

Novitates Gabonenses 56. Two *Anthonotha* species from Gabon transferred to *Englerodendron* (Fabaceae, Caesalpinioideae)

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ABSTRACT

The disputed position of *Anthonotha gabunensis* (Pellegr.) J. Léonard, whether it fits in *Anthonotha* or should be placed in *Leonardendron*, a genus of its own, is reviewed. Its actinomorphic flowers are aberrant, since the genus *Anthonotha* has zygomorphic flowers. Therefore it is transferred to *Englerodendron* that has similar actinomorphic flowers and up until now has been known by its single species *E. usambarensis* Harms from Tanzania. On the same grounds *Anthonotha conchyliphora* (Pellegr.) J. Léonard is also transferred to this genus. *Leonardendron* is synonymized under *Englerodendron*. A key to distinguish *Englerodendron* from related genera is provided as well as a key to the three species of the genus. Important characters of these species are depicted and the distributions of the two species from Lower Guinea are mapped.

KEY WORDS

Fabaceae,
Caesalpinioideae,
Leonardendron,
Englerodendron,
Gabon.

RÉSUMÉ

Novitates Gabonenses 56. Deux espèces d'Anthonotha du Gabon transférées à Englerodendron (Fabaceae, Caesalpinioideae).

La discussion sur la position d'*Anthonotha gabunensis* (Pellegr.) J. Léonard, attribué à ce genre ou placé dans son propre genre *Leonardendron*, est révisée. La fleur actinomorphe d'*A. gabunensis* est aberrante dans le genre *Anthonotha* à fleurs zygomorphes. Pour cette raison l'espèce est transférée à *Englerodendron*, jusqu'à présent connu d'une seule espèce *E. usambarensis* Harms de Tanzanie, qui a des fleurs actinomorphes similaires. Pour la même raison, *Anthonotha conchyliphora* (Pellegr.) J. Léonard est aussi transférée à ce genre. *Leonardendron* devient un synonyme d'*Englerodendron*. Une clé pour distinguer ce genre des genres voisins est présentée ainsi qu'une clé de détermination pour ses trois espèces. Les caractères importants de ces espèces sont illustrés et des cartes de répartitions des deux espèces de la Basse Guinée sont présentées.

MOTS CLÉS

Fabaceae,
Caesalpinioideae,
Leonardendron,
Englerodendron,
Gabon.

INTRODUCTION

Léonard (1955, 1957) reinstalled the genus *Anthonotha* of Palisot de Beauvois (1806) to accommodate the remainder of the African species of *Macrolobium*, the other species having been transferred to the new genera *Gilbertiodendron* J.Léonard (1952), *Paramacrolobium* J.Léonard (1954), and *Pellegriniodendron* J.Léonard (1955). The great variation in the reinstalled *Anthonotha* as regards the petals was visualized by Léonard (1957) in the subdivision of the genus into five sections: *Anthonotha*, with one large petal and four small ones (13 species), *Vouapina*, with (4-)5(-6) petals of the same length (nine species), *Triplisomeria* with 3 large and 2 small petals (three species), *Tetranisomeria* with 1 large and 3 small petals (one species), and *Variabilia* with 2-4 petals of the same length (one species). The number of stamens, whether fertile or staminodial, was not taken into account in this subdivision.

Aubréville & Pellegrin (1958) considered the variation in *Anthonotha* sensu Léonard too wide, saying: "Une troublante diversité dans le nombre des grands pétales et, à un moindre degré, des variations dans l'androcée et dans les fruits", rendering the generic limits uncertain. They created the genera *Triplisomeris* (= section *Triplisomeria*) for the *Anthonotha* species with 3 large petals and *Isomacrolobium* for the species with 4-5 equal petals (= sections *Vouapina* and *Variabilia*). The sections *Anthonotha* and *Tetranisomeria* were united under *Anthonotha*. Thus, the genus *Anthonotha* sensu Léonard with 27 species in five sections was replaced by three smaller genera: *Anthonotha* sensu stricto with 14 species, *Isomacrolobium* with 10 and *Triplisomeris* with three species.

In 1968 Aubréville (1968a) described the new monotypic genus *Leonardendron* based on *Isomacrolobium gabunense* (J.Léonard) Aubrév. & Pellegr., a species having actinomorphic flowers with 5 equal sepals and petals and 5 fertile stamens. Contrary to Aubréville's (1968a) description of the stamen number: "*Staminia fertilia 5 cum petalis alterna, interdum solum 3-4*", I have never observed a flower with 3-4 stamens only, neither in the type material nor in the other material investigated. Staminodes are absent, according to Aubréville (but see below).

Léonard (1996) did not accept the genus *Leonardendron* for several reasons, notably that the 5-stamen character was not constant (as Aubréville [1968a, b] observed in his description), that this character was not correlated with any other, and, that dissection of the flowers often showed a staminode next to the stamens. Aubréville's (1968a) argument that typical *Anthonotha* species have basically 9 stamens: 3 (rarely up to 5 in *Anthonotha noldae* (Rossberg) Exell & Hillc.) fertile and at most 6 staminodial and *Leonardendron* only 5 (sometimes together with 1-2 staminodes), is disregarded by him, because such a situation with less than 9 stamens, i.e. 3 fertile and less than 6 staminodes, is also seen in, notably *Anthonotha (Isomacrolobium) vignei* (Hoyle) J.Léonard.

On closer examination of this stamen character, nine or five, the following was revealed: the genus *Anthonotha* like the genera *Gilbertiodendron*, *Paramacrolobium* and *Pellegriniodendron*, all have 9 stamens, of which 3 (rarely more) are fertile. These 3 stamens are situated in an abaxial position, i.e. across the usually enlarged adaxial petal. The tenth stamen, opposite this large petal, is missing. The number of sterile stamens (the strongly reduced anther may contain pollen), although variable, is maximum 6, 2 belong to the outer whorl, 4 to the inner whorl. The flowers are distinctly zygomorphic, at least as the androecium is concerned.

The situation in *Leonardendron gabunense* is quite different. There are always 5 fertile stamens, all of them from the outer whorl. They alternate with 5 equal petals. There are also 5 equal sepals. The corolla has no single enlarged petal. The flowers are thus actinomorphic, not zygomorphic as in *Anthonotha* proper. Sometimes 1-2 staminodes of the inner whorl of stamens may be present as Léonard (1996) observed. This is confirmed by this study (see Fig. 1F).

This actinomorphic stamen reduction inside an actinomorphic calyx and corolla is also seen in the genus *Englerodendron*, known from the single species *E. usambarensis* Harms from Tanzania. In this species the flowers are 6-7-merous. The outer whorl of stamens is fertile as in *Leonardendron*, the inner one is completely present, but smaller and staminodial (Fig. 1I, J). A similar configuration is found

in *Anthonotha conchyliophora* (Pellegr.) J.Léonard (= *Isomacrobium conchyliophorum* (Pellegr.) Aubrév. & Pellegr.), a species based on two syntypes of which one, the lectotype (see hereafter), has an actinomorphic 5-merous flower with an outer whorl of 5 fertile stamens and an inner whorl of 5 staminodes (Fig. 1B). Generically, these three species: *Anthonotha conchyliophora*, *Englerodendron usambarensis*, and *Leonardendron gabunense* belong together. If *Leonardendron gabunense* stays in *Anthonotha* sensu Léonard then *Englerodendron* is admissible there too and should consequently be united with it. This would create an even wider variation in *Anthonotha*. In this paper it is preferred to unite the three species under the name *Englerodendron*. In Figure 2A-C the flower diagrams of these three *Englerodendron*

species are depicted for comparison with *Anthonotha* (Fig. 2D). Note that the anthers of the fertile stamens and of the staminodes in these diagrams are not differentiated in size.

Phylogenetic relationships based on chloroplast trnL intron sequences as illustrated in Bruneau *et al.* (2000: fig. 1, clade C) do not strengthen the new taxonomic position of *Anthonotha gabunensis*, but it is not in contradiction either.

By its actinomorphic corolla and actinomorphic androecium of basically 10 stamens, the enlarged *Englerodendron* is most closely related to *Oddoniodendron* De Wild. (Ngok Banak & Breteler 2004) and, to a lesser extent, to *Isoberlinia* Craib ex Stapf, where the corolla might be actinomorphic as well. The three genera may be distinguished as follows.

1. Stamens of the inner whorl staminodial, or (partly) absent, much shorter than the fertile ones of the outer whorl *Englerodendron*
— Stamens all fertile, of \pm equal length 2
2. Sepals all free; leaflets (sub-)opposite *Isoberlinia*
— The two adaxial sepals united; leaflets alternate *Oddoniodendron*

SYSTEMATICS

Genus *Englerodendron* Harms

Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie 40: 27, fig. 2 (1907); Léonard, *Académie royale de Belgique, Classe des Sciences, Mémoires in 8°* 30 (2): 199 (1957); Brenan,

Leguminosae, Caesalpinioideae, *Flora of Tropical East Africa*: 149 (1967). — Type: *Englerodendron usambarensis* Harms.

Leonardendron Aubrév., *Adansonia*, sér. 2, 8: 167 (1968); *Flore du Gabon* 15: 244 (1968), **syn. nov.**

TYPE. — *Leonardendron gabunense* (J.Léonard) Aubrév.

KEY TO THE SPECIES OF *ENGLERODENDRON* HARMS

1. Stipules large, enveloping the leaf axil, 1-4.5 cm long (Fig. 1C); bracteoles 15-20 mm long; petals narrowly obovate (15-)20-30 mm long, 5-10 mm wide, \pm as long as the fertile stamens. Lower Guinea 1. *E. conchyliophorum*
— Stipules 1-6 mm long, not enveloping the leaf axil (Fig. 1G, H, K, L); bracteoles 7-12 mm long; petals oblanceolate 10-12(-15) mm long, 1-2.5 mm wide, distinctly shorter than the fertile stamens 2
2. Leaves almost sessile, the lowest pair of leaflets subsessile, resembling large leafy stipules (Fig. 1G, H); sepals, petals, and filaments glabrous. Cameroun, Gabon 2. *E. gabunense*
— Leaves distinctly petiolate, the lowest pair of leaflets distinctly petiolulate, not resembling large leafy stipules (Fig. 1K); sepals and petals ciliolate, filaments pubescent. Tanzania 3. *E. usambarensis*

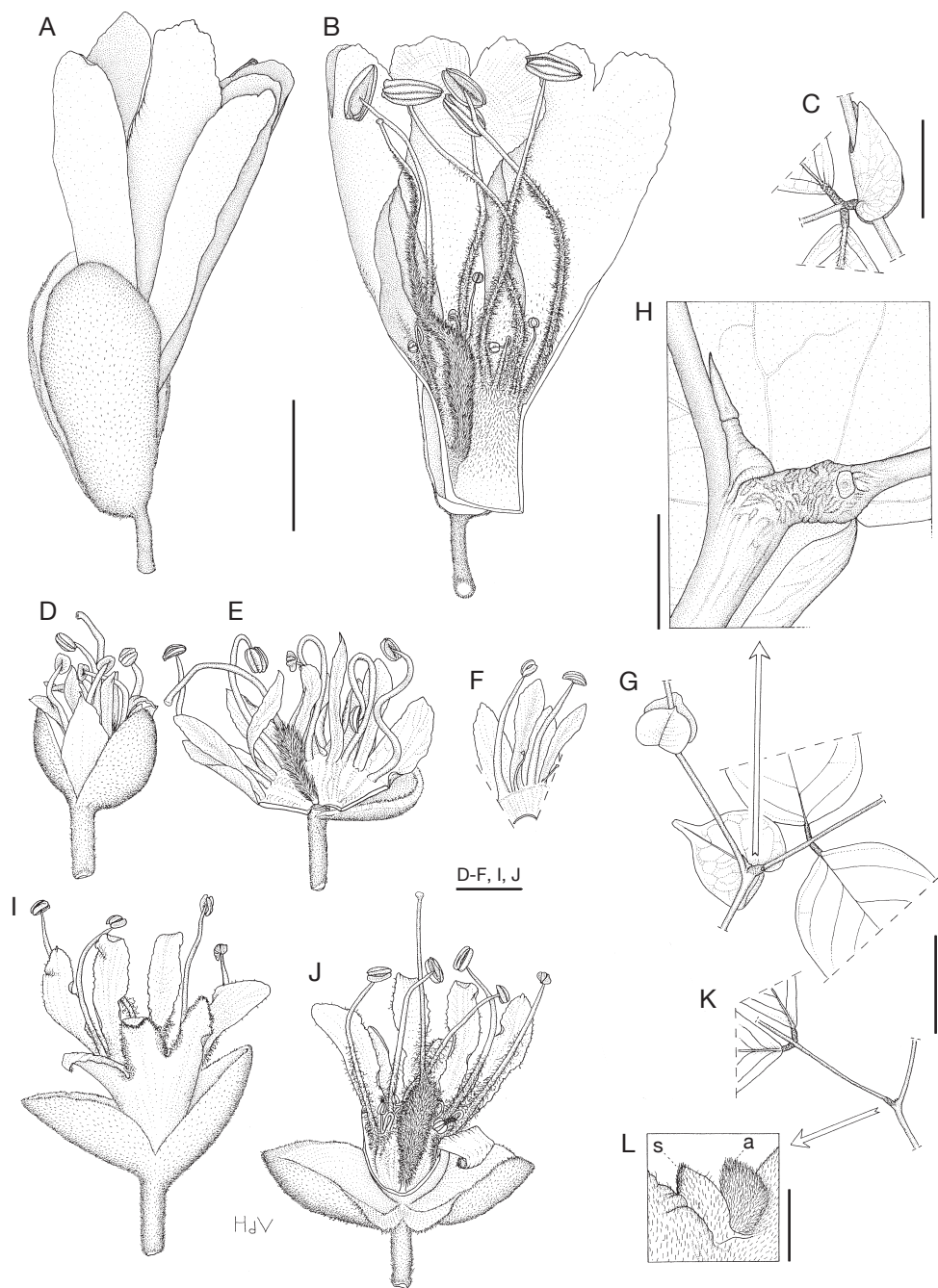


FIG. 1. — *Englerodendron* species: **A-C**, *E. conchyliophorum* (Pellegr.) Breteler; **A**, flower; **B**, flower longitudinal section; **C**, leaf axil with stipules; **D-H**, *E. gabunense* (J.Léonard) Breteler; **D**, flower; **E**, flower opened up; **F**, flower part showing, sepals, petals, stamens, and staminodes; **G, H**, leaf axil with enlargement; **I-L**, *E. usambarense* Harms; **I**, flower, some petals and some stamens missing; **J**, flower longitudinal section; **K, L**, leaf axil with enlargement. Abbreviations: **a**, axillary bud; **s**, stipule. A-C, Van Meer 1574; D, E, Breteler et al. 11081; F, Le Testu 7808; G, H, Breteler et al. 11174; I, J, Semsei 2942; K, L, Peter 48574. Drawing by H. de Vries. Scale bars: A, B, D-F, I, J, 1 cm; C, G, K, 3 cm; H, 5 mm, L, 1 mm.

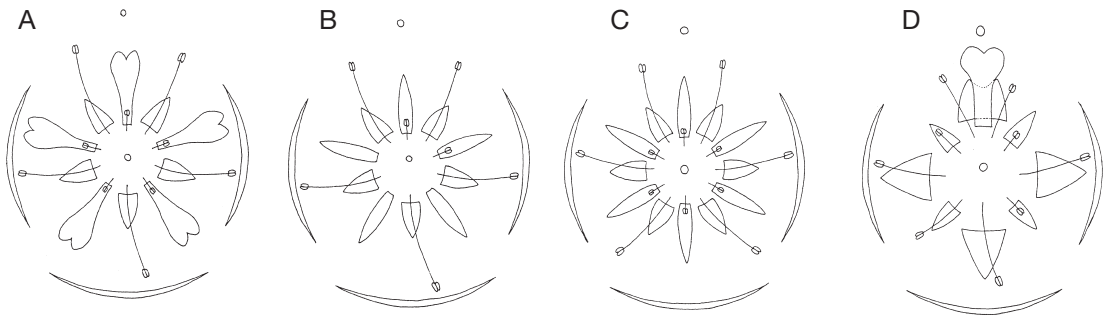


FIG. 2. — Flower diagrams (see text for explanations): **A**, *Englerodendron conchyliophorum* (Pellegr.) Bretelet; **B**, *E. gabunense* (J.Léonard) Bretelet; **C**, *E. usambarense* Harms; **D**, *Anthonotha macrophylla* P. Beauv. A, Van Meer 1574; B, *Le Testu* 7680; C, *Semsei* 2942; D, Bretelet 12060. Drawing by H. de Vries.

1. *Englerodendron conchyliophorum*
(Pellegr.) Bretelet, comb. nov.
(Figs 1A-C; 2A; 3)

Macrolobium conchyliophorum Pellegr., *Bulletin de la Société botanique de France* 88: 503 (1941), p.p.; *Mémoires de l'Institut d'Études centrafricaines* 1: 45 (1948), p.p. — Type: **Gabon**. Near Lastoursville, Micouma, fl., 23.XI.1929, *Le Testu* 7680 (lecto-, P!; iso-, WAG!; designated by Pellegrin [1948]), see Remarks.

Anthonotha conchyliophora (Pellegr.) J.Léonard, *Académie royale de Belgique, Classe des Sciences, Mémoires in 8°* 30 (2): 223 (1957), p.p., see Remarks.

Isomacrolobium conchyliophorum (Pellegr.) Aubrév. & Pellegr., *Bulletin de la Société botanique de France* 104: 498 (1957), p.p.; Aubrév., *Flore du Gabon* 15: 190, fig. 44 (1968), p.p., see Remarks.

SPECIMENS EXAMINED. — **Cameroun**. Thump Mt., Onge, ster., XI.1993, *Thomas* 9860 (WAG!).

Gabon. Micouma near Lastoursville, fl., XI.1929, *Le Testu* 7680 (P!, WAG!, type). — Loango Nat. Park Akaka, fl., XI.2004, *Mouandza et al.* 331 (LBV, WAG!). — Doudou Mts., 40 km NW of Doussala, ster., IV.2000, *Sosef et al.* 1151 (LBV, WAG!). — Moukalaba, Doudou Nat. Park, ster., II.2004, *Van Valkenburg et al.* 2788, 2793a (LBV, WAG!).

Nigeria. Oban Group F. R., West Block, fl., V.1971, *Van Meer* 1574 (WAG!).

HABITAT AND DISTRIBUTION. — Rain forest of Lower Guinea. Altitude 0-500 m.

REMARKS

Léonard (1957) and Aubréville (1968b) cited the Paris specimen of *Le Testu* 7680 as the holotype

of this species. This is not correct. In the original publication, Pellegrin (1941) cited *Le Testu* 7680 and *Le Testu* 5740 without indicating the type. Designation of a type was done in his *Les légumineuses du Gabon* in 1948, where the number 7680 was indicated as type, which in fact is a lectotypification. The other syntype *Le Testu* 5740 is not conspecific. It has only 3 fertile stamens and 6 staminodes as described by Pellegrin (1941, 1948). It is identified as *Anthonotha isopetala* (Harms) J.Léonard var. *macrantha* (J.Léonard) J.Léonard. Pellegrin's description in the protologue shows quite well which part derives from which of the two syntypes. The shape of the stipules, from which the epithet "*conchyliophorum*" is derived, is from *Le Testu* 7680 as well as e.g., the large bracteoles.

Aubréville's concept of *Isomacrolobium conchyliophorum* in the *Flore du Gabon* is also based on these two specimens of *Le Testu*, in the description as well as in his illustration. The elements 2 and 3 of planche 44 are after *Le Testu* 7680, the numbers 1, 4, 5 and 6 after *Le Testu* 5740.

2. *Englerodendron gabunense*
(J.Léonard) Bretelet, comb. nov.
(Figs 1D-H; 2B; 3)

Anthonotha gabunensis J.Léonard, *Académie royale de Belgique, Classe des Sciences, Mémoires in 8°* 30 (2): 224 (1957). — *Isomacrolobium gabunense* (J.Léonard) Aubrév. & Pellegr., *Bulletin de la Société botanique de France* 104:

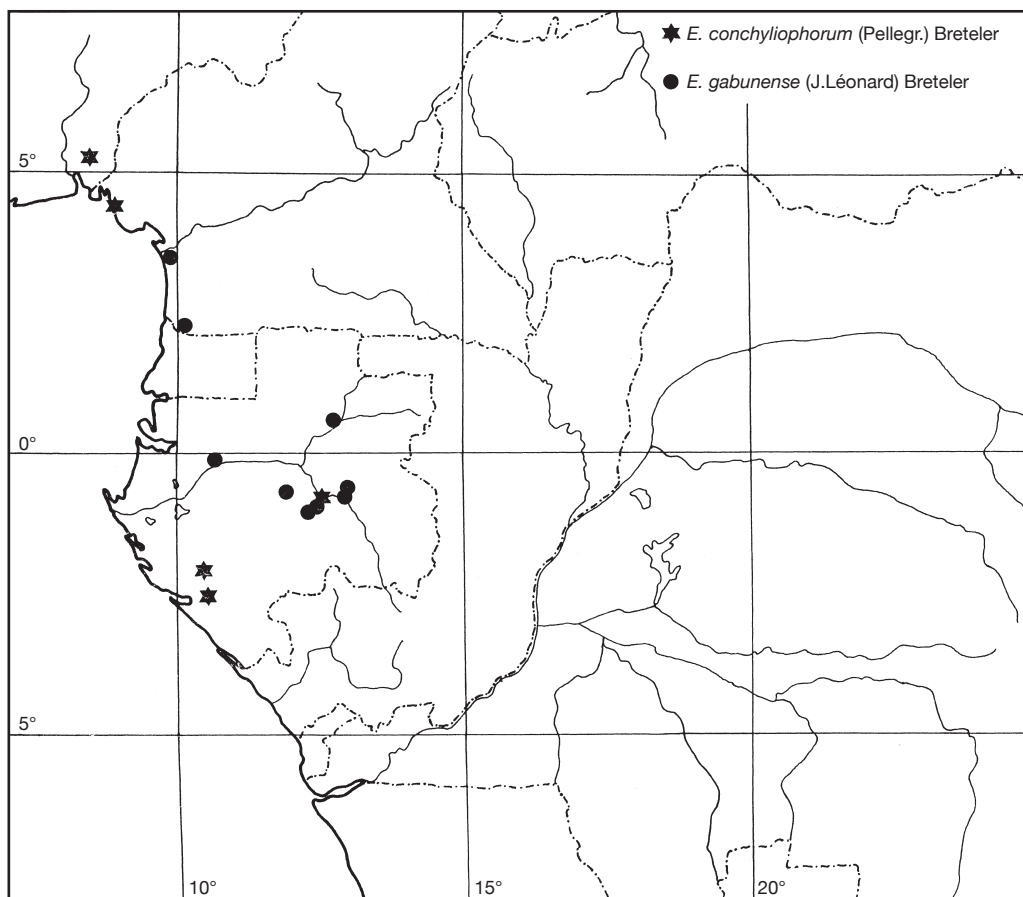


FIG. 3. — Distribution of *Englerodendron* in Lower Guinea.

498 (1958). — *Leonardendron gabunense* (J.Léonard) Aubrév., *Adansonia*, sér. 2, 8: 168 (1968). — Type: **Gabon**. Rongassa, fl., 21.XII.1929, *Le Testu 7808* (holo-, BR!; iso-, P!, WAG!).

SPECIMENS EXAMINED. — **Cameroun**. SE Tissongo Lake, ster., I.1974, *Letouzey 12647* (P!, YA). — Campo Ma'an area, Bibabimvoto, ster., VIII.2000, *Tchouto et al. T4x181* (WAG!, YA).

Gabon. 5-30 km NW Ndjolé, fl., II.1992, *Breteler et al. 11081* (LBV, WAG!). — 30 km E of Lastoursville, fl., IV.1992, *Breteler & Jongkind 11174* (LBV, WAG!). — 8 km NE of Bambidie, fl. b., X.1994, *Breteler et al. 13335* (LBV, WAG!). — Makandé, ster., I.1999, *Breteler et al. 14744* (LBV, WAG!). — Rongassa, fl., XII.1929, *Le Testu 7808* (BR!, P!, WAG!, type). — Koulamoutou, fl., XII.1930, *Le Testu 9089* (BR!, P!, WAG!). — SE of Bambidie, ster., V.1997, *Moukambi 9* (WAG!). — Ipassa near

Makokou, ster., III.2001, *Tabak et al. 125 A* (WAG!).

HABITAT AND DISTRIBUTION. — Rain forest of Lower Guinea. Altitude 0-500 m.

3. *Englerodendron usambarense* Harms (Figs 11-L; 2C)

Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie 40: 28, fig. 2 (1907); Brenan, Leguminosae, Caesalpinioideae, *Flora of Tropical East Africa*: 151, fig. 31 (1967).

TYPE. — **Tanzania**. Lushoto District, between Amani and Bomole, fl., X.1905, *Engler 3436* (holo-, B†; iso-[in *Peter 48011*], B; photo of iso-, K).

HABITAT AND DISTRIBUTION. — A narrow endemic of the East Usambaras rain forest of the Lushoto District in Tanzania. Altitude 760-1000 m.

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