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A taxonomic revision of the rattans of Africa (Arecaceae: Calamoideae)

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1. The majority of the fieldwork work for this revision was undertaken as part of a PhD and subsequent Post-Doctoral studies with University College, London and the Royal Botanic Gardens, Kew (1997–2005)

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Abstract

The rattans of Africa are represented by the endemic palm (Arecaceae) genera *Laccosperma, Eremospatha* and *Oncocalamus,* as well as by a single species of the otherwise Asian genus *Calamus*. These climbing palms occur in a wide range of ecological conditions within the lowland tropical forests of the continent and, throughout their range, play a significant role in the forest economy of the region through the utilisation of their stems, or cane. Despite this economic importance, until recently the taxonomy of this group has been unclear. Based on recent fieldwork as well as thorough examination of herbarium records, a taxonomic treatment of all African rattans is presented. This paper recognises 22 species in the four genera, including four recently described species.

Key words: Arecaceae, palms, Palmae, rattans, taxonomy, tropical rain forest

Introduction

The first rattans from the African continent were collected by the French botanist Baron Palisot de Beauvois. Palisot de Beauvois was appointed in the capacity of "gardener" to the mission of Landolphe (1786–88), with the aim to establish a French trading station, where today is Nigeria. In this capacity he was responsible for the establishment of plantations in the area, but instead he spent much of his time collecting herbarium specimens. Between 1786 and 1787, Palisot de Beauvois explored Owerri and the region around Benin, travelling as far east as Calabar. The collections made by Palisot de Beauvois included samples of many taxa new to science and culminated in the publication of his 19-volume *Flore d'Oware et de Benin en Afrique* (1805–1820). The first volume (1805) included the first description of an African rattan species. Although morphologically distinct from its Asian relatives, particularly in its floral arrangement, Palisot de Beauvois included the taxon in the rattan genus *Calamus*. Further collections of rattan were made in the Niger Delta by Barter (1857–1859) and in the major estuarine areas and coastal forests of Sierra Leone, Nigeria, Cameroon and Gabon by Mann (1859–1863). These collections provided a basis for the first comprehensive treatment of the palms of Africa by Mann & Wendland (1864). Their paper described these new palm discoveries and including eight species of rattan, seven of which were new species. In recognition of the morphological uniqueness of the African rattan taxa, Mann and Wendland (1864) described four main rattan subgenera of the genus *Calamus,* to which, aside from *C. deërratus* G.Mann & H.Wendl. (or "true" *Calamus* as they termed it), *Ancistrophyllum, Laccosperma, Oncocalamus* and *Eremospatha* were consigned.

Drude (1877) first elevated *Laccosperma* to generic rank. This was followed by Wendland who, in Kerchove's *Les Palmiers* (1878), elevated the rattan subgenera, *Eremospatha* and *Oncocalamus,* to generic

rank. It is important to note that in this publication Wendland also recognised *Laccosperma* and *Ancistrophyllum* as distinct taxa. Bentham & Hooker (1883) provided further descriptions of the three African genera, but included *Laccosperma* as a subgenus of *Ancistrophyllum*. This usage persisted until Dransfield (1982), in recognition of Drude's earlier (1877) publication and with reference to Kuntze's (1891) observations, reduced *Ancistrophyllum* to synonymy with *Laccosperma*.

Since Mann & Wendland's (1864) account, the majority of studies of the African rattans have been floristic rather than monographic (Drude 1895, Wright 1902, Guinea-Lopez 1946, Renier 1948, Robyns & Tournay 1955, Irvine 1961, Russell 1968, Letouzey 1978, Dransfield 1986, Berhaut 1988, Morakinyo 1995, Tuley 1995, Sunderland 1997) or have focussed on the economic importance of the species of rattan to the forest economy (Pynaert 1911, Mildbraed 1913, de Wildeman 1919, Hédin 1929, Gossweiler 1936, Dalziel 1937, Raponda-Walker & Sillans 1961, Profizi 1986, Sunderland *et al*. 2008). However, a number of botanists described new species of rattan from the lowland tropical forests of Africa as the botanical exploration of the continent continued (Drude 1895, de Wildeman 1904, Beccari 1908, Beccari 1910, de Wildeman 1916, Burret 1942). It was Beccari who first attempted a monographic treatise of the African rattans. His 1908 monographic account of the genus *Calamus* included the descriptions of five new species from Africa. A later monograph of the African Lepidocaryeae provided the first keys to identification of the endemic African rattan genera and included full descriptions of all the species known at that time (Beccari 1910). Despite the considerable paucity of material at his disposal, Beccari's account provides a useful framework for the classification of the African rattans.

After Beccari's 1908 & 1910 publications, very little taxonomic work was undertaken on the rattans of Africa except for the floristic studies cited above and, until recently, there was considerable taxonomic confusion associated with many of these taxa. The lack of representative fertile material and adequate field observations has thwarted attempts to provide a definitive monograph of this group. *The Palms of Africa* published by Paul Tuley in 1995 included the rattan taxa, but was based on an uncertain taxonomy. Extensive field work undertaken in West and Central Africa from 1997–2005 has clarified the taxonomy of the African rattan taxa significantly and a field guide dedicated to the identification of the rattans of Africa is now available (Sunderland 2007).

Of the 22 species of African rattans (Sunderland 2007), 21 belong to the subtribe Ancistrophyllinae (Dransfield *et al*. 2008). The remaining rattan species, *Calamus deërratus* G. Mann & H. Wendl., is the only representative of this genus in Africa and is not directly related to the Ancistrophyllinae (Baker *et al*. 2009). The Ancistrophyllinae as circumscribed by Dransfield *et al*. (2008) comprises the three morphologically distinct genera, *Eremospatha*, *Laccosperma* and *Oncocalamus* that are all restricted to the tropical rain forests of West and Central Africa. Although recent work on African rattans has provided signficant geographic, taxonomic and morphological information, phylogenetic studies of the taxa have yet to be undertaken at the species level. Thus, the relationships between species and evolutionary history of the subtribe remain poorly known. This would undoubtedly represent an interesting future research opportunity.

Materials and methods

Herbarium collections from BM, BR, EG, FHO, FI, G, GC, HBG, LBR, K, KRI, KUM, LBR, MO, NY, SCA, WAG and YA were examined and compared. In common with many other taxa, in palms the most commonly applied species concept that is applied to palm taxonomy is the morphological species concept. Here, discontinuities in morphological variation provide the means to separate species (Davis and Haywood, 1963). The morphological species concept in palms was reviewed for the Old World by Dransfield (1999) and for the Neotropics by Henderson (1999) and both studies concluded that the delimitation of species using this approach is valid. The species concept applied in this revision is based on morphological discontinuities both within and between populations. Species are thus recognised by the smallest units that can be diagnosed by constant character states.

Conservation status was estimated on the basis of the International Union for Conservation of Nature (IUCN) Red List Categories and Criteria (IUCN 2010). Both "area of occupancy" and "extent of occurrence" was calculated for each taxon and mapped against the IUCN criteria (A–E) to evaluate if a species belongs in a threatened category.

Key to the genera

1. Rattans climbing by means of a flagellum emerging from the leaf sheath..... *Calamus*
–. Rattans climbing by means of a cirrus armed with acanthophylls or short, recurved thorns 2

2. Leaf sheath without spines; stem sometimes with conspicuous knee below leaf junction; lowermost leaflets often swept back across stem; leaflets variously-shaped, often with praemorse apices, or leaflets entire. Inflorescence without conspicuous bracts..... *Eremospatha*
–. Leaf sheath armed with conspicuous spines, stem without conspicuous knee below leaf junction; lowermost leaflets not swept back across stem; leaflets linear-lanceolate. Inflorescence with conspicuous bracts..... 3

3. Ocrea triangular, drying; spines on sheath long, slender and sparsely to densely arranged, not easily detached. Inflorescences produced simultaneously in the axils of the distal leaves (hapaxanthic). Hermaphroditic flowers in dyads, rarely triads ..... *Laccosperma*
–. Ocrea neat, horizontal, not dry; spines on sheath short, irregularly-spaced, black or brown, triangular, easily sloughing off. Inflorescence units, pendulous, produced in axils (pleonanthic). Unisexual flowers in clusters of 7–11..... ..... *Oncocalamus*

Calamus Linnaeus (1753: 325)

Type:—*C. rotang* Linnaeus (1753: 325)

—*Rotanga* Boehm. in Ludwig (1760: 395)

—*Rotang* Adanson (1763: 599)

—*Palmijuncus* Kuntze (1891: 731)

Zalaccella Beccari (1908: 496). Type:—*Zalacella harmandii* (Pierre ex Beccari) Beccari (= *Calamus harmandii* Pierre ex Beccari)

Calospatha Beccari (1911: 232). Type:—*Calospatha scortechinii* Beccari (= *Calamus calospathus* (Ridley 1925: 47) Baker & Dransfield (2008: 162))

Schizospatha Furtado (1955: 525) Type:—*Schizospatha setigera* (Burret) Furtado (*Calamus setiger* Burret (1942: 739) = *Calamus anomalus* Burret (1935:320))

Cornera Furtado (1955: 518). Type:—*Cornera pycnocarpa* Furtado (= *Calamus pycnocarpus* (Furtado) Dransfield (1977: 202))

Solitary or clustered, acaulescent to high-climbing pleonanthic dioecious palms. Stems very slender, only a few mm in diameter, to robust (>15 mm), in Africa moderate, 10–35 mm in diameter, branching sympodially at the base. Leaf-sheaths tightly enclosing the stem, variously armed with spines and spiculae or unarmed, often covered with indumentum, often continued into an ocrea. Mature leaf terminating in a long barbed whip (cirrus) or lacking such a whip (African and some Asiatic species), species without a cirrus normally, but not always bearing a similar barbed whip (flagellum) adnate to the leaf-sheath at the base, equivalent to a modified sterile inflorescence; petiole prominent or absent, variously armed with spines and hooks; rachis usually armed with reflexed hooks; leaflets narrow to broad or rhomboid, single-fold, arranged regularly or irregularly on either side of the rachis or variously clustered, fanned or paired, variously hairy, scaly or spiny.

Inflorescence axillary, with the base of the peduncle adnate to the internode and sheath of the following leaf, hence appearing in a non-axillary position, branching to 2–3 orders, with or without a long terminal flagellum; bracts variously armed, tubular, tightly sheathing, very rarely splitting, sometimes with an expanded limb, never caducous, though rarely tattering and decaying before fruiting; prophyll usually 2–keeled and empty; other ?primary bracts on main axis subtending close to very distant partial inflorescences; partial inflorescences bearing bracts subtending rachillae; rachillae usually with tubular bracts, each, except for the basal-most, subtending a flower or flower group; in male inflorescence flowers solitary, borne together with a bracteole ('involucre'); in female inflorescence flowers borne in pairs, a sterile male (acolyte) together with a fertile female and 2 bracteoles ('involucrophore' and 'involucre'). Male flower symmetrical, calyx tubular, 3-lobed; corolla 3-lobed, divisions almost reaching the base; stamens 6, epipetalous, with free filaments; pistillode minute or absent. Sterile male flower same as the fertile male but anthers empty. Female flower with calyx and corolla $\pm$ as in the male flower; staminodes 6; ovary covered in vertical rows of reflexed scales and tipped with 3 recurved stigmas; locules 3, each with a single ovule, normally only one ovule developing. Fruit variously shaped, tipped with the remains of the stigma, with the calyx and corolla persistent below, covered in vertical rows of reflexed scales. Seed with thick or thin, sweet or sour or very astringent sarcotesta and variously shaped hard diaspore; endosperm homogeneous or ruminate; embryo basal or lateral. Germination adjacent-ligular; eophyll bifid or pinnate.

Etymology:—Latin = a reed.

Notes:—The genus *Calamus* contains around 375 species distributed from Africa, India to Eastern Asia, Malesia, to Australia and Fiji with the greatest abundance and diversity occurring in the archipelagoes of Malesia. The genus is represented in Africa by a single, very variable, widely distributed species.

Calamus deërratus Mann & Wendland (1864: 429), Drude (1895: 130), Cummins (1898: 80), Wright (1902: 108), Beccari (1908: 151), Milbraed (1913: 15), Unwin (1920: 240), Holland (1922: 727), Hédin (1929: 503), Hutchinson (1936: 390), Dalziel (1937: 497), Burret (1939: 204), Guinea–Lopez (1946: 244), Irvine (1952: 31), Berhaut (1954: 211), Robyns & Tournay (1955: 297), Fosberg (1960: 129), Irvine (1961: 775), Tomlinson (1962: 96), Russell (1968: 166), Moore (1971: 113), Letouzey (1978: 314), Hall & Swaine (1981: 139), Johnson (1984: 161), Profizi (1986: 2), Dransfield (1986: 43), Letouzey (1986: 401), Bauchet (1988: 92), Hawthorn (1990: 225), Morakinyo (1995: 199), Tuley (1995: 50), White & Abernethy (1997: 64), Burkill (1997: 347), Aedo *et al*. (1999: 375), Sunderland (2001: 150), Harris (2002; 242), Sunderland *et al*. (2005: 158), Govaerts and Dransfield (2005: 42), Sunderland 2007: 62), Dransfield *et al*. (2008: 195). *Palmijuncus deerratus* (G. Mann & H. Wendl.) Kuntze (1891: 733). *Eremospatha deerrata* (G. Mann & H. Wendl.) T. Durand & Schinz (1894: 458). Type:—CAMEROON, *Mann 2147* (Lectotype (designated here) K!).

Calamus akimensis Beccari (1908: 162). Type:—GHANA, Akim, Kibbi, *Johnson* s.n. (holotype K!).

Calamus barteri Drude (1895: 134), *pro parte* Beccari (1902: 199), Wright (1902: 109), Baudon (1924: 595). Type:—NIGERIA, Onitsha, *Barter 110* (holotype K!).

Calamus falabensis Beccari (1908: 157). Type:—SIERRA LEONE, Falaba, *Scott–Elliot 4460* (holotype FI!).

Calamus heudelotii Drude (1895: 134), Beccari (1908: 155). Type:—GAMBIA, *Heudelot* 372 (lectotype (designated here) K!).

Calamus laurentii De Wildeman (1904: 97), De Wildeman (1905: 24), Durand & Durand (1909: 584), Pyneart (1911: 547), Beccari (1913), De Wildeman (1919: 17), Renier (1948: 81). Type:—DEMOCRATIC REPUBLIC OF CONGO, Eala, *Laurent 126* (holotype BR!; isotype FI!).

Calamus leprieurii Beccari (1902: 200), Beccari (1908: 158). Type:—GAMBIA, *Leprieur 1830* (holotype FI!; isotype P).

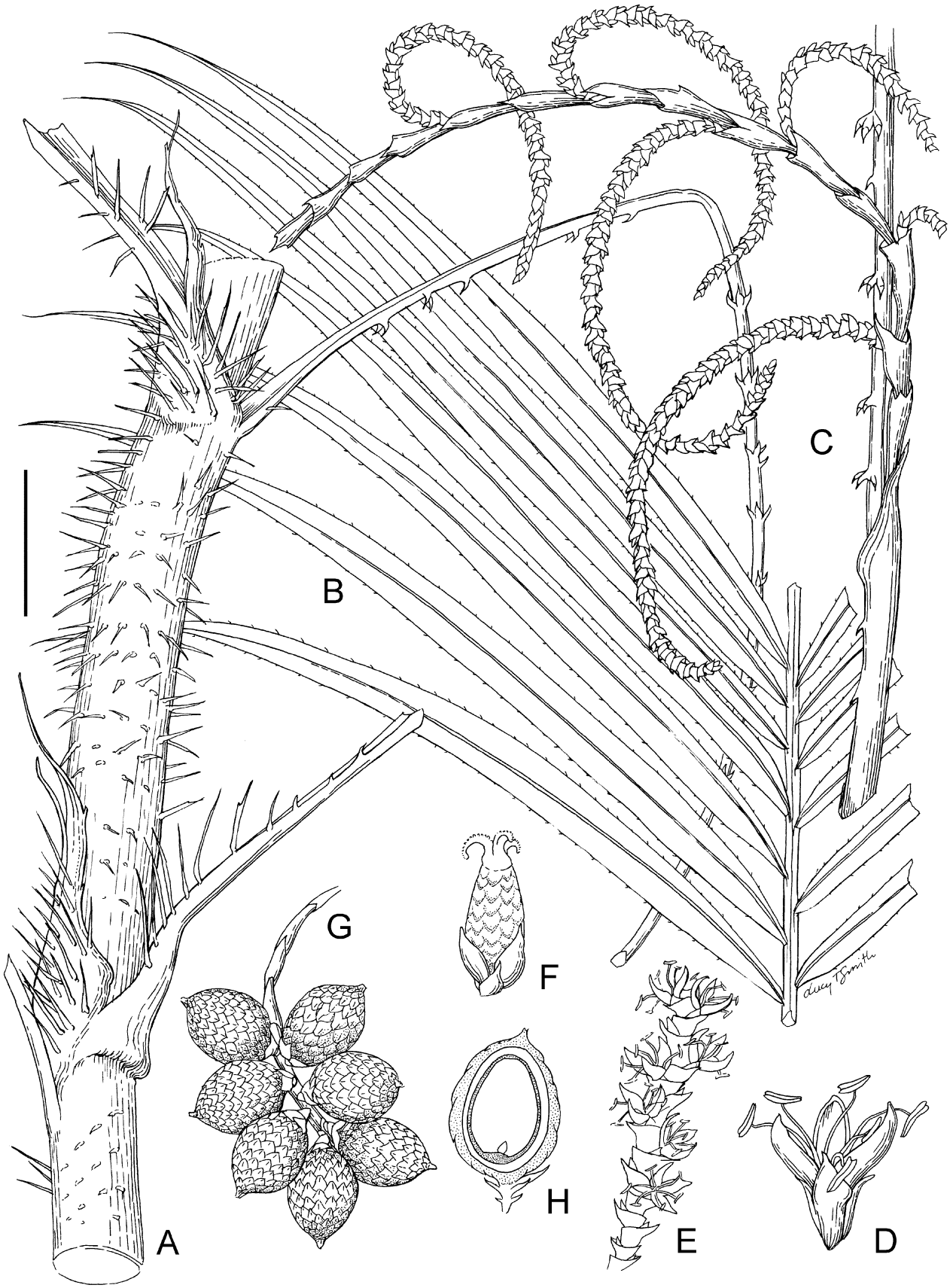


FIGURE 1. *Calamus deërratus*
A. Mature stem. B. Leaflet section. C. Inflorescence. D. Male flower. E. Male Rachilla. F. Pistillate flower. G. Fruit. H. Fruit section. Scale bar: A = 8 cm; B = 5 cm; C = 10 cm; D = 7 mm; E = 5 cm; F = 5 mm; G = 2 cm; H = 1.5 cm. A–B from *Sunderland 22*; C–E from *Sunderland 1754*; F from *Deighton 1847*; G–H from *Eggeling 1626*. Drawn by Lucy T. Smith.

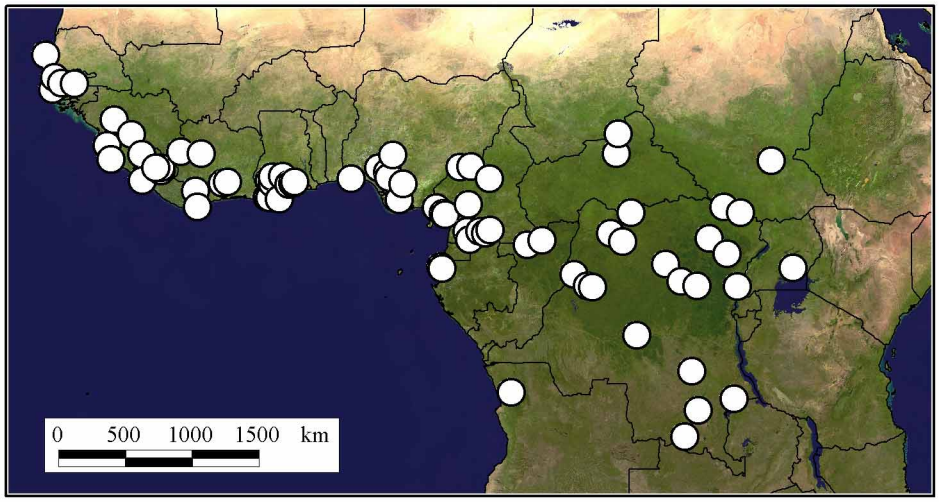
Calamus perrottetii Beccari (1902: 200), Beccari (1908: 160). Type:—SENEGAL, Casamance River, *Perrottet 1826* (holotype FI!; isotype G).

Calamus schweinfurthii Beccari (1902: 200), Drude (1895: 131). Type:—SUDAN, Mansilli, *Schweinfurth 2860* (lectotype (designated here) K!).

Clustered, slender to moderate palm climbing to 20 m, often branching sympodially at the base. Stem without sheaths, 1.0–2.8 cm in diameter, with, 1.2–3.5 cm; internodes 8–20 cm long, more commonly 15–20 cm. Leaf-sheaths varied in armature from almost unarmed to densely spiny, with a distinct horizontal, sometimes folded, knee below the petiole; spines dark brown or black, triangular, flattened at base, up to 3 cm long, clusters of upward pointing spines often concentrated around the leaf-sheath mouth to form a conspicuous cleft; mature sheaths with brown or grey indumentum; ocrea to up 12 cm long, usually 8–10 cm, dry, papyraceous, tongue-shaped, often longitudinally splitting and reflexed, becoming unrecognisable, armed on the margins with spines more pale and bristle-like than those on the leaf-sheath, rarely unarmed. Leaves ecirrate, up to 1.75m long, usually 1.2–1.5m; petiole to 20 cm long, rounded abaxially, concave adaxially, ± 5 mm broad, variously armed with large black spines to 3 cm long and small recurved black thorns; rachis triangular in section distally armed as the petiole, spines becoming sparse distally; leaflets up to 30 on each side of the rachis, sub-equidistant to equidistant proximally, grouped in 3's to 6's distally, linear-lanceolate, finely acuminate to apiculate at apex, bluntly compact at the base, up to 35 cm long by 2 cm broad at the widest point, ± concolorous with slightly darker green upper surface, leaflet margins, main vein and secondary nerves bristly throughout. Flagellum up to 3.5m long by 4 mm wide at the base, decreasing very gradually above, armed with small recurved thorns. Male and female inflorescences similar, up to 3.5m long, with 1–4 partial inflorescences and a long terminal sterile flagellum; axis and bracts armed throughout with reflexed, solitary or grouped black prickle-like spines; bracts tightly sheathing, up to 70 cm long with an expanded, papyraceous limb ± 5 cm long; partial inflorescences to 40 cm long, with up to 15 or more rachillae on each side, subtended by bracts ± 2 cm long (1 cm. exposed), with mouths ± 7 mm wide and with a short triangular limb to 4 mm; rachillae up to 7 cm long, arcuate, arranged distichously; bracts distichous, dull brown in colour, ciliate-hairy around the mouth. Male flowers solitary, distichous, with a minute involucre to 1 mm long; calyx 4 mm long, tubular for ± 3 mm, with 3 short, triangular, striate lobes; corolla-lobes to 7 mm long × 2 mm wide, fused at the base for ± 1 mm, widely diverging at anthesis; stamens to 4 mm long, minutely epipetalous, with filaments up to 3 mm long, anthers ± 3 mm. long, medifixed; pollen yellow. Sterile male flower very similar to fertile male but slightly shorter and narrower. Female flower with calyx tubular at first and then splitting as ovary increases in size, lobes ± 3 mm long; corolla-lobes ± 5 × 2 mm, with 6 minutely epipetalous flattened staminodes; ovary ± 5 mm long by 2.5 mm wide, tipped by 3 stigmas ± 1 mm long, markedly recurved at anthesis. Fruit at maturity to 1.5 cm, × 1 cm with a short beak up to 2 mm tipped by remains of the style, with 17–20 vertical rows of scales. Seed flattened laterally, ± 9 × 8 × 5 mm, with sarcotesta ± 1 mm thick when dry; endosperm homogeneous, embryo basal. Germination adjacent-ligular; eophyll pinnate.

Distribution:—*Calamus deërratus is the most w*idely distributed of the rattans of Africa and is distributed across the humid forest zone of Africa; from the Gambia and Casamance in Senegal, southwards to northern Angola and Zambia and eastwards to southern Sudan and Uganda.

Habitat and ecology:—*Calamus deërratus* has a strong preference for swamp and riverine forest, (Ainslie 1926, Foggie 1941, Ahn 1961) and is rather less common in areas with high rainfall (Hall & Swaine 1981). As such, this species is relatively rare in the Guineo-Congolian forest of Cameroon and Gabon (Richards 1963, Letouzey 1978, Sunderland 2007). This species is more common in drier gallery forest found in the transition zones between Sudanian savanna woodland to the north of the Guineo-Congolian forest formation, and Zambezian savanna woodland to the south. *C. deërratus* occurs in lowland forest areas in west and central Africa at altitudes <500m and in the higher altitude regions of east Africa >1500m. This species is usually found in forest under a canopy, but also occurs in open areas where it often forms dense thickets.



MAP 1. Distribution of *Calamus deërratus.*

Etymology:—(Latin) to "go astray" refers to the habit of this species to form expansive clumps.

Conservation status:—Least concern (LC).

Notes:—Beccari (1908) acknowledged the close relationship of the African species of *Calamus* he described, and his treatment of the African representatives of this genus, along those of Drude (1895) and de Wildeman (1904), was reasonable given the fragmentary and often rather poor quality material at their disposal. The fact that *Calamus* in Africa has been the cause of some taxonomic problems has been undoubtedly due to the recognition of poorly defined infraspecific variation. However, from recent examination of herbarium specimens and field observations, it is clear that *Calamus* in Africa is represented by a single polymorphic species.

Additional specimens examined:—GAMBIA: *Anderson 131*, Fr. July 10, 1975 (MO!), *Heudelot 372*, stam. 1839 (K!), *Ingram* s.n. sterile s.d. (K!), *Starin 136*, Aboko Forest Reserve, Fr., January 20, 1992 (K!), *Starin 28*, Aboko F.R., Fr., December 1979 (K!), SENEGAL: *Berhaut 877*, Sangalkam (14º47N:17º12W) stam. December, 1950 (BR!), *Vanden-Berghen 1752*, Casamance (12º51N:15º17W) sterile, January 4, 1977 (MO!, BR!), *Vanden-Berghen 4094*, Badioure (12º53N:16º08W) stam. November 11, 1980 (BR!), *Vanden-Berghen 5264*, Bouyouye (12º26N:16º44W) pist. July 19, 1982 (BR!), GUINEA-CONAKRY: *Chillou 1905*, Kouyaya (10º25N:12º37W) sterile, March 19, 1940 (K!, BR!), *Ory 216*, Fula Kunda (13º15N:16º37W) sterile, January 25, 1954 (K!), SIERRA LEONE: *Deighton 1847*, Taisma, Central Province, Fr. July 8, 1930 (K!), *Deighton 2592*, Njala (08º06N:10º46W) sterile, January 1, 1933 (K!), *Mann 895*, Bagroo River (07º45N:12º50W) sterile, April 1861 (K!, FI!), *Scott-Elliot 4738*, Kambia (08º41N:13º03W) sterile, January 8, 1892 (K!), *Scott-Elliot 5121*, Musaia (09º27N:11º25W), sterile, March 10, 1892 (K!); *Small 455*, River Seli, Fr., September 5, 1951 (K!); *Thomas 2753*, Jigaya, stam. September 28, 1914 (K!); LIBERIA: *Linder 1078*, Piatah (07º12N:09º28W) sterile, October 15, 1926 (K!, MO!, WAG!); *Linder 1116*, Piatah (07º12N:09º28W) stam., October 17, 1926 (K!, MO!); *Linder 1226*, Gbanga (06º59N:09º28W) sterile, October 24, 1926 (K!, WAG!); *Whyte* s.n., near Kabatown (06º21N:10º43W) stam., April 1904 K!; IVORY COAST: *Hepper & Maley 8041*, Mont des Dans near Santa (08º16N:08º07W) pist., February 3, 1984 (K!); *Hepper & Maley 8177*, Taï Forest (05º38N:07º08W) sterile, February 9, 1984 (K!); *Leeuwenberg 2524*, 61km N of Sassandra (06º10N: 05º19W) stam., January 21, 1959 (WAG!); *Leeuwenberg 2882*, 18km NW of Sassandra (06º15N:05º00W) stam., November 26, 1960 (K!, WAG!); *Oldeman 571*, 9km ENE of Bereby (04º34N:07º00W) seedling, November 9, 1963 (WAG!); *Oldeman 589*, 3km E of Bereby (04º34N:07º00W) pist., November 5, 1963 (K!, WAG!); GHANA: *Adams 2025*, 2m E of Bibiani (06º20N:02º10W) sterile, December 23, 1953 (GC!); *Cummins 128*, Ashanti region, sterile, 1895 (K!); *Enti 643*, Kade Agricultural Station (06º05N:00º50W) pist., March 17, 1972 (GC!, MO!, BR!); *Enti & Hall* s.n., Kade Agricultural Station

(06º05N:00º50W) Fr., May 30, 1970 (GC!); *Hall 2846*, Anjakal, stam., January 20, 1965 (K!, GC!); *Johnson 242*, Kibbi-Akkim (06º09N:00º35W) Fr., December 13, 1899 (K!); *Kinlock 3326*, Tarkwa, Ndumnfri Forest Reserve (05º10N:02º09W) sterile, February 15, 1934 (KUM!); *Kisseadoo 435*, Bobiri Forest Reserve (06º38N:01º17W) sterile, November 10, 1988 (MO!); *Sunderland 2262*, Draw River Forest Reserve (05º12N:02º20W) sterile, May 26, 1999 (K!, KUM!); *Tomlinson* s.n., Bobiri Forest Reserve (06º38N:01º17W) stam., December 20, 1957 (K!); *Tomlinson* s.n., Cape Coast Forest Reserve (05º04N:01º30W) stam., December 15, 1957 (GC!); *Tsiforkor* s.n., Bunsu (06º15N:00º28W) sterile, November 22, 1995 (K!); *Vigne 1868*, Amentia Forest Reserve, E. Region (06º10N:01º58W) pist., March 30, 1930 (K!, KUM!); *Vigne 3951*, South Formango F.R. (06º35N:01º57W) sterile, July 30, 1935 (FHO!, KUM!); BENIN: *Aufsess 424*, Adjarra (06º32N:05º52E) sterile, December 6, 1988 (K!); NIGERIA: *Allison 6994*, Kabba Province (08º08N:06º44N) stam., November 15, 1943 (K!); *Ayewoh 3854*, Ondo Province, Ifon (06º54N:05º46E) sterile, February 24, 1944 (K!); *Barter* s.n., Onitsha (06º06N:06º48E) Fr., s.d. (K!); *Bennett 8*, sterile, February 24, 1906 (K!); *Chapman 5010*, Gangumi Forest Reserve, Gongola State (07º16N:11º23E) Fr., May 24, 1977 (K!); *Chapman 5423*, Baissa Forest Reserve, Gongola State (07º14N:10º38E) Fr., April 29, 1978 (K!); *Gledhill 923*, Akure Forest Reserve (07º12N:05º11E) sterile, April 5, 1968 (K!, WAG!); *Imperial Institute of Nigeria 347*, Ahoada (05º03N:06º34E) sterile, February 1, 1936 (K!); *Keay 28091*, Kouton Kerifi, (08º08N:06º44N) Fl., November 6, 1950 (K!); *Lowe 4353*, Ilaro Forest Reserve, near Abeokuta (08º03N:06º06E) sterile, December 14, 1982 (K!); *Tuley 846*, Lagos (06º28N:03º20E) Fl., May 4, 1964 (K!); CAMEROON: *unknown collector*, Bezirk Djah (03º00N:12º40E) stam., March, 1910 (FI!); *Buschen 3*, Ebolowa (02º55N:11º08E) sterile, s.d. (FI!); *Dransfield 6999*, Mungo River Crossing (04º08N:09º31E) stam., June 27, 1991 (K!, SCA!); *Dransfield 7000*, Mungo River Crossing (04º08N:09º31E) sterile juvenile, June 27, 1991 (K!); *Lederman 2428*, Tibati (06º27N:12º37E) pist., January 29, 1909 (FI!); *Mann 2147*, Cameroon River (04º04N:09º38E) Fl. & Fr., January 1863 (K!, FI!); *Meijer 15220*, Sangmelima (02º55N:11º58E) sterile, March 24, 1981 (K!, MO!, WAG!, YA!); *Meijer 15288*, 9km W of Sangmelima (02º55N:11º58E) sterile, March 26, 1981 (WAG!); *Mildbraed 4190*, 21km northeast of Moloundou (02º03N:15º09E) Fl., June 6, 1911 (HBG!); *Mildbraed 9548*, Buea-Douala at Uham, Fl., May 5, 1914 (K!); *Raynal 10150*, 17km SE Ambam along the river Kye (02º23N:11º16E) sterile, March 1, 1963 (YA!); *Raynal 10548*, Guerima (7km NE de Bafia), gallery forest on river Mbam (04º44N:11º13E) stam., March 28, 1963 (YA!); *Sunderland 1754*, Limbe-Douala road at Mungo Bridge (04º08N:09º31E) stam., November 16, 1996 (K!, SCA!, BH!); *Sunderland 1864*, Djoum (02º48N:12º22E) sterile, September 9, 1997 (K!, YA!, WAG!); CENTRAL AFRICAN REPUBLIC: *Fay 7020*, N'Dele-Pata road (08º08N:21º08E) pist., May 30, 1985 (MO!); *Fay 4381*, Manovo-St Floris National Park (09º29N:21º17E) Fr., April 4, 1983 (K!); *Harris & Fay 820*, Ndakan (02º21N:16º09E) sterile, June 1, 1988 (K!); *le Testu 3594*, Haute-Kotto (04º11N:22º08E) Fr., January 17, 1922, (BR!); EQUATORIAL GUINEA: *Tessmann* 6, Fr., s.d. (FI!); Gabon: *Klaine 3246*, Environs de Libreville (00º35N:09º22E) Fr., February 18, 1903 (K!); DEMOCRATIC REPUBLIC OF CONGO: *Claessens 989*, Mangbetu (02º28N:27º22E) sterile, June 1921 (BR!); *de Witte 4066*, Parc National de l'Upemba (09º04S:26º38E) pist., August, 1948 (BR!); *Demeuse* s.n., sterile, s.d. (BR!); *Evrard 1876*, Likimi (02º49N:20º44E) stam., September 29, 1955 (BR!); *Evrard 3933*, River Tshuapa en amont de Boende (00º44S:19º12E) Fr., April 18, 1958 (BR!); *Germain 210*, Lileko, river Yoko (00º48S:19º34E) stam., February 28, 1940 (BR!); *Hart 633*, Epulu, Ituri forest (01º25M:28º35E) stam., September 8, 1986 (MO!, BR!); *Hoier* s.n., Parc National de Albert (00º46S:29º17E) pist., January, 1930 (BR!); *Laurent 981*, Limbuku, Fr., March 16, 1906 (BR!); *Laurent* s.n., Machofa, Fr. December 17, 1898 (BR!); *Laurent* s.n., Sankuru (04º03S:22º32E) pist., November 18, 1903 (BR!); *Laurent* s.n., stam., 1903 (BR!); *Lejoly 2912*, Ubundu (00º26S:25º28E) stam., March 12, 1978 (BR!); *Leonard 832*, Eala, on banks of the Ikelemba (00º03N:18º18E) Fr., October 14, 1946 (K!, WAG!, BR!); *Louis 15541*, between Lisala and Ukaturaka (02º14N:21º33E) Fr. July 13, 1939 (K!, BR!); *Louis 16796*, Yangambi (00º45N:24º26E) Fr., November 17, 1943 (BR!); *Luja 234*, sterile, s.d. (BR!); *Malaisse 9453*, Kando (10º49S:25º44E) sterile, February 22, 1978 (WAG!, BR!); *Malaisse 11907*, between Kyamasumba and Buzange, sterile, September 20, 1981 (MO!, WAG!); *Malaisse 13889*, Kibwe (08º19S:29º04E) stam., July 12, 1986 (BR!); *Mandango 2977*, Ile Mbo near

Lubutu (00º44S:26º34E) Fr., May 13, 1981 (BR!); *Noirfalise 664*, Parc National de la Garamba (04º10N:29º28E) Fr., August 4, 1950 (BR!); *Robyns 3250*, Parc National de la Garamba (04º10N:29º28E) sterile, July 25, 1948 (BR!); *Sapin* s.n., Milangala, sterile, Febuary 1910 (BR!); *Schweinfurthii 2860*, Manselli, sterile, October 1893 (K!); *Troupin 296*, Parc National de la Garamba (04º10N:29º28E) sterile, March 5, 1982 (BR!); *Vanderyst 12343*, Luenge (06º28S:26º14E) seedling, August 1922 (BR!); *Vanderyst 21843*, seedling s.d. (BR!); ANGOLA: *Gossweiler 13644*, Luachima, NE of Luanda (07º53S:14º05E) pist. & Fr., May 1938 (K!); Sudan: *Andrews 1291*, Equatoria Province, stam., May 28, 1937 (K!); *Jackson 3406*, Equatoria Province, Yambio (04º34N:28º23E) Fr., 1950 (FHO!); *Myers 6757*, Mt Ameringi, sterile, May 28, 1937 (K!); *Myers 11334*, Equatoria Province, stam., May 17, 1939 (K!); UGANDA: *Dawe 149*, Mabira forest (00º30N:33º00E) sterile, 1904 (K!); *Eggeling 1626*, Budongo Forest (07º40N:31º32E) pist., February 1935 (K!, FHO!); *Katende 702*, Nyabisabu River, Budongo (07º40N:31º32E) Fl., October 17, 1970 (K!); *Katende 2783*, Budongo Forest (07º40N:31º32E) stam., September 17, 1977 (MO!); *Poulson 969*, Budongo Forest (07º40N:31º32E) pist., September 18, 1995 (K!)

Eremospatha (Mann & Wendland) Wendland (1878: 244)

Lectotype:—*E. hookeri* (G.Mann & H.Wendl.) H.Wendl. (*Calamus hookeri* Mann & Wendland (1864: 433))

Calamus subgenus *Eremospatha* Mann & Wendland (1864: 433)

Solitary or clustered, spiny, high-climbing, pleonanthic, hermaphroditic rattan palms. Stems circular to triangular in cross section, with short to long internodes, juvenile stems much more slender than the adult, sucker shoots axillary. Leaves pinnate, bifid in juveniles, becoming pinnate, with a terminal cirrus; sheath strictly tubular, unarmed, longitudinally striate, often sparsely to moderately covered with black or brown caducous indumentum or indumentum absent; ocrea conspicuous, entire, tightly sheathing, neatly or obliquely truncate or somewhat saddle-shaped, or drying and becoming longitudinally split; knee absent or conspicuous, vertically linear, abrupt or tapering at base, sometimes more linear, ridge-like; elaminate rachis present on lower stems, or absent; petiole present in juvenile stems, occasionally in mature climbing stems, armed with reflexed spines, sometimes with a caducous indumentum below, or indumentum absent; rachis armed as the petiole, with caducous indumentum below; cirrus armed as the petiole or unarmed; leaflets few to numerous, single-fold except, rarely, in juvenile leaves where lamina undivided, clustered or regularly arranged, linear-lanceolate, sub-orbicular to rhomboid, broadly attenuate at the base, narrowly to broadly praemorse or entire and apiculate at apex, concolorous or somewhat discolorous, usually armed along the margins with conspicuous robust reflexed spines; tranverse veinlets moderately to highly conspicuous; proximal few leaflets on each side of the rachis often smaller than the rest, shaped as the mature leaflets or somewhat linear, strap-like, sparsely to heavily armed along margins, laxly or tightly reflexed across the sheathed stem, or not reflexed and more regularly arranged; acanthophylls in neat pairs, opposite, rarely sub-opposite, parallel, or at varying angles to cirrus. Inflorescence arching outward, branched to 1-order, branches horizontal, peduncle enclosed within the leaf sheath and emerging from the mouth, flattened, not adnate to the internode, the surface glabrous or minutely to profusely papillose; bracts throughout the inflorescence inconspicuous or somewhat more conspicuous; prophyll absent although vestigial scar visible; peduncular bracts absent; rachis somewhat longer or than the peduncle; rachis bracts low, triangular, striate, opposite, alternate distally, sometimes united proximally to form an incomplete sheathing collar; rachillae distichous, opposite proximally and subtended by a double bract, becoming alternate distally, subtended by a single triangular bract, adnate to the inflorescence axis a short distance above the bract, bearing ± distichous, minute, triangular, incomplete bracts, each subtending a pair of equal flowers without bracteoles. Flowers very pale in colour, becoming darker post-anthesis, moderately to strongly fragrant; calyx thick, coriaceous, very shallowly 3-lobed distally, obscurely veined, minutely papillose, corolla very thick, coriaceous, divided at the apex to ¼ to 1/3 its length into 3 short, triangular valvate lobes, remaining approximate, even at anthesis, the

lobes then separating slightly to reveal a discrete trilete opening; stamens 6, united into a fleshy epipetalous ring, clasping the gynoecium and occluding the mouth of the flower, free filaments angled, very short, anthers enclosed within the flower, ± medifixed, very short, somewhat sagittate, latrorse; pollen elliptic, monosulcate, the sulcus extended, exine foveolate, tectate; gynoecium tricarpellate, triovulate, rounded, covered in reflexed scales, tipped by a columnar or tapered, 3-angled style, apically with 3 stigmatic angles, ovule basally attached, anatropous. Fruit 1–3 seeded, stigmatic remains minute, apical, perianth whorls persistent; epicarp covered in vertical rows of reddish-brown reflexed scales with fringed margins, mesocarp fleshy at maturity, endocarp not differentiated, sarcotesta, when present, very thin. Seed sub-basally attached, from the shape of 1/3 of a sphere to hemispherical or ellipsoid (depending on the number of seeds developing), sometimes slightly lobed or grooved, with a conspicuous abaxial ridge opposite the embryo, seed coat thin, rarely fleshy, endosperm homogenous; embryo lateral. Germination adjacent-ligular; eophyll bifid.

Distribution:—*Eremospatha* is represented by eleven species confined to the lowland (<1,000m) forest areas of West Africa and the Congo basin with outliers in Uganda, Tanzania and Zambia.

Etymology:—*Eremo* = (Latin) "destitute of"; *spatha* = (Latin) "spathes"

Notes:—The leaves of this genus display a remarkable plasticity of form, from bifid juvenile leaves to regularly or irregularly pinnate adult leaves. Historically, this has caused much taxonomic confusion and a number of species have been described from juvenile material.

Key to the species of *Eremospatha*:—

1. Stem with sheaths >1 cm in diameter; knee highly conspicuous or absent; leaflets regularly arranged, or moderately inequidistant 2
–. Stem with sheaths ±1 cm in diameter; knee inconspicuous, linear, ridge-like; leaflets conspicuously inequidistant, in groups, clustered or somewhat plumose ..... *1. E. quinquecostulata*

2. Knee present, highly conspicuous beneath leaf 3
–. Knee absent 8

3. Ocrea entire, horizontally or obliquely truncate, or somewhat saddle-shaped… 4
–. Ocrea longitudinally splitting into v-shape, or sometimes tattering 7

4. Mature leaflets few in number (<20 on each side of the rachis) lowermost leaflets reduced, more or less shaped as the mature leaflets; cirrus armed with reflexed spines 5
–. Mature leaflets many in number (>20 on each side of the rachis), linear-lanceolate to ovate, to rhomboid, lowermost leaflets reduced, linear, strap-like; cirrus unarmed 6

5. Mature leaflets obovate-elliptic, inflorescence glabrous ..... *2. E. hookeri*
–. Mature leaflets obovate to suborbicular; inflorescence profusely papillose to give brown velvety appearance..... ..... *3. E. cabrae*

6. Sheath ± triangular in cross section, lowermost leaflets, linear, strap-like; mature leaflets linear-lanceolate with finely acuminate apex ..... *4.E. laurentii*
–. Sheath ± circular in cross section, lowermost leaflets linear to ovate; mature leaflets obovate-elliptic to oblanceolate to rhomboid, with distinctly praemorse apex ..... *5. E. dransfieldii*

7. Leaflets rhomboid or trapezoid with straight margins; cirrus armed with reflexed spines; bracts on inflorescence minute, inconspicuous <2 mm long ..... *6. E. wendlandiana*
–. Leaflets linear-lanceolate; cirrus unarmed; inflorescence bracts conspicuous, up to 5 mm long..... *7. E. barendii*

8. Leaflet apex narrowly to broadly praemorse 9
–. Leaflet apex entire, terminating in a conspicuous apiculum ..... *8. E. cuspidata*

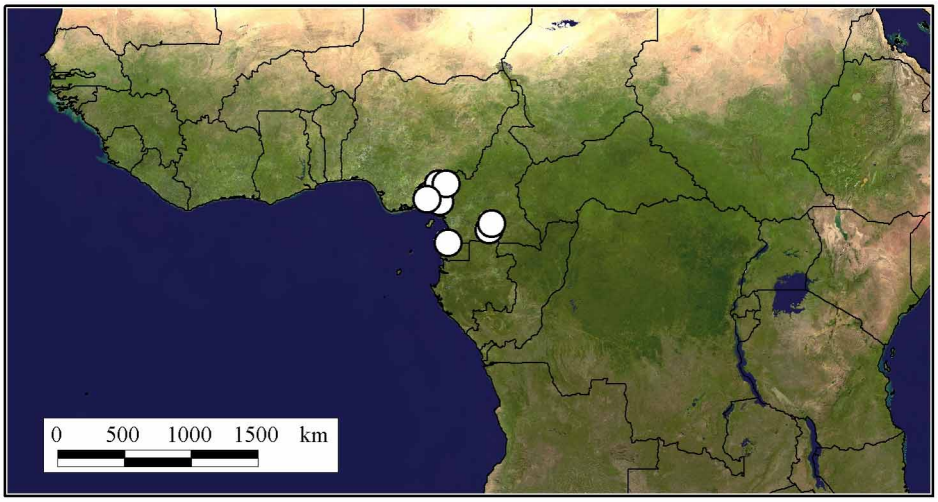
9. Leaflets somewhat papyraceous, mid-green; spines on leaflet margin always forward-facing 10
–. Leaflets somewhat coriaceous, grey-green; spines of leaflet margin reflexed and both forward and rear-facing ..... *9. E. tessmanniana*

10. Leaflets opposite to sub-opposite, linear-lanceolate, apex narrowly praemorse; ocrea with rounded lobe adaxial to the leaf; cirrus unarmed..... *10. E. macrocarpa*
–. Leaflets subopposite to alternate, cuneate, spathulate or ovate, apex moderately to strongly praemorse; ocrea obliquely truncate; cirrus armed ..... 11. *E. haullevilleana*

1. Eremospatha quinquecostulata Beccari (1910: 279), Tuley (1995: 123), Sunderland (2001: 91), Govaerts and Dransfield (2005: 108), Sunderland (2007: 32). Type:—CAMEROON, Dja, *unknown collector* (holotype FI!)

Clustered slender palm climbing to 10–15 m. Stems ± circular in cross-section, without sheaths 4–9 mm, with 5–10 mm; internodes 14–16 cm long. Leaf sheath longitudinally striate, with sparse brown caducous indumentum; ocrea entire, obliquely truncate, extending to 1.2–2.7 cm; knee somewhat inconspicuous, ridge-like, vertically linear, tapering at base, extending to 4 cm. Leaves sessile, or with petiole up to 10 cm long, somewhat flattened, armed along the margins with inequidistant, reflexed, bulbous-based, black-tipped spines; rachis 60–80 cm long, flattened in cross-section proximally, becoming triangular in cross-section distally, armed as the petiole; cirrus up to 40–50 cm long, very fine, armed as the rachis although spines becoming sparse distally; leaflets, 5–12 on each side, inequidistant, grouped in pairs or in 4's, somewhat irregularly clustered, lanceolate to loosely rhomboid, unequally attenuate at base, entire and acuminate to irregularly praemorse at apex, 13–20 cm long × 2–3 cm broad at the widest point, discolorous, adaxially dark green, abaxially mid-green, margin unarmed or sparsely armed with somewhat straight, forward-facing, black-tipped spines, praemorse apex ciliate-spiny; with 5 conspicuous, equal, main veins; lowermost leaflets smaller than the rest, although not obviously so; acanthophylls, somewhat slender, up to 2 cm long, at 45° angle to cirrus. Flower and fruit unknown.

Distribution:—This species is known only from SE Nigeria through to Cameroon.



MAP 2. Distribution of *Eremospatha quinquecostulata.*

Habitat and ecology:—*Eremospatha quinquecostulata* is a slender rattan found only in high forest.
Etymology:—(Latin) "five main veins".

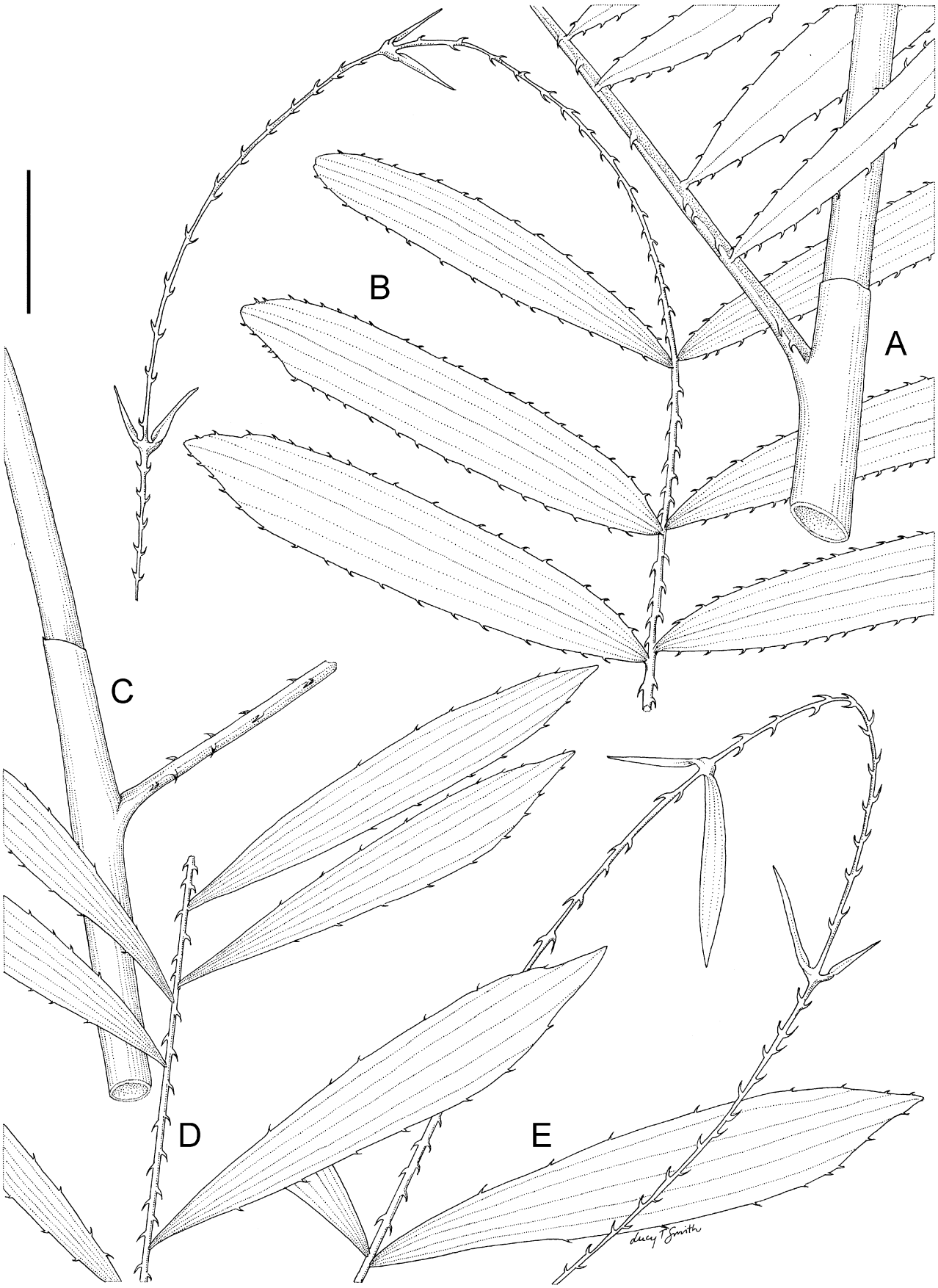


FIGURE 2 . *Eremospatha tessmanniana* (A–B) and *E. quinquecostulata* (C–E)
A. Stem. B. Leaflets and cirrus. C. Mature stem. D. Leaflets. E. Leaflets & cirrus. Scale bar: A = 6 mm. B = 10 cm. C–E = 4 cm. A–B from *Sunderland 2021*. C–E from *Sunderland 1938*. Drawn by Lucy T. Smith.

Conservation status:—Vulnerable (VU) due to its restricted range and habitat loss, particularly along the Nigeria–Cameroon border.

Notes:—This species is relatively uncommon and, along with *E. tessmanniana*, has not been recognised as a distinct species since Beccari's original account (Beccari 1910). Tuley (1995: 123) suggested this species represented "a juvenile form of unknown provenance", however recent field work and study of herbarium collections have confirmed that this is indeed a distinct species. The collection of fertile material would enable a more complete description to be made.

Additional specimens examined:—NIGERIA: *Tuley 653*, Calabar to Mamfe road: Mile 25 (05º18N:08º34E) sterile, July 13, 1964 (WAG!); CAMEROON: *unknown collector*, Bezirk Djah (03º00N:12º40E) sterile (FI!); *Letouzey 4285*, 40km S of Mesamena (03º28N:12º50E) sterile, February 17, 1962 (YA!); *Sunderland 1741*, Rumpi Hills Forest Reserve (04º54N:09º20E) sterile, May 19, 1996 (K!, SCA!, NY!); *Sunderland 1806*, Campo Ma'an Faunal Reserve (02º10N:09º54E) sterile, April 8, 1997 (K!, YA!); *Sunderland 1938*, Takamanda Forest Reserve (06º06N:09º47E) sterile, November 18, 1998 (K!, SCA!); *Sunderland 2054*, Takamanda Forest Reserve (06º08N:09º16E) sterile, January 10, 1999 (K!, SCA!)

2. Eremospatha hookeri (G.Mann & H.Wendl.) H.Wendl. in Kerchove (1878: 244), Drude (1895: 131), Wright (1902: 112), Durand & Durand (1909: 585), Beccari (1910: 281), De Wildeman (1911: 142), Hutchinson (1936: 391), Guinea-Lopez (1946: 245), Fosberg (1960: 129), Irvine (1961: 780), Russell (1968: 168), Letouzey (1978: 314), Olerode (1984: 117), Morakinyo (1995: 200), Tuley (1995: 45), Burkill (1997: 370), Cable & Cheek (1998: 179); Sunderland (2001: 52), Govaerts and Dransfield (2005: 108), Sunderland (2007: 11), Dransfield *et al*. (2008: 150). *Calamus hookeri* Mann & Wendland (1864: 434). Type:—NIGERIA, mouth of the River Niger, *Mann 451* (holotype K!)

Calamus africanus Rollisson (1875: 50), nom. superfl.

Clustered moderate to robust palm climbing to 30 m. Stems often branching, circular in cross-section, without sheaths, 15–20 mm in diameter, with 20–30 mm; internodes 16–20 cm long, commonly less (10–12 cm). Leaf sheath longitudinally striate, sparsely to profusely covered with caducous black indumentum, or indumentum absent; ocrea entire, obliquely truncate, or with high rounded lobe adaxial to the rachis, often drying grey-brown; knee linear, 1.5–3 cm long, somewhat abrupt at base. Juvenile stems up to 15m long; stem with sheath <1.5 cm in diameter; ocrea with linear wrinkle on adaxial side; petiole 8–10 cm long, armed along the margins with inequidistant, reflexed, bulbous-based black-tipped spines; leaves bifid, becoming pinnate, up to 20 cm long × 15 cm broad, deeply notched with rounded, somewhat rectangular lobes; cirrus up to 60 cm long, emerging from the centre; elaminate rachis up to 80 cm long. Leaves on mature stems sessile, up to 2.2 m long; rachis up to 1.5 m long, abaxially rounded adaxially concave, becoming rounded, rarely triangular, in cross section distally, armed as the petiole, although spines becoming more sparse distally, underside of rachis with sparse black caducous indumentum, absent distally; cirrus 50–70 cm long, armed as the rachis; leaflets up to 20 on each side, very variable in shape, obovate-elliptic, oblanceolate to almost rhomboid, bluntly contracted at base, finely to very broadly praemorse at apex, 12–22 cm long × 3.5–5.5 cm broad at the widest point, discolorous, adaxially dark green, abaxially mid-green, armed along the margins with inequidistant forward and (rarely) backward-facing black-tipped spines, c.5–7 main veins radiating from the base; lowermost leaflets smaller than the rest, linear to ovoid, reflexed and laxly to tightly clasping sheath; acanthophylls 2–2.5 cm long. Inflorescence, glabrous, up to 40 cm long; peduncle 12–18 cm long; rachis 18–22 cm long, somewhat straight; rachis bracts 0.5–1.5 mm, bluntly triangular; rachillae distichous, 8–10 on each side, 8–12 cm long, decreasing distally, adnate to the inflorescence axis for 3–7 mm, with <1 mm rounded triangular bracts subtending each dyad. Flowers not known. Fruit at maturity, 1–2–seeded, ovoid to cylindrical, 2.5–3 cm × 1.5–1.7 cm, with 20–21 vertical rows of scales. Seed compressed, 2 cm long × 1.2 cm wide × 0.6 cm thick, flattened on one side, margins somewhat wavy; embryo lateral, raised, opposite flattened side.

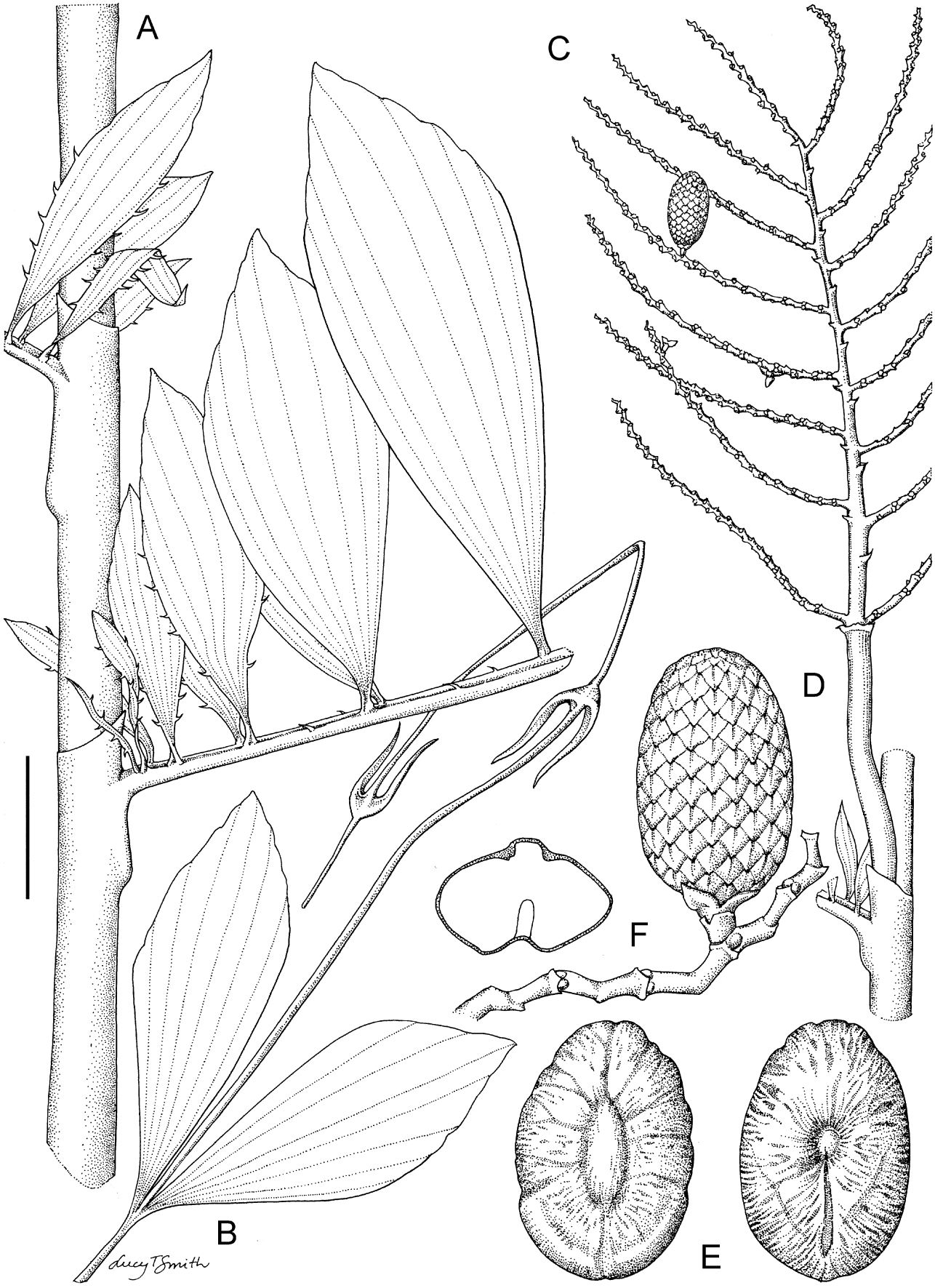
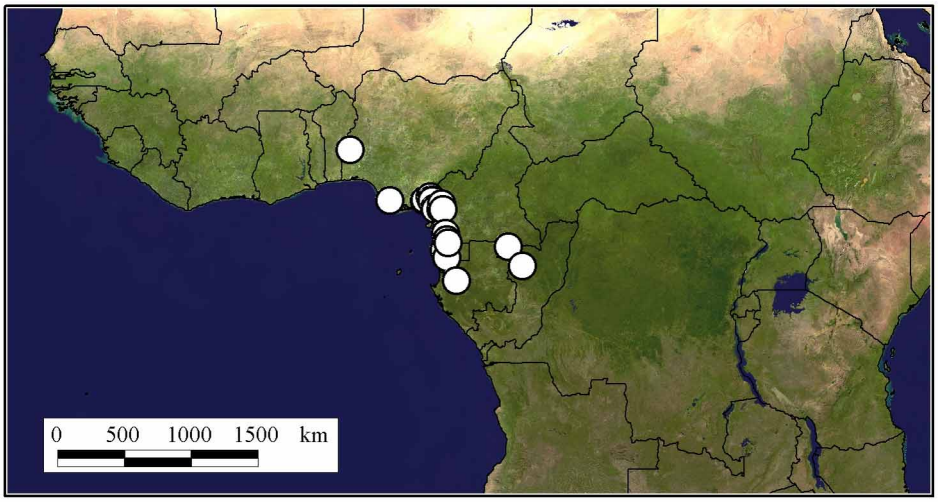


FIGURE 3. *Eremospatha hookeri*
A. Mature stem. B. Leaflets. C. Fruit on infructescence. D. Detail of fruit: E. Seed. F. Cross section of seed. Scale bar: A–C = 5 cm; D = 2.5 cm; E = 1.5cm; F = 1.2 cm. All from *Mann 451*. Drawn by Lucy T. Smith.

Distribution:—This species has a distinct Guineo-Congolian distribution primarily in the northernmost part of the Congo Basin.



MAP 3. Distribution of *Eremospatha hookeri.*

Habitat and ecology:—*Eremospatha hookeri* is particularly shade tolerant and is often found under a forest canopy. However, this species is also common in gaps and in forest margins and is found in a wide range of edaphic conditions, from swamp vegetation to well-drained volcanic soil.

Etymology:—Named after Joseph Dalton Hooker (1817–1911), botanist, and former Director of the Royal Botanic Gardens, Kew.

Conservation status:—Least concern (LC).

Additional specimens examined:—NIGERIA: *Ayewoh 3852*, Ondo Province, Owo (08º25N:03º20E) juvenile, February 24, 1944 (K!); *Maggs 160*, Kwa Falls near Calabar (04º59N:08º20E) sterile, August 26, 1948 (K!); *Mann 451*, River Niger (05º00N:06º00E) Fr., August 1860 (K!); *Morakinyo 1005*, Cross River National Park (05º15N:08º42E) sterile, August 17, 1993 (K!); *Onochie 7706*, Obutung forest, Calabar (05º02N:08º21E) sterile, March 2, 1945 (K!); *Tuley 651*, Oban rubber estate, Calabar (05º02N:08º21E) sterile, July 12, 1964 (K!); CAMEROON: *Dinklage 1155*, Grand Batanga (02º23N:09º50E) sterile, February 18, 1891 (MO!); *Kalbrayer 65*, SW Province, sterile, July, 1904 (K!); *Sunderland 2302*, Korup National Park, Chimpanzee Camp (05º02N:08º48E) sterile, February 15, 2000 (K!, SCA!); *Sunderland 1760*, Limbe-Kumbe road: Mile 40 (04º23N:09º26E) sterile, November 11, 1996 (K!, SCA!, WAG!); *Sunderland 1801*, Campo Ma'an Faunal Reserve (02º10N:09º54E) sterile, March 24, 1997 (K!, YA!, BH!, NY!, MO!, WAG!); *Sunderland 1890*, 30km south of Kribi (02º48N:09º43E) sterile, December 2, 1997 (K!, YA!, BH!, NY!, MO!, WAG!); *Sunderland 2256*, Mokoko River Forest Reserve (04º29N:09º00E) sterile, February 16, 1999 (K!, SCA!, MO!); *Sunderland 2257*, Mokoko River Forest Reserve (04º29N:09º00E) sterile, February 16, 1999 (K!, SCA!, BR!); *Sunderland 2258*, Mbanga-Nkongsamba road (04º25N:09º33E) sterile, February 23, 1999 (K!, YA!, BH!, NY!); *Thomas 5163*, Korup National Park (05º01N:08º51E) sterile, February 20, 1986 (YA!); *Thomas 10059*, Mokoko River Forest Reserve (04º25N:09º02E) sterile, May 22, 1994 (SCA!); EQUATORIAL GUINEA: *Sunderland 1906*, near village of Njakem (01º42N:09º40E) sterile, March 24, 1998 (K!, EG!, WAG!); *Sunderland 1917*, 2km WSW of village of Basilé (01º10N:09º50E) sterile, April 7, 1998 (K!, EG!); GABON: *le Testu* s.n., Haute-Ngounye (00º22S:10º27E) sterile, s.d. (BR!); CONGO: *Bermejo 88*, Parc National d'Odzala (00º36N:14º54E) sterile, 1993 (BR!); *Thomas* et al. *8944*, Bessié village (01º54N:13º56E) sterile, November 23, 1991 (MO!)

3. Eremospatha cabrae (De Wild. & T. Durand) De Wildeman (1903: 95). De Wildeman (1904: 95), Durand & Durand (1909: 585), De Wildeman (1919: 20), Gossweiler (1936: 896), Renier (1948: 82), Walker & Sillans: (1961: 331), Letouzey (1978: 314), Tuley (1995: 45), Sunderland (2001: 56), Harris (2002: 242), Govaerts and Dransfield (2005: 108), Sunderland (2007: 14). *Calamus cabrae* De Wild & T.Durand in Durand & De Wildeman (1899: 151), Baudon (1924: 595). Type:—DEMOCRATIC REPUBLIC OF CONGO, Mayombe, *Cabra* s.n. (holotype BR!)

Eremospatha rhomboidea Burret (1942: 751). Type:—ANGOLA, Nkanda Mbaku, *Gossweiler 10086* (holotype B†; isotype K!).

Eremospatha suborbicularis Burret (1942: 750). Type:—ANGOLA, Nkanda Mbaku, *Gossweiler 10088* (holotype B†; isotype K!).

Clustered moderate palm climbing to 50 m, more commonly 20–30 m. Stems ± circular in cross-section, without sheaths 10–15 mm in diameter, with to 25 mm; internodes 10–15 cm long. Leaf sheath longitudinally striate, sparsely to moderately armed with black caducous indumentum, particularly concentrated on the apex of the sheath; ocrea entire, somewhat saddle-shaped, with 1–1.5 cm rounded lobe adaxial to the leaf; knee narrow, linear, abrupt, up to 2.5 cm long. Leaves sessile, up to 1.5–2 m long; rachis up to 1 m long, abaxially rounded, adaxially flattened or slightly convex, becoming trapezoid then rounded in cross-section distally, with sparse to moderate black caducous indumentum below, armed along the margins with inequidistant reflexed, bulbous-based, black–tipped spines, becoming more sparsely armed distally; cirrus up to 1 m long, armed as the rachis proximally, becoming unarmed distally; leaflets up to 8–10 on each side of the rachis, obovate to trapeziform, narrowly contracted at the base, irregularly and broadly praemorse at apex, 7–16 cm long × 4–9 cm broad at the widest point, concolorous, somewhat coriaceous, with 8 or more main veins radiating from base, armed along the margins with stout forward and (rarely) reverse-facing angular spines, praemorse apex somewhat ciliate-spiny; lowermost leaflets smaller than the rest, erect or reflexed and laxly swept back across the sheath; acanthophylls up to 3.5 cm long, very fine, slender. Inflorescence with profuse, soft, velvety, papillose covering, up to 40 cm long, arching, rarely straight; peduncle up to 20 cm long; rachis 18–28 cm long, rachis bracts 1.5–2 cm, finely acuminate; rachillae distichous, 10–12 on each side, up to 10 cm long, decreasing distally, rarely straight, often arching, adnate to the inflorescence for 10 mm, decreasing distally. Flowers borne in close pairs, with <1 mm long incomplete bracts subtending each dyad; calyx 2–3 mm long × 4 mm wide at the mouth, with 3 distinct rounded lobes; corolla ±1 cm long × 3 mm wide, divided to 1/3 of its length; stamens united into 4 mm–long epipetalous ring, free filaments <0.5 mm long; anthers <1 mm long; ovary 3 mm × 2 mm tipped with c.2 mm long style. Fruit at maturity, 1–seeded cylindrical to rhomboid, 2.5–3 cm long × 16–19 mm wide with 20–24 vertical rows of scales. Seed 2 cm long × 1.6–1.7 cm wide × 0.8 cm thick, flattened on one side with a shallow depression; embryo lateral, raised opposite flattened side.

Distribution:—*Eremospatha cabrae* is restricted to Gabon, southwards to Angola and across to the lowland forests of the wider Congo basin. This species is reported to be relatively common where it occurs (de Wildeman 1904).

Habitat and ecology:—*Eremospatha cabrae* is more commonly encountered in swamp forest and riverine regions.

Etymology:—Named after Captain E. Cabra, Belgian administrator and explorer who collected the type specimen.

Conservation status:—Least concern (LC).

Additional specimens examined:—CENTRAL AFRICAN REPUBLIC: *Harris 3419*, 6km from Bayanga (02º55N:16º16E) sterile, July 7, 1993 (K!), *Harris 4765*, 8km ESE of Lidjombo (02º39N:16º11E) sterile, March 16, 1994 (K!), *Harris 4966*, 25km SE of Bayanga (02º47N:16º25E) Fl., May 27, 1994 (K!), GABON: *Williamson 128*, Lopé Reserve (00º30N:11º32E) sterile, January 1985 (K!), *de Wilde* et al. *11177*,

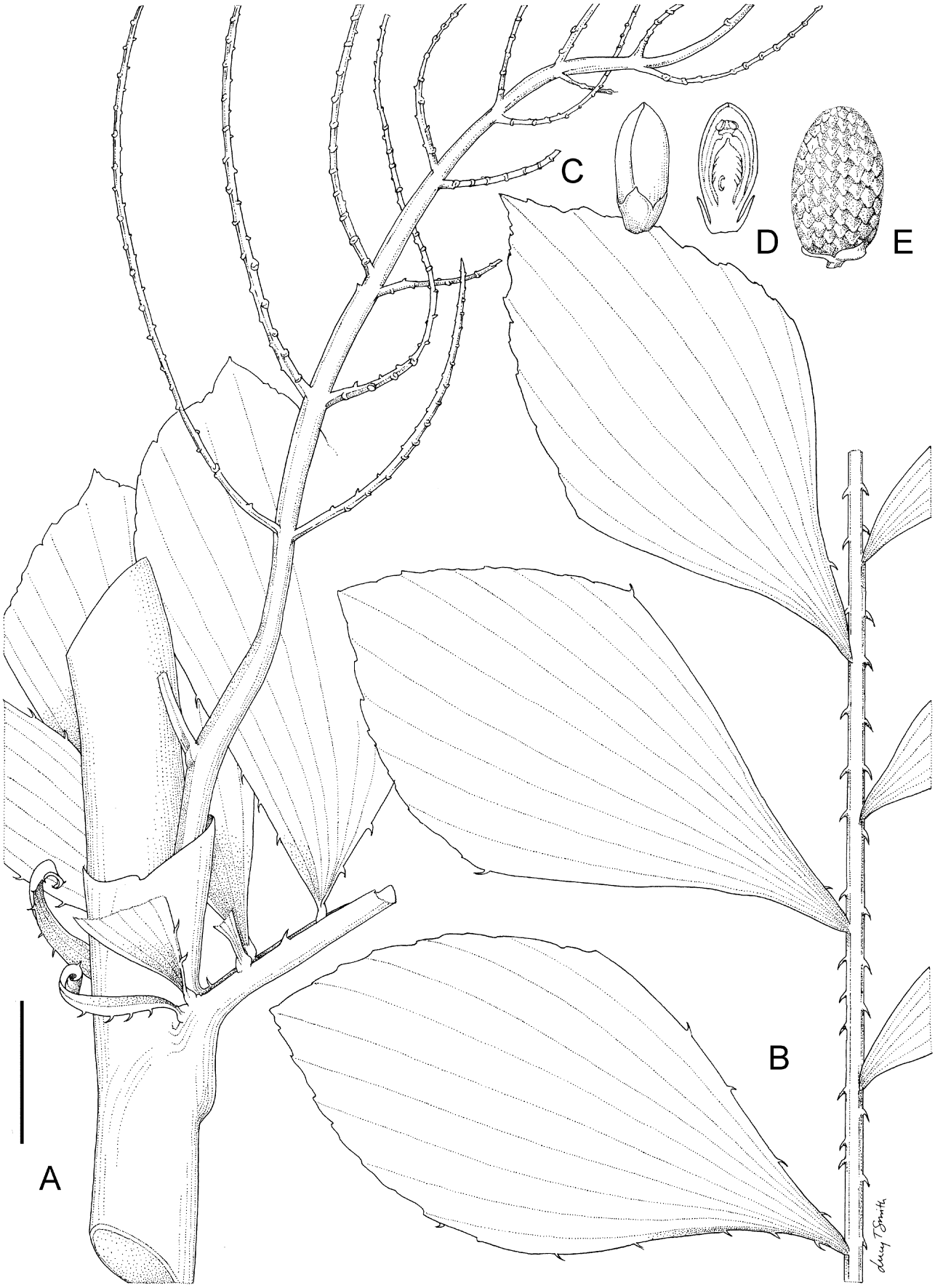
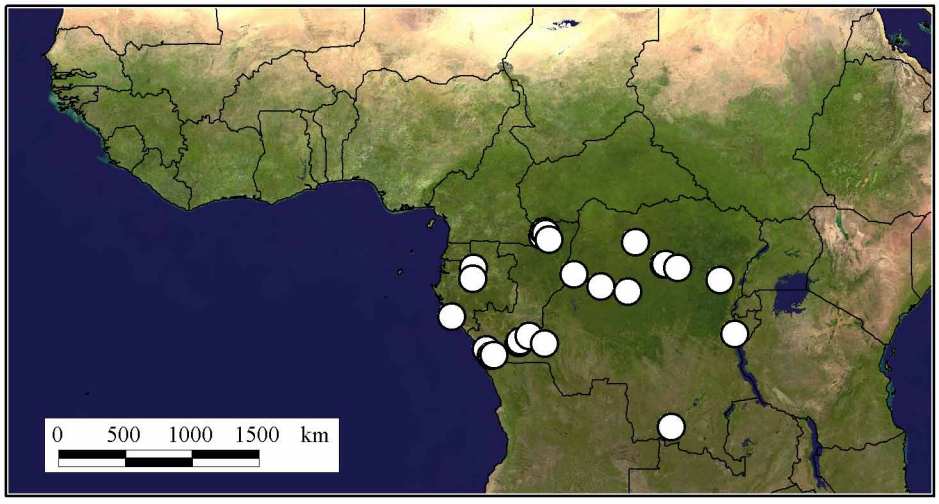


FIGURE 4 . *Eremospatha cabrae*

A. Mature stem & inflorescence. D. Leaflets. C. Flower. D. Flower section. E. Fruit. Scale bar: A = 3 cm; B = 6 cm; C–D = 8 mm; E = 3 cm. A from *Leonard 929*; B–D from *Louis 3804*; E from *Louis 5656*. Drawn by Lucy T. Smith.

road from airport to Vera (02º47S:10º06E) Fl., November 23, 1994 (WAG!), CONGO: Hallé 1814, 20km N of Brazzaville (04º05S:15º17E) Fl., February 2, 1970 (BR!); DEMOCRATIC REPUBLIC OF CONGO: *Allard 294*, Kanya, sterile, 1910 (BR!), *Bequaert 953* Bumba (02º12N:22º27E) Fr., October 28, 1913 (BR!), *Cabra* s.n., Haut-Chiluango, sterile, 1904 (BR!), *Cabra* s.n., Mayombe, sterile, January 21, 1897 (BR!), *Compère* 2182, Kinkosi (04º33S:14º35E) sterile, October 17, 1910 (BR!); *Demeuse* s.n., Mangobo (00º20S:28º06E) sterile, May 1892 (BR!); *Deuse 121*, Lac Tumba (00º46S:20º06E) juvenile, May 6, 1955 (BR!); *Germain 326*, Yangambi (00º45N:24º26E) Fl., May 15, 1940, BR!;, *Gillet 2069*, Kimengue, Fl. & Fr., March 1900 (FI!, BR!); *Hulstaert 1417*, Bokela (01º07S:21º55E) Fr., s.d. (BR!), *Jans 655*, Bokoro, Fl., January 17, 1948 (BR!), *Kuasa 48*, Lukula (05.23S:12.56E) Fr., November 26, 1960 (BR!), *Laurent 912*, Bamama, Fl., February 28, 1896 (BR!), *Laurent 1118*, Eala (00º03N:18º18E) Fr., November 10, 1902 (BR!); *Laurent* s.n., Eala (00º03N:18º18E) sterile, July 1, 1902 (BR!); *Lejoly 1438*, Kisangani (00º30N:25º15E) sterile, April 30, 1977 (BR!), *Lejoly 82/820*, Bateke Plateau (04º35S:16º20E) Fl., December 9, 1982 (BR!); *Leonard 929*, Eala (00º03N:18º18E) Fl., October 1946 (K!, WAG!, BR!); *Liegeois 88*, Tshopo (10º12S:24º51E) sterile, July 1943 (BR!); *Lisowski 86336*, Bateke Plateau (04º35S:16º20E) Fl., July 9, 1982 (BR!); *Louis 3804*, Yangambi (00º45N:24º26E) Fl., April 30, 1937 (K!, WAG!, BR!), *Louis 5656*, Yangambi (00º45N:24º26E) Fr., July 27, 1937 (K!, FHO!, BR!, MO!), *Louis 15169*, between Yangambi and Isangi (00º43N:24º23E) Fl., June 12, 1939 (BR!); *Louis 16797*, Yangambi (00º45N:24º26E) Fr., November 17, 1943 (BR!), *Nannan 46*, Eala (00º03N:18º18E) sterile, August 25, 1914 (K!), *Nsimundeue 1055*, Luki (05º26S:12º44E) Fl., July 17, 1972 (BR!); *Pauwels 2322*, Kisantu (04º25S:14º42E) sterile, April 13, 1959 (BR!); *Pynaert 1673*, Eala (00º03N:18º18E) Fl., August 20, 1907 (BR!); *Pyneart 1073*, Eala (00º03N:18º18E) Fr., 1907 (K!), *Sapin* s.n., Haut-Chiluango, Fr., January 1910 (BR!); *Toussaint 2331*, Vallée de la Nkula, sterile, May 20, 1947 (BR!, MO!), *Wellens 473*, Lubumba (03º57S:29º05E) sterile, December 1923 (BR!), ANGOLA: *Gossweiler 10086*, Mayombe, Luali (05º00S:12º25E) sterile, 1923 (K!), *Gossweiler 10088*, Mayombe, Luali (05º00S:12º25E) sterile, 1923 (K!).



MAP 4. Distribution of *Eremospatha cabrae*.

4. Eremospatha laurentii De Wildeman (1916: 147), De Wildeman (1919: 21), Renier (1948: 82), Morakinyo (1995: 202), Tuley (1995: 45), Cable & Cheek (1998: 179), Sunderland (2001: 61), Harris (2002: 243), Sunderland *et al*. (2005: 148) Govaerts and Dransfield (2005: 108), Sunderland (2007: 16). Type:—DEMOCRATIC REPUBLIC OF CONGO, between Bolobo and Yumbi, *Laurent 645* (holotype BR!).

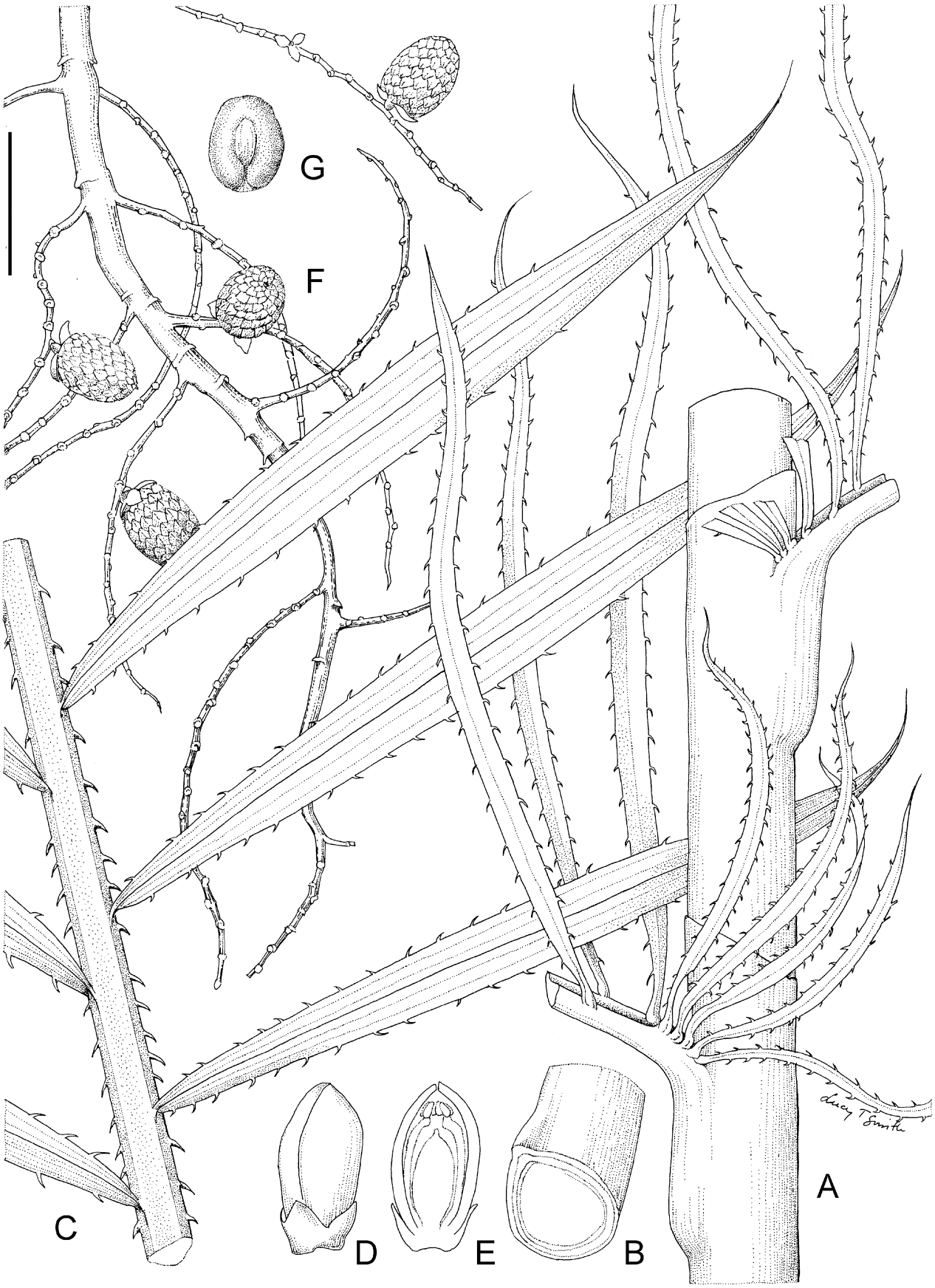
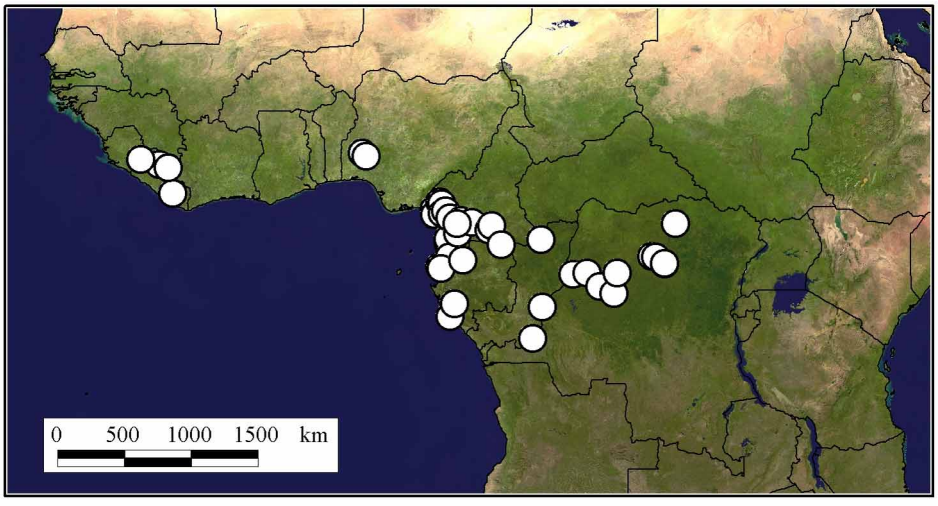


FIGURE 5. *Eremospatha laurentii*

A. Mature stem. B. Stem section. C. Leaflets. D. Flower. E. Flower section. F. Infructescence section. G. Seed. Scale bar: A = 8 cm; B = 1.5 cm; C = 4 cm; D–E = 1 cm. F = 5 cm; G = 8 mm. A–C from *Sunderland 1920*; D–E from *Louis 15994*; F–G from *Otedoh and Tuley 7258*. Drawn by Lucy T. Smith.

Clustered robust palm climbing to 30 m long. Stems ± triangular in cross-section, without sheaths, 18–24 mm in diameter, with 25–30 mm; internodes 10–16 cm. Leaf sheath lightly striate, moderately to profusely covered in caducous grey-black indumentum, or indumentum absent; ocrea entire, obliquely truncate, extending for 1–2 cm; knee conspicuous, narrow, linear, 5–8 cm long, rather abrupt at base. Leaves sessile, up to 3m long; rachis 1.2–1.5m long, abaxially rounded, adaxially convex to concave, becoming trapezoid then triangular in cross-section distally, sparse grey indumentum present below, or absent, armed along the margins with robust reflexed, bulbous-based, black-tipped, spines, becoming sparsely armed distally; cirrus 1.2–1.5 m long, unarmed; leaflets up to 30 on each side of the rachis, inequidistant, opposite to sub-opposite, linear-lanceolate to ovate, bluntly contracted at the base, very finely acuminate at apex, with apex often breaking off giving slightly blunt appearance, 22–38 cm long × 2.8–3.8 cm broad at the widest point, concolorous, armed along the margins with slender to robust black–tipped yellow spines, with ca.6 moderately conspicuous transverse veinlets 1–2 mm apart; lowermost leaflets, smaller than the rest, linear, strap-like, armed along the margins with robust bulbous-based black-tipped yellow to orange spines, laxly swept back across, or tightly clasping stem; acanthophylls 3–4 cm long. Inflorescence glabrous, 24–32 cm long; peduncle 10–15 cm long, somewhat flattened in cross-section; rachis 12–17 cm long, erect, arching; rachillae distichous 8–10 on each side, 5–16 cm long, decreasing distally, adnate to the inflorescence axis for 3–5 mm; rachis bracts, acuminate, <4 mm long, decreasing distally; flower cluster subtended by <1.0 mm. long incomplete bracts. Flowers borne in close pairs; calyx 4 mm long × 5 mm wide at the mouth, with 3 rounded, striate, 1.5–mm long lobes; corolla 7–9 mm × 3–4 mm, divided to ¼ of its length; stamens united into 4 mm–long epipetalous ring, free filaments <0.1 mm, anthers <0.5 mm; ovary 1 mm × 1.5 mm, tipped by 1 mm long style. Fruit at maturity, 1–seeded, globose or cylindrical, 1.6–2.2 cm long × 1.7–2 cm wide, with 18–22 vertical rows of scales. Seed ± compressed, 1–1.2 cm long × 0.8–1 cm wide × 0.6–0.8 cm thick, rounded on one side, embryo lateral, raised into conspicuous 1.5 mm-long stalk-like organ.

Distribution:—This species occurs predominantly in the lowland forests of the northern Congo Basin. However, intriguingly, there are outliers of this species found in the forests of Upper Guinea, with a pronounced disjunction from Ivory Coast to Benin.



MAP 5. Distribution of *Eremospatha laurentii*.

Habitat and ecology:—*Eremospatha laurentii* is found in both open areas as well as in closed-canopy forest. However, this species responds particularly well to selective logging and is a common component of regrowth vegetation where it occurs.

Etymology:—Named after Marcel Laurent (1879–1924), Belgian botanist.

Conservation status:—Least concern (LC).

Additional specimens examined:—SIERRA LEONE: *Deighton 4117*, Gola forest (07º45N:10º45W) Fl., March 10, 1945 (K!); Liberia: *Harley 2174*, Wanana (07º25N:09º31W) Fr., January 24, 1958 (K!); Nigeria: *Onochie 5243*, Olujiji (08º11N:04º08E) sterile, December 13, 1957 (K!); *Otedoh & Tuley 7258*, Ologbo, near Sapele (07º59N:04º25E) Fr., s.d. (K!); *Tuley & Ochie 1682*, South of Maraba, sterile, October 4, 1969 (K!); CAMEROON: *Cheek 5554*, Mount Cameroon: Njonji (04º04N:08º59E) sterile, November 24, 1993 (SCA!); *de Wilde 2183*, 60km S of Eseka (03º39N:10º46E) Fr., March 20, 1964 (WAG!); *Dransfield 7003*, Mungo River Crossing (04º08N:09º31E) Fr., June 27, 1991 (K!, SCA!); *Letouzey 4278*, 40km S of Mesamena (03º19N:12º49E) sterile, February 16, 1962 (YA!); *Letouzey 4416*, 20km E of Somalonyo in Dja (03º00N:12º40E) Fl., February 24, 1962 (YA!); *Letouzey 11796*, 25km NNE of Mintom II (02º03N:13º30E) sterile, Janaury 5, 1973 (YA!); *Letouzey 12477*, Lake Ossa, 8km WNW Edea (03º50N:10º02E) Fl., December 22, 1966 (K!, YA!); *Letouzey 14522*, Rumpi Hills nr Lokando (04º54N:09º20E) sheath only, March 23, 1976 (YA!); *Letouzey 14748*, 25km N of Douala (04º18N:09º43E) Fr., August 29, 1976 (YA!); *Njingum 4*, Mbalmayo (03º31N:11º30E) sterile, June 15, 1999 (K!); *Njingum 8*, Akom II (02º47N:10º34E) sterile, July 3, 1999 (K!); *Sunderland 1752*, Mungo River Crossing (04º08N:09º31E), sterile, November 16, 1996 (K!, SCA!, BH!); *Sunderland 1766*, Southern Bakundu Forest Reserve (04º46N:09º29E) sterile, November 24, 1996 (K!, SCA!, NY!); *Sunderland 1805*, Campo Ma'an Faunal Reserve (02º10N:09º54E) sterile, March 27, 1997 (K!, YA!); *Sunderland* s.n., Sud Province (02º24N:09º54E) sterile., s.d. (K!, YA!); *Watts 514*, Mount Cameroon: Njonji (04º04N:08º59E) sterile, October 15, 1992 (SCA!); CENTRAL AFRICAN REPUBLIC: *Harris & Fay 459*, Ndakan (02º22N:16º09E) Fr., April 4, 1988 (MO!, BR!); EQUATORIAL GUINEA: *Sunderland 1920*, on road to Monte Mitra (01º12N:09º59E) sterile, April 7, 1998 (K!, EG!); GABON: *Klaine* s.n., Libreville (00º35N:09º22E) Fr., January 15, 1907 (FI!); *van Nek 517*, Gamba (02º47S:10º03E) sterile, December 31, 1990 (WAG!); DEMOCRATIC REPUBLIC OF CONGO: *Bequaert 878*, between Bolobo & Sandy Beach (02º08S:16º15E) sterile, October 14, 1913 (BR!); *Couteaux 473*, Eala (00º03N:18º18E) Fr., October 20, 1908 (BR!); *Dubois 912*, Maringa (00º07N:21º17E) Fr., August 1938 (K!, BR!); *Evrard 2984*, between Mangania and Lifoku (00º75S:21º03E) Fr., November 19, 1957 (BR!); *Evrard 4511*, Parc National de Monkoto (00º08N:19º16E) sterile, August 6, 1958 (K!, WAG!, BR!); *Evrard 7070*, Nselé (04º14S15º34E) Fr., May 8, 1975 (BR!, WAG!, MO!); *Gerard 2152*, Bambesa (03º28N:25º11E) Fl., February 20, 1956 (BR!); *Germain 1681*, Eala (00º03N:18º18E) Fr., October 28, 1943 (BR!); *Germain 4808*, Ikelemba river, Fl., February 1949 (BR!); *Gilbert 7909*, Yangambi (00º45N:24º26E) Fl., 1947 (BR!); *Hulstaert 747*, Bokuma, Fl., March 8, 1942 (BR!); *Laurent 645*, between Bolobo & Yumbi (02º08S:16º15E) Fl. & Fr., April 14, 1903 (BR!); *Leonard 55*, between Bamania & Ilelenge, Fr., September 26, 1945 (K!, MO!, BR!); *Leonard 816*, Eala (00º03N:18º18E) Fr., October 12, 1946 (BR!); *Leonard 980*, Eala (00º03N:18º18E) sterile, November 11, 1946 (K!, BR!, WAG!); *Louis 10155*, Yangambi (00º45N:24º26E) Fr., July 1, 1938 (K!, BR!, WAG!); *Louis 11439*, between Yangambi and Basoko (01º12N. 23º51E) Fl. & Fr., September 1938 (K!, BR!, WAG!); *Louis 15925*, Yangambi (0º45N:24º26E) Fr., August 25, 1939 (K!, BR!); *Louis 15944*, Yangambi (00º45N:24º26E) Fl., August 28, 1939 (K!, BR!, WAG!); *Louis 16791*, Yangambi (00º45N:24º26E) Fr., November 17, 1943 (BR!); *Louis 7994*, Yangambi (00º45N:24º26E) Fr., February 22, 1938 (K!, BR!); *Mandango 2970*, Basoko (01º15N:23º36E) Fr., May 13, 1981 (BR!); *Sapin* s.n., sterile, 1912 (BR!); *Thonet 129*, Lac Tumba (00.46S:20.06E) Fr., February 5, 1957 (BR!); CULTIVATED: Java, Furtado A113, Bogor Botanic Garden, sterile (K!); Palm House, RBG Kew, 1984–1058 (K!).

5. Eremospatha dransfieldii Sunderland (2003: 988), Sunderland *et al*. (2005: 150); Pan *et al*. (2006: 77); Sunderland (2007: 18). Type:—GHANA, Draw River Forest Reserve, *Sunderland 2261* (holotype K!; isotypes KUM!, NY!)

Clustered robust rattan palm climbing to 40 m long. Stems circular in cross-section, without sheaths, 18–24 mm in diameter, with 25–30 mm; internodes 10–16 cm. Leaf sheath lightly striate, indumentum absent, but sheath often profusely covered with orange-brown scale insects; ocrea entire, obliquely truncate, extending

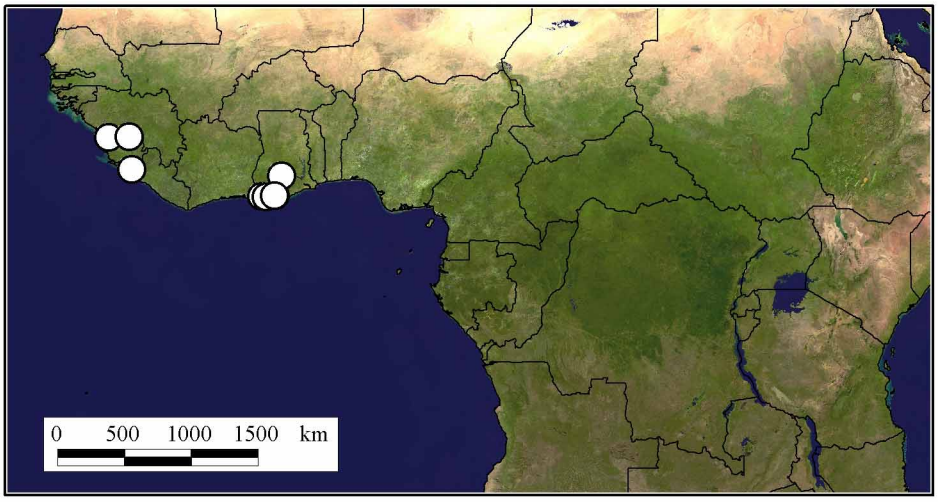
FIGURE 6 . *Eremospatha dransfieldii*

A. Mature sheath. B. Adult leaflets. C. Cirrus. D. Habit. E. Leaflets. Scale bar: A = 4 cm. B–C = 5 cm. D = 1.5 m. E= 12 cm. All from *Sunderland 2261*. Drawn by Lucy T. Smith.

for 1–2 cm above the leaf junction; knee conspicuous, narrowly linear, 2–4 cm long, rather abrupt at base. Leaves sessile, up to 3.5m long; rachis 1.2–1.5m long, abaxially rounded, adaxially convex to concave, becoming trapezoid then triangular in cross-section distally, armed along the margins with robust reflexed, bulbous-based, yellow-orange, spines, becoming more sparsely armed distally; cirrus 1.2–1.5 m long, unarmed; leaflets up to 40 on each side of the rachis, inequidistant, opposite to sub-opposite, highly variable in shape, obovate-ellipticus to oblanceolate to rhomboid, obtusely cuneate at base, more or less praemorse at apex, 12–30 cm long × 3.5–5.5 cm broad; lowermost leaflets, smaller than the rest, linear, strap-like or broadly-lanceolate, armed along the margins with robust bulbous-based yellow to orange spines, laxly swept back across, or tightly clasping stem; acanthophylls 3–4 cm long. Flowers and fruits unknown.

Habitat:—*E. dransfieldii* is a light demanding species found particularly along forest margins, in tree-fall gaps and along roadsides. The species is restricted to areas of high rainfall (>2,000mm) and is locally abundant where it occurs.

Distribution:—The main distribution is centred in the Western Region of Ghana and eastern Ivory Coast with additional populations in Sierra Leone.



MAP 6. Distribution of *Eremospatha dransfieldii*.

Etymology:—This species is named after Dr John Dransfield, palm specialist of the Royal Botanic Gardens, Kew.

Conservation status:—Least concern (LC).

Notes:—Notwithstanding the long history of botanical fieldwork in the Upper Guinea forests of West Africa and despite their economic importance (Falconer 1992, Oteng-Amoako and Obiri-Darko 2001, Sunderland *et al*. 2005) the rattan palms of the region were, until recently, particularly under-represented in herbaria. Three species of *Eremospatha* were previously recorded from the region; *E. macrocarpa*, *E. laurentii* and a third taxon, comprising a few incomplete voucher specimens which were frequently assigned to *E. hookeri*. Due to the significant morphological and ecological differences between these this latter taxon and *E. hookeri*, doubts concerning the identification of "*E. hookeri*" from Upper Guinea were expressed by Sunderland (2001). Further collections confirm that this species is indeed a distinct taxon.

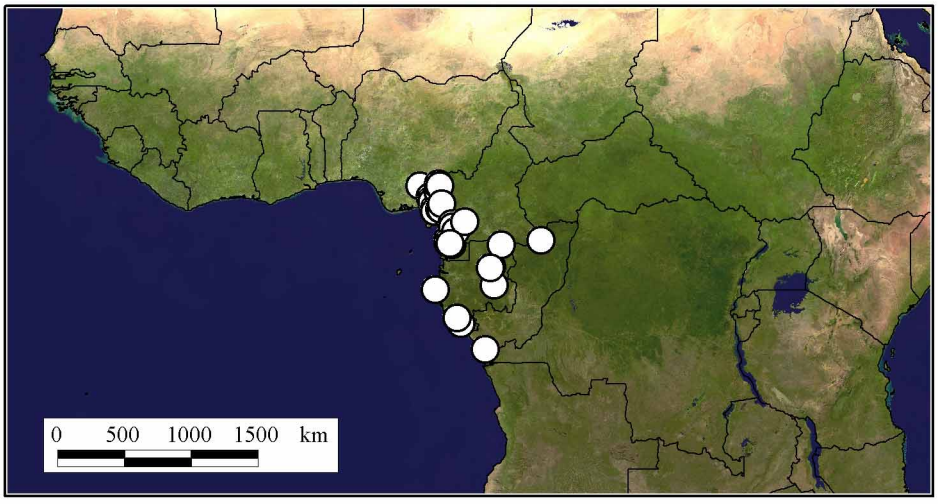
Additional specimens examined:—SIERRA LEONE: *Gledhill 309*, Lake Soufon, sterile, February 14, 1966 (K!, GC!); *Scott–Elliot 4442*, Mofani, sterile, January 12, 1892 (K!); *Small 832*, Kambui Hills (07º05N:11º20W) sterile, November 4, 1952 (K!); GHANA: *Hall & Abbiw 45124*, Subiri Forest Reserve (05º17N:01º43W) sterile, January 2, 1975 (GC!); *Moore & Enti 9888*, Ankasa River Forest Reserve (05º15N:02º36W) sterile, March 3, 1971 (GC!); *Sunderland 2261*, Draw River Forest Reserve (05º12N:02º20W) sterile, May 26, 1999 (K!, KUM!); *Tomlinson* s.n., Bobiri Forest Reserve (06º38N:01.17W) juvenile, December 20, 1957 (K!)

6. Eremospatha wendlandiana Dammer ex Beccari (1910: 290), Hutchinson (1936: 391), Guinea-Lopez (1946: 245), Russell (1968: 168), Letouzey (1978: 314), Letouzey (1986: 401), Morakinyo (1995: 204), Tuley (1995: 45), Cable & Cheek (1998: 179), Sunderland (2001: 66), Govaerts and Dransfield (2005: 109), Sunderland (2007: 20). Type:—CAMEROON, Lake Barombi, *Preuss 460* (holotype B†; isotype FI!)

Eremospatha korthalsiaefolia Beccari (1910: 292); Walker & Sillans (1961: 333). Type:—CAMEROON, Akoafim near Ebolowa, *Dusen 292* (holotype B†; isotype FI!).

Clustered moderate to robust palm climbing to 60 m. Stems ± circular in cross-section, without sheaths 12–20 mm, with 15–30 mm; internodes up to 30 cm long. Leaf sheath only very lightly striate, with sparse to moderate caducous black indumentum; ocrea drying brown and splitting longitudinally, sometimes with horizontal linear wrinkle opposite the leaf, extending to up to 8 cm; knee conspicuous, narrowly-linear, up to 5–12 cm long, tapering at base. Leaves sessile; rachis up to 2m long, abaxially rounded, adaxially flattened or slightly concave on upper surface, becoming rounded then triangular in cross-section distally, armed along the margins with inequidistant, reflexed, bulbous-based, black-tipped spines, with sparse black indumentum below; cirrus up to 2 m long, armed as the rachis, although spines becoming sparse distally, indumentum absent; leaflets up to 20 on each side of the rachis, strictly rhomboid or trapezoid with conspicuously straight margins, broadly attenuate at the base, broadly and irregularly praemorse at apex, very variable in size 12–22 cm long × 8–17 cm broad at the widest point; concolorous, armed along the margins with 2 mm long, robust, slightly reflexed, black-tipped spines, praemorse apex somewhat ciliate spiny; with 5–9 main veins radiating from the base; acanthophylls 2–2.5 cm long, somewhat slender, at 30° angle to cirrus. Inflorescence glabrous, up to 80 cm long, peduncle up to 30 cm long; rachis up to 50 cm long, arching, rachis bracts incomplete, 1.5–2 cm long, decreasing distally, rachillae distichous, 10–12 on each side, 25–30 cm long, decreasing distally, adnate to the rachis for up to 2 cm, less so distally. Flowers borne in close pairs; calyx 2 mm long × 4 mm wide at the mouth, shallowly 3–lobed; corolla ca. 8 mm long × 3 mm wide divided to ¼ of its length; stamens united into 3 mm-long epipetalous ring, free filaments <0.5 mm; anthers <0.75 mm long; ovary 2mm × 1.5 mm tipped with 1 mm long style. Fruit at maturity ovoid to broadly cylindrical, 2.5–3.5 cm × 1.8–2.4 cm, with 15–19 vertical rows of scales. Seed compressed with, 1.8–2.8 cm long × 1.2–1.8 cm wide × ca.1 cm deep, with somewhat undulating margins, flattened on one side or with a shallow depression, embryo lateral, raised, opposite the flattened side.

Distribution:—*E. wendlandiana* is distributed from SE Nigeria to Gabon, commonly in coastal forest, although with outliers present in the swamp forests of the Central African Republic.



MAP 7. Distribution of *Eremospatha wendlandiana*.

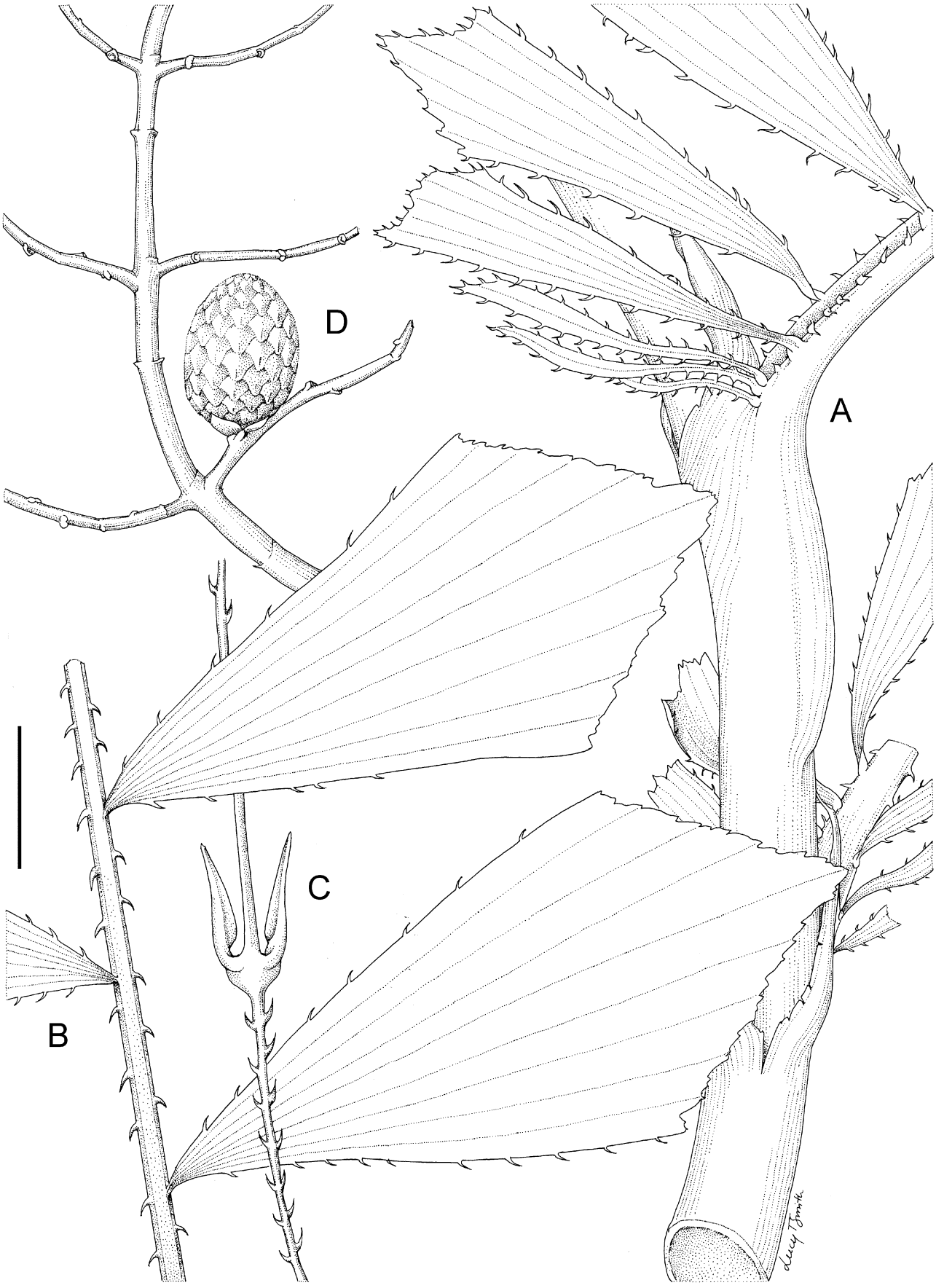


FIGURE 7. *Eremospatha wendlandiana*

A. Mature stem. B. Leaflets. C. Acanthophylls. D. Fruit on infructescence. Scale bar : A = 6 cm. B = 5 cm. C = 2 cm. D = 2.5 cm. A–C from *Sunderland 1798*. D from *Nkefor 920*. Drawn by Lucy T. Smith.

Habitat and ecology:—This species is a common component of gap vegetation and forest margins, although it is commonly present in the juvenile form in closed-canopy forest where it occurs.

Etymology:—Named after Hermann Wendland (1825–1903), German palm botanist and horticulturist.

Conservation status:—Least concern (LC).

Additional specimens examined:—NIGERIA: *Aninze 15402*, Oban Hills (06º00N:09º15E) Fr., February 9, 1946 (K!); *Morakinyo 1001*, Cross River National Park (05º15N:08º42E) Fr., August 11, 1993 (K!); *Tuley 652*, Mile 26 on Calabar to Okpora road (05º60N:08º02E) sterile, July 13, 1964 (WAG!); CAMEROON: *Dransfield 7004*, Mile 40, Buea-Kumba road (04º23N:09º26E) sterile, June 28, 1991 (K!, SCA!); *Dundas 8381*, Southern Bakundu F.R. (04º26N:09º21E) seedling, August 20, 1945 (K!); *Harris 3738*, Onge (04º21N:08º57E) sterile, September 11, 1993 (K!, SCA!); *Iquito 61*, Fr. only (FI!); *Letouzey 4151*, 45km NE of Kribi (03º15N:10º12E) sterile, January 25, 1962 (YA!); *Letouzey 11518*, Nkongkengui, 12km NNE of Makak (03º34N:11º02E) sterile, July 17, 1972 (YA!); *Letouzey 11800*, Mintom I, 70km E of Djoum (02º03N:13º30E) sterile, January 8. 1973 (YA!); *Lowe 3443*, Edea-Kribi rd nr Elogbatindi (03º27N:10º11E) Fr., January 22, 1978 (K!, YA!); *Mildbraed 6036*, 58km east of Kribi (02º56N:10º26E) sterile, July 21, 1911 (HBG!); *Nkefor 920*, Southern Bakundu Forest Reserve (04º46N:09º29E) Fr., s.d. (K!); *Preuss 460*, Barombi (04º40N.09º23E) sterile, 1890 (FI!); *Richards 5209*, Kembong Forest Reserve, SW Province (05º38N:09º14E) sterile, March 16, 1955 (K!); *Rosevear 30138*, Kumba (04º38N:09º26E) sterile, October 29, 1937 (FHO!); *Sunderland 2304*, Korup National Park, Chimpanzee Camp (05º02N:08º48E) sterile, February 15, 2000 (K!); *Sunderland 1640*, Mokoko River Forest Reserve (04º29N:09º00E) sterile, May 1, 1994 (K!, SCA!); *Sunderland 1701*, Southern Bakundu Forest Reserve (04º46N:09º29E) sterile, November 8, 1995 (K!, SCA!, NY!); *Sunderland 1712*, Onge River valley (04º21N:08º57E) sterile, November 23, 1995 (K!, SCA!, MO!); *Sunderland 1719*, 30km north of Mamfe (05º58N:09º20E) sterile, December 2, 1995 (K!, SCA!, BH!) *Sunderland 1927*, Campo Ma'an Faunal Reserve (02º10N:09º54E) sterile, October 11, 1998 (K!, YA!); *Sylvanus* s.n., Obonyi I (06º08N:09º16E) sterile, November 11, 1998 (K!); *Thomas 9733*, Idenau (04º16N:09º01E) sterile, September 10, 1993 (K!, SCA!); *Thomas* s.n., Korup National Park, (04º55N:08º50E) sterile, s.d. (SCA!); *Webb & Bullock 310*, Campo Faunal Reserve (02º24N:09º54E) sterile, July 9, 1976 (K!, YA!); CENTRAL AFRICAN REPUBLIC: *Harris 2360*, 45km S of Lidjombo (02º21N:16º09E) Fl., May 21, 1990 (MO!); EQUATORIAL GUINEA: *Sunderland 1798*, 2km north of Ayemeken village (02º10N:10º03E) sterile, March 13, 1997 (K!, EG!, WAG!); *Sunderland 1876*, 2km SW of village of Angoma (02º03N:10º10E) sterile, September 15, 1997 (K!, EG!, NY!, MO!, WAG!, BR!); GABON: *Breteler* et al. *11194*, 30km E of Latoursville (00º40S:13º00E) Fr., April 30, 1992 (WAG!); *de Wilde* et al. *9301*, 22km from Mayumba (03º16S:10º46E) Fr., December 11, 1986 (MO!, WAG!, BR!); *Gentry & Emmons 33732*, M'Passa field stn. Makokou (00º33N:12º50E) sterile, July 31, 1981 (MO!); *Klaine* s.n., Ogoué River (00º59S:09º03E) sterile, s.d. (K! BR!); ANGOLA: *Gossweiler 7567*, Mayombe, Luali (05º00S:12º25E) sterile, June 1920 (K!); *Gossweiler 8145*, Mayombe, Luali (05º00S:12º25E) sterile, 1920 (K!)

7. Eremospatha barendii Sunderland (2002: 361), Govaerts and Dransfield (2005: 108), Sunderland (2007: 22). Type:—CAMEROON, Ebom, near Lolodorf (03°44'N:10°43'E) 11 March, 1997, *van Gemerden 77* [infructescence] (holotype K!; isotypes YA!, KRI!)

Clustered palm climbing to 25–30 m. Stems circular in cross section, without leaf sheaths, ca.15 mm in diameter, with, to 25 mm; internodes 10–15 cm long. Leaf sheath longitudinally striate, sparsely to moderately covered with dark brown caducous indumentum; ocrea obliquely truncate, dry, grey-brown, often splitting in conspicuous v-shape on abaxial side, extending to 2 cm; knee linear, 3–3.5 cm long, somewhat abrupt at base. Leaf up to 2.4m long; rachis 1–1.2m long, abaxially rounded, adaxially flattened or convex, becoming trapezoid then triangular in cross-section distally, armed along the margins with inequidistant black-tipped, bulbous-based spines, sparse brown indumentum present on underside of rachis, absent distally;

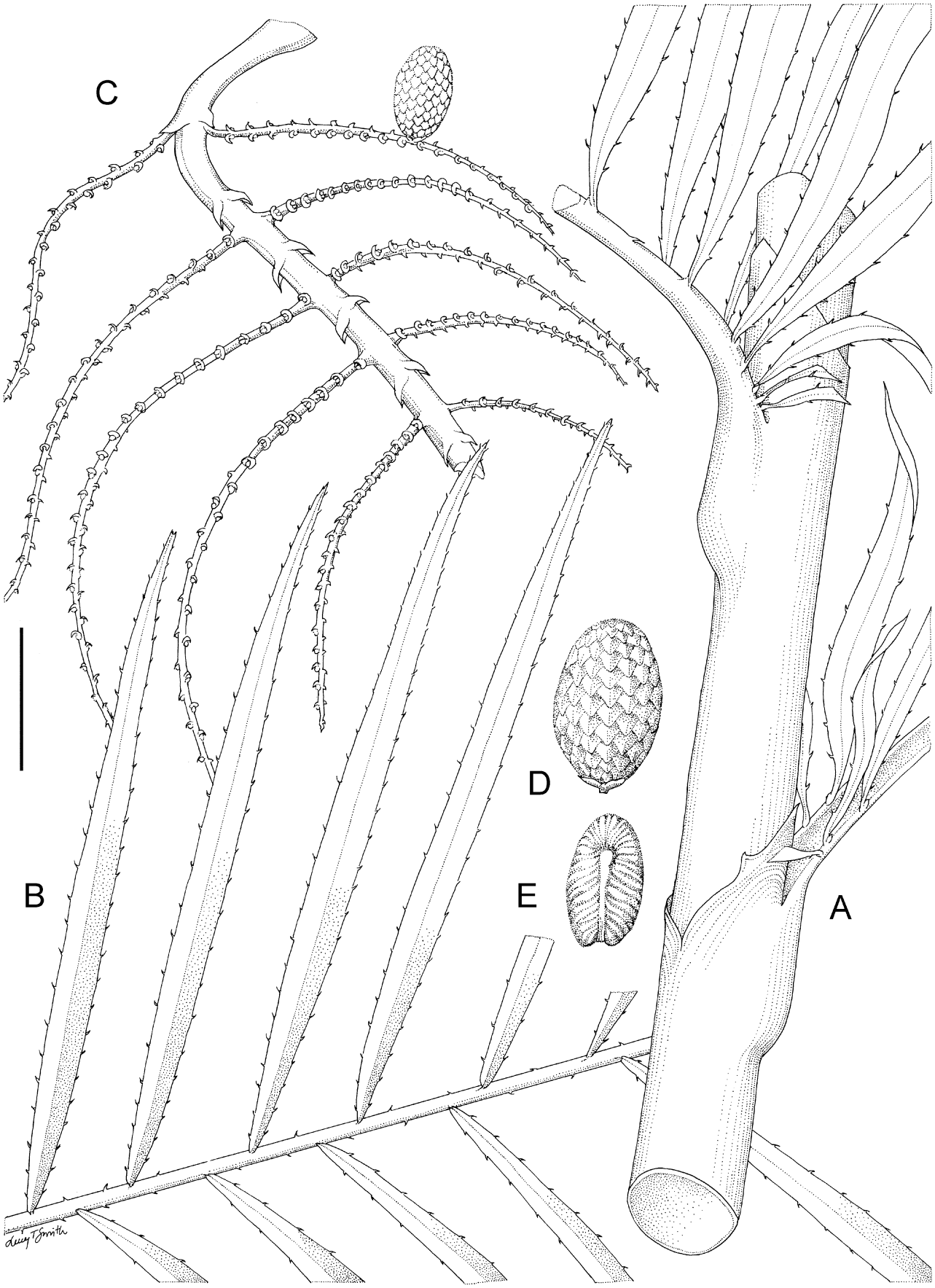
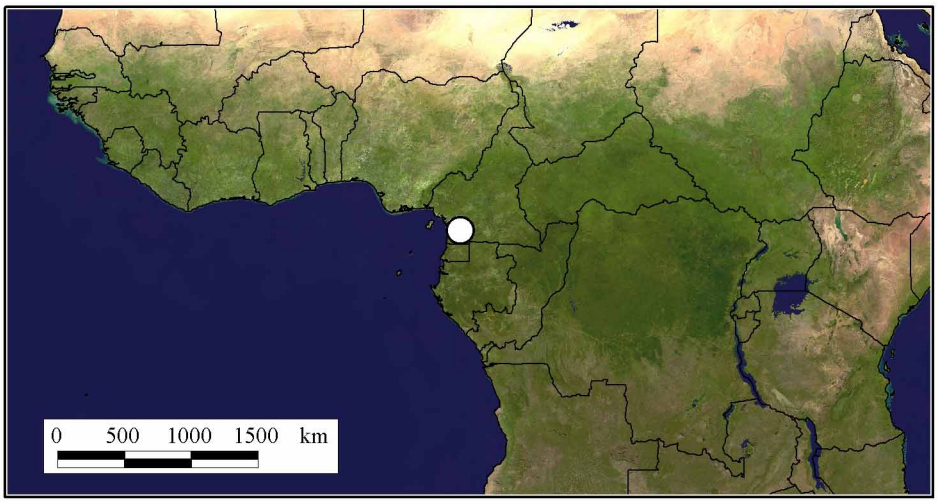


FIGURE 8 . *Eremospatha barendii*

A. Mature stem. B. Leaflets. C. Infructescence. D. Fruit. E. Seed. Scale bar: A = 3.5cm. B = 8 cm. C = 5 cm. D–E = 2.5 cm. All from *van Gemerden 77*. Drawn by Lucy T. Smith.

cirrus up to 1.2 m long, unarmed; leaflets, opposite or sub-opposite, up to 26 on each side of the rachis, linear-lanceolate, broadly contracted at the base, apex narrowly praemorse, 25–32 cm long × 1.5–2 cm broad at the widest point, concolorous, armed along the margins with inequidistant, black-tipped spines, with 5–7 moderately conspicuous transverse veinlets 1–2 mm apart; lowermost leaflets smaller than the rest, linear-ovate, erect or reflexed and laxly swept across stem; acanthophylls 2.4–2.8 cm long. Inflorescence, very lightly papillose up to 30 cm long; peduncle 8–10 cm long; rachis 17–20 cm long, arching, sometimes straight, rachis bracts, finely to broadly acuminate, united at base to form a conspicuous sheathing bract, 3–5 mm long, decreasing distally; rachillae distichous, ca.10 on each side, 10–14 cm long, decreasing distally, adnate for 5–8 mm of the inflorescence axis, arching, rarely straight, with 1–3 mm circular bracts subtending each dyad. Flowers not known. Fruit at maturity, 1–seeded, 2.3–2.8 cm long × 1.5–1.7 cm broad, broadly cylindrical, with 16 vertical rows of scales. Seed compressed, 2 cm long × 1.2 cm wide × 0.7 cm thick, flattened on one side, embryo lateral, raised opposite flattened side.

Distribution:—*Eremospatha barendii* is known only from two locations near Lolodorf, Cameroon.



MAP 8. Distribution of *Eremospatha barendii*

Habitat and ecology:—This is a very poorly-known species but is thought to occur in gaps in high forest.

Notes:—*E. barendii* is an unusual species characterised by the presence of conspicuous bracts on the inflorescence. The dry, splitting ocrea is also an unusual character in this genus, shared only by the very distinct *E. wendlandiana.*

Etymology:—Named after Barend van Gemerden (1967–), Dutch forester who collected the type specimen.

Conservation status:—Data deficient (DD), as there is inadequate available information to make a formal assessment.

Additional specimens examined:—CAMEROON: *van Gemerden 77*, Ebom (03º04N:10º43E) Fr., March 11, 1997 (K!): Couvrier 409, Melenge River (03º04N:10º43E), February 20, 2012.

8. Eremospatha cuspidata (G.Mann & H.Wendl.) Wendland in Kerchove (1878: 244), Wright (1902: 122), Durand & Durand (1909: 585), Beccari (1910: 275), Pyneart (1911: 547), Hédin (1929: 504), Guinea-Lopez (1946: 245), Letouzey (1978: 314), Tuley (1995: 51), Sunderland (2001: 88), Cheek *et al*. (2004: 471), Govaerts and Dransfield (2005: 108), Sunderland (2007: 30). *Calamus cuspidatus* Mann & Wendland (1864: 434). Type:—GABON, Ogooué River, *Mann 1043* (holotype K!).

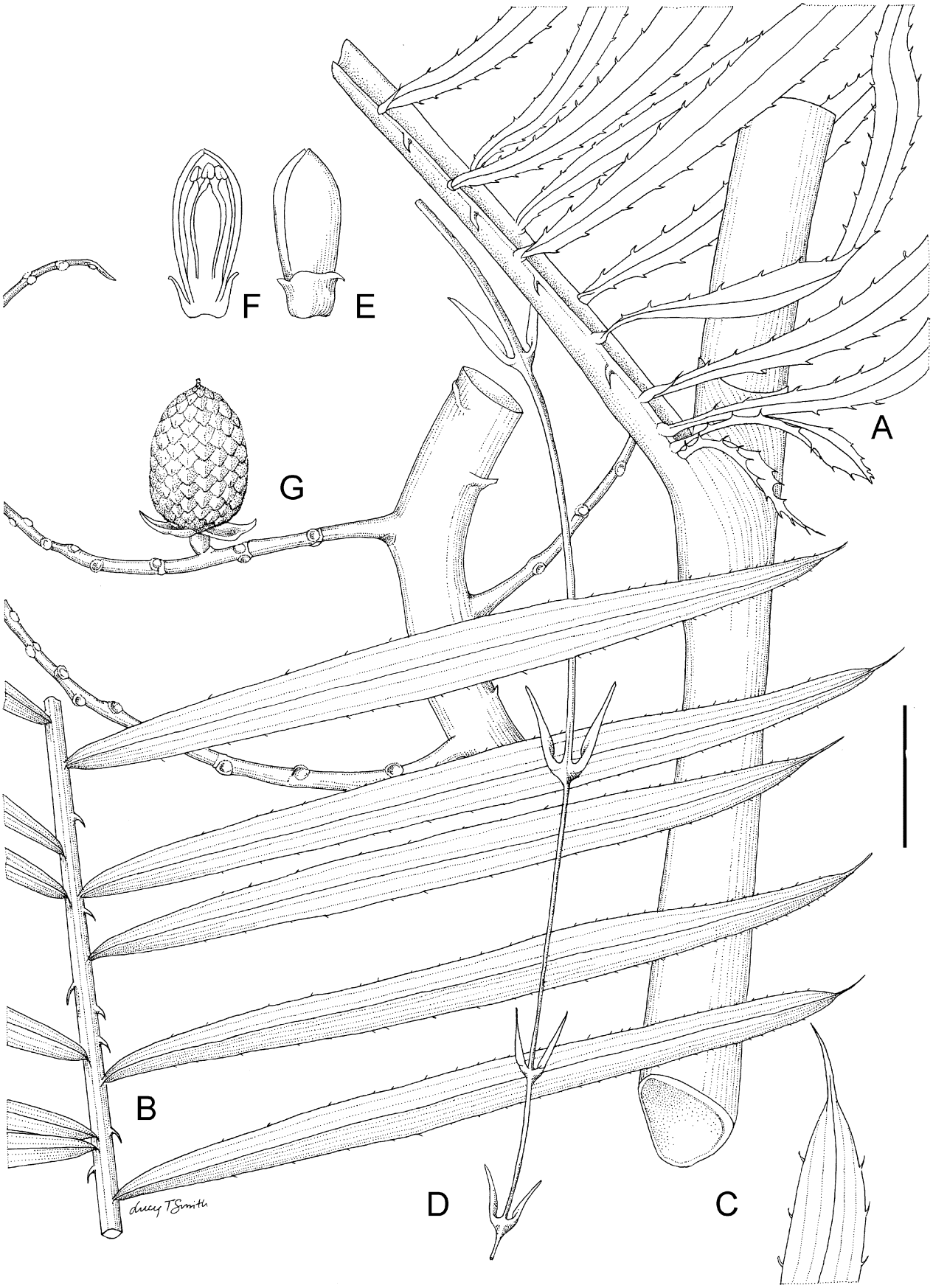
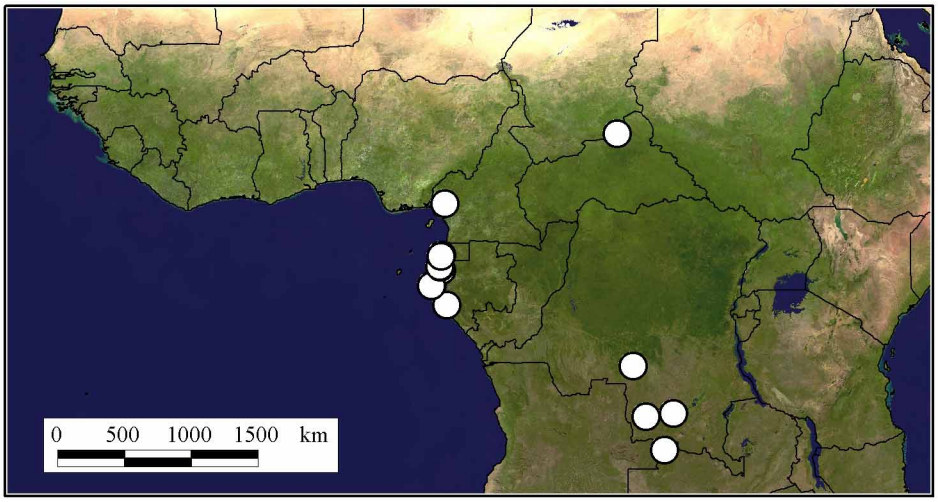


FIGURE 9 . *Eremospatha cuspidata*
A. Mature stem. B. Leaflets. C. Leaflet apex. D. Acanthophylls. E. Flower. F. Flower section. G. Fruit and infructescence. Scale bar: A = 2.5 cm. B = 5 cm. C = 3 cm. D = 2.5 cm. E–F = 1 cm. G = 2 cm. A–C and G from *Sunderland 1909*. D from *Sunderland 1792*. E–F from *Sunderland 1922*. Drawn by Lucy T. Smith.

Clustered slender palm climbing to 12–15m. Stems circular in cross–section, without sheaths, 10–15 mm in diameter, with 16–25 mm; internodes 11–15 cm long. Leaf sheath longitudinally striate sparsely covered with brown-black indumentum; ocrea obliquely truncate, extending ca.1 cm above the rachis; knee absent. Leaves sessile, up to 2 m long; rachis 1–1.3 m long, flattened on upper surface, rounded below, becoming trapezoid then rounded in cross section distally, armed along the margins with inequidistant, reflexed, bulbous-based spines, becoming sparsely armed distally, indumentum absent; cirrus 50–75 cm long, unarmed; leaflets up to 15–20 on each side of the rachis, linear-lanceolate, abruptly contracted at the base, with a fine 0.8–1.2 cm long (rarely 3 cm long) apiculum at the apex, 22–30 cm long × 1.6–2 (rarely 3 cm) broad at the widest point, discolorous, adaxially mid-green, abaxially light green, armed along the margins with inequidistant abrupt black-tipped spines, 5–7 moderately conspicuous transverse veinlets 2–3 mm apart; lowermost leaflets smaller than the rest, linear-ovate, reflexed and laxly swept back across stem; acanthophylls in pairs ca.3 cm long, at 45° angle to cirrus. Inflorescence glabrous, 30–38 cm long, rarely <20 cm, peduncle 10–18 cm long; rachis 20–30 cm, rarely <20 cm, erect or horizontal; rachillae distichous, 10–12 on each side, 5–10–12 cm long, decreasing distally; rachis bracts acuminate <3 mm long, decreasing distally, adnate to the inflorescence axis for 1–1.2 cm; flower cluster subtended by <1 mm–long incomplete bracts. Flowers borne in close pairs, very sweetly scented at anthesis; calyx 4–5 mm × 6 mm wide at the mouth, only very shallowly lobed (<1 mm); corolla 0.7–1 cm × 0.4–0.5 mm, divided to ¼ of its length; stamens united into 4–6 mm long epipetalous ring; free filaments <0.5 mm; anthers <1 mm; ovary 3–4 mm × 2.2.5 mm tipped by ca.2.5 mm long style. Fruit at maturity 1–seeded, ± cylindrical, 2–2.4 cm × 1.6–2 cm with 18–21 rows of vertical scales. Seed compressed, 1.6–2 cm long × 0.8–1 cm wide × 0.6–0.8 cm deep, flattened on one side with a shallow linear depression, embryo lateral, raised, opposite the flattened side.

Distribution:—This species is relatively uncommon and is restricted to the forest areas of the Congo Basin.



MAP 9. Distribution of *Eremospatha cuspidata*

Habitat and ecology:—*Eremospatha cuspidata* is highly unusual amongst the rattans of African in that it is commonly found in the deep white sand savannah areas or "praderas", characteristic of the coastal forests of the Congo Basin where it forms dense, scrambling thickets. However, in some areas, *E. cuspidata* has also been encountered in gap vegetation in forest.

Etymology:—(Latin) refers to finely apiculate leaflet apex.

Conservation status:—Least concern (LC).

Additional specimens examined:—CAMEROON: *Bruneau 1074*, Mt Kupe, SW Province (04º48N:09º42E) sterile, October 26, 1995 (K!); *Mildbraed 9546*, Buea-Douala, sterile, June 5, 1914 (K!);

CENTRAL AFRICAN REPUBLIC: *Fay 4021*, Manovo–St Floris National Park (09º29N:21º17E) sterile, December 30, 1982 (K!); EQUATORIAL GUINEA: *Eneme & Lejoly 113*, Ndote Reserve (01º20N: 09º28E) Fl., August 19, 1987 (EG!); *Sunderland 1792*, near village of Etembue (01º16N:09º26E) Fr., March 13, 1997 (K!, EG!, BH!); *Sunderland 1909*, near village of Etembue (01º16N:09º26E) Fr., March 28, 1998 (K!, EG!, WAG!); *Sunderland 1922*, near village of Etembue (01º16N:09º26E) Fl., April 8, 1998 (K!, EG!, WAG!); GABON: *Breteler & van Raalte 5557*, SE of Port Gentil (00º40S:08º50E) Fl., November 16, 1968 (MO!); *Dybowski* 140, Fl. (FI!); *Mann 1043*, Gaboon River (00º19N:09º29E) Fl. & Fr., July 1861 (K!); *Reitsma 2889*, 20km N of Libreville (00º35N:09º22E) Fr., January 29, 1987 (WAG!, LBR!); DEMOCRATIC REPUBLIC OF CONGO: *Desenfous 2023*, Kaniama, Haut Lomami (06º05S:22º20E) Fl., September 1951 (BR!); *Malaisse 14159*, Mushindi River (09º30S:23º13E) sterile, February 19, 1987 (BR!); *Schmitz 5617*, 66km from Kinda (09º17S:25º03E) Fr., September 20, 1957 (BR!); ANGOLA: *Milne-Redhead 4219*, River Monu, sterile, 1937 (K!); ZAMBIA: *Loverage 931*, Mwinilunga District (11º44S:24º26E) sterile, June 12, 1963 (K!); *Mutimushi 3372*, Mwinilunga District (11º44S:24º26E) sterile, May 19, 1969 (K!)

9. Eremospatha tessmanniana Beccari (1910: 278), Guinea-Lopez (1946: 245), Letouzey (1978: 314), Aedo *et al*. (1999: 375), Sunderland (2001: 86), Govaerts and Dransfield (2005: 109), Sunderland (2007: 28). Type:—EQUATORIAL GUINEA, *Tessmann* 4 (holotype B†; isotype FI!).

Clustered slender palm climbing up to 150 m, more commonly to 60–80 m. Stems, often branching, circular in cross-section, without sheaths 10–12 mm in diameter, with 12–15 mm in diameter; internodes 15–20 cm long. Leaf sheath longitudinally striate, with black caducous indumentum; ocrea entire, horizontally truncate, extending to 1.5 cm; knee absent. Juvenile stems with sheath, 0.6 cm in diameter; petiole angular, 15–17 cm long armed along the margins with reflexed, bulbous-based, black tipped spines; leaves bifid, 20 cm × 24 cm, deeply notched, with somewhat rounded lobes; elaminate rachis present on lower section of stems, up to 80 cm long. Leaves on mature stems sessile, or very nearly so (petiole <1.5 cm), rachis up to 80 cm long, somewhat flattened proximally, becoming triangular in cross-section distally, armed along the margins with reflexed, bulbous–based, black tipped spines, with black caducous indumentum below; cirrus up to 40–60 cm long, armed as the rachis, indumentum absent; leaflets, up to 5–8 on each side, inequidistant, opposite to sub-opposite, linear-elongate to lanceolate, broadly attenuate at the base moderately rounded praemorse at apex, 14–18 cm long × 2.2.5 cm broad at the widest point, concolorous, somewhat rigid, coriaceous, armed along the margins with inequidistant robust black-tipped spines, reflexed and reverse-facing at base, forward-facing at apex, 5 to 7–costulate; lowermost leaflets smaller than the rest, lax, not reflexed; acanthophylls 2–2.5 cm long, slender, ± parallel. Flowers and fruits unknown.

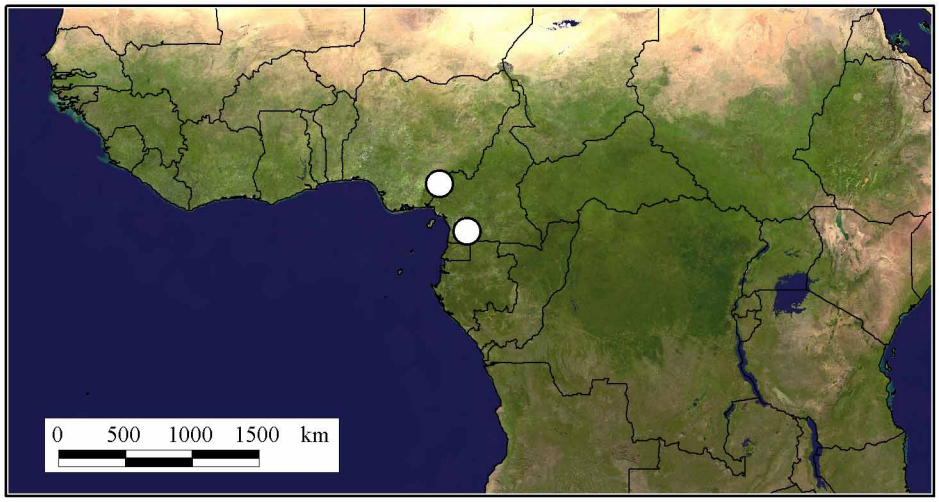
Distribution:—*Eremospatha tessmanniana* is a relatively uncommon species of rattan and is known from only three localities; the Takamanda region of the Cameroon/Nigeria border and cross border region of Cameroon and the Rio Muni territory of Equatorial Guinea. Further collections might link this disjunction.

Habitat and ecology:—*Eremospatha tessmanniana* is a forest species found on well-drained soils in closed-canopy forest.

Etymology:—Named after Günther Tessmann (born? – 1926), German botanist and anthropologist.

Conservation status:—Vulnerable (VU) due to restricted range and localised distribution.

Additional specimens examined:—CAMEROON: *Mildbraed 5285*, sterile, May 20, 1911 (HBG!); *Mildbraed 5879*, Ebolowa (02º55N:11º08E) sterile, s.d. (HBG!); *Sunderland 2021*, Takamanda Forest Reserve (06º08N:09º16E) sterile, January 11, 1999 (K!, SCA!); *Sunderland 2017*, Takamanda Forest Reserve (06º08N:09º16E) sterile, January 17, 1999 K!, SCA!; Type:—EQUATORIAL GUINEA: *Tessmann 4*, sterile, s.d. (FI!)



MAP 10. Distribution of *Eremospatha tessmanniana*.

10. Eremospatha macrocarpa (G.Mann & H.Wendl.) Wendland (1878: 244), Wright (1902: 113), Beccari (1910: 272), Unwin (1920: 240), Hédin (1929: 504), Hutchinson (1936: 391), Dalziel (1937: 507), Burret (1939: 204), Guinea-Lopez (1946: 245), Fosberg (1960: 129) Irvine (1961: 780), Russell (1968: 168), Letouzey (1978: 314), Hall & Swaine (1981: 195), Profizi (1986: 2), Hawthorn (1990: 255), Morakinyo (1995: 202), Tuley (1995: 45), Burkill (1997: 370), Cable & Cheek (1998: 179), Aedo *et al*. (1999: 375), Cheek *et al*. (2000: 191), Sunderland (2001: 74), Cheek *et al*. (2004: 471), Govaerts and Dransfield (2005: 108), Sunderland *et al*. (2005: 150), Pan *et al*. (2006: 77), Sunderland (2007: 24), Dransfield *et al*. (2008: 151). *Calamus macrocarpus* Mann & Wendland (1864: 435). Type:—SIERRA LEONE, Bagroo River, *Mann 2330* (holotype K!).

Eremospatha sapini De Wildeman (1916: 147); De Wildeman (1919: 23); Renier (1948: 82); Type:—DEMOCRATIC REPUBLIC OF CONGO, Thibangu, *Sapin* s.n. (holotype BR!).

Clustered slender to moderate palm climbing to 50–75 m, rarely to 150 m. Stems circular in cross-section, without sheaths, 10–18 mm in diameter, with 22–30 mm; internodes 13–16 cm long. Leaf sheath longitudinally striate, sparsely to moderately covered with light brown scale-like indumentum; ocrea entire, ± truncate saddle-shaped with a 2.5–4.0 cm rounded lobe adaxial to the leaf; knee absent. Juvenile stems up to 20m long; stem with sheath, <1.5 cm in diameter; ocrea with distinct linear wrinkle on adaxial side; petiole <1 cm long; leaves bifid, up to 40 cm × 50 cm, deeply notched, lobes sharply triangular; cirrus up to 80 cm long, emerging from the centre; elaminate rachis often present on juvenile stems, 50–75 cm long. Leaves on mature stems sessile, up to 3.5 m long; rachis 1–1.5 m long, abaxially rounded, adaxially flattened, becoming trapezoid then rounded in cross-section distally, armed along the margins with inequidistant, reflexed thorns, becoming sparsely armed distally, underside of rachis with sparse light brown indumentum; cirrus 1.2–2 m long, unarmed; leaflets, up to 25 pairs on each side of the rachis, linear–lanceolate, abruptly contracted at the base, irregularly and narrowly praemorse at apex, 22–35 cm long × 2–2.5 cm broad at the widest point, concolorous, with 5–7 inconspicuous transverse veinlets 1–2 mm apart, armed along the margins with inequidistant, curved, forward-facing brown-tan spines; lowermost leaflets, smaller than the rest, linear–ovate, reflexed and laxly clasping the stem; acanthophylls ca.3 cm long, parallel to cirrus. Inflorescence glabrous, up to 55 cm long; peduncle 10–15 cm long; rachis 25–40 cm long, arching outwards, rarely straight; rachis bracts, acuminate, opposite proximally, alternate distally, 1–3 mm long, decreasing distally; rachillae distichous, arching vertically, sometimes horizontal, straight, 10–14 on each side, 12–18 cm long, decreasing distally, adnate to the inflorescence axis for 0.5–1.5 mm, with <1 mm-long triangular incomplete bracts subtending each dyad. Flowers borne in close pairs; calyx 3 mm long × 6 mm wide at the

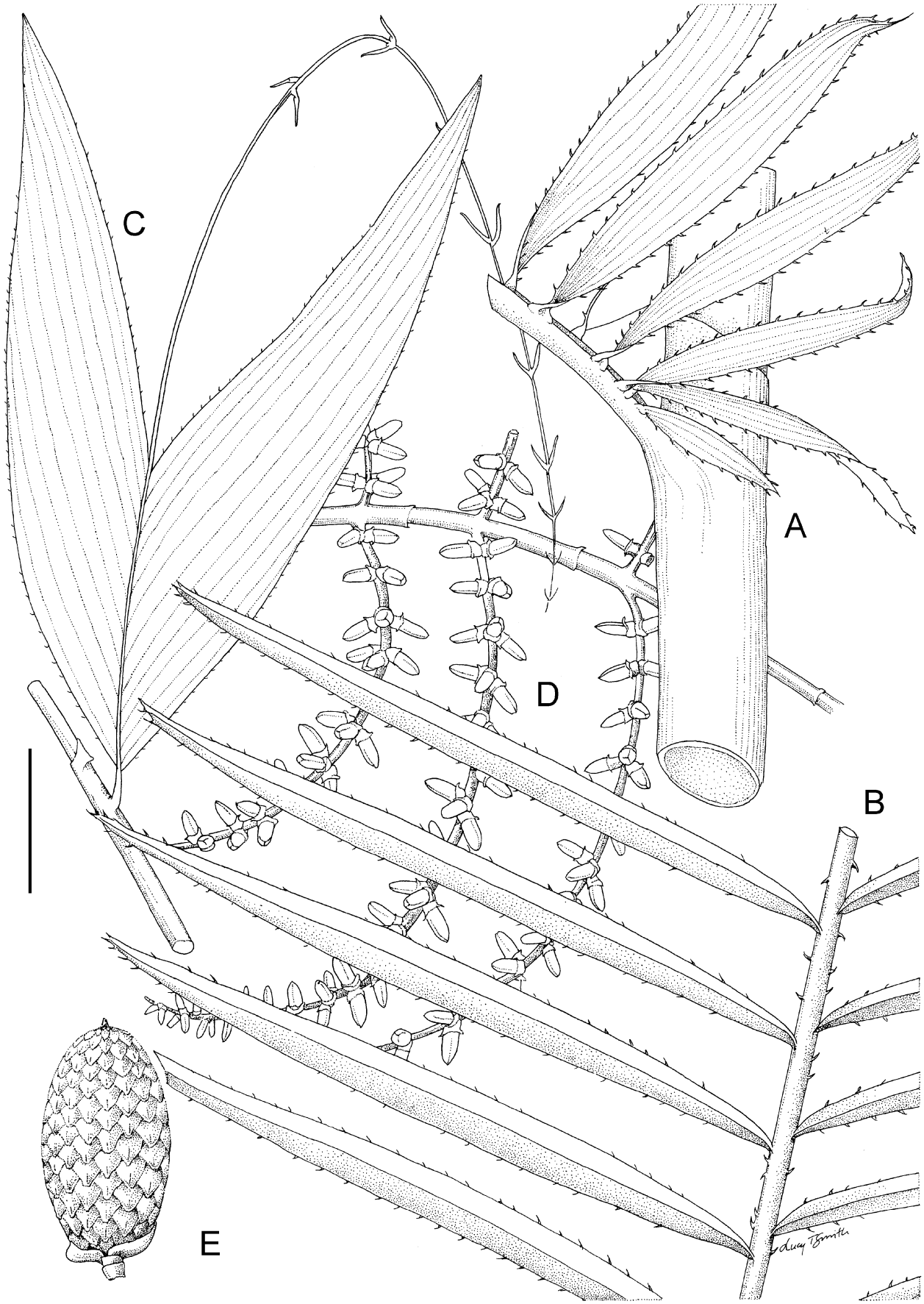
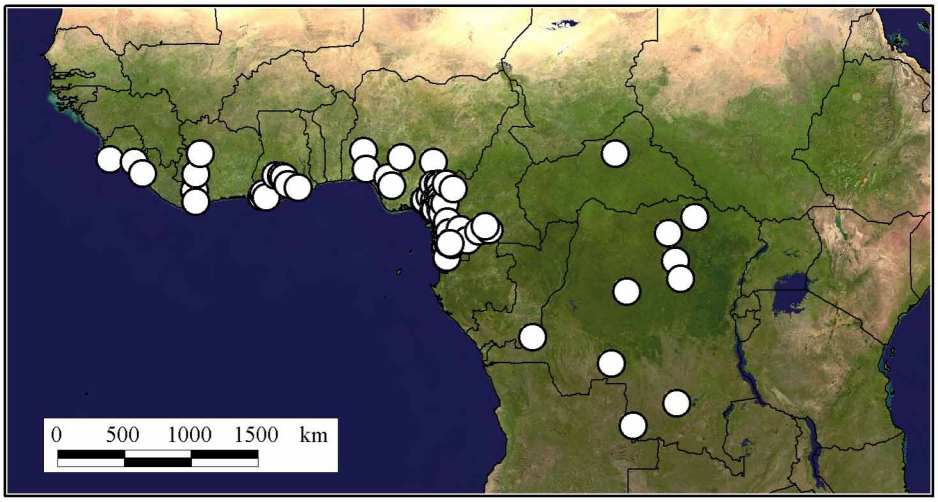


FIGURE 10. *Eremospatha macrocarpa*
A. Mature stem. B. Leaflets. C. Juvenile leaf. D. Infloresence. E. Fruit. Scale bar: A = 3 cm. B–D = 5 cm. E = 2.5 cm. A–B from *Sunderland 1886*. C from *Sunderland 1901*. D from *Sunderland 1886*. E from *Sunderland 1956*. Drawn by Lucy T. Smith.

mouth, with 3 distinct, rounded, lobes; corolla 10 mm long × 4 mm wide, divided to ¼ of its length; stamens united into 5 mm–long epipetalous ring; free filaments <0.5 mm; anthers <1 mm long; ovary 4 mm × 2.5 mm tipped with ca.2 mm–long style. Fruit at maturity 1–seeded, rarely 2–seeded, ± cylindrical, 2.2–2.6 cm long × 1–1.5 cm wide, with 17–24 rows of vertical scales. Seed compressed, 1.8–2 cm long × 1.4–1.8 cm wide × 1 cm thick, flattened on one side or with a shallow depression, embryo lateral, raised, opposite the flattened side.

Distribution:—*Eremospatha macrocarpa* is a very widespread and common species and is distributed from Senegal in West Africa through to the lowland forests of the Congo Basin.



MAP 11. Distribution of *Eremospatha macrocarpa.*

Habitat and ecology:—This species is extremely light demanding, occurring naturally in gap vegetation and forest margins. As a result of this, in common with other members of the genus, *E. macrocarpa* responds extremely well to selective logging activities and is a common component of regrowth vegetation.

Etymology:—The specific name refers to the comparatively large-fruits (Latin).

Conservation status:—Least concern (LC).

Additional specimens examined:—SIERRA LEONE: *Deighton 4118*, Giewahun (07º36N:11º11W) Fr., March 10, 1945 (K!); *Mann* s.n., Bagroo River (07º45N:12º50W) Fr., 1861 (K!); Liberia: *Linder 1341*, Moala, sterile, November 1, 1926 (K!, MO!); IVORY COAST: *Boughey* s.n., Taï Forest (05º38N:07º08W) juvenile, May 5, 1954 (GC!); *Jangoux 215*, Tien-Oula (06º45N:07º04W) juvenile, August 3, 1962 (BR!); *Oldeman 674*, 40km N of Bereby (04º54N:07º02W) Fr. only, November 14, 1963 (WAG!); GHANA: *Adams 2195*, Enchi (05º29N:02º29W) sterile, December 30, 1953 (GC!); *Adams 2214*, Enchi (05º29N:02º29W) sterile, December 30, 1953 (GC!); *Enti 1914*, Ankasa Forest Reserve (05º15N:02º36W) Fl., January 30, 1979 (MO!, WAG!); *Hall 42605*, Ankasa Forest Reserve (05º15N:02º36W) Fl., February 14, 1971 (MO!); *Hall* s.n., Ankasa Forest Reserve (05º15N:02º36W) Fl., February 12, 1971 (GC!); *Irvine 4861*, Kade Agricultural Research Station (06º05N:00º50W) sterile, June 1961 (K!); *Irvine 4873*, Kade Agricultural Research Station (06º05N:00º50W) sterile, June 1961 (K!); *Irvine 4886*, Kade Agricultural Research Station (06º05N:00º50W) sterile, June 1961 (K!); *Johnson* s.n., Aburi (05º51N:00º10W) Fr., February 25, 1901 (K!); *Kisseadoo 441*, Bobiri F.R. (06º38N:01º17W) sterile, November 10, 1988 (MO!); *Moore & Enti 9887*, Ankasa Forest Reserve (05º15N:02º36W) sterile, March 4, 1971 (GC!); *Moore & Enti 9891*, Ankasa Forest Reserve (05º15N:02º36W) Fl., March 4, 1971 (GC!); *Moore & Enti 9893*, Ankasa Forest Reserve (05º15N:02º36W) Fl., March 4, 1971 (GC!); *Sunderland 2260*, Draw River Forest Reserve (05º12N:02º20W) sterile, May 26, 1999 (K!, KUM!); *Sunderland 2264*, Draw River Forest Reserve (05º12N:02º20W) sterile, May 26, 1999 (K!, KUM!); *Tomlinson* s.n., Bobiri F.R. (06º38N:01º17W) sterile, December 20, 1957 (GC!); *Vigne 1829*, Juasso

(06º32N:01º06W) Fl., February 28, 1938 (K!, KUM!); *Vigne 4858*, Kumasi District (06º40N:01º39W) Fl., May 30, 1945 (K!, KUM!, BR!); *West-Skinn 11*, Juasso (06º32N:01º06W) juvenile, 1957 (K!); BENIN: *Aufsess 425*, Adjarra (06º32N:05º52E) sterile, December 6, 1988 (K!); *Aufsess 426*, Adjarra (06º32N:05º52E) sterile, December 6, 1988 (K!); *Aufsess 429*, Adjarra (06º32N:05º52E) sterile, December 6, 1988 (K!); NIGERIA: *Daramola & Adebusuyi 38415*, Kabba Province, Kotokerifi (08º08N:06º44N) Fr., October 24, 1958 (K!); *Jones & Onochie 17237*, Oma & Shasha F.R.'s (07º07N:04º23E) Fr., April 4, 1946 (K!, BR!); *Letter 8224*, Ikan, sterile, 1904 (K!); *Lowe 2793*, 40 miles SE of Benin City (05º59N:06º07E) juvenile, March 28, 1974 (K!); *Maggs 159*, Kwa Falls near Calabar (04º59N:08º20E) juvenile, August 26, 1948 (K!); *Mann 2330*, Cross River (05º15N:08º42E) Fl., February 1863 (K!); *Morakinyo 1003*, Cross River National Park (05º15N:08º42E) seedling, August 15, 1993 (K!); *Morakinyo 1004*, Cross River National Park (05º15N:08º42E) Fr., August 18, 1993 (K!); *Niger Company* s.n., Oban rubber estate Calabar (05º02N:08º21E) sterile, December 15, 1991 (K!); *Nwambin & Tuley 603*, Ojo road (08º19N:04º14E) juvenile, May 4, 1964 (K!); *Onochie & Jones* FHI 17332, Afi River Forest.Reserve, Fr., May 28, 1946 (FHO!); *Thomas 338*, Agola District, sterile, 1911 (K!); *Tuley 1076*, Ikom to Obudu road (06º04N:08º56E) sterile, December 10, 1964 (K!); *Tuley 1077*, Ikom to Obudu road (06º04N:08º56E) seedling, August 24, 1976 (K!); *Tuley 650*, Aban Rubber Estate (07º36N:08º56E) Fr., July 12, 1964 (K!, WAG!); *Unwin 109*, southern Nigeria, Fr., July 28, 1907 (K!); CAMEROON: *Asonganyi 729*, Tissongo, 16km EES of Mouanko (03º24N:09º50E) Fl., January 20, 1984 (YA!); *Brunt 137*, Ndop Plain (05º47N:10º15E) seedling, March 5, 1962 (YA!); *Brunt 207*, Ndop Plain (05º47N:10º15E) sterile, March 21, 1962 (K!); *Dransfield 7005*, Mile 45, Buea-Kumba road (05º02N:09º24E) sterile, June 28, 1991 (K!, SCA!); *Dransfield 7002*, Mungo River Crossing (04º08N:09º31E) juvenile, June 27, 1991 (K!); *Etuge 1393*, Mount Kupe (04º46N:09º41E) sterile, November 5, 1995 (SCA!); *Faden & Mbama 86/60*, Kribi-Ebolowa road (02º51N:10º00E) sterile, January 31, 1986 (YA!); *Harris 2456*, 34km W of Nguti (05º00N:09º00E) sterile, August 27, 1990 (K!); *Harris 2471*, 35km W`of Nguti (05º00N:09º00E) sterile, August 27, 1990 (K!); *Harris & Payne 2470*, 35km W`of Nguti (05º00N:09º00E) sterile, August 29, 1990 (K!); *Letouzey 8465*, 10km SE of Sangmelima (02º55N:11º58E) Fl. & Fr., November 24, 1966 (YA!); *Letouzey 12563*, Lac Tissongo (03º34N:09º53E) Fl. only, January 4, 1974 (YA!); *Letouzey 13843*, 10km N of Nguti (05º23N:09º23E) Fr., June 15, 1975 (YA!); *Meijer* 15221, Sangmelima (02º55N:11º58E) sterile, March 24, 1981 (K!, WAG!, YA!); *Meijer 15251*, Dja Forest Reserve (03º00N:12º40E) sterile, March 25, 1981 (K!); *Njingum 7*, Nguti (05º02N:09º24E) sterile, August 5, 1999 (K!); *Raynal 9785*, 17km SW Ambam (02º21N:11º12E) sterile, February 18, 1963 (YA!); *Sunderland 1702*, Southern Bakundu Forest Reserve (04º46N:09º29E) sterile, November 8, 1995 (K!, SCA!, MO!); *Sunderland 1704*, Southern Bakundu Forest Reserve (04º46N:09º29E) sterile, November 8, 1995 (K!, SCA!, NY!, WAG!); *Sunderland 1713*, Onge River valley (04º21N:08º57E) sterile, November 23, 1995 (K!, SCA!, BR!); *Sunderland 1717*, Kumba to Mamfe road (05º02N:09º24E) sterile, December 1, 1995 (K!, SCA!, BR!); *Sunderland 1720*, 30km north of Mamfe (05º58N:09º20E) juvenile, December 2, 1995 (K!, SCA!, MO!); *Sunderland 1721*, 30km north of Mamfe (05º58N:09º20E) Fl., December 2, 1995 (K!, SCA!, BR!); *Sunderland 1730*, Rumpi Hills Forest Reserve (04º54N:09º20E) seedling, May 19, 1996 (K!, SCA!, BH!); *Sunderland 1742*, Rumpi Hills Forest Reserve (04º54N:09º20E) sterile, May 19, 1996 (K!, SCA!, MO!); *Sunderland 1758*, Limbe-Kumbe road: Mile 40 (04º23N:09º26E) juvenile, November 11, 1996 (K!, SCA!, BR!); *Sunderland 1767*, Southern Bakundu Forest Reserve (04º46N:09º29E) juvenile, November 24, 1996 (K!, SCA!, BH!); *Sunderland 1802*, Campo Ma'an Faunal Reserve (02º10N:09º54E) Fl., March 24, 1997 (K!, YA!, NY!, WAG!); *Sunderland 1807*, Campo Ma'an Faunal Reserve (02º10N:09º54E) sterile, April 8, 1997 (K!, YA!, BH!, MO!); *Sunderland 1856*, 20km south of Kribi (02º34N:09º50E) Fr., August 30, 1997 (K!, YA!, NY!, WAG!); *Sunderland 1881*, Southern Bakundu Forest Reserve (04º46N:09º29E) Fl., November 26, 1997 (K!, SCA!, NY!, MO!); *Sunderland 1883*, Kumba to Mamfe road (05º02N:09º24E) juvenile, November 26, 1997 (K!, SCA!, WAG!); *Sunderland 1886*, 30km south of Kribi (02º48N:09º43E) Fl., November 28, 1997 (K!, YA!, NY!, BR!); *Sunderland 1937*, Takamanda Forest Reserve (06º06N:09º47E) sterile, November 17, 1998 (K!, SCA!); *Sunderland 1999*, 15km north of Nguti on Mamfe road (05º23N:09º23E) Fl., January 6, 1999 (K!, SCA!); *Sunderland 2042*, Takamanda Forest Reserve (06º08N:09º16E) sterile, January 13, 1999

(K!, SCA!); *Sunderland 2043*, Takamanda Forest Reserve (06º08N:09º16E) sterile, January 13, 1999 (K!, SCA!); *Sunderland 2057*, Takamanda Forest Reserve (06º08N:09º16E) sterile, January 18, 1999 (K!, SCA!); *Sunderland 2252*, Mokoko River Forest Reserve (04º29N:09º00E) sterile, February 16, 1999 (K!, SCA!); *Thomas 8182*, 15km W of Manyemen (05º10N:09º15E) sterile, August 29, 1988 (MO!); *Thomas 10058*, Mokoko River Forest Reserve (04º25N:09º02E) sterile, May 22, 1994 (SCA!); *van Gemerden* BL, Ebom II (03º04N:10º43E) sterile, March 11, 1997 (K!); CENTRAL AFRICAN REPUBLIC: *Fay 7018*, N'Dele-Pata road (08º08N:21º08E) Fr., May 30, 1985 (MO!); EQUATORIAL GUINEA: *Lisowski 1263*, Mbini (02º00N:09º45E) juvenile, September 1997 (EG!); *Sunderland 1797*, 2km north of Ayemeken (02º10N:10º03E) juvenile, March 13, 1997 (K!, EG!, NY!); *Sunderland 1800*, 1km north of Ayemeken (02º10N:10º03E) sterile, March 13, 1997 (K!, EG!, WAG!); *Sunderland 1874*, 2km SW of village of Angoma (02º03N:10º10E) seedling, September 15, 1997 (K!, EG!, BH!, MO!); *Sunderland 1901*, 10km south of Bata (01º45N:09º43E) sterile, March 20, 1998 (K!, EG!, WAG!); *Sunderland 1918*, 2km WSW of village of Basilé (01º10N:09º50E) juvenile, April 7, 1998 (K!, EG!, WAG!); DEMOCRATIC REPUBLIC OF CONGO: *Bequaert 7895*, Katala (08º35S:25.16E) Fr., June 28, 1915 (BR!); *Dewevre 639*, Fl., s.d. (BR!); *Dewulf 526*, River L'Uele (03º52N:26º28E) Fl., December 20, 1934 (BR!); *Holman-Bentley* s.n., Upper River Congo, sterile, March 23, 1889 (K!); *Hulstaert 864*, Bamanga (00º16S:25º32E) Fr., November 1, 1942 (BR!); *Hulstaert 1420*, Bokela (01º07S:21º55E) juvenile, s.d. (BR!); *Laurent* s.n., Basounda, sterile, January 10, 1904 (BR!); *Laurent* s.n., River Kivi, Fr., November 6, 1903 (BR!); *Liegeois 86*, 28km from Buta (02º47N:24º43E) sterile, July 1943 (BR!); *Louis 15489*, Bengamisa (00º57N:25º10E) juvenile, July 9, 1939 (BR!); *Pauwels 4543*, Kimpoko (04º11S:15º34E) sterile, July 4, 1964 (BR!); *Sapin* s.n., Kasai (10º07S:22º20E) sterile, s.d. (BR!); *Sapin* s.n., Tshibangu (05º56S:20º54E) Fr., January 1910 (BR!)

11. Eremospatha haullevilleana De Wildeman (1904: 96), De Wildeman (1905: 24), Durand & Durand (1909: 585), Beccari (1910: 285), Pyneart (1911: 547), De Wildeman (1919: 19), Staner & Boutique (1937: 14), Guinea-Lopez (1946: 245), Renier (1948: 82), Dransfield (1986: 35), Tuley (1995: 45), Sunderland (2001: 80), Govaerts and Dransfield (2005: 108), Sunderland (2007: 26). Type:—DEMOCRATIC REPUBLIC OF CONGO, Lubamba, *Gillet 2026* (Lectotype (here designated) BR!).

Clustered slender to moderate palm climbing to 25 m. Stems circular in cross-section, without leaf-sheaths 6–15 mm in diameter, with 10–25 mm; internodes ±15 cm long. Leaf-sheath longitudinally striate, bearing sparse black caducous indumentum; ocrea entire, obliquely truncate, extending to 3–4 cm; knee absent. Juvenile stems up to 15 m long, stem with sheath <1 cm in diameter; petiole up to 15 cm long; leaves bifid, up to 40 cm × 25 cm, deeply notched with rather rounded lobes; cirrus emerging from the centre, up to 60 cm long, armed with inequidistant, reflexed, bulbous-based black-tipped thorns. Leaves on mature stems sessile, or with very short petiole up to 1.2 cm long; rachis 60–80 cm long, abaxially rounded, adaxially concave, becoming trapezoid, then triangular in cross section distally, armed along the margins with inequidistant reflexed, bulbous-based, black-tipped spines, indumentum absent; cirrus up to 80 cm, armed as the rachis, although spines becoming increasingly inequidistant and sparse distally; leaflets 8–14 on each side of the rachis, sub-opposite to alternate, cuneate, spathulate or ovate with an uneven, moderately to strongly praemorse apex, broadly contracted at the base, 9–24 cm long × 2–6 cm broad at the widest point, concolorous, with ciliate-spiny margins, up to 10 sub-equal main veins, transverse veinlets 1–2 mm distant, moderately prominent; lowermost leaflets smaller than the rest, sometimes reflexed and laxly clasping the stem, or absent entirely; acanthophylls up to 2 cm long, very fine. Inflorescence glabrous, up to 35 cm long; peduncle to 10 cm long; rachis up to 20 cm long, sometimes arching, more commonly straight, erect; rachis bracts up to 2 mm long, broadly acuminate; rachillae distichous, opposite, becoming sub-opposite distally, 7–12 on each side, the lowermost ca..7 cm long, decreasing distally, adnate to the inflorescence for 8 mm, less so distally, arching vertically or straight. Flowers borne in close sub-distichous pairs with <1 mm long triangular bracts subtending each dyad; calyx 5 mm × 3 mm wide at the mouth, with 3 rounded to triangular

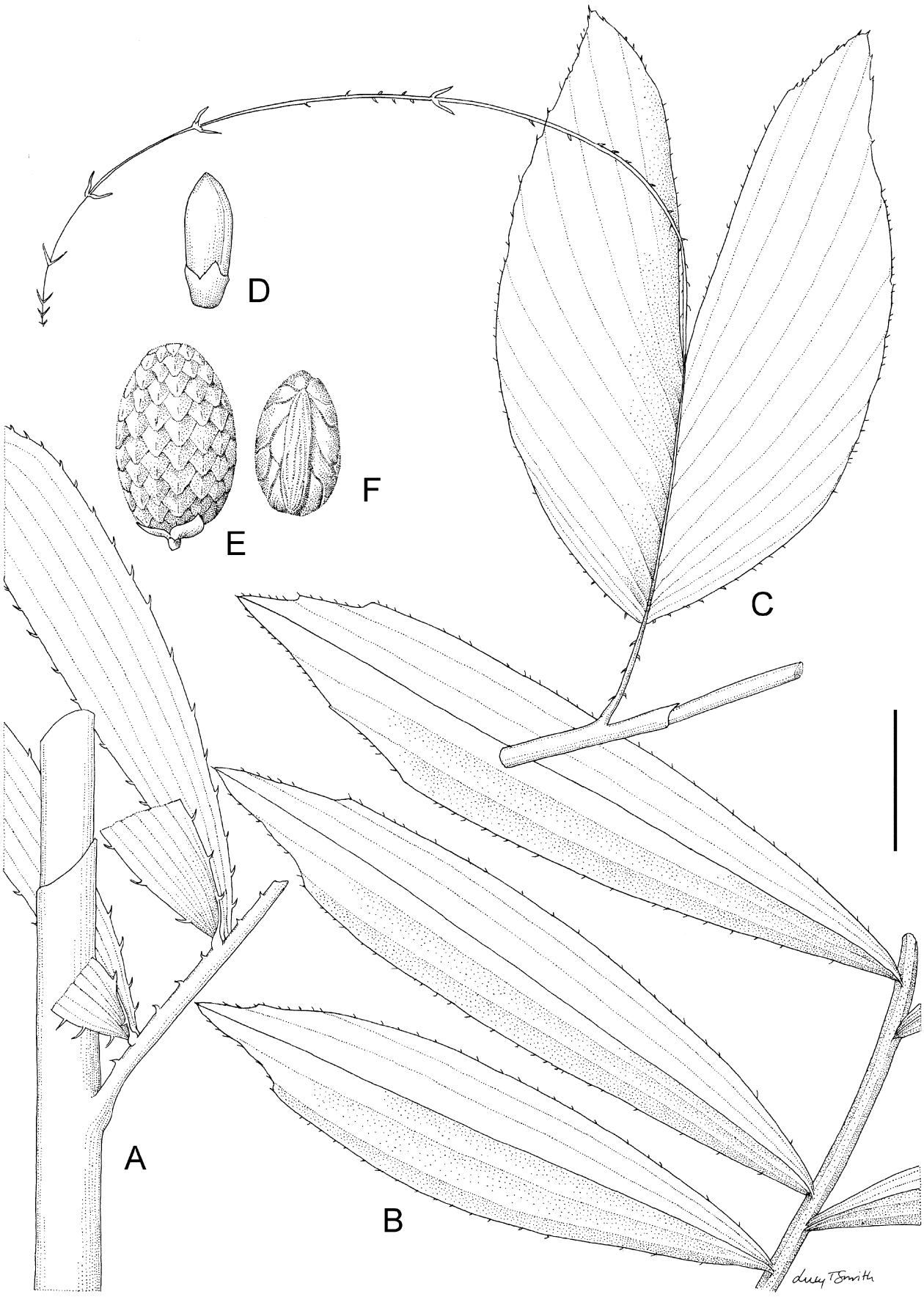
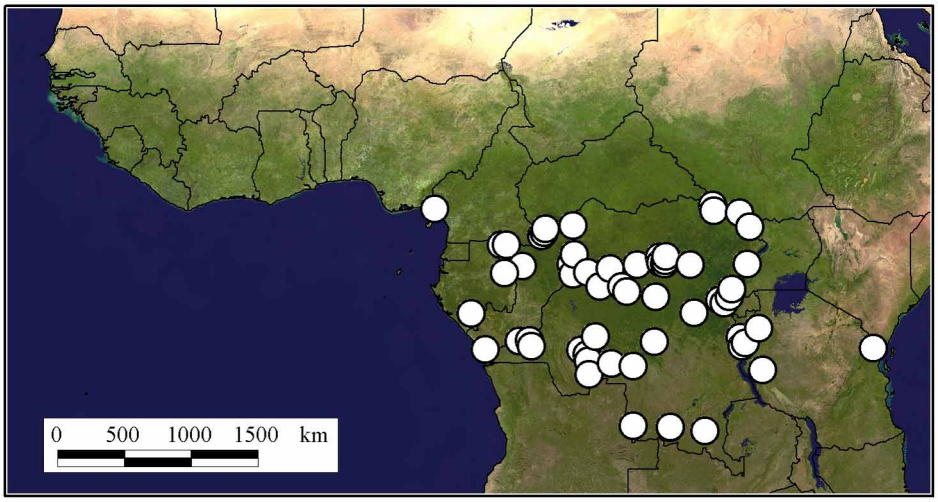


FIGURE 11 . *Eremospatha haullevilleana*

A. Mature stem. B. Leaflets. C. Juvenile leaf. D. Flower. E. Fruit. F. Seed. Scale bar: A = 1.5 cm. B–C = 5cm. D = 1cm. E–F = 2.5 cm. A–C from *Bidgood et al., 2924*. D from *Evrard 5511*. E–F from *Louis 9560*. Drawn by Lucy T. Smith.

striate lobes; corolla 8 mm × 2 mm, divided to ¼ of its length; stamens borne on 3 mm-long epipetalous ring, anthers minute, ca.0.6 mm long; ovary ca.5 mm long, with stigma to ca.2 mm long at anthesis. Fruit at maturity, ovoid to almost cylindrical, 2.5–3 cm × 1.5–2 cm wide with 17–21 vertical rows of dull brown reflexed scales. Seed 2–2.5 cm long × 1.5 cm wide × 0.8–1 cm thick, flattened on one side, with slightly undulate margins; embryo lateral opposite the flattened side.

Distribution:—*Eremospatha haullevilleana* is restricted to the lowland forests of the Congo Basin. Unlike the majority of the African rattan species, it is curiously absent from the coastal forest regions.



MAP 12. Distribution of *Eremospatha haullevilleana*.

Habitat and ecology:—*Eremospatha haullevilleana* is found both in closed-canopy forest and in open areas.

Conservation status:—Least concern (LC).

Additional specimens examined:—CAMEROON: *Letouzey 11798*, Mintom I (02º03N:13º30E) sterile, January 5, 1973 (YA!); CENTRAL AFRICAN REPUBLIC: *Carroll 115*, 35km NE of Bayanga (03º07N:16º27E) sterile, March 13, 1985 (MO!); *Harris 3508*, 20km SE of Bayanga (02º50N:16º22E) sterile, October 10. 1993 (K!); *Harris 2652*, Lidjombo, E of Sangha River (02º39N:16º11E) Fr., November 2, 1990 (K!); GABON: *Wieringa 1550*, 120km on road from Okunju to Makokou (00º08N:13º41E) Fr., September 1, 1992 (WAG!); CONGO: *Harris* et al. *3172*, 55km SW of Souanké (02º02N:13º49E) sterile, November 11, 1991 (K!, MO!); *Lejoly 96/750*, Parc National d'Odzala (00º36N:14º54E) Fl., November 21, 1996 (BR!); *Lerot* s.n., Ogoué, sterile, 1894 (K!); DEMOCRATIC REPUBLIC OF CONGO: *Allard 213*, sterile, 1909 (BR!); *Apema 217*, Masako, sterile, February 1, 1987 (BR!); *Bavicchi 277*, Lukabo, seedling, 1913 (BR!); *Bequaert 1277*, Yambuya (01º15N:24º33E) seedling, November 24, 1913 (BR!); *Bequaert 1411*, Bamalia, Fr., December 9, 1913 (BR!); *Billiet & Jadin 4054*, Bangu Massif (06º41S:19º22E) Fr., February 4, 1987 (BR!); *Callens* s.n., Kisantu (04º25S:14º42E) sterile, March 1947 (BR!); *Claessens 381*, Kalako Kombe (00º45S:21º33E) Fr., January 1910 (BR!); *Compère 2181*, Mputu (04º46S:15º31E) seedling, July 9, 1960 (BR!); *Couteaux 471*, Eala (00º03N:18º18E) Fr., October 20. 1908 (BR!); *Couteaux 1051*, Leopoldville (04º22S:15º23E) sterile, July 21, 1944 (BR!); *de Graer 297*, Mongoli River, sterile, September 1, 1934 (BR!); *de Graer 327*, Doruma (04º43N:27º42E) sterile, October 26, 1924 (BR!); *Dewevre 581*, Fr., s.d. (BR!); *Dewevre 986*, Fimbo, sterile, s.d. (BR!); *Evrard 4041*, Ikelemba river, Befale (00º26N: 20º48E) sterile, May 7, 1958 (K!, BR!); *Evrard 5511*, Yalikungu (00º42N:22º35E) Fl., January 10, 1959 (K!, BR!); *Evrard 5890*, Equateur Province, Bomongo (01º22N:18º23E) Fr., March 11, 1959 (K!); *Flamigny 6361*, Fr., February 1943 (BR!); *Gathy 1639*, Kaniama (06º05S:22º20E) Fl., August 21, 1958 (BR!); *Gerard* 1432, Diagbe (04º19N:27º45E) Fr., July 24, 1954 (K!, BR!); *Gilbert 2258*, 100km from Abo (03º14N:30º10E) sterile, May 1939 (BR!); *Gillet 1385*, Kisantu (04º25S:14º42E) juvenile, 1900 (BR!); *Gillet 2026*, Lukamba

(05º20S:19º14E) Fl. & Fr., 1903 (FI!, BR!); *Gillet 3505*, sterile, 1903 (BR!); *Gutzwiller 539*, Yangambi (00º45N:24º26) seedling, February 10, 1955 (BR!); *Hendrickx 4157*, Hombo (01º52S:28º27E) sterile, August 1946 (BR!); *Herman 2138*, Kaniama, Haut Lomami (06º05S:22º20E) Fl., March 1937 (BR!, WAG!); *Hulstaert 1416*, Bokela (01º07S:21º55E) seedling, s.d. (BR!); *Hulstaert 1418*, Bokela (01º07S:21º55E) Fr., s.d. (K!, BR!); *Hulstaert 1421*, Bokela (01º07S:21º55E) seedling, s.d. (BR!); *Hulstaert 1614*, Bokuma, seedling, July 16, 1953 (BR!); *Hulstaert 1616*, Bokuma, sterile, July 16, 1953 (BR!); *Kitembo 60*, Kalima, Kivu (02º31S:26º26E) sterile, February 1981 (BR!); *Laurent 911*, Eala (00º03N:18º18E) sterile, July 1, 1903 (BR!); *Laurent* s.n., Eala (00º03N:18º18E) Fl., July 15, 1903 (BR!); *Laurent* s.n., Eala (00º03N:18º18E) Fl., 1905 (K!, FHO!); *Laurent* s.n., Isaka (0º28S:23º50E) sterile, November 21, 1903 (BR!); *Laurent* s.n., Kasai (10º07S:22º20E) sterile, November 1895 (BR!); *Lebrun 1508*, Eala (00º03N:18º18E) Fl., December 1931 (BR!); *Leclercq 736*, Doruma (04º43N:27º42E) sterile, March 7, 1958 (BR!); *Lejoly 566*, Bawombi (00º42N:26º11E) seedling, November 17, 1976 (BR!); *Leonard 932*, Eala (00º03N:18º18E) Fl. & Fr., October 26, 1946 (K!, BR!, MO!); *Leonard 933*, Eala (00º03N:18º18E) Fl., October 26, 1946 (K!, BR!, WAG!); *Leonard 936*, Eala (00º03N:18º18E) sterile, October 30, 1946 (K!, BR!, WAG!); *Leonard 1138*, Oriental Province, Weko (01º13N:24º07E) Fr., March 1947 (K!, BR!, MO!); *Liben 2603*, Luisa Territory, Tomba (00º10N:19º18E) Fr., February 1957 (K!, BR!, WAG!); *Liegeois 87*, Oriental Province, Tshopo (10º12S:24º51E) sterile, July 1943 (BR!); *Liegeois 87*, Oriental Province, Tshopo (10º13S:24º50E) sterile, July, 1943 (K!); *Lisowski 7160*, Kouilou, Bena (02º34S:11º27E) sterile, October 8, 1990 (BR!); *Louis 772*, Yangambi (00º45N:24º26E) Fl., December 5, 1935 (BR!); *Louis 847*, Yangambi (00º45N:24º26E) Fl., December 17, 1935 (BR!); *Louis 1970*, Eala (00º03N:18º18E) Fl., May 30, 1936 (K!, BR!); *Louis 3395*, 6km W of Yangambi (00º45N:24º26E) Fr., March 3, 1937 (K!, BR!); *Louis 3638*, 25km NW of Yangambi (00º49N:24º12E) Fl., March 19, 1937 (BR!, WAG!); *Louis 4218*, Yangambi (00º45N:24º26E) seedling, June 22, 1937 (BR!); *Louis 7671*, Yambuya (01º15N:24º33E) Fr., January 24, 1938 (K!, BR!); *Louis 8106*, Yangambi (00º45N:24º26E) seedling, February 25, 1938 (BR!); *Louis 9420*, Yangambi (00º45N:24º26E) Fr., May 18, 1938 (K!, FHO!, BR!); *Louis 9560*, 20km W of Yangambi (00º49N:24º12E) Fr., May 30, 1938 (K!, BR!); *Louis 9731*, Yalibwa, river Lubuye (00º56N:24º30E) Fl., June 9, 1938 (BR!); *Louis 11850*, Yangambi (00º45N:24º26E) Fl. & Fr., October 18, 1938 (BR!, MO!, WAG); *Louis* 12106, 20km W of Yangambi (00º49N:24º12E) Fr., October 27, 1938 (K!, BR!); *Louis 16775*, Yangambi (00º45N:24º26E) Fr., November 17, 1943 (BR!); *Louis 10045*, Oriental Province, Yalibora, Fr., June 1938 (K!, BR!); *Louis* 218, Oriental Province, Yangambi (00º45N:24º26E) seedling, June 1937 (K!, FHO!, MO!); *Luja 107*, Gungu (05º45S:19º19E) seedling, November 18, 1898 (BR!); *Luja 221*, Kasai (10º07S:22º20E) sterile, March 11, 1899 (BR!); *Luja 288*, Lubué (04º08S:19º49E) juvenile, June 16, 1899 (BR!); *Luja 297*, Lubué (04º08S:19º49E) sterile, June 26, 1899 (BR!); *Masens 451*, Kikwit (05º02S:18º48E) juvenile, November, 21, 1990 (BR!); *Mullenders 1166*, Kaniama, Haut Lomami (06º05S:22º20E) sterile, September 1947 (BR!); *Nannan 117*, Bamania, Fr., August 29, 1914 (BR!); *Nsola 621*, Bikoro (00º44N:18º09E) Fr., May 31, 1984 (BR!); *Pynaert 1676*, Eala (00º03N:18º18E) Fr., 1907 (BR!); *Robyns 4300*, Kimengua, sterile, February 7, 1957 (BR!); *Sapin* s.n., Demba (04º27S:23º45E) Fl., December 1910 (BR!); *Sapin* s.n., Tshibangu (05º56S:20º54E) sterile, 1910 (FHO!); *Schmitz 3710*, Kanzenze (10º27S:27º11E) sterile, August 26, 1950 (BR!); *Schouten 103*, sterile, August 23, 1910 (BR!); *Terashima 94*, Nyamakombola (01º41S:28º09E) sterile, October 20, 1989 (BR!); *Thiebaud 321*, Katobo (00º57S:28º58E) Fl., January 1959 (BR!); *Thonet 110*, Lac Tumba (00º46S:20º06E) Fl., October 30, 1957 (K!, WAG!, BR!); *Troupin 2658*, Parc National de Garamba (04º10N:29º28E) sterile, May 21, 1952 (BR!); *Troupin 9162*, Kavumu-Walikele (01º28S:28º48E) Fl., September 11, 1958 (BR!); *Vandenbrand 238*, sterile, s.d. (BR!); *Vanderyst* 2781, Kikwit (05º02S:18º48E) sterile, January 1914 (BR!); *Vanderyst 4906*, Dumu (03º20N:18º18E) sterile, August 1914 (BR!); *Vanderyst 12664*, Fl., November 1922 (BR!); *Vanderyst 30729*, Wula to Kipako, juvenile (May 1932) BR!; ANGOLA: *Gossweiler 10087*, Mayombe, Luali (05º00S:12º25E) Fl., 1923 (K!); *Gossweiler 6645*, Mayombe, Luali (05º00S:12º25E) Fl., 1923 (K!); *Gossweiler 7844*, Mayombe, Luali (05º00S:12º25E) sterile, 1919 (K!); *Gossweiler 8129*, Mayombe, Luali (05º00S:12º25E) sterile, January 5, 1919 (K!); UGANDA: *Dawe 668*, Semliki (00º45N:30º00E) sterile, October 31, 1905 (K!); *Makombo* et al. s.n., Semliki (00º45N:30º00E)

sterile, October 24, 1998 (K!); BURUNDI: *Lewalle 4016*, Kigwena (04º10S:29º32E) sterile, November 9, 1969 (BR!); *Lewalle 4414*, Kigwena (04º10S:29º32E) Fl., February 1, 1970 (BR!); *Reekmans 11180*, Kigwena (04º10N:29º30E) Fr., May 13, 1982 (K!, MO!, BR!); TANZANIA: *Bidgood & Vollesen 3040*, Kigoma to Kasulu road (04º33S:29º52E) sterile, April 1, 1994 (K!); *Bidgood* et al. *2924*, Kigoma: Kasye forest (04º47S:29º40E) sterile, March 23, 1994 (K!); *Eggeling 6207*, 30 miles S of Kibondo (03º34S:30º46E) sterile, July 1951 (K!); *Proctor 470*, Western Province, Mpanda (06º22S:31º03E) Fl., May 1956 (K!); *Proctor 369*, Western Province, Mbuti River (04º53S:38º29E) sterile, February 1955 (K!)

***Eremospatha*: *nomina nuda*:—**

E. longehamata Dammer *nomen in Herb. Berol. = E. cabrae* (De Wild. & T.Durand) De Wild.
E. trapezoidea Dammer *nomen in Herb. Berol. = E. cabrae* (De Wild. & T.Durand) De Wild.
E. schweinfurthii Beccari (1908: 164), *nom. = E. haullevilleana* De Wild.
E. lujae Dammer *nomen in Herb. Berol. = E. haullevilleana* De Wild.
E. wildemannii Dammer *nomen in Herb. Berol. = E. haullevilleana* De Wild.
E. yangambiensis Louis & Mullenders *nom. nud. = Laccosperma opacum* Drude

Laccosperma (G.Mann & H.Wendl.) Drude (1877: 635)

Type:—*L. opacum* (G.Mann & H.Wendl.) Drude

Calamus subgenus *Laccosperma* Mann & Wendland (1864: 430)

Ancistrophyllum (G.Mann & H.Wendl.) Wendland (1878: 230). Type:—*A. secundiflorum* (P. Beauv.) H.Wendl.

Ancistrophyllum subgenus *Laccosperma* (G.Mann & H.Wendl.) Hook.f. in Bentham & Hooker (1883: 937).

Neoancistrophyllum Rauschert (1982: 557). Type:—*Neoancistrophyllum secundiflorum* (P. Beauv.) Rauschert (superfluous substitute name *fide* Dransfield (1982)).

Clustered, spiny, understorey to high climbing, hapaxanthic, hermaphroditic rattan palms. Stems, circular in cross section, rarely oval, with medium to long internodes; sucker shoots axillary. Leaf pinnate, with cirrus; sheath strictly tubular, sparsely to profusely armed with fine scattered spines, sometimes becoming bare; ocrea conspicuous, split opposite the petiole, scarcely sheathing, rarely inflated with inrolled edges or reflexed and tattering, armed as the sheath; knee absent; petiole short to long, much shorter in the reduced leaves subtending the inflorescences, usually armed with inequidistant angular spines along margins, never unarmed; rachis armed as the petiole; cirrus armed with reflexed prickle-like spines and bearing neat pairs of reflexed acanthophylls; leaflets few to very numerous, 1–4 fold, entire, linear to sigmoid, regularly or irregularly arranged, often fiercely armed with short to long spines along the margins and the main ribs, midribs prominent adaxially, transverse veinlets conspicuous or inconspicuous; acanthophylls alternate proximally, sub-opposite to opposite distally. Inflorescences produced simultaneously in the axils of the most distal few, frequently reduced leaves, branched to 1-order; peduncle enclosed within the leaf sheath and emerging from its mouth, ± hemispherical in cross section; prophyll strictly tubular, 2–keeled, enclosed within the subtending leaf sheath; peduncular bracts 1–3; rachis longer than the peduncle; rachis bract distichous, strictly tubular with a triangular limb, without spines, sparsely to profusely indumentose, becoming tattered at apex, each subtending a pendulous or spreading rachilla; rachilla prophyll tubular, 2-keeled, included within the subtending bract, rachilla bracts distichous, tubular with apiculate triangular limb, striate, sparsely indumentose, the margin sometime ciliate, each, except for the basal 1–2, subtending a flower cluster. Flowers usually in dyads, rarely in triads, sometimes solitary towards the tip of the rachillae, the flower cluster bearing a 2-keeled prophyll and 0, 1 or 2, 2-keeled bracteoles (depending on the number of flowers); calyx slightly to strongly stalk-like at the base, often bent at right angles, incompletely divided distally into 3-triangular striate

lobes; corolla tubular at the very base, divided above into 3 oblong , narrow, triangular, valvate lobes; stamens 6, epipetalous, filaments distinct, much swollen, angular, scarcely narrowed at the connective; anthers medifixed, oblong, latrorse, pollen elliptic, monosulcate with finely reticulate, tectate exine; gynoecium tricarpellate, triovulate, ovary covered with scales, those at the base of the style minute, spine-like, style elongate, 3-angled, stigma minute, pyramidal, ovules basally attached, anatropous. Fruit baccate, 1-sometimes 2-seeded, tipped with the base of the style, the remainder of the style usually breaking off in early fruit development, calyx and corolla persistent at base; epicarp covered in vertical rows of reflexed scales with fringed margins, mesocarp white, fleshy and sweet at maturity, endocarp not differentiated. Seed attached sub-basally at one side, ovoid and laterally flattened, or rounded and deeply scalloped, with a very shallow to deep, lateral pit, seed coat fleshy, endosperm homogenous; embryo lateral, opposite the depression or pit. Germination adjacent-ligular; eophyll bifid.

Habitat and distribution:—The genus *Laccosperma* is represented by six species which occur throughout the lowland forest region of West and Central Africa. The species are shade tolerant and are present as slender climbers under the forest canopy, whilst other species are strongly light demanding and are a common component of gaps and forest margins.

Etymology:**—**(Latin) "hole in the seed".

Notes:—The provision of a satisfactory taxonomy of this genus has been hindered by a paucity of adequate fertile material and inadequate field observations to date. Despite a number of species being described, very few species names have been applied. Most notable is the fact that the name *L. secundiflorum* has been far too widely applied to three morphologically distinct species of large-diameter *Laccosperma*. This is an understandable mistake to make, especially as the flowers and fruits of all these species show a remarkable similarity, although there are some morphological differences (*fide* Beccari 1910). In the field, however, where these species are often sympatric, they are easily distinguished from each other.

Key to the species of *Laccosperma*:—

1. Slender canes, stems with sheaths ±2 cm in diameter, with 10–12 leaflets on each side of the rachis; common in forest understorey 2
–. Robust canes, stems with sheaths ±2 cm in diameter, with >12 leaflets on each side of the rachis; common in forest gaps and open areas..... 4

2. Cirrus armed with conspicuous acanthophylls, leaflets ovate 3
–. Cirrus armed with recurved spines, acanthophylls much reduced or absent; leaflets lanceolate ..... *1. L. korupensis*

3. Leaflet margin armed with forward-facing truncate spines, fruit globose; seed sub-globose, covered in polygonal rounded depressions, deeply scalloped on one side..... *2. L. opacum*
–. Leaflet margin unarmed, fruit ovoid; seed ovoid, flattened, with a linear depression on one side ..... *3. L. laeve*

4. Petiole on mature stems >20 cm long, leaflets, sigmoid, elongate, horizontally held on rachis..... *4. L. secundiflorum*
–. Petiole on mature stems <20 cm long; leaflets linear-lanceolate..... 5

5. Sheaths moderately to lightly armed; petiole, rachis and cirrus conspicuously light green to yellow, ocrea short (usually 12–20 cm) truncate, rounded; leaflets mid- to dark green, especially on upper surface, held ± horizontal to rachis; rachis bracts with conspicuous yellow band at base ..... *5. L. acutiflorum*
– . Sheaths moderately to profusely armed; petiole, rachis and cirrus mid to dark green; ocrea usually long (20–30 cm), gradually tapering; leaflets, glaucous blue-green, conspicuously pendulous on rachis; rachis bracts dry throughout .. .. *6. L. robustum*

1. L. korupensis Sunderland (2003: 989), Govaerts and Dransfield (2005: 140); Sunderland (2007: 42). Type:—CAMEROON, Korup National Park, *Sunderland 2303* (holotype K!; isotypes SCA! YA! NY! WAG!)

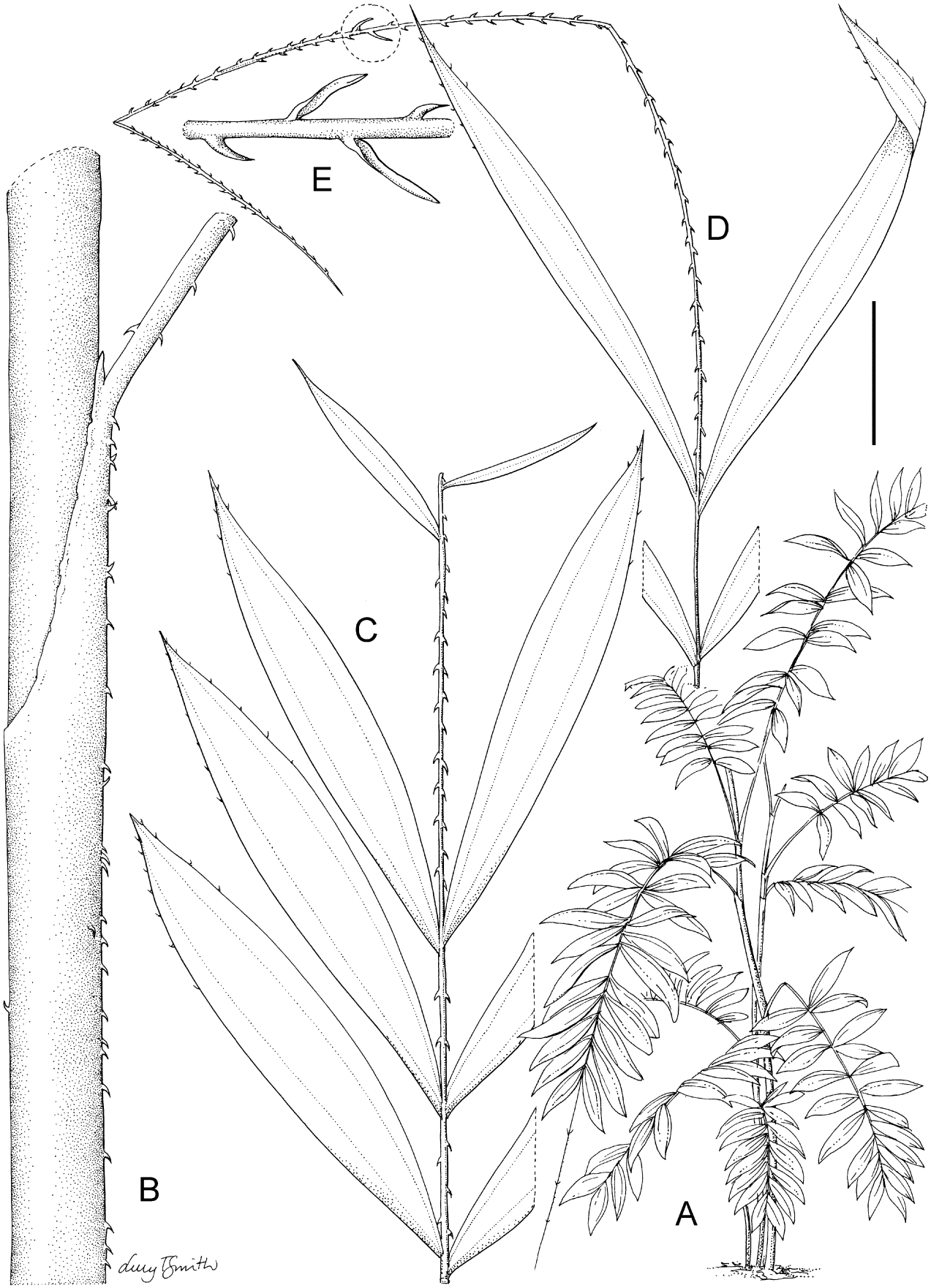


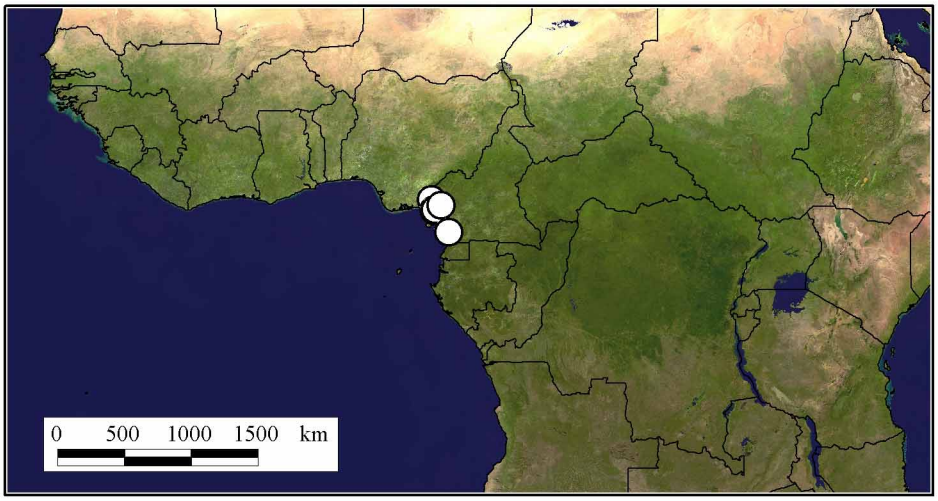
FIGURE 12. *Laccosperma korupensis*

A. Habit. B. Stem. C. Leaflets. D. Leaflet details. E. Acanthophylls. Scale bar: A = 1 m. B = 1 cm. C = 7 cm. D = 10 cm. E = 8 mm. All from *Sunderland 2303*. Drawn by Lucy T. Smith.

Clustered, slender palm climbing to 10m. Stem, not circular in cross section, but somewhat oval, without sheaths up to 12 mm in diameter, with ca.15 mm; internodes 12–15 cm long. Leaf sheath very sparsely to moderately armed with very fine, black tipped, downward-pointing spines; sheaths near leaf junction occasionally unarmed; black caducous indumentum present on mature sheaths; ocrea 7–10 cm long, gradually tapering at the apex, papyraceous and tattering, pale straw-coloured without, dark shiny brown within, armed with very fine black–tipped spines. Leaves up to 1.0 m long; petiole to 12 cm long × 0.8 cm wide, abaxially rounded, adaxially flattened, armed along the edges with up to 1 cm-long, inequidistant, black spines with pale bulbous bases, spreading or reflexed; rachis to 50 cm long, rounded or somewhat angular in cross section, armed as the petiole, the spines decreasing in size distally; cirrus to 70 cm long armed as the rachis, although spines becoming sparse distally; leaflets, 10–18 on each side of the rachis, inequidistant, usually sub-equidistant proximally and borne in pairs distally, lanceolate, finely acuminate at apex, bluntly cuneate at base, 12–20 cm long × 1.5–1.5 cm broad at widest point, ± concolorous, with prominent transverse veinlets and numerous, rather distant, small reflexed spines on the margins; acanthophylls absent. Flowers and fruits unknown.

Habitat:—*L. korupensis* is a species of the forest understorey.

Distribution:—Restricted to the coastal forests of Cameroon, *L. korupensis* is locally abundant in the Korup and National Park and its environs.



MAP 13. Distribution of *Laccosperma korupensis*.

Etymology:—This species is named after the Korup region, which includes the National Park. The word Korup is derived from the ethnic group, the Korop, who have inhabited the cross–border area of Cameroon and Nigeria for the past 200 years (Grimes 1996).

Conservation status :—Near threatened (NT) due to its restricted range and continuing habitat loss.

Notes:—Despite the availability of vegetative material only, there is no doubt that this species is a member of the genus *Laccosperma*, with its significant morphological similarities to both *L. opacum* and *L. laeve*. However, this taxon is unique within the genus in the fact that the reduced leaflets forming grapnel hooks on the cirrus (known as acanthophylls), which are a common character in the rattan genera endemic to Africa, are absent.

Additional specimens examined:—*Collector unknown*, Kumba (04°38'N:09°26'E) sterile, s.d. (FI!); *Cheek 5062*, Koto II (04°21'N: 9°02'E) sterile, October 2, 1993 (K!, SCA!); *Harris 3660*, Onge (04°21'N:08°57'E) sterile, July 11, 1993 (K!); *Harris 3742*, Onge (04°21'N:08°57'E) sterile, September 11, 1993 (K!, SCA!); *Harris 3778*, Onge (04°21'N:08°57'E) sterile, October 11, 1993 (K!, SCA!); *Njingum 2*, Bidou I, near Kribi (02°50'N:09°58'E) sterile, July 15, 1999 (K!); *Sunderland 2303*, Korup National Park,

Chimpanzee Camp (05°02'N:08°48'E) sterile, February 15, 2000 (K!, SCA!); *Thomas 9726*, Idenau (04°16'N:09°01'E) sterile, September 10, 1993 (K!, SCA!).

2. Laccosperma opacum (G.Mann & H.Wendl.) Drude (1877: 635), Küntze (1891: 729), Mildbraed (1914: 54), Dransfield (1981: 456), Dransfield (1982: 36), Hawthorn (1990: 225), Morakinyo (1995: 206), Tuley (1995: 37), Burkill (1997: 373), Cable & Cheek (1998: 179), Sunderland (2001: 100), Harris 2002: 243), Cheek *et al*. (2004: 471), Sunderland *et al*. (2005: 152), Govaerts and Dransfield (2005: 140), Sunderland (2007: 35). *Calamus opacus* Mann & Wendland (1864: 431). *Ancistrophyllum opacum* (G.Mann & H.Wendl.) Drude (1895: 111), Cummins (1898: 80), Wright (1902: 116), Beccari (1910: 227), Mildbraed (1913: 16); (1924: 595), Hédin (1929: 504), Hutchinson (1936: 594), Dalziel (1937: 495), Guinea-Lopez (1946: 244), Fosberg (1960: 129), Irvine (1961: 773), Walker & Sillans (1961: 324), Russell (1968: 167), Moore (1971: 112), Letouzey (1978: 314), Hall & Swaine (1981: 123), Olerode (1984: 117), Aedo *et al*. (1999: 375) ; *Neoancistrophyllum opacum* (Drude) Rauschert ex J.Dransf., Kew Bull. 37: 456 (1982). Type:—EQUATORIAL GUINEA, Bioko, Mann 97 (holotype K!)

Clustered slender palm climbing to 10–15 m. Stem, often branching, without sheaths up to 15 mm in diameter, with ca.20 mm; internodes 10–20 cm long. Leaf sheath moderately to sparsely armed with black tipped, pale coloured bulbous-based, upward pointing or reflexed spines; sheaths near inflorescence occasionally very sparsely armed; black caducous indumentum present on mature sheaths; ocrea 12–30 cm long, gradually tapering at the apex, papyraceous and tattering, pale straw-coloured without, dark shiny brown within, armed with black-tipped spines with pale bulbous bases, particularly at apex. Leaves up to 1.2 m long; petiole to 12 cm long × 0.8 cm wide, abaxially rounded, adaxially flattened, armed along the edges with up to 1 cm–long, inequidistant, black spines with pale bulbous bases, spreading or reflexed; rachis to 60 cm long, rounded or somewhat angular in cross section, armed as the petiole, the spines decreasing in size distally; cirrus to 50 cm long armed as the rachis, although spines becoming sparse distally; leaflets composed of 2–4s fold, 10–12 on each side of the rachis, inequidistant and unequal in size, usually sub-equidistant proximally and borne in pairs distally, sigmoid, 1–5-costulate, the largest 20–30 cm long × 2.5–10 cm broad at widest point, ± concolorous, with prominent transverse veinlets and numerous, rather distant, small spines on the margins; acanthophylls to 2.5 cm long. Inflorescences, numbering 4–8, produced simultaneously in distal 30–50 cm of stem; peduncle ca.10 cm long; prophyll ca.4 cm; lower bracts up to 2 cm long, gradually decreasing distally, with a short triangular acuminate lobe, closely adpressed to the next bract, finely striate; rachillae to 10 cm long, spreading, densely clothed with striate imbricate bracts $\pm$ 4 mm distant, each with a rather wide mouth and short apiculum to 1 mm; bracteoles minute. Flowers 8 mm long × 2 mm wide; calyx, tan-cream, 4 mm long, tubular in the basal 2 mm, with 3 triangular striate lobes 2 mm long × 2 mm wide; petals cream or white, 9 mm long × 2.5 mm wide, lanceolate with a blunt triangular tip; stamen–filaments to 3 mm long × 1 mm wide, minutely epipetalous and united into a very short (<1 mm) basal tube; anthers to 3 mm long 1 mm wide, ovary 1 mm in diameter, stigma to 5 mm long. Fruit rounded, somewhat depressed apically, ca.1.2 cm in diameter, covered in 12–14 vertical rows of pale brown scales with slightly paler margins and each with a central furrow. Seed sub-globose, 6–8 mm in diameter, covered in polygonal rounded depressions, deeply scalloped on one side.

Distribution:—*Laccosperma opacum* ranges from Liberia and Ivory Coast to Cameroon, Gabon and the Congo Basin to eastern Democratic Republic of Congo. This taxon is the only species of rattan known to occur on the island of Bioko.

Habitat and ecology:—Tolerant of deep shade, *L. opacum* is commonly found in high forest in the lower to mid-canopy. This species prefers well-drained soil and is the only species of rattan found on basalt and other volcanic soil types.

Etymology:—(Latin) "darkened" or "dull"; refers to dark green leaflets.

Conservation status:—Least concern (LC).

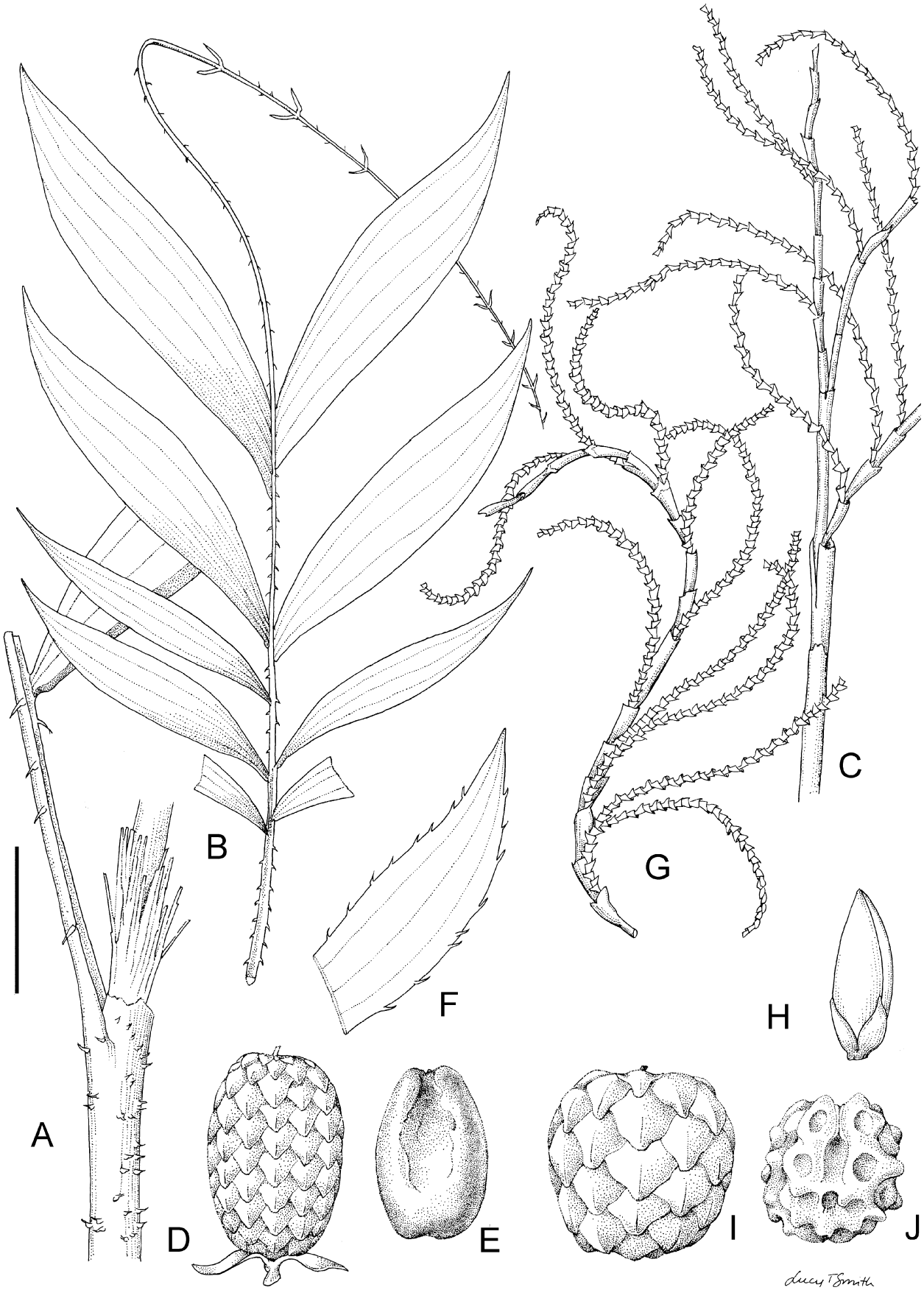
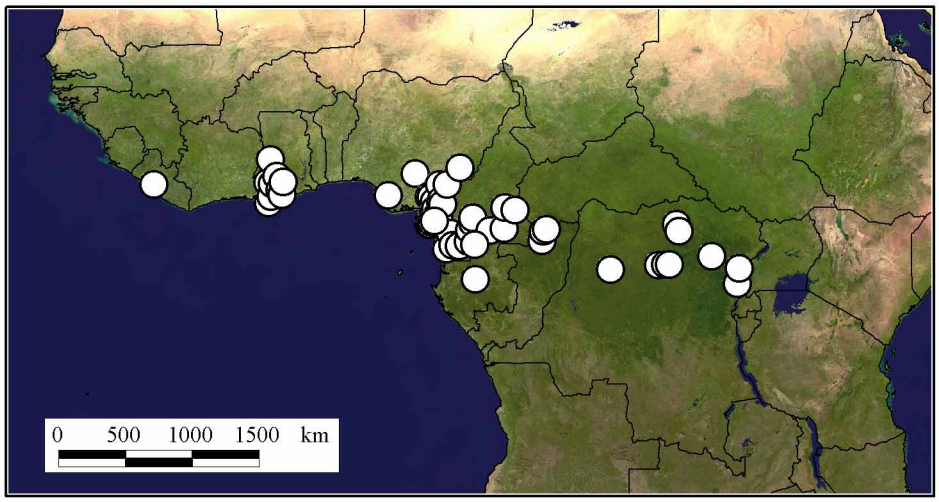


FIGURE 13 . *Laccosperma opacum* (A–G) and *L. leave* (H–J)
A. Mature stem. B. Leaf. C. Inflorescence. D. Fruit. E. Seed. F. Leaflet section. G. Inflorescence . H. Flower in bud. I. Fruit. J. Seed. Scale bar: A = 1 cm. B–C = 10 cm. D–E = 1 cm. F = 5 cm. G = 10cm. H = 8 mm. I–J = 1 cm. A–E from *Sunderland 2266*. F–G from *Sunderland 1700*. H from *Mann 97*. I–J from *Sunderland 1885*. Drawn by Lucy T. Smith.



MAP 14. Distribution of *Laccosperma opacum*.

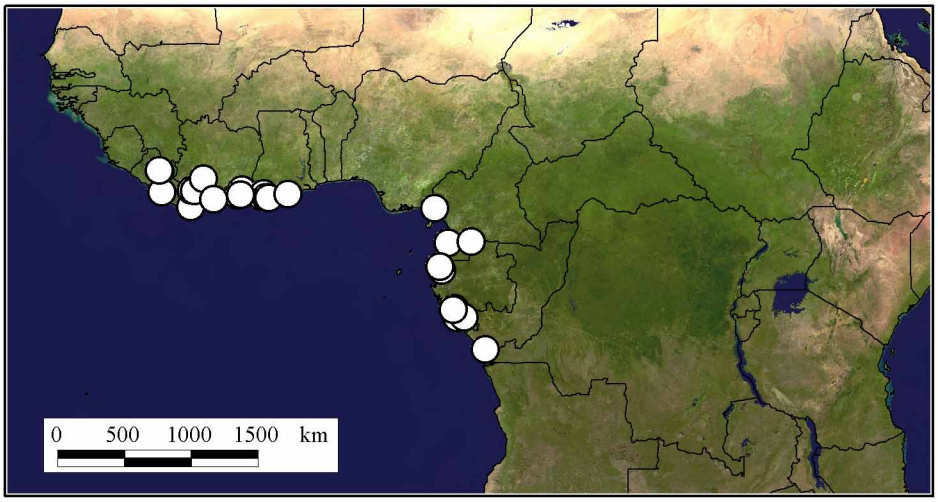
Additional specimens examined:—GUINEA-CONAKRY: *Wolfert 1910*, Ntume, sterile, 1911 (FI!); Liberia: *van Meer 264*, 7 km from Bababli (06º08N:09º55W) Fl., December 12, 1965 (MO!); GHANA: *Adams 2407*, Awaso, Western Region (06º15N:02º17W) sterile, December 24, 1953 (GC!); *Cummins 229*, Kumasi (06º40N:01º39W) Fr., 1995 (K!); *Enti 614*, Bimpong Forest Reserve, Foso (05º43N:01º28W) Fr., February 16, 1972 (GC!, MO!, BR!); *Hall 2748*, Kakum Forest Reserve (05º26N:01º19W) Fl., November 20, 1964 (K!, GC!); *Irvine 502*, Ashantia, Ashanti, sterile, April 30, 1927 (GC!); *Irvine 2075*, Awisa (07º49N:02º07W); Fl., December 1933 (K!, GC!); *Irvine 2300*, Atwabo, Western Region (05º18N:02º03W) Fl., February 28, 1934 (GC!); *Moore 2115*, SS Forest Reserve, sterile, December 1920 (K!); *Morton 3618*, Awaso, Western Region (06º15N:02º17W) Fl., December 3, 1958 (K!, GC!); *Vigne 1365*, Banka, S. Ashanti (06º17N:01º14W) Fl., September 1928 (K!, FHO!, MO!); *Vigne 1875*, Amentia Forest Reserve, E. Region (06º10N:01º58W) Fr., March 30, 1930 (K!, KUM!); *West-Skinn* 90, Axim Cocoa Station (04º52N:02º14W) sterile, 1957 (K!); NIGERIA: *Chapman* 3681, Mambilla Plateau, sterile, April 15, 1975 (FHO!); *Chapman 5202*, Mambilla Plateau, Fl., February 3, 1978 (FHO!); *Chapman 5331*, Baissa River (07º14N:10º38E) Fr., April 1, 1978 (FHO!); *Morakinyo 1006*, Cross River National Park (05º15N:08º42E) sterile, August 18, 1993 (K!); *Otedoh & Tuley 7252*, Okwabe, near Warri (05º22N:05º48E) sterile, August 15, 1972 (K!); *Tuley 530*, Nsukka (06º50N:07º37E) sterile, January 31, 1964 (K!); *Tuley 649*, Calabar to Mamfe road, Mile 31 (05º18N:08º34E) sterile, July 13, 1964 (K!); CAMEROON: *Bos 5162*, 19km from Kribi on Lolodorf road (03º00N:10º03E) Fr., August 7, 1969 (K!, YA!); *Breteler 1241*, Bertoua (04º34N:13º40E) Fl., April 17, 1961 (WAG!); *Breteler 1560*, 23km W of Yaounde on Douala road (03º05N:11º17E) Fl., July 7, 1961 (WAG!); *Breteler* et al *1200*, 6km along Batouri to Betare Oyi road (04º25N:14º21E) sterile March 14, 1961 (WAG!); *Breteler* et al *2563*, Mt Febe nr Yaounde (03º53N:11º31E) Fr., January 23, 1962 (WAG!, BR!); *Bruneau 1093*, Kribi to Ebolowa road, Sud Province (02º51N:10º00E) sterile, October 30, 1995 (K!); *Cheek 5591*, Mt Cameroon, Upper Boando (04º04N:09º08E) Fr., November 30, 1993 (K!, SCA!); *Dransfield 6998*, Mount Cameroon, Upper Boando (04º04N:09º08E) Fl., June 26, 1991 (K!, SCA!); *Fotius* 3074, Djoumbi-Mbidan, 45km St Tiguere, sterile, March 12, 1978 (YA!); *Lederman 1487*, Sanchu, Fr., December 3, 1908 (FI!); *Letouzey 3553*, Betare Dja (03º00N:12º40E) Fr., February 27, 1964 (YA!); *Maitland 761*, Limbe (04º01N:09º11E) Fr., October 1929 (K!); *Mbani 497*, Boa Plain (04º26N:08º54E) sterile, June 5, 1994 (SCA!); *Mildbraed 5264*, Lomie (03º09N:13º37E) sterile, May 18, 1911 (HBG!); *Mildbraed 5310*, Lomie (03º09N:13º37E) sterile, May 21, 1911 (HBG!); *Mpou 338*, Mbalmayo (03º31N:11º30E) Fl., June 6, 1959 (YA!); *Njingum* 11, Nguti (05º02N:09º24E) sterile, August 5, 1999 (K!); *Nkefor 445*, Mabeta-Moliwe (03º58N:09º14E) sterile, s.d. (K!); *Nkongmeneck 596*, Nkobasso, 40km SSE of Ndiki, Fr., November 15, 1983

(YA!); *Raynal 9825*, Meyo-Bibilou, 36km SW Ambam (02º16N:11º11E) sterile, February 19, 1963 (YA!); *Sunderland 1700*, Mabeta-Moliwe Forest (03º58N:09º14E) Fr., October 10, 1995 (K!, SCA!, NY!); *Sunderland 1711*, Onge River valley (04º21N:08º57E) sterile, November 23, 1995 (K!, SCA!, MO!); *Sunderland 1744*, Rumpi Hills Forest Reserve (04º54N:09º20E) sterile, May 19, 1996 (K!, SCA!, BH!); *Sunderland 1750*, Mabeta-Moliwe Forest (03º58N:09º14E) sterile, November 13, 1996 (K!, BH!); *Sunderland 1762*, Mabeta-Moliwe Forest (03º58N:09º14E) sterile, November 25, 1996 (K!, SCA!); *Sunderland 1885*, 10km south of Nguti (05º02N:09º24E) Fr., November 26, 1997 (K!, SCA!, BH!); *Sunderland 1931*, Takamanda Forest Reserve (06º06N:09º47E) sterile, November 10, 1998 (K!, SCA!); *Sunderland 1934*, Takamanda Forest Reserve (06º06N:09º47E) sterile, November 14, 1998 (K!, SCA!); *Sunderland 1936*, Takamanda Forest Reserve (06º06N:09º47E) sterile, November 16, 1998 (K!, SCA!); *Sunderland 2055*, Takamanda Forest Reserve (06º08N:09º16E) sterile, January 18, 1999 (K!, SCA!); *Sunderland 2250*, Mokoko River Forest Reserve (04º29N:09º00E) sterile, February 16, 1999 (K!, SCA!); *Tessmann* s.n., sterile, October 2, 1909 (FI!); *Thomas 6139*, SW Province, nr Mundemba (04º58N:08º55E) Fl., May 12, 1986 (K!, BR!, WAG!, MO!); *Watts 511*, Mt Cameroon, Njonji (04º04N:08º59E) sterile, October 15, 1992 (SCA!); *Watts 821*, Liwenyi (04º23N:08º59E) Fr., October 28, 1993 (K!, SCA!); *Wheatley 154*, Mabeta-Moliwe forest (03º58N:09º14E) Fl., April 10, 1992 (SCA!); CENTRAL AFRICAN REPUBLIC: *Carroll 33*, Dzanga Region, 12km NE of Bayanga (03º07N:16º27E) sterile, April 15, 1985 (K!, MO!); *Harris 5707*, Sangha-Mbaere (02º59N:16º13E) Fr., December 16, 1997 (K!); *Harris & Fay 1494*, Dzanga-Sanga (02º21N:16º09E) sterile, October 31, 1988 (MO!); EQUATORIAL GUINEA: *Barter* s.n., Bioko (03º25N:08º40E) Fl., 1857 (K!); *Carvalho 2212*, Bioko: Malabo to Cupapa (03º34N:08º46E) Fr., August 5, 1986 (K!, BR!); *Guinea 913*, Bioko: Boloko to Luba (03º24N:08º34E) sterile, January 9, 1947 (MO!); *Mann 97*, Bioko (03º31N:08º33E) Fl. & Fr., April 1860 (K!); *Sunderland 1875*, 2km SW of village of Angoma (02º03N:10º10E) sterile, September 15, 1997 (K!, EG!, NY!, BR!); *Sunderland 1904*, 10km south of Bata (01º45N:09º43E) sterile, March 20, 1998 (K!, EG!, WAG!); *Sunderland 1910*, 1km from village of Mfeck-Ayong (02º00N:10º35E) sterile, March 18, 1998 (K!, EG!, WAG!); *Sunderland 1911*, 1km from village of Mfeck-Ayong (02º00N:10º35E) sterile, March 30, 1998 (K!, EG!, WAG!); *Tessmann 44*, Nkolentangau, Fr., December 5, 1907 (FI!); GABON: *le Testu 9258*, Fl., August 26, 1933 (BR!); DEMOCRATIC REPUBLIC OF CONGO: *Bequaert 1824*, Awakubi (01º19N:27º34E) Fr., January 7, 1914 (BR!); *Evrard 3145*, Befale: River Nkoyo (00º24N:20º46E) Fr., December 28, 1957 (BR!); *Gerard 3218*, Bambesa (03º28N:25º11E) Fr., December 11, 1957 (BR!); *Gerard 3933*, Madabu (Zobia) (02º58N:25º22E) Fl., May 22, 1958 (BR!); *Gerard 4951*, Bambesa (03º28N:25º11E) Fr., November 15, 1961 (BR!); *Germain 8728*, Yabahondo (Isangi) (00º42N:23º58E) sterile, March 28, 1956 (BR!); *Lebrun 2985*, Ougodia, Fl., May 1931 (BR!); *Louis 9556*, 30km E of Yangambi (00º45N:24º43E) Fl., May 30, 1938 (K!, BR!); *Louis 13176*, Oriental Province, Yangambi (00º45N:24º26E) Fr., December 1938 (K!, BR!); *Louis* 14729, Yangambi (00º45N:24º26E) Fl., May 6, 1939 (K!, BR!, WAG!); *Louis 16340*, Yangambi (00º45N:24º26E) Fr., December 7, 1939 (BR!); *Mandango 3067*, Ile Mbie: 5km from Kisangani (00º34S:29º15E) Fr., March 2, 1982 (BR!); *Mildbraed 2818*, Beni-Rewenzori (00º30N:29º25E) Fr., 1908 (FI!)

3. Laccosperma laeve (G.Mann & H.Wendl.) H.Wendl. in Kerchove (1878: 249), Küntze (1891: 729), Dransfield (1982: 456), Morakinyo (1995: 205), Tuley (1995: 39), Burkill (1997: 373), Sunderland (2001: 106), Sunderland *et al*. (2005: 152), Govaerts and Dransfield (2005: 140), Sunderland (2007: 38). *Calamus laevis* Mann & Wendland (1864: 430), *Ancistrophyllum laeve* (G.Mann & H.Wendl.) Drude (1895: 111), Wright (1902: 114), Beccari (1910: 261), Hutchinson (1936: 391), Guinea–Lopez (1946: 244), Walker & Sillans (1961: 324), Russell (1968: 167), Aedo *et al*. (1999: 375). *Neoancistrophyllum laeve* (G.Mann & H.Wendl.) Rauschert ex J.Dransf., Kew Bull. 37: 456 (1982). Type:—GABON, Ogoué River, *Mann 1045* (holotype K!).

Clustered slender palm climbing to 10–13 m. Stems often branching, without sheaths to 16 mm in diameter, with ca.20 mm; internodes 8–17 cm long. Leaf sheath moderately to sparsely armed with black-tipped, pale brown spines, spreading or lightly reflexed, upper sheaths near inflorescence more sparsely armed; black caducous indumentum present on mature leaf sheaths; ocrea 8–20 cm long, gradually tapering at the apex, pale straw-coloured without, shiny mid-brown within, armed as the sheath. Leaves up to 1.5 m; petiole on lower leaves up to 18 cm long × 0.8 cm wide, abaxially rounded, adaxially flattened, armed along the margins with angular, inequidistant black tipped, bulbous-based spines up to 1.3 cm long, spreading or reflexed; rachis up to 90 cm long, more commonly, 60 cm, distinctly trapezoid in cross section at the base, rounded in cross-section distally, armed as the petiole, spines decreasing in size distally and becoming regularly reflexed and increasingly bulbous-based; cirrus up to 70 cm long, more commonly 50–60 cm, armed as the rachis; leaflets composed of 2–4 folds, 10–12 pairs on each side of the rachis, inequidistant and unequal in size, usually subequidistant proximally and borne in loose pairs distally, sigmoid, 15–20 to 25–30 cm long × 3.5–6 to 8–10 cm broad at the widest point, ± concolorous with prominent transverse veinlets, margin unarmed; acanthophylls 2.5–2.8 cm long. Inflorescences, numbering 4–8 produced simultaneously in the distal to 30 cm of stem; peduncle ca.8 cm long; prophyll ca.3.5 cm; rachis bracts 1.5–2 cm long, gradually decreasing distally, tapering to form a short, triangular lobe, often tattering, finely longitudinally striate, closely adpressed to the bract above; rachillae 8–12 cm long, spreading, densely covered in imbricate longitudinally striate, rachillae bracts ± 3 mm long, each with a wide opening and 1 mm–long apiculum. Flowers at anthesis, 6–8 mm × 2–3 mm; calyx tan-cream, 4–4.5 mm long, tubular in the basal 2.5–3 mm, with 3 longitudinally striate, 2 mm × 2–2.5 mm triangular lobes; corolla, tubular in the basal 0.8–1 mm only, with three valvate lobes, white or pale cream, longitudinally striate, 6–7.5 mm × 2–2.5 mm, with a broadly acuminate tip; stamen filaments dark brown, 3 mm × 1 mm, united into 1 mm–long basal tube; anthers 3 mm × 1 mm; ovary ± 1 mm in diameter, stigma up to 4 mm long. Fruit at maturity, ovoid, 0.8–1 cm × 0.6–0.8 cm, with 14–18 rows of vertical scales. Seed smooth, ovoid, 0.6–0.8 cm long, 0.4–0.6 cm wide, ± 0.3 cm thick, flattened on one side, with light linear depression running from base to apex.

Distribution:—*Laccosperma laeve* is distributed in the coastal forests from Liberia and the forest of Upper Guinea to Cameroon and south to Cabinda (Angola). However, there is a considerable disjunction from Ghana to Nigeria.



MAP 15. Distribution of *Laccosperma laeve.*

Habitat and ecology:—This species, in common with, *L. opacum* is shade tolerant and is commonly found under a forest canopy. In fact, aside from on basaltic soils the two species often sympatric.

Etymology:—(Latin) “smooth”; refers to the smooth seed coat.

Conservation status:—Least concern (LC).

Additional specimens examined:—LIBERIA: *Jansen 1822*, Mmal Mining Company Concession, Fr. February 13, 1970 (K!); *Linder 676*, Gbanga (06º59N:09º28W) sterile, September 17, 1926 (K!, MO!); *Linder 1228*, Gbanga (06º59N:09º28W) sterile, October 24, 1926 (K!, WAG!); Ivory Coast; *Ake-Assi 9450*, Pata (04º35N:07º23W) sterile, February 19, 1967 (K!); *Boughey 14732*, Issia (06º28N:06º33W) sterile, August 2, 1954 (K!); *Chevalier 22658*, Between Abougoua and Yacassi (05º43N:03º57W) Fr., December 26, 1909 (K!); *de Wilde & Leeuwenberg 3432*, 26km W of Abidjan (05º20N:04º16W) Fl., February 20, 1962 (BR!, MO!); *Hall & Ake-Assi 45442*, 2 miles E of Sakre (05º41N:07º21W) sterile, August 15, 1975 (GC!); *Hepper & Maley 8214*, Taï Forest (05º38N:07º08W) sterile, September 18, 1984 (K!); *Oldeman 137*, Foret de Banco, sterile, July 6, 1963 (K!, WAG!); GHANA: *Adams 2190*, 7 miles from Enchi (05º29N:02º29W) sterile, December 30, 1953 (GC!); *Enti 2344*, Neung Forest Reserve, Tarkwa (05º27N:00º50W) Fr., November 30, 1988 (GC!); *Kinlock 3237*, Tarkwa, Ndumnfri F.R. (05º10N:02º09W) sterile, February 3, 1934 (KUM!); *Moore & Enti 9882*, Ankasa River Forest Reserve (05º15N:02º36W) sterile, March 4, 1971 (GC!); *Sunderland 2265*, Draw River Forest Reserve (05º12N:02º20W) sterile, May 26, 1999 (K!, KUM!); *Sunderland 2266*, Draw River Forest Reserve (05º12N:02º20W) sterile, May 26, 1999 (K!, KUM!); CAMEROON: *Sunderland 1804*, Campo Ma'an Faunal Reserve (02º10N:09º54E) sterile, March 20, 1997 (K!, YA!, MO!, WAG!); *Sunderland 2251*, Mokoko River Forest Reserve (04º29N:09º00E) sterile, February 16, 1999 (K!, SCA!); CONGO: *Sita 4642*, Chaillu, Fl., April 1982 (BR!); GABON: *Arends* et al. *671*, Mt Doubou (02º15S:10º20E), Fr., December 6, 1984 (WAG!); *le Testu 1712*, Region de Nyanga (02º14N:11º27E); Fl., July 3, 1919 (K!, BR!, MO!); *Mann 1045*, Gaboon River (00º19N:09º29E) Fl., 1861 (K!); *Rietsma 2047*, 15km NW of Libreville (00º35N:09º22E) Fr., March 21, 1986 (LBR!); ANGOLA: *Gossweiler 7995*, Mayombe, Luali (05º00S:12º25E) sterile, 1919 (K!)

4. Laccosperma secundiflorum (P.Beauv.) Küntze (1891: 729)**,** (1981: 456), Johnson (1984: 161), Profizi (1986: 2), Hawthorn (1990: 225), Tuley (1995: 36), Burkill (1997: 364), Cable & Cheek (1998: 179), Sunderland (2001: 119), Sunderland *et al*. (2005: 154), Harris (2002: 243), Govaerts and Dransfield (2005: 140), Sunderland (2007: 48), Dransfield *et al*. (2008: 154). *Calamus secundiflorus*Palisot de Beauvois (1805: 10), Hooker (1849: 526), Durand & Schinz (1896: 17), Durand & Durand (1909: 584), Pyneart (1911: 550). *Ancistrophyllum secundiflorum*(P.Beauv.) Wendland (1878: 230), Drude (1895: 131), Wright (1902: 115), Beccari (1910: 251), De Wildeman (1919: 28), Holland (1922: 727), Hutchinson (1936: 391), Chevrier (1936: 897), Staner & Boutique (1937: 13), Dalziel (1937: 495), Renier (1948: 82), Irvine (1952: 31), Fosberg (1960: 129), Irvine (1961: 773), Russell (1968: 167), Moore (1971: 112), Letouzey (1978: 314), Bauchet (1988: 74); *Neoancistrophyllum secundiflorum*(P.Beauv.) Rauschert, Taxon 31: 557 (1982). Type:—NIGERIA (BENIN), *Palisot de Beauvois* s.n. (holotype G!).

Ancistrophyllum laurentii De Wildeman (1916: 148); *Laccosperma laurentii* (De Wild.) Dransfield (1982: 456); *Neoancistrophyllum laurentii* (De Wild.) Rauschert, Taxon 31: 557 (1982). Type:—DEMOCRATIC REPUBLIC OF CONGO, *Laurent* s.n. (holotype BR!).

Ancistrophyllum majus Burret (1942: 747); *Laccosperma majus* (Burret) Dransfield (1982: 456); Neoancistrophyllum majus (Burret) Rauschert, Taxon 31: 557 (1982). Type:—BIOKO, EQUATORIAL GUINEA, *Mildbraed 6873* (holotype B†; isotype HBG†).

Clustered moderate to robust palm, climbing to 25–50 m. Stems without sheaths 20–25 mm in diameter; with 30–35 mm; internodes 18–35 cm long. Leaf sheath dark green, lightly striate, moderately to sparsely armed with black-tipped finely triangular, upward-pointing or spreading spines; sheaths on upper portion of stem more sparsely armed; sparse black indumentum present on mature sheaths; ocrea 25–35 cm long, dry, often tattering, gradually tapering at the apex, dark tan coloured without, shiny dark brown to dull maroon within, armed as the sheath, spines concentrated at apex. Leaves up to 3.5 m long; petiole 30–60 cm long, 1.5–1.8 cm wide, commonly at 45–60° angle to the sheath, light to mid–green to straw coloured often with scattered

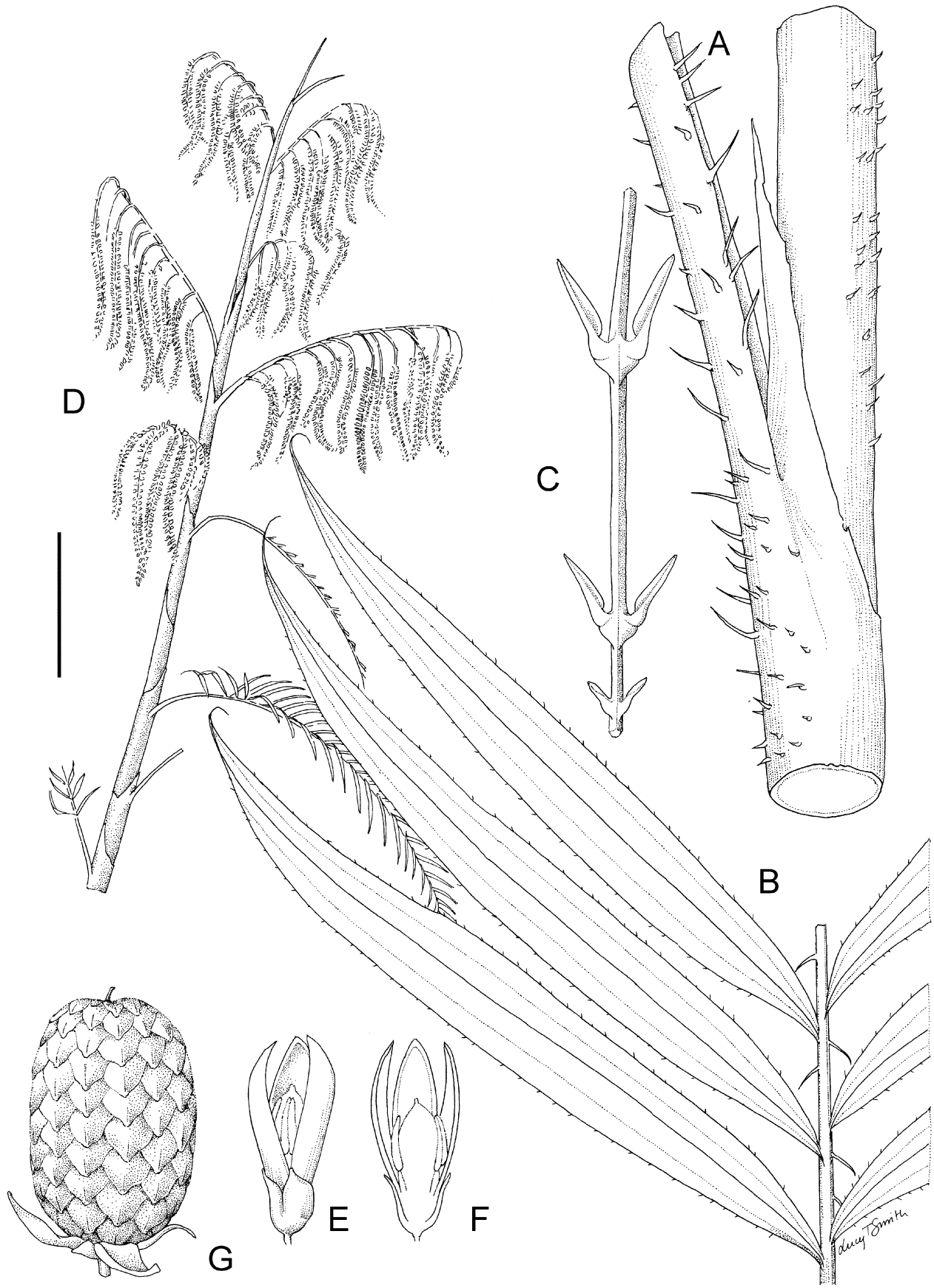
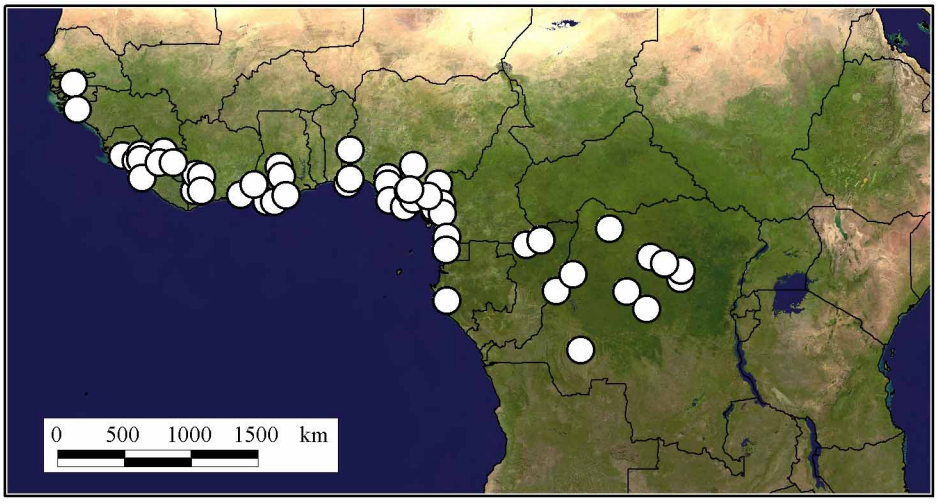


FIGURE 14 . *Laccosperma secundiflorum*

A. Mature stem. B. Leaflets. C. Acanthophylls. D. Inflorescence. E. Flower; F. Flower section. G. Fruit. Scale bar: A = 4 cm. B = 8 cm. C = 3 cm. D = 50cm. E–F = 1cm. G = 1.5 cm. A from *Sunderland 2255*. B–C from *Sunderland 2259*. D from *Tuley photograph* (1964). E–F from *Mann 453*. G from *Tuley photograph* (1963). Drawn by Lucy T. Smith.

brown indumentum below, abaxially rounded, adaxially concave, becoming flattened, somewhat rectangular in cross section distally, armed along the margins with inequidistant black-tipped spines up to 1.8 cm long, angular, spreading in many directions; rachis up to 1.2–1.5m long, hexagonal in cross section proximally becoming trapezoid then rounded in cross section distally, armed as the petiole, spines becoming increasingly short and more sparse distally; cirrus up to 1.5–1.8m long, armed on the underside with inequidistant, reflexed, black-tipped spines, with sparse brown indumentum below; leaflets composed of 2–4–folds, 25–40 on each side of the rachis, equidistant, often variable in width, arching from the rachis, not strictly pendulous, sigmoid, elongate, leaflet apex very finely acuminate with tip often breaking off, 35–45 cm long × 3–8 cm broad at the widest point, concolorous or somewhat discolorous with a darker green adaxial surface, leaflet margin armed with fine to robust, 1–2 mm-long, forward-facing, equidistant black-tipped spines, 1,2 or 3 costulate, each vein armed as the leaflet margin; acanthophylls, up to 4 cm long. Inflorescences, numbering 6–10, produced simulataneously in the distal 1–1.8 m portion of stem; peduncle 15–20 cm long; prophyll 8–10 cm; rachis branches 25–35 cm long, perpendicular to the main axis; rachis bracts 2.5–3 cm long, decreasing distally, dry, often tattering, tapering to form an elongate acutely triangular lobe on the abaxial side, closely adpressed to the bract above, covered with a dense brown indumetum; rachillae 15–25 cm long, pendulous, densely covered with imbricate bracts ca.7 mm long, dry and triangular at apex, each with a wide opening and a 1.5 mm-long apiculum. Flowers at anthesis 1–1.2 cm × 3.0–3.5 mm; calyx 5–5.5 mm long, excluding angular 3 mm-long stalk, 3–3.5 mm wide, dark tan coloured, tubular in the basal 1.5–2 mm, with 3 longitudinally-striate or mottled rounded to bluntly triangular lobes ± 4.5 mm × 3 mm; corolla tubular in the basal 1 mm only, with 3 valvate lobes, white or pale cream, longitudinally striate or mottled, ± 9 mm × 2 mm with a bluntly acuminate tip; stamen filaments dark brown, 4 mm × 1 mm, united into a 2 mm-long basal tube; anthers 3 mm × 1 mm; ovary ca.1 mm in diameter, stigma up to 5 mm long. Fruit ovoid, 1.8–2 cm × 1.3–1.5 cm, with 18–22 vertical rows of scales. Seed smooth, ovoid, 1–1.2 cm long, 0.8–1.2 cm wide, 0.5–0.7 mm deep, lightly flattened on one side.

Distribution:—This species is distributed from Senegal to Cameroon south to Democratic Republic of Congo.



MAP 16. Distribution of *Laccosperma secundiflorum*.

Habitat and ecology:—*Laccosperma secundiflorum* is a species of high forest, and is commonly found under a forest canopy.

Etymology:—(Latin) refers to the inflorescence structure with hermaphrodite flowers in pairs.

Conservation status:—Least concern (LC).

Notes:—A number of species of the large diameter members of the genus *Laccosperma* were described in the early part of the 20th century by Beccari (1910) and de Wildemann (1916), and later by Burret (1942). Although Burret, in particular, was prone to applying very narrow typological species concepts (see Henderson 1999), he has been proven to be somewhat accurate in the majority of his species accounts within this genus and *Oncocalamus*. Despite this, and obvious morphological discontinuities within this complex, evident both from herbarium material and field observations, many of the species described both by Burret and Beccari were never recognised.

One of the major reasons for this is the fact that in their original paper in which Mann & Wendland (1864) re-described *Laccosperma secundiflorum* (syn. *Calamus secundiflorus*), the account was accompanied by an illustration by Fitch, probably based on Mann's field sketches, that showed the growth habit of a number of African palms, including that of *L. secundiflorum*. However, with its conspicuously pendant, and distinctively linear leaflets, the rattan palm labelled in the account as "*L. secundiflorum*" bears little resemblance to the species of Palisot de Beauvois, nor indeed to the original collections of Mann the account cites. The taxon drawn is undoubtedly a species described later by Burret (1942) as *L. robustum*. This confusion seems to have given credence to the oft-mentioned claim of many of the subsequent floristic studies that *L. secundiflorum* is a highly polymorphic taxon both within and between populations. As such, these floristic studies continued to group all of the large-diameter species of *Laccosperma* into a single species complex: *L. secundiflorum* (Drude 1895, Wright 1902, Unwin 1920, Dalziel 1937, Renier 1948, Robyns & Tournay 1955, Irvine 1961, Russell 1968, Letouzey 1978, Dransfield 1986, Berhaut 1988, Morakinyo 1995).

However, field workers began to note that there were in fact at least two species of large-diameter *Laccosperma* in West and Central Africa. The morphological differences between taxa are obvious, particularly as these species are often sympatric. Paul Tuley, who was working in Nigeria in the 1950's–60's, wrote to Tom Russell at Kew, who was then preparing an account of the Palmae for the revision of the Flora of West Tropical Africa. Tuley suggested to Russell that there might be at least two "forms" within the *L. secundiflorum* complex with "one [form] having dropping segments and the other with rigid segments that are held horizontally". Tuley was quite clearly describing, in the first instance, the pendant leaflet habit of *L. robustum*. However, Russell discounts his observations, and states that "all the flowering material at Kew, including collections of Tuley, are referrable to *Ancistrophyllum secundiflorum*" Russell (1968). In addition, Chapin, a botanist active in the then Belgian Congo makes the distinction between the true *L. secundiflorum* and "the one with pendant leaflets that grows in swamps" (Chapin 613, herb. BR!) (author's translation from the French). A brief discussion of this is also reported by Prance *et al*. (2000). Tuley (1995) went some way in distinguishing between the taxa, in describing *L. acutiflorum* and *L. secundiflorum* as separate species, but no doubt a lack of adequate voucher material hindered the preparation of a full account of this group. However, since then, further field-work and examination of herbarium material has confirmed that this "taxon" is composed of three distinct species: *Laccosperma secundiflorum, L. robustum* and *L.acutiflorum*.

Additional specimens examined:—SENEGAL: *Vanden-Berghen 7285*, Casamance (12º51N:15º17W) sterile, November 26, 1984 (BR!); GUINEA-BISSAU: *d'Orey 262*, Cacine (11º06N:15º00W) Fl., January 30, 1954 (K!); GUINEA-CONAKRY: *Chillou 1419*, Condoya forest, sterile, May 16, 1939 (BR!); *Roberty 2903*, Irie (08º16N:09º12W) Fl., December 21, 1954 (K!); SIERRA LEONE: *Deighton 2593*, Njala (08º06N:10º46W) sterile, January 1933 (K!); *Deighton 4119*, Gola forest (07º45N:10º45W) Fr., March 10, 1945 (K!); *Deighton 3090*, Tabe (08º01N:11º56W) Fr., September 21, 1935 (K!); *Jaeger 1802*, Between Krutox & Siki Koro, sterile, September 21, 1945 (MO!); *Jordan 2065*, Gola forest (07º45N:10º45W) Fr., May 13, 1955 (K!); *Jordan 2066*, Gola forest (07º45N:10º45W) Fl., May 14, 1955 (K!); *Pyne* 39, Joru to Daru road (07º41N:11º03W) sterile, November 2, 1955 (K!); *Small 697*, Gola forest (07º45N:10º45W) Fl., May 24, 1952 (K!); LIBERIA: *Adam 20746*, Fr., January 25, 1965 (K!); *Bos 2165*, St Paul river (06º30N:10º40W) Fl., July 27, 1966 (K!, WAG!, BR!); Yvory Coast: *Bernardi 8382*, Tien-Oula (06º45N:07º04W) Fr., March 2, 1962 (K!); *de Wilde 3282*, Nigbi (06º39N:06º39W) Fr., November 21, 1961 (K!, WAG!, BR!); *Hepper & Maley 8178*, Taï Forest (05º38N:07º08W) sterile, February 9, 1984 (K!); *Hepper & Maley 8062*a, Foret de Gheoule, sterile, February 3, 1984 (K!); *Leeuwenberg 3954*, 15km NE of Bianouan (06º06N:03º09E) Fr.,

April 17, 1962 (K!, MO!, WAG!, BR!); GHANA: *Foggie* 16/40, Fr., 1940 (K!); *Hall 3371*, Nkroful, Western Region (04º56N:01º44W) Fl., August 18, 1965 (K!, GC!); *Moore & Enti 9892*, Esiama-Nkroful road (04º56N:01º44W) sterile, March 7, 1971 (GC!); *Morton 377*, Ankobra River, Axim (04º55N:02º16W) sterile, August 18, 1965 (GC!); *Sunderland 2259*, Road from Tarkwa to Axim (05º21N:01º00W) sterile, May 25, 1999 (K!, KUM!); *Tomlinson* s.n., Bobiri Forest Reserve (06º38N:01º17W) sterile, December 20, 1957 (K!, GC!); *Vigne 2410*, Mampong Escarpment (07º17N:01º27W) Fl., August 30, 1932 (K!, KUM!); BENIN: *Aufsess 427*, Adjarra (06º32N:05º52E) sterile, December 6, 1988 (K!); *Latilo* s.n., Sapoba F.R. (06º06N:05º52E) Fr., January 25, 1951 (GC!); NIGERIA: *Arwaodo 42*, Aluu, Niger Delta (05º00N:06º00E) sterile, March 16, 1998 (K!); *Ayewoh 3853*, Ondo Province, Owo (08º25N:03º20E) Fl., February 24, 1944 (K!); *Barter 4*, Niger Delta (05º00N:06º00E) Fl., 1859 (FI!); *Brenan 8580*, Okomu F.R., Fl., December 21, 1947 (K!, FHO!, BR!); *Keay* FHI *6996*, sterile, November 24, 1943 (K!); *Magajie & Tuley 2166*, Ankpa Division (07º23N:07º36E) sterile, February 28, 1971 (K!); *Maggs 150*, Ikot Arna (05º06N:07º36E) Fl., August 23, 1948 (K!); *Mann 453*, Mouth of the River Niger (04º35N:07º00E) Fl., August 1, 1960 (K!, FI!); *Tuley 851*, Ikorundu Causeway, Lagos (06º28N:03º20E) Fl., September 4, 1964 (K!); *Tuley 454*, Between Nsu and Okigwe (05º39N:07º14E) sterile, January 28, 1964 (K!, WAG!); *Tuley 648*, Calabar to Mamfe road, Mile 31 (05º18N:08º34E) Fr., July 13, 1964 (K!); CAMEROON: *Aninze 24732*, Kembong Forest Reserve, SW Province (05º38N:09º14E) sterile, September 5, 1951 (K!); *Gentry* et al. *62566*, Sango River, East Province (02º22N:16º09E) sterile, May 8, 1988 (MO!); *Harris & Payne 2469*, Korup National Park (05º00N:09º00E) Fl., August 29, 1990 (K!); *Letouzey 10605*, Banks of Ngoko river nr Pandama, 8km ESE of Moloundou (02º03N:15º09E) Fl., April 4, 1971 (YA!); *Sunderland 1710*, Onge River valley (04º21N:08º57E) sterile, November 23, 1995 (K!, SCA!, NY!); *Sunderland 1755*, Limbe–Douala road at Mungo Bridge (04º08N:09º31E) sterile, November 16, 1996 (K!, SCA!, BH!); *Sunderland 1763*, 15km from Kribi on Campo road (02º34N:09º50E) sterile, December 1, 1996 (K!, YA!, BR!); *Sunderland 2048*, Takamanda Forest Reserve (06º08N:09º16E) Fl., January 18, 1999 (K!, SCA!); *Sunderland 2059*, Takamanda Forest Reserve (06º08N:09º16E) sterile, January 18, 1999 (K!, SCA!); *Sunderland 2255*, Mokoko River Forest Reserve (04º29N:09º00E) sterile, February 16, 1999 (K!, SCA!); *Thomas 2292*, Korup National Park (04º55N:08º50E) Fl., July 16, 1983 (K!, MO!, YA!); CENTRAL AFRICAN REPUBLIC: *Harris & Fay 449*, Ndakan (02º21N:16º09E) Fl., April 9, 1988 (MO!, BR!); Gabon: *de Wilde et al. 9917* (01º43S:09º50E) sterile, December 1, 1989 (WAG!); DEMOCRATIC REPUBLIC OF CONGO: *Bequaert 7076*, Barumbu (01º13N:23º30E) sterile, March 12, 1915 (BR!); *Chapin 613*, Mompoto, above Lukolela (01º03S:17º12E) Fr., October 22, 1930 (BR!); *Corbisier-Baland 1992*, Eala (00º03N:18º18E) Fl., June 20, 1933 (BR!); *Couteaux 472*, Eala (00º03N:18º18E) Fl., October 20, 1938 (BR!); *Evrard 1686*, Equator Province, Popolo (03º06N:20º45E) Fr., August 22, 1955 (K!); *Germain 1669*, Eala (00º03N:18º18E) Fr., October 1943 (K!, WAG!, BR!); *Hulstaert 869*, Eala (00º03N:18º18E) Fr., November 1, 1942 (BR!); *Hulstaert 1419*, Bokela (01º07S:21º55E) Fr., s.d. (BR!); *Hulstaert 1623*, Bamanga (00.16S:25.32E) sterile, September 17, 1954 (BR!); *Hulstaert 1624*, Bamanga (00º16S:25º32E) sterile, September 17, 1954 (BR!); *Laurent 913*, Eala (00º03N:18º18E) Fl., June 11, 1909 (BR!); *Laurent* s.n., Equator Province, Eala (00º03N:18º18E) Fl., 1905 (K!, BR!); *Laurent* s.n., Fl., 1906 (BR!); *Lejoly 1512*, Batikalela, 43km from Kisangani (00º18N: 25º33E) sterile, May 22, 1977 (BR!); *Leonard 54*, Bank of the river Bonkele, between Bamania & Ilalenga (near Eala) (00º03N:18º18E) Fr., September 26, 1945 (BR!); *Leonard 815*, Between Eala et Bantoie (00º03N:18º18E) Fr. October 12, 1946 (K!, BR!, WAG!); *Leonard 1686*, Popolo (03º06N:20º45E) Fr., August 22, 1955 (BR!); *Leonard 3960*, River Lomela (02º17S:23º15E) Fl., April 21, 1958 (BR!); *Louis 3646*, Yangambi, 5km N de fleuve (00º45N:24º26E) Fl., April 14, 1937 (BR!); *Louis 3699*, Yangambi: 5km N of Yaosuka (00º45N:24º26E) Fl., April 18, 1947 (K!, BR!); *Louis 3958*, Yangambi, 4km N du fleuve (00º45N:24º26E) Fl., May 24, 1937 (K!, BR!, FHO!, WAG!, MO!); *Louis 11739*, Ile Esali, en face de Yangambi (00º45N:24º26E) sterile, s.d. (BR!); *Louis 16995*, Yangambi (00º45N:24º26E) Fr., September 1, 1944 (BR!); *Sapin* s.n., sterile, June 26, 1906 (BR!); *Vanderyst 1408*, Kwango, sterile, 1913 (BR!); *Vanderyst 9974*, Kikwit (05º02S:18º48E) sterile, June 1921 (BR!)

5. Laccosperma acutiflorum (Becc.) Dransfield (1982: 456), Tuley (1995: 37), Cable & Cheek (1998: 179), Sunderland (2001: 109), Cheek et al. (2004: 471), Sunderland et al. (2005: 154), Govaerts and Dransfield (2005: 140), Sunderland (2007: 44). *Ancistrophyllum acutiflorum* Beccari (1910: 255), Hutchinson (1936: 391), Guinea-Lopez (1946: 242), Aedo et al. (1999: 375); *Neoancistrophyllum acutiflorum* (Becc.) Rauschert, Taxon 31: 557 (1982). Type:—CAMEROON, Limbe to Bimbia, Preuss 1232 (holotype B†; isotype FI!)

Clustered robust to massive palm climbing to 70 m, more commonly to 30–50 m. Stems without sheaths 3.5–4.5 cm, with 4.5–5 cm; internodes up to 40 cm long, more commonly 18–25 cm. Leaf sheath light green-yellowish, conspicuously striate, moderately to sparsely armed with angular, black-tipped, spreading or upward pointing, spines, mature sheaths becoming somewhat bare, with only vestigial remains of spines, covered with sparse black-brown indumentum; ocrea 12–20 cm long (although up to 40 cm long on juvenile sheaths only), broadly sheathing and tapering to form a rounded lobe, dry, sometimes splitting longitudinally, light grey-brown without, deep crimson brown within, armed as the sheath although spines often concentrated in central region of ocrea. Leaves up to 3.5 m long; petiole 6–10 cm long × 2–3 cm. wide, much longer on juvenile sheaths (up to 45 cm) light green to dull yellow, with sparse light brown indumentum beneath, abaxially rounded, adaxially flattened or slightly concave, armed along the margins with inequidistant black-tipped, bulbous-based spines 0.8–1 cm long, angular, spreading in many directions; rachis yellow-green, up to 1.8–2.5m long, shaped as the petiole proximally, becoming trapezoid to triangular in cross section distally, armed as the petiole, although spines becoming more sparse distally, underside of rachis with sparse light brown indumentum; cirrus often bright yellow, 1.2–1.8 m long, scarsely armed, ± triangular in cross section; leaflets up to 50 on each side, held horizontally or arching from the rachis, rarely strictly pendulous with a single-fold, equidistant and sub-opposite proximally, alternate distally, linear lanceolate, bluntly acuminate to apiculate at the apex (often breaking off), 30–40 cm long, more commonly 18–30 cm, 3.0–4.5 cm broad at the widest point, rarely up to 6 cm wide, discolorous with dark green upper lamina, light green lower surface, leaflet margin armed with sub-equidistant robust, short, forward-facing black-tipped spines, up to 2mm long, 1–2– or rarely 3–5 costulate, armed as the margin although spines on primary veins rather longer; acanthophylls bright yellow, 4–4.5 cm. long, 0.5 cm. broad, bulbous at base. Inflorescences, numbering 6–12 produced simultaneously in the distal 1.5–2.5 m portion of stem; peduncle 15–20 cm long; prophyll up to 20 cm; rachis branches up to 50 cm long, perpendicular to the main axis, rachis bracts 3–3.5 cm long, decreasing distally, tapering to form an elongate triangular lobe adaxially, closely adpressed to the bract above, upper half dry, grey, longitudinally splitting, at first, lower half fleshy, bright yellow-green, then, as fruits develop, becoming dry throughout; rachillae 20–30 cm long, pendulous, densely covered with yellow-green imbricate bracts 4–5 mm long, with a wide opening and 1 mm long apiculum. Flowers at anthesis 1–1.2 cm × 3 mm; calyx 5–6 mm long, excluding 1.5–2.0 mm stalk, indistinctly striate, cream, tubular in the basal 2–3 mm with 3 broadly triangular to acuminate lobes 3.0–3.5 mm × 2.0–2.5 mm; corolla tubular in the basal 1.5–2 mm, with 3 valvate lobes, white or pale cream, rarely mottled brown/tan, ca.9 mm × 2 mm with broadly acuminate tip; stamen filaments dark brown, 4–5 mm × 1 mm, united into a 1–1.5 mm-long basal tube; anthers 3 mm × 1 mm, ovary ca.1 mm in diameter, stigma up to 6 mm. Fruit at maturity ovoid, 1– (sometimes 2) seeded, 1.8–2 cm × 1.3–1.5 mm wide, with 17–20 vertical rows of scales. Seed smooth, ovoid, with lightly scalloped depression on one side 1.0–1.2 cm long × 0.8–1.2 mm wide × 0.5–0.8 mm deep.

Distribution:—*Laccosperma acutiflorum* is distributed from Sierra Leone to Cameroon, southwards to Gabon and Democratic Republic of Congo.

Habitat and ecology:—*Laccosperma acutiflorum* is a light demanding species commonly found in gap vegetation and in open areas. This species often occurs in seasonally-inundated and swamp forest, although it is also found in drier, exposed sites. *L. acutiflorum* responds well to selective logging and will colonise recently disturbed soil particularly on skid trails and roadsides.

Etymology:—(Latin) refers to acuminate calyx lobes.

Conservation status:—Least concern (LC).

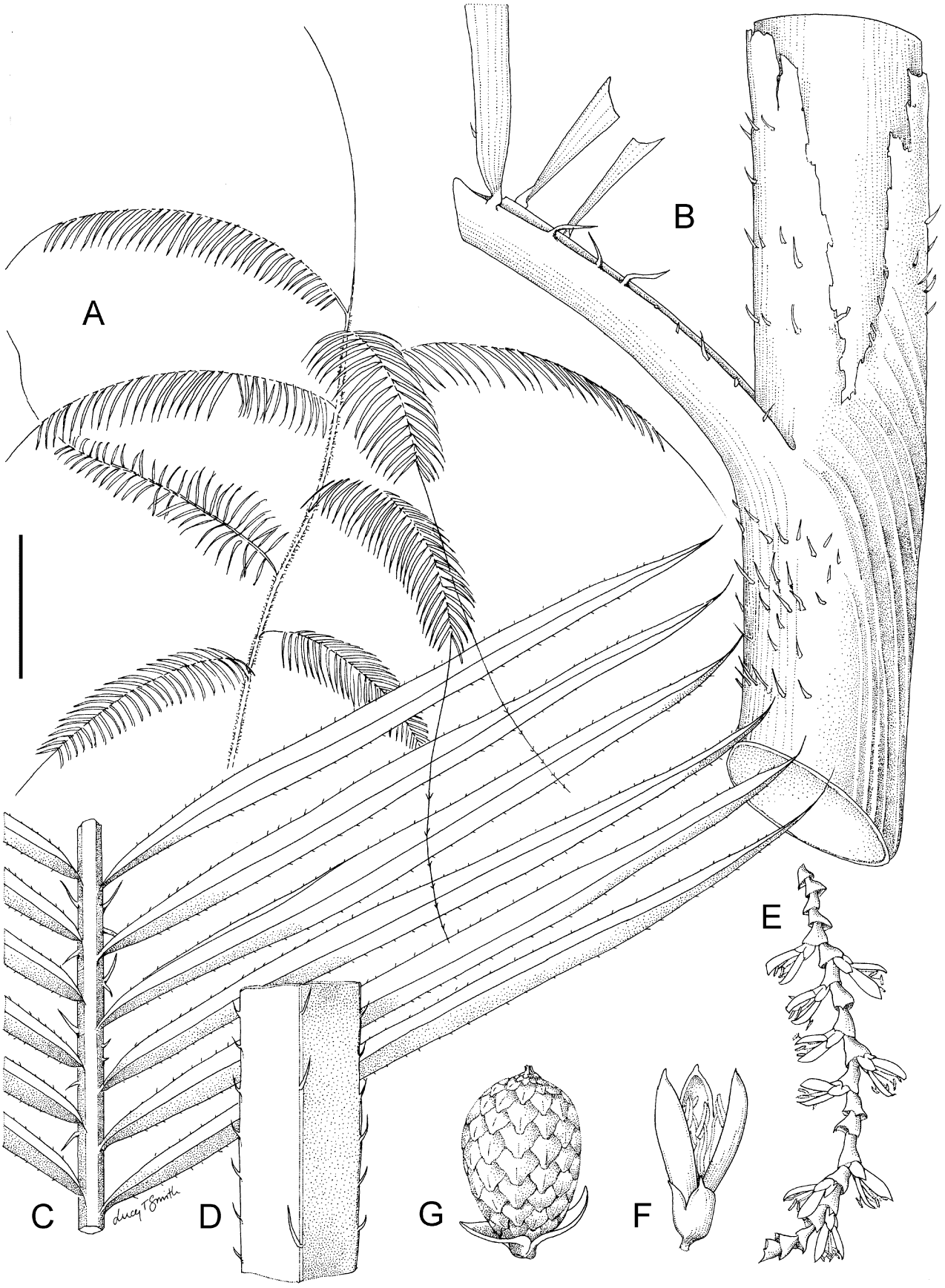
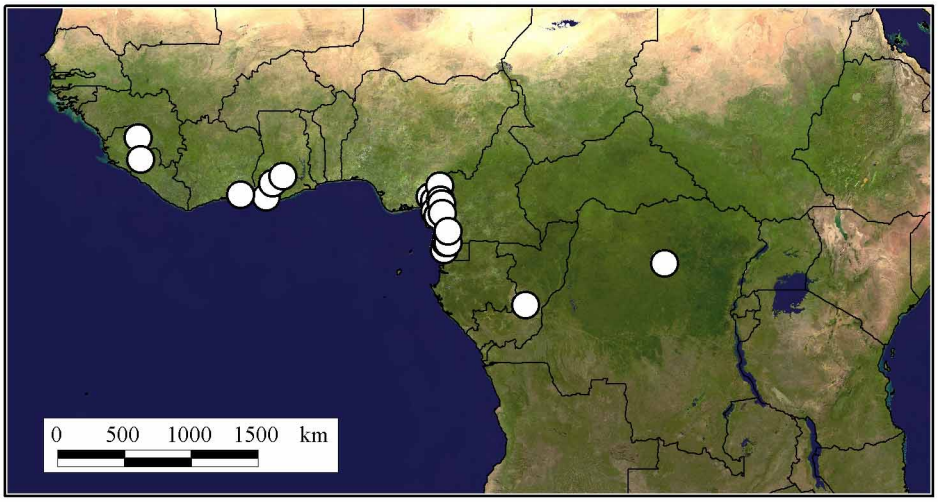


FIGURE 15 . *Laccosperma acutiflorum*

A. Habit. B. Stem. C. Leaflets. D Leaflet section (underside) E. Flowers on rachilla. F. Flower. G. Fruit. Scale bar: A = 1 m. B = 4 cm. C = 5 cm. D = 1 cm. E = 3 cm. F–G = 1 cm. A-E from *Sunderland 1926*. F from *Sunderland 1707*. Drawn by Lucy T. Smith.



MAP 17. Distribution of *Laccosperma acutiflorum*

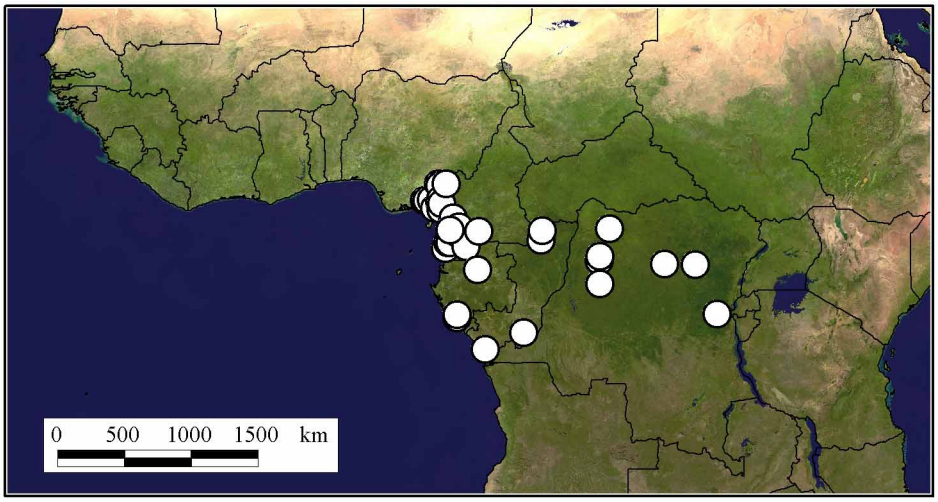
Additional specimens examined:—SIERRA LEONE: *Gledhill 339*, Koruboula to Sokwela (09º12N:10º56W) sterile, February 17, 1966 (K!); *Jordan 2064*, Gola forest (07º45N:10º45W) Fl., May 13, 1955 (K!); GHANA: *Chipp 643*, Konongo, Ashanti region (06º37N:01º12W) Fr., February 4, 1914 (K!); *Enti 758*, Aiyaola Forest Reserve (06º09N:01º53W) Fl., June 1972 (MO!); *Sunderland 2263*, Draw River Forest Reserve (05º12N:02º20W) sterile, May 26, 1999 (K!, KUM!); NIGERIA: *Morakinyo 1000*, Cross River National Park (05º15N:08º42E) Fl. & Fr., August 10, 1993 (K!); CAMEROON: *Dransfield 7001*, Mungo River Crossing (04º08N:09º31E) Fl., June 27, 1991 (K!); *Dusen 292*, Ndian (05º00N:09º00E) Fl. 1892 (FI!); *Preuss 1232*, Victoria to Bimbia (03º59N:09º13E) Fl., April 10, 1894 (FI!); *Sunderland 1707*, Southern Bakundu Forest Reserve (04º46N:09º29E) Fr., November 8, 1995 (K!, SCA!, WAG!); *Sunderland 1714*, Kumba to Mamfe road (05º02N:09º24E) Fr., November 30, 1995 (K!, SCA!, BH!); *Sunderland 1723*, 30km north of Mamfe (05º58N:09º20E) Fr., December 2, 1995 (K!, SCA!, BR!); *Sunderland 1764*, 15km from Kribi on Campo road (02º34N:09º50E) Fr., December 1, 1996 (K!, YA!, MO!); *Sunderland 1855*, 10km from Kribi at Grande Batanga (02º09N:09º48E) Fl., August 30, 1997 (K!, YA!, NY!, BR!); *Sunderland 1882*, Mbakwa-Supe flyover, 20km south of Nguti (05º02N:09º24E) Fr., November 26, 1997 (K!, YA!, BH!, MO!, WAG!); *Sunderland 1926*, Campo Ma'an Faunal Reserve (02º10N:09º54E) Fl., October 10, 1998 (K!, YA!, WAG!); *Thomas 9738*, Idenau (04º16N:09º01E) Fr., September 10, 1993 (K!, SCA!); *van Gemerden 110*, River Lobe, near Kribi (02º57N:09º54E) Fr., December 15, 1996 (K!); EQUATORIAL GUINEA: *Sunderland 1907*, Near village of Njakem (01.42N:09.40E) juvenile, March 24, 1998 (K!, YA!, EG!, WAG!); DEMOCRATIC REPUBLIC OF CONGO: *de Graer 216*, Adjala (02º02S:15º08E) sterile, November 12, 1933 (BR!); *Louis 16995*, Oriental Province, Lac Yangambi (00º47N:24º26E) Fr., September 1944 (K!); *Vanderyst 6411*, sterile, 1917 (BR!)

6. Laccosperma robustum (Burret) Dransfield (1982: 456), Sunderland (2001: 113), Govaerts and Dransfield (2005: 140), Sunderland (2007: 46). *Ancistrophyllum robustum* Burret (1942: 747), Letouzey (1978: 314); Neoancistrophyllum robustum (Burret) Rauschert, Taxon 31: 557 (1982). Type:—CAMEROON, Moloundou, *Mildbraed* s.n. (holotype B†; isotype HBG†). Neotype (here designated):—CENTRAL AFRICAN REPUBLIC, Sangha-Mbaera, *Harris* 5706 (K!)

Clustered robust palm climbing to 30–45 m. Stems without sheaths 30–50 mm in diameter, with 45–60 mm; internodes 35–50 cm long, although more commonly 18–25 cm. Leaf sheath moderately to profusely armed with black-tipped finely triangular, upward pointing or spreading spines; sheaths on upper portion of stem more sparsely armed; juvenile sheaths particularly profusely armed; dense brown-black indumentum present

on mature sheaths, more sparse on juvenile sheaths; ocrea 20–30 cm long, dry, gradually tapering at the apex, reflexed, tattering longitudinally and disintegrating, dark tan mid-brown without, crimson-brown within, armed as the sheath although spines often concentrated at the apex, particularly on juvenile sheaths. Leaves up to 3.5m long; petiole 5–12 cm long, 1.5–2.5 cm. wide, mid to dark green with scattered brown-black indumentum, particularly on upper surface, abaxially rounded, adaxially lightly to moderately concave proximally becoming flattened in cross section distally, armed along the margins with inequidistant black-tipped angular spines up to 1.4 cm long, spreading in many directions; rachis 1.5–2 m long, shaped as the petiole, becoming more trapezoid in cross section then triangular in cross-section distally, armed as the petiole proximally, spines becoming more sparse distally, with sparse brown indumentum present below; cirrus up to 1.5–2 m. long, triangular in cross section, only very sparsely armed with reflexed bulbous-based black-tipped spines, sparse brown indumentum below; leaflets always composed of a single-fold, 45–65 on each side of the rachis, equidistant, opposite to sub-opposite proximally, inequidistant, alternate distally, papyraceous, conspicuously pendulous, finely linear-lanceolate, base abruptly contracted, apex broadly to finely acuminate, often breaking off, 30–45 cm long (commonly up to 60 cm) 1.2–2.8 cm broad at the widest point, ± concolorous, glaucous blue-green, margins armed with inequidistant exceptionally fine, 5–8mm-long, forward facing curved or angular black-tipped spines; 1 costulate midrib armed as the margins although spines much longer.; acanthophylls 4.5–5 cm long. Inflorescences, numbering 6–12 produced simultaneously in the distal 1.5–2.2m portion of stem; peduncle 12–20 cm long; prophyll ± 15 cm long; rachis branches up to 50 cm long, perpendicular to the main axis; rachis bracts glabrous, 1.5–1.8 cm long, decreasing distally, dry throughout, covered in dense brown-black indumentum, tapering to form a truncate triangular lobe abaxially, closely adpressed to the bract above; rachillae 18–25 cm long, pendulous, rachillae bracts campanulate-cylindrical, ± 5 mm long, dry throughout, triangular to broadly acuminate adaxially, each with a wide opening and a 1.5 m.-long apiculum. Flowers in dyads, rarely triads, at anthesis ± 1 cm × 2.5–3.0 mm wide; calyx ± 6 mm long, excluding 1–1.5 mm long angular stalk, 2.5–3 mm wide, tubular in the basal 4 mm only, with 3 dark-tan, lightly striate, rounded to triangular, rarely acuminate, apex, 3.5 × 3 mm; corolla, tubular in the basal 2 mm only, with 3 valvate lobes ca.7 × 2 mm, white or cream, with a bluntly acuminate apex; stamen filaments, brown, fleshy, angular, 3 mm × 1 mm broad, united into 1.5 mm-long basal tube; anthers 3 mm × 1 mm broad; ovary ± 1 mm in diameter, stigma up to 5 mm. Fruit at maturity ovoid; 1– (rarely 2–) seeded, 1.2–1.5 cm × 0.8–1.2 cm, with 17–20 vertical rows of scales. Seed smooth, ovoid, with lightly scalloped depression on one side, 0.8–1.3 cm long × 0.6–0.8 cm wide × 0.5 cm thick.

Distribution:—*L. robustum* is very common species throughout its range and is distributed from SE Nigeria to the central Congo Basin.



MAP 18. Distribution of *Laccosperma robustum*

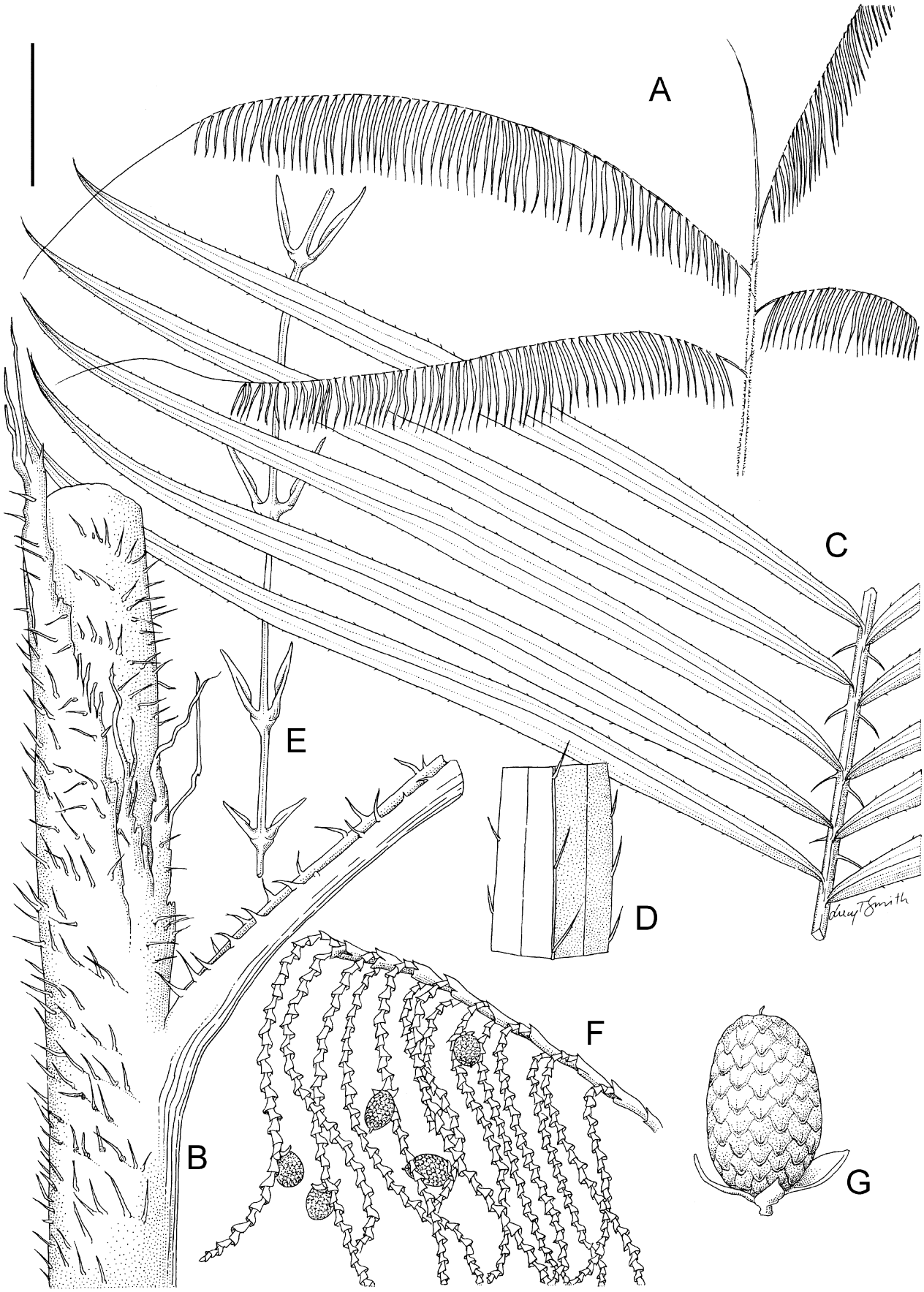


FIGURE 16. *Laccosperma robustum*
A. Habit. B. Mature stem. C. Leaflets. D. Leaflet detail. E. Acanthophylls. F. Infructescence. G. Fruit. Scale bar: A = 80cm. B–C = 5 cm. D = 1 cm. E = 6 cm. F = 5 cm. G = 1 cm. A–E from *Sunderland 1757*. F–G from *Sunderland 1791*. Drawn by Lucy T. Smith.

Habitat and ecology:—This species is commonly encountered in forest gaps and regrowth vegetation and responds well to selective-logging activities. It is encountered on both *terra firma* and seasonally-inundated forest.

Etymology:—(Latin) "robust" or "stout".

Conservation status:—Least concern (LC).

Notes:—*L. robustum* was first described by Burret (1942) from specimens collected by Mildbraed in Moloundou, Cameroon, early in the 20th century. Although the material that Burret cites was destroyed in the allied bombing of Germany in World War II, his description clearly matches this taxon. In this respect a neotype is assigned for this species, (*Harris 5706*) collected in the same area, although across the border in what is now the Central African Republic.

Additional specimens examined:—NIGERIA: *Smith 53*, Calabar (04º59N:08º20E) Fl., June, 1931 (K!); CAMEROON: *Bililong & Bullock 348*, Campo Faunal Reserve (02º14N:09º54E) seedling, s.d. (K!); *Bos 4799*, 20km from Kribi (03º00N:10º03E) Fl., June 10, 1969 (K!, MO!, WAG!, YA!, BR!); *Bos 5160*, 20km from Kribi, (03º00N:10º03E) Fr., August 7, 1969 (K!, WAG!, BR!, YA!); *Dransfield 7006*, Limbe to Kumba road, Mile 40 (05º02N:09º24E) sterile, June 28, 1991 (K!, SCA!); *Gentry & Thomas 52727*, Korup National Park (05º00N:08º30E) sterile, November 12, 1985 (K!, MO!); *Gentry & Thomas 52766*, Korup National Park (05º00N:08º30E) sterile, November 12, 1985 (MO!); *Letouzey* 7368, Nr Benga on Douala to Yaounde rd, Fl., July 7, 1966 (YA!); *Letouzey 8479*, Nr Kamelon, 10km SE Sangmelima (02º55N:11º58E) Fr., November 24, 1966 (YA!); *Lowe 3442*, Edea-Kribi rd nr Elogbatindi (03º27N:10º11E) sterile, January 22, 1978 (K!, YA!); *Njingum 1*, Nkakanzock, near Edea (03º49N:10º14E) sterile, May 15, 1999 (K!); *Njingum 3*, NW Province, Bagoran, sterile, June 1, 1999 (K!); *Njingum 5*, Akom II (02º47N:10º34E) sterile, July 1, 1999 (K!); *Njingum 9*, Nguti (05º02N:09º24E) sterile, August 5, 1999 (K!); *Sunderland 2305*, Korup National Park, Chimpanzee Camp (05º02N:08º48E) sterile, February 18, 2000 (K!, SCA!); *Sunderland 2306*, Korup National Park, Chimpanzee Camp (05º02N:08º48E) sterile, February 18, 2000 (K!, SCA!); *Sunderland 1645*, Mokoko River Forest Reserve (04º29N:09º00E) sterile, May 1, 1994 (K!, SCA!); *Sunderland 1708*, Southern Bakundu Forest Reserve (04º46N:09º29E) Fr., November 8, 1995 (K!, SCA!, BR!); *Sunderland 1722*, 30km north of Mamfe (05º58N:09º20E) sterile, December 2, 1995 (K!, SCA!, BH!); *Sunderland 1740*, Rumpi Hills Forest Reserve (04º54N:09º20E) sterile, May 19, 1996 (K!, SCA!, WAG!); *Sunderland 1747*, Rumpi Hills Forest Reserve (04º54N:09º20E) sterile, May 19, 1996 (K!, SCA!, MO!); *Sunderland 1757*, Limbe -–Kumbe road, Mile 40 (04º23N:09º26E) sterile, November 11, 1996 (K!, SCA!, MO!); *Sunderland 1928*, Campo Ma'an Faunal Reserve (02º10N:09º54E) sterile, October 11, 1998 (K!, YA!); *Sunderland 1930*, Takamanda Forest Reserve (06º06N:09º47E) sterile, November 9, 1998 (K!, SCA!); *Sunderland 1935*, Takamanda Forest Reserve (06º06N:09º47E) sterile, November 15, 1998 (K!, SCA!); *Sunderland 2058*, Takamanda Forest Reserve (06º08N:09º16E) sterile, January 18, 1999 (K!, SCA!); *Sunderland 2253*, Mokoko River Forest Reserve (04º29N:09º00E) sterile, February 16, 1999 (K!, SCA!); *Sunderland 2254*, Mokoko River Forest Reserve (04º29N:09º00E) sterile, February 16, 1999 (K!, SCA!); *van Gemerden* Bi, Kribi to Lolodorf road (03º13N:10º38E) sterile, s.d. (K!); CENTRAL AFRICAN REPUBLIC: *Fay 8236*, Ndakan (02º21N:16º09E) sterile, February 16, 1988 (MO!); *Fay 8254*, Ndakan (02º21N:16º09E) sterile, February 20, 1988 (MO!); *Harris 5704*, Sangha–Mbaere (02º59N:16º13E) Fr., December 16, 1997 (K!); *Harris 5706*, (*ibid*.) Fr., December 16, 1997 (K!); *Harris 5718*, (*ibid*.) Fr., December 25, 1997 (K!); *Harris 5719*, (*ibid*.) Fr., December 25, 1997 (K!); *Harris 5720*, (*ibid*.) Fr., December 25, 1997 (K!); EQUATORIAL GUINEA: *Sunderland 1791*, Bata to Mbini road, 17km from Bata (01º45N:09º43E) Fr., March 11, 1997 (K!, EG!, BH!); *Sunderland 1799*, 4km north of Ayemeken village (02º10N:10º03E) Fr., March 13, 1997 (K!, EG!, NY!, MO!); *Sunderland 1915*, 5km from village of Nsork (01º53N:11º06E) Fr., April 2, 1998 (K!, EG!, WAG!); *Tessmann 2*, sterile, s.d. (FI!); GABON: *Wilks 1486*, 20km N of Koumameyong (00º22N:11º54E) Fr., April 1, 1987 (MO!); DEMOCRATIC REPUBLIC OF CONGO: *Bermejo 19*, Equator: zone d'Ikela (00º36S:20º06E) Fr., s.d. (BR!); *Breyne 2357*, Maluku, Plateau des Bateke (03º52S:15º00E) Fr., June 15, 1975 (MO!, BR!); *Dubois 911*, Boendu, S of Maringa (00º56N:20º03E) Fr., August 1938 (K!, BR!, MO!); *Evrard 4943*, Kodoro–Yekokora (01º16N:20º06E) Fr., September 26, 1958 (BR!); *Leonard 1671*, Popolo (03º06N:20º45E)

Fr., August 20, 1955 (BR!); *Leonard 3817*, Kigulube: Shabunda (02º36S:28º00E) Fr., April 11, 1959 (BR!); *Liegeois 89*, sterile, July 1943 (BR!); *Louis 6445*, Yangambi (00º45N:24º26E) Fr., October 27, 1937 (BR!); *Louis 16049*, River Bokuye (tributary of the Luye), sterile, September 11, 1939 (BR!); *Louis 16794*, Yangambi (00º45N:24º26E) sterile, November 17, 1943 (BR!); *Ndjele 732*, 44km from Lubutu (00º42N:26º32E) sterile, June 22, 1981 (BR!); *Toussaint 2294*, Vallee de la Nkula, Fr., May 7, 1947 (BR!, FHO!); ANGOLA: *Gossweiler 7541*, Mayombe, Luali (05º00S:12º25E) sterile, 1919 (K!)

Oncocalamus (G.Mann & H.Wendl.) G.Mann & H.Wendl. ex Hook.f. in Bentham and Hooker (1883: 936). Type:—*O. mannii* (H.Wendl.) H.Wendl. (*Calamus mannii* H. Wendl.).

Calamus subgenus *Oncocalamus* Mann & Wendland (1864: 436).

Clustered, spiny, moderate to high-climbing, pleonanthic, monoecious rattan palms. Stem circular in cross section, with short to medium internodes; sucker shoots axillary. Leaves pinnate, strongly bifid in juveniles, with a terminal cirrus; sheath strictly tubular, bearing scattered, brown or black, bulbous-based triangular, brittle spines, sometimes becoming bare, and scattered, thin, white, caducous indumentum; ocrea conspicuous, tightly sheathing, neatly horizontally truncate, lobed or somewhat saddle-shaped, armed as the sheath, spines often concentrated on ocrea margin; knee absent, although rounded horizontal swelling visible at the base of the leaf in some species; leaves sessile, or with a very short flattened petiole; rachis unarmed or sparsely to profusely armed on the underside; cirrus bearing reflexed acanthophylls; elaminate rachis co mmon on lower part of stems, bearing equidistant, alternate to opposite acanthophylls; spear leaf deep orange to bright crimson to light green; leaflets few to numerous, usually single-fold, sometimes with 2–4 folds, entire, acute, linear, lanceolate or sigmoid, regularly arranged, usually armed along the thickened margins with robust spines, less so distally, midribs evident, other large veins rather distant, transverse veinlets conspicuous, proximal few leaflets smaller than the rest, often erect, vertical to rachis and stiffly swept back across stem or arching and somewhat pendulous. Inflorescences produced in axils; peduncle enclosed within the leaf sheath and emerging from its mouth, hemisperical or flattened and rectangular in cross-section; prophyll tubular, tightly sheathing, 2–keeled, 2–lobed at its tip, much shorter than the sheath; peduncular bracts ca.4, ± distichous, tightly sheathing at first, later splitting longitudinally, each with a short triangular or straight lobe; rachis longer than the peduncle; rachis bracts like the peduncular, rather close; rachillae pendulous with a basal 2–keeled tubular prophyll and numerous distichous, short, tubular, somewhat inflated, striate bracts, each enclosing a flower cluster, eventually longitudinally splitting and tattering post anthesis; flower cluster partially covered by a tubular 2–keeled prophyll and consisting of 5, 7, 9 or 11 flowers arranged in a group; 1–3 pistillate flowers in the centre subtended by 2 lateral cincinni of 0–2 pistillate and 2–4 staminate flowers, each flower, apart from the central pistillate, bearing an open, spathulate, 2–keeled, prophyllar bracteole. Staminate flowers symmetrical; calyx membranous, striate basally, stalked, tubular, with 3, short, triangular, apiculate lobes; corolla enclosed or only slightly exceeding the calyx, divided almost to the base into 3, elongate, striate, valvate petals; stamens 6, filaments united to form a thick fleshy, androecial tube, free from the corolla, tipped with 6 shallow lobes, bearing pendulous, rounded, latrorse anthers on the inside; pollen elliptic, monosulcate, with scabrate, tectate exine; pistillode very narrow, conical, slightly exceeding the androecial tube. Pistillate flowers superficially very similar to the staminate except slightly broader; calyx and corolla similar; staminodial tube bearing tiny empty anthers; gynoecium tricarpellate, triovulate, ± ellipsoidal, covered in reflexed scales, style long, narrow, 3–angled; ovule basally attached, anatropous. Fruit ± spherical, stigmatic remains minute, conical; epicarp covered in vertical rows of rather thin reflexed scales, mesocarp very thin, almost obsolescent at maturity, endocarp not differentiated. Seed single, ± rounded, smooth or warty, basally attached with an oval hilum, covered with a thin, papery, sweet sarcotesta; endosperm homogenous, laterally penetrated by a smooth-margined mass of inner seed coat; embryo lateral opposite the intrusion. Germination adjacent-ligular; eophyll bifid, petiole of seedling dull reddish pink.

Distribution:—*Oncocalamus* has a distinct Guineo–Congolian distribution and ranges from SE Nigeria to northern Angola, predominantly in coastal forest.

Etymology:—(Greek) *onkos* = hook and *calamus* = reed.

Notes:—Recent collections have provided considerable insight into the life history and morphology of this intriguing genus. Although recent literature has stated that *Oncocalamus* is represented by only one, very variable, species, *O. mannii*, there are in fact four species present in Africa.

Key to the species of *Oncocalamus*:—

1. Slender canes; stems with sheaths <20 mm in diameter, ocrea horizontally truncate, extending to 3 cm beyond leaf, leaves, including cirrus, less than 1 m in length; leaflets sigmoid, composed of 2–4 folds ..... *1. O. wrightianus*
–. Moderate to robust canes; stems with sheaths >20 mm in diameter; ocrea truncate with ± conspicuous 1.5–2.5 cm long rounded lobe; leaves, including cirrus, >1 m long, leaflets linear-lanceolate or only very mildly sigmoid, composed of a single fold 2

2. Stems with sheaths <30 mm in diameter, moderately armed, with no swelling beneath the leaf; leaf with 25–35 pairs of leaflets on each side of the rachis, inflorescence ± 1 m long, flower cluster with variable number of pistillate flowers (1,3,5, or 7) in each, seeds with rounded polygonal depressions, warty ..... *2. O. mannii*
–. Stems with sheaths >30 mm in diameter, unarmed or moderately to profusely armed, with visible rounded swelling beneath leaf; leaf with >35 pairs of leaflets on each side of the rachis; inflorescence >1 m long; flower cluster with constant 3 pistillate flowers in each, seeds smooth 3

3. Leaf sheath moderately to profusely armed, ocrea almost horizontal, truncate, with small (<1 cm) rounded lobe abaxial to the leaf; inflorescence up to 1.2 m long, peduncular and rachis bracts <8 cm long; rachillae bright yellow; south of the Sanaga River ..... *3. O. macrospathus*
– . Leaf sheath barely armed or unarmed, ocrea with high (>1 cm.) rounded lobe abaxial to the leaf; inflorescence up to 1.8 m long; peduncular and rachis bracts >8 cm long; rachillae deep crimson; north of the Sanaga River ..... *4. O. tuleyi*

Oncocalamus wrightianus Hutchinson (1963: 181), Jeffreys (1960: 42), Russell (1968: 167), Profizi (1986: 2), Sunderland (2001: 144), Govaerts and Dransfield (2005: 162), Sunderland (2007: 60). Type:—NIGERIA, Lagos, *Barter 2220* (holotype K!).

Clustered (?) slender palm climbing to 10 m. Stems without sheaths 6–10 mm in diameter, with 8–15 mm; internodes ±15 cm long. Leaf sheaths striate, moderately to sparsely armed with caducous black spines, particularly concentrated and persistent on ocrea, often sloughing off to leave raised, triangular, blister-like scars, sheath sometimes becoming bare at base; white caducous indumentum present on mature sheaths, profuse on young sheaths; ocrea horizontally truncate, without conspicuous lobe, extending to ±3 cm. Leaves sessile, or with a very short (<2 cm) petiole; rachis up to 60 cm long, unarmed; cirrus 35–45 cm long, unarmed; acanthophylls, 1.0–1.8 cm long. Leaflets composed of 2–4 folds, broadly lanceolate, ovate or sigmoid, 7–15 on each side of the rachis, 10–15 cm long, 2.5–5.0 cm broad at the widest point, with 2 or more prominent veins, leaflets margins sparsely armed with rather fine spines. Flower and fruit unknown.

Habitat and ecology:—This species is recorded as occurring in swamp forest only (Dalziel 1937).

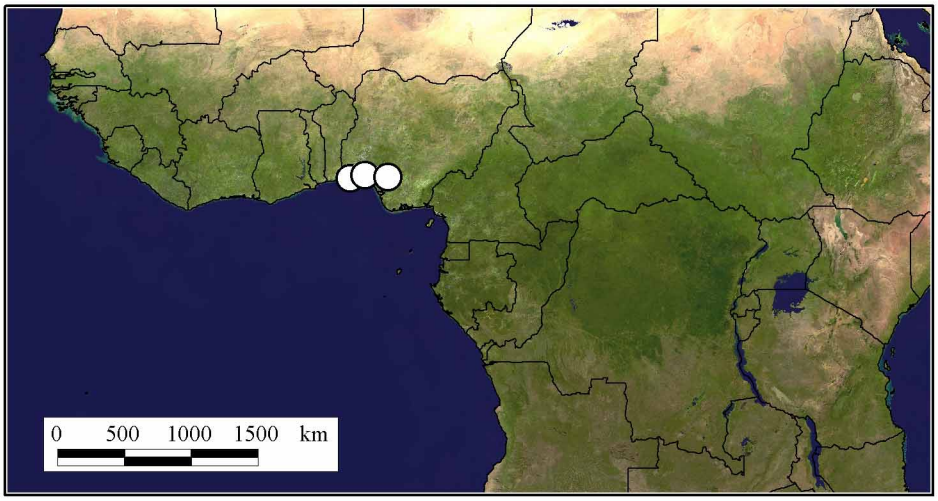
Etymology:—Named after Charles Henry Wright (1864–1941), British botanist.

Conservation status:—Vulnerable (VU) due to its restricted range and habitat loss.

Notes:—*Oncocalamus wrightianus* is distinct from all the other species in this genus by its slender nature and relatively broad, sigmoid leaflets. This species was recently reduced to synonymy by Tuley (1995), who suggested that this species represented a juvenile form of *O. mannii*. However, this is not the case as the juvenile leaves of the members of this genus are strongly bifid. More extensive field collections, particularly those of fertile material, are needed to enable a more detailed description of this taxon to be made.

FIGURE 17. *Oncocalamus wrightianus*
A. Stem and leaf section. Scale bar: A = 3 cm. All from *Aufsess 430*. Drawn by Lucy T. Smith.

Distribution:—*Oncocalamus wrightianus* is known only from southern Benin and Nigeria, extending eastwards to the Niger Delta.



MAP 19. Distribution of *Oncocalamus wrightianus*

Additional specimens examined:—BENIN: *Aufsess 430,* Adjarra (06º32N:05º52E) sterile, December 6, 1988 (K!); NIGERIA: *Barter 2220,* Lagos (06º28N:03º20E) sterile, s.d. (K!); *Jones & Onochie 17416,* Sunmoge to Oshu road (06º40N:04º18E) sterile, April 10, 1946 (K!); *Miller 18,* Lagos (06º28N:03º20E) sterile, s.d., (K!).

2. Oncocalamus mannii (H.Wendl.) H.Wendl. in Kerchove (1878: 252), Drude (1895: 111), Wright (1902: 111), Beccari (1910: 265), Baudon (1924: 595), Hédin (1929: 503), Guinea-Lopez (1946: 244), Tomlinson (1962: 100), Letouzey (1978: 314), Morakinyo (1995: 208), Tuley (1995: 83), Aedo *et al*. (1999: 375), Sunderland (2001: 132), Govaerts and Dransfield (2005: 162), Sunderland (2007: 51). *Calamus mannii* Wendland (1864: 436). Type:—GABON, Gaboon River, *Mann 1044* (holotype K!).

Oncocalamus acanthocnemis Drude (1895: 133), Durand & Durand (1909: 585), Holland (1922: 727), Hutchinson (1936: 391), Dalziel (1937: 508), Guinea-Lopez (1946: 244), Letouzey (1978: 314), Aedo *et al*. (1999: 375). Type:—GABON, *Büttner 527* (holotype B†).

Oncocalamus phaeobalanus Burret (1942: 748), Letouzey (1978: 314), Type:—CAMEROON, Ebolowa, *Mildbraed 5458* (holotype B†; isotype HBG†).

Calamus niger Braun (1889: 147 nom. illeg.) ex Wright (1902: 109), Hedin (1929: 502); Type:—CAMEROON, *Braun* s.n. (holotype B†).

Clustered slender to moderate palm climbing to 15–30 m. Stems without sheaths 8–16 mm in diameter, with 12–28 mm; internodes 12–18 cm long. Leaf sheath longitudinally striate, dark green, tan, often dull crimson brown on young sheaths, moderately to sparsely armed with brown-black spines, concentrated and persistent on the ocrea, spines often sloughing off elsewhere on sheath to leave conspicuous, raised, circular, blister-like scars; thin, white caducous indumentum present on mature sheaths, particularly dense on young sheaths and juvenile individuals; ocrea ± truncate or saddle-shaped with a 0.5–1.8 cm high rounded lobe opposite the rachis, armed as the leaf sheath, spines concentrated at ocrea margin, extending ± 2 cm. Spear leaf deep orange to bright crimson. Juvenile stems up to 6 m long, with sheaths, <1 cm in diameter, leaves sessile or with a short (1.5 cm) petiole, strongly bifid, eventually becoming pinnate, up to 30 cm long and 4.5–6 cm

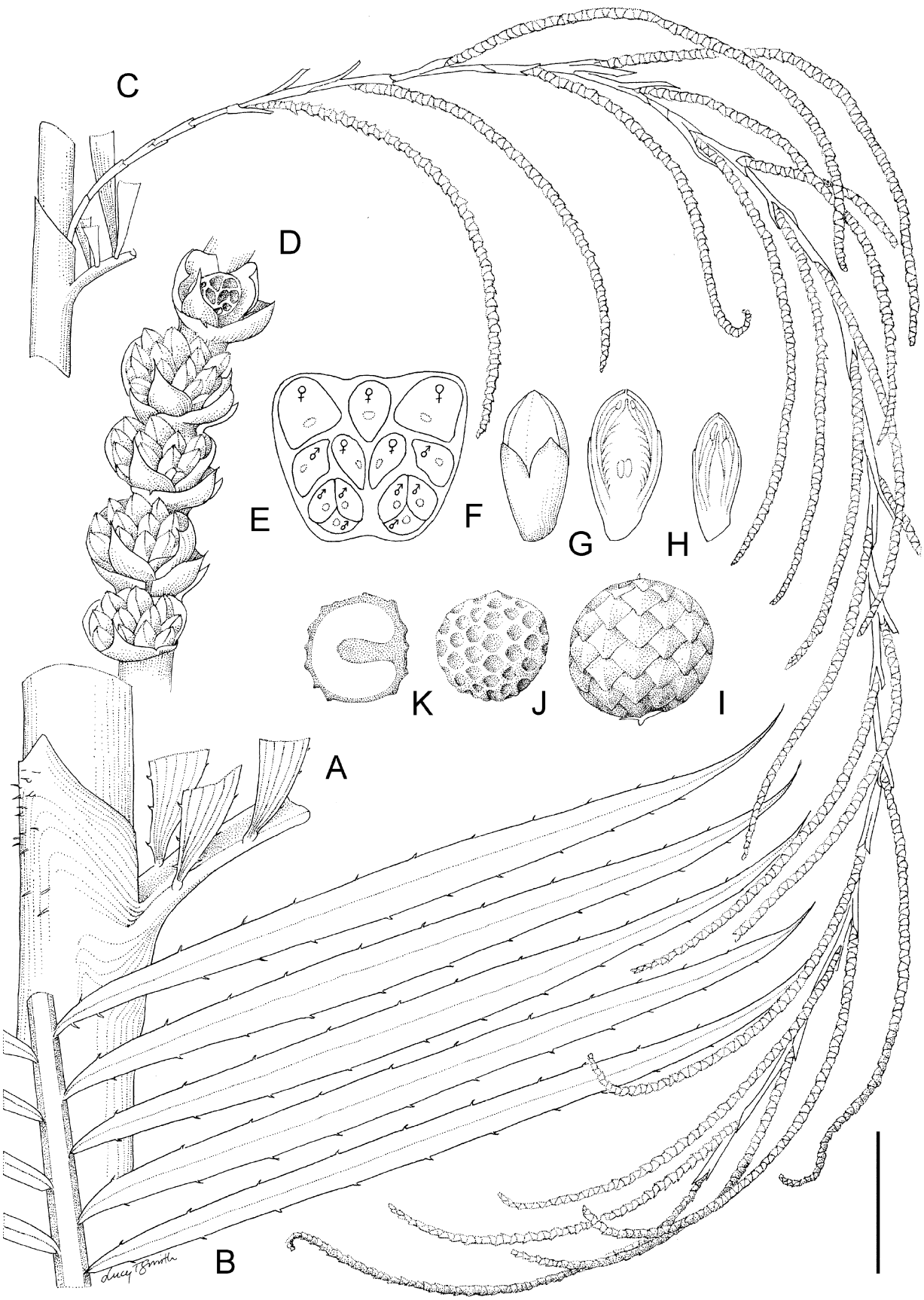
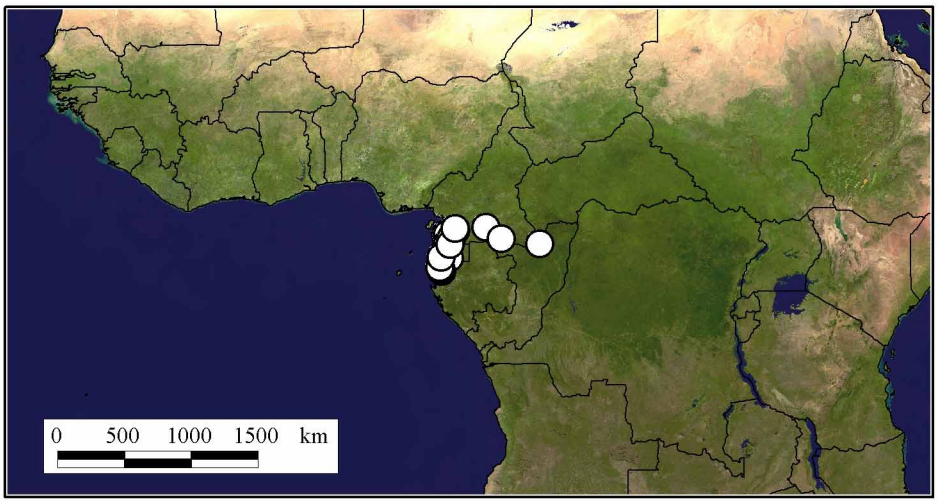


FIGURE 18. *Oncocalamus mannii*
A. Mature stem. B. Leaflets. C. Inflorescence. D. Portion of rachilla. E Flower cluster diagram. F. Pistillate flower. G. Pistillate flower section. H. Staminate Flower. I. Fruit. J. Seed. K. Seed section. Scale bar: A–B = 2.5 cm. C = 3 cm. D = 2.5 cm. E = 0.4 cm. F–H = 0.5 cm; I–K – 1 cm. A–C from *Sunderland 1921*. D–H from *Sunderland 1923*. I–K from *Sunderland 1769*. Drawn by Lucy T. Smith.

broad at the widest point and with a 60 cm long cirrus emerging from the centre; elaminate rachis often present at base of stem, up to 2.5m long. Leaves on mature stems sessile, or with a short (<2.5 cm) flattened petiole; rachis 1–1.2 m long, abaxially rounded, adaxially concave, becoming circular in cross section distally, armed as the leaf sheath, spines particularly profusely armed on underside, although often smaller than those on the sheath; cirrus 1–1.5 m long, unarmed; leaflets, 25–35 on each side of the rachis, linear-lanceolate, to mildly sigmoid, broadly attenuate at the base, apex somewhat acuminate, 16–32 cm long, 1.8–2.5 cm broad at the widest point, ± concolorous, dark green, armed along the margins with robust spines particularly at base of leaflet, single-nerved, with 6–7 conspicuous secondary nerves on each side; lowermost leaflets smaller than the rest, held vertical to rachis; acanthophylls up to 1.5 cm long. Inflorescences in successive axils 3–5m from stem apex; peduncle 8–15 cm long, hemispherical in cross section; prophyll 3–8 cm long; peduncular bracts 2–4, 2.5–4 cm long; rachis up to 0.8–1m long, pendulous; rachis bracts 2.5–4 cm long; rachillae circular in cross section, 15–28 cm long, pendulous, bracts deep–bright crimson prior to anthesis, becoming dry, brown; prophyll subtending flower cluster 3–5 mm, conspicuously striate. Flower cluster with 1–3 central pistallate flowers subtended by 2 lateral cincinni of 1–2 pistillate and 2–3 staminate flowers; staminate flowers 5.5–6.5 mm × 2–3 mm; calyx ca.5.0 mm × 5.0–5.5 mm, including 1 mm–long stalk, tubular for ½ to ¾ of its length; corolla ca.5 mm long, tubular for the basal ±1 mm, cream/yellow; staminodial tube ca.2 mm long; anthers 0.8 mm × 0.3 mm; pistillode 1.5 mm × 0.7 mm, thin, tapering; pistillate flowers similar to the staminate flowers, up to 3–4 mm wide; ovary ca.2.5 mm × ca.1.5 mm. tipped by 1–1.5 mm long style. Fruitat maturity, globose to sub–globose, 1.8–2.2 cm × 1.6–2 cm, with 15–17 rows of vertical scales. Seed sub–globose 1.2–1.6 cm × 1.5–1.9 cm, with a narrow rounded depression below, covered with regular polygonal depressions, giving a distinctly warty appearance; sarcotesta white, thin (<0.5 mm).

Distribution:—*O. mannii* is restricted from southern Cameroon to Gabon.



MAP 20. Distribution of *Oncocalamus mannii*

Habitat and ecology:—*O. mannii* is common in open areas, roadside and forest gaps. This species responds extremely well to selective logging and is a common component of regrowth vegetation.

Etymology:—Named after Gustav Mann (1836–1916), German botanist and horticulturist.

Conservation status:—Least concern (LC).

Additional specimens examined:—CAMEROON: *Asonganyi 279*, Bissombo, 59km SE Akono-linga (03º17N:12º28E) sterile, June 12, 1981 (YA!); *Bililong & Bullock 351*, Campo Reserve, Sud Province (02º14N:09º54E) juvenile, s.d. (K!); *Dinklage 1154*, Grand Batanga, (02º23N:09º50E) juvenile, February 18, 1891 (HBG!); *Letouzey 11776*, NE of Mintom II (02º30N:13º30E) juvenile, January 3, 1973 (YA!); *Letouzey 15317*, 40km S of Kribi (02º28N:09º53E) sterile, December 7, 1979 (YA!); *Sunderland 1765*, 15km from

Kribi on Campo road (02º34N:09º50E) sterile, December 1, 1996 (K!, YA!, WAG!); *Sunderland 1768*, 15km from Kribi on Campo road (02º34N:09º50E) Fr., December 1, 1996 (K!, YA!, WAG!); *Sunderland 1769*, Kribi–Ebolowa road, 30km west of Kribi (02º39N:10º09E) Fr., December 1, 1996 (K!, YA!, BH!); *Sunderland 1790*, 15km from Kribi on Campo road (02º34N:09º50E) Fr., March 5, 1997 (K!, YA!, BH!, MO!, BR!); *Sunderland 1887*, 30km south of Kribi (02º48N:09º43E) Fl. & Fr., November 28, 1997 (K!, YA!, BH!, MO!, WAG!); *Sunderland 1888*, 30km south of Kribi (02º48N:09º43E) sterile, November 28, 1997 (K!, YA!); *Sunderland 1929*, Kribi to Campo road: 40km south of Kribi (02º48N:09º53E) Fr., October 12, 1998 (K!, YA!); *van Gemerden* BJ, Lolodorf (03º05N:10º25E) sterile, s.d. (K!); EQUATORIAL GUINEA: *Sunderland 1793*, Near village of Etembue (01º16N:09º26E) Fl. & Fr., March 13, 1997 (K!, EG!, NY!); *Sunderland 1796*, 2km north of Ayemeken village (02º10N:10º03E) Fr., March 13, 1997 (K!, EG!, NY!); *Sunderland 1900*, 10km south of Bata (01º45N:09º43E) sterile, March 20, 1998 (K!, EG!, WAG!); *Sunderland 1902*, 10km south of Bata (01º45N:09º43E) juvenile, March 20, 1998 (K!, EG!, WAG!); *Sunderland 1903*, 10km south of Bata (01º45N:09º43E) sterile, March 20, 1998 (K!, EG!); *Sunderland 1908*, near village of Etembue (01º16N:09º26E) Fl., March 28, 1998 (K!, EG!, WAG!); *Sunderland 1916*, 20km from Sandje along Cogo road (01º30N:09º40E) Fl., April 7, 1998 (K!, EG!, NY!); *Sunderland 1919*, 2km WSW of village of Basilé (01º10N:09º50E) juvenile, April 7, 1998 (K!, EG!); *Sunderland 1921*, On road to Monte Mitra (01º12N:09º59E) Fl., April 7, 1998 (K!, EG!); *Sunderland 1923*, Near village of Etembue (01º16N:09º26E) Fr., March 28, 1998 (K!, EG!, WAG!); *Tessmann 1*, sterile, s.d. (FI!); CONGO: *Hens 170*, Belabo (02º09N:16º04E) sterile, May 8, 1889 (K!); GABON: *Klaine* s.n., Libreville (00º35N:09º22E) sterile, October 1893 (FI!); *Mann 1044*, Gaboon River (00º19N:09º29E) Fl., July 1861 (K!); *Mann 1044a*, Gaboon River (00º19N:09º29E) sterile, s.d. (K!); *Rietsma 2151*, NNW Libreville (00º36N:09º22E) Fl., April 25, 1986 (LBR!, WAG!)

3. Oncocalamus macrospathus Burret (1942: 749), Sunderland (2001: 136), Govaerts and Dransfield (2005: 162), Sunderland (2007: 54). Type:—ANGOLA, Luali, *Gossweiler 9092* (holotype B†: isotype K!).

Clustered robust palm climbing to 20–35 m. Stems without sheaths, 18–30 mm in diameter, with 28–40 mm; internodes 18–24 cm long. Leaf sheaths very lightly striate, light moderately to profusely armed with upward-pointing brown spines; armature often concentrated on the sheath apex and often sloughing off at base leaving very feint circular scars; profuse white caducous indumentum present on mature and juvenile sheaths; ocrea ± horizontally truncate, somewhat striate, sometimes with a very slight (0.5–1 cm) rounded lobe abaxial to the leaf, armed as the sheath, although spines often concentrated at apex, extending up to 3 cm. Spear leaf dull yellow to bright green. Juvenile sheaths, armed as the mature sheaths only spines more profuse; leaves bifid, soon becoming pinnate; elaminate rachis up to 2 m long. Leaves on mature stems sessile, or with short (<2.5 cm long) petiole; rachis 1.5–2.0 m long, abaxially rounded, adaxially concave, becoming trapezoid then triangular in cross section distally, armed as the sheath, spines particularly profuse on underside, sparse on upper surface; cirrus up to 1.5 m long, ± triangular in cross section, unarmed; leaflets 30–40 on each side of the rachis, lightly pendulous, composed of a single-fold, linear-lanceolate, or ± sigmoid, boadly attenuate at the base, broadly to finely acuminate at apex, 35–45 cm long × 1.5–2.5 cm broad at the widest point, concolorous, armed along the margin with robust spines, particularly at base of leaflet, single-nerved, with 5–7 conspicuous secondary nerves on each side, lowermost leaflets smaller than the rest, somewhat erect or stiffly swept back across stem; acanthophylls up to 5 cm long. Inflorescences in successive, axils, ca.3m from stem apex; peduncle 15–20 cm long; peduncular bracts ca.3–4, 6–7 cm long; rachis up to 1.2 m in length, arching, pendulous; rachis bracts 2.5–4.5 cm long; rachillae, circular in cross-section, 25–35 cm long, pendulous, bracts bright yellow prior to anthesis, becoming dry, grey; prophyll subtending flower cluster 5–7 mm long, striate. Flower cluster with one central pistillate flower subtended by two lateral cincinni with one pistillate and 3–4 staminate flowers; staminate flowers 5 mm × 3.5 mm; calyx longer than the corolla, with short (<1 mm) stalk, tubular for the basal 2 mm; corolla, enclosed within the calyx, ca.4 mm long, tubular for

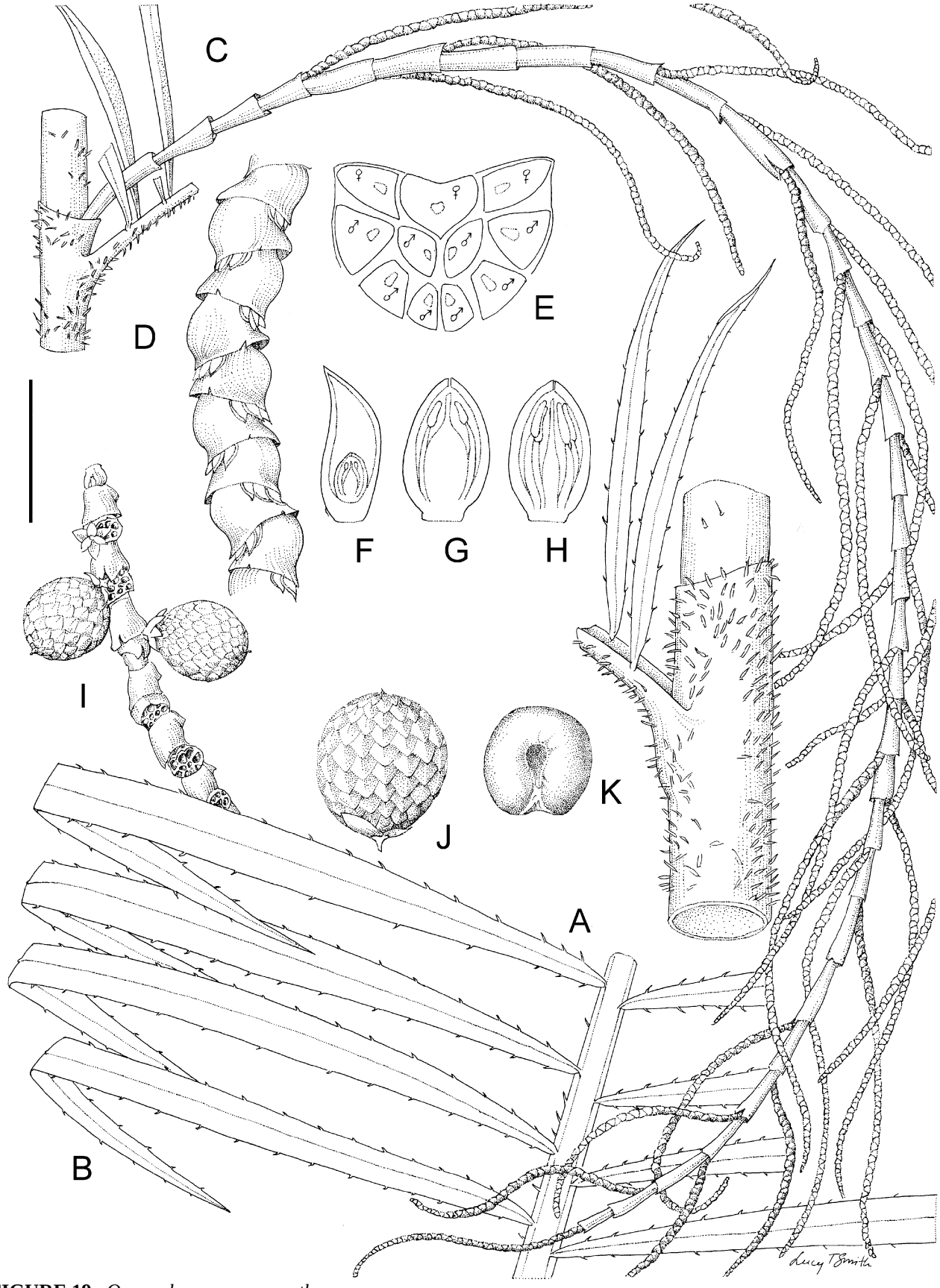
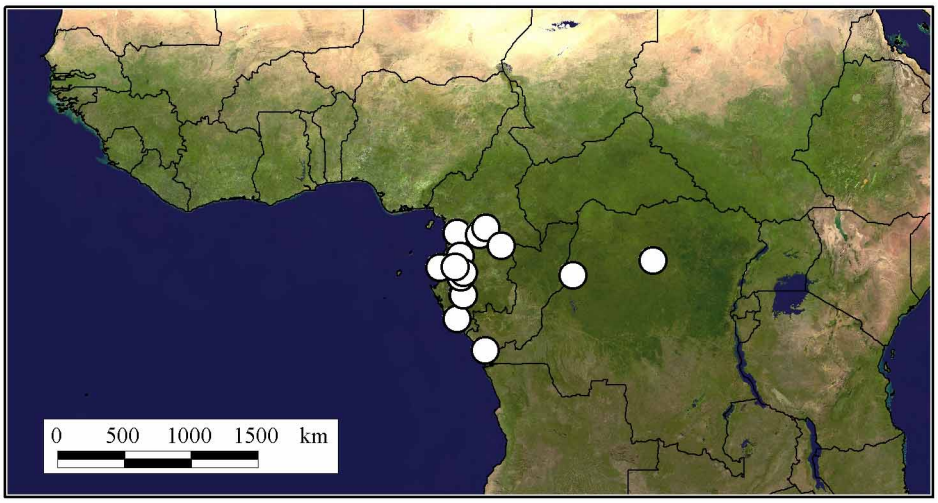


FIGURE 19 . *Oncocalamus macrospathus*
A. Mature stem. B. Leaflets. C. Inflorescence. D. Portion of immature rachilla. E. Flower cluster diagram. F. Pistillate flower with prophyllar bract. G. Pistillate flower section. H. Staminate flower section. I. Fruit on rachilla. J. Fruit. K. Seed. Scale bar: A–B = 2.5 cm. C = 3 cm. D = 1 cm. E = 0.4 cm. F–H = 0.5 cm. I – 0.5 cm. J–K = 1 cm. All from *Sunderland 1913*. Drawn by Lucy T. Smith.

the basal 1 mm; staminodial tube ca.2 mm long; anthers 0.8 mm × 0.2 mm; pistillode 2 mm × 0.5 mm; pistillate flowers similar to the staminate, 3.5–4.5 mm wide; ovary, 2.5 mm × 0.8 mm, tipped with a ca.1.5 mm long style. Fruit at maturity ± globose, 1.8–2 cm., with 18–20 vertical rows of scales. Seed sub-globose, 1.5–1.8 cm × 1.6–1.9 cm, smooth, lightly flattened to depressed below; sarcotesta <0.3 mm.

Distribution:—*Oncocalamus macrospathus* is distributed from Cameroon, south of the Sanaga River, to Cabinda (Angola). This species is more commonly encountered in coastal forest although it also occurs in the lowland riverine forests of the Congo Basin.



MAP 21. Distribution of *Oncocalamus macrospathus*

Habitat and ecology:—This species is commonly found in forest margins, tree-fall gaps and other open areas and is particularly common in seasonally-inundated forest and alongside water courses.

Etymology:—(Latin) refers to the large inflorescence bracts.

Conservation status:—Least concern (LC).

Additional specimens examined:—CAMEROON: *Lejoly 86/1005*, 3km S of L'Olonou (02º46N:12º02E), Fr., December 16, 1986 (BR!); *Letouzey 4556*, 35 km S of Bengbis (03º13N:12º28E), Fr., March 17, 1962 (YA!); *Letouzey 11889*, Mintom I (02º03N:13º30E) Fl., January 23, 1973 (K!, YA!); EQUATORIAL GUINEA: *Sunderland 1913*, Akonibe to Evinayong road (01º21N:10º43E) Fl. & Fr., April 2, 1998 (K!, EG!, BH!, WAG!); *Sunderland 1914*, Akonibe to Evinayong road (01º21N:10º43E) sterile, April 2, 1998 (K!, EG!, WAG!); GABON: *Breteler* et al. *10957*, 5–30km NNW of Ndjale (00º05S:10º45E) Fl., April 21, 1992 (WAG!); *Dibata & Mbouissou 958*, Mission Otouma (00º13N:10º56E) Fr., February 10, 1992 (BR!); *Louis* et al. *1350*, 32km SE of Sindera (01º14S:10º53E) Fr., July 13, 1983 (K!, WAG!, BR!, HBG); *Reitsma 1340*, Between Cap Santa Clara and Cap Esterias (00º34N:09º22E) Fr., August 15, 1985 (WAG!); *Wieringa 466*, 0.5km SE of Tchimbelé (00º36N:10º24E) Fr., January 25, 1990 (WAG!); DEMOCRATIC REPUBLIC OF CONGO: *Couteaux 502*, Eala (00º03N:18º18E) sterile, October 29, 1938 (BR!); *Evrard 2077*, Isangi (01º02N:23º41E) Fl. & Fr., December 11, 1956 (BR!); *Gossweiler* H1039/24, Port Congo, Fr., April 28, 1924 (K!); ANGOLA: *Gossweiler 9092*, Mayombe, Luali, (05º00S:12º25E) Fl. & Fr., s.d. (K!)

4. Oncocalamus tuleyi Sunderland (2002: 365), Govaerts and Dransfield (2005: 162), Sunderland (2007: 57), Dransfield *et al*. (2008: 148). Type:—CAMEROON, Ossing, near Mamfe, *Sunderland 1939* (holotype K!; isotypes SCA! NY! MO!)

Clustered robust palm climbing to 30m, rarely to 50 m. Stems without sheaths 13–22 mm in diameter, with, 25–45 mm; internodes 14–25 cm long, commonly 15–18 cm. Leaf sheath lightly striate, light brown to mid-

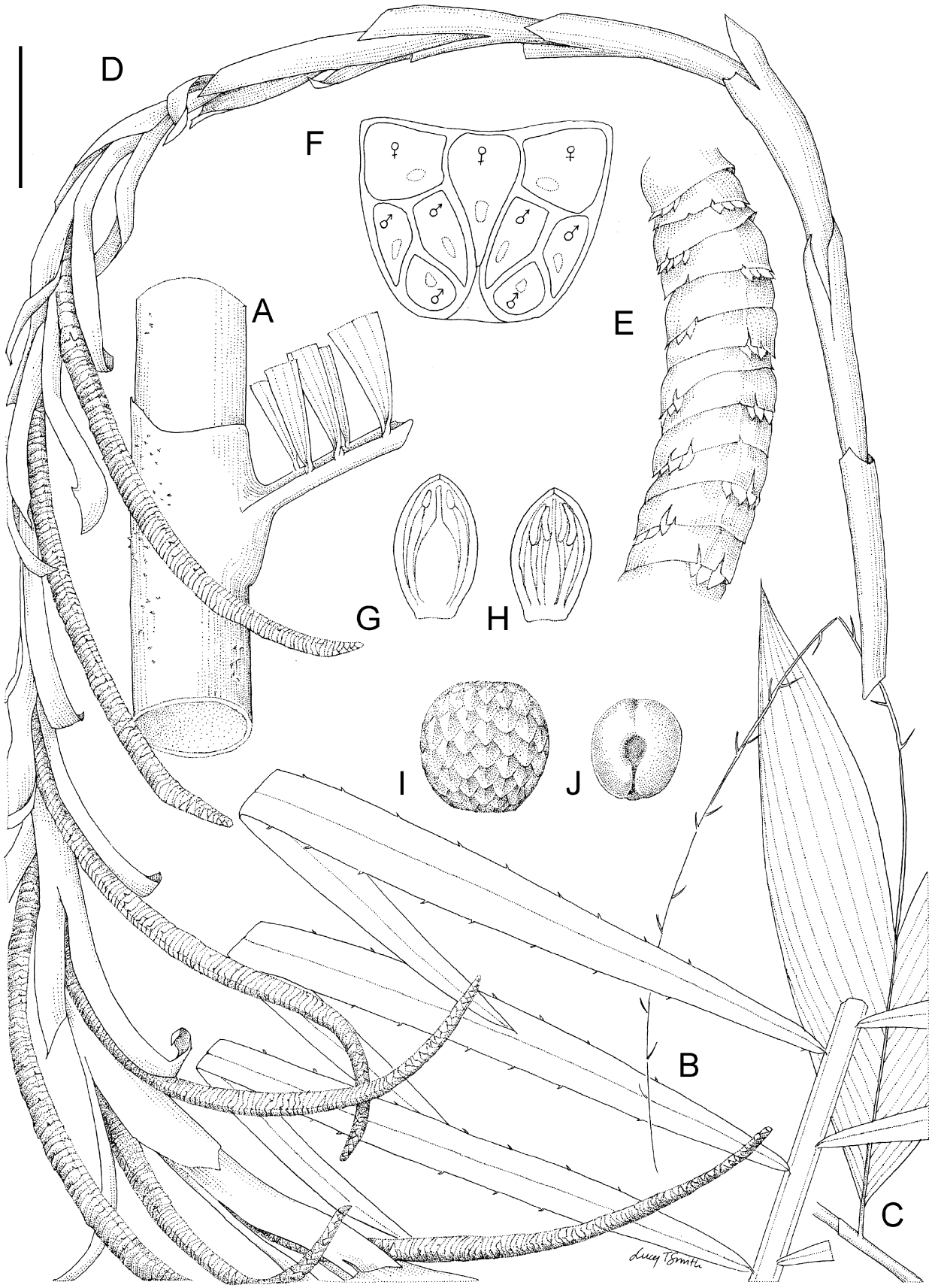
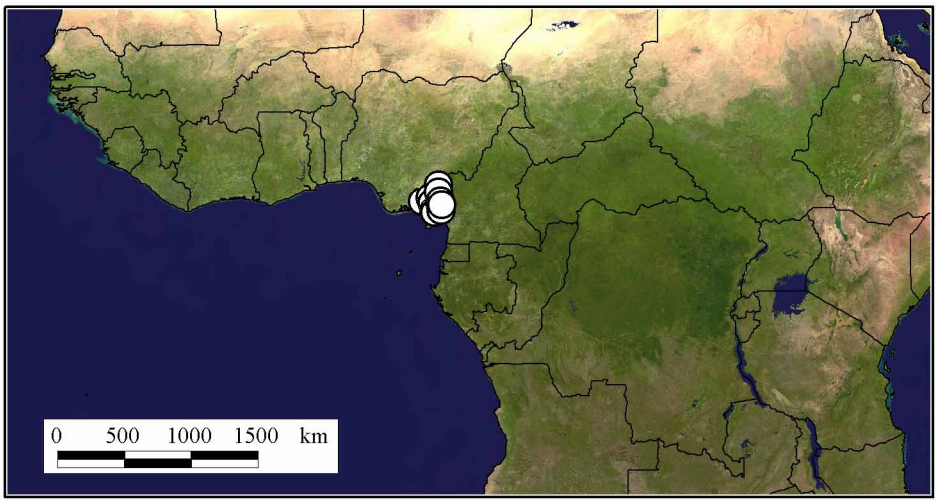


FIGURE 20 . *Oncocalamus tuleyi*
A. Mature stem. B. Leaflets. C. Juvenile leaf. D. Inflorescence. E. Portion of immature rachilla. F. Flower cluster diagram. G. Staminate flower. H. Pistallate flower. I. Fruit. J. Seed. Scale bar. A–B = 5 cm. C = 4 cm. D = 3 cm. E = 0.5 cm. F= 0.4 cm. G–H = 0.5 cm. I = 1 cm. A–B and D–H from *Sunderland 1939*. C from *Sunderland 1746*. I–J from *Sunderland 1761*. Drawn by Lucy T. Smith.

green, very sparsely and patchily armed with dark brown to glaucous black spines, often concentrated on the ocrea; sheaths often becoming bare with spines sloughing to leave raised, linear blister-like scars; thin white caducous indumentum present on young sheaths, absent on mature sheaths; ocrea saddle-shaped, with 1.5–2 cm. rounded lobe abaxial to the leaf, armed as the leaf sheath, spines concentrated on margin, extending for ± 2.5 cm; knee absent, although conspicuous horizontal rounded swelling visible beneath leaf. Spear leaf dull reddish brown, becoming green. Juvenile stems up to 10 m, with sheaths <2 cm in diameter, leaves strongly bifid, becoming pinnate, with a short (<6 cm) petiole, 30–45 cm long, 10–15 cm broad at the widest point, with 60–100 cm-long cirrus emerging from the centre; elaminate rachis common at base of stem, 1.5–2 m long. Leaves on mature stems sessile, or with a short (<3 cm) flattened, unarmed petiole; rachis unarmed 1.2–2m long, abaxially rounded, adaxially concave, becoming trapezoid then triangular in cross section distally, unarmed; cirrus 0.8–1.5 m long, rarely 2 m, unarmed; leaflets up to 30–50 on each side of the rachis, composed of a single fold, rarely rarely composed of up to 4–folds, linear-lanceolate or ± sigmoid, broadly to narrowly attenuate at base, finely acuminate at apex, 25–45 cm long, 2.2–3.3 cm broad at the widest point, ± pendulous, uni-, bi- or sometimes tri-nerved, armed along the margins with robust spines particularly at base of leaflet, lowermost leaflets smaller than the rest, arching and somewhat pendulous; acanthophylls up to 4 cm long. Inflorescences born in leaf axils ca.3 m, from stem apex, peduncle up to 30 cm long, flattened, ± rectangular in cross section; prophyll up to 15 cm long; peduncular bracts ca.4, 13–15 cm long, grey-brown without, crimson-brown within; rachis up to 1.8m long, pendulous; rachis bracts as the peduncular bracts except increasingly triangular, acute, at apex; rachillae ± rounded or slightly flattened, 35–45 cm long, bracts dull crimson prior to anthesis; prophylls subtending flower cluster 4–6 mm long, somewhat striate. Flower cluster with 1 central pistillate flower subtended by 2 lateral cincinni with 1 pistillate and 3–4 staminate flowers. Flowers at anthesis not known. Fruit at maturity ± globose, 1.9–2.1 cm × 1.6–1.8 cm, with 17–19 rows of vertical scales. Seed smooth, sub–globose, 1.5–1.7 cm. × 1.2–1.5 cm. with linear cleft or rounded depression below; sarcotesta white, very thin (<0.3 mm).

Distribution:—This species is restricted to coastal forest from SE Nigeria to SW Cameroon, north of the Sanaga River and is allopatric with *O. mannii*.



MAP 22. Distribution of *Oncocalamus tuleyi*

Habitat:—*Oncocalamus tuleyi* occurs at the forest edge, adjacent to open areas, and in gap regrowth vegetation in forest. This species is an early coloniser of disturbed land and as such is a characteristic feature of roadside vegetation in logged forest.

Etymology:—Named after Paul Tuley (1927–2004), agronomist, civil servant and palm researcher.

Conservation status:—Near threatened (NT) due to its restricted range and habitat loss, particularly along the Nigeria–Cameroon border.

Notes:—Although previously assigned to *O. mannii*, this species is clearly sufficiently morphologically distinct to warrant designation as a separate species. *Oncocalamus tuleyi* is characterised by very robust stems, large rachis bracts on the inflorescence, a uniform flower cluster arrangement and a smooth seed coat.

Additional specimens examined:—

NIGERIA: *Morakinyo 1002*, Cross River National Park (05º15N:08º42E) sterile, August 16, 1993 (K!); *Tuley 1078*, Calabar to Ikot Opora road (05º00N:08º12E) sterile, December 10, 1964 (K!); CAMEROON: *Dransfield 7007*, Mile 48 Buea-Kumba road (05º02N:09º24E) sterile, June 28, 1991 (K!, SCA!); *Dransfield 7476*, 8km S of Nguti (05º02N:09º24E) Fl., November 26, 1997 (K!); *Gartlan 39*, Southern Bakundu Forest Reserve (04º46N:09º29E) Fr., November 11, 1968 (K!); *Sunderland 1705*, Southern Bakundu Forest Reserve (04º46N:09º29E) sterile, November 8, 1995 (K!, SCA!, BR!); *Sunderland 1706*, Southern Bakundu Forest Reserve (04º46N:09º29E) sterile, November 8, 1995 (K!, SCA!, BH!); *Sunderland 1731*, Rumpi Hills Forest Reserve (04º54N:09º20E) seedling, May 19, 1996 (K!, SCA!, NY!); *Sunderland 1733*, Rumpi Hills Forest Reserve (04º54N:09º20E) sterile, May 19, 1996 (K!, SCA!, BH!); *Sunderland 1739*, Rumpi Hills Forest Reserve (04º54N:09º20E) sterile, May 19, 1996 (K!, SCA!); *Sunderland 1743*, Rumpi Hills Forest Reserve (04º54N:09º20E) sterile, May 19, 1996 (K!, SCA!, WAG!); *Sunderland 1746*, Rumpi Hills Forest Reserve (04º54N:09º20E) juvenile, May 19, 1996 (K!, SCA!, NY!, MO!); *Sunderland 1756*; Limbe-Kumbe road: Mile 40 (04º23N:09º26E) juvenile, November 11, 1996 (K!, SCA!, NY!, WAG!); *Sunderland 1759*, Limbe-Kumbe road: Mile 40 (04º23N:09º26E) sterile, November 11, 1996 (K!, SCA!, WAG!); *Sunderland 1761*, Southern Bakundu Forest Reserve (04º46N:09º29E) Fr., November 25, 1996 (K!, SCA!, BR!); *Sunderland 1939*, Mamfe to Ossing road, 15km south of Mamfe (05º38N:09º17E) Fl., November 20, 1998 (K!, SCA!, NY!); *Sunderland 2056*, Takamanda Forest Reserve (06º08N:09º16E) sterile, January 17, 1999 (K!, SCA!) ; *Thomas 9732*, Idenau (04º16N:09º01E) Fr., September 10, 1993 (K!, SCA!); *Thomas* s.n. Korup National Park (04º55N:08º50E) sterile, s.d. (SCA!)

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