

notata (maxima 25–32 cm. longa 4.5–5.3 cm. lata), subtus pallidiuscula, geminis 10–25 cm. inter se remotis. *Spadix femineus* erectiusculus, 80–120 cm. longus, in appendicem 6–15 cm. longam, unguiculatum terminatus, in ramos 6 divisus. *Spathae primariae* 8–20 cm. longae, deciduo furfuraceae, striatae, aculeis brevis robustis reflexis armatae; spatha basalis bicarinata, secus carinas aculeis angustissimis rectis ad 2 cm. usque longis praedita; alterae spathae cylindricae. *Rami primarii* spiculiferentes pyramidales, paulo supra spatharum apicem orientes, 6–20 cm. longi; spathae secundariae 5–15 mm. longae, striatae, late infundibuliformes, apiculatae, secus margines fimbriatae. *Spiculae* 2–5 cm. longae, untrinsecus floribus 6–12; spathellae bracteiformes, concavae, apiculatae, striatae. *Involucrophorum* paulo exsertum, cupulare; involucrum pateriforme. *Perianthium fructiferum* cyathiforme basi truncatum; calyx corollae aequilongus, ad medium partitus. *Fructus* vixdum ex perianthium exsertus, minime evolutis; squamis luteis secus margines brunnescentibus, per series 15–16 dispositis ut videtur.

Stem scandent, 15–18 m. long, 2–2.5 cm. through. *Leaf-sheaths* gibbous, deciduously furfuraceous, striate, armed with unequal spines, the longer ones 1.5–2.5 cm. long, the smaller ones minute and intermingled with others. *Leaves* 75–100 cm. in the pinniferous parts, ending in a long cirrus; petiole 6–7 cm. long, sparsely armed on the margins and on the lower surface; claws on the rachis a few, solitary at first, digitate in the distal portion. *Leaflets* 8–12 on each side of the rachis, usually arranged in groups of two, though often solitary at the base, subopposite or alternate, obovate, gradually cuneate at the base, long acuminate at the apex, 4–6 costate, somewhat paler beneath, unarmed all over excepting a few spinules in the middle of the rib on each side of the main nerve and a few deciduous setae at the apex; the largest leaflets 25–32 cm. long, 4.5–5.3 cm. broad. *Female spadix* 80–120 cm. long, subdivided in 6 unequal branches, and ending in a small 6–15 cm. long, clawed appendix. *Primary spathes* 8–20 cm. long, tubular, striate, armed with short, robust claws; the basal spathe bicarinate, the spines along the carinae few and straight; secondary spathes 5–15 mm. long, striate, fimbriate at margins. *Spikelets* 2–5 cm. long with 6–12 distichous flowers on each side. *Fruiting perianth* pedicelliform. *Fruit* quite immature, scales appearing to be yellow with brownish margins and to be arranged in 15–16 series.

MALAYA: Johore, Sungai Kavu (Kiah 32.310).

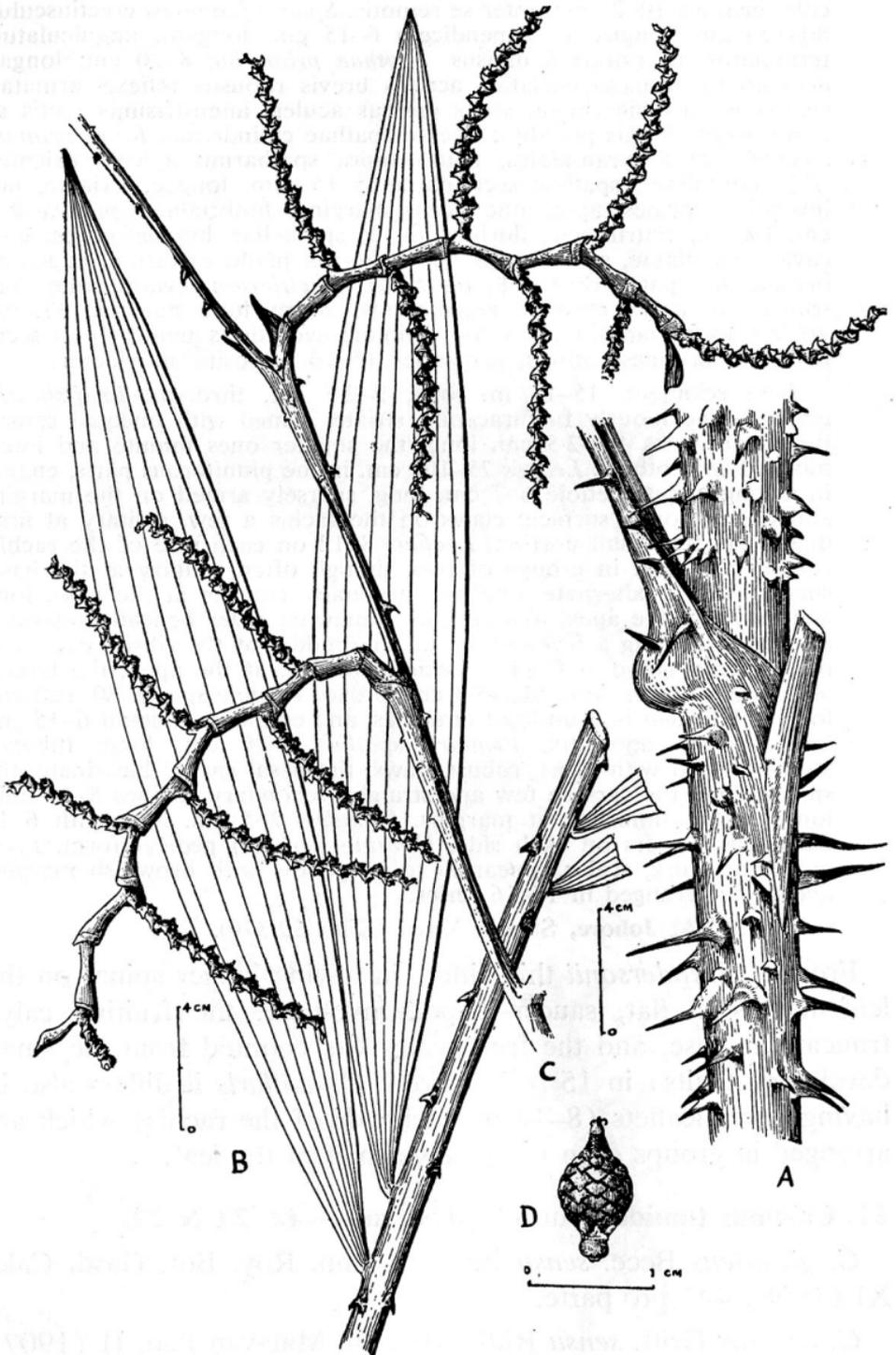
From *C. Hendersonii* this differs in having longer spines on the leaf-sheaths, a flat, saucer-shaped involucre, the fruiting calyx truncate at base, and the fruit scales (as counted from the small developing fruits) in 15 series. From *C. axillaris* it differs also in having fewer leaflets (8–12 on each side of the rachis) which are arranged in groups even in the lower-half of the leaf.

21. *Calamus tumidus* Furtado spec. nov.—t.t. 21 & 22.

C. giganteus Becc. *sensu* Becc. in Ann. Roy. Bot. Gard. Calc. XI (1908) 441 pro parte.

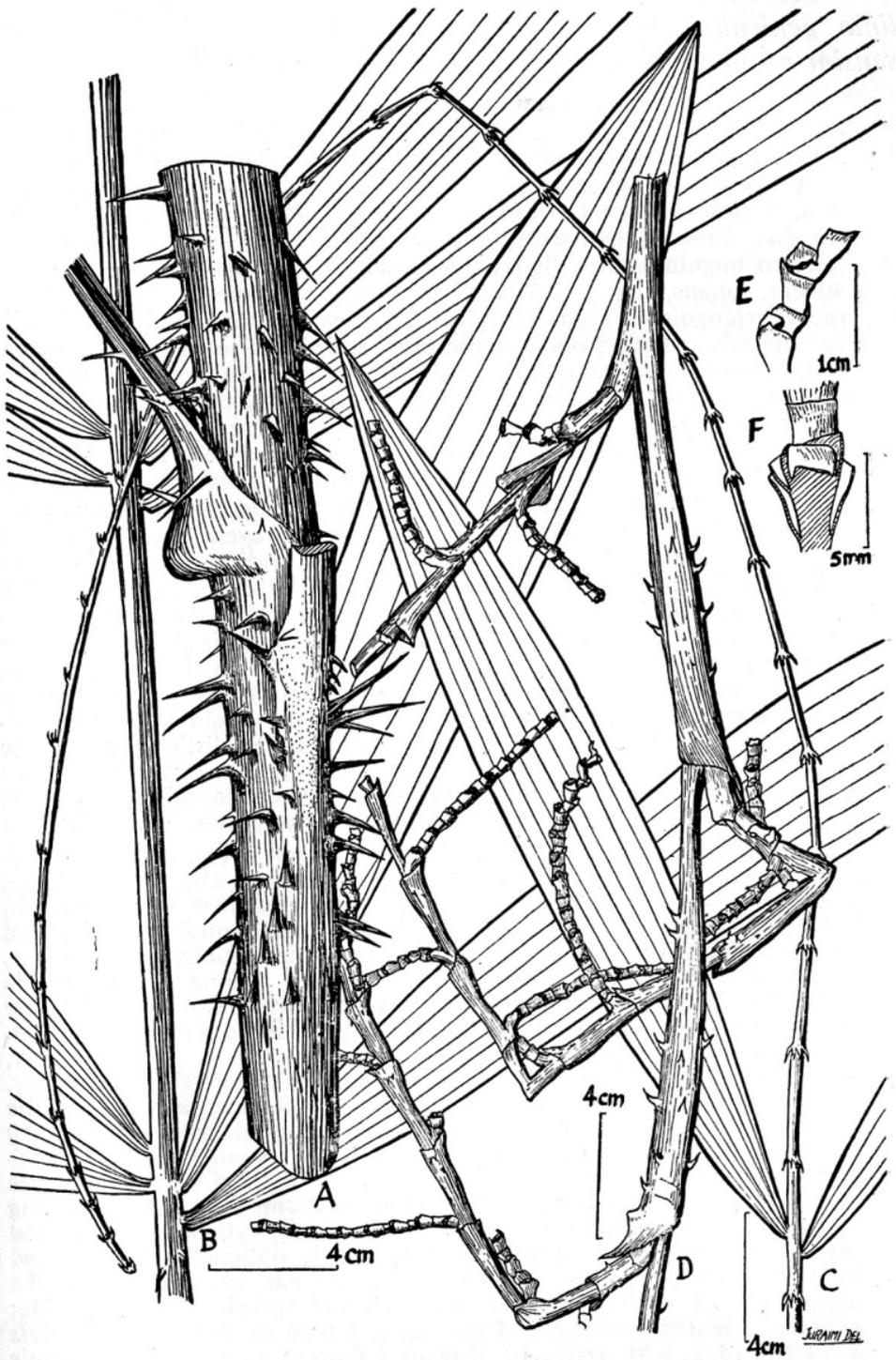
C. ornatus Griff. *sensu* Ridl., Mat. Fl. Malayan Pen. II (1907) 195 et Fl. Malay Pen. (1925) 53 pro parte.

A. C. Manan, cui affinisissima, haec species minus armata, secus vaginae margines et in superficie petioli superiore inermis; vaginae aculeis lignosis fere non-elasticis; foliolis fasciculatis, saepissime



Tab. 21. *Calamus tumidus* (Ridley 11,203 partim).

A, Fragmentum caudicis cum vagina et geniculo. B, Frondis fragmentum. C, Spadicis fragmentum (an *C. tumidus*?) D, Ejusdem fructus.



Tab. 22. *Calamus tumidus* (Corner & Furtado 29,474—holotypus).

A, Caudicis fragmentum ut vagina et geniculum appareant. B, Frondis fragmentum mesiale. C, Frondis fragmentum apicale. D, Spadicis pars feminei. E, Spiculae pars ut spathe, involucrorum et involucrium appareant. F, Idem verticaliter discissa.

geminatis sat distincta. A C. palustri cui in frondium facie similima, geniculo vaginali basi abrupte inflato rotundato, in petiolum sensim exeunte, foliolis bicoloribus haec species dissimillima.

Caudex solitarius scandens, circa 20–30 m. longus, cum vaginis circa 4 cm. in diam. *Vagina* lignosa, aculeis triangularibus, inaequalibus ad 3 cm. longis, distantibus, saepe minoribus, oblique fere sitis praedita, ad petioli basin subito valde gibbosa et infra horizontaliter semi-annulata, petiolum versus rotundato cuneata. *Ocrea* brevissima, lignosa, decidua. *Fronde*s in parte pinnifera metrales vel longiores, in cirrum longum unguibus atris digitatis armatum terminatae; petiolus usque ad 40 cm. longus, basi 2–2.5 cm. latus, secus margines tantum armatus; rachis triangularis, secus margines dorsales tantum unguibus solitariis vel digitatis armata. *Foliola* numerosa, fasciculata, saepissime geminata, paulo divergentia subopposita, 12–20 cm. inter se remota, elongato-elliptica, utrinque sensim cuneata papyracea, longitudinaliter plicatula, subtus glaucescentia (in juvenilibus secus marginem inferiorem linea polita una vel magis notata), utrinque inermia, apicem versus deciduo setosa, 7–11 costata, apicalia minima, altera subaequalia, maxima 40–50 cm. longa, 6–7 cm. lata. *Spadix femineus* haud flagelliformis, crassus, frondibus multo brevior, in appendicem brevem exeuns, breviter pedunculatus, unguibus solitariis validis in appendice digitatis, in ramis primariis 4–5 divisus. *Spathae primariae* basales duae, bicarinatae 4–8 longae, secus carinas aculeatae; alterae spathae 7–15 cm. longae cylindricae, basin versus angustatae, unguibus solitariis armatae, apice oblique truncatae ligulatae. *Rami primarii* ad 25 cm. longi, utrinsecus spiculas alternas ferentes, ad spathae apicem orientes; spathae secundariae conformes, 2–4 cm. longae, inermes vel paulo aculeatae. *Spiculae* 8–10 cm. longae, floribus utrinsecus circa 10 distichis; spathellae infundibuliformes, apice truncatae, ligulatae, striatae. *Involucrophorum* cupulare; involucrum oblique cupulare, immersum; areola semilunaris, ad involucrophori marginem attingens. *Fructus* floresque ignoti.

Stem solitary, climbing, 20–30 m. long, about 4 cm. through. *Leaf-sheaths* woody, armed with stout, usually solitary, somewhat oblique, unequal 1–3 cm. long, spines, smooth and unarmed at the mouth, swollen abruptly into a horizontal and semi-annular geniculum, rounded and then merging gradually into the petiole. *Ocrea* short, deciduous. *Leaves* very long, terminating into a long cirrus; petiole about 40 cm. long, perhaps shorter in older leaves, stout armed along the margins only; claws on the pinniferous rachis simple and marginal, but digitate in terminal parts of the leaf and in cirrus. *Leaflets* many, fasciculate, often geminate, almost opposite, elongate-elliptic, papery, longitudinally plicatulate, whitish below, 7–11 costate, setose along the margins at apex, terminal smallest; others subequal, the largest 40–50 cm. long, 6–7 cm. broad. *Female spadix* much stouter than the leaf-rachis or petiole, ending in a short appendix, divided in 4–5 branches or more; the two basal spathes bicarinate, 4–8 cm. long, aculeate along the ridges; other primary spathes 7–15 cm. long, cylindrical, narrowed towards the base, armed with solitary claws, obliquely truncate and ligulate at apex. *Primary branches* up to 25 cm. long, arising at the mouth of the spathe, bearing 4–5 alternate spikelets on each side; secondary spathes similar, 2–4 cm. long, armed or unarmed. *Spikelets* 8–10 cm. long, with about 10 distichous flowers on each side; spathels funnel-shaped, ligulate, striate. *Involucrophore* deeply cupular; involucre obliquely cupular, immersed; areola semi-lunar, reaching to the surface of the involucrophore. *Flowers* and *fruits* unknown.

MALAYA: Johore, Sungai Kayu Ara (Corner & Furtado 29,474 sub nom. vern. *Rotan Manau Liki*, holotypus); Kuala Tebing Tinggi (Ridley 11,202 et 11,203 partim).

This species is easily distinguished by its geniculum (gibbosity on the sheath) being abruptly and almost uniformly swollen, giving the appearance of a horizontal, semi-circular ring at the base of the petiole; and by its leaflets being whitish underneath. It is quite common at Sungei Kayu Ara, but it was rarely seen in flower. The difficulties of getting it in flower, and also the fact that the species is confused with others, might be the reasons why collections of the species are so few and meagre. In the specimen collected by Corner and myself, the spadix was already dead and it was not possible to get it in a way to show its full details. It was noticed that the petioles tend to be shorter in the leaves produced in higher parts of the stem.

In certain respects this species has the characters of *C. palustris* which, according to Beccari, varies considerably though it is sparsely represented in herbaria. In order to provoke further studies it has been named here as a distinct species on account of the peculiar gibbosity of the sheath. From *C. ornatus*, with which this species has been confused, *C. tumidus* differs in the long cirrus of the leaves and short, non-flagelliferous spadices; from *C. Manan* of which *C. giganteus* appears to be a subspecies or a variety, *C. tumidus* differs in its fascicled bicolored leaflets, its peculiar shaped geniculum, and fewer spines on the sheaths. I have not seen any other large Malayan species which has a geniculum shaped similar to this, but *C. formosanus* from *Formosa* (Taiwan) is depicted by Beccari with a similar shaped geniculum.

Ridley 11,203 (leaf only) belongs here. Another sheet containing a portion of spadix with small immature fruits bears the same number. In the general appearance of its spikelets and spathes, this latter specimen may be easily confused with that of *C. giganteus*; but the fruit-scales are distinctly yellow with dark margins, and this despite the fact that the fruits in the specimens are smaller than those available of *C. giganteus*. The fruit scales are disposed in 12-13 vertical series. The involucre is developed and exsert. Could it be that the involucre which is hollow and included in the type of *C. tumidus* develops later and becomes exsert as in Ridley 11,203? Better specimens are needed to settle this problem. I have therefore not quoted Ridley 11,203 (spadix) as a syntype of *C. tumidus*.

22. Calamus Manan Miq. in Journ. de Bot. Neerl. I (1860) 28 et Prodr. Fl. Sum (1860) 256 et 595; Becc. in Rec. Bot. Surv. Ind. II (1902) 211; Ridl., Mat. Fl. Malayan Pen. II (1907) 196 pro parte typica; Becc. in Ann. Roy. Bot. Gard. Calc. XI (1908) 438 t. 196 et Suppl. (1913) 109; Ridl., Fl. Malay Pen. V (1925) 53 pro parte typica.—t. 23.