

Gambeya korupensis (Sapotaceae: Chrysophylloideae), a new rain forest tree species from the Southwest Region in Cameroon

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Summary. *Gambeya korupensis* Ewango & Kenfack (Sapotaceae: Chrysophylloideae), a new rain forest tree species from the Southwest Region in Cameroon, is described and illustrated. A distribution map is provided. *G. korupensis* has the leaf blade below pubescent on the midribs and secondary nerves, flowers with a pedicel 0.5 – 1 mm long, and a fruit which is ovoid, attenuate at the apex, 5-ridged, verrucose between the ridges, and bright red at maturity. The conservation status of *G. korupensis* is assessed as Vulnerable according to IUCN criteria.

Key Words. *Chrysophyllum*, conservation, IUCN Vulnerable, Korup National Park.

Introduction

Tropical forests inspire botanists and ecologists because of their high diversity and the numerous species still to be described. Great interest has been aroused by the likely impact of climate change and development on their species diversity and more effort is needed to document poorly known areas of biodiversity conservation priority, before their species are lost. During the last two decades, a number of botanical inventories of joint international and national herbaria have been carried out in various parts of such forest areas in Cameroon. These have resulted in conservation checklists (e.g. Cable & Cheek 1998; Cheek *et al.* 2004; Harvey *et al.* 2004), the development of a national red list of threatened species (Onana & Cheek 2011; Onana 2013) and also in the description of many new species (e.g. Burgt & Newbery 2006; Burgt 2009; Kenfack *et al.* 2004).

Following long-term monitoring of permanent plots established in two different parts of Korup National Park (Kenfack *et al.* 2006; Newbery *et al.* 2013), the study of collections made by the authors revealed a species of *Gambeya* Pierre that could not be matched using the major treatments of Tropical African Sapotaceae (Aubréville 1961, 1964a; Heine 1963; Hemsley 1968) nor to any of the recently described species of Sapotaceae (Burgt & Newbery

2006; Burgt 2009; Ewango & Breteler 2001; Kenfack *et al.* 2004). The collections were also compared with authoritatively named material of all tropical African species of *Gambeya* in various herbaria (mostly still stored under *Chrysophyllum* L.; see below). The species was identified as new and provisionally named as *Tulestea* sp. nov. based on fruit structure by D. W. Thomas (Thomas *et al.* 2003) and later as *Chrysophyllum* sp. nov. (Kenfack *et al.* 2006) following examination of the flowers. The leaves, flowers and fruits show distinctive characters proving this to be an undescribed species of *Gambeya*, resembling but different from *Gambeya gigantea* (A. Chev.) Aubrév. & Pellegr.

The Sapotaceae are known as a family in which genera are difficult to define. Engler's 1904 treatment of Sapotaceae united the African genera *Gambeya* and *Donella* Pierre ex Baill. within the genus *Chrysophyllum*, up to then a strictly American genus. Based on floral characters, Aubréville (1964a, b) preferred transferring the African species of *Chrysophyllum* back to *Gambeya* and *Donella* as defined in the traditional circumscription of Pierre (1891). Pennington (1991) supported Engler's classification by preferring a broadly circumscribed *Chrysophyllum*, based on morphological information, including data from cytology, pollen, chemistry and field work. However, Swenson & Anderberg (2005) present evidence that *Chrysophyllum*

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is polyphyletic according to Pennington's circumscription. The African species in the genus *Chrysophyllum* will have to be transferred back to *Gambeya* and *Donella* according to Aubréville (B. A. Mackinder, pers. comm.).

Materials and methods

The herbaria K, MO and WAG were visited by the first author and all specimens found under *Gambeya* and *Chrysophyllum* were studied, as part of his long term effort to study Central African Sapotaceae. The majority of herbarium specimens were examined first hand but some specimens from other institutes were diagnosed using images. Most characters were studied using dry material from herbarium specimens. Measurements on flowers and fruits were made on rehydrated material or on spirit-preserved material, which was dissected and measured under a dissecting microscope. Taxonomic characters follow Pennington (1991); the terminology used in the description follows Beentje (2010). The categories and criteria of IUCN (2012) were used to assess the conservation status of the new species; this assessment has not yet been reviewed through the IUCN Species Information Service.

Taxonomic treatment

Gambeya korupensis Ewango & Kenfack sp. nov. Type: Cameroon, Southwest Region, Korup National Park, NW plot near P transect, X. M. van der Burgt 763 (holotype K000023243; isotypes SCA, WAG, YA).

<http://www.ipni.org/urn:lsid:ipni.org:names:604717142>

Tulestea sp. nov. (as "*Testulea* sp. nov."; Thomas *et al.* 2003: 218).

Chrysophyllum sp. nov. (Kenfack *et al.* 2006: 2059).

Tree 6 – 15 m tall, trunk to 18 cm in diam. at 1.3 m; cylindrical or irregular in shape. Bark smooth, dark brown with lighter brown flake scars. Latex white. *Twigs* with medifixed brown hairs. *Petiole* 1 – 4.5 cm long, with sparse medifixed hairs. *Leaves* elliptic, 9 – 37 × 3 – 14 cm; leaf base cuneate to slightly attenuate; apex acute, acumen 1 – 1.8 cm long; secondary nerves 11 – 20 pairs, joining to form a submarginal nerve 1 – 2 mm from the margin; tertiary nerves parallel, perpendicular to secondary nerves; leaf blade with sparse and inconspicuous translucent dots (best observed on juvenile leaves); young leaves densely pubescent on both surfaces, mature leaves glabrous above, with persistent medifixed brown hairs on midrib and secondary nerves below. *Inflorescence* a fascicle, sessile, with (1 –) 2 – 4 flowers; placed on and just below the leafy portion of the stems. *Flowers*: buds light yellowish brown, up to 5 mm long; pedicel 0.5 – 1 mm long, densely pubescent; calyx imbricate, sepals 5, lanceolate, 4.5 × 1.5 – 2 mm, densely brown hairy outside; corolla c. 3.5 mm long, 5 lobes, ovoid, 0.8 × 0.7 mm, glabrous; stamens 5, filaments 5 mm long, inserted at base of corolla, anthers extrorse, c. 1 mm long; ovary 5-merous, hairy, style 1 mm long, stigma slightly 5-lobed at apex. *Fruit* densely pubescent when young, glabrescent and bright red when ripe, ovoid, 5.5 – 7 × 5 – 6 × 5 – 6 cm, apex attenuate, mesocarp 10 mm thick, with 5 prominent longitudinal ridges, surface between ridges verrucose, splitting into 5 valves when ripe. *Seed* ellipsoid, 22 – 25 × 10 – 13 × 10 mm, brown, glossy, seed scar oblong, narrower in the middle, 28 – 30 × 5 – 8 mm, extending to the apex and base of the seed. Figs 1, 2.

RECOGNITION. *Gambeya korupensis* resembles *G. gigantea*, but differs from it in the leaf having persistent hairs



Fig. 1. *Gambeya korupensis*. A ripe fruits and leaves; B fruiting branch, showing lower surface of the leaves and the nearly ripe fruit. PHOTOS: A DUNCAN THOMAS; B MOSES SAINGE.

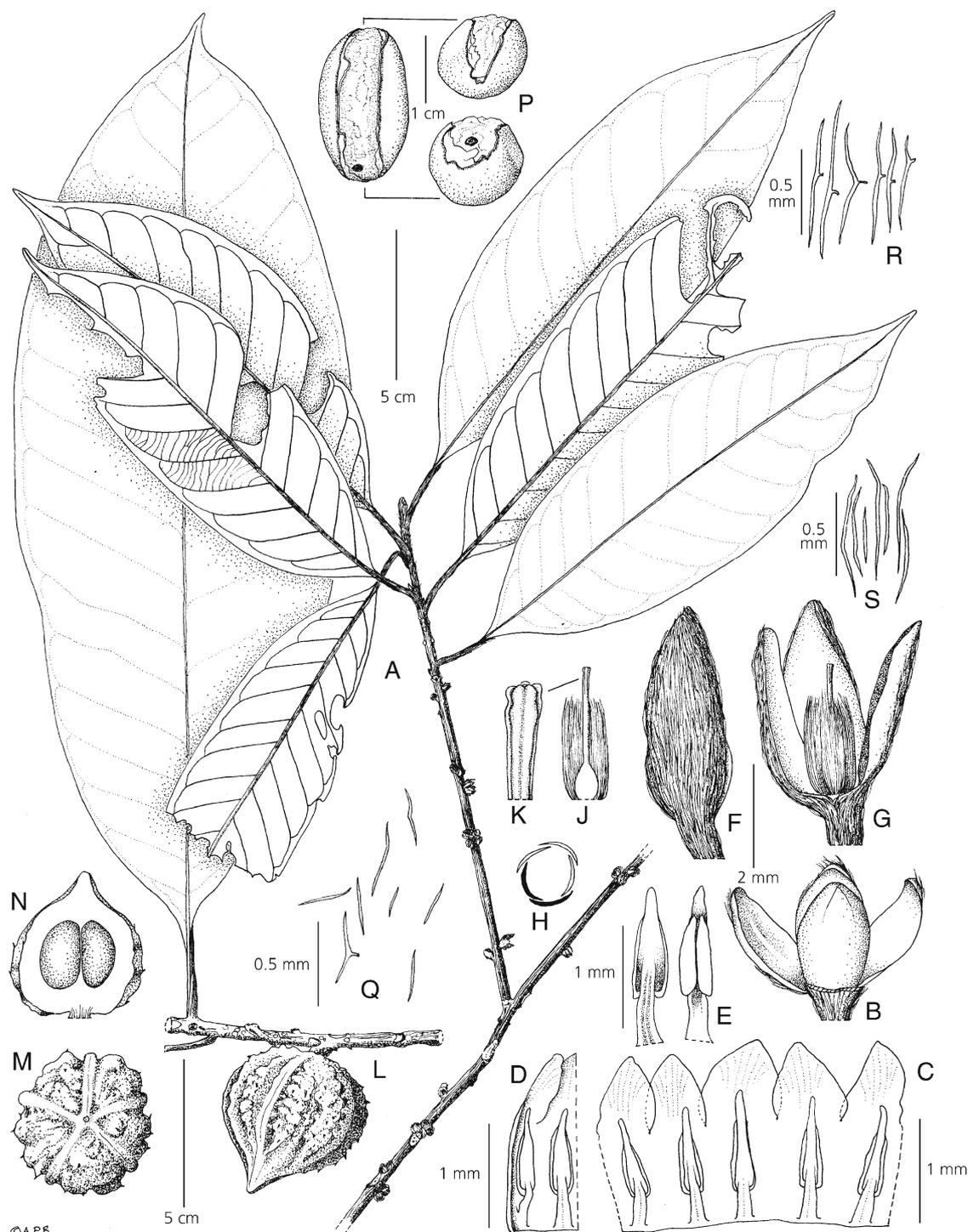


Fig. 2. *Gambeya korupensis*. A habit, flowering shoots with leaves; B flower bud with two sepals removed to display corolla; C corolla opened flat; D part of corolla; E stamen, adaxial (left) and abaxial (right) views; F lateral view of flower at later stage showing elongated sepals; G lateral view of flower with two sepals removed, showing ovary and style; H diagram showing aestivation of sepals; shaded sepals are those removed in G; J gynoecium, with hairs partly removed to show position of ovary; K enlargement of lobed stigma; L fruiting shoot with leaf; M fruit, apical view; N fruit, vertical cross-section; O fruit, lateral view; P seed, three views; Q hairs on leaf abaxial surface, in situ; R selection of hairs from petiole, viewed from side; S selection of hairs from sepal, viewed from above. A – K, Q – S from *Burgt* 763 L – P from *Burgt* 950. DRAWN BY ANDREW P. BROWN.

only on the midrib and secondary nerves below (in *G. gigantea* the leaf is densely pubescent below); in the inflorescence being a sessile fascicle (in *G. gigantea* the inflorescence is a pseudo-raceme, to 3 cm long), in having a flowering pedicel 0.5 – 1 mm long (3 – 4 mm long in *G. gigantea*), and in the ovoid fruit, 5-ridged and verrucose between ridges, with apex attenuate, (*G. gigantea* has a globular, smooth fruit, with apex depressed). Table 1 lists these and some other differences between the two species.

DISTRIBUTION. *Gambeya korupensis* is endemic to the Southwest Region in Cameroon, where it has been found in Korup National Park and the Rumpi Hills (Map 1). All collections seen by the first author were collected in and near the southern half of Korup National Park. The species was observed by one of the co-authors, M. Sainge, in four out of the six 25 ha plots that TroPEG sampled in the Rumpi Hills.

SPECIMENS EXAMINED. CAMEROON. Southwest Region, Korup National Park, NW plot near P transect, subplot 46WN, 5°01'N, 8°47'E, c. 100 m, fl., 9 May 2005, *Burgt* 763 (holotype; K, isotypes SCA, WAG, YA); same loc., subplot 44VN, 5°01'N, 8°47'E, 100 m, fr., 27 May 2007, *Burgt* 950 (K, MO, WAG, YA); Korup National Park, camp near Ekundu Kundu to top of Mt Juahan, 5°09'N, 8°52'E, c. 200 m, fl. & fr., 27 April 1996, *Cheek* 8219 (BR, G, K, MO, P, PRE, WAG, YA); Korup National Park, Chimpanzee Camp, fl., 10 May 2010, *Sainge, Kenfack & Mambo* 2214 (MO); Korup National Park, Mt Yuhan, 5°09'N, 8°52'E, 538 m, fr., 7 June 2011, *Sainge* 2673 (MO, YA); Korup National Park, rocky river banks of Mana R., 4°55'N, 8°50'E, 50 m, fr., 6 – 16 July 1983, *Thomas* 2267 (MO); near Korup National Park, between Bulu and Ekumbako, 4°56'N, 8°52'E, fr., 1 June 1984, *Thomas* 3498 (MO, K).

HABITAT. *Gambeya korupensis* occurs in the understory of lowland rain forest on well-drained sandy soil with crystalline rocks below and sometimes exposed on the surface; at 0 – 500 m alt.



Map 1. Distribution map of *Gambeya korupensis*. Dots represent the cited collections; the open circle represents an observation.

CONSERVATION STATUS. *Gambeya korupensis* is here assessed as “Vulnerable B1ab(i,iii,v)” according to IUCN (2012) criteria. The estimated Extent of Occurrence (EOO) is 480 km² (calculated using Geocat 2015), which indicates Endangered; but the number of locations is six and in most locations the species is relatively well protected, so the species is assessed as Vulnerable. Several facts suggest continuing decline. Many people who live in the surroundings of the park do not agree with the prohibition of farming and hunting inside the park. The ban on farming and hunting within Korup National Park is currently enforced only in parts of the park. The populations of *G. korupensis* in the park are therefore not completely protected against disturbance. The collections and observations situated outside the park were made in areas subject to slash and burn agriculture and conversion to oil palm plantations.

The type collection was made in the “P transect plots” (Newbery *et al.* 2013), located in Korup National Park. Trees between 10 and 50 cm dbh were registered in 56 randomly located subplots of 50 m × 50 m within the P transect plots (area of

Table 1. Morphological differences between *Gambeya korupensis* and *G. gigantea*.

Character	<i>Gambeya korupensis</i>	<i>Gambeya gigantea</i>
Habit	Understory tree, 6 – 15 m tall, trunk to 18 cm in diam.	Canopy tree, 30 – 40 m tall, trunk to 60 cm in diam.
Leaf blade	Few inconspicuous translucent dots	Many conspicuous translucent dots
Leaf blade below	Pubescent only on midrib and secondary nerves	Densely pubescent
Leaf venation	Secondary nerves joining to form a submarginal nerve	Secondary nerves fading near the leaf edge
Inflorescence	Fascicle, sessile	Pseudo-raceme, to 3 cm long
Flower	Pedicel 0.5 – 1 mm long	Pedicel 3 – 4 mm long
Fruit	Ovoid, apex attenuate, 5-ridged, verrucose between the ridges	Globular, apex depressed, smooth
Seed scar	Extending to the apex and base of the seed	Not extending to the apex and base of the seed

each subplot 0.25 ha; total area of all 56 subplots 14 ha). Of the 5755 registered trees between 10 and 50 cm dbh, 12 trees (in 9 subplots) were identified as *Gambeya korupensis*. In the 50 ha Korup Forest Dynamics Plot in Korup National Park, *G. korupensis* is known by a total of 160 trees of 1 – 20 cm dbh, eight of which are 10 – 20 cm dbh (Thomas *et al.* 2003; Kenfack *et al.* 2006).

The forest plot distribution data from Thomas *et al.* (2003), Kenfack *et al.* (2006) and Newbery *et al.* (2013) yield a population estimate for the new species of about 30,000 individuals of reproductive size in the c. 150 km² area within Korup National Park where the species has been collected; assuming that the trees reach reproductive size at 5 cm dbh, a reasonable assumption based on our field observations.

PHENOLOGY. Collected in flower from April to June. Fruit maturation is observed from early June. Some individuals may bear flowers and young fruits at the same time.

NOTES. In the KFDP plot in Korup National Park, the species shows a strongly clumped distribution and seems to be regenerating well based on the size-class distribution of the 160 individuals \geq 1 cm dbh in this plot (Thomas *et al.* 2003).

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