

## Two new taxa in *Magnistipula* (Chrysobalanaceae) from Korup National Park, Cameroon

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**Background** – In the course of the identification work of trees in the permanent plots around the “P transect” in the southern part of Korup National Park, Cameroon, two new taxa in *Magnistipula* Engl. were discovered.

**Key results** – *Magnistipula multinervia* Burgt and *Magnistipula butayei* De Wild. subsp. *korupensis* Burgt (Chrysobalanaceae) are described and illustrated. *M. multinervia* is the thirteenth described species of *Magnistipula*. It is a rainforest tree to 41 m high with relatively small leaves (usually 7–10 cm long), and with stipules to 12 × 4 mm, with 10–20 parallel, longitudinal veins. *M. butayei* subsp. *korupensis* is the eleventh described subspecies of *M. butayei*. It is a rainforest tree to c. 30 m high with relatively elongated flowers and elongated persistent stipules.

**Conservation status** – The two new taxa are only known from the southern part of Korup National Park in Cameroon. Both taxa are very rare; a survey done of 8936 trees over 10 cm stem diameter resulted in respectively four and fourteen trees registered of the two taxa. The numbers of known living trees presently are four and fifteen. The IUCN conservation status of both taxa is assessed as “Critically Endangered” CR D.

**Key words** – *butayei*, Cameroon, Chrysobalanaceae, IUCN conservation status, Korup, *Magnistipula*.

### INTRODUCTION

Korup National Park is situated in the South-West Province of Cameroon near the Atlantic Ocean and the border with Nigeria, and is completely covered by a mosaic of diverse primary rainforests. Korup has an exceptionally high biological diversity. Several plant species newly discovered in Korup have been published recently (e.g. van der Burgt 2009); more will be published in the future (Kenfack et al. 2006, van der Burgt & Eyakwe 2010).

A part of the southern section of the Korup forest is characterized by stands of large trees of the subfamily Caesalpinioideae, forming distinct patches, where the majority of the trees with a diameter  $\geq 50$  cm belong to species from this subfamily (Newbery & van der Burgt, unpubl. data). The Caesalpinioideae-rich forest also contains many tree species from other families, although usually at lower densities compared to the surrounding forest.

The Caesalpinioideae-rich forest was selected in 1990 for a long-term study of the ecology and dynamics of several locally dominant Caesalpinioideae tree species (Newbery et al. 1998). Two permanent plots were set up, near the “P transect”. In the plots, all trees  $\geq 50$  cm diameter were regis-

tered and identified; smaller trees were registered in subplots located at random inside the plots.

In the course of the identification work of trees in these plots, several undescribed tree species have been found. Most of these new species are in the Caesalpinioideae subfamily (van der Burgt & Eyakwe 2010); two are in the Sapotaceae (van der Burgt 2009). Two new taxa in *Magnistipula* Engl. (Chrysobalanaceae) were also discovered, and are described in the present paper.

Both new taxa are trees from primary lowland rainforest. Trees of both taxa hardly drop anything on the ground when flowering, which makes them difficult to find in flower. One of the two new taxa was particularly difficult to collect in flower, because only four trees were found, all of which are around 40 m high. After numerous visits to these four trees over a period of several years, to check if they were flowering or fruiting, they were found in flower and a collection could be made using alpine climbing equipment.

The genus *Magnistipula* was created in 1905 (Engler 1905), and revised by White (1976) and by Prance & White (1988). Presently the genus consists of thirteen species including the new species presented here (Prance & Sothers 2003, this study). The genus is distributed in tropical Africa

(eleven species) and Madagascar (two endemic species). The centre of distribution of the genus is in Cameroon and in Gabon. Of the thirteen species of *Magnistipula*, eight occur in Cameroon and eight in Gabon; together these two countries have ten species (Lebrun & Stork 2006).

One of the species, *M. butayei* De Wild., presently consists of eleven subspecies including the new subspecies presented here (Prance & Sothers 2003, Pollard et al. 2004, this study).

#### CHARACTERISTICS OF THE NEW TAXA

Both new taxa presented here key out as *Magnistipula butayei* in Prance and Sothers (2003). The first of the new taxa, *M. multinervia* Burgt, keys out as *M. butayei* De Wild. subsp. *sargosii* (Pellegr.) F.White (Pellegrin 1920, Letouzey & White 1978), but is in fact so different from this taxon that it is here described as a new species of *Magnistipula* and not as a new subspecies of *M. butayei*. Some differences are listed in table 1.

The stipules of *M. multinervia* are very different from those of *M. butayei*. *M. multinervia* has stipules to 12 mm long, base 1.5–2 mm wide, margin dentate, and with 10–20 parallel, longitudinal veins. The pair of stipules is in fact derived from a bud scale and has an identical venation. All subspecies of *M. butayei* have stipules looking like small leaves (when large enough to see this character), 3–28 mm long, with a narrow, petiolate base, an entire margin, a single primary vein and pinnate secondary veins.

The leaves of *M. multinervia* are much more hairy than those of the eleven subspecies of *M. butayei*. The hairs on the upper side of the leaf are caducous in these taxa, but leave behind small gland-like scars. Therefore the number of hairs that was present on young leaves can be precisely counted in mature leaves. The upper side of the leaves of *M. multi-*

*nervia* have 30–40 hair scars per mm<sup>2</sup>; the upper side of the leaves of the subspecies of *M. butayei* have 0–15 hair scars per mm<sup>2</sup>.

The second new taxon, *Magnistipula butayei* De Wild. subsp. *korupensis* Burgt keys out as *M. butayei* De Wild. subsp. *ituriensis* Champl. (Prance & Sothers 2003, Champluvier 1990), but there are some differences between the two subspecies. These differences are small but they are comparable to the differences between the other subspecies of *M. butayei*. Some differences are listed in table 2. The geographic distance between the two subspecies is considerable; they are separated by an interval of c. 2300 km and an altitudinal distance of c. 650 m.

#### TREATMENTS OF THE NEW TAXA

##### *Magnistipula multinervia* Burgt, sp. nov.

*Magnistipula butayei* De Wild. subsp. *sargosii* (Pellegr.) F.White affinis sed foliis (5–)7–10(–14) cm (nec 10–25 cm) longis, folia basi cuneata (nec cordata), stipulis oblongis vel ovatis 10–20 venas parallelas habentibus (nec stipulis anguste lanceolatis vel linearibus unicam venam habentibus), pedicellis 2–5 mm (nec 2 mm) longis, paginis lateribus receptaculo c. 4 mm (nec c. 3 mm) longis differt. – Type: Cameroon, Southwest Province, Korup National Park, NW plot near P transect, subplot 49QN, tree number NW1316, 5°01'N 8°47'E, alt c. 100 m, 22 Feb. 2008, *van der Burgt et al.* 1127, fl (holo-: K; iso-: B, BR, COI, G, MA, MO, P, SCA, WAG, YA).

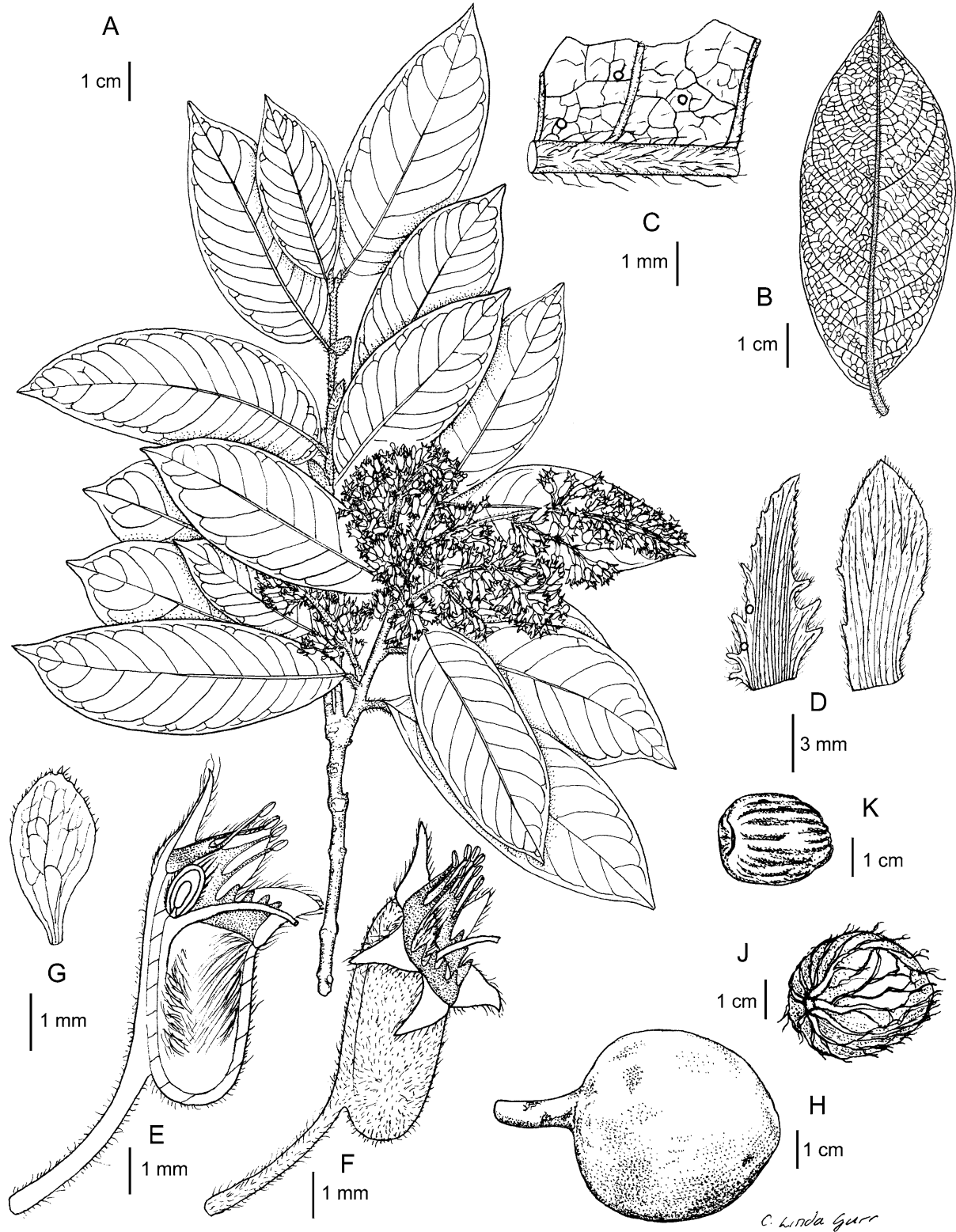
Tree, to 41 m high, dbh to 57 cm; bole cylindrical, to c. 25 m long; no buttresses. Bark brown, with rough, brittle flakes. Stems hairy when young, hairs to 1 mm long; older stems glabrescent, with light grey lenticels. Bud scales brown, up to c. 6, caducous; proximal scale c. 2 mm long and 4 mm wide, distal scales to 12 mm long and 10 mm wide; apex emargin-

Table 1 – Some differences between *Magnistipula butayei* and *M. multinervia*.

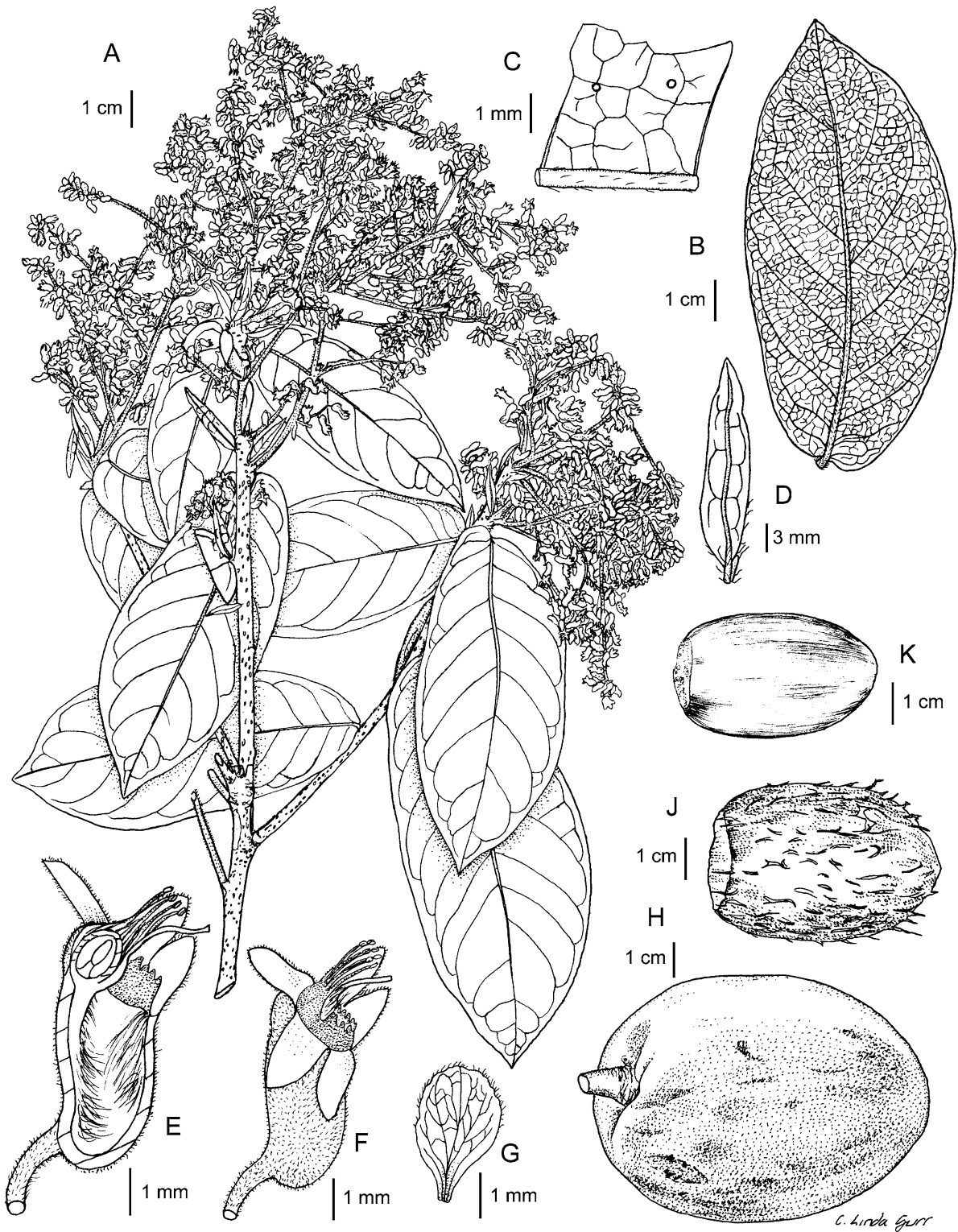
Character	<i>M. butayei</i>	<i>M. multinervia</i>
Stipules	a single primary vein (when large enough to see this)	10–20 parallel, longitudinal veins
Leaf base	cordate to cuneate. In all subspecies some or all leaves have a cordate base.	cuneate
Distance between secondary veins in central part of leaves	c. (6–)8–15 mm	5–7 mm
Hair scars on upper side of the leaves	0–15 hair scars per mm <sup>2</sup>	30–40 hair scars per mm <sup>2</sup>

Table 2 – Some differences between *Magnistipula butayei* subsp. *ituriensis* and *M. butayei* subsp. *korupensis*.

Character	<i>M. butayei</i> subsp. <i>ituriensis</i>	<i>M. butayei</i> subsp. <i>korupensis</i>
Stipules	to 20 mm long	to 28 mm long
Leaf size	to 15.5 × 5.5 cm	to 15 × 7 cm
Distance between secondary veins in central part of leaves	to 8 mm	to 15 mm
Receptacle	1.5 × as long as wide	2 × as long as wide
Receptacle lateral side	c. 3 mm long	c. 4 mm long

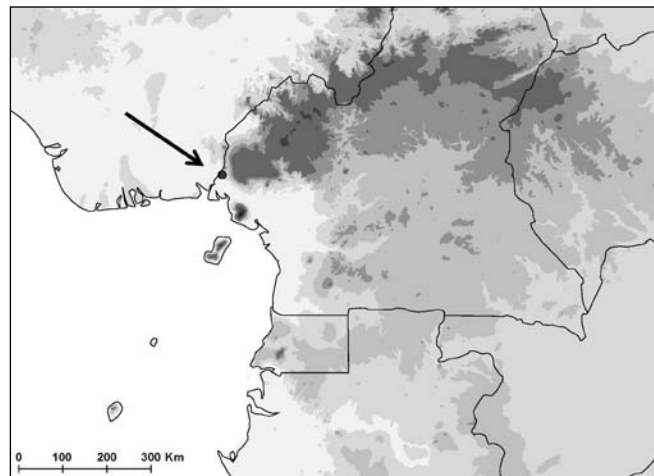


**Figure 1** – *Magnistipula multinervia*: A, twig with inflorescence; B, leaf lower surface; C, detail of leaf lower surface with three glands; D, two stipules, lower surface; E, flower dissected lengthwise; F, flower; G, petal; H, fruit; J, endocarp; K, seed (A–G from van der Burgt et al. 1127; H–K from van der Burgt et al. 934; H drawn from photo of fresh material; J & K drawn from dried material). Drawing by Linda Gurr.



**Figure 2** – *Magnistipula butayei* subsp. *korupensis*: A, twig with inflorescences; B, leaf lower surface; C, detail of leaf lower surface with two glands; D, stipule lower surface; E, flower dissected lengthwise; F, flower; G, petal; H, fruit; J, endocarp; K, seed (A–G from *van der Burgt et al.* 659 (K); H–K from *van der Burgt et al.* 953 (K); H drawn from photo of fresh material; J & K drawn from material on spirit). Drawing by Linda Gurr.

ate, margin slightly dentate, venation parallel, progressively transforming to a pair of stipules; outer surface and margins densely hairy with hairs to 0.8 mm long, inner surface with hairs to 0.1 mm long. Stipules in pairs, free, caducous, light green; oblong to ovate, to 12 × 4 mm, base 1.5–2 mm wide, apex acute, margin dentate, 10–20 parallel, longitudinal veins, the outer veins ending at the teeth on the margin; 0–2 sessile glands of 0.25 mm diameter at the edge near the base; outer surface, margins and base of inner surface densely hairy with hairs to 1 mm long, inner surface with hairs to 0.1 mm long. Stipules on lower part of the shoot c. rectangular; stipules on upper part of the shoot c. triangular. Leaves alternate, elliptic, base cuneate to obtuse, margin entire, apex acuminate; (5–)7–10(–14) × (2–)2.5–4(–6) cm; petiole 4–9 mm, hairy; both sides medium glossy when fresh, dull when dry; 8–13 pairs of secondary veins, usually 5–7 mm apart in the central part of the leaf; hairs simple, to 1.5 mm long, upper surface of young leaves with many erect hairs, becoming glabrous, the hairs leaving behind c. 30–40 small gland-like scars per mm<sup>2</sup>; lower surface with hairs mostly on the veins, persistent; midvein impressed and hairy above, prominent and hairy below; glands 24–32 per leaf, evenly distributed across the leaf blade, sessile, 0.25 mm diameter, visible on the lower surface. Inflorescence a panicle, terminal or axillary, (3–)8–12(–18) cm long, 2–6 cm wide; axis light green, densely hairy with ferruginous hairs to c. 1 mm long; bud scales resembling those of the stems; lateral branches 0.1–3(–6) cm long, with basal bract 7–10 × 2–4 mm resembling a stipule, sometimes a small leaf and a pair of stipules at base of a lateral branch. Flower pedicel free part 2–5 mm long, part fused with receptacle 4 mm long, densely hairy, hairs to 0.2 mm long, sparse hairs to 0.8 mm long; c. 2 basal bracts 2–4 × 0.5–1 mm, persistent, outside and margin densely hairy, short hairs inside; receptacle light green, densely hairy, hairs simple, to 0.2 mm long, sparse hairs to 0.8 mm long, cylindrical, 2 mm diameter, c. 4.5 mm long on lateral sides, dorsal side c. 5 mm long, ventral side c. 4 mm long, base strongly gibbous, apex asymmetric, inside a whorl of simple retrorse hairs to 1.5 mm long. Sepals 5, triangular, hairy outside, short hairs inside, c. 2.5 × 1.5 mm, slightly unequal in size. Petals 5, probably white, alternate to sepals, c. 3 × 2 mm. Stamens 7, placed on dorsal side, filaments glabrous, c. 2.5 mm long, lower 1.2 mm fused, fused part c. 3 mm wide at base and 1.2 mm at apex; anthers brown, elliptic, c. 0.3 mm long. Staminodes c. 9, placed on ventral side, 1.2 mm high, lower  $\frac{1}{3}$  to  $\frac{2}{3}$  part fused. Ovary placed at mouth of receptacle, c. 1.5 × 1.5 mm, densely covered in simple hairs 0.2 mm long, some long hairs at apex; ovules 2 in a single locule. Style 3 mm long, attached to base of ovary, glabrous, stigma punctiform. Fruit epicarp light grey-green, dull, densely hairy with hairs c. 0.2 mm long; young fruits oblong, mature fruits almost globular; fresh fruit to 6 × 5 × 5 cm, dried fruit to 4.5 × 3.5 × 3.5 cm; mesocarp a little scented, c. 1 cm thick, whitish outside to light orange-pink inside; fresh endocarp to 4 × 3.5 × 3.5 cm, dried endocarp to 3.5 × 3 × 3 cm, seed coat thin, surrounded by c. 9 veins departing from the base and forming a network around the seed coat; dense layer of irritating hairs to 4 mm long between the seed coat and the seed. Seed globular, reddish brown, cream inside, striped longitudinally, fresh seed



**Figure 3** – Distribution map of *Magnistipula multinervia* and *M. butayei* subsp. *korupensis*. Both taxa are represented by the single dot.

to 3 × 2.5 × 2.5 cm, dried seed to 2.5 × 2 × 2 cm, irregular in shape. Figs 1, 4A & B.

**Habitat** – Primary rainforest rich in tree species from the Legume subfamily Caesalpinioideae, on well-drained sandy soil; 100 m a.s.l. The rainfall at the Bulu weather station, c. 12 km southeast of the type locality, ranged from 4023 to 6146 mm/year, and averaged 5040 mm/year (1984–2008). The climate is strongly seasonal with one distinct dry season from December to February (average monthly rainfall less than 100 mm).

**Distribution** – Known only from the “NW plot” near the P transect in the southern part of Korup National Park. Fig. 3.

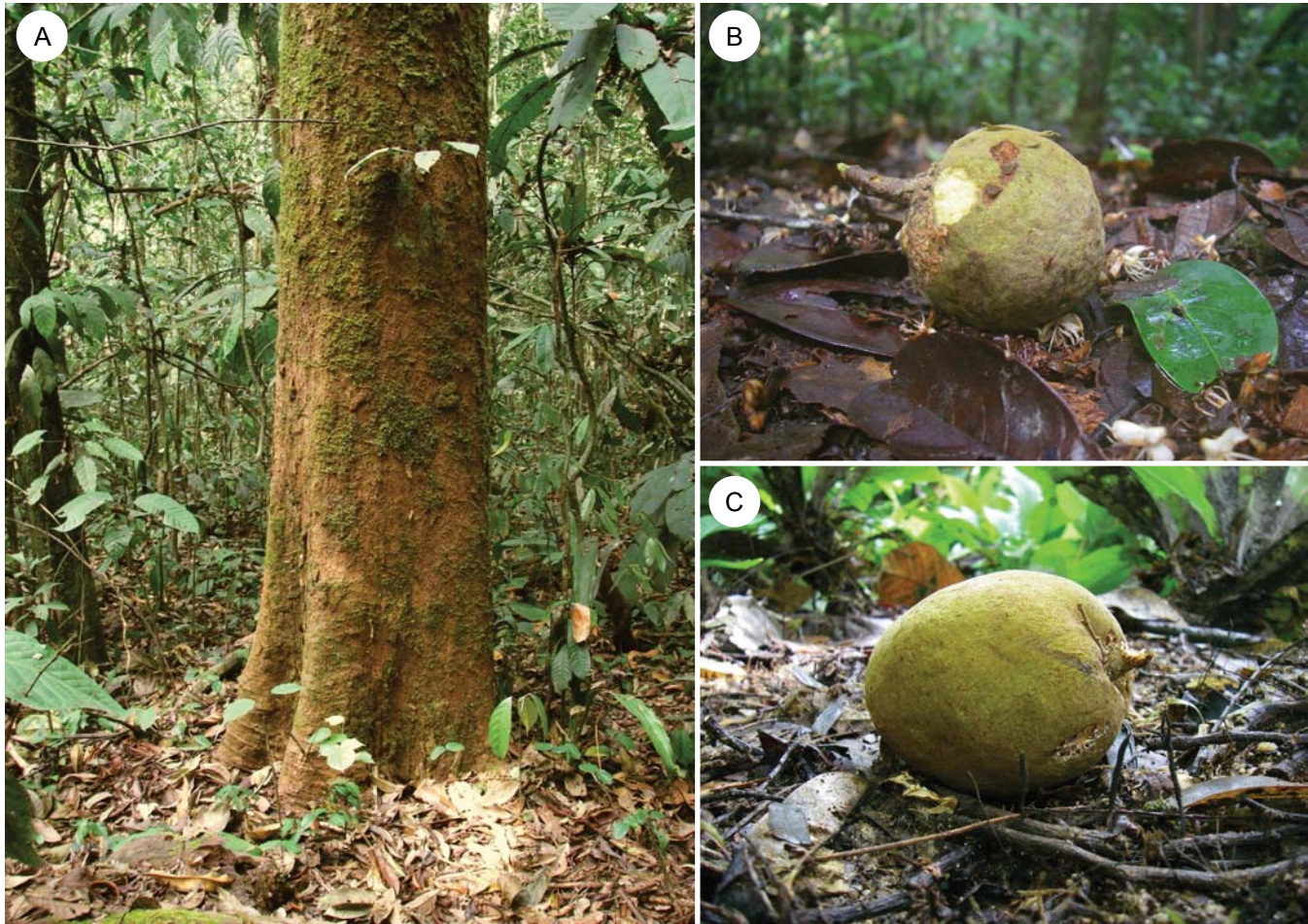
**Conservation Status** – Of the 8936 identified trees > 10 cm in diameter in the “P transect plots”, four trees were identified as *M. multinervia* (See the section “ecological notes on the new taxa”). All four trees were mature and were found in the “NW plot”, at distances of 51 to 599 m to each other. The species is assessed here as “Critically Endangered, CR D” (IUCN 2001), because the number of mature trees known is less than fifty.

**Etymology** – *Magnistipula multinervia* is named after the venation of the stipules, which may have up to 20 parallel, longitudinal veins.

**Other specimens examined** – **Cameroon**: Southwest Province, Korup National Park, NW plot near P transect, subplot 41WN, tree number NW0543, 5°01'N 8°47'E, alt c. 100 m, 10 Mar. 2007, *van der Burgt et al.* 917, young fr (BR, G, K, MO, P, SCA, WAG, YA); same tree, 23 May 2007, *van der Burgt et al.* 934, fr (BR, K, MO, WAG, YA).

***Magnistipula butayei* De Wild. subsp. *korupensis* Burgt, subsp. nov.**

*Magnistipula butayei* De Wild. subsp. *ituriensis* Champl. affinis sed stipulis usque 28 mm (nec usque 20 mm) longis, venis secundariis foliorum usque 15 mm (nec usque 8 mm) inter se separatis, receptaculo 2-vel (nec 1.5-vel) longiori quam latiori, paginis lateribus receptaculo c. 4 mm (nec c. 3 mm) longis differt. – Type: Cameroon, Southwest Prov-



**Figure 4** – A, the *Magnistipula multinervia* tree from which the type was collected, the trunk is 51.7 cm in diameter at a height of 1.3 m; B, fruit of *Magnistipula multinervia*; C, fruit of *Magnistipula butayei* subsp. *korupensis*. Photographs taken by the author.

ince, Korup National Park, near P transect, near P plot, subplot 17N, 5°00'N 8°48'E, alt c. 100 m, 3 Mar. 2004, *van der Burgt et al.* 659, fl (holo-: K; iso-: B, BR, COI, G, MA, MO, P, SCA, WAG, YA).

**Tree**, to c. 30 m high, dbh to 74 cm; bole cylindrical or slightly fluted, to c. 15 m long; buttresses to 3 m high and extending to 0.5 m from the stem. Bark brown, with rough, brittle flakes. **Stems** hairy when young, hairs to 1.5 mm long; older stems glabrescent, with light grey lenticels. **Bud scales** of stems not seen but probably resembling those of the inflorescence. **Stipules** in pairs, free, persistent; lanceolate, to 28 × 6 mm, base shortly petiolate, apex acute, margin entire but sometimes with a single lobe to 3 mm long, placed on the proximal side at the base; venation leaf-like, a single primary vein running nearer to the distal side, up to 5 glands evenly distributed across the stipule blade, sessile, 0.15 mm diameter; outer surface glabrescent, margins and veins of inner surface hairy with hairs to 1 mm long. **Leaves** alternate, elliptic to slightly obovate, base (sub-)cordate, margin entire, apex acuminate; 8–15 × 3–7 cm, juvenile leaves to 25 × 9 cm with base auriculate; petiole 2–3 mm, hairy; both sides medium glossy when dried; 8–11 pairs of secondary veins, usually 10–15 mm apart in the central part of the leaf; hairs simple, to 1.5 mm long, upper surface of young leaves with a

few erect hairs, becoming glabrous, the hairs leaving behind c. 3–6 small gland-like scars per mm<sup>2</sup>; lower surface with hairs mostly on the veins, persistent; midvein impressed and hairy above, prominent and hairy below; glands 23–26 per leaf, distributed across the leaf blade but more common near the midrib, sessile, 0.15 mm diameter, visible on the lower surface. **Inflorescence** a panicle, terminal or axillary, 4–13 cm long, 2–9 cm wide; axis with dense ferruginous hairs c. 0.2 mm long and sparse hairs to 0.8 mm long; bud scales up to c. 6?, caducous; proximal scale c. 2 mm long and 4 mm wide, distal scales to 6 mm long and 6 mm wide; apex emarginate, margin entire, venation parallel; outer surface and margins hairy with hairs to 0.5 mm long, inner surface with short appressed hairs; lateral branches of inflorescence to 7 cm long, with basal bract on lower laterals to 5 × 5 mm resembling a bud scale, on upper laterals to 4 × 1 mm. **Flower pedicel** free part 1–2(–4) mm long, part fused with receptacle 4 mm long, densely hairy, hairs to 0.2 mm long; basal bract 1–2 × 0.3–1 mm, persistent, both sides and margin densely hairy; receptacle densely hairy, hairs simple, to 0.2 mm long, cylindrical, 2 mm diameter, c. 4.5 mm long on lateral sides, dorsal side c. 5 mm long, ventral side c. 4 mm long, base strongly gibbous, apex asymmetric, inside a whorl of simple retrorse hairs to 1.5 mm long. **Sepals** 5, triangular, hairy outside and inside, c. 2.5 × 1.5 mm, slightly unequal in size. **Petals** 5, white, alter-

nate to sepals, c.  $3 \times 2$  mm. **Stamens** 7, placed on dorsal side, filaments glabrous, c. 3 mm long, lower 1.5 mm fused, fused part c. 3 mm wide at base and 1.2 mm at apex; anthers brown, elliptic, c. 0.3 mm long. **Staminodes** c. 8, placed on ventral side, c. 1.2 mm high, lower  $\frac{3}{4}$  part fused. **Ovary** placed at mouth of receptacle, c.  $1 \times 1$  mm, densely covered in short simple hairs, lower part glabrous, a tuft of long hairs at apex; ovules 2 in a single locule. **Style** 3.5 mm long, attached to base of ovary, a few long hairs on lower part of style, stigma punctiform. **Fruit** epicarp light brownish green, dull, densely hairy with hairs c. 0.2 mm long; mature fruits ovate, base cordate, apex emarginate or rounded; fresh fruit to c.  $10 \times 7 \times 7$  cm, dried fruit to c.  $8 \times 6 \times 6$  cm; mesocarp with fruity scent, c. 2 cm thick, cream-coloured outside to light orange inside; fresh endocarp to c.  $9 \times 3.5 \times 3.5$  cm, dried endocarp to c.  $7 \times 3 \times 3$  cm, seed coat thin, surrounded by veins departing from the base and forming a network around the seed coat, dense layer of irritating hairs to 3 mm long between the seed coat and the seed. **Seed** ovate, light brown, cream inside, striped longitudinally, with a hilum 1.3 cm diameter, fresh seed to c.  $8 \times 3 \times 3$  cm, dried seed to c.  $6 \times 2.5 \times 2.5$  cm. **Seedling** germination hypogeal, epicotyl c. 25–35 cm long, whorl of leaves at apex. Figs 2 & 4C.

**Habitat** – Primary rainforest rich in tree species from the Legume subfamily Caesalpinioideae, on well-drained sandy soil; 100 m a.s.l. The rainfall at the Bulu weather station, c. 12 km southeast of the type locality, ranged from 4023 to 6146 mm/year, and averaged 5040 mm/year (1984–2008). The climate is strongly seasonal with one distinct dry season from December to February (average monthly rainfall less than 100 mm).

**Distribution** – Known only from the permanent plots around the P transect in the southern part of Korup National Park. Fig. 3.

**Conservation Status** – Of the 8936 identified trees > 10 cm in diameter in the “P transect plots”, fourteen trees were identified as *M. butayei* subsp. *korupensis* (See the section “ecological notes on the new taxa”). One of these trees died after the setup of the plots, while two more trees were found by chance. In total, fifteen living trees > 10 cm in diameter were found. Most of these fifteen trees were mature. The taxon is assessed here as “Critically Endangered, CR D” (IUCN 2001), because the number of mature trees known is less than fifty.

**Etymology** – Named after Korup National Park within which all known individuals of this species are located.

**Other specimens examined** – **Cameroon**: Southwest Province, Korup National Park, P plot near P transect, subplot 23B,  $5^{\circ}01'N$   $8^{\circ}48'E$ , alt. c. 100 m, 28 May 2007, *van der Burgt et al.* 953, fr (K, MO, WAG, YA).

#### ECOLOGICAL NOTES ON THE NEW TAXA

The two new taxa of *Magnistipula* presented here have only been found within the “P transect plots” in the Caesalpinioideae-rich primary lowland rainforest in the southern part of Korup National Park in Cameroon (Newbery et al. 1998). Both taxa are absent from the 50 ha “KFDP plot” (Kenfack et

al. 2006), which is situated 11 km northeast of the P transect plots, but still within Korup National Park.

The total size of the “P transect plots” is 155.75 ha. All trees over 50 cm dbh were registered and identified. Of the total 3181 registered trees over 50 cm dbh, three trees were identified to *M. multinervia* and nine trees to *M. butayei* subsp. *korupensis*. Trees with a dbh ranging between 10 and 50 cm were registered in 56 subplots of 0.25 ha each (total size 14 ha), randomly located within the P transect plots. Among the 5755 registered trees between 10 and 50 cm dbh, one tree was identified to *M. multinervia* and five trees to *M. butayei* subsp. *korupensis*. Therefore, the survey of 8936 trees over 10 cm stem dbh resulted in registration of four trees of *M. multinervia* and fourteen trees of *M. butayei* subsp. *korupensis*. One tree of *M. butayei* subsp. *korupensis* died after registration, while in and around the plots, two more trees of this taxon were found by chance. In total four trees of *M. multinervia* and fifteen trees of *M. butayei* subsp. *korupensis* are known presently. It is almost certain that more trees of both taxa occur in the forests in or near the southern part of Korup National Park, because most of the area outside the plots is unexplored for these two taxa.

Fruits of both taxa are usually partly eaten by animals when found on the ground. Seedlings of both taxa were sometimes found at distances of up to c. 100 m from the crown projection of the nearest parent tree, indicating the existence of seed dispersal by animals.

The large and heavy fruits of *M. butayei* subsp. *korupensis* may well be attractive to elephants. These fruits contain a large amount of supposedly edible flesh, fall to the ground when ripe, and develop a strong fruity scent which later includes an alcoholic scent as well. However, the seeds are not well protected and may not survive passing through the digestive system of an elephant. Elephants have become rare in the southern part of Korup National Park, and have been observed only once in the “P transect plots”. Their traces were seen near two of the *M. butayei* subsp. *korupensis* trees, which were not fruiting at the time.

#### ACKNOWLEDGEMENTS

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