

# New and little-known species of *Englerodendron* (Leguminosae-Detarioideae) from Central Africa, with a revised key to the genus

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**Background and aims** – The genus *Englerodendron* (Leguminosae-Detarioideae) has recently been enlarged to include *Isomacrobium* and *Pseudomacrobium*, and currently includes 18 tropical African species. The recent discovery of a new species in Gabon has led us to re-evaluate the delimitation of several taxa in the genus.

**Material and methods** – This paper is based on field work by the authors in Gabon, and on a study of herbarium material from BR, BRLU, K, LBV, MO, P, and WAG; normal practices of herbarium taxonomy have been applied.

**Results** – *Englerodendron nguemae* is described and illustrated as a new species, endemic to Gabon. It is remarkable for the variation in its leaves, which may be 2-jugate, 1-jugate, or unifoliolate on the same plant. The species is most similar to *E. brachyrhachis*, but the latter has uniformly 2-jugate leaves; *E. nguemae* also differs in its longer and more broadly winged leaf rachis (if present) that is convex (not flat) above, its stamen filaments pubescent at the base, and its glabrous style. Several collections from the Democratic Republic of the Congo, previously associated with *E. obanense*, are considered here to represent two different taxa. One of them, *E. macranthum* (a new combination and name at new rank based on *Macrobium isopetalum* var. *macranthum*, which is raised to species status), is endemic to the Mayombe range and differs from *E. obanense* by its inflorescences branched from the base or nearly so, and its shorter 1-seeded pods. The other taxon, still imperfectly known and here treated as *Englerodendron* sp. A, is endemic to the Kivu region; it differs from *E. obanense* by its large foliaceous stipules and from *E. conchyliphorum* by the lack of a basal auricle on the stipules. In addition, the first records of *E. leptorrhachis* from Equatorial Guinea, and of *E. conchyliphorum* from the Republic of the Congo, are documented, and a revised key to the now 21 species (one undescribed) of *Englerodendron* is presented.

**Keywords** – Africa; Caesalpiniaceae; Caesalpinioideae; Democratic Republic of the Congo; Equatorial Guinea; Gabon; *Isomacrobium*; new species; Republic of the Congo; taxonomy.

## INTRODUCTION

The genus *Englerodendron* Harms (Leguminosae-Detarioideae), considered here in the broad sense, includes 18 African species (de la Estrella et al. 2019; Jongkind &

Breteler 2020). It was originally described with a single species from Tanzania, *E. usambarensis* Harms (Harms 1907), and remained monotypic for almost a century, until Breteler (2006) transferred two species from Central Africa to the genus, and Burgt et al. (2007) added a fourth species

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from Cameroon. More recently, de la Estrella et al. (2019) expanded the delimitation of *Englerodendron* to include the monotypic *Pseudomacrolobium* Hauman (Hauman 1952; Léonard 1952b) and the 12 species of *Isomacrolobium* Aubrév. & Pellegr. (Aubréville & Pellegrin 1958; Breteler 2008, 2011), most of which had originally been included in a broadly circumscribed *Macrolobium* Schreb. (e.g. Pellegrin 1941, 1948; Léonard 1952a, 1952b) or *Anthonotha* P.Beauv. (Léonard 1955, 1957). Finally, Jongkind & Breteler (2020) added a new species from Liberia to the genus.

*Englerodendron*, in this new circumscription, is strongly supported as monophyletic and is sister to *Anthonotha* (de la Estrella et al. 2019). It is also easily recognised among African Detarioideae even by vegetative characters: the leaves are paripinnate, with non-twisted petiolules, opposite symmetrical leaflets that are green on both sides (vs discolorous and densely felted below in *Anthonotha*, at least when young) and well-marked secondary veins looping at a distance from the margin. The flowers, which are enclosed in the bud by the valvate bracteoles, are extremely variable in their number of stamens (3 to 13) and in the number and development of the petals (from actinomorphic with 5–7 equal petals in *Englerodendron* s.s. to more or less strongly zygomorphic with some of the petals reduced or absent in the former *Isomacrolobium* and *Pseudomacrolobium* species) but they are always different from *Anthonotha* flowers, which have a single large clawed petal in an adaxial position. The pods are shortly pubescent and without longitudinal ridges, thus similar to *Anthonotha*.

All species of *Englerodendron*, with the exception of *E. usambarensis*, occur in the Guineo-Congolian region sensu White (1979). The genus has its centre of diversity in the Lower Guinea subcentre of endemism (sensu White 1979) where 12 of the 18 species occur, nine of them being endemic. Only one species, *E. obanense* (Baker f.) Estrella & Ojeda, has a broad distribution from Sierra Leone to the Democratic Republic of the Congo; the other species have relatively narrow ranges.

A new species of *Englerodendron* from Gabon has recently been discovered by the authors and colleagues, and is here described and illustrated as *E. nguemae* O.Lachenaud & E.Bidault. In the process of comparing this species with its relatives, we came across two overlooked taxa from the Democratic Republic of the Congo that had been previously included in *E. obanense*. One of them, which is endemic to the Mayombe range, was originally described as *Macrolobium isopetalum* var. *macranthum* J.Léonard; it is here raised to species rank, as *Englerodendron macranthum* (J.Léonard) O.Lachenaud, and a complete description is presented. The second Congolese taxon, which occurs in South Kivu, is known from imperfect material only, and thus cannot yet be formally described; it is here treated as *Englerodendron* sp. A, and compared with its presumed closest relative, *E. conchyliphorum* (Pellegr.) Breteler. These changes bring the number of *Englerodendron* species to 21 (one undescribed). We also document here the first records of *E. leptorrhachis* (Harms) Estrella & Ojeda from Equatorial Guinea, and of *E. conchyliphorum* from the Republic of the Congo. Finally, a revised key to the species of *Englerodendron* is presented.

## MATERIAL AND METHODS

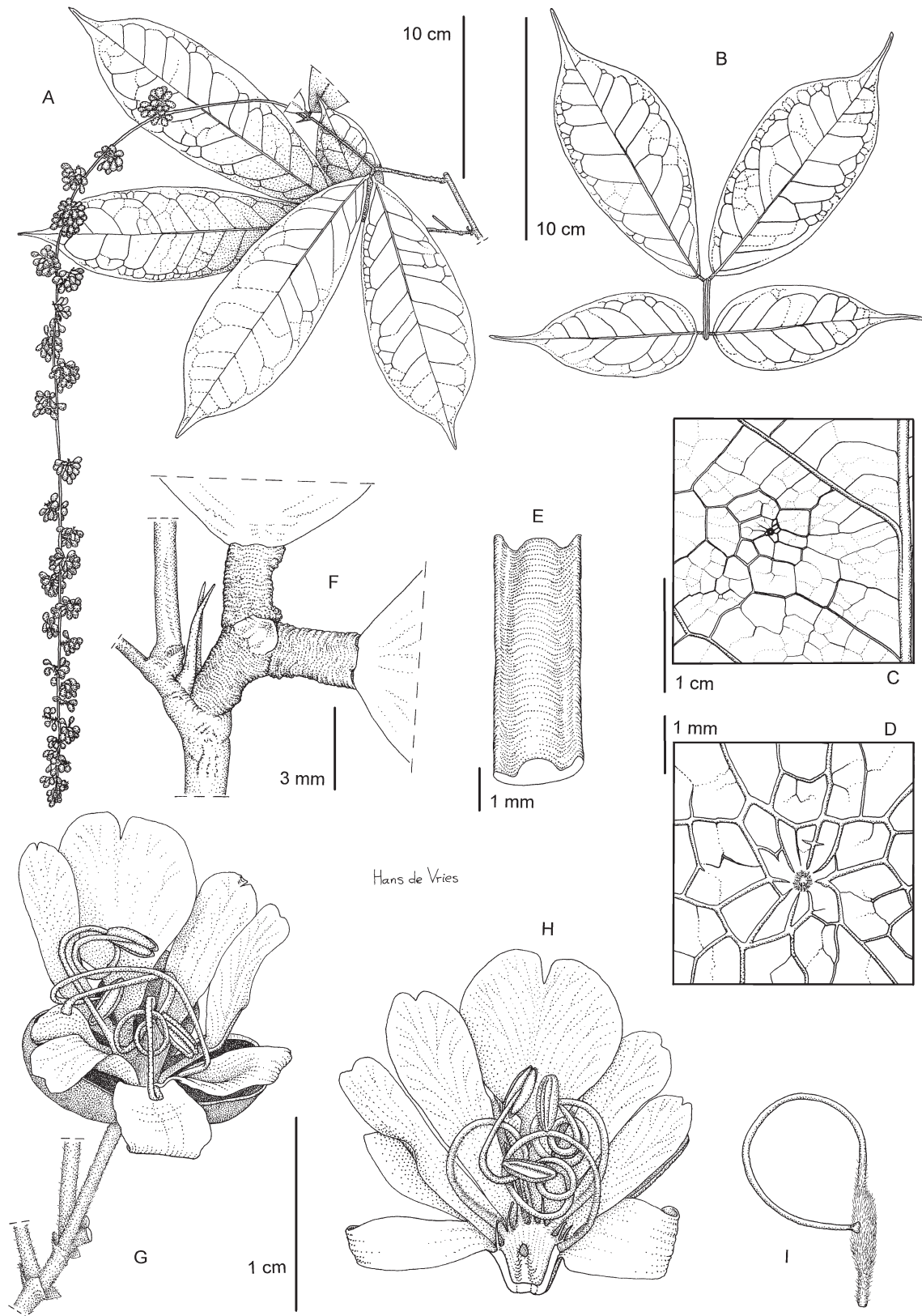
This paper is based on a study of herbarium material from BR, BRLU, K, LBV, MO, P, and WAG. The description of the new species is based on dry material, flowers preserved in alcohol, field observations, and photographs. A preliminary assessment of risk of extinction using the IUCN categories and criteria (IUCN 2012, IUCN Standards and Petitions Committee 2019) is provided for *Englerodendron nguemae* and *E. macranthum*. The geographical parameters of Area of Occupancy (AOO) and Extent of Occurrence (EOO), estimated using a 2 × 2 km grid, were calculated using GeoCAT (Bachman et al. 2011).

## TAXONOMIC TREATMENT

*Englerodendron nguemae* O.Lachenaud & E.Bidault, **sp. nov.** (figs 1, 2) – Type: GABON • Concession forestière Rougier-Ivindo, au bord de la rivière Djidji; 0°5'34"S, 12°20'49"E; 27 Oct. 2015; fl.; *Bidault, Nguema, Akouangou, Bikissa & Kaparidi 2214*; holotype: MO; isotypes: BR[BR0000008739421], BRLU, LBV, P[P01193022], WAG.

**Diagnosis** – Inflorescentiis longe pendulis, floribus petalis leviter inaequalibus (1 majore, 4 minoribus), foliisque uni- vel paucijugatis *E. brachyrhachide* (Breteler) Estrella & Ojeda et *E. hallei* (Aubrév.) Estrella & Ojeda similis, sed ab ambabus differt foliis diversis, bijugatis rhachide conspicue alato et supra convexo vel unijugatis raro etiam unifoliolatis (in *E. brachyrhachide* semper bijugatis rhachide supra plano et angustissime alato, in *E. hallei* semper unijugatis vel unifoliolatis), staminibus basi pubescentibus (nec glaberrimis), styloque glabro (nec basi pubescente). A primo foliolis longiore acuminatis (acumine 1–3.7 vs 0.3–1 cm longo) et pedicellis longioribus (6–8 vs 3–4 mm longis), a secundo foliolis nervis lateralibus paucioribus (7–11 nec 4–6) et non tam adscendentibus, petioloque brevioribus 2–5 mm longo nec (4–)8–20 mm etiam distinguitur.

**Description** – Shrub or small tree, 2.5–8 m tall. Trunk cylindrical, 5 cm in diameter, pale brown with grey blotches. Twigs horizontal, cylindrical, 1–2 mm thick, glabrous or with short patent hairs ca 0.1 mm long, soon covered with brown bark. Stipules intrapetiolar, 2 per axil, linear, 3–5 × 0.4–0.5 mm, very shortly connate at base, glabrous, early caducous to ± persistent. Leaves with 1–2 pairs of opposite leaflets, or sometimes unifoliolate on the same plant; petiole short and robust, 2–5 mm long, glabrous or pubescent like the twigs, transversely ringed; rachis (only present in 2-jugate leaves) 2–4 cm long, glabrous or pubescent like the twigs, convex on both sides and slightly winged laterally; petiolules 2–5 mm long, thick, cylindrical, glabrous or pubescent like the twigs, transversely ringed; leaflets elliptic to obovate, the upper pair (or the only one in 1-jugate or unifoliolate leaves) 10.5–34.5 × 3.2–14 cm, the lower pair (in 2-jugate leaves) 5.5–14 × 2–6 cm, rounded to obtuse at base and ending in a narrow acumen 1–3.7 cm long, papyraceous, glabrous above, minutely and very sparsely pubescent below, green on both sides, the lower side slightly paler; midrib impressed above, prominent below; secondary veins 7–11 pairs, slightly impressed above in life (almost flat when dry) and prominent below, weakly



Hans de Vries

**Figure 1** – *Englerodendron nguemae*. A. Flowering branch. B. Leaf. C. Detail of the lower leaf surface. D. Detail of a gland. E. Detail of the leaf rachis, seen from below. F. Node with stipules. G. Flower. H. Open flower, inside. I. Ovary and style. From Bidault *et al.* 2214 (BRLU & MO). Drawn by Hans de Vries.





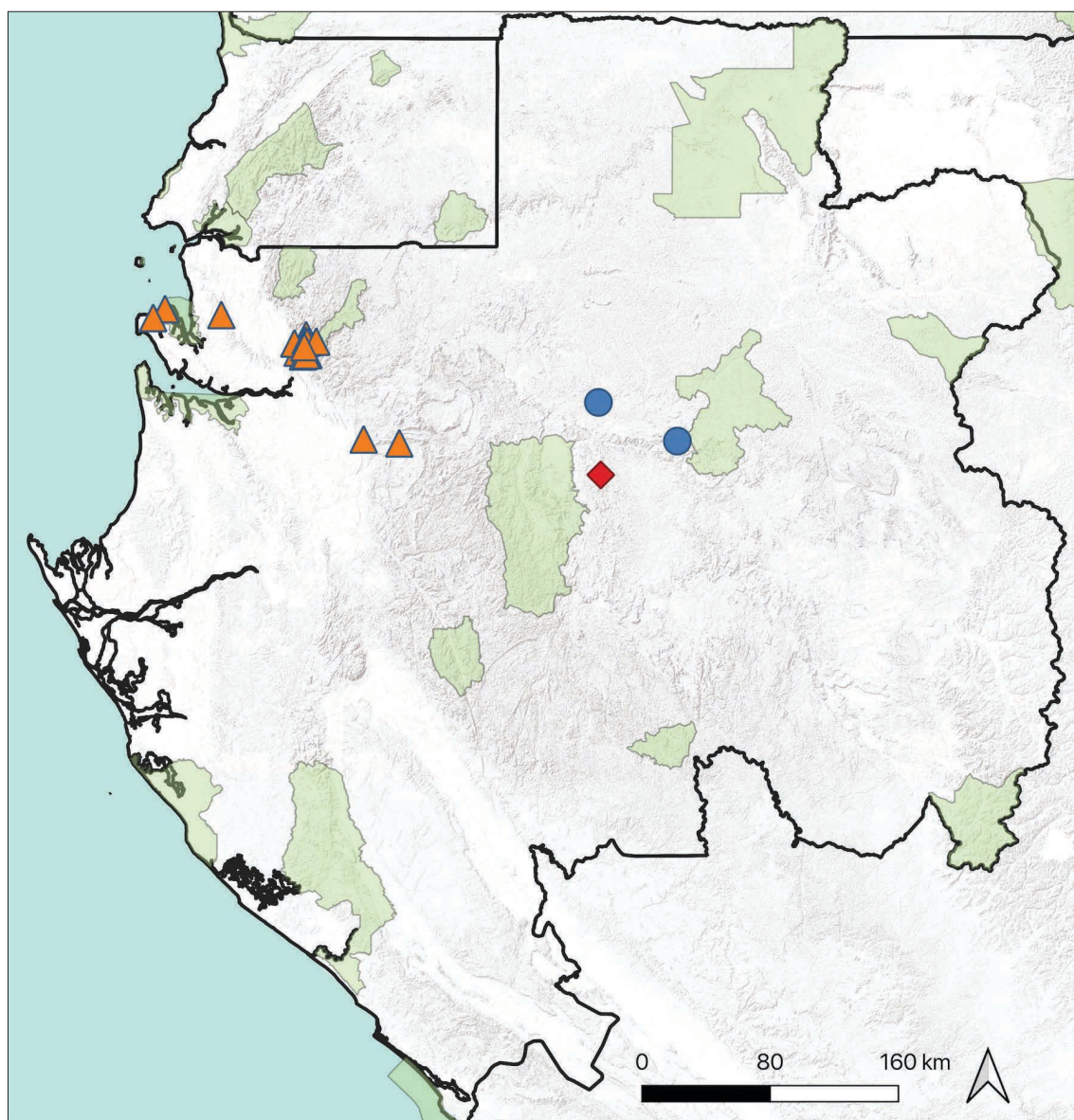
**Figure 2** – *Englerodendron nguemae*. A. General view of the plant. B. Leaves, upper surface. C. Leaves, lower surface. D. Detail of the leaf rachis, lower surface. E. Inflorescence in bud. F. Detail of two open flowers. A, B, D from Lachenaud *et al.* 3313; C, E, F from Bidault *et al.* 2214. Photographs: Olivier Lachenaud (A, B, D) CC-BY-ND, Ehoarn Bidault (C, E, F) CC-BY-ND.



ascending, forming very conspicuous loops 2–13 mm from the leaf margin; tertiary veins prominently reticulate on the lower leaf surface, forming a network with areolae ca 1 mm wide; glands scattered in lamina (fig. 1D). **Inflorescence** an axillary or terminal, pendulous, narrow elongated panicle up to 1 m long, with peduncle 8–14 cm long; primary branches 0.4–1.3 cm long, obliquely recurved backwards, each with 4–20 flowers; all axes with dense short appressed hairs; bracts very small, ovate, ca  $0.7 \times 0.5$  mm, acute or obtuse at apex, ciliate, otherwise glabrous or nearly so. **Pedicels** 6–8 mm long, with short and dense appressed beige indumentum. **Bracteoles** obovate,  $5\text{--}9 \times 3\text{--}4$  mm, concave, rounded at apex, completely enclosing the flower bud, covered with short appressed beige indumentum on both sides but more densely so outside, with edges also pubescent, ca 0.25 mm thick. **Hypanthium** glabrous, ca 2 mm long. **Sepals** 4, subequal, ovate,  $6\text{--}7 \times 3\text{--}4.5$  mm, the adaxial one faintly

notched at apex, the others entire and rounded, glabrous or very sparsely ciliate. **Petals** 5, light pink, glabrous, unequal; adaxial petal only slightly longer but much broader than the rest, narrowly obcordate,  $12 \times 6$  mm, gradually tapering at base, bilobed for ca 1.5 mm at apex; other 4 petals subequal, oblanceolate, ca  $10 \times 2.5$  mm, minutely bilobed at apex. **Stamens** 3; filaments ca 20 mm long, shortly pubescent at base and glabrous at apex; anthers ca  $3 \times 1.5$  mm, papillose. **Staminodes** 4, linear, ca 1 mm long, glabrous, opposite the smaller petals. **Ovary** densely villose, ca 5 mm long, with 6 ovules. **Style** ca 20 mm long, glabrous, stigma capitate. **Pods** not known.

**Distribution and ecology** – *Englerodendron nguemae* is endemic to east-central Gabon, where it occurs in blackwater riparian forest, around the limit of the inundation level, 283–381 m in elevation (fig. 3, blue circles). It has only been collected twice, along the Djidji and Ké Rivers, but is locally



**Figure 3** – Distribution of *Englerodendron brachyrhachis* (red diamond), *E. hallei* (orange triangles), and *E. nguemae* (blue circles). Map created with QGIS v.3.22 (QGIS Development Team 2021). Protected areas are shown in green.

**Table 1** – Differences between *Englerodendron brachyrhachis*, *E. hallei*, *E. leptorrhachis*, and *E. nguemae*. Diagnostic characters are in bold.

	<i>E. brachyrhachis</i>	<i>E. hallei</i>	<i>E. leptorrhachis</i>	<i>E. nguemae</i>
<b>Leaves</b>	always 2-jugate	1-jugate or unifoliolate	(1–)2- to 5-jugate	1–2-jugate or unifoliolate
<b>Petiole length</b>	1–4 mm	<b>(4–)8–20 mm</b>	2–7 mm	2–5 mm
<b>Rachis</b>	<b>0.6–1.5 cm long</b> , very slightly winged but not auriculate below leaflets, <b>flat above</b>	absent	(0–)6–20(–29) cm long, winged and <b>auriculate below each leaflet pair</b> , convex above	2–4 cm long (if present), winged but not auriculate below leaflets, convex above
<b>Leaflet base</b>	obtuse to cordulate	<b>acute</b>	obtuse to cordulate	obtuse to rounded
<b>Midrib of leaflets (above)</b>	impressed	impressed	<b>prominent</b>	impressed
<b>Secondary veins of leaflets</b>	(6–)8–9(–11) pairs, weakly ascending	<b>4–6 pairs, strongly ascending</b>	7–14, weakly ascending	7–11 pairs, weakly ascending
<b>Acumen of leaflets</b>	0.3–1 cm	0.8–2.8 cm	0.6–1.5 cm	1–3.7 cm
<b>Indumentum of twigs &amp; main veins of leaflets (lower side)</b>	velutinous, with patent brown hairs	glabrous or with minute appressed hairs	glabrous or with minute appressed hairs (or sometimes erect on veins)	glabrous to shortly velutinous
<b>Pedicle length</b>	3–4 mm	5–9 mm	(6–)8–10(–13) mm	6–8 mm
<b>Petal colour</b>	pinkish red	white or pale pink	white or cream	light pink
<b>Stamen filaments</b>	glabrous	glabrous	pubescent at the base	pubescent at the base
<b>Style</b>	pubescent at the base	pubescent at the base	glabrous	glabrous

abundant and gregarious, and likely to be more widespread since its area of origin is not very well explored. It could occur in the Ivindo and Lopé National Parks, close to the areas of collection.

**Phenology** – Flowers have been collected once in October, at the beginning of the rainy season.

**Etymology** – The species name honours Diosdado Nguema, Equatoguinean botanist living in Gabon, who assisted the authors during most of their expeditions to this country, and in whose company the species was discovered. He participated in the collection of more than 6,400 collection numbers, making him one of the most prolific field botanists in Gabon, and his unrivalled field knowledge of Gabonese trees has been invaluable.

**Conservation status** – Endangered: EN B2ab(iii). This species is only known from 2 recent collections, representing 2 occurrences and 2 subpopulations. Given the recent dates of collection and the still important forest cover in both areas, we consider that none of the occurrences are extirpated. Based on a  $2 \times 2$  km cell size, the AOO is estimated as 8 km<sup>2</sup>, below the upper threshold for “Critically Endangered” status under Criterion B2. The EOO cannot be calculated, since only 2 occurrences are known. The species is not known from any protected area, though it could be expected in the Ivindo and Lopé National Parks. Both occurrences are threatened by logging, which induces a significant decline in the extent and quality of the habitat, either directly or indirectly by affecting the sedimentation of the rivers. One of them (near the Djidji river) is located within a logging concession; the other (near the Ké River), although not included in a concession, is in an area experiencing much informal logging (as witnessed in 2020) due to its proximity to the National Road 3, and is also threatened by a projected renovation of the national road, which is expected to induce a decline in the habitat

extent and quality. These 2 occurrences represent 2 locations (sensu IUCN 2019), with regard to the most important threat (i.e. logging). We infer a past, current, and future continuous decline in the extent and the quality of the habitat of this species, and *Englerodendron nguemae* is thus preliminarily assessed as EN B2ab(iii).

**Additional material studied** – GABON • Rivière Ké à l’est de la piste Koumameyong–Booué; 0°07'29"N, 11°54'12"E; 9 Nov. 2020; st.; *Lachenaud, Bidault & Nguimbit 3313*; BR, BRLU, LBV, MO, P, WAG.

**Notes** – *Englerodendron nguemae* is remarkable by its polymorphic leaves (1-jugate and 2-jugate leaves are usually present together on the same plant, and unifoliolate leaves may be present as well) that are almost sessile and, when 2-jugate, have a distinctly winged rachis. Unifoliolate leaves, which seem to derive from 2-jugate leaves by the loss of one leaflet, have not been reported in *Englerodendron* to date, but they do sometimes occur in *E. hallei* (Aubrév.) Estrella & Ojeda, alongside more typical 1-jugate leaves.

The most similar species, and presumed closest relative of *E. nguemae*, is *E. brachyrhachis* (Breter) Estrella & Ojeda, which differs by characters cited in the key below. The winged leaf rachis is an unusual character in the genus, otherwise only found in *E. brachyrhachis* (but the rachis wings in this species are very narrow) and in *E. leptorrhachis* (Harms) Estrella & Ojeda from Cameroon and Equatorial Guinea. The new species also resembles *E. hallei* in characters of the inflorescences (pendulous, with an elongate rachis) and flowers (with 3 fertile stamens and one petal broader than the others) and in the occurrence of unijugate/unifoliolate leaves. Differences between these four species (which do not necessarily form a clade) are summarised in table 1. *Englerodendron nguemae*, *E. brachyrhachis*, and *E. hallei* all are endemic to Gabon, but appear to have separate



ranges (fig. 3), while *E. leptorrhachis* occurs in Cameroon and Equatorial Guinea.

***Englerodendron macranthum*** (J.Léonard) O.Lachenaud, **comb. & stat. nov.** – *Macrolobium isopetalum* Harms var. *macranthum* J.Léonard, *Bulletin du Jardin botanique de l'État à Bruxelles* 22: 186 (Léonard 1952a) – *Anthonotha isopetala* (Harms) J.Léonard var. *macrantha* (J.Léonard) J.Léonard (Léonard 1957: 224) – Type: D.R. CONGO • Luki; 11 Oct. 1948; fl.; *Donis 2045*; holotype: BR[BR0000008803887].

**Description** – Small tree 3–9 m tall. Trunk up to 45 cm in diameter. Twigs glabrous, cylindrical, 1.5–3 mm thick. Stipules very early caducous, not seen. Leaves entirely glabrous, with 3(–4) pairs of opposite leaflets; petiole 0.6–1.7 cm long; rachis 4.4–10 cm long, ± cylindrical; petiolules 3–5 mm long, cylindrical, transversely ringed; leaflets elliptic, the basal pair 6–7.2 × 3.4–3.9 cm, the upper 2(–3) pairs 10.6–14.5 × 3.5–4.8 cm, rounded or obtuse at the base, acuminate at the apex, coriaceous, drying greyish-green to olive brown; midrib impressed above, prominent below; secondary veins 5–8 pairs, prominent below and slightly so above, ascending and strongly curved, forming inconspicuous loops 1.5–5 mm from the leaf margin; tertiary veins reticulate and slightly prominent on the lower leaf surface; glands scattered or absent. Inflorescences terminal, axillary or on the old wood, paniculate, 9–18 cm long, branched from the base or nearly so; primary ramifications up to 5 cm long, bearing lateral cymules 1–1.5 cm long; all axes with dense appressed brown hairs; bracts early caducous, not seen. Pedicels 2.5–3 mm long, pubescent like the inflorescence axes. Bracteoles obovate, 8–10 × 5–5.5 mm, concave, rounded at the apex, completely enclosing the flower bud, covered with short golden-brown indumentum on both sides but more densely so outside, with edges also pubescent, ca 0.7 mm thick. Hypanthium glabrous, campanulate, 3–3.2 × 1.3–2.2 mm. Sepals 4, subequal, elliptic, 8–10 × 2.5–3.5 mm, rounded at the apex or the adaxial one faintly notched, outside basally with a few hairs near the margin, otherwise glabrous. Petals 5, white, glabrous, subequal, narrowly obovate, 8–12.5 × 2.2–3.5 mm, gradually tapering at the base, entire to shortly bilobed at apex. Stamens 3; filaments ca 19 mm long, sparsely pubescent at base; anthers elliptic, ca 2.5 × 1 mm, glabrous. Staminodes 6, linear, 1.3–2 mm long, glabrous, often with an aborted anther. Ovary densely villous, ca 5 mm long, with 6–7 ovules. Style ca 16 mm long, glabrous, stigma capitate. Pods (only 2 seen) 1-seeded, shortly ovate to shortly obovate, 7–8 × 3.5–3.4 cm, acuminate at the apex, laterally flattened with thickened margins, transversely wrinkled, covered with short and dense brown velvety indumentum. Mature seeds not seen.

**Distribution and ecology** – *Englerodendron macranthum* is endemic to the Luki area in southwestern D.R. Congo, at the southern extremity of the Mayombe range, occurring in riparian forest.

**Phenology** – Flowers collected in October, fruits in January.

**Conservation status** – Critically Endangered: CR B2ab(iii,v). This species is only known from 3 old collections (1947–1948) representing one occurrence and

one subpopulation. Based on a 2 × 2 km cell size, the AOO is estimated as 4 km<sup>2</sup>, below the upper threshold for “Critically Endangered” status under Criterion B2. The EOO cannot be calculated, since only one occurrence is known. The only occurrence is in the Luki Biosphere Reserve in D.R. Congo, parts of which are threatened by illegal deforestation for slash-and-burn agriculture and charcoal production in spite of the official protection status. A past, current, and future continuous decline in the extent and the quality of the habitat and in the number of mature individuals may therefore be inferred, and *Englerodendron macranthum*, being known from a single location, is thus preliminarily assessed as CR B2ab(iii,v).

**Additional material studied** – D.R. CONGO • Luki, vallée de la N’Kula; 6 Jan. 1947; fr.; *Toussaint 2087*; BR[BR0000017320115] • *ibid.*; 15 Oct. 1947; fl.; *Toussaint 2491*; BR[BR0000017320122].

**Notes** – This taxon has a chaotic history: originally described as a variety of *E. isopetalum* (Harms) Breteler & Wieringa, it was then synonymised with *E. sargosii* Pellegr. (Breteler 2008) and later with *E. obanense* (Baker f.) Estrella & Ojeda (Breteler 2011). After a detailed examination of the material, we conclude that it represents a separate species. Its flowers are closely similar to those of *E. obanense*, but while the latter has a pendulous inflorescence with an elongate rachis and a peduncle > 3 cm long, *E. macranthum* has a ± corymbose inflorescence branched from the base or nearly so, and apparently not pendulous, similar to those of *E. isopetalum* and *E. sargosii*. It differs from *E. isopetalum* by its smaller flowers (see the key) and from *E. sargosii* by its glabrous leaves, petals, and filaments. Finally, its short 1-seeded pods (illustrated in Breteler 2011: figure 3G, as *Isomacrolobium obanense*) seem quite different from the elongate pods of *E. isopetalum*, *E. obanense*, and *E. sargosii* (Breteler 2011: figure 3D, H & I) although since only two pods of *E. macranthum* have been seen, and not many more of the other three species, it remains unclear whether this character is constant.

Breteler (2006: 109) cited a collection from Gabon, *Le Testu 5740*, as *Anthonotha isopetala* var. *macrantha*, which he later included in *E. obanense* (Breteler 2011: 76). This collection indeed resembles *E. obanense* more, especially in inflorescence characters, but has unusually large flowers and stipules for that species; its identity remains uncertain at present. See also the notes under *E. sp. A* below.

### ***Englerodendron* sp. A**

**Description** – Shrub 5–8 m tall or medium-sized tree. Twigs glabrous, cylindrical, 1–3 mm thick, soon covered with a whitish bark. Stipules subpersistent, intrapetiolar and fused at the base, broadly ovate and foliaceous, 8–40 × 4.5–13 mm, rounded at the base and at the apex, bent over the twig, glabrous. Leaves with 2–3 pairs of opposite leaflets (rarely the lowest pair subopposite); petiole 1–2.2 cm long, glabrous or with very sparse hairs towards the base; rachis 5–8.5 cm long, glabrous, slightly canaliculate above; petiolules 3–6 mm long, cylindrical, glabrous, transversely ringed; leaflets elliptic, 6.5–23 × 2.2–9.2 cm, acute to obtuse at base, acuminate at the apex, coriaceous, glabrous

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**Key to the species of *Englerodendron***

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We have seen very little material of *E. nigericum* and are not sure whether it is really distinct from *E. obanense*, but have followed Breteler (2011) in keeping them separate. More collections are needed to solve this issue.

1. Midrib of leaflets prominent above; leaves (1–)2–5-jugate with rachis broadly winged and auriculate below every pair of leaflets [Cameroon, Equatorial Guinea]..... ***E. leptorrhachis* (Harms) Estrella & Ojeda**
  - 1'. Midrib of leaflets impressed or flat above; leaf rachis (if present) cylindrical, or if winged, not bearing auricles ..... **2**
  2. Stipules large and foliaceous, 8–45 × 4–15 mm, usually persistent or tardily caducous, bent over the twig ..... **3**
  - 2'. Stipules smaller, < 7 × 3 mm, early caducous ..... **4**
  3. Stipules auriculate at the base; bracteoles 15–20 mm long [Nigeria–Republic of the Congo]..... ***E. conchyliophorum* (Pellegr.) Breteler**
  - 3'. Stipules not auriculate at the base; bracteoles (only seen in young buds) 4–5 mm long [D.R. Congo: Kivu, Gabon?]...... ***Englerodendron* sp. A**
  4. Leaves 1–2-jugate or unifoliolate, rachis slightly winged if present ..... **5**
  - 4'. Leaves 2- to 7-jugate, rachis cylindrical or slightly canaliculate above (rarely a few 1-jugate leaves may be present as well in *E. triplisomere*)..... **8**
  5. Leaves 1-jugate or rarely unifoliolate; leaflets with 4–6 pairs of strongly ascending secondary veins; petiole (4–)8–20 mm long; petals (not seen in *E. libassum*) white or pale pink..... **6**
  - 5'. At least some of the leaves 2-jugate; leaflets with 7–11 pairs of weakly ascending secondary veins; petiole 2–5 mm long; petals light pink to red ..... **7**
  6. Leaves caudate at the apex; inflorescence with secondary ramifications < 1 cm long [NW Gabon] .... ***E. hallei* (Aubrév.) Estrella & Ojeda**
  - 6'. Leaves gradually acuminate at the apex; inflorescence with secondary ramifications up to 2.7 cm long [Liberia] ..... ***E. libassum* Jongkind & Breteler**
  7. Leaves always 2-jugate; rachis 0.6–1.5 cm long, flat above, only slightly winged; acumen of leaflets 0.3–1 cm long; stamen filaments glabrous, style pubescent in lower half [Gabon] ..... ***E. brachyrhachis* (Breteler) Estrella & Ojeda**
  - 7'. Leaves polymorphic (2-jugate, 1-jugate, or unifoliolate); rachis if present 2–4 cm long, convex above, rather broadly winged; acumen of leaflets 1–3.7 cm long; stamen filaments pubescent at the base, style glabrous [Gabon] ..... ***E. nguemae* O.Lachenaud & E.Bidault**
  8. Inflorescence ± corymbose and rather contracted, < 18 cm long, not pendulous, branched from the base or almost so (peduncle < 1.5 cm); fertile stamens 3–10(–13); leaves 2–5-jugate ..... **9**
  - 8'. Inflorescences thyrsoid and usually longer, pendulous, with peduncle ≥ 3 cm long; fertile stamens 3–5; leaves (1–)2–7-jugate..... **14**
  9. Flowers with 6–7 equal petals and 6–7 fertile stamens; petals hairy at the base; leaves 4–5-jugate [Tanzania]..... ***E. usambarense* Harms**
  - 9'. Flowers with up to 5 petals, these often unequal, and either 3–5 or 10–13 fertile stamens; petals usually glabrous (hairy at the base in *E. sargosii*); leaves 2–4-jugate ..... **10**
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10. Twigs and leaf rachis pubescent..... 11
- 10'. Twigs and leaves glabrous ..... 12
11. Flowers (sub)sessile; bracts (5–)6–9 mm long, about as long as the bracteoles [Guinea–Ghana].....  
..... *E. vignei* (Hoyle) Estrella & Ojeda
- 11'. Flowers on pedicel ca 5 mm long; bracts < 2 mm long, much shorter than the bracteoles [SW Gabon,  
SW Republic of the Congo]..... *E. sargosii* Pellegr.
12. Flowers with 10(–13) fertile stamens; petals very unequal, 3 large, 2 minute [N & C D.R. Congo]....  
..... *E. mengei* (De Wild.) Estrella & Ojeda
- 12'. Flowers with 3–7 fertile stamens (often with additional staminodes); petals 5, subequal..... 13
13. Flowers small: pedicels 1.5–2.5 mm long, bracteoles 6–8 mm, sepals 5–7(–9) mm, entirely glabrous,  
petals about the same length; pods pustulate, several-seeded, much longer than broad [Cameroon to S  
Gabon]..... *E. isopetalum* (Harms) Breteler & Wieringa
- 13'. Flowers larger: pedicels 2.5–3 mm long, bracteoles 8–10 mm long, sepals 8–10 mm long, at base with  
a few hairs, petals 8–12.5 mm long; pods not pustulate, (always?) 1-seeded and hardly longer than  
broad [SW D.R. Congo]..... *E. macranthum* (J.Léonard) O.Lachenaud
14. Leaf axis and petiolules distinctly pubescent (sometimes sparsely so in *E. graciliflorum*) with hairs  
ascending to patent, not closely appressed..... 15
- 14'. Leaf axis and petiolules glabrous, or with minute and closely appressed hairs..... 16
15. Flowers small, with 3 fertile stamens: petals 3–4 mm long, stamen filaments 4–5 mm long, style 5–7  
mm; lower leaflets cordiform to broadly ovate [Cameroon–SW D.R. Congo] .....  
..... *E. graciliflorum* (Harms) Estrella & Ojeda
- 15'. Flowers larger, with 5 fertile stamens; petals 11–15 mm long, stamen filaments 20–26 mm long, style  
15–21 mm long; lower leaflets elliptic [SW Cameroon] ..... *E. korupense* Burgt
16. Leaves 5- to 7-jugate [SC D.R.Congo] ..... *E. lebrunii* (J.Léonard) Estrella & Ojeda
- 16'. Leaves (1–)2- to 4-jugate ..... 17
17. Lowest pair of leaflets cordiform, subsessile, bent over twig; flowers with 5 fertile stamens; petals red  
[Cameroon, Gabon]..... *E. gabunense* (J.Léonard) Breteler
- 17'. Lowest pair of leaflets similar in shape to the others, petiolulate, not bent over twig; flowers with 3  
fertile stamens; petals white to cream ..... 18
18. Flowers small: bracteoles 4–6(–7) mm long, petals (0.5–)1–4 mm long, anthers 1.5–2.5 mm long  
[Guinea, Liberia, Sierra Leone?]...... *E. explicans* (Baill.) Estrella & Ojeda
- 18'. Flowers larger: bracteoles (6–)8–10(–13) × 4–7 mm, larger petals 10–15(–19) mm long, anthers 3–5  
mm long (species difficult to separate in the absence of flowers)..... 19
19. Petals very unequal in length, 2 small ones shorter than the calyx and 3 large ones much exceeding it;  
leaves (1–)2-jugate [Gabon]..... *E. triplisomere* (Pellegr.) Estrella & Ojeda
- 19'. Petals nearly equal in length (but often differing in width), all exceeding the calyx; leaves 2–4-jugate  
..... 20
20. Leaves 2-jugate, upper leaflets with 12–15 pairs of secondary veins; flowers with one large and 4  
smaller petals [Nigeria, SW Cameroon?, D.R. Congo?] .. *E. nigericum* (Baker f.) Estrella & Ojeda
- 20'. Leaves (1–)2–3(–4)-jugate, upper leaflets with 4–9(–11) pairs of secondary veins; flowers with 3–4  
large and 1–2 smaller petals, or rarely with 5 subequal petals [Nigeria, D.R. Congo].....  
..... *E. obanense* (Baker f.) Estrella & Ojeda
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above, glabrous or with very sparse appressed hairs below, drying dark grey to olive brown; midrib impressed above, prominent below; secondary veins 8–11 pairs, ascending and strongly curved, forming irregular loops 1.5–3 mm from the leaf margin; tertiary veins prominently reticulate on the lower leaf surface, forming a network with areolae ca 1 mm wide; glands scattered in the lamina. Inflorescence axillary, paniculate; peduncle 7.5–9.5 cm long; rachis at least 11.5 cm long (broken); primary branches 0.7–3 cm long; all axes densely puberulous; bracts small, ovate, 1–1.5 × 1.2–1.5 mm, ciliate, otherwise glabrous. Flowers only known in bud. Pedicels 1–2 mm long, densely puberulous. Bracteoles elliptic to obovate, 4–5 × 3.5–4.5 mm, concave, rounded at apex, completely enclosing the flower bud, densely puberulous outside. Pods not known.

**Distribution and ecology** – *Englerodendron* sp. A occurs in the Kivu region of eastern D.R. Congo (where it is the only species of the genus) in the transition zone between lowland and submontane forests, 700–1150 m in elevation.

**Phenology** – Flower buds collected in August and September.

**Notes** – This species is undoubtedly new, but the very poor state of the material precludes its description for the moment, four of the collections being vegetative and the remaining two (*Pierlot 830* & *945*) having damaged inflorescences with flower buds only; it would be highly desirable to obtain further material. Its large persistent foliaceous stipules, which are fused at the base and bent over the twig, resemble those of *E. conchyliophorum* but lack the basal auricle of the latter, and its flowers, although known in bud only, are obviously much smaller than in *E. conchyliophorum*. The species' range also seems to be widely different from *E. conchyliophorum* (which occurs from Nigeria to the Republic of the Congo) and indeed from all other species of the genus, none of which is found in eastern D.R. Congo.

One of the collections, *Michelson 788*, was identified by Breteler as probably *E. obanense*, and although it is not cited in his revision of the genus (Breteler 2011), the maximum size of the stipules given in brackets in Breteler's description of *E. obanense*, and the single dot from eastern D.R. Congo on his distribution map of that species (op. cit.: figure 20) presumably refer to this collection. True *E. obanense* has smaller and usually caducous stipules, and does not occur so far east, being found in D.R. Congo only in the southwest of the country.

Several collections from the Mayombe range in southwestern D.R. Congo (*Flamigni 10330*, BR) and southern Gabon (*Lachenaud et al. 3705*, BRLU, LBV, MO; *Dauby et al. 2588*, BRLU; *MBG Transect 1262*, BRLU) closely resemble *E. sp. A* in vegetative characters, especially in the shape and size of their stipules, although their localities are ca 1800 km further west than the rest of the material. The three Gabonese collections are vegetative only, while *Flamigni 10330* has young inflorescences with flower buds, which differ from *E. sp. A* in being shorter and usually branched from the base. Better material from the same area is required to elucidate their status. These collections appear to differ from *E. macranthum*, which also occurs in the Mayombe, by their subsistent (vs early caducous) stipules, leaflets prominently reticulate on the lower surface,

bracteoles with a darker brown indumentum, and sepals entirely glabrous. *Flamigni 10330* was cited by Breteler (2011: 75) as *E. nigericum*, but the latter has much longer inflorescences and smaller caducous stipules.

**Material studied** – D.R. CONGO • Kimbili; 8 Dec. 1948; st.; *Michelson 788*; BR[BR0000006569389, BR0000016132320] • Mingazi, terr. Kalehe, km 86 route Kavumu–Walikale; 2°00'S, 28°28'E; 925 m; 6 Sep. 1955; fl. buds; *Pierlot 830*; BR[BR00000017324212] • Kampala, terr. Walikale, km 215 route Kavumu–Walikale; 1°27'S, 28°05'E; 700 m; 20 Aug. 1955; fl. buds; *Pierlot 945*; BR[BR0000017350891] • Bwemba, km 86 route Kavumu–Walikale; 2°S, 28°25'E; 950 m; 24 Jul. 1957; st.; *Pierlot 2146*; BR[BR0000017350907] • Kembe, terr. de Walikale, km 153 route Sake–Walikale; 1°07'S, 28°10'E; 920 m; 10 Jun. 1958; st.; *Pierlot 2284*; BR[BR0000016132283]; Ishunga–Kakeyi, km 120 route Sake–Walikale; 1°20'S, 28°32'E; 1150 m; 11 Jun. 1958; st.; *Pierlot 2326*; BR[BR0000017350914].

***Englerodendron conchyliophorum*** (Pellegr.) Breteler (Breteler 2006: 109) – *Macrobium conchyliophorum* Pellegr. (Pellegrin 1941: 503) – *Anthonotha conchyliophora* (Pellegr.) J.Léonard (Léonard 1957: 223) – *Isomacrobium conchyliophorum* (Pellegr.) Aubrév. & Pellegr. (Aubréville & Pellegrin 1958: 498) – Type: GABON • Micouma; 23 Nov. 1929; fl.; *Le Testu 7680*; lectotype: P[P00368043, P00368044]; isolectotypes: BM, BR[BR0000008916419, BR0000008916747], WAG[WAG0003578, WAG0003579, WAG0027127].

**Material studied** – REPUBLIC OF THE CONGO • Région du Kouilou, près du village de Ngongo; 5 Aug. 1991; st.; *Doumenge 717*; P • Parc National d'Odzala, transect Tombi, sources de la Pandaka; 0°50'N, 14°52'E; 17 Jan. 1996; st.; *Lejoly 96/30*; BRLU.

**Notes** – This species was known to occur in Nigeria, Cameroon, and Gabon (Breteler 2006) and Equatorial Guinea (Velayos et al. 2010). Its occurrence in the Republic of the Congo is here documented for the first time; collections from this country are vegetative, but easily recognised by the characteristic foliaceous and auriculate stipules.

***Englerodendron leptorrhachis*** (Harms) Estrella & Ojeda (de la Estrella et al. 2019: 568) – *Macrobium leptorrhachis* Harms (Harms 1902: 157) – *Anthonotha leptorrhachis* (Harms) J.Léonard (Léonard 1955: 202) – *Isomacrobium leptorrhachis* (Harms) Aubrév. & Pellegr. (Aubréville & Pellegrin 1958: 498) – Type: CAMEROON • Bipindi; Aug.–Sep. 1901; fl.; *Zenker 2445*; lectotype: P[P00368035], **designated here**; isolectotypes: BR[BR0000008915580], E[E00136942], G[G00162581], GOET[GOET005069], HBG[HBG519484], K[K000417775], L[L.2035102], M[M0110620], MO[MO-714860], P[P00368034], S[S-G-3886], WAG[WAG0003550, n.v.].

**Material studied** – EQUATORIAL GUINEA – Rio Muni • Monte Bata, 1 km au N de la route Bata–Niefang au niveau de Santa Marta; 10 Aug. 2003; st.; *Senterre & Obiang 4294*; BRLU.

**Notes** – This species was so far regarded as endemic to Cameroon (Breteler 2011; de la Estrella et al. 2019). A



collection from Equatorial Guinea has since been found, and represents a new record for the country; although it is vegetative only, the winged leaf rachis bearing auricles below every pair of leaflets is extremely characteristic and leaves no doubt as to the identification.

Breteler (2011: 73) cited *Zenker 2445* (P) as lectotype of the species, but this number has two sheets in P; the one bearing flowers is here selected as lectotype (the other sheet is vegetative).

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