Two new species of *Colea* Bojer ex Meisn. (Bignoniaceae) endemic to Madagascar

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**ABSTRACT**
A recent review of the Malagasy Bignoniaceae for the Catalogue of the Vascular Plants of Madagascar has enabled us to discover new species in most genera in the family. We provide the description of two new species of *Colea* Bojer ex Meisn., a genus endemic to the Malagasy region (*C. labatii* Callm. & Phillipson, sp. nov and *C. unifoliolata* Callm. & Phillipson, sp. nov). The new species are provided with illustrations, a discussion of their morphological affinities and a conservation threat analysis based on the IUCN Red List Categories and Criteria.

**RESUMÉ**
Deux espèces nouvelles de *Colea* Bojer ex Meisn. (Bignoniaceae) endémiques de Madagascar. Une révision récente de la famille des Bignoniaceae pour le Catalogue des plantes vasculaires de Madagascar nous a permis de découvrir de nouvelles espèces dans la plupart des genres. Nous décrivons deux nouvelles espèces de *Colea* Bojer ex Meisn., genre endémique de la région malgache (*C. labatii* Callm. & Phillipson, sp. nov et *C. unifoliolata* Callm. & Phillipson, sp. nov). Les nouvelles espèces sont décrites avec des illustrations, une discussion sur leurs affinités morphologiques ainsi que l’évaluation préliminaire de leurs statuts de conservation suivant les Catégories et Critères de l’UICN.
INTRODUCTION

Madagascar is the second most important centre of Bignoniaceae diversity in the world after South America, with 65 currently accepted species (many with numerous varieties) in nine genera, six of which are endemic to the Malagasy region (Madagascar, the Comoro Islands, the Mascarenes and the Seychelles). The genus Colea Bojer ex Meisn. can be easily distinguished from the other members of the tribe Coleeae in Madagascar (Ophiocolea H. Perrier, Phyllarthon DC., Phylloctenium Baill. and Rhodocolea Baill.) by its opposite compound leaves, bilocular stamens and oblong fleshy indehiscent fruits, which may be smooth, but in many species are covered with an irregular network of wavy ridges and lobes. Perrier de la Bâthie (1938a, b) listed 18 endemic species of Colea from Madagascar with two additional species occurring in the other western Indian Ocean islands: C. seychellarum H. Perrier (Seychelles) and C. colei (Bojer ex Hook.) M.L. Green (Mascarenes). Zjhra (2006) added five

Fig. 1. – Distributions of the Colea Bojer ex Meisn. new species mapped on the bioclimatic zones of Madagascar (after Cornet 1974; see Schatz 2000) with protected areas hatched (names given for selected sites): C. labatii Callm. & Phillipson, sp. nov. (●), C. unifoliolata Callm. & Phillipson, sp. nov. (□).
Two new species of *Colea* (Bignoniaceae) endemic to Madagascar

Fig. 2. — *Colea labatii* Calm. & Phillipson, sp. nov.: A-C, Labat & al. 2805 (holotype, P), inflorescence (A), flower (B) and leaf (C); D, Bardot-Vaucoulon & Andrianantoantina 1061 (paratype, P), fruit. Scale bars: A, B, D, 1 cm; C, 2 cm.
new species endemic to the Masoala Peninsula in northeastern Madagascar.

A recent review of the Malagasy Bignoniaceae for the Catalogue of the Vascular Plant of Madagascar (http://www.tropicos.org/project/mada) has enabled us to clarify and refine taxon delimitations and has lead us to discover new species in most genera in the family. In this article, we describe two distinctive new species of Colea: C. labatii sp. nov. occurring in the northern dry semi-deciduous forests of Madagascar and C. unifoliolata sp. nov. only known from the 671 m summit of the quartzite massif of Ankirindo in the Makira humid evergreen forests northwest of Maroantsetra (Fig. 1).

SYSTEMATICS

**Colea labatii** Callm. & Phillipson, sp. nov.  
(Figs 2; 4B, C)

_Haec specie a congeneris foliis glabris, foliolis papyraceis ovatis ellipticis abaxialiter semper glandulis depressis in sicio nigris dispersis, floribus bilabiatis atque corolla alba ovatis ellipticisve abaxialiter semper glandulis depressis in tubo basim currentibus distinguetur._


**DESCRIPTION**

Teelet 2-3 m tall. Leaves imparipinnate, 35-40 (including petiole) × 11-22 cm; petiole 5-10 cm long, c. 2 mm diameter, glabrous, thickened at the base, verticillate on the branches, 4-5(6) leaves per verticil, leaf scars conspicuous on the older stems; leaflets 7-13, blade ovate to elliptic, 7-12 × 3-5(-7) cm, papery, glabrous, with depressed black (when dry) glands scattered over the abaxial surface; base asymmetric, shortly attenuate; margins entire; apex acuminate, the acumen up to 1 cm long, midrib and secondary veins visible on both surfaces, prominent below; petiolute 2-5 mm, glabrous; rachis straight. Inflorescence a highly contracted raceme, cauliflorous on swollen nodule, typically with up to 15 flowers; axes with a very short glandular indument, up to 2 cm long; bracts setaceous, c. 2 × 0.2 mm, with scattered short glandular trichomes. Calyx clavate in buds, pale green (black when dry), breaking open with into 2 to 3 irregular lobes, c. 5-6 × 2 mm, glabrous. Corolla funnel-shape, white and faintly pink-tinged in bud, and obscurely 2-lipped, with five sub-equal spreading lobes, c.1-1.5 × 0.4-0.5 cm, finely puberulent with a whitish glandular indument outside, and with a sparse short white indument in the throat; tube gradually narrowed to c. 2 mm diameter within the calyx, with five longitudinal yellow ridges running inside from the sinuses to the base of the tube, yellow above the mouth of the calyx outside; lobes rounded c. 4-6 × 3-4 mm. Stamens 4, c. 12 mm in length; anthers c. 2 mm, 2-locular. Style 9-15 mm long. Fruit a pendant ellipsoidal indehiscent follicle, c. 6 × 1.8 cm, attenuate at the summit, surface coarsely rugose.
**Distribution and ecology**

*Colea labatii* sp. nov. is only known from dry forests of northern Madagascar. It grows on eroded limestone in the Ankaranana region and basaltic rocks around montagne d’Ambre and Marovato (north of Ankaranana).

**Remarks**

*Colea labatii* sp. nov. is characterized by its glabrous leaves with papyraceous ovate to elliptic leaflets, always with depressed black (when dry) glands scattered over the abaxial surface; the inflorescence is a highly contracted raceme inflorescence (up to 2 cm), cauliflorous on nodules, bearing bilabiata flowers with a white or pink-tinged corolla with yellow ridges running inside from the sinuses to the base of the tube. Perrier de la Bâthie (1938a) referred the only collection of the species available to him (Perrier de la Bâthie 10346) to *C. barbatula* H. Perrier, separating it from typical material of this species as *C. barbatula* var. *ambrensis* H. Perrier. This name is not accompanied by a Latin description or diagnosis and is therefore not validly published according to the ICBN Code art. 36.1 (McNeill et al. 2006). *Colea labatii* sp. nov. differs from *C. barbatula* in its densely arranged flowers (up to 15) on a short highly contracted raceme (vs a lax inflorescence with few flowers in *C. barbatula*), the white flowers (vs dark pink) and the rugose ellipsoid follicle (vs verrucate and obovoid). *Colea barbatula* is only known from humid forests in the eastern escarpment of Madagascar far from the restricted northern distribution of *C. labatii* sp. nov.

**Etymology**

The species epithet commemorates our colleague and friend Jean-Noël Labat, who collected the type specimen. Sadly, Jean-Noël passed away before this article was brought to press. His contribution to our knowledge of the plants of Madagascar has been significant. Perhaps best known for his major contribution to the published monograph of the legumes (Du Puy et al. 2001), Jean-Noël also published on several other groups of plants. He led and supported numerous collaborative projects on Madagascar. His excellent collections from Madagascar, often accompanied by pictures and detailed notes, are a valuable legacy to the scientific community.

**Conservation status**

With an EOO of 228 km², an AOO of 63 km² and three subpopulations, two of which within the protected area network (Ankarana) (calculation following Callmander et al. 2007), *C. labatii* sp. nov. is assigned a preliminary status of Endangered [EN B1ab(iii)+B2ab(iii)] (IUCN 2001).

**Colea unifoliolata** Callm. & Phillipson, sp. nov.

(Figs 3; 4A)

*Haec species a congeneris foliis unifoliatis, lamina foliari crasse coriacea discolori adaxialiter atroviridi (in sicco atrogrisea) abaxialiter clare purpurea (in sicco atropurpurea) atque corolla saturate magentea fauce alba luteo-maculata distinguitur.*

**TYPUS. — Madagascar.** Prov. Toamasina, Summit of quartzite massif of Ankirindro, c. 25 air-km NW of Maroantsetra via the Antainambalana and then Vohimaro rivers, 15°18'08"S, 49°33'04"E, 671 m, fl., 1.II.1999, Schatz et al. 3915 (holo-, MO!; iso-, P[P00568744]!, TAN!).


**Description**

Treelet 2-3 m tall, usually unbranched. Leaves unifoliolate, (13-)19-21 (including petiole) × 6-7 cm; petiole 2.5-3.5 cm long, c. 2 mm diameter, glabrous, canaliculate, thickened and slightly angled at the apex, verticillate on the branches, 2-4 leaves per verticil; leaf blade elliptic, (10-)16-18 × 6-7 cm, thick succulent, coriaceous, discolored, dark green above (dark grey when dry), bright purple below, base shortly attenuate; margins entire; apex rounded, rarely acuminate; midrib and secondary veins visible on both surfaces, prominent below, glabrous. Inflorescence a highly contracted raceme, up to 3 cm, cauliflorous on nodules, axes glabrous, bracts sessate, with a very short glandular indument c. 1.5 × 0.1 mm, with scattered short glandular trichomes. Calyx with 5 veins, 5- toothed, light green (black when dry), c. 5 × 3 mm, glabrous. Corolla funnel-shape, deep magenta, the throat white with yellow splotches, and obscurely 2-lipped, with 5 sub-equal spreading...
Fig. 3. – Colea unifoliolata Callm. & Phillipson, sp. nov.: A, B, Schatz et al. 3915 (isotype, P), flower (A) and branch (B); C, Antilahimena, Pascal & Ramaroson 1680 (paratype, P), fruit. Scale bars: A, C, 1 cm; B, 2 cm.
Fig. 4. — **A**, Colea unifoliolata Calm. & Phillipson, sp. nov., branch, leaves and single flower (arrow), Schatz et al. 3915 (photo: G. E. Schatz); **B, C**, Colea labatii Calm. & Phillipson, sp. nov.; **B**, Bardot-Vaucoulon 1061 (photo: M. Bardot-Vaucoulon), mature fruit; **C**, Labat et al. 2805 (photo: J.-N. Labat), close-up of flower.
lobes, c.1-1.5 × 0.4-0.5 cm, finely puberulent with a whitish glandular indument outside; tube gradually narrowed to c. 2 mm diameter within the calyx; lobes rounded c. 4-6 × 4 mm. Stamens 4, c. 14 mm in length; anthers c. 2 mm, 2-locular. Style 15-18 mm long. Fruit an indehiscent follicle, pendant, immature fruit c. 3 × 1.5 cm, dark green (black when dried), ripped, c. 0.7-0.8 mm in diameter.

DISTRIBUTION ANDECOLOGY
Colea unifoliolata sp. nov. is only known from lowland evergreen tropical forest in the Makira region on the summit of Ankirindro Mountain, northwest of Maroantsetra (Fig. 1).

REMARKS
Colea unifoliolata sp. nov. is unique within the genus in having unifoliolate leaves. It is characterized by its leaf blade that is thick, coriaceous, discolorous, dark green above (dark grey when dry), bright purple below; its highly contracted inflorescence, the flowers with deep magenta corolla lobes and a white throat with yellow blotches. The new species is the ninth species of the genus Colea known to occur in the Antongil Bay region along with: C. asperrima H. Perrier, C. hirsuta Aug. DC., C. membranacea Aug. DC., C. nana H. Perrier, C. ramiflora Zjhra, C. rosea Zjhra, C. sysmae Zjhra and C. tetragona DC. However, none of the other species bear unifoliolate discolorous leaves, nor do they possess similarly coloured flowers.

CONSERVATION STATUS
With only two collections, an AOO of 9 km² and one subpopulation, none of which situated within the protected area network, C. unifoliolata sp. nov. is assigned a preliminary status of Critically Endangered [CR B2ab(iii)] (IUCN 2001).

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