

Finally I want to call attention to some local species of *Arenga*. All over the place in our lowland forests we see on sandstone a species of *Arenga* with undulate leaf margins. The local people use it for their blowpipes and I have seen the fiber used with a piece of porcelain rubbed against a stem of the bamboo *Gigantochloa* sp. for making fire. This use is also mentioned by Beccari and by Elmer in the Philippines for a related or possibly identical species of *Arenga*. I have been puzzled a long time

about a dwarf gregarious palm, possibly an *Arenga*, which is very common in swampy forests just behind the mangrove. This matter also needs more field study. After having seen the rather scanty collections of Bornean palms in some European and American herbaria, and when I have been able to collect much more information on the original descriptions and type localities of Bornean palms, I hope to engage myself with greater vigor in the exploration of the palms of North Borneo.

Two New Palms from Peru

HAROLD E. MOORE, JR.

From mid-April to the end of June, 1960, the palms of eastern Peru were the subject of a reconnaissance survey carried out by the writer in company with Ing. Adolfo Salazar C. of the Peruvian Forest Service and Dr. Earl E. Smith, Forestry Advisor, Agricultural Division, USOM/Peru.

The study of the palms collected is not yet complete but three have proved to be of unusual interest in that they represent undescribed species of apparently limited distribution. A new species of *Iriartella* is being described elsewhere in conjunction with a study of that genus (*Gentes Herbarum* 9 in press). Two others, one representing a new genus of cocoid palms, the other a new species of the arecoid genus *Socratea*, are described herein.

Chrysallidosperma

Ruminate endosperm is reasonably common in a number of genera of arecoid palms where it may be used to distinguish groups of species in subgeneric categories, but where it alone is seldom considered as a characteristic of generic importance. Among the cocoid palms, however, ruminate endosperm occurs only in a few monotypic genera—*Poly-*

andrococos, *Arikuryroba*, *Lytocaryum*, *Barbosa*, *Rhyticocos*—and appears to be of greater significance. The last four of these genera belong with a complex centered about *Syagrus* in which generic differences lie largely in the fruit and seed.

To these genera must be added another which seems to have a close affinity with them, but which differs from them in some rather striking characteristics of the fruit and seed. Because the form of the last suggests an odd chrysalis, I propose for this genus the name *Chrysallidosperma* from the Greek *chrysallis* (chrysalis) and *sperma* (seed). The epithet honors Dr. Earl E. Smith who initiated, arranged details for, and participated in the survey of palms as part of the program of the Agriculture Division, United States Operation Mission to Peru, International Cooperation Administration, and of the Servicio Forestal of Peru.

Juvenile plants of *Chrysallidosperma* were seen before mature individuals and were thought to represent an overgrown *Geonoma Spixiana* because of the large elongate-cuneate leaves which are undivided except for the bifid apex. These

juvenile leaves may reach a length of three meters and may persist until the trunk is more than a foot or two high, only then beginning to divide. At maturity, however, the leaves are always pinnate with slender delicate pinnae.

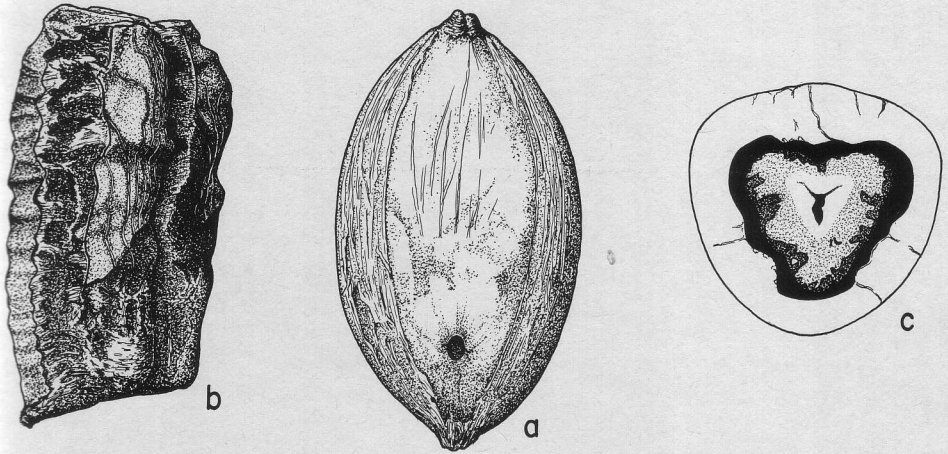
Chrysallidosperma finds its closest relationship with *Barbosa* and *Rhyticocos* from which it differs in the irregularly three-angled seed that is truncate apically and obliquely truncate basally to the acute base of the outer margin wherein lies the embryo. The endocarp is very thick and hard with broad intruded bands between the shining vittae above the pores inside. Pending completion of studies on cocoid genera for a proposed "genera palmarum," the following brief synopsis and provisional key to genera of the "*Syagrus* alliance" may help to relate *Chrysallidosperma* within the alliance.

The *Syagrus* alliance consists of unarmed palms, except sometimes the sharply toothed margins of the petiole, with pistillate flowers not or only slightly

sunken in the inflorescence axes. Leaves are mostly moderate in size and the pinnae frequently are arranged in groups and borne in several planes. Two bracts, the inner longer and deeply plicate-sulcate, subtend the inflorescence which is normally of one kind only (not like the dimorphic inflorescences of *Attalea* and its allies) bearing pistillate flowers on the axis of the spike or at the base of, in the lower portion of, or nearly throughout the rachillae. The pistillate flowers are ovate or ovate-conic, the sepals acute or more or less cucullate, the petals with conspicuously valvate apices. Staminate flowers have mostly acute, distinct or basally connate sepals much shorter than the flat petals, and 6 stamens. Fruit may be small or large with fibrous mesocarp and very thin to very thick endocarp, the pores near the base or at least below the middle. Included genera are *Arecastrium*, *Arikuryroba*, *Barbosa*, *Chrysallidosperma*, *Lytocaryum*, *Microcoelum*, *Rhyticocos* and *Syagrus*.

PROVISIONAL KEY TO THE GENERA

1. Petiole spinose-dentate along the margin; pinnae more or less oblique or toothed apically at maturity; seed with ruminant endosperm. Brazil. *Arikuryroba*
1. Petiole unarmed; pinnae acute to acuminate; seed various.
 2. Exocarp and mesocarp splitting regularly and longitudinally into three sections from the apex toward the base at maturity; endocarp thin. (the three species which fall here are maintained in one genus, *Lytocaryum*, by Toledo, in *Lytocaryum* & *Microcoelum* by Burret and Potztl)
 3. Endosperm homogeneous. Brazil. *Microcoelum*
 3. Endosperm ruminant. Brazil. *Lytocaryum*
2. Exocarp and mesocarp not splitting at maturity or only irregularly so; endocarp mostly woody or bony and thickish to very thick.
 4. Seeds with homogeneous endosperm.
 5. Cavity of the endocarp irregular; seed irregular, gibbous-uncinate. Brazil to northern Argentina. *Arecastrium*
 5. Cavity of the endocarp regular, trivittate within; seed not irregular, terete in cross section. Colombia, Ecuador and Peru, to Brazil, northern Argentina. *Syagrus*
 4. Seeds with ruminant endosperm.
 6. Seed solid or with a very narrow central cavity, irregularly angled in cross section with rounded edges and impressed sides, truncate apically, obliquely truncate basally to the acute base of the outer margin and included basal embryo; endocarp ellipsoid, very thick and bony, readily separating from the thin fibrous mesocarp when dry, acute at both ends, marked with 3 pitted bands externally between the pores and with corresponding internal intrusions, the wall thinnest along the vittae above the pores. Peru. *Chrysallidosperma*
 6. Seed hollow, terete in cross section and globose or obovoid, the embryo sub-basal on one side near the uniformly rounded or tapered base; endocarp of uniform thickness.
 7. Endocarp ovoid, thin, woody, with a conic-rostrate apex; endosperm oily, broadly hollowed in the center. Brazil. *Barbosa*
 7. Endocarp ellipsoid-obovoid, thick, bony, acute at both ends but not rostrate; endosperm dry, narrowly hollowed in the center. Lesser Antilles. *Rhyticocos*



73. *Chrysalidosperma Smithii*. a, endocarp $\times 1$; b, seed $\times 1\frac{1}{2}$; c, endocarp and seed in cross section $\times 1$ (from Moore et al 8516).

Chrysalidosperma H. E. Moore, gen. nov. (Palmae—Cocoideae).

Barbosae et *Rhyticoco* similis sed semine solido vel in medio anguste cavo, irregulariter triangulari, ad apicem truncato ad basin oblique truncato, endocarpio duro crasso intus trivittato intervallibus crassioribus differt.

Solitary unarmed monoecious palms of moderate size. Leaves pinnate; sheath short, fibrous; petiole elongate; pinnae arranged in groups along the rachis and borne in several planes, acute to acuminate at the apex, narrowly reduplicate at the base, with prominent keeled mid-nerve above. Inflorescences interfoliar, subtended by 2 unequal basally inserted bracts, the outer short, ancipitous, opening obliquely at the apex, the inner deeply plicate-sulcate, with an elongate manubrium, the cymba woody, rostrate, splitting abaxially; peduncle and rachis elongate; rachillae spirally arranged and more or less flexuous, numerous, enlarged basally, at least the lower ones with a prominent naked base, bearing flowers in triads of a sessile central bracteolate pistillate and 2 lateral pedicellate staminate in the lower half or less of the rachillae, paired or solitary and sessile sta-

minate above. Staminate flowers with 3 small distinct acute sepals, 3 large somewhat asymmetric acutish valvate petals grooved within, 6 stamens, the short filaments basally connate then distinct, the shortly sagittate linear anthers straight and basifixed, pistillode of 3 minute protuberances; pistillate flowers as long as the staminate, conic-ovoid and obtuse in bud, sepals 3, ovate, convolute-imbricate, petals 3, about as long as the sepals, convolute-imbricate with valvate apices, staminodes united in a prominent annulus, the pistil trilocular with 1 axile ovule attached the length of each locule, only one maturing, style enlarged, stigmas distinct. Fruit narrowly ovoid or ellipsoid, the exocarp thin, smooth, mesocarp of numerous slender longitudinal fibers readily separable from the endocarp, this acute at each end, very hard, thick and bony, with 3 prominent pitted vertical bands outside corresponding with 3 intruded bands alternating with 3 shining vittae within, the pores near the base in the vittae; seed irregularly 3-angled with rounded edges and sculptured impressed sides, truncate at the apex, obliquely truncate at the base to the narrow outer edge and included



74. *Chrysallidosperma Smithii*. Dr. Smith holds an entire inflorescence, complete with bracts, collected near Yurimaguas, Peru.

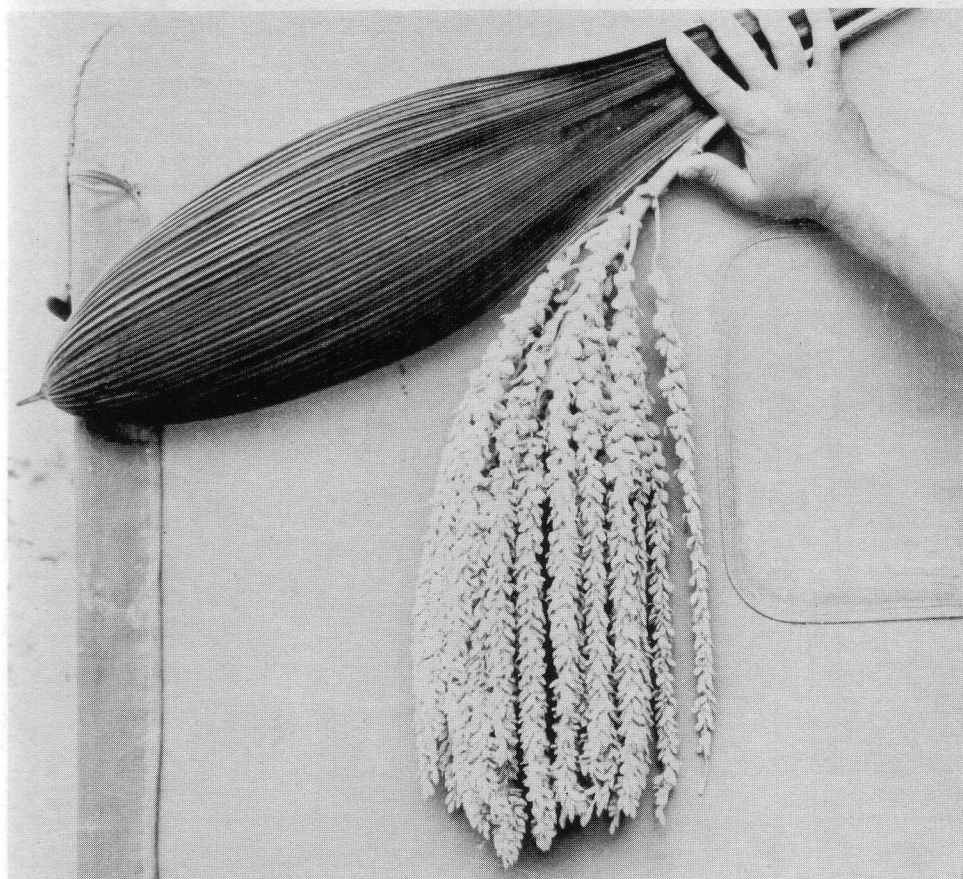
basal embryo, endosperm solid or with a very narrow central cavity and runcate marginally.

***Chrysallidosperma Smithii* H. E. Moore, sp. nov.**

Caudex ad 10 m. altus. Folia 2-3 m. longa, pinnis utrinque 83-92 in gregibus dispositis. Inflorescentia longe pedunculata, rachillae ca. 35. Flores masculi 10-13 mm. alti, flores feminei 12 mm. alti. Fructus 6.5-7 cm. longus, 3-5 cm. in diam., semine 3.5 cm. longo, 2 cm. lato.

Stems solitary, grey or brown, irregularly and not prominently ringed, sometimes fissured lengthwise, to ca. 10 m. high, 8 cm. in diam. Leaves 10-15 in a spreading or ascending gracefull lacy crown, dark green and dull above; sheath short, with finely woven fibers covered with tawny tomentum when young but fraying in age; petiole 3.7-9 dm. long, rounded and deciduous red-brown and pale-brown tomentose becoming glabrate and dark waxy-lepidote be-

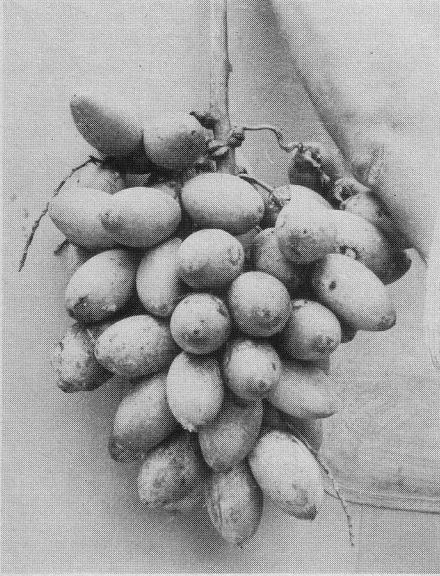
low, channelled and glabrate above; rachis 2-3 m. long, rounded and dark furfureaceous toward the margins below, channelled to sharply angled above; pinnae 83-92 on each side of the rachis in groups of 1-3 (-5), spreading and borne in 2-3 planes at least toward the base, but the blade nearly flat in appearance, the lowermost pinnae long acuminate-attenuate, ca. 70 cm. long, 4 mm. wide, those at mid-leaf acute, ca. 66 cm. long, 3 cm. wide, those at apex ca. 23 cm. long, 6 mm. wide, all with midnerve prominent and keeled above, impressed below, and prominent cross-veinlets in life and when dry, glabrous except for minute pale waxy peltate scales or scale-bases below, the secondary and tertiary nerves very fine and scarcely distinct. Inflorescence white in flower, green in fruit, long-pedunculate, the thin outer bract ca. 40 cm. long, 4.2 cm. wide, minutely brown peltate-lepidote where protected, the inner bract with a slender brown tomentose or



75. *Chrysallidosperma Smithii*. Close-up of same inflorescence showing the pistillate flowers restricted to lower part of rachillae.

brown ceraceous lepidote manubrium ca. 6 dm. long and a shortly rostrate (to 6 cm.) brown furfuraceous cymba ca. 7.5 dm. long, 13.5 cm. wide; peduncle ellipsoid in section, ca. 7.5 dm. long, 1.4 cm. wide, 9 mm. thick, densely deciduous brown tomentose becoming glabrate, at least marginally and apically, the rachis ca. 2.5 dm. long with shining brown hairs and minute pale peltate scales, the rachillae ca. 35, enlarged basally, ca. 25-40 cm. long, the lower ones with a long naked base and 1-2-7 or to 28 spirally arranged triads of a central sessile pistillate flower and two lateral staminate flowers on prominent pedicels

3-5 mm. long in the lower half or less, staminate flowers sessile and paired or solitary in the upper half or more of the rachilla, the rachillae more or less flexuous between flowering nodes; staminate flowers sweet-scented, glabrous, 10-13 mm. long, creamy white, sepals, ca. 1 mm. long, petals dull, thick; pistillate flowers ca. 12 mm. high, 10 mm. diam. at base, sepals 10 mm. high, 9 mm. wide at base, petals shorter in bud, staminodes united in a dark brown annulus ca. 2 mm. high, pistil ovoid. Fruit narrowly ovoid or ellipsoid, rounded at base and apex, 6.5-7 cm. long, 3.5-4.2 cm. in diam. when dry, smooth, the



76. *Chrysallidosperma Smithii*. A fruiting cluster.

mesocarp ca. 3 mm. thick when dry, endocarp ca. 6 mm. long, 3.5 cm. in diam., ca. 5 mm. thick above the pores, ca. 9

mm. thick above the intruded and prominent bands between the pores, the pores ca. 1 cm. from the base; seed ca. 3.5 cm. long, 2 cm. wide.

PERU. Department Loreto: Province Alto Amazonas; on open wooded slopes with acid sandy clay soils (pH 4.5) between kilometers 13 and 14 on Yurimaguas-Tarapoto road, May 24, 1960. *H. E. Moore, Jr., A. Salazar C. & E. E. Smith 8516* (BH, TYPE; USM, ISOTYPE). Province Coronel Portillo; wooded slopes 6-8 kilometers beyond Aguaytía on road to San Alejandro, ca. 330 m. alt., April 29, 1960, *H. E. Moore, Jr., A. Salazar C. & E. E. Smith 8375* (BH, USM).

Socratea Salazarii

Socratea Salazarii H. E. Moore, sp. nov.

Caudex 2-9 m. altus. Foliarum pinnae indivisae utrinque 11-16. Fructus magnus, ovoideus, ca. 3.5 cm. longus, 3.3 cm. in diam. ad apicem irregulariter fissus.



77. *Socratea Salazarii*. An entire leaf from near Yurimaguas, Peru.



78. *Socratea Salazarii*. Pinnae from the middle of the leaf, the base to the right of photograph.

Trunk solitary, brown, ringed, 2-9 m. high, 6.5 cm. in diam. or more, from sparsely to moderately spiny separated stilt roots .7-1 m. high, 3.5-4 cm. in diam., the spines to 3 mm. long. Leaves about 7, spreading, the sheaths blue-green to dark green with a visible coat of shining red-brown predominantly medifixed hairs at least when young, 0.9-1.2 m. long; petiole ca. 4 dm. long, terete, minutely brown lepidote or brown punctulate; rachis essentially terete but alternately ridged below each pinna above, at first covered with a dense coat of appressed brown basifixed, medifixed or substellately branched hairs but soon glabrate and densely brown punctulate, at least below, 1.6-2.2 m. long; pinnae 11-16 on each side of the rachis, glossy green above, rufous below where densely and conspicuously pilose on the surface and the numerous prominent yellowish nerves, and especially so at the point of

insertion, or at length becoming glabrate and densely brown punctulate, undivided, cuneate-trapezoidal in outline and arcuate-undulate or flattish in life, the lower margin longest, lacerately toothed and tapered from both margins to a more or less acute apex except the apical pinnae, those broadly truncate and subflabellate, lowermost pinnae 28-34 cm. long and narrower than the remainder, pinnae at mid-leaf ca. 72-75 cm. long, 20-23 cm. wide at widest point, the apical ca. 30 cm. long on lower margin, 14-25 cm. wide at apex, 18-21 cm. along the rachis, the primary nerves ca. 25-28 on pinnae from mid-leaf with slender intervening nerves and often with broad longitudinal bands of dense appressed brown hairs. Inflorescences as many as four, solitary at nodes below crownshaft, the peduncle 14-18 cm. long, 1-3 cm. wide at scar of outer bract, dorso-ventrally compressed, arcuately decurved;

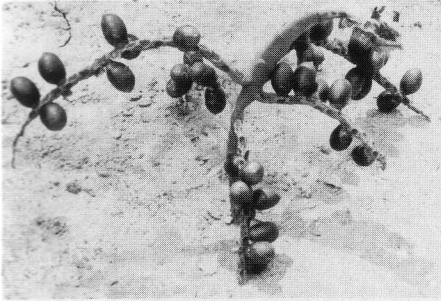


79. *Socratea Salazarii*. Detail of the upper portion of a leaf.

bracts 4, erect, the outer ca. 10 cm. long, the innermost ca. 31 cm. long, at least the inner with medifixed hairs similar to those of the sheath; rachis 6-7 cm. long with 5-8 short stout stiff glabrous (?) rachillae 20-31 cm. long, compressed and the lowest ca. 17 mm. wide, 8 mm. thick at the base, marked with elliptic scars of pistillate flowers and fruits ca. 8 mm. long. Flowers creamy-white; staminate ca. 5 mm. high (reconstructed from damaged specimens), petals angled, stamens ca. 30 (field observations); pistillate ca. 4 mm. high in bud, in fruit the perianth more or less explanate with sepals ca. 3 mm. high, petals ca. 5 mm. high, 7 mm. wide. Fruit ellipsoid-ovoid, ca. 3.5 cm. long with perianth, 2.5 cm. in diam. when fresh, ca. 3.3 cm. long with perianth when dry, greenish-brown drying light brown and somewhat granular, with excentrically apical stigmatic remains, the fruit splitting irregularly at the apex to expose the thickish white dry pulp when completely

mature; seed ca. 2.5 cm. long, 2 cm. wide, attached basally, with numerous pale anastomosing raphe branches ascending to the apical embryo. Seedling leaf (as grown at Cornell University) deeply bifid.

PERU. Department Loreto: Province Coronel Portillo; in dense woods in low areas a few kilometers southwest of Yurac on road to Boquerón del Padre Abad, alt. ca. 400 m., April 27, 1960, *H. E. Moore, Jr., A. Salazar C. & E. E. Smith 8366* (BH, USM); on wooded slopes 6-8 kilometers beyond Aguaytia on road to San Alejandro, alt. ca. 330 m., April 29, 1960, *H. E. Moore, Jr., A. Salazar C. & E. E. Smith 8381* (BH, USM). Province Alto Amazonas; on open wooded slopes with acid sandy clay soils (pH4.5) between kilometers 13 and 14 on Yurimaguas-Tarapoto road, May 24, 1960, *H. E. Moore, Jr., A. Salazar C. & E. E. Smith 8517* (BH, TYPE; USM, ISOTYPE).



80. *Socratea Salazarii*. An infructescence with fruits not yet split at the tips.

Socratea Salazarii was found in what appears to be a very restricted habitat in company with or in the same region as either a new *Iriartella* (8366) or *Chrysalidosperma Smithii* (8517). Most species of *Socratea* have the middle pinnae much dissected. Apart from the tall and small-fruited *S. exorhiza* of Brazil which as often interpreted seems to differ significantly from the original description of Martius, only *S. gracilis* Burret from British Guiana and a taxon represented by incomplete material from the Río Kananarí, Vaupes, Colombia (*Schultes & Cabrera 10105-E*, BH) have undivided pinnae. *S. gracilis*, however, has a much smaller fruit only 18 mm. long when dry (but immature), and the pinnae at mid-leaf are often divided into two segments. The material from Colombia approaches *S. gracilis* in fruit size but in foliage, inflorescence and other characteristics seems closely related to *S. Salazarii*.

Fruit of *S. Salazarii* is the largest yet described for the genus, being approached only by that of *S. macrochlamys* Burret. When mature, it splits naturally and irregularly at the apex revealing the dry white pulp, as noted both near Yurac and Yurimaguas where fruiting plants were collected. The description of the inflorescence at anthesis and of staminate and pistillate flowers is incomplete owing to damage incurred in drying and shipment.

The epithet recognizes the invaluable aid given by the Peruvian Forest Service as represented by Ing. Adolfo Salazar C. who, as my counterpart in a Point-Four project, facilitated the study of Peruvian palms during 1960 in every direct and indirect way.

LETTERS

It always gives me great sorrow to see a dead palm tree, and I understand quite well how distressed you must have been in your recent drive to Louisiana [seeing the winter-killed palms along the Gulf coast—L.H.W.] or Mr. Dent Smith with the terrible loss of so many of his palms. We do not have any freezes under our tropical sky, but my lot has been to witness the utter, savage destruction of thousands upon thousands of *Scheelea magdalenica*, *Sabal mauritiaeformis*, and *Copernicia tectorum*—some of the scheeleas and sabals over 70 feet tall—either felled or expeditiously burned alive in gigantic holocausts with the forests in which they grew. Opening of new lands for extensive pastures, cotton fields or rice fields (in the low *Copernicia* terrains) has been responsible for the loss of about 85 per cent of our forests, including tremendous numbers of the three species mentioned above without counting the bushy, spiny *Bactris minor* and *Pyrenoglyphis major*, or the climbing, vine-like *Desmoncus myriacanthos*.

The *Pinanga patula* is a success in my garden. My plants are 13 to 20 inches tall, and two of them are beginning to grow a secondary stem. *Areca Langloisiana*, seeds of which Mrs. Langlois kindly sent me last December, has germinated 33 per cent, but *Neodypsis Lastelliana*, also received from Mrs. Langlois, has been a complete failure, the embryos having rotted.

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