

***Phyllarthron longipedunculatum* Callm. & Phillipson, sp. nov. (Bignoniaceae): a new species from Northern Madagascar**

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Published on 30 December 2016

Callmander M. W. & Phillipson P. B. 2016. — *Phyllarthron longipedunculatum* Callm. & Phillipson, sp. nov. (Bignoniaceae): a new species from Northern Madagascar. *Adansonia*, sér. 3, 38 (2): 275-280. <https://doi.org/10.5252/a2016n2a11>

ABSTRACT

A new species of *Phyllarthron* DC. (Bignoniaceae) is described from Northern Madagascar: *Phyllarthron longipedunculatum* Callm. & Phillipson, sp. nov. The new species is endemic to low elevation tropical evergreen forests and is known from the North of the Masoala peninsula and around the foothills of the Kalobinono and Tsaratanana massifs. The new species differs from all the other species of the genus by its petiolate articulate phyllodes reduced to a single article and the cauliflorous inflorescences gathered on a contracted raceme at the apex of a long peduncle. Line drawings are provided, along with a discussion of its morphological affinities and a preliminary risk of extinction assessment.

KEY WORDS

Bignoniaceae,
Phyllarthron,
Madagascar,
new species.

RÉSUMÉ

Phyllarthron longipedunculatum Callm. & Phillipson, sp. nov. (Bignoniaceae): une nouvelle espèce du nord de Madagascar.

Une nouvelle espèce de *Phyllarthron* DC. (Bignoniaceae) est décrite du nord de Madagascar: *Phyllarthron longipedunculatum* Callm. & Phillipson, sp. nov. La nouvelle espèce est endémique des forêts denses humides de basse altitude: elle est connue du nord de la péninsule de Masoala et des contreforts des massifs du Kalobinono et du Tsaratanana. La nouvelle espèce diffère des autres espèces du genre par sa feuille articulée pétiolée réduite à un seul article et les inflorescences cauliflores groupées en un racème compact au sommet d'un long pédoncule. Des dessins au trait sont fournis, ainsi qu'une discussion de ses affinités morphologiques et une évaluation préliminaire de son risque d'extinction.

MOTS CLÉS

Bignoniaceae,
Phyllarthron,
Madagascar,
espèce nouvelle.

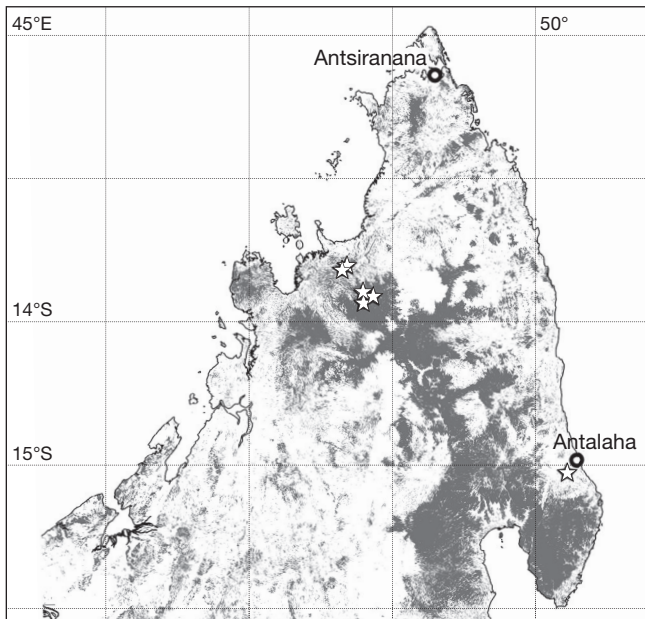


FIG. 1. — Detailed map of northern Madagascar showing the distribution of *Phyllarthron longipedunculatum* Callm. & Phillipson, sp. nov. (★, point near Antalaha represents original locality for Bernard 1776) plotted on a map of forest cover in 2000 (grey) following Harper *et al.* (2007).

INTRODUCTION

The tribe Coleeae Bojer (sensu Callmander *et al.* 2016) comprises four genera, all confined to the Western Indian Ocean islands: *Colea* Bojer ex Meisn. (including *Ophiocolea* H. Perrier) – Madagascar, Comoros, Mauritius and the Seychelles; *Phyllarthron* DC. – Comoros and Madagascar; *Phylloctenium* Baill. and *Rhodocolea* Baill. – Madagascar only. Most of the 69 currently accepted species of Coleeae are endemic to Madagascar, with only four occurring in the smaller islands of the region. The tribe is characterised by its indehiscent fruits and showy flowers, and it possesses considerable diversity in leaf morphology (Perrier de la Bâthie 1938a). Most species are small trees or shrubs (Perrier de la Bâthie 1938a). The last complete taxonomic treatment of Bignoniaceae for Madagascar and the Comoro Islands dates back 80 years (Perrier de la Bâthie 1938a, b). Since that time botanical inventory in the region has already resulted in the discovery of 30 new species and has rendered many of Perrier's species delimitations quite inadequate (see for example Phillipson & Callmander 2016). A fully revised account of the family is urgently needed, especially since many of the species are narrow endemics and are thus threatened by deforestation and habitat degradation (Good *et al.* 2006). Together with several collaborators, we have started this work, and have published 12 new species since 2011 (10 in Coleeae) (Callmander & Phillipson 2011, 2012; Callmander *et al.* 2011, 2012), redefined many species circumscriptions (presented in the Madagascar Catalogue 2016) and published a phylogenetic study on the tribe Coleeae (Callmander *et al.* 2016). Nevertheless there is still more to be

completed and we anticipate that the total number of species in the Coleeae will reach at least 100 (Callmander *et al.* 2016).

The genus *Phyllarthron* DC. (Bignoniaceae) currently comprises 18 accepted species from Madagascar and one from the Comoro Archipelago (*P. comorense* DC.). With its leaves reduced to leaf-like phyllodes, the genus is highly distinctive and unique in Coleeae and Bignoniaceae as a whole. The majority of species in Coleeae have well-developed pinnate leaves, although simple leaves, which may be unifoliolate in origin, characterise all species of *Phylloctenium* and *Colea unifoliolata* Callm. & Phillipson (Callmander & Phillipson 2012). The phyllodes of *Phyllarthron* are articulate in most species, with the proximal article corresponding to the petiole and the others corresponding to the portions of the leaf rachis between the opposite pairs of leaflets of a pinnate leaf, however the phyllodes in some species are reduced to a single article, and thus resemble a simple leaf such as is found in certain other genera of Coleeae as mentioned above (Callmander & Phillipson 2012).

During the course of botanical inventory in the Northern Mountains Complex of Madagascar, several collections were made of a *Phyllarthron* with a single article that did not match either of the two known species displaying this characteristic: *P. ilicifolium* (Pers.) H. Perrier from littoral forest around Fort Dauphin in the south east, and *P. megaphyllum* Capuron from lowland forest in northern Madagascar around the Manongarivo Massif and in the Loky-Manambato region (Perrier de la Bâthie 1938a, b; Capuron 1960; Madagascar Catalogue 2016). We found an older collection in P that matches the new specimens and another recent, but sterile, collection from North of the Masoala peninsula, but which had been wrongly identified as *P. ilicifolium*, and concluded that the material represents an undescribed species.

We describe the new species of *Phyllarthron* as *Phyllarthron longipedunculatum* Callm. & Phillipson, sp. nov. It is endemic to the lowland evergreen tropical forests in the north of Madagascar. We provide a comparison of its morphological features with those of other members of the genus, along with line drawings, a distribution map and a risk of extinction assessment based on the IUCN Red List Categories and Criteria (IUCN 2012).

SYSTEMATICS

Phyllarthron longipedunculatum

Callm. & Phillipson, sp. nov.

(Figs 2; 3)

The new species differs from all its congeners in having leaves reduced to a simple article and arranged in whorls of 3-4 or in opposite pairs; by its cauliflorous racemose inflorescence with the flowers congested at the apex of a well-developed peduncle.

TYPUS. — Madagascar. Prov. Antsiranana, RNI Tsaratanana, Ambanja, Marovato, [13°59'S, 48°41'E], 18.XI.1953, fl., *Réserves naturelles* 5754 (holo-, P[[P03272705](#)]!; iso-, P[[P03272703](#)]!, TEF).



FIG. 2. — *Phyllarthron longipedunculatum* Callm. & Phillipson, sp. nov.: **A**, fruit; **B**, branch; **C**, cauliflorous inflorescence; **A**, *Antilahimena et al.* 414 (paratype, G); **B**, *Antilahimena et al.* 824 (paratype, TAN); **C**, *Rakotovao et al.* 3753 (paratype, P). Scale bar: 2 cm.

TABLE 1. — Morphological features distinguishing *Phyllarthron longipedunculatum* Callm. & Phillipson, sp. nov., *P. ilicifolium* (Pers.) H. Perrier and *P. megaphyllum* Capuron.

	<i>Phyllarthron ilicifolium</i>	<i>P. megaphyllum</i>	<i>P. longipedunculatum</i> , sp. nov.
Size of phyllode	4.5-7 x 1.8-4 cm	50-70 x 16-20 cm	22-30 x 5.5-6.5 cm
Leaf arrangement	opposite	verticillate	opposite or verticillate
Leaf base	petiolate; petiole 0.6-1.2 cm	sessile	petiolate; petiole 2 cm
Inflorescence peduncle	short, 1-3 cm	short, 1-2 cm	long, (5-)10-30 cm
Fruit size	short, c. 2.5 cm	long, up to 25 cm	intermediate, c. 12 cm

PARATYPES. — **Madagascar.** Prov. Antsiranana, Fiv. Ambanja, RNI Tsaratanana, Antsahafaly river, Mandrizavona village, 700 m, 13°52'33"S, 48°48'44"E, 25.III.2000, fr., *Antilabimena et al.* 414 (G, MO, P[P03421679], TAN, WIS); RNI Tsaratanana, Betaindambo, near Ramena river, 562 m, 13°53'04"S, 48°51'10"E, 16.XI.2001, fl., *Antilabimena* 824 (G, MO, TAN); Fkt. Ambatomitraka, village Ambinany ["Macolline"], 73 m, 14°52'23"S, 50°15'40"E, 21.XII.2010, ster., *Bernard 1776* (MO, P, TAN); Tsaratanana, river Bepaka, close to junction North river Ramena, 516 m, 13°51'02"S, 48°47'54"E, 12.XI.2001, fl., *Birkinshaw & Antilabimena 1004* (MO, P[P00853256]); Beramanja, Kalobinono, 550 m, 13°38'41"S, 48°40'19"E, buds, *Callmander et al.* 753 (G, MO, P[P06139283], TAN); sommet de la forêt de Galoko, 738 m, 13°34'55"S, 48°43'13"E, 9.X.2013, fl., *Marjato et al.* 496 (G, MO, P[P00853263], TAN); versant NW du Kalobinono, 550 m, 13°38'41"S, 48°40'13"E, fl., *Rakotovo et al.* 3753 (MO, P[P03421679], TAN); Anketrabe, Bilinta, Kalobinono, 13°38'37"S, 48°40'26"E, fl., *Randriatsivery et al.* 386 (MO, P[P00853264], TAN).

DISTRIBUTION AND ECOLOGY. — *Phyllarthron longipedunculatum*, sp. nov., is endemic to the lowland tropical humid forests of the Sambirano Region on the foothills of the Tsaratanana and Kalobinono [formally known as Kalabenono] massifs and further east near Antalaha to the North of the Masoala peninsula (Fig. 1). The paratype, *Bernard 1776*, is believed to be from an individual transplanted from another site south-west of Antalaha, and is not known to occur naturally at "Macolline" (Jean-Luc Mora-Mahafeno, pers. comm.).

CONSERVATION STATUS. — With six known collections from five different locations, an Extent of Occurrence (EOO) of 2300 km² and an Area of Occupancy (AOO) of 32 km² (calculation using GeoCAT – Bachman *et al.* 2011) and with two subpopulations in the protected area network (Ampasindava-Kalobinono and Tsaratanana), *Phyllarthron longipedunculatum*, sp. nov., is assigned a preliminary status of "Vulnerable" [VU C1; C2a(i)]. The threat assessment of the new species is justified by its restricted AOO and few locations, despite the fact that two sub-populations are situated within protected areas where, theoretically, no population decline is anticipated. Low elevation tropical evergreen forests are the most threatened type of tropical forests in Madagascar and elsewhere in the world due to human pressure (Curran *et al.* 2004). Good *et al.* (2006) showed that nearly 50% of the species were threatened. We predict that improved taxonomic understanding and additional pressure during the past decade would probably increase this estimate near to 75%.

DESCRIPTION

Treelike to 4 m. Stems with conspicuous leaf scars. Leaves simple, opposite or 3-4 verticillate or in pairs, 22-30 x 5.5-6.5 cm (including petiole); petiole 2 cm, c. 0.2 cm in diam., glabrous; blade lanceolate, apex acuminate, the acumen 1-1.5 cm long; margin entire; midrib and secondary veins prominent on the lower surface. Inflorescence cauliflorous, gathered on a contracted raceme at the apex of a long peduncle; peduncle (5-)10-30 cm, with flower pedicel scars from consecutive years; pedicel 0.5-1.5 cm; calyx cupuliform, 5-lobed, with 5 veins ending a mucro at the apex of a tooth, 0.8-1 cm x 0.1-0.2 cm deep; corolla

tubular, 5.5 cm x 3 cm, with five sub-equal spreading lobes, rather abruptly narrowed to c. 2 mm diameter in the basal 1/4; tube c. 3 x 1 cm; lobes rounded c. 1 x 1.2 cm; stamens 2.5 cm in length, anthers 2.2 mm, 2-locular; stylus peltate, c. 3 cm. Fruit oblong, 12 x 2.5 cm, apically acuminate.

REMARKS

Phyllarthron longipedunculatum, sp. nov., cannot be mistaken for any other known species. It is unique with its combination of leaves reduced to simple articles, arranged in whorls of 3-4 or in opposite pairs, and its inflorescence a cauliflorous raceme with the flowers generally congested near the apex of a (5-)10-30 cm long peduncle. The flowers of the new species are quite similar to those of the other two uni-articulate species, and it is morphologically intermediate in certain respects between them, notably with respect to the size of its phyllodes and its fruit, which suggest a possible hybrid origin for the new species. However, its elongate inflorescences contrast with those of the other species, and although its distribution overlaps with that of *P. megaphyllum*, *P. ilicifolium* is only known from the extreme south-east of Madagascar, so the hypothesis of a hybrid origin seems untenable. A DNA sample of the new species was included in our study of the phylogeny of the Coleaceae (Callmander *et al.* 2016: "*Phyllarthron* sp. *Bernard 1776*"), where it was embedded among pluri-articulate species of the genus, sister to *Phyllarthron articulatum*. Unfortunately DNA samples for the other two uni-articulate species were not available, but we nevertheless regard the three species as closely-related that to have probably originated through radiation from a common uni-articulate ancestor. Table 1 presents the morphological differences between the three known uni-articulate species of *Phyllarthron*.

Acknowledgements

The authors thank their collaborators of the Département de Biologie et Écologie végétales de l'Université, the Parc Botanique et Zoologique de Tsimbazaza, the Missouri Botanical Garden, the Vahatra association in Antananarivo and the Conservatoire et Jardin botaniques de la Ville de Genève. We are grateful to Charles Rakotovo for the use of his photographs, Roger Lala Andriamiarisoa for his fine drawings and Jean-Luc Mora-Mahafeno for information about the origin of plants at "Macolline". Finally we thank Thierry Deroin and Sven Buerki for their reviews that improved an earlier version of this manuscript. Financial support was provided to MWC by Conservation International-Madagascar and the National Geographic Society (grant no. 8114-06).



FIG. 3. — *Phyllarthron longipedunculatum* Callm. & Phillipson, sp. nov., living plant from Kalobinono (*Rakotovao et al.* 3753): **A**, inflorescence on a trunk with buds and one open flower; **B**, another inflorescence with open and fallen flowers (photos by C. Rakotovao).

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Submitted on 29 September 2015;
accepted on 1st April 2016;
published on 30 December 2016.