

by specimens of different age, but not older than 50 years. The adult specimens are large tall trees attaining a height of 25-30 m. and a trunk diameter from 70-80 cm. (at Sukhumi). At the age of 35-40 years the palms have 40-50 large flabelliform leaves up to 4 m. long in a dense crown. The diameter of the leaf lamina is 1.3 m. and 8-12 new leaves are formed during the vegetative period, spring until autumn. The longevity of a leaf is 3-4 years but the dead leaves remain attached to the tree for a long time, hanging down loosely. Flowers are profuse, borne annually in August on large, drooping inflorescences 3.5-4.5 m. long. The fruits ripen in December-January. *W. filifera* is widespread in the gardens and parks of the Black Sea coast of the Caucasus (Sochi, Sukhumi, Batumi). During very cold winters all the leaves are destroyed by frost, but during the next summer new leaves develop. On the south coast of Crimea all the unsheltered and unprotected specimens failed to survive through the exceptionally cold

winter of 1949-1950. The species is drought-resistant, growing on lime soils and preferring lowland sites.

Washingtonia robusta is represented by plants of different age but not over 45 years. The adult specimens are tall trees attaining the height of 20-22 m. (at Sukhumi); the trunk diameter is 60-70 cm. Thirty- to forty-year-old specimens have fifty large leaves 2.5-3.0 m. long, the diameter of the leaf blade being 1.5 m. The formation of new leaves is observed all the year round, but this process is most intense from April until October. 12-15 new leaves develop annually; the leaf longevity is 2-3 years. The inflorescences are large, 2.5-3.0 m. long, borne annually in June. The fruits ripen in November-December. This species is cultivated on the Black Sea coast of the Caucasus (Sochi, Batumi, Sukhumi) but is less frost resistant than *W. filifera*. In the sites sheltered from winds the frost damage is much less sore and in the impaired plants a bunch of new leaves is formed during the next summer.

Hunting for Palms in North Borneo

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North Borneo is the northeastern part of the Great Island, about the size of Ireland. The country is very sparsely populated. Only 450,000 people live here, and these for the greatest part are concentrated in coastal areas along the west coast. I have been travelling three years through this country in search of timber trees, meanwhile paying more casual attention to palms. This article is not intended to give an exhaustive survey of the palms of North Borneo, as my knowledge of them is still very limited and I feel yet at the beginning of my palm studies.

The genera represented in Borneo are generally the same as in Sumatra and

Malaya. The richest in species are the rattans of which there is a considerable amount for export. Our collections of these spiny creatures (species of *Calamus*, *Daemonorops*, *Plectocomia*, *Korthalsia* and *Ceratolobus*) are still very incomplete. The most important from a commercial point of view is *Calamus caesia* called *rotan sega* which I saw rather frequently along the upper reaches of the Kinabatangan River. Along the coast, *Nypa* of course is quite abundant at the estuaries of rivers. Behind the *Nypa* and mangrove zone we often see, as in Sumatra, a sandy zone with a dominance of *Oncosperma tigillarum*, the *nibung* palm. Some people in



66. *Pholidocarpus Majadum*, Batu Sapi Rd., Sandakan, North Borneo. Photograph by W. Meijer.



67. *Pholidocarpus Majadum* inflorescence from trees in seasonal swamp forest, Serudong River, Tawan, North Borneo. Photograph by W. Meijer.

coastal towns use this palm for ornamental groups in their gardens. This same palm is very much used by the local fisher people for flooring. Inside the mangrove we often see our most common species of *Calamus*, *C. aquatilis*, called *rotan bakau* (*bakau* means mangrove).

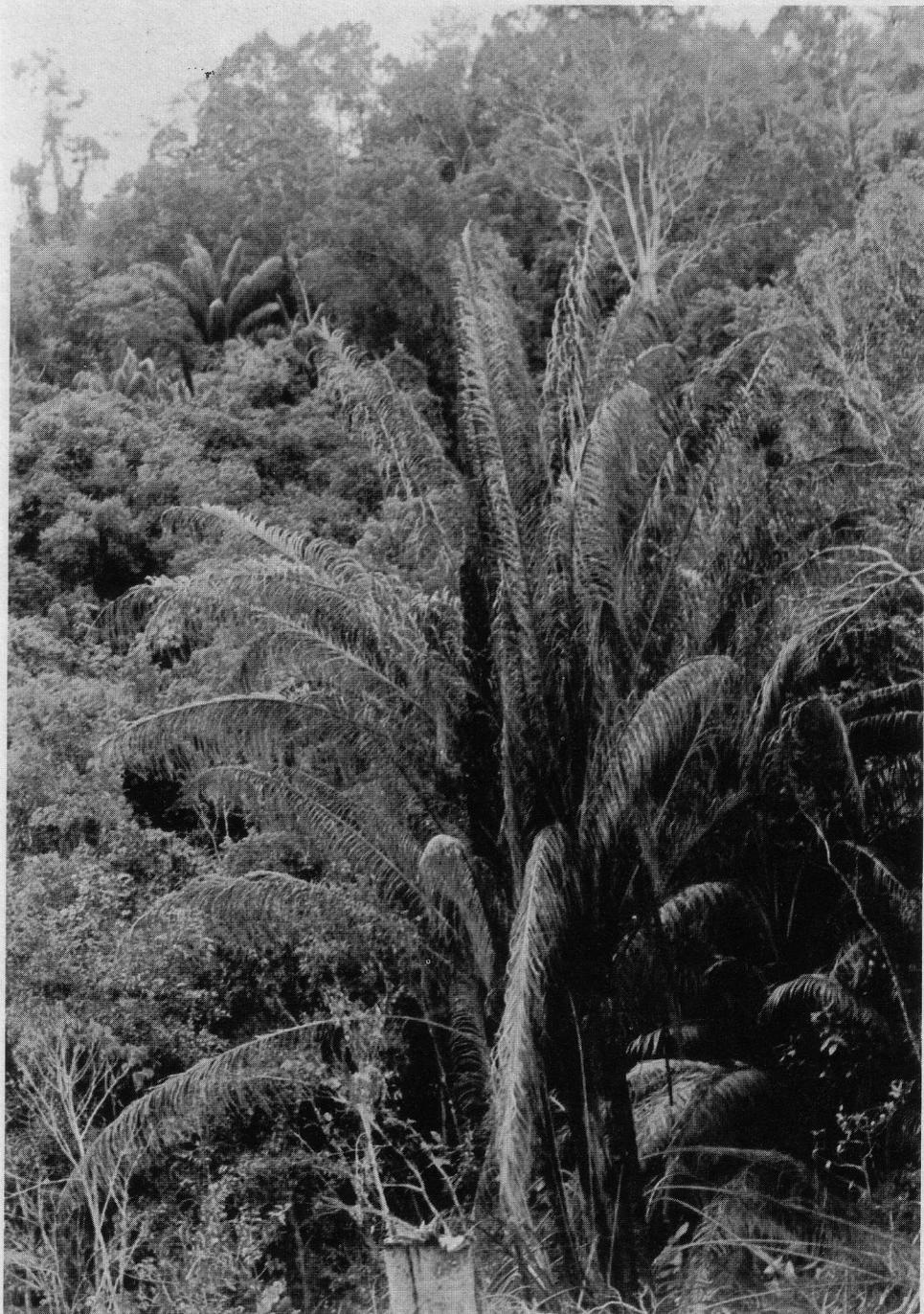
Some palms are peculiar to swamp forests. *Cyrtostachys Lakka* with its attractive reddish sheaths is very common on the west coast in places where the railways go through sandy swampy

areas, but it also occurs near Sandakan on the east coast. Swamp forests on more fertile soils are often characterized by a dominance of the large fan palms, *Pholidocarpus Majadum*. They look like species of *Livistona*, only with larger brownish fruits with broken brown corky skins. It is rather easy to grow them. The coastal swamps along the west coast are also very good localities for the attractive common species of *Licuala*, *L. spinosa*, and for some species of *Salacca*.

The most northern end of North Bor-



68. *Licuala spinosa* on the Malay Peninsula. Photograph by W. Meijer.



69. *Eugeissona* cf. *insignis* north of Tamparuli, Jesselton-Kota Belud Rd., North Borneo. Photograph by W. Meijer.



70. Details of *Eugeissona* cf. *insignis* north of Tampurli, Jesselton-Kota Belud Rd., North Borneo. Photograph by W. Meijer.

neo is the Kudat Peninsula near Marudu Bay. This bay is fringed with a great amount of *Corypha elata*. Unfortunately the Agricultural Department is trying to exterminate these populations because they harbour insects which cause damage in the near-by coconut plantations.

Sago palms (*Metroxylon*) are most common on the flat swampy Klias Peninsula where they must have been introduced. The related genus *Eugeissona* is locally represented by one or two species. Better collections and notes have to be made of these. They tend to be common in secondary forests on hills on the west coast but also on some steep river banks in the southeast corner of the country. At least one species, *E. utilis*, also produces sago. In the midst of the country I found lowland dipterocarp forests with a very rich undergrowth of a palm which has a habit simi-

lar to *Pholidocarpus*. It belongs, however, to a totally different genus. The leaf stalks are not spiny and the fruits have an edible endosperm. This is probably *Borassodendron Machadonis* which was not known from this part of Borneo.

Walking through the jungles we meet rather frequently dwarf palms belonging to the genera *Licuala* and *Pinanga*. Several of these might become very ornamental palms in other parts of the world. There are about 30 species of *Licuala* and 40 species of *Pinanga* with those of related or similar genera like *Iguanura*, *Gigliolia*, and even dwarf species of *Areca*. The first two mentioned have not yet been collected by me in North Borneo but of the latter I secured some herbarium specimens and living material from river banks and swampy forests.



71. *Calamus* cf. *scipionum*, the walking-stick rotang, Bukit Hampuan, Ranau, North Borneo. Photograph by W. Meijer.



72. *Arenga undulatifolia*, Sebatik Island, North Borneo. Photograph by W. Meijer.

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

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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