

Since there are desert shrubs that show this same white-grey-blue quality (*Encelia*, desert holly) it is quite possible that somewhere in Baja California there is a well-watered ideally located canyon filled with *E. armata* and other "white" shrubs. When this canyon is located, the old prospector's white palm canyon will be known.

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The Botanic Garden at Bogor

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The Bogor Botanic Garden (*Kebun Raya Indonesia*—"Great Garden of Indonesia") is located at Bogor, formerly Buitenzorg, West Java, forty miles from Djakarta, the Indonesian capital. It was founded in 1817 as a scientific institution. Almost a century and a half have since elapsed and during this time the institution has grown into an organization of international importance. An illustrated article on the Garden in its present form appeared in *The National Horticultural Magazine* in July 1958.

The Bogor Garden, now covering two hundred and fifty acres, is predominantly an arboretum, although herbaceous plants also are cultivated on a large scale. [The arboretum is also devoted to native Indonesian plants.] Palms have received a great deal of attention; in fact, the palms are one group of plants in which the Bogor Garden takes particular pride.

Beautiful avenues and well arranged groups of palms mark the entrance of the garden. The ornamental qualities of these plants were the leading principle for the lay-out of the palm sections. *Roy-*

stonea and various species of *Livistona* are used for rows along the border lines. The American *Orbignya*, *Scheelea*, and *Attalea*, the African *Raphia* and *Lodoicea*, the high Malaysian *Pholidocarpus*, and the very decorative rows of *Phoenix Roebelenii*, are the most conspicuous palms near the entrance of the Garden. The *Lodoicea* palm is a female plant. According to Mr. Douglas, former Superintendent of the Garden, who had this plant under continuous observation, every year it forms abortive fruits without fertilization; these fall before they become ripe. Attempts to get male plants have not been successful nor has it been possible to obtain pollen for artificial pollination. Along the forest garden the climbing rattan palms form a kind of tropical jungle. A huge group of the spiny Indonesian *nibung* palm, *Oncosperma horridum*, is located near the Director's office. In front of the garden office we find among various American palms a highly attractive group of terminal flowering *Eugeissona* sp. from Borneo. Here, also is a non-stooling species of *Oncosperma* from Northern Sumatra which is still undescribed.

Small groups of palms are planted near the nursery along the famous old Canarium Avenue. *Actinorhytis Calapparia*, a common palm in Sumatran kampongs, and the highly ornamental Sumatran *Cyrtostachys Renda* with red leaf sheaths, are very attractive. Proceeding along the arboreous legumes and the *Pandanus* groups we reach the pond gardens occupying a kind of valley whose slope is planted with a great variety of palms. Some of them are *Corypha*, various *Livistona*, *Phytelephas* from Peru with male and female plants, the latter producing vegetable ivory, and *Orania macrocladus*, a palm which grows wild in West Java near Depok and in the lowlands near Djasinga. *Nypa fruticans*, usually associated with mangroves, grows very well along the pond where it flowers and fruits.

Along the Tjiliwung river is a special part of the Garden devoted to some

species of *Metroxylon*, the sago palms, which furnish the staple food for eastern Indonesia. The taxonomy of these palms is still not completely known. Against the slope of the river valley is another section of the Garden totally devoted to palms. *Cocos nucifera*, the most common and most important cultivated palm of Indonesia, grows here in various varieties. Highly ornamental is the slender gregarious *Oncosperma tigillaria*, a palm which in Sumatra and Borneo forms strips of palm forest on sandy banks behind the mangrove. Another pride of Indonesian palms is *Pigafetta filaris* from Celebes. Some species of *Caryota* and *Pinanga* are also very attractive. Near the bridge grows the great symbol of the economic importance of this garden for the welfare of Indonesia—*Elaeis guineensis*. In 1848 it was introduced from Africa into Indonesia and since 1854 it has been the forefather of



3. Part of the palm section of the Bogor Botanic Garden, Photograph by W. Meijer.



4. *Livistona rotundifolia* planted in a row at Bogor. Photograph by W. Meijer.

the highly valuable oil palm plantations of North Sumatra. Nearby along the Tjiliwung river is the famous *Borassus* probably *B. sundaica*, from eastern Indonesia.

One hundred and ninety-five genera of palms comprising at least three hundred and forty-three species are cultivated in the Garden, not counting five unidentified species. Some of the genera are represented by a large number of species: *Arenga* 14, *Bactris* 8, *Calamus* 43, *Caryota* 10, *Daemonorops* 23, *Licuala* 12, *Livistona* 14, *Phoenix* 19, *Pinanga* 10, *Sabal* 6, *Salacca* 7. These figures,

taken from the 1957 catalogue of the plant species in cultivation at the Bogor Garden, apply only to the Garden at Bogor and not to the palms cultivated at our other branch botanic gardens in Indonesia.

These other gardens, which all come under the administration of the Bogor Garden, are: the Mountain Garden at Tjibodas in West Java, established in 1867 and located on the slope of Mount Gedeh, 40 miles inland from Bogor, at an elevation of 4,200 feet, contains 200 acres with 3000 acres of forest reserve; Sibolangit, 30 miles west of Medan in



5. Female flowers of *Lodoicea maldivica* producing abortive fruits. Photograph by A. Dilmy.

eastern Sumatra, established in 1914, consists of 60 acres with a forest reserve of 250 acres; Purwodadi in eastern Java with 210 acres, founded in 1941; Setia Mulia Institute for Natural Sciences, established in 1955 at Padang in western Sumatra consists of 150 acres of garden and 7500 acres of forest reserve; and Bedugul in Bali. The aggregate area for the Bogor garden and its several subsidiaries consists of 885 acres of garden and 10,750 acres of forest reserve, a total probably not surpassed by that of any other botanical garden in the tropics.

A country of the size of Indonesia

does not have of course, a uniform climate. Bogor is very wet; Tjibodas still wetter; Purwodadi has a protracted dry season; Sibolangit and Padang are situated at low elevations, and Bedugul is in the hills. Consequently we are in a position to cultivate the palms in the habitat that suits them best.

We have no illusion about the correctness of the names by which we designate our plants. We presume that part of the nomenclature we use is obsolete.

Many of our palms are old. In one respect this is an advantage. For in identifying plants it is often difficult to define a species, and this is especially

troublesome in palms because several of them do not flower until they have reached a great age, and the fruits are needed for determining the species.

Seed can be distributed to foreign botanic gardens when available, which is not often.

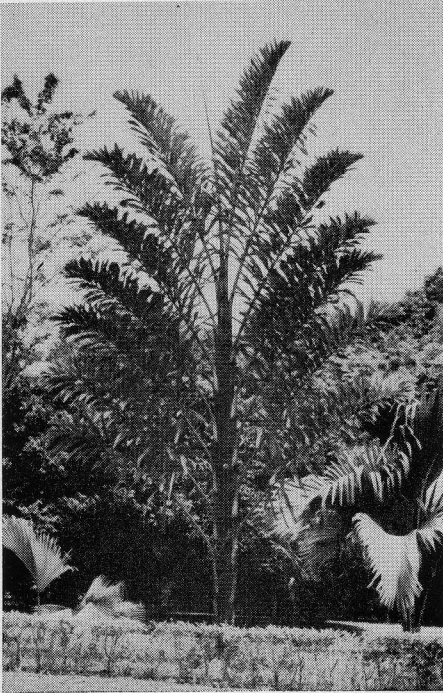
The palm collection of the garden though rich in species may still be further enriched. Many species of Malaysian *Licuala*, *Pinanga*, various species of *Arenga*, the curious giant-leaved but short-stemmed *Johannesteijsmannia altifrons*, are still lacking in the garden. The palm flora of Indonesia is very fascinating and the living collection of the Botanic Gardens will prove to be valuable for a future monographic treatment of these tropical trophies of the Plant Kingdom. Palms should be studied in the field and in the garden. The great classical example of a study of this type



6. *Wallichia densiflora* in flower at Bogor. Photograph by J. Douglas.



7. *Wallichia densiflora* (*W. oblongifolia*) growing at the Bogor Botanic Garden. Photograph by W. Meijer.



8. *Wallichia disticha* with its two-ranked leaves at Bogor. Photograph by Sudidjan.

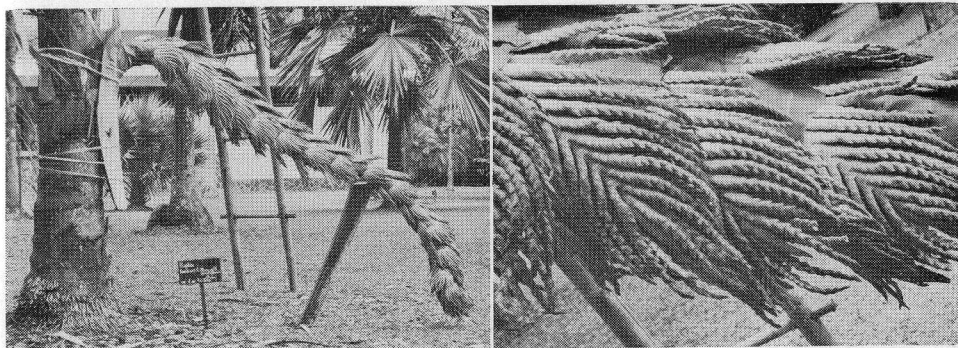
was by the famous Italian botanist, O. Beccari (1843-1920) who stayed three years in the wild forests of Borneo and afterwards made journeys in Sumatra and eastern Indonesia and Australia. Further studies of Malaysian palms were made by Burrett, Furtado, and Pichi-Sermolli. In April, 1957, R. C. Bakhuizen van der Brink, Jr., published a survey of native and many cultivated palms dealing with 78 species of which about 40 are indigenous (Part 16 of C. A. Backer's *Beknopte Flora van Java*. Emergency edition in Dutch, 74 pages). Some investigators have recently studied the flower biology and cytology of palms in the Bogor Botanic Garden. The flowering of *Corypha umbraculifera* and *C. elata* in the garden during 1955-56 brought about extensive study of their taxonomy and cytology.

These and other publications dealing with palms are to be found in the large library (Bibliotheca Bogoriensis), that for several generations has been part of the treasures of the Bogor Garden. This library was started in 1842 and today it comprises 150,000 books and subscribes to 1,400 periodicals. It is said to be the largest library of its kind in southeastern Asia. The Bogor Garden has issued a number of publications, most of them technical, dealing with palms. The first was in 1873 and the latest in 1958. An index to the palms in the Garden's collection was first published in 1899, and was revised in 1901, 1909 and 1914.

Also to be mentioned is the Herbarium Bogoriense, where dried and "in vitro" material of palms and other plants may be consulted. The herbarium was started in 1817 and today a half a million species are represented by dried material and material preserved in alcohol. The Herbarium occupies four large buildings and a few smaller ones.

Also to be mentioned is another section of the *Kebun Raya Indonesia*, namely the *Flora Malesiana*, an ambitious project to compile a flora of the entire vegetation of the area comprising Malaya, Indonesia, the Philippines, and New Guinea. At least 50 botanists of all countries are contributing to this project. Several parts have already appeared, and it is hoped that the day is not far when the monograph of Malaysian palms will be published.

Anyone who feels inclined to come to Bogor to inspect our living plant collection or to use our Herbarium, our Library or our Laboratory, will be cordially welcome and will receive full assistance. The Bogor Botanic Garden, one of the largest and oldest institutions of its kind in the tropics, endeavours to forge ahead whilst per-



9. *Raphia Hookeri* at the Bogor Botanic Garden, inflorescence left, closeup right. Photographs by J. Douglas.

petuating its traditions, but we need the help of experts from all over the world.

Assistance given by Dr. E. J. H. Cor-

ner of Cambridge University (England) and by the Staff of the Herbarium Bogoriense and Bibliotheca Bogoriensis is gratefully acknowledged.

Palms of Indonesia

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No botanist is at present able to deal adequately with the palms of the Indonesian Archipelago — a part of the great Malaysian Islands. Although the palm family amounts only to about one-twentieth of the whole flora, it is represented by about 60 genera and at least 800 species. A discussion of all these palms would be out of the scope of this article. Furthermore, it would take more than a life time to master this subject. Therefore, I will deal only with some of the more common Indonesian palms and my experiences with them. But first let us review briefly previous work done with Indonesian palms.

The German-Dutch botanist, Rumphius (?1628-1702), who lived on the Island Ambon in the Moluccas, was the first to study Indonesian palms. His book *Herbarium Amboinense* was issued with text in both Latin and Dutch in six volumes from 1741 to 1755 long after his death. He was very much im-

pressed by the striking form, habits, structure, and life history of palms. He described them and many other plants of the Moluccas and adjacent areas. His book starts with the coconut palm of the Malayan tropics. Other cultivated palms he described were areca nut palm (*Areca Catechu*), the sugar palm (*Arenga pinnata*), the sago palm (*Metroxylon Sagu*), and the rattans. Rumphius' work appeared before Linnaeus' *Species Plantarum* (1753) which started the binomial system of nomenclature and therefore Rumphius' names have no standing in botany. But many Latin names given by Linnaeus and later authors refer back to plants originally described by Rumphius.

An early work dealing with palms of Indonesia according to the Linnaean system was that of C. L. Blume (1796-1862) in the second volume of his *Rumphia* (1839-1843). Blume studied the native flora of West Java. He described for the first time a number of