# A new Critically Endangered cloud forest tree *Microcos* (Grewiaceae-Malvaceae) from the Rumpi Hills of S.W. Region Cameroon.

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**Summary.** We describe *Microcos rumpi* (Grewiaceae-Malvaceae) as a new species to science from the Rumpi Hills of SW Region Cameroon, a proposed Tropical Important Plant Area. Confined on current evidence to submontane forest, the species is threatened by expanding habitat clearance for farms and is assessed as Critically Endangered. A massive tree, attaining 35 – 40 m height, and 80 cm trunk diameter at 1.3 m above ground, its biomass is calculated as in the range of 7 – 8 metric tonnes. It is the third tree species of the genus recorded from Cameroon and only the fourth recorded west of D.R. Congo. A key to these four species is presented.
The concept of *Microcos* in Africa in relation to *Grewia* is discussed, and three new combinations are made, transferring three species names from *Grewia to Microcos*: *Microcos louisii* (Wilczek) Cheek, *M. evrardii*( Wilczek) Cheek and *M.schmitzii* (Wilczek) Cheek.

**Keywords:** Biodiversity crisis; Extinction; *Grewia*: Tiliaceae; Tropical Important Plant Areas

## Introduction

In connection with the Cameroon Tropical Important Plant Areas programme (Darbyshire *et al.* 2017; Cheek, continuously updated), in May 2022, while clearing a backlog of specimens which had resulted from a survey of the Rumpi Hills and Nta Ali in S.W. Region Cameroon (Thomas 1995), two specimens, *Thomas* 10426 and 10442 (both K!) that had been field-identified as *Grewia coriacea* Mast. (more correctly, see below, *Microcos coriacea* (Mast.) Burret), were found to be discordant with that species. Further checks against reference specimens in the Kew herbarium showed that not only did they differ from *Microcos coriacea* but from all other *Microcos* species in tropical Africa (see Results below). Accordingly, these Rumpi Hills specimens are here formally described and named as *Microcos rumpi* Cheek.

*Microcos* Burm. ex L. (1753) is a palaeotropical genus of about 78 species (Govaerts et al., continuously updated) based on *M. paniculata* Burm. ex L. (1753) from Sri Lanka. Linnaeus (1767) later synonymised *Microcos* under *Grewia* L. However, the genus was resurrected by Burret (1926). Burret's authoritative revision (1926) of former Tiliaceae sens. lat. presaged

its break-up into todays's Brownloideae/Brownlowiaceae, Tiliaceae sensu stricto/Tilioideae and Grewioideae/Sparrmanniaceae (Grewiaceae) including *Microcos* (Bayer *et al.* 1999, Bayer & Kubitzki 2003, Cheek in Heywood *et al.* 2007). Burret's was the last global treatment of *Microcos* (Burret 1926). He recognised 53 species, of which 19 were recorded from Africa and 34 in Asia. Of the 99 names in *Microcos* listed in IPNI (continuously updated), Govaerts *et al.* continuously updated) accept 78 names. The majority of these 78 are in S.E. Asia, but with 11 in Africa. *Microcos* is absent from the Neotropics and Madagascar.

Illogically, while *Microcos* has been maintained as a separate genus from *Grewia* in Asia (e.g. Chung 2003, 2006, Chung *et al.* 2005a, Chung & Soepadmo 2011), the two genera have often been united under *Grewia* in Africa. For example, in one of the most recent Flora accounts of *Grewia* (including *Microcos*) for Africa, Whitehouse in Whitehouse *et al.* (2001) states " …Kirkup followed Burret in recognising *Microcos* as a distinct genus; this concept has also been followed in SE Asia. Although there are clear differences between *Microcos* and the other sections of *Grewia*, for consistency I am following the practice set by the other African floras, of not recognising…." This practice of retaining *Microcos* in *Grewia* is maintained widely today in Africa, for example by the excellent and essential African Plant Database (continuously updated). In fact, the two genera are readily separated as expressed in the key below, modified from that in Whitehouse (2001):

Trees and climbers, rarely shrubs, of evergreen forest; stigmas entire; fruit unlobed; inflorescences terminal, sometimes axillary also, many-flowered……**Microcos**

Shrubs, rarely trees, of bushland or woodland; stigmas lobed; fruit 4-lobed, rarely entire; inflorescences usually axillary or leaf-opposed, rarely terminal, usually few-flowered……..**Grewia**

According to the molecular analysis of Brunken & Muellner (2012), *Microcos* is not embedded in *Grewia*, neither are these two genera sisters, in fact they fall into distinctly separate clades. Additional characters for separating the two genera are found in the pollen, wood anatomy and in the leaf anatomy, particularly the epidermal cells (Chattaway 1934, Chung 2002, Chung *et al.* 2003, 2005b). *Microcos* was maintained in Bayer & Kubitzki (2003). However, in Africa, several species described in *Grewia* remain to be transferred formally to *Microcos* which is partly addressed in this paper (see below).

In contrast to Asia (see references above), the genus *Microcos* has been little studied in Africa, as evidenced by the fact that the first new name in African *Microcos* since 1926 was published in 2004 (*Microcos barombiensis* (K. Schum.) Cheek in Cheek *et al.* 2004: 414). In the course of matching the material described as new in this paper, it became clear that a revision of the genus for Africa is desirable to address specimen misidentifications and additional apparently undescribed species. It is hoped to address these problems in future.

**Methods**

Herbarium citations follow Index Herbariorum (Thiers *et al.* continuously updated) and binomial authorities IPNI (continuously updated). Material was collected using the patrol method (e.g. Cheek & Cable 1997). Material of the suspected new species was compared morphologically with material of all other African *Microcos* (or *Grewia* sect. *Microcos* (L.)Wight & Arnott) principally at K and YA, but also using images of specimens available online, principally from BR, P and WAG. Burret's types of *Microcos* at B were destroyed by allied bombing in 1943 so it was not possible to consult them. This disaster has necessitated that subsequent authors select neotypes of his names, e.g. Whitehouse (2001).
The conservation assessment was made using the categories and criteria of IUCN (2012). Herbarium material was examined with a Leica Wild M8 dissecting binocular microscope. This was fitted with an eyepiece graticule measuring in units of 0.025 mm at maximum magnification. The description terminology follows Beentje & Cheek (2003) and Cheek (2017). The drawing was made with the same equipment using Leica 308700 camera lucida attachment.

**Taxonomic Results**

Here we formally transfer three more names from *Grewia* to *Microcos* for the reasons given in the discussion, and so that one of them can be referred to in the context of the taxonomic placement of the main subject of this paper, *Microcos rumpi* (see below). All three names are of taxa of D.R. Congo published in what was intended to be a precursory account to the Flore de Congo Belge Tiliaceae treatment, although the last preceded the first by several months.

***Microcos louisii*** (R.Wilczek) Cheek **comb. nov.**

*Grewia louisii* R.Wilczek (1963a:20; 1963b: 460). Type: D.R. Congo, District Forestier Centrale, Yalulia, 20 km a l'Est de Yangambi, foret maracageuse de la riviere Butale, alt ? 470 m, petit arbre, fl. Fr. 30 May 1938, *Louis* 9549 (holotype BR barcode BR00000897140!; isotypes BR00000197143!, YBI barcode YBI154249425!)

***Microcos schmitzii*** (R.Wilczek) Cheek **comb. nov.**

*Grewia louisii* R.Wilczek (1963a:20; 1963b: 459). Type: D.R. Congo, District du Haut-Katanga: Elisabethville (now Lumbumbasi), Muhulu, arbuste parfois lianeux, fl. fr., 20 April 1949, *Schmitz* 2288 (holotype barcodes BR0000008930415! isotypes BR00000893041!, K000241788!, KIP468350430, KIP225201638!, KIP555461425!, PRE0271994-0!, YBI155054003!)

***Microcos evrardii*** (R.Wilczek) Cheek **comb. nov.**

*Grewia evrardii* R.Wilczek (1963a:24; 1963b: 463). Type: D.R. Congo, District Forestier Centrale, Mondombe-Yalusaka (Terr. Ikela), Ingende, foret maracageuse, arbuste, fl.fr. 12 avril 1959, *Evrard* 6116 (holotype barcode BR00000896343!; isotypes YBI104161000!)

Here we present a key to the *Microcos* tree species west of D.R. Congo, a table of characters separating the three Cameroon species tree species, and the similar *M. louisii* of D.R. Congo, from each other. We then formally describe and name the new entity, *Microcos rumpi*.

KEY TO THE SPECIES OF MICROCOS TREES IN AFRICA WEST OF D.R. CONGO

1. Leaves deeply toothed. Maiombe Mts of Cabinda……..***M. gossweileri***
   Leaves entire. Nigeria to Congo-Brazzaville, unknown from Cabinda…….2
2. Leaf base cuneate, leaf surfaces glabrous ……..***M. coriacea***
   Leaf base truncate or cordate, leaf blade lower surface stellate hairy…..……3
3. Leaves with domatia; abaxial surface 10 – 20% covered with scattered stellate hairs; lateral nerves (7 – )8 – 9( – 10) on each side of the midrib; fruits smooth…….***M. rumpi sp. nov.***
   Leaves without domatia; abaxial surface >80% covered with stellate hairs (hairs touching each other); lateral nerves 11 – 13 on each side of the midrib; fruits verrucate ……..…….***M. magnifica***

| | *Microcos coriacea* | *Microcos louisii* | *Microcos rumpi* | *Microcos magnifica* |
|---|---|---|---|---|
| Height (m) | 10 – 20 | 7 – 8 | 35 – 40 | 20 – 35 |
| Number of lateral nerves on each side of midrib | 4 – 5( 6) | 5 – 6 | (7 – )8 – 9( – 10) | 11 – 13 |
| Leaf-base | Acute to rounded | Truncate to rounded | (Rounded-) truncate(-cordate) | Truncate to abruptly cordate |
| Domatia | No | Yes | Yes | No |
| Nervation | Basally 3-nerved | Pinnately nerved | Pinnately nerved | Basally 3-nerved |
| Tertiary Nerves | Reticulate | Reticulate | Scalariform | Scalariform |
| Alt. range (m) | 0 – 500( – 1000) | 400 – 600 | c. 1300 | 750 – 1000 |
| Geography | Nigeria-Gabon | D.R.Congo | Rumpi Hills, Cameroon | Mt Kupe and Ebo Forest, Cameroon |

Table 1. Major diagnostic characters separating *Microcos coriacea*, *M. louisii M. rumpi* and *M. magnifica.* Data from specimens at K and for the last species from Cheek (2017).

***Microcos rumpi*** Cheek ***sp. nov.*** Type: Cameroon, S.W. Region, Korup Project Area, Rumpi Hills, near Madie River 4º 58'N, 9º 15'E, fr. 22 Feb 1995, *D.W.Thomas* 10426 (holotype K, barcode K000875935; isotypes EA, K, MA, US, YA). (Fig. 1).

*Grewia coriacea* sensu D.W.Thomas (1995), non Mast. (Masters 1868).

*Canopy emergent evergreen tree, 35 – 40 m tall,* and to 80 cm diam. 1.3 m above ground-level, trunk irregularly fluted at base, slash pink and fibrous looking, not peeling. Leafy stems (from saplings) terete 2 – 3 mm diam., internodes 1.6 – 3.3 cm long, epidermis purple black, smooth, 20 – 50% covered by a range of stellate to simple dull white to yellow hairs, stellate hairs 10 – 15-armed, 0.1 – 0.15 mm diam., simple, bifid, trifid and cruciate hairs 0.025 – 0.05 mm long (Fig. 1E). Previous year's stems with surface longitudinally furrowed and with raised, longitudinally elliptic, pale brown, lenticels 0.5 x 0.2 – 0.35 mm.
*Leaves* alternate, blades simple, entire, coriaceous, sub-bullate, drying mid brown, (ovate-) ovate-elliptic to elliptic-oblong (elliptic-obovate), (14.2 – )15.1 – 19( – 28.8) x (8 – )9.2 – 11( – 11.8) cm, apex subacuminate or acumen short and broad, obtuse, 0.4 – 0.8( – 0.9) x 0.4 – 1.0( – 1.2) cm, base slightly asymmetric (broadly rounded-) truncate (-cordate), sinus c. 5 x 18 mm; abaxial surface pinnately nerved (not tri- or palmately nerved at base), lateral nerves prominent (7 – )8 – 9( – 10) on each side of the midrib, arising at c. 50 º from the midrib, straight, and then arching gradually upwards, becoming parallel with the margin then uniting with the nerve above via tertiary nerves, forming looping inframarginal nerves 3 – 4 mm from the margin in the distal half of the leaf. Domatia conspicuous, at junction of lateral nerves and midrib with a bright white dense tuft of hairs on each, the two tuft bases separated by c. 0.5 mm, the hairs 0.5 – 1 mm long, the apices of the hairs of the two tufts interlocking (Fig. 1C). Tertiary nerves very prominent, scalariform, 14( – 17) between the basal and near basal secondary nerve pairs. Quaternary nerves barely detectable with the naked eye, reticulate, cells isodiametric, 0.75 – 1.25 mm diam.; indumentum of dull white mainly 6 – 8-armed stellate hairs 0.1 – 0.2 mm diam., covering 10 – 20( – 30%) of the surface; adaxial surface with nerves impressed, quaternary nerves invisible, glabrous; margin slightly revolute and thickened, entire.
*Sapling leaves* (*D.W. Thomas* 10442, K) as mature, canopy leaves but papyraceous, lanceolate, 20 – 21 x 8.9 – 9.7 cm, acumen narrowly triangular 2 – 2.3 x 0.6 – 0.8 cm, base rounded-truncate, lateral nerves 9 – 11 on each side of the midrib, quaternary nerves reticulate, conspicuous with the naked eye, finer nerves conspicuous with lens, also reticulate, cells c. 3 mm diam.,; margin slightly sinuate, with veinlets terminating in minute purple glandular teeth, teeth 3 – 4 mm apart, broadly obtuse, c. 0.1 x 0.15 mm, indumentum extremely sparse. *Stipules* lateral to petiole base, caducous, cicatrices white, sub-isodiametric, 0.7 – 1 x 1 mm. *Petiole* cylindrical (0.8 – )1 – 1.4( – 1.5) x 0.2 – 0.3 cm, indumentum as stem. *Buds* supra-axillary, inserted 0.5 – 1 mm above the axil, narrowly ellipsoid 1.5 x 0.75 – 1.2 mm, completely covered in grey stellate hairs. *Inflorescence* not seen, probably terminal, paniculate. *Flowers* (rehydrated from *Thomas* 10442) pre-anthetic buds obovoid-cylindric 7.5 – 9 x 4 mm, pedicel 1.5 – 2 x 1 mm, 5 ridged, ridges rounded, minutely puberulent. *Sepals* 5, valvate, divided to the base, oblong-spatulate, 6 – 7 x 1.7 – 2 mm, the proximal half narrowed, c. 1.1 mm wide, in bud marginal ⅓ inflexed, surface minutely and densely simple

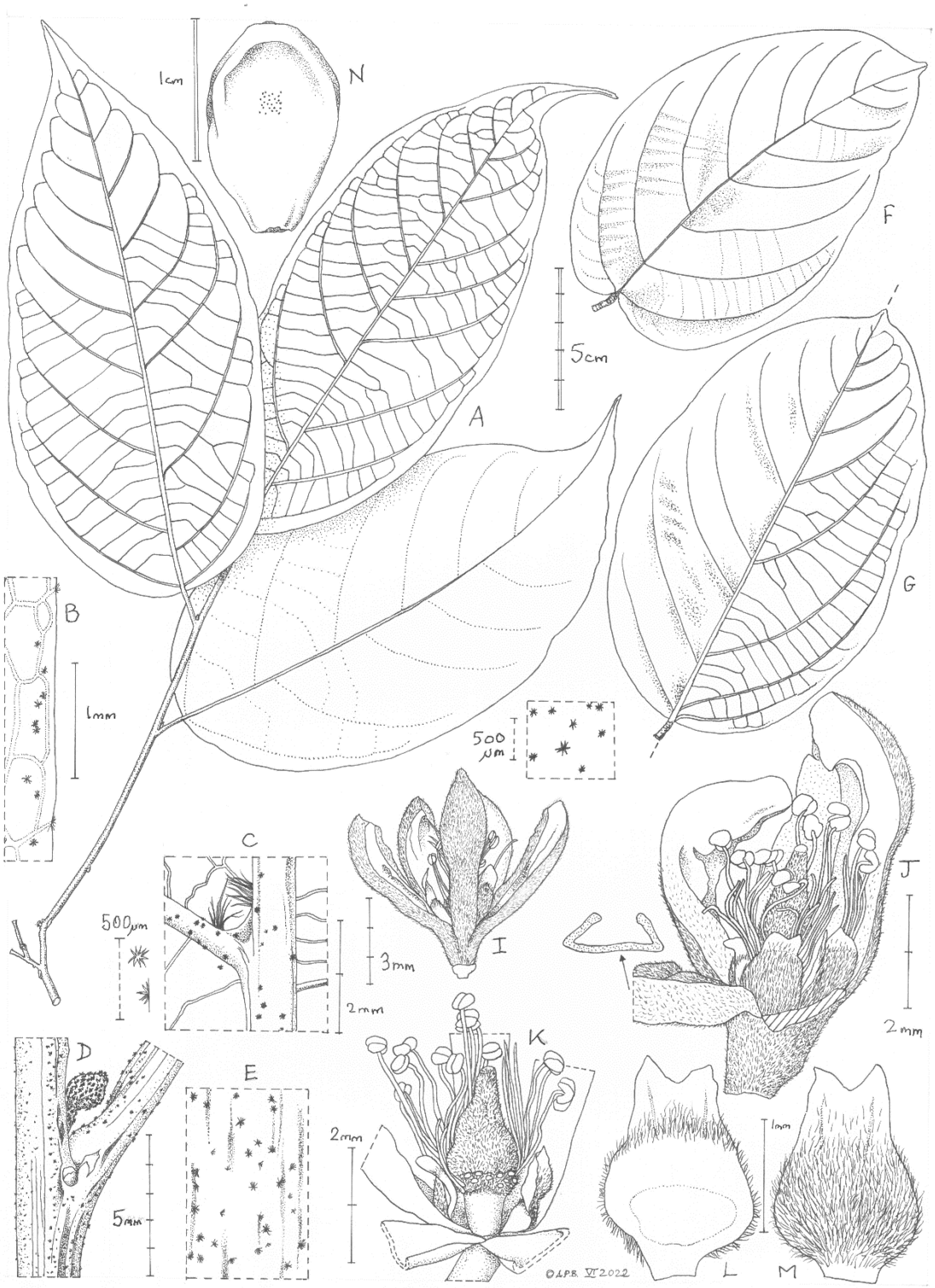


Fig. 1. *Microcos rumpi.* **A** habit of leaf stem (sapling); **B** abaxial leaf margin (detail from A); **C** domatia (detail from A); **D** stem node showing stipule scar, supra-axillary bud and petiole base (detail from A); **E** indumentum on stem (detail from A); **F** mature (canopy) leaf, adaxial surface; **G** mature (canopy) leaf, showing adaxial, pleated surface on left and abaxial (scalariform tertiary nerves) on right; **H** indumentum, abaxial surface (from G); **I** flower, side view; **J** flower three sepals removed; **K** flower showing androgynophore and ovary (after removal of intervening stamens, petals and sepals); **L** petal, adaxial surface; **M** petal, abaxial surface; **N** fruit, side view. **A-E, I-M** from *Thomas* 10442(K); **F-H** from *Thomas* 10426 (K, holo.). All drawn by ANDREW BROWN.

puberulent (Fig. 1I&J). *Petals* 5, dark red, 2 – 2.2 x 1 mm, basal part ovate-elliptic 1.1 – 1.2 x 1 mm, distal part narrowed, oblong, 1 x 0.25 mm, sometimes retuse, outer (abaxial) surface with basal part completely covered in dense golden – yellow to white stellate hairs, 3 – 5-armed, arms erect, 0.05 – 0.11 mm long, distal part glabrous; inner surface with basal part divided into three portions, from base to apex: a) densely golden papillate zone c.0.5 mm long, b) dark red glabrous zone c.0.3 mm long, c) densely long-white hairy zone c.0.4 mm long, with hairs 0.05 – 0.07 mm long, extending along the margins (Fig. 1L&M); distal part more or less glabrous but with a few white stellate hairs at base. *Androgynophore* yellow, longitudinally 5-angular 1 x 1.1 mm, glabrous; surmounted by a subrugose platform 0.5 mm long, 2.25 – 2.4 mm wide, densely short simple hairy (Fig. 1K). *Stamens* c. 60, free, in c. 3 whorls, completely concealing the ovary, filaments cylindrical, dark red, glabrous, 2.1 – 6 mm long, the shortest outermost; stamens dithecate, medifixed, subhemispherical, 0.5 mm diam. *Ovary* ovoid-conical, 1.75 x 1.25 mm, with c. 6 shallow, longitudinal, rounded ribs, apex obtuse-rounded, densely pale yellow simple puberulent; style stout, black, 0.3 mm diam., tapering from base to apex. Stigma white, capitate-discoid, 0.1 – 0.12 mm diam. Surface minutely papillate. *Fruits* brown or purple-brown, glossy, obovoid 3.3 – 5 x 2 – 3.2 cm, pericarp hard, brittle, 0.25 mm thick (Fig. 1N); mesocarp with long, soft, dull pale yellow dense fibres, each c. 0.05 mm diam. Endocarp ovoid 9 – 12 x 6 – 7 mm, pale brown, the outer surface smooth, with lines of fibres attached, 2 – 3-valved, valves longitudinal, c. 0.5 mm thick. *Seed* narrowly ovoid 8 – 9 x 5 mm, pale brown.

**RECOGNITION.** *Microcos rumpi* Cheek differs from *M. coriacea* (Mast.) Burret in the leaves being pinnately nerved (not trinerved), the number of lateral nerves 7 – 9 on each side, with domatia comprised of two tufts of white hairs (not 4 – 5( – 6) nerves and domatia absent), tertiary nerves strongly scalariform, leaf apex rounded or very shortly and broadly acuminate (versus reticulate, long-acuminate).

**DISTRIBUTION.** Cameroon, S.W. Region, Rumpi Hills.

**HABITAT.** Submontane forest with *Santiria trimera* (Burseraceae), *Garcinia smeathmannii* (Clusiaceae or Guttiferae) and *Carapa grandifolia* (now *C. oreophila* Kenfack, Meliaceae) (*D.W. Thomas* 10426); c. 1300 m alt.

**ETYMOLOGY.** Named as a noun in apposition for the Rumpi Hills in S.W. Region, Cameroon, to which this species is restricted on current evidence.

**SPECIMENS EXAMINED. CAMEROON.** S.W. Region, Rumpi Hills, near Madie River 4º 58'N, 9º 15'E, fr. 22 Feb 1995, *D.W.Thomas* 10426 (K holo. barcode K000875935; iso. EA, MA, US, YA); ibid fl.fr. 22 Feb 1995, *D.W.Thomas* 10442 (K barcode K001383574, YA).

**VERNACULAR NAMES & USES.** None are recorded.

**CONSERVATION STATUS.** Known from a single location, the higher altitudes of the Rumpi Hills, where it grows with the point endemic *Ocotea ikonyokpe* van der Werff. (Lauraceae, van der Werff 1996). The site of the type specimen collection of the last, *D.W. Thomas* 10456 is given as "l.5 km W of Madie River ford". This species, in the identical habitat, with similar restricted range has been assessed for its global extinction risk status as threatened but is not yet published on iucnredlist.org (July 2022). *Microcos rumpi* is here

assessed as Critically Endangered since only a single site is known, area of occupation is calculated as 4 $km^2$ using the preferred IUCN grid cell size and extent of occurrence as the same. Plotting the grid reference of the two specimens on Google Earth shows that the site is outside the existing Rumpi Hills protected area, and examining historic imagery shows that between July 2008 and Jan. 2011, there is an increase in cleared areas of forest along the road c. 500m to the west of the grid reference, and also clearing distant from the road. This justifies an assessment of CR B1ab(iii) + B2ab(iii). This distinctive, huge tree has not been found in surveys elsewhere in the Cameroon Highlands and adjacent areas (Cheek 1992; Cheek *et al.* 1996; Cable & Cheek 1998; Cheek *et al.* 2000; Maisels *et al.* 2000; Chapman & Chapman 2001; Cheek *et al.* 2004; Harvey *et al.* 2004; Cheek *et al.* 2006; Cheek *et al.* 2010; Harvey *et al.* 2010; Cheek *et al.* 2011). Therefore, it may indeed be endemic to the Rumpi Hills.

**NOTES.** The only known collections of *Microcos rumpi* appear to be connected with a transect made by Thomas (1995:37 – 39, table 5) in the Rumpi Hills. In that transect, 607 stems above 10 cm dbh (trunk diameter at 1.3 m above ground level) were recorded in five size classes and allocated to 80 different species (Thomas 1995: 37 – 39, table 5). The transect area was 1 Ha (1 km x 10 m) at elevation 1200 – 1350 m alt., starting at the Madie River crossing between Dikome and Madie, just to the East of the RHFR. Hilltops were reported to be dominated by *Santiria trimera* (Burseraceae) a well-known indicator species of submontane forest in Cameroon. *Microcos rumpi* (as "*Grewia coriacea"*) occurred 10 times in total, 5 stems (c. 1% of stems) in the 10 – 29 cm size classes, 1 stem in the 30 – 49 cm class (c. 1.5%), and 4 stems (c. 15%) in the 50 – 69 cm size class (Thomas 1995). Therefore, within the transect area, the species is not uncommon, since about 1 in every 60 stems above 10 cm dbh is *Microcos rumpi*. While the specimen location metadata relates to that given for the transect, the size class data given for the specimen (up to 80 cm dbh) exceeds that for any recorded in the transect, suggesting the specimen(s) were taken near to but outside the transect.

Since only two stems among the 607 of the Rumpi Hills transect are placed in the 90+ cm size class (Thomas 1995), at 80 cm dbh (*Thomas* 10426), *Microcos rumpi* must be among the most massive trees in its Rumpi Hills cloud forest habitat consistent with the height given of 35 – 40 m (*Thomas* 10426). Taking the average wood density of *Microcos* of 0.5 $kg/dm^3$ from Dryad (Zanne *et al.* 2009) in the absence of African data derived from Asian species of *Microcos*, together with the metadata cited above from *Thomas* 10426, the equation for estimating the biomass of trees from moist tropical forests (Chave *et al.* 2005) gave an above ground biomass of such a tree as approximately 6500 kg, plus 1400 kg below ground (equation from Sierra *et al.* 2001), that is 7.9 metric tonnes per tree. That such an immense organism could remain unknown to science until now is remarkable if not without precedent.

At the time of specimen collection it was evident from the specimen metadata that the collector queried whether these specimens represented *Grewia coriacea* (*Microcos coriacea*) since the trees were so much larger than those of the species encountered at lower altitudes. But by the time the report was written (Thomas 1995) the specimens are unambiguously attributed to *Grewia coriacea* (*Microcos coriacea*).

While *Microcos rumpi* is most likely to share a most recent common ancestor with one of the two other Cameroonian tree *Microcos* species, *M. coriacea* and *M. magnifica* (see above), it shares a remarkable character with one of the most common and widespread Congolese species, *M. louisii*. Both species have leaf domatia comprised of two separate clusters of white hairs which interlock at the apex (Fig. 1C). The two species share other similarities in leaf shape but differ in the features indicated in Table 1. In addition, *M. louisii* is mainly confined to seasonally flooded and swamp forests of the Congo basin and is not recorded from cloud (submontane) forest in Cameroon.

**The Rumpi Hills**

The Rumpi Hills Forest Reserve (RHFR) is situated 80 km N of Mt Cameroon, 50 km W of Bakossi Mts and 15 km SE of Korup National Park. The highest point is given as Mt Rata, at 1800 m (https://en.wikipedia.org/wiki/Rumpi_Hills). Data on the Rumpi Hills is scarce. The most authoritative appears to be a study on land-use change by Beckline *et al.* (2018). They state that the Rumpi Hills exhibits two seasons; the dry season from November to April and the rainy season from May to October with annual rainfall that ranges between 4027–6368 mm. Mean monthly maximum temperatures in the dry season is estimated at 31.8°C and 18.2°C during the rainy season. The relative humidity is high during most of the year with minimum monthly values ranging between 78% and 90%. Ethnic groups are the Ngolo, Bima, and Balue. The Rumpi Hills Forest Reserve is given as 455 $km^2$ and is kidney-shaped in outline. Google Earth imagery shows the forest canopy of RHFR to be largely intact, apart from oil palm plantations inside the far western boundary around the settlement of Ekumbako (4º 55' 41.47"N, 80 56' 18.43"E). However, the boundary shown on Google Earth may be inaccurate and this settlement may fall outside the boundary. Despite the name, most of RHFR apart from inside the northern and eastern boundary, is not aligned with the upland area of the Rumpi Hills, which lie to the east. RHFR is below 600 m and mostly below 300 – 400 m.

The highest settlement of the Rumpi Hills is Dikome Balue, the capital of the Rumpi Hills, which lies outside the RHFR. It is only 7 km S of the recorded location of *Microcos rumpi*. Smaller settlements, mostly above 1000 m alt. are scattered regularly through the hills proper, that occupy the area east and southeast of the RHFR. A recent study of changes in the Rumpi Hills between 2000 – 2014 based on satellite images and, importantly, on-the-ground surveys in 14 settlements around RHFR and 200 land-use change plots, reported that during the 14-year period, dense forest dropped to 90.2% while settlements increased from 744.6 to 2148.8 hectares in 2014. Also, farmlands increased by 18.25% representing a change from 9,400 to 11,117 Ha (Beckline *et al.* 2018). Despite this, observation of Google Earth imagery dating from 2015 (accessed 17 July 2022) shows large areas of forest with intact canopy. The presence of the range-restricted endemics *Ocotea ikonyokpe* (see above), and, also outside the boundary of the RHFR, to the north, the point endemic *Ledermanniella prasina* J. J. Schenk & D. W. Thomas (Podostemaceae, Schenck & Thomas 2004), now joined by a third Rumpi Hills endemic species, *Microcos rumpi* (this paper) are indicators that the Rumpi Hills are a centre of plant diversity. That the numbers of recorded endemic plant species is so low compared with the neighbouring Bakossi Mts and Mt Kupe (Cheek *et al.* 2004) is

undoubtedly down to the comparatively very low levels of botanical survey and identification in the Rumpi Hills. Undoubtedly many additional new species to science, including Rumpi Hill endemic species, will be brought to light if botanical collections and identifications are resumed in the Rumpi Hills while natural habitat remains.

**Discussion**

*Microcos rumpi* is the latest in a long line of discoveries of new species to science from the cloud forest habitats of the Cameroon Highlands. These species vary from epiphytic herbs e.g. *Impatiens frithi* Cheek (Balsaminaceae, Cheek & Csiba 2002) and *I. etindensis* Cheek & Eb. Fisch. (Balsaminaceae, Cheek & Fischer 1999) to terrestrial herbs e.g. *Brachystephanus kupeensis* I. Darbysh. & Champl. (Acanthaceae, Champluvier & Darbyshire 2009) and *Isoglossa dispersa* I. Darbysh. (Darbyshire *et al.* 2011), rheophytes e.g. *Ledermaniella onanae* Cheek (Cheek 2003) and *Saxicolella ijim* Cheek (Podostemaceae; Cheek *et al.* 2022a) to achlorophyllous mycotrrophs e.g. *Kupea martinetugei* Cheek & S.A.Williams (Triuridaceae, Cheek *et al.* 2003) and *Afrothismia amietii* Cheek (Cheek 2007, Thismiaceae) and understorey shrubs and small trees e.g. *Kupeantha kupensis* Cheek (Rubiaceae, Cheek *et al.* 2018a) and *Psychotria darwiniana* Cheek (Rubiaceae, Cheek *et al.* 2009*)*, to canopy trees, e.g. *Vepris zapfackii* Cheek & Onana, *Deinbollia onanae* Cheek, and *Vepris onanae* Cheek (Cheek & Onana 2021; Cheek *et al.* 2021a; 2022b)

Most of these new species were first described as point or near-endemics, but several have, with more research, been found to be more widespread e.g. *Tricalysia elmar* Cheek (Rubiaceae, Cheek *et al.* 2020a) now known to extend from Mt Kupe and Bali-Ngemba to e.g. the Rumpi Hills (Lachenaud *et al.* 2013), *Coffea montekupensis* Stoff. (Stoffelen *et al.* 1997) first thought to be endemic to Mt Kupe is now known to occur in the Tofala Sanctuary (Lebialem Highlands, Harvey *et al.* 2010) and *Oxyanthus okuensis* Cheek & Sonké (Rubiaceae, Cheek & Sonké 2000) initially thought to be endemic to Mt Oku is now known to extend to Tchabal Mbabo (Lachenaud *et al.* 2013). It is to be hoped that the range of *Microcos rumpi* will be similarly extended by future research and its extinction risk assessment consequently reduced.

**Conclusion**

It is important to uncover the existence of previously unknown plant species as soon as possible and to formally name them. Until this is done, they are invisible to science and the possibility of their being assessed for their conservation status and appearing on the IUCN Red List is greatly reduced (Cheek *et al.* 2020b), limiting the likelihood that they will be proposed for conservation measures, and that such measures will be accepted. Although there are exceptions (Cheek & Etuge 2009; Cheek *et al.* 2019a), most new plant species to science are highly range-restricted, making them almost automatically threatened (Cheek *et al.* 2020b).

Only 7.2% of the 369,000 flowering plant species (the number is disputed) known to science have been assessed on the IUCN Red List. (Bachman *et al.* 2019; Nic Lughadha *et al.* 2016; 2017). However, the vast majority of plant species still lack assessments on the Red List (Nic

Lughadha *et al.* 2020). Fortunately, Cameroon has a plant Red Data book (Onana & Cheek 2011), which details 815 threatened species, but it needs updating. Thanks to the Global Tree Assessment (BGCI 2021) many of the world's tree species have now been assessed. The State of the World's Trees concluded that the highest proportion of threatened tree species is found in Tropical Africa, and that Cameroon has the highest number (414) of threatened tree species of all tropical African countries (BGCI 2021). This will be further increased by the addition of *Microcos rumpi.*

Concerns about global plant species extinctions are increasing as the biodiversity crisis continues. In Cameroon, the lowland forest species are *Oxygyne triandra* Schltr., *Afrothismia pachyantha* Schltr. have been considered extinct for some years (Cheek & Williams 1999, Cheek *et al.* 2018b, Cheek *et al.* 2019b). Similarly, *Pseudohydrosme bogneri* Cheek & Moxon-Holt and *P. buettneri* Engl. are now considered extinct in lowland forest in neighbouring Gabon (Moxon-Holt & Cheek 2020; Cheek *et al.* 2021b). However, submontane (cloud) forest species are now also being recorded as extinct in Cameroon, such as the well-documented case of *Vepris bali* Cheek *et al.* 2018c), and the only recently discovered *Monanthotaxis bali* Cheek (Annonaceae, Cheek *et al.* 2022c). Global species extinctions are being recorded from across Africa, from West (e.g. *Inversodicraea pygmaea* G. Taylor and *Saxicolella deniseae* Cheek in Guinea (Cheek *et al.* 2017; 2022a)) to East (e.g. *Kihansia lovettii* Cheek and *Vepris* sp A of FTEA in Tanzania (Cheek 2004; Cheek & Luke 2022)).

If such extinctions are to cease, or more realistically, to be slowed, improved conservation prioritisation programmes are needed to firstly determine the most important plant areas for conservation (Darbyshire *et al.* 2017) and secondly to implement protection with local communities and authorities through well-drawn up management plans and resourcing. Cultivation and seedbanking of species at risk of extinction, if feasible, are important fall-back strategies, but conservation of species in their natural habitat must be the first priority.

The survival of *Microcos rumpi* may not seem urgent at present because while data on habitat loss around the Rumpi Hills shows a steady increase (Beckline *et al.* 2017), there are also still large tracts of habitat seemingly intact where the species may survive (Google Earth imagery, accessed July 2022). However, scenarios can change very rapidly, as with *Saxicolella deniseae* which when collected for the first time in 2018 was not considered to be at risk of extinction, but which appears to have become globally extinct in 2020 or 2021, before it was published (Cheek *et al.* 2022a).

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