m. long, the petiole subequal to the blade, considerably exceeded in length by the inflorescence. Petiole 3.8 cm. wide, distinctly carinate above near the end; ligule 4.2 cm. in diameter. Fruit grayish, 9-10 mm. in diameter; seed chestnut-brown, finely rugose or nearly smooth, 7-8 mm. in diameter; embryo oblique, at an angle of somewhat less than 45 degrees from the horizontal. Type specimen from Joyua (no. 154).

The palm-leaf hats manufactured in large quantities in Puerto Rico are made from the present species. The center of the hat industry is at Joyua, a small village on the western coast of the island some miles southwest of Mayaguez and west of Cabo Rojo. Here many hundreds of the palms are growing along the shore in a narrow belt of coral sand.

From the two species of *Sabal* recognized by Grisebach *Inodes causiarum* differs from *umbraculifera* in having the inflorescence

much longer than the leaves, while the trunk and leaves are much shorter and thicker than in *Sabal mauritiiformis* a native of Trinidad and Venezuela which appears from Karsten's figure, reproduced in the *Natürlichen Pflanzenfamilien*, to have neither the leaves nor the habit of an *Inodes* though there is no other genus to which it can be referred with greater propriety. The diameter of the trunk of the Trinidad palm described as *S. mauritiiformis* is given as from 12 to 15 inches, while *I. causiaram* is often two feet or more thick.

From the Florida palmetto, **Inodes Palmetto** (*Corypha Palmetto* Walter, Fl. Carol. 1788) the Puerto Rico species differs most conspicuously in not retaining the old leaf-bases which give the trunk of the Florida palm so rough an appearance. The cause of this difference is doubtless to be found in the fact that as with most other palms the trunk of *I. Palmetto* grows to full size while the surrounding leaf-bases are still alive, but in the West Indian species the trunk tapers greatly, especially in young trees, and the leaf-bases are torn away by its gradual enlargement to full diameter. The existence in southern Florida of an *Inodes* having this last characteristic is a fact of much interest, recently brought to my attention by Mr. E. A. Schwarz, of the U. S. Department of Agriculture. The specific distinctness of this palm was impressed upon Mr. Schwarz, not only by its naked trunk, different habit, and smaller size (5 m., instead of 10 to 20 m.), but also by the possession of a distinctly tropical insect fauna, quite different from that of the more northern palmetto with which he had previously been familiar.*

This new Florida species it gives me pleasure to name **Inodes Schwarzii** in honor of its discoverer, in whose opinion of its distinctness I have great confidence, although he makes no claims to botanical skill. It is confined, as far as observed by Mr. Schwarz, to the coral reef formation of southern Florida, the most accessible station visited being about one mile south of Co-

* Of numerous insects distinctive of the more southern palmetto the most conspicuous is a longicorn beetle, *Agallissus chamacropis* Horn, the larvae of which bore in the leaf-bases. The more common *Inodes* is inhabited by the allied genus *Zagymnus*, though another species of *Agallissus* is reported from Texas, where the native *Inodes* is of the smooth-trunked type.

coanut Grove on the coral reef of the mainland side of Biscayne Bay. In the vicinity of Snapper Creek, *Inodes Schwarzii* extends to the Everglades where it is met by *I. Palmetto*. It was also seen on the Perrine Grant about six miles from Cocanut Grove; it seemed not to occur about Miami but reappeared with the appropriate formation and attendant fauna at New River, though again absent at Lake Worth. A photograph secured by Mr. H. J. Webber (negative 164) on Taby Island near Long Key shows an *Inodes* with a naked trunk and a smaller crown of straighter leaves than are normal for *I. palmetto*. Messrs. Swingle and Webber had also remarked the distinctness of the smooth-trunked palmetto of South Florida.

A third robust species of *Inodes* is growing in the conservatory of the Department of Agriculture labeled *Sabal umbraculifera*. It differs conspicuously from *I. causiarum* by the very large leaves and by the great development of fine brown fibers which fill all the interstices between the leaf bases, and suggest the name **Inodes vestita**.* Photographs of both the species have been prepared for the illustration of comparative detailed descriptions.

Sabal Mexicana has been reported from Cuba, and as it is described in Sargent's *Silva* (10 : 43) as having a trunk "often 2½ feet in diameter," a robustness equalled only by the Puerto Rico trees, the question of its identity was examined. It appears that the original of *S. Mexicana* came from southern Mexico and is a trunkless or very slender, rather than a robust species, being only about 10 cm. in diameter. The berry and the seed are de-

* **Inodes vestita** sp. nov. Trunk about 45 cm. thick at base, columnar or tapering upward; surface rimose, the chinks commonly 5 mm. wide and 20 mm. apart. Leaf-bases torn into very numerous, fine, hair-like, light reddish-brown fibers, a few much coarser than the others and measuring from .6 to 1 mm. in diameter. The epidermis separates into delicate membranous shreds, the surface of which is delicately pitted and sparsely beset with brownish hairy-margined peltate scales. Petiole 10 cm. or upward in width below near where it begins to split, 4.5 cm. wide at base of ligule; 3 m. long, concave above; blade 2.13 m. long, 2.50 m. wide, composed of about 60 segments, the apical united more than two-thirds their length, the basal for less than one-third; apical segments 4.5 cm. wide, deeply divided above, a long fiber terminating both the longer and the shorter ribs.

As shown by the rimose bark this species affords a rather extreme instance of the gradual enlargement of the trunk at a distance from the growing point. Numerous leaf-bases remain attached to the trunk in the greenhouse as they would not do in nature, since they are torn loose except for a few fibers at the extreme sides.

scribed as closely similar to those of *Sabal Adansoni*. Sargent's *S. Mexicana* from southern Texas, in addition to the seven times greater thickness of the trunk, has a seed nearly 1.25 cm. broad with a strongly prominent micropyle. There can be little doubt that it is another new species, quite distinct from that of Puerto Rico, similar only in the unusual diameter of the trunk, which is furthermore described as bright reddish brown instead of white or very light grayish as *Inodes causiaram*. In the view of the apparently localized distribution of the species of this genus the name **Inodes Texana** would be appropriate for that described and figured by Sargent as noted above.

In addition to the recently described **Inodes Uresana** (*Sabal Uresana* Trelease, Rep. Mo. Bot. Gard. 12 : 79), there is another large-seeded *Inodes* on the western slope of Mexico, a specimen of which was collected at Acaponeta, State of Tepic (no. 1528) by Dr. J. N. Rose,* for whom this species may be named **Inodes Rosei**. The seeds are of the same size and shape as those of *I. Uresana*, but have the surface much more finely rugose, or nearly smooth, with the embryo directly lateral, not subdorsal. The branches of the inflorescence are slender and but little over 1 mm. in diameter instead of fusiform and thickened in the middle to nearly 3 mm. as shown in Professor Trelease's photographic illustration.

THRINAX Linn. f.; Swartz, Prod. Veg. Ind. Occ. 51. 1788

In the genus *Thrinax* were formerly placed all the West Indian fan-palms with smooth stems and no midribs, but the gradual dis-

* Dr. Rose also kindly permits the use of the following field notes and measurements showing that *Inodes Rosei* is also a taller and more slender tree than *I. Uresana*.

"Trees 6-12 or sometimes even 18 meters high, the long slender naked trunk 15-20 cm. in diameter, crowned with a large cluster of leaves; petioles 60 cm. or more long, flat on the face, pubescent, but becoming glabrate; blade pale green, 8 cm. or more in width, strongly keeled, more or less clothed beneath with brown scales on the large veins; segments cleft to below the middle, 25 mm. or less wide; inflorescence in large branching panicles 60 cm. or more long; fruit spherical, 18 mm. in diameter, blackish or dark blue when mature."

"A very common tree east of Rosario towards Mazatlan, also extending all the way from Rosario to Acaponeta; especially common on the low hills, and east of Rosario toward the mountains. This species is of considerable economic importance, the trunks being used in building fences, corrals and huts, while the leaves appear as thatch on a majority of the houses of this region."

covery of numerous and diverse species has resulted in propositions for subdivision and segregation on the part of several botanists. As usual these new groups have been characterized very inadequately, and that mostly from the flowers and seeds, and with no attempt at establishing correlations of habit or other vegetative features without which the classification is likely to remain formal and artificial, as well as useless for popular and field study. Possibly no ecological differences exist among the *Thrinax*-like palms of other regions, but in Puerto Rico there are, as shown in the discussion of the following genus, two well-defined types, one of which varies the ordinary short columnar habit by the possession of a tall slender and flexible trunk which doubtless enables it to compete in a measure with the rapid growth of the surrounding vegetation, and which is also obviously adapted for withstanding the force of the strong winds encountered in the exposed places apparently preferred by palms of this species.

The type of the genus *Thrinax* is the Jamaican *T. parviflora*, a tree 3 to 6 metres high with the trunk swollen at base. The leaves are said to be 30-60 cm. long with rigid lanceolate divisions; the stipes longer than the leaves, terete-compressed. The spadix is said to be terminal, nearly erect and 60-90 cm. long. The tree grows in dry maritime situations in Jamaica and Santo Domingo. It does not appear that the original specimens of this species have been examined by Sargent or other recent writers, but it seems reasonable to use the name for the group of short species with uniform albumen and a basal cavity instead of a complete perforation. Swartz's statement regarding the seed "*intus albus, medio ruber*," in connection with its context "*nauco osseo fragile tectus*" might possibly be rendered "white inside, red between" and might refer to the red coat of the seed rather than to a red center as commonly inferred. Of course Swartz might have cut his seed transversely, but if so he would doubtless have discovered and noted the perforation had one existed. Patrick Brown's account of the Jamaica species, cited by Swartz, evidently refers to a palm with the habits of *T. Ponceana*. On the other hand the "very slender" palm referred to under this name in the Jamaica Bulletin (1: 196. 1894) shows greater similarity with *Thrinax*.

***Thrinax praeceps* sp. nov.**

Trunk 8–12 cm. in diameter at base, columnar or slightly enlarged upward, seldom attaining over 3 or 4 meters in height. The leaf-bases split in the middle of the midrib and long remain adherent to the trunk. When they finally fall away on older trees a rather rough grayish and longitudinally chinked rimose surface is exposed.

The stalks of large leaves measure 75–80 cm. in length and 1.2–1.5 cm. in width. The middle divisions of the leaf are 55 cm. and under in length and attain a width of 4.8 cm., and in the middle of large leaves are united for more than half their length. Cross-veinules numerous, distinct in both surfaces but especially the upper. The white pubescence or tomentum which clothes the young leaves and is especially abundant on the ligule soon disappears, leaving the under side glaucous or slightly pruinose.

This species is described at some length a little later in a comparison of generic characters under *Thrincoma alta*. The type specimen (no. 850) was collected on the precipitous mountain-side which overhangs the road between Utuado and Arecibo, a short distance to the northward from the station where *Thrincoma alta* was obtained.

What is believed to be the same species was collected in a similar situation on the side of a mountain overlooking the town and valley of Lares.

***Thrinax Ponceana* sp. nov. Plate 43**

Trunk 5–8 cm. or more in diameter, columnar, or slightly tapering or enlarged upward, 1–4 m. high; surface coarsely and irregularly rimose longitudinally. Leaf-bases separating into abundant rather loose light grayish or brownish fibers. Leaves numerous, large, drooping or pendant; petioles 65 mm. long, 1.5–2 cm. wide; segments attaining 75 cm. in length and 3.5 cm. in width, united for half their length. Seed smooth, mahogany-brown, 5 mm. in diameter. Type specimen no. 1005.

This species apparently exists in much larger quantities than any other yet known from Puerto Rico, being the predominant plant on several square miles of territory along the range of dry limestone hills which skirt the southern coast of the island, to the west of Ponce. Many of the palms are scattered among the taller shrubs and trees wherever there is sufficient soil and water to permit these to grow and yet not enough to give them exclusive pos-

session, but on many of the drier and more sterile higher slopes the advantage is with the palms.

This abundance of living material deserves more careful study than could be given during a very brief visit to this almost uninhabited part of the island, but one note of systematic interest was made. Several species of *Thrinax*, of which *T. Morrisii* Wendland may serve as an example, have been described chiefly with reference to the relative size of the leaf segments and the extent of their separation. If the palms under observation near Ponce belonged, as was believed, all to one species, it is not only true that the individual *Thrinax* passes all the stages from the narrow and grass-like, almost completely separated segments of the very young plant, to the more than half united leaf of the large tree, but it also appears to be true that under unfavorable conditions a *Thrinax* may not be able to attain to full maturity of size and form but may at the same time produce flowers and seeds. In the narrow chinks and crevices of the bare rocks were very small, stunted trees, obviously of great age, while but a few feet distant a deeper fissure might hold vegetable débris and moisture sufficient to nourish vigorous specimens several times the size of their less fortunate companions. The stunted trees retain in proportion to their size, but apparently with little reference to their age, the small deeply divided leaves of young plants and have short few-branched inflorescences, another difference of supposed systematic importance.

In *Thrinax Ponceana* the leaves of well grown trees have the middle divisions united to about the middle; the smaller the leaves, the more deeply they are divided. A further correlation with size is that of the "fullness" of the leaf. The basal sinus is not closed by the overlapping of the lateral divisions as in some species, but the area is too great for a plane circle and there are one or more folds, more numerous and deeper in large leaves. The lateral divisions do not lie in the plane of the others but project upward or backward nearly at right angles with the plane of the middle divisions.

The middle divisions of large leaves may measure 75 cm. in length by 3.5 and sometimes nearly 4 cm. in width, while the narrowly grass-like lateral segment is only .8 cm. wide and about 30

cm. long. The lowest segment is not divided at the tip but is produced into a slender hair-like seta, 6 or 8 cm. long, making it nearly as long or longer than the next segment above.

The normal segments are split at the apex to the distance of from 2 to 8 cm. and the tips are usually markedly divaricate, owing to the fact that the young leaves of this species suffer two impressions from the bases of older leaves, one near the middle the other near the end. The pressure causes the curvature of the unopened leaves, which in turn causes them to split apart when the leaf expands.

Old leaves are smooth and glaucous on the lower side, but in the younger state more or less remains of the delicate appressed hairiness present on the lower surfaces of the newly opened leaves. The lower surface is distinctly grayish and glaucous, but under a lens it can be seen that this appearance is due to the presence of numerous whitish points (stomata?) among which are scattering brownish spots of larger size, the nature of which remains a question.

The free stalks of the largest leaves attain 65 cm. in length and are 2 cm. wide near the base, 1.5 cm. near the apex. The cross section is lenticular above, but the upper surface becomes flat toward the base.

Young unopened leaves are covered near the base, both above and below, with a scurfy white tomentum and the margin of the ligule has a long white fringe.

To avoid possible error it seems best to make separate entry of the following notes on specimens which might be considered quite distinct from the larger and normally mature form of *Ponccana*, but which represent, it is believed, merely a somewhat depauperate condition of that species, although leaves exactly comparable were not brought home by our party. The specimens in question were collected by Sintenis (no. 3500) on the south coast of the island near Guanica and distributed from Berlin as "*Thrinax* n. sp."

The leaves are characterized by the narrow straight-sided segments which retain the same width (15 mm. or less) for about 11 cm.; they are united in the middle of the leaf for about 8 cm. and the apical tapering part is about the same length. Other species,

so far as known, have the segments much broader, both absolutely and relatively, and the width is held for a very much smaller proportion of the length.

In addition the midrib is unusually weak, inconspicuous and only slightly prominent on the lower side. The small fibro-vascular bundles which compose it are sometimes spread apart so that there is scarcely an indication of a rib while in other segments of the same leaf, and especially at the base, the conditions are more normal. The midrib is sufficiently distinct above, though very small and fine in comparison with other species.

Lower surface of leaf glabrous or somewhat glaucous, very slightly puberulous on the depressed veins near the base. Veinlets inconspicuous, mostly subequal, though 4 or 5 are sometimes a little larger than the others. Transverse veinlets indistinct below.

Petiole slender, 4 mm. wide, lenticular in cross section; about 2 mm. thick. Ligule small and weak, short, with a small apical mucro.

Fruits 5 mm. in diameter, olive brown, irregularly rugose-coriaceous on the outside as though dried from a pulpy condition; exocarp with a slightly sweetish taste. Seed bright mahogany-brown, darker below, depressed-globose, with a sublateral raphe; embryo ascending but more nearly lateral than vertical; conical basal cavity extending somewhat above the center, nearly filled with a deep red material.

At the time of our visit in July no ripe fruits of *T. Ponciana* were found on the trees, but a few picked up from the ground are apparently indistinguishable from those of Sintenis' specimen.

Thrincoma gen. nov.

Trunk slender, tapering, flexible; wood firm, covered by a smooth hard brittle outer shell or bark.

Leaf bases long-sheathing, expanded by the separation of the fibers of the side opposite the midrib; petiole strongly flattened above the base, prominently angled above and below; ligule large and firm, produced laterally to support the outer divisions.

Leaf-divisions narrow, separated below the middle and below the point of greatest width; texture firm and coriaceous; veinules subequal, close together, cross-veinules obsolete. Lower surface clothed with persistent closely appressed hairs, the upper coated with wax when young.

Seeds with few longitudinal grooves, the surface not polished, grayish ; embryo subapical.

The generic name alludes to the preference of this palm for the summits of crags and the brows of perpendicular cliffs which abound in the limestone region of the north side of Puerto Rico.

The tall, slender trunk and other differences between this genus and *Thrinax* are probably to be interpreted as ecological adaptations necessary to enable the present palm to compete with the vegetation which often surrounds its base, and to withstand the winds to which it is commonly exposed. The species of *Thrinax* and other allied genera, as far as known, have the trunk rigid and columnar, or even enlarged from the base upwards. When growing solitary and exposed they seldom, if ever, attain half the height of *Thrincoma*. Usually, however, they are protected by other vegetation or by growing gregariously in thickets.

Thrincoma might be described as a *Thrinax* which has adopted habits of the arecoid genus *Aeria* which grows in similar situations in a neighboring part of the island. In addition to the smooth, slender, and flexible trunk *Thrincoma* makes further provision against the wind in having fewer, less ample, tougher and more deeply divided leaves and like the arecoid palms it also drops the old leaves as soon as their usefulness is past, instead of retaining, like *Thrinax*, a large pendant cluster of them. The details of these differences are given below in a comparative note on fresh material of *Thrincoma alta* and *Thrinax pracceps* collected but a short distance apart in the lower part of the Arecibo valley along the Utuado-Arecibo road. In this region of jagged mountains, *Thrinax* seeks shelter against the walls of perpendicular precipices, while *Thrincoma* challenges the wind and the admiration of the traveller by its evident preference for the crags and pinnacles.

***Thrincoma alta* sp. nov.**

With but one species known with certainty to belong to the present genus the separation of generic and specific characters would have little purpose. Data for a specific description are, however, contained in the following notes which are retained in their original comparative form as better illustrating the generic differentiation of *Thrincoma* and *Thrinax*, as represented by *Thrinax pracceps*.

The trunk of *Thrincoma* differs in three adaptive particulars from that of *Thrinax praeceps*, *Ponceana* and similar species which are merely columnar with very short internodes and an irregularly rimose surface, not smooth and hardened.

1. There are distinct internodes from 3.5 to 5 cm. in length. These indicate rapid growth and would increase the chances of survival in the face of competition of quick-growing tropical vegetation.

2. The trunk tapers gradually from a diameter of 9 cm. near the base to 3.5 at the top, and thus possesses considerable flexibility in view of its great length, 11 meters, *Thrinax praeceps* and other related types not exceeding 4 or 5 meters.

3. In order to support the weight and strain of this greater height, the texture of the wood is extremely hard and firm, especially near the base of the trunk. Externally it is covered by a smooth shell or bark of very hard, brittle, dark colored material. The fibers of the interior which in *Thrinax* are merely imbedded in a soft pith like those of a corn-stalk are here thickened and cemented together, as in tall palms of other groups, into a dense hard wood. In the specimen cut by us all but a small area of the middle of the trunk was thus hardened, rendering it extremely heavy. The wood-fibers of *Thrincoma* are much coarser than those of *Thrinax*, and there appear to be none of the obliquely radial threads which are abundant in the wood of *Thrinax Ponceana*.

With reference to methods of leaf-attachment four differences may be noted :

1. In *Thrinax praeceps* the leaf-bases split below in the median line and remain long attached to the trunk. This adaptation is not confined to the old leaves but appears while the leaves are still very young, or as soon as they begin to be expanded by the pressure of those above them. In the tall species such pressure separates the fibers of the opposite side of the cylinder. The short species has the outside of the leaf-bases densely tomentose, and the tomentum is especially abundant along the edges of the split midrib of the young leaf.

2. The ligule of *Thrincoma* is notably larger than that of *Thrinax* and continues to lie in the same plane as the blade, and

becomes brown with maturity. In old leaves of *Thrinax* the ligule stands nearly at a right angle to the blade and remains green.

3. For leaves of the same size the petioles, not including the sheathing base, are longer (75–80 cm.) in the short than in the tall species (60–65 cm.).

The petiole of the short species is of nearly the same width (1.2–1.5 cm.) throughout, while in the other it is distinctly broader at both ends than in the middle. The enlargement at the ligule is abrupt. The base widens gradually to about 2 cm. but is much thinner than in the short species. In the upper part of the petiole the reverse is true, the cross section of the leaf-stalk of the *Thrincoma* being almost diamond-shape, while that of *Thrinax* is merely lenticular.

4. These differences of proportion of ligule and stalk are obviously correlated with the different habits of the two species. The shorter and more robust trunk of the one enables it to withstand the strain of the relatively limited exposure to the wind. There is also a greater flexibility in the leaf itself, due to its thinner texture and to the smaller development of the ligule and adjacent thickened area, so that the leaves are often split to near the center. The narrow petiole of the tall species affords greater flexibility in the lateral plane while strength has been secured by the greater thickness. On the other hand the thinness of the base of the petiole of *Thrincoma* reduces resistance by permitting the petiole to be twisted when the leaf is opposed to the wind or blown laterally, thus avoiding the strain which would come upon the more rigid base of the petiole in *Thrinax*.

The more salient differences between the leaf-blades of the two species may be enumerated as follows :

1. Although the length of the middle segments of the leaves of *Thrincoma* are longer (62 cm.) than those of the other (55 cm.) the apparent size of the latter is much greater because they are fully expanded while those of *Thrincoma* remain more or less fan-shaped, generally opening less than a semicircle. This decreases the lateral expansion, since the shortest divisions are brought to the sides, and gives no projection below the ligule where in *Thrinax* more than one third of the foliar expanse is located.

2. The leaf segments are much narrower (3.6 cm.) in the tall than in the short species (4.8 cm.).

3. Practically the difference in width is still greater because the segments of *Thrincoma* are never fully expanded but remain deeply channelled, thus decreasing the area of exposure to the wind and increasing the rigidity of the leaf.

4. Resistance to the wind is also reduced in the tall species by the separation of all the segments to more than two-thirds their length, while in *Thrinax praeceps* the median segments are united more than half way up. In the latter, as in the other members of the group, the separation begins at the point of greatest width of the segment, but as if to show that the deeply divided leaves of *Thrincoma* are an adaptation, the greatest width is located near the longitudinal middle of the segments, 10 cm. or more above the bottom of the cleft.

5. The texture of the leaf of *Thrincoma* is thicker and firmer so that the segments generally remain straight to the tips while in *Thrinax* they often droop after the leaves have become fully expanded.

6. The color of the leaves of the tall palm is a very dark green while those of *Thrinax praeceps* are uniformly of a much lighter, fresher tint.

7. The veinules of the firm leaves of *Thrincoma* are more numerous and closer together than those of *Thrinax*.

8. The veinules are also subequal in size, giving an appearance of uniform pattern, while in *Thrinax praeceps* from 3 to 5 of the veinules of each side of the midrib are distinctly larger than the others, the larger veinlets being separated by from 3 to 10 smaller ones.

9. In *Thrincoma* the cross-veinules are scarcely visible to the naked eye; under a lens they are still obscure, never equalling in size the smaller of the longitudinal veinules, which they seldom appear to cross. In *Thrinax praeceps*, on the contrary, the cross-veinules are as large as the finer longitudinal ones; they are obvious without a lens and give the fabric of the leaf a peculiar marbled effect on account of the fact that they are generally oblique or wavy and commonly appear to cross several of the longitudinal veinules.

10. The margins of the segments are thickened in both species, and on the upper side there is a groove inside the mar-

ginal rib. In the short species the margin is flat below and does not become decurved in drying. In the other the thin edge is closely folded under, and on drying the sides of the segments uniformly roll under, giving the dried leaves of the two species an appearance even more dissimilar than in the fresh state.

11. The lower surface of the leaf of *Thrincoma* has a silvery white layer of fine closely appressed hairs, all lying parallel to the veins and forming a continuous covering. The fibers seem not to be attached merely at one end, but along the side. They are firmly adherent and are to be removed only by scraping or rubbing; the surface underneath is deep green like the upper side, but the fibers remain in the grooves between the veins. In *Thrinax praeceps* the lower surface of mature leaves is smooth and glaucous, a comparatively very slight hairy covering present in young leaves being evanescent, though traces of it are usually to be found in the deeper basal grooves. The glaucous appearance is due to the presence of numerous white or hyaline points arranged in rows (stomata?). The hairiness of one leaf and the glaucous character of the other are probably to be looked upon as different adaptations for the same purpose—the reduction of transpiration.

12. The upper surface and the ligule of young leaves of *Thrincoma* are covered with a layer of wax in the form of small plates or scales not present in *Thrinax*.

Thringis gen. nov.

Trunk columnar, rimose; wood pithy. Leaves coriaceous with equal veinules, silvery below with closely appressed whitish pubescence. Fruits distinctly pedicellate, the pedicel with a bract above the base. Seed cerebriform, irregular, with wide furrows and convolutions; surface smooth and shining. Embryo subapical.

The characters of this genus are imperfectly known, none of the specimens being complete. Supposing however, that the association is a natural one, we have a genus with leaves and pedicellate fruits much more similar to those of *Thrincoma* than to those of *Thrinax*, and at the same time a columnar, rimose and pithy trunk like that of *Thrinax* and *Coccothrinax*. The seeds appear to differ from those of all related genera in the possession of large irregular convolutions. The coriaceous leaves, small

fruits, subapical embryo, and other differences separate this genus from *Coccothrinax*.

***Thringis laxa* sp. nov.**

The trunk is columnar or somewhat enlarged upward, about 3.6 m. high and 12 cm. in diameter. Surrounding its base was a dense turf of fine upright rootlets. The bark was rough and rimose.

The leaves are similar to those of *T. latifrons*, but smaller, the segments being about 70 cm. long by 33 mm. wide. The size of leaves is thus about the same as those of *Thrincoma alta*, but the texture is thin and flexible, the veinules being slender and not prominent on either side. The pubescence is much thinner than that of *T. alta* and of a silvery-gray color.

A palm collected in December, 1899, at Vega Baja, but without fruit (no. 1041). The habit and trunk are not those of *Thrincoma*, but the form and texture of the leaves and ligule associate the species with *Thrincoma alta* rather than with the palms here placed in *Thrinax*.

The columnar habit and protected habitat are reflected in the small ligule, 18 mm. across, and the relatively broad petiole, 13 mm. wide. It appears from the dried specimens of this species and *T. latifrons* that the leaves may have been "full," or irregularly folded, instead of strictly and equally expanded as in *Thrincoma alta*, and the greater width of the segments is a further indication of this possibility. The rigidity of the leaf of *Thrincoma alta* can be maintained because the segments are narrow and do not open widely.

The soft texture of the leaves of this palm is recognized by the natives who use it for making hats and call it "yaray" the same name which is applied in this part of the island to *Inodes causiaram*.

***Thringis latifrons* sp. nov.**

The leaves, inflorescence and young plants of a palm collected by Sintenis (no. 3278) on Monte Calabaza near Coamo are much larger and coarser than those of *Thrincoma alta*. The total length of the middle segments of the leaf would be over a meter, and the width of the larger divisions is over 5 cm. The thickness of the petiole at the base of the ligule is over 10 mm. The form of the

ligule is much like that of *Thrincoma alta*, though scarcely as large in proportion to the size of the leaf.

The lower surface is clothed with a satiny, appressed grayish pubescence somewhat less pronounced than that of *Thrincoma alta*. As in that species the veinules are of equal size, but they are more widely separated, and the wavy and usually somewhat oblique transverse veinules are easily distinguishable on both sides of the dried leaf. There are also slight traces of wax on the ligule and in the grooves of the upper surface. The median divisions are united for distinctly more than one-third their length.

The spathes and spadix are distinctly larger than those of *Thrincoma alta*, but the fruits are, unfortunately, quite immature and contain only shriveled seeds. The pedicels of the fruits are 2-4 mm. long and bear, usually near the middle, a very slender bract 1-2 mm. long.

This species is apparently distinct from *Thringis laxa* in the larger size and firmer texture of the leaves. It differs in the longer pedicels of the fruits, with their longer and more slender bracts, from a specimen belonging to the New York Botanical Garden and supposed to have been collected by Mr. A. A. Heller, though the number (3278) indicates that it may belong to the Sintenis series.

This consists of a single, short, once-branched inflorescence arising from two fibrous spathes. The fruits are about 4 mm. in diameter, nearly spherical, distinctly apiculate, deep reddish brown in color and borne on pedicels 2-3 mm. long, with a bract 1 mm. long or less at or below the middle. The seeds are 2-2.5 mm. in diameter; the surface is smooth and shining and light brown in color; general shape spherical but with deep folds and convolutions.

No leaves are known in connection with this specimen, and the exact locality is also in doubt. Mr. Heller believes, however, that the inflorescence came from a small *Thrinax*-like palm growing in the limestone hills a few miles to the east of San Juan.

Family ARECACEAE

A large family, with abundant genera in the tropics of America and Asia, but absent from tropical Africa. The Puerto Rico representatives may be recognized very easily by the fact that the

leaf crown is supported upon a column of the sheathing bases, a character of which the royal palm furnishes a conspicuous and ever-present example. Of the remaining genera, one, the betel palm of the East Indies is sparingly introduced about towns in the western part of the island and may be recognized at a glance by reason of the extremely dark green of its foliage. The other two genera are native palms confined to uncultivated areas and thus seldom seen at close range from traveled roads. The mountain palm, *Acrista*, covers the summits of many of the mountains of the island, but *Aeria* seems to be confined to the range of high limestone crags which skirt the northern coast of the island between Bayamon and Arecibo.

Key to the Genera of Arecaceae

Trunk tall and slender, tapering from a swollen base; spathes numerous (7); inflorescence appearing in the axis of the rather persistent lower leaves, long and slender; staminate flowers arranged in rows. AERIA.

Trunk robust or of uniform diameter; spathes 1 or 2; inflorescence short and brush-like, not exposed until the enclosing leaf below it falls away; flowers not set in rows. Spathes single, the fruits 2.5 cm. long; leaf-divisions upright, very dark green. ARECA.

Spathes 2, fruits less than 1.25 cm. long; leaf-divisions horizontal or oblique.

Trunk robust, thickened near the middle; leaf-divisions inserted by twos and standing at different angles; inflorescence twice or thrice branched, standing close to the leaf-bases. ROYSTONEA.

Trunk slender, of uniform diameter; leaf-divisions at equal distances, horizontal; inflorescence once-branched, at maturity 15 cm. or more below the leaf-bases. ACRISTA.

Aeria gen. nov.

A tall slender palm evidently related to *Gaussia*, but the embryo lateral instead of basal, and the pinnae without basal cushions.

Among palms in Puerto Rico *Aeria* resembles only *Acrista*, from which it is readily distinguishable by the very slender habit, the swollen base of the trunk, the much-branched slender interfoliar inflorescence, the shorter sheathing bases of the leaves, and the numerous spathes.

The embryo of *Aeria* is located near the longitudinal middle of the seed on the side opposite the rudiment of the style, which is here located at the base of the fruit instead of on the side as in *Acrista*. The albumen is also uniform, except for a small central cavity and the outer covering is fleshy rather than fibrous.

The position of the embryo is, perhaps, the most obvious difference between this genus and *Gaussia*, but there are several other significant discrepancies. Thus the flowers are arranged 3 or 4 in a row, very seldom 5 or 6. Three fruits develop from one flower only exceptionally. The trunk is of more than medium height, and the inflorescence is in reality infrafoliar, for although the dead leaf-bases and midribs of the leaves are persistent and support the long inflorescence, this condition is not comparable to that of the cocoid and other really interfoliar inflorescences.

***Aeria attenuata* sp. nov.** Plate 45

The tallest of Puerto Rico palms, probably attaining 30 metres and upward. The trunk is supported on a mass of coarse roots with spine-like projecting rootlets arranged in whorls. The surface of the trunk is smooth with very faint annular impressions. Near the ground the diameter is 12 to 15 cm. and increases upward to about 25 cm. at about 3 m. above the base. Above this swelling the trunk tapers very gradually and in tall specimens is less than 7 cm. in diameter at the top.

The sheathing leaf-base is only 20 cm. long. The leaves remain attached long after the rupture of the open side, but no fibers are formed, the edges of the split side being fringed only with brown membranous shreds. The petiole is rather short, round and rigid and the rachis is prominently angled above.

Segments of a rather firm texture and standing in different planes, but all more or less upright or oblique to the rachis, segments from middle of leaf 2.3 cm. wide near the base, 3.8 cm. long. The segments are set very closely together, especially the proximal, and overlap each other in a succubous manner. Fresh fruits deep orange in color and of an unsymmetrical oval in shape, 16 mm. by 12 mm., with a firm, fleshy outer covering 1.6 mm. thick, adherent to the seed, the three persistent styles remain of the same size and are located at the base of the fruit.

The seed is flattened oval, 11 mm. by 9 mm., with a prominent basal tubercle (hilum). The surface is brownish with a few shallow impressed lines, but the albumen is white and uniform. Flowers and ripe fruit were obtained at Vega Baja in December, 1899; type specimen no. 1040.

The so-called llume palm is a most striking ornament of the rugged limestone hills from Vega Baja to Manati and Arecibo. At a sufficient distance the slender trunk is no longer visible and the crown of leaves appears as if suspended in mid-air, while at closer range it does not seem possible that so slender a shaft can maintain itself. This very slenderness with the attending flexibility is however, an element of strength since it permits the trees to bend before the wind while the leaves diminish the resistance by straightening out as in the cocoanut. The hurricane of August, 1899, seemed to have done little damage to these tallest of Puerto Rico palms, many of which project for more than half their height above everything standing about them. As the trees of the rather sparse forest growth of these hills are commonly from 12 to 18 metres tall, the llume palms must often attain upwards of 30 metres.

ARECA CATECHU Linn. Sp. Pl. 1189. 1753

In the western end of the island the betel palm of the Malay region has been sparingly introduced, though the fact does not seem to have been reported hitherto. A few were seen in gardens about Mayaguez and others in and near San Sebastian. So far as we were able to learn, the people do not know the name or nature of this introduced species which is apparently planted only as an ornament or a curiosity. The form is not unpleasing, but the extremely deep, sombre green of the foliage seems almost unnatural and imparts a suggestion of artificiality.

Only photographs and fruits of *Areca* were secured at San Sebastian, but Puerto Rico specimens collected by Sintenis (no 5749) at Aguadilla have already been distributed from the Berlin Botanical Garden with the label "Palma Spec. Subtrib. Attaleae."

ROYSTONEA Cook, Science, II. 12: 479. 1900

Orcodoxa Martius and more recent authors, not Willdenow.

The history of the generic name *Orcodoxa* shows that botanical writers of the last few decades have been in error in removing the two original species and applying it to another series of similar but not closely related forms. To avoid further confusion with reference to a name which by reason of the conspicuous character of

the trees has wide use in popular literature it seems desirable to add the following notes on the genus *Oreodoxa* as originally established by Willdenow in the Memoires de l'Academie Royale, Berlin, 1804, a publication which seems to have been consulted very seldom, even by writers on palms.

Spathe universal, univalvate ; spadix ramose, perianth monophyllous, tripartite below, the divisions ovate, acute, concave ; petals ovate, acuminate, concave. Filaments six, of the length of the corolla ; anthers oblong, acute. Style tripartite, shorter than the filaments, stigma acute. Ovule, drupe, and seed globose ; drupe succulent, but slightly fibrous ; seed single, cartilaginous, nearly smooth, marked with a longitudinal sulcus. In the discussion subsequent to the statement of the above characters, *Oreodoxa* is said to be distinct from *Bactris* in the tripartite style and in the absence of the "ordinary three impressions" ; it is distinguished from *Areca*, then supposed to include *Euterpe* and species now generally placed in *Oreodoxa*, in the single spathe, the triple style and the hermaphrodite flowers.

The first species is *Oreodoxa acuminata*, referred by recent authors to *Euterpe* but probably constituting a distinct genus. The trunk is erect, cylindrical, very smooth, and attains a height of from 15 to 18 metres ; the "root" throws out suckers at the base of the trunk. The fronds are pinnate, with opposite or alternate, very long, ensiform, acuminate pinnae, replicate at base. The strongly convolute young leaves form a green apex for the trunk, five feet high. Spathes cinereous, folded in at the base of the leaf-sheaths at the top of the trunk, univalvate, deciduous ; spadix erect, much branched, having the appearance of a broom.

The heart of the bundle of leaf-bases, about two feet long and three inches thick is eaten as a salad, with oil and vinegar. It is also stated that the deciduous boat-shaped spathes serve as reservoirs of rain-water which is long retained in the cool shade cast by the trees. Birds and beasts, and human natives as well, are said to be dependent at times upon the liquid thus stored, since in the regions where the palm grows there are at times no other means of procuring water. The forests of the high mountain chain of Buena Vista in the province of Caracas are the native home of the species. It thus appears that in addition to the structural differ-

ences *Oreodoxa acuminata* occupies quite a different place in nature from that of the more thoroughly tropical species commonly referred to that genus, and the stoloniferous habit also indicates a different ecology.

The second of the original species of *Oreodoxa* is now referred to the genus *Catoblastus*. It is a somewhat smaller tree from 12 to 15 metres high, with a generally similar habit, and is also stoloniferous, but the pinnae are broad, cuneiform and praemorse, or irregularly truncate as in the species generally referred to *Martinezia*. The drupaceous fruit is grayish and the pulp is only slightly succulent; seed the size of a pigeon's egg, its exterior brown, marbled with numerous veins. In the characters of the spathe the arrangement of the fruit and the edible quality of the heart of the leaf-cluster, as well as in the formation of lateral off-shoot this species is said to be similar to the first.

Botanists are not yet agreed upon the methods of dealing with complications like the present in regard to the names of plants, but it appears certain that those who do not recognize *Oreodoxa* as a genus distinct from those admitted in the more recent works on palms must associate it either with *Euterpe* or *Catoblastus*. The latter name it would in that case replace, being much older. Moreover, unless we are prepared to disregard Willdenow's statements concerning the stoloniferous trunk, the simple spathe and the hermaphrodite flowers, to say nothing of many minor points of circumstantial evidence, there is no scientific warrant for applying the name *Oreodoxa* to the noble Antillean species with which it has been universally associated.

The dried specimens which Willdenow studied were supplemented by notes of field observation by a court gardener, who was evidently also a botanist of some experience, to whom Willdenow refers as his "friend." The living colors are described with considerable detail throughout the entire paper, which renders noteworthy the fact that the spathes are stated to be cinereous. This is in agreement with species of *Euterpe* which have membranous spathes, but indicates a wide difference from the West Indian trees where the spathes are thick and fleshy and remain vivid green until they open and fall away.

The name *Roystonea* has been given to this ornament of the

Puerto Rico landscape as a respectful compliment to General Roy Stone, the American engineer officer who secured the admiration of the people of Puerto Rico by his fearlessness and conspicuous energy in the Adjuntas road-building campaign which flanked the line of Spanish defenses, and whose subsequent interest in the improvement of the island will undoubtedly affect its future history.

Roystonea Borinquena sp. nov. Plate 45. f. 2.

Trunk normally fusiform, 30-60 cm. thick, 12-18 m. high. Leaf-segments 4-4.4 cm. in width. Inflorescence robust, compact, twice-branched, the branches numerous and coarse, ferruginous, pubescent. Fruits long-oval, yellowish brown at maturity. Seeds 8 mm. by 6.3 mm., flattened about the hilum, rounded below; wall of endocarp smooth, adherent over a small area.

The royal palm of Puerto Rico differs from that of Cuba in having the trunk generally shorter, more robust and more distinctly fusiform. The inflorescence is twice branched, with the branches more densely clustered, coarser and darker colored than those of the Cuban royal palm, *Roystonea regia*. They are also covered with a slightly hispid brown pubescence while Cuban specimens are much smoother and more pallid. The difference of habit, to judge from photographs of the Cuban species, is most apparent when the trees have grown in the open, as when planted in avenues or along roadsides. In Puerto Rico, trees which are obliged to compete with other vegetation are often tall, slender and unsymmetrical. The typical form is shown in our photograph (no. 250) taken in the plaza of Juana Diaz.

Martius gives the width of the pinnae of the Cuban royal palm as from 8 to 12 lines. Cuban specimens show as much as one inch and a quarter, while others from Porto Rico are half an inch wider (44 mm.) of somewhat coarser texture and with more widely separated secondary veins. The fruits of the Puerto Rico palm are a deep yellowish brown when ripe, while those of the Cuban are said to become violet or bluish black. According to Martius, the fruits of the Cuban species are 6 lines by 4, but dried specimens show no such discrepancy of proportions and measure only about 8.5 mm. by 7.5 mm.

In Puerto Rico the fresh fruits are also much longer than broad, perhaps even more slender than the figures given for the Cuban;

when dry they still appear somewhat longer and larger than the latter.

The seeds of *Roystonea Borinquena* differ in several particulars from those of the Cuban species. In shape they are longer and less spherical, measuring 8 by 6.3 by 5.5 mm. instead of 7.8 by 7 by 6 mm. ; the side bearing the hilum is much flattened and even slightly concave ; the fibers radiating from the hilum are longer, and the corner between the hilum and the micropyle is evenly rounded, not sharply squared and prominent as in *R. regia*. On the back of the seed the smooth inner wall of the endocarp is closely adherent over a small area, while in Cuban seeds this wall remains attached over nearly the whole side and is furthermore distinctly rugose-coriaceous on the surface, and has a distinct sulcus in the median line.

The royal palm is not only the more conspicuous and characteristic natural object in most parts of Puerto Rico, but it probably exceeds the cocoanut in total economic importance. The most useful part is the *yagua* or sheathing base of the leaf, with which a large proportion of the houses of the poorer classes are thatched or sided, or both.

The royal palm is one of the wild species which has been distinctly advantaged by human interference in natural conditions. It is a general fact that outside the climbing species palms are not successful in competing with tropical forest vegetation. Originally the royal palm and the corozo were probably confined to the more rugged slopes of the lower limestone hills where they both still retain a foothold in places where the natural growth seems never to have been cleared away. But the vast majority of royal palms now in existence in Puerto Rico stand on land which has been cultivated at one time or another, and where the palms were able to secure a foothold before the competition of other plants became too strong.

The discovery of root tubercles on a young plant of this species has been noted in the introductory statement. These tubercles though small in size are very numerous upon the smaller roots. In shape they are mostly oval and symmetrical. The larger are about 2 mm. in length though our natural-size photograph shows several fusiform or clavate bodies from 5 to 10 mm. long and as

much as 2 mm. thick. The color of the roots and tubercles is white.

The royal palm of Florida is commonly referred to *Oreodoxa regia*, though with very doubtful propriety. Apparently on account of its great size, Cooper (Smithsonian Report 1860: 440. 1861) was inclined to identify it with *Oreodoxa oleracea* which had also been reported from the Bahamas. The inflorescence and seeds collected by Curtis on the western borders of the everglades (no. 2676) are, however, obviously not those of *R. oleracea* but are much more similar to those of *R. regia*. The branches of the inflorescence are much longer and more lax than those of the species of Cuba and Puerto Rico, from which they also differ in the frequent development of tertiary branches, in this respect resembling *Roystonea oleracea*. The fruits do not resemble those of *R. oleracea* but are closely similar to those of the other species though somewhat smaller and more nearly spherical. Several reliable witnesses are on record to the effect that the trees are from 28 to 35 metres high and as much as 45 metres has been claimed, while among the royal palms of Cuba and Puerto Rico 18 metres is the commonly recognized limit of size. Mr. C. T. Simpson, of the U. S. National Museum, states that the palms of southwestern Florida lack the conspicuous bulge so characteristic in the trunks of the Puerto Rican trees, and that they grow almost in reach of tide-water, while the natural habitat of the Puerto Rico species is evidently the limestone hills. In view of these differences it seems preferable to treat the Florida royal palm as a distinct species, for which the name **Roystonea Floridana** is proposed.

Mr. Simpson also informs me that the royal palms seen on the islands off the coast of Honduras had the size and habit of those of Florida and not the relatively stunted appearance of those seen by him in Hayti and Jamaica. This fact is suggestive in connection with the popular idea that the palms of Florida are to be looked upon as recent arrivals from Cuba. Instead it seems more reasonable to believe that the royal palm of Puerto Rico, like the species of *Thrinax* of that island, is a remnant of the flora of the time when the limestone hills were keys and hammocks like those of southern Florida, and relatively poor in vegetation able to crowd out the palms.

Acrista gen. nov.

Trunk slender, of uniform diameter. Pinnae horizontal, appendiculate. Inflorescences distinctly infrafoliar; spathes two, the outer short, the inner long and slender. Spadix once-branched, the branches coarse, tapering. Fruits with stigma lateral, seed deeply ruminant, embryo basal.

Related to *Roystonea*, but differing in the more slender habit, the once-branched inflorescence, the basal embryo, and in having the leaflets in one plane. The color of the foliage is also considerably lighter than that of the royal palm so that from a distance the general appearance suggests the cocoanut rather than the royal palm.

There is also some resemblance between the foliage of *Acrista* and *Cocops*, but the absence of sheathing leaf-bases in the latter genus will enable even young specimens to be separated. Moreover the leaf-divisions of *Cocops* are much narrower and those at the end of the leaf are not so much shortened as in *Acrista*.

Further differences from *Roystonea* are to be found, such as the much smaller size and the larger roots, which are tuberculate and inclined to become superficial like those of the llume palm. The sheathing leaf-bases are not as long proportionately as in *Roystonea*, and there is a distinct formation of fibers, although the texture is flimsy. The outer sheaths do not split off and fall away as promptly as in *Roystonea* but several dead ones sometimes hang from about the base of the crown. Although the sheath is longer than in *Aeria* the fibers are much better developed, there being but a few membranous shreds in *Aeria*, and no distinct fibers at all.

Among the mountains between Cayey and Guayama many summits are covered with the *palma de sierra*, probably in places which have never been cleared. A few of the palms follow down the steeper uncultivated ravines. From a distance the crowns suggest royal palms but a closer view renders the difference apparent. There is also no suggestion of the bulging trunk of *Roystonea*. In height the *palma de sierra* probably does not exceed the royal palm.

The tips of leaflets of young leaves are connected by two brittle red strands both of which lie on the mesial face, one along the

edge, the other near the middle. The tips of the leaflets are of the same material and are sometimes persistent as long corneous appendices like those of the cultivated *Howea*.

The generic name *Euterpe* Gaertner, which is commonly applied to a considerable series of American palms related to the present, was in reality established for the Malayan genus for which the name *Calyptrocalyx* Blume is now in use, *Pinanga silvestris globosa* Rumphius being cited by both Gaertner and Blume as the original, in the one case, of *Euterpe globosa*, and in the other of *Calyptrocalyx spicatus*. The origin and identity of the seed described and figured by Gaertner have not been established, and seem likely to remain in doubt; but in describing *Calyptrocalyx*, Blume argued that the generic name should remain with the seeds studied by Gaertner and declared that these did not belong to any Malayan species but to some of the arecoid palms of the Mascarene Islands. This suggestion seems not to have been disposed of by Martius or others, but the fact that Gaertner's fruits showed an apical stigma seems to exclude them from the American group with which the generic name has been associated.

In making use of the name *Euterpe* for Brazilian palms Martius cites Gaertner as author of the genus and states that it is of worldwide distribution in the tropics. Gaertner's *E. globosa* is placed as a synonym of *E. oleracea* * Martius, and Jacquin's older name *Arcca oleracea* stands in the same relation to *Euterpe cdulis* Martius, thus rendering *Euterpe oleracea* Martius a specific homonym. Subsequently Martius claims the genus *Euterpe* for himself and expresses doubt whether it is the same as that named by Gaertner, while Drude in Engler and Prantl's *Natürlichen Pflanzenfamilien* says "*Euterpe* Mart. (nicht Gaertn.)." Martius also admits that the West Indian *Arcca oleracea* Jacquin is distinct from the Brazilian species of *Euterpe*, and redescribes it under the name *Orcodoxa oleracea*.

A further complication connected with *Acrista* was brought to light by finding that specimens collected by Sintenis (no. 1525) in the Luquillo Mountains in northeastern Puerto Rico and distributed from the Berlin Botanical Garden as *Orcodoxa oleracea* belong to the present genus, together with others collected in Martinique by Hahn (no. 805) and identified at Paris. With the last, the local

* Hist. Nat. Palmarum 2 : 29.

name *choux palmiste* is given, the same which Jacquin noted in the original description of his *Areca oleracea* (Stirp. Am. 278. 1763). Moreover, it can scarcely be determined from Jacquin's description whether he was dealing with a *Roystonea* or an *Acrista* or with both, though his claim that his was the tallest palm of the Antilles might hold the name for the *Roystonea*.

It might then be argued by some that Miller's species, *Palma altissima* constituted a segregate from Jacquin's *oleracea* and that the latter name is available for the *Acrista* of Martinique, whether identical or not with that of Puerto Rico. But with a possible doubt between the *Acrista* and the *Roystonea* there can scarcely be a justification for the use of the same name for a third South American species or a fourth West Indian.

As a means of decreasing the confusion it may be suggested that as neither the generic nor the specific name of the Brazilian palm which Martius called *Euterpe oleracea* (Hist. Nat. Palm. 2: 29) is available, the name **Catis Martiana** may be proposed, the generic designation having reference to the drooping pinnae characteristic of the present species and several of its South American relatives.

***Acrista monticola* sp. nov.** Plate 44

Trunk smooth, 10 to 15 m. high, perhaps taller, from 12 to 15 cm. in diameter, with distinct ring-like leaf scars and internodes, light brownish or appearing grayish with bark lichens.

Leaves about 2 m. long, the pinnae lanceolate, equally spaced and lying nearly horizontal, 55 cm. long and 4 cm. broad; the surface light green on both sides, with very close parallel longitudinal veinlets, but no visible cross veins. The sheathing bases are considerably shorter and generally appear somewhat more robust than in *Roystonea*. In protected situations the leaf-bases persist and the margins shrivel up and expose a flimsy network of fibers. Inflorescences appearing several close together; by the falling of the leaves above them they are left several inches below the leaf-bases before maturity is attained. Spathes fusiform, long, more slender and pointed than in *Roystonea*. Spadix once-branched, 1 m. long, 6 cm. in diameter at base, tapering gradually to the apex. Branches 23 cm. long and less, the proximal branches longest; at first appressed to the rachis, the branches are opened out and held stiffly erect by a fleshy turgid cushion on the upper (distal) side of the base of each. The branches of the rachis may thus be said to be hinged, and with maturity the supporting cushion

dries away and allows them to resume a direction nearly parallel to that of the rachis.

The dried fruits of *Acrista* are grayish brown in color and nearly smooth or somewhat coriaceous in external texture; they measure 11 or 12 mm. in length and are nearly as wide, being slightly oboval in shape. The outer wall is thin and brittle and covers a more or less distinct thin layer of amorphous brownish material probably representing the pulp of the fresh fruit; in the dry state this may adhere either to the outer wall or to the fibers next inside. Near the base these fibers are simple, pointed and vertical; about half way up they divide and anastomose and are, as it were, felted and cemented together to form an oval sac open below and closed above. The outer fibers are much coarser than the inner and there are sometimes suggestions of three layers separated by a dark-brown friable material. A few of the delicate inner fibers are adnate to the surface of the seed which is otherwise free from its fibrous covering.

Seed 8.5 mm. by 8 mm., slightly lighter in color than the outside of the fruit. Surface slightly uneven with obscure veinlike ridges and impressions of the fibers of the outer covering. The kernel is white, hard and bony, and deeply ruminant, though this is not apparent from the outside. The channels are very narrow and often radial and straight; they penetrate 3 mm. or less. Embryo directly basal; hilum lateral, somewhat below the level of the stigma; a short raphe extends about half way to the embryo.

Family COCACEAE

The cocoid palms are a distinctly American group, the African oil-palm, *Elaeis Guineensis* and the cocoanut being the only outliers of the family which have been supposed to be indigenous in the Old World. South America is the center of distribution and is the home of a large proportion of the two hundred or more species. Only five genera reach Puerto Rico, and one of these, *Cocos*, was probably not a native of the island.

Key to the Subfamilies of Cocaceae

- | | | |
|---|------------------------------------|------------------------|
| Trunks, stems, and midribs beset with sharp spines; seeds | foraminate at or above the middle. | Subfamily BACTRIDINAE. |
| Trunks and other parts unarmed; seeds | foraminate at base. | Subfamily COCINAE. |

Subfamily BACTRIDINAE

Some of the numerous South American representatives of this group are nearly smooth, but the three genera known from Puerto Rico have the trunks, leaf-bases, midribs and inflorescences beset with sharp black spines, and are thus readily recognizable.

Key to the Genera of Bactridinae

- Trunk small, cespitose; leaves separated by long internodes; foramina of seeds apical. BACTRIS.
- Trunk medium or large, solitary; leaves crowded together at the summit; foramina peripheral.
- Trunk slender; leaf-divisions broad, praemorse-truncate; pistillate and staminate flowers intermixed on the inflorescence; exocarp fleshy. CURIMA.
- Trunk robust; leaf-divisions narrow, sharp-pointed; pistillate flowers below and separate from the staminate; exocarp fibrous. ACROCOMIA.

BACTRIS Jacquin, *Stirp. Am.* 279. *pl.* 271. 1763

The type of this genus, *Bactris minor* Jacquin, described from the vicinity of Carthagena, Colombia, is a small spiny palm with creeping rootstocks. The upright trunks are about an inch thick and twelve feet high, with long spiny internodes. The fruits are fleshy, purple, and about the size of a cherry. Several species of *Bactris* are known from the West Indies though the generic name has doubtless been applied rather loosely to all the small spiny coccid palms.

The two following species of *Bactris* from Puerto Rico described by Martius several decades ago seem not to have been secured by recent collectors unless it be true, as suggested below, that one of them, the simple-leaved *B. acanthophylla* applies to a young *Curima*. Of *B. Pavoniana* the narrowly grass-like leaf-divisions would be sufficiently characteristic to separate it at once from all other palms known from Puerto Rico.

BACTRIS ACANTHOPHYLLA Martius, *Palm. Orbign.* 67

“Trunk low, spiny; frond simple, the petiole spiny; blade lanceolate in young plants, oblong in the adult, cuneate at the base and bifid at apex, the margin unequally erose, unarmed; rachis and primary veins spiny on both sides; spines bristle-like, narrowed at base, those of the petiole black, those of the blades fuscous.”

“In the western part of the island of Puerto Rico, near the village of Yrurena, in swampy places on the margins of aboriginal forests at an altitude of 400 feet ; collected by Wylder, 1827.” (Martius Hist. Palm. 3 : 281.)

A specimen to which the above diagnosis would not be inapplicable was collected by Sintenis in the mountain forests near Maricao (no. 484). It was distributed from Berlin as a *Martinezia*, together with two other very young plants and a seed to which one of these was attached.

The seed evidently did not come from a cocoid palm but together with the young seedlings may belong to *Acrista*. The large spiny plant is probably a young specimen of *Curima*, and should these suggestions prove to be correct the specific name *acanthophylla* must be transferred to this genus though whether it will replace *colophylla* or not is not to be determined until it can be ascertained that the Maricao species is the same as that here described from Bayamon.

BACTRIS PAVONIANA Martius, Palm. Orbign. 70

“Frond pinnate, rachis with rather long spines and black bristles : linear acuminate, about equally distant, the terminal united, setose-ciliate, glaucous below and with a sparse whitish down.”

“Puerto Rico ; Pavon.” (Martius, Hist. Pal. 3 : 282.)

Grisebach has reported this species from Antigua and has re-described it as follows, presumably from the Antigua specimens.

“‘Trunk low’ ; *leaves pinnatisect* : *segments numerous, grass-like, linear-acuminate* or the uppermost broader by cohesion, glaucous and minutely puberulous or glabrescent beneath, approximate, subequidistant, reduplicate at the base : *rachis armed with very long black prickles* and rare bristles, keeled above.—Flowers unknown ; leaf-segments (in our specimens, which are cut off, perhaps about the middle of the rachis) more than 30-jugal, 3'''–6''' distant, 12''–8'' long, 4'''–2''' broad, superior gradually shorter, the uppermost cohering ones sometimes 6'''–8''' broad : prickles scattered or clustered, slender, the greatest 2'' long. HAB. Antigua : *Wullschl.*, Blubber valley ; [Portorico].” (Grisebach, Fl. Brit. W. I., 520. 1864.)

Curima gen. nov.

Trunk rather slender, internodes armed with scattered slender spines. Leaves and inflorescence also spiny, especially on the proximal parts. Pinnae numerous, strap-shaped, praemorse-truncate, imperfectly separated near the ends of the leaves. Inflorescence rather slender, once-branched; pistillate flowers mostly located near the bases of the branches. Fruit drupaceous, exocarp fleshy, not fibrous; foramina peripheral.

A palm related to *Acrocomia* and to the genera commonly grouped under the name *Martinezia*, to which *Aiphanes* and *Marara* are generally referred as synonyms. Reasons why none of these names appears available for the Puerto Rico species are given below. The characters of the fruit, with foramina near the middle, seem to indicate that *Curima* is not remotely related to *Acrocomia*, from which it differs superficially in the more slender habit, the truncate or praemorse leaves and the very long and lax inflorescence.

Curima colophylla sp. nov. Plate 46

The solitary trunk rises from a mass of spiny roots somewhat smaller than those of the llume palm (*Aeria*). Diameter of trunk from 1-1.5 cm., often slightly thinner near the ground, though showing no such tendency to bulge as appears in *Roystonea*, *Aeria* and *Acrocomia*. The surface of the internodes is rather sparingly provided with needle-like spines smaller and more slender than those of *Acrocomia*. On old trunks the spines are often more or less completely absent.

Leaves 2.13-2.5 m. long, with from 30 to 40 pairs of strap-shaped praemorse-truncate divisions shorter and broader as the end of the leaf is approached, and with a terminal undivided area several inches wide. There is no apparent tendency toward the arrangement of the leaf-divisions in clusters as in *Martinezia caryotaefolia* and other allied species.

The base, rachis, midribs and even the surfaces of the pinnae are beset with coarse black or deep red spines which are closely appressed when young and become erect as soon as the surfaces are exposed, all the parts except the spines and the upper surfaces of the leaf-division being covered at first with a light grayish or brownish scurfy coating which gradually disappears.

The inner spathe is narrowly fusiform and about 1 m. long. It splits to the level of the outer spathe revealing the spadix and its extremely spiny peduncle. The flowers are greenish cream colored in mass, paler and not so yellow as in *Acrocomia*. The pistillate flowers are relatively very few and located near the base of the simple branches.

The cherry-like fruits are dull orange or brick red with rather dry fleshy or oily exocarp having a rather mealy though distinctly acid flavor, but no really unpleasant taste. This fleshy covering is only very slightly fibrous, and that near the base; the seeds fall off very easily sometimes leaving the base of the exocarp attached to the fruiting branch. The nut is about 12 mm. in greatest or transverse diameter and about 10 mm. high, while the fresh fruit is 14-16 mm. through and 12 or 13 mm. thick. The surface is deeply and irregularly pitted and marked with three radially fibrous striate foveolae.

It is perhaps too soon to assert that there is only one species of the present genus in Puerto Rico. The trees certainly differ considerably in size though not more than the cocoanut and others. There is also a noticeable difference in the abundance of spines. Such apparent variability may, however, be due to age, the older trees tending to become less densely beset with the brittle black spines which are often conspicuous on young specimens.

The specimens (no. 878) and photographs on which this genus and species were based were secured on the limestone hills near the wagon road between Bayamon and Toa Baja where the present palm is not uncommon.

Curima appeared to be especially abundant about Bayamon but is probably rather generally distributed in the limestone hills of the island, perhaps also on other soils. A few trees were seen along the road between Utuado and Lares, and numerous others between Isolina and Manati. Sintenis collected specimens of what is apparently the same species near Juncos and Hato Grande, and at Maricao young specimens discussed under *Bactris acanthophylla*.

As far as Puerto Rico is concerned, this palm is very easily recognized by means of the curiously truncate leaf-divisions, the outer margins of which appear as though accidentally injured or

eaten away by caterpillars. This feature is, however, shared with numerous other West Indian and South American palms, though apparently only one, the so-called *grigri* palm of Martinique can be referred to the present genus with confidence. For this the name **Curima corallina** (*Martinezia corallina* Martius, Hist. Nat. Palm. 3: 284) appears to be correct, although Martius places Gaertner's much older *Bactris minima* as a synonym for his species. Gaertner, however, was making a second attempt at re-naming Jacquin's *Bactris minor*, having previously misplaced that name in connection with a West Indian *Acrocomia*, probably the same to which Jacquin had already supplied the name *Cocos aculeatus*. Thus it is possible to treat *Bactris minima* Gaertner as a synonym of *Bactris minor* Jacquin and the restoration of Gaertner's inappropriate name for the *Curima* is thus avoided.

With this preliminary description we may return to the consideration of the generic names *Martinezia*, *Aiphanes* and *Marara* which other writers have applied to relatives of the present palm or treated as synonyms. *Martinezia* was described by Ruiz and Pavon (Prodr. Flor. Per. et Chil. 148. 1794) for five Peruvian palms, but it was amended by Martius (Hist. Nat. Palm. 3: 283) by the removal of all the original species and the substitution of a new set. Of the original species studied by Ruiz and Pavon only two, *M. ciliata* and *M. abrupta* were mentioned in connection with the original description of the genus, and this because they offered exceptions to the generic characters. If these were to be excluded for this reason from those among which the type is to be sought the name *Martinezia* must go with the subsequently published *M. ensiformis*, now referred to *Euterpe** or with *M. lanceolata* and *M. linearis*, now placed in *Chamaedorea*. If we hold to the first species, *M. ciliata*, *Martinezia* is probably a synonym of *Bactris*. The second species, *M. abrupta*, has escaped Martius and the Index Kewensis, in which a sixth name *M. interrupta* is the only one by Ruiz and Pavon now credited as being a genuine *Martinezia*. Thus by the method of elimination *Martinezia* would according to current classification replace *Chamaedorea* while by the method of types it would stand as a synonym of *Bactris*.

The genus *Aiphanes* was established by Willdenow on *Aiphanes*

* Roemer and Schultes treated *Martinezia* as a synonym of *Oreodoxa*.

aculeata, a spiny palm from the mountains about Caracas. The trunk is said to be erect, ten meters high, subcylindrical and very spiny. The leaves are about 1.6 m. long, with four pairs of remote, broad, cuneate, praemorse pinnae, strongly whitish pubescent on the under side; the petiole is also beset with spines. Spathe acuminate at both ends, aculeate on the outside, smooth within, opening longitudinally; spadix 4.5 dm. long, composed of cylindrical spikes placed opposite. Flowers hermaphrodite; calyx trifid, the divisions acute; petals acuminate; filaments 6, subulate, anthers rounded, style as long as the stamens, stigma trifid; drupe globose, the fleshy farinaceous pulp rather tasteless, though edible; nut hard, of the size of a musket ball, unilocular, black, furrowed with a large number of grayish grooves, of which three are always much larger than the others. The kernel is white, very sweet, and very good to eat. *Aiphanes* grows in the ravines and forests of the high mountains of the district of Caucagua, province of Caracas, Venezuela and requires a fertile, somewhat moist soil. It flowers and fruits in July.

From the above it appears that *Aiphanes* is a genus quite different from *Curima*, approaching some of the South American species of *Bactris* much more closely than it resembles the Puerto Rico tree.

The genus *Marara* was based by Karsten (Linnaea, 28: 389) on *M. bicuspidata* from Colombia, a cespitose palm having a trunk 7 meters high and 10 cm. in diameter, clothed with black spines 6 to 8 mm. long. The leaves are 125 cm. long with from 60 to 80 pairs of cuneate pinnules which measure 3 dm. in length and 15 cm. in width, and are clustered in sixes or eights. This appears to be a very extreme development of the leaf-arrangement seen in the cultivated palm commonly called *Martinezia caryotaefolia* where the leaflets are distinctly clustered, but by no means so crowded as must be the case when on the side of a leaf 125 cm. long are leaflets with an aggregate width of 10-13 m.

The palm commonly cultivated in conservatories as *Martinezia caryotaefolia* is obviously allied to *Curima*, perhaps more closely than to either *Aiphanes* or *Marara*, but in addition to the clustered pinnules it has a more slender habit, especially apparent in the long internodes and the more lax inflorescence. This difference

in habit is also evidently correlated with the fact that the leaf-bases do not become deeply gibbous and obliquely inclined from the trunk as in *Curima* but remain closely sheathing. Moreover, the upper side of the leaf-stalk which in the Puerto Rico palm is deeply channeled and has lateral corners sharp or torn into fibers nearly to the insertion of the lowest pinnae is in the conservatory species nearly cylindrical for a long distance below the pinnae, and has long spines on the upper side as well as on the lower. It is as though the ligule were located in *Curima* near the insertion of the lowest pinnae while in the other form it remains close to the trunk, with a cylindrical section intercalated to reach to where the pinnae begin. Apparently we are dealing with still another generic group for which the name *Tilmia* would not be inappropriate in allusion to the shorn and disheveled appearance which it shares with *Curima*. The species studied are *Tilmia caryotaefolia* (*Martinezia caryotaefolia* H.B.K. Nov. Gen. et Sp. 1: 305. pl. 699) in the National Botanic Garden and *T. disticha* (*Martinezia disticha* Linden, Cat. 32. 1875).

The seeds of *Tilma caryotaefolia* are like those of *Curima*, but considerably larger, rounder, and much smoother. The foramina are peripheral, but are much smaller and more shallow, those of *Curima* being surrounded, as it were, by a prominent rim which adds somewhat to the apparent width of the seed. In both genera the nuts are unsymmetrical, the side which has the largest foramen being distinctly larger than the others and in *Curima* the irregularly pitted sculpture is coarser.

ACROCOMIA Martius, Hist. Nat. Palm. 2: 66

A genus of palms distributed through tropical America from Mexico to Cuba and Paraguay. All the species are of stocky, compact growth, with a dense crown of numerous leaves. The trunk and the leaf-stalks are usually armed with strong, sharp spines, sometimes several inches long.

Although totally different on close inspection this genus has in Puerto Rico a superficial resemblance to the royal palm, which often deceives travelers. The similarity lies mostly in the two facts that both the royal and corozo palms are more robust and stiffly erect than the cocoanut, and that the leaf-divisions instead of lying

horizontal and in one plane are tilted at different angles to the midrib, thus giving the foliage seen in the mass a somewhat unkempt appearance in comparison with the cocoanut.

In distinguishing the corozo palm from the royal palm when seen at a distance so great that the spines of the one and the columnar green leaf-sheaths of the other can not be seen, recourse may be had to the following facts. The leaf-crown of the corozo palm is much rounder, thicker and more compact than that of the royal palm, since it contains many more leaves, and these persist much longer. The royal palm can also be known by the unopened leaves which project straight upward like flag-poles or lightning-rods, while in *Acrocomia* the leaves open as they are pushed out and seldom offer a suggestion of the spire-like effect.

Acrocomia media sp. nov.

Trunk 20–30 cm. in diameter near the base, thickened above to 50 cm. or less ; height commonly about 6–8 m. rarely exceeding 10 m. Surface of trunk with slight annular impressions. Internodes armed with slender black spines, the larger 10–15 cm. long, mostly confined to the lower half of the internodes. Fruit green, becoming yellowish, the husk firmly fibrous, inedible ; about 35 mm. in diameter, nearly spherical in shape, with a distinct apical papilla. Kernel 25 mm. wide by 22 mm. long ; width of the cavity 18 mm. The type specimen was collected near Ponce (photograph no. 255).

The *Acrocomia* of Puerto Rico seems to differ from *A. aculeata* (Jacquin) in its robust habit and somewhat bulging trunk, while it is less stout and less swollen than *A. fusiformis* (Swartz). The name *Acrocomia lasiospatha*, although used by Martius and Grisebach has no warrant for supplanting *fusiformis* of Swartz, which must be preferred for the Jamaica species with the thick, swollen trunk.

In Jamaica there seem to be at least two species of *Acrocomia*, the larger of which is called the "great macaw" palm, and is described as having a fusiform trunk as thick as a man's body. What is presumably the same species occurs in Cuba as shown by a photograph from the vicinity of La Gloria on the north coast. The greatest diameter of the trunk is three or four times the thickness near the base. In Puerto Rico no trees approximating these proportions were observed, the greatest amount of swelling probably not reaching twice the diameter below. According to Maza

Acrocomia lasiospatha grows wild in Cuba and is known under the name "coroja de Jamaica." Swartz described his *Cocos fusiformis* on the supposition that it was distinct from the *Cocos aculeatus* of Jacquin, from Martinique, by reason of the fusiform trunk. The species was, nevertheless, reduced by Martius to his South American *Acrocomia sclerocarpa*, perhaps because the spathe is said to be spiny, a character probably subject to great variation.

Jacquin's name *Acrocomia aculeata* (1763) must, it seems, be used for the West Indian palm placed by Martius under his *A. sclerocarpa*, which is to be maintained, if at all, as a South American species. Jacquin declares that the habit of his tree is similar to that of *Cocos nucifera* and *Cocos amara* (*Syagrus*), and his figure shows a tall straight trunk tapering slightly upward, with no tendency to bulge. The spines of the trunk are few and the midribs are aculeate on both sides. The drawing of the fruit is 37 mm. long by 41 mm. wide and has a broad conic papilla at apex. As indicated above, such a tree was not noticed in Puerto Rico where all the corozo palms are distinctly, though slightly, thicker some distance above the base, though apparently never equaling *A. fusiformis* in this respect.

Subfamily COCINAE

Key to the Genera of Cocinae

Trunk distinctly ringed, rising from an inclined swollen base; leaves numerous, many of the lower drooping or pendant, the divisions many and narrow; fruits very large, borne continuously. Cocos.

Trunk nearly smooth, straight and columnar; leaves fewer, not becoming pendant, divisions less numerous and broader; fruits small, borne at one time and ripening together. Cocops.

COCOS NUCIFERA Linn. Sp. Pl. 1188. 1753

The cocoa-palm is largely confined to the neighborhood of the coast, but is occasionally planted in small numbers in the interior districts, though it generally does not thrive in such situations especially on the north side of the island. On the drier southern slope of Puerto Rico, which is avoided by the royal palm, the cocoanut seems to thrive better, when it has once become established. Cocoanuts are mostly gathered while still green, for the sake of the milk or, as it is there called, the water (*coco de agua*) a popular beverage wherever obtainable. Although the

local consumption of nuts for this purpose is considerable it is largely confined to the towns of the coast region. Thus it may be said that in Puerto Rico the cocoa palm affords a luxury rather than a necessity, and that it is exceeded in economic importance by the royal palm.

Cocops gen. nov.

In a valley on the road between Lares and San Sebastian several young palms were noticed with leaves similar to the cocoanut, but smaller and finer. Finally one mature specimen was found, with both trunk and leaves strongly suggesting the cocoanut, but much smaller. The leaves are light green, the leaflets in one plane, and the fibers separating from the narrow base of the leaf. The fibers are few and flimsy, but like those of the cocoanut and other South American species of *Cocos*. The palm stood within a few feet of a small permanent brook, down which the seeds had evidently been carried and there were several young palms along the bank. The native living in an adjacent house could give us no name except *palmilla*, and seemed to think that none was necessary since the tree does not yield *yagua* or anything else of use. Its early extermination is therefore not unlikely.

In the absence of flowers and fruit * the relationships of the present genus cannot be ascertained nor its validity satisfactorily established. There seems, however, to be no reason for including the species in any of the genera known from Puerto Rico or other parts of the West Indies, and to associate it with Central and South American types would be a still less warrantable procedure.

It is also believed that under the present circumstances the application of a name is justified by convenience of reference and that this will also assist in securing the attention of botanical collectors better than a mere allusion to "an unknown palm which may be new."

Cocops rivalis sp. nov.

In diameter the trunk appeared to be about midway between the palma de sierra (*Acrista*) and the cocoanut, and had the short internodes of the latter. The leaves, however, probably remain

* That the fruits are small and are ripened at one season, as stated in the key, was apparent from the size of the seedlings and from other circumstances which accorded with the testimony of the man whose house stood within a few rods of the largest tree.

somewhat smaller than those of *Acrista* to which they might also be said to have a general similarity, except at the base where their cocoid proclivities become obvious. At a little distance *Cocops* might be overlooked as *Acrista*, while at shorter range it might be mistaken for a very depauperate cocoanut. No species of *Cocos* is, however, known to be native in the West Indies except the doubtful *Cocos crispus* H.B.K., from Cuba.

As a species *Cocops rivalis* may prove to be similar to *Syagrus amara* (Jacquin), which is reported as far north as Jamaica, but it seems to have no true generic affinity with *Syagrus cocoides* Martius, the South American palm which is the type of its genus. According to Martius *S. amara* is 30 cm. in diameter, as large or larger than *Cocos nucifera* and attains the height of from 20 to 35 meters; *Syagrus cocoides*, on the other hand, is a small slender palm with a trunk 2.5-3 m. high and 5-7.5 cm. in diameter, and with foliage and habit resembling the slender and diffuse South American species referred by Martius to *Cocos*, but very different from *Cocos nucifera* or from *Cocops*.

A leaf collected by Sintenis (no. 6061) near Camuy and coming from Berlin labeled *Oreodoxa*, obviously did not originate with an arecoid palm, but probably belongs with the present species. The region of Camuy is but a few miles from Lares, but there is much extremely rough and unoccupied country between, so that the danger of extermination appears to be somewhat diminished.

Explanation of Plates

PLATE 43. *Thrincoma alta*, top of type specimen (no. 848).

PLATE 44. *Thrincoma alta*, part of leaf and seeds, natural size.

PLATE 45. *Tarinox Ponceana*, type (no. 1005).

PLATE 46. *Acrista monticola*, type (no. 761) collected near Adjuntas.

PLATE 47. Fig. 1, *Aeria attenuata*. Fig. 2, *Cocops rivalis* (left) and *Roystonea Borinquena* (right).

PLATE 48. *Curima colophylla*, apex of flower-cluster and terminal leaf-division, natural size. From type specimen (no. 878).



THRINCOMA ALTA



THRINCOMA ALTA



THRINAX PONCEANA



ACRISTA MONTICOLA



COCOPS RIVALIS



AERIA ATTENUATA



CURIMA COLOPHYLLA

New York Botanical Garden Library

QL 36 .A1 C596 gen
Cook, Orator Fuller/A synopsis of the pa



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