

## **The Genus *Ophiocolea* H. Perrier in Northern Madagascar with Description of Four New Species and Two Lectotypifications**

Authors: Callmander, Martin W., Phillipson, Peter B., Razanajatovo, Mialy, and Nusbaumer, Louis

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# The genus *Ophiocolea* H. Perrier in northern Madagascar with description of four new species and two lectotypifications

Martin W. Callmander, Peter B. Phillipson, Mialy Razanajatovo & Louis Nusbaumer

## Abstract

CALLMANDER, M. W., P. B. PHILLIPSON, M. RAZANAJAVOTO & L. NUSBAUMER (2011). The genus *Ophiocolea* H. Perrier in northern Madagascar with description of four new species and two new lectotypifications. *Candollea* 66: 133-145. In English, English and French abstracts.

A recent review of *Bignoniaceae* for the “Catalogue of the vascular plants of Madagascar” has revealed new species in most of the genera present on the island. We provide descriptions of four new species in the genus *Ophiocolea* H. Perrier, a genus that is endemic to the Malagasy region: *Ophiocolea ambrensis* Callm. & Phillipson, *Ophiocolea darainensis* Callm., Phillipson & Nusb., *Ophiocolea pauciflora* Callm., Phillipson & Razan. and *Ophiocolea ratovosonii* Callm. & Phillipson. Field photographs and line drawings are provided for each of these four new species. Two species described previously, *Ophiocolea decaryi* H. Perrier and *Ophiocolea velutina* H. Perrier, are lectotypified. For all six treated species, we provide a short discussion on morphological affinities and eco-geography, and perform a conservation threat analysis based on the IUCN Red List Categories and Criteria.

## Key-words

*BIGNONIACEAE* – *Ophiocolea* – New species – Madagascar – Taxonomy – Lectotypification – Conservation

## Résumé

CALLMANDER, M. W., P. B. PHILLIPSON, M. RAZANAJAVOTO & L. NUSBAUMER (2011). Le genre *Ophiocolea* dans le Nord de Madagascar avec quatre nouvelles espèces et deux lectotypifications. *Candollea* 66: 133-145. En anglais, résumés anglais et français.

Une révision récente des *Bignoniaceae* pour le «Catalogue des plantes de Madagascar» a révélé l’existence de nouvelles espèces dans la plupart des genres présents dans l’île. Nous décrivons ici quatre nouvelles espèces du genre endémique de la région malgache *Ophiocolea* H. Perrier: *Ophiocolea ambrensis* Callm. & Phillipson, *Ophiocolea darainensis* Callm., Phillipson & Nusb., *Ophiocolea pauciflora* Callm., Phillipson & Razan. et *Ophiocolea ratovosonii* Callm. & Phillipson. Ces descriptions sont accompagnées de photographies de terrain et de dessins au trait. Deux espèces précédemment décrites, *Ophiocolea decaryi* H. Perrier et *Ophiocolea velutina* H. Perrier sont lectotypifiées. Pour les six espèces traitées, nous fournissons une brève discussion sur leurs affinités morphologiques et son éco-géographie, et analysons leur statut de conservation suivant les Catégories et les Critères de la Liste Rouge de l’UICN.

Addresses of the authors: MWC: Missouri Botanical Garden, P.O. Box 299, St. Louis, Missouri, 63166-0299, U.S.A. & Conservatoire et Jardin botaniques de la Ville de Genève, ch. de l’Impératrice 1, CP 60, 1292 Chambésy, Switzerland.

Email: [martin.callmander@mobot.org](mailto:martin.callmander@mobot.org)

PBP: Missouri Botanical Garden, P.O. Box 299, St. Louis, Missouri, 63166-0299, U.S.A. & Département Systématique et Evolution (UMR 7205), Muséum National d’Histoire Naturelle, case postale 39, rue Cuvier 57, 75231 Paris CEDEX 05, France.

MR: Université d’Antananarivo, Laboratoire de Biologie Végétale, 101 Antananarivo, Madagascar.

LN: Université de Genève, Laboratoire de Botanique systématique et Biodiversité & Conservatoire et Jardin botaniques de la Ville de Genève, ch. de l’Impératrice 1, CP 60, 1292 Chambésy, Switzerland.

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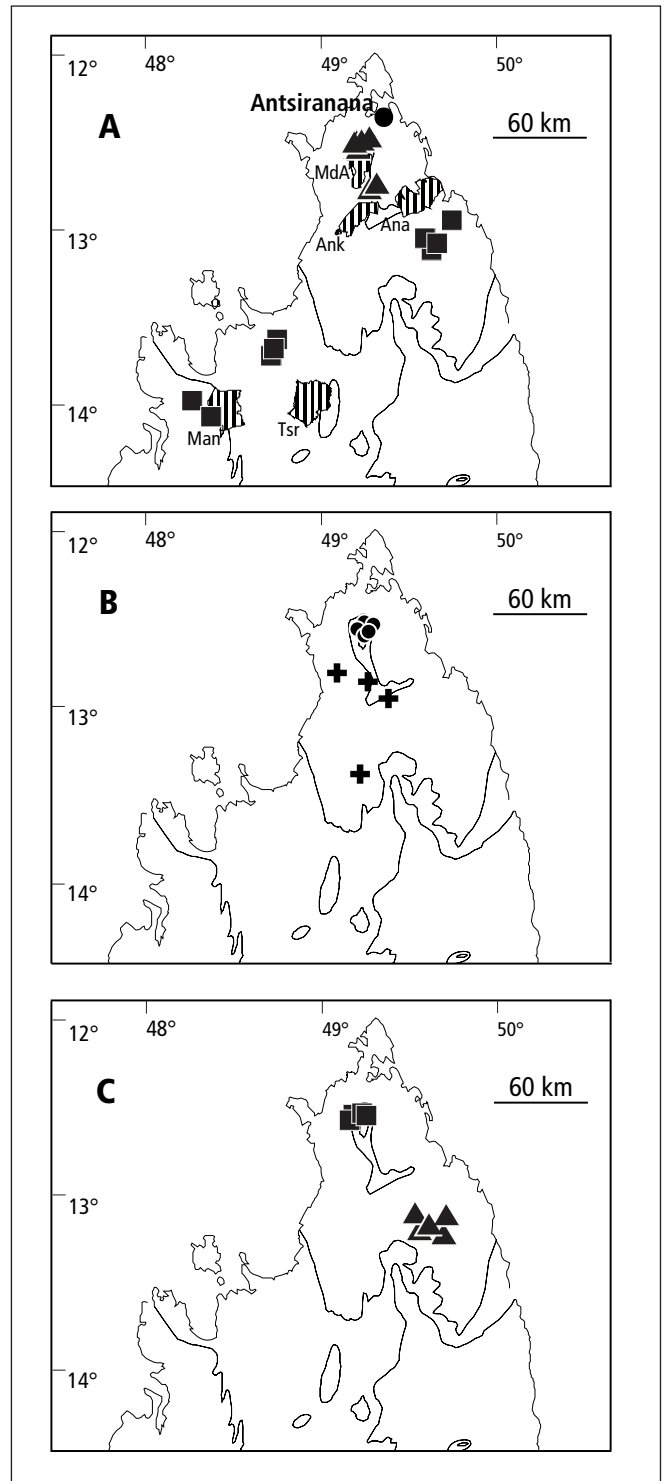
## Introduction

The Malagasy members of the *Bignoniaceae* family are segregated into two tribes based primarily on the dehiscence of the fruit: tribe *Tecomeae* Endl. (dehiscent) and tribe *Coleeae* Bojer (indehiscent). The latter includes five genera in Madagascar: *Colea* Meisn., *Ophiocolea* H. Perrier, *Phyllarthron* DC., *Phylloctenium* Baill. and *Rhodocolea* Baill. *Ophiocolea* was described by PERRIER DE LA BÂTHIE (1938a) for the five species then known with 2-locular ovaries and long cylindrical fruits. The genus currently includes six species, five endemic to Madagascar and a single species, *O. comorensis* H. Perrier, endemic to the Comoro Islands.

*Ophiocolea* in Madagascar has been regarded as taxonomically difficult due in part to the rather broad species concept adopted by PERRIER DE LA BÂTHIE (1938a, b) for *O. floribunda* (Lindl.) H. Perrier. The morphological variation in this complex which has elements occurring throughout the humid and sub-humid regions of the island, certainly represents more than one species and will be treated in a separate article. The other described species have more restricted distribution ranges and generally distinctive morphological features. In the north of Madagascar, *O. decaryi* H. Perrier can be easily recognized by its very hairy, coriaceous leaves and fruits, and white flowers with the corolla tubes yellow inside, whereas *O. velutina* H. Perrier has sparsely hairy sub-coriaceous leaves with condensed cauliflorous inflorescences with flowers characterized by reddish corollas tinted with yellow in the mouth. *Ophiocolea delphinensis* H. Perrier, from the south-east, has distinctive ribbed fruits and flowers with corollas with pink lobes. The yellow-flowered *O. vokoanensis* Zjhra from the Masoala peninsula is however part of the *O. floribunda* complex, and difficult to distinguish from other elements of this group.

## Description of four new species of *Ophiocolea* from Northern Madagascar

A recent review of Malagasy *Bignoniaceae* (MADAGASCAR CATALOGUE, 2011) has enabled us to refine species delimitations and has led us to recognize new taxa in most of the genera present. In *Ophiocolea* we are able to recognize four distinctive new species from Northern Madagascar which we describe below, namely: *O. ambrensis* Callm. & Phillipson, *O. darainensis* Callm., Phillipson & Nusb., *O. pauciflora* Callm., Phillipson & Razan. and *O. ratovosonii* Callm. & Phillipson (Fig. 1). Each species is provided with line drawings and photographs, as well as a conservation threat assessment following IUCN (2001). For the latter, calculations of area of occupancy (AOO), extent of occurrence (EOO) and number of subpopulations are based on methods presented in



**Fig. 1.** – Distributions of *Ophiocolea* H. Perrier in Northern Madagascar mapped on the bioclimatic zones of Madagascar (after CORNET, 1974; see SCHATZ, 2000) and protected area network (Ank: Ankarana; Ana: Analamera; Man: Manongarivo; Mda: Montagne d’Ambre; Tsr: Tsaratanana). **A.** *O. decaryi* H. Perrier (squares) and *O. velutina* H. Perrier (triangles); **B.** *O. pauciflora* Callm., Phillipson & Razan. (circles) and *O. ratovosonii* Callm. & Phillipson (crosses); **C.** *O. ambrensis* Callm. & Phillipson (squares) and *O. darainensis* Callm., Phillipson & Nusb. (triangles).

CALLMANDER & al. (2007). Historical collections lacking geographic coordinates were post facto georeferenced where possible using SCHATZ & LESCOT (2011). These data are placed in square brackets in the citation of collections.

***Ophiocolea ambrensis*** Callm. & Phillipson, **spec. nova** (Fig. 2, 3)

**Typus:** MADAGASCAR. **Prov. Antsiranana:** Montagne d'Ambre, [12°31'30"S 49°10'30"E], 14.X.1954, fl., *Service Forestier 11280* (holo-: P [P00722270]!; iso-: G [G00303496]!, K!, MO!, P [P00722268]!, TEF!, WIS!).

*Haec species a congeneris foliorum petiolo rhachideque anguste alatis atque corolla valde zygomorpha indumento albo dense vestito distinguitur.*

*Well-branched tree* to 15 m tall. *Leaves* imparipinnate, 17-40 × 8-14 cm (including petiole); petiole 5-7 cm long, ca. 0.2-0.3 cm diam., glabrous, thickened at the base and somewhat amplexicaule, narrowly winged, verticillate on the branches, 4-5 leaves per verticil, leaf scars conspicuous on older stems. *Leaflets* (7-)11-13; blade ovate-lanceolate, (3-)6-10 × (1-)2-3 cm, somewhat coriaceous, glabrous; base attenuate; margins entire, coarsely undulate; apex slightly acuminate, the acumen 0.5 cm long; midrib and secondary veins prominent on both surfaces, red 'in vivo'; reticulate venation visible; petiolule 0.2-0.5 cm, glabrous; rachis straight. *Inflorescence* born on stems and trunk (to near the base), racemose, gradually expanding during anthesis; primary axis 10-16 cm, pedicels 5-8(-15) mm; bracts ca. 2-3 mm × 1 mm, pubescent. *Calyx* cupuliform, magenta, irregularly divided in the distal part, (0.4-)0.7-1 cm long. *Corolla* tubular, zygomorphic, the upper and lateral lobes spreading, the lower lobe reflexed, ca. 3-4.5 × 1.7 cm, dark pink with yellow blotches on interior throat (dark brown when dried), densely covered with a white indument before anthesis, puberulent after; tube slightly curved downwards, with a sparse whitish indument on the inner ridges on the palate, rather abruptly narrowed to ca. 3 mm diameter in the basal 1/4, the mouth oblique; lobes rounded to 4-angled, the 2 posterior, ca. 5 × 4 mm, the 2 lateral and the posterior slightly larger, ca. 7 × 5 mm. *Stamens* 4, ca. 35 mm in length, slightly longer than corolla at maturity; anthers ca. 3-4 mm long, 2 locular; stylus ca. 45 mm. *Fruit* unknown.

*Distribution and ecology.* – *Ophiocolea ambrensis* is only known from the montane evergreen forests of the Montagne d'Ambre (Fig. 1).

*Conservation status.* – With an EOO of 2 km<sup>2</sup>, an AOO of 18 km<sup>2</sup>, and 1 subpopulation in a protected area (Montagne d'Ambre), *O. ambrensis* is assigned a preliminary status of "Vulnerable" (VU D2).

*Notes.* – *Ophiocolea ambrensis* differs from *O. velutina*, which also occurs on Montagne d'Ambre, by its glabrous (vs. pubescent in *O. velutina*) leaves with much smaller leaflets (6-10 × 2-3 cm vs. 7-18 × 2-8 cm), and its narrowly winged petiole and rachis (vs. petiole and rachis not winged in *O. velutina*). The flowers of both species are distinctive in the genus in being highly zygomorphic (see Fig. 2, 3), but they differ most notably in the size and indument of the calyx and indument of the corolla and those of *O. ambrensis* are borne on an expanded racemose inflorescence (vs. highly condensed). Another species from Montagne d'Ambre is described below.

Sheets of two collections of *O. ambrensis* at MO were annotated by A. H. Gentry with the invalid unpublished names: *O. schatzii* (Schatz & al. 1524) and *O. ornithophila* (Miller & al. 3620) in 1989 and 1991 respectively. These names have been entered into databases and have since proliferated in certain electronic media. It is curious that Gentry regarded these very similar collections to represent different species.

*Paratypes.* – MADAGASCAR. **Prov. Antsiranana:** Montagne d'Ambre, bords du Petit Lac, [12°32'S 49°10'E], fl., X.1944, *Homolle 193* (P); Montagne d'Ambre, 12°32'S 49°10'E, 65 m, 21.X.1988, fl., *Miller & al. 3620* (MO [2 sheets], P, TAN); Montagne d'Ambre, 12°33'S 49°08'E, 65 m, fl., 14.IX.1987, *Schatz, Rakotozafy, D'Arcy & Randrianasolo 1524* (MO [2 sheets], P, TAN).

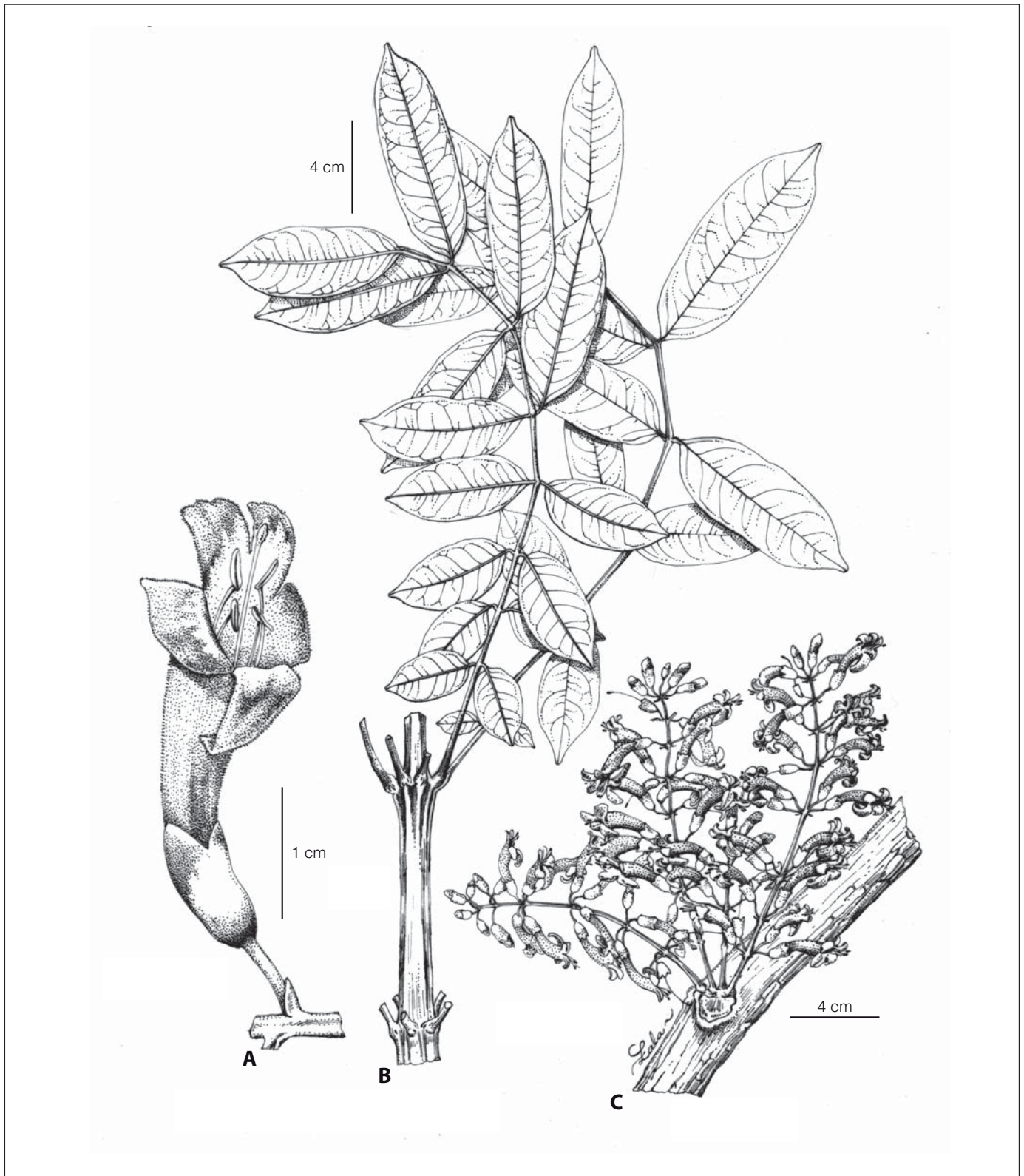
***Ophiocolea darainensis*** Callm., Phillipson & Nusb., **spec. nova** (Fig. 4, 5)

**Typus:** MADAGASCAR. **Prov. Antsiranana:** Daraina, massif d'Antsahabe, 13°13'S 49°34'E, 500 m, fl., 16.X.2004, *Callmander & al. 244* (holo-: P [P00722269]!; iso-: G [G00019763]!, K!, MO!, TAN!).

*Haec species a congeneris internodiis foliaribus proximalibus 4 vel 5 fractiflexis, calyce infundibuliformi ad orem aperto atque corolla tubulari infra pallide lutea supra rubroaurantiaca lobis pallide luteis distinguitur.*

*Tree* to 7 m tall; dbh < 20 cm. *Leaves* imparipinnate, 25-30(-49) × 14-16(-18) cm (including petiole); petiole 5-7(-9) cm long, ca. 0.2-0.4 cm diam., glabrous, thickened at the base and somewhat amplexicaule, verticillate on the branches, (5-)6(-7) leaves per verticil, leaf scars conspicuous on the older stems. *Leaflets* 17-21; blade ovate-lanceolate, 8-15(-19) × 2.5-5(-7) cm, sub-coriaceous, glabrous; base attenuate asymmetrically; margins entire, coarsely undulate; apex acuminate, the acumen 1-1.5(-2) cm long; midrib and secondary veins prominent on the both surfaces, reticulation visible; petiolule 0.5-1(-2) cm, glabrous. *Rachis* forming a zig-zag between the 4-5 pairs of leaflets in the proximal part of the leaves. *Inflorescence* born on stems and trunk, on woody mounds with a nodular appearance, bracts filamentous, (0.3-)0.5 × 0.1 mm, hairy. *Calyx* funnel-shaped open at the mouth, 4-8 mm long, white, with 5 red veins each ending in a short mucro, glandular or





**Fig. 2.** – *Ophiocolea ambrensis* Callm. & Phillipson. **A.** Flower; **B.** Branch and leaves; **C.** Inflorescence.

[**A, C:** Service Forestier 11280, TAN; **B:** Miller & al. 3620, TAN] [Drawing: R. L. Andriamiarisoa]



**Fig. 3.** – Flowering branch of *Ophiocolea ambrensis* Callm. & Phillipson.  
[Photo: G. E. Schatz]

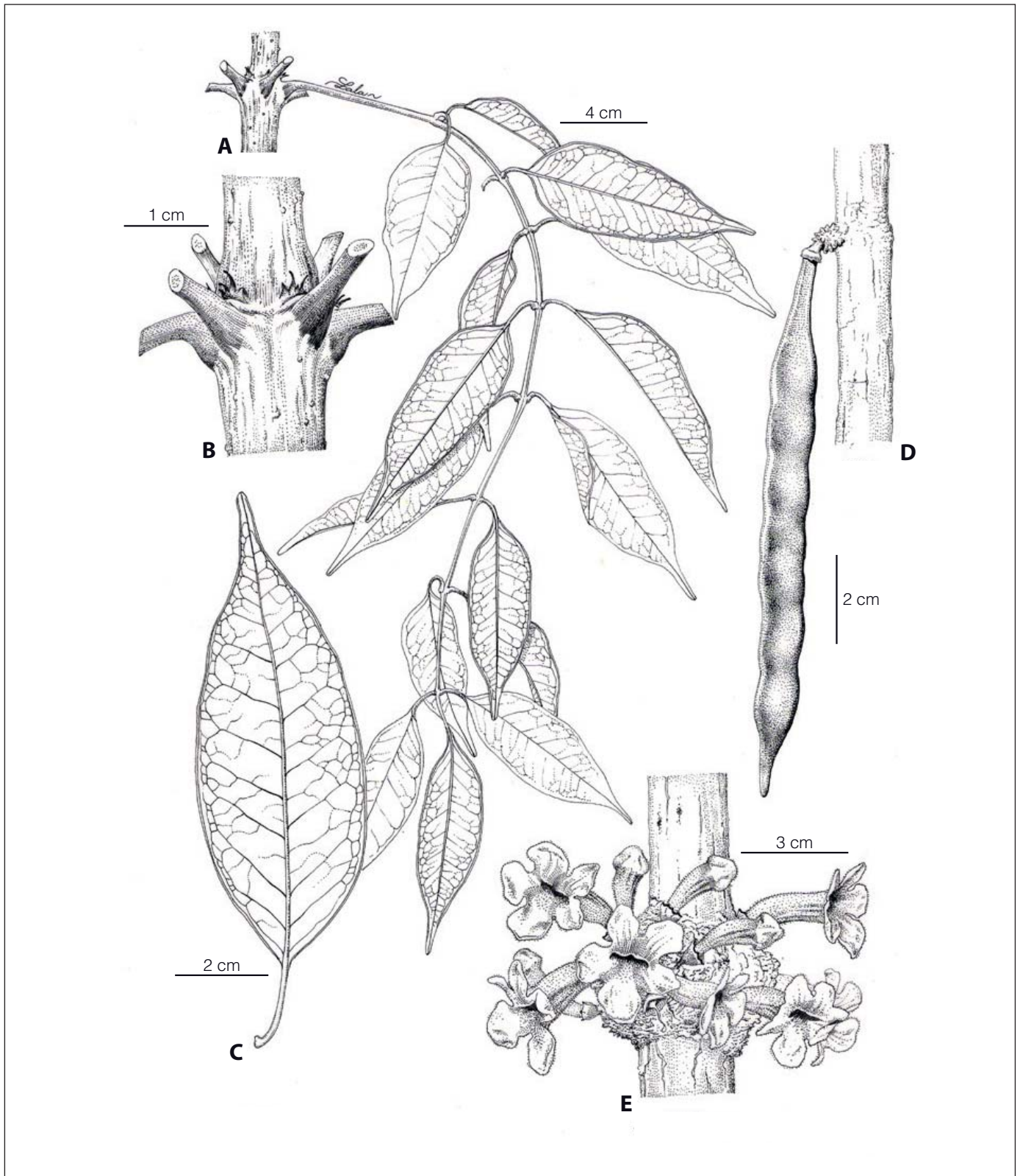
non-glandular puberulent. *Corolla* tubular, obscurely 2-lipped, with five sub-equal spreading lobes, ca.  $3 \times 1.2$  cm, finely puberulent with a pale cream-coloured indument outside and inside on the lobes, and with a villous indument on the palatal ridges and in the throat; tube slightly curved downwards, with 2 longitudinal ridges on the palate, narrowed gradually to ca. 2 mm diameter in the basal 1/4, lower portion pale yellow, upper portion orange-red (colour somewhat masked by the puberulent indument outside); lobes rounded, ca.  $5 \times 7$  mm, pale yellow, the upper 3 lobes suffused with the orange-red coloration extending out from the tube, the lower 2 lobes with a distinct deep orange-yellow area adjacent to the sinuses. *Stamens* 4, ca. 18 mm in length; anthers 2 mm, 2-locular; style 22 mm long. *Fruit* an indehiscent pod, reddish, pendant, ca.  $16 \times 1.8$  cm. *Seeds* numerous, subspherical, ca. 0.7-0.8 mm in diam.

*Distribution and ecology.* – *Ophiocolea darainensis* is only known from the Loky-Manambato region (Daraina) at elevations between 200 and 950 m. It occurs in semi-deciduous evergreen forests, but also in ripicolous habitats of dry deciduous forests (Fig. 1).

*Conservation status.* – With an EOO of 119 km<sup>2</sup>, an AOO of 45 km<sup>2</sup>, and 4 subpopulations in a protected area (Loky-Manambato), *O. darainensis* is assigned a preliminary status of “Vulnerable” (VU D2).

*Notes.* – *Ophiocolea darainensis* differs from all the other species of the genus by its leaves with the internodes of the rachis between the 4-5 terminal leaflets forming a zig-zag while in other species the rachis is more or less straight. *Ophiocolea darainensis* resembles *O. ratovosonii* in having inflorescences that develop in the axils of fallen leaves and gradually develop into woody mounds with a nodular





**Fig. 4.** – *Ophiocolea darainensis* Callm., Phillipson & Nusb. **A.** Leaf; **B.** Insertion of the petioles; **C.** Leaflet; **D.** Fruit; **E.** Inflorescence.

[**A-C:** Rakotondrajaona & al. 367, TAN; **D:** Ranirison, Wohlhauser & Nusbaumer 316, TAN; **E:** Callmänder & al. 244, P] [Drawing: R. L. Andriamiarisoa]



**Fig. 5.** – Inflorescence of *Ophiocolea darainensis* Callm., Phillipson & Nusb.  
[Photo: M. W. Callmänder]

appearance, formed from the remains of the inflorescences from consecutive years, giving rise each year to a flush of densely-congested bracts, and also in having individual flowers and fruits that protrude on short pedicels. However, *O. darainensis* differs from *O. ratovosonii* by its funnel-shaped calyx which is open at the mouth (vs. campanulate and closed around the corolla in *O. ratovosonii*), and by the colour (white with yellow vs. red-brown with yellow-orange) of its tubular (vs. campanulate) corolla (Fig. 4, 5). *Ophiocolea darainensis* is the third species member of the genus known to occur in the Daraina region along with *O. floribunda* s.l. and *O. decaryi*, from which it differs by its flowers being borne on the stems in contracted inflorescences forming woody mounds (vs. flowers on a lax inflorescence, often paniculate, never forming woody mounds in both *O. floribunda* and *O. decaryi*).

*Paratypes.* – **MADAGASCAR. Prov. Antsiranana:** Daraina, forêt d'Antsahabe, 13°13'02"S 49°32'51"E, 910 m, fl., 6.XII.2004, *Gautier & Nusbaumer 4840* (G, TEF, WIS); Daraina, forêt d'Ambilondomba, 13°09'40"S 49°38'46"E, 400 m, 27.I.2004, fr., *Ranirison, Wohlhauser & Nusbaumer 316* (G, TEF, WIS); Vohemar, Daraina, Ambatoharanana, Binara, Forêt de Bemôsy à 2 km au nord-ouest d'Ankijabe, 13°14'41"S 49°37'53"E, 275 m, 01.XI.2005, fl., *Rakotondrajaona & al. 367* (G, MO, P, TAN); Daraina, forêt d'Ambohitsindroina, 13°07'55"S 49°28'31"E, 200 m, 14.I.2006, fl., *Nusbaumer & Ranirison 1937* (G, TEF).



***Ophiocolea pauciflora*** Callm., Phillipson & Razan., **spec. nova** (Fig. 6, 7)

**Typus:** MADAGASCAR. **Prov. Antsiranana:** Montagne d'Ambre, bordure du cratère (Petit lac), 12°32'14''S 43°10'42''E, 1070 m, fl. & fr., 5.XII.2007, *Razanajatovo, Ramandimbimanana & Trigui 6* (holo-: G [G00075949]!; iso-: K!, MO!, P!, TEF!, WIS!).

*Haec species a congeneris inflorescentia 2- vel 3-flora, pedicellis pubescentibus atque corolla tubulari recta purpurea zonis luteis manifestis juxta sinus tubo intus albido distinguitur.*

*Treelet* to 3 m tall. *Leaves* imparipinnate, 33-39(-47) × 16-20(-26) cm (including petiole); petiole 8-10 cm long, ca. 0.2-0.3 cm diam., pubescent, slightly thickened at the base and somewhat amplexicaule, verticillate on the branches, 5-6 leaves per verticil, leaf scars conspicuous on older stems. *Leaflets* 11-15; blade ovate-lanceolate, (3-)9-10(-13) × (1.5-) 3-4(-4.5) cm, chartaceous, puberulent; base attenuate; margins entire; apex acuminate, the acumen 0.5-1 cm long; midrib and secondary veins prominent on the both surfaces, reticulation visible; petiolules 0.5-0.8 cm (lateral leaflets) or up to 4 cm (distal leaflets), puberulent. Rachis straight. *Flowers* born on main stems and branches, 1-4 per inflorescence, on pubescent pedicels (up to 1 cm long). *Calyx* cupuliform, purple, with 5 whitish teeth, puberulent. *Corolla* tubular, with five sub-equal spreading lobes, ca. 2.4 × 1 cm, finely pubescent, with a whitish woolly indument in the throat; tube straight, or rather abruptly narrowed to ca. 1.5 mm diameter in the basal 1/4, purple; lobes rounded, ca. 0.3 × 0.4 mm, with a distinct yellow area adjacent to the sinuses and interior of tube whitish. *Stamens* 4, ca. 9 mm in length, anthers 2 mm, 2-locular; stylus ca. 10-15 mm. *Fruit* an indehiscent pod, pendant, ca. 0.8-1.6 × 25 cm, apiculate, apicule 0.8 cm. *Seeds* ca. 16, sub-ellipsoid, ca. 4-5 × 6-10 mm.

*Distribution and ecology.* – *Ophiocolea pauciflora* is only known from the montane evergreen forests of the Montagne d'Ambre at ca. 1000 m (Fig. 1).

*Conservation status.* – With an EOO of > 1 km<sup>2</sup>, an AOO of 9 km<sup>2</sup>, and only 1 subpopulation in a protected area (Montagne d'Ambre), *O. pauciflora* is assigned a preliminary status of Vulnerable (VU D2).

*Notes.* – *Ophiocolea pauciflora* can be easily recognised by its pauciflorous inflorescence with 1-4 purple flowers on pubescent pedicels (Fig. 7). It is the third species of *Ophiocolea* known to occur on the Montagne d'Ambre along with *O. ambrensis* and *O. velutina*. It differs from these species by its straight tubular corolla (vs. zygomorphic corolla with a curved tube in both *O. ambrensis* and *O. velutina*).

*Paratypes.* – MADAGASCAR. **Prov. Antsiranana:** Montagne d'Ambre, partie nord, 12°30'59''S 49°10'24''E, 1030 m, 10.XII.2006, fl., *Gautier & Chatelain 5093* (G, TEF); Parc National Montagne d'Ambre, [12°32'44''S

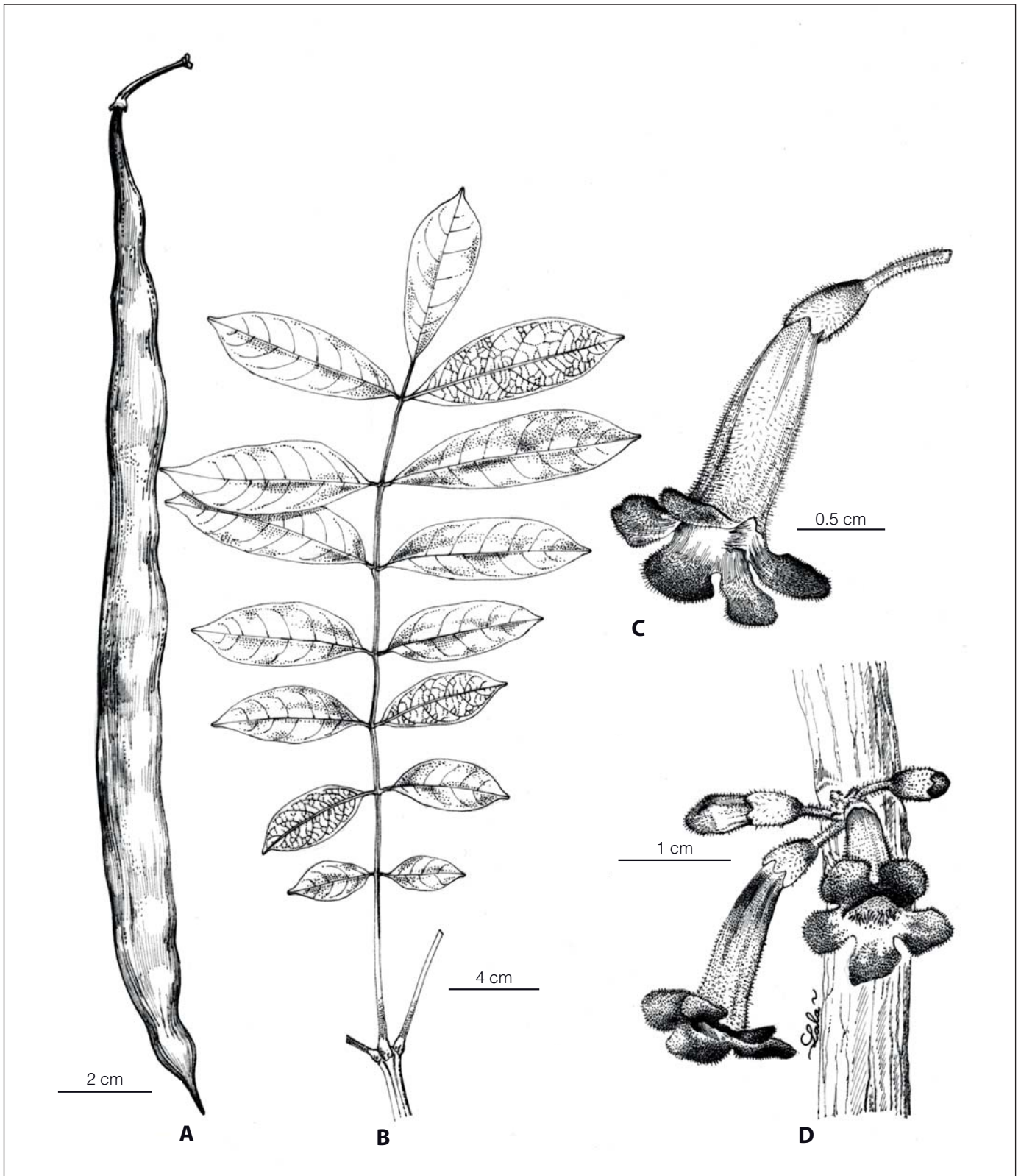
49°10'48''E], 1200 m, 23.V.1974, st., *Gentry 11944* (MO [MO-021878, MO-021879]); Montagne d'Ambre, 12°32'S 49°11'E, 990-1100 m, 16-20.XI.1992, *Malcomber & al. 1790* (G, MO, P, TAN); Montagne d'Ambre National Park, 12°31'26''S 49°10'25''E, 1140 m, 11.XI.2006, *Ranaivojaona & al. 1593* (G, MO, P, TAN); Montagne d'Ambre, env. de la station des Roussettes et du Petit Lac, [12°31'30''S 49°10'30''E], 1000-1100 m, 18-20.XI.1958, *Service Forestier 20032* (P, TEF); Joffreville, Montagne d'Ambre, Roussettes, [12°31'30''S 49°10'20''E], 28.IX.1981, fl., *Service Forestier 32001* (P, TEF).

***Ophiocolea ratovosonii*** Callm. & Phillipson., **spec. nova** (Fig. 8, 9)

**Typus:** MADAGASCAR. **Prov. Antsiranana:** Plateau de l'Ankarana, environs Est d'Antanatsimanaja (Mahamesina), au S. d'Ambondromifehy, s.d., [12°53'00''S 49°12'30''E], fl., *Service Forestier 23181* (holo-: P [P00568724]!; iso-: MO!, TEF!).

*Haec species a congeneris corolla brevi lata campanulata leviter tantum zygomorpha tubo ferrugineo lobis luteoaurantiacis recurvatis distinguitur.*

*Treelet* to 3(-5) m tall, generally unbranched. *Leaves* imparipinnate, 35-46(-52) × 13-22(-28) cm (including petiole); petiole 6-9 cm long, ca. 0.3-0.4 cm diam., glabrous, somewhat thickened at the base, verticillate on the branches, 5-8 leaves per verticil, leaf scars conspicuous on the older stems. *Leaflets* 17-21; blades elliptic, 10-16 × 2.8-4.2 cm, sub-coriaceous, glabrous; base cuneate, sometimes slightly asymmetric; margins entire, sometimes somewhat undulate (at least when dry); apex acute; midrib and secondary veins prominent on abaxial surface, midrib impressed on adaxial surface, secondary veins visible; reticulation hardly visible; petiolule 0.4-0.7(-1) cm, glabrous; rachis straight. *Inflorescence* born on trunk, contracted, developing in the axils of fallen leaves and gradually developing into woody mounds with a nodular appearance that are formed from the remains of the inflorescences from consecutive years, that giving rise each year to a flush of densely-congested bracts, and individual flowers and fruits that protrude on short pedicels; bracts filamentous ca. 2 × 0.2 mm, pubescent. *Calyx* campanulate, 4 × 3-4 mm, sparsely puberulent, pale green, sometimes shading to red-purple in the lower half, with 5 sometimes red-purple tinged veins ending in a short mucro. *Corolla* campanulate, obscurely 2-lipped, with five sub-equal recurved lobes, ca. 14-18 × 6-9 mm, finely and sparsely puberulent with a pale indument outside and inside on the lobes, and with a dense white woolly indument on the palate and extending onto the lower lip; tube straight, with 2 broad longitudinal palatal ridges, abruptly narrowed to ca. 3.5 mm diameter in the basal portion within the calyx, distal portion red-brown; lobes rounded ca. 2-4 × 3-6 mm, orange-yellow with diffuse red-brown venation. *Stamens* 4, ca. 10 mm in length; anthers 2.5 mm, 2-locular; style 13 mm long. *Fruit* unknown.



**Fig. 6.** – *Ophiocolea pauciflora* Callm., Phillipson & Razan. **A.** Fruit; **B.** Leaf; **C.** Flower; **D.** Inflorescence.

[**A-D:** Razanajatovo, Ramandimbimana & Trigui 6, TAN] [Drawing: R. L. Andriamiarisoa]



Fig. 7. – Inflorescence of *Ophiocolea pauciflora* Callm., Phillipson & Razan.  
[Photo: L. Gautier]

**Etymology.** – The species is named in honour of Fidy Ratovoson, a Malagasy botanist working for the Missouri Botanical Garden in Madagascar who has collected intensively in the northern dry forests of Madagascar during a coordinated set of inventory projects conducted under the International Cooperative Biodiversity Group (ICBG) program.

**Distribution and ecology.** – *Ophiocolea ratovosonii* is only known from Madagascar's northern dry forests (Fig. 1).

**Conservation status.** – With only 4 collections known, an EOO of 1,032 km<sup>2</sup>, an AOO of 36 km<sup>2</sup> (calculation following CALLMANDER & al., 2007) and 4 subpopulation, one of which is encompassed in the Protected Area network (Ankarana), *O. ratovosonii* is assigned a preliminary status of "Endangered" (EN B1ab[i, iii], B2ab[i, iii]).

**Notes.** – The flowers of *O. ratovosonii* are unique among the Malagasy members of the genus with their short broad campanulate corolla, which is only weakly zygomorphic, and consists of a red-brown tube and reflexed yellow-orange lobes. This species somewhat resembles *O. darainensis* but the latter species' zig-zag leaf rachis and the shape, colour and indument of its calyx and corolla are quite different

(Fig. 5, 9; see *O. darainensis* above). *Ophiocolea ratovosonii* differs from *O. velutina*, the only other member of the genus known to occur in the dry forests of Madagascar (*O. velutina* extends from Montagne d'Ambre into neighbouring northern dry forests), by its glabrous leaves (vs. pubescent in *O. velutina*) and campanulate (vs. strongly zygomorphic) corolla.

**Paratypes.** – **MADAGASCAR. Prov. Antsiranana:** Masorolava, Mahagaga, partie Nord-Ouest, 12°46'38"S 49°01'28"E, 87 m, 23.IX.2007, *Andriamihajarivo, Ravoahangy, J. Bernard, Salam & Razafindrainibe* 1391 (MO, P, TAN); Chaîne de montagne d'Andrafiarana, aux alentours d'Anjahankely, 12°54'58"S 49°19'59"E, 513 m, 18.XI.2010, fl., *Burivalova & al.* 32 (G [G00303499], MO, P, TEF); Ambilobe, Ambakirano, Behefaka, Ambinanibekona (Anjahana), 10 km au S de Behefaka, 13°21'10"S 49°09'59"E, 65 m, 4.VI.2005, fl., *Ratovoson, Hong-Wa, Leopold & Razafy* 1005 (MO, TAN).

### Lectotypification of two species of *Ophiocolea* occurring in Northern Madagascar

The two *Ophiocolea* species described by Perrier de la Bâthie in 1938 that occur in Northern Madagascar require lectotypification, which we effect below. We list all the available collections for these two very distinctive species, together with conservation threat analyses and some additional comments.

***Ophiocolea decaryi*** H. Perrier in Ann. Mus. Colon. Marseille ser. 5, 6: 32, 33. 1938.

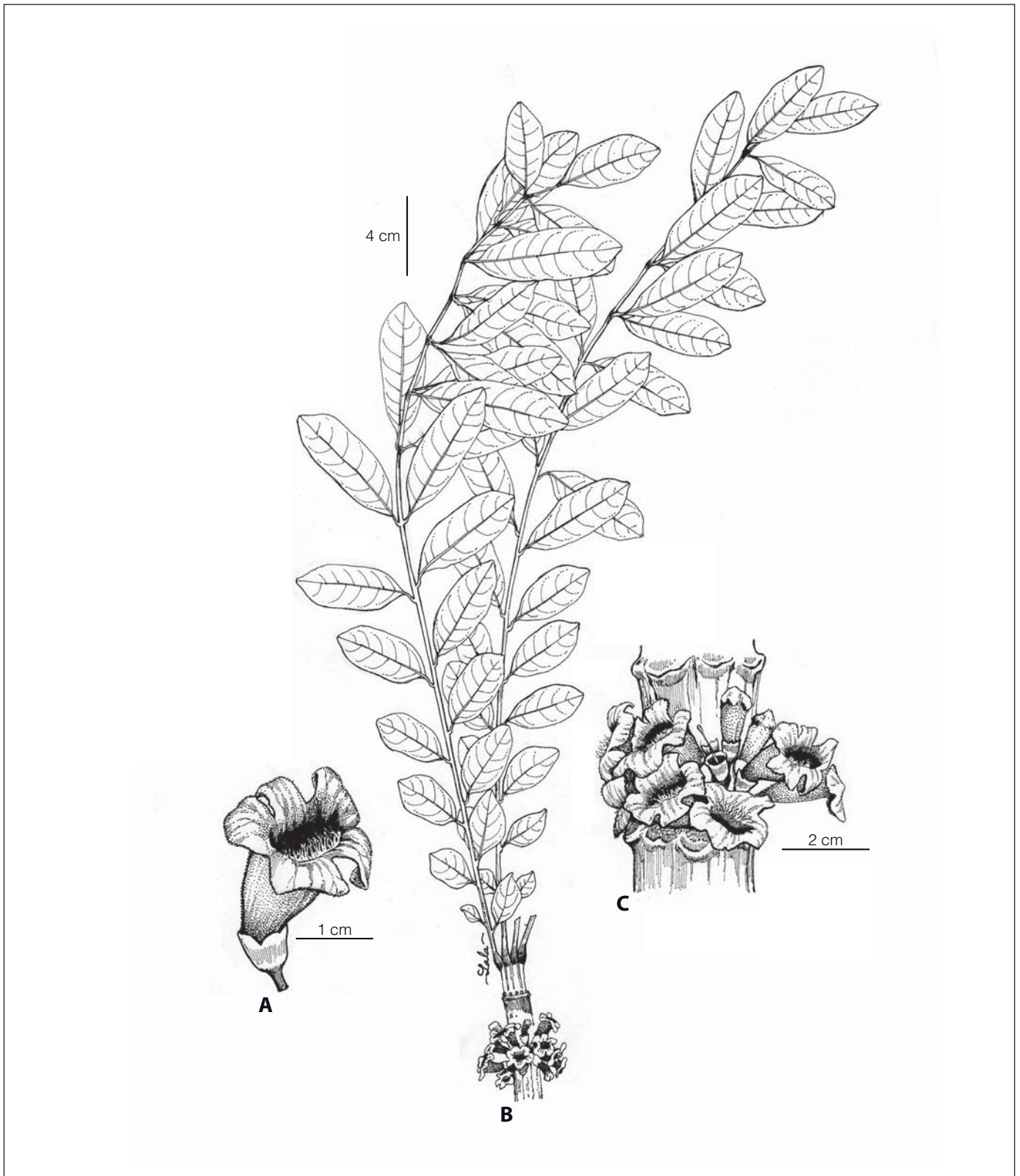
**Lectotypus** (designated here): **MADAGASCAR. Prov. Antsiranana:** Maromandia, Ankaramy, [14°01'S 48°10'E], [200 m], 19.XI.1922, fl., *Decary* 1267 (lecto-: P [P0064 8519]!; isolecto-: P [P00648518, P00648520]!).

**Other material examined.** – **MADAGASCAR. Prov. Antsiranana:** Nord du village de Daraina, forêt d'Ambilondamba, 13°10'S 49°39'E, 400 m, 25.X.2004, fl. & fr., *Callmander & Anselme Be* 266 (G, K, MO, P, TAN); Ambilobe, Anketrabe, forêt de Kalabenono, 13°38'09"S 48°40'08"E, 316 m, 30.X.2005, fl., *Callmander, Jo Vazaha & Malaza* 526 (G, K, MO, P, TAN); Maromandia, Ankaramy, [14°01'S 48°10'E], [200 m], 29.XII.1922, fl & fr., *Decary* 1365 (P); Vohémar, Daraina, Ambatoharana, Analamazava, à 8 km d'Ankijiabe, 13°16'12"S 49°36'40"E, 617 m, 30.X.2005, fr., *S. Randrianasolo & al.* 539 (G, K, MO, P, TAN); Vohémar, Daraina, Ambarilao, Tsaratanana, Ampondrabe, à l'Ouest d'Ambarilao, 12°57'48"S 49°41'57"E, 427 m, 24.IX.2007, fl., *S. Randrianasolo & al.* 606 (MO, P, TAN); Base du massif du Manongarivo, côté W, [14°06'30"S 48°18'00"E], XI.1908, fr., *Perrier de la Bâthie* 10357 (P [2 sheets]); Mont Kalabenono, [13°39'S 48°40'E], VIII.1908, fl., *Perrier de la Bâthie* 10356 (P); Daraina, forêt d'Antsahabe, 13°12'37"S 49°33'29"E, 545 m, 30.X.2005, fr., *Razafitsalama & al.* 747 (G, K, MO, P, TAN); forêt de Kalabenono, chaîne de Galoko, 8 km au Sud-Est d'Anketrabe, 13°37'27"S 48°40'05"E, 340 m, 19.XI.2006, fr., *Razafitsalama, Torze & Toninjama* 1067 (MO, TAN).

**Conservation status.** – With an EOO of 6,484 km<sup>2</sup>, an AOO of 24 km<sup>2</sup>, and 7 subpopulations, 2 of which are within the protected area network (Loky-Manambato), *O. decaryi* is assigned a preliminary status of Vulnerable (VU B1ab[i, iii]2ab[i, iii]).

**Notes.** – *Ophiocolea decaryi* is based on four syntypes (*Decary* 1267, *Decary* 1365, *Perrier de la Bâthie* 10356, *Perrier de la Bâthie* 10357). We choose *Decary* 1267 as the





**Fig. 8.** – *Ophiocolea ratovosonii* Callm. & Phillipson. **A.** Flower; **B.** Flowering branch with leaves; **C.** Inflorescence.

[**A:** Ratovoson & al. 1005, TAN; **B-C:** Service Forestier 15356, TAN] [Drawing: R. L. Andriamiarisoa]



Fig. 9. – Inflorescence of *Ophiocolea ratovosonii* Callm. & Phillipson.

[Photo: Z. Burivalova]

lectotype since it holds the most complete material and was collected by Raymond Decary for whom the species was named. This species is found in the Sambirano region and in the Loky-Manambato area (Daraina complex) (Fig. 1). It can be recognized by its inflorescence borne of the stems bearing small white flowers tinted with yellow in the throat of the corolla (Fig. 10).

***Ophiocolea velutina*** H. Perrier in Ann. Mus. Colon. Marseille sér. 5, 6: 32, 33. 1938.

**Lectotypus** (designated here): **MADAGASCAR. Prov. Antsiranana:** Montagne d'Ambre, [12°27'S 49°12'E], ca. 900 m, X.1932, fr., *Perrier de la Bâthie 18835* (lecto-: P [P00647492]!); isolecto-: P [P00647491, P00647493]!).

*Other material examined.* – **MADAGASCAR. Prov. Antsiranana:** Montagne d'Ambre (partie NO), [12°32'S 49°08'E], 23.XII.1967, st., *Bernardi 12014* (G, P); Montagne d'Ambre NP, 12°31'S 49°08'E, 630 m., 12.II.1992,

fl., *Malcomber & al. 1197* (G, MO, P, TAN); Forêt d'Analamahisto au S d'Anivorano-Nord, [12°48'S 49°15'E], 300 m, XII.1937-I.1938, fl., *Humbert 19071* (TAN, P); Montagne d'Ambre, [12°27'36"S 49°12'00"E], ca. 1000 m, I.1926, fl., *Perrier de la Bâthie 17554* (P [3 sheets]); Forêt d'Analamahitsy, PK 84 de la route Diégo-Ambilobe entre Anivorano Nord et Ambondromifehy, [12°47'S 49°15'E], 16.II.1962, fl., *Service Forestier 22013* (P [2 sheets], TEF); Massif de la Montagne d'Ambre, rivière des Makis, en aval de la Grande Cascade, [12°30'18"S 49°10'24"E], 18-20.XI.1958, fl., *Service Forestier 22050* (P, TEF).

**Conservation status.** – With an EOO of 101 km<sup>2</sup>, an AOO of 45 km<sup>2</sup>, and 2 subpopulation, one encompassed in a protected area (Montagne d'Ambre), *O. velutina* is assigned a preliminary status of Endangered (EN B1ab[i, iii]).

**Notes.** – *Ophiocolea velutina* is based on 2 syntypes (*Perrier de la Bâthie 17554*, *Perrier de la Bâthie 18835*); we have chosen the gathering that comprises both flowering and fruiting material as the lectotype. This species occurs in the



North around the Montagne d'Ambre in dry or transition forests (Fig. 1) and is characterized by its hairy sub-coriaceous leaves and its condensed inflorescences bearing red-tinted flowers marked yellow in the throat.

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Fig. 10. – Inflorescence of *Ophiocolea decaryi* H. Perrier. [Photo: M. W. Callmander]