

## A New Aquatic Palm from Madagascar

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On my way to an isolated area of forest during fieldwork in Madagascar in 1992 I drove across a bridge and saw a group of palms growing along the river with their feet in the water (Fig. 1). On the way back that evening, I stopped the car to take a closer look, and spotted quite a number of clumps, with their roots in the riverbed. My excitement grew; I thought I had discovered the first Malagasy stand of *Nypa*, the Indo-Pacific mangrove palm. I started walking upstream to see if I could find any fertile material, and it was not long before I saw a palm full of fruit—and I actually gasped in amazement, because it was a *Ravenea*, my very “own” genus, and a new species to boot! (Figs. 2,3). That was immediately clear because the tree showed a combination of characters unknown in the genus. I found a few seedlings sprouting under the water, on a rock pavement, and in my mind I dubbed the species “rheophytica.” Then I found some fruit, opened it to look at the seed, and found that it had already sprouted inside the fruit, a strategy employed by many types of mangrove trees (Figs. 4,5,6).

By now the light was fading fast and so I drove back to the nearest town for the night. Early the next morning I was back at the site of the new palm, accompanied by a Malagasy assistant. We walked along the river bank and saw about 400 trees with trunks, as well as large numbers of young plants. The population was in full fruit, but the male trees showed only dead inflorescences. All the trees grew in the fast-flowing stream, not one being found on dry land. The river here was 1–2½ m deep (3–8 feet). All trees were bent over

the water, probably anchored to the banks. I climbed a female tree to collect the leaves and the fruit, but while I was working my way up the steeply inclined trunk the orange fruits started dropping in great numbers—plopping into the river with a very melodious sound, each seed with its own note, depending on size and the length of the drop. As I grasped the inflorescence with the few remaining fruits a wonderful name for the new species hit me—*Ravenea musicalis*.

The male inflorescences were old and dead, but it was still possible to see they were multiple, as in several other *Ravenea* species. I asked a local man when these trees had flowered, and he replied “December.” Since it was March, this seemed quite likely, and I resolved to come back at the end of the year.

When I did so, in December 1992, the situation was virtually the same, with the exception being that the fruit was in a slightly younger stage, and only just turning yellowish. I checked a few hundred trees, but not a flower in sight. Again, I asked a local man when these trees flowered, but our languages did not quite match—his French was even worse than my Malagasy—and it took some time before he understood. Ah, flowers on the “Torendriky”? Well, it had been a strange year. “August?” I asked hopefully; “Eny [yes]” was the answer, but when I went through the months with him he said “eny” to December as well. . . .

“I’ll have to come back again” should be the palm chaser’s motto. Still, the material at hand is enough to distinguish the species from all others, and it is one of my



1. My first view of *Ravenea musicalis*—a small stand in deep water. 2. Young and mature trees. Note the large amount of floating fruit. The large-leaved aroid is *Typhonodorum lindleyanum*.

favorite Malagasy palms. Large amounts of mature seed have been distributed from the Royal Botanic Gardens, Kew, and are growing vigorously in places as far apart as Hawaii and London. In its home range, the palm seems to be restricted to a very small area. Despite a search of the area, I only saw it in that single river. Even considering the large numbers there, and the fact that it is not used by local people, it must be considered "vulnerable." Any serious upstream pollution or drying up of the river could wipe out the entire population.

### ***Ravenea musicalis* Beentje, sp. nov.**

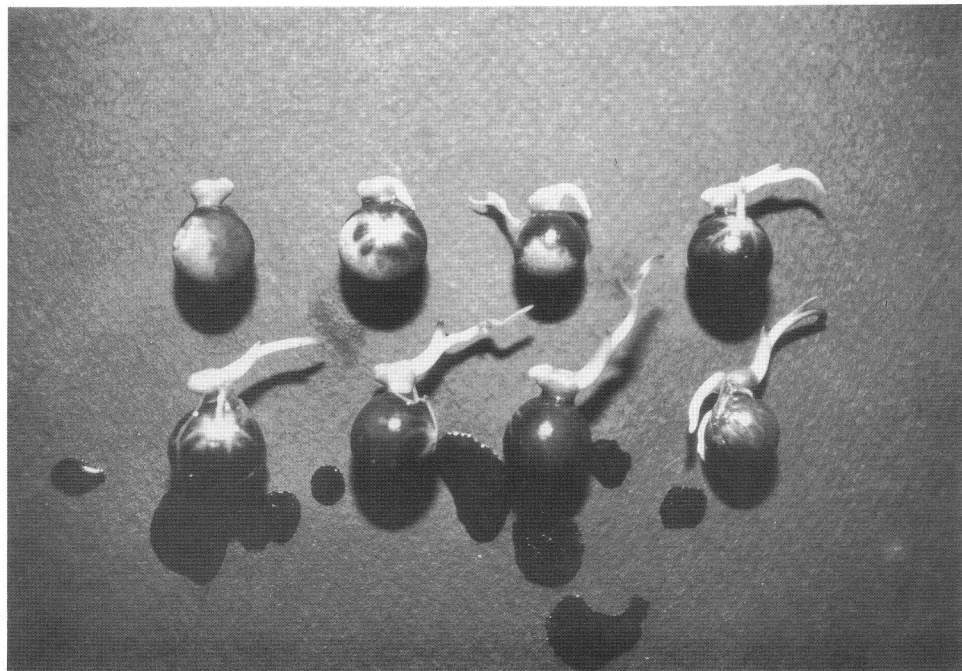
*R. rivulari* affinis sed ligno molli, inflorescentiis maribus semel ramosis, inflorescentiarum feminearum rachillis paucioribus, fructu semineque majore recedit; a congeneribus diversa habitu atque habitatione, germinatione singulari distinctissima. TYPUS: Madagascar, pagus Belavenona, flumen Andriambe, *Beentje & Andriampaniry* 4611 (holotypus K; isotypi BH, MO, P, TAN).

Solitary, unarmed dioecious palm to 10 m tall, of which 0.5–2.5 m below the water; trunk ventricose, DBH 30–40 cm, base (at water level) to 50 cm across, near the crown ca. 11 cm across, internodes here 0.5 cm, nodal scars 0.5 cm; bark pale brown, soft, with internodes 1–2 cm; wood soft, cream-colored, fibrous, without hard fibers. Leaves 14–16, spiral, porrect to spreading, arching, held on edge in distal half, with stiff or arching leaflets; sheath 36–41 × 13–20 cm, adaxially orange, abaxially proximally orange, distally green, with thin gray tomentum; fibers few; petiole 15–19 × 3.5–5 × 1.5 proximally, glabrous, keeled; rachis 132–178 cm, in mid-leaf 1–1.5 cm across; with little abaxial tomentum; leaflets in one plane, regular (interval in mid-leaf 2–2.5 cm), stiff, 59–63 on each side of the rachis, the proximal 36–47 × 0.5–1.5 cm, median 42–53 × 1.6–2.4 cm, distal 10–30 × 0.4–1.3 cm;

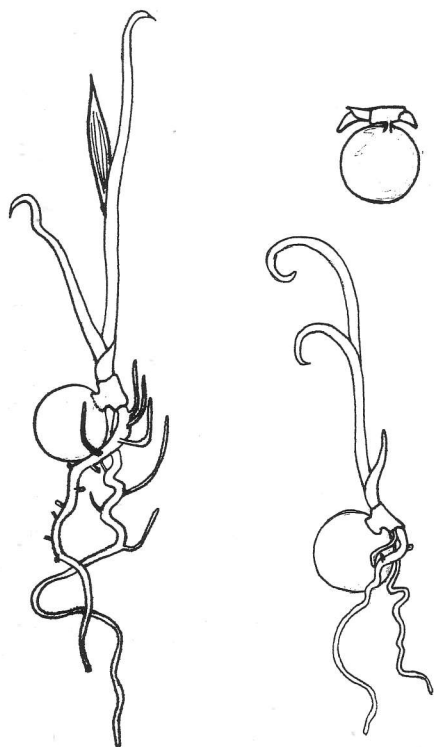


3. Close-up of crown with fruiting branches.

ramenta none or few, large, basal on midrib and outer main veins; main veins 4. Staminate inflorescences multiple in 5's, the individual inflorescences to 115 cm, branched to 1 order, pendulous in later stage; peduncle 36–38 cm, proximally 1 cm across, distally 0.6–0.7 cm across; bracts 29–30 cm, 38 cm, 64 cm (in 2), 84 cm (in 5), 80 cm (in 10); rachis 54 cm, with many dense rachillae; rachillae 7–24 cm, 1–1.5 mm across; flowers spaced; flowers unknown. Pistillate inflorescence solitary, spreading, 105–125 cm, branched to 1 order, the axes green; peduncle 48–52 cm, proximally 3–5 × 2–2.5 cm, distally 2–3 × 1.3–2 cm; prophyll 10 × 4 cm; peduncular bracts 20–24 cm (inserted at 0–2.5 cm), 49–52 cm (inserted at 3–3.5 cm), 82–83 cm (inserted at 4–9 cm), 100–103 cm (inserted 10–24 cm); rachis 39–55 cm, with 58–68 branches; rachillae 9–42 cm, the proximal spreading, the distal porrect, the base



4. Germination: the four upper stages are found within closed fruit, the four lower stages are found under water.



proximally flat,  $0.6-1.5 \times 1$  cm, in fruit 3-3.5 mm across; pedicels 0.5 mm; calyx connate for 1 mm, 1.5 mm wide, free lobes  $1.7-2.6 \times 1.6-2$  mm, ovate, acute; petals in fruit only present as fiber remnants, ca. 2.5 mm long. Fruit orange,  $17-23 \times 14-19$  mm, one-seeded; stigmatic remains subapical to lateral. Seed brown, 10-14 mm across, hard, seedcoat black, 0.2 mm thick; endosperm solid, homogeneous. Seedling with 3-4 scale leaves: the first small, the second, third and fourth to 9 cm long and with curving tips; eophyll pinnate.

*Distribution.* Madagascar, only known from one site.

*Specimens Examined.* Belavenona, R. Andriambe, March 1992 (fr.), *Beentje & Andriampaniry 4611* (type); idem (old stom.), *Beentje & Andriampaniry*

5. Germination: from within the closed fruit (upper right) to the first emerging leaf (left).



6. Submerged seedlings, with young emergent plants, in fast-flowing water 7. Seedlings in cultivation at Kew.

4612; idem, Dec. 1992 (y. fr.), *Beentje* 4756.

*Ravenea musicalis* grows in 0.5–2.5 m deep, flowing water and always leans over towards deeper water. The seeds sprout within the closed fruit; the fruits float and rot and then the seeds sink. The palm also grows as a rheophyte on submerged rock pavements, but is then sterile and only grows to a height of 1 m. The local name is “Torendriky” (“submerged trunk”); there are no uses known to local people.

*Note.* The species is distinct from all other *Ravenea* species by the absence of hard fibers in the outer wood; by its habit and habitat; and by the seed sprouting within the unopened fruit. Its nearest relative is probably *R. rivularis*, from which it differs by the staminate inflorescence, branched to one order only, by the pistillate inflorescence, with much fewer rachillae, and by the much larger fruit and seed.

In cultivation in Antananarivo and at Kew a few curious characteristics became apparent. The second and third scale leaves curve through 180–270° at the apex at

an early stage in development, which is perhaps a feature to aid establishment in fast-flowing water, since they may catch on protuberances on the riverbed. A similar strategy might be employed by the secondary rootlets, which sprout in large numbers and grow towards the light, rather than in the direction in which the main roots grow (i.e., downwards). Remarkably, the first true leaves are floppy, and the leaflets soft and pendulous (Fig. 7).

### Acknowledgments

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