Chapeliera magna, a new species of Rubiaceae from eastern Madagascar

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Academic editor: Lena Struwe | Received 28 August 2014 | Accepted 5 January 2015 | Published 15 January 2015

Citation: Kainulainen K, Razafimandimbison SG (2015) Chapeliera magna, a new species of Rubiaceae from eastern Madagascar. PhytoKeys 44: 89–95. doi: 10.3897/phytokeys.44.8513

Abstract
A new species of Chapeliera was discovered during a recent field trip to the Masoala National Park in eastern Madagascar, and is described here as Chapeliera magna Kainul., sp. nov. This species is readily distinguishable from previously described species of the genus by its quadrangular shoots, triangular-calytrate stipules, sessile leaves, pubescent styles, and ridged fruits. It also differs in the larger number of ovules and the much larger size of leaves and fruits.

Keywords
Chapeliera, Madagascar, Octotropideae, Rubiaceae

Introduction
Chapeliera A. Rich., is a genus endemic to Madagascar that belongs to tribe Octotropideae (Rubiaceae; subfamily Ixoroideae). The taxonomic history of the genus is complex (Madagascar Catalogue 2014). Chapeliera madagascariensis A. Rich. was originally described by Richard (1830), commemorating Louis Armand Chapelier who had collected the type material in eastern Madagascar. However, the name was first published by De Candolle in September 1830, citing Richard’s (1830) manuscript that was not published until December that same year (Stearn 1957). De Candolle’s
(1830) description is essentially identical, but with an added note on the similarity of
the plant habit to that of an Apocynaceae. Baillon (1880), considered Chapelieria and
Tamatavia Hook.f. as congeneric. Tamatavea melleri had been described by Hooker
(1871: pl 1090) just a few years earlier although with some reservation as to its novelty:
“I advance this genus as new with some hesitation, because it may prove to be one of
the several Madagascan genera which are so imperfectly or incorrectly characterized
in systematic works, that it is impossible to recognize them by their description”. Schu-
mann (1891), included Tamatavea melleri in Chapelieria as C. melleri, and Chevalier
(1942) subsequently synonymized the two names.

In a revision of Malagasy Apocynaceae, Pichon (1949) noted that the type mate-
rial of Chapelieria madagascariensis was mixed and included both Apocynaceae and
Rubiaceae material, and consequently he synonymized the name under Carissa edulis
Vahl var. septentrionalis Pichon. The Apocynaceae specialists Markgraf (1976), and
Leeuwenberg and van Dilst (2001), also considered Chapelieria a synonym of Carissa.
Recently, however, Davies and Davis (2014), emended the description of Chapelieria
madagascariensis and specified one of the Chapelier specimens as the holotype (a paper
to clarify the issue of the typification is in preparation, Davis AP, pers. comm.). They
also described two new species of Chapelieria (C. multiflora N.M.J. Davies & A.P. Da-
vis and C. septentrionalis N.M.J. Davies & A.P. Davis), and estimated the total number
of species in Madagascar to be about ten.

During a recent field trip to southern Masoala National Park, we collected an un-
known Chapelieria and it is here described as a new species. Morphologically, the plant
conforms to the characterization of tribe Octotropideae by Tosh et al. (2008), hav-
ing articulated petiole bases with distinct sutures, paired supra-axillary inflorescences,
hermaphroditic flowers with secondary pollen presentation, funnelform corollas with
left-contorted aestivation, 2-locular ovaries with axile placentation, pendulous ovules,
and striate pattern of the seed coat. Characters that support a placement in Chapelieria
as described by Davies and Davis (2014), include the sessile inflorescences, sessile flow-
ers, 5-merous flowers, and seeds with entire endosperm. In contrast, the new species
does not have grooved/ridged styles, and further broadens the generic description of
Chapelieria (Davies and Davis 2014) by having stipules fused to a cap that cover the
apical buds, sessile leaves, simple styles (not club-shaped), and in the larger number
of ovules per locule (16 vs. 3–7). Furthermore, the styles of this species are sparsely
pubescent, and the fruits are distinctly ribbed. The latter two traits are also be found
in the genus Flagenium Baill. Characters that distinguish Flagenium from Chapelieria
include the presence of both erect and pendulous ovules, and the absence of articu-
lated petioles (Ruhsam and Davis 2007). Preliminary molecular phylogenetic analyses
of both cpDNA and rDNA data support a position of the new species in Chapelieria
(Kainulainen et al. unpublished data).

Flower buds of Chapelieria are enclosed by calyptrate bracts (Chevalier 1947), and
this is also the case in Chapelieria magna. The conical sheath formed by the fused bracts
is split by the expanding flower buds, but the bracts persist as an asymmetric triangular
sheath around the inflorescence branches. Lateral buds appear to form continuously,
and many buds of varying levels of development are found within the cymose inflorescences. However, because of the congested nature of the inflorescence, branchlets with primordial buds may appear as single bracteolate flowers.

**Taxonomy**

*Chapelieria magna* Kainul., sp. nov.
urn:lsid:ipni.org:names:77144550-1
Figures 1, 2

**Diagnosis.** Differs from previously described species of *Chapelieria* (*C. madagascariensis*, *C. multiflora*, and *C. septentrionalis*) by its quadrangular shoots; triangular-calytrate stipules; sessile leaves (vs. petiole 5–11 mm); simple, terete, sparsely pubescent styles (vs. club-shaped, grooved/ridged, glabrous styles); ovule number (ca. 16 vs. 3–7 per locale); distinctly ridged fruits (vs. ±smooth fruits); and the much larger size of leaves (up to 42 × 12.2 cm vs. <16.6 × 7.8 cm), and fruits (up to 45 × 20 mm vs. <13 × 7.0 mm).

**Type.** MADAGASCAR. Toamasina Province: Analamarofo Region, Maroantsetra District, Masoala National Park, 15º41.910’S; 49º57.815’E, 115 m altitude, 15 January 2013 (fl.), S.G. Razafimandimbison et al. 1240 (holotype S!, isotype, TAN!).

**Description.** Treelet, to 4 m tall, all vegetative parts glabrous; with decussate, horizontal branches; branchlets quadrangular, 4.0–7.0 mm in diameter, bark drying brown. Stipules ca. 25–30 mm long, initially calyptrate and covering the apical bud, subsequently interpetiolar, triangular, with raised median line and apiculate apex; persistent. Leaves: sessile, narrowly obovate, ca. 39.0–42.0 × 10.5–12.2 cm; bases acute–auriculate; apices acute; adaxial surface: green when fresh, drying pale brownish-gray, smooth, secondary veins brochidodromus, obvious, curved, 15–20 pairs; midribs prominent, pale green when fresh, ±the same colour of the leaf when dry; abaxial surface: pale green when fresh, pale brown when dry, veins reddish-brown. Inflorescences ±sessile, many-flowered (although only 1–few flowers may be mature at any given time); bracts initially calyptrate and covering the flower buds, subsequently splitting unequally to asymmetric, ±triangular sheaths, ca. 18 × 21 mm (1st order bracts), pale green–bright reddish pink, adaxially glabrous, abaxially densely strigose (hairs ca. 0.9 mm), bracteoles reduced; Flowers: hypanthium narrowly urceolate, ca. 6.7 × 2.0 mm; calyces greenish white–bright reddish pink; calyx tubes 3.0–5.0 mm long, externally glabrous, but with hairs (ca. 0.5–1.0 mm long) and colleters on the lower inner surface; calyx lobes ca. 7.5 × 1.3 mm, narrowly triangular, with ciliolate margins (hairs ca. 0.5–2.5 mm); corollas white, funnelform, ±curved; corolla tubes ca. 15 mm long, externally and internally glabrous; corolla lobes ca. 10 × 4.6 mm long, acute, recurved at anthesis; stamens: sessile, attached ca. 3 mm below corolla sinus; anthers white, ca. 7.9 × 0.8 mm, linear, medifixed, exserted for ca. 0.5–1.0 mm; styles simple, ca. 16.5 mm long, sparsely pubescent (hairs ca. 0.5 mm long); stigmas shortly bifid (lobes ca. 0.5 mm long); exserted for ca. 0.5–1.0 mm; ovary ellipsoid, 2-locular, ovules arranged
Figure 1. Chapelieria magna. A Habit and habitat B Flowering branch. Note the apical calyptrate stipules (one leaf removed) C Flower buds, and fruits in longitudinal and transversal sections, on leaf (×1.5) D Fruits E Inflorescence on leaf (×1.5). Photographs by Kent Kainulainen.
in two series, pendulous, ca. 16 ovules per locule; Fruits: mature fruits red, ca. 36–45 × 14–20 mm, glabrous, fleshy-indehiscent, fusiform, and apically elongated, with distinctive longitudinal grooves/ridges; calyx lobes persistent. Seeds: maturing at ± same rate, ca. 4.8–6.8 × 4.0–6.0 mm, compressed and angular.
**Distribution and habitat.** *Chapelieria magna* is only known from the type collection, made from a small stand of understory treelets in the rainforest of southern Masoala National Park. Notably, *Chapelieria madagascariensis* also occurs in this area. Although previously only known from the (eastern) Masoala peninsula by a collection made in 1951 (A. Tata 3404-RN; Davies and Davis 2014), we collected a specimen 4.7 km south of the *C. magna* locality in the nearby Tampolo littoral forest (*Razafimandimbison et al. 1217A; S, TAN*). However, whereas *Chapelieria madagascariensis* was found on sandy soil (cf. Davies and Davis 2014), the habitat of *C. magna* was on lateritic soil.

**Phenology.** Both flowers and fruits were found when we collected *Chapelieria magna* in mid-January. This is during the rainy season in Madagascar.

**Acknowledgements**

We thank Hanta Razafindraibe and the Masoala park guide Séraphin for assistance in the field; Charlotte M. Taylor, Birgitta Bremer, and Khoon Meng Wong for helpful comments on an earlier version of the manuscript, and two anonymous reviewers for comments on this version; the DGF (Direction Générale des Forêts) and MNP (Madagascar National Parks) in Madagascar for issuing collecting permits; the Missouri Botanical Garden, Madagascar Program for logistical support; the Parc Botanique et Zoologique de Tsimbazaza and Missouri Botanical Garden, Madagascar Program (Faranirina Lantoarisoa) for arranging collecting permits. Travel grants for the field trip were provided by the Royal Swedish Academy of Sciences.

**References**

Baillon HE (1880) *Histoire des plantes* 7. Hachette, Paris, 1–546.
Chevalier AJB (1942) Les cafiers du globe, fasc. 2: iconographie des cafiers sauvages et cultives et des Rubiacees prises pour des cafiers. Encyclopédie Biologique 22: 1–36, pl. 1–158.
Chevalier AJB (1947) Les cafiers du globe, fasc. 3: systematique des cafiers et faux cafiers, maladies et insectes nuisibles. Encyclopédie Biologique 28: 1–356.
Davies NMJ, Davis AP (2014) *Chapelieria septentrionalis* and *C. multiflora* spp. nov. (Rubiaceae, Octotropideae) and an emended description for *C. madagascariensis*. Nordic Journal of Botany 32(6): 691–700. doi: 10.1111/njb.00459
De Candolle AP (1830) Rubiaceae. Prodromus systematis naturalis regni vegetabilis 4. Treuttel & Würtz, Paris, 341–622.
Hooker JD (1871) *Tamatavea melleri*. Hooker’s Icones Plantarum 11: pl. 1090.
Leeuwenberg AJM, van Dilst FJH (2001) Series of revisions of Apocyanaceae XLIX, *Carissa L.* Wageningen University Papers 1: 3–109.
Madagascar Catalogue (2014) Catalogue of the vascular plants of Madagascar. Missouri Botanical Garden, St. Louis, U.S.A. & Antananarivo, Madagascar. http://www.efloras.org/madagascar [accessed: 08.2014]
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Markgraf F (1976) Apocynaceae. In: Humbert H, Leroy J-F (Eds) Flore de Madagascar et des Comores: plantes vasculaires / publiée sous les auspices du gouvernement général de Madagascar et sous la direction de H. Humbert. Muséum national d’histoire naturelle, Paris, 1–318.
Pichon M (1949) Les Carissa de Madagascar. Mémoires de l’Institut Scientifique de Madagascar, Série B, Biologie Végétale 2: 125–140.
Richard A (1830) Mémoire sur la famille des Rubiacées, contenant la description générale de cette famille et les caractères des genres qui la composent. Imprimerie de J. Tatsu, Paris, 1–270., reimpr. (1834) in Mémoires de la Société d’Histoire Naturelle de Paris 5: 81–304.
Ruhsam M, Davis AP (2007) A taxonomic revision of the genus Flagenium Baill. (Rubiaceae-Octotropideae). Botanical Journal of the Linnean Society 155: 557–570. doi: 10.1111/j.1095-8339.2007.00714.x
Schumann K (1891) Rubiaceae. In: Engler A, Prantl K (Eds), Die natürlichen Pflanzenfamilien, vol. 4, part 4, Engelmann, Leipzig, 1–56.
Stearn WT (1957) Achille Richard’s ”Mémoire sur la famille des Rubiacées”. Taxon 6(7): 186–188. doi: 10.2307/1215994
Tosh J, De Block P, Davis AP, Dessein S, Robbrecht E, Smets EF (2009) The tribal placement of the monospecific tropical African genus Petitiocodon (Rubiaceae) based on molecular data and morphology. Blumea 53(3): 549–565. doi: 10.3767/000651908X607503
