

The Genus *Pandanus* in Micronesia

II. Section *Microstigma*

Benjamin C. STONE¹

In Part I of this series on Micronesian *Pandanus* [*Micronesica* 3(2):105-128, 1967] a general introduction and a key for determination of the sections of the genus which occur in Micronesia were presented. In this Part II the Sect. *Microstigma*, with one Micronesian species, is considered.

PANDANUS Stickm.

Sect. *Microstigma* Kurz, J. Bot. 5: 105, 1867.

Cephalia solitary (or racemose), often elongate or cylindrical. Carpels all (or nearly all) free, 1-seeded. Stigmas horizontal or vertical, circular-notched or V-shaped reniform, either central on the pileus or markedly excentric (then vertical), sessile or nearly so. Staminate spikes solitary (or racemose?); stamens mostly clustered, the cluster sessile or nearly so, and stamens few, up to approx. 6. Staminodia occasionally present around distal drupes in pistillate cephalia. Exocarp of drupe often oily, usually red.

Type species: *Pandanus conoideus* Lamarck (*P. ceramicus* Rumph, ex Kurz; *P. butyrophorus* (Webb ex Gaud.) Kurz).²

Sect. *Bryantia* Warb. is synonymous, based on the same type species.

The description of this section has been slightly revised here for the details of the stamens, owing to the occurrence of very low-connate stamens in the staminal phalanges of *Pandanus latericius* B.C. Stone, which is certainly a member of this Section. The phalanges are just discernible, since only the bases of the usually 6 filaments are slightly connate.

Other species: *Pandanus cominsii* Hemsl., *P. englerianus* Martelli, *P. macgregorii* Martelli, *P. latericius* B.C. Stone, *P. minusculus* B.C. Stone, *P. magnificus* Martelli, *P. ruber* St. John, *P. exiguus* Merr. & Perry, *P. leiophyllus* Martelli, *P. meniscostigma* Merr & Perry, *P. subumbellatus* Solms, *P. hollrungii* Warb.

Distribution: The type species is from Ceram in the Moluccas; the remaining species are chiefly of New Guinea, the Bismarck Archipelago, the Solomon Islands, and Australia (the last two). One species, the subject of this paper, occurs in Micronesia (Truk and Ponape).

¹ School of Biological Sciences, University of Malaya, Kuala Lumpur.

² Note that in Part I of this series the type species was erroneously given as *Pandanus montanus* Bory. This arose from a confusion of *P. conoideus* Lamk., and *Sussea conoidea* Gaud., a synonym of *P. montanus* Bory.

The oily exocarp of fruits of these plants has been exploited as a food or culinary material by several of the New Guinea peoples and those in the Molucca Islands. The ripe fruits are boiled, thus releasing the oils, and the product thus obtained is often used with rice as a kind of butter-substitute (hence the name *Bryantia butyrophora* Webb—meaning, roughly, the butter-yielding *Bryantia*).

It will be noticed that I exclude *Pandanus polycephalus* Lamarck, and its allies, although these are included both by Kurz in his original description and discussion of Sect. *Microstigma*, and by Warburg [Pflanzenr. IV, 9: 68. 1900] in his Sect. *Bryantia* (Gaud.) Warb. Although certainly closely related, it is considered that they form a separate group, Sect. *Jeanneretia* (Gaud.) Stone.

It is also possible that the species with vertical, excentric stigmas, such as *P. conoideus* Lamarck, *P. magnificus* Martelli, and *P. ruber* St. John, should be distinguished from the group with horizontal, central stigmas, such as *P. cominsii* Hemsl. and most of the other species enumerated above.

Even if such a group is distinguished there seems good reason to keep *Microstigma*, *Jeanneretia*, and the group based on *P. cominsii*, all close together. St. John [Pacif. Sci. 14: 227. 1960] also included Sect. *Sussea* Warb, which I consider incorrect; for this group, typified by *P. montanus* Bory, is *in sensu stricto*, a Mascarene Island group and seems both homogeneous and somewhat distinct from the Indo-Pacific members of *Microstigma*. The structure of the stamens is different, and the leaves lack ventral-pleat denticulations, in the Mascarene plants. Therefore I am inclined to consider Sect. *Sussea* as a group worthy of recognition distinguishable from Sect. *Microstigma*, Sect. *Jeanneretia*, and from any other sectional group comprising Pacific area species.

Pandanus cominsii Hemsley, in Hook. Icon. Pl. 27:t. 2654. 1900.

var. ***miconesicus*** B.C. Stone, Melan. Pl. Stud. 5. 1965; et MS. in Herb. Bishop Mus. Plates I, II, III.

A forma typica recedit syncarpiis drupisque brevioribus.

Type: Stone 5340 (Truk, Tol Is. summit, Jan. 1965; in Herb. Univ. Guam, Univ. Malaya).

P. Hollrungii Warb. forma *caroliniana* Martelli, Engler's Bot. Jahrb. 49: 66, 1912; et in Kanehira, Enum. Micron. Pl. 261, 1935.

P. Cominsii Hemsley of Kanehira, Bot. Mag. (Tokyo) 49: 356, f. 31, 1935.

Enum. Micron. Pl. 260, 1935; Bot. Mag. Tokyo 50: 544, 1936.

Hosokawa, Bull. Biogeograph. Soc. Japan, 7(11): 181, 1937.

Glassman, *Flora of Ponape*, Bish. Mus. Bull. 209: 112, 1952.

Small tree 5–13 m tall, supported on prickly proproots about 1–2.5 cm in diameter and of various lengths, mostly basal; trunk sparsely branched, set with spiral rows of buds, the bark grayish toward base, greenish just below leaf-clusters. Leaves 3-ranked in spirals, dark glossy green above, somewhat flatter green below, 23–40 times longer than broad, ca. 110–200 cm long, 4–7 cm wide. Leaf-base sheathing, blade narrowed toward base, widening and thereafter gradually attenuate to a subacute or slightly acuminate tip. Blade M-shaped, margins denticulate-

serrate, the teeth near the tip of the leaf about 4 per cm, ca. 0.7 mm long; near the midpoint about 2 per cm, 0.7–0.9 mm long; near base, broader and rather stout subtriangular, 2–3 per cm, 1–1.5 mm long. Dorsal costa similarly dentate, but smooth toward the leaf-base. Upper secondary pleats near leaf-tip set with small acicular teeth.

Female bracts foliaceous, transitional ones green-tipped, innermost bracts at floral maturity orange, others dull orange to yellowish, thereafter drying pale brown and chartaceous. Syncarpial bracts about nine, enclosing the fruit. Transitional leafy bracts with green tips and orange basal (especially ventral) yellow-orange coloration; inner bracts successively less V-shaped, more concave; true bracts completely yellow-orange, the outer ones with slight suffusion of green at extreme tips. Bract lengths, beginning with the outermost, as follows: (1) 66×7 cm; (2) 58×5.5 cm; (3) 52×4.5 cm; (4) 46×3.5 cm; (5) 42×2.5 cm; (6) 38×1.9 cm; (7) 33×1.1 cm; (8) 27×0.7 cm; (9) 25×0.5 cm. As indicated by these measurements, the innermost bract is almost vestigial, essentially linear.

Female inflorescence a cylindric syncarp, solitary, borne at first erect, axillary, concealed by the bracts. Mature fruit somewhat drooping, dull red, composed of unilocular drupes. Fruiting syncarp 4–5 times longer than broad, (14–) 21.5–27×4.2–6 cm. (*Stone 1816*: 26×6 cm; *1990*: 21.5×4.8 cm; *Hill 0113*: 22×4.2 cm; *Hill 0203*: 25×5 cm.). Syncarp subtrigonous-cylindric, tapering slightly to a rounded tip. Peduncle thick trigonous. Drupes connate by the red thin pericarp, pilei free, 14–16×4–6 mm, apex and base somewhat fleshy, the flesh not present in sicco leaving a bundle of fibers enclosing the endocarp. Pileus pentahexagonal, in age freeing from the mesocarp fibers. Stigma 1, apical, sessile to falsely stipitate (often seemingly stipitate *in sicco*), black, 1.3–1.6 mm in diameter, sub-orbicular with a groove on the side toward the apex of the syncarp. Endocarp 1-locular, subcentral or higher, reddish-osseous, very hard. Upper mesocarp of a few fibers, with a central cavity containing a jelly-like (later pithy) tissue. Lower mesocarp fibrous.

Male inflorescence a single pendent unbranched multistaminate spike, long-cylindric, 30–35×2.3–2.6 cm, cream-white, borne on a long fleshy peduncle 30–35 cm long, bearing 9 whitish bracts, up to 55 cm long, rather distantly set, 2–6 cm apart, closer near the spike. Spike composed of numerous stamens, these ca. 6–6.3 mm long, connate in phalanges consisting of (usually) 6 or 7 stamens, the filaments high connate, free 1 mm or less, forming a compressed somewhat 2-layered group. Anthers elongate-suboblong, at base slightly sagittate, at the tip with a very slight prolongation of the connective, appearing somewhat acuminate but not caudate; anthers 4-lobed, 3–3.3 mm long, ca. 0.3 mm wide, often somewhat wider at base and tapering slightly to the tip; apparently white. Male trees vegetatively like the females.

Specimens examined:

CAROLINE ISLANDS: *Ponape*, Net District, 1 mile East of Colonia, banks of Tawensokola River, 17 April 1957, *B.C. Stone 1816* (female), BISH.

Net District, Nanepil, gully along road, 300', 5 June, 1957, *B. C. Stone 1990*, (female), BISH. Mt. Seletereh, 1425', rainforest, 28 July 1949, *S. F. Glassman 2742* (US). 1935? *R. Kanehira 3705*, (US; FUKUOKA). Along Lehtau River, lowlands, Feb. 1965, *B. C. Stone 5452* female, 5453 male (GUAM, KLU).

Truk, Moen Id., slope behind Moen Village, 17 Nov. 1949, *Donald Anderson 768* (male), BISH. Moen Id., 31 March 1956, *Peter J. R. Hill 560331-0113* (female), BISH. Moen Id., 31 March 1956, *Peter J. R. Hill 560331-0203* (female), BISH. Tol Id., leg. *K. Ine*, 6 Dec. 1934, *R. Kanehira 3489* (FUKUOKA). Tol, Uman, coll. *Kraemer* (B), type of forma *caroliniana*; not seen. Tol, Jan. 1965, *B. C. Stone 5340* female (GUAM, KLU, holotype of var. *micronesicus*). Fefan Isl., 7 Aug. 1936, *Hosokawa 8380*, staminate, (TAIPEI).

Vernacular names: *Truk*, "niffa"; *Ponape*, "matal". It is interesting to compare the Ponapean name with the vernacular name applied to this species in the Bugotu language, spoken in Santa Ysabel in the Solomon Islands, which is "matha" (with *th* pronounced as in "mother"). There is an appearance and sound which suggests the possibility of cognate status for the two words "matal" and "matha".

Ecology: *Pandanus cominsii* var. *micronesicus* has been considered by Hosokawa [cf. *Micronesica* 3(1):19-30, 1967, for summary of references] as a useful indicator species in ecological studies in Micronesia. In *Ponape* he found it in the *Campnosperma-Pandanus* association from 30-680 m alt. in *Ponape* as one of the major species (group N in Raunkiaer's system, that is a nanophanerophyte). Hosokawa [Proc. 8th Pacif. Sci. Congress IV: 473-481, 1967] states that the *Campnosperma brevipetiolata-Pandanus cominsii* association is "well-developed on sloping or flat planes up to some 680 m alt. in *Ponape*. The dominant species is *C. brevipetiolata* and the major characteristic species are *Pandanus cominsii* and *Bentinckiopsis ponapensis* Becc." (a palm; best treated as *Clinostigma ponapensis* (Becc.) Moore & Fosb.). Elsewhere Hosokawa states that *P. cominsii*, sometimes with *Aglaiia ponapensis* Kaneh., predominates among understorey shrubs and reaches from 2 to 5 m height.

In *Truk* this pandan plays the same role ecologically and according to Hosokawa is found on the hills and summits of Tol, Trowasi, Udot, Wara, Fefan, and Tadiu Islets.

Flowering of these plants appears to be inhibited by constant shade and stimulated by more open conditions. Along riverbanks in particular, where the sun can penetrate, flowering and fruiting trees may be found, often in close association with *Scirpodendron ghaeri*, a gigantic sedge whose long (to 22 feet!) leaves are extremely similar to those of a pandan, but arise from nearly ground level.

EXPLANATION OF THE PLATES

- Plate I. *Pandanus cominsii* var. *micronesicus*. A, B. Leaf tips, ventral side. C. Section of middle of leaf. D. Marginal teeth of leaf base. E. Midrib teeth near leaf base. F. Midrib teeth near leaf apex. G. Drupes in top view. H. Drupes in side view. (All from *Stone 1816*).
- Plate II. *Pandanus cominsii* var. *micronesicus*. A (Upper left and center). Staminate flower. Inset, pollen grain, much enlarged. B, C (top to bottom) Drupes in longisection, side view, and top view; B a drupe from center of cephalium, C a drupe from apex of cephalium. D. Pileus and stigma of a drupe. (Stamens from *Stone 5453*; drupes from *Stone 1816*).
- Plate III. *Pandanus cominsii* var. *micronesicus*. Entire staminate inflorescence (*Stone 5453*).
- Plate IV. *Pandanus cominsii* var. *micronesicus*. Entire pistillate cephalium (*Stone 5452*).

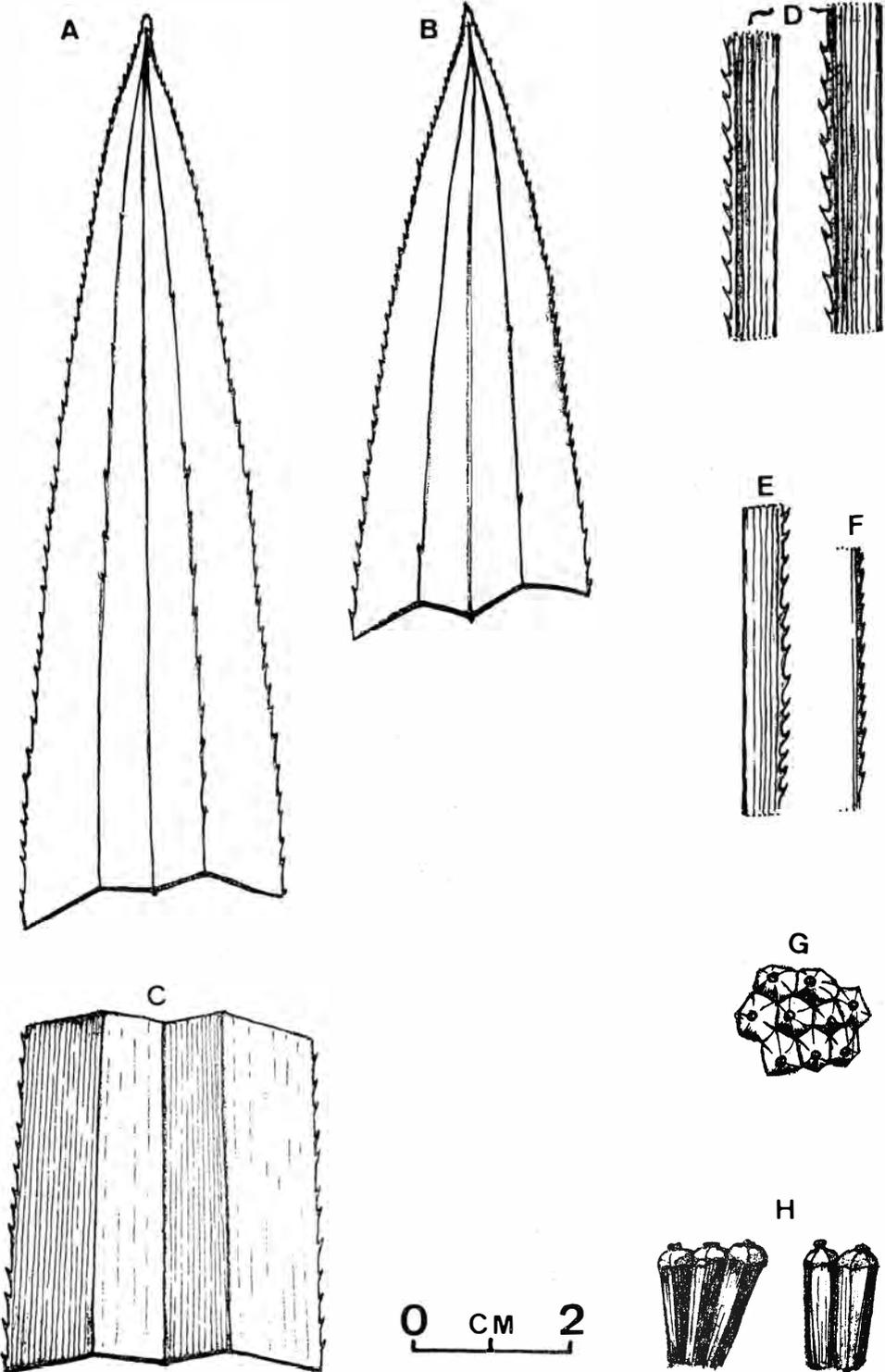


Plate I.

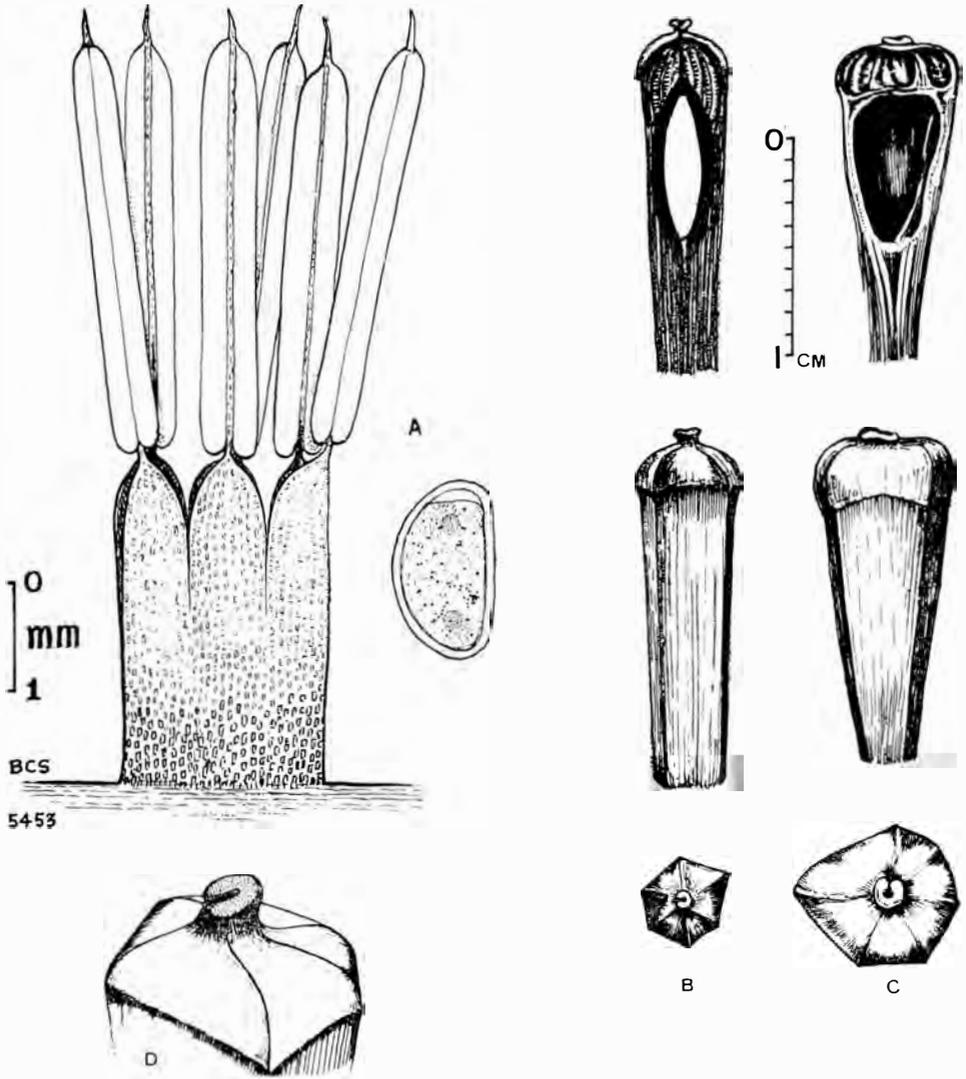


Plate II.

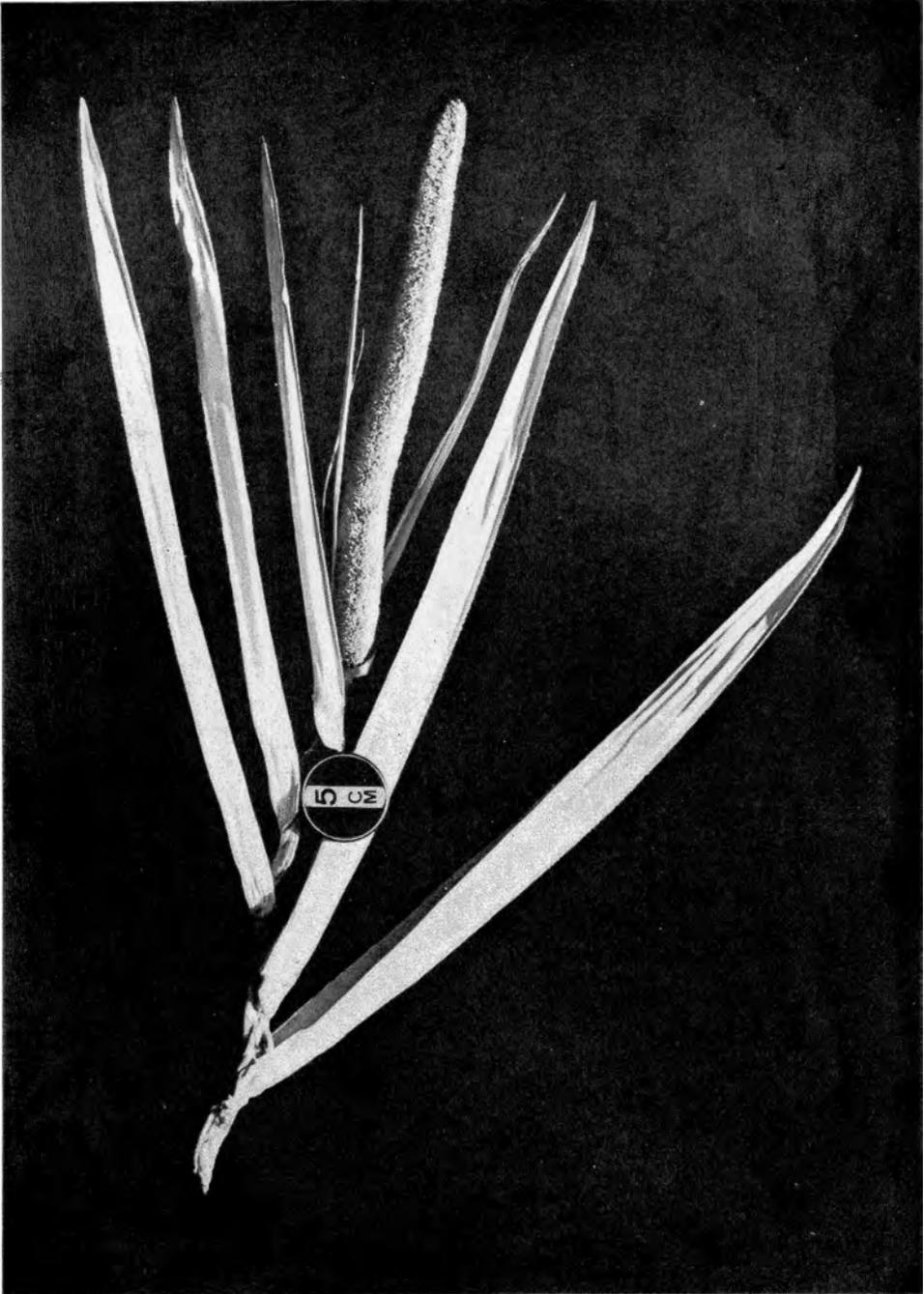


Plate III.

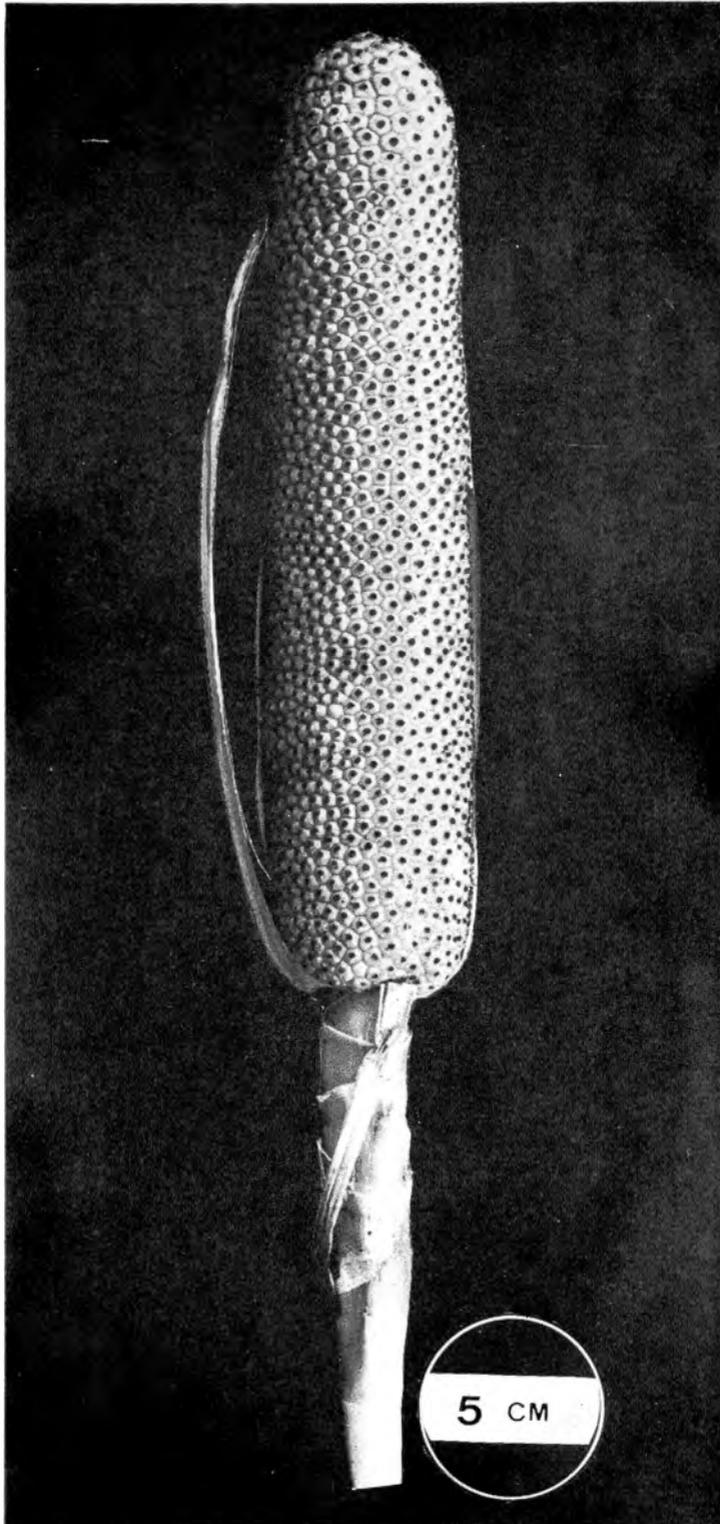


Plate IV.