Towards a Revision of the Genus Vitex L. (Lamiaceae) in Madagascar I : a Distinctive New Species from Northeastern Madagascar

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Towards a revision of the genus Vitex L. (Lamiaceae) in Madagascar I: a distinctive new species from North-eastern Madagascar

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Abstract

CALLMANDER, M. W., P. B. PHILLIPSON & G. E. SCHATZ (2014). Towards a revision of the genus Vitex L. (Lamiaceae) in Madagascar I: a distinctive new species from North-eastern Madagascar. *Candollea* 69: 141-147. In English, English and French abstracts.

A review of the genus *Vitex* L. *(Lamiaceae)* in the context of the "Catalogue of the Vascular Plants of Madagascar" project has led us to discover a number of probable new species and uncover other necessary taxonomic changes for the genus. One particularly distinctive new species, *Vitex lowryi* Callm., Phillipson & G. E. Schatz, is described and illustrated in this article, the first of a series in which we envisage presenting the results of our ongoing investigations on Malagasy *Vitex*. A discussion of the differences between the new species and a group of the morphologically most similar species of the genus in Madagascar is provided, together with photographs showing the key features of each. Finally, a distribution map and a preliminary conservation assessment following IUCN Red List Categories and Criteria are provided for the new species.

Key-words

LAMIACEAE – *Vitex* – Taxonomy – Madagascar – IUCN Red List

Résumé

CALLMANDER, M. W., P. B. PHILLIPSON & G. E. SCHATZ (2014). Vers une révision du genre Vitex L. (Lamiaceae) à Madagascar I: une nouvelle espèce caractéristique du Nord-Est de Madagascar. *Candollea* 69: 141-147. En anglais, résumés anglais et français.

Une étude du genre *Vitex* L. *(Lamiaceae)* dans le cadre du projet «Catalogue des plantes vasculaires de Madagascar» nous a permis de découvrir un certain nombre de probables nouvelles espèces et de changements taxonomiques pour ce genre. Une nouvelle espèce particulièrement distinctive, *Vitex lowryi* Callm., Phillipson & G. E. Schatz, est décrite et illustrée dans cet article, le premier d'une série dans laquelle nous envisageons de présenter les résultats de nos investigations en cours. Une discussion sur les différences entre la nouvelle espèce et un groupe d'espèces du genre morphologiquement similaires à Madagascar est présentée, ainsi que des photographies montrant les principales caractéristiques de chacunes. Enfin, une carte de distribution et une évaluation préliminaire de conservation suivant les Catégories et Critères de la Liste Rouge de l'UICN est présentée pour la nouvelle espèce.

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Introduction

The genus *Vitex* L. *(Lamiaceae)* comprises c. 250 species, and is distinguished within subfamily *Viticoideae* by its palmate leaves (occasionally unifoliolate), its terminal or axillary inflorescence, (4-)5(-6) corolla lobes and a 1-4-seeded fruit (Bramley & al., 2009). This pan-tropical genus, which also has a few species in temperate regions, has its primary centre of diversity in South East Asia – a region for which excellent recent taxonomic revisions are available for the genus (de Kok, 2007, 2008). Madagascar is also an important secondary centre of diversity for the genus and was revised by Moldenke in 1956 for the *Verbenaceae* volume of the "Flore de Madagascar et des Comores", which followed his earlier descriptions of eighteen new species in the series of articles "New and noteworthy plants" in the journal "Phytologia" (Moldenke, 1951, 1953). In the Flora treatment Moldenke accepted 39 species native to Madagascar, to which all but two of the native species are endemic, distributed in a broad diversity of habitats across the entire island. Moldenke also noted the presence of certain introduced species, at least one of which has become naturalised. Subsequently only two additional species have been described from Madagascar: *V. menabeensis* Capuron (1972: 51) and *V. masoalensis* Schatz (1990: 207).

In the course of reviewing the genus *Vitex* for the "Catalogue of the Vascular plants of Madagascar" (Madagascar Catalogue, 2014), MWC and PBP reviewed all of the available specimens in the herbaria at G, MO and P. Only about 190 collections of the genus *Vitex* in Madagascar were available to Moldenke in 1956, whereas today we estimate that a total of at least 1400 have been made (based on data in Tropicos, 2014 and Sonnerat, 2014), representing a 7-fold increase in the specimen-base. Furthermore, it is remarkable that approximately half of the known collections (about 700) have been made in the past 24 years since *V. masoalensis* was described by GES in 1990. This vast amount of additional material permits a much better understanding of the diversity and distribution of the genus in Madagascar than was previously possible and our review for the Madagascar Catalogue has revealed at least 14 new species awaiting description, as well as other necessary taxonomic and nomenclatural changes. Elsewhere we have already published the new combination *V. hispidissima* (Seem.) Callm. & Phillipson based on material that was originally mistakenly referred to the genus *Colea* Meisn. *(Bignoniaceae)*, thus providing the correct name for the species referred to previously as *Vitex congesta* Oliv. (Phillipson & Callmander, 2013).

In this first in a series of planned articles focusing on the Malagasy *Vitex*, we describe a distinctive new species from northeastern Madagascar, and provide a discussion of its morphological affinities and a risk of extinction assessment following the IUCN Red List Categories and Criteria (IUCN, 2012). Calculations of the "Area of Occupancy" (AOO), "Extent of Occurrence" (EOO) and number of subpopulations were based on the methods presented in Callmander & al. (2007).

Taxonomy

Vitex lowryi Callm., Phillipson & G. E. Schatz, **spec. nova** (Fig. 1, 2A).

Typus: Madagascar. Prov. Antsiranana: Tsihomanaomby massif, ca. 23 air-km NW of Sambava, W of Ambavala (PK 269 on Sambava-Vohémar road, RN 5a), 14°06'08''S 50°02'46''E, 150 m, 7.V.2000, *Lowry & al. 5178* (holo-: MO-798818!; iso-: P [P04396770]!, TAN!).

Haec species a congeneris madagascariensibus foliolis abaxialiter secus venas necnon petiolis petiolulisque indumento ferrugineo-aurantiaco villoso longo persistente copioso vestitis atque indumento longo densissimo pallide aureo inflorescentiam floremque tegente bracteolas brevissimas sicut lobos calycinos occultante distinguitur.

Monocaulous *treelet* 4-15 m tall. *Leaves* palmately compound, 3-5-foliolate, with a generally persistent, long, villous, rusty-orange indument; leaflets obovate to elliptic, sub-sessile to shortly petiolulate, chartaceous, the largest (median) leaflets 20-35 × 8-15 cm, the blades undulate, dark green above and olive green below *in vivo;* base attenuate; apex rounded; margin entire; abaxial surface covered by a dense rusty-orange indument on the veins, with similar but shorter and more sparse indument between the veins; adaxial surface sometimes with sparse and apparently caducous rusty-orange indument on the midrib and main veins, rugose between the veins; midrib and main veins prominent below and somewhat impressed above; petiole stout and stiff, 7-11 cm long. *Inflorescence* a much-branched but highly condensed cyme, borne on the trunk and in the axils of leaves, completely covered by a very dense silvery to golden sericeous indument; cyme-branches up to 2-3 cm long, c. 2 mm in diam. *Flower* c. 3 cm long, sub-sessile, subtended by a very short bracteole obscured by the dense indument. *Calyx* cupuliform, the lobes reduce to a minute apical tooth, c. 6-8 × 8-10 mm, 5-lobed, sericeous. *Corolla* zygomorphic, broadly funnel-shaped, c. 25 mm long, 25 mm wide and 30 mm high, 5-lobed; throat c. 5 mm diam. at the base, c. 15 mm diam. at the mouth; inner surface glabrous, pale yellow sometimes lightly tinged dull pink towards the margin; outer surface densely pubescent, pale yellow or dull pink; upper pair of lobes fused, 10 × 10 mm, free for the distal 1/3, the free portions triangular, apices broadly acute; lateral lobes 10 × 6 mm, triangular, apices shortly rounded; lower lobe 10 × 5 mm, lingulate, with a rounded apex. *Stamens* 4, curved and appressed to the upper lobes; filaments c. 22 mm long, the proximal 7 mm villous, exserted c. 6 mm, pale yellow, the exserted portion sometimes tinged dull pink;

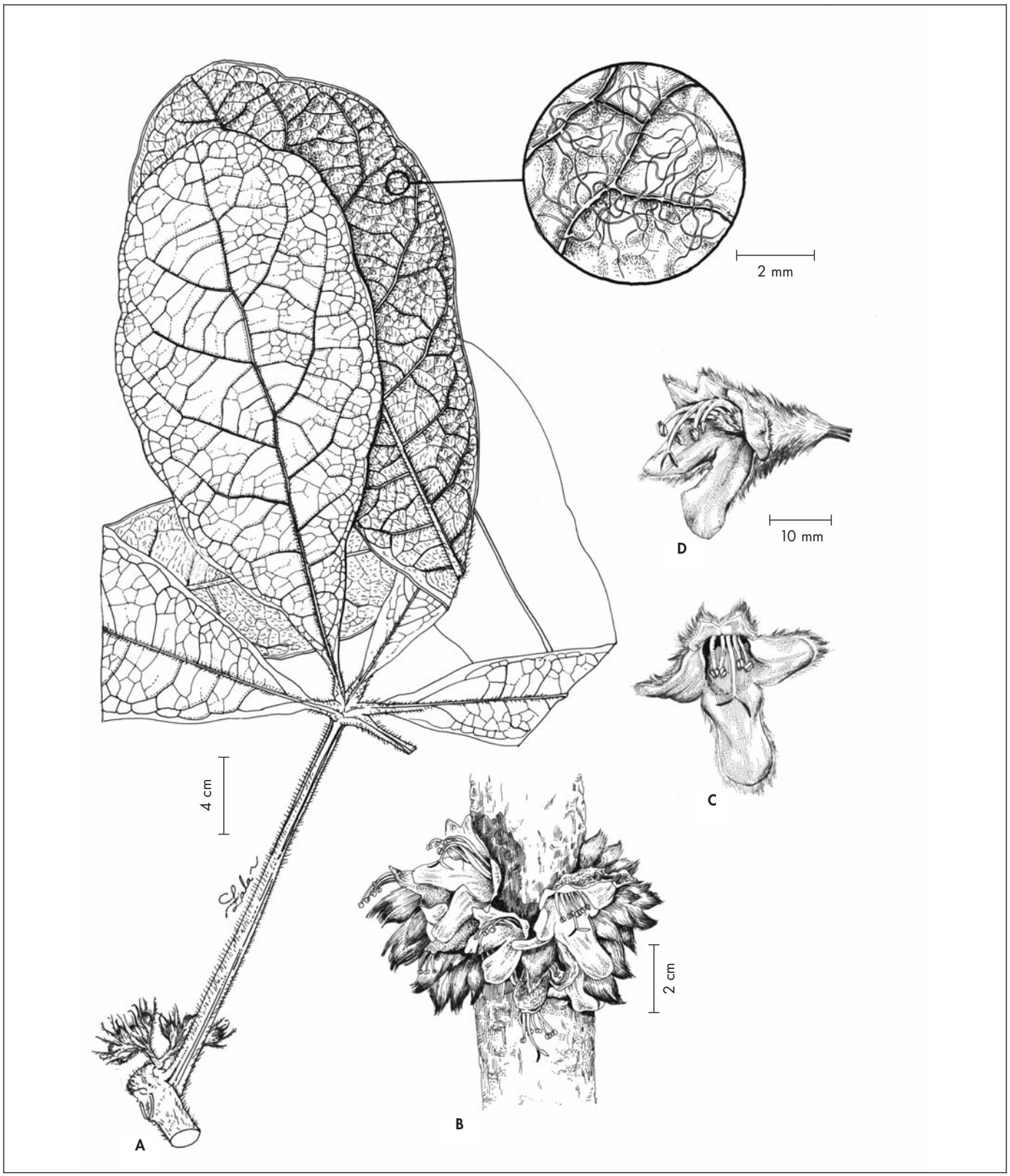

Fig. 1. – *Vitex lowryi* Callm., Phillipson & G. E. Schatz. **A.** Leaf, with detail of indument on abaxial surface inset; **B.** Inflorescence; **C.** Flower (front view); **D.** Flower (three-quarter view). [*Lowry & al. 5178*, TAN, P, photos] [Drawing: R. L. Andriamiarisoa]

anthers compressed ovoid, c. 2 × 1 mm long, purple with pale yellow pollen. *Style* curved and appressed to the upper lobes, 25-35 mm long, bifid for the distal 3 mm. *Fruit* unknown.

Observations. – *Vitex lowryi* falls in a group with four other species in Moldenke's identification key (Moldenke 1956: 76, couplet 45), characterized by having large 3-7-foliolate palmately compound leaves, with the leaflet length to width ratio of 2-4:1; flowers with tubular (vs. bilabiate) corollas, borne on compact dense, mostly cauliflorous inflorescences. A new identification key to this group of *Vitex* and other related species will be provided in a forthcoming publication as several other species still need to be recognized. Among these, *V. lowryi* is easily distinguished in flower from *V. hispidissima* (= *V. congesta*) and *V. coursii* Moldenke (= *V. pulchra* Moldenke) by its short broadly funnel-shaped (vs. long curved cylindric) corolla, and from *V. waterlotii* Danguy, by the curved stamens and style appressed to the upper lip of the corolla and slightly exserted (vs. the stamens and style straight, patent, and well exserted). It is most similar to *Vitex hirsutissima* Baker which has a similarly shaped corolla, stamens and style, but it differs by the extremely dense, long, pale golden indument on the inflorescence and outer parts of the flower which obscures the very short bracteoles and calyx lobes (vs. less dense, shorter, red-brown indument, with the longer bracteoles and calyx lobes clearly visible). *Vitex lowryi* also differs from *Vitex hirsutissima* by its copious, persistent, long, villous, rusty-orange indument on the veins of the abaxial surface of the leaflets, the petioles, and the petiolules (vs. caducous, short, sparse, appressed, red-brown indument on the veins of the abaxial surface of the leaflets, and short, very sparse, appressed, pale grey indument on the petioles, and the petiolules). *Vitex masoalensis* also belongs to this group of closely related species, but is easily distinguished from *V. lowryi* (and *V. hirsutissima*), with which it shares the short, funnel-shaped corolla and curved stamens and style appressed to the upper lip of the corolla, by its massive, sessile leaves. A set of representative photographs for these six species is given in Figure 2.

Distribution and ecology. – *Vitex lowryi* is endemic to north-eastern Madagascar. It is known only from three collections in remnant patches of low elevation (c. 100-300 m) forest between Sambava and Vohemar: on the Tsihomanahomby Massif, Analalava forest near Antsatoby and a forest patch just south of Antsirabe Nord (Fig. 3). The new species is not sympatric with any of the morphological similar species: *V. waterlotii* is confined to dry forest on limestone in the far north; *V. hirsutissima*, *V. hispidissima* and *V. masoalensis* occur on the Masoala Peninsula and around the Baie d'Antongil area, while *V. coursii* occurs further south in escarpment forest at mid-elevation near Moramanga and Lac Alaotra.

Etymology. – This plant is named in honor of our friend and colleague Porter P. Lowry II who collected the type specimen. Pete first visited Madagascar in 1986 during the early days of Missouri Botanical Garden's Madagascar Programme, in which he has played a key role ever since. He has collected more than 2,000 collections in Madagascar and is also responsible for many excellent plant photographs, including several different species of *Vitex*. His specimens, field description and photographs of the species described here provided us with important information.

Conservation status. – With an EOO of 207 km², an AOO of 27 km² and three subpopulations, none situated within the protected area network, *Vitex lowryi* is assigned a preliminary status of "Endangered" [EN B1ab(i,iii,iv,v)+2ab(i,iii,iv,v)] following IUCN Red List Categories and Criteria (IUCN, 2012). The new species is known from only three locations in isolated evergreen lowland forest remnants. The available habitat of the species is severely threatened, and is expected to diminish significantly in the future, in which case *V. lowryi* may become "Critically Endangered".

Paratypi. – **Madagascar. Prov. Antsiranana:** env. S Antsirabe-Nord, sur la nouvelle route Vohémar-Sambava, [14°00'11"S 49°57'47"E], 18-21.X.1966, *Service Forestier 24890* (G, MO, P [P04396771], TEF); Vohémar, Vohimarina, Fanambana, Antsatoby, forêt de transition d'Analalava, 13°37'32"S 49°59'42"E, 1.VII.2007, *Rasoafaranaivo 173* (MO, P [P00853158], TAN).

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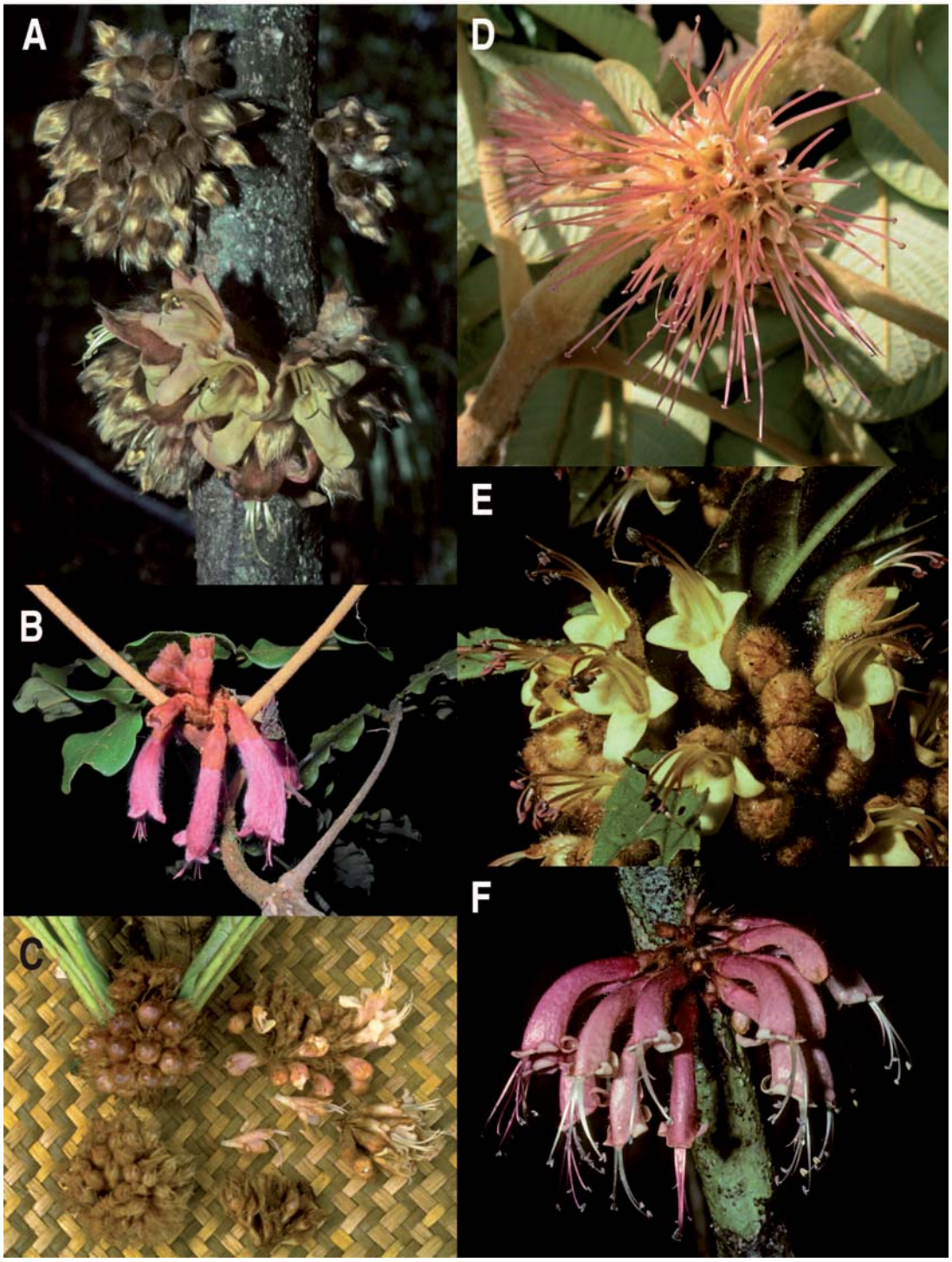

Fig. 2. – Inflorescences of *Vitex* L. species from Madagascar. **A.** *Vitex lowryi* Callm., Phillipson & G. E. Schatz; **B.** *Vitex coursii* Moldenke; **C.** *Vitex masoalensis* G. E. Schatz; **D.** *Vitex waterlotii* Danguy; **E.** *Vitex hirsutissima* Baker; **F.** *Vitex hispidissima* (Seem.) Callm. & Phillipson.

[**A:** *Lowry & al. 5178*; **B:** *Antilahimena 8437*; **C:** *Schatz 1353*; **D:** *Randrianaivo* 1099; **E:** *Lowry 4481*; **F:** *Lowry 4340*] [Photos: **A, E-F:** P. P. Lowry II; **B:** P. Antilahimena; **C:** G. E. Schatz; **D:** R. Randrianaivo].

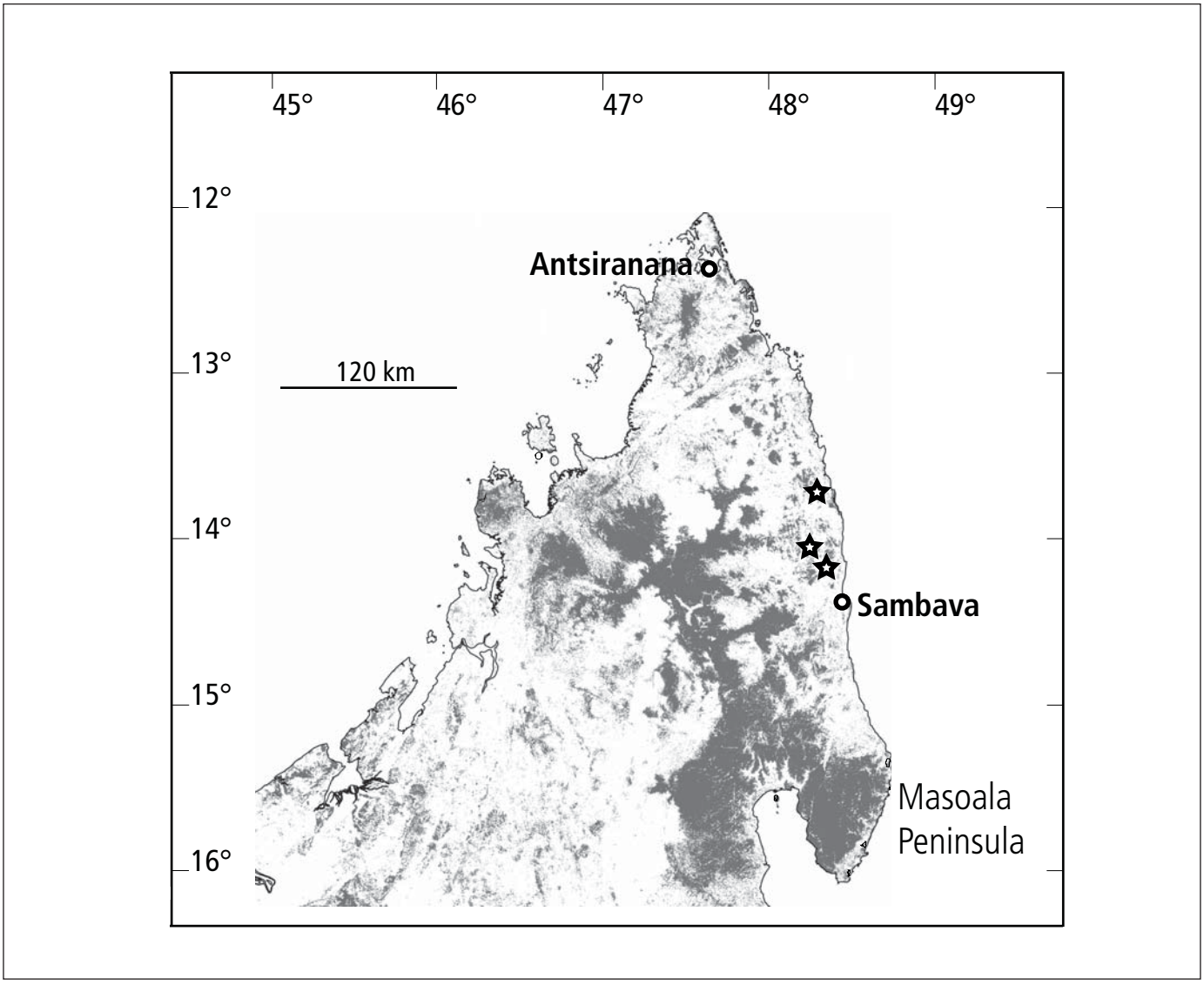

Fig. 3. – Map of northern Madagascar showing the distribution of *Vitex lowryi* Callm., Phillipson & G. E. Schatz (stars), plotted on a map of forest cover in 2000 (grey) following Harper & al. (2007).

References

Bramley, G. L.C., F. Forest & R. P. J de Kok (2009). Troublesome tropical mints: re-examining generic limits of Vitex and relations (Lamiaceae) in South East Asia. *Taxon* 58: 500-510.

Callmander, M. W., G. E Schatz, P. P. Lowry II, M. O. Laivao, J. Raharimampionona, S. Andriambololonera, T. Raminosoa & T. Consiglio (2007). Application of IUCN Red List criteria and assessment of Priority Areas for Plant Conservation in Madagascar: rare and threatened Pandanaceae indicate sites in need of protection. *Oryx* 41: 168-176.

Capuron, R. (1972). Notes sur les Verbénacées de Madagascar. *Adansonia* ser. 2, 12: 45-53.

de Kok, R. P. J (2007). The genus Vitex L. (Lamiaceae) in New Guinea and the South Pacific Islands. *Kew Bull.* 62: 587-603

de Kok, R. P. J (2008). The genus Vitex (Labiatae) in the Flora Malesiana region, excluding New Guinea. *Kew Bull.* 63: 17-40

Harper, G. J., M. K. Steininger, C. J. Tucker, D. Juhn & F. Hawkins (2007). Fifty years of deforestation and forest fragmentation in Madagascar. *Environ. Conserv. 34*: 325-333.

IUCN (2012). *IUCN Red List Categories and Criteria: Version 3.1.* 2nd edition. IUCN Species Survival Commission, Gland & Cambridge.

Madagascar Catalogue (2014). *Catalogue of the Vascular plants of Madagascar*. Missouri Botanical Garden, Saint-Louis & Antananarivo [http://www.efloras.org/madagascar].

Moldenke, H. N. (1951). Notes on new and noteworthy plants, XII. *Phytologia* 3: 406-447.

Moldenke, H. N. (1953). Notes on new and noteworthy plants, XVI. *Phytologia* 4: 285-294.

Moldenke, H. N. (1956). Verbenacées. *In:* Humbert, H. (ed.), *Fl. Madagascar Comores* 174.

Phillipson, P. B. & M. W. Callmander (2013). A clarification of B. C. Seeman's Malagasy species of Colea Meisn. (Bignoniaceae). *Candollea* 68: 67-71.

Schatz, G. E. (1990). A new Vitex (Verbenaceae) from Madagascar. *Ann. Missouri Bot. Gard.* 77: 207-208.

Sonnerat (2014). *Base de données de collections du Muséum national d'Histoire naturelle.* MNHN, Paris [http://science.mnhn.fr/institution/mnhn/collection/p/item/search/form].

Tropicos (2014). Missouri Botanical Garden. Saint-Louis [http//www.tropicos.org/].