

Frutescent species of the genus *Dorstenia* L. (*Moraceae*) in the Paletropics

by

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Abstract. — A revision is presented of the group of frutescent *Dorstenia* species with a single row of appendages on the margin of the receptacle which occur in rain-forest areas of tropical Africa. The group comprises: *D. dorstenioides* (Engl.) M. Hijman & C. C. Berg, *D. involuta* M. Hijman & C. C. Berg, *D. turbinata* Engl., *D. angusticornis* Engl., *D. alta* Engl. and *D. scaphigera* Bureau.

Introduction

Engler (1898) distinguished three sections within the African species of the genus *Dorstenia*: section *Nothodorstenia*, section *Eudorstenia* and section *Kosaria*.

In the following new subdivision of the genus the rather clear-cut section *Nothodorstenia* is maintained. The section *Eudorstenia* and *Kosaria*, which cannot be distinctly separated, are replaced by a (provisional) division of five groups of species.

The revision of the genus *Dorstenia* in the Paletropics will be carried out according the following subdivision and published in parts:

1. *Frutescent species*

group A: *Dorstenia* L. section *Nothodorstenia* Engl.

Receptacles with at least two rows of short true bracts on the margin and lower down on the receptacle. Infructescences with one or a few fruits; endocarp body large, globose, and smooth.

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Species : *D. africana* (Baillon) C. C. Berg, *D. djettii* Guillaumet, *D. elliptica* Bureau, *D. kameruniana* Engl., *D. oligogyna* (Pellegr.) C. C. Berg. A revision of this group has already been published by Berg (1978).

group B : Receptacles with a single row of appendages on the margin. Infructescences with one or a few fruits; endocarp body large, globose, and smooth.

Species : *D. dorstenioides* (Engl.) M. Hijman & C. C. Berg, *D. involuta* M. Hijman & C. C. Berg, *D. turbinata* Engl., *D. angusticornis* Engl., *D. alta* Engl., *D. scaphigera* Bureau. This group is dealt with in the present paper.

2. Herbaceous and semi-succulent species

group C : Herbaceous plants with creeping rhizomes and ascending stems. Indument variable. Infructescences with several fruits; endocarp body rather small, subglobose, and often smooth.

Species of rain-forests in tropical West and Central Africa (about 30 species, a.o. *D. poinsettiiifolia* Engl., *D. zenkeri* Engl., *D. mannii* Hook. f.).

group D : Herbaceous or semi-succulent plants, often with erect and branched stems. Indument variable. Infructescences with several fruits; endocarp body small, tetrahedral to subglobose and tuberculate.

Species of rain-forests in tropical East Africa (about 10 species, a.o. *D. schlechteri* Engl., *D. zanzibarica* Oliver).

group E : Herbaceous plants with stems ascending from a rhizome. On most parts of the plant stiff hairs. Infructescences with several fruits; endocarp body rather small, subglobose, and tuberculate.

Species of montane rain-forests in N.-E. tropical Africa (about 5 species, a.o. *D. soerensenii* Friis, *D. brownii* Rendle, *D. fromontana* Fries).

3. Succulent species

group F : Succulent plants with fleshy stems arising from a basal fleshy tuber or a fleshy rhizome. Infructescences

with many fruits; endocarp body small, tetrahedral, and tuberculate.

Species with a rather wide distribution, especially in drier regions of Central and East tropical Africa, but also in Madagascar, Socotra, Yemen, India, and Sri Lanka (about 10 species, a.o. *D. benguellensis* Welw., *D. gigas* Schweinf.).

A more definite subdivision of the genus *Dorstenia* will be proposed in a final article.

History

In 1895 Bureau described *Dorstenia scaphigera* as a new woody species quite different from all previously reported species. He suggested that it constituted a new section of the genus and noted that it was related to *D. kameroniana* Engl. (= *D. kameruniana* Engl.) and *D. elliptica* Bureau.

Engler (1898) classified the latter species under *Dorstenia* section *Nothodorstenia* Engl.

C. C. Berg (1978) brought the genus *Craterogyne* Lanjouw in synonym with the genus *Dorstenia* L. and remarked that four of the five *Craterogyne* species have to be placed in *Dorstenia* section *Nothodorstenia*. Species of this section are distinctly related to another group of frutescent species (cf. Berg 1977, 1978; Berg & Hijman 1977), comprising *D. dorstenioides*, *D. involuta*, *D. turbinata*, *D. angusticornis*, *D. alta* and *D. scaphigera*. These are the species which are discussed in the present paper.

Morphology

Habit : *D. scaphigera* forms a low (ca. 1 m) shrub, which, like *D. involuta*, is sometimes unbranched. The other species are larger, branched shrubs up to 2 m in height. The branches of *D. turbinata* sometimes reach a length of 4.80 m.

Latex : Little white latex, sometimes rather watery.

Leaves : The leaves vary in shape but tend to be obovate and are distinctly acuminate at the apex; they are distichously arranged along the twigs — an arrangement which is also found in *D. africana* and *D. kameruniana*.

Stipules : The stipules of *D. angusticornis* are subulate and lateral and this is a feature in which the species resembles *D. elliptica*; *D. scaphigera* has narrowly triangular and more or less lateral stipules too. The other four species have semi-amplexicaul stipules with a broad base, as do the other four species of the section *Nothodorstenia*.

Indument : The indument of the leafy twigs, leaves, and inflorescences is rather similar in all species and consists of straight or curved hairs intermixed with retrorse, uncinata hairs.

Inflorescence : The inflorescence occur solitary or sometimes in pairs, in the leaf axils, but not on short-shoots as is the case with the species of the section *Nothodorstenia*. The inflorescences bear appendages, produced by the margin of the receptacle. The term « appendages » is used because of their origin; they are outgrowths of the margin and have no structure of a leaf. In species of the section *Nothodorstenia* the short bracts which are borne by the inflorescences sometimes have the structure of scale-leaves and occur also lower down on the receptacle.

Flowers : The inflorescences are bisexual, but the pistillate flowers are often restricted to one or two (occasionally up to five in *D. turbinata*). In all species except *D. involuta*, the style does not emerge from the perianth. The stamens are inflexed in the bud; at anthesis they are bent in several directions in *D. involuta* and *D. dorstenioides* and inwards in the other species. The filaments of *D. dorstenioides* are relatively long and basally swollen. The perianth of pistillate and staminate flowers has an indument of globose or clavate-oblongoid hyaline hairs.

Fruits : Because of the large enclosed endocarp body, the infructescence is swollen in the centre. Large seeds with a smooth endocarp wall are characteristic for all the frutescent species.

Distribution

The present species are all components of the undergrowth in the rain-forests of tropical Africa. *D. turbinata*, *D. angusticornis*, *D. involuta*, and *D. dorstenioides* are found only in tropical West Africa; *D. turbinata* occurs throughout a rather large area, from Guinea to Gabon, while the other three species are confined to South-East Nigeria, Cameroun, and Gabon. *D. scaphigera* occurs in

Central Africa. *D. alta* has its principal distribution in tropical East Africa, but it occurs also in Congo-Brazzaville.

Relationships

The frutescent group of species under discussion here is a distinct entity within the genus *Dorstenia*, but it cannot be placed at the same taxonomic level as the section *Nothodorstenia*. In that section the presence of several rows of bracts on the receptacle appears to be an important character and was a feature by which Engler (1898) sought to distinguish the section *Nothodorstenia*. Engler placed species with one row of « bracts » (= appendages) on the margin of the receptacle in the section *Eudorstenia*.

Rendle (1916) adopted this subdivision and distinguished within the section *Eudorstenia* groups of woody, herbaceous, and succulent species. The woody species of the section *Eudorstenia*, the species described here, appear to be morphologically closely related to species of the section *Nothodorstenia* through the woody habit, the small number of pistillate flowers, the presence of relatively large and smooth endocarp bodies, and the broad stipules.

D. dorstenioides seems nearest to the species of the section *Nothodorstenia*. In describing it as *Trymatococcus dorstenioides*, Engler (1914) pointed out that it showed similarities with species of the genus *Dorstenia* e.g. the unequal « bracts » (= appendages) placed on the margin of the receptacle. Lanjouw (1935), who placed the African species of *Trymatococcus* in the genus *Craterogyne*, likewise distinguished *Craterogyne dorstenioides* from the other species by the bracts of the receptacle. The author is in agreement with Berg (1978) who placed the five species of the genus *Craterogyne* in the genus *Dorstenia* and put them, with the exception of *D. dorstenioides*, together with *D. elliptica* in the section *Nothodorstenia*, on account of the resemblance of their bracts.

D. involuta and *D. turbinata* appear to be closely related. Some specimens of the rather variable *D. turbinata* approach the rather uniform *D. involuta*, in the shape of the inflorescence. But a geographical disjunction makes a distinction between the species possible.

D. involuta also appears to be closely related to *D. dorstenioides*, through the shape of the inflorescence and the occurrence of short appendages.

D. alta, *D. angusticornis*, and *D. scaphigera* have in common the naviculate shape of the receptacle with two terminal appendages.

Key to the species of the genus *Dorstenia* in the Paletropics

1. Frutescent species 2
- Herbaceous or succulent species 9
2. Receptacle with at least two rows of short true bracts on the margin and often lower down group A, sect. *Nothodorstenia*
Receptacle with a single row of appendages on the margin . 3 (group B)
3. Receptacle actinomorphic 4
- Receptacle zygomorphous 6
4. Receptacle more or less turbinate, appendages longer than 3 mm. . . 5
- Receptacle discoid, stellate; flowering face plane, almost orbicular, appendages up to 3 mm long, (sub)deltoid, longer ones alternating with very short ones 1. *D. dorstenioides*
5. Receptacle (sub)turbinate; flowering face convex and lobed; primary appendages 6-8, up to 6 mm long, marginally and terminally undulate and involute 2. *D. involuta*
Receptacle turbinate; flowering face often concave, primary appendages 2-8(-9), mostly 4, up to 30 mm long, usually plane 3. *D. turbinata*
6. Receptacle with a narrow margin, up to 1 mm wide 7
- Receptacle with a wide erect margin 8
7. Stipules subulate and lateral; receptacle linear-naviculate, 1-2 mm broad 4. *D. angusticornis*
Stipules triangular and semi-amplexicaul; receptacle naviculate, ca. 4 mm broad 3. *D. turbinata*
8. Lamina often with 2-6 lobes in the upper part; receptacle with two terminal appendages (2.5-) 7-30 mm long 5. *D. alta*
Lamina entire; receptacle with two terminal appendages, up to 2 mm long 6. *D. scaphigera*
9. Herbaceous or semi-succulent plants 10
- Succulent plants with fleshy stems arising from a basal fleshy tuber or a fleshy rhizome group F
10. Semi-succulent or herbaceous species; infructescences with a few to many fruits; endocarp body tetrahedral to subglobose and tuberculate . group D
- Herbaceous species 11
11. Indument variable; endocarp body smooth; plants of lowland rain-forests in West and Central Africa group C
- Indument of stiff and dense hairs; endocarp body tuberculate; plants of montane rain-forests in N.-E. tropical Africa group E

1. *Dorstenia dorstenioides* (Engl.) M. Hijman & C. C. Berg, *Adansonia*, ser. 2, 16 : 428 (1977). — Type : *Mildbread* 5988, Cameroun, 58 km E of Kribi (holo- B). — Fig. 1.

Trymatococcus dorstenioides Engl., *Bot. Jahrb.* 51 : 434 (1914).

Craterogyne dorstenioides (Engl.) Lanjouw, *Rec. Trav. Bot. Néerl.* 32 : 276 (1935).

Shrubs up to 1.5 m tall, branched, the lower part of the branches woody, the leafy part of the branches 1-2.5 mm thick, rather densely puberulous with whitish appressed straight or curved hairs, or also

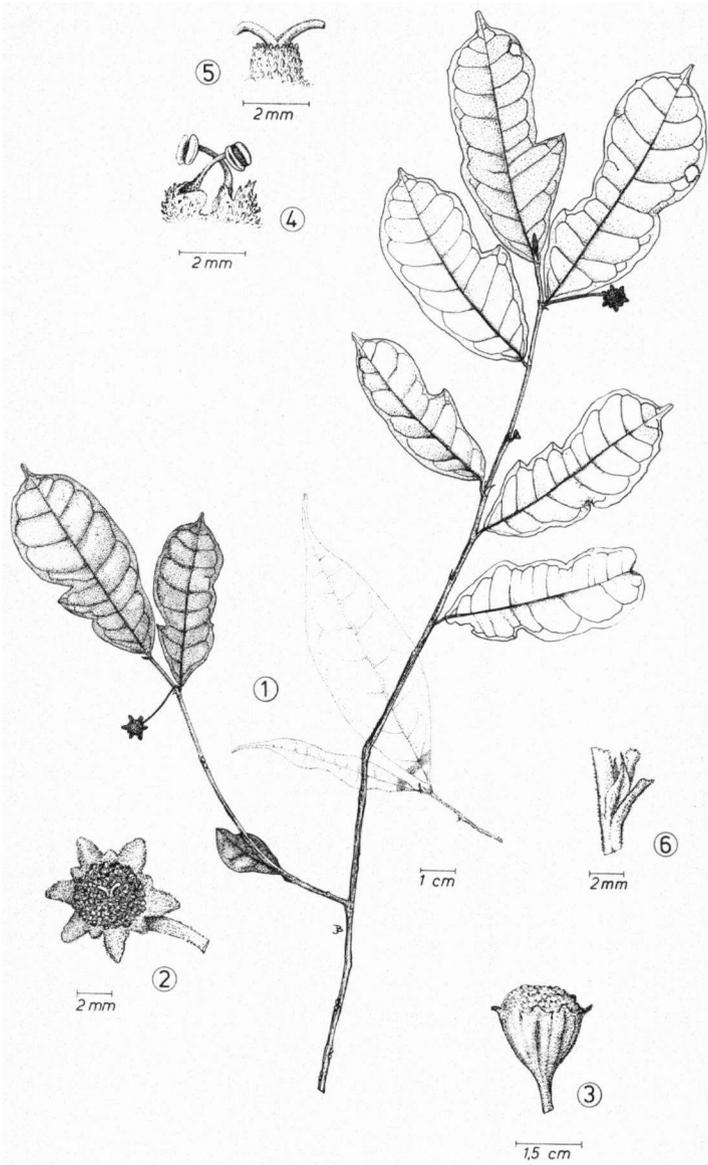


Fig. 1. — *Dorstenia dorstenioides* (Engl.) M. Hijman & C. C. Berg: 1, twigs; 2, inflorescence; 3, infructescence; 4, staminate flower; 5, pistillate flower; 6, stipules (1-5, *Letouzey* 8984; 6, *De Wilde* 8039).

with sparse retrorse uncinata hairs or sparse almost patent hairs, internodes 0.5-3 cm long. *Leaves* distichous, lamina elliptic to oblong, (3-)5.5-16 cm long, (1-)3-6.5 cm broad, broadest at, above, or below the middle, chartaceous, acuminate to subcaudate (or to subacute), at the base acute to subobtusate, margin entire to more or less irregularly repand to lobed, above (almost) glabrous, beneath with rather sparse retrorse uncinata hairs or also with curved hairs on and near the main veins; main veins slightly prominent to slightly impressed above, slightly prominent beneath, smaller veins scarce and inconspicuous, 6-10 pairs of secondary veins; petiole 1-5 mm long and 1 mm thick, its indument like that of the leafy twigs; stipules caducous (or subpersistent), triangular and semi-amplexicaul, 3-4 mm long and ca. 2 mm broad at the base, with a prominent midrib, cuspidate, sparsely puberulous, with minute white curved hairs, mainly on the midrib. *Inflorescences* greenish, solitary; peduncle 16-26 mm or 7-8 mm long, ca. 1 mm thick, puberulous with white appressed straight hairs or entirely or only on the upper part mainly with retrorse uncinata hairs; receptacle stellate, 8-10 mm in diam., flowering face almost orbicular, margin rather narrow to almost absent, appendages 8-11, up to 3 mm long, almost triangular, obtuse, the longer ones usually alternating with short ones, and sometimes lobed at the lower end, upper surface of the receptacle, margin and appendages puberulous with mainly minute white retrorse uncinata and sparser white straight appressed to almost patent hairs, lower surface puberulous also with straight hairs; some tens of staminate flowers, perianth 0.5-0.8 mm high, perianth lobes two, usually with a three-partite top, with sparse hyaline hairs, stamens two, filaments 0.8-1.5 mm long and ca. 0.1 mm broad, later on the lower part swollen, at and after anthesis curved in different directions, anthers 0.3-0.5 mm long and broad, connective rather small; pistillate flowers one or two central, perianth tubular ca. 1 mm high and 0.8 mm in diam., with an irregularly (three-) lobed margin, puberulous with sparse minute globose hairs, style not emerging from the perianth, stigmas two, tongue-shaped, 0.5-1 mm long and ca. 0.4 mm broad. *Infructescences* (sub)turbinate, ca. 13 mm high, ca. 13 mm in diam.; endocarp body ca. 10 × 5 mm, endocarp crustaceous, smooth, with a woody disc towards the hilum; seed ca. 8 × 4.5 mm, testa with a darker coloured vascularized part.

Distribution : The species is known from four localities east of Kribi in Cameroun. It usually occurs in the shrub layer of closed high forest, at altitudes of 60-200 m.

CAMEROUN : *De Wilde* 8039, 111 km on the road Ebolowa-Kribi, fl., March (WAG). *Letouzey* 8984, near to the river Kienke, NNW of Nkolbewa, 36 km on the road Kribi-Ebolowa, fl., March (P, YA). *Mildbraed* 5988, near to Fenda, 58 km E of Kribi, fl., July (B). *Raynal* 13 459, Assok, 40 km N of Nyabésan, fl., Feb. (P).

2. *Dorstenia involuta* M. Hijman & C. C. Berg, *Adansonia*, ser. 2, 16 : 424, fig. 1 (1977). — Type : *Bos* 3428, Cameroun, 13.5 km from Kribi, N of Ebolowa road, Kienke Reserve (holo- WAG). — Fig. 2.

Shrubs 50-200 cm tall, with unbranched or branched stems, the lower parts of the lower branches woody and glabrous, the leafy parts of the branches 1-3 mm thick, puberulous with dense short white straight appressed hairs, intermixed with retrorse uncinat hairs, internodes 0.5-6 cm long. *Leaves* almost distichous; lamina obovate or oblanceolate to oblong, occasionally linear, (2-)6-20 cm long, (1-)2.5-6.5 cm broad, chartaceous or subcoriaceous, apex gradually or abruptly acuminate, 5-20 mm long and 1.5-5 mm broad, with an acute acumen, base cuneate or subobtusate or one side cuneate and the other side subobtusate, margin entire or repand to sinuate or coarsely dentate, above and beneath glabrescent; veins slightly prominent above, more prominent beneath, 7-14 and occasionally 25 pairs of secondary veins set at 60-80°(-90°) to the midrib, curving upwards and forming rather distinct connecting loops at 1-7 mm from the margin; petiole 2-15 mm long and ca. 1.5 mm thick, its indument like that of the stem, but denser; stipules caducous, triangular and semi-amplexicaul, 2-4 mm long, at the base ca. 1.5 mm broad, with minute stiff appressed hairs, mainly on the very prominent midrib. *Inflorescences* solitary; peduncle often gradually passing into the receptacle, 6-25 mm long and 1-2 mm in diam., densely puberulous with retrorse uncinat and straight appressed hairs; receptacle subturbinate, the upper surface stellately lobed, at anthesis strongly convex, sometimes almost plane (very young receptacles concave), 2-5 mm high and 5-10 mm in diam., including the 0.5-1 mm broad repand or slightly dentate margin, lobes of the receptacle 6-8, reflexed, ca. 2 mm long and 2 mm broad, passing into linear or spatulate, marginally and terminally involute and undulate, 3-6 mm long and 1-2 mm broad, reflexed

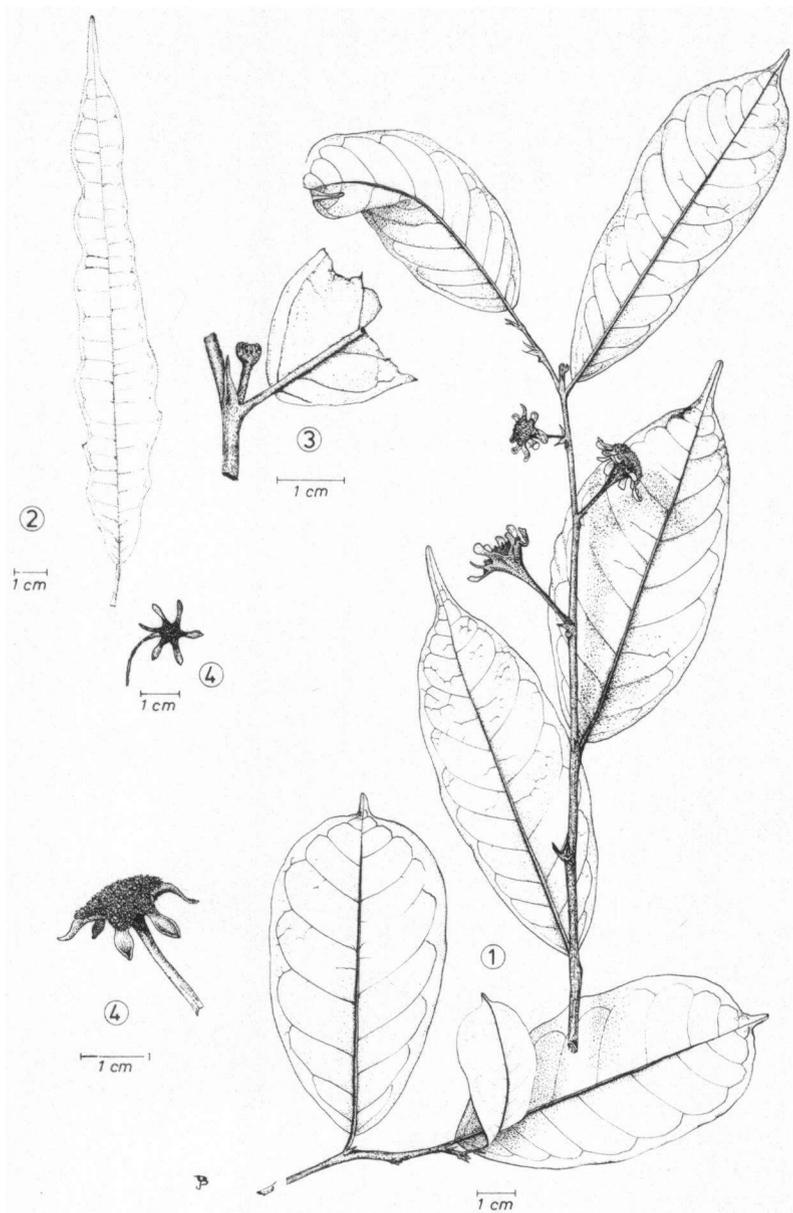


Fig. 2. — *Dorstenia involuta* M. Hijman & C. C. Berg : 1, twigs; 2, leaf; 3, stipules; 4, inflorescences (1, 3 & 4, Bos 3428; 2, Farron 7090).

primary appendages, between the primary appendages occasionally one smaller secondary appendage; upper surface of margin and appendages as well as lower surface of the receptacle with rather dense minute white uncinata and stiff appressed hairs, lower surface of receptacle with conspicuous ribs passing into the primary appendages; staminate flowers numerous, perianth two-lobed, stamens two, perianth lobes ca. 0.25 mm in diam., filaments ca. 0.35 mm long, bent in several directions, anthers ca. 0.35 mm long and ca. 0.25 mm broad, connective as broad as the theca; pistillate flower one, central, perianth tubular, at the base 0.5-1 mm in diam., with minute hyaline clavate hairs, ca. 0.5 mm high, style with a length of 0.35 mm projecting above the perianth, stigmas 2, spreading, ca. 0.7 mm long. *Infructescences* turbinate, enlarged in the centre, up to 10 mm high, endocarp body globose, up to ca. 10 mm in diam., smooth.

Distribution : The species is only found in one area in Cameroun, near Kribi. It occurs in fairly dry to wet places in high forests.

Note : *D. involuta* is closely related to *D. turbinata*. Specimens of *D. turbinata*, collected in Oban (Nigeria), including specimens belonging to the former *D. obanensis*, which have convex receptacles and short reflexed appendages, differ slightly from *D. involuta*. Intermediate forms have not yet been found in the region between Oban and Kribi. The collection *Farron* 7090 differs from the other ones in the narrow, almost linear leaves with a great number of secondary veins set at an angle of ca. 90°.

CAMEROUN : *Bos* 3316, 15 km from Kribi, 2-3 km N of Ebolowa road, Bidou II, fl., Nov. (WAG); 3428, 13.5 km from Kribi, N of Ebolowa road, Kienke Reserve, fl., Dec. (WAG); 3644, 12 km S from Kribi, Lolodorf road, fl., Jan. (WAG); 3714, 15 km N of Kribi, Mpolongwe, fl., Jan. (WAG); 3811, 13 km from Kribi, S of Ebolowa, fl., Jan. (WAG); 4307, 28 km from Kribi, on the road to Lolodorf, Bidou I, fl., June (WAG); 4404, 12 km from Kribi, between Ebolowa and Kienke Reserve, fl., April (WAG); 4572, 12 km from Kribi, Lolodorf road, fl., May (WAG); 5226, 18 km from Kribi, Lolodorf road, fl., Aug. (WAG, YA); 6478, S of km 14 on the road Kribi-Lolodorf, fl., March (WAG); 6584, 3 km N of km 20 on the road Kribi-Lolodorf, fl., March (WAG). *Farron* 7090, 70 km on the road Edea-Kribi, fl., April (P). *Hijman & Weerdenburg* 302, Dept. of Kribi, ca. 1 km S of Nko'olong, S of road to Ebolowa, fl., Dec. (U, YA).

3. *Dorstenia turbinata* Engl., Bot. Jahrb. 33 : 115 (1902); Rendle in Prain, Fl. Trop. Afr. 6 (2) : 57 (1916); Pellegr., Mém. Soc. Linn. Norm., nov. ser., 1 (3) : 79 (1928); De Wild., Pl. Bequaert. 6 : 69 (1932); Keay, Fl. W. Trop. Afr. 1 (2) : 599 (1958). — Type : *Schlechter* 12 871, Cameroun, between Njoke and Malende (holo-B, iso- BM, BR, G, K, L, LD, WAG). — Fig. 3-5.

D. smythei Sprague, Kew Bull. 1908 : 299 (1908); Keay, Fl. W. Trop. Afr. 1 (2) : 599 (1958). — Type : *Smythe* 237, Sierra Leone, Jepihun (holo- K, photo BM).

D. edeensis Engl., Bot. Jahrb. 46 : 272 (1911); Rendle in Prain, Fl. Trop. Afr. 6 (2) : 58 (1916). — Type : *Büsgen* 465, Cameroun, Edea (holo- B).

D. ledermannii Engl., Bot. Jahrb. 46 : 272 (1911). — Type : *Ledermann* 6299, Cameroun, Ndonge (holo- B, photo BM).

D. buesgenii Engl., Bot. Jahrb. 46 : 272 (1911). — Type : *Büsgen* 429, Cameroun, Edea (holo- B, photo K, U).

D. dinklagei Engl., Bot. Jahrb. 46 : 273 (1911), non Engl. 1908.

D. aspera A. Chev. var. *deltoidea* A. Chev., Bull. Soc. Bot. France 58, Mém. 8 : 208 (1912). — Type : *Chevalier* 21 288 bis, Ivory Coast, along the Boan, at Danané (holo- P).

D. spathulibracteata Engl., Bot. Jahrb. 51 : 429 (1914) (a new name for *D. dinklagei* Engl. 1911). — Type : *Dinklage* 2573, Liberia (holo- B, photo BM).

D. smythei var. *deltoidea* Hutch. & Dalz., Kew Bull. 1929 : 19 (1929).

D. aspera A. Chev., Bull. Soc. Bot. France 58, Mém. 8 : 207 (1912); De Wild., Pl. Bequaert. 6 : 20 (1932). — Type : *Chevalier* 21 197, Ivory Coast, Danané (holo- P).

D. obanensis Hutch. & Dalz., Fl. W. Trop. Afr. 2 (1) : 427 (1928), nomen; Kew Bull. 1929 : 18 (1929), descr. — Type : *Talbot* s.n., Nigeria, Oban (holo- K).

Shrubs 50-200(-480) cm tall with branched woody stems, the lower part of the branches glabrous, up to ca. 4 mm thick, the leafy part sparsely to densely puberulous with short brownish to white straight appressed or patent hairs intermixed with short white retrorse uncinatate hairs, ca. 1.5 mm thick; internodes 0.5-5(-7) cm long. *Leaves* distichous; lamina obovate to oblanceolate or oblong to elliptic and sometimes rhomboid to subdeltoid, (3-)8-21 cm long and (1-)3-7(-9) cm broad, chartaceous to subcoriaceous, apex often abruptly and sometimes gradually acuminate, acumen 3-25 mm long and 2-5 mm broad, rounded or mucronate, base cuneate or subobtuse, sometimes oblique, margin repand to coarsely dentate in the upper part, above glabrous, beneath sparsely puberulous with

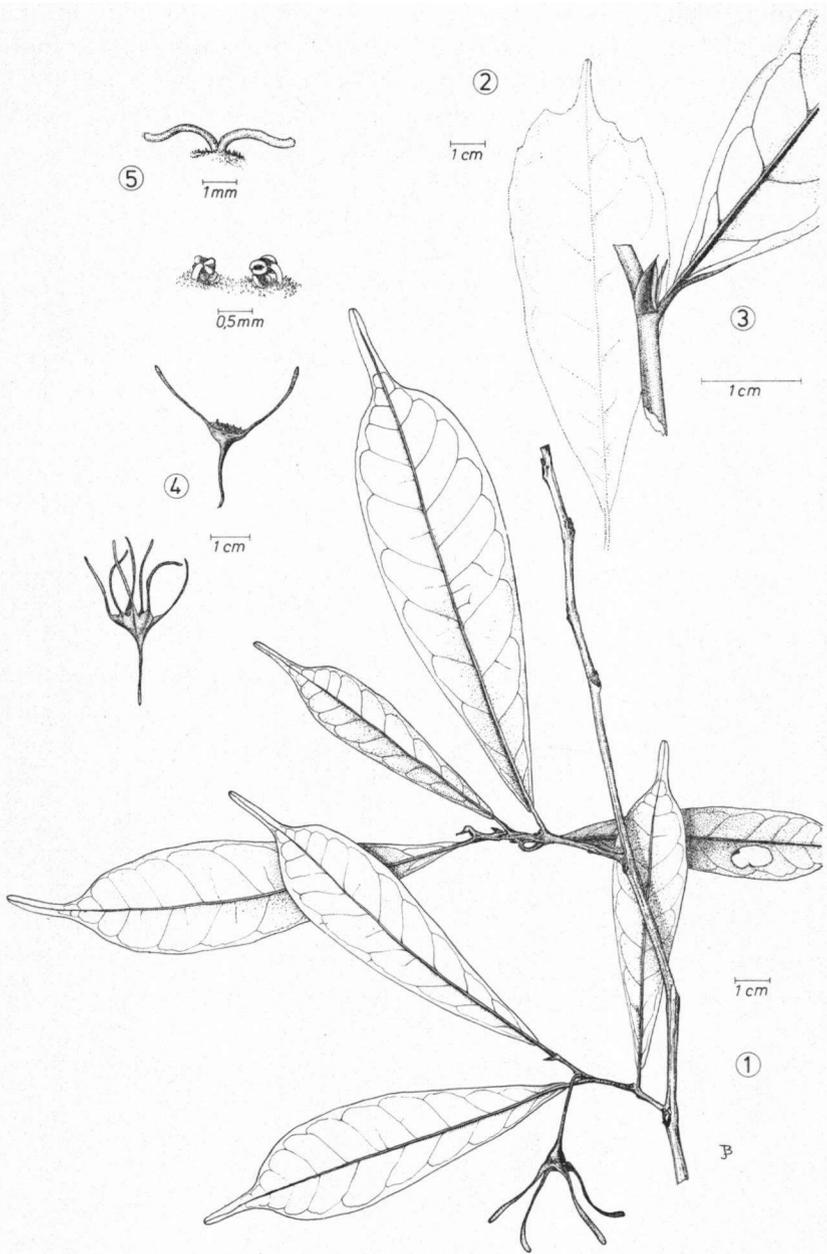


Fig. 3. — *Dorstenia turbinata* Engl.: 1, twig (Leeuwenberg 9138); 2, leaf (Le Testu 2181); 3, stipules (Le Testu 5577); 4, inflorescences: with two appendages (Le Testu 2181) and with seven appendages (Le Testu 2141); 5, pistillate and staminate flower (Leeuwenberg 8753).

minute white retrorse uncinata and straight hairs, mainly on and near the main veins; main veins slightly prominent above, more prominent beneath, 6-10(-12) pairs of secondary veins, set at 50-80° to the midrib, curving upwards and forming rather distinct connecting loops at 1-3 mm from the margin, tertiary veins rather inconspicuous; petiole 2-12(-17) mm long and ca. 1.5 mm thick, its indument like that of the leafy twigs or denser; stipules caducous, triangular and semi-amplexicaul, 2.5-5.5(-7) mm long and at the base up to 3 mm broad, with a rather prominent mid-vein, puberulous with minute curved appressed hairs, especially at the base, sometimes ciliolate. *Inflorescences* (light) greenish, solitary or sometimes in pairs; peduncle gradually passing into the receptacle, (3-)5-30 mm long and 1-2 mm thick, puberulous with minute straight appressed hairs and retrorse uncinata hairs; receptacle turbinate or naviculate, 4-15 mm in diam. and 2-10 mm high, flowering face 3-8(-9) lobed or oblong, concave to convex, margin absent or 0.2-1 mm broad, primary appendages 2-8(-9), in the lobed receptacles extending from the lobes, linear or oblanceolate to narrowly spatulate, plane or sometimes canaliculate, up to 30 mm long and pointing upwards or 4-10 mm long and patent to reflexed, ca. 1 mm broad or if spatulate then up to 3 mm broad in the upper part, sometimes between the primary appendages 1-4 smaller, secondary appendages, up to 7 mm long and 0.5 mm broad; upper surface of margin and appendages, as well as lower surface of the receptacle, with sparse to rather dense minute white straight appressed and retrorse uncinata hairs, lower surface of the receptacle often with conspicuous ribs passing into the primary appendages; staminate flowers numerous, with two irregularly dentate ca. 0.3 mm high and 0.3-0.5 mm broad perianth lobes, with minute hyaline globose to oblongoid or clavate hairs, stamens two, filaments 0.3-0.8 mm long and ca. 0.1 mm thick, bent inwards, but after anthesis bent outwards, anthers ca. 0.35 mm long and broad, connective almost as broad or slightly broader than the theca; pistillate flowers 1-3(-5), in the centre, perianth tubular, 0.3-0.9 mm in diam. and up to 0.7 mm high, with minute hyaline globose to oblongoid or clavate hairs, style before and at anthesis not or just exceeding the perianth, 0.5-2 mm long and ca. 0.3 mm thick, stigmas two, spreading to revolute, 0.5-2.5 mm long and ca. 0.2 mm thick, between the flowers sometimes minute hyaline oblongoid or clavate hairs. *Infruc-*

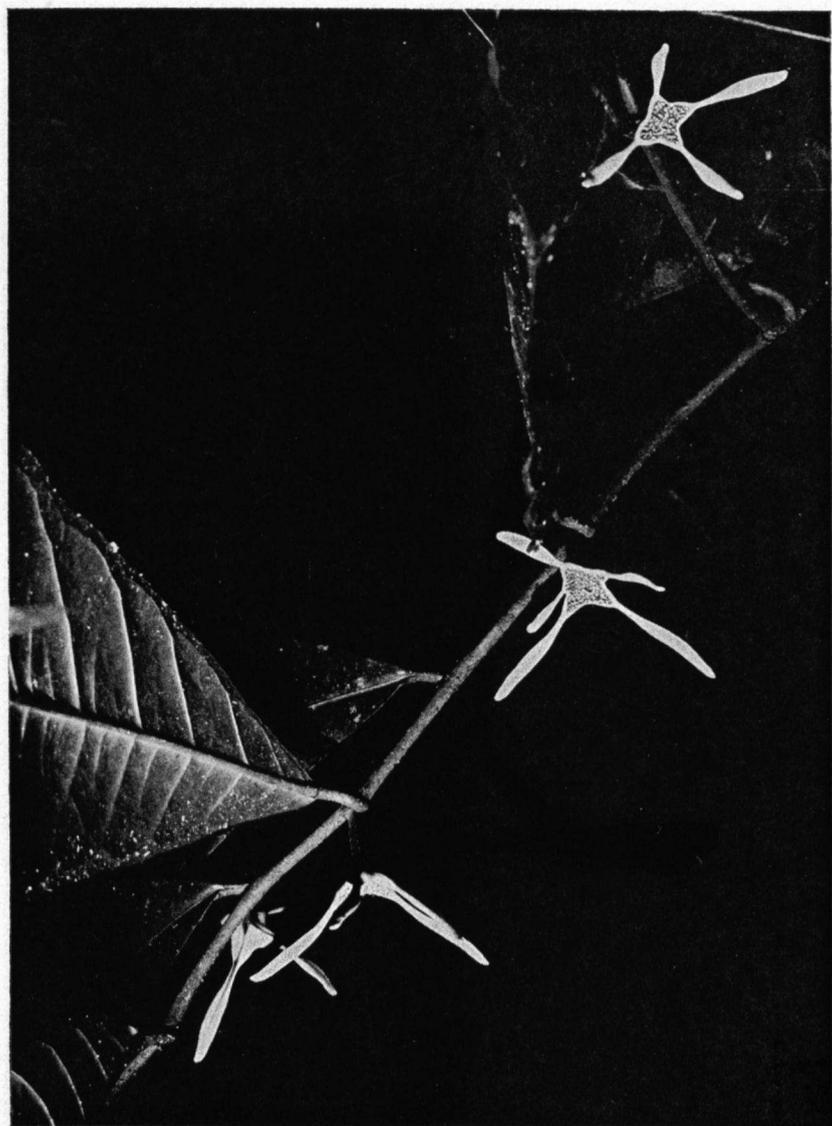


Fig. 4. — *Dorstenia turbinata* Engl. : twig.

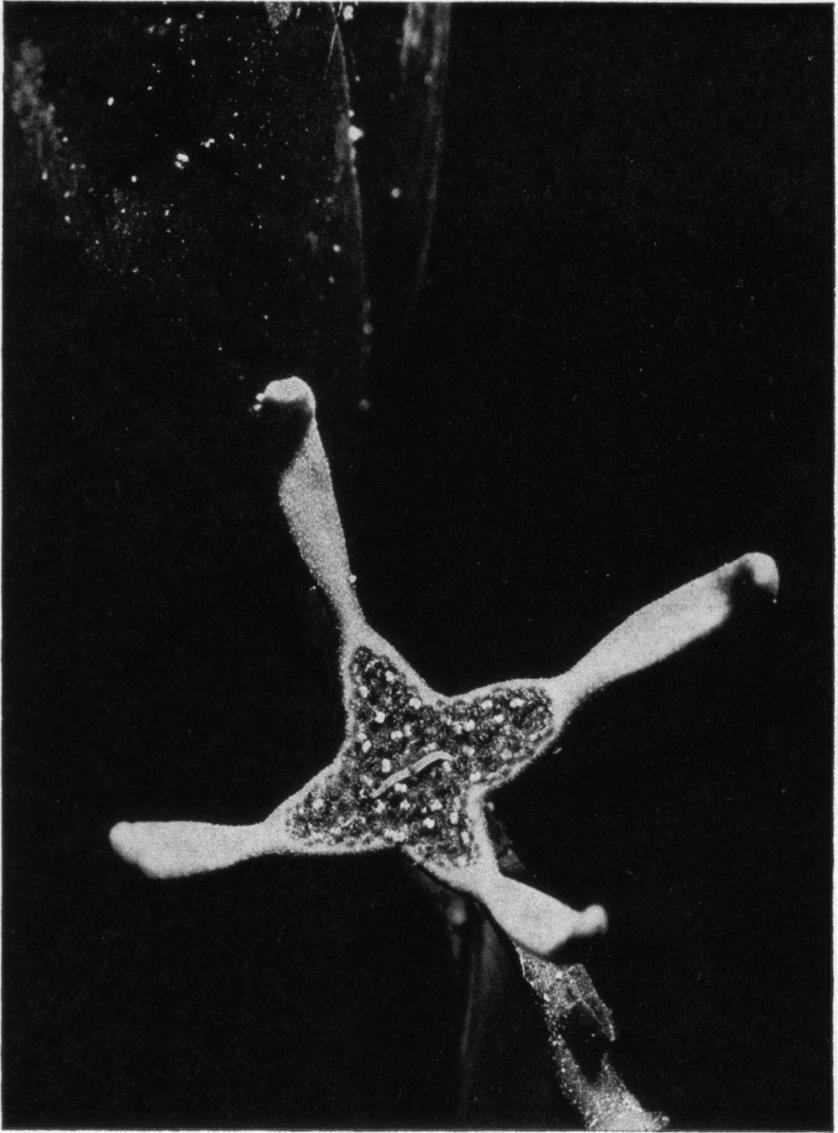


Fig. 5. — *Dorstenia turbinata* Engl.: inflorescence.

tescences subglobose; endocarp body subglobose, 4-8 mm in diam., smooth; seed subglobose, endosperm lacking; cotyledons rather unequal and thick, radicle short.

Distribution : The species is known from a large area in tropical West Africa : Guinea, Sierra Leone, Liberia, Ivory Coast, Ghana, Nigeria, Cameroun, Equatorial Guinea, Gabon and from one spot in West Zaire. It occurs in the undergrowth of primary and secondary forests, at altitudes up to 450 m.

Note : The species is variable in the shape of its inflorescence. Specimens with naviculate receptacles and two appendages have been collected mainly in Guinea, Sierra Leone, Liberia, Ivory Coast, and Ghana, but one such collection has also been made more southwards, in Equatorial Guinea (*Sanford* 5851) and another one in Gabon (*Le Testu* 2181). Specimens with turbinate and lobed receptacles and three or more appendages have been gathered in the Ivory Coast, Ghana, Nigeria, Cameroun and Gabon. From Liberia there is one collection (*Bos* 2478) with two long and two very short appendages in one inflorescence. But these two groups of specimens (formerly distinguished as *D. smythei* and *D. turbinata*) cannot be considered as distinct species, for intermediates occur : inflorescences with two and four appendages may occur in the same collection (*Vigne* 1428), as may also inflorescences with two and three appendages (*Bamps* 2351, 2529; *Bos* 2853; *Linder* 1202).

Several collections from the Ivory Coast and Liberia (*Bamps* 2351; *Chevalier* 21 288 bis; *N. Hallé* s.n.; *Leeuwenberg & Berg* 3843; *Linder* 1202) have distinctly rhomboid to obdeltoïd leaves, but also in other collections the leaves may tend to be rhomboid or obdeltoïd. It is therefore not necessary to establish a distinct form like the former *D. smythei* var. *deltoïdea*. Specimens collected in Oban (Nigeria) (including specimens belonging to the former species *D. obanensis*) differ slightly from *D. involuta*, but a clearcut geographical disjunction makes the distinction into two species acceptable. No collections of intermediate forms have been made in the area between Oban and Kribi (where *D. involuta* occurs).

GUINEA : *Schnell* 3795, Monts Nimba, fl., Oct. (P).

SIERRA LEONE : *Deighton* 3335, fl., Dec. (K, P); 3840, between Nyandehun and Bongo (Koya), fl., Dec. (K, P); 3862, Gegbwema, fl., Jan. (K); 4929, Mamunta, fl., Nov. (K, P); 5612, Sugar Loaf Mt., fl., Nov. (K); 5798, Njagbela (Valunia), fl., July (K, P). *Jaeger* 9036, W of Doua, fl., Jan. (K). *King*

86B, near Lalahun, Guara Chiefdom, fl., Dec. (K). *Marmo* 28 (K). *Smythe* 52, Gola torsi, fl., Jan., (K); 237, Jepihun, fl., Jan. (K). *Thomas* 3690, Bumbnua, fl., Oct. (K); 7926 (K).

LIBERIA : *Adam* 20 371, Mont Nimba, fl., Dec. (K, UPS); 20 801, Mont Nimba, fl., Feb. (K, UPS). *Adames* 729, Dolo Farm, fl., Nov., (K, UPS). *Baldwin jr.* 9256, Central Prov., Sanokwele, Ganta Distr., fl., Sept. (K, WAG); 10 156, Western Prov., Kolahun Distr., Karmadhun, fl., Nov. (K); 10 250, Western Prov., Kolahun Distr., Vahon, fl., Nov. (K); 10 257, Western Prov., Boporo Distr., Javajai, fl., Nov., (K); 10 357, Western Prov., Boporo Distr., Bangee, fl., Nov. (K). *Bos* 2478, near Gbedin, Nimba County, fl., Dec. (BR, WAG); 2853, Grand Gedeh county, Chien, along the Tapeta road, fl., Jan. (BR, WAG). *Dinklage* 2573, between Jenneh and Cabolia, fl., April (B). *Harley* 1218A (WAG). *Linder* 961, Peahtah, fl., Oct. (K, MO, WAG); 1199, 1202, 1203, Banga, fl., Oct. (K, MO, WAG), *Van Meer* 233, University New Site, 17 miles from Monrovia, fl., Oct. (BR, WAG).

IVORY COAST : *Aké Assi* 2736, E of Tai, fl., Jan. (ABI); 2875, forest of N'Zida, fl., March (ABI); 6813, forest of Tai, fl., Oct. (P). *Bamps* 1931, forest of Sangouiné, fl., Jan. (BR); 2351, Gbapleu, forest of Tiapleu, fl., Jan. (BR, WAG); 2529, forest of Téké, fl., March (BR, LISC, P, WAG); 2684, Pinhou, plantation Planche, fl., March (BR). *Breteler* 5308, 8 km SSE of Aboisso, fl., July (WAG); 5961, 6 km SE of Aboisso, fl., Nov. (WAG); 6003, km 54 Sassandra-Gognoa, fl., Nov. (WAG). *Chevalier* 17 492, Malamalasso (P); 21 162, Bassin of Haute-Nuon, between Ganhoué and Bampleu, fl., April (P); 21 197, Bassin of Haute-Nuon, Danané (Fort-Hittos), fl., April (P); 21 288, 21 288bis, Country of the Dyola's, border of the Boan river, near to Danané, fl., April (P); 21 303, Country of the Dyola's, between Danané and Goutokoume, fl., April (P). *De Wilde* 753, forest of N'Zida, near to the plantation « Ocapana », fl., Nov. (B, FHI, S, WAG); 858, 20 km of Man, on the road to Danané, fl., Nov. (WAG); 899, forest of Tiapleu, near to the border of Guinea, fl., Nov. (WAG); 3540, in forest between the village Troya and the Cavally River, fl., March (B, BR, P, WAG). *Geerling & Bokdam* 1821, 1 km N of Yéalé, fl., Dec. (BR, WAG). *Guillaumet* 512, between Mana and Kako, 25 km from Néromer, fl., Jan. (ABI); 1079, forest N of the road Tabou-Pata-Idié, fl., Dec. (ABI, P); 1140, forest between Borou and Para, fl., Jan. (ABI, P); 1179, forest between Troya and Cavally, 25 km S of Tai, fl., March (ABI); 1570, between Sokloboda and Cavally, Grabo, fl., Aug. (ABI, P); 1872, forest of Koadguézou, region of Toulepleu, fl., Dec. (ABI); 1880, forest of Lebakuya, Canton Bakoué Sassandra, fl., Jan. (ABI) (mixed collection, with *D. djettii*); 1917, forest of Tiapleu, N of Danané, fl., May (ABI). *Hallé N.*, s.n., Sassandra forest, fl., Sept. (P); s.n., Sassandra forest, fl., Oct. (P). *Leeuwenberg & Bouquet* 3843, 43 km N of Duékoué, along road to Man Forest, fl., April (B, BR, MO, P, WAG). *Nozeran* s.n., Tiapleu (Danané), fl., Sept. (P). *Téhé* 338, Forest of Rocher Zohou, Duékoué, fl., Oct. (ABI). *Thoiré* 251, San-Pedro, fl., April (P). *Versteegh & den Outer* 384, surroundings of Yapo, 25 km SE of Agboville, fl., June (WAG).

GHANA : *Hall & Abbiw* GC 44 676 (FHI 80 614), 2 km E of Enchi junction on road to Boisne, fl., Nov. (FHI, P); GC 44 686, Disue River Forest Reserve, fl., Nov. (FHI, WAG). *Prempeh* 19, Boinso, fl., Nov. (UPS). *Vigne* 1428, Abiado, Axim District, fl., Nov. (FHO); 4745, Benso W. P., fl., Sept. (FHO).

NIGERIA : *Daramola* FHI 72 381, SE State, Ikom Distr., Cross River North Forest Reserve, fl., Oct. (FHI). *Keay* FHI 28 209, Ogoja Prov., Ikom Distr., Aboabam, fl., Dec. (FHI, K, MO, P); 28 213, Ogoja Prov., Ikom Distr., Aboabam, fl., Dec. (MO, FHI). *Latilo & Oguntayo* FHI 67 651, SE State, Ikom Distr., Cross River North, Forest Reserve on Ikom-Mamfe road, fl., Feb. (FHI, WAG). *Okafor* FHI 41 719, 41 731, Ogoja Prov., Ikom Distr., Cross River North Forest Reserve, fl., Dec. (FHI). *Okeke, Ekwuno, Macauley & Ariwaondo* FHI 73 359, SE State, Calabar Distr., Awi Forest Reserve, fl., Aug. (FHI). *Onochie* FHI 36 179, Calabar, Prov., Oban Distr., Forest Reserve Orem, fl., Jan. (FHI, FHO, P).

Talbot, 626, 628, 629, 675, 2320, Oban (BM). *Talbot Mr. & Mrs.* sn., Oban (K). *Van Meer* 1271, 1274, Oban Group Forest Reserve, East Block, fl., April (WAG); 1443, 1444, Oban Group Forest Reserve, West Block, between pillar 59 and 60, fl., April (FHI, WAG); 1521, 1568a, Oban Group Forest Reserve, West Block, fl., May (WAG); 1692 (FHI 36 819), Cross River North Forest Reserve, ca. 15 km SE of Ikom, fl., Sept. (FHI, WAG).

CAMEROUN : *Binuyo & Daramola* 35 657, Kumba Distr., S Bakundu Forest Reserve, fl., March (FHO). *Bos* 3704, ca. 9 km S of Kribi, S bank of Lobé River, fl., Jan. (WAG). *Büsgen* 429, 465, Edea, fl., Jan. (B). *Chevalier* (Fleury) 33 186, near to Dékouma, in forest of N'Dzijo, near to the station of Mujuha, fl., July (P). *De Wit* sub. no. 45, herb. no. 8169, Mbalmayo, fl., Dec. (WAG); sub. no. 290, herb. no. 8270, Loum, S of N'Kongsamba, fl., Dec. (WAG). *Hijman & Weerdenburg* 307, ca. 15 km S of Kribi, E of road to Campo, near Eboundja II, fl., Dec. (U, YA); 320, 326, Kumba Distr., S. Bakundu Forest Reserve, near to track to Kendonge Camp, fl., Dec. (U, YA); 341, Kumba Distr., ca. 2 km S of Kumba, fl., Dec. (U, YA). *Jacques-Félix* 2512 (P); 9138, Mbalmayo-forest, fl., Nov., (BR, K, P, WAG, YA). *Ledermann* 6229, Nonge, fl., Nov., (B). *Leeuwenberg* 5219, 8 km W of Masok, fl., March (WAG); 8753, W of km 58 Douala-Loum road, S of Kompina, fl., Nov. (WAG); 9138, E of Bandem, 3 km E of Yingui, fl., Jan. (WAG); 9168, 5 km N of km 17 Yingui-Yabassi, fl., Jan. (WAG). *Leeuwenberg & Berg* 9689, 5 km NE of Dibombé, a village on km 11 of Loum-Yabassi road, fl., April (WAG). *Letouzey* 10 830, near to Ndoknaboa, 30 km SW of Ndikini-meki, fl., Dec. (BR, K, P, YA); 10 934, near to Ndokmen II, 8 km E of Yinzui, fl., Jan. (P, YA); 13 694, between Mbakem and Tabo, 20 km W of Mamfe, fl., June (P, U, YA). *Mckey* 68, Akpasang river camp, fl., Feb. (P); 76, Akpasang river camp., fl., Feb. (YA). *Onochi* FHI 34 835, Mamfe, Cross River, fl., March (FHI). *Schlechter* 12 871, between Njoke and Malende (B, BM, BR, G, K, L, LD, WAG).

EQUATORIAL GUINEA : *Sanford* 5851, along River Metom, 52 km from Bata on the Rio Benito road, tributary of the River Benito, fl., Feb. (K).

GABON : *Breteler* 6599, right bank of Ogooué River, ca. 4 km SW of Lastoursville, (WAG). *Chevalier* 27 074, Mbaro, on the Ramboué, fl., Oct. (P). *Hallé*, N. 1196, Makokou, Vallon de la Mission Catholique, fl., Feb. (P). *Le Testu* 2141, Ocouanza, fl., Oct. (BM, BR, P); 2149, Pays Itsogho, Mapoungui, fl., Oct. (BM, P); 2181, Pays Itsogho, fl., Nov. (BM, BR, P); 2364, Pays Itsogho, Outembo, fl., Oct. (BM); 2365, Kalengove Bendolo, fl., July (BM); 2366 Pays Itsogho, fl., Nov. (BM, P); 5577, Ighoumbi, fl., Oct. (BM, BR); 7658, Limbenga, Haut-Ogooué, fl., Nov. (BM, BR, P); 8446, Mbighou, Haut-Ogooué, fl., Oct. (BM, BR, P). *Thollon* 90, Ogooué, Ndjobé (P).

ZAIRE : *Callens* 2153, Mpese, fl., Dec. (BR).

4. *Dorstenia angusticornis* Engl., Bot. Jahrb. 46 : 274 (1911); Rendle in Prain, Fl. Trop. Afr. 6 (2) : 60 (1916); Keay, Fl. W. Trop. Afr. 1 (2) : 599 (1958). — Type : *Zenker* 3584, Cameroun, Bipinde (lecto- P, iso- BM, BR, COI, G, K, L, MO, SPL). — Fig. 6.

Shrubs 50-100 cm tall, stems branched, stems and the lower parts of the branches woody, glabrous, the leafy parts thick, with dense short curved and retrorse uncinat hairs, internodes 2-4 cm long. *Leaves* almost distichous; lamina obovate to oblanceolate or elliptic to oblong, (4-)7-17 cm long, 2-5 cm broad, chartaceous or sub-coriaceous, apex abruptly acuminate, acumen up to 20 mm long and ca. 3 mm broad, rounded or mucronate, base cuneate, margin

entire or in the upper part with 1-4 2-10 mm long and ca. 2 mm broad teeth, glabrous, above and beneath, or with sparse short white curved hairs mainly on the midrib; midrib and secondary veins slightly prominent above, more prominent beneath, (5-)6-9 pairs of secondary veins; petiole 2-8 mm long and ca. 2 mm thick, its indument like that of the stem; stipules subpersistent, subulate, 2-4(-5) mm long, at the base ca. 0.5 mm broad, with an indistinct midrib, indument of the stipules almost lacking. *Inflorescences* solitary or in pairs; peduncle gradually passing into the receptacle, ca. 5 mm long and 0.5 mm thick, peduncle as well as outer surface of receptacle with minute retrorse uncinata and thicker appressed white hairs; receptacle linear-naviculate, its two arms making an angle of 90-120°, 16-24 mm long and 1-2 mm including the 0.25-0.5 mm broad entire margin, in the centre ca. 2 mm high, at the two ends passing into a linear ca. 7 mm long and ca. 1 mm broad appendage, flowering face rather plane and as long as the receptacle; upper surface of margin and appendages with rather dense minute white retrorse uncinata hairs; staminate flowers arranged more or less in three rows, the peripheral flowers with one perianth lobe at the side of the margin and one stamen, the central flowers with two perianth lobes and two stamens, perianth lobes triangular to rectangular, ca. 0.35 mm high and ca. 0.35 mm broad at the base, with some minute hyaline clavate hairs, anthers ca. 0.3 mm long and ca. 0.4 mm broad, connective as broad as the theca; pistillate flower solitary, central, perianth tubular, ca. 0.5 mm in diam. and ca. 0.25 mm high, style ca. 0.5 mm long, not exceeding the perianth or sometimes by 0.25 mm, ca. 0.15 mm thick, stigmas two, linear, 0.5-1.5 mm long and 0.25-0.5 mm thick, spreading. *Infructescences* naviculate, in the centre (enlarged) up to 8 mm high; endocarp body globose, ca. 7 mm in diam., smooth.

Distribution : The species is only known from Cameroun; it usually occurs in the undergrowth of primary and old secondary forest, at low altitudes.

Note : *D. angusticornis* is closely related to *D. turbinata*. In many features the two are similar, but they can easily be separated by the shape of the stipules : triangular in *D. turbinata*, subulate in *D. angusticornis*.

CAMEROUN : *Binuyo & Daramola* FHI 35 178 (WAG), FHI 35 179 (FHO, P) Kumba Distr., Banga, S Bakundu Forest Reserve, fl., Jan. *Büsgen* 185, without locality (B). *Farron* 7301, Kumba Distr., S Bakundu Forest Reserve, fl., May (P).

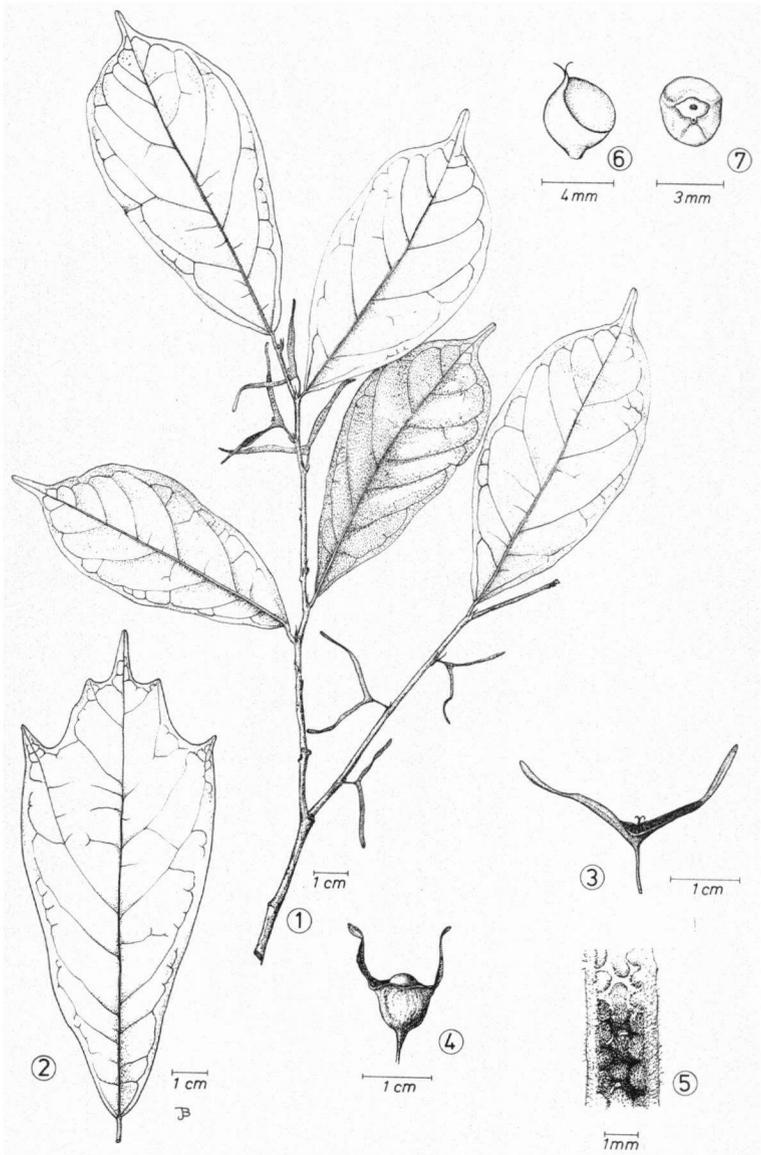


Fig 6. — *Dorstenia angusticornis* Engl.: 1, twig; 2, leaf; 3, inflorescence; 4, infructescence; 5, part of flowering face; 6, fruit; 7, endocarp body (1, 3, 5, Letouzey 12515; 2 & 4, Leeuwenberg & Berg 9799; 6 & 7, Leeuwenberg 9194).

Hijman & Weerdenburg 327, Kumba Distr., S Bakundu Forest Reserve, fl., Dec. (U, YA). *Keay* FHI 37 368, Kumba Distr., between Bai Rubber Estate and Bokosso, fl., Jan. (P); FHI 37 526, Victoria Distr., S of Likoko, on Bafia path, fl., Feb. (P). *Leeuwenberg* 8684, 1 km SW of Ediki, 15 km on the road Kumba-Victoria, fl., Nov. (WAG); 9194, 2 km N of Solé, 20 km on the road Loum-Yabassi, fl., Jan. (WAG). *Leeuwenberg & Berg* 9799, Kumba Distr., S. Bakundu Forest, 8 km W of Kindongi Camp., fl., May (WAG). *Letouzey* 11038, 50 km N of Edea, between Tomel and Massok, fl., Jan. (BR, P, YA); 12 515, 10 km SE of Eseka, near to Makomol, fl., Dec. (P, YA). *Zenker* 473 (B, BR, G, LD, MO, P, U, WAG), 3584 (B, BR, COI, G, K, L, MO, P, SPL), Bipinde, fl., Dec.

5. *Dorstenia alta* Engl., Bot. Jahrb. 40 : 545 (1908); Rendle in Prain, Fl. Trop. Afr. 6 (2) : 59 (1916); Peter, Fedde Rep. Spec. 40 (2) : 77 (1932). — Type: *Warnecke* 310, Tanzania, Amani, E Usambaras (holo- B, iso- BM, K). — Fig. 7.

D. orientalis De Wild., Pl. Bequaert. 6 : 49 (1932). — Type: *Sacleux* 2318, Tanzania, Amboni, near Tanga (holo- P).

Shrubs up to 2 m tall, with branched woody stems, the lower part of the branches glabrous, up to 5 mm thick, the leafy part 1-2.5 mm thick, puberulous with short white to brown curved hairs, intermixed with sparser to denser shorter whitish retrorse uncinat hairs; internodes (0.4-)1-2.5(-5) cm long. *Leaves* distichous; lamina elliptic to obovate or (narrowly) oblong, (3-)5-17(-20) cm long and (1-)2-8 cm broad, chartaceous, apex acute to acuminate, acumen up to 15(-25) mm long and 2-4(-8) mm broad, mucronate, sometimes oblique, base cuneate to subobtuse, sometimes oblique, margin entire or in the upper part with 2-6 up to 20 mm long and 15 mm broad lobes, above glabrous or puberulous with short brownish-white curved appressed hairs on or near the midrib, beneath glabrous to sparsely puberulous with minute white retrorse uncinat hairs; midrib slightly prominent above, midrib and main veins prominent beneath, 5-8(-14) pairs of secondary veins, curving upwards and forming rather distinct connecting loops at 1-4 mm from the margin; petiole canaliculate, 2.5-6(-9) mm long and 0.6-1 mm thick, its indument like that of the leafy twigs or denser; stipules subpersistent, tapering from a 0.5-1.5 mm broad base to a subulate point, 1-6 mm long, with a rather distinct midrib in the lower part, glabrous to puberulous with minute curved appressed and retrorse uncinat hairs, the stipules at the top of the twigs are longer and more puberulous than those lower down. *Inflorescences* solitary; peduncle 4-14 mm long and 0.5-1 mm thick, (densely) puberulous with short white retrorse uncinat hairs intermixed with sparser to denser short brownish white curved appressed hairs; receptacle

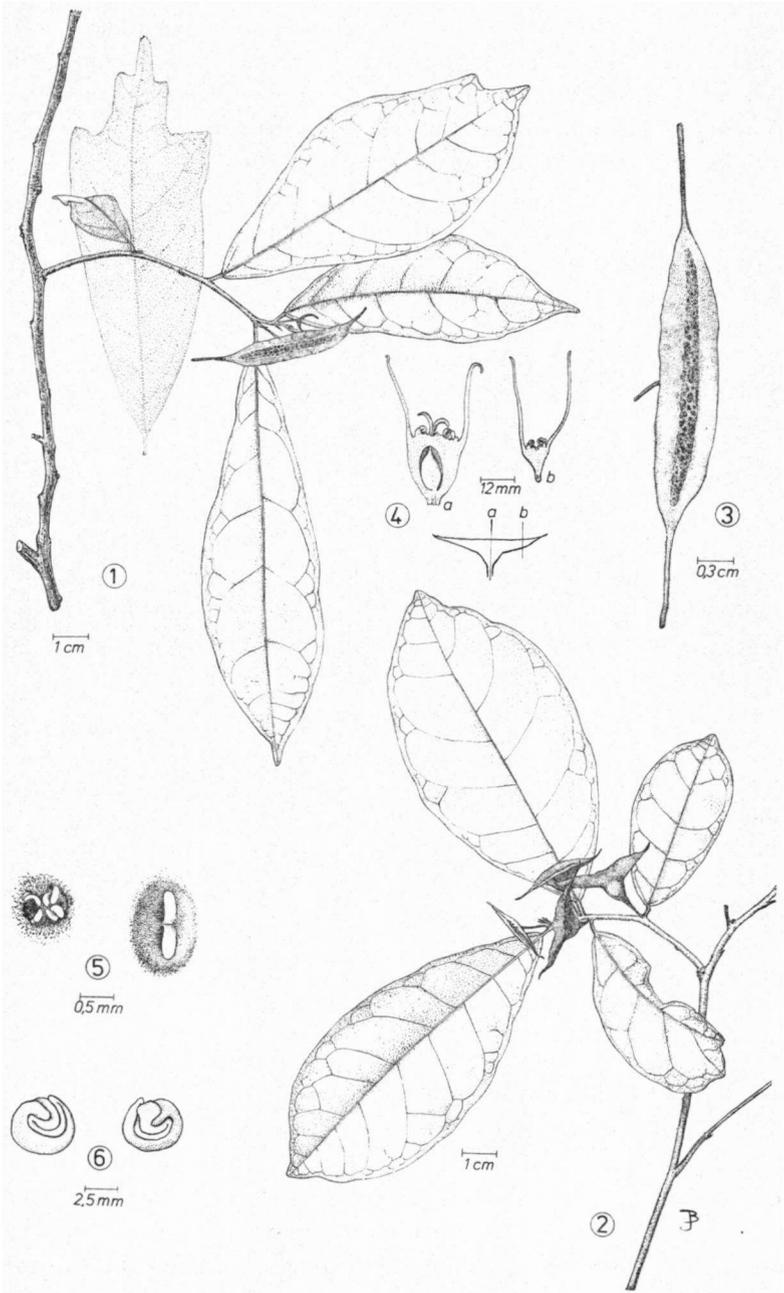


Fig. 7. — *Dorstenia alta* Engl.: 1 twig; 2, twig; 3, inflorescence; 4, inflorescence; 5, staminate and pistillate flower; 6, embryo (1, 3, 5, *Faulkner* 1851; 2, *Drummond & Hemsley* 3593; 4, *Semsei* 1900; 6, *Bally* 8136).

greenish with a reddish brown flowering part, naviculate with an erect margin, 15-40 mm long and 5-15 mm high including the margin, flowering face linear and plane, up to 30 mm long and ca. 2.5 mm broad, margin finely undulate and finely vertically veined, 3-8 mm broad, ending in two terminal (2.5-)7-30 mm long and 1-3 mm broad appendages, sometimes unequal and often with a distinct midvein and minute secondary veins, occasionally a third tooth-like appendage on the margin, upper surface of the receptacle rather densely puberulous with minute retrorse uncinata hairs, near to or on the edge of the margin some longer patent hairs, lower surface of the receptacle rather densely puberulous, especially on the longitudinal midrib; staminate flowers not very crowded, ca. 45, perianth with 1-3, ca. 0.3 mm broad lobes with minute globose to clavate and flat hyaline hairs, stamens 1-3, filament 0.3-0.4 mm long and 0.1-0.2 mm broad, anthers ca. 0.25 mm broad and long, bent inwards, connective rather broad (0.2 mm); pistillate flowers one or two, perianth disciform, ca. 1.5 mm in diam., with some minute globose hyaline hairs, style ca. 0.6 mm long and 0.2 mm thick, not exceeding the perianth, stigmas two, spreading, ca. 0.75 mm long and 0.25 mm broad. *Infructescences* turbinate to subglobose in the centre; endocarp body subglobose, 5-7 mm in diam., smooth; seed ca. 6 mm long and 5 mm broad, testa with a thickened vascularized part below the hilum; embryo with much folded slightly unequal cotyledons, the inner shorter one almost completely enclosed by the outer long one, radicle short.

Distribution : The species is known from several localities in East Africa (Kenya and Tanzania) and from one locality in West Africa (Congo-Brazzaville). It occurs in the undergrowth of evergreen (secondary) or riverine forest, often in limestone gorges, at altitudes from sea-level to 1300 m.

Note : The collection *Farron* 4991 is the only one from Congo-Brazzaville. It differs from collections made in tropical East Africa in several features : a rather large leaf (up to 20 cm long) having a long acumen (up to 25 mm), a large number of secondary veins (14 pairs), and a rather long petiole (6-9 mm), and also a receptacle with rather short (ca. 2.5 mm) appendages. In the latter feature this collection seems to be related to *D. scaphigera*, but it differs in characters of the flowering face, stipules, and leaf margin.

KENYA: *Adams* 103, Coast Prov., Oma Simba, between Kilifi and Kaloleni, 22 km SW of Kilifi, fl., Nov. (EA, K). *Battiscombe* 689a, Mwea River, fl., July (K). *Drummond & Hemsley* 1199, Coast Prov., Shimba Hills, 9 miles SW of Kwale fl., Feb. (B, BR, EA, FI, K, LISC, S, W). *Faden et al.* 70/944, Kilifi Distr., Cha Simba, Kaloleni-Kilifi road, ca. km 14, fl., Dec. (EA, K). *Magogo & Glover* 741, Kwale Distr., Shimba Hills, Marere Pum Ping Station, fl., April (BR, EA, K).

TANZANIA: *Bally* 8136, Tanga Prov., near Tanga, Siga Caves, fl., April, (G, K). *Drummond & Hemsley* 3351, Tanga Distr., E. Usambaras, between Ngua and Magunga Estates, fl., July (B, BR, EA, FI, K, LISC, S, W); 3523, Tanga Distr., Kivomila River, 5 miles SE of Ngomeni, fl., July (B, EA, K, LISC, S); 3593, Tanga Distr., 4 miles W of Tanga, Mkulumuzi River, Amboni Caves, fl., Aug. (B, K, LISC, S, W). *Faulkner* 1105, Magunga Estate, fl., Nov., (B, BR, K, LISC, S); 8151, Kange Gorge, fl., April (B, BR, K). *Greenway* 4872, E Usambaras, Kisiwani, fl., Jan. (BR, EA, FHO, K); 6020, E. Usambaras, Tongwe, fl., Sept. (EA, K). *Haerdi* 572/o, Southern Highlands Prov., Itula, Ifakara, fl., Aug. (BR, EA, G, K, P). *Harris* 927, 6 miles W of Tanga, fl., Sept. (EA). *Mwasumbi & Harris* (DSM) 2686, Eastern Prov., 50-52 km from Morogoro on the road to Matombo SE of Morogoro, Kimboza Forest Reserve, fl., Sept. (EA, K). *Paulo* 174, 177, Eastern Prov., Morogoro Distr., Mtibwa, fl., Nov., (EA, FHO, K). *Procter* 3573, Tanga Prov., Kange Gorge, near Tanga, fl., March (EA, K). *Sacleux* 2318, near to Tanga, Forest of Amboni, fl., Oct. (P). *Semsei* 1418, Eastern Prov. Morogoro Distr., Turiani, Manyangu Forest, fl., Nov.; 1429, 1900, Eastern Prov., Morogoro Distr., Mtibwa Forest Reserve fl., Nov. (EA, FHO, K). *Warnecke* 309, sine loco, (EA); 310, Amani, O Usambaras, fl., March (B, BM, K). *Zimmerman* 2933, along Kwamknyo, fl., March; 3547, Sigi, fl., March; 7185, Pandeni, fl., Dec.; 7186, Amani, fl., July (EA).

CONGO: *Farron* 4991, left bank of the Kouilou, 4 km upstream of Kakamoeka, Souda, fl., Feb. (P).

6. *Dorstenia scaphigera* Bureau, Bull. Mus. Hist. Nat. Paris 1 : 60 (1895); Engl., Monogr. Afr. Pfl. 1 *Moraceae* : 19 (1898); De Wild. & Th. Dur., Ann. Mus. Congo, ser. 2, 1 : 58 (1900); De Wild., Pl. Nov. Herb. Hort. Then. 7 : 277, fig. 52 (1907); De Wild., Pl. Bequaert. 6 : 63 (1932); Hauman, Fl. Congo, Ruanda-Urundi 1 : 70 (1948). — Type: *Dybowski* 716, Congo, Haute Kemo (holo-P). — Fig. 8.

Shrubs or half-shrubs, 30-150 cm tall, with ascending or erect, branched or unbranched woody stems, the lower part of the branches almost glabrous, 4-8 mm thick, the leafy part rather densely puberulous with brownish to white curved and uncinatate hairs, internodes 1-4 cm long, and 1-2.5 mm thick. *Leaves* distichous; lamina elliptic to oblong, (2.5-)8-17(-20) cm long and (1.5-)3-7.5 cm broad, broadest at or above the middle, chartaceous, apex slightly to abruptly acuminate, acumen up to 25(-35) mm long and 2-4 (-7.5) mm broad, mucronate, base cuneate or sometimes obtuse, margin entire to repand, above with sparse short brown-white curved appressed hairs mainly on the midrib, beneath with sparse to dense short brown-white curved appressed hairs and with sparse

to dense minute uncinata white hairs near the main veins; main veins prominent above and beneath, 5-10 pairs of secondary veins; petiole 3-11 mm long and ca. 1 mm thick, above canaliculate, its indument like that of the leafy twigs but denser; stipules subsistent, narrowly triangular, 1.5-4 mm long, at the base 0.2-0.6 mm broad, with a prominent midrib, sometimes sparsely puberulous with brownish white curved appressed hairs. *Inflorescences* yellowish green, solitary; peduncle 9-14 mm long and 0.5-1 mm thick, rather densely puberulous with short curved appressed brownish white hairs intermixed with sparser minute uncinata hairs to almost glabrous; receptacle naviculate with an erect margin, (25-)30-60 mm long, 8-18 mm high in the centre including the margin, flowering face linear and plane, 25-35 mm long and ca. 1 mm broad, margin entire to repand, vertically veined, 5-8(-10) mm broad, ending in two up to 2mm long terminal appendages, upper surface of the receptacle rather densely puberulous with minute uncinata hairs, on the edge of the receptacle short white clavate hairs, lower surface of the receptacle sparsely puberulous, longitudinal midrib distinct and densely puberulous with mainly short patent curved hairs; staminate flowers 10-14, arranged in one row at a distance of 0.25-2 mm from each other, perianth (1-)2(-3) lobed, ca. 1.5 mm long and 0.7 mm broad, perianth lobes triangular with a three-partite top, puberulous with minute hyaline globose to clavate hairs, stamens (1-)2(-3), filament ca. 0.3 mm long and 0.2 mm broad, bent inwards, anthers ca. 0.3 mm long and 0.25 mm broad, connective ca. 0.3 mm broad; pistillate flowers 1(-3), perianth tubular, at the top somewhat fimbriate, ca. 0.25 mm high and 0.5 mm in diameter, with minute hyaline globose to clavate hairs, style almost absent to ca. 1 mm long, ca. 0.5 mm thick, stigmas vittiform, spreading and revolute, ca. 1.5 mm long and 0.5 mm thick. *Infructescences* naviculate, in the centre enlarged up to ca. 10 mm in diameter; endocarp body subglobose, ca. 6 mm in diameter, smooth; seed ca. 5 × 4 mm, testa with a distinct vascularized part below the hilum; cotyledons folded, unequal, the inner shorter one almost completely enclosed by the outer longer one, radicle short.

Distribution : The species is known from Central Africa : Zaire, Congo-Brazzaville, and the Central African Republic. It occurs in the undergrowth of secondary or primary forest on dry or wet and even periodically flooded places, at altitudes up to 630 m.



Fig. 8. — *Dorstenia scaphigera* Bureau : 1, twig; 2, inflorescence; 3, staminate and pistillate flower (1, *Luja* 81S; 2 & 3, *Liben* 3844).

Note : The collections *Liben* 3844, *Louis* 920 and *Luja* 1S have inflorescences with three pistillate flowers.

CENTRAL AFRICAN REPUBLIC : *Le Testu* 3947, Yalinga Distr., La Haute-Kotto, fl., June (BM, BR, P). *Tisserant* 1095, La Waka, 18 km N of Bombari, fl., April (BM, BR, P); 1725, Mbaïki Distr., Boukoko, fl., March (BM, BR, P). Without collector's name : 2184, Bangandou fl., June (P).

CONGO : *Descoings* 10 066, Bangui Distr., path Sekid-Sebokélé, S of the road of M'Baiki, (P); 10 139, Bangui Distr., path Nzila-Bimbo, S of M'Poko, fl., March (P). *Dybowski* 716, Haut Kemo, fl., April (P). *Sita* 3030, Mayombe Distr. Bondika, fl., Jan. (P). *Tisserant* 201, NW Bessou, Olepo river, fl., Feb. (P).

ZAIRE : *Bequaert* 1801, Avakubi, fl., Jan. (BR). *Boutique* 285, Yangambi, isle Esali, fl., Aug. (BR); 297, between Lua Vindu and Lua Dekere, fl., April (BR). *De Giorgi* 51, Mobeka, Gwei, fl., Dec. (BR). *Evrard* 492, Boketa, fl., march (BR); 1430, road Gemena-Bosobolo, fl., July (BR). *Germain* 7773, Katongo, Nianga, road Tongoni-Wamaza, fl., June (BR, FHO, P, LISC); 8764, Yabwesu-Ogeto, Lubile river, fl., April (BR). *Gilbert* 1621, Libenge, fl., July (BR); 1829, Kwamondema, fl., Aug. (BR). *Gutzwiller* 561, Yamenda-Yangambi, fl., March (BR). A. *Léonard* 827, Isangi Terr. Yangambi, fl., June (BR, WAG); 5727, Kabambare Terr., Wamaza, fl., Aug. (BR, EA, WAG). *Liben* 3844, 3873, on the road Mwene-Ditu, fl., Oct. (BR). *Louis* 920 (BR, MO, P), 6908 (BR), 1533 (BR, MO, P), Yangambi, isle Esali, fl., Dec., Oct.; 12 466, Yangambi, isle Lotumba, fl., Nov. (B, BR, FHO); 13 797, Yangambi, isle Booke wa Mbole, fl., Feb. (BR, MO, P); 14 449, Yangambi, isle Esali, fl., April (BR, MO, P, WAG), *Luja* 1 S, 32 S, 81 S, Kondue, fl., April (BR); 253, Kasai, Bena-Dibele, fl., April (BR). *Thonner* 45, Bobi, near Ngali, fl., Sept. (BR).

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