

## Revision of the genera *Myrianthus* and *Musanga* (Moraceae)

by

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*Abstract.* — The African members of the *Conocephaloideae* are revised. *Musanga* comprises two species: *M. cecropioides* and *M. leo-errerae*. In *Myrianthus* seven species are recognized: *M. arboreus*, *M. holstii*, *M. preussii* (with ssp. *preussii* and ssp. *seretii*), *M. libericus*, *M. serratus* (with var. *serratus* and var. *letestui*), and *M. cuneifolius*. *M. serratus* var. *letestui* is described as new.

In Engler's system of the *Moraceae* (1889) the two African genera *Myrianthus* and *Musanga*, together with the neotropical genera *Cecropia*, *Coussapoa*, and *Pourouma* and the Asiatic genus *Poikilospermum* (= *Conocephalus*), constituted the subfamily *Conocephaloideae*. Chew Wee-Lek (1962) suggested transferring the small-seeded genera *Cecropia*, *Coussapoa*, *Poikilospermum*, and *Musanga* to the *Urticaceae*, but retained the big-seeded genera *Myrianthus* and *Pourouma* in the *Moraceae*. Corner (1962) transferred the whole subfamily *Conocephaloideae* to the *Urticaceae*, mainly on the basis of the similarities in the characters of the ovary: a simple stigma and a basally attached orthotropous ovule. However, distributing the genera assigned to the subfamily *Conocephaloideae* over two families can hardly be justified, because of the many anatomical and morphological features they have in common (cf., for example, Renner 1907; Erdtman 1952; Lebacqz 1950; Normand 1950). No suggestion for transferring such a distinct group as the *Conocephaloideae* to another family can properly be made without first thoroughly examining the delimitation of the *Moraceae* and *Urticaceae*.

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The present study is based on material in the following herbaria : B, BR, BM, COI, E, FHO, G, K, L, LISC, LISU, S, U, UPS, WAG.

1. *Myrianthus* P. de Beauvois, Fl. Oware 1 : 16 (1805); Baillon, Hist. Pl. 6 : 214 (1875-1876); Bentham & Hooker, Gen. Pl. 3 (1) : 379 (1880); Engler in Engler & Prantl, Nat. Pflanzenfam. 3 (1) : 94 (1889); Engler, Monogr. Afr. Pfl. 1 [*Moraceae*] : 37 (1898); Rendle in Prain, Fl. Trop. Afr. 6 (2) : 230 (1917). — Type species : *M. arboreus* P. de Beauvois.

*Dicranostachys* Trécul, Ann. Sci. Nat., Bot., ser. 3, 8 : 85 (1847); Baillon, Hist. Pl. 6 : 214 (1875-1876); Engler, Monogr. Afr. Pfl. 1 [*Moraceae*] : 37 (1898). — Type species : *D. serrata* Trécul.

*Myrianthus* sect. *Dicranostachys* (Trécul) Engler, Monogr. Afr. Pfl. 1 [*Moraceae*] : 37 (1898).

Dioecious *shrubs* or trees with stilt-roots or lianas. *Leaves* spirally arranged, simple to palmately compound, stipules fused, (sub)amplexicaul, glabrous inside. *Inflorescences* paired in the axils of the leaves, bracteate, pedunculate; the staminate ones repeatedly dichotomously branched, bearing the flowers close together on the ultimate to more proximal branches, perianth with (3-)4, more or less imbricate tepals, stamens 3-4, filaments straight in the bud, free or basally connate, anthers extrorse; pistillate inflorescences globose-capitate, flowers several to many, basally connate, perianth tubular, 2-3-lobed, ovary free, ovule orthotropous and basal, stigma simple; fruit : exocarp fleshy, adnate to the fleshy, yellow to orange-red coloured perianth, endocarp woody; seed big, without endosperm, testa membranaceous, cotyledons equal and plane, radicle short and apical.

## History

The genus *Myrianthus* was established by Palisot de Beauvois (1805), who described *M. arboreus*. In 1847 Trécul described *Dicranostachys*, with *D. serrata*; he regarded the genus as related to *Myrianthus*. The two genera were kept separated by Baillon (1877), but were united by Bentham & Hooker (1880). Remarkably enough they described the ovule as apical and pendulous, while Baillon (1877) correctly described the ovule of *Myrianthus* as basal and orthotropous, as did Trécul for *Dicranostachys*. Engler took over

this error in his treatment of the *Moraceae* in « Die natürlichen Pflanzenfamilien » (1889). However, he corrected it in his monograph of African *Moraceae* (1898) and at the same time subdivided *Myrianthus*, in which he distinguished 6 species into the sections *Eumyrianthus* and *Dicranostachys* on account of (partly presumed) differences in the pistillate flowers, infructescences, and leaves. In Engler's monograph (cf. p. 37, 38, and plate XVI, fig. a) material of *M. holstii* was assigned to *M. arboreus*, as the two species were separated on the basis of the degree of incisions of the leaves. Rendle (1917) maintained the subdivision of *Myrianthus* and distributed the ten species described at that time over the two sections. Later on this subdivision of *Myrianthus* was seldom applied. Up to the present, 12 *Myrianthus* species have been described and 7 have commonly been distinguished.

## Morphology

### *Habit*

Except for *M. scandens*, a liana with air-roots, all species are trees or shrubs. The former habit is characteristic for *M. arboreus* and *M. holstii*, but it also occurs in *M. serratus* and *M. preussii*. The trees may reach a height of 20 m, as commonly met with in *M. holstii*, although for *M. preussii* ssp. *seretii* heights of 24 m and 30 m are (possibly incorrectly) mentioned. *M. cuneifolius* is found mainly as a shrub or small tree (up to 3.5 m tall).

### *Leaf*

The leaves vary from simple and entire to palmately compound, with 5-7 leaflets. Seedlings have simple leaves which gradually pass into the leaves characteristic for the adult specimens. Palmately compound leaves are characteristic for *M. arboreus*, *M. holstii*, and *M. preussii* and occur commonly in *M. cuneifolius*. Normally, *M. serratus*, *M. libericus*, and *M. scandens* have simple leaves. In *M. serratus* the leaves are usually simple, but sometimes 3-5-fid. These 3-5-fid leaves are common in *M. libericus* and may occur in *M. scandens* and even in *M. holstii*. Depending on the leaf shape the venation is pinnate or palmate.

### *Petiole*

The dimensions of the petioles depend on the dimensions of the leaf blades. In *M. arboreus*, *M. holstii*, and some specimens of *M. serratus* the petioles are coarsely sulcate and ribbed, but almost even in the small-leaved species. In *M. libericus* the petioles formed at the beginning of the growing period are relatively long, gradually becoming shorter towards the end of the growing period.

### *Stipules*

The stipules are usually caducous, but subsistent in *M. serratus* var. *serratus*, *M. cuneifolius*, and *M. preussii* ssp. *preussii*. The long stipules of *M. arboreus* and *M. holstii* are fully amplexicaul and leave conspicuous annular scars; in the other species they are subamplexicaul and leave inconspicuous not fully annular scars. The stipules are glabrous inside.

### *Indument*

The characters of the indument are important for identification purposes. They have to be examined on the younger parts, as the indument usually disappears with age. The hairs are unicellular or pluricellular. The unicellular hairs vary in dimensions, shape, colour and insertion. On the lower leaf surface, especially the areoles, the indument is arachnoid. The pluricellular (glandular?) hairs are often more or less irregularly globose-capitate, sessile or stipitate, and yellow-brown or dark red. They are inconspicuous in herbarium material, except on the younger parts of *M. arboreus* and *M. holstii*.

### *Staminate inflorescence*

The peduncle bears 2-7 more or less equal primary branches. Each one branches repeatedly (up to 7 times) and dichotomously. The flowers are borne in dense groups on the secondary dichotomous ramification. The clusters of flowers may be confined to the ultimate (n) branches or may extend to more proximal (n-1 to n-4) branches (see fig. 1). Solitary flowers are sometimes found at the bifurcation of the secondary branches. The bracts among the flowers are usually narrow and subcucullate at the apex. The other bracts, usually situated on the bifurcations, are broader (often deltoid, broadly obovate, or broadly ovate) and plane or convex.

### *Staminate flower*

The perianth is rather variable. As a rule it consists of 4, more or less distinctly 2-merous, (sub)cucullate tepals. The tepals are free or basally connate. The filaments are free or connate. The dimensions of the floral parts show little variation; in *M. holstii*, however, they are distinctly greater.

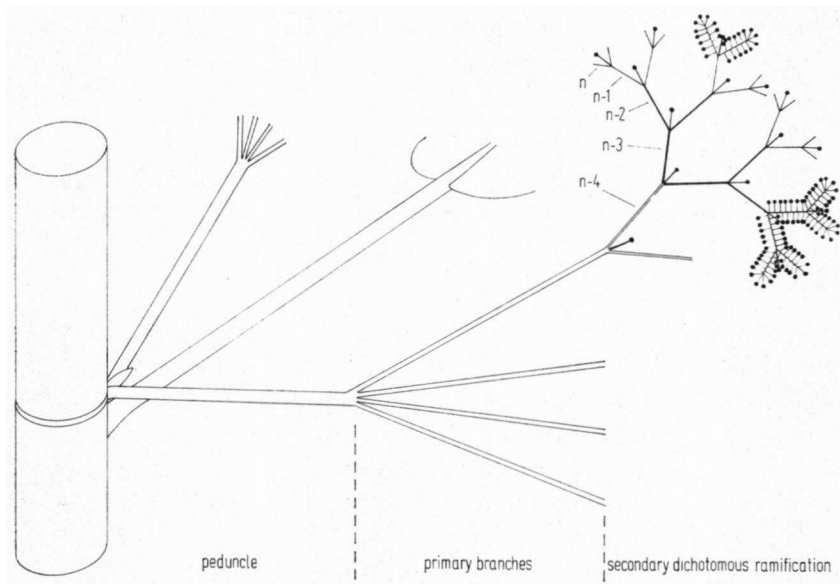


Fig. 1. — Scheme of the staminate inflorescence of *Myrianthus*.

### *Pollen*

Pollen of *M. serratus*, *M. arboreus*, *M. libericus*, and *M. preussii*, treated by the acetolysis method (Erdtman 1960) and studied under a light microscope, seems to be uniform. Its description according to Reitsma's terminology (1970) is as follows :

*Pollen class* : diporate. *P/E ratio* : 1.15. *Aperture* : ecto-aperture — porus; rather indistinct, irregularly shaped, mostly circular to faintly elliptic; endo-aperture — identical with the ectoporus. *Exine* : thin; *sexine* : as thick as the exine; *sexine* and *nexine* decreasing towards the apertures. *Ornamentation* : pilate, tectate; columellae

very fine. *Outlines* : equatorial view — elliptic to rectangular, faintly acuminate, with convex to rhombic sides and obtuse angles; polar view — circular to elliptic. *Measurements* : longest axis 13-18  $\mu$ ; exine about 1  $\mu$ ; longest axis of the aperture about 2  $\mu$ .

#### *Pistillate inflorescence*

The pistillate inflorescence is globose-capitate; a distinctly enlarged receptacle is seen only in *M. arboreus*. The number of flowers varies from 20 to 50 (80). The interfloral bracts are (sub)spathulate and usually basally adnate to the perianths.

#### *Pistillate flower*

The tubular perianth is obovoid with a flat apex in *M. arboreus*, but ovoid to conical in the other species. The ovary is almost free.

#### *Infructescence*

The infructescence may reach a diameter of more than 12 cm (as mentioned for *M. arboreus* and *M. libericus*). The fruiting perianth is yellow to orange-red coloured and adnate to the exocarp, forming a more or less fleshy layer round the woody endocarp. Lignification of the ovary begins at the apex. Because infructescences are often scarce in collections, they cannot always be completely described.

#### **Distribution**

*M. holstii* inhabits moist montane forests in East Africa. The other species are found in the lowlands of West and/or Central Africa, usually on moist soils and in secondary forests, at forest edges, along rivers, etc. *M. preussii*, and possibly also *M. cuneifolius* and *M. scandens* (on moist soils), may occur in the undergrowth of primary forests. *M. arboreus* and *M. serratus* occur throughout the tropical rain forest areas. *M. libericus* grows in the rain forest area of West Africa. *M. cuneifolius* is confined to northern Gabon and *M. scandens* to northern Zaïre.

#### **Taxonomical remarks**

There is no basis for the subdivision of *Myrianthus*, as the differences in characters are too diffusely spread over the genus.

*M. serratus* and *M. cuneifolius* are very closely related and with the application of a somewhat broader species concept the two would even be regarded as conspecific. The main argument for keeping the two species separate is the occurrence of rigid curved hairs and compound leaves in *M. cuneifolius*. On the other hand, *M. serratus* is very variable and in the present treatment two subspecies are distinguished. When more collections of *M. serratus* become available, it may be possible to distinguish further regional infra-specific taxa. *M. arboreus* and *M. holstii* are rather closely related. They show several resemblances, but are distinctly different in the indument and inflorescences. The two species are almost allopatric, their areas only overlapping in East Zaïre and Uganda; in addition, *M. holstii* is a montane species, whereas *M. arboreus* is a lowland species. *M. serratus* is more or less intermediate between these two species and the other members of the genus. *M. scandens*, a liana, appears to have a somewhat isolated position because of its habit. Louis (1948) regarded *M. scandens* as related to *M. serratus*, mainly because of the simple leaves which they have in common. However, in the characters of the inflorescences *M. scandens* is more or less intermediate between *M. arboreus* and *M. holstii*, but in those of the indument it is related to *M. libericus*. In spite of the simple leaves *M. scandens* seems to be closer to *M. arboreus* and *M. holstii* than to the other species of the genus. *M. libericus* is variable in its habit, leaf shape, and leaf dimensions; also variable are the number of flowers in the pistillate inflorescences and the number of flowers producing fruits.

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| 1. Tree or shrub . . . . .   | 2                        |
| Liana; leaves simple, entire to 3-5-fid, scabrous above because of broad conical and uncinata hairs; leafy twigs with short patent grey or grey-brown hairs . . . . .  | 4. <i>M. scandens</i>    |
| 2. Young twigs, petioles and costae beneath with patent to appressed stiff straight or somewhat curved hairs . . . . .   | 3                        |
| Young twigs, petioles and costae beneath scabrous because of rigid curved hairs; shrub up to 4 m tall; leaves simple and truncate at the base or compound with 3-5 sessile leaflets . . . . .  | 7. <i>M. cuneifolius</i> |
| 3. Leaves compound, rarely simple and 3-5-lobed; stipules 3-5 cm long, in <i>M. preussii</i> to 1.5 cm long, fully amplexicaul, leaving conspicuous and annular scars . . . . .  | 4                        |
| Leaves simple, entire to 3-lobed, rarely 5-lobed; stipules up to 1.5 cm long, not fully amplexicaul, leaving inconspicuous and not completely annular scars . . . . .  | 6                        |
| 4. Young twigs and petioles with patent, rarely appressed, yellow to orange-brown hairs; leaves with (3)5-7(8) leaflets, beneath with patent 0.5-2.5 mm long, curved yellow to orange-brown hairs on primary and secondary veins, above almost glabrous; stipules up to 4 cm long, orange-brown sericeous; (leaves sometimes 5-fid to 5-parted); East Africa . . . . . | 2. <i>M. holstii</i>     |

- Young twigs with white to cinnamon coloured appressed to patent hairs; leaves with 5-7 leaflets, beneath usually with white to greyish hairs on primary and secondary veins; West and Central Africa . . . . . 5
5. Leaves glabrous and shining above, except for the veins: leaves up to 40 × 30 cm, leaflets with a 1-3 cm long acumens, rarely acute, attenuate at the base, usually with 1-2 cm long petioles; staminate inflorescences up to 9 cm in diameter, flowers in dense groups 2-5 mm long only on the (most) distal branches; perianth of the pistillate flower ovoid to conical . . . . . 3. *M. preussii*  
Leaves above initially with white appressed hairs; (glabrescent, latest at the leaf base), leaves up to 80 × 90 cm; staminate inflorescences more than 15 cm in diameter, flowers also on more proximal branches; perianth of the pistillate flower obovoid with flat apex . . . . . 1. *M. arboreus*
6. Leaves usually glabrous above except for the veins; young twigs, petioles, and leaf veins beneath with appressed minute white (or brownish) hairs; petioles usually more or less equally (in var. *serratus* 2-6(-10) cm, in var. *letestui* up to 13 cm) long; stipules subpersistent or caducous (in var. *letestui*); pistillate inflorescences short pedunculate (up to 0.8 cm long) or subsessile; perianth with white to grey hairs, interfloral bracts deltoid and adnate to the perianth; staminate inflorescences with 1.5-2 cm long groups of flowers . . . . . 6. *M. serratus*  
Leaves initially hairy above, glabrescent; young twigs, stipules, and leaf veins beneath with patent yellow-brown to grey-brown hairs; petioles distinctly different in length on the same twig (from 15 to 5 cm long); stipules caducous; pistillate inflorescences with 2-5 cm long peduncles, rarely sessile; perianth with yellow-brown to grey-brown hairs, interfloral bracts small, lanceolate to oblong, with a narrowed base; staminate inflorescences with 0.3-0.5 cm long groups of flowers, only on the (most) distal branches . . . . . 5. *M. libericus*

1.1. *Myrianthus arboreus* P. de Beauvois, Fl. Oware 1 : 16, t. 11, 12 (1805); Engler, Monogr. Afr. Pfl. 1 [*Moraceae*] : 37, t. 16 (1898); Rendle in Prain, Fl. Trop. Afr. 6 (2) : 231 (1917); Keay in Fl. W. Trop. Afr., ed 2, 1 : 614 (1958). — Type : *P. de Beauvois* s.n., Nigeria, Benin (G). — Fig. 2, 3.

*Shrubs* or trees up to ca. 10 m tall, with a spreading crown and a short bole; cortex greyish-green; leafy twigs (0.5-)1-2.5 cm thick, with 1.3-7 cm long internodes and with short (almost) appressed white or (in Zaïre) sometimes cinnamon coloured to greyish brown hairs, intermixed with sparse longer patent hairs. *Leaves* compound with 5-7 leaflets, occasionally 5-7-fid, leaflets sessile or petiolulate, up to 63 × 22 cm, lanceolate to oblanceolate, acute to acuminate; margin serrate to serrato-dentate; above with sparse white appressed, on the costa patent hairs, glabrescent (often except for the costa), beneath on the main veins appressed to patent whitish to cinnamon-coloured or greyish-brown hairs, on the smaller veins rather dense ca. 1.5 mm long patent hairs, areoles arachnoid-tomentellous; veins prominent beneath; petiole (16-)25-53 cm long, 0.3-0.9 cm thick,



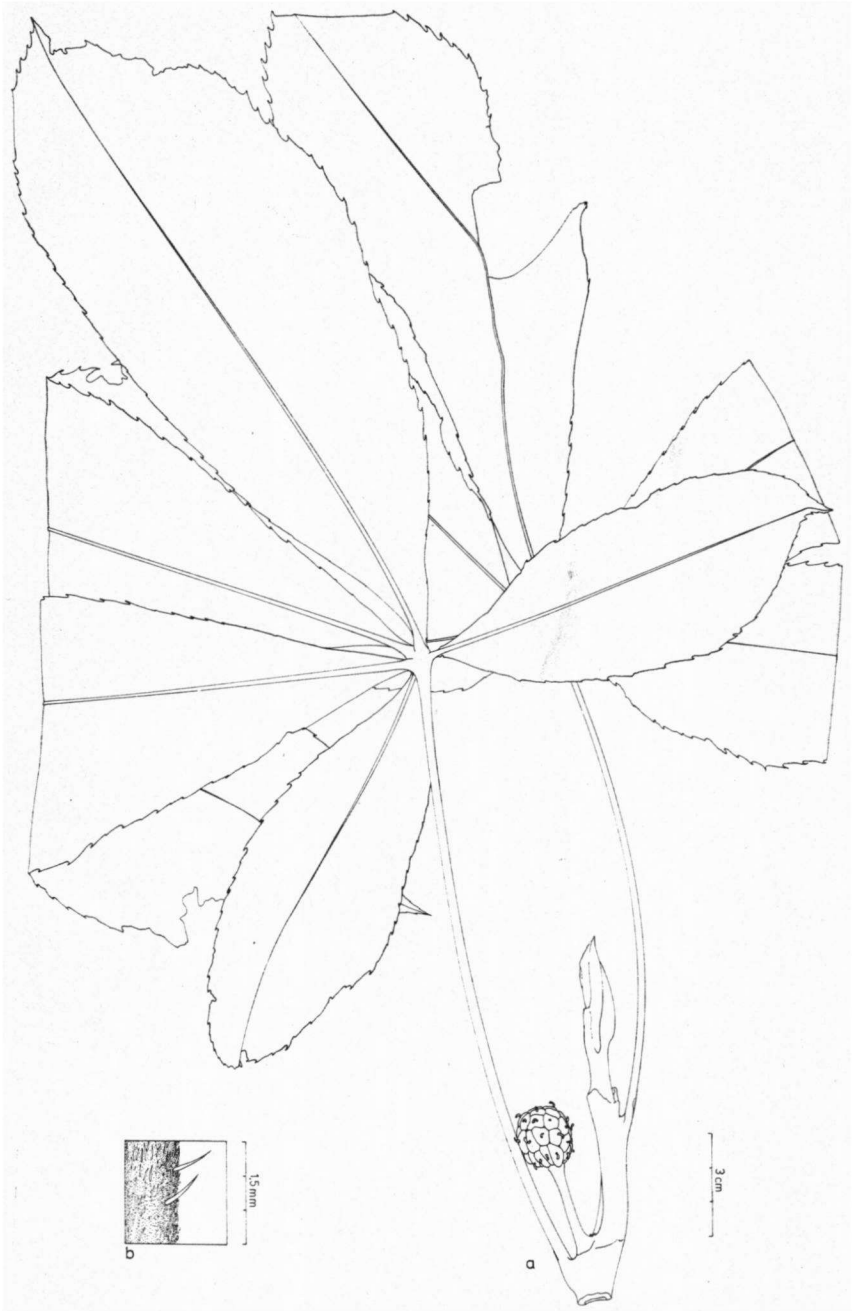


Fig. 2. — *Myrianthus arboreus*: a, leafy twig with pistillate inflorescences (Welwitsch 2590): b, indument of the twig.

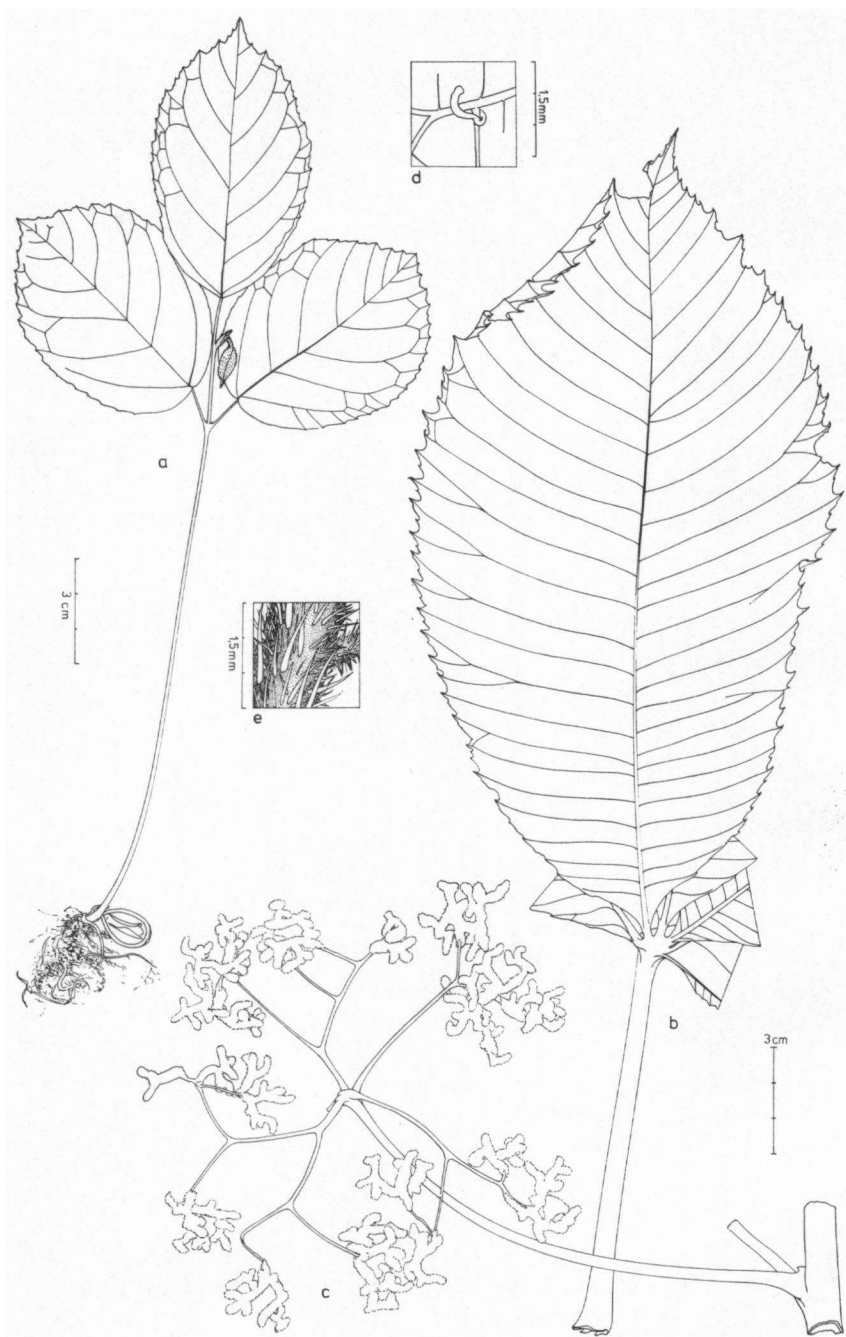


Fig. 3. — *Myrianthus arboreus*: a, seedling (from Breteler 1592); b, leaf (Delvaux 619); c, staminate inflorescence (Welwitsch 2590); d, « gland », on leaves of seedlings; e, indument of the leaf.

sulcate and ribbed, initially with short patent hairs; stipules (1.5-, 3-5 cm long, fully amplexicaul, with greyish to cinnamon-greyish brown indument, intermixed red pluricellular hairs. *Staminate inflorescences* up to 20 × 30 cm, excluding the peduncle, which is (7-)13-21 cm long, 3-5 mm in diameter, with 3-7 primary branches, each one branching 3-6 times; flowers on the n to n-4 branches, (up to 1-2.5(-3.5) cm from the ends of the ultimate branches); perianth 0.6-1.0 mm long, thickened towards the apex, (with a sparser indument than the bracts); stamens 0.8-1.2 mm long, anthers 0.3-0.5 mm long; interfloral bracts narrower and more variable in shape than the other bracts, narrowed towards the base, sometimes thickened towards the apex; the other bracts 0.6-1.0 mm long, ovate to deltoid, with a cucullate and thickened apex, on the outside with white to grey short stiff hairs. *Pistillate inflorescence* globose, 2-3.5 cm in diam., peduncle up to 2.5 cm long and 0.3 cm thick, with whitish appressed to patent hairs; receptacle ellipsoid, 1-1.5 cm in diam.; flowers 20-50(-80); perianth obovoid, with a flat apex, 0.8-1.0 cm high, 0.3-0.5 cm in diameter, scabrous because of broad conical hyaline hairs, stigma 2.5-3.5 mm long; interfloral bracts up to 1.0 cm long, linear to narrowly spatulate, basally adnate to the perianths. *Infructescences* 6-10(-15) cm in diam.; peduncle up to 6 cm long and 0.8 cm thick, receptacle strongly enlarged; fruiting perianth ca. 2 cm high and ca. 1.5 cm in diam., orange-red; endocarp body 1.5-1.7 × 0.6-0.8 cm, even or ribbed; seed up to 1.2 cm long.

Flowering in West Africa from (November) January to July; in Central Africa throughout the year, but mainly from January to March.

*Distribution* : from Guinea to Angola, and eastwards to southern Sudan, Uganda, and Western Tanzania (fig. 11, 1); in secondary vegetation and in more or less open places in rain forests.

1.2. *Myrianthus holstii* Engler, Monogr. Afr. Pfl. 1 [*Moraceae*] : 37, t. 16A, 17E (1898); Rendle in Prain, Fl. Trop. Afr. 6 (2) : 237 (1917); Lebrun, Ann. Soc. Sci. Brux., ser. B, 54 : 156 (1934); Hausman, Fl. Congo Ruanda-Urundi 1 : 84 (1948). — Lectotype : *Holst* 3308, Tanzania, Usambara, Lubindi (B; isotype K). — Fig. 4.

*M. holstii* Engler var. *quinquesectus* Engler, Bot. Jahrb. 30 : 295 (1901). — Type : *Goetze* 1312, Tanzania, Muakareri (B; isotypes BM, BR, G, L, P).

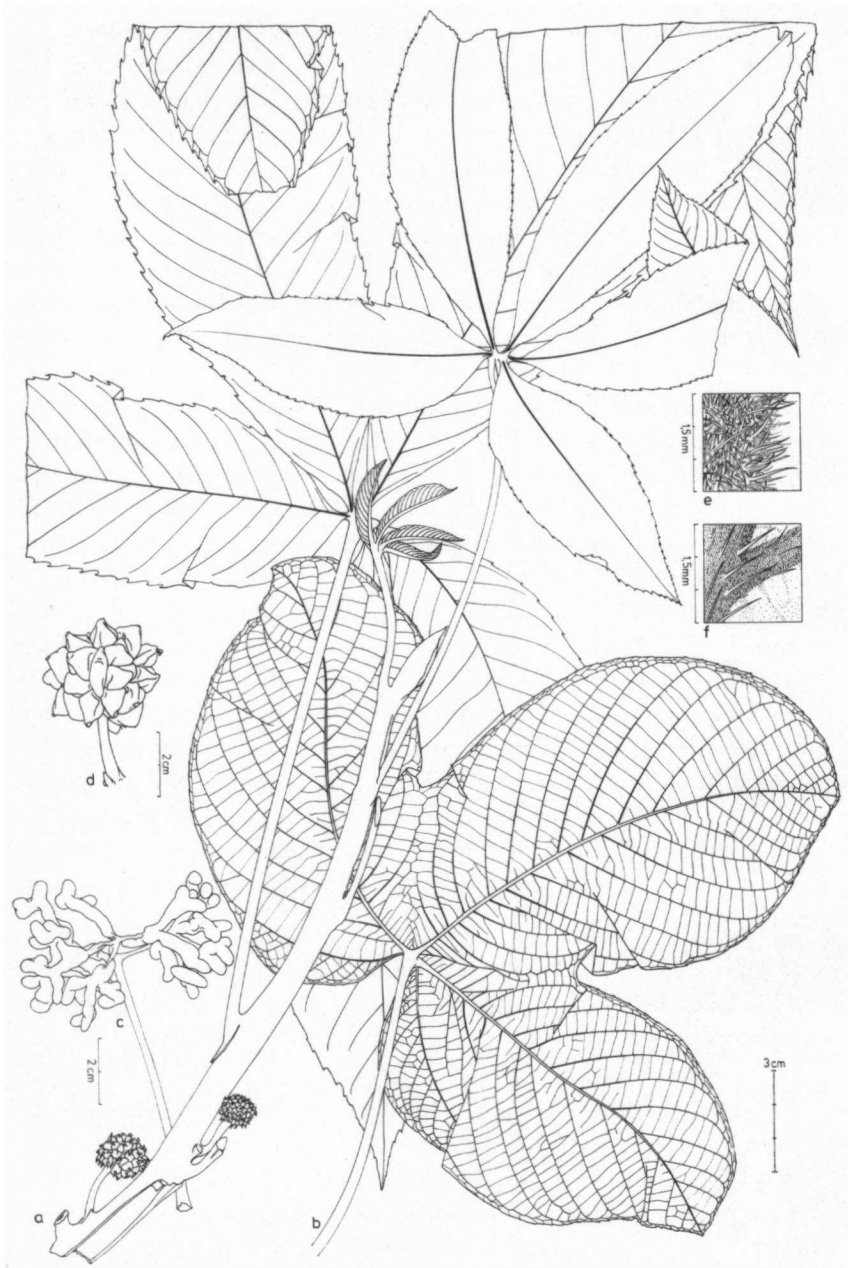


Fig. 4. — *Myrianthus holstii*: a, leafy twig with pistillate inflorescences (Stolz 1591); b, leaf (Fries & Fries 2112); c, staminate inflorescence (Mendonça 295); d, infructescence (Torre & Correia 14 829); e, indument of the twig; f, indument of the leaf.

*M. mildbraedii* Peter, Fedde Repert. Sp. Nov., Beih. 40 (2) : 112, tab. 11 (1932). — Syntypes : Peter 7574, 7722, 15 816, Tanzania (not seen).

*Tree* 5-20 m tall, with a spreading crown and a short bole; cortex light brown to pinkish; leafy twigs 0.6-2.5 cm thick; internodes 1-3(-5) cm long, hollow, at first ribbed, later on somewhat sulcate, covered with persistent short appressed white hairs, intermixed with caducous longer patent light orange-brown hairs, this indument subpersistent on the nodes. *Leaves* 3-5(-7)-fid or compound with (3-) 5-7(-8) leaflets, lamina 25-50 × 32-60 cm, leaflets sessile or with up to 3 mm long petiolules, oblanceolate-oblong to obovate, acuminate to acute, at the base acute to subattenuate, the middle leaflet 17-43 cm long, 6-12 cm broad; base of the simple leaves obtuse to cordate; leaf margin subentire to serrate; upper surface (at first reddish and) somewhat shining, glabrous except for red pluricellular hairs and a few patent unicellular hairs on the costa, lower surface with light orange-brown to yellow-brown, usually somewhat curved appressed to patent hairs, being paler on the tertiary veins, areoles white arachnoid-tomentose; petiole 7-35 cm long, 3-8 cm thick, sulcate and ribbed, with short patent to appressed light orange-brown (to greyish) hairs; stipules 1.5-4 cm long, caducous, light orange-brown sericeous. *Staminate inflorescences* 4-10 cm to 4-13 cm, excluding the up to 3-3.5 cm long, sulcate peduncle with dense to sparse patent to appressed orange-brown hairs, branched 5-7 times; flowers on the ultimate (n) to more proximal (n-a to n-3) branches, up to 1-3.5 cm from the ends of the ultimate branches; perianth 1.1-1.5 mm high, tepals free or basally connate, apex obtuse, sub-cucullate and thickened, outside with sparse orange-brown hairs, margin ciliolate; stamens distinctly exceeding the perianth, 2.3-3.1 mm long, anthers 0.8-1.0 mm long, filaments free or basally connate; interfloral bracts as long as the perianths, (sub)cucullate; the other bracts obovate to spatulate, or shorter, with a cucullate and thickened apex. *Pistillate inflorescences* globose, 1-2 cm in diam.; receptacle small; peduncle 0.9-2.3 cm long, 1-3 mm thick (broadened towards the apex), covered with dense patent to appressed orange-brown hairs; style 3-4 mm long, stigma ca. 2 mm long, 0.2-0.3 mm broad; interfloral bracts narrow-spatulate. *Infructescences* 5-8 (or more ?) cm in diam.; fruiting perianth up to 2.5 cm high, orange to yellow; endocarp body 12 × 8 mm; seed 5 × 3 mm.

Flowering throughout the year (?), mainly from September to January.

*Distribution* : Zaïre, Rwanda, Burundi, Uganda, Kenya, Tanzania, Zambia, Rhodesia, and Mozambique (fig. 11, 2), in the regrowth or remnants of mesophile mountain forests at altitudes from ca. 1000 to 2200 m.

1.3. *Myrianthus preussii* Engler, Bot. Jahrb. 20 : 149 (1894); Engler, Monogr. Afr. Pfl. 1 [*Moraceae*] : 41, t. 17A (1898); Lebrun, Ann. Soc. Sci. Brux., ser. B, 54 : 156 (1934). — Types : *Preuss* 478a, Cameroun, near Barombi (B). — Fig. 5.

*Shrubs* or trees up to 10 (25-30 ?) m tall; cortex grey to brown; leafy twigs 3-7 mm thick, internodes 1-4(-5) cm long, faintly ribbed to even, with short white to grey hairs. *Leaves* compound with (3-) 5-6 leaflets, lamina 20-30 × 23-40 cm, leaflets with 0.5-3 cm long petiolules, rarely sessile, oblanceolate, acuminate, acumen 1-2.5 cm long, at the base acute to attenuate, rarely subobtusely; margin entire to serrate-dentate; the middle leaflet 25-33 cm long, 6-9 cm broad, with 18-26 pairs of secondary veins, the outer leaflets about half as long as the middle one, above glabrous and shining beneath with sparse appressed and few patent hairs on the prominent veins, areoles arachnoid-tomentose; petiole 10-30 cm long, 2-3 mm thick, sulcate and ribbed, with appressed short white hairs, glabrescent; stipules 0.7-1.5 cm long, caducous to subpersistent, white to grey sericeous. *Staminate inflorescences* 3 × 3 cm to 9 × 9 cm, excluding the 4-13 cm long, 1-3 mm thick, sulcate peduncle with appressed short white hairs, 3-5 primary branches, each one branched 3-5 times; flowers in globose to cylindrical groups on the ultimate (n) branches to the next more proximal (n-1) branches, up to 3-6(-12) mm from the ends of the ultimate branches; perianth 0.5-0.7(-0.9) mm high with 3-4, free or basally connate, sparsely puberulous to glabrous, ciliolate tepals; stamens 0.8-1.2(-1.5) mm long, anthers 0.2-0.5 mm long; interfloral bracts 0.4-0.7 mm long, similar to the other bracts. *Pistillate inflorescences* 1.8-2.5 cm in diameter; peduncle 2-4 cm long, 0.2-0.3 cm thick, sulcate, with appressed short white hairs; flowers 8-20, perianth ovoid to conical to protracted conical, 9-11 mm high, at the base 4-7 mm in diameter, scabrous because of short appressed to patent hairs; stigma 0.5-0.8 mm long and 0.3 mm broad; interfloral bracts linear to subspathulate, 1.5-2 mm

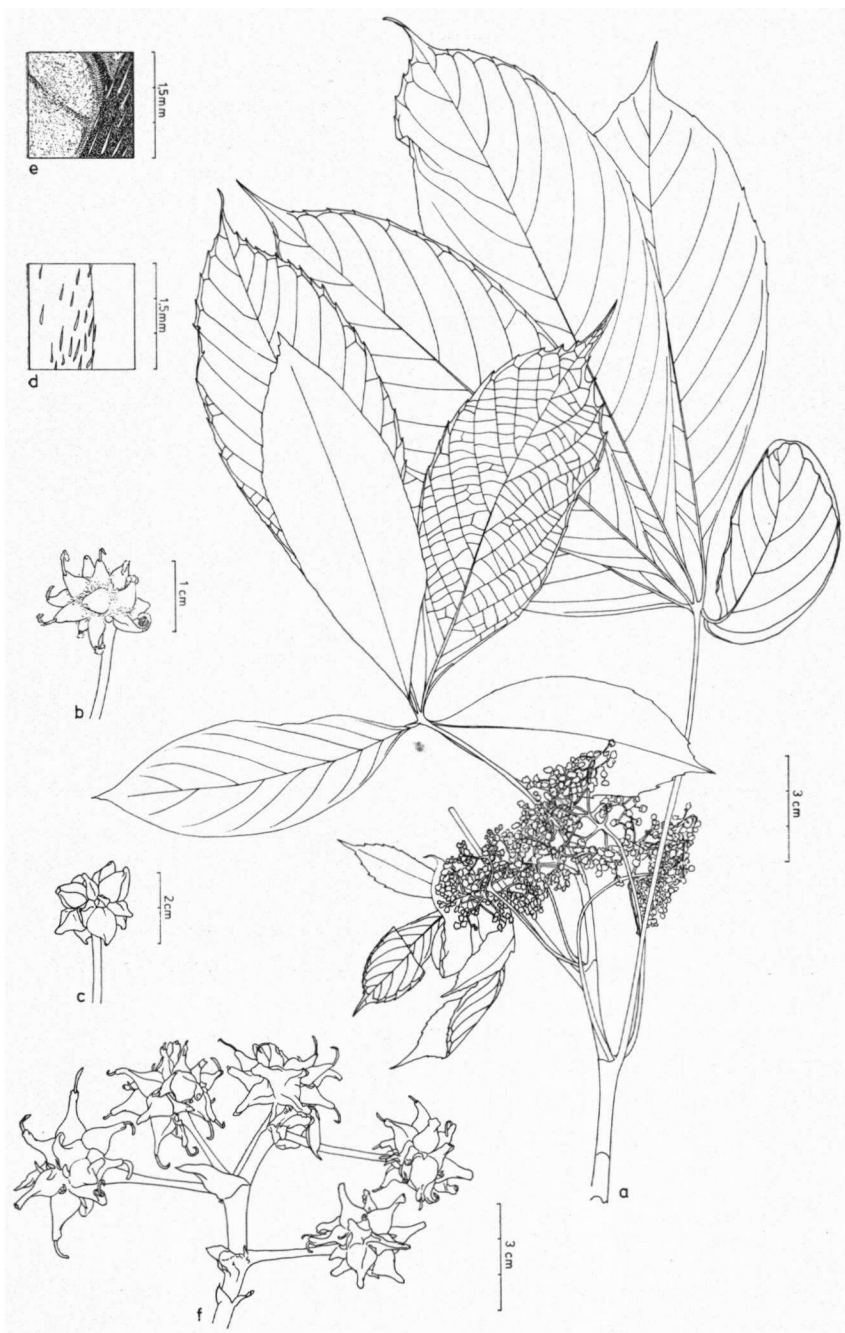


Fig. 5. — *Myrianthus preussii* ssp. *seretii*: a, leafy twig with staminate inflorescences (Bequaert 2265); b, pistillate inflorescence (Louis 3109); c, infructescences (Louis 5588); d, indument of the twig; e, indument of the leaf; ssp. *preussii*: f, end of a twig with pistillate inflorescences (Leeuwenberg 5190)

long. *Infructescences* up to 5 cm in diam.; endocarp body  $1.5 \times 1.3$  cm; seed  $8 \times 6-7$  mm.

Flowering throughout the year (?), mainly from December to April.

Two subspecies can be readily distinguished.

1.3.a. *Myrianthus preussii* ssp. *preussii*. — Fig. 5, f.

*M. gracilis* Engler, Bot. Jahrb. 20 : 150 (1894); Engler, Monogr. Afr. Pfl. 1 [*Moraceae*] : 39, t. 17B (1898). — Types : *Preuss* 478b, Cameroun, near Barombi (B).

*M. talbotii* Rendle, Jour. Bot. 53 : 354 (1915). — Lectotype : *Talbot* 624, Nigeria, Oban (K).

*Shrubs* 1-3 m high; stipules subpersistent; fruiting perianth protracted, interfloral bracts in infructescences lengthened.

*Distribution* : S.E. Nigeria and Cameroun (fig. 11, 3).

1.3.b. *Myrianthus preussii* ssp. *seretii* (De Wild.) de Rooter stat. nov. — Fig. 5, a-e.

*M. sereti(i)* De Wild., Ann. Mus. Congo, Bot., ser. 5, 3 : 68 (1909). — Type : *Seret* 590, Zaïre, Gombari (BR).

*M. laurentii* De Wild., Ann. Mus. Congo, Bot., ser. 5, 3 : 68 (1909). — Type *M. Laurent* 2002, Zaïre, Eala (BR).

*M. elegans* Engler, Wiss. Ergebn. Deutsch. Zentr. Afr. Exp. 1907-1908 2 : 182 (1914). — Type : *Mildbraed* 2260, Zaïre, Ruwenzori (B).

*Shrubs* or trees 2-10 m tall; stipules caducous; fruiting perianth not protracted, distinctly ovoid; interfloral bracts not lengthened in the infructescence.

*Distribution* : Zaïre and Rwanda (fig. 11, 3).

1.4. *Myrianthus scandens* Louis ex Hauman, Bull. Jard. Bot. Etat Brux. 19 : 62 (1948); Hauman, Fl. Congo Ruanda-Urundi 1 : 85, t. 10 (1948). — Lectotype : *Louis* 11 878, Zaïre, Yangole (BR, isotypes FHO, K, P). — Fig. 6.

*Lianas* with air roots; leafy twigs ca. 0.3-0.7 cm thick, internodes 4-9.5(-14) cm long, with 0.3-1.0 mm long, patent, white to yellow-brown hairs, glabrescent. *Leaves* usually simple and entire, and then





Fig. 6. — *Myrianthus scandens*: a, leafy twig with staminate inflorescences (Louis 13 506); b, leaf (Gilbert 9037); c, pistillate inflorescence (Gilbert 8677); d, infructescence (Gilbert 9037); e, indument of the twig; f, indument of the leaf.

9-25 cm long, 5-14 cm broad and ovate to oblong, sometimes 3-5-lobed and then 9-21 cm long and 17-23 cm broad; apex acute to acuminate; base obtuse to cordate; margin serrate; scabrous above because of hair bases; beneath with appressed grey to grey-brown hairs on the costa and the secondary veins, patent weaker hairs on the tertiary veins; and arachnoid-tomentellous in the areoles; petiole 2.5-8.5(-19) cm long, even, indument as on the twigs; stipules 0.5-1.3 cm long with yellowish to brown appressed hairs. *Staminate inflorescences* 3-7.5 cm long, 1 mm thick, peduncle branched 5-6 times, with grey to grey-brown patent hairs, flowers on the ultimate (n) and more proximal branches (as far as n-2 to n-3), up to 1-2.5 cm from the ends of the ultimate branches; perianth 0.5-0.7 mm high, stamens hardly exceeding the perianth, filaments 0.3-0.6 mm long, anthers 0.2-0.4 mm long; interfloral bracts subcucullate, obovate to spatulate, the other bracts triangular, acute, convex. *Pistillate inflorescences* globose, 0.9-1.2 cm in diam.; peduncle 1.2-3 cm long, with grey to grey-brown appressed hairs; flowers 10-12; perianth ovoid, 3-4 mm high, with patent whitish to yellow-brown hairs, stigma 1.9-2.3 mm long. *Infructescences* up to at least 2.5 cm in diam. (only immature ones seen).

Flowering from February to June (to or also from August to October).

*Distribution* : Northern Zaïre, in the Zaïre Basin (fig. 11, 2).

1.5. *Myrianthus libericus* Rendle, Jour. Bot. 53 : 354 (1915); Rendle in Prain, Fl. Trop. Afr. 6 (2) : 236 (1917). — Lectotype : *Unwin & Smythe* 2, Sierra Leone (K). — Fig. 7, 8.

*Shrubs* or small trees up to 9 m tall; leafy twigs 0.6-1.0 cm thick, internodes 0.5-2.5 cm long, with dense patent short stout yellow-brown hairs, more or less glabrescent. *Leaves* simple, 17-41 cm long, 8.5-33 cm broad, entire and elliptic to lanceolate or oblong to obovate, or 3-5 palmately lobed; mostly with a distinctly longer middle lobe; acute to acuminate, at the base acute to truncate (to subcordate); margin serrate to serrato-dentate; above with sparse patent to appressed hairs, glabrescent, beneath on the prominent veins appressed to patent, on the tertiary veins predominantly patent hairs, young leaves yellow-brown sericeous; 9-12(-15) pairs of secondary veins; petiole 5-15(-24) cm long, ribbed and sulcate, with short and distinctly longer, predominantly patent hairs, at the apex

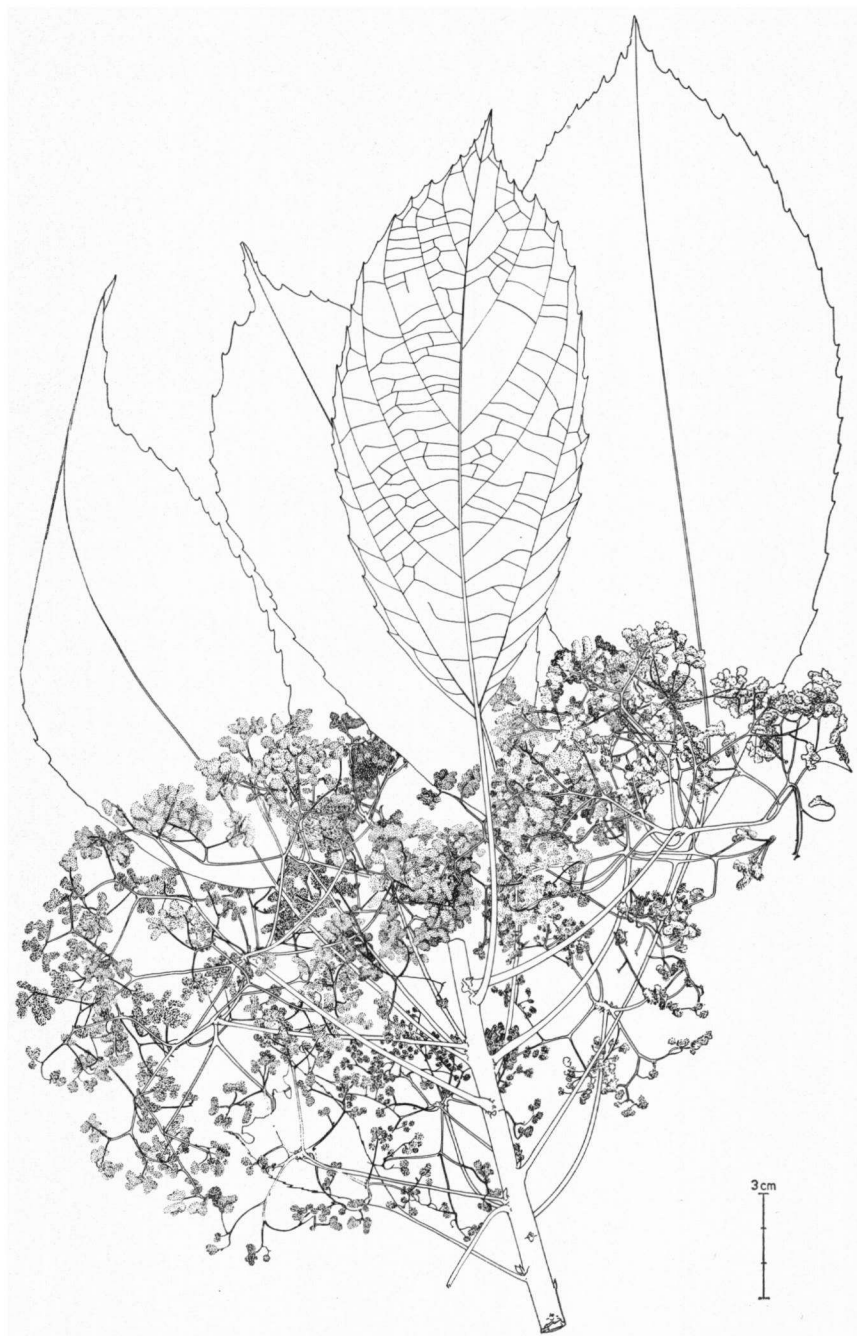


Fig. 7. — *Myrianthus libericus*: leafy twig with staminate inflorescences (de Wilde 3195).



Fig. 8. — *Myrianthus libericus*: a, leaf (van Harten 201); b, pistillate inflorescence (Leeuwenberg 2224); c, infructescence (de Wilde 300); d, infructescences (Bamps 2407); e, indument of the twig; f, indument of the leaf.

and the base with denser and longer hairs; stipules 0.5-1.1 cm long, caducous, grey sericeous, scars inconspicuous. *Staminate inflorescences* 3 × 3 cm to 11 × 11 cm, 5-8 primary branches, each one branched 3-4 times, peduncle 3.5-10 cm long, 1-2 mm thick, puberulous; flowers in globose groups ca. 3 mm in diameter on the ultimate (n) or more proximal (n-1) branches; perianth 0.6-1.2 (-1.4) mm high, tepals 3-4, free, with a cucullate and thickened apex, outside sparsely hairy, margin ciliolate; stamens distinctly exceeding the perianth, 0.7-1.3(-1.5) mm long, anthers 0.2-0.5 mm long; interfloral bracts linear to spatulate, 0.4-1.2 mm long; the other bracts ovate to obovate to subspathulate. *Pistillate inflorescences* 1-2 cm in diam.; peduncle 2-5 cm long, sometimes lacking or up to 0.2 cm long, 1-3 mm thick, with grey to grey-brown patent, rarely appressed hairs; flowers 10-30(-40); perianth ovoid, 4 × 3 mm, with dense grey-brown (almost) appressed hairs, apex with a narrow 2-3-lobed opening; stigma 2-3 mm long, interfloral bracts ovate to oblanceolate, ca. 2 mm long, grey to yellow-brown sericeous. *Infructescences* with quite different dimensions, depending on the number of fruiting perianths, up to 11.5 cm in diam.; fruiting perianth scabrous-tuberculate; endocarp body at least 1 × 0.8 cm.

Flowering mainly from October to March (or May).

*Distribution* : West tropical Africa, from Guinea to Ghana (fig. 11, 2).

1.6. *Myrianthus serratus* (Trécul) Bentham & Hooker, Gen. Pl. 3 (1); 379 (1880); Engler, Monogr. Afr. Pfl. 1 [*Moraceae*] : 40, t. 17C (1898); Rendle, Journ. Bot. 53 : 353 (1915); Rendle in Prain, Fl. Trop. Afr. 6 (2) : 235 (1917). — Fig. 9.

*Dicranostachys serrata* Trécul, Ann. Sci. Nat., Bot., ser. 3, 8 : 85 (1847). — Type : *Heudelot 840* ♂, Guinea, Fouta Djallon (P; isotypes B?, G, K).

*Shrubs* or trees up to 16 m tall; cortex grey to yellow-grey or red-brown, slightly sulcate; leafy twigs 4-7 mm thick, internodes 0.5-2.5 cm long, with appressed short white hairs, glabrescent. *Leaves* simple, entire to 3(-5)-lobed, ovate, obovate, elliptic, oblanceolate (or lanceolate), (8-)18-32 cm long, 8.5-15 cm broad, acute, sometimes obtuse or subacuminate, at the base acute to truncate, sometimes attenuate; margin prominently to rather faintly duplicato-serrate to serrato-dentate; above usually glabrous except for some hairs on the

veins, sometimes hairy but soon glabrescent, beneath with (almost) appressed short white to grey hairs on the costa and secondary veins, tertiary veins and areoles silver white to greyish white arachnoid-tomentose; costa and secondary veins slightly prominent beneath, 6-13 pairs of secondary veins; petiole 2-13 cm long, faintly sulcate (and ribbed), with appressed short white hairs; stipules 0.5-1.5 cm long, caducous or subpersistent, with sparse appressed white hairs. *Staminate inflorescences* (including the peduncle)  $2 \times 2 - 5 \times 6$  cm, with 2-4 primary branches, each one branched 5-7 times; peduncle 1.5-4.5 cm long, 1-2 mm thick, with appressed white short hairs, distally patent hairs; flowers on the ultimate (n) to more proximal (up to n-3) branches, up to ca. 1.5-2 cm from the ends of the ultimate branches; perianth 0.6-1.0(1-2) mm high, tepals (2-)3-4, free or basally connate, obovate, apex thickened, cucullate, with stiff short white hairs; filaments 0.7-1.0 mm long, anthers 0.2-0.5(-0.8) mm long, 0.3-0.4 mm broad; interfloral bracts 0.4-0.9 (-1.2) mm long, the other bracts deltoid, acute, at the base convex. *Pistillate inflorescences* globose, 0.5-2.0 cm in diam.; peduncle 0.4-0.8 cm long, with minute appressed to patent white hairs; flowers 3-12; perianth ovoid, 1.5-2.5 mm high, 1.2-2.0 mm in diam., stigma 1.2-2.2 mm long; interfloral bracts triangular to ovate. *Infructescences* with 1-4 fruiting 1.5-2 cm high perianths; endocarp body 1.1-1.5  $\times$  1.0-1.4 cm with up to 16 distinct to faint ribs.

Flowering from January to May in West Africa, from Cameroun to Zaïre probably throughout the year.

*Distribution* : From Senegal to Zaïre.

1.6.a. *Myrianthus serratus* var. *serratus*. — Fig. 9, a-f.

*Stipules* subpersistent; margin of the lamina usually prominently dentate; petiole 2-6(-10) cm long; cortex of the leafy twigs grey to yellow-grey; stamens hardly exceeding the perianth, anthers (0.3-) 0.4-0.5(-0.8) mm long, longer than broad; perianth of the pistillate flowers ovoid.

*Distribution* : From Senegal to Cameroun (fig. 11, 4).

1.6.b. *Myrianthus serratus* var. *letestui* de Ruitter var. nov. — Fig. 9, g. — Type : *Le Testu* 9337, Gabon, La Lara (P).

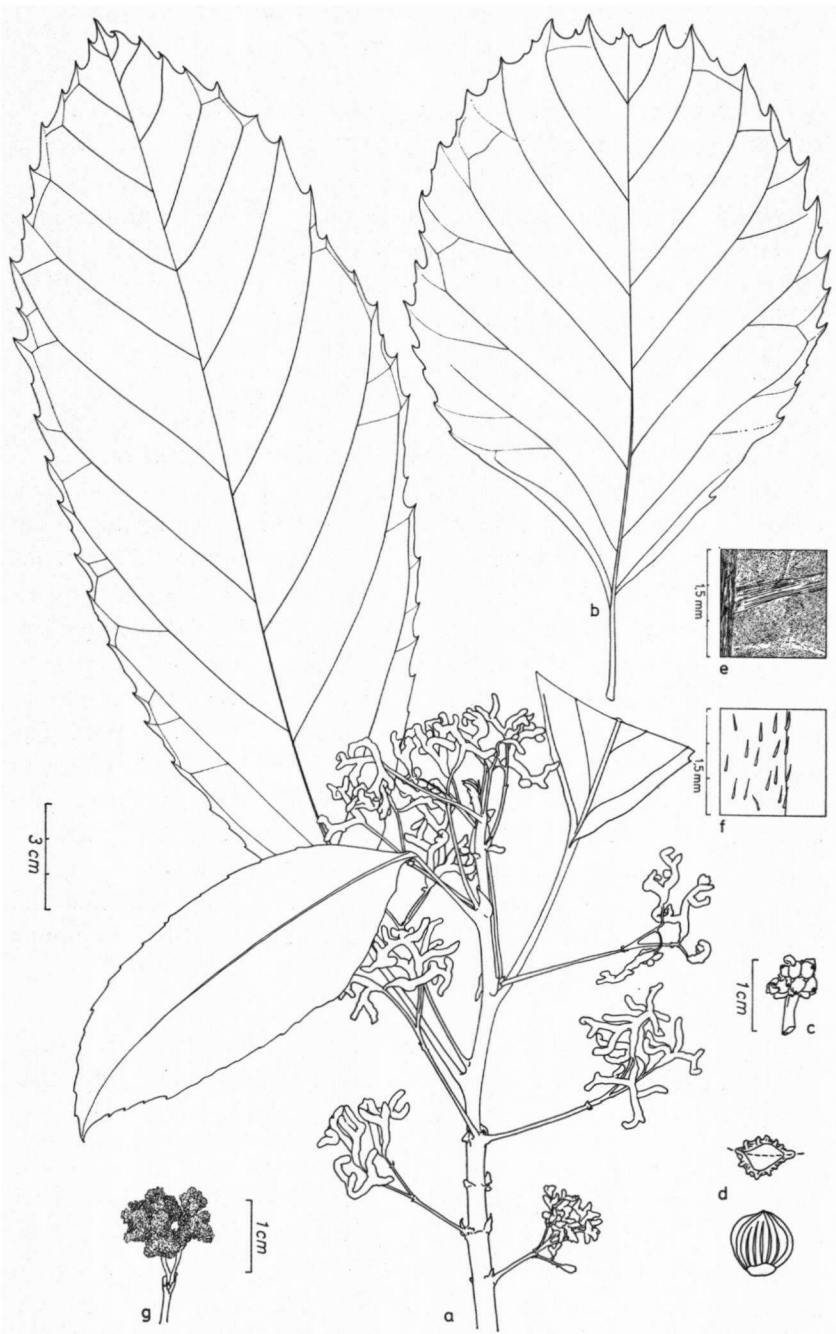


Fig. 9. — *Myrianthus serratus* var. *serratus*: a, leafy twig with staminate inflorescences (de Wilde 3614); b, leaf (Barter 1100); c, pistillate inflorescence (Leeuwenberg 5379); d, endocarp (Busson s.n.); e, indument of the twig; f, indument of the leaf; var. *letestui*: g, staminate inflorescence (Le Testu 9337).

*Frutex* vel arbor parva; stipulae caducae; petioli 3-13 cm longi; cortex ramulorum statu sicco badius; antherae parvae, 0.2-0.3 (-0.4) mm longae et latae.

*Stipules* caducous; margin of the lamina usually not prominently dentate; petiole 3-13 cm long; cortex of the leafy twigs red-brown (when dry); anthers small, 0.2-0.3(-0.4) mm long, as broad as long; pistillate inflorescences not seen.

*Distribution* : From Gabon to Zaïre and Angola-Cabinda (fig. 11, 4).

*Note* : A single collection from Sao Tomé (*Chevalier* 14 257), consisting of leaves only and possibly collected from a juvenile specimen, having petioles longer than 30 cm and leaves up to 40 cm long, belongs to *M. serratus*, but not with certainty to var. *serratus*.

Some collections recently made in Cameroun at altitudes between 850 and 1250 m (*Letouzey* 10 802, 11 208, 13 641, *Satabié* 105) are provisionally placed in *M. serratus*. These collections have sub-persistent stipules, like in *M. serratus* var. *serratus*. The cortex of the leafy twigs is red-brown like in *M. serratus* var. *letestui*. The leaves are mostly 3-5-lobed, whereas they are commonly entire in *M. serratus* var. *serratus*. The base of the lamina is acute or subcordate. The indument is brownish, while it is normally whitish in *M. serratus*. The petioles are up to 27 cm long and distinctly different in length on the same twig, like in *M. libericus*. The material is too scarce to allow a well-founded decision about its taxonomic position.

1.7. *Myrianthus cuneifolius* (Engler) Engler, Monogr. Afr. Pfl. 1 [*Moraceae*] : 40, t. 17D (1898); Rendle in Prain, Fl. Trop. Afr. 6 (2) : 236 (1917). — Fig. 10.

*M. serratus* (Trécul) Bentham & Hooker var. *cuneifolius* Engler, Bot. Jahrb. 20 : 150 (1894). — Type : *Soyaux* 381, Gabon, near Munda (B; isotype K).

*Shrubs* or small trees up to 2(-3.5) m tall; leafy twigs 0.4-0.6 cm thick, internodes 2-6 cm long, cortex of leafy twigs red-brown, scabrous because of rigid uncinatate 0.2-0.5 mm long hairs. *Leaves* simple and entire to compound with 5 sessile leaflets, coriaceous to chartaceous; simple and entire leaves elliptic to oblanceolate; up to 30 × 8 cm; acute to acuminate, at the base truncate; margin sub-



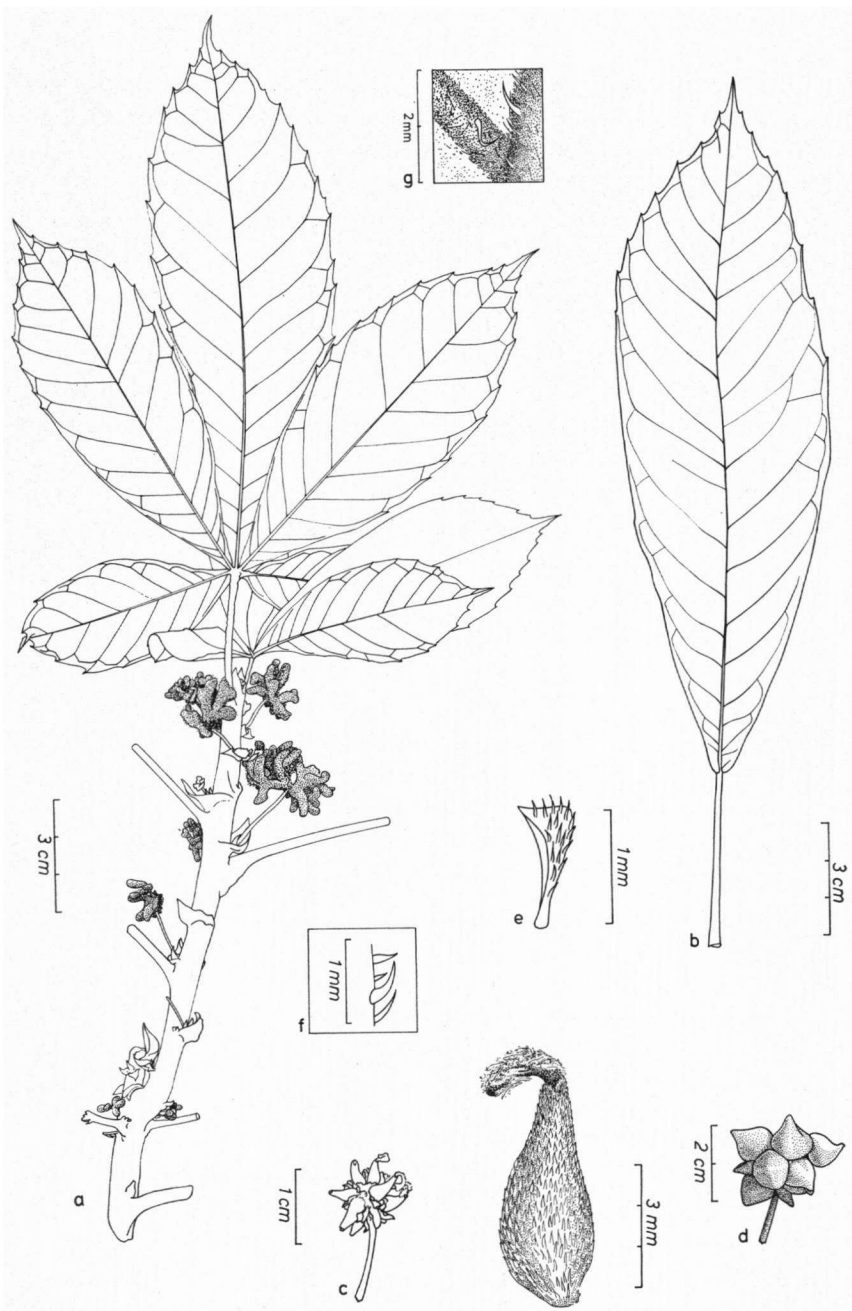


Fig. 10. — *Myrianthus cuneifolius*: a, leafy twig with staminate inflorescences (N. Hallé 866 bis); b, leaf (Mann 1051); c, pistillate inflorescence and flower (Mann 1819); d, infructescence (Klaine 191); e, tepal of staminate flower (Klaine 63); f, indument of the twig; g, indument of the leaf.

entire to serrate; compound leaves up to  $35 \times 40$  cm; above glabrous, except for some hairs on the main veins, beneath with rigid curved hairs on the main veins, areoles arachnoid-tomentose; veins prominent beneath, 12-18 pairs of secondary veins, petiole (0.5)2.5-2.4 cm long, sulcate and ribbed, red-brown, covered with rigid curved hairs; stipules 1.0-1.4 cm long, subpersistent, with appressed grey to grey-yellow hairs. *Staminate inflorescences* (excluding the peduncle)  $2.7 \times 2.5$  cm, peduncle 0.5-3 cm long, 1 mm thick, with dense patent short grey to yellow-grey hairs; 2-5 primary branches, each one branched 4-6 times; flowers close together on the ultimate (n) and more proximal (up to n-4) branches, up to 1.5-3.5 cm from the ends of the ultimate branches; perianth 0.6-1.2 mm high, tepals cucullate with a thickened apex, ciliolate; stamens 0.5-1.4 mm long, filaments often completely connate, anthers 0.3-0.5(-0.6) mm long; interfloral bracts 0.4-1.0 mm long. *Pistillate inflorescences* 1-2 cm in diam., subsessile or shortly (up to 1 cm long) pedunculate; flowers 25-40; perianth more or less long-conical, 6-7 mm long, 2-3 mm in diam.; stigma 2-2.5 mm long; interfloral bracts deltoid, as the perianth covered with firm red-brown to yellowish appressed hairs. *Infructescences* up to 3 (or more?) cm in diam., fruiting perianths few (3-5), ovoid; endocarp body  $1.1 \times 1.0$  cm, even.

Flowering possibly from June to December.

*Distribution* : Confined to north-western Gabon and the adjacent part of Rio Muni (fig. 11, 2).

2. Musanga R. Brown in Tuckey, Narrative Exp. River Zaïre, App. : 453 (1818); Tedlie in Bowdich, Miss. Ashantee : 372 (1819); Bennett in Bennett & Brown, Pl. Jav. Rar. : 49 (1898); Engler, Monogr. Afr. Pfl. 1 [*Moraceae*] : 42 (1898). — Type species : *M. cecropioides* R. Brown ex Tedlie.

Dioecious *trees* with stilt roots. *Leaves* spirally arranged, peltate, with 8-18 radiating segments; stipules fused, completely amplexicaul, hairy inside. *Inflorescences* paired in the axils of the leaves, pedunculate, bracteate; the staminate ones repeatedly dichotomously branched, with terminal globose-capitate groups of flowers, perianth 2-lobed, 1 stamen, pistillode absent; pistillate inflorescences flattened spikes with numerous dense (sub)sessile flowers, perianth tubular, ovary free, ovule sub-basal, orthotropous, stigma simple. *Fruit* free,

endocarp crustaceous, mesocarp mucilaginous, exocarp membranaceous; seed with endosperm, cotyledons equal and flat, radicle apical.

## Morphology

### *Habit*

The two *Musanga* species are trees with a short bole and a spreading crown. The ramification is regular; on the trunk and branches (sub)verticillate, becoming bifurcate on the distal branches. The formation of branches is rhythmical. Well-developed stilt-roots are common in *M. cecropioides*, but small or lacking in *M. leo-errerae*.

### *Leaf*

Young seedlings have simple and entire, basally-attached leaves with pinnate venation. However, the venation soon becomes palmate and the leaves become incised and peltate. The indument also gradually changes with age. The leaves of adult specimens of *M. cecropioides* are usually smooth above, while on young trees the leaves are scabrous or scabridulous. In *M. leo-errerae* adult specimens retain scabridulous leaves. The stipules, being membranaceous in seedlings but coriaceous in adult specimens, vary considerably in dimensions, depending on the diameter of the twigs and the presence of inflorescences.

### *Staminate inflorescence*

The staminate inflorescences resemble those of *Myrianthus preussii*, having a peduncle dividing into a number (3-5) of primary branches, each of which ramifies repeatedly and dichotomously. The flowers are borne in globose-capitate groups on the ultimate branches.

On treating the flowers with 10 % KOH solution (to make pollen preparations) a red dye is released from the perianth of *M. cecropioides* but not from that of *M. leo-errerae*.

### *Pollen*

Pollen from *Musanga* species has been prepared and studied in the same way as with *Myrianthus*. It may be described as follows :

*Pollen class* : diporate. *P/E ratio* : 1,18. *Aperture* : as for *Myrianthus* pollen. *Exine* : thin; *sexine* : as thick as the exine. *Ornamentation* : intectate, sometimes a tectum perforatum; columellae rather rough. *Outlines* : like those of *Myrianthus* pollen. *Measurements* : longest axis 11-17  $\mu$ ; exine about 1  $\mu$ ; longest axis of the aperture about 2  $\mu$ .

*Musanga* pollen resembles that of *Myrianthus*; the structure of the sexine, however, is distinctly different.

### *Pistillate inflorescences*

The pistillate inflorescences are spike-like, often more or less clavate and applanate, and sometimes incised at the apex.

In the two *Musanga* species solitary or groups of staminate flowers have been observed several times. The occurrence of staminate flowers in the pistillate inflorescences of *M. cecropioides* can be easily traced, because of the (sub)peltate bracts accompanying the staminate flowers and the higher and more densely hairy perianth of the staminate flowers. Such mixed inflorescences are commonly met with in material of *M. cecropioides* from West Africa (as far as Cameroun), but have not been found in material from Zaïre, Angola, and Uganda. The presence of staminate flowers in pistillate inflorescences of *M. leo-errerae* is less obvious, as there is little difference between the bracts accompanying the staminate flowers and those accompanying the pistillate flowers.

The shape of the fruit, especially of the endocarp body, is variable and depends more or less on the length of the pedicel. The pericarp is differentiated into three layers : the endocarp, which is hardened and thickened simultaneously over its whole surface (unlike *Myrianthus*), the mucilageous mesocarp, and the membranaceous exocarp.

### Distribution and ecology

*M. cecropioides* commonly occurs in the tropical rain forest area of West and Central Africa, in secondary vegetation, along rivers, etc. It seems to take up the same ecological « niche » as many *Cecropia* species do in the Neotropics. Introduced *Cecropia* species which have run wild replace *M. cecropioides*. *M. leo-errerae* occupies a small area in the mountains of East Zaïre and Uganda, where it occurs at altitudes from 1000 to 2000 m in open places.

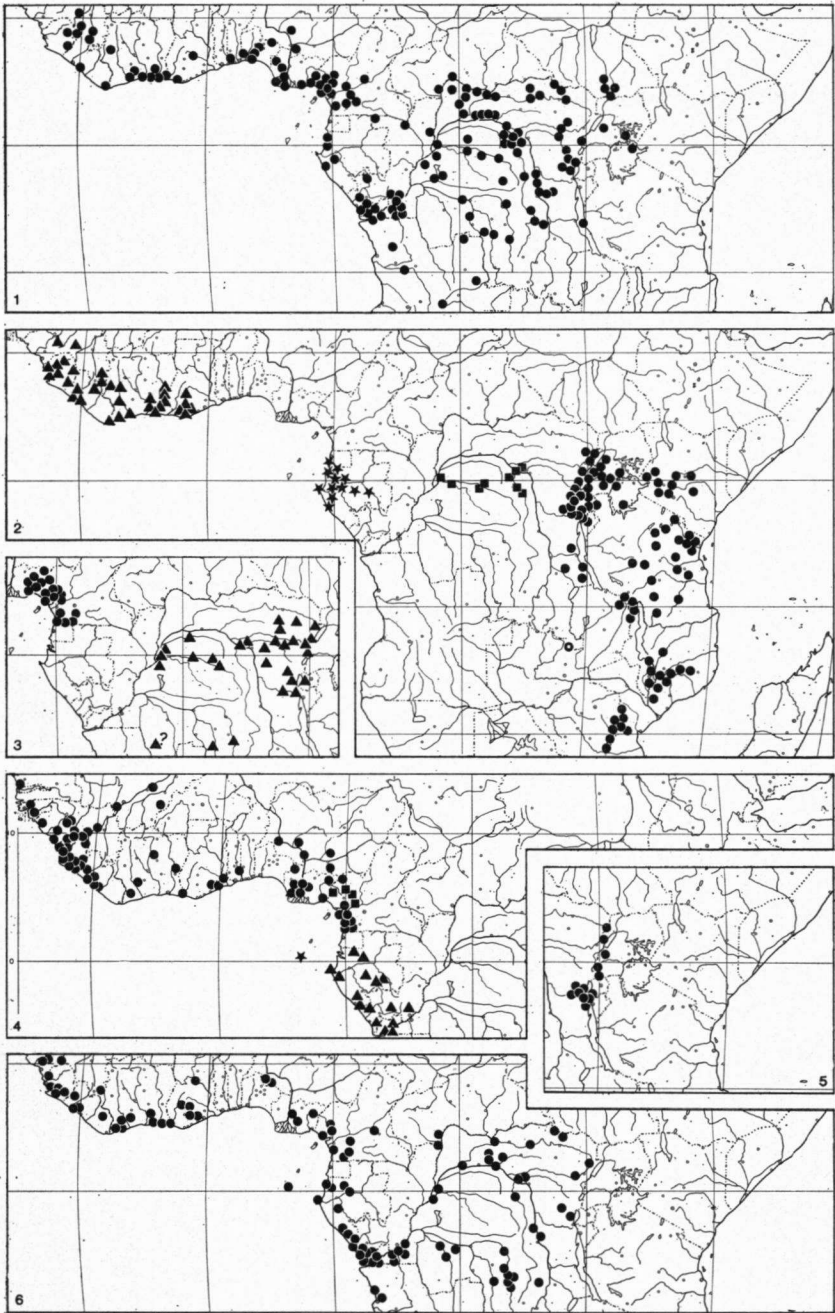


Fig. 11. — 1, *Myrianthus arboreus*; 2, ● — *Myrianthus holstii*, ○ — seedlings probably belonging to *M. holstii*, ■ — *Myrianthus scandens*, ★ — *Myrianthus cuneifolius*, ▲ — *Myrianthus libericus*; 3, *Myrianthus preussii*: ● — ssp. *preussii*, ▲ — ssp. *seretii*; 4, *Myrianthus serratus*: ● — var. *serratus*, ▲ — var. *letestui*, ■ and ★ — specimens different from the two varieties; 5, *Musanga leo-errerae*; 6, *Musanga cecropioides*.

**History and taxonomical remarks**

Musanga was mentioned and described for the first time by R. Brown in the Appendix to Capt. Tuckey's Narrative of an expedition to explore the river Zaïre in Congo (1818). R. Brown (1819) described the material (then ?) collected by Chr. Smith as *M. cecropioides* and later, on another occasion (1838) as *M. smithii*; this latter name has been commonly applied for a long time.

The second species of *Musanga*, *M. leo-errerae*, was described in 1960 by Hauman and J. Léonard. It is closely related to *M. cecropioides*. *Musanga* shows resemblances with the neotropical genus *Cecropia*, especially in habit and ecology, and with the neotropical genus *Coussapoa*, especially in characters of flowers and inflorescences.

Stilt-roots short or lacking; staminate inflorescences little branched, with 10-25 heads, 1.0-1.3 cm long and 0.6-1.0 cm broad, peduncle 6-10 cm long, bracts linear with 1-5 stiff hairs; pistillate inflorescences up to 2.3 cm long, slightly flattened, stigma distinctly exceeding the perianth, bracts linear, hairy; at altitudes from 1000 to 2000 m in East Zaïre, Rwanda, Uganda . . . . . 2. *M. leo-errerae*

Stilt-roots usually present; staminate inflorescences much branched, with many heads, 0.3-0.5 cm in diameter, bracts peltate or subpeltate, glabrous; pistillate inflorescences up to 5 cm (when fruiting up to 12 cm) long, only the hairs of the stigma exceeding the perianth; bracts linear to spatulate, glabrous . . . . . 1. *M. cecropioides*

2.1. *Musanga cecropioides* R. Brown ex Tedlie in Bowdich, Miss. Ashantee : 372 (1819); Hiern, Cat. Afr. Pl. Welwitsch 4 : 995 (1900); Exell, Cat. Vasc. Pl. São Tomé : 309 (1944). — Type : *Chr. Smith* s.n., Zaïre, along Zaïre River (BM; isotype K).

*M. smithii* R. Brown ex Bennett in Bennett & Brown, Pl. Jav. Rar. : 49 (1838); Engl., Monogr. Afr. Pfl. 1 [*Moraceae*] : 42, t. 18 (1898); Engler, Pflanzenw. Afr. 3 (1) : 34 (1915); Rendle in Prain, Fl. Trop. Afr. 6 (2) : 239 (1917). — Type : Based on the same type specimen as *M. cecropioides*.

*Trees* up to 30(-45 ?) m tall, usually with stilt-roots; leafy twigs 0.8-1.5 cm thick, with 1-2.5 cm long internodes and short appressed white hairs, initially intermixed with long patent light brown hairs and reddish to dark-brown pluricellular hairs. *Leaves* up to 110 cm in diameter, segments (9-)11-18, oblanceolate, 6-7.5 cm long, 1.5-15 cm broad, with a tapering base, margin entire; above glabrous, occasionally scabridulous, beneath on the veins minute grey to white appressed hairs intermixed with longer disappearing hairs, in the

areoles white arachnoid-tomentellous; veins almost plane above, prominent beneath, most tertiary veins parallel; petiole up to 110 cm long, broadened towards the apex and the base, with sparse brown hairs, glabrescent; stipules 7-30 cm long, inside white to light brown sericeous, outside with short white appressed hairs and brown to blackish brown pluricellular hairs, initially intermixed with long patent brown hairs. *Staminate inflorescences* up to 10 × 15 cm, excluding the 4-9 cm long, almost glabrous peduncle, heads 3-5 mm in diam., with ca. 50 sessile flowers; perianth obovoid, 1.3-1.7 mm high, appressed-pubescent; stamen 1.7-2.2 mm long, anther ellipsoid, 0.4-0.6 mm long; interfloral bracts peltate or subpeltate, as long as the perianth, glabrous. *Pistillate inflorescences* more or less clavate and towards the apex appanate, 2-5 cm long, 1.5-3 cm broad, with dense sessile or short-pedicellate flowers, peduncle 4-10 cm long, almost glabrous; perianth 1.6-2.2 mm high, ca. 0.4 mm in diam., appressed puberulous, more densely towards the apex; style ca. 0.5 mm long, stigma ca. 0.5 mm long, not or hardly exceeding the perianth, only a tuft of ca. 0.5 mm long hairs visible; interfloral bracts linear to narrowly spatulate, glabrous. *Infructescences* up to 12 cm long, endocarp body (sub)ovoid, (1.6-)1.8-2.6(-2.8) mm long, tuberculate; seed 0.7-1.0 × 0.3-0.6 mm.

Flowering probably throughout the year (everywhere?).

*Distribution*: West and Central Africa (fig. 11, 6), in secondary vegetation and along rivers in the rain forest area; in Zaïre up to altitudes of 1200 m.

2.2. *Musanga leo-errerae* Hauman & J. Léonard, Bull. Agr. Congo 51 : 61 (1960). — Type: Pierlot 1349, Zaïre, Bitale (BR).

*Trees* up to 30 m tall, with or without short stilt-roots; leafy twigs 1-1.5 cm thick, with 0.5-0.8 cm long internodes, initially with long yellow-brown hairs, which are dense near the scars of the stipules. *Leaves* up to 40 cm diameter, segments 8-11, oblanceolate, 14-28 cm long, 4-10 cm broad, acuminate to apiculate, with a tapering base; margin entire to subserrate; above scabrous, beneath with grey to brownish long appressed hairs on the veins, grey arachnoid-tomentellous in the areoles; veins almost plane above, prominent beneath, most tertiary veins parallel; petiole 12-35 cm long, broadened at the base and the apex, with minute patent hairs intermixed with distinctly longer, rather weak, whitish to brownish

hairs; stipules 8-16 cm long, inside whitish to greyish sericeous, outside yellowish to brown sericeous. *Staminate inflorescences* sparsely branched, with 10-25 heads, 1.0-1.3 cm long and 0.6-1.0 cm broad, peduncle 6-10 cm long, with patent brown hairs; perianth 1.7-2.1 mm high, yellow-brown pubescent towards the thickened apex; stamen 2.8-3.3 mm long, anther ellipsoid, 0.4-0.6 mm broad, bracts linear 1.2-1.8 mm long, with 1-5 0.5-0.8 mm long brown hairs on the apex. *Pistillate inflorescences* 1.5-2.3 cm long, 1-1.5 cm broad, 0.5-0.8 cm thick; peduncle 5-8 cm long, with patent brown hairs; perianth 1.8-2.8 mm high, with up to 0.5 mm long stiff brown hairs on the thickened apex; style 1.3-2.1 mm long, stigma exceeding the perianth by ca. 0.5 mm; interfloral bracts 1-2 mm long, with a few to many 0.4-0.8 mm long yellow-brown hairs. *Infructescences* 2-3 cm long, 1.4-2.2 cm broad; perianth up to 5 mm high, endocarp body ovoid, 2.3-3.7 mm long.

Flowering September to November (to February?).

*Distribution* : In eastern Zaïre, Uganda, Rwanda and Burundi (fig. 11, 5), in secondary montane forest, at altitudes from (ca. 850) 1000 to 2000 m.

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- Leemans, J.*, Zaïre : 291 (1.4), 641 (2.1).
- Leeuwenberg, A. J. M.*, Ivory Coast : 1749, 2184 (2.1), 2224 (1.5), 2682 (1.1), 3160 (2.1), 4015 (1.1); Cameroun : 5111 (1.6.a), 5190 (1.3.a), 5379 (1.6.a), 5513, 5914, 59.61 (2.1), 6026 (1.3.a), 6644, 6713 (2.1), 6948 (1.3.a), 8287 (1.1), 8723, 8802, 9115 (1.3.a), 9162 (1.6.a), 9484, 9937, 10 216 (1.1).
- Leeuwenberg, A. J. M. & C. C. Berg*, Cameroun : 9627 (2.1), 9656 (1.1), 9683 (2.1), 9767 (1.1).
- Lemaire, B.*, Zaïre : 76 (1.1), 357 (2.1).
- Léonard, A.*, Zaïre : 701 (1.4), 709, 1483 (1.1), 1655 (1.3.b), 2006, 2028 (1.2), 2041 (2.2), 2123 (1.1), 2876 (1.3.b), 3449 (1.2), 5850 (1.3.b).
- Léonard, J.*, Zaïre : 17 (2.1), 351, 1027, s.n. (1.1).
- Le Testu, G.*, Dahomey : 240 (1.1), Gabon : 1044 (2.1), 1878, 6303 (1.6.b), 7585 (1.7), 9337 (1.6.b), s.n. (1.1), s.n. (1.7).
- Letouzey, R.*, Cameroun : 1297 (1.1), 10 353, 10 802, 11 208 (1.6.-), 12 636 (1.6.a), 13 588 (1.3.a), 13 641 (1.6.-), 14 004 (1.6.a).
- Lewalle, J.*, Zaïre : 209 (1.2), 1733 (2.2).
- Liben, L.*, Zaïre : 2321 (2.1), 2433 (1.1), 2594 (1.3.b), 3341 (1.1).
- Linder, D. H.*, Liberia : 209 (1.5), 215 (2.1), 319 (1.6.a) 742, 1056, 1396 (1.5).
- Louis, J.*, Zaïre : 528, 736, 803 (1.1), 1403, 1603, 1.3.b), 2415 (1.1), 2419, 2798, 3109, 3765 (1.3.b), 4115 (1.1), 4385 (2.1), 5588, 6447, 7701, (1.3.b), 8382 (1.1), 8473, 11 346 (1.3.b), 11 877 (1.4), 12 909 (1.3.b), 13 501 (2.1), 13 506 (1.4), 13 857 (2.1), 14 615 (1.3.b), 15 717 (1.4).
- Loveridge, M. V.*, Uganda : 202 (1.1, 1.2).
- Maitland, T. D.*, Cameroun : 391 (1.3.a), s.n. (1.1).
- Malchair*, Zaïre : 137 (1.1).

- Mann, G.*, Sierra Leone? : 44, 45 (2.1); Cameroun : 716 (1.1); Gabon : 1051 (1.7); Rio Muni : 1819 (1.7); Nigeria : 2273 (1.6.a).
- Marimo, V.*, Sierra Leone : 131 (1.5).
- Marlier, M.*, Zaïre : 1480 (2.2).
- Martineau*, Ivory Coast : 229 (1.5), 263 (1.1).
- Maudoux, E.*, Zaïre : 77 (2.1), 1012 (1.1), 1205 (2.1).
- McGregor, G. M.*, Rhodesia : M78/39 (1.2).
- McLeod, N. C.*, Nigeria : s.n. (1.1).
- Melville, F. A.*, Sierra Leone : 14 (2.1).
- Menavanza, F.*, Zaïre : 22 (1.3.b).
- Mendonça, E. A.*, Moçambique : 295, 2200, 2541, 3642 (1.2).
- Michelson, A.*, Zaïre : 28 (1.1), s.n. (1.3.b).
- Mildbraed, J.*, Zaïre : 2260 (1.3.b).
- Millen, H.*, Nigeria : 114 (1.1).
- Mission Scient. Kasai*, Zaïre : s.n. (1.1).
- Mission Forest. Katanga*, Zaïre : 667 (1.1).
- Moloney, C. A.*, Nigeria : s.n. (1.1).
- Monteiro, R., Santos & Murta*, Angola : 189 (2.1).
- Morel*, Zaïre : 1, 2 (2.1).
- Mortehan*, Zaïre : 72 (2.1), 479 (1.1), 1068 (2.1).
- Morton, J. K.*, Ghana : A463 (1.5), A558 (1.6.a), A778, GC667 (1.1).
- Morton, J. K. & D. Gledhill*, Sierra Leone : SL1972 (1.5).
- Morton, J. K. & Jarr*, Sierra Leone : SL3270 (1.5).
- Mullenders, W.*, Zaïre : 1175 (1.1).
- Myers, J. G.*, Sudan : 11 807 (1.1).
- Nannan*, Zaïre : 16, 20 (1.1), FII (2.1).
- Newbould, J. & R. M. Harley*, Tanzania : 4495 (1.1).
- Newbould, J. & T. G. Jefford*, Tanzania : 2638 (1.1).
- Neuman, E. I. & T. C. Whitmore*, Malawi : 578 (1.2).
- Okafor, J. C. & B. O. Daramola*, Nigeria : (herb. FHI) 54 605 (1.6.a).
- Onochie, C. F. A.*, Ngeria : (herb. FHI) 8240, 34 325 (1.1), 36 026, 36 098 (1.3.a), 40 451 (2.1).
- Onyeachusim, H. D. & M. G. Latilo*, Nigeria : (herb. FHI) 54 038 (1.3.a), 54 217 (1.1).
- Palm, A. A.*, Ghana : 2005, 2605 (1.5).
- Palisot de Beauvois, A. M. F. J.*, Nigeria : s.n. (1.1).
- Pardy, A. A.*, Rhodesia : Pl/55 (1.2).
- Pauwels, L.*, Zaïre : 4973 (1.1).
- Peal, J.*, Nigeria : 169 (1.6.a).
- Pierlot, R.*, Zaïre : 85, 267 (1.2), 602 (2.2), 730 (1.1), 833, 998 (2.2), 1024 (1.2), 1075 (2.2), 1161 (2.1), 1215, 1349, 1350, 1459, 1505; Rwanda : 1579 (2.2); Zaïre : 1666, 1669a (2.2), 2206 (1.1), 2349, 2399 (1.2), 2426, 2570 (2.2), 3172, 3228 (1.2), 3262 (2.2).
- Pitery, Zaïre* : 602, 603 (1.1).
- Pobéguin, H.*, Guinea : 687 (1.6.a); Congo : 1082 (1.1); Guinea : 1293 (2.1), 1405 (1.6.a).
- Pole-Evans, I. B. & J. Erens*, Zaïre : 1828 (1.1).
- Polhill, R. & B. Verdcourt*, Kenya : 270 (1.2).
- Poole, C. E. L.*, Sierra Leone : 43, 332 (1.1).

- Preuss, P.*, Cameroun : 478a, 478b (1.3.a).  
*Purseglove, J. W.*, Uganda : P2505 (1.2).  
*Putman, Zaire* : 94 (1.3.b).  
*Raynal, J. & A. Raynal*, Cameroun : 9596 (2.1), 9885 (1.3.a), 9932 (2.1).  
*Reygaert, F.*, Zaire : 208 (2.1), 415 (1.1), 629 (2.1).  
*Reynders, M.*, Rwanda : 29 (1.2), 63 (2.2), 122 (1.2), 247 (2.2).  
*Richards, H. M.*, Tanzania : 6801 (1.2).  
*Rion, R. P.*, Tanzania : 9 (1.2).  
*Risopoulos, S.*, Zaire : 694 (2.1).  
*Roberty, G.*, Guinea : 7197 (1.6.a); Ivory Coast : 10 481 (1.1), 15 463, 15 829, 15 877 (1.5); Guinea : 16 058 (1.5), 17 235 (1.6.a); Sierra Leone : 17 920 (1.6.a).  
*Robyns, W.*, Zaire : 710 (2.1), 1069 (1.1), 2314 (1.2), 4302 (2.1).  
*Rosenthal, Gabon* : s.n. (2.1).  
*Rouyez, Cameroun* : s.n. (1.6.a).  
*Saint Clair-Thompson, G. W.*, Tanzania : 1224 (1.2).  
*Samai, S. K.*, Sierra Leone : 269 (2.1).  
*Sapin, A.*, Zaire : s.n. (2.1).  
*Sargos, Congo* : 47 (1.1), 142 (2.1).  
*Satabié, B.*, Cameroun : 105 (1.6.-).  
*Schlieben, H. J.*, Tanzania : 2769 (1.2).  
*Schmitz, A.*, Zaire : 5765 (2.1), 6564 (1.2).  
*Schnell, R.*, Guinea : 535 (1.5), 2531 (1.1), s.n. (2.1).  
*Schweinfurth, G.*, Zaire : 3138 (1.1), s.n. (2.1).  
*Scott Elliot, G. F.*, Sierra Leone : 4439, 4560, 5059, 5881 (1.6.a), s.n. (1.5).  
*Semsei, S. R.*, Tanzania : 1205, 2518 (1.2).  
*Seret, F.*, Zaire : 590 (1.3.b).  
*Serv. Agr. Angola, Angola* : 9338 (1.1).  
*Serv. Forest. Cameroun, Cameroun* : 28 (1.1).  
*Silletoe, F.*, Sudan : 255 (1.1).  
*Simão, J.*, Moçambique : 151/48, 547 (1.2).  
*Sitha, P.*, Congo : 232 (1.1).  
*Small, D.*, Sierra Leone : 390 (2.1), 673 (1.6.a), 802 (1.5).  
*Smeyers, Zaire* : 23, 69 (1.2).  
*Smith, Chr.*, Congo : s.n. (2.1).  
*Smith, J.*, Nigeria : 29 (1.1).  
*Smythe, C. W.*, Sierra Leone : 232 (2.1).  
*Snowdon, J. D.*, Rwanda : 1617 (1.2).  
*Soyaux, H.*, Gabon : 1? (2.1), 381 (1.7), s.n. (2.1).  
*Sperry, Uganda* : 547 (1.2).  
*Stanfield, D. P.*, Nigeria : (herb. FHI) 45 612 (1.1).  
*Staner, F.*, Zaire : 1371 (1.1).  
*Steedman, E. C.*, Rhodesia : 5147, 5148 (1.2).  
*Stolz, A.*, Tanzania : 1591, 1659 (1.2).  
*Struhsaker, T. T.*, Cameroun : 9 (1.1), 17 (1.2).  
*Styles, B. T.*, Uganda : 158 (1.2).  
*Swynnerton, C. F. M.*, Rhodesia : 111, 1052 (1.2).  
*Tailfer, Y.*, Zaire : 34 (1.1).  
*Talbot, P. A.*, Nigeria : 624 : 624 bis, 635, 684 (1.3.a), 684, s.n. (1.1).

- Taton, A.*, Zaïre : 160 (1.2).  
*Taylor, G.*, Uganda : 2766a (1.2).  
*Thoiré*, Ivory Coast : s.n. (2.1).  
*Thollon, F. R.*, Congo : 3, 20 (1.1), 85, 86 (2.1); Gabon : 103 (1.7); Congo : 758 (2.1).  
*Thomas, N. W.*, Nigeria : 2360 (2.1); Sierra Leone : 3438, 3572 (1.5), 6545, 6632 (1.6.a), 7709 (2.1), 8243, 8653, 8747 (1.6.a), 9459, 9720, 10 940 (1.5).  
*Thomas, R.*, Zaïre : 1445, 1448 (1.2).  
*Thonet, J.*, Zaïre : T240 (2.1).  
*Toka, L.*, Zaïre : 130 (1.1).  
*Tolliez, J.*, Ivory Coast : 213, 258 (1.1).  
*Torre, A. R.*, Moçambique : 2995, 3198, 3575, 4511, 4593, s.n. (1.2).  
*Torre, A. R. & M. F. Correia*, Moçambique : 13 664, 14 829, 16 374 (1.2).  
*Torre, A. R. & A. Pereira*, Moçambique : 12 951 (1.2).  
*Touret, G.*, Gabon : 158 (1.7).  
*Toussaint, L.*, Zaïre : 240 (or 248?) (1.1), 2338 (2.1).  
*Townsend, R. G. R.*, Malawi : 96, 285 (1.2).  
*Traub, Z. D.*, Liberia : 192 (2.1).  
*Troupin, G.*, Zaïre : 3001, 3140 (1.1), 3701 (2.1), 6256 (1.3.b); Rwanda : 9816 (1.2); Zaïre : 10 101 (1.1); Rwanda : 11 005, 11078 (1.2); Zaïre 11 401 (2.1); Rwanda : 11 154 (1.2).  
*Tuley, P.*, Nigeria : 886 (1.6.a).  
*Ujor, E.*, Nigeria : (herb. FHI) 30 849 (1.3.a).  
*Unwin, A. H.*, Nigeria : 40 (1.1).  
*Unwin, A. H. & C. W. Smythe*, Sierra Leone : 2 (1.5).  
*Van den Brande, P.*, Zaïre : 77 (2.1).  
*Van der Gucht*, Zaïre : 86 (1.3.b).  
*Vanderyst, H.*, Zaïre : 8696, 8719, 25 382, 26 894 (2.1), 29 567 (1.1).  
*Van Harten, A. M.*, Liberia : 201 (1.5), 325 (1.1).  
*Van Meer, P. P. C.*, Liberia : 189 (2.1).  
*Verdcourt, B.*, Tanzania : 129 (1.2).  
*Vermoesen, F.*, Zaïre : 1661 (2.1), 1886 (1.1).  
*Vigne, C.*, Ghana : 197 (2.1), 942, 1388, 4087 (1.5).  
*Vogel, E.*, Nigeria : s.n. (1.6.a).  
*Vuillet, J.*, Mali : 13 (1.6.a).  
*Wagemans, J.*, Zaïre : 1073 (2.1), 1110, 1129 (1.1).  
*Wallace, G. B.*, Tanzania : 434 (1.2).  
*Weiler, G.*, Angola : s.n. (1.1).  
*Wellens*, Zaïre : s.n. (1.1).  
*Welwitsch, F. M. J.*, São Tomé : 2392 (2.1); Angola : 2590, 2591 (1.1); São Tomé : 2592 (2.1).  
*White, F.*, Kenya 1029 (1.2); Zambia : 3736 (1.2); Nigeria : 8410 (1.6.a), 8433 (1.3.a).  
*Wigg, L. J.* : Tanzania : 68 (1.2).  
*Wild, H.*, Rhodesia : 2060, 2061, 2163 (1.2).  
*Willan, R. L.*, Tanzania : 455 (1.2).  
*Wills, D. A.*, Ghana : 27/28 (1.5).  
*Yafunga, F.*, Zaïre : 22 (1.3.b).  
*Yates, C. C.*, Nigeria : 34 (1.1).  
*Zenker, G.*, Cameroun : 166, 168, 1100, s.n. (1.1).