

(stam.), *Beentje* 4491 (K, MO, P, TAN); idem, Oct. 1991 (pist., old fr.), *Beentje* 4502 (BH, K, MO, P, TAN); Ambodiriana, Dec. 1944 (fr.), *Cours* 1945 (K, P, TAN); Andrambolahy kely to Andranampony, April 1951 (y.fr.), *Cours* 4512 (K, P, TAN). Ampasimanolotra: Ambila, Feb. 1924 (y.fr.), *Perrier* 15991 (P). Vatomaniry: Ilaka Atsipanana, Oct. 1991, (stam.) *Beentje* 4503 (BH, K, MO, P, TAN); idem, (pist.) *Beentje* 4504 (BH, K, MO, P, TAN). Farafangana: S of Farafangana, May 1992 (old stam.), *Beentje* & *Andriampaniry* 4675 (BH, K, MO, P, TAN). Vangaindrano: near Ranomena, May 1992 (old stam.), *Beentje* & *Andriampaniry* 4674 (K).

Beentje 4501 (BH, K, MO, P, TAN), Toamasina: Betampona differs from typical *sambiranensis* in many sheaths remaining on trunk, full of humus and debris; sheath 28 cm; median leaflets 56–68 × 2.8–3.9 cm; staminate inflorescence multiple, non-tubular peduncular bract cylindrical, porrect from proximal first order branch, thin, green, 25 × 1.7 cm porrect part, apex fringed; 22 first order branches (branched) + 7 solitary; another uncertain collection is Tolanaro, Ste Luce, March 1989 (part of infrutescence only), *Dumetz* 632 (K, MO, P, TAN). In Jumelle (1927) the following specimen is cited: dry forest in the Ankaizina, on sandstone, c. 800 m alt, (pist.), *Perrier* 11954. This collection is not at Paris or Antananarivo.

POLLINATION & DISPERSAL. Flowers visited by bees and small flying beetles (pers. obs.); fruit eaten by Madagascar Blue Pigeon, and defecated seeds germinating well (as did seed from fallen fruit) (C. Birkinshaw, pers. comm.).

LOCAL NAMES & USES. 'Anivo; Anivona; Mafahely' (general), 'Soindro' (Tsimihety); 'Ramangasina' (Betsimisaraka); outer wood used for floorboards; young palmheart cooked with manioc and eaten, but slightly bitter (hence the name 'Mafahely', which means a little bit bitter).

This taxon gave me serious problems. The types of *R. sambiranensis* and *R. amara* are quite distinct, but with material I found in the Manongarivo Mountains the distinctions blurred; only the length of the leaf rachis and the number of leaflets is less in the plants from higher altitudes, but all other characters fall in a normal variation range. Tree size may vary from 6 m (DBH 10 cm) in montane populations, to 25 m (DBH 30 cm) in moist lowland forest.

Populations from riverine forest in the dry western Bongolava and the Bemaraha Tsingy, more than 700 km from the main population, show no differences from typical *R. sambiranensis*. Montane populations from Marojejy differ slightly in a longer petiole, a higher number of leaflets, a longer rachis of the staminate inflorescence; but not enough to warrant distinction even at varietal level. Eastern populations from white sand in the littoral, as well as from poor soils more inland, differ slightly in the more arching leaves and the slightly longer anthers; all differences are at one end of a range rather than absolute, and therefore I am treating this species as a variable one, rather than distinguishing geographically based subspecies with very minor morphological differences.

7. *Ravena julietiae* *Beentje* sp. nov. *R. glaucae* accedens sed foliolis majoribus absque ramentis, inflorescentia feminea multo longiore bene distincta. Type:

Madagascar, Amby forest, *Beentje & Andriampaniry* 4783 (holotypes K; isotypic BH, MO, P, TAN).

Graceful medium-sized palm, the *trunk* 3–10 m, DBH 10–15 cm, diameter near crown c. 7 cm; basal boss to 15 cm high, 40 cm across; internodes 6–12 cm (near crown 2 cm), nodal scars c. 1 cm, bark brown-grey; wood very hard, with black fibres just below the bark; base of crown bulbous, c. 15 cm across. *Leaves* 9–23 in the crown, gracefully arching; sheath 40–80 × 12–16 cm, pale green, the base abaxially with white to pale brown tomentum; petiole 30–80 cm long, proximally 3.5–6 × 2.2–4 cm across, distally 2.5–4 × 1.4–3.5 cm, deeply canaliculate with sharp edges, glabrescent or with a few scattered scales; rachis 110–280 cm, canaliculate or flat for some 40 cm, keeled for the rest, green with white scattered scales, in midleaf 1.7–2 cm wide; leaflets stiff or with the distal part of the leaflet pendulous, the leaflets on opposite sides of the rachis at an angle of c. 90° to each other, 34–48 on each side of the rachis, the proximal 58–110 × 1.3–3.7 cm, median 47–90 × 3.3–5.2 cm (interval 4 cm), distal 10–26 × 1.2–2.3 cm; ramenta apparently none, but in young leaves sparse large ramenta over entire length of midrib. *Staminate inflorescence* interfoliar, only known dead, multiple in 5s–7s, the individual inflorescences up to 90 cm, branched to 2 orders; peduncle 38–47 cm, distally c. 5 × 3 mm across; prophyll not seen; peduncular bracts unknown, except for one found on the ground, 84 cm long; rachis 46–55 cm, distally zigzag, with about 26 branched and 5 unbranched branches; rachillae 3.5–17 cm, distally sinuous. *Pistillate inflorescence* interfoliar, solitary, erect, spreading in fruit, 250–400 cm, branched to 1 order; peduncle 145–305 cm, proximally 2–2.2 × 1.3–1.8 cm across, distally 1.5 × 1 cm across, green with silvery-brown indument; prophyll 15–20 × 5 cm; peduncular bracts 22–36 cm (inserted at 2–6 cm from the base of the peduncle), 37–114 cm (inserted at c. 13 cm), 185–225 cm (inserted at c. 19 cm), 240–280 cm (inserted at 25–115 cm); rachis 28–70 cm long; rachillae 29–34 in number, 20 (distally)–49 (proximally) cm long, 2.5–4 mm across in fruit; pedicels 1–8 mm; flowers unknown. *Fruit* colour unknown, 22–27 mm long, 17–20 mm across and with lateral beak in younger stage, one-seeded; seed ovoid or ellipsoid, black, 19–20 × 14–17 mm; seed coat black, 0.2 mm thick. Germination remote. Eophyll bifid. Fig. 2.

DISTRIBUTION. Eastern Madagascar, between Mananara Avaratra and Vangaindrano.

HABITAT. Moist lowland forest; on slight to steep midslopes; 50–285 m.

SPECIMENS EXAMINED. Mananara Avaratra: Antanambe, April 1992 (old pist.), *Beentje et al.* 4623 (K, MO, P, TAN). Ampasimanolotra: Andrambolahy kely to Andranampony, April 1951 (fr.), *Cours* 4510 (K, P, TAN). Manakara: Amby forest, May 1992 (old pist.), *Beentje & Andriampaniry* 4661 (K, TAN); idem, July 1992 (old pist.), *H. Beentje & J. Beentje* 4719 (K, TAN); idem (fr., seedl.), *Beentje* 4722 (K). Farafangana: Manombo, Jan. 1993 (fr.), *Beentje & Andriampaniry* 4783 (holotype K, isotypic BH, MO, P, TAN) and (old stam.), *Beentje & Andriampaniry* 4784 (K, TAN), and (y.fr.), *Beentje & Andriampaniry* 4787 (K).

LOCAL NAMES & USES. 'Sindro madiniky' (Betsimisaraka, Antanambe); 'Saroroira' (Betsimisaraka, Brickaville), used in construction; 'Vakapasy, Anive, Anivona' (Tanala/Antaisaka), hollowed trunks used for irrigation pipes.

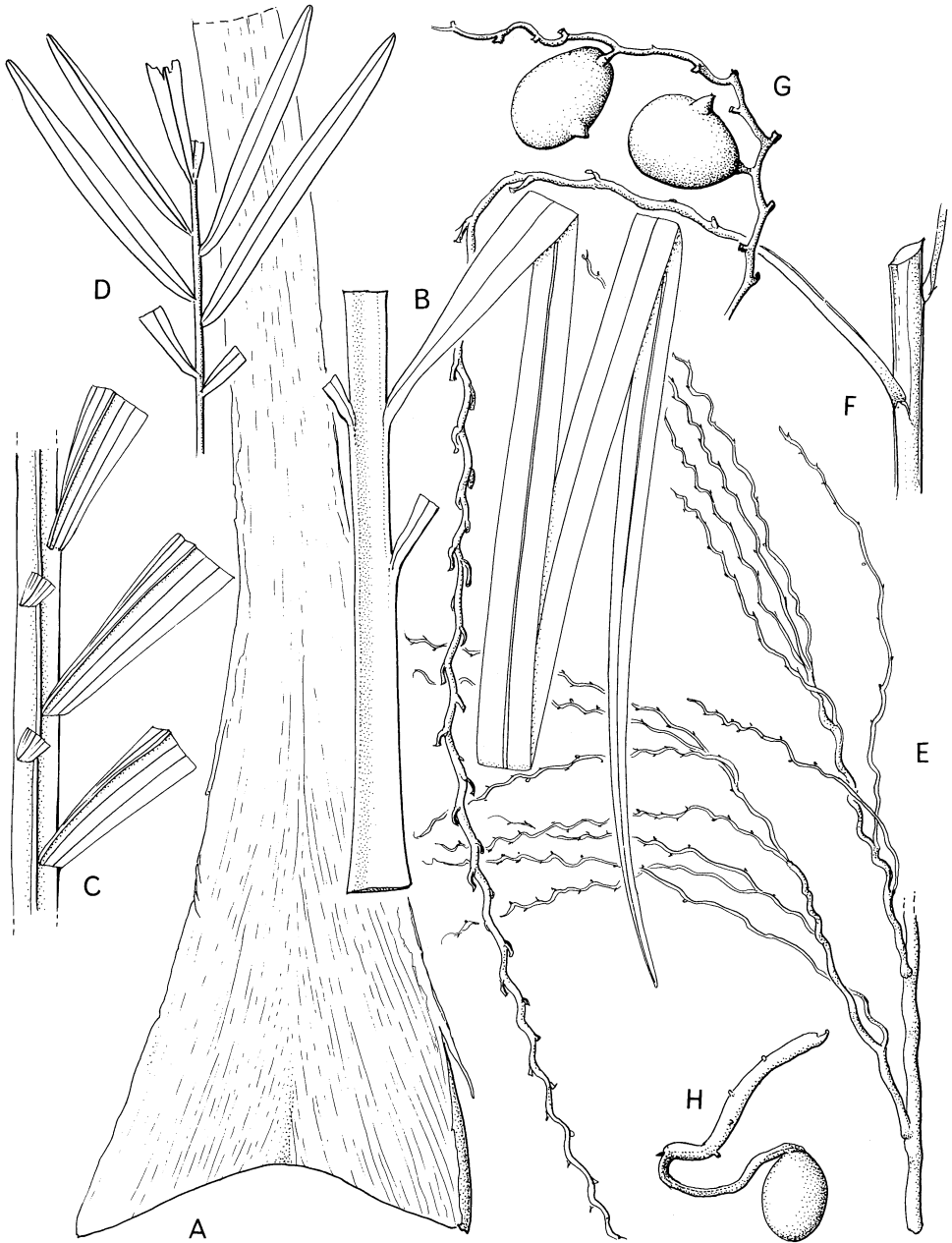


FIG. 2. *Ravenea julietiae*. **A** leaf sheath $\times \frac{2}{3}$; **B** proximal leaflet $\times \frac{2}{3}$; **C** median portion of rachis $\times \frac{2}{3}$; **D** leaf tip $\times \frac{2}{3}$; **E** portion of staminate inflorescence $\times \frac{2}{3}$; **F** portion of pistillate inflorescence $\times \frac{2}{3}$; **G** portion of rachilla with immature fruit $\times \frac{2}{3}$; **H** germinating seed $\times \frac{2}{3}$. **A-D**, **F-G** from *Beentje & Andriampaniry* 4787, **E** from *Beentje & Andriampaniry* 4784, **H** from *Beentje* 4722. Drawn by Rosemary Wise.

The staminate trees seem to have more leaves than the pistillate ones, with ranges from 21–23 (staminate) and 11–19 (pistillate). Male trees also seem to have longer petioles, 60–80 cm rather than 30–50 cm.

The species is distinguished from other species with solitary pistillate, but multiple staminate inflorescences, by its extraordinarily long pistillate inflorescences, its large black seeds, and the dimensions of its leaflets. It is the only *Ravenea* species apart from *R. louvelii* in which remote germination has been observed, rather than the usual adjacent-ligular germination. It is named after my wife, Juliet, who first drew my attention to it.

8. *Ravenea rivularis* Jum. & H. Perrier in Ann. Inst. Bot.-Géol. Colon. Marseille 3, 1, 1:54, t. 29–31 (1913); Becc. in Palme del Madagascar: 51, fig. 41 (1914); Jum. in Ann. Inst. Bot.-Géol. Colon. Marseille 4, 5, 1: 37 (1927); Jum. & H. Perrier in Fl. Madagascar 30: 172 (1945). Type not indicated, lectotype (indicated here) Madagascar, upper Imaloto basin, near Isalo, *Perrier* 11958 (lectotype P).

Majestic tree palm; *trunk* 5–22 (30?) m, cylindrical or slightly inflated towards the middle; DBH 36–50 cm, diameter near crown 15–18 cm; internodes 4–10 cm; wood with tough black fibre layer in the outer part; inner wood soft; bark pale brown-grey (not white, as Fl. Mad. states!); diameter of base of crown c. 22 cm. *Leaves* 16–25, porrect to pendulous, slightly arching, held on edge in the distal half of the leaf; sheath 30–50 × 15–16 cm, green and proximally with cottony white or grey-brown indument; margins ragged and fibrous; petiole 6–20 cm long, 4–4.5 × 1.5–1.6 cm across, adaxially flat with slightly sharp edges, white-waxy and -scaly; rachis green, white and scaly when young, 1.28–1.62 m long, 1–1.7 cm wide towards the middle, abaxially almost flat or slightly convex, densely pubescent to glabrescent, adaxially flat in the proximal half, more distally keeled with flat top and with the keel almost as wide as the rachis; leaflets regular, in one plane, stiff to pendulous, attenuate, green to slightly yellow, slightly waxy, 70–73 on each side of the rachis, the proximal 20–55 × 0.5–1.7 cm, the median 52–64 × 1.5–3.2 cm (interval c. 2 cm), the distal 16–42 × 0.4–1.9 cm; especially abaxially with the veins bearing minute whitish scales, also with a few large brown or grey ramenta on midrib abaxially. *Staminate inflorescence* in multiples of 5s–7s (Fl. Mad. says solitary), erect, branched to 2 orders, 86–90 cm; peduncle 32–45 cm, green, proximally 0.9–1.1 cm across and densely pubescent, distally c. 0.8 cm across and glabrescent, slightly flattened; prophyll not known; peduncular bracts (based on one collection, cut just above base) 18 cm, 85 cm, 88 cm, 71 cm (the last inserted at 13 cm from the base of the peduncle), abaxially short-pubescent; non-tubular peduncular bract at 15–30 cm from the base, membranous, 35–41 × 2 cm; rachis bracts c. 6 × 0.2 cm at the base of the rachis; rachis 52–89 cm, slightly pubescent; branches 60–100, dense; rachillae 3–21 cm long, sinuous in the distal part; bracteole c. 0.7 × 0.4 mm; pedicel 0.5–1 mm long; calyx connate for 0.5–0.7 mm, 0.6–1 mm across, free lobes 1.2–1.3 × 0.7–0.8 mm, triangular, acute; petals 3.5–5.8 mm, ovate, acute; filaments 0.4 (epipetalous, adnate for 0.3–0.4 mm)–0.8 (free) mm; anthers 3.1–3.4 × 1.2–1.5 mm; pistillode