



Figure 1: *Caryota gigas*, base of trunks, Hodel et al. 1773 (holotype).
Note person at left of tree on left, and huge root boss. Photo by Don Hodel.

Two New Giant *Caryota* and Additional New Species of Palms from Thailand

by Don Hodel

In preparation for the publication of a book on the palms and cycads of Thailand in July, 1998, recent field work in that country has yielded four new species of palms which I take great pleasure in naming, describing, and illustrating here. Two of the new species are giant, solitary *Caryota*, perhaps the largest in the genus. One, *C. gigas* from mountains in the north, has been cultivated in Southern California and elsewhere for about 12 years, although the name was not validly published. Here I formally validate that name and, in addition, provide a name for another, only recently discovered giant *Caryota*. The latter, just brought to my attention in late 1997, is from remote, wet mountain forest in the south peninsula. The two other new species are climbing rattans, a *Calamus* and a *Plectocomia*. Also, a nomenclatural note offers a new combination for a previously named *Pinanga*.

CARYOTA GIGAS Hahn ex Hodel sp. nov. Figs. 1, 2, 4. Inflorescentis grandissimis. Typus: Thailand. Nan: Doi Phu Kha, Hodel & Vatcharakorn 1773 (Holotypus BK, Isotypus BH).

Solitary, massive, emergent, gregarious, monoecious, monocarpic tree palm to 40 m tall (Figs. 2 & 4). Stem 50-90 cm diam., ventricose, markedly constricted at base and top (Fig. 4), swollen between, rounded to elliptic in cross-section, prominently ringed (Fig. 1), internodes 20-30 cm, tan, often curved at base, usually with conspicuous mass of prop roots at base to 1.5 m high. Leaves 6-15, clustered in a compact crown at the very top of the stem (Fig. 2), bipinnate, spreading, broadly ovate in outline; sheaths to 4 m long, deeply split opposite petiole, densely covered with grayish tomentum and dark brown, flaky scales and hairs, margins with fine to coarse, black fibers; petiole to 100 cm long, broadly channeled above, rounded below; rachis to 6 m long, spreading, rounded below; petiole and rachis covered with similar indument as sheath; pinnae 19-22 on each side of rachis, to 3.5 m long, spreading but distinctly drooping at tips; pinnules up to 27 on each side of pinna rachis, 20-35 x 7-15 cm, +/- rhomboid, pendulous, apical margins obtusely and jaggedly toothed. Inflorescences 3-5, initiating at top of stem and moving downward at each successive node, interfoliar at first becoming infrafoliar later, pendulous, massive (Fig. 4), to 6 m long; peduncle to 1 m long, downward-curved, stout, to 15 cm diam., bursting through sheath of subtending leaf; prophyll unknown, other bracts 9-13, usually falling prior to fruit maturation, densely covered with brownish indument similar to that of sheath; rachis to 5 m long, stout, to 18 cm diam. at base and gradually tapering toward tip; rachillae numerous, to 3 m long, short-ascending off rachis then quickly pendulous. Flowers in triads of a later-opening pistillate flanked on each of two sides by earlier-opening staminate. Staminate flowers 2 x 2 cm, obovoid, calyx 6 x 9 mm, cupular, sepals tightly imbricate to apex, broadly rounded apically, covered with grayish brown tomentum, margins uneven, sometimes with remnants of tomentum, briefly connate basally with short,

appressed reddish to brownish hairs adaxially; petals 1.8 x 1 cm, ovate, valvate, connate basally, thick, acute, yellow; stamens arranged on a receptacle 5 mm high, 70-145 in number, 8-14 mm high, filaments 1-6 mm long, some adnate to petals, anthers 6-10 mm long, basifixed, very narrowly oblong, bifid apically. Pistillate flowers 1 cm high, +/- globular; sepals 5 x 8-12 mm, imbricate, rounded, margins irregular; petals 8 x 8 mm, valvate, thick, leathery, yellow; staminodes 6-9 mm long; pistil globose, 3-lobed. Fruits to 2.9 x 3.5 cm, flattened-globose; epicarp red, thick, leathery; fruiting perianth 8 x 17 mm, explanate, triangular, not lobed, apices acute. Seeds usually 2 per fruit and hemispherical, to 2.4 x 1.8 cm, rarely 1 per fruit and slightly reniform, then to 2 x 1.7 cm, prominently and deeply longitudinally grooved.

Paratypes: Thailand. Nan: Doi Phu Kha 30 kms east of Nan, Kerr 4957 (BM,K); Hahn & Poona, 5920 (WIS, BKF,BH,K), 6734 (WIS).

Distribution and Ecology: *Caryota gigas* is a gregarious species known only from a relatively small area on Doi Phu Kha east of Nan near the Laotian border in north Thailand. It occurs on steep slopes in moist, mountain forest from 1400-1600 m

Notes: *Caryota gigas* is rather localized, occurring along a four-kilometer stretch of the main highway through Doi Phu Kha. Associated palm species include *Arenga westerhoutii*, *Calamus feanus*, *C. flagellum*, *Caryota maxima*, *Livistona speciosa*, *Myrialepis paradoxa*, and *Wallichia siamensis*. It is apparently absent from nearby mountains with similar if not identical and suitable habitat.

William J. Hahn proposed the specific epithet in 1993 in his doctorate thesis for the University of Wisconsin but never validly published it. Kampon Tansacha of Nong Nooch Tropical Garden and Inge Hoffmann have widely distributed seeds of *C. gigas* over the last 10 years, and the species is now widely cultivated. With Hahn's permission I have retained his suggested epithet.

Everything about *Caryota gigas* is large. It has a large stem, large leaves, unusually large inflorescences, and large fruits. Along with *C. no* from Borneo and *C. kiriwongensis* named and described below, it is among the largest species of the genus. Its inflorescence is among the largest in the entire palm family. *C. gigas* is probably associated with the *C. obtusa* complex of species but its immense size, strongly ventricose stem, tightly compact crown of leaves restricted to the very top one-tenth of the stem, and unusually large inflorescences distinguish it. *C. kiriwongensis* is similar but differs in its grayish, not strongly ventricose stem; larger leaves with only slightly drooping tips; much smaller inflorescences; flowers with abundant and rather long, not appressed, reddish brown hairs; deeply lobed fruiting perianth; and scarcely grooved seeds.

By the time plants have commenced to flower the crown of leaves has been reduced to only two to three, often much abbreviated and malformed leaves at the top of a markedly constricted stem, and the plants have taken on a rather bizarre, not too attractive appearance. Plants are most spectacular



Figure 2: *Caryota gigas*, crown of leaves, Hodel et al., 1773 (holotype). Note drooping pinnae tips. Photo by Don Hodel.



Figure 3: *Caryota kiriwongensis*, crown of leaves, Hodel et al., 1809 (holotype). Note only slightly drooping pinnae tips.



Figure 4: *Caryota gigas*, habitat, Hodel et al., 1773 (holotype). Note leaves restricted to very top of markedly constricted stem and very large inflorescence (right side at top of tree on right).

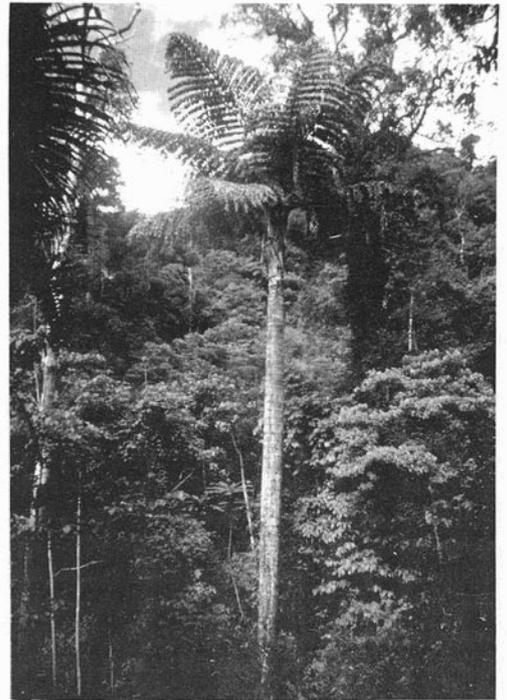


Figure 5: *Caryota kiriwongensis*, habit, Hodel et al., 1809 (holotype). For scale, note person at right side of base of tree with hand on trunk. Photo by Don Hodel.

and handsome prior to flowering before the upper part of the stem constricts and the crown still retains a full contingent of normal, large, striking leaves.

Caryota gigas is a conspicuous component of the forest. Its emergent and gregarious nature and crown of large, spreading, bipinnate leaves with drooping tips tightly clustered at the top of a slender, constricted stem give one the strong impression of a gigantic, super tree fern.

Caryota gigas is rather common in collections and gardens of palm enthusiasts in coastal Southern California. It has survived outdoors and grown vigorously at the Huntington Botanical Garden in San Marino for several, relatively mild winters with only a few, near-freezing nights. Tansacha and Hoffmann first distributed seeds in the late 1980s early 1990s as the Giant Thai Mountain *Caryota* and later as *C. gigas*.

CARYOTA KIRIWONGENSIS Hodel sp. nov. Figs. 3,5. Grandissima. Typus: Thailand. Nakhon Si Thammarat: Kiriwong, Hodel et al. 1809 (Holotypus BK, Isotypus BH).

Solitary, massive, emergent, monoecious, monocarpic tree palm to 35 m tall (Fig. 4). Stem to 85 cm diam., only slightly ventricose, enlarging to nearly 1 m diam. about half-way up, ringed, internodes 20-30 cm, grayish, usually with conspicuous mass of prop roots at base to 2.5 m high. Leaves 8-10 (Fig. 3), clustered in a compact crown at the very top of the stem, bipinnate, ascending to spreading, broadly ovate in outline; sheaths to 2.5 m long, deeply split opposite petiole, densely covered with whitish gray tomentum and dark brown, flaky scales and hairs, margins with fine to coarse, black fibers; petiole to 50 cm long, broadly channeled above, rounded below; rachis to 8 m long, spreading, rounded below; petiole and rachis covered with similar indument as sheath; pinnae up to 25 on each side of rachis, to 3.5 m long, spreading, only slightly drooping at tips; pinnules up to 40 on each side of pinnae, to 35 x 12 cm, +/- rhomboid, pendulous, apical margins jaggedly but finely toothed. Inflorescences 3-5, initiating at top of stem and moving downward at each successive node, interfoliar at first becoming infrafoliar later, pendulous, large, to 2.5 m long; peduncle to 1 m long, downward-curved, stout, to 10 cm diam., bursting through sheath of subtending leaf; prophyll unknown, other bracts unknown, all falling prior to fruit maturation; rachis to 1.5 m long, stout, to 10 cm diam. at base, tapering toward tip; rachillae numerous, to 1.5 m long, short-ascending off rachis then drooping to pendulous, sparsely covered with grayish indument and reddish brown hairs. Flowers in triads of a later-opening pistillate flanked on each of two sides by earlier-opening staminate, triad subtended proximally by a lip-like bracteole 1.5 mm high. Staminate flowers just prior to anthesis 16 x 9 mm, ovoid; calyx 7 x 9 mm, cupular, truncate, sepals tightly imbricate, briefly connate at base, broadly rounded to nearly straight apically, covered with grayish indument and abundant reddish brown hairs, margins irregularly toothed, fringed with reddish brown hairs; petals 13 x 7 mm, ovate, valvate, free nearly to base, smooth and +/- glabrous or with few scattered reddish brown hairs, faintly longitudinally nerved when dry, thick, apex acute, slightly incurved; stamens arranged on a hemispherical receptacle 2 mm high, 110-130 in number, 1 cm high, filaments slender, 0.5-2 mm long, anthers 8-9 mm long, basifixed, very narrowly oblong, bifid apically. Pistillate flowers on a pedicel 2 mm high, subtended proximally

by 2, imbricate, sepal-like bracteoles 1.5 mm high covered with reddish brown hairs, flowers 10 x 7.5 mm, broadly ovoid; calyx 6 x 7 mm, cupular, truncate, sepals tightly imbricate nearly to apex, broadly rounded to nearly straight apically, thick, covered with grayish indument and abundant reddish brown hairs especially adaxially; petals 10 x 7 mm, broadly ovate, valvate, thick, leathery, acute; staminodes mostly lacking, rarely 1-2, then 0.6 mm high, acute to acuminate; pistil 7 x 7 mm, triangular-obovoid, stigma 2-lobed, acute, 1.5 mm high. Fruits to 2.6 x 3.3 cm, flattened-globose; epicarp red, thick, leathery, fruiting perianth 7 x 16 mm, explanate, star-shaped, corolla deeply and prominently 3-lobed, lobes 8 mm long, long-rounded to acute. Seeds usually 2 per fruit and hemispherical, to 2.2 x 1.7 cm, rarely 1 per fruit and reniform, then to 2.2 x 1.5 cm, only lightly longitudinally grooved.

Distribution and Ecology: *Caryota kiriwongensis* is known only from the upper reaches of the Kiriwong Valley behind Nakhon Si Thammarat in south peninsular Thailand. It occurs along the lower parts of steep, often rocky slopes in very wet, mountain forest at about 1200 m elevation. In contrast to *C. gigas*, *C. kiriwongensis* is not gregarious. Only about 50 large plants scattered across an area about five kilometers wide are known and only a few of them are reproductive. Seedlings and saplings are scarce.

Notes: In the middle 1980s rumors were heard of a giant *Caryota* in the mountains behind Nakhon Si Thammarat but it was not until 1992 that a farmer and hunter in the area, Aow Panya, confirmed its existence. In August, 1997, Panya took Poonsak Vatcharakom, botanical collector and guide for Kampon Tansacha of Nong Nooch Tropical Garden, to see the palms. Panya, Vatcharakom, and I along with two porters made the three-day trek into the upper Kiriwong in November, 1997, and we made the only collections of this giant species. A photograph of a *Caryota* in south Thailand in *Principes* (17: 32, 1973) might represent *C. kiriwongensis*.

Nearly everything about *Caryota kiriwongensis* is large. Although its inflorescences are considerably smaller than those of *C. gigas*, the stem and leaves of *C. kiriwongensis* equal or even slightly surpass those of *C. gigas*.

The Kiriwong area is one of the wettest places in Thailand and unusually rich in palms. At least 17 species occur in the valley, including *Arenga caudata*, *A. westerhoutii*, *Calamus blumei*, *C. javensis*, *C. peregrinus*, *C. tomentosus*, *Caryota kiriwongensis*, *C. mitis*, *Daemonorops didymophylla*, *D. geniculata*, *D. kunstleri*, *D. sabut*, *D. sepal*, *Oncosperma horridum*, *Pinanga paradoxa*, *Plectocomia elongata*, *Plectocomiopsis geminaflora*. Nearly all are widespread throughout south peninsular Thailand. Strangely, *Licuala* and *Iguanura*, genera also common throughout south peninsular Thailand, are absent from the Kiriwong.

Caryota kiriwongensis is similar to *C. gigas* but the latter differs in its tan, strongly ventricose stem; slightly smaller leaves with drooping tips; much larger inflorescences; flowers with rather sparse and appressed reddish brown hairs; more or less unlobed fruiting perianth; and deeply and prominently grooved seeds. Like *C. gigas*, *C. kiriwongensis* is probably associated with the *C. obtusa* complex of species but its immense size, and tightly compact crown of spreading, flat leaves restricted to the very top one-tenth of the stem distinguish it.