

scientia infrafoliaris in 3 ordines ramificans prophyllum et bracteam peduncularem unicam ferens; rachillae flores basin in triades apicem versus flores masculos singulatim vel binatim ferentes; flores masculi 52–59 staminibus; flores feminei 10–12 staminodiis; fructus magnus, suberoso-verrucatus, reliquiis stigmatum basilaribus, endocarpio crasso tumorem cordiformem basilem ferenti, endospermio superficialiter ruminato, embryo apicali. Typus. *L. halleuxii* J. Dransf.

Massive solitary unarmed monoecious pleoanthic tree palm. Trunk bare, ringed with leaf scars. Leaf reduplicately pinnate; sheath tubular, forming a well developed crownshaft, bearing wax and scales; petiole rather short, channelled adaxially, rounded or ridged abaxially, densely covered with caducous chocolate-brown scales; rachis adaxially somewhat channelled near the base, ridged distally, abaxially rounded or flattened, scaly as the petiole; leaflets very regular, numerous, linear-lanceolate, long acuminate, except near the leaf tip where bifid; adaxial leaflet surface glabrous, abaxial bearing a few large dark brown ramenta near the base on the main vein and more numerous small ramenta on secondary veins, pale brown peltate scales abundant on all veins; transverse veinlets not visible. Inflorescence infrafoliar, branched to 3 orders, the whole inflorescence exposed long before anthesis, protandrous; peduncle moderate in length; prophyll splitting along one side; peduncular bract longer than the prophyll; first-order branches widely spreading, the basal few branched to the third order, the distal branched to the second order or unbranched; rachillae numerous, elongate, pendulous or spreading, somewhat swollen, with flowers partially embedded in shallow pits; rachilla bracts rather obscure, forming the lower lip to the pits; floral bracteoles minute, included in the pits. Flowers borne in triads of a central pistillate and two lateral staminate for about two-thirds the rachilla length, and in pairs of staminate flowers in the distal third. Staminate flower in bud  $\pm$  bullet-shaped; sepals 3,  $\pm$  distinct, minutely connate at the base, imbricate, strongly keeled and gibbous; petals 3,  $\pm$  distinct in bud, valvate, boat-shaped, adaxially grooved, glabrous, later the floral receptacle greatly enlarging carrying the petal bases above the calyx, the petals becoming reflexed by a swollen pulvinus at the petal bases; stamens 52–59, borne on the dome-shaped receptacle, filaments terete, straight or contorted in bud, rarely filaments partially connate, anthers frequently rather irregular in outline due to close-packing in the bud, basally sagittate, medifixed, latrorse; pollen elliptic, monosulcate with perforate tectate exine; pistillode columnar, hidden among the filament bases. Pistillate flower known only in immature bud; sepals 3, distinct, imbricate, unequal, rounded; petals 3, distinct, basally strongly imbricate, with triangular valvate tips; staminodes 10–12, minute, tooth-like or strap-shaped, distributed evenly around the gynoeceium; gynoeceium pseudomonomerous, ovoid, stigmas apical, as yet scarcely developed, ovule hemianatropous, basally attached. Fruit large, globose, the epicarp cracked polygonally into low corky warts, stigmatic remains basal; mesocarp rather spongy, easily separable from the endocarp; endocarp spherical, with a basal heart-shaped pale brown button; endosperm very shallowly and sparsely ruminant; embryo apical. Germination adjacent-ligular; eophyll bifid.

**Lemurophoenix halleuxii** *J. Dransf.* sp. nov. Palma pergrandis, formosissima solitaria caule usque 20 m et columna coronae roseo-griseata usque 1.5 m longa; rachis folii usque 4.25 m longa foliolis c. 60 utrinsecus regulariter

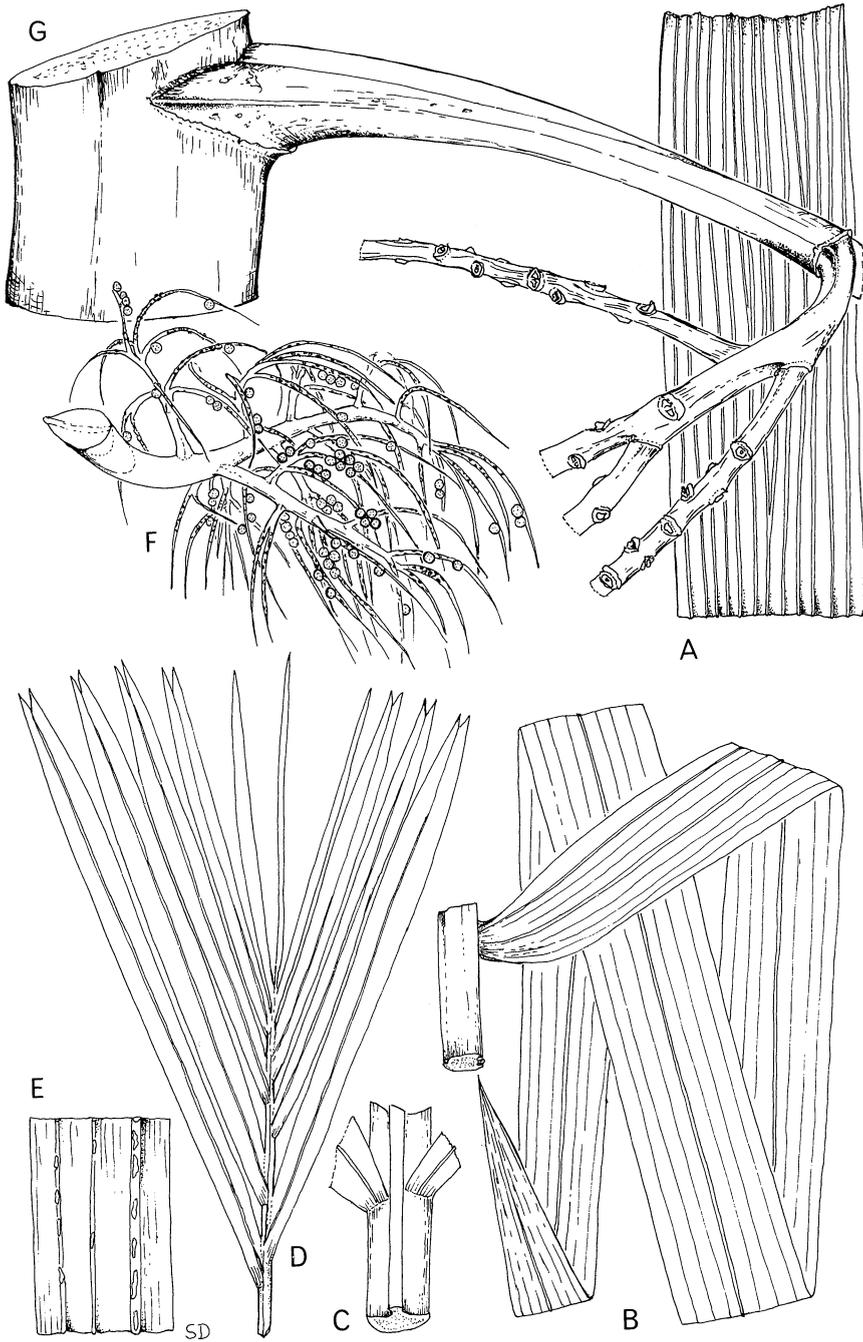


FIG. 1. *Lemurophoenix halleuxii*. **A** detail of leaf sheath  $\times \frac{2}{3}$ ; **B** leaflet from mid leaf, abaxial view  $\times \frac{1}{3}$ ; **C** detail of rachis at mid leaf, adaxial view  $\times \frac{1}{2}$ ; **D** leaf tip  $\times \frac{1}{3}$ ; **E** detail of lower surface of leaflet  $\times 3$ ; **F** infructescence, greatly reduced; **G** tip of peduncle and proximal first-order branch  $\times \frac{2}{3}$ . **A** from Dransfield *et al.* JD 6453, **B–G** from Dransfield *et al.* JD6402. Drawn by Soejatmi Dransfield.

dispositis; inflorescentia usque 2 m longa pedunculo usque 50 cm; bracteae (prophyllum et bractea peduncularis) extus carmesinae intus cremeae; rachillae c. 110, usque 40 cm longae, cremeae demum virides; flos masculus alabastro 8 × 4 mm, petalis anthesin reflexis, staminibus receptaculo tumido portatis; fructus c. 50 mm diam. Typus: Madagascar, *Dransfield et al.* JD 6453 (holotypus K; isotypy BH, MO, NY, P, TAN).

Immense tree palm. Trunk to 20 m tall, at base c. 1 m diam., higher up c. 50 cm diam., pale brown, leaf scars c. 10 cm apart. Leaf to 4.5 m long; crownshaft c. 1.5 m long, c. 50 cm diam., the leaf-sheath greyish pink when newly exposed, bearing scattered dark brown peltate scales and abundant white wax; petiole to 25 cm long, c. 10 cm wide and 5 cm thick at the base; leaflets very regular, c. 60 on each side of the rachis, stiff, rich dark green, c. 6 cm distant, linear-lanceolate, the proximal c. 65 × 2 cm, in mid leaf c. 95 × 6 cm, decreasing abruptly in size to 17 × 0.7 cm near the tip; rachis when young bright crimson, young blade flushed red. Inflorescence very robust, c. 2 m long; peduncle c. 50 cm long, grossly swollen and winged to c. 35 cm wide at the base, decreasing to 10 × 4.5 cm near the insertion of the first branch, the surface densely covered with rough brown scales; prophyll and peduncular bract abaxially bright crimson, cream-coloured within; prophyll to 90 cm, splitting along one side, inserted c. 15 cm above the base of the peduncle; peduncular bract to 120 cm long, inserted c. 10 cm above the prophyll insertion; first-order branches c. 12–15, the basal devoid of branches in the basal 20–25 cm, to 4–5 cm thick; rachillae c. 110, cream-coloured at anthesis, becoming green, to 40 cm long, c. 8–9 mm diam., somewhat swollen, with flowers partially embedded in shallow pits c. 6–10 mm apart, rachilla surface minutely papillose and scaly; rachilla bracts c. 2 × 8 mm, fleshy. Staminate flower-bud pale greenish brown, c. 8 × 5 mm, at anthesis the flower with a spread of c. 14 mm; sepals connate in the basal 0.8 mm, c. 3.5 × 6 mm, c. 2 mm thick at the keel, the margin minutely ciliate, otherwise glabrous; petals c. 7 × 3 mm, pale brown, later the floral receptacle carrying the petal bases c. 4 mm above the calyx, the petals becoming reflexed by a pulvinus to 1.5 mm thick at the petal bases; stamens 52–59, borne on the receptacle c. 4.5 mm wide, filaments 2–4 × 0.1 mm, anthers c. 2 × 0.5 mm; pistillode, c. 1.5 × 0.2 mm, hidden among the filament bases. Pistillate flower in immature bud, c. 4.5 mm diam.; sepals c. 3.5–4.5 mm diam.; petals c. 3.5 mm long; staminodes 10–12, 0.4 × 0.2 mm; gynoeceum c. 2.5 × 1.5 mm. Fruit chestnut brown, globose, at maturity c. 50 mm diam., the epicarp cracked into corky warts less than 1 mm high and 2–5 mm across; mesocarp c. 8 mm thick, whitish; endocarp spherical, c. 33 mm diam., 1 mm thick, deep brown, with a basal heart-shaped pale brown button c. 11 × 11 × 7 mm. Eophyll flushed reddish-brown when newly emerged. (Plate 1; Figs 1 & 2).

VERNACULAR NAME: "Hovitra vari mena"

MADAGASCAR. Maroantsetra, Andranofotsy River, Sahavary, hills east of village, Andilampananina, primary forest, deep narrow valley at 350–450 m, 23 Oct. 1986, *Dransfield, D. N. Cooke, A. Rakotozafy, J. H. Beach, P. P. Lowry & G. Jean* JD 6402 (BH, K, MO, NY, P, TAN); 10 Feb. 1988, *Dransfield, A. J. Henderson & M. Staniforth* JD 6453 (holotype K; isotypes BH, MO, NY, P, TAN).

The most difficult problem still requiring solution is the affinities of this majestic palm. The pinnate leaf and the arrangement of flowers in triads of a



PLATE 1 *Lemurophoenix halleuxii*. **A** mature tree in full fruit; **B** David Cooke collecting material from a fruiting individual; **C** view into crown of immature tree; **D** immature fruit to show warty pericarp  $\times 1/2$ . **A** photographed by D. Cooke; **B – D** J. Dransfield.

central pistillate and two lateral staminate clearly indicate that it belongs to subfamily *Arecoideae* (Uhl & Dransfield 1987). The reduplicate vernation, the presence of only two large bracts in the inflorescence (the prophyll and a peduncular bract) and the pseudomonomerous gynoeceium (i.e., a gynoeceium with a single fertile locule but with vestiges of two further locules) further narrow the affinity to tribe *Areceae*, but to which subtribe of this, the most variable of tribes in *Arecoideae*, the palm is most closely related is not obvious. The corky-warted fruit is present in *Manicariinae* and two genera of *Iguanurinae* (*Sommieria* and *Pelagodoxa*), but the former has trilocular, triovulate gynoecea while the fruits of genera in the latter subtribe (which consists of genera with pseudomonomerous gynoecea) have a conspicuous operculum in the endocarp that is lacking in the "red-lemur palm". Besides, such corky-warted fruits are found in several quite unrelated palm genera (see Uhl & Dransfield 1987) suggesting that this epicarp condition may have arisen several times in the evolutionary history of the family. Multistaminate flowers occur in many arecoid subtribes and the ontogeny of multistaminy is various (Uhl & Moore 1980), again suggesting that the presence of more than six stamens may have arisen several times. One of the most curious features is the internal fruit structure. The endocarp bears a basal heart-shaped button which seems to represent the sclerified vascular supply next to the chalaza. Such a structure is also present in *Orania* and *Halmoorea* in the *Oraniinae* (and in members of subfamily *Phytelephantoideae*); however, members of *Oraniinae* are tricarpellate and triovulate and are vegetatively and in inflorescence structure both rather uniform and quite different from the red-lemur palm. Apart from the presence of more than six stamens, the staminate flowers do bear a resemblance to those of larger members of the quintessentially Madagascar subtribe *Dypsidinae*, but, without drastically altering the circumscription of the *Dypsidinae*, an otherwise apparently very natural group, the "red-lemur palm" cannot be included. It may be necessary to create a new monotypic subtribe for this very distinctive new genus, but even so this does not solve the problem of which subtribe of *Areceae* is the sister group. A greater understanding of the relationships will require developmental study and may be helped by cladistic studies in progress (Dransfield & Uhl, in prep.) and until then I defer the subtribal placement.

*Lemurophoenix halleuxii* occurs in a steep-sided valley below the long ridge-top leading eastwards from the village of Sahavary. The valley is at about 350–450m above sea level. There is a great abundance of different palms in the forest here, yet there is little peculiar about the habitat. Furthermore, *Lemurophoenix* does not occur in similar valleys nearby. As one drops down from the crest of the ridge, suddenly one becomes aware of immense palms in the forest canopy in the valley bottom, the huge greyish-pink crownshafts and vast bunches of fruit standing out amidst the surrounding green. There are about 30 mature individuals and about 20 juveniles in various stages of development. Beneath the mature trees lie thick carpets of bare endocarps, either newly fallen or rotting. Seedlings are distinctive but very scarce. It appears that there is little effective dispersal and very limited regeneration and it is difficult to imagine which extant Malagasy animal might be capable of dispersing the rather large diaspore. It is not known to occur anywhere else in the vicinity of Maroantsetra or on the Masoala Peninsula.

The horticultural potential of this palm could be very great indeed. It has the stature of the Caribbean royal palm, *Roystonea oleracea*, but has the added

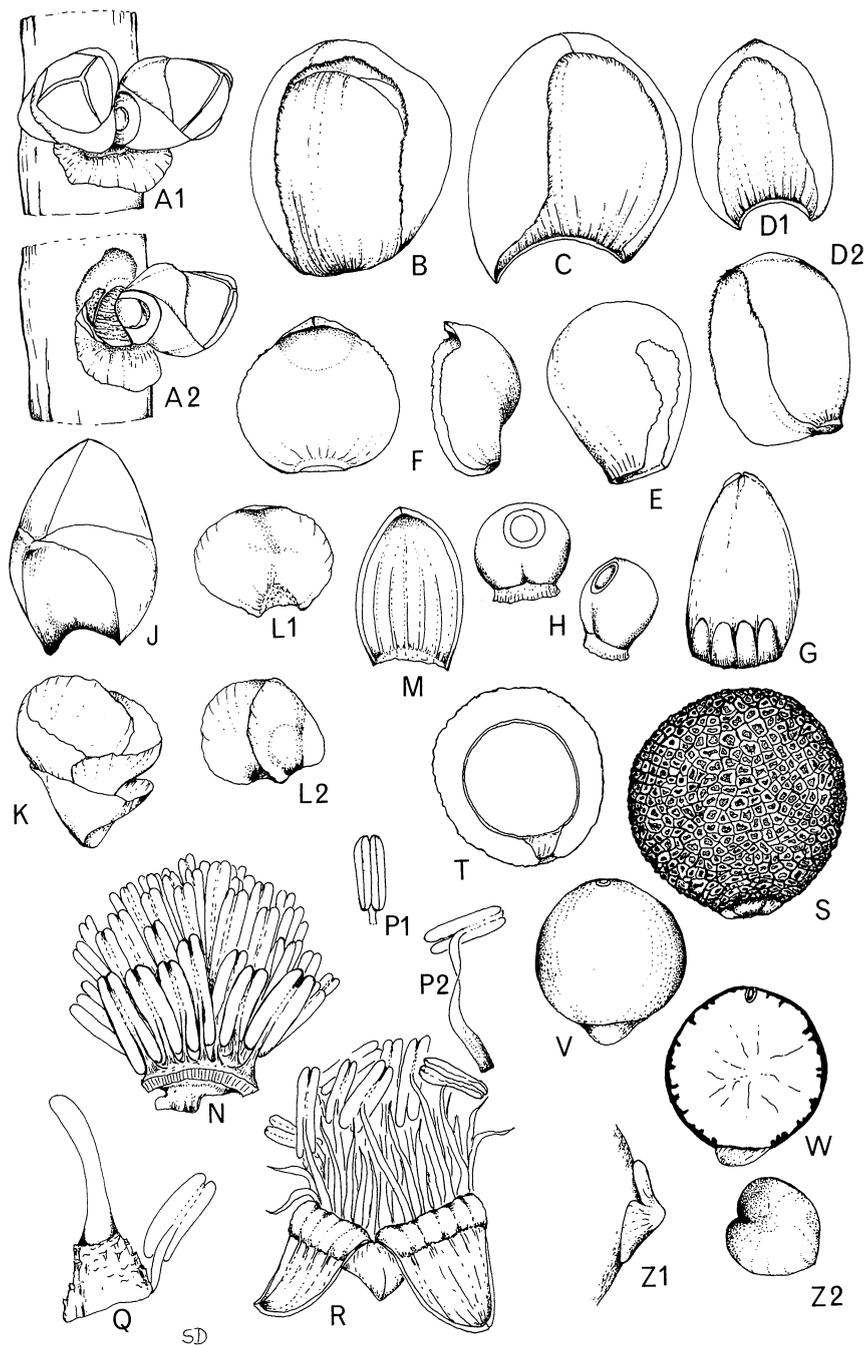


FIG. 2. *Lemurophoenix halleuxii*. **A1** triad  $\times 3$ ; **A2** triad, one staminate flower removed  $\times 3$ ; **B** pistillate flower bud  $\times 10$ ; **C**, **D1**, **D2**, **E** sepals of pistillate flower bud  $\times 10$ ; **F** two views of petal of pistillate flower  $\times 10$ ; **G** ovary with four staminodes  $\times 14$ ; **H** two views of ovule  $\times 50$ ; **J** staminate flower bud  $\times 4\frac{1}{2}$ ; **K**, **L1**, **L2** sepals of staminate flower  $\times 4\frac{1}{2}$ ; **M** petal of staminate flower bud  $\times 4\frac{1}{2}$ ; **N** androecium of staminate flower bud  $\times 7$ ; **P1** stamen from bud  $\times 7$ ; **P2** stamen from open flower  $\times 3$ ; **Q** pistillode and one stamen  $\times 7$ ; **R** open staminate flower  $\times 3\frac{1}{2}$ ; **S** fruit  $\times \frac{2}{3}$ ; **T** vertical section of immature fruit  $\times \frac{2}{3}$ ; **V** endocarp  $\times \frac{2}{3}$ ; **W** vertical section of endocarp and seed  $\times \frac{2}{3}$ ; **Z1**, **Z2** two views of basal excrescence on endocarp  $\times 2$ . **A–V**, **Z** from *Dransfield et al.* JD6453, **W** from *Dransfield et al.* JD6402. Drawn by Soejatmi Dransfield.

attraction of the wonderfully pink-tinged grey crownshaft. As a specimen tree for tropical gardens or for avenues it would be spectacular indeed, if it is amenable to cultivation. Unlike the easily cultivated Malagasy palms *Chrysalidocarpus lutescens*, *C. madagascariensis*, *Bismarckia nobilis* and *Neodypsis decaryi*, *Lemurophoenix* occurs in one of the warmest and wettest parts of the island so it may be less tolerant than these others, now so widespread in cultivation.

*Lemurophoenix halleuxii*, as "Red-Lemur Palm", is now well known to the more avid palm collectors throughout the world and every year large quantities of ripe seed from the only known population are harvested and exported. The removal of seed, if it continues at this rate, will ultimately affect the regeneration of the palm and endanger its survival.

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