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Taxonomic revision of *Phyllanthus* (Phyllanthaceae) in Madagascar and the Comoro Islands III: subgenera *Swartziani*, *Afroswartziani* and *Emblica*

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Summary. The third part of the revision of the genus *Phyllanthus* L. (Phyllanthaceae) in Madagascar and the Comoro Islands treats the subgenera *Swartziani* comb. & stat. nov., *Afroswartziani* subgen. nov. and *Emblica*. Taxonomic history of the subgenus *Phyllanthus* is given and its circumscription is revised. *Phyllanthus* subgenus *Afroswartziani* subgen. nov. comprises thirteen species. One species *P. ankazobensis* is described as new to science. *P. vatovaviensis* and *P. madagascariensis* var. *kalambatitrensis* are validly published by this paper. Identification keys, descriptions and species notes (habitat, distribution and threats) are provided. Distribution maps and IUCN conservation assessments are provided for all species and varieties.

Key Words. IUCN conservation assessments, lectotype, new species, new subgenera, *Phyllanthus ankazobensis*, *Phyllanthus vatovaviensis*.

Introduction

This paper is the third part of our series of revisions of the genus *Phyllanthus* L. in Madagascar and the Comoro Islands. In the first part (Ralimanana & Hoffmann 2011) we gave a general synopsis of the subgenera and sections occurring on these islands and dealt with the subgenera *Isocladus* G. L. Webster, *Betsileani* (Jean F. Brunel) Ralim. & Petra Hoffm., *Kirganelia* (A. Juss.) G. L. Webster and *Tenellanthus* Jean F. Brunel. In the second part (Ralimanana & Hoffmann, submitted) we treated subegenera *Anisonemoides* (Jean F. Brunel) Ralim. & Petra Hoffm. and *Menarda* (Müll. Arg.) Ralim. & Petra Hoffm. (= both treated within *Bruneliathus* Ralim. & Petra Hoffm., subgen. nov. ined. (Ralimanana & Hoffmann 2011)). In the present paper we review the circumscription of subgenus *Phyllanthus* sensu Webster (1956 – 1958) which has recently been shown to be non-monophyletic in molecular phylogenetic studies (Kathriarachchi *et al.* 2006). In the first modern systematic treatment of the genus, his monograph of West Indian *Phyllanthus*, Webster (1956 – 1958) recognised four sections within subgenus *Phyllanthus*. They are *Callitrichoides* G. L. Webster, *Cyclanthera* G. L. Webster, *Phyllanthus* and *Urinaria* G. L. Webster. Webster divided section *Phyllanthus* into three subsections: *Niruri* G. L. Webster, *Swartziani* G. L. Webster and *Pentaphylli* G. L. Webster. He pointed out that subgenus *Phyllanthus* included the majority of the various herbaceous and undershrub representatives, it was also a heterogenous group and possibily polyphyletic.

When Brunel (1987) revised the subgenus *Phyllanthus* in tropical Africa, he proposed wide-ranging changes to the classification. He moved the monospecific Cuban section *Callitrichoides* into a new subgenus *Microglochidion* (Müll. Arg.) Jean F. Brunel, and transferred the West Indian section *Cyclanthera* to subgenus *Xylophylla* (L.) Pers. In subgenus *Phyllanthus*, Brunel (1987) retained only two of Webster's sections which are *Phyllanthus* (containing the type of the genus, neotropical *P. niruri* L., and one African species *P. benguelensis* Müll. Arg.) and *Urinaria* (containing *P. urinaria* L.). All other species of Webster's subgenus *Phyllanthus* were placed in section *Anthophyllus* Jean F. Brunel which he divided into four subsections: *Swartziani*, *Pentaphylli*, and two new subsections *Callidisci* Jean F. Brunel and *Odontadenii* Jean F. Brunel & Jacq. Roux. He proposed several other, pr edominantly African sections to be included in subgenus *Phyllanthus*.

According to recent molecular data (Kathriarachchi *et al.* 2006), African, Madagascan and some Asian representatives of section *Phyllanthus* subsection *Swartziani* sensu Webster, are grouped in a strongly supported clade that is genetically divergent from the

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clade containing the type species of subsection *Swartziani*, *P. amarus* Schumach. & Thonn. and *Reverchonia* A. Gray. Both groups can be circumscribed by the morphological characters listed below. Based on both the morphological and genetic divergences, we here raise the neotropical subsection *Swartziani* (typified by the pantropical weed *P. amarus*) to subgeneric level, and create a new subgenus *Afroswartziani* Ralim. & Petra Hoffm. subgen. nov. to accomodate the paleotropical species. More African species need to be examined with molecular methods to establish whether other sections that were proposed by Brunel (1987) should be supported, but the inclusion of *Phyllanthus hutchinsonianus* S. Moore (a member of section *Praephyllanthus* Jean F. Brunel) in the *Afroswartziani* clade makes this at least partially doubtful. The herbaceous subgenus *Swartziani* has mainly bisexual cymules, membranous cataphylls and cataphyllary stipules. In contrast, *Afroswartziani* species are mostly shrubs or small trees and very rarely herbs but woody at the base. They have unisexual cymules (except very rarely bisexual in *P. ampandrandavae* Leandri), cataphylls and cataphyllary stipules that are mostly subcoriaceous to coriaceous. Thirteen endemic Madagascan species of subgenus *Afroswartziani* are treated in this paper. Of those, *Phyllanthus lokohensis* Leandri and *P. madagascariensis* Müll. Arg. were included in the molecular phylogenetic analyses of Kathriarachchi *et al.* (2006). The other members of clades F and G in Kathriarachchi *et al.* (2006) included in those analyses (all from continental Africa or Asia) were *P. debilis* Klein ex Willd., *P. gossweileri* Hutch., *P. hutchinsonianus* S. Moore, *P. kaessneri* Hutch., *P. mannianus* Müll. Arg., *P. rheedii* Wight and *P. sepialis* Müll. Arg. The only member of subgenus *Swarziani* occurring in Madagascar and the Comoro Islands is *P. amarus*, an introduced weed of American origin.

With 1269 accepted species (Govaerts *et al.* 2000), *Phyllanthus s.l.* is the largest genus in the *Phyllanthaceae*. It is known as a taxonomically "difficult" genus due to its complexity and morphological diversity. Circumscription of *Phyllanthus* has been widely discussed (Wurdack *et al.* 2004; Kathriarachchi *et al.* 2006; Pruesapan *et al.* 2012). Wurdack *et al.* (2004) demonstrated that *Phyllanthus* is polyphyletic using the *rbcL* region. Katriarachchi *et al.* (2006) was the first study to present a broad molecular analysis of *Phyllanthus* and its allies and to evaluate the existing classification of *Phyllanthus*. They found that *Breynia* J. R. Forst. & G. Forst, *Glochidion* J. R. Forst. & G. Forst, *Reverchonia* A. Gray and *Sauropus* Blume are nested within *Phyllanthus* and should be combined with it, thus proposing an expansion of the generic concept. Pruesapan *et al.* (2012) argued that the number of species per genus analysed by Kathriarachchi *et al.* (2006) was insufficient to support their findings. Pruesapan *et al.* (2012) support the maintenance of *Breynia* and *Glochidion* at generic level and the splitting of *Phyllanthus* into smaller genera, backing up their argument with a new analysis of nuclear and chloroplast markers.

Lack of molecular data still remains problematic for Madagascan *Phyllanthus*. Kathriarachchi *et al.* (2006) have included only two of the 13 species of the subgenus *Afroswartziani* presented in this paper, and none of the seven Madagascan *Gomphidium*. This data is insufficient to support the recognition of the subgenera in this paper at generic rank. Therefore we focus on the classification change at infrageneric level.

The last taxon treated here is *Phyllanthus* subgenus *Emblica* section *Urinaria*. This group was classified in subgenus *Phyllanthus* by both Webster (1956 – 1958) and Brunel (1987). Although the morphology of these pantropical herbaceous weeds (invasive from Asia) otherwise fits relatively well into subgenus *Phyllanthus*, some morphological characters support one of the most surprising results of Kathriarachchi *et al.* (2006, see there for more discussion): that *P. urinaria* is most closely related to a group of Asian tree species that include the well-known *P. emblica* L. (clade N). We therefore here transfer section *Urinaria* from subgenus *Phyllanthus* to subgenus *Emblica*.

Materials and methods

The revision presented here is based on studies of herbarium material, spirit collections, and field observations. Field work was conducted in different areas of Madagascar. Apart from our own collections, herbarium material of *Phyllanthus* was consulted at BM, K, LINN, P and the national herbaria in Madagascar (TAN and TEF). The descriptions and measurements of all vegetative and floral characters are mostly based on dried specimens or softened plant parts, supplemented by field observations. Distribution maps and conservation assessments were obtained using GIS (Arcview 3.3) and applying IUCN criteria (IUCN 2001). The floristic domains here referred to are as defined by Humbert (1965).

Taxonomic treatment

I. Phyllanthus subgen. **Swartziani** (*G. L. Webster*) *Ralim. & Petra Hoffm.*, **comb. & stat. nov.**

http://www.ipni.org/urn:lsid:ipni.org:names:77134143-1

Subgenus *Phyllanthus* section *Phyllanthus* subsection *Swartziani* G. L. Webster (1955: 53). Type species: *Phyllanthus amarus* Schumach. & Thonn.

Monoecious *herbs* with phyllanthoid (pinnatiform) or non-phyllanthoid (phyllotaxy spiral) branching. Brachyblasts absent. Cataphylls and cataphyllary stipules thinly membranous. Stipules entire or irregularly

toothed. *Leaves* alternate. *Inflorescences* on leafy branches, axillary, bisexual, 1 – 7-flowered. Tepals (4 –)5 – 6. Disc free glands in male flowers, annular in female flowers (but described as discrete glands for *Phyllanthus abnormis* Baill. by Johnston & Warnock 1963; Webster 1970). *Stamens* 2 – 3; filaments entirely or partially fused into a column; anthers entirely or partially fused, dehiscing obliquely to less commonly horizontally; pollen 3-colporate, reticulate (Webster 1956 – 1958; Brunel 1987). *Ovary* 3-locular, smooth (sometimes slightly rugose in *P. amarus*); styles free, bifid; stigmas obtuse (somewhat dilated in *Reverchonia* according to Webster & Miller (1963)). *Fruits* dehiscent; tepals persistent, not accrescent in fruit. *Seeds* smooth or finely striate longitudinally.

This description includes the North American *Reverchonia arenaria* A. Gray, *Phyllanthus abnormis* and the pantropical weed *P. amarus*, which are the only taxa so far known to belong definitely to this subgenus (= clade E in Kathriarachchi *et al.* 2006).

1. Phyllanthus amarus *Schumach. & Thonn.* (Schumacher 1827: 421).

Phyllanthus niruri L. var. *amarus* Leandri (1958: 73). Type: Africa, Guinea, *Thonning* 4 (holotype fragment, K!; C).

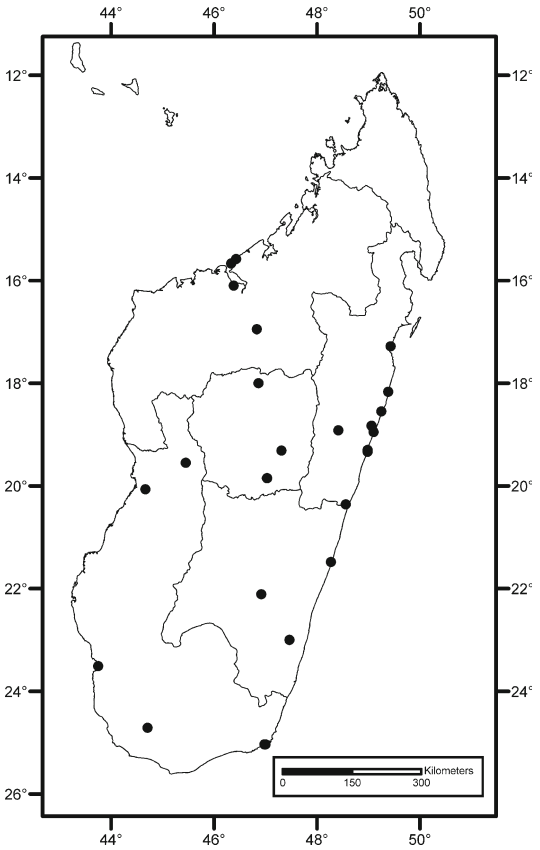
Phyllanthus amarus Schumach. & Thonn. var. *baronianus* Leandri (1939: 184), **nom. invalid.** *Phyllanthus niruri* L. var. *baronianus* (Leandri) Leandri (1958: 74).

Phyllanthus niruroides Müll. Arg. var. *madagascariensis* Leandri (1939: 185), **nom. invalid.**

Monoecious *herbs* 10 – 45 cm tall. Branching pinnatiform; orthotropic branches terete, 1 – 3 mm in diam., striate, glabrous. Cataphylls triangular, 1 – 2 × 0.3 – 0.4 mm, brown yellowish or reddish, thinly membranous, entire, glabrous. Cataphyllary stipules triangular, 1 – 1.8 × 0.3 – 0.8 mm, yellowish brown or reddish, thinly membranous, entire, glabrous. Plagiotropic branches solitary or in fascicles of two, terete, 4 – 12 cm long, 0.4 – 0.5 mm in diam., striate, glabrous. Stipules persistent, triangular or linear, 1 – 1.2 × 0.2 – 0.3 mm, membranous, entire, glabrous, green or reddish when fresh. *Leaves* 12 – 27 per branch. Internodes 0.7 – 2.8 mm long. Petioles terete, 0.3 – 0.5 × c. 0.1 mm, glabrous. Leaf blades elliptic to oblong, 3 – 11 × 3 – 4 mm, 1 – 1.7 times longer than wide, obtuse or rounded at the base, rounded or obtuse at the apex, membranous, entire, glabrous on both sides, green or reddish green adaxially, light green or greyish green abaxially when fresh; midvein flattened adaxially, prominent abaxially; secondary veins 4 – 5 pairs, indistinct adaxially, flattened abaxially. *Inflorescences* bisexual, consisting of 1 – 2 male flowers. Bracts linear or triangular, grouped in tufts of 3 – 6 mainly sterile bracts, 0.3 – 0.4 × 0.2 – 0.3 mm, entire, glabrous. *Male flowers* 0.4 – 0.7 × 1 – 1.2 mm. Pedicels 0.6 – 1.2 × c. 0.2 mm, glabrous. Tepals 5 (very rarely 6), subequal, elliptic or ovate, 0.4 – 0.7 × 0.2 – 0.4 mm, obtuse to acute, membranous, glabrous on both sides, margin entire, hyaline for $^1/_4$ of total tepal width on each side, veins unbranched. Disc glands 5 (very rarely 6), globose, c. 0.1 mm in diam., smooth. Stamens 3 (rarely 2), filaments fused into a column; column terete, 0.2 – 0.3 × 0.1 – 0.2 mm; anthers partially or entirely fused, ovoid or elongate (sometimes reduced to one or two functional anthers), c. 0.1 mm long, dehiscing obliquely to less commonly horizontally. *Female flowers* 0.7 – 1 × 0.8 – 1 mm. Pedicels 1 – 1.3 × 0.1 – 0.3 mm, glabrous. Tepals 5 (or very rarely 6), equal, elliptic to obovate, 0.8 – 1 × 0.3 – 0.6 mm, acute, membranous, glabrous on both sides, margin entire, hyaline for $^1/_4$ of total tepal width on each side, veins unbranched. Disc lobed, smooth. Ovary 3-locular, globose, 0.4 – 0.6 × 0.4 – 0.5 mm, smooth or slightly rugose, glabrous; styles free, bifid for c. $^1/_2$ of their length, terete, 0.1 – 0.2 mm long; stigmas obtuse. *Fruits* globose or depressed globose, 1.5 – 2 × 1.5 – 2 mm; fruiting pedicels 1.5 – 2 × 0.1 – 0.3 mm, glabrous; columella 0.6 – 1 mm long. *Seeds* 1 – 1.5 × 0.8 – 1 mm, finely striate longitudinally.

DISTRIBUTION. This species originated in America, pantropical by introduction; in Madagascar distributed in eastern, central, western and southern floristic domains. Map 1.

SPECIMENS EXAMINED. MADAGASCAR. s.loc., *Baron* 1611 (P); *Baron* 4886 (K, P); *Baron* 4081 (K); *Baron* 6715 (P); *Chapelier* s.n. (P); alt. 1200 m, 1 March 1945, *Cours* 2701 (P); 11 Aug. 1932, *Decary* 10268 (P); *Herbier du Jardin Botanique de Tananarive* 3987 (P); *Humblot* 96 (P); vers 1882, *Lanz* s.n. (P); *Leandri* 27264 (P); *Perrier de la Bâthie* 9538 (P); *Perrier de la Bâthie* 9866 (P); *Du Petit Thouars* s.n. (P). Antananarivo. Manankazo, 2 Jan. 1942, *Decary* 17093 (P); Ambatolampy, Station forestière de Manjakatompo, Anosiarivo, 19°19'09"S, 47°19'01"E, alt. 1800 m, 26 Jan. 2004, *Ralimanana* 434 (K, TAN); Antsirabe, Jan. 1914, *Perrier de la Bâthie* 9847 (P). Fianarantsoa. Befotaka, Farafangana, 11 Aug. 1926, *Decary* s.n. (P); Mananjary, s. dat. 1909, *Geay* 7029 (P); & Mananjary, s. dat. 1909, *Geay* 7030 (P); Andringitra, 22°7'20"S, 46°55'22"E, alt. 1440 m, 24 March 2004, *Ralimanana* 524 (K, MO, P, TAN); Ankatafana, forêt d' Ambahisosotra, 21°29'12"S, 48°16'20"E, 19 June 2004, *Ranaivojaona* 820 (TAN); Angalapena Betsileo, *Scott Elliott* 2157 (P). Antsiranana. Nosy be, May 1847, *Boivin* 2190 (P); Sambava, Bemanevika, 14°07'36"S, 50°09'26"E, alt. 3 m, 7 June 2013, *Rakotonasolo et al.* 2225 (K, TAN). Mahajanga. Ste Marie de Marovoay, 29 Aug. 1911, *Kaudre* s.n. (P); Amborovy, 18 May 1965, *Peltier & Peltier* 5266 (P); Aux



Map 1. Distribution of *Phyllanthus amarus*.

environs de Maevatanana, July 1900, *Perrier de la Bâthie* 274 (P); Parc National d'Ankarafantsika, 16°19'09"S, 46°48'08"E, alt. 120 m, 22 Oct. 2002, *Ralimanana et al.* 242 (K, TAN); Station forestière Antsanitia, 15°35'20"S, 46°25'56"E, alt. 19 m, 23 Oct. 2002, *Ralimanana* 250 (G, K, MO, P, TAN). Toamasina. Vicinity of Brickaville, 18°50'S, 49°04'E, alt. 100 m, 1 May 1983, *d'Arcy* 15253 (MO); Station Agricole de Lac Alaotra, 24 Aug. 1937, *Boiteau* 2708 (P); Analamazaotra, Oct. 1939, *Boiteau* 4246 (P); Toamasina, 15 Jan. 1989, *Brunel* 12670 (P); Aux environs de Toamasina, May 1989, *Brunel* 12671 (P); Ambila, 29 April 1928, *Decary* s.n. (P); Ambila, 29 April 1928, *Decary* 6407 (K); Ambila, alt. 3 – 9 m, 9 Oct. 1946, *Cours* 2893 (P); Vatomandry, 31 Jan. 1904, *Guillot* 85 (P); Aux environs de Toamasina, 25 Sept. 1912, *Viguier & Humbert* 287 (P); Côte Est, *Lantz* s.n. (P); Brickaville, forêt de Vohibola, sable blanc, 18°33'35"S, 49°15'05"E, alt. 0 – 10 m, 26 Oct. 2002, *Ranaivojaona* 456 (K, MO, TAN); Mahanoro, Ambalavontaka, forêt littorale d'Ampamanara, 20°22'22"S, 48°33'56"E, alt. 13 m, 14 April 2004, *Ranaivojaona* 611 (K, MO, TAN); Ambalavontaka, forêt littorale d'Ampamanara, 20°22'22"S, 48°33'56"E, alt. 13 m, 14 April 2004, *Ranaivojaona* 612 (K, MO, TAN); Fénérive Est, station forestière de Tampolo, 17°17'S, 49°26'E, alt. 0 – 5 m, 8 April 1997, *Randrianaivo* 85 (MO, P, TAN); Ankirindro, Maroantsetra, 15°19'20"S, 49°33'26"E, alt. 100 m, 2 Feb. 1999, *Schatz et al.* 3936 (MO, P); Andovoranto, alt. 300 m, 12 Oct. 1912, *Viguier & Humbert* 667 (P); Andovoranto, Anivorano, 14 Oct. 1912, *Viguier & Humbert* 708 (P). Toliara. Sud de Toliara, Feb. 1989, *Brunel* 12515 (P); Tolagnaro, 25 May 1932, *Decary* 9810 (K, P); Tolagnaro, 11 Aug. 1932, *Decary* 10268 (P); Tolagnaro, 25 May 1932, *Decary* 9810 (P); Tolagnaro, 25°2'S, 46°59'E, 11 March 1989, *Gereau & Dumetz* 3227 (K, MO, P, TAN, TEF); Miandrivazo, *Hure* s.n. (P); Morondava, Kirindy Nord, 20°4'21"S, 44°40'37"E, alt. 41 m, 24 March 2003, *Ralimanana et al.* 328 (K, MO, P, TAN); St Augustin, 23°31'19"S, 43°45'4"E, alt. 7 m, 16 Feb. 2004, *Ralimanana et al.* 478 (K, TAN); Ampanihy, Besavoa, 24°43'41"S, 44°43'0.7"E, alt. 227 m, 18 Feb. 2004, *Ralimanana et al.* 500 (K, TAN); Tolagnaro, *Scott Elliott* 2380 (K, P).

COMORES. Mayotte, Coconi, 12°50'6"S, 45°8'12"E, alt. 95 m, 28 Nov. 2000, *Labat & Barthelat* 3313 (K, P).

HABITAT IN MADAGASCAR. Species growing on different types of vegetation on different types of soil; sea level – 1800 m.

II. Phyllanthus subgen. **Afroswartziani** *Ralim. & Petra Hoffm.*, **subgen. nov.** Type: *Phyllanthus lokohensis* Leandri.

http://www.ipni.org/urn:lsid:ipni.org:names:77134144-1

Subgenus *Afroswartziani* is similar to subgenera *Swartziani* and *Tenellanthus* because of the dehiscing fruits, but differs from *Swartziani* in the habit (shrub or small tree), very rarely herbaceous but even then woody at the base (vs always herbs), the cataphylls and cataphyllary stitpules subcoriaceous to coriaceous (vs membranous); differs from *Tenellanthus* in (2 –) 3 stamens partially or entirely fused (5 (– 7), entirely free), in anthers dehiscing obliquely or horizontally (vs longitudinally), the pollen 3-coloporate, exine microperforate or scabrous (vs 4-colporate, reticulate) and the seeds smooth or thinly striated (vs papillose or verrucose).

Monoecious or dioecious *shrubs*, small *trees* or rarely *herbs* with phyllanthoid (pinnatiform or bipinnatiform) branching. Brachyblasts absent. Cataphylls and cataphyllary stipules subcoriaceous to coriaceous. *Leaves* alternate. Stipules entire. *Inflorescences* on leafy branches, axillary, unisexual or very rarely with bisexual cymules, 1 – 2-flowered, female flowers generally solitary. Tepals 5 – 6. Disc free glands in male flowers, annular lobed or subentire in female flowers. *Stamens* 2 – 3; filaments entirely or partially fused into a column (free in aberrant *P. kaessneri* (Brunel 1987)); anthers entirely or partially fused or entirely free, dehiscing obliquely or horizontally; pollen 3-colporate, microperforate or scabrous. *Ovary* 3-

locular, smooth to rugose, sometimes on short gynophore; styles free or fused at the base, bifid; stigmas obtuse or acute. *Fruits* dehiscent; tepals persistent, sometimes accrescent in fruit. *Seeds* 2 per locule, smooth or finely striate longitudinally.

This description is provisional because it is restricted to the Madagascan representatives and the few continental African and Asian species (*Phyllanthus debilis* Klein ex Willd., *P. gossweileri* Hutch., *P. hutchinsonianus* S. Moore, *P. mannianus* Müll. Arg., *P. rheedii* Wight and *P. sepialis* Müll. Arg.; and maybe *P. kaessneri* Hutch.) that were shown to belong to this subgenus by Kathriarachchi *et al.* (2006: clades G and F). Wider sampling for phylogenetic molecular analysis is likely to show that more species belong to subgenus *Afroswartziani*.

Key to species of *Phyllanthus* subgenus *Afroswartziani*

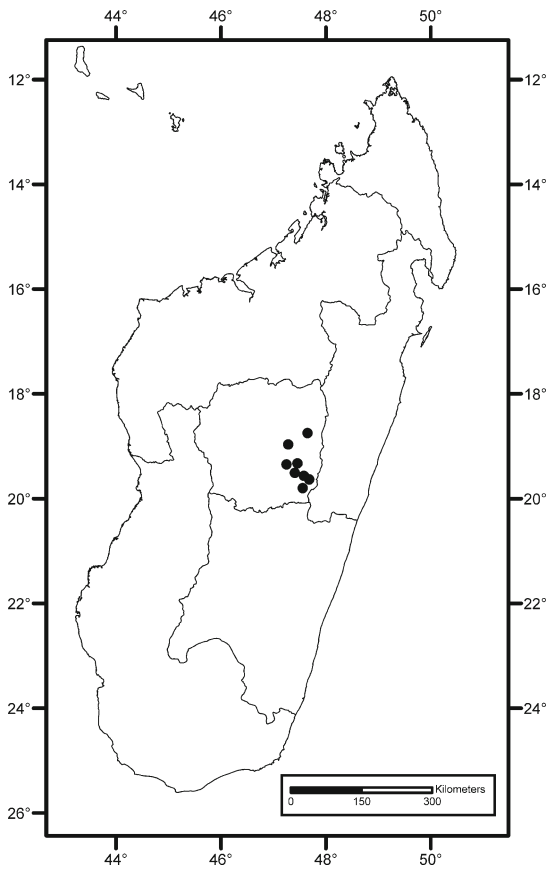
1. Annual or perennial herbs, up to 30 cm high. **2**
1'. Shrubs or small trees, more than 30 cm high. **4**
2. Plants sprawling on ground; leaf blades ovate, obovate or suborbicular 1.7 – 3 × 1 – 2 mm; bracts in a tuft of 4 – 6 sterile bracts in male flowers; disc glands rugose to verrucose in male inflorescence; filaments entirely fused in column; anthers entirely fused. . . . . **2. P. venustulus**
2'. Plants erect; leaf blades elliptic, lanceolate or oblong, 5 – 8 × 2 – 4 mm; bracts not tufted; disc glands smooth; filaments fused in column for $^{1}/_{4}$ – $^{2}/_{3}$ of their total length; anthers free. **3**
3. Midvein prominent on both sides; secondary veins indistinct on both sides. Tepals 6 in male flowers; anthers dehiscing obliquely; disc 3-lobed in female flowers; fruits 1 – 1.3 × 1.2 – 2 mm; seeds 0.6 – 1 × 0.4 – 0.6 mm. . . . . **3. P. ampandrandavae**
3'. Midvein flattened on both sides; secondary veins 4 – 6 pairs, flattened abaxially, indistinct or flattened adaxially. Tepals 5 in male flowers; anthers dehiscing horizontally; disc 5-lobed in female flowers; fruits 2 – 2.5 × 2.3 – 2.7 mm; seeds 1.6 – 2.3 × 1 – 1.4 mm. . . . . **4. P. andranovatensis**
4. Bracts not tufted in male inflorescences; filaments partially united into a column for $^{1}/_{2}$ – $^{3}/_{4}$ of their total length, anthers ovoid, free and dehiscing obliquely; female flower tepals 4 mm long or more. **5**
4'. Bracts in a tuft in male inflorescences; filaments entirely fused in column, anthers partially or entirely fused in a circumscissile synandrium dehiscing horizontally; female flower tepals 1 – 4 mm long. **8**
5. Branches trailing and flexible, plagiotropic branches glabrous; gynophore 0.3 – 0.4 mm; styles fused for $^{2}/_{3}$ of their length. . . . . **5 P. ankazobensis**
5'. Branches erect, plagiotropic branches pubescent or scabridulous; gynophore absent, styles free or only fused at the base. **6**
6. Leaves subcoriaceous to coriaceous; plant of littoral forest. . . . **6a. P. madagascariensis** var. **madagascariensis**
6'. Leaves membranous or chartaceous; not a littoral forest plant. **7**
7. Tepals 5 in male flower, veins unbranched; disc glands globose; female disc annular lobed; stigmas obtuse. . . . . **6b. P. madagascariensis** var. **kalambatitrensis**
7'. Tepals 5 – 6 in male flower, veins branched; disc glands elliptic transversally; female disc annular subentire; stigmas acute. . . . . **7. P. melleri**
8(4). Plagiotropic branches grouped at the distal part of the orthotropic branches; rheophyte. **8. P. rangoloakesis**
8'. Plagiotropic branches spread regularly along orthotropic branches; not a rheophyte. **9**
9. Plagiotropic branches slightly flattenned; anthers partially fused. . . . . **9. P. coursii**
9'. Plagiotropic branches terete; anthers entirely fused into a disciform circumscissile synandrium, unlobed or 2 – 3 lobed. **10**
10. Internodes 0.5 – 1 mm; leaf blades 1.5 – 3 mm wide, asymmetric at the base. . . . . **10. P. ivohibeus**
10'. Internodes 2 – 10 mm; leaf blades 5 – 12 mm wide, symmetric at the base. **11**
11. Cataphylls and cataphyllary stipules c. 0.4 mm long; petioles c. 0.4 mm long; leaf apex round; male flower tepals 1 – 1.3 mm long; fruiting pedicel 2.5 – 3 mm long. . . . . **11. P. vatovaviensis**
11'. Cataphylls and cataphyllary stipules 0.8 – 1.5 mm long; petioles 0.8 – 1.5 mm long; leaf apex obtuse, acute or mucronulate; male flower tepals 2 – 2.5 mm long; fruiting pedicel 5 – 10 mm long. **12**
12. Leaves obtuse at the apex, margin non revolute. Flowering and fruiting pedicels terete; gynophore 0.2 – 0.5 mm; ovary 0.5 – 1 mm diam.; disc glands smooth in male flowers; anthers fused into a disciform trilobed synandrium. . . . . **12. P. lokohensis**
12'. Leaves acute to mucronulate at the apex, margin revolute. Flowering and fruiting pedicels terete and becoming flattened and widened approaching the receptacle; gynophore absent; ovary 1.3 – 1.5 mm diam.; disc glands rugose or verrucose in male flowers; anthers entirely fused into a disciform bilobed (very rarely trilobed) synandrium . . . . . **13. P. moramangicus**

2. Phyllanthus venustulus *Leandri* (1938: 198). Type: Madagascar, Antananarivo, Ambatolampy, Tsiafajavona, 22 Nov. 1912, *Humbert & Viguier* 1739 (lectotype P(P000782930)!, selected here; isolectotype P(P000482887)!). This collection was chosen as lectotype because it contains male and female plant parts on the same sheet.

Dioecious *herbs*, sprawling on the ground. Branching pinnatiform; orthotropic branches terete, 0.5 – 1 mm in diam., striate, glabrous. Cataphylls triangular, 1.2 – 1.8 × 0.5 – 0.7 mm, coriaceous, entire, glabrous. Cataphyllary stipules triangular, 1.2 – 1.7 × 0.5 – 0.7 mm, coriaceous, entire, glabrous. Plagiotropic branches solitary, terete or slightly compressed, 0.8 – 2.5 cm long, 0.4 – 0.6 mm in diam., glabrous, rugose. Stipules persistent, triangular or subulate, 1 – 2 × 0.2 – 0.3 mm, membranous, entire, glabrous, yellowish, with white hyaline margin. Internodes 0.7 – 2 mm long. *Leaves* 8 – 17 per branch. Petioles terete or flattened, 0.2 – 0.4 × 0.2 – 0.3 mm, glabrous. Leaf blades ovate, obovate or suborbicular, 1.7 – 3 × 1 – 2 mm, 1.1 – 1.7 times longer than wide, rounded at the base, slightly mucronulate or obtuse at the apex, chartaceous, entire, sometimes slightly revolute, glabrous on both sides; midvein prominent or not visible adaxially, prominent abaxially; secondary veins 3 – 4 pairs, not visible adaxially, prominent abaxially. *Inflorescences* unisexual, consisting of 1 flower, male inflorescence on proximal part of plagiotropic branches, female inflorescence on distal part. Bracts triangular or elliptic, 0.5 – 0.7 × 0.2 – 0.3 mm, entire, glabrous, in a tuft of 4 – 6 mainly sterile in male flowers. *Male flowers* 0.8 – 1.2 × 0.7 – 1 mm, whitish when fresh. Pedicels 0.5 – 0.8 × c. 0.3 mm, glabrous. Tepals 5, subequal, elliptic or obovate, 0.8 – 1 × 0.4 – 0.6 mm, round or obtuse, membranous, glabrous on both sides, margin entire or slightly erose, hyaline for $^1/_4$ of total tepal width on each side, veins unbranched. Disc glands 5, lenticular, peltate, c. 0.2 × 0.2 – 0.3 mm, rugose to verrucose. Stamens 2 – 3, filaments entirely fused into a column; column terete, 0.4 – 0.6 × 0.2 – 0.3 mm; anthers entirely fused into a disciform circumscissile synandrium, 0.2 – 0.3 mm in diam., dehiscing horizontally. *Female flowers* 1.9 – 3 × 1.9 – 4 mm. Pedicels 0.8 – 1 × 0.2 – 0.4 mm, glabrous. Tepals 5, inequal, ovate or obovate, 1.5 – 3 × 0.8 – 1.5 mm, obtuse, membranous, glabrous on both sides, margin entire, hyaline for $^1/_4$ of total tepal width on each side, veins unbranched. Disc lobed, smooth. *Ovary* 3-locular, globose, 0.5 – 0.7 × 0.5 – 0.7 mm, smooth or slightly rugose, glabrous; styles entirely free, bifid for c. $^1/_2$ of their length, terete, 0.4 – 0.5 mm long; stigmas obtuse and papillose. *Fruits* globose, 1 – 1.4 mm in diam., glabrous; fruiting pedicels 1 – 1.3 × 0.3 – 0.5 mm, glabrous; tepals 1.8 – 2.3 × 0.9 – 1.3 mm; styles persistent; columella 0.4 – 0.8 × 0.2 – 0.3 mm. *Seeds* 1 – 1.2 × 0.8 – 0.9 mm, striate longitudinally.

DISTRIBUTION. Endemic to Madagascar. Central floristic domain; 1200 – 1800 m. Map 2.

SPECIMENS EXAMINED. MADAGASCAR. Antananarivo. Ambatolampy, Tsiafajavona, 22 Nov. 1912, *Humbert & Viguier* 1739 (lectotype P); Ambatolampy, Tsiafajavona, 22 Nov. 1912, *Humbert & Viguier* 1739 (isolectotype P) Ambatolampy, Tsiafajavona, s. dat., *Perrier de la Bâthie* 13371 (lectoparatype P); Ambatolampy, Tsiafajavona, s. dat., *Perrier de la Bâthie* 13530 (lectoparatype P); Manjakatompo, 21 Dec. 1950, *Benoist* 545 (P); Manjakatompo, 19 Dec. 1951, *Benoist* 1675 (P); Ambohimandroso, bord de l'Onive, alt. 1500 m, Dec. 1955, *Bosser* 8836 (P, TAN); Marécage, Ankaratra, entre Antsampandrahana et Namokely, alt. 1200 m, Feb. 1957, *Bosser* 10994 (TAN); Marécage, route d'Anjozorobe, P. K. 34, Dec. 1958, *Bosser* 12392 (TAN); Bords des rizières, aux environs de Manjakandriana, Feb. 1960, *Bosser* 13733 (TAN); Bords des rizières, Manjakatompo, March 1961, *Bosser* 15275 (P, TAN).



Map 2. Distribution of *Phyllanthus venustulus*.

HABITAT. Peat and rocky areas; subhumid bioclimate; 1500 – 2500 m.

CONSERVATION STATUS. Endangered (EN (B1abi-iv + B2abi-iv)). *Phyllanthus venustulus* has an area of occupancy (AOO) of 312.5 km^2 and an extent of occurence (EOO) of 3582 km^2. This species is found outside of protected areas and it is threatened by habitat loss due to agriculture and annual bush fire which lead to a decline of the EOO, the AOO, and the number of locations or subpopulations.

3. Phyllanthus ampandrandavae *Leandri* (1957: 224). Type: Madagascar, Toliara, aux environs d'Ampandrandava, entre Bekily et Tsivory, Nov. 1942, *Seyrig* 72 B (holotype P(P00535932)!; isotype P(P00535933)!).

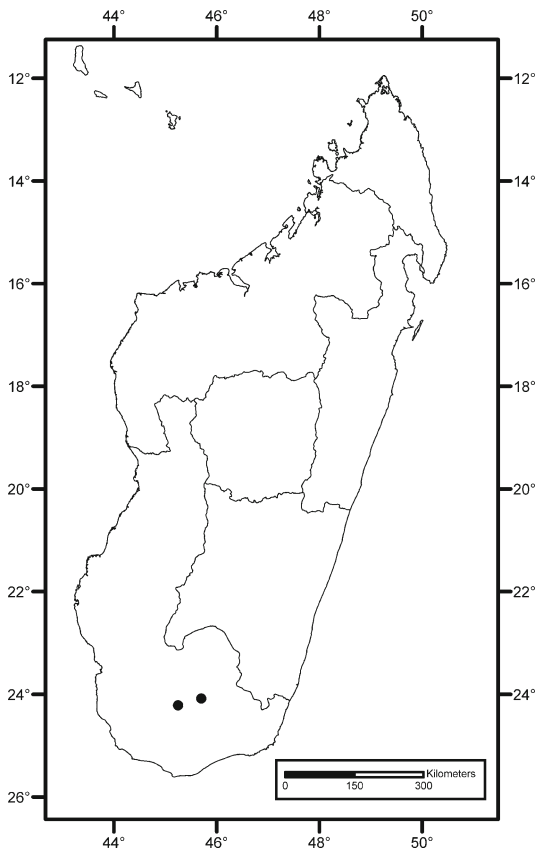
Monoecious *herbs*, 20 – 30 cm high. Branching pinnatiform; orthotropic branches woody, terete, 0.8 – 1 mm in diam., striate, glabrous. Cataphylls triangular or lanceolate, 0.8 – 1 × 0.3 – 0.5 mm, subcoriaceous, entire, glabrous. Cataphyllary stipules triangular or lanceolate, 0.8 – 1 × 0.3 – 0.5 mm, subcoriaceous, entire, glabrous. Plagiotropic branches solitary, terete or subangular, 3.5 – 9.5 cm long, c. 1 mm in diam., glabrous, striate. Stipules persistent, triangular, 0.8 – 1 × 0.3 – 0.5 mm, membranous, entire, glabrous. Internodes 1.5 – 4 mm long. *Leaves* 10 – 27 per branch. Petioles terete, c. 0.5 × 0.2 mm, glabrous. Leaf blades elliptic or sometimes lanceolate, 5 – 6 × 2 – 3 mm, 2 – 2.5 times longer than wide, attenuate or rounded at the base, acute at the apex, sub-coriaceous or chartaceous, entire, glabrous on both sides; midvein prominent on both sides; secondary veins not visible on either side. *Inflorescences* unisexual or bisexual, consisting of 1 male and 1 female flowers, or 1 female flower, female inflorescences on proximal part of plagiotropic branches, bisexual inflorescences on distal part of plagiotropic branches. Bracts triangular, 0.4 – 0.8 × 0.3 – 0.5 mm, entire, glabrous. *Male flowers* c. 0.6 × 1 mm. Pedicels c. 0.6 × 0.1 mm, glabrous. Tepals 6, inequal, obovate or suborbicular, c. 0.6 × 0.6 mm, rounded, membranous, glabrous on both sides, margin entire, hyaline for $^3/_4$ of total tepal width on each side, veins unbranched. Disc glands 5 or 6, globose, c. 0.1 mm in diam., smooth. Stamens 3, filaments fused into a column for c. $^1/_4$ of their length; filaments terete, c. 0.5 × 0.1 mm; column c. 0.1 × 0.3; anthers ovoid to globose, free, c. 0.2 mm in diam., dehiscing obliquely. *Female flowers* c. 0.9 × 1 mm. Pedicels c. 1 × 0.2 mm, glabrous. Tepals 5 – 6, equal, obovate or suborbicular, c. 0.8 × 0.5 mm, rounded or obtuse, membranous, glabrous on both sides, margin entire, hyaline for $^1/_3$ of total tepal width on each side, veins branched. Disc annular 3-lobed, smooth. *Ovary* 3-locular, globose, c. 1 × 1 mm, smooth, glabrous; styles entirely free, bifid for c. $^1/_2$ of their length, terete, c. 0.15 mm long; stigmas obtuse and papillose. *Fruits* depressed globose, 1 – 1.3 × 1.2 – 2 mm, glabrous, smooth; fruiting pedicels c. 1 × 0.1 mm, glabrous; tepals c. 1 × 0.6 mm; styles persistent; columella c. 0.7 × 0.2 mm. *Seeds* 0.6 – 1 × 0.4 – 0.6 mm, striate longitudinally.

DISTRIBUTION. Endemic to Madagascar: central and southern floristic domains. Map 3.

SPECIMEN EXAMINED. MADAGASCAR. Toliara. Ankilibe, Feb. 1989, *Brunel* 12515 (P); aux environs d'Ampandrandava, entre Bekily et Tsivory, Nov. 1942, *Seyrig* 72 B (holotype P); aux environs d'Ampandrandava, entre Bekily et Tsivory, Nov. 1942, *Seyrig* 72 B (isotype P).

HABITAT. Wooded grassland or degraded dry spiny forest; 600 – 800 m.

CONSERVATION STATUS. Endangered (EN (B2abii-iv)). *Phyllanthus ampandrandavae* has an AOO of 46.219 km^2. This species is found in southern areas of Madagascar and localities are outside of protected areas. The species



Map 3. Distribution of *Phyllanthus ampandrandavae*.

is threatened by habitat loss due to annual bush fire and pasture which lead to a decline in the AOO, the quality of habitat, and the number of locations or subpopulations. We assume that this species is very rare because it is only known from two collections from Ankilibe and Ampandrandava.

4. Phyllanthus andranovatensis *Jean F. Brunel & Jacq. Roux* (1981: 400). Type: Madagascar, Tolanaro, Andranovato, près de Vinanibe, 8 Oct. 1975, *Brunel* 2130 (holotype STR; isotypes TOGO, P(P00535927)!, TAN(TAN000574)!)

Monoecious *herbs* 10 – 20 cm high. Branching pinnatiform; orthotropic branches terete, 0.5 – 1.1 mm in diam., slightly rugose or striate, glabrous. Cataphylls triangular, 0.4 – 0.9 × 0.2 – 0.3 mm, coriaceous, entire, glabrous. Cataphyllary stipules 0.3 – 0.9 × 0.2 – 0.3 mm, coriaceous, entire, glabrous. Plagiotropic branches solitary, terete or slightly compressed, 1 – 4 cm long, 0.3 – 0.4 mm in diam., glabrous, rugose. Stipules persistent, linear, 1 – 1.5 × 0.1 – 0.3 mm, membranous, entire, glabrous. *Leaves* 7 – 14 per branch. Internodes 0.4 – 2 mm long. Petioles terete, 0.4 – 0.5 × 0.2 – 0.3 mm, glabrous. Leaf blades elliptic or oblong, 5 – 8 × 2 – 4 , 2 – 2.5 times longer than wide, obtuse at the base, obtuse or rounded at the apex, membranous, entire, glabrous on both sides, light green adaxially and reddish abaxially when fresh; midvein flattened on both sides; secondary veins 4 – 6 pairs, flattened abaxially, indistinct or flattened adaxially. *Inflorescences* unisexual, consisting of 1 – 2 male flowers or only 1 female flower, male inflorescence on proximal part of plagiotropic branches and female inflorescence on distal part of plagiotropic branches. Bracts linear, 0.3 – 0.5 × c. 0.1 mm, entire, glabrous. *Male flowers* 1.3 – 1.5 × 1.8 – 2.5 mm. Pedicels 0.8 – 1 × 0.2 – 0.4 mm, glabrous. Tepals 5, equal, obovate, 1 – 1.3 × 0.6 – 0.9 mm, rounded, membranous, glabrous on both sides, margin entire, hyaline for c. $^1/_4$ of total tepal width on each side, veins unbranched. Disc glands 5, obovate, thin, c. 0.2 × 0.2 mm, smooth. Stamens 2 – 3, filaments fused into a column for $^2/_3$ their length; filaments terete, 0.4 – 0.6 × 0.1 – 0.2 mm; anthers free, c. 0.3 mm long, dehiscing horizontally. *Female flowers* 1.3 – 1.9 × 2 – 2.5 mm. Pedicels 1 – 1.4 × 0.3 – 0.4 mm, glabrous. Tepals 5, equal, elliptic, 1 – 1.9 × 0.8 – 1.2 mm, rounded, membranous, glabrous, margin entire, hyaline for c. $^1/_4$ of total tepal width on each side, veins unbranched. Disc annular 5-lobed, smooth. *Ovary* 3-locular, globose or depressed globose, 0.7 – 1 × 0.7 – 1.3 mm, smooth, glabrous; styles entirely free, terete, bifid for c. $^1/_2$ of their length, 0.4 – 0.5 mm long; stigmas obtuse. *Fruits* globose or depressed globose, 2 – 2.5 × 2.3 – 2.7 mm, glabrous; fruiting pedicels 1 – 2 × 0.3 – 0.5 mm, glabrous, smooth at base and slightly papillose at apex; tepals 1 – 2 × 0.8 – 1.3 mm; styles caducous; columella c. 0.3 × 0.2 mm. *Seeds* 1.6 – 2.3 × 1–1.4 mm, with 9 – 11 longitudinal striae.

DISTRIBUTION. Endemic to Madagascar: eastern floristic domain. Map 4.

SPECIMEN EXAMINED. MADAGASCAR. Toliara. Tolanaro, Andranovato, près de Vinanibe, 8 Oct. 1975, *Brunel* 2130 (isotypes P, TAN).

HABITAT. Littoral forest and swamp; alt. sea level – 10 m.

CONSERVATION STATUS. Data deficient (DD). *Phyllanthus andranovatensis* is only known from the type and has not been collected in recent years.

5. Phyllanthus ankazobensis *Ralim. & Petra Hoffm.* **sp. nov.** Type: Madagascar, Antananarivo, Anjozorobe, Antsahabe, 18°23'47"S, 47°56'9"E, alt. 1330 m, 12 Dec. 2002, *Ralimanana & Ranaivojaona* 306 (holotype K!; isotypes G!, MO!, P!, TAN!).

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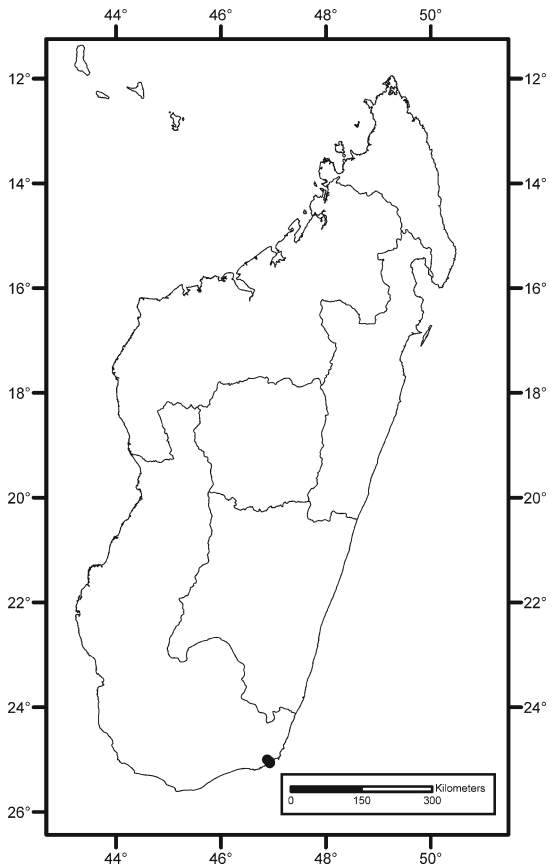
Monoecious *shrubs* with trailing and flexible orthotropic and plagiotropic branches, 50 – 80 cm high. Branching pinnatiform; orthotropic branches terete, 0.5 – 2 mm in diam., rugose, glabrous. Cataphylls triangular, 0.6 – 1.5 ×



Map 4. Distribution of *Phyllanthus andranovatensis*.

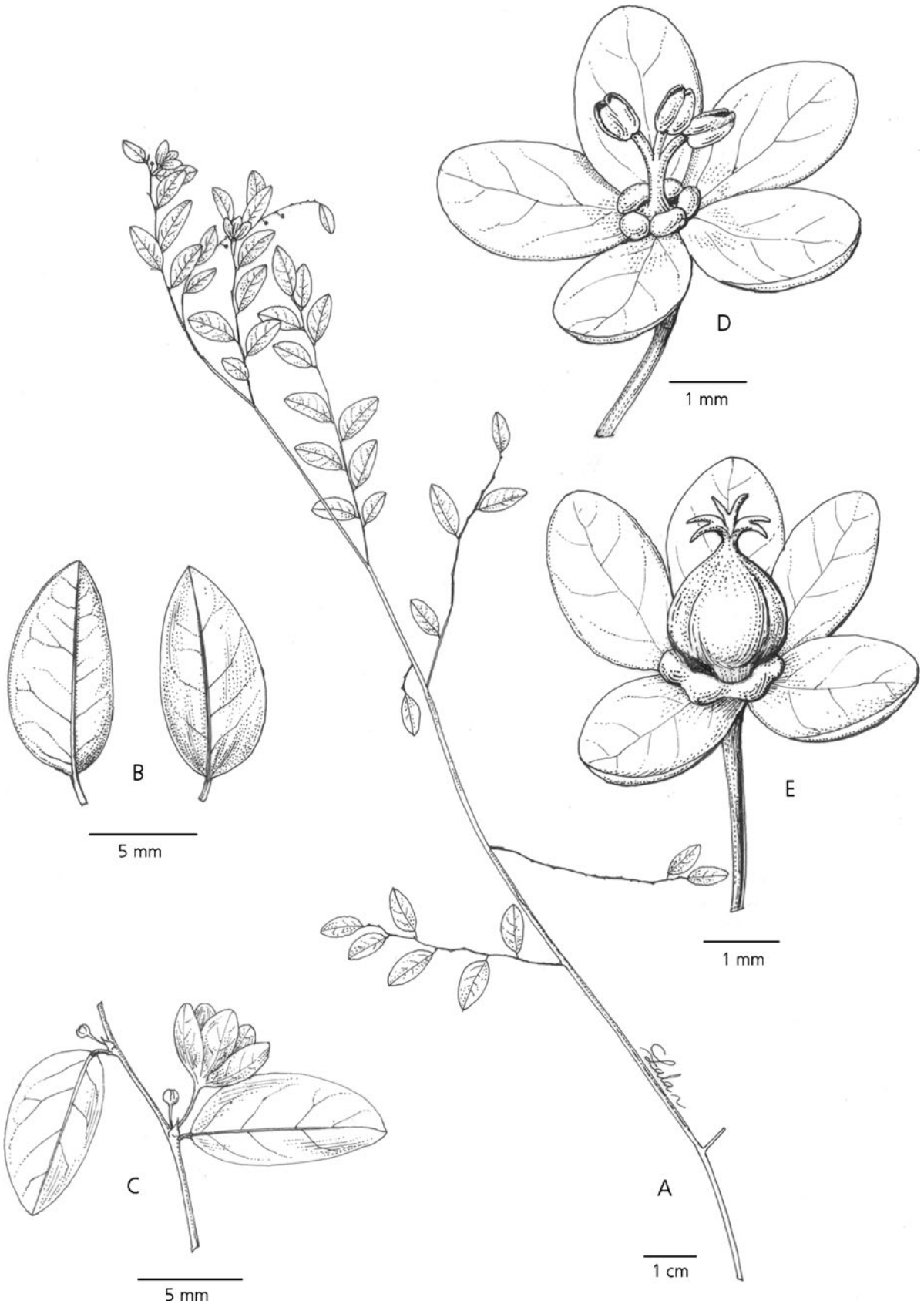
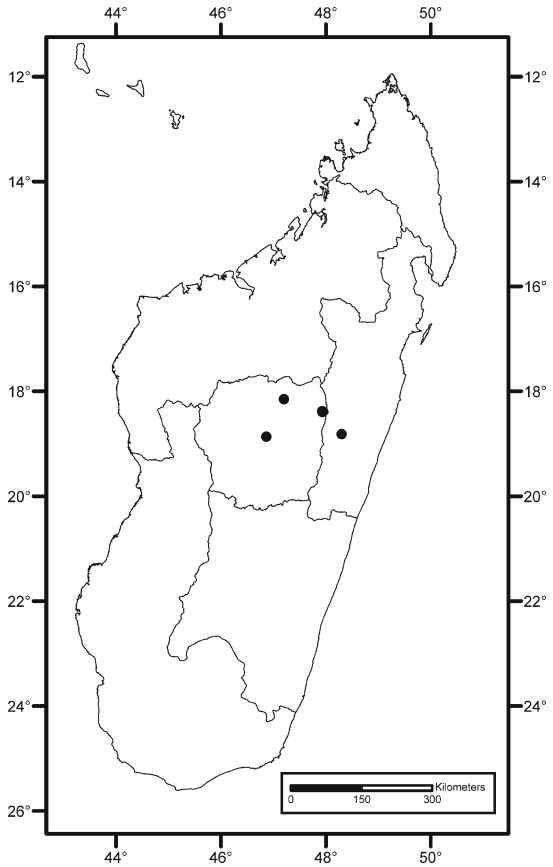


Fig. 1. *Phyllanthus ankazobensis*. **A** habit; **B** leaves; **C** part of plagiotropic branch; **D** male flower; **E** female flower. From *H. Ralimanana* 306 (TAN). DRAWN BY R. L. ANDRIAMIARISOA.

0.3 – 0.5 mm, subcoriaceous or coriaceous, light brown with white hyaline margin, entire, glabrous. Cataphyllary stipules triangular, 0.4 – 1.5 × 0.3 – 0.5 mm, subcoriaceous or coriaceous, glabrous. Plagiotropic branches solitary, terete, 2 – 5.5 cm long, 0.3 – 0.5 mm in diam., glabrous, striate or smooth. Stipules persistent, triangular, 0.7 – 1.2 × 0.3 – 0.5 mm, membranous, entire, glabrous. Internodes 1 – 7 mm long. *Leaves* 5 – 14 per branch. Petioles terete, 0.5 – 1 × 0.3 – 0.6 mm, glabrous. Leaf blades ovate, 3 – 10 × 2 – 5.5 mm, obtuse or rounded, asymmetric at the base, obtuse or acute, often mucronulate at the apex, chartaceous, revolute, glabrous on both sides, green adaxially and light green abaxially when fresh; midvein flattened adaxially, prominent abaxially; secondary veins 3 – 5 pairs, indistinct adaxially, flattened abaxially. *Inflorescences* unisexual, consisting of 2 or 3 male flowers (one open and the others in bud) or only 1 female flower; male inflorescences on proximal or middle parts of plagiotropic branches and female inflorescence on distal part. Bracts linear or triangular, 0.3 – 0.5 × 0.2 – 0.3 mm, entire, glabrous. *Male flowers* 2 – 3 × 1.5 – 2 mm, cream when fresh. Pedicels 2 – 3 × 0.1 – 0.2 mm, glabrous. Tepals 5, equal, obovate, elliptic to obovate, 2 – 3 × 1 – 1.5 mm, rounded, membranous, glabrous on both sides, margin entire, hyaline for c. $^1/_8$ of total tepal width on each side, veins branched. Disc glands 5, reniform or lenticular, 0.2 – 0.3 × c. 0.2 mm, verrucose. Stamens 3, filaments fused into a column for $^1/_2$ – $^2/_3$ of their length; filaments terete, free part 0.3 – 0.5 mm long; column terete, 0.3 – 0.6 mm in diam.; anthers free, ovoid, 0.2 – 0.4 mm long, dehiscing obliquely. *Female flowers* 4 – 5 × 4 – 6 mm, cream when fresh. Pedicels 1.4 – 2 × 0.2 – 0.3 mm (1 mm wide near the receptacle), glabrous. Tepals 5, equal or inequal, elliptic to obovate, 5 – 6 × 3 – 4 mm, rounded, membranous or slightly coriaceous, glabrous on both sides, margin entire, hyaline for $^1/_{10}$ – $^1/_8$ of total tepal width on each side, veins branched. Disc lobed, smooth. Ovary 3-locular, ovoid or globose, 0.8 – 1 × 0.8 – 1 mm, on gynophore 0.3 – 0.4 mm, smooth, glabrous; styles fused for $^2/_3$ of their length, bifid for $^1/_3$ their length, terete, 0.6 – 0.8 mm long; stigmas obtuse. *Fruits* only immature ones seen, globose, 1 – 2 × 1 – 2 mm, glabrous; fruiting pedicels terete, 3 – 5 × 0.3 – 0.5 mm glabrous, tepals 5 – 7 × 3 – 4 mm. Fig. 1.

RECOGNITION. *Phyllanthus ankazobensis* is similar to *P. madagascariensis* in leaf shape, stamen number, filament fusion, and the capsular fruits but differs in the trailing and flexible branches (vs erect), gynophore 0.3 – 0.4 mm (vs gynophore absent) and the styles fused into a column for $^2/_3$ of their length (vs styles free or only fused at the base).
DISTRIBUTION. Endemic to Madagascar: central floristic domain. Map 5.
SPECIMENS EXAMINED. MADAGASCAR. Central Madagascar, *Baron* 3739 (K, P); Antananarivo. Manankazo, près d'Ankazobe, 1913, *Perrier de la Bâthie* 9881 (P); Anjozorobe, Antsahabe, 18°23'47"S, 47°56'9"E, alt. 1330 m, 12 Dec. 2002, *Ralimanana & Ranaivojaona* 306 (holotype K, isotypes G, MO, P, TAN). Toamasina. Alaotra Mangoro, Ambatovy, 18°51'12"S, 48°19'04"E, alt. 1104 m, 11 June 2008, *Antilahimena* 6298 (MO, P, TAN); Ambatovy, 1 July 1966, *Peltier & Peltier* 5999 (P); Moramanga, Andasibe, Andasifahatelo, Marinjo, corridor forestier Analamay Mantadia, 18°47'05"S, 48°24'12"E, alt. 1044 m, 29 May 2012, *Rasoazanany & T. Ratolojanahary* 222 (MO, TAN); Moramanga, Ambatovy, Ampitambe, 18°51'03"S, 48°43'E, alt. 1144 m, 15 Feb. 2005, *Razanatsoa et al.* 160 (MO, P, TAN).
HABITAT. Open humid forest; alt. 1000 – 1200 m.
CONSERVATION STATUS. Vulnerable (VU (B1abi-iv + B2abi-iv)). *Phyllanthus ankazobensis* has an EOO of 7292 km^2 and an AOO of 1016 km^2. Habitat is threatened by annual fire, agriculture and mining which lead to a decline in the AOO, and the EOO, the quality of habitat, and the number of locations or subpopulations.



Map 5. Distribution of *Phyllanthus ankazobensis*.

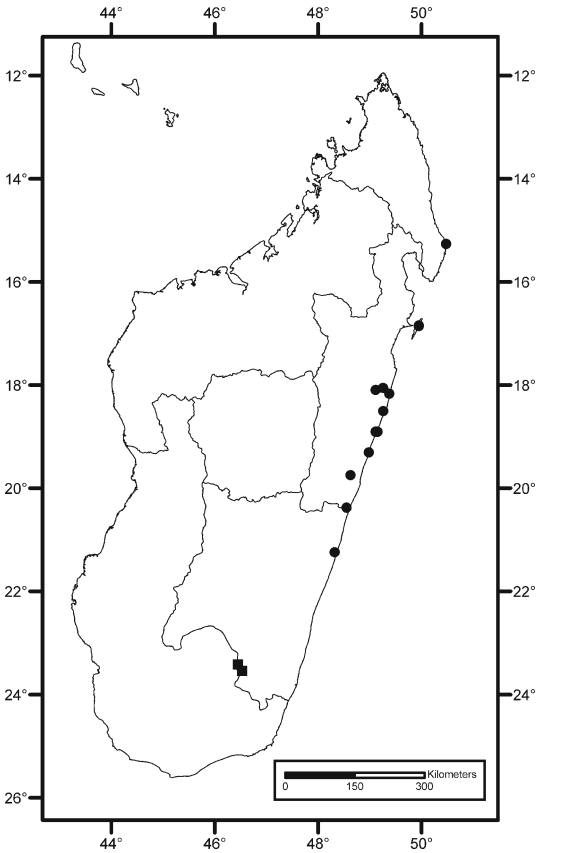
6. Phyllanthus madagascariensis *Müll. Arg.* (Müller 1863: 35). Type: Madagascar, aux environs de Tamatave, *Chapelier* s.n. (holotype P(P00078221)!; isotype P(P00078222)!).
Phyllanthus tampinensis Leandri (1957: 233). Type: Madagascar, Tampina, Sud de Tamatave, *Decary* 17701 (holotype P(P00535931)!).

Monoecious *shrubs* 50 – 100 cm high. Branching pinnatiform; orthotropic branches terete, 2 – 6 mm in diam., striate, glabrous. Cataphylls triangular, 0.3 – 1 × 0.2 – 0.4 mm, coriaceous entire, glabrous. Cataphyllary stipules 0.3 – 1 × 0.2 – 0.4 mm, coriaceous entire, glabrous. Plagiotropic branches solitary or fascicled in twos, terete, 3 – 15 cm long, 0.3 – 0.4 mm in diam., pubescent or scabridulous, striate. Stipules persistent or caducous, triangular, 0.4 – 1.8 × 0.3 – 0.4 mm, membranous or subcoriaceous, entire, glabrous. Internodes 1.5 – 4 mm long. *Leaves* 4 – 16 per branch. Petioles terete or terete, 0.3 – 1 × 0.2 – 0.3 mm, glabrous. Leaf blades elliptic, ovate, obovate, 5 – 15 × 4 – 10 mm, 1.3 – 1.5 times longer than wide, attenuate and asymmetric at the base, acute or obtuse at the apex, subcoriaceous to coriaceous or chartaceous, entire, sometimes slightly revolute, glabrous adaxially, thinly papillose or glabrous abaxially, green adaxially and light green abaxially when fresh; midvein flattened on both sides; secondary veins distinct or indistinct on both sides. *Inflorescences* unisexual; consisting of 1 or 2 male flowers or only 1 female flower; male inflorescences and female inflorescences on different branches or male inflorescences on proximal of plagiotropic branches and female inflorescence on distal part. Bracts triangular or elliptic, 0.5 – 0.8 × c. 0.3 mm, entire or slightly erose, glabrous. *Male flowers* 1.7 – 3 × 2 – 4 mm, whitish green when fresh. Pedicels 1 – 3.5 × 0.2 – 0.3 mm, glabrous. Tepals 5, equal, elliptic or obovate, 1.7 – 3 × 1.5 – 2 mm, rounded, membranous, glabrous on both sides, margin entire, hyaline for c. $^1/_8$ of total tepal width on each side, veins unbranched. Disc glands 5, globose, c. 0.4 × 0.4 mm, smooth. Stamens 3, filaments fused for $^2/_3$ – $^3/_4$ of their length; column terete, 1.5 – 1.7 mm in diam.; free parts terete, 0.3 – 0.5 mm in diam.; anthers free, ovoid, c. 0.3 mm long, dehiscing obliquely. *Female flowers* 3.2 – 7 × 6 – 10 mm, whitish green when fresh. Pedicels 3 – 3.5 × 0.3 – 0.5 mm, glabrous. Tepals 5, equal, elliptic or obovate, 5 – 7 × 3 – 5 mm, rounded, coriaceous, glabrous on both sides, margin entire, hyaline for $^1/_{12}$ of total tepal width on each side, veins branched. Disc annular lobed, smooth. *Ovary* 3-locular, globose, 1 – 2 × 1 – 2 mm, smooth, glabrous; styles free or fused at the base, bifid for c. $^1/_2$ of their length, terete, 1.2 – 2 mm long; stigmas obtuse. *Fruits* depressed globose, 2 – 3 × 3 – 4.5 mm, glabrous; fruiting pedicels terete, 3 – 6 × 0.3 – 0.5 mm, glabrous; tepals 5 – 8 × 4 – 5.2 mm; styles persistent; columella 0.8 – 1.2 × 0.2 – 0.4 mm. *Seeds* 1.7 – 2 × 1 – 1.5 mm, smooth.

6a. **Phyllanthus madagascariensis** var. **madagascariensis**

Leaf blades subcoriaceous to coriaceous; secondary veins indistinct in both sides. *Female flower* tepals 6 – 7 × 3 – 5 mm. Species growing in littoral forest.

DISTRIBUTION. Endemic to Madagascar: Eastern floristic domain (Antsiranana, Fianarantsoa and Toamasina province); sea level – 20 m. Map 6.



Map 6. Distribution of *Phyllanthus madagascariensis* var. *madagascariensis* (circles) and *P. madagascariensis* var. *kalambantitrensis* (squares).

SPECIMENS EXAMINED. MADAGASCAR. s. loc., Oct. 1883, *Humblot* 145 (K, P). Antsiranana. Antalaha, Ambohitralanana, Ambodirafia, littoral forest, 15°16'31"E, 50°28'60"E, 8 April 2003, *Ranaivojaona* 562 (TAN). Fianarantsoa. Mananjary, March – May 1909, *Geay* 7090 (P); Mananjary, March – May 1909, *Geay* 7230 (P); Mananjary, March – May 1909, *Geay* 7259 (P); Mananjary, March – May 1909, *Geay* 7947 (P); Farafangana, Mahabo, 23°11'9"S, 47°42'22"E, alt. 25 m, 9 Nov. 2001, *McPherson & Rabenantoandro* 18390 (K, MO); Mahanoro, Ambodibonara, forêt littorale Antaimby, 20°22'22"S, 48°33'16"E, alt. 10 m, 16 May 2004, *Razakamalala et al.* 1126 (K, MO, TAN); Ampasimaneva, forêt littorale d'Ambolo, 20°43'59"S, 48°27'09"E, alt. 13 m, 15 June 2004, *Razakamalala et al.* 1449 (MO, P, TAN). Toamasina. Ste Marie, Lokintsy, forêt littorale d'Ambohidena, 16°51'9"S, 49°57'13"E, alt. 19 m, 9 Oct. 2003, *Andrianarivelo et al.* 87 (K, MO, P, TEF); Ste Marie, *Boivin* 1886[2] (P); aux environs de Tamatave *Chapelier* s.n. (holotype P); aux environs de Tamatave *Chapelier* s.n. (isotype P); Ambila, 4 May 1928, *Decary* 6445 (K, P, TAN); Tampina, sud de Toamasina, 5 March 1942, *Decary* 17701 (P); Ste Marie, Lokintsy, forest of Ambohidena, 16°51'S,

49°57'E, alt. 10 m, 13 May 2003, *McPherson et al.* 18925 (K, MO, P); Ambila, 18°48'S, 49°09'E, alt. 10 m, 23 Sept. 2000, *Miller et al.* 10640 (K, MO, P); Tampina, Nov. 1921, *Perrier de la Bâthie* 13323 (P); Brickaville, S of Ambila, 18°54'S, 49°7'E, alt. 0 – 10 m, 4 Aug. 1996, *Randrianasolo* 479 (K, MO, P); Ste Marie, Lokintsy, forêt d'Ambohidena, 16°50'25"S, 49°57'9"E, alt. 10 m, 19 Feb. 2004, *Razakamalala et al.* 897 (K, MO); Ste Marie, Lokintsy, forest of Ambohidena, 16°51'11"S, 49°57'10"E, 1 June 2004, *Rabehevitra* 1182 (MO, P, TEF); Ambila, road to Andevoranto, 18°49'S, 49°08'E, alt. 10 m, 3 July 1995, *Razafimandimbison* 182 (K, MO).

HABITAT. Littoral forest.

CONSERVATION STATUS. Vulnerable (VU (B1abi-iv + B2abi-iv)]. *Phyllanthus madagascariensis* var. *madagascariensis* has an EOO of 14968.4 km^2 and an AOO of 972 km^2. The habitat is found in littoral forest which is fragmented and is severely threatened by slash and burn agriculture.

6b. Phyllanthus madagascariensis var. **kalambatitrensis** *Leandri ex Ralim. & Petra Hoffm.*, **var. nov.** Type: Madagascar, Kalambatritra massif, *Humbert* 12118 (holotype P!).

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Phyllanthus madagascariensis var. *kalambatitrensis* Leandri (1958: 82), **nom. invalid.**

RECOGNITION. *Phyllanthus madagascariensis* var. *kalambatitrensis* differs from var. *madagascariensis* in the leaf blades being chartaceous (vs subcoriaceous to coriaceous), the secondary veins distinct (vs indistinct) and the female flower with tepals 4 – 4.5 × 1.8 – 2 mm (vs 6 – 7 × 3 – 5 mm). Plant growing in mid-elevation humid forest (vs littoral forest).

DISTRIBUTION. Endemic to Madagascar: Central floristic domain. Map 6.

SPECIMENS EXAMINED. MADAGASCAR. Fianarantsoa. Iakora, Begogo, Bekora, forêt de Sahalava au sud du village d'Androizaha, forêt humide, 23°31'59"S, 46°32'04"E, alt. 1180 m, 28 Jan. 2005, *Andrianjafy* 751 (MO, TAN). Toliara. Betroka, Ivahona, Befarafara, forêt humide de moyenne altitude, 23°24'48"S, 46°26'55"E, alt. 1561 m, 27 May 2005, *Andrianjafy* 1136 (MO, TAN).

HABITAT. Mid-altitude humid forest; alt. 1100 – 1600 m.

CONSERVATION STATUS. Least Concern (LC). *Phyllanthus madagascariensis* var. *kalambatritrensis* has an AOO of 5 km^2 with two locations inside a protected area. The location is in remote area and very rarely visited by people so this species is not under human pressure.

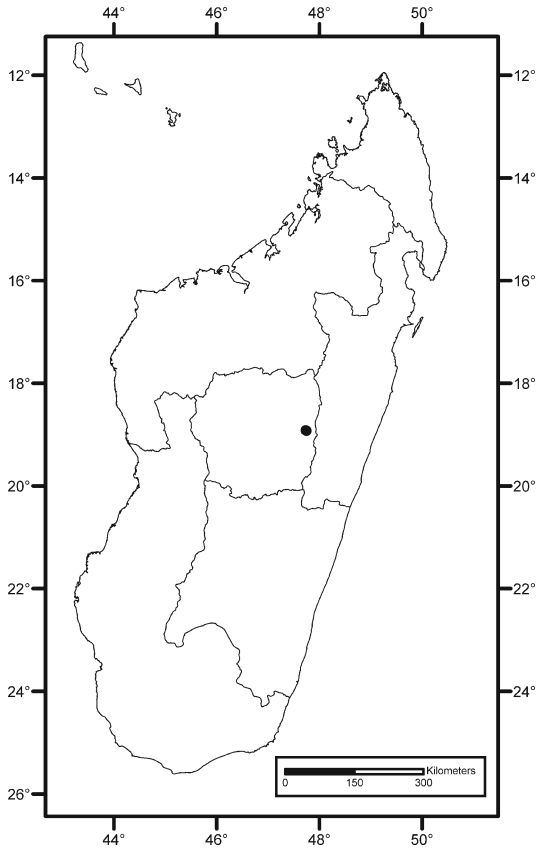
7. Phyllanthus melleri *Müll. Arg.* (Müller 1864: 514). Type: Madagascar, between Toamasina and Antananarivo, *Meller* s.n. (holotype K!).

Phyllanthus melleri var. *campenoni* Leandri (1939: 185), **nom. invalid.**

Monoecious *shrubs* 50 – 100 cm high. Branching pinnatiform; orthotropic branches terete, 2 – 4 mm in diam., glabrous. Cataphylls triangular, 0.5 – 1.7 × 0.2 – 0.4 mm, coriaceous, entire, glabrous. Cataphyllary stipules triangular, 0.4 – 1.7 × 0.2 – 0.4 mm, coriaceous, entire, glabrous. Plagiotropic branches fascicled in twos or solitary, terete, 3 – 16 cm long, 0.3 – 0.8 mm in diam., scabridulous to pubescent, striate. Stipules persistent or caducous, triangular or subulate, 0.4 – 1.8 × 0.3 – 0.4 mm, slightly coriaceous, entire, glabrous. Internodes 3 – 5 mm long. *Leaves* 4 – 10 per branch. Petioles terete, 0.5 – 1 × 0.2 – 0.3 mm, glabrous. Leaf blades ovate or elliptic, 4 – 15 × 3 – 10 mm, 1.3 – 1.5 times longer than wide, attenuate or obtuse, sometimes suboblique or asymmetric at the base, acute or obtuse at the apex, chartaceous, entire, glabrous on both sides; midvein flattened on both sides; secondary veins 3 – 5 pairs, flattened on both sides. *Inflorescences* unisexual, consisting of 1 or 2 male flowers, or only 1 female flower; male inflorescences on proximal part of plagiotropic branches and female inflorescences on distal part, or inflorescences on different branches. Bracts triangular or elliptic, 0.4 – 0.6 × c. 0.3 mm, entire, glabrous. *Male flowers* 1.8 – 4 × 2 – 4 mm, whitish green when fresh. Pedicels 1 – 4 × 0.2 mm, glabrous. Tepals 5 – 6, equal, elliptic or obovate, 2 – 4 × 1.5 – 2 mm, rounded, membranous, glabrous on both sides, margin entire, hyaline for c. $^1/_8$ of total tepal width on each side, veins branched. Disc glands 5 or 6, elliptic transversally, c. 0.4 mm in diam., smooth. Stamens 3, filaments fused into a column for $^2/_3$ – $^3/_4$ of their length; filaments 1.5 – 2 mm long; column terete, 1.5 – 1.7 mm in diam.; free parts terete, 0.3 – 0.6 mm in diam.; anthers free, ovoid, c. 0.3 mm long, dehiscing obliquely. *Female flowers* 3 – 5 × 6 – 10 mm, whitish green when fresh. Pedicels c. 3 × 0.5 mm, glabrous. Tepals 5, equal, elliptic or obovate, c. 5 × 2 – 3 mm, rounded, chartaceous, glabrous on both sides, margin entire, hyaline for c. $^1/_8$ of tepal width, veins branched. Disc annular subentire, smooth. Ovary 3-locular, globose, 1 – 1.5 mm in diam., smooth, glabrous; styles fused at the base, bifid for c. $^1/_2$ of their length, terete, 1.2 – 1.5 mm long; stigmas acute. *Fruits* globose, only immature ones seen, glabrous; fruiting pedicels terete, c. 4 × 0.5 mm, glabrous, tepals c. 5 × 2 – 3 mm.

DISTRIBUTION. Endemic to Madagascar: Central floristic domain. Map 7.

SPECIMENS EXAMINED. MADAGASCAR. Central Madagascar, *Baron* 411 (K); Central Madagascar, *Baron* 3741 (K); Central Madagascar, *Baron* 4080 (K); *Campenon*



Map 7. Distribution of *Phyllanthus melleri*.

s.n. (P). Antananarivo. Between Toamasina and Antananarivo, *Meller* s.n. (holotype K); station forestière d'Angavokely, 18°55'35"S, 47°45'1"E, alt. 1715 m, 2 Nov. 2002, *Lowry II et al.* 5814 (K, MO); Andramasina, Antakafatra, Andranomena forest; 19°27'10"S, 47°58'52"E, alt. 1594 m, 16 Dec. 2009, *Ralimanana et al.* 1594 (TAN, TEF).

HABITAT. Open humid forest or humid forest boundaries; alt. 1590 – 1720 m.

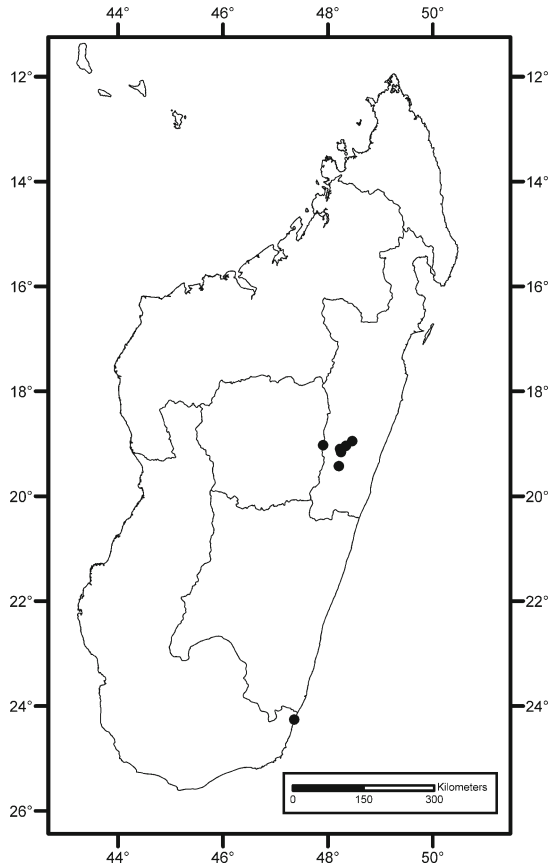
CONSERVATION STATUS. Endangered (EN B2ab(ii,iii,iv)). *Phyllanthus melleri is* known from six collections but four of them are without precision of localities. It has an AOO of 130.162 km^2 and it is found outside of protected areas. Therefore this species is threatened by habitat loss due to human activities such as fire and forest logging which lead to a decline of area of occupancy, quality of habitat and number of locations.

8. Phyllanthus rangoloakensis *Leandri* (1938: 198). Type: Madagascar, Central Madagascar, Andrangoloaka, Nov. 1880, *Hildebrandt* 3707 (holotype P(P00078271)!; isotypes P(P00078272, P00078273)!, G, JE, US).

Monoecious *shrubs* 50 – 70 cm high. Branching pinnatiform; orthotropic branches terete, 2 – 5 mm in diam., rugose (scars of old plagiotropic branches visible), glabrous. Cataphylls triangular, 1 – 1.5 × 0.5 – 1 mm, coriaceous, entire or slightly erose, glabrous. Cataphyllary stipules 0.9 – 1.5 × 0.5 – 1 mm, coriaceous, entire or slightly erose, glabrous. Plagiotropic branches solitary, grouped at the distal part of the orthotropic branch, terete, slightly dilated at the base, 3.5 – 9.5 cm long, 0.6 – 1 mm in diam., glabrous, striate. Stipules persistent, triangular, 1.5 – 1.8 × 0.5 – 0.6 mm, coriaceous, entire, glabrous. *Leaves* 20 – 36 per branch. Internodes 1 – 2 mm long. Petioles terete or flattened, 0.5 – 1 × 0.4 – 0.6 mm, glabrous. Leaf blades oblong subfalcate, 6 – 10 × 2.5 – 3 mm, 2.4 – 3.3 times longer than wide, obtuse at the base, acute at the apex, chartaceous, entire, slightly revolute, glabrous on both sides, green adaxially when fresh, light green abaxially when fresh; midvein prominent adaxially, flattened abaxially; secondary veins indistinct on both sides. *Inflorescences* unisexual, male inflorescences with 1 – 2 flowers (one open and one still in bud), female inflorescences with one female flower, male inflorescence on proximal part and female inflorescence on distal part of plagiotropic branches. Bracts linear or triangular, grouped in a tuft of 4 – 6 mainly sterile bracts in male inflorescences, 0.4 – 0.8 × 0.1 – 0.2 mm, entire, glabrous. *Male flowers* 1.2 – 1.5 × 1.8 – 1.9 mm, whitish green when fresh. Pedicels 0.4 – 0.6 × c. 0.3 mm, glabrous. Tepals 5, equal, obovate, 1 – 1.5 × 0.8 – 1 mm, rounded, membranous, glabrous on both sides, margin entire, hyaline for $^1/_8$ – $^1/_6$ of total tepal width on each side, veins unbranched. Disc glands 5, lenticular, c. 0.3 mm in diam., smooth. Stamens with filaments entirely fused in a column; column terete, 0.4 – 0.6 × c. 0.3 mm; anthers completely fused into a disciform circumscissile synandrium dehiscing horizontally. *Female flowers* 1.7 – 2.2 × 2.3 – 3 mm, whitish green when fresh. Pedicels 0.5 – 0.7 × 0.3 – 0.4 mm, glabrous. Tepals 5, equal, elliptic, 1.5 – 2 × 0.7 – 1 mm, slightly coriaceous, obtuse, glabrous on both sides, margin entire, hyaline for c. $^1/_8$ of total tepal width on each side, veins branched near the apex. Disc lobed, smooth. *Ovary* 3-locular, globose, 1 – 1.2 mm, smooth, glabrous; styles fused at the base, bifid for $^1/_3$ – $^1/_2$ of their length, terete, 0.5 – 0.8 mm long; stigmas obtuse. *Fruits* globose, 1.5 – 2 mm in diam., glabrous; fruiting pedicels 1 – 1.4 × 0.3 – 0.5 mm, glabrous; tepals 1.5 – 2 × 1 – 1.3 mm; styles persistent; columella c. 0.7 × 0.3 mm. *Seeds* 1 – 1.5 × 0.7 – 1 mm, smooth. Rheophyte.

DISTRIBUTION. Endemic to Madagascar: Central and eastern floristic domains. Map 8.

SPECIMENS EXAMINED. MADAGASCAR. Central Madagascar, Andrangoloaka, Nov. 1880, *Hildebrandt* 3707 (holotype P); Central Madagascar, Andrangoloaka, Nov. 1880, *Hildebrandt* 3707 (isotypes P). Toamasina. Roches humides, route d'Anosibe An'ala, Aug. 1953,



Map 8. Distribution of *Phyllanthus rangoloakensis*.

Bosser 6099 (P); Roches humides, route d'Anosibe An'ala, Aug. 1953, *Bosser* 6100 (P); Moramanga, rocher humide, route d'Anosibe, Aug. 1953, *Bosser* 6115 (TAN); Entre Sandrangato et Anosibe, sud de Moramanga, alt. 800 – 1000 m, 3 – 7 Nov. 1952, *Capuron & Leandri* 1696 (P); Above Anevoka, 18°57'S, 48°28'E, alt. 900 m, *Gillespie* 4027 (K, MO, P); Vallée de Manampanihy, col de Sahindro, Feb. 1934, *Humbert* 14004 (P); 41 km S of Moramanga, road to Anosibe An'ala, 19°14'52"S, 48°13'54"E, 28 Nov. 1996, *Schatz et al.* 3709 (K, MO, TEF); Road to Lakato, 19°00'52"S, 48°20'47"E, alt. 1040 m, 10 Nov. 2003, *Schatz et al.* 4141 (MO, P). Toliara. Haut vallée de Manampanihy, col de Saindro, alt. 1200 m, Feb. 1934, *Humbert* 14004 (MO, P).

HABITAT. Species growing on rocks near stream or in river-beds; alt. 800 – 1200 m.

CONSERVATION STATUS. Vulnerable (VU (B1ab i-iv + B2ab i-iv)). *Phyllanthus rangoloakensis* has an EOO of 16548.7 km^2 and an AOO of 567 km^2. All locations are outside of protected areas and the habitat is threatened by bush fire and cut and slash.

9. Phyllanthus coursii *Leandri* (1957: 226). Type: Madagascar, Sud-Est du Lac Alaotra, *Cours* 191 (holotype P (P00535905)!; isotype US).

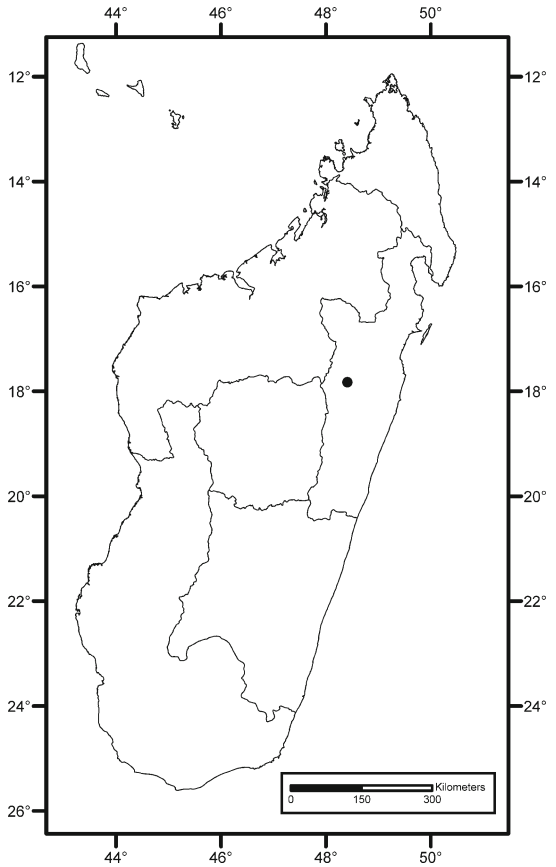
Monoecious *shrubs* 80 – 100 cm high. Branching bipinnatiform; orthotropic branches terete, 0.5 – 2.5 mm in diam., striate, glabrous. Cataphylls triangular, c. 1 × 0.5 mm, coriaceous, entire, glabrous. Cataphyllary stipules triangular, c. 0.8 × 0.5 mm, coriaceous, entire, glabrous. Plagiotropic branches solitary, slightly flattened, 3 – 8.5 cm long, c. 0.3 mm in diam., puberulent, striate. Stipules persistent or caducous, triangular, c. 0.8 × 0.4 mm, membranous, entire, glabrous. Internodes 3 – 6 mm long. *Leaves* 5 – 12 per branch. Petioles terete, c. 1 × 0.2 mm, glabrous. Leaf blades elliptic or ovate, 4 – 15 × 2.5 – 7 mm, 1.5 – 1.6 times longer than wide, slightly attenuate or obtuse at the base, obtuse or acute, mucronulate at the apex, chartaceous, entire or slightly revolute, glabrous on both sides; midvein flattened adaxially, prominent abaxially; secondary veins 4 – 5 pairs, slightly prominent adaxially, flattened abaxially. *Inflorescence* unisexual, consisting of 2 – 4 male flowers or only 1 female flower; male inflorescences on proximal part and female inflorescences on distal part of plagiotropic branches. Bracts triangular, grouped in a tuft of 9 – 10 mainly sterile bracts in male inflorescences, c. 0.7 × 0.3 mm, entire, glabrous. *Male* flowers c. 1.4 × 1 – 1.2 mm, whitish green when fresh. Pedicels c. 3 × 0.2 mm, glabrous. Tepals 5, subequal, broadly obovate, 1 – 1.4 × c. 1.2 mm, rounded, membranous, glabrous on both sides, margin entire, hyaline for c. $^1/_8$ of total tepal width on each side, veins reticulately branched. Disc glands 5, peltate, lenticular, c. 0.3 × 0.3 mm, rugose or verrucose. Stamens 3, filaments entirely fused into a column; column terete, c. 1 × 0.2 mm; anthers partially fused, c. 0.3 mm long, dehiscing horizontally. *Female* flowers 1.8 – 2 × 2.5 – 3 mm, whitish green when fresh. Pedicels 5 – 7 × c. 0.2 mm, glabrous. Tepals 5, subequal, obovate, c. 2 × 1.4 mm, rounded, membranous, glabrous on both sides, margin entire, hyaline for $^1/_{12}$ – $^1/_8$ of total tepal width on each side, veins branched. Disc annular, lobed, smooth. *Ovary* 3-locular, globose, c. 0.8 mm in diam., smooth, puberulent or pubescent; styles free or fused only at the base, bifid for c. $^1/_3$ of their length, terete, c. 0.6 mm long; stigmas obtuse. *Fruits* globose, c. 2 mm in diam., puberulent or pubescent, striate; fruiting pedicels terete, 4 – 5 × c. 0.2 mm, glabrous; tepals c. 3 × 1.6 mm; styles persistent; columella c. 1 × 0.4 mm. Seeds 0.8 – 1.2 × 0.3 – 0.4 mm, smooth.

DISTRIBUTION. Endemic to Madagascar: central floristic domain. Map 9.

SPECIMEN EXAMINED. MADAGASCAR. Sud-Est du Lac Alaotra, *Cours* 191 (holotype P).

HABITAT. Mid-altitude humid forest.

CONSERVATION STATUS. Data Deficient (DD). *Phyllanthus coursii* is only known from the type and has not been collected in recent years.



Map 9. Distribution of *Phyllanthus coursii*.

10. Phyllanthus ivohibeus *Leandri* (1938: 197). Type: Madagascar, Fianarantsoa, Ivohibe, bassin de Manampatra, *Perrier de la Bâthie* 9760 (lectotype P!, selected here). Because of the quality and the preservation of the specimens, this collection is chosen as lectotype.

Dioecious *shrubs* 40 – 70 cm high. Branching pinnatiform; orthotropic branches terete, 0.5 – 2 mm in diam., smooth, glabrous. Cataphylls triangular, 0.5 – 0.8 × 0.3 – 0.4 mm, coriaceous, entire, glabrous. Cataphyllary stipules 0.4 – 0.8 × 0.3 – 0.4 mm, coriaceous, entire, glabrous. Plagiotropic branches solitary, terete, 2 – 8 cm long, 0.3 – 0.4 mm in diam., glabrous, striate. Stipules persistent, triangular, 0.5 – 1 × c. 0.3 mm, membranous, entire, glabrous. Internodes 0.5 – 1 mm long. *Leaves* 9 – 48 per branch. Petioles terete, 0.4 – 0.6 × 0.2 – 0.3 mm, glabrous. Leaf blades elliptic (asymmetric at the base), c. 2.5 – 5 × 1.5 – 3 mm, 1.6 times longer than wide, rounded at the base, acute, obtuse or rounded at the apex, chartaceous, entire, sometimes revolute, glabrous on both sides; midveins prominent adaxially, impressed abaxially; secondary veins 3 – 4 pairs, indistinct adaxially, flattened abaxially. *Inflorescences* unisexual, consisting of 2 male flowers or only 1 female flower. Bracts triangular, grouped in a tuft of 5 – 8 mainly sterile bracts in male inflorescences, 0.4 – 0.6 × 0.2 – 0.3 mm, entire or slightly erose, glabrous. *Male flowers* 1.8 – 2 × 2 – 2.2 mm, whitish when fresh. Pedicels 1.5 – 2 × 0.2 – 0.3 mm, glabrous. Tepals 5, equal, elliptic or suborbicular, 1.5 – 1.7 × 1 – 1.5 mm, rounded, membranous, glabrous on both sides, margin entire, hyaline for c. $^1/_3$ of total tepal width on each side, veins unbranched. Disc glands 5, peltate, lenticular, c. 0.4 × 0.3 mm, rugose or verrucose. Stamens 2 – 3, filaments entirely fused into a column; column terete, 0.8 – 1 × 0.2 – 0.3 mm; anthers completely fused into a disciform circumscissile synandrium, unlobed or with two or three lobes, dehiscing horizontally. *Female flowers* 2 – 2.5 × 3 – 3.5 mm, whitish when fresh. Pedicels 1.5 – 2 × c. 0.2, glabrous. Tepals 5, elliptic or obovate, 1.8 – 2.5 × 1.3 – 1.7 mm, rounded, membranous, glabrous on both sides, margin entire, hyaline for $^1/_6$ – $^1/_4$ of tepal width on each side, veins unbranched. Disc lobed, smooth. *Ovary* 3-locular, globose, 1 – 1.7 mm in diam., smooth, glabrous; styles entirely free, bifid for c. $^1/_2$ of their length, terete, 0.8 – 1 mm long; stigmas obtuse. *Fruits* depressed globose, 1.5 – 2 × 1.7 – 2.2 mm, glabrous; fruiting pedicels 3 – 5 × 0.2 – 0.3 mm, glabrous; tepals 2 – 3 × 1.5 – 2 mm. *Seeds* c. 1 × 0.8 mm, smooth. Fig. 2.

DISTRIBUTION. Endemic to Madagascar: central floristic domain (Antananarivo and Fianarantsoa province). Map 10.

SPECIMENS EXAMINED. MADAGASCAR. Antananarivo. Antananarivo, *Perrier de la Bâthie* 9735 (P); Tsinjoarivo, NE of queen's palace, 19°37'91"S, 47°41'49"E, alt. 1555 m, 18 Nov. 2004, *Ralimanana & Rajaonarison* 649 (TAN); Vakinakaratra, N of Pic Vohimalaza near Betafo, alt. 1600 m, 18 Nov. 1912, *Viguier & Humbert* 1363 (P). Fianarantsoa. Vangaindrano, Midongy Atsimo, Ambangivelo, Telorano, 23°43'33", 47°02'13"E, alt. 705 m, 22 Sept. 2008, *Bussmann et al.* 15074 (MO, TAN); Manjarivolo, alt. 1650 m, 1 Nov. 1970, *Guillaumet* 3457 (P); Bassin de Matitanana, Sept. 1934, *Hein* s.n. (P); Haute vallée de Rienana, alt. 1000 – 1400 m, *Humbert* 3621 (lectoparatype P); Ivohibe, bassin de Manampatra, *Perrier de la Bâthie* 9760 (lectotype P); Itomampy, mont Papanga, alt. 1300 – 1700 m, 2 – 3 Dec. 1928, *Humbert* 6917 (P); Ambalavao, Ambalamanasy, Ambondrombe, 21°25'S, 44°57'E, 26 May 2004, *Rakotonasolo* 803 (MO, TAN); Ivohibe, Ambarongy, N of Iantara R, 22°13'20"S, 47°01'29"E, alt. 720 m, 12 Oct. 1994, *Rakotovao et al.* 153 (MO, TAN); limite nord de la reserve, le long de la riviere Ifefitany, 22°28'12"S, 46°57'36"E, alt. 900 m, *Rakotovao et al.* 838 (MO, TAN); Andrambovato, côte Talatamaty river, mid altitude forest, 21°30'07"S, 47°24'06"E, alt. 1075 m, 13 Oct. 2000, *Rakotovao & Randriantafika* 998 (K, MO, TAN).

HABITAT. Open humid forest and secondary vegetation; alt. 700 – 1700 m.

CONSERVATION STATUS. Vulnerable (VU (B1ab i, iii, iv)). *Phyllanthus ivohibeus* has an EOO of 19706 km^2. This

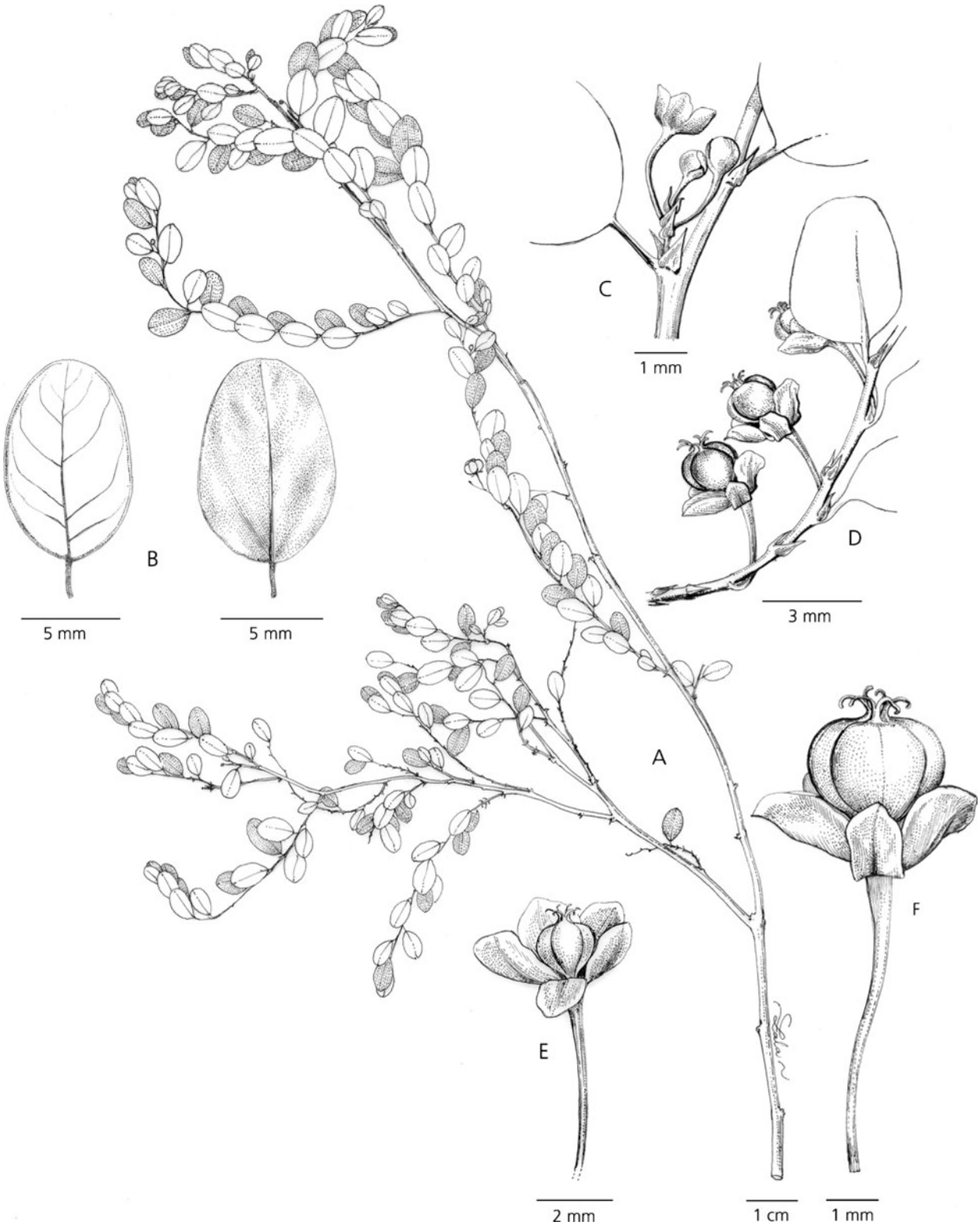
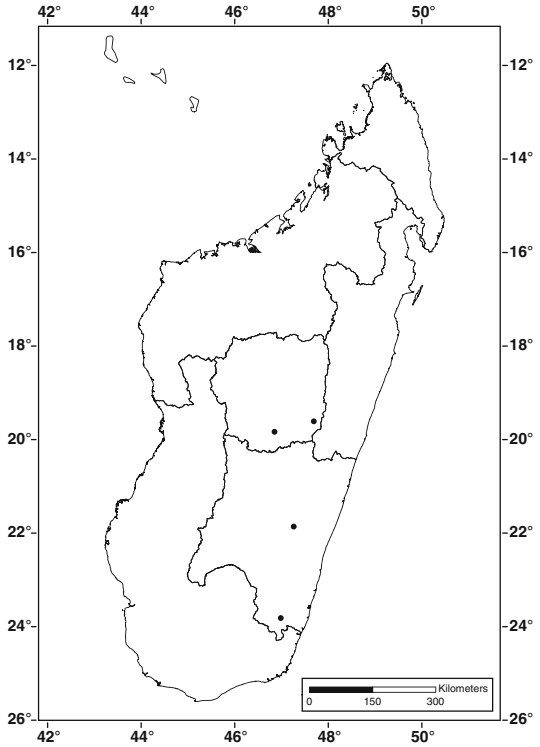


Fig. 2. *Phyllanthus ivohibeus*. **A** habit; **B** leaves; **C** nodes with stipules, petiole, leaves and inflorescence; **D** part of plagiotropic branch with fruits; **E** female flower; **F** fruit. From *F. Rakotonasolo* 803 (TAN). DRAWN BY R. L. ANDRIAMIARISOA.



Map 10. Distribution of *Phyllanthus ivohibeus*.

species is threatened by habitat loss due to fire and forest logging which lead to a decline in extent of occurrence, the quality of habitat, and the number of locations.

11. Phyllanthus vatovaviensis *Leandri ex Ralim. & Petra Hoffm.* **sp. nov.** Type: Madagascar, Fianarantsoa, Mont Vatovavy, *Decary* 13730 (holotype P(P00482889)!; isotypes P(P00078287, P00078288)!).

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Phyllanthus vatovaviensis Leandri (1958: 68), **nom. invalid.**

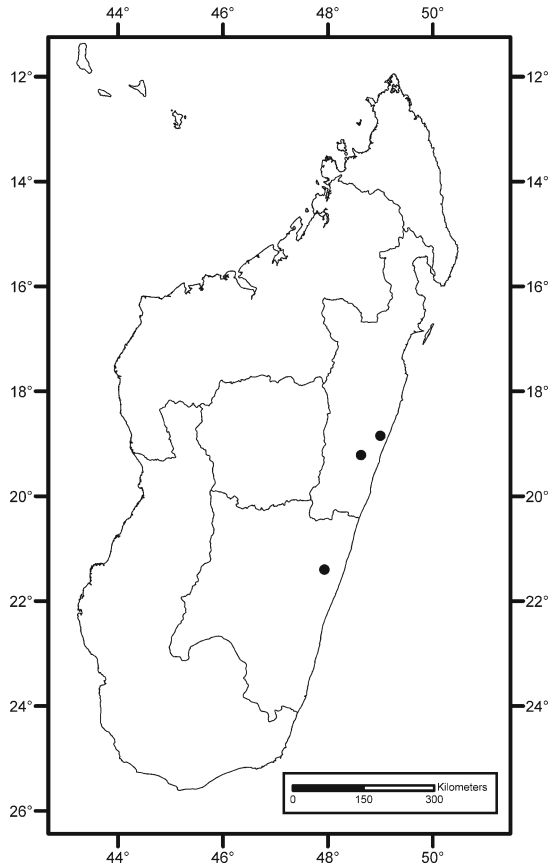
Monoecious *shrubs* 40 – 50 cm high with flexible branches. Branching pinnatiform or bipinnatiform; orthotropic branches terete, 0.5 – 2 mm in diam., striate, glabrous. Cataphylls triangular, c. 0.4 × 0.5 mm, coriaceous, entire, glabrous. Cataphyllary stipules triangular, c. 0.4 × 0.5 mm, coriaceous, entire, glabrous. Plagiotropic branches solitary, flexible, terete, 3 – 11 cm long, 0.3 – 0.5 mm in diam., glabrous, striate. Stipules persistent, triangular, 0.8 – 1.5 × 0.3 – 0.5 mm, membranous, entire, glabrous. Internodes 2 – 4 mm long. *Leaves* 9 – 25 per branch. Petioles terete, c. 0.4 × 0.2 mm, glabrous. Leaf blades elliptic to oblong (symmetric at the base), 8 – 14 × 5 – 6 mm, 1.6 – 2.3 times longer than wide, rounded or obtuse at the base, rounded at the apex, chartaceous, entire, slightly revolute, glabrous on both sides; midvein slightly prominent adaxially, flattened abaxially; secondary veins 3 – 5 pairs, flattened on both sides. *Inflorescences* unisexual, consisting of 2 or 3 male flowers or only 1 female flower; male and female inflorescences on different branches. Bracts triangular, grouped in a tuft of 9 – 12 mainly sterile bracts in male inflorescences, 0.2 – 0.4 × 0.2 – 0.3 mm, entire, glabrous. *Male flowers* 1 – 1.3 × 1 – 1.2 mm, whitish green when fresh. Pedicels 1 – 2 × 0.2 – 0.3 mm, glabrous. Tepals 5, inequal (the outer ones larger than the inner ones), obovate or suborbicular, 1 – 1.3 × 0.7 – 1.2 mm, rounded, membranous, glabrous on both sides, margin entire, hyaline for c. $^1/_4$ of total tepal width on each side, veins unbranched. Disc glands 5, lenticular, c. 0.3 × 0.2 mm, rugose or verrucose. Stamens 2, filaments entirely fused into a column; column terete, c. 0.6 × 0.3 mm; anthers entirely fused into a disciform circumscissile bilobed synandrium, dehiscing horizontally. *Female flowers* 1.8 – 2 × 2.2 – 2.8 mm, whitish green when fresh. Pedicels 2 – 3 × 0.2 – 0.3 mm (diam. increasing apically to 0.4 – 0.5 mm), glabrous. Tepals 5, equal, obovate or elliptic, 1.8 – 2 × 1 – 1.2 mm, rounded, membranous, glabrous on both sides, margin entire or slightly erose, hyaline for c. $^1/_6$ of total tepal width on each side, veins branched. Disc ± flattened, irregularly lobed, smooth. Ovary 3-locular, sub-globose, 0.7 – 1.2 mm in diam., smooth, glabrous; styles fused at the base, bifid for c. $^1/_2$ of their length, terete, 0.6 – 0.7 mm long; stigmas obtuse. *Fruits* sub-globose, 1.3 – 2 × 1.2 – 1.8 mm, glabrous; fruiting pedicels terete in the basal half, becoming flattened apically, 2.5 – 3 × 0.2 – 0.4 mm, glabrous; tepals c. 3 × 2 mm; styles caducous; columella c. 1 × 0.3 mm. *Seeds* c. 1.3 × 1 mm, finely longitudinally striate.

RECOGNITION. *Phyllanthus vatovaviensis* is similar to *P. moramangicus* in the bracts of the male flowers being tufted, the stamen filaments being entirely fused, the anthers fused into a disciform circumscissile synandrium but differs from *P. moramangicus* by the petiole c. 0.4 mm long (0.8 – 1 mm), the leaf blades oblong (vs ovate to lanceolate), leaf blade length up to 14 mm (vs up to 25 mm) and the apex rounded (vs acute or mucronulate).

DISTRIBUTION. Endemic to Madagascar: Eastern floristic domain. Map 11.

SPECIMENS EXAMINED. MADAGASCAR. Central Madagascar, *Baron* 1887 (P). Fianarantsoa. Mont Vatovavy, *Decary* 13730 (holotype P); Mont Vatovavy, *Decary* 13730 (isotypes P). Toamasina. vatomandry, Ambalabe, 19°11'18"S, 48°33'6"E, alt. 650 m, 13 March 2005, *Razanatsima et al.* 9 (MO, P, TAN).

HABITAT. Humid forest and degraded humid forest; alt 100 – 650 m.



Map 11. Distribution of *Phyllanthus vatovaviensis*.

CONSERVATION STATUS. Endangered (EN (B1abi-iv + B2ab i-iv)). *Phyllanthus vatovaviensis* has an EOO of 3158 km^2 and an AOO of 1875 km^2. All locations are found outside of protected areas. This species is mainly found in the east of Madagascar where the habitat is threatened by cut and slash agriculture and forest logging.

NOTES. *Phyllanthus vatovaviensis* is among the taxa cited by Leandri (1958) in *Flore de Madagascar et des Comores*. He referred to the first description of this species. However, after checking the journal we noted that no diagnosis of this species was included. Investigations into Leandri's other publications have yielded no results. The species had not been validly published previously.

12. Phyllanthus lokohensis *Leandri* (1957: 229). Type: Madagascar, Antsiranana, Massif de Marojejy (Nord-Est), bassin de Lokoho Est d'Ambalamanasy II, alt. 600 m, *Humbert & Capuron* 22206 (holotype, P(P00078219)!; isotype P(P00535937)!).

Monoecious *shrubs* 40 – 100 cm high. Branching pinnatiform; orthotropic branches terete, 1.5 – 3 mm in diam., striate or smooth, glabrous. Cataphylls triangular, 1.3 – 1.5 × 0.4 – 0.6 mm, subcoriaceous, entire, glabrous. Cataphyllary stipules triangular, 1.3 – 1.5 × 0.4 – 0.6 mm, subcoriaceous, entire, glabrous. Plagiotropic branches solitary, terete, 4 – 15 cm long, 0.4 – 0.9 mm in diam., glabrous or pubescent, striate. Stipules persistent, triangular, 0.8 – 1.3 × 0.4 – 0.6 mm, membranous, entire or slightly erose, glabrous. Internodes 2 – 10 mm long. *Leaves* 7 – 20 per branch. Petioles terete, 1.2 – 1.5 × 0.3 – 0.5 mm, glabrous or rarely pubescent. Leaf blades elliptic to ovate (symmetric at the base), 5 – 18 × 5 – 12 mm, 1 – 1.5 times longer than wide, obtuse at the base and apex, membranous to chartaceous, glabrous on both sides, green or reddish green adaxially, reddish or greyish green abaxially when fresh; midvein flattened on both sides; secondary veins 3 – 7 pairs, slightly prominent adaxially, flattened abaxially. *Inflorescences* unisexual, consisting of 1 or 2 male flowers or only 1 female flower; male inflorescences on proximal part and female inflorescences on distal part of plagiotropic branches, or male and female inflorescences on different branches. Bracts triangular or elliptic, grouped in a tuft of 5 – 7 mainly sterile bracts in male inflorescences, 0.9 – 1.5 × 0.4 – 0.7 mm, dentate or erose, glabrous. *Male flowers* 2 – 2.5 × 2.5 – 4 mm, whitish green when fresh. Pedicels terete, 2.5 – 5 × c. 0.1 mm, glabrous. Tepals 5, equal, elliptic or obovate, 2 – 2.5 × 1.8 – 2 mm, rounded or obtuse, membranous, glabrous on both sides, margin entire, hyaline for $^1/_8$ – $^1/_6$ of total tepal width on each side, veins branched. Disc glands 5, reniform, 0.4 – 0.5 mm in diam., smooth. Stamens 3, filaments entirely fused into a column; column terete, 0.6 – 0.8 × c. 0.3 mm; anthers completely fused into a disciform circumscissile tri-lobed synandrium, dehiscing horizontally. *Female flowers* 3.5 – 5 × 4 – 8 mm, whitish green when fresh. Pedicels 3 – 7 × 0.1 – 0.2 mm, glabrous. Tepals 5, equal, elliptic or obovate, 3 – 4 × 2 – 3 mm, rounded, slightly coriaceous or membranous, glabrous on both sides, margin entire, hyaline for c. $^1/_{10}$ of total tepal width on each side, veins branched. Disc lobed, rugose or smooth. *Ovary* 3-locular, globose, 0.5 – 1 mm diam., on short gynophore 0.2 – 0.5 mm, smooth, glabrous; styles fused into a column for c. $^1/_4$ of their length, bifid for c. $^1/_3$ of their length, terete, 1.5 – 2 mm long; stigmas obtuse. *Fruits* globose, 1.5 – 2.5 mm in diam., glabrous; fruiting pedicels terete, 6 – 7 × c. 0.3 mm, glabrous; tepals 3 – 7 × 3 – 4 mm; styles persistent; columella 1 – 2 × 0.3 – 0.4 mm. *Seeds* 1 – 1.8 × 0.7 – 1 mm, smooth or thinly striate longitudinally, light green or yellowish when fresh. Fig. 3.

DISTRIBUTION. Endemic to Madagascar; Central and eastern floristic domains. Map 12.

SPECIMENS EXAMINED. MADAGASCAR. Antsiranana. Massif de Marojejy (Nord-Est), bassin de Lokoho Est

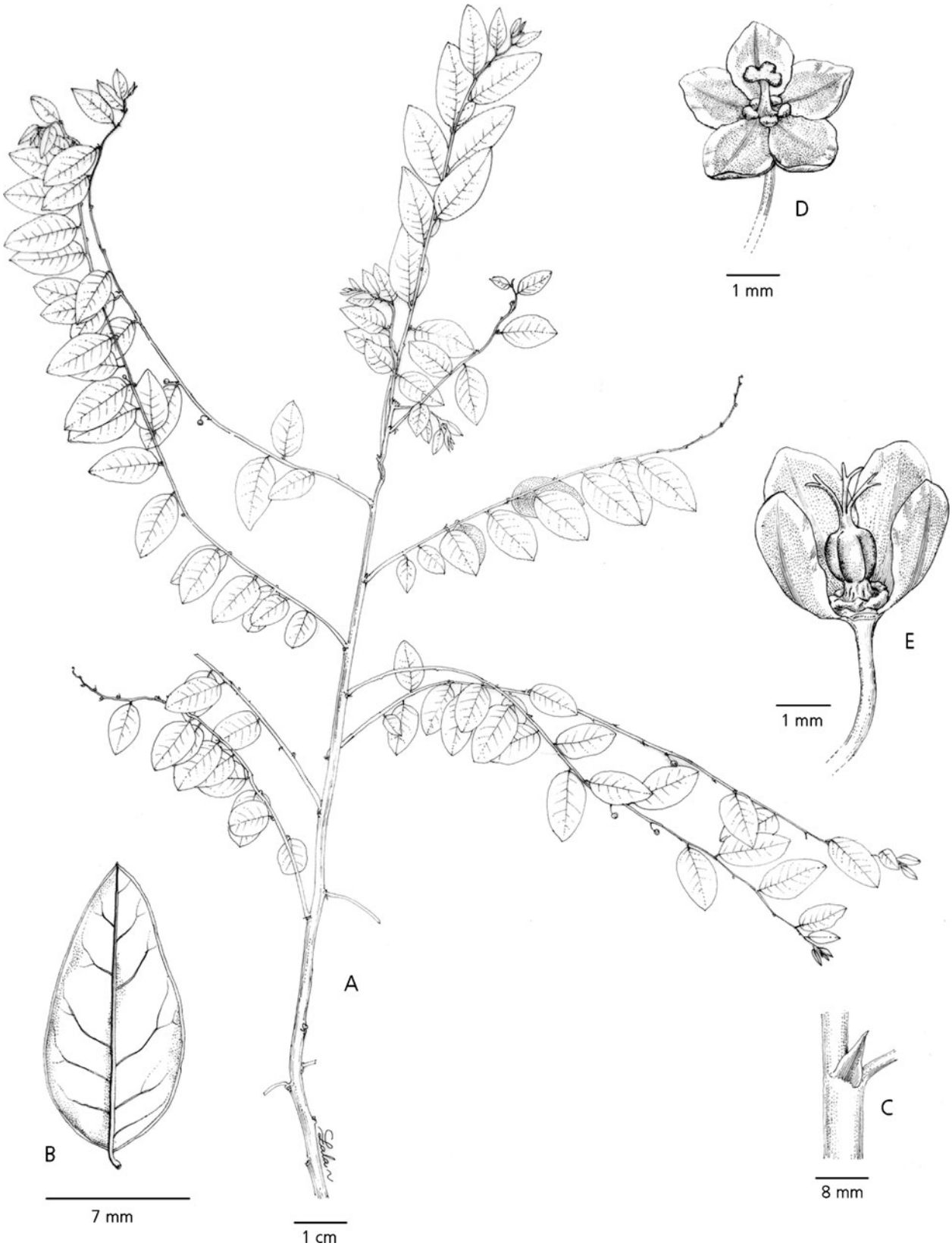
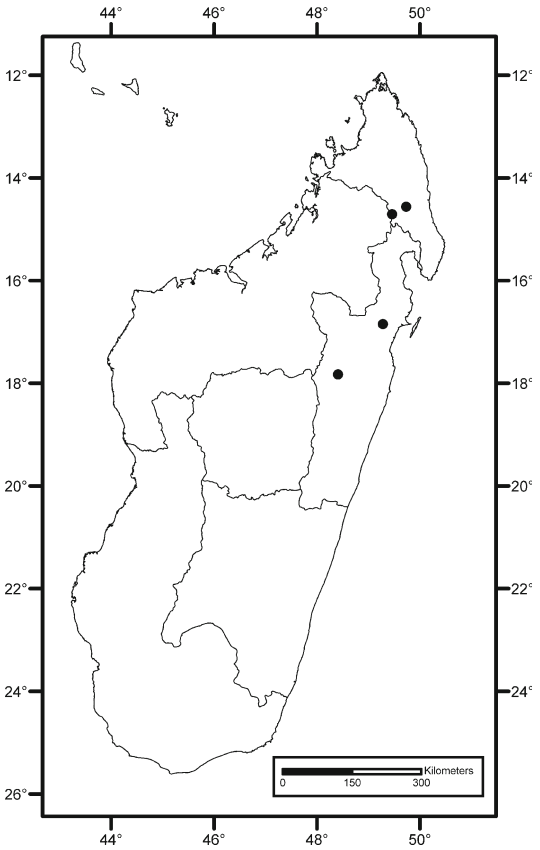


Fig. 3. *Phyllanthus lokohensis*. **A** habit; **B** leaf; **C** node; **D** male flower; **E** female flower. From *G. Cours* 4305 (TAN). DRAWN BY R. L. ANDRIAMIARISOA.



Map 12. Distribution of *Phyllanthus lokohensis*.

d'Ambalamanasy II, alt. 600 m, *Humbert & Capuron* 22206 (holotype P); Massif de Marojejy (Nord-Est), bassin de Lokoho Est d'Ambalamanasy II, alt. 600 m, *Humbert & Capuron* 22206 (isotype P); Andapa, Ambalamanasy II, Marojejy National Park, Betsiasisa forest, east of Antanimbaribe, 14°29'10"S, 49°34'02"E, alt. 865 m, 1 Feb. 2013, *Ralimanana et al.* 1752 (K, MO, P, TAN). Fianarantsoa. Réserve Spéciale d'Ivohibe, forest of Marovitsika, 22°28'49"S, 49°56'49"E, alt. 850 m, Oct. 2000, *Hoffmann* 224 (K, TAN). Toamasina. Brickaville, Anjahamamy, Anivoranokely, Ankerana forest, 18°24'12"S, 48°48'24"E, alt. 975 m, 25 Jan. 2012, *Antilahimena* 8041 (MO, TAN); Rahobevava, c. 1250 m, 12 March 1951, Herbier de Station Agricole Alaotra, *Cours* 4305 (TAN); Soanierana Ivongo, between Ambatovaky and Amberomanitra, 16°51'40"S, 49°17'20"E, alt. 350 m, 17 Dec. 2003, *Ralimanana et al.* 410 (G, MO, P, TAN); Soanierana Ivongo, between Amberomanitra and Ambatobe, 16°51'S, 49°17'E, alt. 348 m, 18 Dec. 2003, *Ralimanana et al.* 416 (K, MO, P, TAN); Brickaville, Maroseranana, Ambodilendemy, forêt d'Ankerana, 18°24'48"S, 48°47'32"E, alt. 1180 m, 23 March 2011, *Ravelonarivo et al.* 3817 (MO, TAN); Brickaville, Maroseranana, Ambatolampy, forêt d'Ankerana, 18°24'11"S, 48°47'04"E, alt. 1131 m, 1 Feb. 2012, *Ravelonarivo & Felix* 4264 (MO, P, TAN).

HABITAT. Humid forest; alt. 350 – 1250 m.

CONSERVATION STATUS. Vulnerable (VU (B1abi-iv)). *Phyllanthus lokohensis* has an EOO of 13317 km^2 and an AOO of 4870.59 km^2. This species has a disjunct distribution. It is threatened by habitat loss due to human activities such as cut and slash which leads to a decline of area of occupancy, quality of habitat and number of locations or subpopulations.

13. Phyllanthus moramangicus (*Leandri*) *Leandri* (1958: 84). *Phyllanthus melleri* Müll. Arg. subsp. *moramangicus* Leandri (1938: 197). Type: Madagascar, Toamasina: Moramanga, forêt au sud de Moramanga, *Decary* 7185 (holotype P!).

Monoecious *shrubs* 40 – 60 cm tall. Branching pinnatiform; orthotropic branches terete, becoming slightly flattened apically, 2 – 3 mm in diam., striate, glabrous. Cataphylls triangular, 0.8 – 1 × 0.5 – 0.7 mm, coriaceous, entire, glabrous. Cataphyllary stipules triangular, 0.8 – 1 × 0.5 – 0.6 mm, coriaceous, entire, glabrous. Plagiotropic branches solitary or fascicled in twos, terete, 3.5 – 9.5 cm long, 0.5 – 0.7 mm in diam., puberulous or glabrous, striate. Stipules persistent, triangular, 0.8 – 1 × 0.4 – 0.6 mm, membranous, entire, glabrous. *Leaves* 7 – 13 per branch. Internodes 2 – 6 mm long. Petioles terete, 0.8 – 1 × 0.4 – 0.5 mm, glabrous. Leaf blades ovate to lanceolate (symmetric at the base), 8 – 25 × 5 – 7 mm, 2 – 4.1 times longer than wide, obtuse to attenuate at the base, acute to mucronulate at the apex, chartaceous, revolute, glabrous on both sides, green adaxially, green greyish abaxially when fresh; midvein prominent on both sides; secondary veins 3 – 7 pairs, slightly prominent adaxially, flattened abaxially. *Inflorescences* unisexual, consisting of 2 male flowers or only 1 female flower; male inflorescences and female inflorescences on different branches. Bracts triangular, grouped in a tuft of 8 – 15 mainly sterile bracts in male inflorescence, 0.5 – 0.8 × 0.3 – 0.4 mm, entire or slightly erose, glabrous. *Male flowers* 1.8 – 2 × 2 – 2.2 mm, whitish green when fresh. Pedicels 2 – 3 × c. 0.5 mm, glabrous. Tepals 5, subequal, obovate, 2 – 2.2 × 1 – 1.5 mm, rounded, slightly coriaceous or membranous, glabrous on both sides, margin entire, hyaline for c. $^1/_8$ of tepal width on each side, veins unbranched. Disc glands 5, lenticular, c. 0.3 × 0.2 mm, rugose or verrucose. Stamens 2 (– 3); filaments entirely fused into a column; column terete, 0.4 – 1 × 0.3 – 0.4 mm; anthers entirely fused into a disciform circumscissile synandrium, bilobed or very rarely tri-lobed, c. 0.2 × 0.3 mm in diam., dehiscing horizontally. *Female flowers* 2 – 3 × 3 – 4 mm, whitish when fresh. Pedicels 5 – 8 × c. 0.4 mm, apically flattened and slightly thickened (up to 0.8 mm), glabrous. Tepals 5, inequal, ovate or obovate, 2 – 3 × 1.5 – 1.8 mm, rounded or obtuse,

slightly coriaceous or membranous, glabrous on both sides, margin entire, hyaline for c. $^1/_8$ of total tepal width on each side, veins branched. Disc lobed, verrucose. *Ovary* 3-locular, globose, 1.3 – 1.5 mm diam., smooth, glabrous; styles fused only at the base, bifid for c. $^1/_3$ of their length, terete, 0.6 – 0.8 mm long; stigmas obtuse. *Fruits* depressed globose, 2 – 2.5 × 2 – 3 mm, glabrous; fruiting pedicels terete, apically slightly thickened, 5 – 10 × 0.4 – 0.8 mm, glabrous; tepals 2.5 – 3 × 1.5 – 1.8 mm; styles caducous; columella 1.2 – 1.4 × 0.3 – 0.4 mm. *Seeds* 1 – 1.3 × 1 – 1.2 mm, smooth. Fig. 4.

DISTRIBUTION. Endemic to Madagascar: Central floristic domain. Map 13.

SPECIMENS EXAMINED. MADAGASCAR. Toamasina. Moramanga, forêt au sud de Moramanga, *Decary* 7185 (holotype P). Road to Lakato, c. 14 km S of RN2, 19°01'43"S, 48°21'06"E, alt. 1040 m, 13 Nov. 2003, *Lowry II et al.* 6246 (MO, TAN); Aux environs de la Chutes de la Mort, PK 55 route de Moramanga Anosibe An'ala, 11 Dec. 1965, *Services Forestiers* 24397 SF (*Capuron*) (TEF); Andasibe, Morafeno Anevoka, forêt d'Andasihamaka, 18°57'55"S, 48°27'33"E, 29 Dec. 2002, *Ranaivojaona* 556 (TAN); Ambatovy, forêt de Berano, 18°51'35"S, 48°19'56"E, alt. 1070 m, *Ranaivojaona* 1046 (MO, TAN); Alaotra Mangoro, Andasibe, Parc d'Analamazaotra, Barika Amboasary, 18°56'46"S, 48°26'17"E, alt. 1071 m, 13 March 2013, *Rasoazanany et al.* 466 (MO, P, TAN).

HABITAT. Open humid forest, degraded humid forest and secondary vegetation.

CONSERVATION STATUS. Endangered (EN (B1abi-iv + B2ab i-iv)). *Phyllanthus moramangicus* has an EOO of 187 km^2 and an AOO of 30 km^2. All locations are found outside protected areas. This species is threatened by human activities such as cut and slash, mining and annual fire.

III. Phyllanthus subgen. **Emblica** (*Gaertn.*) *G. L. Webster* sect. **Urinaria** *G. L. Webster*

Phyllanthus subgenus *Phyllanthus* section *Urinaria* G. L. Webster (1955: 51). Type of section: *Phyllanthus urinaria* L.

Monoecious *herbs* with pinnatiform phyllanthoid branching. Brachyblasts absent. *Leaves* alternate. Stipules entire. *Inflorescences* on leafy branches, axillary, unisexual, 1 to 2-flowered. Tepals 5 or 6. Disc: free glands in male flowers, annular in female flowers. Stamens 3; filaments entirely fused into a column; anthers basifixed, free, dehiscing longitudinally; pollen prolate, 4 – 5-colporate, exine tectate, scabrous and microperforate (Brunel 1987). *Ovary* 3-locular, tuberculate; styles free, bifid; stigmas obtuse. *Fruits* dehiscent; tepals persistent, not accrescent; seeds 2 per locule, deeply and coarsely transversally ribbed.

14. Phyllanthus urinaria *L.*, *Species Plantarum* (Linnaeus 1753: 982). Type: Sri Lanka. *Herb. Hermann* 1: 15; 2: 7; 3: 55; 4: 41, No. 332 (lectotype BM!, selected by Fawcett & Rendle (1920: 255); Jarvis (2006)).

Monoecious *herbs* 10 – 40 cm high. Orthotropic branches terete, 0.4 – 0.6 mm in diam., rugose or smooth, glabrous. Cataphylls triangular, acute, 1.5 – 2.5 × 0.3 – 0.4 mm, subcoriaceous or chartaceous, with hyaline margin, entire, glabrous. Cataphyllary stipules triangular, auriculate at the base, 1 – 2 × 0.3 – 0.4 mm, membranous or chartaceous, entire, glabrous. Plagiotropic branches solitary, flattened and winged, 1 – 10 cm long, 0.3 – 0.4 mm in diam., rugose or smooth, glabrous or hirsutulous. Stipules persistent, triangular or lanceolate, 0.4 – 0.6 × 0.2 – 0.3 mm, membranous or chartaceous, entire, glabrous. *Leaves* 4 – 11 per branch. Internodes 1 – 2.5 mm long. Petioles terete, 0.4 – 0.6 × c. 0.3 mm glabrous. Leaf blades mostly oblong or obovate-oblong, 3.5 – 8 × 1.6 – 3 mm, 1.7 – 2.6 times longer than wide, rounded or obtuse and sometimes slightly asymmetric at the base, obtuse or acute and mucronulate at the apex, membranous, glabrous on both sides, margin slightly denticulate; midvein prominent on both sides; secondary veins 3 – 5 pairs, flattened or indistinct adaxially, prominent abaxially. *Inflorescences* unisexual, consisting of 1 – 2 male flowers on distal part of plagiotropic branches, and of 1 female flower on proximal part of plagiotropic branches. Bracts triangular or ovate, grouped in a tuft of 4 – 6 mainly sterile bracts in male inflorescences, 0.2 – 0.4 × 0.2 – 0.3 mm, entire, glabrous, whitish green when fresh. *Male flowers* 0.5 – 0.6 × 0.4 – 0.6 mm, greenish white when fresh. Pedicels 0.5 – 0.7 × c. 0.3 mm, glabrous. Tepals 5 or 6, equal, obovate or oblong, membranous, 0.3 – 0.6 × 0.3 – 0.4 mm, obtuse or acute, glabrous, margin entire, hyaline for $^1/_6$ of total tepal width on each side, veins unbranched. Disc glands 5 or 6, globose. Stamens 3; filaments entirely fused into a column; column terete, 0.1 – 0.2 mm long, c. 0.1 mm in diam.; anthers free, ovoid, 0.3 – 0.5 mm long, dehiscing longitudinally. *Female flowers* 0.5 – 0.8 × 0.4 – 0.6 mm, whitish green when fresh. Pedicels 0.5 – 1 × c. 0.4 mm, glabrous. Tepals 5 or 6, equal or unequal, membranous, oblong or lanceolate, 0.5 – 0.8 × 0.3 – 0.4 mm, obtuse or acute, glabrous on both sides, margin entire, hyaline for $^1/_6$ of total tepal width on each side, veins unbranched. Disc lobed, c. 0.1 mm thick. *Ovary* 3-locular, globose or depressed globose, 0.3 – 0. 5 × 0.3 – 0.5 mm, tuberculate, glabrous; styles 3, fused at the base, bifid for $^2/_3$ – $^3/_4$ of their length, flattened, 0.2 – 0.4 mm long; stigmas obtuse. *Fruits* depressed globose, c. 2 × 3 mm, glabrous; fruiting pedicels 0.6 – 1.3 × c. 0.4 mm; tepals 0.7 – 1 × 0.3 – 0.4 mm; styles persistent or caducous; columella 0.5 – 1 × 0.3 mm. *Seeds* 0.6 – 1.2 × 0.5 – 0.9 mm, dorsally and laterally with deep and coarse transversal ridges.

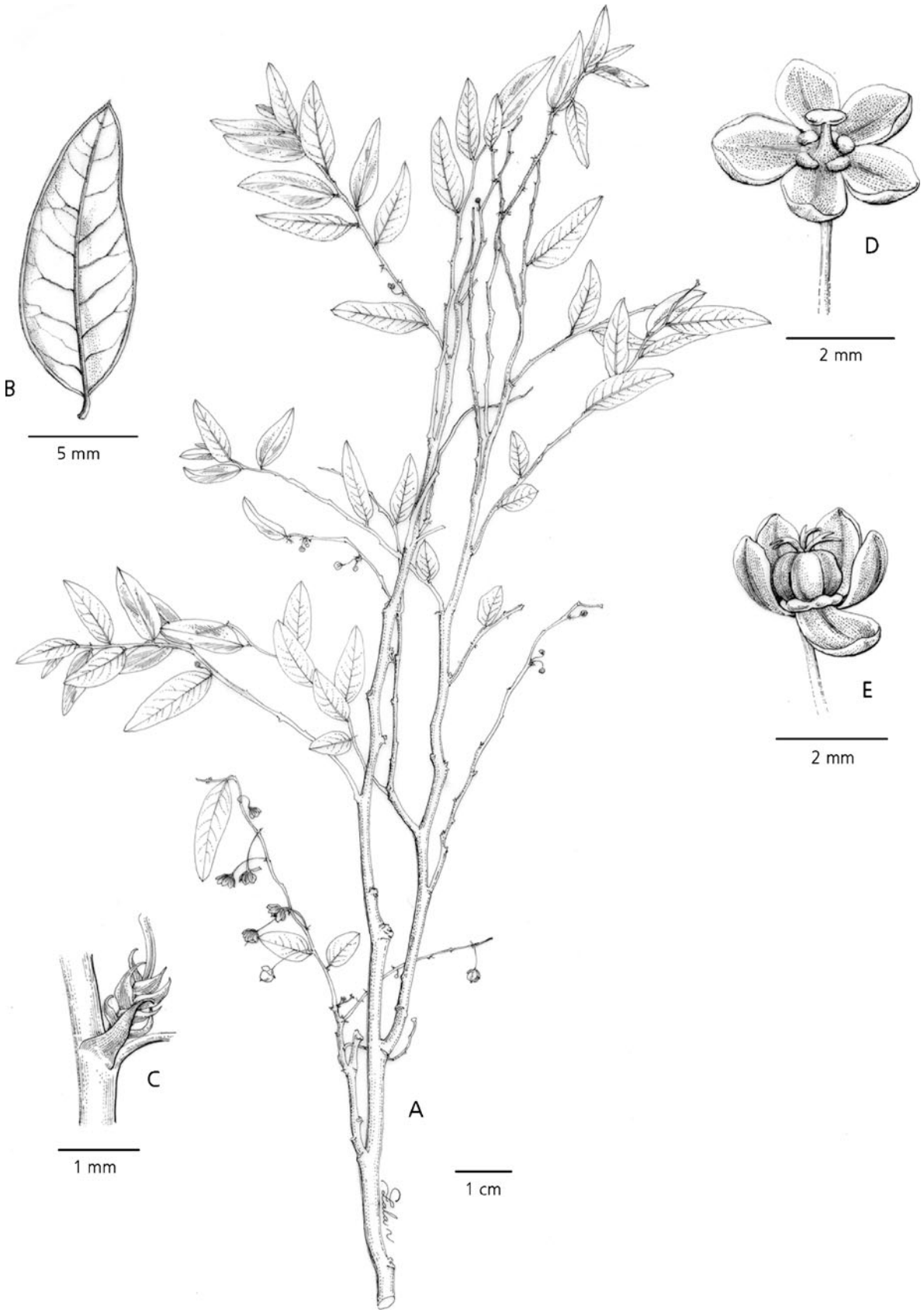
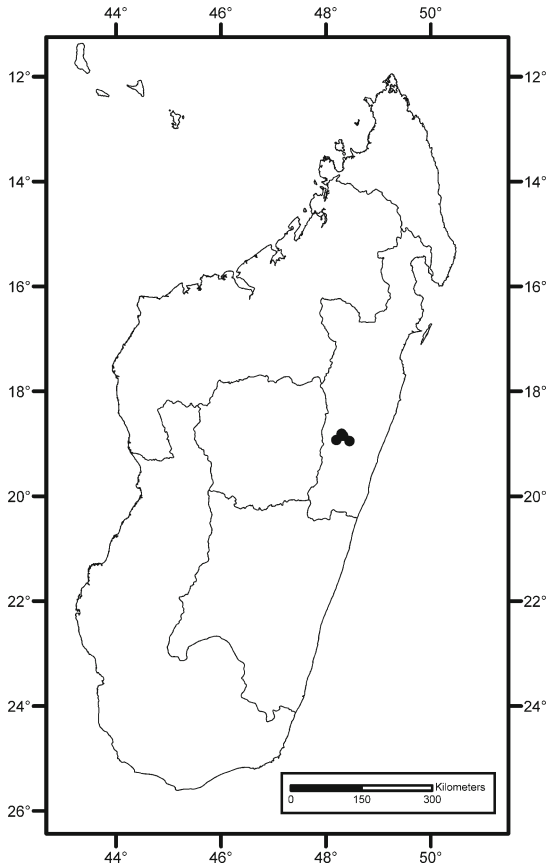
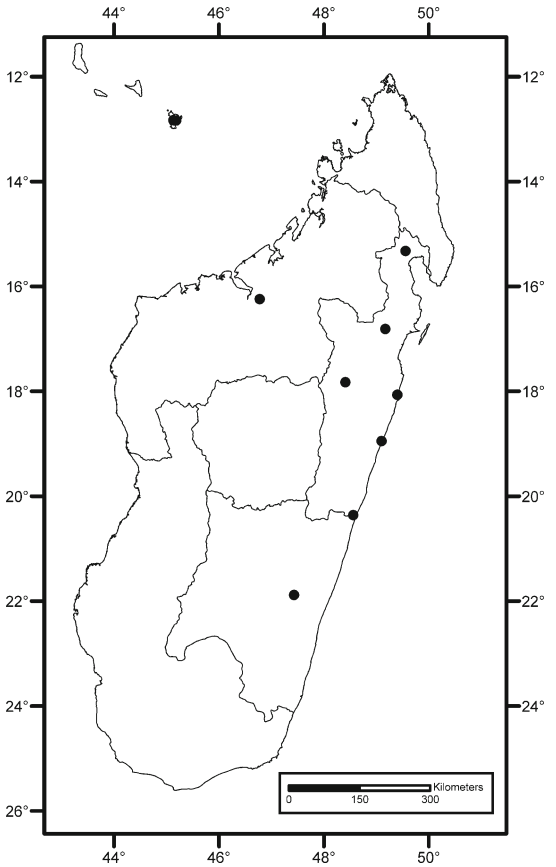


Fig. 4. *Phyllanthus moramangicus*. **A** habit; **B** leaf; **C** node with stipule, petiole and tuft of sterile bracts; **D** male flower; **E** female flower. From *R. Ranaivojaona* 556 (TAN). DRAWN BY R. L. ANDRIAMIARISOA.



Map 13. Distribution of *Phyllanthus moramangicus*.



Map 14. Distribution of *Phyllanthus urinaria*.

DISTRIBUTION. Native to Asia, introduced and becoming common in the tropics worldwide; in Madagascar: Eastern and Sambirano floristic domain. Map 14.

SPECIMENS EXAMINED. SRI LANKA. *Hermann* 1: 15; 2: 7; 3: 55; 4: 41, No. 332 (lectotype BM). **MADAGASCAR.** s. loc., Nov. 1819, *Perrier de la Bathie* s.n. (P); 21 June 1866, *Gerrard* 72 (K). Antsiranana. Nosy Be, *Hildebrandt* 3156 (K, P). Fianarantsoa. Fort Carnot, 1986, *Beaujard* 77 (P). Toamasina. Ambatondrazaka, *Herb. Station Agric. Alaotra* 27646 (P, TAN); Soanierana Ivongo, Ambatovaky Reserve, 16°49'19"S, 49°10'14"E, 475 m, 10 Dec. 2003, *Ralimanana et al.* 350 (K, MO, TAN); Mahanoro, Ambodibonara, forêt littorale d'Ampamanara, 20°22'22"S, 48°33'56"E, 13 m, 14 May 2004, *Ranaivojaona* 611 (K, MO, TAN); Ankirindro massif, Maroantsetra, 15°19'20"S, 49°33'26"E, 100 m, 2 Feb. 1999, *Schatz et al.* 3936 (K, MO); Andevoranto, Anivorano, 300 m, 12 Feb. 1912, *Viguier & Humbert* 667 (P). **COMORO ISLANDS**. **MAYOTTE**. Grande Terre, Dembeni, Hauts Tsararano, 2 Aug. 2002, *Barthelat* 979 (K, Mayotte); Coconi, 12°49'87"S, 45°8'23"E, 100 m, 17 Nov. 2002, *Ralimanana & Hoffmann* 279 (K, TAN).

HABITAT IN MADAGASCAR. Humid forest boundaries, littoral forest, fields; alt. 10 – 500 m.

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