near Sandakan. Thus a special effort was made to see it in the field and to secure adequate specimens for study. The result has proved especially rewarding since the species is most unusual.

The Caryotoideae, including *Arenga*, *Caryota* and *Wallichia*, have generally been characterized, among other peculiarities, by the basipetal development of inflorescences commencing from the top of the stem and flowering downward until sometimes the last develops from nodes beneath the surface and emerges through the soil. To find a species of *Arenga* in which this pattern is reversed with acropetal development of inflorescences is both exciting and perplexing as it raises questions for which there is no answer at present. The epithet *retroflorescens* (flowering backward) has been used to point up this seemingly anomalous behavior with respect to its congeners, though not to most other palms.

So unusual is this behavior that the authors spent some time examining plants in the field. Quite apart from our own observations, the stems of those plants which had produced them also provide evidence, for there are inflorescence scars at successive nodes from the base to the new inflorescences among the leaves.

There is some suggestion that an acropetal sequence of flowering may exist in some of the smaller species formerly placed in the genus *Didymosperma*, but unfortunately sufficient material has not been seen in the herbarium or in the wild to verify the suggestion. The whole problem of flowering sequence in the subfamily is one that merits attention.

We found only one rather extensive colony of this palm in Sepilok but the junior author has found it common in the Labuk delta. As to its relationship, it surely belongs in section *Arenga*, both from the habit and the trilocular, triovulate pistil. It differs from all species currently included in that section not only in acropetal development of inflorescences but in the spicate inflorescences. The general aspect is rather that of *Arenga Engleri* from Formosa with which it also agrees in having relatively few stamens. The narrow pinnae at once distinguish A. *retroflorescens* from three other indigenous species of Borneo — A. *brevipes*, A. *undulatifolia*, and Beccari's *Didymosperma borneense* which has not yet been transferred pending study of its relationship to A. *caudata*.

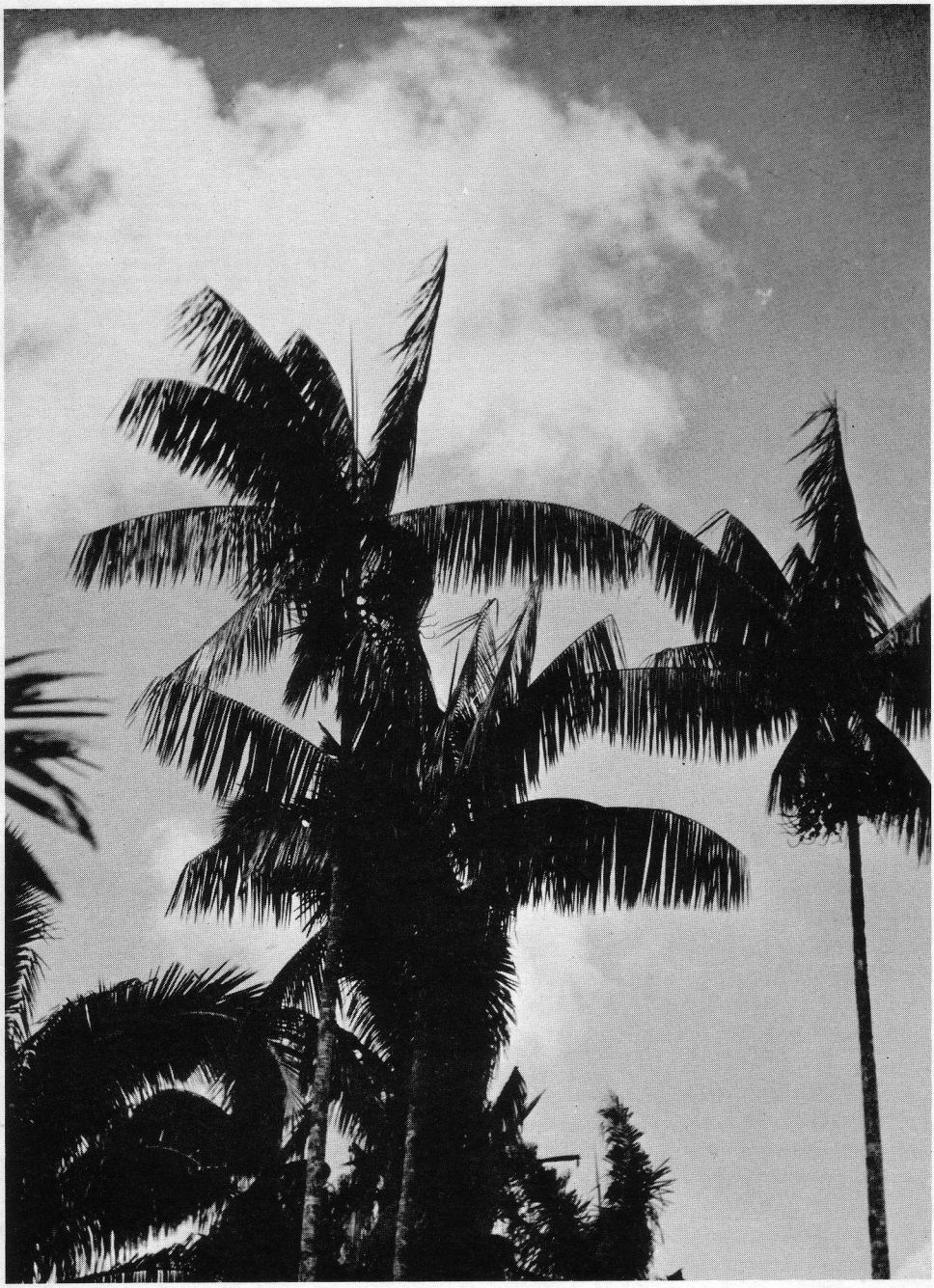
Palm Hunting Around the World

HAROLD E. MOORE, JR.

II. Malaya and Sarawak

Kuala Lumpur, capital of Malaysia, is a busy city seemingly expanding in every direction. Palm country lies nearby, but this first stop in early December was principally to establish contact with forestry officials, to obtain information about and hopefully to make plans to visit the Langkawi Islands before continuing to Singapore to work with the collections and library at the Botanic Gardens.

The scaly-fruited palms (subfamily Lepidocaryoideae) have long interested Dr. Furtado who, though retired, still works at the Botanic Gardens. At one time, there were more of these palms in the garden collections than there are today but there is a wealth of other palm material in mature state — handsome *Rhopaloblaste ceramica*, the curious *Borassodendron Machadonis*, *Orania*



89. *Rhopaloblaste ceramica* outlined against the sky at Singapore Botanic Gardens. Photo G. Addison

Palindan, Oncosperma, Pinanga, Calyptrocalyx spicatus to name only a few. Mr. Burkill, the Director, permitted materials to be taken from these for our

90. *Ptychoraphis singaporensis* is native on the island and also cultivated at Singapore. Photo G. Addison.

anatomical and other studies at Cornell and provided assistants to help with the task of collecting, preserving and drying specimens. The environs of Singapore bolster the garden's collections with local palms of considerable interest including the especially important *Ptychoraphis singaporensis* in the forest reserve at Bukit Timah on Singapore Island.

But I get ahead of my story. For on my first visit to the gardens, Mr. Burkill showed me about and introduced me to staff members including Dr. Chew Wee Lek who was also entertaining a visitor. Introductions were made and the two visitors did a "double take" for T. D. Pennington of the Commonwealth Institute of Forestry at Oxford University and H. E. Moore, Jr., had suddenly become more than signatures at the bottom of letters concerned with palm specimens collected by Mr. Pennington (or

Terry as he soon became) in Ecuador.

This meeting had happy consequences since both visitors had interests in several areas which we managed to visit in concert, sharing expenses for Terry's car. Thus back to Bukit Timah, which we visited for palms and Meliaceae (Mahogany family) on which Terry was writing his doctoral dissertation.

Bukit Timah rises sharply from the surrounding territory and on its slopes I had my first experience with rattans while Terry and his crew were gathering specimens of meliaceous trees. Here

91. *Orania Palindan* stands by the road in the Botanic Gardens.

92. The knife-like petiole margins of *Borassodendron Machadonis* make this a difficult tree to collect.

grew several species of *Daemonorops* — *D. grandis, D. didymophyllus, D. periacanthus, D. hystrix* — a species of *Calamus,* and *Korthalsia scaphigera* with the inflated tips of the sheaths housing colonies of ants. On the upper slopes we encountered fine clumps of *Ptychoraphis singaporensis,* the slender stems up to eight feet high bearing neat dark green leaves. The down-curved inflorescences had yellowish male flowers and a few of the older ones bore orange-yellow fruits. We had been given permission to make limited collections so got some practice in handling the sometimes ferociously armed *Daemonorops* in preparation for a trip to the forest reserves in the vicinity of Mersing on the mainland.

The state of Johore, in which Mersing

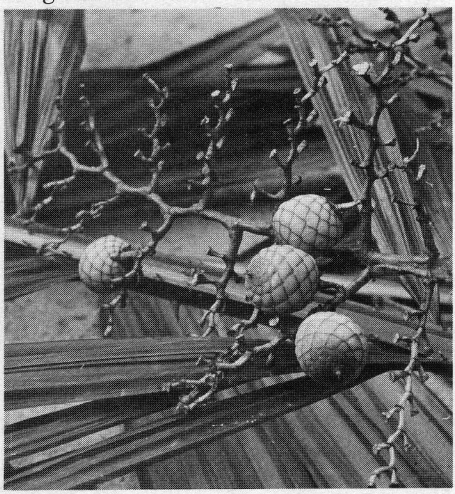
93. An assistant holds the male inflorescence of *Borassodendron*.

lies on the east coast, is reached by a bridge from Singapore. On Sunday, December 15th, Mr. and Mrs. Burkill packed a picnic lunch and accompanied Terry and myself to a halfway point on the road to Mersing. A cholera scare separated our party temporarily when guards at the entrance to Johore required certificates of vaccination for entry, but a reunion of the two cars

94. *Daemonorops periacanthus* ready for pres-

was only briefly delayed and we lunched on a logging trail in sight of *Oncosperma horridum*, a stiff stately palm with single trunk very different in appearance from the clustered graceful *Oncosperma tigillarium*. The latter grows chiefly near the coast, both here and in Borneo, and despite its unfriendly prickly nature is a handsome ornamental. Clumps of this species in the Botanic Gardens at Singapore are one of the principal ornamental features of the garden, to my mind.

Collecting was delayed until later, for after-lunch plans necessitated a return for the Burkills and continuation for Terry and myself in order to make arrangements for visits to the several forest reserves near Mersing, which town also provided comfortable quarters in the government resthouse.



95. The fruits of *Daemonorops periacanthus* are light brown and scaly.

Arrangements completed, we spent Monday in a reserve about seven miles to the north on the road to Endau. Highlight of this reserve was the discovery of *Johannesteijsmannia altifrons* in some quantity (and here perhaps a public confession is called for — the overly long name which seemed euphonious enough on proposal has aroused the ire

96. *Oncosperma tigillarium* is a beautiful palm whether wild, as here near Mersing, or cultivated.

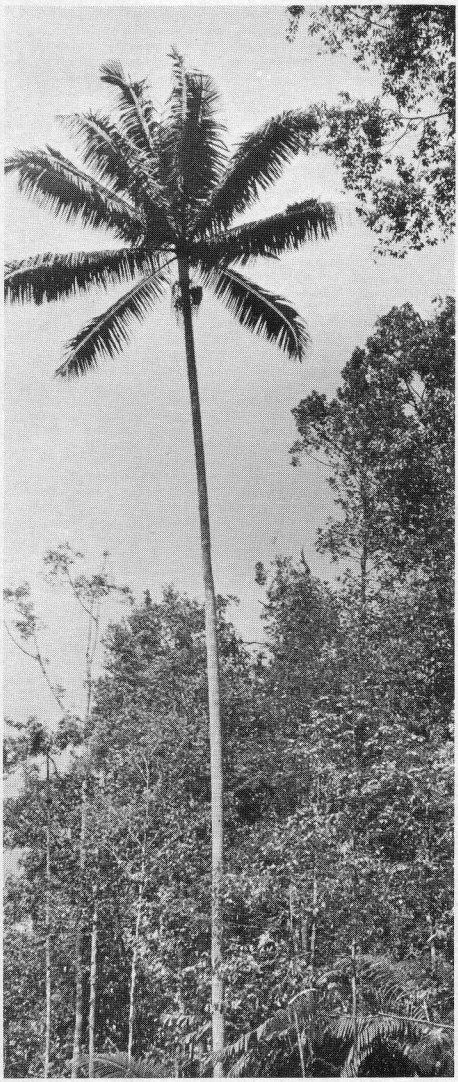
of at least one distinguished botanist who may wish to join Terry and myself in referring to it as Joey's palm!). The leaves of this palm, known as *daum payong* locally, are widely used as thatch (*atap*), both on roofs and as siding, but there have been relatively few recent collections in good flower. Readers can only

imagine the joy which accompanied the discovery of plants with inflorescences partially obscured by the debris that accumulates among the leaves. The bracts of the inflorescence are brown and open on one side; the branches are pale yellow-velvety in contrast to the milk-white flowers which are mildly scented of sewage! Perhaps it is the scent that attracts the numerous thrips or thrips-like insects which were in the flowers. Quite apart from their utility, the leaves of this species, scarcely qualifying for the term palmate, are of exceptional interest to the student of palms as are the strange corky-warted fruits. A complete series of Joey's palm is now available for a detailed study.

A second event was the discovery of *Cyrtostachys Lakka,* the sealing-wax palm. With all respect to the justly famous avenue of this palm in the garden at Singapore, the few plants growing in a sandy acid seep on a hillside seemed far more exotic and when plants are numerous, as they are near Sandakan in Sabah, there are few palms that can match them for beauty.

The reserve also yielded *Licuala longicalycata, Nenga,* a little *Pinanga,* ant-inhabited *Korthalsia echinometra,* and *Calamus perakensis,* a short stemmed reclining species with long flat fibers at the sheath-orifice and no entangling cirrhi on the leaf.

A second forest reserve 17 miles from Jemaluang on the road to Kluang showed me why Dr. Furtado had referred to *Eugeissona triste* as a weed. All along the cut-over roadsides one sees the leaves of this palm rising from clumps of a few stems which are so short as to appear absent. At length, an inflorescence terminates the stem, producing short branches with large hard flowers tipped with very sharp petals and, in time, odd egg-shaped fruits covered with myriad tiny scales. Here too, were *Nenga* and such species as the "stemless' *Licuala ferruginea,* a diminutive *Arenga* of the *Didymosperma* alliance, *Pinanga malaiana* in colonies of slender stems to 12 feet high, the black



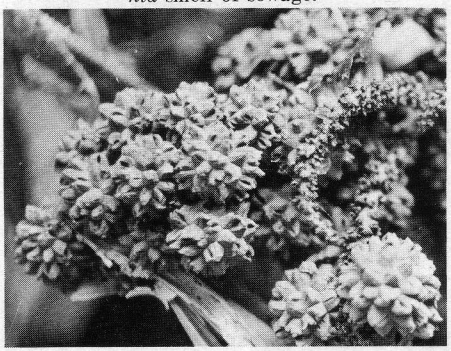
97. We picnicked near *Oncosperma horridum.*

98. Dr. Pennington and *Johannesteijsmannia.*

fruits striking against the red branches of the fruiting inflorescences. A species of *Iguanura, Daemonorops geniculatus, D. angustifolius* and an odd *Calamus* were also found here, and in another reserve, nearer Jemaluang but five miles off the road, *Iguanura geonomaeformis* — prop-rooted and with dull-red but glistening fruits — *Daemonorops verticillaris,* and more *Nenga* were casualties

99. Leaves of *Johannesteijsmannia* are used for thatch and siding on a forest reserve building

100. Milk-white flowers of *Johannesteijsmannia* smell of sewage.



101. The curious warty fruits of *Johannesteijsmannia* photographed in Sarawak.

to the cause of botany.

These few paragraphs occupied but a short time in the writing but a week in the doing with the assistance of one or sometimes more forest guards. I digress here to express thanks for the many courtesies extended by the Forest Service in all Malaysia and by Mr. Burkill, Dr. Chew, and other staff at the Botanic Gardens. And to interrupt further, an expression of gratitude for the transplanted custom of afternoon tea is due somewhere in these writings. A botanist's day begins early and ends late in the field, but there is usually that refreshing interlude between actual collecting and the tedious job of preparing specimens and of note-writing which replenishes body fluids (I think our record at Mersing was on the order of seven cups of tea each) and allows muscles to slack temporarily.

A final trip away from Singapore led us to Kuala Lumpur again where, on the hills east of the city, one sees *Orania sylvatica*, *Oncosperma horridum* and *Arenga Westerhoutii*. The main objective, however, was *Maxburretia rupicola*, a low fan palm which grows on limestone outcrops similar to the *mogotes* of Cuba. The original locality yielded nothing (much of the area is now a quarry site), but on Gunong Takun, between Kuala Lumpur and Kanching, plants were relatively common in crevices and holes on the sheer lime cliffs. Only a few, none in flower or fruit, were attainable by the steep trail. A real find along the trail at the base was a male plant of *Myrialepis Scortechinii* in full flower. So far as I am aware, the creamy fragrant male flowers of this species have not yet been described and it is thanks to the help of officials at the Forest Research Institute at Kepong and Mr. Yong Fann Chin that they were found.

Return to Singapore on the evening of December 23rd brought into focus the Christmas holidays, which Mr. and

102. *Eugeissona triste* forms a patch by a forest trail in a Mersing reserve.

Mrs. Burkill made bright with an invitation to join them and other guests for Christmas dinner in their spacious home overlooking the Botanic Gardens. For a northerner with southern leanings, it was no great sacrifice to spend a "green" Christmas in sight of the great clumps of *Oncosperma* earlier mentioned, nor to note in passing through the gardens an expanding inflorescence of a *Pinanga* which was burdened the next day with bees visiting the white flowers. Usually male flowers open and fall long before the female flowers on the inflorescence of arecoid palms, so it was of especial interest to note that flowers of both sexes were mature at the same time on this *Pinanga*, the male flowers dropping very early in the day.

Sarawak

December 30th had been set as departure date for a month in Borneo — two weeks in Sarawak and three in Sabah. A beautiful flight from Singapore is routed over the numerous small islands off the coast and then in view of the Borneo mountains to Kuching, capital of Sarawak and former home of the Brooke family, the "White Rajahs." There I was introduced to the hospitality of the Forest Department personnel and installed, appropriately enough but only temporarily, in the Palm Hotel before an afternoon of planning with Mr. Smythies, Chief Conservator of Forests, Dr. Anderson and Dr. Ashton, the forest botanist, who among them had worked out a busy schedule.

Early on the 31st, Mr. Smythies and assistants picked me up for a day on Mt. Matang which rises about 3,000 feet not far from Kuching. For almost any botanist, and especially for one concerned with palms, this mountain is an exciting one. Here Beccari collected many new species of *Licuala, Calamus, Daemonorops, Pinanga, Areca* and an odd little palm, *Gigliolia subacaulis*, of

which I was particularly anxious to collect a full series of specimens and preserved material.

We stopped in the low "heath forest" or *kerangas* forest at the base of the mountain where, growing in the moist acid soil, we collected *Licuala mattanensis*, a single-stemmed species with unbranched inflorescences, what seems to be a form of *Licuala furcata*, *Calamus nematospadix*, appropriately named because of the very delicate inflorescence, and two *Daemonorops*, *D. microstachys* with short stems and ascending leaves and *D. formicarius*, a clumped species the several stems of which are armed with concentric rings of very slender downward-pointing black spines which protect innumerable tiny ants.

At higher elevations on a trail above the water works, we collected the now familiar *Korthalsia scaphigera*, *Daemonorops cristatus*, *D. oxycarpus*, the coarse *Calamus paspalanthus*, inflorescences of which measured 23 feet long, and a handsome slender *Pinanga*, *P. tomentella*, with elongate wedge-shaped leaves.

But of *Gigliolia* we saw nothing, nor did we on a second visit on January 7th when we climbed to the top of the mountain by way of the old road which the rajahs formerly used to reach a bungalow hideaway. The summit was perfectly clear — the first time in Mr. Smythies' many visits — and the view over Sarawak to the sea and to the main mountain mass magnificent. On this trip we got more *Daemonorops* — *D. periacanthus*, *D. collariferus*, another species with strange hair-margined collars on the sheaths housing ants — *Calamus mucronatus*, *C. mattanensis*, the high-climbing *Korthalsia Cheb* with its large sheaths harboring large black ants whose activities were noisy enough to be audible for some distance, a few plants of *Arenga undulatifolia*, a handsome little *Iguanura*, a *Pinanga*, *Areca tenella* and, in mossy forest below the summit, *Calamus pygmaeus*.

Besides these forays to Mt. Matang, Dr. Anderson spent two days with me. We celebrated the New Year by visiting Semengoh Forest Reserve not far from Kuching where a patch of fine forest held so many rattans that by day's end I began to despair and had the feeling that no two plants belonged to the same species. In the 25 acres, more or less, we found *Pinanga crassipes*, a short-trunked but rather stout species with clustered stems, short prop roots, and brilliant crimson fruits, a little *Areca*, *Calamus mattanensis*, *C. hispidulus*, *Daemonorops melanochaetes*, *D. microstachys*, *D. acanthobolus* and two as yet unidentified *Daemonorops* species in collectable condition. A second one-day trip on January 8th took us to the limestone hills near the village of Bau, which had only recently been cleared of

103. Sibat holds *Korthalsia scaphigera* stem with terminal inflorescence.

104. Bako National Park from the sea.

an invading guerrilla party from Kalimantan (Indonesian Borneo). These hills are composed for the most part of much dissected limestone with occasional igneous intrusions. The sharp "dog-tooth" rocks make for difficult travel and heavy rain did nothing to make life easier but the contrast to acid regions was sharp. Here we found palms rare — only *Calamus paspalanthus* and a little *Pinanga* seemed to take to the soil of these hills except for the igneous intrusions where *Licuala mattanensis* and *L. furcata*, seen first on Mt. Matang, occur. The contrast was reminiscent of Amazonian Peru where, collecting palms but also with an eye for relatives of the African violet (Gesneriaceae), one learned not to look for many palms in the few limestone regions where gesneriads abound, and, equally, not to worry about missing many gesneriads in the acid swamps and forests where palms abound.

Distance, weather conditions during January, and lack of time precluded extended visits inland. Thus the major event in Sarawak was a four-day trip to Bako National Park on the coast near the mouth of the Sarawak River. Here, with a little resthouse as base, and with the diverse topography of the trail-dissected park at one's disposal, a visitor can accomplish much in a short time. On the morning of January 2nd, with Paul Chai as assistant and three Iban (Sea Dyak) tree climbers — Banyeng, Benang, and Sibat — to complete the party, a loaded boat left Kuching headed downriver. Along the lower reaches, *Nypa fruticans* is abundant on the river margins but other palms are not obvious. Arriving near the park — for we could not beach the boat but waded ashore and transported gear over mud-flats on a hand truck — *Oncosperma tigillarium* is obvious on the cliffs and slopes near the shore, even from a distance. Once established in camp, an afternoon on the southern sector of the Lintang path brought us to *Daemonorops longispathus*, one of the more ornamental species of the genus though not recommended for the average home garden, an interesting *Calamus* and clumps of the handsome *Eugeissona insigne* well deserving its name. The stems cluster with sometimes a short trunk below the leaves which are erect with soft irregularly arranged somewhat pendulous pinnae. The sharp blackish spines on the long petioles are formidable adversaries but yield to one prepared with heavy gloves. The terminal inflorescence is a great stalk up to 30 feet high, 2½ inches in diameter, with spirally arranged short branches on which, at this season, we found an abundance of large-beaked scaly fruit.

On other trails about Bukit Tambi, a hill in the park, *Johannesteijsmannia altifrons* abounds and near it what ap-

105. Rest stop at Bako, left to right are Banyeng anak Ludong, Paul Chai, Sibat anak Bubong, Benang anak Luang.

pears to be an undescribed species of *Gigliolia* with few stiff leaves, though detailed studies must still be made. *Calamus, Licuala, Pholidocarpus, Pinanga* and *Caryota* are other genera which were collected in the park, keeping the party busy on the trail and until light failed at the camp. Then we gathered around a communal pot of rice enriched with salt fish and onions or greens which Sibat prepared over a wood fire in the shelter occupied by the tree climbers. Sometimes Benang would pull out his harmonica and the air was always alive with laughter and the splat of hands attempting to diminish the overabundant population of mosquitos. Once, to turn the tables, the limited talent of the botanist was drawn on by a request for a "native" American dance. Since the frug, etc., were not in my repertoire, I made my debut as entertainer with a solo rendition of a Mexican dance (perhaps modified over the original) which dissolved the audience in shouts of amusement and nearly left us floorless as well. One needs something besides botanical training to keep up with demands of field work!

Since *Gigliolia* had not turned up at Mt. Matang, since I had not then recognized the material from Bako as a probable *Gigliolia,* and since *Gigliolia* was the most important palm in Borneo for my purposes, it seemed advisable to travel to Sabah by way of the little town of Bintulu where Beccari had found a second species, *Gigliolia insignis.* Some rearranging of plane tickets and a visa for an overnight stop at Brunei proved no real problem and Air Borneo's local service deposited me on January 9th at the airstrip in Bintulu where Mr. Joseph Yong of the Forest Service met me to arrange a trip by outboard motor boat to a presumed certain locality for *Gigliolia* not far from the Kidurong Lighthouse and to show me a few of the palms — *Daemonorops, Pinanga, Areca* — in the immediate vicinity of Bintulu.

The sea off Bintulu and especially off Kidurong Light is apt to be too rough for travel at times so on the morning of the 10th two forest guards and myself waited at the dock prepared for an overnight stop at the lighthouse if necessary and prepared also for cancellation of the trip. Fortune was kind, however,

106. *Eugeissona insigne* by the trail at Bako.

and we were soon speeding downriver in clouds of spray and breasting the heavy swells at the river's mouth headed for the smoother sea off shore. Forest guards also make capable boatmen in Bintulu, following the swells and currents seemingly as easily as a forest trail. By mid-morning we had tied up near the lighthouse and were afoot along the beach stopping here and there for a quick look into forest patches, one of which yielded *Cornera conirostris*, an unusual relative of *Calamus*, but with the heath forest (*kerangas*) by a slow stream called Sungei Gerais as our objective.

Palms were not rare — *Cyrtostachys Lakka*, in fact, is abundant back of the beach in wet acid sands, *Pinanga*, *Licula*, *Areca*, *Calamus* and *Daemonorops* are frequent — but *Gigliolia*, if there, eluded us. Having traversed the forest reserve to its boundaries and a trail in-

107. Banyeng is dwarfed by the apex of *Eugeissona insigne* inflorescence.

land back to the lighthouse, we came to an unexpected calm sea. With the thought that another area closer to Bintulu and accessible by bicycle down the beach might be rewarding, the decision to take advantage of the sea for a return trip was quickly made. Though the sea was less calm by far at Bintulu, we "sprayed" through to the dock before the light was gone.

Next day, perched atop a rented bicycle (soon found to have brakes in name only), I joined my guides to pedal down a dirt road to, and then along, the beach for some miles to the water works at Nyabau. Close by the pumping station we paused for a splendid specimen of *Daemonorops longispathus*, then commenced to circle the base of the slopes of a low hill, Bukit Nyabau, following a ridge in lowland dipterocarp forest beside the small stream Sungei Nyabau. My assistants were hunting within calling distance for a palm with narrow pinnae, having been shown rough sketches of what to look for. There are times such as this when excitement can mount high — the last

chance to obtain what seems unobtainable — and there is a feeling of wanting to find the thing by yourself that was gratified in this instance when just off the crest of a ridge I spied a low nearly stemless palm with narrow pinnae and then a couple of others nearby. In a moment the sight of the characteristic inflorescences of *Gigliolia insignis* among the leaves had me shouting to the others. It was not long before we had discovered all stages of flower and fruit on adjacent slopes. An even richer assemblage of plants, some with stems up to eight feet high, was later discovered on slopes just above the catchment basin for the water works. Through one of those unfortunate accidents, a large series of duplicate collections prepared for distribution was among three parcels of specimens that have strayed on the postal journey between Borneo and Ithaca, but some specimens and jars of air-mailed preserved material are ready for detailed study and an analysis of the relationship of this odd genus to *Areca* with which it seems closely related. The visit to Sarawak was thus concluded successfully and with an overnight stop at Brunei I headed north for three weeks with Dr. Meijer, the forest botanist in Sabah, formerly North Borneo.

The J. Harrison Wright Palm Collection

David Barry, Jr.

Two young Englishmen, J. Harrison Wright and his brother, Ben, came to Riverside, California, in 1873. They developed adjoining orange groves on twenty acres on the outskirts of the town, living in separate homes on the property. J. Harrison Wright, who never married, shared his home with an unmarried sister, Martha, and when he passed away in 1941, I lost a friend and tutor. I remember his funeral service which was held in a small wooden church built years ago. He had been a part of the Riverside scene for many years, and his death was a great loss.

J. Harrison Wright was a charming and cultured man. He was educated in Europe to which he returned from time to time. His friends and contemporaries who were interested in palms included Odoardo Beccari of Florence, the well known Italian taxonomist who died in 1920, and J. Robertson Proschowsky, the palm collector on the French Riviera (see *Principes* 5: 100-103). Wright and Liberty Hyde Bailey were close friends and Dr. Bailey made the Wright home a port of call when in California.

The Wright home at 2502 Adams Street was about two hundred and fifty feet back from the road. A driveway entered, divided, and encircled the house to join the entranceway. Within and along that encirclement were palms. The rest of the land was in oranges.

The collection of palms was outstanding as one that could endure extremes of temperature from 18° F. to 112° F. or higher. I first saw these palms about thirty-five years ago. Most of the plants had been grown from seed. The glass house that had been used for propagating had disappeared, and no new introductions were being made. I felt that the garden was completed in that Mr. Wright had covered the field in the introduction of palms that could withstand the climate of Riverside with the resources, transportation and knowledge available at the time.

Wright's palms were well grown with the advantage of deep, fertile soil,