

Endemic families of Madagascar. VII. A synoptic revision of *Leptolaena* Thouars sensu stricto (Sarcolaenaceae)

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ABSTRACT

As part of an assessment of the vascular plant families endemic to Madagascar and the Comoro Islands, a synoptic revision is presented of *Leptolaena* Thouars sensu stricto (Sarcolaenaceae). Unresolved questions of generic delimitation among *Leptolaena* s.s., *Mediusella* (Cavaco) Hutch., *Xerochlamys* Baker, and *Sarcolaena* Thouars preclude a comprehensive revision of *Leptolaena* sensu lato at the present time. Two previously recognized species are retained (*L. multiflora* and *L. pauciflora*), *L. cuspidata* is resurrected from synonymy, and five new species are described: *L. abrahamii*, *L. delphinensis*, *L. gautieri*, *L. masoalensis*, and *L. raymondii*. Preliminary assessments of the conservation status of each species are provided, along with a key to the species in English and French.

KEY WORDS

Sarcolaenaceae,
Leptolaena,
Madagascar,
conservation.

RÉSUMÉ

Familles endémiques de Madagascar. VII. Une révision synoptique du genre Leptolaena Thouars sensu stricto (Sarcolaenaceae).

Dans le cadre de l'évaluation des familles de plantes vasculaires de Madagascar et des Comores, la révision synoptique du genre *Leptolaena* Thouars sensu stricto (Sarcolaenaceae) est présentée. Des questions non résolues concernant

MOTS CLÉS
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conservation.

la délimitation générique de *Leptolaena* s.str., *Mediusella* (Cavaco) Hutch., *Xerochlamys* Baker, et *Sarcolaena* Thouars excluent actuellement la réalisation d'une révision complète de *Leptolaena* sensu lato. Deux espèces déjà reconnues (*L. multiflora* et *L. pauciflora*) sont retenues ; *Leptolaena cuspidata* est réhabilitée, et cinq nouvelles espèces sont décrites : *L. abrahamii*, *L. delphinensis*, *L. gautieri*, *L. masoalensis*, et *L. raymondii*. Une évaluation préliminaire pour la conservation du statut de chaque espèce est présentée, ainsi qu'une clé à l'espèce, en anglais et en français.

INTRODUCTION

This is the seventh in our series of synoptic revisions of genera in Madagascar's endemic plant families (cf. LOWRY et al. 1999, 2000; SCHATZ et al. 1998, 1999a,b, 2000b), which we are publishing to provide an updated taxonomic framework for assessing the c. 100 species concerned using the IUCN Red List threat categories (SCHATZ et al. 2000a), with the ultimate goal of compiling a Red Data Book detailing the conservation status of each species. For the present paper, our original intention was to review species circumscriptions within *Leptolaena* Thouars sensu lato, i.e., including both *Mediusella* (Cavaco) Hutch. and *Xerochlamys* Baker, thus adopting the broader generic concept of CAVACO (1952a,b). However, reconsideration of the characters that have been utilized to distinguish the three genera from one another, as well as to distinguish closely related *Sarcolaena* Thouars, has caused us to question the generic limits among the representative taxa.

Sarcolaena has traditionally been circumscribed to include those taxa that exhibit pefoliation vernation traces on their leaves, a result of an induplicate-folded condition of the immature leaves during the bud stage, versus the inrolled condition in related genera. However, a recently described species of *Sarcolaena* entirely lacks vernation traces (*S. isaloensis* Randrianasolo & J.S. Mill.), and they are also occasionally absent in *S. eriophora* Thouars (RANDRIANASOLO & MILLER 1999). CAVACO (1952a,b) emphasized the complete dissociation of the pericarp at maturity into silky "malpighian" hairs to distinguish *Sarcolaena* from *Leptolaena* sensu lato. However, *Xerochlamys* also exhibits comparable dissociation

of the pericarp at maturity into hairs, and *Leptolaena* sensu stricto possesses hairs at the base and sometimes on the interior walls of the locules. Stipule morphology would appear to ally *Sarcolaena* and *Xerochlamys*, both of which possess stipules fused into a single hood-like structure, versus the free stipules of both *Leptolaena* s.s. and *Mediusella* (CAPURON 1970). Stamen number has also been used to distinguish genera, with *Sarcolaena*, *Xerochlamys*, and *Mediusella* all possessing "numerous" stamens, i.e., greater than 20, versus *Leptolaena* s.s. with purportedly 10 stamens. Closer examination of stamen number in *Leptolaena* s.s. for the new taxa described here reveals variable, possibly species-specific values ranging from 6-8 in *L. masoalensis*, 8-10 in *L. abrahamii*, 10 in *L. delphinensis*, 10-12 in *L. gautieri*, and nearly consistently 11 in *L. raymondii*. Recent reexamination of pollen of Sarcolaenaceae showed that differences among the four genera were insufficient to support either the division into subgenera or recognition at the rank of genus (NILSSON & RANDRIANASOLO 1999).

In light of the problems involved in assigning taxa within *Leptolaena* sensu lato and *Sarcolaena* to genera, we have decided to restrict the present study to *Leptolaena* sensu stricto, i.e., *Leptolaena* subgenus *Leptolaena* [treated as subgenus "*Euleptolaena*" by CAVACO (1951)], which comprises a morphologically coherent group that in all likelihood is monophyletic. *Leptolaena* s.s. can be distinguished by its smaller number of stamens, generally smaller flowers, and often glabrous condition. We have examined the specimens at the major herbaria with important holdings of Malagasy plants (K, MO, P, TAN and

TEF), and have reviewed the circumscription of the species in the group as recognized by CAVACO (1952a,b).

In the treatment of Chlaenaceae (= Sarcolaenaceae) for the Flore de Madagascar, CAVACO (1952b; see also CAVACO 1952a) recognized seven species of *Leptolaena*, two of which (*L. multiflora* and *L. pauciflora*) belong to the group being treated here. CAVACO also followed PERRIER DE LA BATHIE (1931) in considering *L. cuspidata* Baker to be a variety of *L. multiflora*, whereas we resurrect this taxon to the rank of species.

Recent phylogenetic studies utilizing molecular sequence data indicate that Sarcolaenaceae and Dipterocarpaceae are sister taxa within an expanded Malvales (ALVERSON et al. 1998; BAYER et al. 1999). Fossil pollen of Sarcolaenaceae from the Miocene of South Africa shows that the family was more widespread in the past and has become endemic to Madagascar through extinction elsewhere (COETZEE & MULLER 1984).

As in the previous papers in this series, we have re-evaluated species circumscriptions by examining morphological features in combination with eco-geographic parameters, including bioclimate (CORNET 1974; SCHATZ 2000; see also LOWRY et al. 1997, 1998) and geological substrate (DU PUY & MOAT 1996). Our analysis was facilitated by recent collections made by Malagasy students conducting field work for their DEA studies at the Université d'Antananarivo as part of the Endemic Plant Families of Madagascar Project (SCHATZ et al. 2000a).

Comparative analysis of the available material of *Leptolaena* sensu stricto has thus enabled us to propose the following revised taxonomy, in which eight species are recognized, five of which are described as new. For the "Material examined" cited below under each species, abbreviations are as follows: FC = Forêt Classée, PN = Parc National, RB = Réserve de la Biosphère, RNI = Réserve Naturelle Intégrale, RS = Réserve Spéciale, and STF = Station Forestière. A full listing of exsiccatae for each species, with complete localities and latitude/longitude coordinates, has been compiled for the Madagascar Conspectus Project (SCHATZ et al. 1996), and is available on the World Wide Web through W3 TROPICOS (<http://mobot.mobot.org/W3T/Search/vast.html>). Images of selected taxa are also available on the Web at (<http://www.mobot.org/MOBOT/Madagascar/sarcolae.html>). Specimen data can also be accessed through the SONNERAT database at (<http://www.mnhn.fr/basel/sonnerat.html>). Geographic coordinates indicated in square brackets were assigned *post facto* using available information on Malagasy place names and topographic maps, compiled as a gazetteer of botanical collecting localities in Madagascar (<http://www.mobot.org/MOBOT/research/madagascar/gazetteer/>).

LEPTOLAENA Thouars

Hist. Vég. Isles Austral. Afriq. : 41, pl. 11 (1805).

TYPE. — *Leptolaena multiflora* Thouars.

Key to the species of the *Leptolaena* s.s.

1. Leaves small, the largest blades usually < 2 cm long (occasionally to 4.5 cm), broadly ovate to circular or rhombic; inflorescences composed of 1-5 flowers 7. *L. pauciflora*
- 1'. Leaves larger, the largest blade > 3 cm long, lanceolate, obovate or narrowly to broadly ovate or elliptic; inflorescences composed of 7-50 flowers (2-8 in *L. masoalensis*) 2
2. Leaf apex obtuse to rounded, sometimes emarginate 3
- 2'. Leaf apex acute to acuminate 4
3. Involucre urceolate, 3 mm tall, covered with dense granular ferruginous indumentum; sepals exerted 1-1.5 mm beyond involucre; leaves narrowly to broadly elliptic, secondary veins (8-)11-13 per side 3. *L. delphinensis*
- 3'. Involucre ellipsoid to oblong, 7 mm tall, covered with sparse, short white indumentum; sepals completely included within involucre; leaves elliptic to slightly obovate, secondary veins usually 8 per side 5. *L. masoalensis*

- 4. Leaves sparsely to moderately sericeous below, with both short appressed trichomes and longer slightly raised trichomes often exceeding 1 mm long (older leaves occasionally subglabrous), margins distinctly revolute 8. **L. raymondii**
- 4'. Leaves glabrous below or with indumentum restricted to the midvein, margins weakly revolute to flat, sometimes minutely thickened 5
- 5. Leaf blades with evident indumentum on the midvein below 6
- 5'. Leaf blades completely glabrous (rarely a few trichomes at the base of the midvein below) 7
- 6. Involucre usually < 3 mm tall, densely golden yellow granular farinose, rounded at the base with a distinct peduncle 1 mm long; petals 7-9 × 1-1.5 mm; leaves lanceolate to ovate, apex distinctly long cuspidate 2. **L. cuspidata**
- 6'. Involucre 3-3.5 mm tall, densely ferruginous granular farinose, usually also with slightly erect whitish trichomes 0.5 mm long, especially in the lower portion, evenly tapering to a cuneate base, with an indistinct peduncle < 0.5 mm long; petals 10.5-12 × 1.5-2 mm; leaves ovate to broadly ovate, apex acute to acuminate, rarely cuspidate 4. **L. gautieri**
- 7. Leaves narrowly ovate, usually strongly falcate and inequilateral, often drying reddish black, apex distinctly acuminate to cuspidate, largest blades 2.5-4.5(-5.5) cm long; sepals at anthesis equal to involucre teeth or exceeding them by < 0.5 mm 1. **L. abrahamii**
- 7'. Leaves elliptic, usually equilateral to somewhat inequilateral, rarely a few somewhat falcate, drying brownish to olive green, largest blades greater than (3-)5.5 cm long; sepals at anthesis exceeding the involucre teeth by (0.8-)1-1.8 mm 6. **L. multiflora**

Clé des espèces de *Leptolaena* s.str.

- 1. Feuilles petites, les plus grands limbes généralement < 2 cm de long (parfois jusqu'à 4,5 cm), largement ovales à circulaires ou rhombiques ; inflorescence composée de 1 à 5 fleurs 7. **L. pauciflora**
- 1'. Feuilles plus larges, les plus grands limbes > 3 cm de long, lancéolés, obovales ou étroitement ou largement ovales à elliptiques ; inflorescences composées de 7 à 50 fleurs (2 à 8 pour *L. masoalensis*) 2
- 2. Feuille à apex obtus à arrondi, parfois émarginé.....3
- 2'. Feuille à apex aigu à acuminé 4
- 3. Involucre urcéolé, haut de 3 mm, couvert d'un indument dense granuleux et ferrugineux ; sépales dépassant l'involucre de 1-1,5 mm ; feuilles étroitement à largement elliptiques, nervures secondaires (8-)11-13 paires.... 3. **L. delphinensis**
- 3'. Involucre ellipsoïdal à oblong, haut de 7 mm, couvert d'un court indument blanc clairsemé ; sépales inclus complètement dans l'involucre ; feuilles elliptiques à légèrement obovales, nervures secondaires généralement 8 paires 5. **L. masoalensis**
- 4. Feuilles peu à modérément cireuses dessous, portant à la fois de courts trichomes apprimés, et de plus longs trichomes légèrement dressés, souvent dépassant 1 mm de long (feuilles plus âgées parfois subglabres), marges distinctement révolutes 8. **L. raymondii**
- 4'. Feuilles glabres dessous ou à indument limité à la nervure principale, marges faiblement révolutes à planes, parfois à peine épaissies 5
- 5. Limbe foliaire à indument marqué sur la nervure principale à la face inférieure 6
- 5'. Limbe foliaire complètement glabre (portant rarement quelques trichomes dessous à la base de la nervure principale) 7
- 6. Involucre généralement < 3 mm de haut, jaune d'or, densément granulo-farinoux, arrondi à la base, avec un pédoncule distinct de 1 mm de long ; pétales 7-9 × 1-1,5 mm ; feuilles lancéolées à ovales, apex longuement cuspidé 2. **L. cuspidata**
- 6'. Involucre de 3-3,5 mm de haut, ferrugineux, densément granulo-farinoux, portant généralement des trichomes blanchâtres, légèrement dressés, plus particulièrement dans la partie basse, progressivement atténué en une base cunéiforme, pédoncule indistinct < 0,5 mm de long ; pétales 10,5-12 × 1,5-2 mm ; feuilles ovales à largement ovales, apex aigu à acuminé, rarement cuspidé 4. **L. gautieri**
- 7. Feuilles étroitement ovales, généralement très dissymétriques et falciformes, devenant souvent noir rougeâtre en séchant, apex distinctement acuminé à cuspidé, les plus grands limbes longs de 2,5-4,5(-5,5) cm ; sépales à l'anthèse de même taille que les dents de l'involucre ou les dépassant de moins de 0,5 mm 1. **L. abrahamii**
- 7'. Feuilles elliptiques, généralement symétriques à légèrement dissymétriques, rarement falciformes, devenant brunâtres à vert olive en séchant, les plus grands limbes dépassant (3-)5,5 cm de long ; sépales à l'anthèse dépassant les dents de l'involucre de (0,8-)1-1,8 mm 6. **L. multiflora**

1. *Leptolaena abrahamii* G.E. Schatz & Lowry, sp. nov.

Haec species a congeneris ad Leptolaenam sensu stricto pertinentibus foliis glabris anguste ovatis falcatis inaequalateralibus in sicco arborubentibus, sepalis dentes involucales aequantibus vel eos < 0.5 mm excedentibus distinguitur.

TYPUS. — *Miller, Bradford, Rakotonasolo & Randrianasolo 8746*, Madagascar, Prov. Toamasina, forest N of Andasibe, along railroad tracks, 18°56'S, 48°25'E, 860 m, 20 Oct. 1996, fl. (holo-, MO!; iso-, P!, TAN!).

Shrubs to trees (1-)4-15 m tall, trunk to 72 cm dbh, stems short tomentose. Leaves chartaceous, narrowly ovate, strongly falcate, 2.5-4.5(-5.5) × 1.3-2.5 cm, reduced in the inflorescence, glabrous, usually drying reddish black above, dark brown below, base broadly acute to ovate, margins minutely thickened and usually somewhat revolute, apex long acuminate to subcaudate, venation brochidodromous, distinct, especially below, secondary veins (12-)14-22 per side, midrib slightly raised above, distinctly below; petiole 3-4 mm long, 0.5-0.8 mm diam., narrowly canaliculate, sparsely puberulous, stipules caducous, scars evident. Inflorescence terminal, corymbose, c. 20-40 flowered, axes with minute stellate indumentum often interspersed with scattered appressed trichomes to 0.3 mm long; peduncle 1-1.5 mm long, involucre ellipsoid in bud, urceolate to narrowly cupulate at anthesis, 3.5-4 mm tall, 3-3.3 mm in diam., densely ferruginous stellate, apical margin with 6-7 subequal triangular teeth 0.5-1.2 mm tall, 0.5-1.5 mm broad at the base; sepals obovate, 4 × 2.5 mm, exerted to a height equal to the involucre teeth or exceeding them by no more than 0.5 mm, densely white hirsute outside, glabrous inside; petals narrowly elliptic, 8-9 × 1.8-2.2 mm, pale yellow, sparsely sericeous outside, exerted 5-6 mm beyond involucre teeth at anthesis; stamens 8-10, free to the base, filament c. 5 mm long, anther horse-shoe shaped, 0.8 mm tall; ovary ovoid, densely light brown tomentose, style slender, exerted, 5-6 mm long, stigma hemispherical, crateriform, with 3 lobes, c. 2 mm across. Fruit ovoid to ellipsoid, 4-5 mm tall, 2.5-3.5 mm diam.,

irregularly longitudinally channeled, glabrous, entirely enclosed within the persistent sepals and involucre. — Fig. 1.

Leptolaena abrahamii is a shrub to medium-sized tree that occurs in mid-elevation humid forest from Analamazaotra-Périnet RS and around Moramanga NNE to Zahamena RNI, with populations also recorded farther S at Ampasinambo and Ranomafana PN (Fig. 2). It can be recognized by its glabrous, narrowly ovate, falcate leaves with a distinctly acuminate to cuspidate apex, which usually dry reddish black, and its sepals that are equal to the involucre teeth or exceed them by less than 0.5 mm.

ETYMOLOGY. — The species epithet honors Jean Prosper ABRAHAM, one of Madagascar's most distinguished forestry agents who was stationed for much of his career at Moramanga and Périnet, where he collected material of *Leptolaena abrahamii* (*Service Forestier 21955*).

VERNACULAR NAMES. — Amaninombilahy, Anjananjana, Fotona, Voandrozana.

CONSERVATION STATUS. — With an extent of occurrence < 20,000 km² and five sub-populations, three of which occur within protected areas, *L. abrahamii* is assigned a preliminary status of Vulnerable (VU).

PARATYPES. — MADAGASCAR, *Prov. Fianarantsoa: Service Forestier 13718*, Sahamaizina, Ampasinambo, Nosy Varika, [20°31'S, 48°00'E], 18 Jan. 1955, y.fr., fr. (P); *Service Forestier 14241*, Ranovao, Ranomafana PN, [21°18'S, 47°38'30"E], 13 June 1955, bud, fl., y.fr. (P, TEF). *Prov. Toamasina: Cours 1206*, Nonokambo, [17°44'S, 48°44'E], 950 m, Nov. 1938, bud, fl., y.fr. (P); *Cours 4230*, Bemainty à Androndramanitra [18°00'S, 48°47'E], 800-850 m, 9 Mar. 1951, fr. (MO, P); *Dequaire 27840*, Zahamena RNI, [17°38'30"S, 48°50'E], fl., y.fr. (P); *Herb. Inst. Sci. Madag. 3773*, Beravina, Analamazaotra-Périnet RS, [18°56'S, 48°26'E], 1 June 1951, bud (P, TAN); *Herb. Inst. Sci. Madag. 4230* [= *Cours 4230*], Bemainty à Androndramanitra [18°00'S, 48°47'E], 800-850 m, 9 Mar. 1951, fr. (TAN); *Herb. Jard. Bot. Tananarive 2844*, Sihanaka, 21 Aug. 1937, bud (P); *Mabberley 813*, 3 km SE of Périnet, Analamazaotra-Périnet RS, 18°55'S, 48°25'E, 850-900 m, 29-30 Mar. 1971, ster. (K, TAN); *Mission Schedl 37*, Betsatsa, près Périnet, Analamazaotra-Périnet RS, [18°56'S,

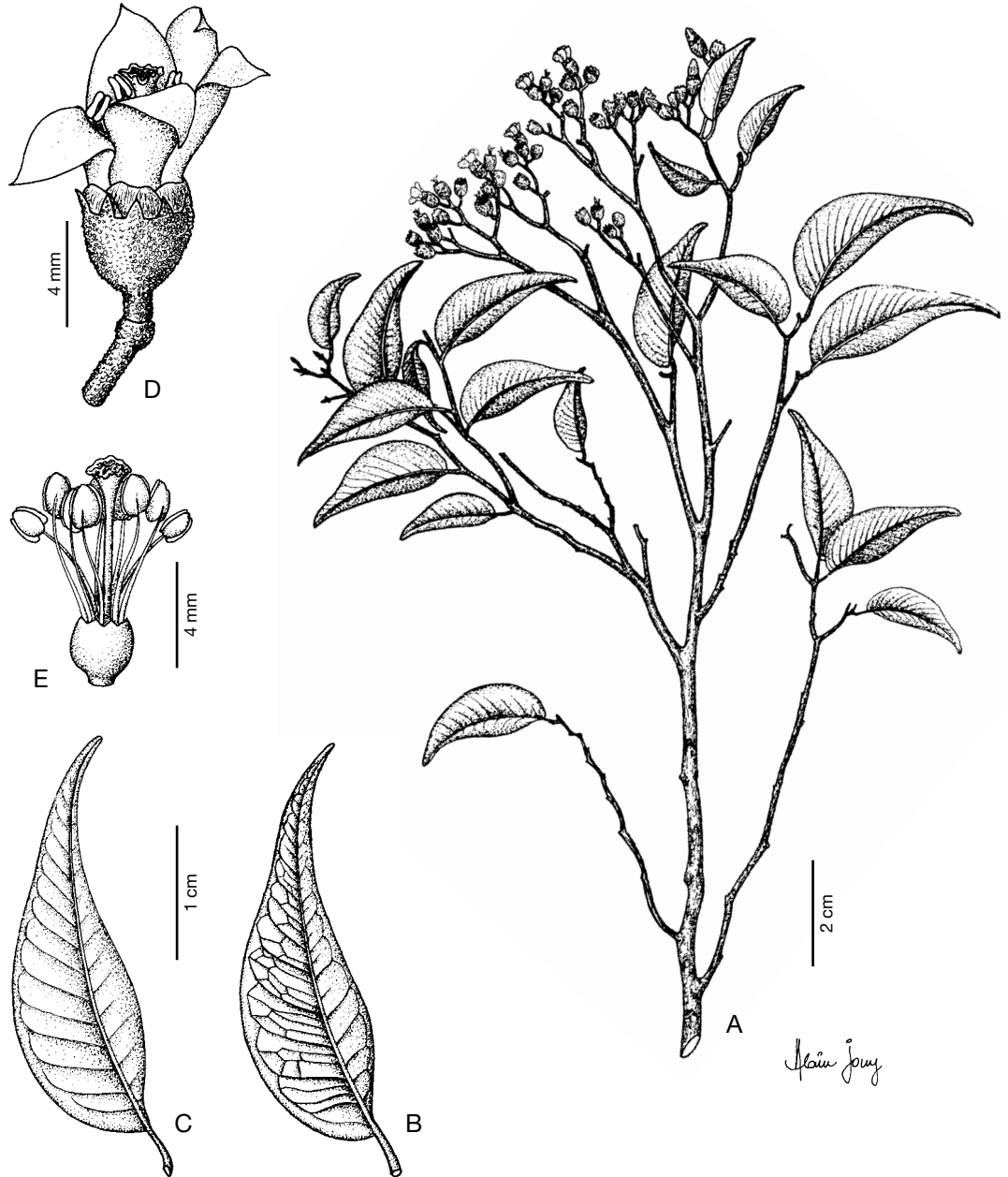


Fig. 1. — *Leptolaena abrahamii*: **A**, flowering branch; **B**, leaf (adaxial surface); **C**, leaf (abaxial surface); **D**, flower; **E**, flower with petals removed. (A-C, Miller et al. 8746; D-E, Réserves Naturelles 15).

48°26'E], 17 Nov. 1952, ster. (TAN); *McPherson* 17523, Ambatovy, 18°50'54"S, 48°17'56"E, 1000 m, 1 Mar. 1998, fr. (MO, P, TAN); *Morat* 3218, Ambatovy, [18°49'S, 48°18'E], May 1969, bud (MO,

P, TAN); *Perrier de la Bâthie* 5336, Analamazaotra-Périnet RS, [18°56'S, 48°26'E], 800 m, fr. (K); *Réserves Naturelles 15*, Analamazaotra-Périnet RS, [18°56'S, 48°26'E], 30 Oct. 1936, fl. (MO, P);

Réserves Naturelles 1587, Sahamalaza, Manakambanihy-Est, Zahamena RNI, [17°38'30"S, 48°50'E], 12 Nov. 1948, bud, fl., y.fr. (P); *Réserves Naturelles 3169*, Sahatavy, Zahamena RNI, [17°38'30"S, 48°50'E], 14 Sep. 1951, bud (MO, P, TAN); *Réserves Naturelles 10953*, same locality, 12 June 1960, bud, fl., (P, TEF); *Réserves Naturelles 12684*, Sahamalaza, Zahamena RNI, [17°38'30"S, 48°50'E], 28 Dec. 1963, fr. (TEF); *Schatz & Rabenantoandro 3991*, Analamazaotra-Périnet RS, [18°55'58"S, 48°25'16"E], 16 Mar. 2000, ster. (MO); *Schatz & Rabenantoandro 3993*, 0.5 km E of Andasibe, [18°55'11"S, 48°25'17"E], 16 Mar. 2000, fr. (G, K, MO, P, TEF); *Service Forestier 3497*, Masse (= Ampasimpotsy-Gara), Analamazaotra-Périnet RS, [18°58'30"S, 48°21'E], 26 Apr. 1951, bud (P, TAN, TEF); *Service Forestier 3773*, Beravina, Analamazaotra-Périnet RS, 1 June 1951, bud, fl. (P, TAN, TEF); *Service Forestier 5070*, Boqueton Abehovana (Piste Moramanga-Farizana), [19°05'S, 48°15'E], 14 Apr. 1952, bud (P, TEF); *Service Forestier 6242*, Antsahatsaka, Beravina, Analamazaotra-Périnet RS, [18°58'S, 48°16'30"E], 5 Nov. 1952, fl. (MO, P, TEF); *Service Forestier 7509*, Sahamamy, Analamazaotra-Périnet RS, [18°56'S, 48°26'E], 21 Aug. 1953, bud (P, TEF); *Service Forestier 7564*, Sahamaloto, Analamazaotra-Périnet RS, [18°56'S, 48°26'E], 24 Jan. 1953, fl. (TEF); *Service Forestier 10348*, Analamazaotra-Périnet RS, [18°56'S, 48°26'E], 8 June 1954, bud (MO, P, TEF); *Service Forestier 14959*, km 2, Périnet, Analamazaotra-Périnet RS, [18°56'S, 48°26'E], 27 Feb. 1955, bud (P, TEF); *Service Forestier 17932*, Analamazaotra-Périnet RS, [18°56'S, 48°26'E], 800 m, 4 Apr. 1958, bud (P, TEF); *Service Forestier 21244*, same locality, 26 July 1962, ster. (MO, P); *Service Forestier 21278, 21279, 21280, 21281, 21282*, same locality, 9 Nov. 1962, ster. (MO, P); *Service Forestier 21898*, Sandrangato FC, [19°06'30"S, 48°14'30"E], 900 m, 29 Oct. 1964, bud (MO, P, TEF); *Service Forestier 21955*, Sandrangato FC, près Toby, PK 27 route d'Anosibe An'ala, [19°06'30"S, 48°14'30"E], c. 900 m, 29 Oct. 1964, bud, fl., y.fr. (MO, P, TEF); *Service Forestier 25441*, Sandrangato FC, [19°06'30"S, 48°14'30"E], 900 m, 29 Oct. 1964, fl. (MO, P, TEF); *Service Forestier 26096*, Sahatsaora (= Sahatsara), Zahamena RNI, [17°38'30"S, 48°50'E], 19 July 1966, bud (P, TEF); *Service Forestier 26927*, Nangaranana (= Nagarana), Canton Marovoay, [18°44'S, 48°22'E], Feb. 1970, bud (P, TEF); *Service Forestier 26968*, same locality and date, fr. (P, TEF); *Service Forestier 105-B-R-172*, Ambodivoasary, Analamazaotra-Périnet RS, [18°56'S, 48°26'E], 14 Mar. 1952, ster. (P, TEF); *Service Forestier 124-B-R-172*, Menalamba, near Analamazaotra-Périnet RS, [18°52'S, 48°22'30"E], 9 Apr. 1952, ster. (TEF); *Thouvenot 12*, Analamazaotra-Périnet RS, [18°56'S, 48°26'E], 1919, bud, fl., y.fr. (K, P); *Viguiet 851*, Analamazaotra-Périnet RS, [18°56'S, 48°26'E], 1000 m, 21 Oct. 1912, bud, fl. y.fr. (MO, P).

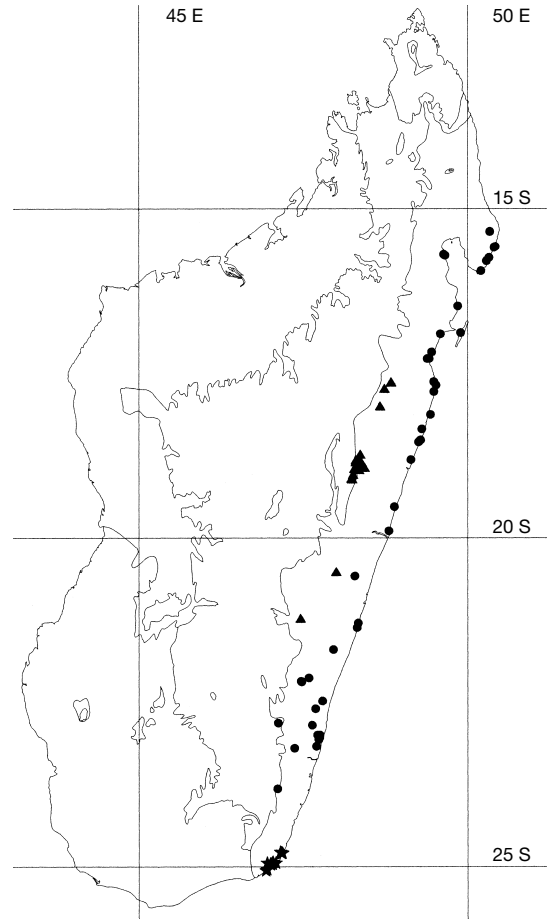


Fig. 2. — Distributions of *Leptolaena*, mapped on the bioclimatic zones of Madagascar (after CORNET 1974; see SCHATZ 2000). *L. abrahamii* (▲), *L. delphinensis* (★), *L. multiflora* (●).

2. *Leptolaena cuspidata* Baker

J. Linn. Soc. Bot. 25: 296 (1889). — *Leptolaena multiflora* var. *cuspidata* (Baker) H. Perrier, Bull. Soc. Bot. France 78: 60 (1931). — Type: *Baron 5835* [cited in protologue as “next 5836”], Madagascar, chiefly from north-west Madagascar, fr. (holo-, K!; iso-, P!).

Leptolaena cuspidata is a shrub to small tree that occurs in the subhumid forest of the Sambirano region in NW Madagascar, below 500 m elevation (Fig. 3). It can be recognized by its distinctive densely golden yellow granular farinose involucre and lanceolate to ovate, long-cuspidate leaves.

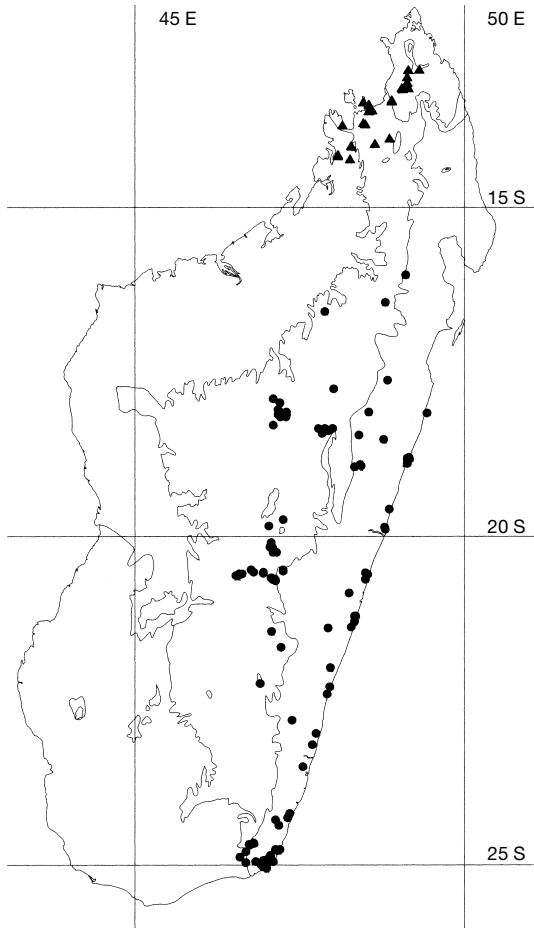


Fig. 3. — Distributions of *Leptolaena*, mapped on the bioclimatic zones of Madagascar (after CORNET 1974; see SCHATZ 2000). *L. cuspidata* (▲), *L. pauciflora* (●).

VERNACULAR NAMES. — Zahana, Zahéna, Zana.

CONSERVATION STATUS. — With an extent of occurrence < 20,000 km², an area of occupancy < 2,000 km², and only three of 14 sub-populations encompassed within protected areas, *L. cuspidata* is assigned a preliminary status of Vulnerable (VU).

MATERIAL EXAMINED. — *Baron* 5836, 6283, without precise locality; *Baum* 333, Ambodimanga; *Birkinshaw* 1, Antsatsaka; *Bosser* 20152, Ampasindava; *Cours* 5674, Mt. Ambohiparaka; *Decary* 938, 1165, 2095, Maromandia; *Decary* 14775, 14794, Ambilobe; *Derleth* 89, Manongarivo RS; *Gentry* 11870, 57-

58 km N of Ambanja; *Hildebrandt* 3306, Vavatohe; *Humbert* 18752, Ambanja; *Humbert* 19041, Ambodimagodro; *Humbert* 25580, SW of Ambilobe; *Humbert* 32649, Ankarana RS; *Humbert* 32873, Ambohipiraka; *Perrier de la Bâthie* 3021, Ambanja; *Perrier de la Bâthie* 3023, Maromandia; *Perrier de la Bâthie* 5340, Ambohipiraka; *Perrier de la Bâthie* 15677, bas Sambirano; *Phillipson* 2017, Beramanja; *Ravololonanahary* 37, Ambato; *Service Forestier* 3078, Irano (Irarona) to Beramanja; *Service Forestier* 3141, 3142, Andilamboay; *Service Forestier* 3171, Tsaratanana RNI; *Service Forestier* 7501, Bekaka to Benavony; *Service Forestier* 8225, Anjahakely (= Ampahakely); *Service Forestier* 10434, Ambilobe; *Service Forestier* 11486, Manongarivo RS; *Service Forestier* 12987, Anjakely; *Stiefel* 68, Manongarivo RS; *Totozafy Be* 563, Manongarivo RS.

3. *Leptolaena delphinensis* G.E. Schatz & Lowry, sp. nov.

Haec species a congeneris ad Leptoanem sensu stricto pertinentibus foliis glabris apice obtusis usque rotundatis, involucre urceolato granulati dense ferrugineo c. 3 mm alto atque sepalis involucre c. 1.5 mm excedentibus distinguitur.

TYPUS. — *McPherson, Dumetz & Rabevohitra* 14222, Madagascar, Prov. Toliara, North of Fort Dauphin near Ste. Luce (Manafaty), NW of village in forest remnant on sand, 24°47'S, 47°10'E, 20 m, 22 Oct. 1989, fl. (holo-, MO!; iso-, P!, TAN!, TEF!).

Shrubs to trees 3-10 m tall, trunk to 20 cm in diam., stems glabrous. Leaves chartaceous, narrowly to broadly elliptic, 1.8-5.2 × 0.8-3.2 cm, reduced in the inflorescence, glabrous, base obtuse to rounded, margins slightly to strongly revolute, apex rounded to occasionally obtuse, venation obscurely brochidodromous, secondary veins (8-)11-13 per side, midrib flat above, raised below; petiole 3 mm long, c. 1 mm diam., canaliculate, glabrous, stipules indistinct, caducous. Inflorescences terminal, corymbose, 10-50-flowered, the axes glabrous; peduncle 0.7-0.8 mm long, involucre urceolate, 3 mm tall, 2.5 mm diam. at apex, densely granular ferruginous farinose, apical margin with 8-9 subequal triangular teeth, 0.5 mm tall, 0.4 mm broad at base; sepals exerted 1-1.5 mm beyond involucre, densely white hirsute outside,



Fig. 4. — *Leptolaena delphinensis*: A, flowering branch; B, flower (McPherson et al. 14222).

glabrous to sparsely hirsute inside; petals narrowly elliptic, 7×2.5 mm, white fading to yellow, exserted 6 mm beyond involucre at anthesis; stamens 10, free to the base, filaments c. 7-8 mm long, anthers 0.8 mm tall; ovary conic-ovoid, densely whitish tomentose, style slender, exserted, c. 7-8 mm long, stigma hemispheric, with 3 weakly differentiated lobes, c. 0.8 mm across. Fruit globose to widely ovoid, somewhat asymmetric, with a longitudinal channel and concave apex when dry, c. 3-4 mm tall, 2-3 mm diam., glabrous, entirely enclosed within the persistent sepals and involucre. — Fig. 4.

Leptolaena delphinensis is a shrub to small tree, and is restricted to humid littoral forest on sand near Ft. Dauphin in SE Madagascar (Fig. 2). It can be distinguished by its leaves with an obtuse to rounded apex, small, urceolate, densely granular ferruginous involucre 3 mm tall, and sepals that are exserted 1-1.5 mm beyond the involucre.

VERNACULAR NAMES. — Fotobavy, Fotoda, Fotondahy, Fonto, Fotona.

CONSERVATION STATUS. — With no sub-populations recorded from within the current protected areas network, and thus a predicted population reduction of > 80% in the next three

generations, *L. delphinensis* is assigned a preliminary status of Critically Endangered (CR). Along with *L. raymondii*, the status of *L. delphinensis* demonstrates the urgent need for additional protection of littoral forest along the East coast of Madagascar.

PARATYPES. — MADAGASCAR, *Prov. Toliara*: *Decary 10064*, Vinanibe, [25°03'S, 46°56'E], 10 July 1932, fl. (P); *Dumetz et al. 683*, Mandena STF, 24°57'S, 47°00'E, 0-10 m, 17 Apr. 1989, bud (K, MO, P, TAN, TEF); *Humbert 5955*, environs de Fort Dauphin, sables entre le pic St. Louis et la mer, [25°03'S, 47°00'E], 20 Sep.-6 Oct. 1928, fl. (MO, P); *Jacquemin 1149*, Mandena STF, [24°57'S, 47°00'E], 8 Dec. 1972, fr. (MO, P); *Johnson WIII37*, Mandena STF, [24°57'S, 47°00'E], 16 July 1963, bud (P); *McPherson et al. 14142*, Mandena STF, low forest on sand, 24°57'S, 47°00'E, 25 m, 17 Oct. 1989, fl. (K, MO, P, TAN, TEF); *McPherson & Dumetz 14665*, Mandena STF, 24°57'S, 47°00'E, 25 m, 7 Dec. 1989, fr. (MO, TAN); *McPherson et al. 14835*, Ste. Luce (Manafiafy), 24°47'S, 47°10'E, 20 m, 18 Jan. 1990, fr. (MO, TAN); *Rabenantoandro et al. 272*, Mandena STF, 24°57'11"S, 47°00'16"E, 5 m, 27 Sep. 2000, fl. (G, K, MO, P, TEF); *Rabenantoandro et al. 308*, Mandena STF, 24°55'20"S 47°02'23"E, 0-50 m, 4 Oct. 2000, fl. (G, K, MO, P, TEF); *Rabevohitra 2053*, Ste. Luce (Manafiafy), forêt au N. du village, 24°46'S, 47°09'E, 10 m, 20 Oct. 1989, fl. (MO, P, TAN, TEF); *Rabevohitra & Rabenantoandro 3701*, Mandena STF, 24°57'03"S 47°00'03"E, 5 m, 4 Oct. 2000, fl. (G, K, MO, P, TEF); *Service Forestier 399*, Mandena STF, forêt littorale, [24°57'S, 47°00'E], 16 Feb. 1949, fr. (P, TEF); *Service Forestier 8207*, same locality, 24 July 1953, fl. (P, TEF); *Service Forestier 14597*, same locality, 1 Sep. 1955, fl. (P); *Service Forestier 28656*, vestiges forestiers, sur dunes anciennes, sur la route de Ste. Luce, [24°47'S, 47°11'E], 11 Dec. 1968, fr. (P, TEF); *Zarucchi et al. 7504*, Mandena STF, coastal low forest on sand, 24°57'S, 47°02'E, 10 m, 26 May 1991, bud (K, MO, P, TAN).

4. *Leptolaena gautieri* G.E. Schatz & Lowry, *sp. nov.*

Haec species a congeneris ad Leptoanem sensu stricto pertinentibus foliis ovatis vel late ovatis apice acutis usque acuminatis secus costam subtus indumento manifeste vestitis, involucre granulati-farinoso dense ferrugineo plerumque trichomatibus suberectis albidis c. 0.5 mm longis vestito atque petalis 10.5-12 mm longis distinguitur.

TYPUS. — *Gautier 2920*, Madagascar, Prov. Antsiranana, Manongarivo RS, Bekolosy, 14°02'S, 48°18'E, 1240 m, 29 Mar. 1996, fl. (holo-, MO!; iso-, G, P!, TAN!, TEF!).

Trees 3-15 m tall, stems initially hirsute-tomentose, then glabrescent. Leaves chartaceous, ovate to broadly ovate, 1.1-4.8 × 0.5-3.7 cm, reduced in the inflorescence, blade glabrous, base obtuse to rounded or subcordate, apex acute to acuminate, the very tip rounded, occasionally somewhat falcate, venation obscurely brochidodromous, secondary veins 9-14 per side, midrib flat to slightly raised above, sparsely to moderately hirsute-tomentose, raised below with sparsely to moderately dense sericeous to hirsute indumentum; petiole 2.5-4 mm long, 1 mm in diam., canaliculate, moderately to densely hirsute, stipules indistinct, caducous. Inflorescences terminal and axillary from the uppermost leaves, corymbose, 7-30-flowered, the axes densely grey hirsute-tomentose; peduncle 0.1-0.5 mm long, indistinct; involucre urceolate, 3-3.5 mm tall, 2.5-3 mm diam. at apex, tapering evenly to a cuneate base, densely granular ferruginous farinose, usually also with sparse to moderately dense whitish golden partially erect hairs to 0.5 mm, especially towards the base, apical margin with 8-10 subequal triangular teeth, 1 mm tall, 0.5-1 mm broad at base; sepals exerted 1.5 mm beyond involucre, densely whitish golden hirsute outside, glabrous inside; petals narrowly oblong to oblanceolate, 10.5-12 × 1.5-2 mm, white to pale yellow, with evident venation upon drying, exerted 7-9 mm beyond involucre teeth at anthesis, the apex rounded; stamens 10-12, free to the base, filaments 6-8 mm long, anthers 0.5-0.9 mm tall; ovary ovoid, densely light brown tomentose, style slender, exerted, 6-8 mm long, stigma obtriangular to hemispheric, 1 mm in diam. Fruit globose, somewhat asymmetric, with a longitudinal channel and concave apex when dry, c. 2.5 mm tall, 2.5 mm diam., glabrous, entirely enclosed within the persistent sepals and involucre. — Fig. 5.

Leptolaena gautieri is a small to medium-sized tree that occurs in mid-elevation subhumid forest from 800 m to over 1,200 m (Fig. 6). It can be

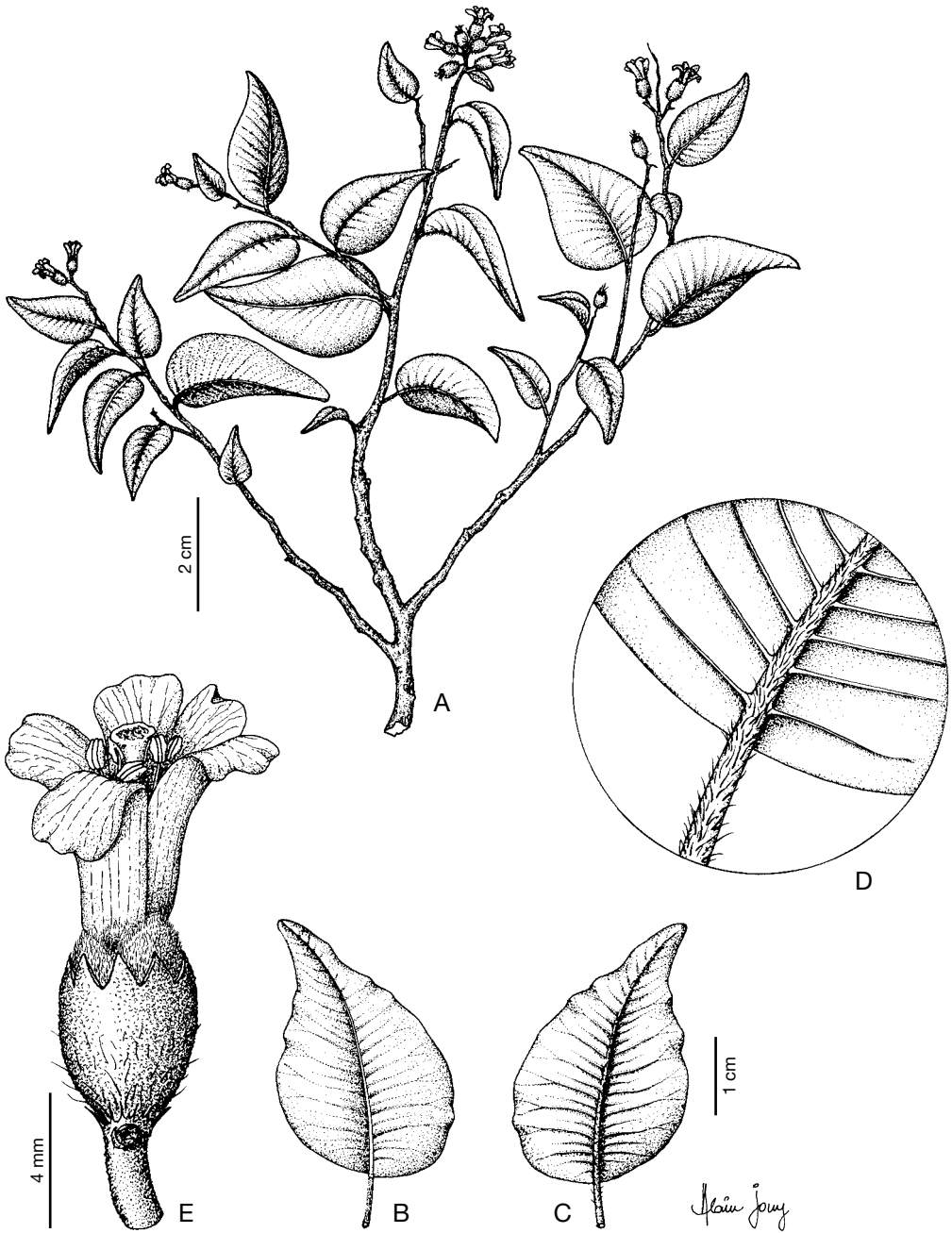


Fig. 5. — *Leptolaena gautieri*: **A**, flowering branch; **B**, leaf (adaxial surface); **C**, leaf (abaxial surface); **D**, base of leaf (abaxial surface) and petiole; **E**, flower. (A, Gautier 2361; B-E, Schatz 3233).

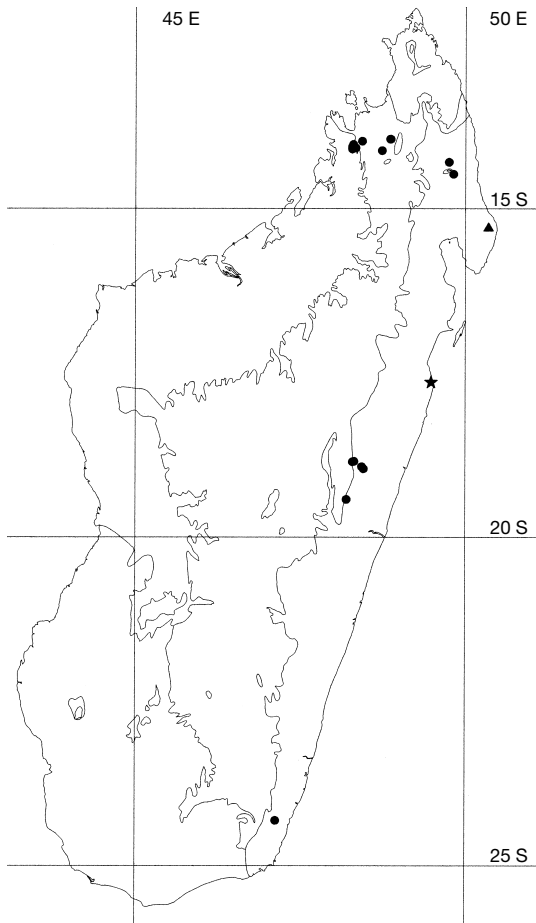


Fig. 6. — Distributions of *Leptolaena*, mapped on the bioclimatic zones of Madagascar (after CORNET 1974; see SCHATZ 2000). *L. masoalensis* (▲), *L. gautieri* (●), *L. raymondii* (★).

recognized by its ovate to broadly ovate leaves with an acute to acuminate apex and evident indumentum on the midvein below, its densely ferruginous granular farinose involucre that usually also has slightly erect whitish trichomes 0.5 mm long, and petals that are 10.5-12 mm long.

ETYMOLOGY. — The species epithet honors Laurent GAUTIER, our friend and colleague at the herbarium in Geneva, who has significantly advanced our knowledge of the flora of the Manongarivo Special Reserve.

VERNACULAR NAMES. — Anjananjana, Zahana.

CONSERVATION STATUS. — With an area of occupancy < 2,000 km², and only four of eight sub-populations encompassed within the protected areas network, *L. gautieri* is assigned a preliminary status of Vulnerable (VU).

PARATYPES. — MADAGASCAR, *Prov. Antsiranana: Gautier & Chatelain 2344*, Manongarivo RS, Bekolosy, vallon en amont de la chute, 14°02'S, 48°18'E, 1100 m, 15 June 1994, fl. (G, TAN); *Gautier 2361*, Manongarivo RS, Bekolosy, 14°02'S, 48°18'E, 800 m, 15 June 1994, fl. (G, MO, P, TAN); *Gautier 3510*, Manongarivo RS, Ambahatra, cours supérieur, 13°59'S, 48°26'E, 1210 m, 8 Mar. 1999 (G, MO); *Humbert & Capuron 24147*, Mt. Anjenabe, vallée inférieure de l'Androranga, affluent de la Bemarivo aux environs d'Antongondriha, [14°18'S, 49°45'E], 1130 m, 3-7 Nov. 1950, fr. (P); *Malcomber & Rakotomalala 2608*, Manongarivo RS, Bekolosy, 14°02'S, 48°18'E, 1000-1200 m, 4 Dec. 1993, fr. (MO, P, TAN); *McPherson & van der Werff 16359*, Manongarivo RS, above the village of Ambodisakoana, 14°05'S, 48°20'E, 1100 m, 16 Oct. 1994, fr. (MO, P, TAN); *McPherson & van der Werff 16396*, same locality, 1100-1200 m, 18 Oct. 1994, bud (MO, P, TAN); *Rakotomalaza 48*, Manongarivo RS, Bekolosy, 14°04'S, 48°17'E, 1000-1480 m, Apr. 1993, fl. (MO, P, TAN); *Rakotozafy 336*, plateau de Beankany, Ambanja, 12 Dec. 1963, bud (P, TAN); *A. Randrianasolo 307*, Marojejy RNI, 14°29'S, 49°49'E, 300-800 m, 21 Apr. 1993, fl. (MO, P, TAN); *A. Randrianasolo 325*, same locality, 500-600 m, 22 Apr. 1993, fl. (MO, P, TAN); *Réserves Naturelles 2237*, Tsaratanana RNI, Ambavala, Marovato, Ambanja, 26 Sep. 1950, fr. (MO, P, TAN); *Schatz 3233*, Manongarivo RS, Bekolosy, 14°06'S, 48°17'E, 1000 m, 28 Mar. 1991, fl. (K, MO, P, TAN). *Prov. Toamasina: Labat et al. 3068*, Moramanga, Andasibe, Forêt de Maromizaha, 18°57'56"S, 48°27'34"E, 1020 m, 1 Apr. 1999, fr. (BR, G, K, P, MO, TAN); *McPherson 17467*, Ambatovy, 18°51'12"S, 48°18'48"E, 1100 m, 26 Feb. 1998, bud (MO, P, TAN); *Perrier de la Bathie 14887*, Analamazaotra-Périnet RS, [18°56'S, 48°26'E], Oct. 1920, fl. (P); *Rakotomalaza 1046*, Ambatovy, 18°51'07"S, 48°18'47"E, 1100 m, 30 Jan. 1997, bud (MO, P, TAN); *Rakotomalaza 1279*, same locality, 18°51'08"S, 48°18'59"E, 990 m, 25 Mar. 1997, bud (MO, P, TAN); *Rakotomalaza 1286*, same locality, 18°51'28"S, 48°17'43"E, 26 Mar. 1997, bud (MO, P, TAN); *Rakotomalaza 1309*, same locality, 18°51'10"S, 48°18'49"E, 1050 m, 13 May 1997, fl. (MO, P, TAN); *Randriambololona et al. 17*, Mantady PN, 18°56'S, 48°26'E, 960 m, 27 Oct. 1997, fr. (MO, P, TAN); *Service Forestier 10341*, Mangorokely, Anosibe, Moramanga, [19°26'S, 48°12'E], 19 May 1954, fl. (P). *Prov. Toliara: Humbert 20704*, Mt. Vohimavo au Nord d'Ampasimena, bassin de la Manampanihy, [24°19'S, 47°08'E], 830 m, 27-28 Mar. 1947, fl. (MO, P).

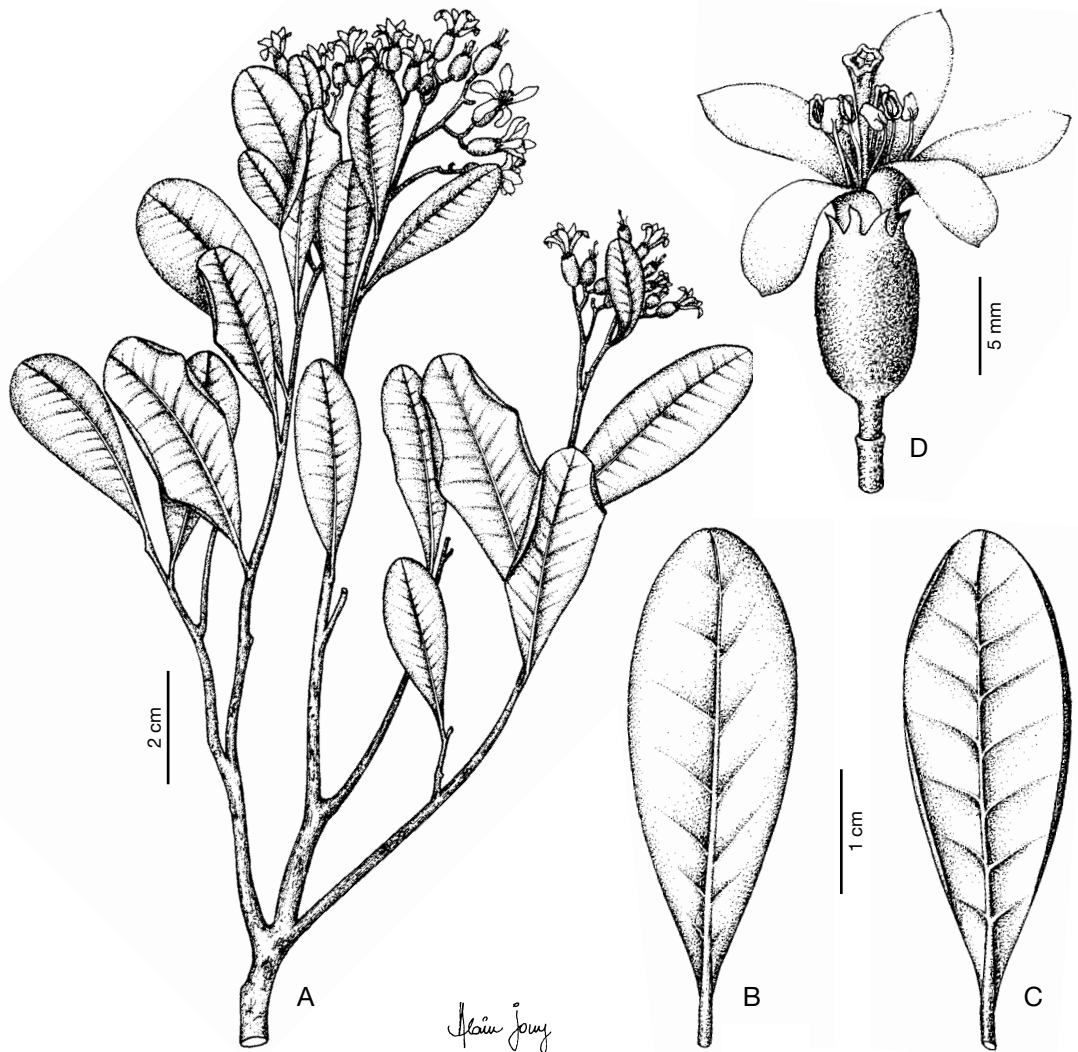


Fig. 7. — *Leptolaena masoalensis*: A, flowering branch; B, leaf (adaxial surface); C, leaf (abaxial surface); D, flower (Rahajasoa et al. 790).

5. *Leptolaena masoalensis* G.E. Schatz & Lowry, sp. nov.

Haec species a congeneris ad Leptoanem sensu stricto pertinentibus foliis glabris apice obtusis usque rotundatis, involucre ellipsoideo plerumque glabro interdum sparse albido-hirsuto c. 7 mm alto sepalis omnino includente atque staminibus tantum 6 ad 8 distinguitur.

TYPUS. — Rahajasoa, Rabe & Bernard 790, Madagascar, Prov. Antsiranana, Masoala PN, Réserve Naturelle d'Ambato, 15°17'S, 50°21'E, 380 m, 8 Oct. 1994, fl. (holo-, MO!; iso-, K!, P!, TAN!).

Shrubs to 2 m tall; stems glabrous to sparsely pubescent. Leaves subcoriaceous, elliptic to slightly obovate, 2.4-4 × 1.1-1.7 cm, glabrous, discoloured when dry, dark olive brown above, lighter olive green below, base cuneate to acute, margins strongly revolute, apex rounded, venation weakly brochidodromous, secondary veins c. 8 per side, midrib flat above, raised below with very sparse scattered trichomes or glabrous; petiole 2-3 mm long, 0.6-0.8 mm diam., shallowly canaliculate, stipules caducous. Inflorescences

axillary in the terminal leaves, 2-8-flowered, axes sparsely to densely puberulous; peduncle 1-2 mm long, distinct, involucre ellipsoid to oblong, glabrous, 7 mm tall, 3 mm diam., apical margin with 8 narrowly triangular, subequal teeth 1 mm tall, 1 mm broad at base, glabrous or sometimes sparsely short whitish hirsute; sepals completely included within the involucre, 4 × 4 mm, circular, strongly inrolled, densely whitish hirsute outside, glabrous inside; petals narrowly oblong, 12 × 3 mm, clear yellow with evident venation upon drying, glabrous, exserted 5-6 mm beyond involucre; stamens 6-8, free to the base, filament 8-10.5 mm long, anthers unknown; ovary ellipsoid, 1 mm diam., densely whitish golden hirsute-strigose, the trichomes to 2 mm long, style 11.5 mm long, slender, exserted 4-5 mm above involucre, stigma capitate, 1 mm in diam. Fruit unknown. — Fig. 7.

Leptolaena masoalensis is known only from the type collection made at Ambato, a hill in the northeastern part of the Masoala Peninsula (Fig. 6) well known for its large population of *Nepenthes masoalensis* Schmid-Hollinger. At first glance, *L. masoalensis* may be mistaken for *L. delphinensis*, with which it shares leaves with an obtuse to rounded apex. However, *L. masoalensis* can be easily distinguished by its much larger, ellipsoid to oblong involucre 7 mm tall, sepals that are completely included within the involucre at anthesis, and leaves with only 8 secondary veins per side versus (8-)11-12 in *L. delphinensis*.

CONSERVATION STATUS. — With an area of occupancy < 100 km², and only a single known population that appears to lie just outside the limit of Masoala National Park, *L. masoalensis* is assigned a preliminary status of Critically Endangered (CR).

6. *Leptolaena multiflora* Thouars

Hist. Vég. Isles Austral. Afriq.: 41, t. 11 (1805). — Type: *Thouars s.n.*, Madagascar, without precise locality (P!).

As here recognized, *Leptolaena multiflora* occurs primarily in coastal forest mostly on sand, with a few populations recorded farther inland,

probably on similar substrates (Fig. 2). In the past, this species has been broadly circumscribed to include all of the new taxa described here, as well as the Sambirano endemic *L. cuspidata*. As defined here, *L. multiflora* can be distinguished by its glabrous, elliptic, usually almost equilateral leaves, the largest of which usually exceed 5.5 cm in length and dry an olive green to brownish color. In addition, the sepals at anthesis exceed the involucre teeth by (0-8-)1-1.8 mm, a feature that separates *L. multiflora* from *L. abrahamii*.

VERNACULAR NAMES. — Amaninombilahimena, Amaninombilahy, Amaninombilahy à petites feuilles, Anjananjana, Birana, Dilatra, Dilatry Lahy, Fotona, Fotona Beravina, Fotonala, Hazoambo, Hazomasy, Helana, Jana, Manilombilahy, Manina ombilahy, Sarifatra, Tsilaitra à petites feuilles.

CONSERVATION STATUS. — Despite an extent of occurrence and area of occupancy far in excess of 20,000 km² and 2,000 km² respectively, with only four of c. 19 sub-populations occurring in protected areas, and thus indicating a possible population reduction in the next three generations of > 50%, *L. multiflora* is assigned a preliminary status of Endangered (EN).

MATERIAL EXAMINED. — *Baron 2632, Bojer s.n., Forbes s.n., Louvel 6, Thouars s.n.*, without precise locality; *Andrianjafy 66*, Rantabe; *Bernard 372*, Masoala PN; *Birkinshaw 354*, Mananara RB; *Boivin s.n.*, Foulpointe; *d'Alleizette 268*, Nosy-Be(?); *Decary 5198*, Ifandana; *Humblot 349*, Nosive; *Perrier de la Bâthie 14186*, Mahanoro; *Rabe 157*, Beankoraka; *Rabenantoandro 563*, Mahatsara STF; *Rabevohitra 3808*, Mahabo; *Rahajaso 424*, Masoala PN; *Raholivelo 37*, Tampolo STF; *A. Randrianasolo 292*, Ilaka-Est, 458, Tampolo STF; *Réserves Naturelles 2746, 3403, 5514, 9113, 9124, 9310*, Masoala RNI; *Richard s.n.*, Foulpointe; *Richard 4, 40*, Ste. Marie; *Schedl 135*, Ambila-Lemaitso STF; *Service Forestier 4-R-7*, Antetezana STF; *Service Forestier 89-R-303*, Manampano; *Service Forestier 174-R-116*, Ampasinambo; *Service Forestier 745-R-1*, Ambila-Lemaitso STF; *Service Forestier 1371*, Andatsakala; *Service Forestier 1616*, Ambila-Lemaitso STF; *Service Forestier 2414*, Soanierano Ivongo; *Service Forestier 3680*, Tohakandra; *Service Forestier 3809*, Misevo; *Service Forestier 4679*, Antetezana STF; *Service Forestier 4813*, Ifanirea; *Service Forestier 5107*, Berano; *Service Forestier 5677*, Foulpointe; *Service Forestier 6252*, Rantabe; *Service Forestier 7494*, Fampotakely;

Service Forestier 7510, Antetezana STF; *Service Forestier* 8901, Rantabe; *Service Forestier* 9501, Ampangalana Atsimo; *Service Forestier* 10053, 10076, Tampolo STF; *Service Forestier* 12401, Amporoforo; *Service Forestier* 12929, Manombo STF; *Service Forestier* 13906, Amporoforo; *Service Forestier* 14504, Ifanirea; *Service Forestier* 15215, Tampolo STF; *Service Forestier* 15302, Manombo RS; *Service Forestier* 15305, Berano; *Service Forestier* 15378, Andrazaha; *Service Forestier* 15493, Analavory; *Service Forestier* 16118, Ambazato; *Service Forestier* 16215, Evato; *Service Forestier* 16472, 17820, Tampolo STF; *Service Forestier* 18082, Vohibola; *Service Forestier* 19173, Tampolo STF; *Service Forestier* 19535, Ampangalana Atsimo; *Service Forestier* 21217, Ambila-Lemaitso STF; *Service Forestier* 21471, Ambohimary; *Service Forestier* 21493, Manombo STF; *Service Forestier* 29717, Lakato; *Service Forestier* 29860, Tampolo STF; *Service Forestier* 29892, Ambila-Lemaitso STF; *Service Forestier* 32831, 34550, Mahatsara; *Service Forestier* 34575, Sahamalaza; *Service Forestier* 35140, Mahatsara; *Ursch* 116, Tampina.

7. *Leptolaena pauciflora* Baker

J. Linn. Soc. Bot. 20: 96, 97 (1883). — Lectotype (here designated): *Baron* 1390, Madagascar, in forests of the province of Imerina (K!; iso-, MO!, P(3 sheets)!).

Leptolaena turbinata Baker, J. Linn. Soc. Bot. 20: 97 (1883). — *Leptolaena pauciflora* var. *turbinata* (Baker) H. Perrier, Bull. Soc. Bot. France 78: 60 (1931). — Type: *Baron* 1560, Madagascar, East coast (holo-, K!; iso-, P!).

Leptolaena parviflora Scott-Elliot, J. Linn. Soc. Bot. 29: 6 (1891). — Lectotype (here designated): *Scott-Elliot* 2554, Madagascar, woods near Fort Dauphin (K!; iso-, P(2 sheets)!).

Leptolaena rubella Scott-Elliot, J. Linn. Soc. Bot. 29: 7 (1891). — *Leptolaena pauciflora* var. *rubella* (Scott-Elliot) H. Perrier, Bull. Soc. Bot. France 78: 60 (1931). — Type: *Scott-Elliot* 2369, Madagascar, woods near Fort Dauphin (holo-, K!; iso-, P(2 sheets)!).

Leptolaena pauciflora is a small shrub to medium-sized tree occurring from humid littoral forest at sea level to subhumid and montane woodland and thicket up to 2,300 m (Fig. 3). Other than habit, it is remarkably uniform in vegetative and reproductive characters throughout its broad ecological range, and is easily recognized by its small, broadly ovate to circular or rhombic leaves usually not exceeding 2 cm in length.

Of the two syntypes cited in the protologue of *L. pauciflora* (*Baron* 1390 and *Meller s.n.*), the former is here chosen as the lectotype. Syntypes were also cited for *L. parviflora* (*Scott-Elliot* 2554 and *Scott-Elliot* 2713), the first of which is here chosen as the lectotype.

VERNACULAR NAMES. — Amaninambilahy, Anjananjana, Anjananjalahy, Fotina, Foto, Fotona, Fotona Madinidravina, Fotondahy, Hazomaritra, Laro, Madiorano, Milaliambomadinika, Taolandaro.

CONSERVATION STATUS. — With an extent of occurrence far exceeding 20,000 km², and c. 33 sub-populations, six of which are present in protected areas, *L. pauciflora* is considered not threatened, and assigned a preliminary status of Lower Risk (LR).

MATERIAL EXAMINED. — *Baron* 1390, 1560, 2624, *Meller s.n.*, without precise locality; *Andrianjafy* 11, Andranofeno-Sud; *Barnett* 502, Mt. Ibity; *Benoist* 759, Ambila-Lemaitso STF; *Boiteau* 2568, Mahialambo; *Bosser* 7944, Tampoketsa d'Ankazobe; *Bosser* 9969, Sahatsio; *Bosser* 14138, pic St. Louis; *Bosser* 15978, Tampoketsa; *Bosser* 18772, col des Tapias; *Cours* 2981, Ambila-Lemaitso STF; *Cours* 4646, Didy; *Cremers* 1624, 2020, Ambohitantely RS; *Cremers* 2311, Marosiky; *Croat* 29218, Antsirabe; *Croat* 29910, Ireto; *Decary* 4026, 4038, Fort-Dauphin; *Decary* 6353, 6388, 6502, 6508, Ambila-Lemaitso STF; *Decary* 7302, Ankazobe; *Decary* 7473, Ambohitantely RS; *Decary* 10011, pic Saint Louis; *Decary* 13063, 13226, Ambatofinandrahana; *Decary* 14023, 14036, Faliarivo; *Decary* 14927, Tampoketsa d'Ankazobe; *Decary* 17214, Manankazo STF; *Decary* 17311, Ambositra; *Decary* 17333, Ambatofinandrahana; *Decary* 17403, Ambositra; *Descouings* 338, Fort-Dauphin; *Dorr* 3842, col des Tapias; *Edmondson* 95-57, Mandena STF; *Geay* 7507, 7618, 7707, 7926, 8708 Mananjary; *Gentry* 11363, Ambila-Lemaitso STF; *Gentry* 11836, Ambohitantely RS; *Gereau* 3294, Evatra; *Gereau* 3423, Manafiafy; *Gereau* 5690, Anjozorobe; *Harder* 1536, Anjozorobe; *Humbert* 4640, col des Tapias; *Humbert* 5864, Enivaha; *Humbert* 5899, pic St. Louis; *Humbert* 7111, col des Tapias; *Humbert* 11090, Ambohitantely RS; *Humbert* 13835, Andohahela RNI; *Humbert* 14080, Imonty; *Humbert* 14477, Faliarivo; *Humbert* 20623, Ampasimena; *Humbert* 20702, Vohimavo; *Humbert* 28059, Ambatofinandrahana; *Humbert* 29938, Ireto; *Jacquemin* 934, Ambavarano; *Jacquemin* 1158, Mandromodromotra; *Johnson* WII 33, Mandena STF; *Jongkind* 828, 932, col des Tapias; *Keraudren* 1062, pic Saint Louis; *Keraudren* 24894,

24997, Fort Dauphin; *Keraudren* 25712, Ivato-Ambatofinandrahana; *Keraudren* 26009, Itremo; *Labat* 3010, col des Tapias; *Leeuwenberg* 14443, c. 20 km Ivato-Itremo; *Leeuwenberg* 14589, Ambila-Lemaitso STF; *Leeuwenberg* 14648, Anjozorobe; *Lewis* 728, Ambila-Lemaitso STF; *Louvel* 33bis, Analamazaotra-Périnet RS; *Lowry* 4375, 4397, Anjozorobe, 5215, Mandena STF; *McPherson* 14164, Ste. Luce; *McPherson* 14278, Analalava (Manantenina); *Messmer* 781, Itremo; *Miller* 8777, Anjozorobe; *Morat* 3315, Ivato; *Morat* 4411, Andohahela RNI; *Morat* 4512, Antsiatsiaka; *Peltier* 2159, Fiadanana; *Peltier* 2184, Anjoma; *Perrier de la Bâthie* 3004, Andringitra RNI; *Perrier de la Bâthie* 3007, Ambatofinandrahana; *Perrier de la Bâthie* 3012, Matatana; *Perrier de la Bâthie* 4488, Vatovavy; *Perrier de la Bâthie* 5337, Manankazo STF; *Perrier de la Bâthie* 5341, Ibity; *Perrier de la Bâthie* 5342, Tamatave; *Perrier de la Bâthie* 13180, Tsitondroina; *Perrier de la Bâthie* 13213, Beveromay; *Perrier de la Bâthie* 13574, Ibity; *Phillipson* 1850, Ambila-Lemaitso STF; *Rabenantoandro* 62, Itremo; *Rabehohitra* 3770, Mahabo; *Rakotoarisoa* 22, 32, Ambatofinandrahana; *Rakotoarisoa* 59, Faliarivo FC; *Rakotozafy* 2682, Anjozorobe; *Randriamampionona* 331, 569, Andohahela RNI; *Randriamanantena* 119, Andohahela RNI; *Randrianaivo* 75, Ambohitantely RS; *A. Randrianasolo* 224, Ambila-Lemaitso STF; *A. Randrianasolo* 232, Ivato; *A. Randrianasolo* 283, Manantantely; *A. Randrianasolo* 347, Manafiafy; *Rauh* 1445, Fort-Dauphin; *Réserves Naturelles* 13-RN-XI, Andohahela RNI; *Réserves Naturelles* 168, 202, Ambohitantely RS; *Réserves Naturelles* 706, Andringitra RNI; *Réserves Naturelles* 1416, 1499, Ambila-Lemaitso STF; *Réserves Naturelles* 6507, Andringitra RNI; *Réserves Naturelles* 6706, Ambohitantely RS; *Réserves Naturelles* 7166, Andringitra RNI; *Réserves Naturelles* 11247, Zahamena RNI; *Réserves Naturelles* 11691, Andringitra RNI; *Schatz* 1320, Ambila-Lemaitso STF; *Schatz* 2961, Anjozorobe; *Schatz* 3955, Ankafobe; *Schatz* 3964, Itremo; *Schedl* 133, Ambila-Lemaitso STF; *Scott-Elliot* 2369, 2554, 2713, 2713bis, 2753, Fort-Dauphin; *Service Forestier* 3-R-3, Ambohitantely RS; *Service Forestier* 54-R-10, Itremo; *Service Forestier* 232, Manandona; *Service Forestier* 1078, 1122, 1569, Ambila-Lemaitso STF; *Service Forestier* 2155, Fianarantsoa; *Service Forestier* 2708, Ampandrambato; *Service Forestier* 3259, Ambila-Lemaitso STF; *Service Forestier* 3267, Mahanoro; *Service Forestier* 3811, Anosivelo; *Service Forestier* 4157, 4707, 4711, Ambila-Lemaitso STF; *Service Forestier* 4829, Mangatsiatra; *Service Forestier* 4887, 4908, Ambila-Lemaitso STF; *Service Forestier* 5625, Vohipaho; *Service Forestier* 5631, Marohita; *Service Forestier* 5737, Ambila-Lemaitso STF; *Service Forestier* 6077, Mandena STF; *Service Forestier* 7035, Mananjary; *Service Forestier* 7258, Ambila-Lemaitso STF; *Service Forestier* 7292, Misevo; *Service Forestier* 7419, Mandena STF; *Service Forestier* 7598, Fierenana; *Service Forestier* 7771,

Mandromodromotra; *Service Forestier* 7820, Mandena STF; *Service Forestier* 8416, Ambohitantely RS; *Service Forestier* 9506, Ampangalana Atsimo; *Service Forestier* 9540, Marohita; *Service Forestier* 9592, Ambohitantely RS; *Service Forestier* 9647, Ambila-Lemaitso STF; *Service Forestier* 9668, Manantenina; *Service Forestier* 11542, Faliarivo; *Service Forestier* 12988, Vatovary (=Vatovory); *Service Forestier* 13180, Ambila-Lemaitso STF; *Service Forestier* 13472, Ankijana; *Service Forestier* 13701, Ampangalana Atsimo; *Service Forestier* 14047, Antanambao; *Service Forestier* 14661, Nosy-Varika; *Service Forestier* 14670, Analalava; *Service Forestier* 14763, Ankijana; *Service Forestier* 15156, Anjozorobe; *Service Forestier* 15806, Sahavoay; *Service Forestier* 16113, Nosy-Varika; *Service Forestier* 16119, Ambazato; *Service Forestier* 16806, Manankazo STF; *Service Forestier* 18361, Ambohitantely RS; *Service Forestier* 18771, Manohilahy; *Service Forestier* 19626, Iamboala; *Service Forestier* 19695, Ambohimana; *Service Forestier* 19874, Ambohitantely RS; *Service Forestier* 22456, Andohahela RNI; *Service Forestier* 25366, Ampasimpotsy STF; *Service Forestier* 32214, Ambila-Lemaitso STF; *Service Forestier* 34202, Ambohitantely RS; *Zarucchi* 7345, Anjozorobe; *Zarucchi* 7411, Ambila-Lemaitso STF.

8. *Leptolaena raymondii* G.E. Schatz & Lowry, sp. nov.

Haec species a congeneris ad Leptoenam sensu stricto pertinentibus foliis falcatis apice longe cuspidatis marginibus valde revolutis subtus indumento persistente ex trichomatibus brevibus adpressis etiam saepe trichomatibus suberectis > 1 mm longis constante distinguitur.

TYPUS. — *Randrianasolo* & *Ranaivojaona* 638, Madagascar, Prov. Toamasina, Dist. Fénérice-Est, Mahatsara STF, 17°38'S, 49°29'E, 5 m, 10 Nov. 1999, fl. (holo-, MO!; iso-, G!, K!, P!, TAN!).

Trees 5-10 m tall, to 20 cm dbh, stems short sericeous-tomentellous. Leaves chartaceous, ovate to broadly ovate, usually strongly falcate, 2-4.5 × 0.7-2.3 cm, glabrous above, appressed short sericeous below often mixed with slightly erect trichomes > 1 mm long, sometimes subglabrescent, base strongly asymmetrical with one side obtuse to rounded and the other side cuneate, margins strongly revolute, apex long cuspidate, the very tip rounded, venation obscurely brochidodromous, secondary veins 8-10 per side, midrib slightly raised above,

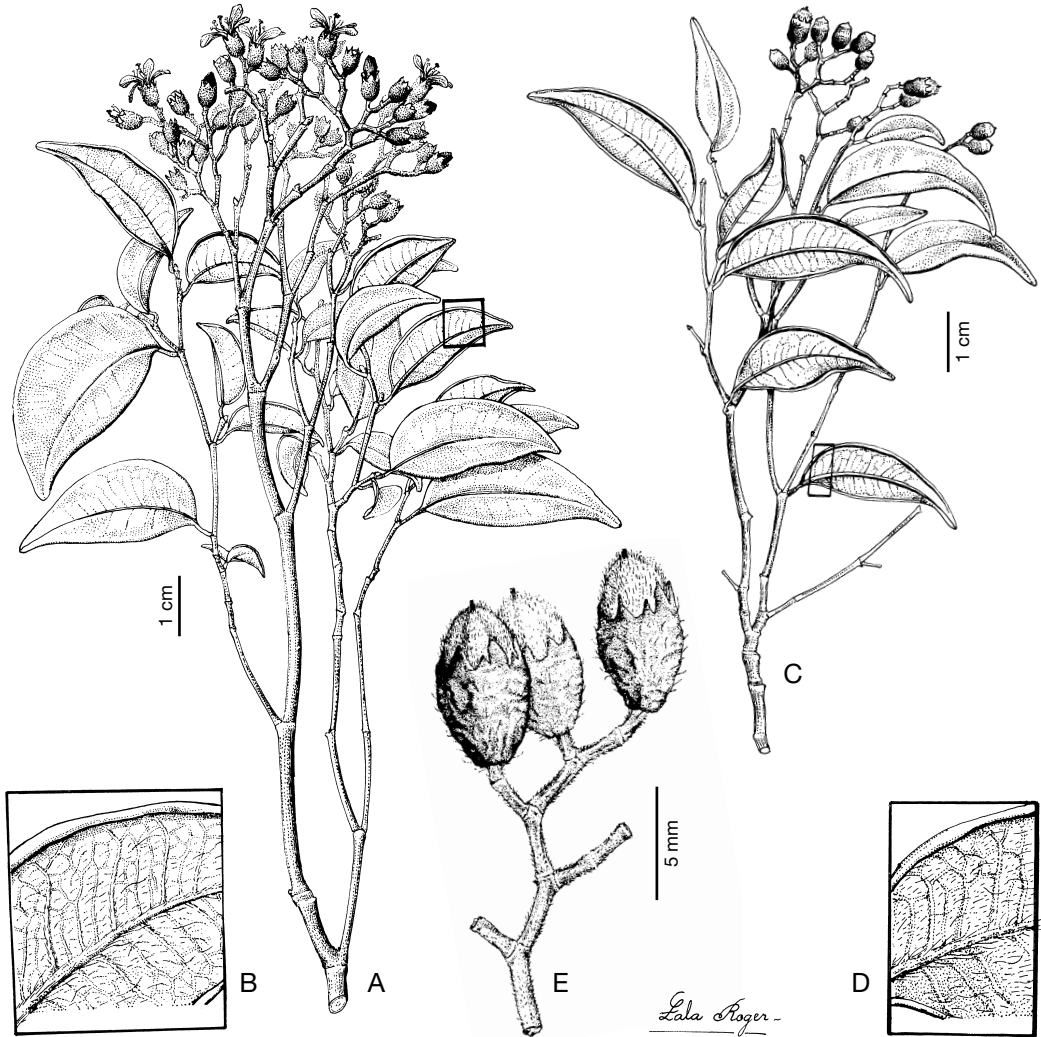


Fig. 8. — *Leptolaena raymondii*: A, flowering branch; B, leaf (abaxial surface); C, fruiting branch; D, leaf (abaxial surface); E, immature fruits (A-B, *Service Forestier 34104*; C-E, *Service Forestier 34554*).

glabrous, raised below, moderately densely sericeous; petiole 2-4 mm long, 0.7-0.8 mm in diam., canaliculate, densely sericeous, stipules indistinct, caducous. Inflorescences terminal and axillary from the uppermost leaves, corymbose, 9-20-flowered, axes densely gray hirsute-tomentose; peduncle 0.5-1 mm long, indistinct to somewhat distinct; involucre urceolate, base acute to obtuse, 2.5-3.5 mm tall, 2.5-3 mm diam. at apex, densely granular ferruginous farinose and also with moderately dense white

appressed trichomes to 0.3 mm long, apical margin with 8-10 unequal triangular to narrowly triangular teeth, 1-1.3 mm tall, 0.3-1 mm broad at base; sepals exerted 1 mm beyond involucre, 3 × 3 mm, very widely obovate, apex rounded, strongly inrolled, densely whitish hirsute outside, glabrous inside; petals narrowly oblong to oblanceolate, 8-9 × 2-3 mm, white to pale yellow, glabrous, exerted 4-5 mm beyond involucre, with evident venation upon drying, the apex rounded; stamens (10-)11(-12), free,

filaments 4.5-5.5 mm long, anthers oblong 0.6-0.9 × 0.3 mm; ovary obovoid, 1 × 0.8 mm, densely whitish hirsute, style slender, 5-6 mm long, exerted 4 mm above involucre, sparsely whitish velutinous towards the base, stigma capitate, 1.2-1.5 mm diam. Mature fruit unknown. — Fig. 8.

Leptolaena raymondii is a small to medium-sized tree known only from Mahatsara Station Forestière (Fig. 6). It is the only species of *Leptolaena* sensu stricto with persistent indumentum throughout the lower surface of the leaf blade, consisting of both short appressed trichomes and often longer partially erect trichomes greater than 1 mm long. The leaves of this species are further characterized by their strongly revolute margins.

ETYMOLOGY. — The species epithet honors our friend and colleague Raymond RABEVOHITRA, Head of the FOFIFA herbarium (TEF), who has contributed so much to our knowledge of Madagascar's woody flora.

VERNACULAR NAMES. — Amaninombilahy, Anjananjana.

CONSERVATION STATUS. — With an area of occupancy < 100 km², and only a single known population that is not included within the current protected areas network, *L. raymondii* is assigned a preliminary status of Critically Endangered (CR). Along with *L. delphinensis*, the status of *L. raymondii* demonstrates the urgent need for additional protection of littoral forest along the East coast of Madagascar.

PARATYPES. — MADAGASCAR, *Prov. Toamasina*: *Rabenantoandro et al.* 562, Mahatsara STF, 17°38'13"S, 49°29'03"E, 2 m, 7 July 2001, bud (G, K, MO, P, TAN); *Razafindramora et al.* 150, same locality and date, bud (K, MO, P, TEF); *Service Forestier* 32648, Marovovonana, Mahatsara STF, [17°38'S, 49°29'E], 15 June 1985, bud (MO, TEF); *Service Forestier* 34104, Mahatsara STF, [17°38'S, 49°29'E], 19 Oct. 1990, fl. (MO, TEF); *Service Forestier* 34407, Andranonana, Mahatsara STF, [17°38'S, 49°29'E], 1 Oct. 1992, bud (G, K, MO, P, TEF, WAG); *Service Forestier* 34554, point d'essai, Mahatsara STF, [17°38'S, 49°29'E], 1 Dec. 1993, bud, fr. (MO, TEF); *Service Forestier* 35141, same locality, 30 Aug.-4 Sep. 1999, bud (MO, TEF).

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