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Talbotiella cheekii (Leguminosae: Detarioideae), a new tree species from Guinea

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Summary. *Talbotiella cheekii* Burgt, a new tree species from Guinea, is described and illustrated. It is a tree to 24 m high, with a stem diameter to 83 cm, and occurs in forest dominated by tree species of the Leguminosae subfamily Detarioideae, on rocky stream banks and rocky hill slopes, at an altitude of 100 – 600 m. It is estimated that 1600 – 2400 mature trees have been seen, in about twelve forest patches; more trees may be present in places not yet visited. One of the localities of the new species is situated at only 46 km northeast of the centre of the capital Conakry and 6 km northeast of the town centre of Coyah, part of the Conakry urban agglomeration. Its distribution is 1400 km further west from the previous westernmost distribution of the genus. The current extent of occurrence is 166 km^2. *Talbotiella cheekii* is here assessed as Endangered (EN) following IUCN Red List categories.

Résumé. *Talbotiella cheekii* Burgt, décrite et illustrée dans cet article est une nouvelle espèce d'arbre en provenance de la Guinée. C'est un arbre atteignant jusqu'à 24 m de haut et 83 cm de diamètre. L'espèce se trouve dans les forêts dominées par des arbres de la sous-famille des Leguminosae Detarioideae, aux abords des ruisseaux rocheux et des pentes rocheuses, à une altitude de 100 à 600 m. On estime qu'entre 1600 et 2400 arbres matures ont été vus dans environ douze parcelles forestières. Il est possible que plus d'arbres soient présents dans des endroits n'ayant pas encore été visités. L'une des localités de la nouvelle espèce est située à seulement 46 km au Nord-Est du centre de la capitale Conakry et à 6 km au Nord-Est du centre-ville de Coyah, une partie de l'agglomération de Conakry. Sa distribution est à 1400 km plus à l'Ouest de la distribution la plus occidentale du genre. La zone d'occurrence actuelle est de 166 km^2. Le risque d'extinction de *Talbotiella cheekii*, ici évalué selon les critères de la liste rouge de l'IUCN, est En danger.

Key Words. Conservation, Endangered species, West Africa.

Introduction

It came as a great surprise to discover a new tree species of *Talbotiella* Baker. f. in Guinea. One of the localities of the new species (*Burgt* 2188) is situated at only 46 km northeast of the centre of the capital Conakry and 6 km northeast of the town centre of Coyah, part of the Conakry urban agglomeration. The new species is located 1400 km further west from the distribution area of *Talbotiella gentii* Hutch. & Greenway in Ghana, the westernmost of the eight previously known *Talbotiella* species (Mackinder *et al.* 2010b). The new species is found in and near Coyah Préfecture where it occurs gregariously in forested valleys of a sandstone plateau. Although it is very common in some of these valleys, it had never before been collected, perhaps because collectors were focussing on areas further inland, in the Fouta Djalon, where more interesting plant collecting opportunities were thought to exist. The short flowering period may also have contributed to the new species remaining unnoticed for so long. This, however, changed when Martin Cheek, head of the Africa and Madagascar Team of the Identification and Naming Department of the Royal Botanic Gardens, Kew, turned his attention to the last remaining forest patches in the valleys on the sandstone plateau of the Coyah Préfecture. In September 2015, he collected the first specimens of the new species.

The genus *Talbotiella* was revised by Mackinder *et al.* (2010b). Eight species were recognised, of which four were newly described and one was

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transferred from *Hymenostegia* Harms. Seven species are relatively rare trees, occurring in small areas. The eighth species occurs in a larger area but is known from only seven collections. Six species were assessed as critically endangered (CR) and two as endangered (EN). Together, the eight *Talbotiella* species treated by Mackinder *et al.* (2010b) occur in Ghana, Nigeria, Cameroon, Gabon and Congo (Brazzaville). In Cameroon, the centre of diversity of the genus, six of the eight species occur, five of which are country endemics (Mackinder *et al.* 2010b).

The genus *Talbotiella* is placed in the Leguminosae subfamily Detarioideae (LPWG 2017). The genus is characterised by the unique combination of the presence of imbricate bud scales, persistent petaloid bracteoles, the absence of petals and a pubescent ovary (Mackinder *et al.* 2010b). The species of the closely related genus *Hymenostegia* are characterised by the presence of two or three well developed spathulate petals providing a clear distinction from *Talbotiella* species (Mackinder *et al.* 2010a). The species of another closely related genus, *Plagiosiphon* Harms, usually have five well-developed petals, three large and two smaller (Aubréville 1970). The new species is placed in the genus *Talbotiella*, because it has the combination of morphological characters mentioned for the genus, including an absence of petals on the four known flowering collections.

Talbotiella cheekii *Burgt* **sp. nov.** Type: Guinea, Coyah Préfecture, along stream between villages Saliya and Yataraya, 7 April 2017, *X. M. van der Burgt, P. M. Haba, A. Diallo & G. Konomou* 2084 (holotype K [K001244000], isotypes B, BM, BR, C, E, EA, ETH, F, FHO, FI, G, GH, H, HBG, HNG, LBV, LE, LISC, MA, MO, MPU, NY, O, P, PRE, S, SING, US, W, WAG, YA).

http://www.ipni.org/urn:lsid:ipni.org:names:77179007-1

Tree to 21 m high, stem diam. to 83 cm; bole 0.5 – 7 m long, straight, cylindrical or fluted, sometimes with buttresses to 1.5 m high and 1 m wide; bark light brown with sparse thin flakes; larger branches nearly vertical. *Stems* densely hairy to glabrescent, hairs to 0.3 mm long. *Bud scales* of leafy twigs and inflorescences identical, up to 12, distichous, imbricate, caducous, coriaceous, not keeled, outer surface hairy around midrib, margins ciliate, inner surface glabrous; proximal scale suborbicular, 1 × 2 mm, distal scales becoming progressively larger and more papery, apical scale obovate, to 22 × 6 mm. *Stipules* (seen on young foliage) in pairs, free, narrowly lanceolate, 6 – 26 × 1 – 2 mm, apex acute, sometimes auriculate at base, auricle 1 × 0.5 mm, outer surface and margins hairy, hairs to 1 mm long, inner surface glabrous. *Leaves* paripinnate, 5 – 9 × 2.5 – 4 cm; petiole 1.5 – 3 mm long, leaf rachis 4 – 7 cm long, densely hairy, hairs to 0.5 mm long. *Leaflets* sessile, in 9 – 14 pairs per leaf, upper and middle leaflets opposite, lower pairs sub-opposite, largest leaflets on fertile branches 12 – 22 × 4 – 7 mm, 2.9 – 3.4 × longer than wide, smallest leaflets 8 × 3 mm; leaflets oblong, base and apex asymmetric, apex rounded to slightly emarginate; mature leaflets glabrous on both sides, midvein of young leaflets hairy above, margin sparsely ciliate, lower surface sparsely appressed hairy; midvein running in middle of leaflet; venation above obscure, below clear; 0 – 2 glands on the distal half of the lower surface, near the rachis. *Inflorescence* a 10 – 18-flowered raceme, axis 3 – 6 cm long including a peduncle about 1 cm long, peduncle and rachis densely hairy, hairs to 1 mm long; floral bract white, linear, 9 – 17 × 1 – 1.5 mm (to 4 mm wide on the lowest flower of an inflorescence), edges and veins on outer surface hairy, hairs to 0.6 (– 1) mm long, inner surface glabrous. *Flowers*: pedicel pink to red, sparsely hairy, hairs to 0.5 (– 1.2) mm long, portion of pedicel below bracteoles 6 – 18 mm long, portion above bracteoles 3 – 6 mm long. *Bracteoles* white, (sub-) opposite, linear, 8 – 18 × 0.7 – 1.6 mm, glabrous, a single trichome to 0.6 mm long at apex; *hypanthium* pink to red, campanulate, 2 – 3 mm long, longest on the adaxial side, 1.5 – 2 mm wide at top, sparse hairy, upper part often glabrous. *Sepals* 4, white, ovate, cucullate, glabrous, a few hairs at apex, apex rounded, the apex of all 4 sepals may be bilobed, 5 – 8 × 3 – 5 mm, abaxial and adaxial sepals wider than lateral sepals. *Petals* absent. *Stamens* 10, filaments white, free, 7 – 13 mm long, glabrous; anthers orange-brown, elliptic, 1.2 – 1.4 mm long. *Ovary* reddish green to dark red, 3 – 6 × 1.5 – 2 mm, glabrous, the margin densely hairy, hairs to 0.5 mm long; stipe 2 mm long, mostly fused to the adaxial side of the hypanthium, ovules 2, style white to pink, 6 – 8 mm long, sparse hairs on lower part, upper part glabrous, stigma capitate. *Infructescence* axis 3 – 6 cm long, densely hairy, hairs to 1 mm long, with up to 5 pods, fruiting pedicels 1.4 – 2.1 cm long, sparsely hairy, hairs to 0.5 mm long. *Pod* 1 – 2-seeded, 4.5 – 7.7 × 2 – 3.6 cm, stipe 2 mm long, beak acuminate, 2 mm long, upper suture slightly broadened, pod surface glabrous, both sutures with sparse hairs 0.5 mm long. *Seeds* brown, disk-shaped, 15 – 17 × 14 – 16 × 4 mm. *Seedling* hypocotyl 5 – 8 cm, epicotyl 5 – 8 cm, two opposite leaves 6 – 8 × 3 – 4 cm, each with 7 – 9 pairs of leaflets, largest leaflets 15 – 23 × 6 – 8 mm. Figs 1 – 3.

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Fig. 1. *Talbotiella cheekii*. A two flowers; B twig with inflorescences; C infructescence with two fruits; D leaves. A – B from *Burgt* 2087; C from *Molmou* 988; D from *Burgt* 2065. PHOTOS: **A, B, D** XANDER VAN DER BURGT; **C** MARTIN CHEEK.

RECOGNITION. *Talbotiella cheekii* is morphologically similar to *T. batesii* Baker f. The pedicels of *T. cheekii* are pink to red, 9 – 24 mm long; the bracteoles are 8 – 15 × 0.7 – 1.5 mm (the pedicels of *T. batesii* are white, 4 – 10.5 mm long; the bracteoles are 6 – 8.5 × 1.1 – 2.5 mm). The ovary of *T. cheekii* is reddish green to dark red, and glabrous with only the edges densely hairy (the ovary of *T. batesii* is pale pink, and densely hairy). The pod of *T. cheekii* is glabrous, the sutures sparsely hairy (the pod of *T. batesii* has the surfaces and suture moderately puberulous). The leaflet apex of *T. cheekii* is rounded to slightly emarginate (the leaflet apex of *T. batesii* is acute).

DISTRIBUTION. Guinea (Map 1). *Talbotiella cheekii* occurs on the sandstone plateau in the northern part of Coyah Préfecture. Its distribution just extends into Dubreka and Kindia Préfectures.

SPECIMENS EXAMINED. GUINEA. Coyah Préfecture, valley in sandstone plateau SE of Kouriya, 9°45'29.1"N, 13°18'06.0"W, 350 m, sterile, 11 Oct. 2016, *Burgt* 2065 (BR, G, HNG, K, MO, P, PRE, WAG); valley in sandstone plateau E of Kouriya, 9°46'41.6"N, 13°16'42.0"W, 260 m, seedlings, 12 Oct. 2016, *Burgt* 2068 (BR, HNG, K, MO, P, WAG); along stream between villages Saliya and Yataraya, 9°45'23.7"N, 13°15'41.4"W, 120 m, fl., 7 April 2017, *Burgt* 2084 (holotype K; isotypes B, BM, BR, C, E, EA, ETH, F, FI, FHO, G, GH, H, HBG, HNG, LBV, LE, LISC, MA, MO, MPU, NY, O, P, PRE, S, SING, US, W, WAG, YA); along small stream SW of Kaporo Village, 9°43'01.6"N, 13°16'51.1"W, 130 m, fl., 8 April 2017, *Burgt* 2087 (B, BR, G, HNG, K, LISC, MO, NY, P, PRE, SING, WAG); on hill slope just E of Sagouya Village, 9°42'38.8"N, 13°16'47.4"W, 190 m, fl., 10 April 2017, *Burgt* 2093 (B, BR, G, HNG, K, LISC, MO, P, PRE, WAG); along rocky stream 3.5 km NE of Malassi Village, 9°41'33.4"N, 13°13'42.2"W, 110 m, old inflor., 13 April 2017, *Burgt* 2097 (B, BR, G, HNG, K, LISC, MO, P, PRE, WAG); Kindia Préfecture, Plateau de Tassing above Fossikouré Village, 9°41'59.1"N, 13°10'41.7"W, 540 m, sterile, 8 Dec. 2017, *Burgt* 2187 (BR, HNG, K, MO, P, SERG, WAG); Coyah Préfecture, vertical sandstone cliff 50 m above stream at the checkpoint near Pont KK, 9°45'05.5"N, 13°21'27.6"W, 150 m, fl., 9 Dec. 2017, *Burgt* 2188 (B, BR, G, HNG, K, LISC, MO, P, PRE,

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Fig. 2. *Talbotiella cheekii*. A crown of tree in flower; B group of trees; C stem of a young tree; D stem of an old tree. A from *Burgt* 2093; B – D not collected. PHOTOS: XANDER VAN DER BURGT.

SERG, WAG); Kakiwoundi Forest, 9°43'46"N, 13°17'28.2"W, 250 m, sterile, 28 Sept. 2015, *Cheek* 18133 (HNG, K, WAG); valley in sandstone plateau SE of Kouriya, 9°45'29"N, 13°18'16.7"W, 188 m, sterile, 28 Sept. 2015, *Cheek* 18190 (HNG, K); Dubreka Préfecture, plateau E of Dobiro Village, 9°50'37.5"N, 13°26'16.8"W, 420 m, sterile, 10 Dec. 2017, *Haba* 1095 (HNG, K, WAG); Coyah Préfecture, plateau S of Kouriya, 9°45'05.5"N, 13°20'28"W, 200 m, fr., 10 Sept. 2017, *Konomou* 294 (HNG, K, WAG); Kakiwoundi Forest, 9°43'45.9"N, 13°17'17.8"W, 220 m, fr., 8 June 2016, *Molmou* 988 (HNG, K, WAG).

HABITAT. *Talbotiella cheekii* occurs in closed-canopy semi-deciduous forest on rocky stream banks and rocky hill slopes, alt. 100 – 600 m. The general precipitation is about 2800 mm/y but may be higher or lower in the valleys where the trees are found, due to orographic influences on precipitation levels. The climate is strongly seasonal with a pronounced dry season from December to April. *Talbotiella cheekii*

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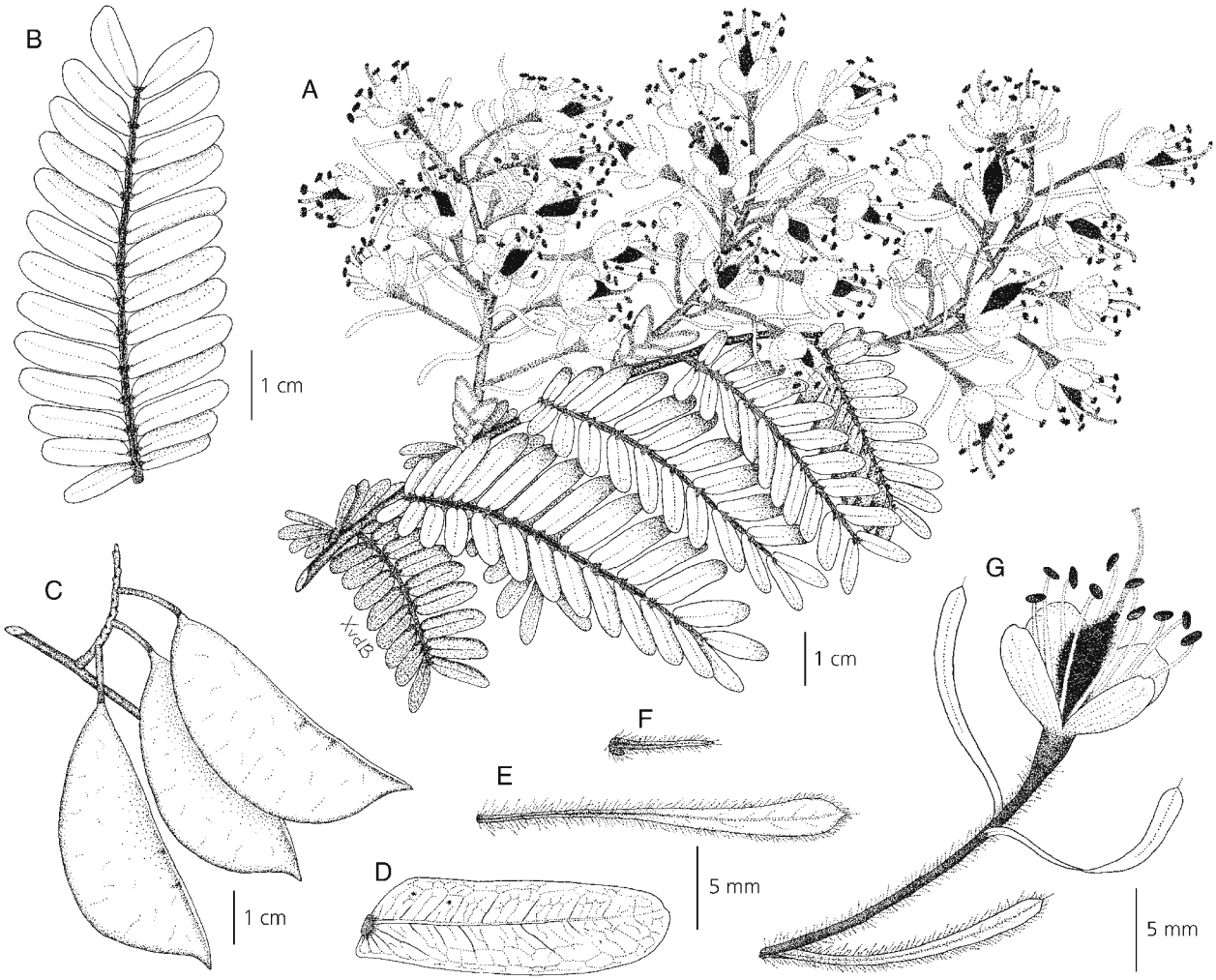


Fig. 3. *Talbotiella cheekii.* **A** branch with inflorescences; **B** leaf upper surface; **C** infructescence with three fruits; **D** leaflet lower surface showing two glands; **E** stipule; **F** auriculate stipule; **G** flower. **A, E, G** from *Burgt* 2087; **B, D, F** from *Burgt* 2065; **C** from *Molmou* 988. DRAWN BY XANDER VAN DER BURGT.



Map 1. Distribution of *Talbotiella cheekii* Burgt sp. nov. in West Africa

occurs gregariously, in Detarioideae-dominated forest. The species occurs with the four Detarioideae species *Cryptosepalum tetraphyllum* (Hook. f.) Benth., *Guibourtia copallifera* Benn., *Gilbertiodendron aylmeri* (Hutch. & Dalziel) J. Léonard and *Tessmannia baikiaeoides* Hutch. & Dalziel.

CONSERVATION STATUS. There is not much forest left in Coyah Préfecture. Slash-and-burn farming, annual dry-season grass fires damaging forest edges, and urban development have much reduced the area under forest cover. *Talbotiella cheekii* was found in about twelve forest patches, between 1 and 7 ha in size, situated on steep rocky slopes or along rocky streams. Numerous seedlings, saplings and juvenile trees are present in these forest patches. Trees will not survive forest fires, although they may survive coppicing at about 1 m high which the local farmers often practice when they convert forest into farmland. The main stem of *T. cheekii* trees is usually too short and fluted to be useful as construction

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timber. Poles are made from juvenile trees with a straight trunk and used in the construction of houses. Several *T. cheekii* trees were observed broken where adjacent trees had been logged.

Talbotiella cheekii classifies as Endangered under IUCN (2017) criterion B1. The extent of occurrence is 166 km^2, calculated with Geocat (2018) from the 13 cited specimens and 10 field observations. Additional forest patches exist in localities which, to date, are unvisited; both within and near the current extent of occurrence. The extent of occurrence may therefore increase because of future surveys but will almost certainly remain within the IUCN (2017) EN B1 thresholds of 100 – 5000 km^2. The number of mature trees seen by the authors is estimated at 1600 – 2400. The total number of mature trees is estimated at 5000 – 10000. The twelve forest patches are located near seven different villages or suburbs; therefore, the species is supposed to occur in seven locations (IUCN 2017). However, there is a reduced probability of recolonisation; therefore *T. cheekii* may be considered severely fragmented and IUCN criterion B1a still indicates EN (IUCN 2017). *Talbotiella cheekii* trees are found in small and often relatively isolated subpopulations, most of which are located near farmland or near land divided up for urban development. Some of these small subpopulations may go extinct soon. The ballistic seed dispersal method of *T. cheekii* (see the notes section below) results in a relatively short (probably less than 30 m) and strictly limited maximum seed dispersal distance. Except for dispersal by water downstream in gullies and streams, long-distance seed dispersal methods are unknown for *T. cheekii* and related Detarioideae tree species (Burgt 1997; Burgt pers. obs.).

Talbotiella cheekii also classifies as Endangered under IUCN criterion A. The authors have seen several patches of farmland on rocky slopes and several galleries of secondary vegetation along rocky streams, where only a few damaged *T. cheekii* trees were present. Presumably there were once many more trees there, since *T. cheekii* always occurs gregariously in natural forests. If the generation length is roughly estimated to be 40 years, the reduction of forest cover in the region where *T. cheekii* occurs is estimated to have resulted in 60% to 90% population reduction of *T. cheekii* trees over the past three generations. In the future, the population reduction will likely continue but may become somewhat less, because some of the remaining trees were growing in places unsuitable for farming and relatively safe from forest fires: amongst large rocks along streams and on steep cliffs. However, if the current rate of deforestation in Coyah Préfecture continues, the population reduction of *T. cheekii* may well be over 50% during the next three generations.

Talbotiella cheekii is here assessed, following IUCN Red List categories, as Endangered, EN A2c+3c; B1ab(iii,iv,v) (IUCN 2017). Conservation actions are planned to protect the species. Martin Cheek is working with the Guinean Ministère de l'Environnement des Eaux et Forêts to increase protection of the region where *T. cheekii* occurs, as well as other regions with rare plant species. National and local authorities will be informed about the conservation importance of the species. Conservation posters will be prepared and distributed. The tree may be planted in gardens. Seeds will be collected for Kew's Millennium Seed Bank; although it is not certain that the seeds are orthodox since they are dispersed at the height of the rainy season.

PHENOLOGY. *Talbotiella cheekii* flowers and leaf flushes in April, at the end of the dry season. All flowers of an inflorescence open at the same time (Fig. 1B); the few flower buds present on *Burgt* 2084, the first of the flowering collections, were unable to open because they were insect infested. All mature trees of *T. cheekii* were flowering simultaneously on the 7th and 8th of April 2017. No observations were made on the 6th of April or before that date. On the 9th and 10th of April only wilted flowers were present. The flowering tree collected on 9th of December 2017, *Burgt* 2188, was badly damaged by fire and presumably therefore flowering, as there were no other trees flowering at that time.

In June and July fruits are mature and seeds are dispersed. The seeds germinate within a week after dispersal. All species of *Talbotiella* of which fruits are known, disperse their seeds ballistically (Mackinder *et al.* 2010b). The seeds of *T. cheekii* are also dispersed in this way, with the drying valves of a pod curling in opposite directions. *Talbotiella cheekii* trees are gregarious (Fig. 2B) and this tendency is probably related to the relatively short and strictly limited maximum dispersal distance of the ballistic seed dispersal within a forest environment.

ETYMOLOGY. *Talbotiella cheekii* is named after Dr Martin Cheek, Head of the Africa & Madagascar Team in the Identification and Naming Department of the Royal Botanic Gardens, Kew. The new species was discovered thanks to his long-standing commitment to the study of African plants. He has been studying the flora of Guinea on field expeditions since 2005, supported the restoration of the National Herbarium of Guinea, and described a new genus and four new species from the country (Cheek & Burgt 2010; Cheek & Haba 2016a, 2016b; Cheek & Williams 2016; Cheek *et al.*

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2016). He is also involved in the designation of new protected areas in Guinea as part of Kew's Tropical Important Plant Areas (TIPAs) Project (Darbyshire *et al.* 2017) and is supervising a Darwin Initiative-funded project on rare plant species conservation in the country.

VERNACULAR NAME. Linsonyi (from *Burgt* 2084); Meni (from *Molmou* 988); Wonkifong wouri khorohoi (from *Burgt* 2097), translated as the "Tree with hard wood from Wonkifong". This last name was proposed by the people of Malassi village when the trees were shown to them. All three names are in the Susu language.

USES. The wood is fine-grained, with a density of c. 900 kg m^{-3}. A pole made from the wood can be used as a pestle to pound food in a mortar (from *Burgt* 2084). A decoction from the leaves is used to remove the magical powers from confessed sorcerers (from *Molmou* 988).

NOTES. *Talbotiella cheekii* is characterised by the long pedicels, pink to red in colour, the long and narrow bracteoles, the glabrous pod (only the margin sometimes has a few hairs) and the rounded to slightly emarginate leaflet apex. Apart from this, the leaves and leaflets of *T. cheekii* and *T. batesii* are more or less similar; both species have 9 – 14 pairs of leaflets per leaf. Of all previously described *Talbotiella* species, *T. cheekii* is morphologically most similar to *T. batesii*. This is remarkable, because *T. batesii* is the easternmost species of *Talbotiella*, occurring in southeast Cameroon, northeast Gabon and north Congo (Brazzaville), at 2900 to 3100 km distance from *T. cheekii*, the westernmost species. A molecular analysis might show, however, that *T. cheekii* is more closely related to a different species, for example to *T. gentii* from Ghana, geographically the nearest of the eight existing *Talbotiella* species.

Two more plant species from the Leguminosae family have been newly discovered in Guinea in recent years: *Eriosema triformum* Burgt (Burgt *et al.* 2012), a pyrophytic herb with unifoliolate leaves, from submontane grassland, endemic to the Pic de Fon area in the Simandou Range, and *Gilbertiodendron tonkolili* Burgt & Estrella (Estrella *et al.* 2012), a tree from well-drained sandy and/or rocky soils on river banks and forest patches, first discovered in Sierra Leone, and later found to occur also in Guinea (e.g. the specimens *Cheek* 16172, 16583 and 16614; all in HNG and K).

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