Five new species of Englerophytum K. Krause (Sapotaceae) from central Africa

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Abstract

GAUTIER, L., O. LACHENAUD, X. VAN DER BURGT & D. KENFACK (2016). Five new species of Englerophytum K. Krause (Sapotaceae) from central Africa. *Candollea* 71: 287-305. In English, English and French abstracts. DOI: http://dx.doi.org/10.15553/c2016v712a14

Five new species of *Englerophytum* K. Krause *(Sapotaceae)* are described: *Englerophytum paludosum* L. Gaut., Burgt & O. Lachenaud, *Englerophytum gigantifolium* O. Lachenaud & L. Gaut., *Englerophytum libenii* O. Lachenaud & L. Gaut., *Englerophytum sylverianum* Kenfack & L. Gaut., and *Englerophytum ferrugineum* L. Gaut. & O. Lachenaud. All five species are illustrated with line drawings and three of them with field photos. Distribution maps are also provided, and a preliminary extinction risk assessment according to IUCN Categories and Criteria is carried out: *Englerophytum paludosum* is assessed as "Least Concern", *Englerophytum sylverianum* as "Vulnerable", *Englerophytum libenii* and *Englerophytum ferrugineum* as "Endangered", and *Englerophytum gigantifolium* as "Critically Endangered".

Résumé

GAUTIER, L., O. LACHENAUD, X. VAN DER BURGT & D. KENFACK (2016). Cinq nouvelles espèces d'Afrique centrale dans le genre Englerophytum K. Krause (Sapotaceae). *Candollea* 71: 287-305. En anglais, résumés anglais et français. DOI: http://dx.doi.org/10.15553/c2016v712a14

Cinq nouvelles espèces du genre *Englerophytum* K. Krause *(Sapotaceae)* sont décrites: *Englerophytum paludosum* L. Gaut., Burgt & O. Lachenaud, *Englerophytum gigantifolium* O. Lachenaud & L. Gaut., *Englerophytum libenii* O. Lachenaud & L. Gaut., *Englerophytum sylverianum* Kenfack & L. Gaut., et *Englerophytum ferrugineum* L. Gaut. & O. Lachenaud. Les cinq espèces sont illustrées par des dessins au trait, et trois d'entre elles également par des photos de terrain. Des cartes de distribution sont fournies, ainsi qu'une évaluation préliminaire de leur risque d'extinction selon les catégories de l'UICN: *Englerophytum paludosum* est évalué comme «Préoccupation Mineure», *Englerophytum sylverianum* comme «Vulnérable», *Englerophytum libenii* et *Englerophytum ferrugineum* comme «En Danger», et *Englerophytum gigantifolium* comme «En Danger Critique».

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Introduction

The African genus *Englerophytum* K. Krause was described by Krause (1914) for the species *E. stelechanthum* K. Krause. Aubréville (1960, 1961, 1964a) added two new species, combined three others in the genus, and published three further invalid names. While Liben (1989) advocated strongly in favour of keeping *Englerophytum* separate from the related genera *Wildemaniodoxa* Aubrév. & Pellegr. and *Zeyherella* (Pierre ex Baill.) Aubrév. & Pellegr., on the basis of the degree of fusion of filaments and the number of floral parts, Pennington (1991) united all these genera under *Englerophytum*. He considered the genus to be closely allied to *Synsepalum* (A. DC.) Daniell, with which it shares the frequent presence of stipules, usually 5-merous flowers, the irregular presence of small staminodes (actually absent or vestigial in *Englerophytum*), and a similar structure of seeds and embryos; however, he kept *Englerophytum* distinct from *Synsepalum* because of the characteristic brochidodromous striate venation, and the strong tendency towards fusion of the filaments in a staminal tube.

Generic limits in *Sapotaceae* are a major issue, as exemplified by the fact that one year after Aubréville's (1964b) generic monograph of the family, which considered 122 genera, Baehni (1965) retained only 63 genera. The latest generic treatment by Pennington (1991) recognized only 53 genera, which can be interpreted as an extreme attempt to reconcile points of views through lumping. Molecular phylogenetics has dramatically improved our understanding of *Sapotaceae* by demonstrating that many of Pennington's (1991) larger genera are not monophyletic (e.g. Anderberg & Swenson, 2003; Swenson & Anderberg, 2005), and tends to agree in several instances with Aubréville's (1964b) finer generic divisions. These studies, which unfortunately included only five species of *Synsepalum* and two of *Englerophytum*, showed that these genera form together a monophyletic group, but might not be monophyletic in their present acceptance (Swenson & Anderberg, 2005).

A recent unpublished Master thesis (Borg, 2013) shows that the two closely related species *E. natalense* (Sond.) T.D. Penn. and *E. oblanceolatum* (S. Moore) T.D. Penn. are placed on a separate lineage to the other members of the genus, of which seven out of 12 described species were included in the study. Those latter seven species form a strongly supported monophyletic group, which includes not only *E. stelechanthum* (type of *Englerophytum*) but also the type species of both *Wildemaniodoxa* and *Zeyherella*, genera kept separate by Liben (1989). A case could be made for retaining the two latter genera as distinct, on account of their free stamen filaments (both genera) and number of corolla lobes and stamens *(Wildemaniodoxa),* but since they are otherwise very similar to *Englerophytum* s.s., and undistinguishable from the latter in the absence of flowers, it seems best to include them in the genus.

Gautier (1997) listed nine species of *Englerophytum* s. str., with 5 additional species in the genera *Wildemaniodoxa* and *Zeyherella*. Recent collections from Central Africa by three of us (DK, OL, XB), as well as a re-examination of the material available in in BR, BRLU, G, K, MA, MO, P and WAG, have revealed the existence of five new species of *Englerophytum*. These are here described as *E. paludosum* L. Gaut., Burgt & O. Lachenaud, *E. gigantifolium* O. Lachenaud & L. Gaut., *E. libenii* O. Lachenaud & L. Gaut., *E. sylverianum* Kenfack & L. Gaut., and *E. ferrugineum* L. Gaut. & O. Lachenaud.

The five species described below are provided with line drawings, colour photos, a discussion on their morphological affinities and a preliminary risk of extinction assessment using the IUCN Red List Categories and Criteria (IUCN, 2012).

One of these species *(E. paludosum)* has the stamen filaments free or nearly so, and would have been described in *Zeyherella* had that genus been maintained. The remaining four species have the stamen filaments fused into a tube, and belong to *Englerophytum* even if considered in the narrow sense of Aubréville (1960, 1961, 1964a) and Liben (1989). All five species have relatively large leaves for the genus and, except for *E. ferrugineum*, which is quite distinct by the dark brown lower leaf surface, they are very similar in vegetative characters and easily confused in the absence of flowers. Table 1 lists the main characters separating them.

As mentioned above, Aubréville (1960, 1961, 1964a) published three names in the genus, which are not valid as they lacked a Latin diagnosis (mandatory at the time of their description). *E. kennedyi* Aubrév. & Pellegr [nom. nud.] was proposed with a very brief French diagnosis in the "Flore du Cameroun" (Aubréville, 1964a). This species is identical to *E. paludosum*, for which we have chosen not to retain Aubréville's name since it has been frequently misapplied to another of our new species *(E. sylverianum). Englerophytum letestui* Aubrév. & Pellegr. [nom. nud.], and *E. kouloungense* Aubrév. & Pellegr. [nom. nud.], were first published with very brief French descriptions by Aubréville (1960), then with slightly extended French descriptions in the "Flore du Gabon" (Aubréville, 1961). The former name is based on a poor collection with leaves and detached fruits, which could belong to two of our new species (either *E. gigantifolium* or *E. libenii*), so we have not retained that name either. *E. kouloungense* is still only known from the original sterile specimen, and its identity remains obscure.

Systematics

Englerophytum paludosum L. Gaut., Burgt & O. Lachenaud, **spec. nova** (Fig. 1-3).

– *Englerophytum kennedyi* Aubrév. & Pellegr., Fl. Cameroun 2 : 71. 1964 [nom. nud.].

Typus : Cameroon. Southwest Region : Ndian division, Korup National Park, NW plot near P transect, subplot 39PN, 5°01'N 8°47'E, 100 m, 26.V.2007, fl., *van der Burgt 944* (holo- : K [K000460371]! ; iso- : BR!, E!, G [G00418157]!, MO!, P!, WAG!, YA!).

Englerophytum paludosum L. Gaut., Burgt & O. Lachenaud differs from other members of the genus by the combination of a 5-merous pale green corolla with patent lobes, the stamens with filaments free to the base or nearly so, the large (14-35 cm long) oblanceolate or spathulate leaves with the base of the lamina shortly rounded, and the persistent acicular stipules. It resembles E. libenii O. Lachenaud & L. Gaut., E. sylverianum Kenfack & L. Gaut. and E. stelechanthum K. Krause, but these species have the leaves cuneate at base and the stamens filaments connate into a tube.

A medium-sized *tree*, up to 20 m high and 54 cm DBH, with brown bark and white latex ; bole straight, not buttressed, but sometimes with small aerial roots at base ; small red pneumatophores occasionally present around the tree ; branching dichotomous, foliage clustered at the apex of the twigs, the latter 5-6 mm diam. (innovations 3 mm diam.), shortly appressed-pubescent. *Stipules* paired, acicular with inrolled margins, 6-14 mm long, 0.8-2 mm wide if flattened, persistent, appressed-pubescent outside, glabrous inside. *Leaves* alternate, simple, entire, oblanceolate or spathulate ; petiole 5-15(-30) mm long, 2.5-3.5 mm in diameter, longitudinally ribbed when dry, appressed-pubescent ; blade 14-35 cm long, 3.7-10 cm broad, broadest at $^3/_4$ of its length or higher, gradually narrowed to an obtuse or rounded base, rounded to acuminate at apex (acumen up to 15 mm long), chartaceous to coriaceous, strongly discolorous ; upper side green, glabrous ; lower side silvery white to coppery, with a dense immersed white indumentum intermingled with additional 0.5 mm golden to brown medifixed trichomes ; primary nerve canaliculate above, very prominent below, appressed-pubescent ; nervation brochidodromous, with 26-60 secondaries 5-10 mm apart, interspersed with parallel inter-secondaries and tertiaries, almost indistinct from each other above, more distinct below, the nerves c. 1 mm apart, faintly raised above and below, forming an angle of 60-70° with the midrib, then slightly curving upwards, and anastomosing 1 mm from margin. *Inflorescences* ramiflorous, borne on the branches below the leaves and in the lower axils, fasciculate, with 4-10 flowers, most of them pointing downwards ; pedicels golden-brown, 10-17 mm long and c. 0.6 mm in diameter at anthesis, 14-28 mm long and 1-2 mm thick in fruit, appressed-pubescent with medifixed trichomes. *Calyx* golden-brown, consisting of 5 imbricate, broadly ovate or elliptic sepals, 3-3.5 mm long × 2.5-3.5 mm broad, rounded at apex, appressed-pubescent outside (except for a 0.3 mm glabrous and somewhat hyaline margin, sometimes only visible on the inner three sepals) and fringed with white 0.3 mm trichomes, glabrous inside. *Corolla* whitish to pale green, glabrous ; tube cylindrical to slightly urceolate 1.5-3 mm long × 2-2.5 mm in diameter in its broader part ; lobes 5, ovate, entire, imbricate and patent, 3 mm long × 2-2.5 mm broad, obtuse at apex. *Stamens* 5, opposite the corolla lobes ; filaments white, obliquely bent outwards, 1.5-2.5 mm long, 1 mm wide at base and 0.4 mm at apex, 0.6 mm apart from each other, free or very shortly united at base into a rim 0.3 mm long in continuation of the corolla tube ; anthers initially whitish but soon turning brown, erect or obliquely bent inwards, free from each other, broadly sagittate, 2 mm long × 1.2-1.7 mm broad, shortly apiculate, extrorse and dehiscing longitudinally. *Ovary* globular, 2 mm long, with 5 locules and one ovule per locule, densely hirsute with 1 mm long trichomes directed upwards ; style pale green, narrowly conical, 1.5-2 mm long, 0.4 mm at base. *Fruits* ellipsoid to ovoid, 25-28 × 15-19 × 11-18 mm when dry, densely puberulous with golden-brown appressed hairs, 1- or 2-seeded ; seeds ellipsoid and slightly compressed, 20-21 × 12-14 × 9-10 mm, with a shiny testa and a broad ovate ventral scar for their whole length, 9-10 mm broad at base and gradually narrowing towards apex ; embryo with plano-convex cotyledons, 18 × 10 × 4 mm, radicle not exserted.

Etymology. – The species epithet refers to the swampy habitat of the species.

Distribution and ecology. – *Englerophytum paludosum* is sparsely distributed from southern Nigeria to central D.R. Congo (Fig. 3A). It occurs in swamp forests and periodically inundated forests. According to OL's field experience in Gabon, the species is uncommon in this country.

In the southern part of Korup National Park only two *E. paludosum* trees ≥ 50 cm stem diameter have been recorded in the "P transect plots" (Total area 155.75 ha ; 3,181 registered trees ≥ 50 cm). Being a medium-sized tree species, they only rarely grow larger than 50 cm stem diameter. Sixteen trees between 10 and 50 cm diameter have been recorded in 56 random located subplots (total area 14 ha ; 5,755 registered trees between 10 and 50 cm).

Conservation status. – *Englerophytum paludosum* has a broad range, is known from more than ten locations, and occurs in swampy habitats, which are usually difficult to access and relatively preserved from deforestation. It is therefore assessed as "Least Concern" according to IUCN Categories and Criteria (IUCN, 2012).

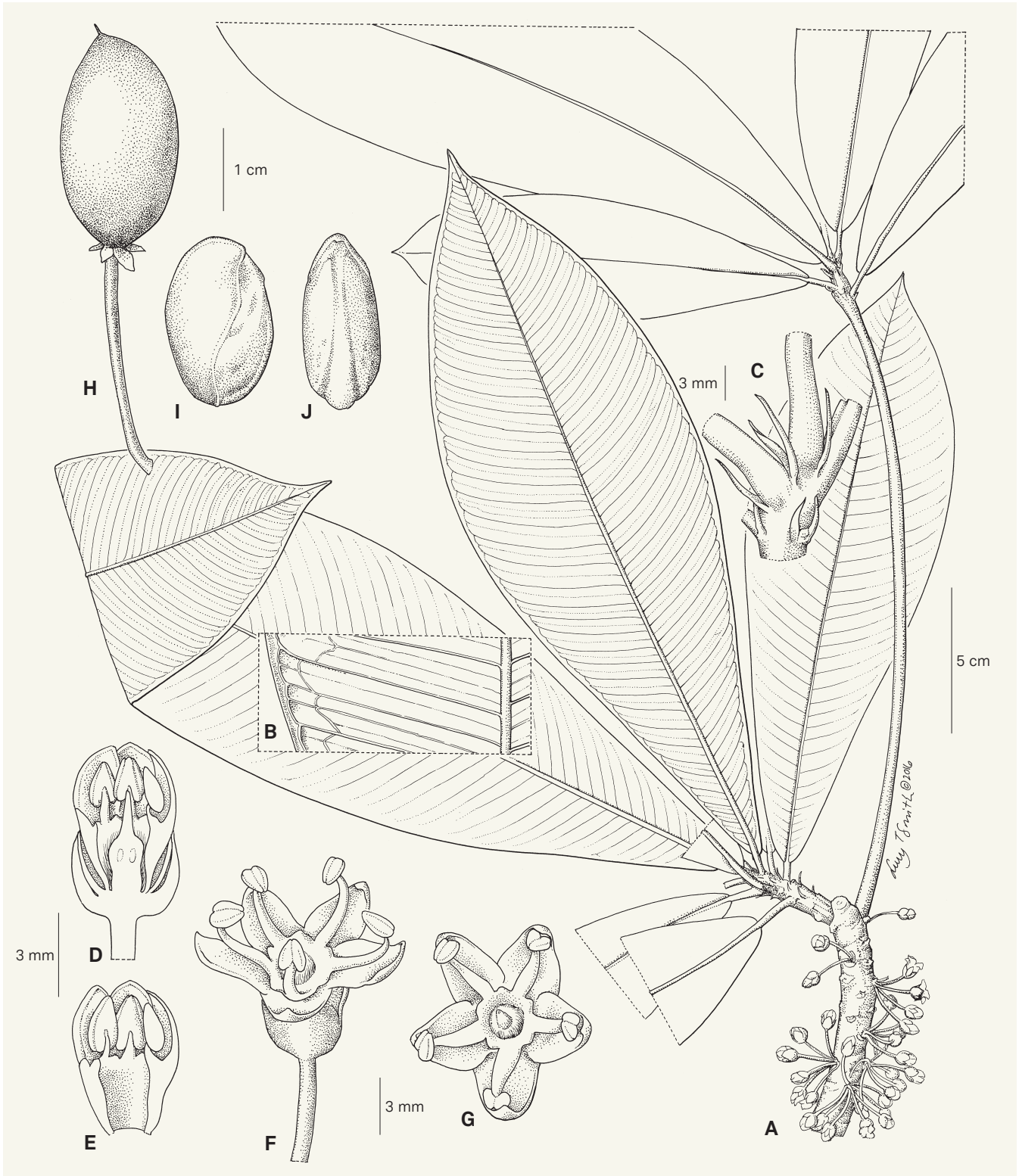

Fig. 1. – *Englerophytum paludosum* L. Gaut., Burgt & O. Lachenaud. **A.** Twig with leaves and inflorescences; **B.** Detail of the lower surface of the leaf, showing venation (50 x 21 mm); **C.** Stipules; **D.** Flower bud, longitudinal section; **E.** Corolla in bud stage, longitudinal section; **F.** Open flower, side view; **G.** Open flower, viewed from above; **H.** Fruit; **I.** Seed, lateral view; **J.** Seed, ventral view.
[**A-G:** *van der Burgt 944*, BR, K; **H-J:** *Leontovitch 27*, BR] [Drawing: L.T. Smith]

Fig. 2. – Field photographs of *Englerophytum paludosum* L. Gaut., Burgt & O. Lachenaud. **A.** Aerial roots at the base of the trunk ; **B.** Leaves ; **C.** Inflorescence ; **D.** Apex of twig showing stipules ; **E.** Flowers, Gabon ; **F.** Flowers, Cameroon. [**A, B, D**: *Lachenaud et al. 2010*; **C, F**: *van der Burgt 944* ; **E**: *Maas et al. 10325*] [Photos: **B, F**: X. van der Burgt, **A, C, D**: O. Lachenaud, **E**: P. Maas]

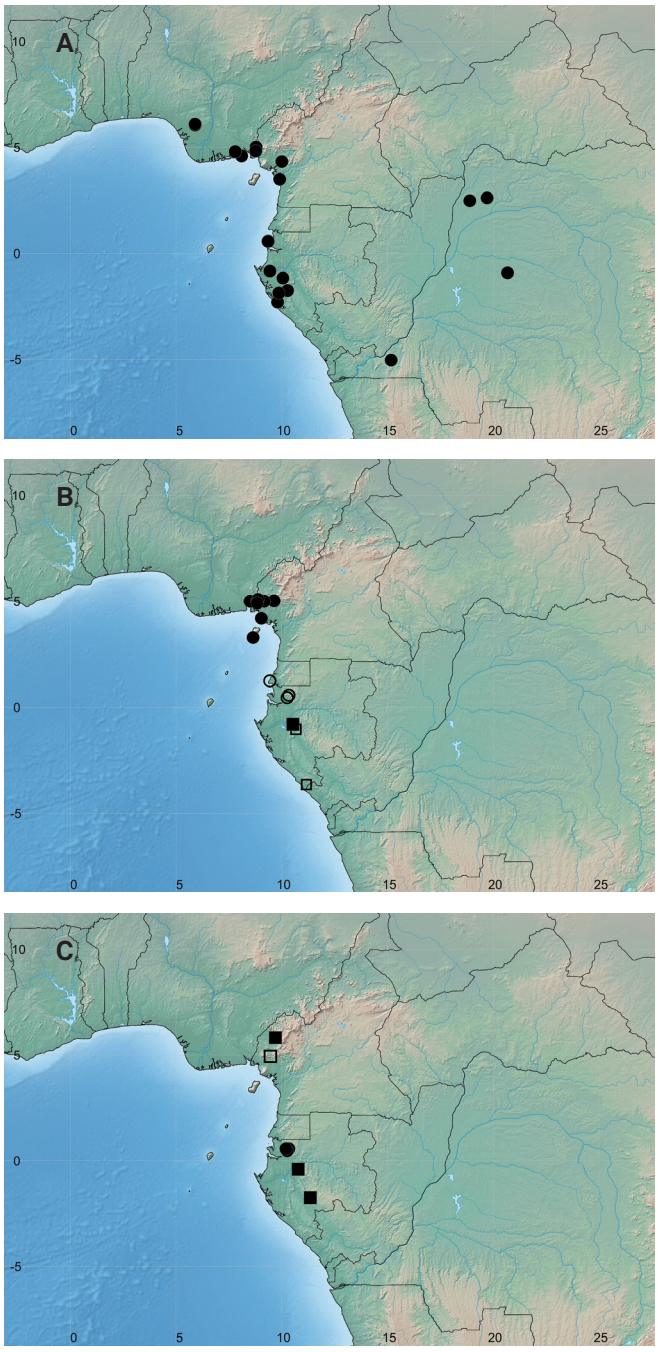

Fig. 3. – Distribution maps of the five new species of *Englerophytum* K. Krause. **A.** *Englerophytum. paludosum* L. Gaut., Burgt & O. Lachenaud; **B.** *Englerophytum gigantifolium* O. Lachenaud & L. Gaut. (squares) and *E. sylverianum* Kenfack & L. Gaut. (circles); **C.** *Englerophytum libenii* O. Lachenaud & L. Gaut. (squares) and *E. ferrugineum* L. Gaut. & O. Lachenaud (circles). Open symbols indicate specimens associated with doubt.

Notes. – *Englerophytum paludosum* has the stamen filaments free at the base or nearly so, and would have been described in *Zeyherella* in the classification of Aubréville (1961, 1964a) and Liben (1989). However, this character shows some variation in *Englerophytum paludosum*. From the limited flowering specimens available, it appears that the populations from Nigeria and Cameroon (including the type specimen) have the filaments shortly united at base, while those from Gabon and D.R. Congo have the filaments entirely free. They are otherwise so similar in vegetative and corolla characters (compare Fig. 2E and F), and also in ecology, that we regard them as conspecific.

The leaf size varies considerably in *E. paludosum*. Most of the collections have rather large leaves, and in the vegetative state are easily confused with *E. sylverianum*, although the latter species has very different flowers, leaves gradually cuneate at base, caducous stipules, and a different habitat (see Table 1 for differences). The small-leaved collections, e.g. *Schoenmaker 138*, might be mistaken for *E. stelechanthum*, which shares acicular persistent stipules. However, *E. stelechanthum* also has very different flowers with fused filaments, the leaves gradually cuneate at base, and a different habitat, being found on drained soils.

The fruits of *E. paludosum* are edible and much appreciated in D.R. Congo *(Leontovitch 27)*.

Paratypi. – **Cameroon. Littoral Region :** Route forestière SNCB (km 36 vers Ndoksom) : env. 25 km S Yabassi, 11.V.1976, ster., *Letouzey 14905* (P [2 sheets]); Transect B Tissongo, Douala-Edea Reserve, 26.VI.1976, ster., *Waterman & McKey 887* (K). **Southwest Region :** riv. de Mosongosele et de Ndian depuis Mosongosele jusqu'à l'entrée amont de la mangrove, env. 20 km au SW de Mundemba, 13.VI.1976, ster., *Letouzey 15176* (P [2 sheets]). **Gabon. Prov. Estuaire :** Forêt classée de la Mondah, E de la route menant au Cap Estérias, 0°35'10"N 9°21'19"E, 20 m, 1.IV.2007, ster., *MBG Transect 480* (BRLU); c. 20 km N of Libreville, forêt de la Mondah, 0°34'N 9°21'E, 18.II.2003, ster., *Sosef et al. 2025* (WAG); **Prov. Moyen-Ogooué :** Eguémoué [=Lake Oguémoué], 20.XI.1953, ster., *Guillery 1206* (P); Eguémoué, 12.XII.1953, ster., *Guillery 1221bis* (P); **Prov. Ngounié** : road from Mandji to Rabi, 18 km W of Mandji, Sentier Botanique, 1°45'S 10°16'E, 14.XI.2011, fl., *Maas et al. 10325* (WAG); **Prov. Ogooué-Maritime :** Préf. de M'paga, à env. 7 km au N du lac Alombié, au S de la réserve de Wonga Wongué, 0°49'59"S 9°26'09"E, 15.X.2014, ster., *Bidault et al. 1728* (BRLU, LBV, MO); Région du Lac Alombié, ± 9 km au NW de Mpaga, 0°49'59"S 9°26'06"E, 111 m, 19.X.2014, fl. buds, *Lachenaud et al. 2010* (BR, BRLU, G, LBV, MO, P, WAG); Rabi-Kounga, N'Gove 2°18'S 9°48'E, 13.XI.1991, fl. & imm. fr., *Schoenmaker 138* (BR, WAG [2 sheets]); Rabi 32, N'Gove 1°52'S 9°52'E, 11.XII.1990, old fl., *van Nek 495* (WAG [2 sheets]). **D.R. Congo. Prov. Bas-Congo :** Boko-Ngufu, 1.XI.1949, ster., *Callens 2141* (BR); **Prov. Equateur :** Parc National Monkoto, Percée Yenge-Loile, limite Parc National, 3.VIII.1958, fl., *Evrard 4447* (BR); Wendji, env. de Coquillhatville [= Mbandaka], V.1930, fl., *Lebrun 324* (BR); Terr. Budjala, 25.VII.1937, fr., *Leontovitch 27* (BR); Terr. Bomboma (Ngiri), 27.IV.1938, ster., *Leontovitch 68* (BR, 2 sheets, K). **Nigeria. Akwa Ibom state ;** Distr. Eket; Western end of the Northern Boundary of Stubbs Creek F. R. about 2 miles from Ibeno, 12.V.1953, ster., *Onochie FHI 32913* (K); Distr. Calabar; Akpan, 4.VII.1952, ster., *Ujor FHI 31621* (K); **Edo state :** Sapoba, s.d., ster., *Kennedy 1962* (BR, K); Sapoba, s.d., fl., *Kennedy 2313* (K); By side

of Jamieson R. at Sapoba, 12.XI.1949, ster., *Meikle 528* (K); Sapoba, Jamieson River Bank, 7.VIII.1947, ster., *Onochie FHI 23425*, (K, 2 sheets); Sapoba, Jamieson River, 7.IX.1943, ster., *Symington FHI 5693* (K); **State unknown:** *sine loc.*, s.d., ster., *Kennedy 2278* (BR, MO).

Englerophytum gigantifolium O. Lachenaud & L. Gaut., **spec. nova** (Fig. 3-5).

– *Englerophytum letestui* Aubrév. & Pellegr., Not. Syst. Paris 16: 255. 1960; Fl. Gabon 1: 88. 1964 [nom. nud.]

Typus: Gabon. Prov. Moyen-Ogooué: Mabounié, site base no. 2, entre camp et débarcadère, 0°48'00"S 10°31'23"E, 73 m, 10.XI.2013, fl., *Lachenaud 1253* (holo-: BRLU!; iso-: BR!, LBV!, MO!, P!, WAG!).

Englerophytum gigantifolium O. Lachenaud & L. Gaut. differs from other members of the genus by the combination of a 7- to 8-merous dark pinkish and bowl-shaped corolla with erect lobes, the stamens with filaments connate into a tube but anthers free, and the very large leaves (37.5-54 × 9-12.5 cm) with persistent stipules. The other species have the corolla either 5- or 10-merous, and the stamens with either both anthers and filaments connate, or both free.

A small understory *tree*, up to 6 m high, very ramose, with white latex; foliage clustered at the apex of the twigs, the latter 7-13 mm diam., shortly appressed-pubescent. Stipules paired, narrowly lanceolate with inrolled margin, 12-17 mm long, 1.5-3.5 mm wide if flattened, not or weakly carinate at base, coriaceous, persistent, appressed-pubescent outside, glabrous inside. *Leaves* alternate, simple, entire, oblanceolate; petiole 20-30 mm long, 4-7 mm diam., longitudinally ribbed when dry, shortly appressed-pubescent; blade 37.5-54 cm long, 9-12.5 cm broad, broadest at 2/3 or 3/4 of its length, acute at base, rounded at apex or with a short blunt acumen < 5 mm long, coriaceous and strongly discolorous; upper side green, glabrous; lower side coppery, with a dense immersed whitish indumentum intermingled with additional golden-brown medifixed trichomes; primary nerve in continuity of the petiole, canaliculate above, very prominent below and longitudinally ribbed when dry, appressed-pubescent; nervation brochidodromous and densely parallel, with numerous secondaries hardly distinct from the inter-secondaries and tertiaries, the nerves c. 1 mm apart, faintly raised above, more distinctly below, forming an angle of 60-75° with the primary nerve, then finally curving and anastomosing c. 1 mm from the margin. *Inflorescences* borne on the trunk, or on the branches up to the axils of the lower leaves, fasciculate, with 7-15 flowers pointing downwards; pedicels brown, 12-23 mm long and c. 1.3 mm in diameter at anthesis, appressed-pubescent. *Calyx* brown, consisting of 5(-6) imbricate and broadly ovate sepals, 3.5-4 mm long × 3-4 mm broad, obtuse at apex, appressed brown-pubescent outside (the inner ones often with a narrow hyaline glabrous area on the margin, fringed with short trichomes), glabrous inside. *Corolla* dark pinkish, glabrous, bowl-shaped; tube 2.5 mm long × 5 mm broad, ± hemispherical and gradually widening towards apex; lobes 7-8, triangular, entire, imbricate and erect, c. 4.5 × 3 mm, acute at apex. *Stamens* 7-8, opposite the corolla lobes; filaments connate into a short, white fleshy tube c. 1 mm long, in continuation of the corolla tube when seen from inside, and concealing the ovary; anthers beige, erect and free from each other at apex, sagittate, c. 4 mm long × 1.5 mm broad, apiculate with a short sterile appendage, extrorse and dehiscing longitudinally. *Ovary* subglobose, c. 1 mm, with 5-6 locules and 1 ovule per locule, densely hirsute with stiff trichomes directed upwards; style narrowly conical, 3 mm long, glabrous. *Fruits* unknown.

Etymology. – The species epithet refers to its exceptionally large leaves.

Distribution and Ecology. – *Englerophytum gigantifolium* is known with certainty only from the Mabounié region in West-Central Gabon, where it is not rare; but it is probably more widespread in western Gabon (see Notes). It grows in lowland forest on well-drained soils.

Conservation status. - *Englerophytum gigantifolium* is only known with certainty from a single location, where the forest is threatened by a mining project. A decline in the extent and quality of habitat, number of subpopulations and number of mature individuals is therefore expected. The new species is preliminarily assessed here as "Critically Endangered" [CR B2ab(iii,iv,v)], according to IUCN Categories and Criteria (IUCN, 2012). It is however likely that more localities exist, and if this is confirmed, the new species should accordingly be downgraded to a lower Category.

Notes. – *Englerophytum gigantifolium* has quite distinctive flowers, which are unique in the genus in being 7- to 8-merous. The androecium is also unusual in having fused filaments but free anthers. The flowers are thus intermediate between those of the former genus *Zeyherella* (here included in *Englerophytum*), with both anthers and filaments free, and those of *Englerophytum* s.s., with stamens united from the basis of the filaments to the tip of the connectives.

In vegetative characters *E. gigantifolium* differs very little from *E. libenii*: the stipules are not strongly keeled, and the leaves are of a richer coppery-rufous colour below, but since both species are little-collected, it is not clear how far these characters are reliable. No fruiting specimens have been collected yet, but they should be separable from *E. libenii* by the larger size of the calyx.

The invalid name *E. letestui* Aubrév. & Pellegr. is based on *Le Testu 5801* (Gabon, Ngounié, Sindara, 6.XII.1925, fr., P), a poor collection bearing only leaves and detached fruits, with

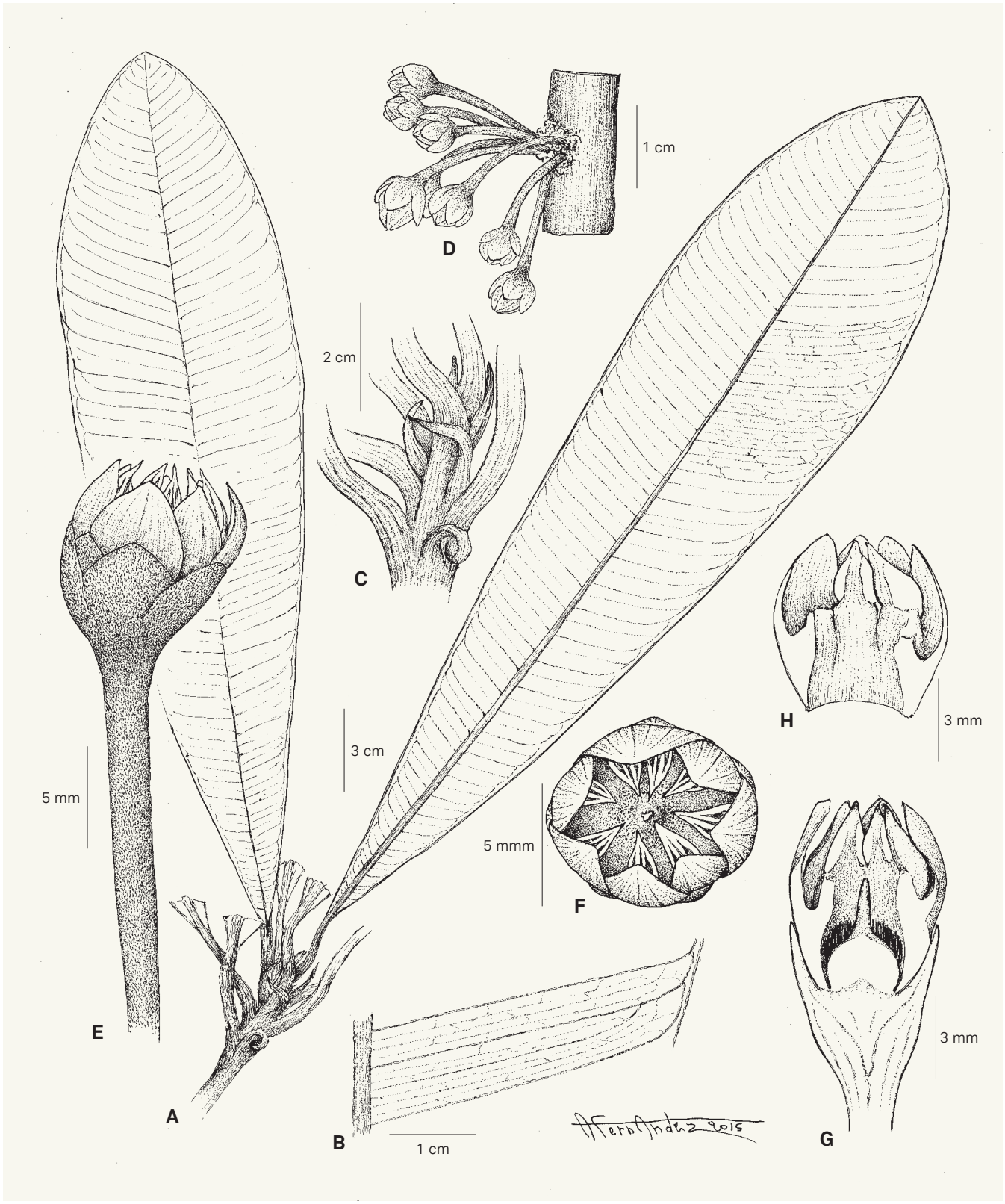

Fig. 4. – *Englerophytum gigantifolium* O. Lachenaud & L. Gaut. **A.** Leafy twig; **B.** Detail of the lower surface of the leaf, showing venation; **C.** Apex of twig with stipules and base of petioles; **D.** Inflorescence; **E.** Flower, side view; **F.** Flower, viewed from above; **G.** Flower, longitudinal section; **H.** Longitudinal section of corolla, with one stamen removed.
[*Lachenaud et al. 1253*, BR & BRLU] [Drawing: A. Fernandez]

Fig. 5. – Field photographs of *Englerophytum gigantifolium* O. Lachenaud & L. Gaut. **A.** Young inflorescence on trunk ; **B.** Leaves ; **C.** Inflorescence on twigs ; **D.** Flowers.
[*Lachenaud et al. 1253*] [Photos : O. Lachenaud]

unfortunately no calyces present at their base. This specimen could belong to either *E. gigantifolium* or *E. libenii*, though on geographical grounds the former is perhaps more likely. The fruits and seeds are closely similar to those of *E. libenii*.

The sterile collections *Dauby et al. 2655* (Gabon, Nyanga, E de la lagune Banio, à env. 20 km au NE de Ndindi et 20 km à l'E du débarcadère de Kayes, 3°38'36"S 11°09'47"E, 31.III.2012, BRLU) and *2830* (Gabon, Ngounié, Zone de Mabounié, à env. 45 km au SE de Lambaréné, rive E de la Ngounié, 0°45'5"S 10°30'45"E, BRLU), closely match *E. gigantifolium* in vegetative characters, and very probably belong to this species (particularly the latter specimen, which comes from the same area as the type).

Englerophytum libenii O. Lachenaud & L. Gaut., **spec. nova** (Fig. 3, 6).

Typus : Gabon. Prov. Ngounié : Between Mouila and Yéno, about 40 km on road from Mouila, 1°45'S 11°21'E, ± 400 m, 23.IX.1986, *Breteler et al. 8125* (holo- : WAG [WAG0110462]! ; iso- : BR!, K [K001243435]!, MA [MA521173]!, MO-4314406!, WAG [WAG0110463]!).

Englerophytum libenii O. Lachenaud & L. Gaut. differs from other members of the genus by the combination of a small, 5-merous wine red corolla (tube 1.8 mm, lobes 1.7 mm), the stamens with filaments fused into a tube and connate anthers closing the corolla throat, the large leaves (25.5-60 × 7-12.5 cm) with cuneate base, and the strongly keeled stipules. The other large-leaved species of Englerophytum have a larger corolla, and the stipules not or hardly keeled.

A small understory *tree*, 6-8 m high, 10-30 cm in diameter, dichotomously branched, with latex; foliage clustered at the apex of the twigs, the latter 5-10 mm diam., appressed-pubescent. Stipules paired, narrowly lanceolate with inrolled margins, markedly keeled, 10-15 mm long, 2-2.5 mm wide if flattened, coriaceous, appressed-pubescent outside, glabrous inside, tardily caducous. *Leaves* alternate, simple, entire, oblanceolate; petiole 20-35 mm long, 2.5-4 mm in diameter, longitudinally ribbed when dry, shortly appressed-pubescent; blade 25.5-60 cm long, 7-12.5 cm broad, broadest at $^2/_3$ or $^3/_4$ of its length, acute to obtuse at base, rounded at apex or with a short blunt acumen < 3 mm long, coriaceous and strongly discolorous; upper side green, glabrous; lower side pale greyish-coppery to silvery, with a dense immersed whitish indumentum intermingled with sparser golden-brown medifixed trichomes; primary nerve in continuity of the petiole, canaliculate above, very prominent below, appressed-pubescent; nervation brochidodromous and densely parallel, with numerous secondaries hardly distinct from inter-secondaries and tertiaries, the nerves c. 1 mm apart, faintly raised on both sides, forming an angle of 60-80° with the primary nerve, then finally curving and anastomosing c. 1 mm from margin. *Inflorescences* borne on the trunk, and on the branches up to the axils of the lower leaves, fasciculate, with 4-22 flowers apparently pointing downwards; pedicels 12-20 mm long and 0.5-1 mm in diameter at anthesis, becoming slightly thicker but not accrescent in fruit, appressed golden-brown pubescent. *Calyx* brown, consisting of 5 imbricate and broadly ovate sepals, 2-2.5 mm long × 1.5-2.5 mm broad, obtuse at apex, appressed golden-brown pubescent outside (the inner ones often with a narrow hyaline glabrous area on the margin, fringed with short trichomes), glabrous inside. *Corolla* wine red, glabrous; tube 1.8 × 1.5 mm, ± cylindrical and constricted towards the apex; lobes 5, broadly ovate, entire, imbricate and erect, c. 1.7 × 1.3 mm, subacute at apex. *Stamens* 5, opposite the corolla lobes; filaments entirely connate, forming a short cylindrical fleshy tube c.1 mm long in continuation of the corolla tube when seen from inside; anthers dirty brown, connivent at apex and closing the corolla throat, sagittate, c. 1.5 mm long × 1 mm broad, shortly apiculate, extrorse and dehiscing longitudinally. *Ovary* piriform, c. 1.5 mm long, with 5 locules and 1 ovule per locule, densely hirsute with stiff trichomes directed upwards; style cylindrical, 1 mm long, glabrous. *Fruits* fleshy, red when mature, globose to ovoid, 24-30 × 16-35 mm when dry, smooth or slightly lobed (at least when dry), shortly puberulous and eventually glabrescent, 1- to 5-seeded; seeds 17-27 × 12-18 × 12-13 mm, with a shiny testa and a broad ovate ventral scar for their whole length, 8-9 mm broad at base and gradually narrowing towards apex; embryo with plano-convex cotyledons, 14 × 10 × 4 mm, radicle not exserted.

Etymology. – The specific epithet refers to the Belgian botanist Louis Liben (1926-2006) to honour his important contribution to the study of the Central African flora. Liben published one family treatment in the "Flore du Cameroun" series *(Combretaceae)* and several in the "Flore d'Afrique Centrale" (the most notable being *Combretaceae, Oleaceae* and *Rhizophoraceae*). His work on *Sapotaceae* for the flora, unfinished for health reasons, was particularly helpful in understanding the taxonomy of *Englerophytum* and its allies. More information about his life and work can be found in Evrard & Bamps (2006) and Fabri (2007).

Distribution and ecology – *Englerophytum libenii* is known from southwest Cameroon and central Gabon; it is likely to be more widespread, but appears to be rare. It occurs in primary and secondary forest on drained soils, up to 400 m in altitude.

Conservation status. – *Englerophytum libenii* has an extent of occurence (EOO) of 13,200 km^2 and an area of occupancy (AOO) of 12 km^2 [calculation using Bachman et al. (2011) with a with a grid cell size of 2 × 2 km]. It is known from three locations only, none of which is protected. Forest exploitation and clearance for agriculture represent potential threats,

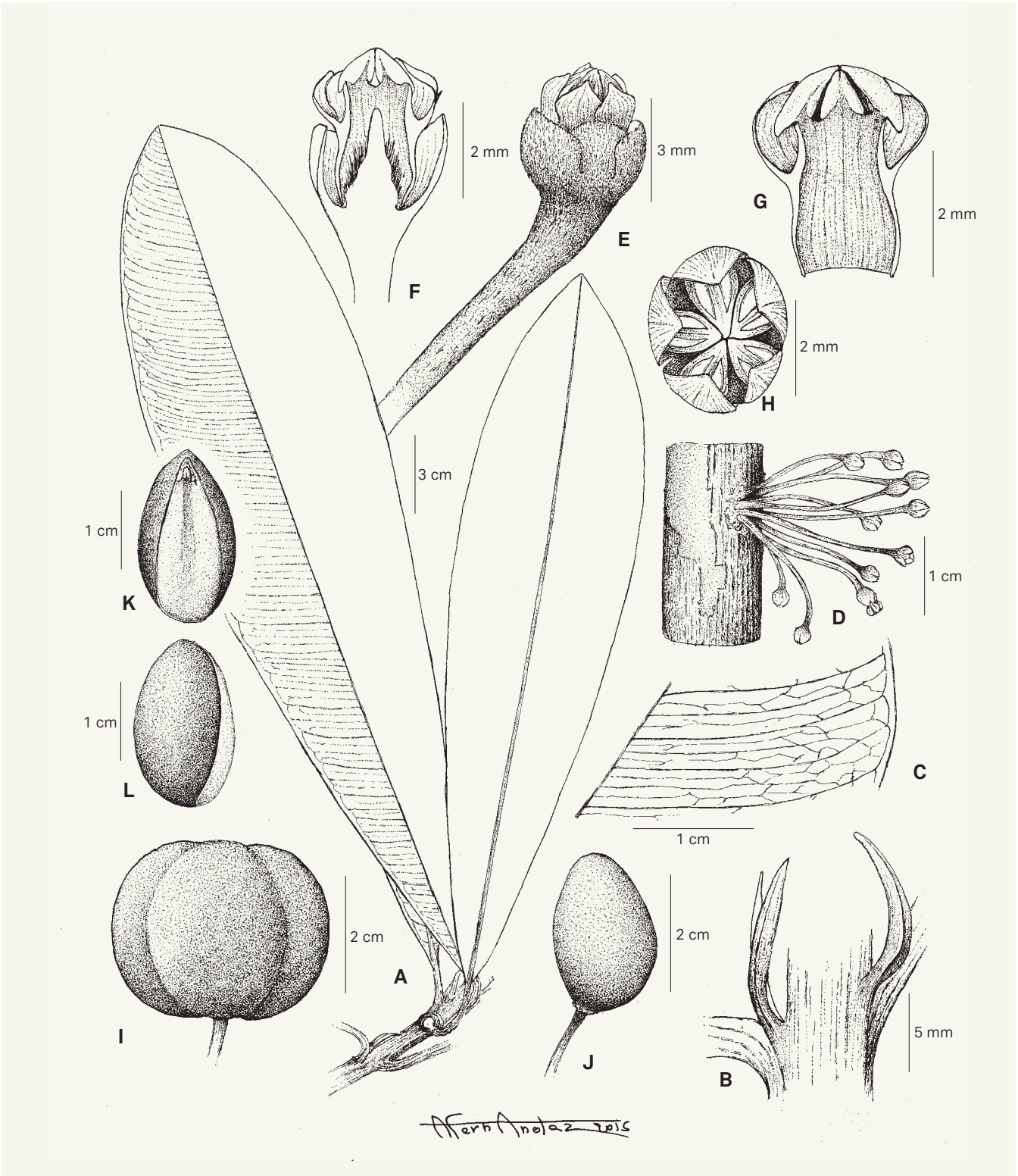

Fig. 6. – *Englerophytum libenii* O. Lachenaud & L. Gaut. **A.** Leafy twig; **B.** Portion of twig with stipules and base of petioles; **C.** Detail of lower surface of the leaf, showing venation; **D.** Inflorescence; **E.** Flower, side view; **F.** Flower, longitudinal section; **G.** Portion of corolla with stamens, seen from inside; **H.** Flower, viewed from above; **I-J.** Fruits (dry condition); **K.** Seed, ventral view; **L.** Seed, lateral view.
[**A-C:** *Champluvier 6101*, BR; **D-H:** *Breteler et al. 8125*, BR; **I-L:** *Champluvier 6106*, BR] [Drawing: A. Fernandez]

and are likely to result in a decline of the EOO, AOO, extent and quality of habitat, number of subpopulations and number of individuals. The new species is preliminarily assessed here as "Endangered" [EN B2ab(i,ii,ii,iv,v)].

Notes. – In vegetative characters, *E. libenii* is very similar to *E. gigantifolium* described above. The flowers, however, are strikingly different, being smaller, and with 5 (instead of 7-8) corolla lobes and stamens, the latter coherent by their tips, and the corolla tube ± cylindrical and constricted at apex. *E. libenii* also closely resembles *E. sylverianum*; the latter also has a 5-merous corolla and an thers coherent by their tips, but its flowers are much larger. The differences between the three species are summarised in Table 1. The fruiting specimens *Champluvier 6101* and *6106* are referred to *E. libenii* due to the small size of their calyx (smaller than the flowering calyx of *E. gigantifolium*). The markedly keeled stipules of *E. libenii* appear to be diagnostic of the species; they are, however, not always well-preserved on herbarium specimens.

The collections of *E. libenii* from Cameroon and Gabon are well-separated geographically, but their flowers are very similar and we have not found any significant differences, although the Cameroon material tends to have larger leaves. The specimen *Letouzey 14366* (Cameroon. Southwest Region: Entre Nongomadiba et Supe, 40 km au N de Kumba (feuille IGN 1/200 000 Mamfe), 21.VIII.1975, fr., (BR, K, P)), which the collector considered conspecific with *14333*, probably belongs to this species, but since it consists only of detached fruits, a slight doubt remains.

Paratypi. – **Cameroon. Southwest Region:** Près Numba, 45 km ENE Mamfe, 18.VIII.1975, fl. & imm. fr., *Letouzey 14333* (BR, K, P). **Gabon. Prov. Moyen-Ogooué:** Mboumi, 0°18'-0°30'S 10°45'-10°48'E, 1.II.2000, fr., *Champluvier 6101* (BR); *ibid. loc.,* 1.II.2000, fr., *Champluvier 6106* (BR).

Table 1. – Selected character states across the five new species of *Englerophytum* K. Krause. Diagnostic characters in bold.

	E. paludosum	***E. gigantifolium***	***E. libenii***	***E. sylverianum***	***E. ferrugineum***
Habit	medium-sized tree (to 20 m)	small tree (to 6 m)	small tree (to 8 m)	small to medium-sized tree (to 10 m)	medium-sized tree (to 20 m)
Petiole [mm]	5-15(-30)	20-30	20-35	15-45	(15-)20-30
Lamina [cm]	14-35 x 3.7-10	37.5-54 x 9-12.5	25.5-60 x 7-13.5	25-52 x 7-15	(13.5)23-70 x (4.2)6-15
Leaf base	**obtuse to rounded**	acute	acute to obtuse	acute	acute to obtuse
Lower side of lamina	silvery to coppery	coppery	silvery to coppery	silvery	**dark brown**
Stipules	**acicular**	not keeled (or weakly at base)	**strongly keeled**	not keeled (or weakly at base)	not keeled
Inflorescences	on branches only (not on trunk)	on trunk and branches	on trunk and branches	on trunk and larger branches	on trunk
Flowering pedicels [mm]	long, 10-17	long, 12-23	long, 12-20	long, 20-30	**short, 3-6**
Calyx: size of sepals	3-3.5 x 2.5-3.5	3.5-4 x 3-4	**2-2.5 x 1.5-2.5**	**4.5-5.5 x 3.5-4.5**	3 x 3.5
Corolla: colour	**whitish to pale green**	dark pinkish	wine red	wine red	unknown
Corolla: shape of tube	cylindrical or nearly so	hemispherical	cylindrical	cylindrical or nearly so	hemispherical
Corolla: tube length x diameter [mm]	1.5-3 x 2-2.5	2.5 x 5	1.8 x 1.5	**3.5-4.5 x 2.5**	0.6 x 1.7
Corolla: number of lobes	5	**7-8**	5	5	5
Corolla: size of lobes [mm]	3 x 2-2.5	4.5 x 3	**1.7 x 1.3**	**4.5-5.5 x 3.5-4**	4 x 4
Corolla: position of lobes	**patent**	erect	erect	erect	erect
Number of stamens	5	**7-8**	5	5	5
Filaments	**free or nearly so**	fused	fused	fused	fused
Anthers	divergent, erect to oblique	divergent, erect	connivent, closing corolla throat	connivent, closing corolla throat	connivent, closing corolla throat
Style [mm]	1.5-2	3	1	3-4	2
Fruits: number of seeds	1-2	unknown	1-5	1	unknown
Habitat	**swampy or flooded forests**	forest on drained soils	forest on drained soils	forest on drained soils	forest on drained soils

Englerophytum sylverianum Kenfack & L. Gaut., **spec. nova** (Fig. 3, 7, 8).

Typus : Cameroon. Southwest Region : Korup National Park, descent to Chimpanzee from "Big Boulder", 05°04'08"N 08°51'35"E, 120 m, 25.V.1997, fl., *Kenfack 764* (holo- : MO! ; iso- : K!, WAG!, YA!).

Englerophytum sylverianum Kenfack & L. Gaut. differs from other members of the genus by the combination of a large 5-merous wine red corolla (tube 3.5–4.5 mm, lobes 4.5-5.5 mm), the stamens with filaments fused into a tube and connate anthers closing the corolla throat, and the large leaves (25–62 × 7–15 cm) with a cuneate base and a silvery underside. It resembles E. libenii, which has much smaller flowers and strongly keeled stipules, and E. paludosum which differs in the pale green corolla, the stamen filaments free or nearly so, and the rounded leaf base.

A small to medium-sized understory *tree*, up to 10 m high and 25 cm DBH, with white latex ; foliage clustered at the apex of the twigs, the latter 6-8 mm in diameter, shortly appressed-pubescent. *Stipules* paired, lanceolate with in-rolled margins, faintly keeled at base, 10-15 mm long, 2-3 mm wide, soon inrolled and appearing subulate, then caducous, appressed-pubescent outside, glabrous inside, persistent or sometimes caducous. *Leaves* alternate, simple, entire, obovate-elliptic to oblanceolate ; petiole 15-45 mm long, 2.5-3.5 mm in diameter, longitudinally ribbed when dry, appressed-pubescent ; blade 25-62 cm long, 7-15 cm broad, broadest at $^2/_3$ to $^3/_4$ of its length, acute at base, narrowly acuminate to apiculate at apex for 5-15 mm, chartaceous and strongly discolorous ; upper surface dark green, glabrous ; lower surface silvery-white, with a dense immersed whitish indumentum, sometimes with additional scarce 0.5 mm golden to brown medifixed trichomes ; primary nerve narrowly canaliculate above, very prominent below and longitudinally ribbed when dry, appressed greyish-pubescent and appearing distinctly golden-brown when fresh ; nervation brochidodromous, with 30-40 secondaries 5-10 mm apart, interspersed with parallel inter-secondaries and tertiaries, almost indistinct from each other above, more distinct below, the nerves c. 1 mm apart, clearly raised above, shallowly raised below, forming an angle of 60-70° with the primary nerve, then finally curving and anastomosing 1-1.5 mm from margin. *Inflorescences* borne on the trunk at 0.5-5 m high, or on the thicker branches below the leaves, fasciculate, with 15-40 densely crowded pendulous flowers ; pedicels brown, 20-30 mm long and 1 mm diameter at anthesis, slightly thicker but not accrescent in fruit, appressed -pubescent. *Calyx* golden-brown, consisting of 5 thick imbricate, transversally wrinkled and widely ovate sepals, 4.5-5.5 mm long × 3.5-4.5 mm broad, connate at base for c. $^2/_5$ of their length, rounded at apex, appressed-pubescent outside (except for a 0.5 mm glabrous and somewhat hyaline margin, fringed with 0.5 mm trichomes, sometimes only visible on the inner three sepals), glabrous inside. *Corolla* dark wine red with yellowish apex, glabrous ; tube 3.5-4.5 mm long, 2.5 mm broad, cylindrical to slightly urceolate ; lobes 5, obovate, entire imbricate and erect, 4.5-5.5 mm long × 3.5-4 mm broad, with acute apex. *Stamens* 5, opposite the corolla lobes ; filaments connate, forming a white fleshy tube 2.5-3 mm long in continuation of the corolla tube as seen from inside, i.e. 4-5 mm from the base of the corolla ; anthers whitish, coherent with their tips and closing the corolla throat, sagittate, 3 mm long × 1.2 mm broad, extrorse and dehiscing longitudinally, with a 0.5 mm sterile tip. *Ovary* ovoid, 1.5-2.5 mm, with 5 locules and one ovule per locule, densely hirsute with 1.5 mm long trichomes directed upwards ; style conical, glabrous, 3-4 mm long, 0.6 mm in diameter at the base. *Fruits* fleshy, wine red to bright red when mature, globose to ovoid, 30-40 × 20-35 mm when dry, smooth, glabrous or with remains of a caducous golden-brown pubescence, single-seeded ; seed ellipsoid, 25-35 × 14-18 × 10 mm, with a shiny dark brown testa and a broad basiventral scar for $^4/_5$ of the length of the seed and $^2/_3$ of its breadth, i.e. covering c. 50 % of the seed surface. Embryo with plano-convex 20 × 10 × 4 mm cotyledons, radicle not exserted.

Etymology. – The epithet has been chosen in honour of David Kenfack's wife, Sylveriste Nkenfack Ngueguim, in recognition of her support during fieldwork that led to the discovery of this new species in Korup.

Distribution and ecology. – *Englerophytum sylverianum* is known with certainty only from southwest Cameroon and Bioko, but very probably occurs in continental Equatorial Guinea (Rio Muni) and northern Gabon (Crystal mountains) ; see notes below. It grows in primary and secondary rainforests on drained soils, from sea level to 1000 m elevation.

In Korup National Park, the population of *E. sylverianum* seems to be increasing in size. One of us (DK) monitored a population of 652 individuals (with dbh ≥ 1cm) of this species within a 50-ha plot. During a 10 years period, 38 individuals (6 %) died, 64 (9.8 %) recruited, which resulted in a net increase in the population of 26 individuals.

Conservation status. – *Englerophytum sylverianum* is known from seven locations representing 10 subpopulations. The new species has a restricted range with an EOO estimated to be c. 9,140 km² (but this figure is not relevant here, as it includes much of the ocean between Cameroon and Bioko) and an AOO of 44 km². Given the deforestation currently taking place in the Southwest Region in Cameroon, the population reduction is likely to be in excess of 30 % over 3 generations, and a decline in the EOO, AOO, habitat extent and quality, number of subpopulations and number of individuals is

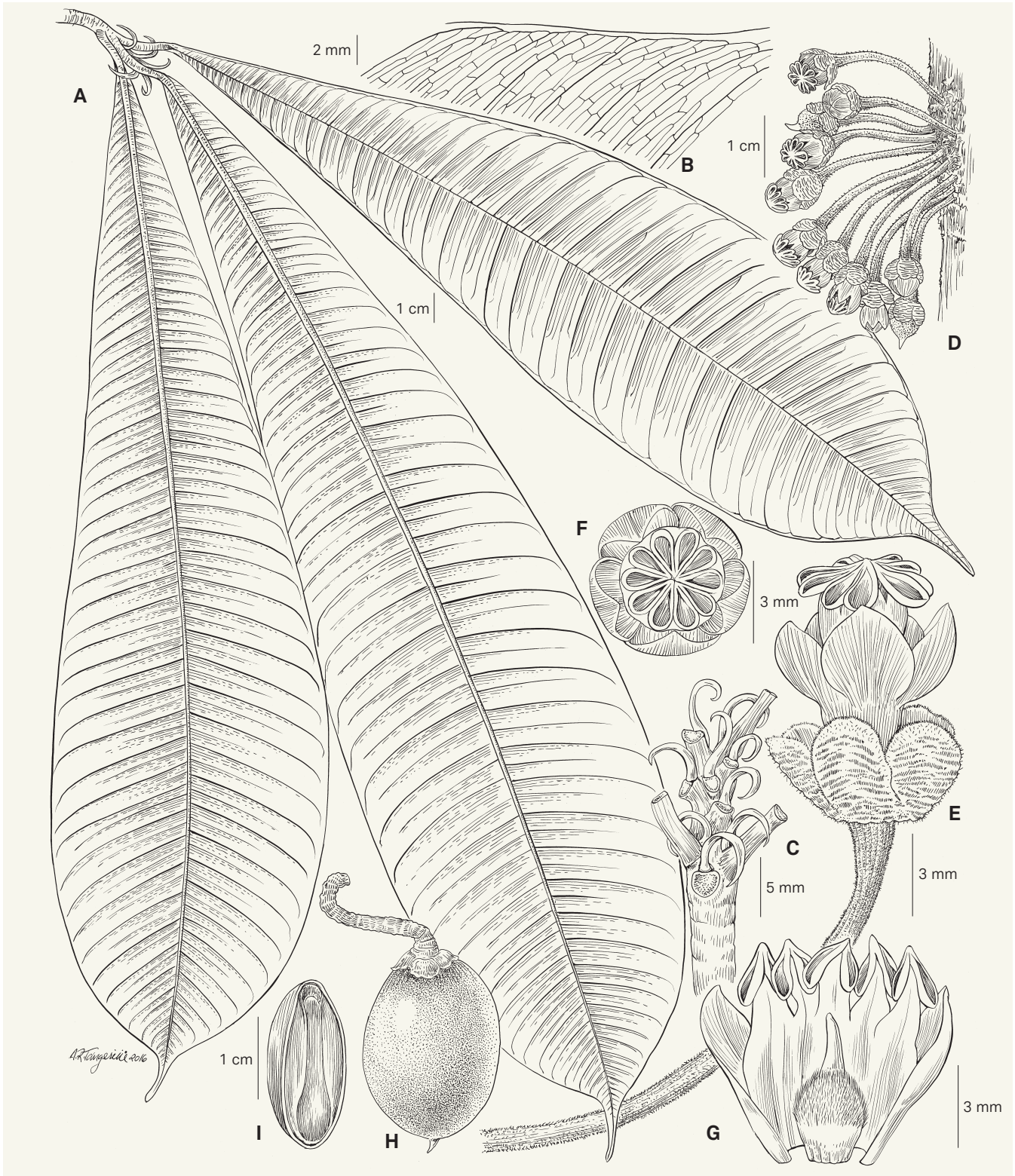

Fig. 7. – *Englerophytum sylverianum* Kenfack & L. Gaut. **A.** Leafy twig; **B.** Detail of the lower surface of the leaf, showing venation; **C.** Branch apex with leaves removed, showing stipules; **D.** Inflorescence; **E.** Flower; **F.** Flower viewed from above, showing the united stamens; **G.** Corolla longitudinally sectioned and opened, with ovary; **H.** Fruit; **I.** Seed, ventral view.
[**A-G:** *Kenfack 764*; **H-I:** *Sainge & Kenfack 2245*] [Drawing: Alice Tangerini]

Fig. 8. – Field photographs of *Englerophytum sylverianum* Kenfack & L. Gaut. **A.** Leaves; **B.** Fruits; **C.** Seeds; **D.** Inflorescence. [Photos: **A, C:** D. Kenfack **B:** X. van der Burgt, **D:** M. Sainge]

expected. The new species is preliminarily assessed here as "Vulnerable" [VU A2c+3c; B2ab(i,ii,iii,iv,v)] according to IUCN (2012).

Notes. – Several sterile collections from Gabon and Equatorial Guinea (Equatorial Guinea: Littoral Prov., Sud de Etembue, 1°15'N 9°26'E, 1.VIII.1998, ster., *Lejoly & van Asbroeck 46,* BRLU. Gabon: forêt des Mts de Cristal, XII.1959, ster., *Aubréville G 128,* P [P00099621]; Mts de Cristal, Mt Mbilan, 0°27'21"N 10°15'12"E, 2005, ster., *MBG transect 239,* BRLU) probably belong to *E. sylverianum*, which they match very well in vegetative characters. However, confirmation from fertile material would be needed.

The species is called "Mbolokonde" by the Bakweri people of southwest Cameroon *(McKey 1)*. The fruits are reportedly edible by sucking *(Manning 1720)* and have a very sweet flesh *(McKey 1)*. McKey also reports that "according to villagers, the population flowers and fruits gregariously at 3-5 years intervals".

Paratypi.– **Cameroon. Southwest Region:** Korup National Park, path from Science Camp to the plots, 5°0'42"N 8°48'23"E, 110 m, 18.X.2015, old fl., *Burgt 1891* (K, YA); Forested slope in the Bakossi Mountains 1-8 km NNE of Menyum village, 5°01'N 9°38'E, 1000 m, imm. fr., *Doumenge 455* (G; MO; WAG); Trail to Korup National Park, 2 km W of Ekondo Titi-Mundemba Road, 4 km N of bridge over Ilor River, c. 5°00'N 8°30'E, 100 m, 11.11.1985, ster., *Gentry & Thomas 52694* (K; MO); Banyong, between Awong and Banyu, c. 15 km W Mayemen, 5°00'N 9°10'E, 420 m, 3.V.1988, ster., *Gentry & Thomas 62499* (MO); Idenau, Onge River, 4°18'N 8°57'E, 100 m, 9.11.1993, ster., *Harris 3766* (K); Korup National Park, E of "Camp 1" along E-W path from "Camp 1" to temporary camp on the way to the Mana River foot bridge, 5°01'N 8°49'E, 100 m, 9.IV.1987, fl., *Manning 1720* (MO; WAG); Bomana village near Idenau, near base of Mt Cameroon, 5.VIII.1974, galled fl., *McKey 1* (P [2 sheets]); Korup National Park, 5°4'18"N 8°52'6"E, 28.II.2012, ster., *IRD Plot 263* (BRLU); Korup National Park, 5°4'58"N 8°52'25"E, 279 m, cross mountain trail, near Chimpanzee Camp, 8.VI.2011, fr., *Sainge 2708* (MO, YA); Korup National Park, 5°04'08"N 8°51'35"E, 50-ha plot, 11.V.2010, fr, *Sainge & Kenfack* 2245 (MO, YA); banks of river Moriba, northern Rumpi Hills, 4° 58'N, 8° 57'E, 297 m, fr, *Sainge 4040* (MO, YA); Bomana, Onge, 4°15'N 9°01'E, 200 m, 6.X.1993, ster., *Tchouto 704* (K); South Korup Reserve, 4°55'N 8°50'E, 50 m, 6-16.VII.1983, fr., *Thomas 2248* (MO; P [2 sheets]; WAG). **Equatorial Guinea:** Bioko Sud, Moaba-Moka Trail; Pt 139-138, 16.III.2007, fl., *Luke et al. 11971* (EA, K).

Englerophytum ferrugineum L. Gaut. & O. Lachenaud, **spec. nova** (Fig. 3, 9).

Typus: Gabon. Prov. Estuaire: Mts de Cristal, Route de Kinguélé, 18.I.1968, fl., *Hallé & Villiers 4506 bis* (holo-: P [P00099668]!).

Englerophytum ferrugineum L. Gaut. & O. Lachenaud differs from other members of the genus by the combination of large oblanceolate leaves (15.5-)23-70 × (4.2-)6-15 cm with dark ferruginous-brown underside, many-flowered inflorescences borne on the trunk, short flowering pedicels (3-6 mm) and stamens with filaments fused into a tube and connivent anthers. The leaf colour and indumentum resembles Zeyherella letestui Aubrév. & Pellegr., but that species has free stamen filaments, inflorescences with few flowers (10-20) on longer pedicels (8-10 mm) and borne on the leafy twigs (not on the trunk), and rather small leaves, not exceeding 17 × 5 cm.

A medium-sized tree, 20 m high and 40 cm DBH, with white latex; twigs 8 mm in diameter, densely appressed-pubescent with dark brown indumentum. *Stipules* paired, falciform with inrolled margins, not keeled, 8-15 mm long × 2-4 mm broad, appressed-pubescent with ferrugineous-brown indumentum outside, glabrous inside, persistent or caducous. *Leaves* alternate, simple, obovate to oblanceolate; petiole 20-30 mm long, 5-7 mm in diameter, longitudinally ribbed when dry, with a persistent dense appressed ferrugineous-brown pubescence; blade (15.5-)23-70 cm long, (4.2-)6-15 cm broad, broadest at 2/3 of its length, acute to obtuse at base, rounded to shortly acuminate at apex (acumen up to 1 cm), chartaceous and strongly discolorous; upper side green, glabrous except for very scattered 0.4-1.2 mm medifixed trichomes; lower side dark ferruginous-brown, with a dense immersed white indumentum mostly hidden by an additional dense external layer of adpressed ferruginous 0.3-1.0 mm trichomes; primary nerve in continuity of the petiole, canaliculate above, very prominent below, appressed brownish-pubescent; nervation brochidodromous, with 40-00 secondaries c. 10 mm apart, interspersed with parallel inter-secondaries and tertiaries, indistinctly raised above and shallowly raised below, forming an angle of 70-80° with the primary nerve, then finally curving and anastomosing 2 mm from the margin. *Inflorescences* on the trunk, fasciculate, with 100-200 very densely aggregated flowers; pedicels 3-6 mm long and 0.6 (proximal)-1.0 (distal) mm wide at anthesis, shortly appressed brown-pubescent. *Calyx* ferrugineous-brown, consisting of 5 sepals shortly united at base, the lobes imbricate, 3 mm long × 3.5 mm broad, obtuse at apex, very shortly appressed pubescent outside (the outer sepals entirely brown-pubescent, the inner ones with golden trichomes and a 0.3 mm glabrous area inside the ciliate margin), glabrous inside. *Corolla* (colour unknown) glabrous, spherical, 4-5 mm in diameter; tube cup-shaped, very short, 0.5-1 mm long; lobes 5, broadly ovate to semi-circular with rounded apex, imbricate, 4 × 4 mm. Stamens 5, opposite the corolla lobes; filaments connate into a cylindrical tube 2.3 mm long, attached to and in continuation of the corolla tube and concealing the ovary; anthers connivent and closing the corolla throat (possibly splitting at a later stage of flower development), broadly sagittate, 3 mm long × 1.5 mm broad, shortly apiculate, extrorse and dehiscing longitudinally. Ovary conical, 1.0 mm high and 1.0 mm diameter at base, with 5 locules and one ovule per locule, densely hirsute with stiff 1.9 mm long trichomes directed upwards; style glabrous, 2 mm long, 0.6 mm in diameter at base, tapering to 0.3 mm at the blunt apex. *Fruits* unknown.

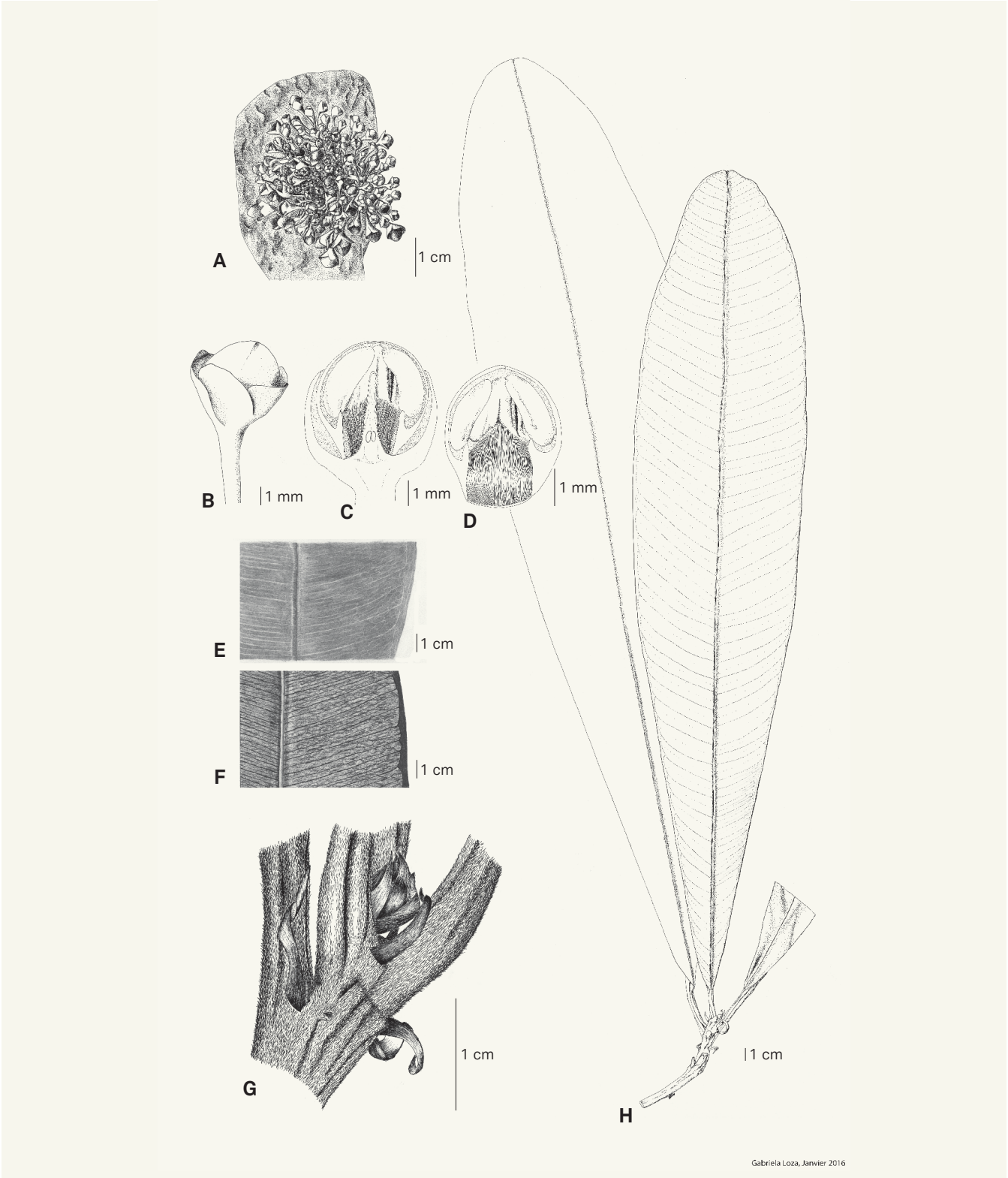

Fig. 9. – *Englerophytum ferrugineum* L. Gaut. & O. Lachenaud. **A.** Inflorescence; **B.** Flower bud; **C.** Longitudinal section of flower; **D.** Longitudinal section of corolla; **E.** Leaf blade detail, upper surface; **F.** Leaf blade detail, lower surface; **G.** Branch apex showing stipules; **H.** Extremity of twig with leaves. [Drawing: G. Loza]

Etymology. – The specific epthet refers to the ferruginous-brown colour of the lower leaf surface, twigs, pedicels and calyx.

Distribution and Ecology. – *Englerophytum ferrugineum* is endemic to the Crystal Mountains in north-western Gabon. It grows in primary forest on drained soils, or sometimes along rivers, 500-600 m in altitude.

Conservation status. – *Englerophytum ferrugineum* is known from three locations, representing an EOO and AOO of respectively 79 and 12 km^2, and all situated outside protected areas. The species has a narrow range and deforestation for mining and/or agriculture represents a potential threat. A decline in EOO, AOO, habitat extent and quality, number of subpopulations and number of individuals is expected. It is preliminarily assessed here as "Endangered" [EN B1ab(i,ii,iii,iv,v)+B2ab (i,ii,iii,iv,v)].

Notes. - The type collection of *E. ferrugineum (Hallé & Villiers 4506 bis)* only consists of inflorescences collected on the trunk of a medium-sized tree 20 m high, whose foliage was probably out of reach of the collectors. The description of the vegetative parts is based on the paratype *Hallé & Villiers 4506*, collected on the same day by the same collectors in the same locality, on a smaller tree 7 m high. The collectors were confident that the two collections were conspecific, as the label of N° 4506 says : "Fleurs voir 4506 bis". Since they were experienced botanists and the species has a very distinctive foliage, we have no reason to question this association.

Vegetatively, this species resembles *Zeyherella letestui* Aubrév. & Pellegr., which has the same dark brown indumentum on the lower side of the leaves. The latter, however, differs in the free stamen filaments, the inflorescences with few flowers (10-20) on longer pedicels (8-10 mm) and borne on the leafy twigs (not on the trunk), and the rather small leaves, not exceeding 17 × 5 cm. The leaves of *Englerophytum ferrugineum* are much larger, except sometimes at the very apex of the twigs.

A collection from southern Cameroon, *Letouzey 9221* (P), and another from Monts de Cristal in Gabon, *MBG Transect 1025* (BRLU), have leaves resembling this species, but not so densely dark brown pubescent beneath, and with non-appressed T-shaped hairs. They probably represent an undescribed related species ; unfortunately, both collections are sterile.

Paratypi. – **Gabon. Estuaire**. Mts de Cristal, route de Kinguélé, 18.I.1968, ster., *Hallé & Villiers 4506* (P [2 sheets]) ; Mts de Cristal, Mt Mbilan, 0°28'18"N 10°15'24"E, 2005, ster., *MBG Transect 443* (BRLU) ; Mts de Cristal, montagnes de Mvé Lakéné, 0°34'0"N 10°11'57"E, 2007, ster., *MBG Transect 762* (BRLU) ; Mts de Cristal, route en venant à Mela, s.d., ster., *Normand* 1 (P).

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References

Anderberg, A.A. & U. Swenson (2003). Evolutionary lineages in Sapotaceae (Ericales) : a cladistic analysis based on ndhF sequence data. *Int. J. Pl. Sci.* 164 : 763-773.

Aubréville, A. (1960). Note sur les Sapotacées de l'Afrique Equatoriale. *Notul. Syst. (Paris)* 16 : 223-279.

Aubréville, A. (1961). *Sapotacées. Fl. Gabon* 1.

Aubréville, A. (1964a). *Sapotacées. Fl. Cameroun* 2.

Aubréville, A. (1964b). Les Sapotacées ; taxonomie et phytogéographie. *Adansonia, Mém.* 1 : 1-157.

Bachman, S., J. Moat, A.W. Hill, J. de la Torre & B. Scott (2011). Supporting Red List Threat assessments with GeoCAT : geospatial conservation assessment tool. *Zookeys* 150 : 117-126.

Baehni, C. (1965). Mémoires sur les Sapotacées. III. Inventaire des genres. *Boissiera* 11.

Borg, D. (2013). *Morphology and Systematics of two African genera of Sapotaceae - Synsepalum (A. DC.) Daniell and Englerophytum K. Krause.* MSc thesis. The University of Edinburgh & Royal Botanic Gardens Edinburgh.

Evrard, C. & P. Bamps (2006). Louis Liben (1926-2006). *Syst. & Geogr. Pl.* 76 : 151-154.

Fabri, R. (2007). A supplement to the bibliography of Louis Liben (publications after 1986). *Syst. & Geogr. Pl.* 77 : 246.

Gautier, L. (1997). Sapotaceae. *In :* Lebrun, J.-P. & A. Stork (ed.). *Enum. Pl. Fl. Afrique Trop.* 4 : 25-49. Conservatoire et Jardin botaniques de la Ville de Genève.

IUCN (2012). *IUCN Red List Categories and Criteria Version 3.1.* 2nd ed. IUCN Species Survival Commission, IUCN, Gland & Cambridge.

Krause, K. (1914). Englerophytum, eine neue afrikanische Gattung der Sapotaceen. *Bot. Jahrb. Syst.* 50, Suppl. : 343-348.

Liben, L. (1989). La véritable identité des genres et espèces confondus sous le nom de «Bequaertiodendron magalismontanum» (Sond.) Heine & Hemsley (Sapotaceae) en Afrique centrale et occidentale. *Bull. Jard. Bot. Nat. Belg.* 59 : 151-169.

Pennington, T.D. (1991). *The genera of Sapotaceae*. Royal Botanic Gardens. Kew.

Swenson, U. & A.A. Anderberg (2005). Phylogeny, character evolution, and classification of Sapotaceae (Ericales). *Cladistics* 21 : 101-130.