

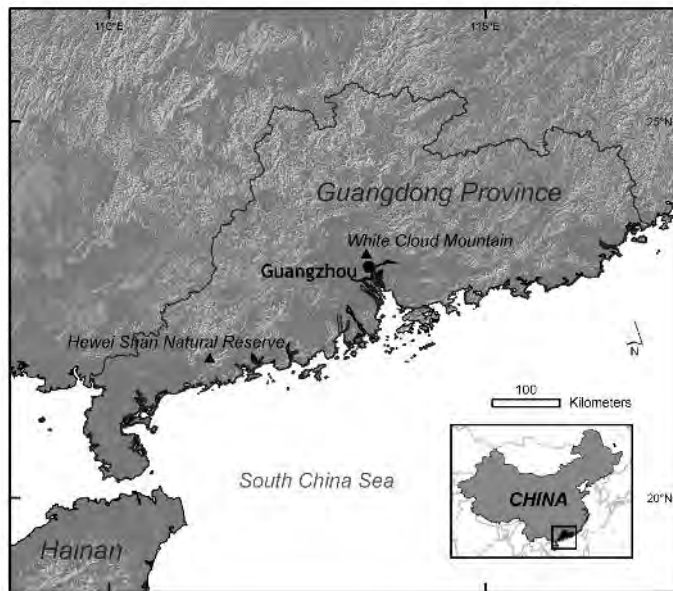
Arenga longicarpa, a Poorly Known Species from South China

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1. Map of Guangdong Province showing the two localities (triangles) visited to find *Arenga longicarpa*.



In this paper, the authors describe the hunt for a little known species of *Arenga*, *A. longicarpa*, restricted to South China.

In February 2010 Marc Jeanson visited China as part of his continuing revision of the caryotoid palms (*Arenga*, *Caryota* and *Wallichia*). China has an interesting palm flora comprising ca. 73 native species, out of which 27 are endemic, including the seldom-seen

and poorly known *Arenga longicarpa*. Chinese palms are mainly distributed in the southern provinces of Hainan (26 native species on the island) and Yunnan. Native palms are also present in Guangxi, Guangdong, Jiangxi and Fujian (Pei et al. 1991) but are rather scarce in



2. *Caryota maxima*, a common palm in Guangdong province.

these provinces (Henderson 2009). Some of them, however, are particularly noteworthy, such as *Guihaia* in Guangxi (Dransfield et al. 1985).

The first stop on Jeanson's itinerary was Guangdong Province (Fig.1), to visit the type locality of a large *Caryota* (Fig. 2) described as *Caryota ochlandra* by Hance in 1879. Govaerts and Dransfield (2005) considered this name to be a synonym of *Caryota maxima* Blume ex.

Mart. This palm is very common in the area of Dinghu Shan and is, without a doubt, conspecific with *Caryota maxima*.

Our next item on the agenda was the illusive *Arenga longicarpa*. This species was described in 1989 (Wei 1989) based on the study of only four specimens (including the type). The first collection of this palm was made by Otto Kuntze on White Cloud Mountain (Baiyun Shan) (Fig.1) in 1875, and his specimen is in

the New York Botanical Garden herbarium but was not a basis for the original description. One specimen cited in the protologue (*South China Inst. Bot. Exped. 383971*) was collected in Taishan County in 1973 but was not seen in the herbarium of that institute, IBSC. The other two cited specimens and the type were collected in the same locality, Mt. Heweishan (Fig.1) (in the Heweishan Natural Reserve) in Dianbai County. Collections were made in 1980, 1984 and 1985. Because this species had not been collected since 1985, little information – and no DNA material – was available. Prior to the publication of his field guide of palms of southern Asia (Henderson 2009), Andrew Henderson visited the region but was unable to find this species.

During Jeanson's two week trip, two out of the three localities known from herbarium specimens were visited. After several days in the South China Botanical Garden checking the specimens in the herbarium, including the type specimen, Liu Qian, a student from Nanjing Agriculture University investigated Mt. Baiyun Shan (White Cloud Mountain). The mountain is located at approximately 17 kilometers north of Guangzhou city: it is now totally integrated in the huge suburban area surrounding Guangzhou. We tried as much as possible to investigate areas far from the touristic trails and roads filled with people

during the Chinese New Year holidays, emphasizing especially the streams banks, a habitat often preferred by *Arenga* species. We ended up lost and finally met a group of people asking us to leave immediately because we were in a forbidden area; we were unaware that we had entered a military zone. We followed their directions for the quickest way to get out, and after five hours of exploration on the mountain, decided that we would end our search in this locality. From what we had observed, most of the non-cultivated vegetation on Baiyun Shan is secondary, and *Arenga longicarpa* seems absent in this place (although we did not investigate the northern part of the park). Since the 1970s, Guangzhou was massively urbanized, and the forest of Baiyunshan was largely replanted, which could explain the absence of this species since Kuntze's collection.

After Baiyun Shan, we visited the locality where three collections were made in Dianbai county. The first day, after a six hour trip from Guangzhou, we followed our guide through the Heweishan Natural Reserve where he took us to *Caryota mitis* and *Caryota maxima*, two other representatives of tribe Caryoteae in this area. These two species were unfortunately the only species our guide could locate after having read the description. We were a bit desperate to find *Arenga longicarpa* after having seen the

3. Habitat of *Arenga longicarpa* in Heweishan Natural Reserve.





4. *Arenga longicarpa*. Top left: habit of a mature individual; top right: detail of the leaflets; bottom left: unripe fruits; bottom right: seedling.

desolate and highly modified landscapes of the southern part of Hweishan Natural Reserve. Again, our first instinct was to focus our time and attention on the banks of streams in the area (Fig. 3). A dam was built and created an artificial lake (Xiaoshui Brook). We decided to survey the downstream banks and quickly discovered, at about 295 m altitude, a small population of perhaps ten different clumps of

Arenga longicarpa, which allowed us to make herbarium collections and to update the description (Fig. 4).

The day after, we decided to go further north to see if the species could be found at higher elevations as indicated on the herbarium labels, one of which said the palm grew at 750 m. We followed a trail across a vast area that



5. Pristine forest above 700 m elevation in Heweishan Natural Forest.

was formerly a conifer plantation. The trees had been devastated by a disease and then by a fire a short time before our visit, which gave the entire area a lunar landscape aspect. At about 700 m altitude, the forest reappeared and looked pristine (Fig. 5). The contrast was striking between the zone we just walked through and the beauty of the landscape we now faced. We walked for hours along different mountain streams but unfortunately did not find any other population of *Arenga longicarpa*. More field work is necessary to determine whether this species is present at this altitude range, where *Calamus rhabdocladus* (Fig. 6) is common.

Arenga longicarpa C.F. Wei, Acta Bot. Austro Sin. 4: 7. 1989. TYPE: CHINA, Guangdong, Taishan, C.F. Wei 123250 (holotype: IBSC!).

Shrub, 2–3 m high. Stems, when developed, clustered, to 50–60 cm high, 1–2 cm diam., to 7 cm with sheaths. Leaves 10–12, all along the stem, 2–2.5 m long, sheaths 20–25 cm long, disintegrating into brown/black fibers covering the stem; petiole rounded, 120–135 cm long, rachis 70–90 cm long, middle blade ca. 45 cm wide. Pinnae ca. 12 per side, mostly clustered in groups of 2 or 3 at the base and apex of rachis, elongated, linear obtriangular, 25–40 cm long, 4–5 cm wide at the widest (ca. the 2

thirds of the pinna length), dark shiny green adaxially, white silvery with very faint brown stripes abaxially, margin entire, apex acuminate and jagged, 6–15 cm long, base wedge-shaped; terminal pinna flabellate, 18 cm long and 9.5 cm wide. Inflorescences erect, unisexual, the whole plant either dioecious or monoecious; female inflorescence ca. 75 cm (measured on few specimens), rachillae 3–8, 20–39 cm long; male inflorescence, 39–42(50) cm long, rachillae 6, light green when young, becoming pinkish, peduncle ca. 28 cm long (measured on few specimens), prophyll 9.5 cm long, 1.7 cm in diameter, peduncular bracts 6, the first and sixth peduncular bracts 17–18.5 cm long, second 22 cm, others to 26.5 cm long, prophyll and peduncular bracts covered with light to dark brown scales. Male flowers oblong, 8–9 mm long; sepals 3, to 3 mm long, imbricate, color unknown; petals 3, 12–15 mm long, to 0.45 cm wide, orange, stamens 6–20, anther linear, to 9–10 mm long, ca. 0.8 mm wide, filaments short, ca. 1 mm long. Female flowers unknown. Fruit oblong to conspicuously reniform, 1.5–18 cm long, 9–10 mm diam., from green to orange, red to purple red when mature, one seeded, sepals persisting, 4–5 mm long and 4–5 mm wide at the base, bright red, triangular. Seed oblong to slightly pyriform, 12–13 mm long, 6–7 mm wide; endosperm homogenous, white.



6. *Calamus rhabdocladus* Burret, a common palm in the understory of South China and Indochina.

Specimens Examined. CHINA: Guangdong Province: Dianbai County, Heweishan, 25 Jan. 1980, fl. and fr., *C.F. Wei 123180* (IBSC!); Dianbai County, Heweishan, 10 Jun. 1984, fl. and fr., *C.F. Wei 123215* (IBSC!); Dianbai County, Heweishan, 7 Jul. 1985, fl. and fr. *C.F. Wei 123250* (Holotype, IBSC!); Dianbai County, Heweishan Natural Reserve, 295 m asl, 27 Feb. 2010, fr., *Jeanson & Guo MJ85* (IBSC! NY! P! K!); Guangzhou, White Cloud Mountain, ca. 305 m asl, 6 Feb. 1875, fl., *Kuntze s.n.* (NY!)

The habit of this species appears much like that of *Arenga porphyrocarpa* (Blume ex. Mart.)

H.E. Moore from Indonesia (Java and Sumatra). Mogeia (1999) suggested that the two names should be synonymized. Indeed, both species are densely clumped and stemless for most of their lifespan until the reproductive stage, when a short stem is developed. The first inflorescence is female, branched, and terminal; the following inflorescences develop in a basipetal sequence and are male and branched (Fig. 7). In *A. porphyrocarpa* the inflorescences are multiple whereas in *A. longicarpa*, inflorescences are always solitary. *Arenga longicarpa* can be easily identified by the shape of its pinnae (Fig. 4), which are

7. *Arenga longicarpa*. Top left: fruits at different stages of maturity; bottom left: detail of a fruit and seed; right: immature male inflorescence.





8. A clump of *Arenga longicarpa* in an open environment after deforestation of the gallery forest.

similar to those of some forms of *Arenga caudata* (Lour.) H.E. Moore, from which it is immediately distinguishable by its branched inflorescences (Fig. 7).

Phenology. Although the south of Guangdong Province has a very seasonal climate (Woo et al. 1997), this species was found flowering and fruiting all year long.

Vernacular name. Chang Guo Guang Lang (Pinying 123180, Mandarin)

Uses. Unknown

Distribution. Endemic to the southern part of Guangdong province.

Conservation. The clumps that we observed growing in open areas in this population did not look very healthy. The signs of stress of these clumps were a general yellowing, the papery brown margins of the pinnae and the shorter size compared with those growing in a shaded position (Fig. 8). It seemed obvious that what we observed was the remnant of a population that used to be more widespread. It was confirmed from the guide, who told us that there were more individuals before the construction of the reservoir. The retention lake drowns part of the population, but several other causes can explain this unhealthy appearance. *Arenga longicarpa* is a reophyte of seasonal streams (Fig. 3). Guangdong Province,

like other provinces of South China, experiences many intense rainstorms associated with typhoons and tropical storms (Woo et al. 1997), yet the hydrographic system has been highly modified by the dam (Fellowes et al. 2002). In addition, the gallery forest was cleared, and exposure to the sun has deleterious effects on this species (see above), which seems to be at its ecological optimum on sandy soils on river banks in the shade of riparian forests.

The distribution of *Arenga longicarpa* has been reduced over the past century. From the data we were able to gather, *A. longicarpa* faces several anthropogenic threats in Guangdong Province including urbanization and deforestation. In the absence of more extended field data we recommend the IUCN status “endangered” for this species (IUCN 2004). If this species could be found at higher elevations (700–800 m) the conservation perspective would be much improved because the lowland forests of this area have been much more disturbed than the forest above ca. 700 m altitude (Fellowes et al. 2002). Unfortunately of the fruits collected during this expedition (Figs. 4 & 7) none contained ripe seeds. Seedlings (Fig. 4) and part of a clump were collected to try an *ex situ* conservation experiment in the South China Botanical Garden under the supervision of Ms. Guo

Lixiu. Ms. Guo is also still in contact with the guide of Hweishan Natural Reserve in order to obtain mature seeds and distribute it to as many botanical institutions as possible. The Hweishan Natural Reserve (City-level) was established in Dec., 2008, next to the Ehuangzhang Nature Reserve (Province-level). We hope that this protection will be enough to allow *in situ* conservation as well!

Acknowledgments

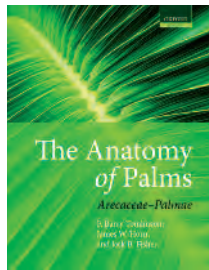
This trip was made possible thanks to the Annette Kade Fellowship and a PPF Barcoding grant from the Museum National d'Histoire Naturelle in Paris. Thanks to Andrew Henderson, Liu Qian from Nanjing Agriculture University, Mr. Li Zhishu from Hweishan Natural Reserve, Fangfang Weng, Qunkai Liu and Lawrence Kelly for their assistance and support.

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PALM LITERATURE

THE ANATOMY OF PALMS ARECACEAE – PALMAE. P. B. Tomlinson, J. W. Horn & J. B. Fisher. Oxford University Press. 2011. ISBN: 978-0-19-955892-6. Price \$225.00. Hardcover. Pp. 251.



A family-wide survey of the anatomy of palms is not a project for the faint of heart. The material needed for such a study is scattered across six continents and is sometimes difficult to identify. Palms are large, bulky and difficult to collect, and their tissues resist the dissection techniques developed for lesser plants. Prior to sectioning, the material must be soaked for days in hydrofluoric acid, washed and infused with alcohol and then infiltrated with resin, a lengthy and complicated process that can take weeks. In short, a study of palm anatomy requires comprehensive collections, a specialized laboratory and scientists with the time and commitment to see the project through.

Enter Barry Tomlinson, Jay Horn and Jack Fisher, who with support from Harvard University, National Tropical Botanical Garden, and the National Science Foundation, have tackled this Herculean task. This volume, in fact, is an updated version of Tomlinson's 1961 work, *Anatomy of the Monocotyledons. Vol. II: Palmae*. The new book completely supplants the old one with the clear advantage of 50 years of technological and intellectual progress. One of the most important advances is the phylogenetic underpinning of the new volume, following the classification in *Genera Palmarum 2*. Another important advance is the use of digital photography, which allowed the authors to capture color photomicrographs as they looked through their microscopes. Had they relied on old-fashioned color film, the cost of film and processing, not to mention the uncertainties of exposure and focus when shooting through a microscope, would have doomed the project from the start.

The book is into two main parts. Part one is an introduction to palm structure. The authors outline the heroic methods used to achieve the spectacular images of palm anatomy that grace the pages. They then explain the