



Seven new species of *Licuala* (Livistoninae, Arecaceae) from New Guinea

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Abstract

Based on newly gained insights from intensified fieldwork, we describe seven new species of *Licuala* from New Guinea and adjacent islands. All species are illustrated and provided with information on their habitat, conservation status and morphological affinities.

Abstrak

Berdasarkan pemahaman baru yang diperoleh dari hasil kerja lapangan yang intensif, kami mendeskripsi tujuh spesies baru *Licuala* dari New Guinea dan pulau-pulau sekitarnya. Semua spesies baru ini diilustrasikan dan dilengkapi informasi tentang habitat, status konservasi, dan dibahas kedekatan morfologinya.

Keywords: Palmae, Indonesia, Papua New Guinea, Taxonomy, Conservation Status

Introduction

Recent fieldwork on New Guinea and adjacent islands has led to a number of discoveries of new palms. With 25 species, *Licuala* is one of the most diverse genera on the island, only second to *Calamus*. All the species recorded so far are endemic to New Guinea. During the years from 1877 to 1921, the Italian botanist Odoardo Beccari published a total of 17 new species of *Licuala* from New Guinea based on his own collections from Indonesian New Guinea and collections deposited in the Berlin herbarium (Beccari 1877, 1909, 1914, 1921). Later, the German botanist Max Burret published 11 species in a series of publications (Burret 1933, 1935, 1939, 1941). They were based on material forwarded for identification by various collectors who had visited the island. Most recently, Anders S. Barfod has published a number of new species in collaboration with colleagues (Barfod 2000, Banka & Barfod 2004, Heatubun & Barfod 2008, Barfod & Heatubun 2009). The revision of the genus as part of the Palms of New Guinea project has revealed 12 new species in total, of which seven are published here (Baker 2002).

Materials & Methods

Collections were prepared during fieldwork conducted on New Guinea and adjacent islands. Herbarium specimens of *Licuala* were studied at A, AAU, B, BH, BO, BRI, CANB, FI, K, L, LAE, MAN, MO, USF (herbarium acronyms according to Thiers 2020). Flowers and fruits were prepared by boiling for dissection and analysis under a Leica stereomicroscope. We used a micrometer scale slide for measurements. Palmweb (2022) allowed us to retrieve the

original descriptions of closely allied species. Definitions of the morphological characters follow Genera Palmarum (2. Ed.) (Dransfield *et al.* 2008). Conservation assessments follow the IUCN categories and criteria (IUCN 2021).

Taxonomic Treatment

1. *Licuala bakeri* Barfod & Heatubun, *sp. nov.*

Type:—INDONESIA. West Papua Province: Manokwari Regency (now Teluk Wondama Regency), Kowi, near Wondiwoi village (ca. 9 km south of Wasior), 950 m, 2°48'14"S, 134°32'22"E, 24 February 2000, *Baker et al. 1059* (holotype K!; isotypes AAU!, BO, L, MAN!).

Figure 1

Diagnosis:—Differs from *Licuala bellatula* by having a non-bifid mid-segment. Differs from *Licuala essigii*, *L. flexuosa*, *L. sandsiana* and *L. lauterbachii* by its small size, mid-segment that is not wider, less than 2 mm long flowers and uniseriate stamens.

Solitary understory palm, 1–2 m tall. **Stem** about 3 cm in diam., with 5–10 mm long internodes and inconspicuous leaf scars. **Leaves** 6–8(–10) in crown; leaf sheath breaking up early into a fine, brown, fibrous mesh; petiole 60–90 cm long, about 5–7 mm wide at the base, unarmed or with minute spines at the very base; lamina divided into 31–45 segments, 30–35 cm long, all segments with 2 adaxial ribs, truncate, increasing in apex width from 4 mm in basal segment to 12 mm in mid-segment, indentation of individual segments 2–5 mm long. **Inflorescence** 35–45 cm long, erect to curved with 5–6 first order branches; peduncle 10–12 cm long; prophyll 12–14 cm long, light brown chartaceous; peduncular bracts lacking; rachis erect to curved, straight to moderately zig-zagged; proximal rachis bract 13–15 cm long, inserted 10–15 cm above prophyll, with 1–4 cm long, neat split along one side, glabrous, basally contained in prophyll to free; first order branch patent, the proximal one with 2–9 cm long main axis, carrying 8–25 rachillae, these 3–9 cm long, patent, sparsely pubescent to glabrous. **Flowers** hermaphroditic, solitary throughout, subsessile, elliptical to obovate, 1.5–2 mm long, floral subtending bract inconspicuous; calyx about 1 mm long, shortly fused with receptacle, breaking up regularly to about half way in three, apically obtuse lobes; corolla about 1.2–1.7 mm long, lobes 0.6–1 mm long; staminal tube fused to corolla for 0.4–0.5 mm, staminal ring about 0.2 mm high; anthers inserted in one level, rounded, ca. 0.2 mm long; ovary globose, 0.5–0.6 mm across; style ca. 0.5 mm long; locules situated in the middle of the gynoecium. **Fruit** globose, 8–10 mm across, mesocarp ca. 1 mm thick, endocarp brittle, smooth. **Seed** endosperm with central cavity.

Distribution and habitat:—North–western New Guinea from the Wandammen Peninsula in the West to Waropen and Yapen Island in the East. Also recorded further south in the southern foothills of the Sudirman Range. It grows in light, open forest

Conservation:—Near Threatened. *Licuala bakeri* has a relatively restricted distribution. Deforestation due to mining concessions is a major threat in its distribution range.

Etymology:—Named after William J. Baker, our esteemed colleague and long-time friend who is in charge of the Palms of New Guinea project.

Uses:—The stem is used for arrows.

Local name:—*Ansuni* (Yawa)

Notes:—This palm is highly distinctive with its small size, unarmed petioles, finely divided leaves, and delicate inflorescence. It has the smallest flowers recorded in the genus so far.

Specimens examined:—INDONESIA. Papua Province: Fak–Fak Regency (Mimika Regency now), 540 m, 4°17'11"S, 137°1'2"E, 1998, *Baker 883* (BO, MAN!, K!); Timika, 545 m, 4°17'25"S, 137°0'94"E, 11 February 1998, *Heatubun 183* (AAU!, BO!, K!, MAN!); 435 m, 4°20'26"S, 136°58'7"E, 1998, *Witono 6* (BO, K!, MAN!); Yapen–Waropen, 750 m, 1°47'55"S, 136°17'58"E, 1997, *Widjaja 6864* (BO, K!, L!). West Papua Province: Wandammen Peninsular, Wondiwoi Mountains, 800 m, 2°45'S, 134°35'E, 5 March 1962, *Schramm 13349* (L!).

2. *Licuala bankae* Barfod & Heatubun, *sp. nov.*

Type:—PAPUA NEW GUINEA. Milne Bay Province: Hagita, sea level, 10°19'S, 150°18'E, 1 March 2000, *Barfod 449* (holotype AAU!; isotypes CANB! BRI!, K!, LAE!).

Figures 2, 3A–B.

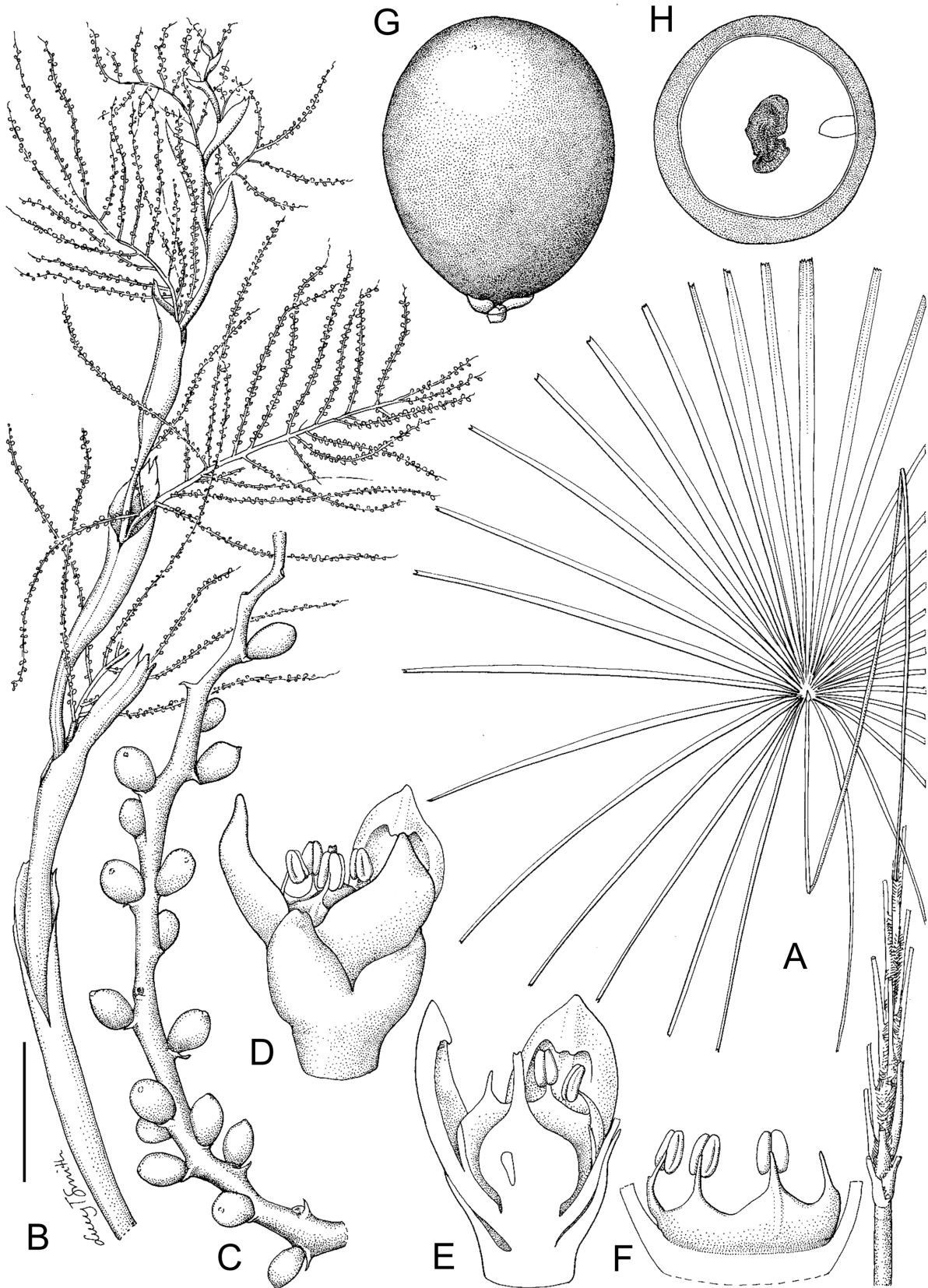


FIGURE 1. *Licuala bakeri*. A. Stem with one leaf left. B. Inflorescence. C. Rachilla with flowers in bud. D. Flower. E. Flower in longitudinal section F. Staminal ring in outside view. G. Fruit H. Fruit in transverse section. Scale bar: A = 12 cm, B = 4 cm, C = 5 mm, D, E = 1.3 mm, F = 1 mm. A–H from *Baker 1059*. Drawn by Lucy T. Smith.

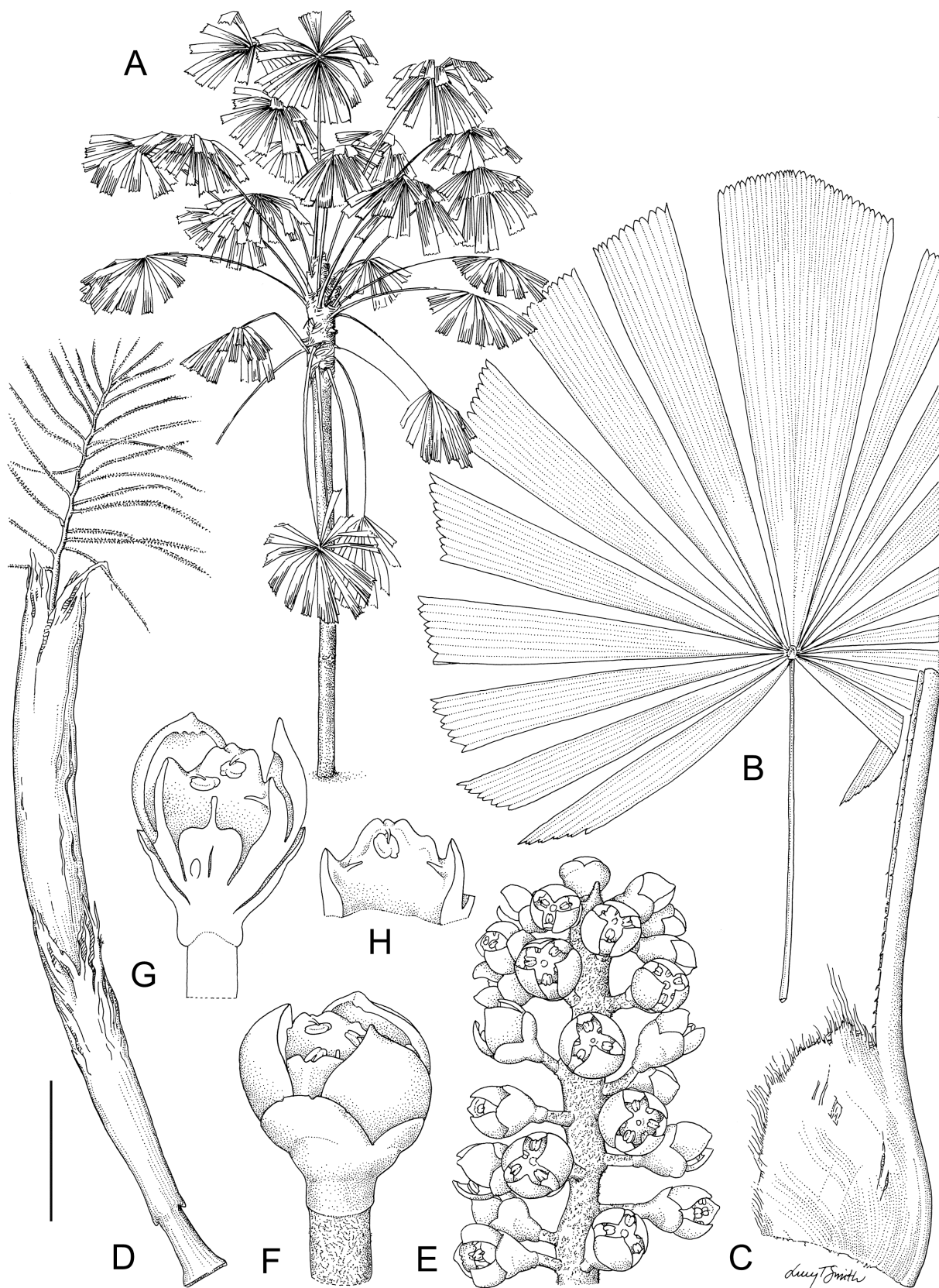


FIGURE 2. *Licuala bankae*. A. Habit. B. Leaf lamina and part of petiole. C. Leaf base with leaf sheath attached. D. Basal part of inflorescence with proximal first order branch left. E. Distal part of rachilla with flowers at anthesis. F. Flower. G. Flower in longitudinal section. H. Staminal ring in inside view. Scale bar: A = 130 cm; B = 18 cm, C = 12 cm, E = 7 mm, F, G, H = 2.5 mm. A–H from Barfod 449. Drawn by Lucy T. Smith.

Diagnosis:—This species shares several traits with *Licuala multibracteata*, *L. penduliflora*, and *L. suprafolia* such as inflorescences with more than ten nodes, pedicellate flowers and biseriate stamens. It differs from these by having fibrous, loosely sheathing rachis bracts, ferruginously haired rachillae and pedicels, rounded calyx lobes and a short style.

Solitary palm tree up to 7 m tall. **Stem** about 10 cm in diam. **Leaves** about 35 in crown; sheath 30–40 cm long disintegrating into a fibrous mesh; petiole variable in length, up to 1.8 m long in fully developed leaves, 2–2.5 cm wide at the base, 0.8–1 cm wide below insertion of lamina and covered by patches of ferruginous, woolly tomentum, lower third armed with up to 3–4 mm long spines; lamina rounded to heart-shaped in outline, divided in 17–19 segments; mid-segment with 16–20 adaxial ribs, 65–70 cm long, 18–20 cm wide and rounded apically; lateral segments with 3–5 adaxial ribs, 45–50 cm long, about 10 cm wide and slightly oblique apically, basal segments with 2–3 adaxial ribs, 24–30 cm long, about 3 cm wide and highly oblique apically; indentations leading to adaxial ribs, 0.5–5.5 cm long, those leading to abaxial ribs less than 0.5 cm long; hastula eccentric. **Inflorescences** 100–120 cm long, branched to second order, with 10–11 partial inflorescences, curved at anthesis and zigzagged, contained within the crown at anthesis, pendant at fruiting stage; peduncle 40–50 cm long, contained in prophyll and peduncular bract; prophyll 29 cm long, 2–2.5 cm wide basally, disintegrated apically in fibrous mesh; one peduncular bract, similar to prophyll in size and texture, but not as sharply keeled; rachis 70–80 cm long; basal rachis bract 13 cm long, main axis of proximal first order branch about 30 cm long, carrying about 40 rachillae, both rachis and rachillae covered by patches of ferruginous hairs. **Flowers** solitary, hermaphroditic, subtending bracts up to 1 mm long, often partly deciduous and inconspicuous, borne on 1–2.5 mm long, ferruginously haired pedicels; calyx campanulate, fused with receptacle for 0.3–0.4 mm, glabrous, greenish with brown margins, breaking up regularly in three, about 1 mm long, rounded lobes; corolla yellow, about 3.5 mm long, lobes 1.5 mm long; androecium fused to corolla for about 2 mm, staminal ring about 1 mm high, anthers inserted in two levels and opening in two pulses, about 0.5 mm long; ovary glabrous, 0.8–1 mm long, truncate to rounded apically; style 0.5–0.6 mm long, locules situated in lower half, about 0.3 mm long. **Fruit and seed** unknown.

Distribution and habitat:—*Licuala bankae* is only known from forest edges outside Alotau. Apparently an endemic to the Milne Bay province.

Conservation:—Critically Endangered. *Licuala bankae* is only known from one site, where it was locally common along the fringes of land cleared for oil palm plantation.

Etymology:—Named in honor of the late Roy Banka, an esteemed member of the Palms of New Guinea team and an eager student of New Guinean plant resources.

3. *Licuala coccinisedes* Barfod & Heatubun, *sp. nov.*

Type:—PAPUA NEW GUINEA. Sandaun Province: Bewani, sea level, 3°1'S, 141°8'E, 19 March 2000, *Barfod et al.* 484 (holotype AAU!; isotypes BRI!, CANB!, K!, LAE!)

Figures 3C–D, 4.

Diagnosis:—*Licuala coccinisedes* differs from *L. bacularia* by having white, mostly solitary flowers, which are borne on crimson-red pedicels. The leaf segments have straight lateral margins, as opposed to slightly curved lateral margins in *L. bacularia*.

Single-stemmed, shrubby palm, to 2 m tall. **Stem** 2–2.5 cm in diam. **Leaves** 12–20 in crown; leaf sheath 15–20 cm long, brown, breaking up into a fibrous mesh, distal part sometimes detached from petiole in 2 strap-like, 20–25 long extensions; petiole 40–100 cm long, 8–10 mm wide at the base, 5–6 mm wide below the insertion of the lamina, covered basally by patches of ferruginous, woolly tomentum, armed on lower half; blade rounded in outline, divided into 7–11 segments, these with straight lateral margins and covered by scattered, minute, ferruginous, possibly glandular hairs on lower surface, otherwise glabrous; mid-segment 35–55 cm long, not bifid, 15–20 cm across at the apex, clearly wider than remaining segments, rounded to truncate, indentations leading to adaxial ribs 5–10 mm long, those leading to abaxial ribs less than 5 mm long. **Inflorescence** 60–90 cm long, erect branched to the second order with 5–6 first order branches; peduncle 22–28 cm long, not or shortly exposed distally; prophyll 20–25 cm long, ca. 5 mm wide basally, covered by ferruginous tomentum increasing in density towards the distal part, splitting cleanly and irregularly; peduncular bract one or lacking; rachis straight to curved distally; basal rachis bract 8–9 cm long, proximal first order branch, erect with 1–2 cm long peduncle and 0.5–1 cm long rachis, bearing 3–5 rachillae, each 6–10 cm long, minutely pubescent, spreading. **Flowers** solitary, hermaphroditic, subtended by 0.2–0.5 mm long bract, pedicel, 0.5–0.6 mm long, pink to crimson red at anthesis; calyx campanulate, 1.2–1.5 mm long, fused with receptacle for less than 0.3–0.4 mm, glabrous, neatly splitting in 3 up to 0.5–0.7 mm, triangular lobes; corolla pale cream, 1.6–1.8

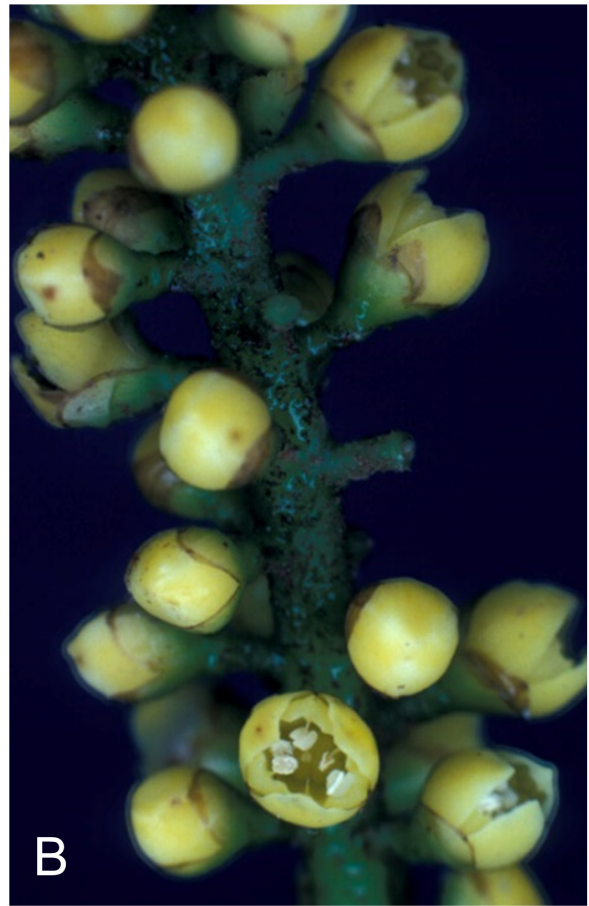


FIGURE 3. *Licuala bankae*. A. Habit. B. Part of rachilla with flowers at anthesis. *Licuala coccinisedes*. C. Part of rachilla with flowers at anthesis. Note red pedicels. D. Mature fruits. A, B from Barfod 449, C, D from Barfod 484. All photos: Anders S. Barfod.

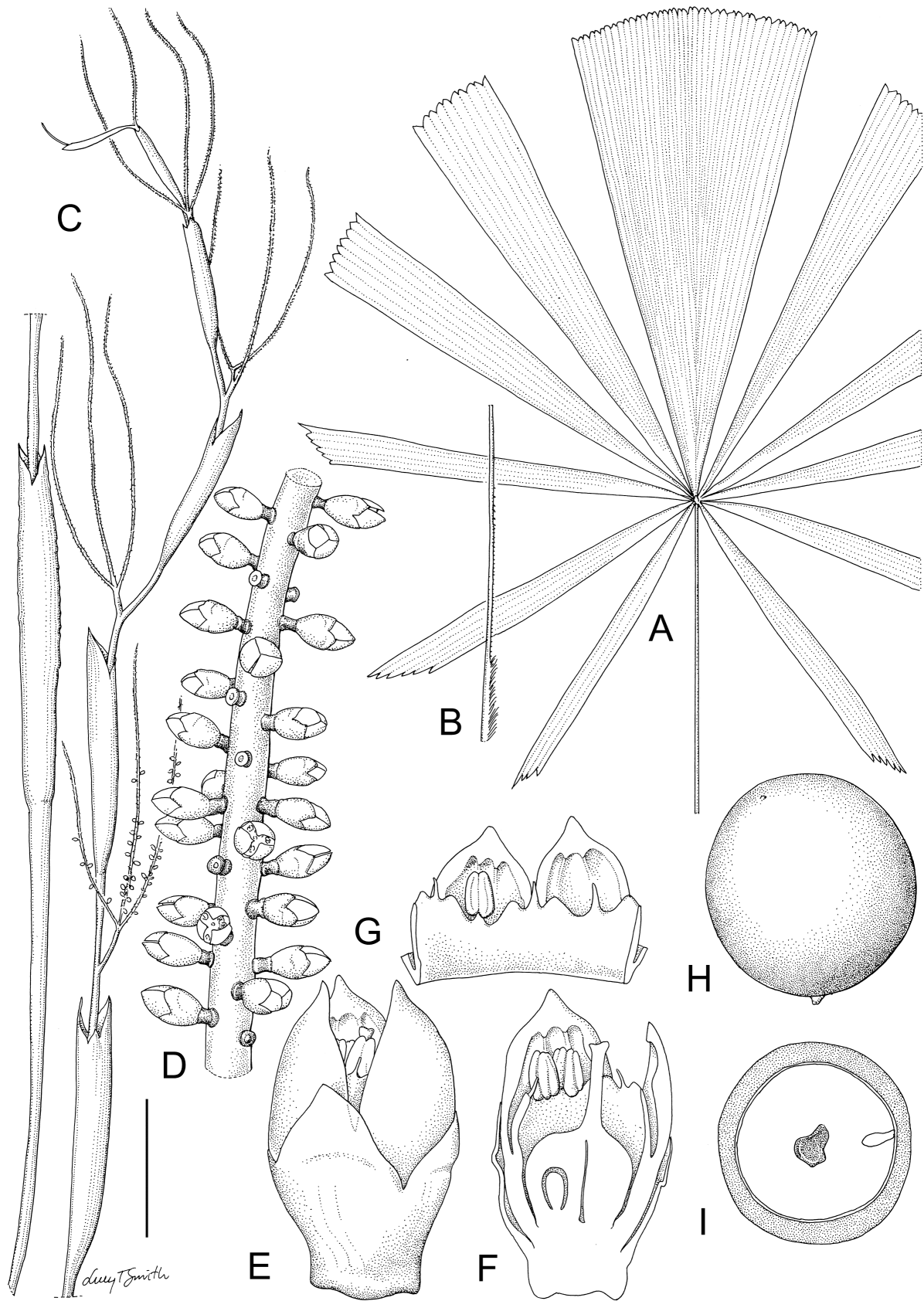


FIGURE 4. *Licuala coccinisedes*. A. Leaf lamina and part of petiole. B. Leaf base with leaf sheath attached. C. Lower and upper part of Inflorescence D. Rachilla with flowers in different phases of opening. E. Flower. F. Flower in longitudinal section. G. Staminal ring in inside view. H. Fruit. I. Fruit in transverse section. Scale bar: A, B = 12 cm, C = 4 cm, D = 7 mm, E, F = 1.5 mm, G = 1.6 mm, H, I = 5 mm. A–I from Barfod 484. Drawn by Lucy T. Smith.

mm long, lobes 1–1.2 mm long; staminal ring about 0.5 mm high, anthers inserted in two levels, about 0.3 mm long; ovary 0.7–0.8 mm long, truncate to rounded apically, style 0.7–0.8 mm long, locules situated in lower half. **Fruit** red at maturity, globose, 9–11 mm in diam.; mesocarp ca. 1 mm thick; endocarp brittle, smooth. **Seed** 7–9 mm in diam., endosperm with central cavity.

Distribution:—Known from the Bewani and Cyclops Mountains in northern central New Guinea and a single record from North Fly in the Western Province of Papua New Guinea.

Habitat:—Rainforest understorey at sea level to 750 m.

Local names:—*Lump Bral* (Bewani), *Yal Bral* (Bewani).

Conservation status:—Vulnerable. *Licuala coccinisedes* has a restricted distribution. Deforestation due to mining and logging concessions is a major threat in its distribution range.

Etymology:—The epithet refers to the crimson-red pedicels.

Notes:—The crimson-red pedicels that reveals the identity of this species are not conserved in dried voucher specimens

Specimens examined:—INDONESIA. Papua Province: Jayapura Regency, North Cyclops Mountains, 50 m, 2°30'S, 140°32'E, 8 February 2001, *Desianto 22* (AAU!, K!, MAN!); PAPUA NEW GUINEA. Western Province: North Fly District, junction of Harvey Creek and Ok Mani River, 10 km WNW of Tabubil, 750 m, 5°14'28"S, 141°8'22"E, 14 December 2000, *Baker 1136* (AAU!, K!, LAE!); Sandaun Province: Ituly village, 200 m, 3°2'S, 141°8'E, 26 November 1996, *Barfod 407* (AAU!); Apambo village, 200 m, 3°2'S, 141°8'E, 26 November 1996, *Barfod 408* (AAU!).

4. *Licuala essigii* Barfod & Heatubun, *sp. nov.*

Type:—PAPUA NEW GUINEA. West Sepik Province: road to logging area, 2 miles W of Vanimo, 120 m, 2°40'S, 141°15'E, *Essig 55080* (holotype BH!, isotype LAE!).

Figure 5.

Diagnosis:—Differs from *Licuala flexuosa* by having petioles with spines basally only, first order inflorescence branches bearing up to 15 second order branches, and smaller flowers with a pubescent calyx and shallow lobes.

Solitary, mid-sized palm. **Stem** 3–6 m tall. **Leaf** sheath 20–30 cm long, disintegrating into a fibrous mesh; petiole 120–150 cm long, 10–12 mm wide basally, 7–9 mm wide below insertion of lamina, covered distally by scattered ferruginous tomentum, armed on lower 1/10 with up to 2 mm long slightly recurved spines; lamina divided in 13–17 segments, these with scattered ferruginous ramenta towards the base on the abaxial side; mid-segment 55–70 cm long, with 20–24 adaxial ribs, radial margins straight, 25–30 cm wide at the apex, truncate; lateral segments 40–50 cm long, with 4–5 adaxial ribs, 5–6 cm wide apically, truncate; basal segments, 3.5–4.5 cm wide apically, with 3–4 adaxial ribs, obliquely truncate; indentations 5–7 mm long, those leading to adaxial ribs broadly U-shaped, those leading to abaxial ribs V-shaped. **Inflorescence** 70–80 cm long, erect with 4–5 first order branches; peduncle 32–38 cm long, covered or only slightly exposed at flowering; prophyll inserted 6–8 cm above the peduncle base, 13–15 cm long, loosely fitting, chartaceous, basally with dense ferruginous tomentum along the keels, apical splits irregular, no more than 1.5 cm long; peduncular bract lacking; rachis straight to slightly curved distally; proximal rachis bract 17–19 cm long, inserted near the opening of the prophyll, loosely fitting, with up to 3 cm long irregular apical splits, otherwise similar to prophyll in texture and hair cover; first order branches erect, the proximal one with 3–4 cm long peduncle, basally hidden in the rachis bract, 10–12 cm long main rachis, carrying up 15 rachillae, these 6–8 cm long, pubescent, curved. **Flowers** solitary, subtended by minute bracts, pedicels 0.3–0.5 mm long; calyx urceolate, 3–3.5 mm long, distally membranous and striate after drying, slightly pubescent at the base and distally, breaking up irregularly, almost truncate; corolla 3.5–4 mm long, lobes ca. 2 mm long; staminal tube fused to corolla for 1.4–1.6 mm, staminal ring ca. 1 mm long, anthers inserted in two levels, 0.5–0.6 mm long; ovary 1.6–1.8 mm long, style ca. 1 mm long. **Fruit** and **seed** not seen.

Distribution:—Only collected once in 1971 near Vanimo in the north-western part of Papua New Guinea.

Habitat:—Lowland rainforest at sea level to 50 m

Local names:—None recorded.

Conservation status:—Critically Endangered. *Licuala essigii* is known from only one site where it is threatened by a logging concession. Additional localities have not been found through subsequent fieldwork.

Etymology:—Named in honour of Frederick B. Essig, whose fieldwork in PNG in the 1970s yielded many exciting discoveries.

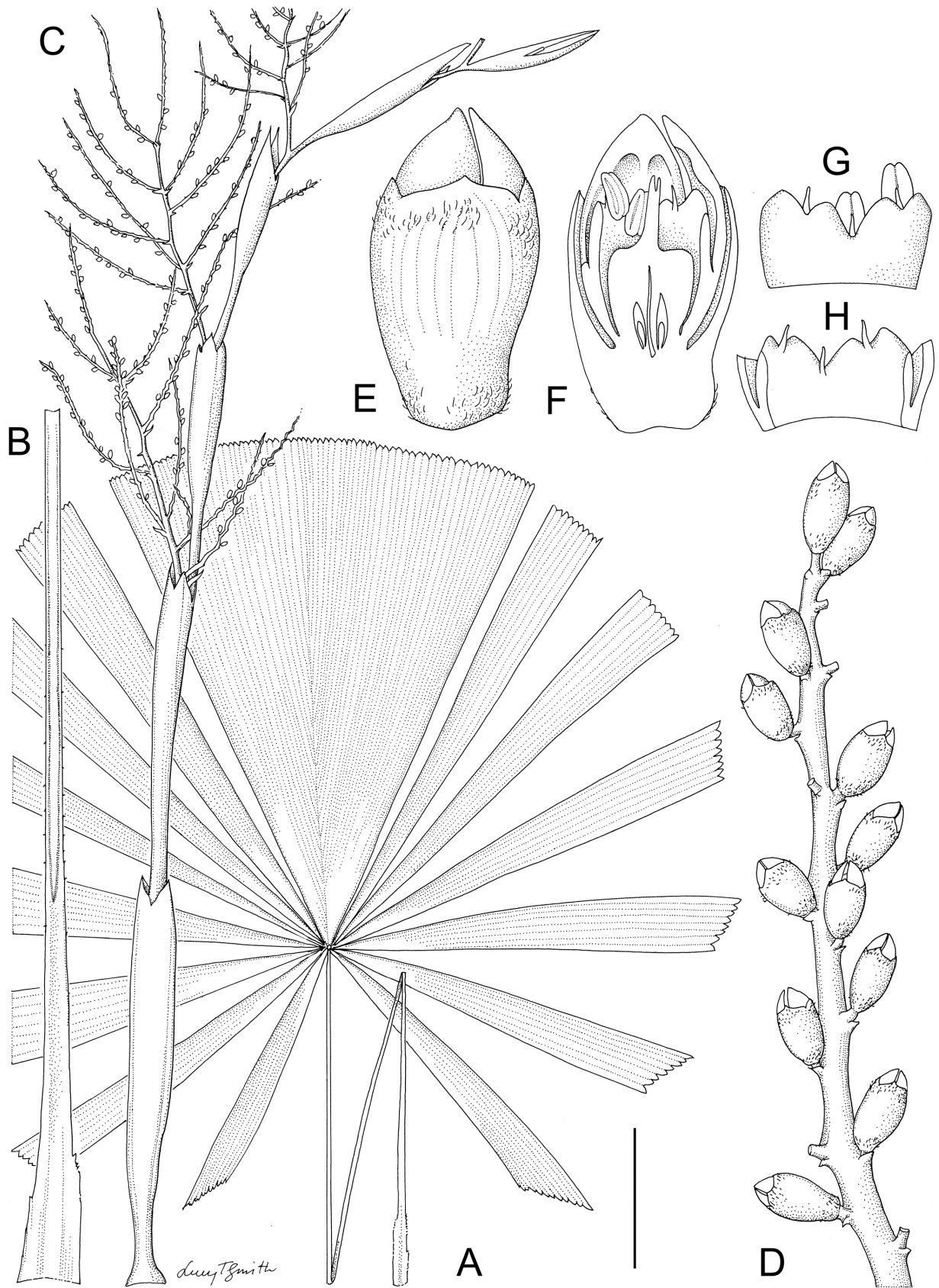


FIGURE 5. *Licuala essigii*. A. Leaf. B. Detail of leaf base. C. Inflorescence. D. Distal part of rachilla with flowers at early anthesis. E. Flower. F. Flower in longitudinal section. G. Staminal ring in outside view. H. Staminal ring in inside view. Scale bar: A = 18 cm, B, C = 8 cm, D = 5 mm, E, F, G, H = 2 mm. A–H from *Essig LAE 55080*. Drawn by Lucy T. Smith.

5. *Licuala multibracteata* Barfod & Heatubun, *sp. nov.*

Type:—PAPUA NEW GUINEA. Central Province: Hiritano highway near Brown River, 50 m, 9°16'S, 147°13'E, 3 April 2000, *Barfod et al.* 468 (holotype AAU!, isotypes BRI!, CANB!, K!, LAE!)

Figure 6.

Diagnosis:—This species shares many-noded inflorescences and pedicellate flowers with *Licuala bankae*, *L. penduliflora*, and *L. suprafolia*. It differs from these by having bullet-shaped flowers, with a shallowly splitting calyx and much longer corolla.

Solitary palm tree up to 4 m tall. **Stem** about 7–8 cm in diam. **Leaves** about 20–25 in crown; leaf sheath 25–30 cm long, disintegrating into a fibrous mesh, apex often detached in a 20–25 long strap-like appendix; petiole 150–200 cm long, flattened, 2–2.5 x 0.6–0.8 cm in cross section, 0.8–1 cm wide below insertion of lamina, covered distally by patches of ferruginous tomentum, lower 1/10 armed with up to 5 mm long, curved spines; lamina rounded in outline, divided in 25–35 segments; mid-segment 60–70 cm long, with 10–15 adaxial ribs, 13–17 cm wide, truncate apically; lateral segments 55–65 cm long, with 3–4 adaxial ribs, 5–7 cm wide, truncate apically, basal segments 50–60 cm long, with 2–3 adaxial ribs, about 3–5 cm wide, oblique apically; indentations leading to adaxial ribs, 1–2 cm long, those leading to abaxial ribs, only slightly shorter. **Inflorescences** 140–160 cm long, branched to second order, with 9–11 partial inflorescences, straight, curved and contained within the crown at flowering; peduncle 60–80 cm long, covered by prophyll and peduncular bract; prophyll 25–30 cm long, 3–4 cm wide basally, inserted 10–15 cm above the peduncle base, with ferruginous tomentum increasing in density towards the margins, breaking up irregularly in up to 10 cm long splits; peduncular bracts 2, 18–22 cm long, similar to prophyll in size and texture, but not as sharply keeled, splitting neatly with 1–2, up to 2 cm long splits; rachis 75–90 cm long; basal rachis bract similar to peduncular bracts in size, texture and hair cover; main axis of proximal first order branch 5–15 cm long; carrying about 10–20 rachillae, both rachis and rachillae covered by scattered to dense ferruginous tomentum. **Flowers** mostly single, hermaphroditic, subtending bract 0.6–0.8 mm long, pedicel 1.5–1.7 mm long, glabrous; calyx funnel-shaped, 3 mm long, fused with receptacle for ca. 1 mm, glabrous, breaking up in shallow, pointed lobes, 0.2–0.3 high; corolla 4.7–5 mm long, white, fused with staminal tube for ca. 1.5 mm, splitting in pointed, ca. 3 mm long lobes; staminal ring 1.1–1.3 mm high, anthers inserted in two levels, 0.4–0.6 mm long; ovary glabrous, 1.4–1.6 mm long, rounded to slightly truncate apically; style, 1.3–1.5 mm long, locules ca. 1 mm long situated in lower half of gynoecium. **Fruit** orange to red at maturity, globose, 8–10 mm in diam., remnant calyx conspicuous; mesocarp about 1 mm thick; endocarp smooth. **Seed** endosperm with central cavity.

Distribution and habitat:—This species has thus far only been recorded from fragments of periodically inundated forest on alluvial flats along the Brown River.

Local names:—None recorded.

Uses:—None recorded.

Conservation status:—Critically Endangered. *Licuala multibracteata* is known from only three sites. Additional localities have not been found through subsequent fieldwork. It has specific habitat requirements and deforestation due to logging concessions is a major threat in its distribution range.

Etymology:—The epithet describes the numerous bracts borne on the main axis of the inflorescences, the basal ones being empty (= peduncular bracts) and the remaining ones subtending first order branches (= rachis bracts).

Specimens examined:—PAPUA NEW GUINEA. **Central Province:** 4 miles E of Karema, 20 m, 9°11'S, 147°17'E, 12 July, 1962, *Schodde* 2542 (A!, BRI! CANB!, K!, L!, LAE!); one mile NE of Bereina, 20 m, 8°39'S, 146°30'E, 7 September 1962, *Pullen* 3644 (CANB!); near Malalaua, 5 m, 8 4'S; 146 9'E, 2 March, 1966, *Craven* 932 (CANB!, LAE!); Brown River road 30 miles N of Port Moresby, 10 m, 9°10'S, 147°10'E, 21 February, 1972, *Essig* 55172 (BH!, LAE!).

6. *Licuala sandsiana* Barfod & Heatubun *sp. nov.*

Type:—PAPUA NEW GUINEA. Manus Province: Manus Island, ca. 1 km SE of Lessau village, 125 m., 2°1'S, 146°34'E, 22 November 1975, *Sands et al.* 2746 (holotype K!, isotype L!).

Figure 7.

Diagnosis:—From the other small-sized species with a wide, unsplit mid-segment, it differs by having inflated rachis bracts. It differs from *Licuala adscendens*, *L. coccinisedes* and *L. flexuosa* by having a truncate calyx and a petiole that is armed at the very base only. It differs from *Licuala essigii* by having leaves that are 75–80 cm across as opposed to 80–100 cm across, and by having 2–3 cm long first order branches, as opposed to 10–12 cm long.

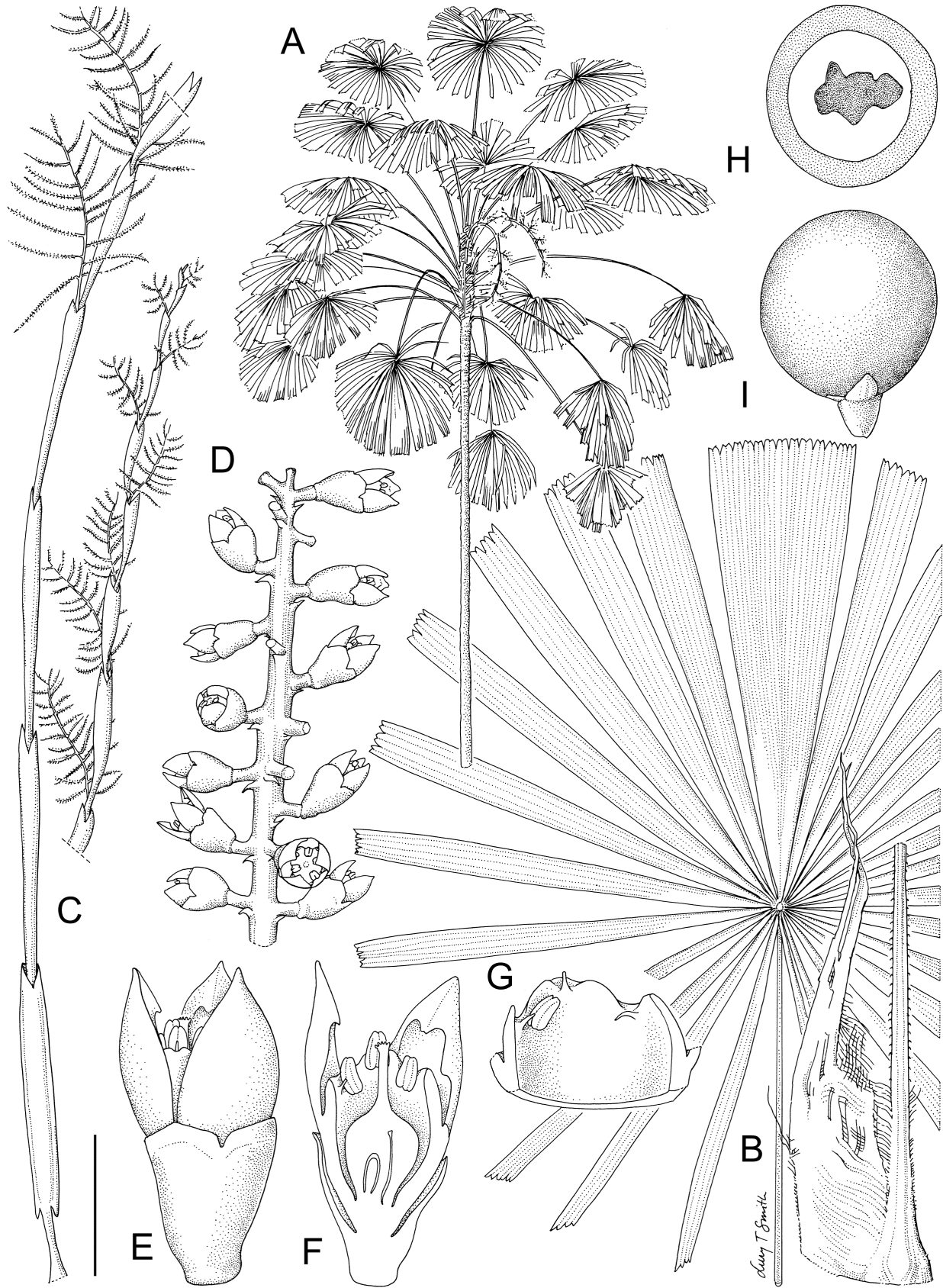


FIGURE 6. *Licuala multibracteata*. A. Habit. B. Leaf lamina with part of petiole and leaf base with leaf sheath attached. C. Lower and upper part of inflorescence. D. Distal part of rachilla with flowers at early anthesis. E. Flower. F. Flower in longitudinal section. G. Staminal ring in inside view. H. Fruit in transverse section. I. Fruit. Scale bar: A = 90 cm; B = 18 cm, C = 20 cm, D = 7.5 mm, E, F = 2 mm, G = 1.6 mm, H, I = 5 mm. A–I from Craven 932. Drawn by Lucy T. Smith.

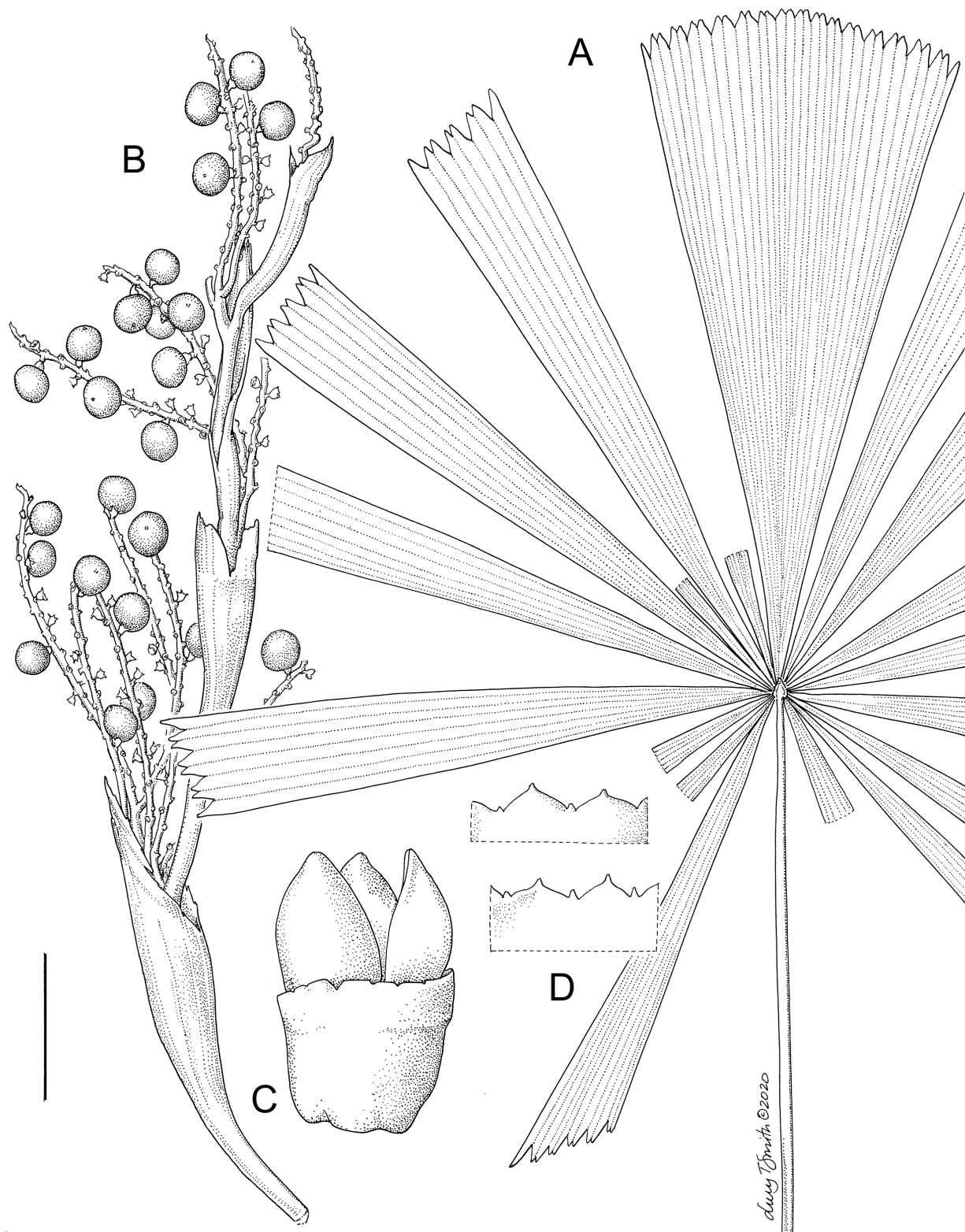


FIGURE 7. *Licuala sandsiana*. A. Leaf lamina and part of petiole. B. Upper part of infructescence. C. Flower past anthesis. D. Remnants of staminal ring. Scale bar: A = 12 cm; B = 4 cm; C, D = 2.5 mm. A, C, D from *Sands 2768*; B from *Kerenga LAE 77563*. Drawn by Lucy T. Smith.

Solitary palm to 4 m tall. **Stem** 6–8 cm in diam., covered distally by persistent leaf bases. **Leaves** with 20–25 cm long brown sheath, disintegrating in fibrous mesh, later lost; petiole 50–80(–100) cm, in fully developed leaves, 12–14 mm wide at the base, 4–6 mm wide below the insertion of the lamina, covered by a mix of scattered black dots and ferruginous hairs, the latter increasing in density towards the margins, lower $\frac{1}{3}$ to $\frac{1}{2}$ armed with up to 3–4 mm long recurved spines, unevenly sized and somewhat irregularly distributed; lamina divided in 14–17 segments, truncate at the apex, mid-segment 45–50 cm long, with 4–6 adaxial ribs, 8–12 cm wide and truncate apically; lateral segments 35–40 cm long, with 3–4 adaxial ribs, 3.5–6 cm wide apically and increasingly oblique apices towards the base; indentations leading to adaxial ribs 7–11 mm long, those leading to abaxial ribs 3–5 mm long. **Inflorescences** 60–80 cm, branched to second order, with 6–7 first order branches, straight to slightly curved; peduncle 15–20 cm long, contained in or barely exposed outside prophyll, covered by patches of dense ferruginous tomentum; prophyll 15–18 cm long, 2–3 cm wide at the middle, chartaceous, with patches of ferruginous ramenta, splitting irregularly in up to 2 cm deep incisions; peduncular bract missing; rachis 45–60 cm long; proximal rachis bract 15–17 cm long, similar to prophyll in texture, colour and hair cover, but not as sharply keeled, slightly inflated at the middle, typically with up to 4 cm deep split along one of the lateral facies; peduncle of proximal first order branch hidden in subtending bract, rachis 2–3 cm long, carrying 7–9 rachillae, both rachis and rachillae covered by ferruginous tomentum. **Flowers** in pairs basally to solitary distally, hermaphroditic, subtending bracts a shallow rim to 0.5 mm long, pedicels ca. 0.5 mm long; calyx ca. 2.5 mm long, glabrous, truncate or with shallow lobes; staminal ring about 1 mm high, anthers biseriate. **Fruit** globose, 12–15 mm in diam., yellow to red at maturity, mesocarp 3–4 mm thick, endocarp brittle, slightly grooved longitudinally. **Seed** 6–7 mm in diam.

Distribution and habitat:—Restricted to Manus Island where it grows in lowland rainforest

Local names:—*Sanin* (Manus)

Uses:—none recorded

Conservation status:—Endangered. *Licuala sandsiana* has a restricted distribution. Deforestation due to logging concessions is a major threat in its distribution range.

Etymology:—Named after the collector of the type, M.J.S. Sands, to pay tribute to his great contribution to our knowledge of the flora of New Guinea in general and Manus Island in particular.

Specimens examined:—PAPUA NEW GUINEA. Manus Province: Manus Island, near Bundrahei Primary School, 30 m, 2°10'S, 146°40'E, 28 October 1974, *Foreman 59210* (BH!, L!); Silin Administrative Center, 20 m, 2°9'S, 146°33'E, 30 March 1981, *Kerenga 77563* (K!, L!, USF); 1 km SW of Kabuli village, sea level, 2°7'S, 146°40'E, 24 November 1975, *Sands et al. 2768* (K!, L!, LAE!); Wili River between Pelikawa and Dremmel, ca. 150 m, 2°7'S, 146°44'E, 24 June 1971, *Stone 10452* (LAE!, BH!).

Notes:—Only a few flowers past anthesis were available for description.

7. *Licuala suprafolia* Barfod & Heatubun, *sp. nov.*

Type:—PAPUA NEW GUINEA. Milne Bay Province: Mullins Bay road, sea level, 10°23'S, 150°6'E, 3 March 2000, *Barfod 462* (holotype AAU!; isotypes BRI!, CANB!, K!, LAE!)

Figure 8.

Diagnosis:—This species shares many-noded inflorescences and pedicellate flowers with *Licuala bankae*, *L. penduliflora* and *L. multibracteata*. It differs from these by having inflorescence exposed above the crown and fruits with 2–3 mm thick mesocarp and a slightly furrowed endocarp.

Solitary palm tree up to 7 m tall. **Stem** about 8 cm in diam. **Leaf** bases persistent to about 1 m above the ground; sheath 30–40 cm long, early disintegrating into a deciduous, brown, delicate fibrous mesh; petiole 100–120 cm long, 3–3.5 cm wide at the base to ca. 1 cm wide distally, covered by patches of dense, ferruginous ramenta, lower $\frac{1}{2}$ armed with up to 10 mm long, recurved spines; lamina circular to oblong in outline, divided in 19–23 segments; mid-segment 75–90 cm long, with 7–9 adaxial ribs, 12–15 cm wide and truncate apically; lateral segments with 3 adaxial ribs, 3–4 cm wide, truncate to slightly oblique apically, basal segments 45–55 cm long, with 3–4 adaxial ribs, 2.5–3.5 cm wide and highly oblique apically; indentations leading to adaxial ribs 1.2–1.7 cm long, those leading to abaxial ribs 5–7 mm long. **Inflorescence** 250–320 cm long, erect and curved outwards from the crown centre, branched to second order, with 10–11 partial inflorescences; peduncle 110–120 cm long, contained in the prophyll and peduncular bracts; prophyll 45–55 cm long, brown, chartaceous, covered with patches of ferruginous adpressed tomentum, especially along the keels, tapering at the base and somewhat constricted apically, up to 5 cm wide above the middle, splitting cleanly to 10–15 cm adaxially; two peduncular bracts, green basally to brown and chartaceous towards the apex, the

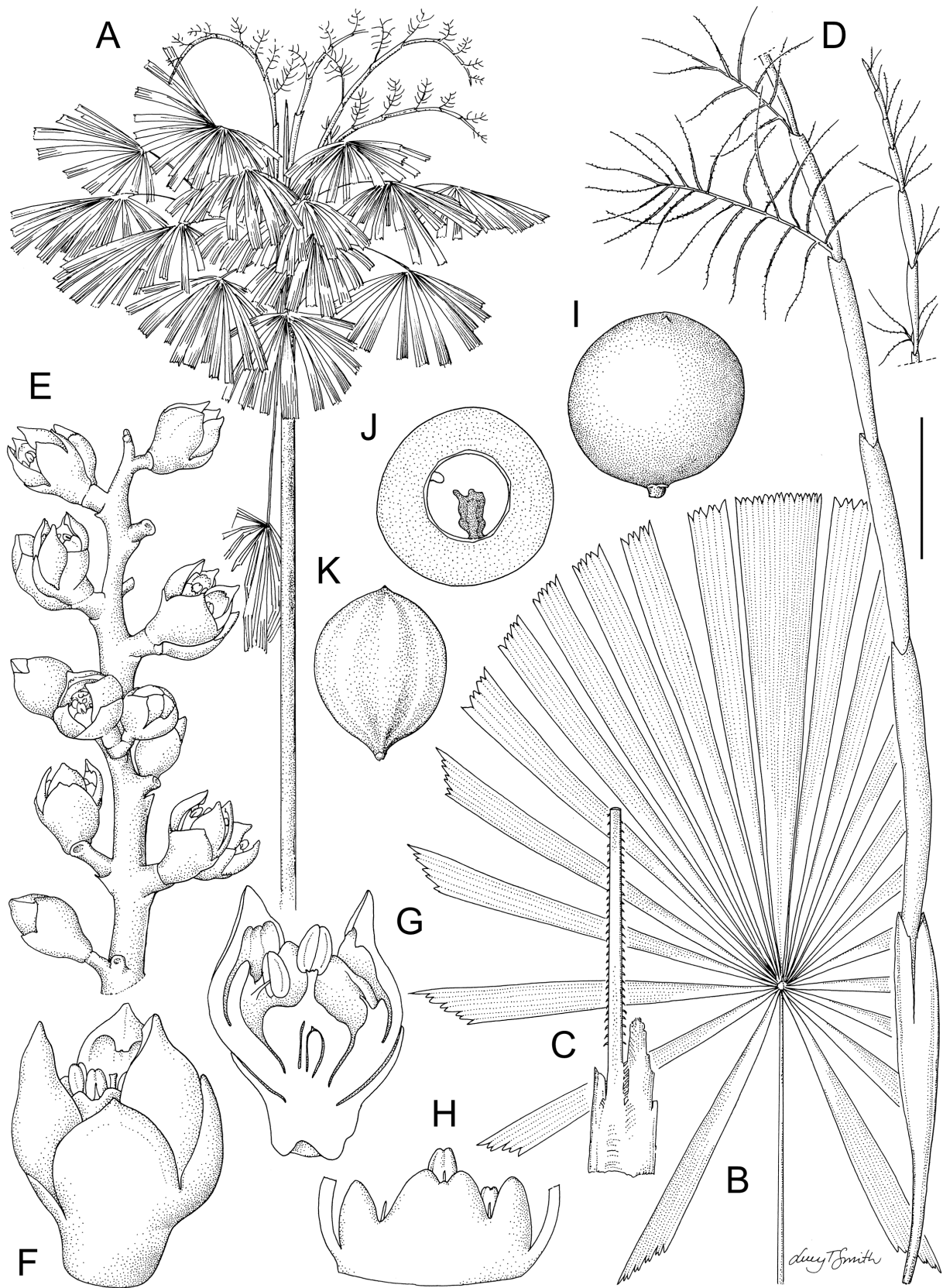


FIGURE 8. *Licuala suprafolia*. A. Habit. B. Leaf lamina and part of petiole. C. Leaf base with leaf sheath attached. D. Lower and upper part of inflorescence. E. Distal part of rachilla with flowers at anthesis F. Flower. G. Flower in longitudinal section. H. Staminal ring in outside view. I. Fruit. J. Fruit in transverse section. K. Endocarp. Scale bar: A = 1 m; B = 24 cm, C, D = 18 cm, E, F, G, H = 1.6 mm, I, J = 7 mm, K = 5 mm. A-K from *Barfod 462*. Drawn by Lucy T. Smith.

lowermost one ca. 40 cm long, the uppermost one ca. 30 cm long, both otherwise similar to prophyll in texture and hair covering, but not as sharply keeled; rachis 140–200 cm long; basal rachis bract ca. 30 cm long, contained basally in upper peduncular bract, peduncle of basal first order branch hidden in subtending bract, main axis 25–30 cm long, proximally with ferruginous tomentum in patches, carrying 25–30 rachillae, these glabrous to the unaided eye, but with scattered minute hairs visible in 10x magnification. **Flowers** in pairs proximally to mostly single distally on the rachillae, hermaphroditic; subtending bracts 0.2–0.3 mm long, pedicels of single flowers 0.8–1.2 mm long, those of paired flowers 0.2–0.4 mm long, with minute ferruginous hairs only visible at 20x magnification; calyx campanulate, fused with receptacle for 0.7–0.8 mm, glabrous, breaking up in three, ca. 1.5 mm long, pointed lobes; corolla 2.8–3 mm long, white, split to 2 mm; staminal tube fused to corolla for about 1–1.2 mm, staminal ring 0.8–1 mm high, anthers inserted in two levels, with 0.2–0.3 mm long filaments, rounded to elliptical, ca. 0.5 mm long; ovary glabrous, ca. 1 mm long, more or less truncate apically; style 0.4–0.6 mm long, locules 0.6–0.8 mm long. **Infructescence** similar to inflorescence, in overall morphology and hair covering, only slightly more expanded and robust. **Fruit** globose, 9–12 mm in diam., mesocarp ca. 2.5 mm thick, endocarp brittle, slightly furrowed. **Seed** endosperm with irregularly shaped cavity, usually extending from the periphery to the middle.

Distribution and habitat:—Only one collection has been made; it is most probably a local endemic. In periodically, inundated forest patches.

Conservation status:—Critically Endangered. *Licuala suprafolia* is known from only one site that is threatened by a logging concession and palm oil plantations. It has not been recorded subsequently.

Etymology:—The epithet refers to the inflorescences that are exposed above the crown at flowering, an unusual feature in the genus.

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