A synoptic revision of *Olax* L. (Olacaceae) in Madagascar and the Comoro Islands

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ABSTRACT
A synoptic revision of *Olax* L. from Madagascar and the Comoro Island Archipelago is provided based on morphological data gathered from a study of herbarium specimens. We recognize eight species of *Olax* occurring in this region, including three new species, *O. antsiranensis*, *O. capuronii*, and *O. mayottensis*. *Olax antsiranensis* has coriaceous leaves with an emarginate apex, a 5-petaled flower, and fruit with a weakly accrescent calyx. *Olax capuronii* has leaves of similar shape and size, but possesses a 3-petaled flower and a non-accrescent calyx in fruit. *Olax mayottensis* has larger acuminate leaves, 5 petals per flower, and a fruit which is completely surrounded by an accrescent calyx. All of the newly described species are of conservation concern because of their restricted ranges, with both *O. capuronii* and *O. mayottensis* considered endangered. Of the eight species treated here, six species are endemic to Madagascar, *O. mayottensis* is endemic to Mayotte, and *O. dissitiflora* occurs in Madagascar, Tanzania, Mozambique, and northern South Africa.

KEY WORDS
Olacaceae,
Olax,
Madagascar,
Comoros,
Mayotte,
conservation,
new species.

RÉSUMÉ

Révision synoptique des Olax *L. (Olacaceae) de Madagascar et des Comores.*

Une révision synoptique du genre *Olax* L. est proposée pour Madagascar et l'archipel des Îles Comores, sur la base de données morphologiques obtenues par l'étude de matériel d'herbier. Nous reconnaissons huit espèces d'*Olax* dans cette région, y compris trois espèces nouvelles, *O. antsiranensis*, *O. capuronii*, et *O. mayottensis*. *Olax antsiranensis* possède des feuilles coriaces, émarginées, des fleurs à cinq pétales et un fruit avec un calice faiblement accrescent. *Olax capuronii* possède des feuilles de forme et de taille similaire, mais une corolle avec trois pétales et un fruit sans calice accrescent. *Olax mayottensis* a de grandes feuilles acuminées, cinq pétales par fleur et un fruit qui est complètement entouré par le calice accrescent. Toutes les nouvelles espèces décrites sont concernées par la conservation à cause de leur aire de répartition restreinte, *O. capuronii* et *O. mayottensis* étant considérés comme en danger. Des huit espèces traitées ici, six sont endémiques de Madagascar, *O. mayottensis* est endémique de Mayotte, et *O. dissitiflora* est présent à Madagascar, au Mozambique, en Tanzanie et au nord de l'Afrique du Sud.

MOTS CLÉS
Olacaceae,
Olax,
Madagascar,
Comores,
Mayotte,
conservation,
espèces nouvelles.

INTRODUCTION

The pantropical family Olacaceae is composed of about 30 genera and 200 species (Breteler *et al*. 1996; Mabberley 1997). *Olax* L. (*c*. 40-45 species) is the largest genus in the family, occurring from Africa to southeast Asia, Australia and New Caledonia. Morphological (Malécot *et al*. 2004) and molecular (Nickrent & Malécot 2001; Malécot 2002) studies suggest that Olacaceae are paraphyletic at the base of Santalales and that *Olax* belongs to tribe Olaceae Horan., a monophyletic group sister to tribes Aptandreae Engl. and Anacoloseae Engl. *s.s.*, and to the genus *Chaunochiton* Benth. (five species, neotropics). Within Olaceae, *Olax* is most closely related to *Dulacia* Vell. (13 species, South America) and *Ptychopetalum* Benth. (four or five species: two or three in Africa, two in South America). Preliminary molecular studies (Malécot 2002) indicate that *Dulacia* may be nested within a paraphyletic *Olax*, but broader sampling and additional sequence data are needed to resolve generic circumscription in this part of the family.

Olax consists of small trees, shrubs, or rarely lianas (e.g., *O. scandens* Roxb., southeast Asia). Most species are probably root hemiparasites, a characteristic which has been confirmed for *O. scandens* (Barber 1907) and *O. imbricata* Roxb. (Kuo *et al*. 1989). The genus is distinguished from putative relatives by its pentamerous flowers (individual petals may be fused or split resulting in a 3, 4, 6, or 7-merous corolla), androecium composed of a variable number of stamens and bifid staminodes, and superior or semi-inferior ovary with a long cylindrical style. An accrescent calyx occurs in about two-thirds of the species. *Dulacia* differs from *Olax*, in the traditional sense, by having an androecium composed of three stamens and six staminodes and an exclusively semi-inferior ovary. *Ptychopetalum* is distinguished from *Olax* by its lamellate, non-uncinate petals (vs. adaxially papillate with a small uncinate thickening at the apex), androecium made up of 12 fertile stamens and no staminodes, and by the lack of an accrescent calyx. Some *Olax*, including three Malagasy species (*O. capuronii*, *O. lanceolata* and *O. madagascariensis*), possess some of the defining characteristics of *Ptychopetalum* and *Dulacia* (a non-accrescent calyx and flowers with three stamens or six staminodes). The lamellate petals of *Ptychopetalum*, however, never occur in *Olax*.

Engler (1909) constructed an infrageneric classification for *Olax*, based mainly on stamen and staminode number, characters that may be quite variable even between flowers on a single plant. In the Malagasy species, Capuron (1968) analyzed the sizeable quantitative variation in the androecium and corolla, finding numerous permutations in the ratios of these floral organs that he used, in part, when delimiting his species. Similar patterns of variation have been noted in species of *Olax* throughout much of the geographic distribution of the genus, e.g., Africa (Louis & Léonard 1948; Hutchinson & Dalziel 1958; Michaud 1966), southeast Asia (Hu 1929), and New Caledonia (Villiers 1980). In our study area, several authors (Jussieu 1789; Lamarck 1791; Du Petit-Thouars 1806; De Candolle 1824) have used variation in floral merosity to recognize monotypic segregates of *Olax*, basing both *Pseudaleia* Thouars ex DC. and *Pseudaleioides* Thouars on Malagasy material and *Fissilia* Comm. ex Juss. on a La Réunion type. More recently and in the present study, these three segregates are considered synonymous with *Olax*. Palynological (Lobreau-Callen 1980) and leaf anatomy (Baas *et al*. 1982) studies do not support the recognition of the segregate genera nor the infrageneric classifications based on the number of floral parts.

To date, no worldwide monograph of *Olax* has been published, but several regional treatments are available. Areas covered include west Africa (Michaud 1966; Villiers 1973), La Réunion (Scott 1997), Australia (George 1984), southeast Asia (Ling 1982; Sleumer 1984), and New Caledonia (Villiers 1980). Cavaco & Keraudren (1955a) recognized eight species of *Olax* in their Olacaceae treatment for the *Flore de Madagascar et des Comores*, which was followed several years later by their description of a ninth Malagasy species (Cavaco & Keraudren 1963). Since the *Flore*, the only significant taxonomic work on the Malagasy species of *Olax* was carried out by Capuron (1968), in the form of an unpublished technical report entitled "Olacacées, Opiliacées et Santalacées arbustives ou arborescentes de Madagascar". The manuscript, part of Capuron's study of the forest flora of Madagascar, was a preliminary revision of the Malagasy members of the three closely-related families with particular emphasis on *Olax*, the most speciose genus. He dealt with the placement of several of his own recent collections, which he considered to represent two novel taxa. Capuron's work has been invaluable to our studies, even though we have been unable to agree with all of his taxonomic conclusions.

MATERIALS AND METHODS

Morphological data was gathered from herbarium specimens deposited at B, BM, G, K, MO, P, TAN, TEF, US, and WAG. Photos of types and other representative specimens are posted on the W³TROPICOS database at: http://mobot.mobot.org/W3T/Search/vast.html.

Coordinates and elevations were assigned, when possible, to collections lacking such data using the "Gazetteer to Malagasy Botanical Collecting Localities" (Schatz & Lescot 2005). Post-facto coordinates and elevations are enclosed by square brackets. Distribution maps were generated using ArcView GIS (v. 3.2a) software, with Malagasy species mapped over the five simplified bioclimatic zones of Madagascar (Schatz 2000, following Cornet 1974).

Conservation status for each species is provisionally assigned based on *Red List Categories and Criteria* (IUCN 2001). Extent of occurrence (EOO) and area of occupancy (AOO) were calculated using several ArcView project scripts developed by J. Moat (see Willis *et al*. 2003). A grid cell size of 10 × 10 km was used to determine the AOO for narrowly distributed species, except for *Olax mayottensis*, endemic to the small island of Mayotte, where it was more appropriate to use a 3 × 3 km grid cell size. Geographically widespread species were evaluated with a 100 × 100 km grid cell.

Exsiccatae citations include the following abbreviations: SF, Service forestier; RN, Réserves naturelles; PN, Parc national; RNI, Réserve naturelle intégrale; RS, Réserve spéciale; STF, Station forestière.

Parts of some of the species illustrations are taken from Capuron's (1968) report. Other illustrations are original.

SYSTEMATICS

Genus *Olax* L.

Species Plantarum 34 (1753). — Type: *Olax zeylanica* L.

Fissilia Comm. ex Juss., *Genera Plantarum* 260 (1789). — Type: *Fissilia psittacorum* Lam.

Pseudaleia Thouars, *Genera Nova Madagascariensia* 15 (1806), *nom. illeg.*

Pseudaleia Thouars ex DC., *Prodromus* 1: 533 (1824). — Type: *Pseudaleia madagascariensis* DC.

Pseudaleioides Thouars, *Genera Nova Madagascariensia* 15 (1806). — Type: *Pseudaleioides thouarsii* DC.

Description

Hemiparasitic shrubs or trees, rarely lianas; secondary roots with lateral haustoria. Branches exstipulate, usually 4-sided, ± winged in cross section, longitudinally striate, 2 or 4 decurrent lines originating at leaf scars; young branches often zig-zag. Leaves simple, alternate-distichous, rarely decussate, glabrous, margin entire; venation pinnate; secondary veins anastomosing in brochidodromous loops near the margin; fine venation irregularly reticulate; petioles articulate. Inflorescences axillary, racemose, pseudosolitary, or solitary, sometimes ramified with bracts subtending ramifications; axes often zig-zag; bracts usually small and early caducous, sometimes persistent and becoming large and foliose. Flowers hermaphroditic or rarely unisexual, tubular, actinomorphic; calyx cupuliform and small at anthesis, often accrescent in fruit, margin entire to denticulate; corolla with 3 to 6 (7) petals; petals valvate, free or attached by their bases at anthesis, sometimes irregularly fused, upper one-half to one-third of the petal abaxially decurved, glabrous adaxially (except papillate with a small uncinate thickening near apex of lobes), glabrous abaxially; petal ligule (i.e. membranous protuberance between petal and base of free portion of stamen) often present; androecium in one or two whorls, each whorl consisting of various permutations of stamens and staminodes; stamens most often 3 to 6 (7); filaments partially fused to corolla; anthers bilocular, introrse, basifixed, longitudinally or rarely apically dehiscent; staminodes bifid, most often 3 to 6 (7), generally longer than fertile stamens; glandular zone (i.e. nectary disc) minute, surrounding the base of the ovary; ovary superior or semi-inferior (i.e. partly nested in the glandular zone), 1-locular (or 3-locular near the base of the locule), placenta central and basally inserted in a column subtending 1 to 3 ovules; ovules pendulous, anatropous, tenuinucellate, uni- or ategmic; style either short or long; stigma capitate, usually 3-lobed. Fruits drupaceous, 1-seeded, sometimes completely surrounded by an accrescent calyx; persistent style short; mesocarp ± developed; endocarp coriaceous. Seeds with copious, oily endosperm.

Key to the species of *Olax* L. in Madagascar and the Comoro Islands
(see Table 1 for a summary of flower and fruit variation)

1. Petals 3, rarely 4; calyx not accrescent in fruit 2
— Petals 5 or 6, rarely 4; calyx accrescent in fruit 4

2. Leaves lanceolate or narrowly elliptic, (3-)4-8 times longer than broad; apex narrowly acute; base cuneate ..... 5. *O. lanceolata*
— Leaves ovate, obovate, or broadly elliptic, 2-3(-3.5) times longer than broad; apex acuminate, acute, broadly rounded, obtuse, or emarginate; base broadly rounded, obtuse, or acute 3

3. Leaves 4.5-11.5 cm long, ovate, rarely elliptic; apex acuminate, rarely acute; venation generally visible on both surfaces; fruits spheroid ..... 6. *O. madagascariensis*
— Leaves 1-4.2 cm long, obovate, rarely elliptic or ovate; apex broadly rounded, obtuse, emarginate, or rarely acute; venation inconspicuous abaxially, or only the secondaries faintly visible; fruits obovoid ..... 2. *O. capuronii*

4. Fertile stamens 3, rarely 4 or 5; accrescent calyx crustaceous or semi-fleshy, completely surrounding the fruit 5
— Fertile stamens 6, rarely 5 or 7; accrescent calyx chartaceous, only surrounding the base of the fruit (*c*. 7-11 mm in diam.) 7

5. Leaves coriaceous; venation inconspicuous, or only secondaries faintly visible; petioles darker than midribs; fruits 12-17 mm in diam. ..... 4. *O. emirnensis*
— Leaves semi-succulent, membranous-chartaceous, or largest leaves becoming chartaceous; venation usually distinct; petioles not darker than midribs; fruits 6-9 mm in diam. 6

6. Leaf blades 2-5 cm long, 1-2 cm wide, semi-succulent or membranous-chartaceous; petioles *c*. 0.5 mm in diam.; floral pedicels longer than corolla, rarely of equal length, 0.3-0.5 mm in diam.; fruits ellipsoid or spheroid [plants of Madagascar and Africa] .... 3. *O. dissitiflora*
— Leaf blades 4.2-10 cm long, 1.3-4.5 cm wide, chartaceous, or only the leaves near the tips of the branches membranous-chartaceous; petioles 1-2 mm in diam.; floral pedicels shorter than corolla, *c*. 1 mm in diam.; fruits ovoid [plants of Mayotte] ..... 7. *O. mayottensis*

7. Leaves 5-12 cm long (true leaves only, leafy organs in pseudosolitary inflorescences are foliose bracts); blades abaxially glaucous; apex acute and usually mucronate, rarely obtuse or rounded; petal ligule 0.6-1 mm long, densely pubescent ..... 8. *O. thouarsii*
— Leaves 1.5-4 cm long; blades not glaucous; apex emarginate; petal ligule 0-0.3 mm long, sparsely pubescent ..... 1. *O. antsiranensis*

TABLE 1. — Flower and fruit variation in Malagasy *Olax*. Abbreviations: **NAC**, not accrescent; **SAC**, strongly accrescent, completely surrounding fruit; **WAC**, weakly accrescent, only surrounding base of fruit.

	Olax antsiranensis	***Olax capuronii***	***Olax dissitiflora***	***Olax emirnensis***	***Olax lanceolata***	***Olax madagascariensis***	***Olax mayottensis***	***Olax thouarsii***
Petal number	5	3	5 or 6	(4) 5 or 6	3 (4)	3 (4)	5	(4) 5 or 6
Stamen number	(5) 6 (7)	3	3 (4 or 5)	3 (4 or 5)	3	3 (4)	3	(5) 6 (7)
Staminode number	4 or 5	6	(4) 5 (6)	(4) 5 (6)	6	(5) 6 (7)	(4) 5 (6)	(0-2) 3-5
Fruit shape	transverse-ellipsoid	obovoid	ellipsoid or spheroid	ellipsoid	spheroid	spheroid	ovoid	transverse-ellipsoid
Fruit diam. (cm)	1.5-1.7	1.7-1.8	0.6-0.9	1.2-1.7	1.3-1.4	1.4-1.9	0.7-0.9	1.6-1.8
Calyx in fruit	WAC	NAC	SAC	SAC	NAC	NAC	SAC	WAC

1. *Olax antsiranensis*
Z.S.Rogers, Malécot & Sikes, sp. nov.
(Fig. 1)

"*Olax pseudaleioides* subsp. *sabulicola*" Capuron, *Olacacées, Opiliacées et Santalacées arbustives ou arborescentes de Madagascar*: 13 (1968), *nomen inval*. [ineffective publication].

Olax antsiranensis *a* O. thouarsii *in laminis 1.5-4 (haud 5-12) cm longis (n.b.: bracteis interdum foliaceis!) plus minusve concoloribus et apicibus emarginatis (haud paginis abaxialibus glaucis et apicibus acutis acuminatis vel raro obtusis vel rotundatis), et ligulis petalorum 0-0.3 (haud 0.6-1) mm longis indumento pubescenti sparso (haud dense) praeditis, differt.*

TYPUS. — **Madagascar.** Prov. Antsiranana, au Sud du Mont Raynaud, sur sables, [12°30'S, 49°27'E], 26.IV.1963, fl., *Service Forestier (Capuron) 22719* (holo-, P!; iso-, P-00418010!, TEF!).

PARATYPES. — **Madagascar.** Prov. Antsiranana, sous-préfecture de Vohémar, commune rurale de Daraina, forêt de Bekaraoka, partie sud Andranostimaty, 13°11'S, 49°42'E, 130 m, 10.III.2003, fl., *Gautier et al. 4305* (G, INH!). — Ramena, Andavakoera, à 8 km au Sud du village Andavakoera, forêt sèche sur sable, 12°20'53"S, 49°21'27"E, 50 m, 11.VIII.2004, imm. fr., *Guittou et al. 75* (K!, MO!). — Analabe forest, Fivondronana Vohémar, Fokontany Anjiabe, 13°04'14"S, 49°53'40"E, 26.II.2003, fl., *Rabevohitra et al. 4554* (K!, MO!, P!, TEF). — Fivondronana Diego II, Commune Ramena, Fokontany Andavakoera, forêt sèche d'Andranonankomba,

Montagne des Français, 12°20'48"S, 49°21'28"E, 88 m, 7.IX.2004, fr., *Randrianaivo et al. 1074* (G!, MO!, P, TAN, TEF). — Same locality, 12°23'02"S, 49°20'12"E, 310 m, 28.III.2004, fl., *Ratovoson et al. 735* (MO!, P, TAN). — Tendrombohitr'Antsingy [= Montagne des Français], [12°22'S, 49°21'E], 26.XI.1958, fr., *SF (Capuron) 20103* (P!, TEF!). — Sakaramy STF, forêt d'Analandriana, près de Sakoramy (Diégo-Suarez), [12°26'S, 49°16'E], 17.XII.1963, fr., *SF (Capuron) 23017* (P!, TEF!). — Ambongoabo massif, à l'Ouest de Diégo-Suarez, [12°15'S, 49°10'E], 26.I.1966, fr., *SF (Capuron) 24442* (P!, TEF!). — Vohémar, [13°22'S, 50°00'E], 14.X.1966, fr., *SF (Capuron) 24867* (P!, TEF!).

Description

Trees to 10 m tall. Branches glabrous; young branches 4-sided, winged; older branches terete, darker; bark cracked, exfoliating. Leaves alternate, distichous, elliptic or ovate, rarely obovate, 1.5-4 cm long, 9-23 mm wide, *c*. 2-2.5 times longer than wide; leaf blades chartaceous, glabrous, surfaces smooth, rarely slightly wrinkled, usually darker in color adaxially, base acute-cuneate (decurrent with petiole), margin slightly revolute, more obvious in lower half, apex apparently emarginate, sometimes with a short mucron in the sinus; midrib depressed or slightly raised adaxially, raised abaxially, glabrous; venation usually conspicuous on both surfaces, less pronounced abaxially, secondary veins *c*. 5 pairs per side; petioles 0-0.5 mm long, *c*. 1 mm in diam., glabrous. Inflorescences racemose or pseudosolitary; axes 4-sided, *c*. 0.5 mm in diam., reaching 7 mm long, proliferating with up to 5 flowers; floral pedicel 2.2-2.8 mm long, c. 0.5 mm in diam. Flowers hermaphroditic, tubular, heterostylous; calyx cupuliform, green, 1-1.2 mm long, semimembranous, glabrous, margin truncate; petals 5, white, oblong, 5.8-7.7 mm long, glabrous adaxially; petal lobes *c*. 3 mm long, 1.1-1.7 mm wide; petal ligule absent or up to 0.3 mm long, sparsely puberulent or glabrous; free portion of filaments 1-2 mm long; fertile stamens (5) 6 (7); anthers oblong, *c*. 1.5 × 0.7 mm, longitudinally dehiscent; staminodes 4 or 5, each bifid portion narrowly elliptic, *c*. 2 × 0.5 mm, membranous, glabrous, base thick, dark, articulate with filament; nectary disc annular, 0.1-0.2(-0.3) mm tall, glabrous; ovary ovoid-spheroid, *c*. 1.2 × 1 mm; style *c*. 0.4 mm in diam., articulate above ovary in immature fruit; long style not seen; short style 2.3-2.7 mm long; stigma capitate, 3-lobed, 0.4-0.6 mm in diam., papillate. Drupes transversely ellipsoid, uniformly depressed at both poles, 1.1-1.2 cm long, 1.5-1.7 cm in diam., yellow, glabrous; accrescent calyx surrounding base of fruit, thin and chartaceous, 7-8 mm in diam., margin tearing irregularly into 4-8 lobes; stylar remnants *c*. 0.2 mm long.

Remarks

The flowers of *Olax antsiranensis* have 5 petals, (5) 6 (7) stamens, 4 or 5 staminodes, and a weakly accrescent calyx in fruit. *Olax antsiranensis* is distinguished from *O. thouarsii* by its 1.5-4 (vs. 5-12) cm long leaves, the more or less concolorous leaf blade with an emarginate apex (vs. abaxially glaucous blade with an acute, acuminate, or rarely obtuse or rounded apex), and by the 0-0.3 (vs. 0.6-1) mm long, sparsely (vs. densely) pubescent petal ligule. Please note that leaves of *O. thouarsii* should not be confused with its foliose bracts (see species no. 8 for further discussion).

The placement of this taxon was not addressed in the *Flore* (Cavaco & Keraudren 1955a) because no collections were available at that time. Capuron (1968) collected *Olax antsiranensis* on five occasions, considering it to be a subspecies of *O. thouarsii* (though he regarded *O. pseudaleioides* to be the correct name for the species). We believe that *O. antsiranensis* deserves recognition at the rank of species.

Distribution and phenology

Olax antsiranensis occurs in a few dry forest fragments in northern Madagascar near Diégo-Suarez and Vohémar from 0 to 310 m elevation (Fig. 11). The species grows on sand, calcareous limestone, and lateritic soil on basaltic rock. It flowers February through April and fruits from August to January.

Vernacular name

Kombimba (*Ratovoson et al. 735*); Sarinkombimba (*Guittou et al. 75*).

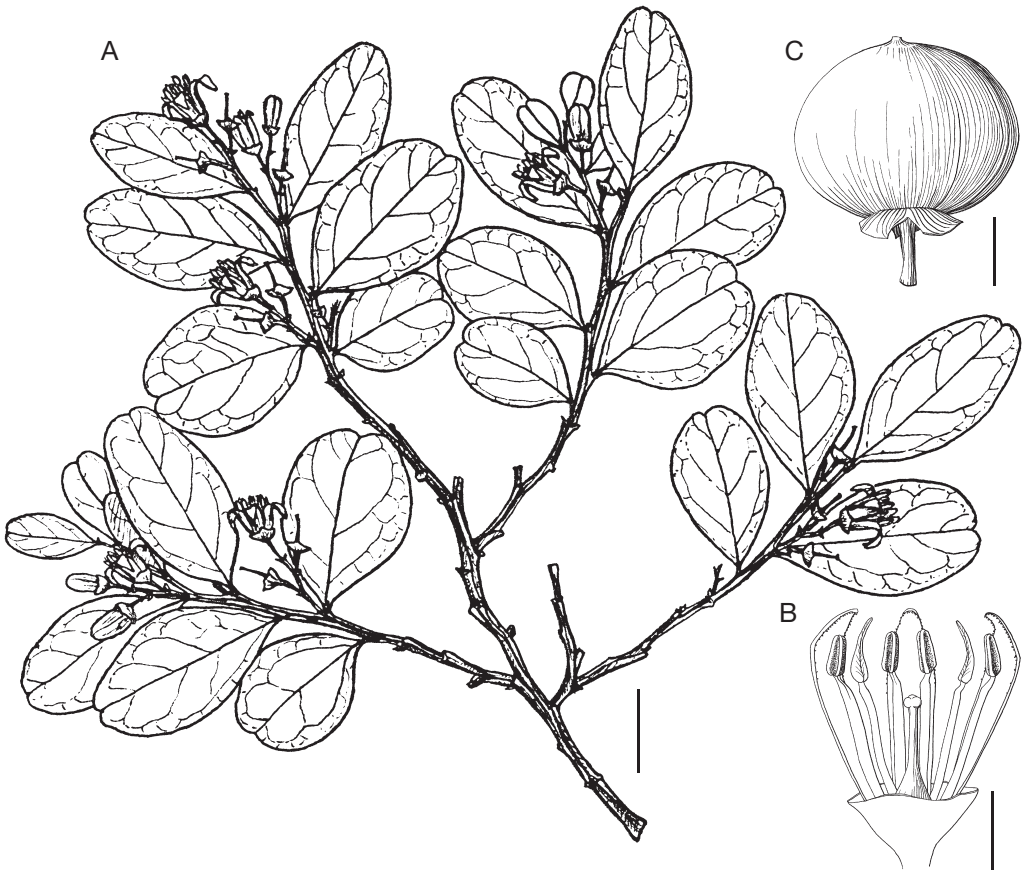

FIG. 1. — *Olax antsiranensis* Z.S.Rogers, Malécot & Sikes: **A**, flowering branch; **B**, flower (two petals, two stamens and two staminodes removed); **C**, fruit. A, *Service Forestier 22719* (type); B, *Rabevohitra 4554*; C, *Service Forestier 20103*. Scale bars: A, 1 cm; B, 3 mm; C, 4 mm.

USE

"Fakaboka" (*Ratovoson et al. 735*). In Malagasy, Fakaboka means the plant is used by sorcerers to curse people (F. Ratovoson pers. comm.).

CONSERVATION STATUS

Olax antsiranensis grows in one protected area (Sakaramy). The EOO of the species is 1400 km^2, a figure which easily meets the requirements of B1 in the EN category (i.e. EOO < 5000 km^2). AOO for the species is 600 km^2 (grid cell size 10 × 10 km) and does not quite qualify as EN in the B2 category (i.e. AOO < 500 km^2). Therefore, the species is assigned a provisional conservation status of Vulnerable (VU B1ab + 2ab).

2. *Olax capuronii*
Z.S.Rogers, Malécot & Sikes, sp. nov.
(Fig. 2)

"*Olax suarezensis*" Capuron, *Olacacées, Opiliacées et Santalacées arbustives ou arborescentes de Madagascar*: 18 (1968), *nomen inval.* [ineffective publication].

Olax capuronii *e* O. madagascariensi *in laminis obovatis raro ellipticis vel ovatis 1-4.2 cm longis (haud ovatis, raro*

ellipticis vel obovatis, 4.5-11.5 cm long), nervatura adaxiali inconspicua (haud utrinque vulgo manifesta), apicibus rotundatis obtusis vel raro acutis (haud acuminatis raro acutis), et fructibus obovoideis (haud sphaeroideis), differt.

TYPUS. — **Madagascar.** Prov. Antsiranana, Orangéa, à l'Est de Diégo-Suarez, [12°15'S, 49°23'E], 24.III.1964, fl., imm. fr., *Service Forestier (Capuron) 23275* (holo-, P!, iso-, P-00418013!, TEF!).

PARATYPES. — **Madagascar.** Prov. Antsiranana, Baie des dunes, 12°14'26"S, 49°22'17"E, 2 m, 18.V.2004, imm. fr., *Andrianjafy et al. 427* (MO!, P, TAN, WAG!). — Diégo-Suarez, Vovo Village District, 12°19'05"S, 49°23'07"E, 85 m, 22.IV.1993, fl., *Harder et al. 1682* (MO!, P!). — Forêt d'Analabe, Fivondronana Vohémar, Firaisana Nosy be, Fokontany Anjiabe, 13°04'50"S, 49°54'07"E, 11.VII.2003, imm. fr., *Rabehevitra et al. 260* (K!, MO!, P, TEF). — Forêt de l'Orangéa, Fivondronana Antsiranana I, Firaisana Ramena, 12°14'20"S, 49°21'49"E, 13 m, 29.VIII.2001, imm. fr., *Rabenantoandro & Razanatsoa 576* (MO!, P, TAN). — Same locality, 18.X.1954, fr., *SF (Capuron) 11333* (P!, TEF!). — Same locality, 9.XI.1961, imm. fr., fr., *SF (Capuron) 20372* (P[2]!, TEF!). — Same locality, 1.II.1969, fl., fr., *SF (Capuron) 28742* (P!, TEF!).

DESCRIPTION

Trees to 4 m tall. Branches glabrous; young branches 4-sided, winged; older branches terete, darker; bark cracked, exfoliating. Leaves alternate, distichous, obovate, rarely elliptic or ovate, 1-4.2 cm long, 6-21 mm wide, *c.* 1.5-2 times longer than wide; leaf blades coriaceous, glabrous, strongly wrinkled and dark green adaxially, smooth or slightly wrinkled and lighter green abaxially, base obtuse or rarely acute (strongly decurrent with petiole), margin revolute, apex obtuse, broadly rounded, rarely acute or emarginate, often with an abaxially decurved apicule; midrib depressed adaxially, raised abaxially, glabrous; venation inconspicuous or adaxially represented by 2-4 faint pairs of depressed secondaries, abaxially inconspicuous or faintly visible; petioles 0-0.5 mm long, *c.* 1 mm in diam., glabrous. Inflorescences racemose; axes 4-sided, *c.* 0.8 mm in diam., reaching 1.1 cm long, proliferating with up to 9 flowers; floral pedicel 1.9-3 mm long, *c.* 0.5 mm in diam. Flowers hermaphroditic, tubular, heterostylous; calyx cupuliform, green, 0.3-0.5 mm long, glabrous, margin wavy, semimembranous; petals 3, white, oblong, 6.5-8 mm long; petal lobes ovate, 2.5-3 mm long, 1.5-2 mm wide; petal ligule 0-0.1 mm long, sparsely puberulent, with a few much longer (*c.* 0.5 mm long), irregularly spaced trichomes; free portion of filaments 0.5-1.5 mm long; fertile stamens 3; anthers oblong, *c.* 1.5 × 0.8 mm, longitudinally dehiscent; staminodes 6, each bifid portion narrowly elliptic, *c.* 2 × 0.5 mm, membranous, glabrous, base thick, dark, articulate at filament; nectary disc annular, *c.* 0.1 mm tall, glabrous; ovary ovoid, *c.* 2 × 1 mm; style *c.* 0.3 mm in diam., articulate above ovary in immature fruit; long style 4-5 mm long; short style *c.* 1.5 mm long; stigma capitate, 3-lobed, *c.* 0.3 mm in diam., papillate. Drupes obovoid, slightly depressed at apex, 1.9-2.2 cm long, 1.6-1.8 cm in diam.; calyx in fruit not accrescent, circular, *c.* 3 mm in diam., margin entire; stylar remnants *c.* 0.2 mm long.

REMARKS

Olax capuronii has flowers with 3 petals, 3 stamens, 6 staminodes, and a non-accrescent calyx in fruit. This combination of characters suggests an affinity with *O. madagascariensis*, but *O. capuronii* differs from that species by its 1-4.2 cm long, obovate, rarely elliptic or ovate leaves (vs. 4.5-11.5 cm long, ovate, rarely elliptic or obovate, leaves), inconspicuous or only faintly visible adaxial venation (vs. venation usually visible on both surfaces), rounded, obtuse, or rarely acute or emarginate leaf apex (vs. acuminate or rarely acute apex), and obovoid (vs. spheroid) fruit. When sterile, *O. capuronii* should not be confused with *O. antsiranensis*, a species with leaves of similar size and sometimes shape, because leaf blades of the former are more coriaceous, more distinctly veined, and have more strongly revolute margins.

This species was not treated by Cavaco & Keraudren (1955a) in the *Flore* as collections were not yet available. We concur with Capuron (1968), who intended to describe it as a new species, and therefore would like to honor him with our choice of epithet.

DISTRIBUTION AND PHENOLOGY

Olax capuronii is endemic to three sandy littoral forest fragments (Orangéa, Vovo, Vohémar) in

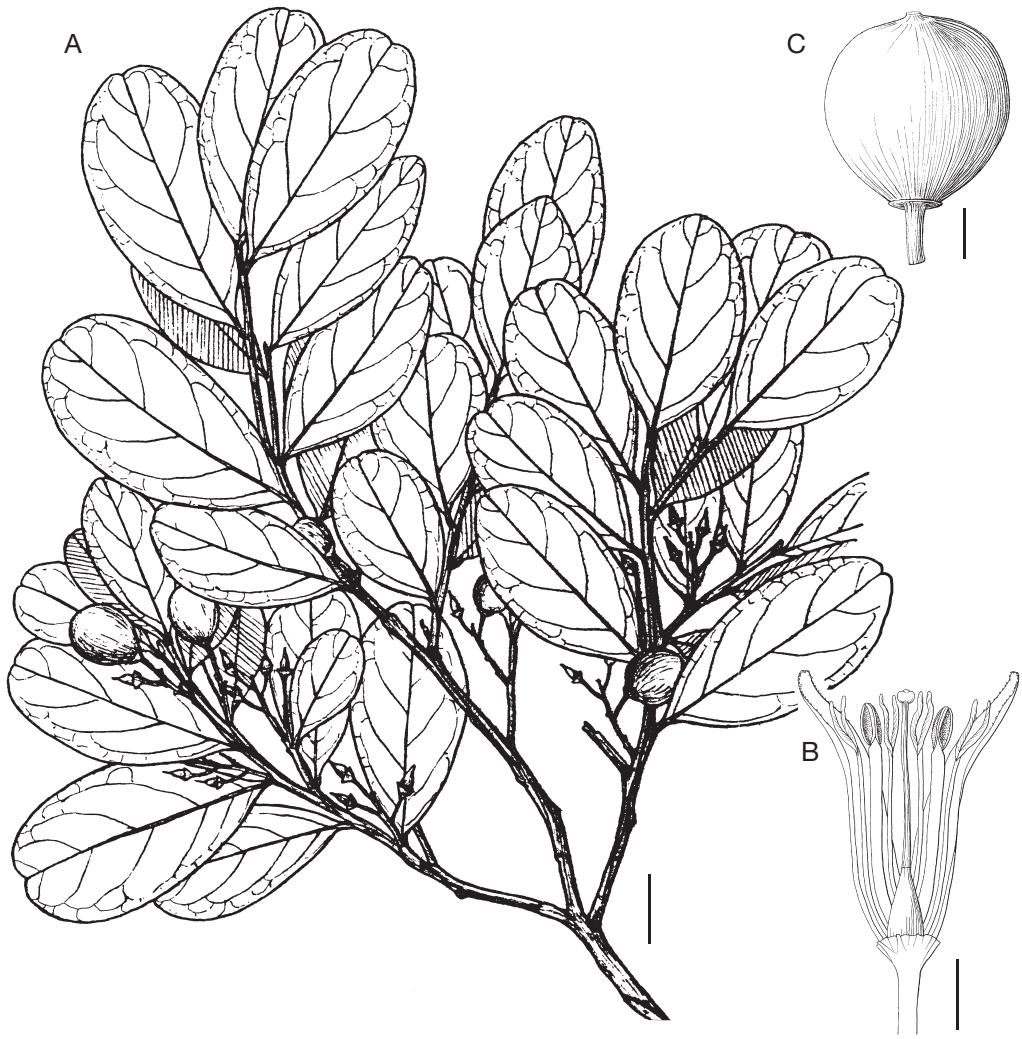

FIG. 2. — *Olax capuronii* Z.S.Rogers, Malécot & Sikes: **A**, branch; **B**, flower (one petal, one stamen, and two staminodes removed); **C**, fruit. A, C, *Service Forestier 20372*; B, *Service Forestier 23275* (type). Scale bars: A, 1 cm; B, 2 mm; C, 5 mm.

northern Madagascar from 0 to 85 m elevation (Fig. 9). The species has been recorded in flower from February to April and in fruit in May, July to August, and October through November.

VERNACULAR NAME

Hazomena (*Andrianjafy et al. 427*).

CONSERVATION STATUS

Olax capuronii has not been collected inside any formally protected areas. The EOO for the species is 212 km^2 and the AOO is 400 km^2 (grid cell size 10 × 10 km). These figures indicate that *O. capuronii* should be considered Endangered (EN B1ab + B2 ab).

3. *Olax dissitiflora* Oliv.
(Fig. 3)

Flora of Tropical Africa 1: 350 (1868). — Type: Mozambique, Sena, X.1858, *Kirk s.n.* (lecto-, K-000198748!, left-hand specimen, designated by Garcia 1963).

Olax andronensis Baker, *Journal of the Linnean Society*, Botany 25: 306 (1889). — Type: Madagascar, "province of Androna", fl., *Baron 5548* (holo-, K!; iso-, P!).

Olax stuhlmannii Engl., *Notizblatt des K. Botanischen Gartens und Museums zu Berlin* 2: 283 (1899). — Type: Tanzania, Pwani Region, Kisarawe District, Usaramo, Mkurutuni [= Kurutuni], [6°57'S, 39°09'E], 100 m, IX.1894, fr., *Stuhlmann 8562* (lecto-, herbarium not cited, designated by Garcia 1963). See Remarks.

ADDITIONAL MATERIAL EXAMINED. — **Madagascar.** Without precise locality, 1847-1852, fr., *Boivin 2617* p.p.
Prov. Antsiranana, Montagne des Français, 6 km S of Ramena Beach, 12°22'S, 49°21'E, 175 m, 9.XI.1993, fl., fr., *Almeda 7358* (CAS, MO!). — Ankarana RS, campement des Anglais, 12°55'S, 49°09'E, 50-409 m, 12-20.X.1993, fl., *Andrianantoanina & Rochsceohclher 375* (G!, MO[2]!, P!, TAN). — Ankarana massif, tsingy du lac vert, 5.XI.1990, fl., *Bardot-Vaucoulon 242* (P!). — Same locality, 12°54'43"S, 49°06'39"E, 15.X.1997, fl., *Bardot-Vaucoulon & Andrianantoanina 772* (P[2]!). — Same locality, 12°53'09"S, 49°06'40"E, 130 m, 23.X.1997, fl., *Bardot-Vaucoulon & Andrianantoanina 857* (K, MO!, P[2]!, TAN). — Montagne des Français, Betahitra, 12°19'32"S, 49°20'11"E, 310 m, 25.XI.1996, fr., *Labat et al. 2820* (K, MO!, P!, TAN!, WAG). — Ankarana RS, 12°51'S, 49°04'E, 100-200 m, 22-26.XI.1992, fr., *Malcomber et al. 1906* (MO!, P!, TAN!). — Mantamena, part of Bekaroaka Range, 7 km NE of Daraina (Vohémar), 13°08'S, 49°42'E, 150 m, 5.XII.1989, fr., *Meyers & Boltz 7* (MO!, P!, TAN). — Same locality, 112-330 m, 26.X.1990, fl., *Meyers 201* (MO!, P!, TAN!). — Same locality, 26.XI.1990, fr., *Meyers 216* (MO!, TAN). — Ramena, Fivondronana Antsiranana I, Firaisana Ramena, Forêt de Babaomby, 12°11'01"S, 49°20'45"E, 97 m, 31.VIII.2001, bud, *Rabenantoandro & Razanatsoa 596* (G!, MO!, P, TAN!). — Analabe forest, Fivondronana Vohémar, Fokontany Anjiabe, près du lac Sahaka, 13°04'55"S, 49°54'34"E, 4.XI.2002, fl., imm. fr., *Rabevohitra et al. 4259* (G!, MO!, P!, TEF, US!). — Orangéa, à l'Est de Diégo-Suarez, 12°14'S, 49°22'E, 118 m, X.1975, bud, *Rakotozafy 1510* (TAN!). — Ampondrahazo, forêt d'Ampondrahazo, canton de Mahavanona, 12°25'S, 49°28'E, 0-50 m, X.1975, fl., *Rakotozafy 1576* (TAN!). — Daraina (Vohémar), 13°11'S, 49°41'E, 175 m, 19.X.1988, fl., *Rakotozafy & Raharilala 2280* (TAN!). — Fivondronana Ambilobe, Commune Tanambao-Marivorahona, Fokontany Ananjaka, Forêt de Tsiandrotonana, près du village d'Ankatsaka Andavakoera, 13°04'57"S, 49°11'30"E, 57 m, 8.XI.2004, fr., *Randrianaivo et al. 1103* (MO!, P, TAN). — Ankarana RS, [12°55'S, 49°09'E], 28.XI.1952, fr., *SF (Belin) 6179* (P!, TEF!). — Baie de Diégo-Suarez, [12°17'S, 49°18'E], 15.X.1955, fl., *SF (Belin) 14882* (P!, TEF!). — Montagne des Français, sommet de l'Anosiravo, [12°19'S, 49°20'E], 350 m, 7.XI.1961, fl., *SF (Capuron) 20354* (P!, TAN!, TEF!). — Ambohipiraka, Sud de l'Ambohipiraka (Ambilobe), [13°10'S, 49°06'E], 13.X.1966, fl., *SF (Capuron) 24844* (P!, TEF!). — Bezavona, massif de Bezavona, entre la Fanambana et la Manambery, [13°32'S, 49°54'E], 13.XII.1966, fr., *SF (Capuron) 27237* (P!, TEF!). — Montagne des Français, [12°22'S, 49°21'E], 10.XI.1979, fl., *SF (Rabevohitra) 29580* (TEF[2]!). — Same locality and date, fl., fr., *SF (Rabevohitra) 29581* (TEF[2]!). — Ankarana RS, forêt Ampondralatsaka, ouest du village Mahamasina, [12°57'S, 49°08'E], 15.XI.1979, fl., fr., *SF (Rabevohitra) 29645* (TEF[3]!). — Montagne des Français, sur marnes du Cénomanien, route de Ramena, p.k. 8, [12°22'S, 49°21'E], 22.VIII.1980, fl., *SF (Rabevohitra) 29938* (TEF[2]!).
Prov. Fiananarantsoa, Vallée d'Ihosy, [22°32'S, 46°09'E], 700 m, fl., *Perrier de la Bâthie 16881* (P!). — Menarahaka, forêt de Menarahaka, Canton Sakalalina, District Ihosy, [22°32'S, 46°30'E], 16.XI.1951, fl., *SF 4749* (P!, TEF!). — Ihosy STF, Ihosy, [22°23'S, 46°07'30"E], 30.X.1953, fl., *SF (Bégué) 7621* (P!, TEF!). — Mahasoa, aux environs d'Ihosy, p.k. 531 de la route Ihosy-Fianarantsoa, [21°58'S, 46°27'E], 4.X.1953, bud, *SF (Capuron) 8556* (P!, TEF!). — Andringitra RNI, Ankorovana, près d'Ankazomby, Antambohobe, [22°07'S, 46°49'E], 15.XI.1967, fl., *SF (Rakotoniana) 26507* (P!, TEF!).
Prov. Mahajanga, Madirokely, Marovoay, [16°07'S, 46°38'E], IX.1955, fl., *Bosser 8406* (MO!, P!, TAN!). — Miarinarivo, route Andilamena, [16°36'30"S, 47°12'E], XI.1962, fl., *Bosser 16494* (MO!, P!, TAN!). — Tsingy de Bemaraha, north of the Manambolo river, 19°09'S, 44°49'E, 50 m, 27.XI.1996, fr., *Jongkind et al. 3250* (MO!, WAG). — Bemaraha RNI, environs rivière Ambodiria, 1 km d'Ambinda, près d'Antsalova, 18°38'S, 44°42'E, 100-200 m, 5.XII.1992, fr., *Labat & Deroin 2313* (MO!, P!, TAN!). — Besafotra, affluent de droite du Menavava (Boina), [17°05'S, 46°40'E], X.1899, fl., fr., *Perrier de la Bâthie 958* (G!, P[4]!). — Same locality, XI.1902, fr., *Perrier de la Bâthie 958bis* (P!). — Mahajanga, environs de Majunga, [15°43'S, 46°19'E], X.1901, fr., *Perrier de la Bâthie 10688* (P!). — Same locality, fr., *Perrier de la Bâthie 16881bis* (P!). — Namoroka RNI, Andranomavo, Soalala, [16°21'S, 45°17'E], 21.IX.1955, fl., *RN (Randriamiera) 7222* (P!, TEF!). — Antsely, [16°00'S, 45°54'E], 29.XI.1951, fr., *SF (Razanajatovo) 5396* (TEF!). — Manisakomby, Majeramanga, canton Sitampiky, district Ambato-Boéni, [16°10'S, 45°56'E], 8.III.1957, fr., *SF (Razafimahandry) 17755* (P!, TEF!). — Ambondro-Ampasy, forêt d'Ambondro-Ampasy, [15°01'S, 47°16'E], [50 m], 29.X.1958, fr., *SF (Capuron) 18799*

(P!, TEF!). — Tanjona, Cap Tanjona, Mitsinjo, [15°47'S, 45°41'E], [0-100 m], 16.X.1963, fl., *SF (Therezien) 21388* (P!, TEF!).
Prov. Toliara, Ambovombe, [25°10'S, 46°05'E], XI.1956, fl., *Bosser 10476* (P!, TAN!). — Tuléar, km 45 route Toliara-Tananarive, [23°16'S, 43°59'E], 11.XI.1961, fr., *Chauvet 185* (P!, TEF!). — Sarodrano, route de Sarodrano, Tuléar, [23°27'S, 43°46'E], 19.IX.1962, fl., *Chauvet 343* (P!, TEF!). — Massif de l'Angavo à l'Est de Antanimora, [24°50'30"S, 45°48'E], 20.VII.1926, ster., *Decary 4528* (P!). — Tsimanampetsotsa Réserve, Lac Manampetsotsa, [24°03'S, 43°43'E], 23.X.1940, imm. fr., *Decary 16044* (P!, TAN!). — Same locality, 24.X.1940, fr., *Decary 16061* (P!). — Vinanibe forêt, préfecture de Fort-Dauphin, [25°03'S, 46°56'E], 100 m, 17.X.1990, fl., *Dumetz 1328* (MO!, P!, TAN!). — Andohahela RNI (parcelle 3), [25°00'S, 46°40'E], [200-600 m], 17.XI.1990, fr., *Dumetz 1419* (MO!, P!, TAN!). — Andohahela RNI, à l'ouest de Sakaravy (rivière), 24°51'S, 46°38'E, 100-138 m, 31.X.1994, fr., *Eboroke 899* (MO!, P!, TAN). — Mangarivo, XI (no year), fl., fr., *Grevé 32* (G!, MO!, P[6]!). — Morondava, terrains sablonneux, [20°17'S, 44°17'E], XI.1885, fl., fr., *Grevé 78* (MO[2]!, P[9]!, TAN!). — Betsako, forêt de Betsako Ankazoabo, [22°11'S, 44°42'E], 500-600 m, 21.XI.1955, fl., *Herb. Bot. 1078* (TAN!). — Ampandrandava, crête de Morafeno, [24°05'S, 45°42'E], 750 m, IX.1943, fl., imm. fr., *Herbier du Jardin Botanique de Tananarive 6033* (P!). — Sud Madagascar, fl., *Herbier Institut Scientifique Madagascar 490* (MO!, TAN!). — Andohahela PN, between Tsimelaha and Ambatohabo, 24°56'08"S, 46°37'33"E, 200 m, 9.X.2000, fl., *Hoffmann et al. 153* (G!, TAN!). — Saint-Augustin, Vallée de l'Onilahy, Baie de Saint-Augustin, [23°33'S, 43°46'E], 10 m, 27.IX.1924, fl., *Humbert 2596* (P[2]!). — Plateaux et vallées de l'Isalo, environs de Fanjahira, [23°29'S, 44°44'E], 300-600 m, 9.X.1924, fl., *Humbert 2754* (G!, P[4]!). — Plateaux et vallées de l'Isalo, gorges de la Sakamarekely et de la Sambalinieto, [23°18'S, 45°07'E], 500-1000 m, 19.X.1924, fl., *Humbert 2872* (G!, P!, TAN!, US!). — Mont Vohipolaka au N de Betroka (Centre-Sud), [23°08'S, 46°05'E], 1100 m, XI.1933, fl., *Humbert 11645* (P!). — Maromby, Vallée de la Manambolo (bassin du Mandrare), [24°21'S, 46°34'E], 300-400 m, XII.1933, fr., *Humbert 12769* (P[2]!). — Isomony, Vallée de la Manambolo (bassin du Mandrare), aux environs d'Isomonony, [24°31'S, 46°37'E], 400-600 m, XII.1933, fr., *Humbert 12816bis* (P!). — Same locality, 400-900 m, XII.1933, fr., *Humbert 13048* (P!). — Tuléar, 35-50 km N of Tuléar, 23°12'S, 43°37'E, 0-20 m, 11.XI.1989, fr., *Keating & Miller 2239* (MO!, P!, TAN!). — Tsimanampetsotsa RNI, environs du lac Tsimanampetsa, [24°03'S, 43°45'E], 0-100 m, 23.XI.1960, fr., *Leandri & Saboureau 3997* (P!, TAN!). — Same locality, 24.XI.1960, fr., *Leandri & Saboureau 4020* (P!). — Route d'Ifaty, Nord de Tuléar, 23°09'S, 43°36'E, 5.XI.1987, fr., *Morat & Raharimalala 7902* (P!). — Beza Mahafaly RS, near Betioky, 23°41'S, 44°38'E, 150 m, 15.XI.1987, fr., *Phillipson 2568* (MO!, P!, TAN!). — Same locality, 170 m, 1.XII.1987, fr., *Phillipson 2651* (MO!, P!, TAN!). — Tsimanampetsotsa RNI, Lac Tsimanampetsotsa, 24°04'S, 43°46'E, 50 m, 7.X.1990, fl., *Phillipson et al. 3715* (G!, MO!, P!, TAN!). — Belo-Manja, [19°42'S, 44°33'E], 10.X.(no year), fl., *Rauh 893* (TAN!). — Ankazoabo, 22°17'S, 44°31'E, 400 m, 3.XI (no year), fr., *Rauh 1073* (TAN!). — Andohahela PN, [24°53'S, 46°35'E], 25.XI.1953, fr., *RN (Rakotoniaina) 5955* (TEF!). — Maromby, Amboasary-Sud, [24°42'S, 46°44'E], 28.X.1962, fr., *RN (Rabevazaha) 12188* (P!, TEF!). — La Table, 15 km by road E of Toliara along Route Nationale 7, 23°24'S, 43°47'E, 100 m, 3.XI.1987, fr., *Schatz et al. 1759* (MO!, P!, TAN!). — Kirindy, Préfecture Morondava, *c.* 60 km by road NE of Morondava, in the Kirindy Swiss forestry concession, 20°05'S, 44°38'E, 45 m, 25-31.X.1990, fl., imm. fr., *Schatz 2991* (MO!, P!, TAN!). — Antanimora, Namolory, Fort-Dauphin, [24°49'S, 45°40'E], 16.XII.1951, fr., *SF 4437* (P!, TAN!, TEF!). — Betioky, sur la route Betioky-Soalara, [23°42'S, 44°20'E], 16.IX.1953, fl., *SF (Capuron) 8456* (P!, TEF!). — Ranopiso, Manambaro, Fort-Dauphin, [25°03'S, 46°41'30"E], [0-100 m], 19.IX.1954, fl., *SF (Rasolofoson) 10905* (P!, TEF!). — Ambalarao, 3 km au SE du village du Beahetse, [22°04'S, 43°17'E], 24.X.1954, fl., *SF (Valitera) 12249* (TEF!). — Amparahitsa, Amparehitsy, Ambovombe, [24°46'S, 46°30'E], 10.IX.1955, fl., *SF 15666* (P[2]!, TEF!). — Betsako, Forêt de Betsako, à 6 km environ au Sud du village de Tanandava, [22°21'S, 44°42'E], 700 m, 21.X.1955, fl., *SF (Ravelosaona) 15793* (TEF!). — Filanjara, Forêt à 3 km au nord du village Filanjara, canton Ankilizato, district de Mahabo, [20°23'S, 45°01'E], 27.X.1955, fl., fr., *SF (Tsimagna) 16393* (P!, TEF!). — Betobory [= Betoboro], 1 km à l'Est du village de Betobory, canton et district Befasy Morondava, [20°47'S, 44°32'E], 0-150 m, 26.IX.1956, fl., *SF (Rakotovao & Valitera) 16553* (P!, TEF!). — La Table, à l'Est et Sud de La Table (Tuléar), [23°24'S, 43°47'E], 8.XI.1967, fr., *SF (Capuron) 27893* (P!, TEF!). — Tranoroa, Menarandra, près de Tranoroa, [24°42'S, 45°04'E], 14.XI.1967, fr., *SF (Capuron) 27971* (P!, TEF!). — Beraketa, au Sud de Beraketa, [24°11'S, 45°42'E], 18.XI.1967, fr., *SF (Capuron) 28016* (P!, TEF!). — Bevilany, à l'Est de Bevilany, [25°00'S, 46°38'E], 7.XII.1968, fr., *SF (Capuron) 28566* (P!, TEF!). — Andranomena RS, forêt d'Andranomena-Marofandilia (Morondava), [20°09'S, 44°26'E], 28.XI.1969, fl., *SF (Capuron) 28919* (P!, TEF!). — Ampandrandava, environs d'Ampandrandava (entre Bekily et Tsivory), [24°05'S, 45°42'E], X.(no year), fl., *Seyrig 28* (P!). — Morafeno, environs d'Ampandrandava (entre Bekily et Tsivory), [24°03'S, 45°44'E], 750 m, IX.1942, fl., *Seyrig 75* (P!). — Ampandrandava, environs d'Ampandrandava (entre Bekily et Tsivory), [24°05'S, 45°42'E], XI.1942, fr., *Seyrig 75B* (P!). — Ambalatsindro, 40 km NE of Betioky, [23°39'S, 44°38'E], 5.VI.1987, ster., *Sussman 186* (MO[2]!). — Same locality, 19.X.1987, ster., *Sussman 349* (MO[2]!).

Description

Olax dissitiflora (Fig. 3) has flowers with 5 or 6 petals, 3 (rarely 4 or 5) stamens, and a strongly accrescent calyx that almost completely surrounds a relatively small fruit (6-9 mm in diam.). The closest putative relative of *O. dissitiflora* is the Mayotte endemic, *O. mayottensis*, but the former is recognized by its smaller, more membranous leaves (2-5 vs. 4.2-10 cm long), slender petioles (*c.* 0.5 vs. 1-2 mm in diam.), longer, gracile pedicels (0.3-0.5 mm in diam. and longer than, or rarely equal to, the length of the corolla vs. *c.* 1 mm in diam. and substantially shorter than the corolla), and by its differently shaped fruits (ellipsoid or spheroid vs. ovoid).

Remarks

Olax dissitiflora was treated under its synonym, *O. andronensis* Baker in the *Flore* (Cavaco & Keraudren 1955a), with the African name *O. stuhlmannii* Engl. listed in synonymy. Lucas (1968) was the first author to propose that all three binomials were synonymous and to acknowledge the priority of the Oliver name.

Distribution and phenology

Olax dissitiflora is widespread throughout the dry and subarid regions of Madagascar from 0 to 1000 m elevation (Fig. 10). Populations are generally located in dry forest to the west of the central plateau from the far north to the extreme south, but a few populations reach subhumid forest near Ihosy in Fianarantsoa Province. The species also occurs in Tanzania, Mozambique, and northern South Africa (Garcia 1963; Lucas 1968; Jordaan 2003). *Olax dissitiflora* flowers from August through November and fruits from September through December. Of the nearly 100 examined collections, a single one falls outside of the range cited. In that case (*SF 17755*), the plant was evidently fruiting in March.

Vernacular names

Ambihotse (*SF 10905*); Antika (*SF 4749*); Azopassy (*Grevé 32*, *78*); Hazomalany fotsy (*SF 6179*); Hazomparasy (*Seyrig 28*); Hazompasy (*SF 12249*); Hazomposa (*Decary 4528*; *Laha 243*; *RN 5955*, *12188*; *SF 4437*); Hazondomohina (*SF 29645*); Hazonganahary (*Humbert 11645*); Karimbola (*Sussman 186*); Karimbolabe (*Sussman 349*); Karimbolamintsy (*Sussman 349*); Kiran-drambihary (*Meyers & Boltz 7*); Maitsoririnina (*SF 3344*); Manarimbitana (*SF 29938*); Manohilatsaka (*SF 15793*); Salohimbalala (*SF 16393*); Tsifetreposa (*SF 16553*); Tsifolaboay (*Herb. Bot. 1078*; *SF 15793*).

Uses

Leaves used as a purgative (*SF 15793*); wood used to make boxes (*SF 15793*) and as a construction material (*SF 16393*); unspecified medicinal use (*Sussman 186*, *349*).

Conservation status

Olax dissitiflora is common in Madagascar and adjacent continental African countries. The species has been collected within numerous protected areas in Madagascar (Andohahela, Andranomena, Ankarana, Bemaraha, Beza Mahafaly, Ihosy, Namoroka, Tsimanampetsotsa). *Olax dissitiflora* should be considered a species of Least Concern (LC).

Typification

Several Kirk sheets of *Olax dissitiflora*, both with and without collection numbers, are deposited at K. Two specimens representing different collections are affixed to one of the unnumbered sheets (K-000198748) and the specimen on the left side should be regarded as the lectotype because it bears the locality and date that corresponds to the information cited in the publication where the lectotypification was first made (Garcia 1963).

Two collections (*Schlechter 11620*, Mozambique; *Stuhlmann 8562*, Tanzania) were cited in the protologue of *Olax stuhlmannii*. In *Flora Zambesiaca*, Garcia (1963) placed the name into synonymy with *O. dissitiflora* and stated that *Stuhlmann 8562* was the lectotype collection without mentioning a specific herbarium. Duplicates of the original material of the Stuhlmann collection probably would have been deposited at B and K, but appear to be missing from those herbaria (R. Vogt & V. Noble pers. comm.). In the *Flora of Tropical East Africa*, Lucas (1968) cited an EA isosyntype of *Stuhlmann 8562*, but no relevant material has been found in that herbarium (S. Masinde pers. comm.). The second syntype, *Schlechter 11620* (B!, BM!, BR!, K!, G[3]!,

FIG. 3. — *Olax dissitiflora* Oliv.: **A**, flowering branch; **B**, flower (two petals, one stamen, and two staminodes removed); **C**, fruit. A, *Service Forestier 8456*; B, *Service Forestier 15666*; C, *Labat & Deroin 2313*. Scale bars: A, 1 cm; B, 2 mm; C, 6 mm.

MO!, P!, WAG!, Z!), definitely belongs to *O. dissitiflora*. Garcia's omission of the institution where the lectotype was deposited is not sufficient justification to overturn his lectotypification. We refrain from designating a neotype at this time in hopes that duplicates of *Stuhlmann 8562* will be located.

4. ***Olax emirnensis*** Baker
(Fig. 4)

Journal of the Linnean Society, Botany 21: 331 (1884). — Type: Madagascar, central Madagascar, fl., *Baron 3078* (holo-, BM!; iso-, K!, P!).

Olax tsaratananensis Cavaco & Keraudren, *Boletim da Sociedade Broteriana*, sér. 2, 29: 25 (1955). — Type: Madagascar, Prov. Antsiranana, Tsaratanana, [13°49'S, 48°44'E], 1500 m, X.1912, imm. fr., fr., *Perrier de la Bâthie 2008* (holo-, P!); **syn. nov.**

ADDITIONAL MATERIAL EXAMINED. — **Madagascar.** Prov. Antananarivo, Ambohitantely RS, [18°05'S, 47°16'E], X.1955, fl., *Bosser 8518* (MO!, TAN!). — Manankazo STF, Manankazo au NE d'Ankazobe, [18°09'S, 47°14'E], 1500 m, 1913, fl., *Perrier de la Bâthie 2243* (P!). — Andreba, Fiv. Anjozorobe, Commune Betatao, Forêt de Besofina, à 8 km au Sud de Betatao, et 6 km N d'Andreba, 18°15'10"S, 47°53'27"E, 1386 m, 9.III.2000, fr., *Randrianaivo et al. 516* (MO!, P!, TAN). — Same locality, 18°15'54"S, 47°52'58"E, 1412 m, 12.III.2000, fr., *Randrianaivo et al. 527* (MO!, P!, TAN). — Ambohitantely RS, sur le tampoketsa d'Ankazobe, [18°05'S, 47°16'E], 29.X.1967, fl., *SF (Capuron) 27814* (P!, TEF!). — Tsimanahirivotra, massif de Tsimanahirivotra, au N d'Anjozorobe, [18°16'S, 47°54'E], 1.XI.1967,

fl., *SF (Capuron) 27817*, (P!, TEF!). — Ambohitantely RS, sur le Tampoketsa d'Ankazobe, [18°09'S, 47°18'E], 25.II.1968, fr., *SF (Capuron) 28270* (P!, TEF!). — Same locality, 17.I.1981, fr., *SF 34280* (TEF!).

Prov. Antsiranana, Tsaratanana Massif, 14°04'40"S, 48°53'47"E, 882 m, 30.X.2000, fl., *Antilahimena et al. 621* (MO!). — Partie occidentale du Massif du Marojejy (Nord-Est) de la vallée de l'Ambatoharanana au bassin supérieur de l'Antsahaberoka, [14°32'S, 49°36'E], 9.XI-2.XII.1959, fl., *Humbert & Saboureau 31530bis* (P!). — Same locality, 1300-1400 m, same date, fl., *Humbert & Saboureau 31742* (P!). — Manongarivo RS, Antsatrotro, [14°05'S, 48°23'E], 800 m, XI.1954, fr., *SF (Capuron) 11503* (P!, TEF!).

Prov. Fiananarantsoa, Mahabo-Mananivo, forêt de Analazaha, 23°12'38"S, 47°43'47"E, 25 m, 19.II.2003, fr., *Ludovic et al. 252* (G!, MO!, P, TAN). — Mahabo, S of Farafangana, near village of Mahabo, 23°10'51"S, 47°42'29"E, 30 m, 5.XI.2001, imm. fr., *McPherson & Rabenantoandro 18333* (BR!, K!, MO!, P, TEF, US!). — Iabomary, forêt littorale sur latérite, 40 km au SO de Farafangana, Mananivo, 23°03'34"S, 47°40'23"E, [0-50 m], 6.II.2001, fr., *Rabenantoandro et al. 426* (G!, K!, MO!, P!, TAN). — Mahabo-Mananivo, Fivondronana Farafangana, Firaisana Mahabo-Mananivo, 23°12'00"S, 47°42'26"E, 17 m, 6.XI.2001, imm. fr., *Rabenantoandro & McPherson 699* (MO!, P[2]!, TEF). — Same locality, 23°10'20"S, 47°42'23"E, 29 m, 23.IX.2002, fl., *Rabenantoandro et al. 963* (BM!, GRA!, MO!, P!, TEF, WAG!). — Same locality, 23°10'12"S, 47°41'54"E, 5.II.2001, fr., *Rabevohitra & Rabenantoandro 3788* [= *SF 35378*] (MO!, TEF!). — Farafangana, près de Farafangana, [22°49'S, 47°49'E], 15.X.1964, fl., *SF (Capuron) 23569* (P!, TEF!).

Prov. Mahajanga, Besakay, source de la rivière Besakay, canton Betrandraka, district Tsaratanana, [16°59'S, 47°31'E], 16.III.1957, fr., *SF (Laoza) 16923* (P!, TEF!).

Prov. Toamasina, Toamasina, 3-5 m, 11.X.1946, bud, *Cours (Herbier de la station agricole de l'Alaotra) 2966* (MO!, P!, TAN!). — Marankoditra [= Andranokoditra], forêts côtières de l'Est, [18°36'S, 49°15'E], fl., *Louvel 192* (P!). — Tampina, forêt de Tampina, [18°31'S, 49°17'E], XI.1923, fl., *Louvel 206* (P!). — Vohibola, *c.* 2 km W of Andranokoditra, 18°35'46"S, 49°14'06"E, 2-5 m, 9.II.2003, fr., *Lowry et al. 6040* (MO!). — Île Sainte-Marie, Lokintsy, forêt d'Ambohidena, 16°51'11"S, 49°57'10"E, 10 m, 13.V.2003, fr., *McPherson et al. 18906* (BM!, MO!, P, TEF). — Antanambao, N of Soanierana-Ivongo, near village of Antanambao-Ambodimanga, 16°45'28"S, 49°42'59"E, 10 m, 19.V.2003, fr., *McPherson et al. 18955* (MO!, P, TEF, WAG!). — Ambila Lemaitso, 18°48'S, 49°09'E, 0 m, 15.XI.1989, fl., *Miller & Keating 4540* (MO). — Same locality, 10 m, 16.I.1999, fr., *Miller & Lowry 10461* (G!, MO!, TAN). — Brickaville, [18°50'S, 49°04'E], XI.1921, fl., imm. fr., *Perrier de la Bâthie 14074* (P!). — Ambohidena, Fivondronana Sainte-Marie, Firaisana Lokintsy, Fokontany Ambohidena, 16°51'11"S, 49°57'10"E, 1.VI.2004, fl., *Rabehevitra & Poity 1111* (B!, MO!, P, TEF). — Antanambao-Ambodimanga, Fivondronana Soanierana-Ivongo, Commune Manompana, forêt sur sables d'Antanambao-Ambodimanga, 16°45'40"S, 49°42'35"E, 1.II.2003, fr., *Rabevohitra et al. 4362* (BM!, K!, MO!, P!, TEF). — Vohibola forest, Brickaville, 18°35'42"S, 49°14'02"E, 10.II.2003, fr., *Rabevohitra et al. 4390* (MO!, P, TEF!). — Ambatovy, Phelps Dodge project site, on the road towards Torotorofotsy, 18°52'S, 48°20'30"E, 1000 m, 21.I.1997, fr., *Rakotomalaza et al. 973* (MO!, P, TAN). — Analamay, Phelps Dodge project site, Analamay, 18°49'26"S, 48°20'16"E, 1000 m, 26.I.1997, fr., *Rakotomalaza et al. 994* (MO!, P!). — Ambila Lemaitso, coastal dune forest just N of railroad bridge, W of pangallane (canal), 18°51'S, 49°08'E, 0-25 m, 28.I.1993, fr., *Schatz et al. 3429* (G!, MO!, P!, TAN!). — Tampolo STF, 9 km N of Fénérive, 17°17'15"S, 49°25'11"E, 10 m, 27.XI.1994, fr., *Schatz et al. 3620* (MO!, P!). — Same locality, 2.V.1956, fl., *Service Agricole 1043* (MO[2]!, TAN[2]!). — Same locality, fl., *SF (Capuron) s.n.* (P!). — Ambila Lemaitso STF, forêt d'Ambila, Brickaville, [18°49'S, 49°08'E], 7 m, 25.I.1951, fr., *SF (Randrianjanaka) 1116* (TEF!). — Menagisy STF, [18°52'S, 49°04'E], 0-50 m, 28.II.1951, fr., *SF (Verdet) 3211* (TEF!). — Ambila Lemaitso STF, [18°49'S, 49°08'E], 25.IX.1952, fl., *SF (Capuron) 5692* (P!, TEF!). — Same locality, 29.XII.1952, fr., *SF (Rabetsitonta) 6478* (P!, TEF!). — Tampolo STF, Fénérive-Est, [17°17'S, 49°23'E], 10.IV.1954, fl., *SF 10051* (P!, TEF!). — Same locality, 24.VIII.1954, fr., *SF (Pierre) 10825* (P!, TEF!). — Same locality, 2.V.1956, fl., *SF 15895* (P!, TEF!). — Same locality, 26.IX.1956, fr., *SF (Zavah) 16100* (P!, TEF!). — Ambila Lemaitso STF, Brickaville, [18°49'S, 49°08'E], 24.II.1958, fr., *SF (André) 19003* (P!, TEF!). — Mangalimaso, forêt de Mangalimaso, à l'Ouest de Foulpointe, [17°41'S, 49°29'E], 23.XI.1962, fr., *SF (Capuron) 22090* (P!, TEF!). — Mananara Avaratra PN, Sud de Mananara, [16°26'S, 49°50'E], 10-14.XI.1964, fr., *SF (Capuron) 23760* (P!, TEF!). — Ambila Lemaitso, [18°49'S, 49°08'E], 14.XII.1967, imm. fr., *SF (Capuron) 28033* (P!, TEF!). — Île Sainte-Marie, forêt d'Ampanihy, [18°49'S, 49°08'E], 17.V.1969, fl., imm. fr., *SF (Capuron) 28850* (P[3]!, TEF!). — Andranokoditra, Akanin'ny Nofy, Ambila, Brickaville, 18°36'S, 49°15'E, 25.XI.1983, imm. fr., *SF (Rabevohitra) 32536* (TEF!).

Prov. Toliara, Mandena, 2 km E of Botanic Garden, 24°58'S, 47°00'E, 15 m, 9.X.1990, fl., *Faber-Langendoen et al. 2185* (MO!, P!, TAN!). — Analalava, a few km NW of Manantenina, forêt d'Analalava, 24°13'S, 47°21'E, 40 m, 28.X.1989, imm. fr., *McPherson 14275* (MO!, P!, TAN!, TEF). — Mandena, NE of Fort-Dauphin, 24°57'S, 47°00'E, 25 m, 7.XII.1989, fr., *McPherson & Dumetz 14658* (MO!, P!, TAN!, TEF). — Sainte-Luce, near village of Ste. Luce (Manafiafy), 24°47'S, 47°10'E,

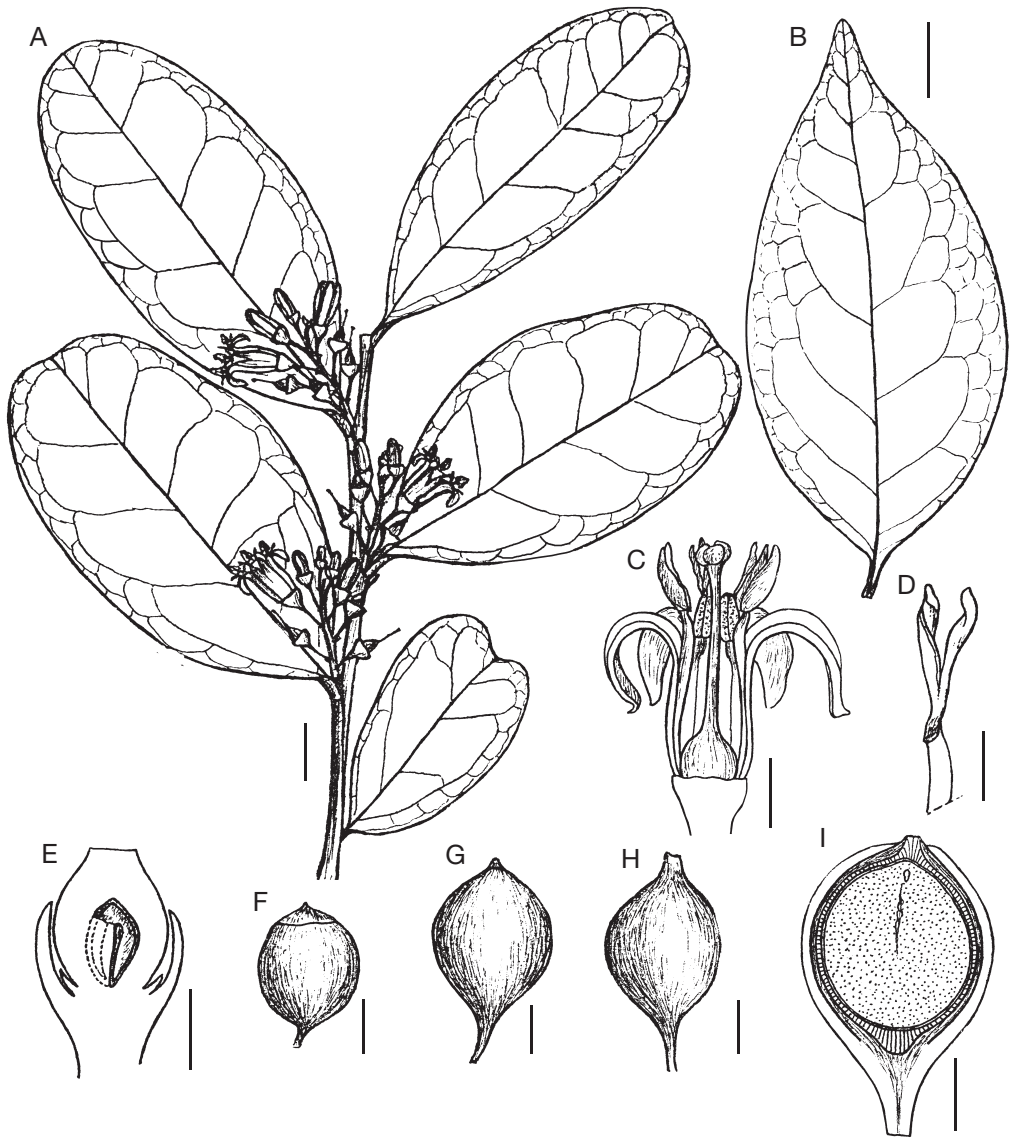

FIG. 4. — *Olax emirnensis* Baker: **A**, flowering branch; **B**, other leaf form; **C**, flower (one petal, one stamen and one staminode removed); **D**, staminode; **E**, longitudinal section of ovary, disk, and calyx; **F**-**H**, fruits with varying degrees of an accrescent calyx; **I**, longitudinal section of fruit. A, *Service Forestier 5692*; B, *Service Forestier 11503*; C, E, *Service Forestier 27814*; D, *Service Forestier 27817*; F, *Service Forestier 28270*; G, I, *Service Forestier 23760*; H, *Service Forestier 16100*. Scale bars: A, B, 1 cm; C, 2 mm; D, E, 1 mm; F-I, 5 mm.

20 m, 16.I.1990, fr., *McPherson et al. 14821* (MO!, P!, TAN!). — Mandena, forêt littorale, 24°56'27"S, 47°01'40"E, 15 m, 28.XI.2002, fr., *Randrianaivo et al. 851* (MO!, P, TAN). — Same locality, 24°57'16"S, 46°59'20"E, 10 m, 19.I.2006, ster., *Rogers et al. 905* (MO!, TAN!). — Bemangidy, entre les fleuves Vatomena et Manambato, au N de Fort-Dauphin, [24°34'S, 47°12'E], 14.XII.1968, fr., *SF (Capuron) 28661* (P!, TEF!). — Mandena STF, au N de Fort-Dauphin, [24°57'S, 47°00'E], 14.XII.1969, ster., *SF (Capuron) 29013* (P!, TEF!). — Same locality, 1.XII.1997, fr., *SF (Rabevohitra) 35032* (TEF!).

Description

Olax emirnensis has flowers with 4 (rarely 5 or 6) petals, 3 (rarely 4 or 5) stamens, 5 (rarely 4 or 6) staminodes, and a strongly accrescent calyx in fruit. The species differs from the most morphologically similar Malagasy species, *O. dissitiflora*, by its coriaceous (vs. membranous-chartaceous or semi-succulent) leaves, inconspicuous venation that is rarely represented by faint secondaries (vs. all orders of venation usually visible), by its robust (*c.* 1-2 vs. *c.* 0.5 mm in diam.) leaf petioles darker than the midribs (vs. concolorous), and by its larger (12-17 vs. 6-9 mm in diam.) fruits.

Remarks

Cavaco & Keraudren (1955b) based the name *Olax tsaratananensis* on a single collection from the Tsaratanana massif. Capuron (1968), with his extensive collections of *Olax* and prolific field experience, disagreed with the recognition of *O. tsaratananensis* as a distinct entity. While some vegetative characters vary noticeably among specimens collected from different areas of the island, the consistency observed in floral, fruit, and several other leaf characters (e.g., texture, venation, petiole morphology) allow us to circumscribe a single cohesive taxon, that includes the type of *O. tsaratananensis*.

Distribution and phenology

Olax emirnensis occurs from 0 to 1500 m elevation, along most of Madagascar's east coast (from the northern side of the Masoala peninsula south to Fort-Dauphin) in littoral forest on sand, and in subhumid forest along the central plateau on laterite and granite (from Manongarivo to Marojejy, and south to Ambohitantely and Andasibe-Moramanga; Fig. 10). *Olax emirnensis* has been recorded in flower from April through June and from September to November. The species fruits from August through June.

Vernacular names

Androvola (*Cours 2966*); Maitsoririnina (*SF 10051*, *10825*, *15895*, *16100*); Manarimbitana à grandes feuilles (*SF 32536*); Raisongo (*SF 1116*, *3211*); Soazanahary (*Rabenantoandro et al. 963*); Tsintsoraka (*SF 19003*); Vadiandro (*Rabevohitra et al. 4362*).

Use

Wood used for construction material (*SF 16100*, *16923*).

Conservation status

Olax emirnensis is common in Madagascar and has been collected in 11 protected areas (Ambila Lemaitso, Ambohitantely, Mananara Avaratra, Manankazo, Mandena, Manongarivo, Marojejy, Masoala, Menagisy, Tampolo, Tsaratanana). The estimated EOO of the species is 193 000 km^2 and the AOO is 150 000 km^2 (grid cell size 100 × 100 km). *Olax emirnensis* is assigned a conservation status of Least Concern (LC).

5. ***Olax lanceolata*** Cavaco & Keraudren (Fig. 5)

Bulletin de la Société botanique de France 110: 245 (1963). — Type: Madagascar, Prov. Toliara, Tuléar, Besifaka, [22°38'S, 43°38'E], 11.II.1955, fl., *Service Forestier 12814* (holo-, P-0048891!; iso-, P!, TEF).

Additional material examined. — **Madagascar.** Prov. Mahajanga, Bora, aux environs d'Ampombolava (Antsohihy), [15°01'S, 48°12'E], 16.III.1965, fl., *SF (Capuron) 24071* (P!, TAN!, TEF!). — Berivotra, sur le plateau de Berivotra, au Sud de Majunga, [15°54'S, 46°34'E], [100 m], 24.XI.1965, fr., *SF (Capuron) 24294* (P!, TEF!).

Prov. Toliara, Morondava, 20°17'S, 44°17'E, 1990, ster., *Rahantamalala 200* (P!). — Kiranomena, 5 km au Sud de Kiranomena, [19°36'S, 45°37'E], 11.VIII.1954, ster., *SF 51-R-243* (P!, TEF). — Analamary, Tuléar [23°00'S, 44°33'E], 6.II.1951, fl. galls, *SF (Rasolofoson) 2839* (P!, TEF!). — Bekinana, Befasy, Morondava, [20°36'S, 44°27'E], [80-100 m], 15.IX.1954, fl. galls, imm. fr., *SF (Valitera) 10869* (P[2]!, TEF!). — Ambohimahavelona, Tuléar, [23°26'S, 43°54'E], 24.I.1955, fl., *SF (Bototsalaoendry) 12677* (P!, TEF!). — Antanimieva STF, station vers Ankaro, Morombe, [22°16'S, 43°46'E], 28.III.1955, imm. fr., *SF (Verdet) 13314* (P!, TEF!). — Tsivonoakely, au Nord du Fiherenana, [23°09'S, 43°37'E], [0-50 m], 30.XII.1961, fr., *SF (Capuron) 20217* (P!, TEF!). — Tanandava, près de Tanandava, [21°43'S, 43°45'E], 26.V.1965, fl. galls, imm. fr., *SF (Capuron) 24117* (P!, TEF!).

FIG. 5. — *Olax lanceolata* Cavaco & Keraudren: **A**, flowering branch; **B**, flower (one petal, one stamen, and one staminode removed); **C**, fruit. A, *Service Forestier 13314*; B, *Service Forestier 12814* (type); C, *Service Forestier 24294*. Scale bars: A, 1 cm; B, 2 mm; C, 3 mm.

DESCRIPTION

Olax lanceolata has flowers with 3 (rarely 4) petals, 3 stamens, 6 staminodes, and a non-accrescent calyx in fruit. The species is distinguished from *O. madagascariensis*, the closest presumed relative, by its lanceolate or narrowly elliptic leaves with a length to width ratio of (3-)4-8:1 (vs. ovate or elliptic leaves with a l/w ratio of 2-3[-3.5]), leaf blades with a narrowly acute apex and cuneate base (vs. acuminate or rarely acute apex with a broadly rounded, obtuse, or rarely acute base), and by its smaller fruits (13-14 vs. 14-19 mm in diam.).

REMARKS

Since the type of *Olax lanceolata* was collected in 1955, Cavaco & Keraudren were unable to describe the species until after the publication of the *Flore.* The common occurrence of galled flowers and the rarity of fruiting collections have made this species somewhat difficult to define. It is interesting that relatively few collections have been made of a species so widely distributed in the western half of the island, with only one new collection made in the past 40 years.

DISTRIBUTION AND PHENOLOGY

Olax lanceolata occurs in dry and subarid forests located in western Madagascar from 0 to 600 m elevation (Fig. 11). The species has been recorded in flower in January through March and in the months of May and September. Fruiting takes place from November through December.

VERNACULAR NAME

Ambihotse (*SF 51-R-243*, *2839*, *10869*, *12677*, *13314*, *24117*).

USE

Wood used to make boxes (*SF 51-R-243*).

CONSERVATION STATUS

Olax lanceolata has been collected in two protected areas (Antanimieva, Bora). The EOO for the species is 121 000 km² and the AOO is 80 000 km² (grid cell size 100 × 100 km). Given these figures, *O. lanceolata* is assigned a provisional conservation status of Least Concern (LC).

6. *Olax madagascariensis* (DC.) Valeton (Fig. 6)

Critisch Overzicht der Olacineae B. et H. 120 (1886). — *Pseudaleia madagascariensis* DC., *Prodromus* 1: 533 (1824). — *Olax madagascariensis* (DC.) Cavaco, *Flore de Madagascar* 59: 4 (1955), *nomen superfl.* [isonym]. — Type: Madagascar, without precise locality, imm. fr., *Du Petit-Thouars s.n.* (holo-, P-00148708!; iso-, B-W 866!, P-00148707!).

Olax pseudaleia Willd. ex Steud., as "*pseudoleia*", *Nomenclator Botanicus* 1: 562 (1821), *nom. nud.*

Olax humbertii Cavaco & Keraudren, *Bulletin de la Société botanique de France* 102: 119 (1955). — Type: Madagascar, Prov. Toliara, massif de l'Andohahela, vallée supérieure de la Sakamalio, [24°32'S, 46°41'E], 1100 m, I.1934, fl., fr., *Humbert 13544* (holo-, P-0048888!; iso-, P!); **syn. nov.**

ADDITIONAL MATERIAL EXAMINED. — **Madagascar.** Without precise locality, fl. galls, fr., *Chapelier s.n.* (P!). Prov. Antsiranana, Nosy-Be, Réserve naturelle intégrale Lokobe, 13°25'10"S, 48°18'20"E, 40 m, 1.VIII.1994, fr., *Antilahimena 146* (MO!, P!, TAN). — Manongarivo RS, 14°04'S, 48°17'E, 200 m, 4.IX.1997, fr., *Gautier et al. 3232* (G!, MO!, P!, TAN!). — Montagne d'Ambre PN, Grande Cascade, 12°31'36"S, 49°10'20"E, 840 m, 14.IV.1993, fl., fl. galls, *Harder et al. 1567* (MO!, P!, TAN!). — Ankarana RS, near Campement des Anglais, 12°54'S, 49°08'E, 150 m, 28.I.1994, fr., *Leeuwenberg et al. 14334* (MO!, P!, WAG). — Montagne d'Ambre PN, Grande Cascade, 12°29'S, 49°10'E, 580 m, 23.II.1992, fl., *Malcomber et al. 1263* (G!, MO!, P!, TAN!). — Ankarana RS, 12°52'S, 49°14'E, 320 m, 23.XI.1989, fr., *McPherson 14532* (MO!, P!, TAN!). — Same locality, 12°51'S, 49°07'E, 150 m, 25.XI.1989, fr., *McPherson 14544* (MO!, P!, TAN!, TEF). — Antsahalalina, part of Bobankora Range, 12 km E of Daraina, 13°14'S, 49°46'E, 205-607 m, 10.II.1991, bud, *Meyers & Boltz 268* (MO!, P!, TAN!). — Ambondrobe, Fivondronana Vohémar, Firaisana Tsarabaria, Fokontany Manakana, 13°41'48"S, 50°05'18"E, 14.III.2004, imm. fr., *Rabevohitra et al. 5182* (K!, MO!, P, TEF!). — Ankarana RS, aux environs d'Ambondromifehy, [12°53'S, 49°12'E], 6.X.1954, fr., *SF (Capuron) 11262* (P!, TEF!). — Montagne d'Ambre PN, bassin de la rivière des Makis, [12°30'S, 49°05'E], 750 m, 13.X.1954, fr., *SF (Capuron) 11292* (P[2]!, TEF[2]!). — Ankarana RS, près de la grotte d'Ampandriampanihy, [12°57'S, 49°08'E], 13.XI.1958, fr., *SF (Capuron) 18966* (P[2]!, TEF!). — Same locality, 100 m, 13.XI.1958, fr., *SF (Dansey) 19441* (P!, TEF!). — Ambinanifaho, à l'Ouest d'Isahana-Ambodipont, entre Antalaha et Sambava, [14°37'S, 50°07'E], 19.IV.1966, fl., fl. galls, *SF (Capuron) 24640* (P[2]!, TAN!, TEF!). — Ambanitazana, près d'Andrapengy,

au N d'Antalaha, [14°40'S, 50°12'E], 22.X.1966, fr., *SF (Capuron) 24965* (P!, TEF!). — Sambava, au Sud de Sambava, [14°16'S, 50°10'E], 1-10.IV.1967, fl., fl. galls, *SF (Capuron) 27707* (P!, TEF!). — Diégo-Suarez, without precise locality, 17.X.1927, ster., *Ursch 200* (P!).
Prov. Mahajanga, Andohajango, Beanamafaika [= Andohajango], Befandriana-Nord, [15°54'S, 48°30'E], 1.IV.1951, fl., *SF (Rasolofo) 3344* (P[2]!, TAN!, TEF!). — Ambondro-Ampasy, ouest de la presqu'île d'Antonibe), [15°01'S, 47°16'E], [50 m], 2-5.V.1958, fl., *SF (Capuron) 18559* (P[2]!, TEF). — Ankobakobaka, Analarezy, Ankobakobaka, [15°08'S, 48°17'E], 29.VII.1970, ster., *SF (Abraham) 30041* (P!, TEF!).
Prov. Toamasina, Menaloha, forêt de la Menaloha, au bord de la route de Nickelville, [17°42'S, 48°28'E], 850 m, 23.XII.1944, fl., *Cours (Herbier de la station agricole de l'Alaotra) 1985* [= *Homolle 1985*] (MO!, P[2]!, TAN!). — Vohibola forest, Brickaville, 18°35'42"S, 49°14'02"E, 10.II.2003, fl., *Rabevohitra et al. 4414* (G!, K!, MO!, P!, TEF). — Mananara-Nord, réserve de Biosphère, forêt d'Ibanda, [16°09'S, 49°32'E], 5.II.1990, bud, *Raharimalala 251* (P!). — Same locality, 12.II.1990, fl., *Raharimalala 311* (P!). — Same locality, 18.II.1990, fl., *Raharimalala 318* (P!). — Vohimenakely, Amparafaravola, Vohimena-Ambodisakoana, à 7 km de Vohimenakely, 17°20'05"S, 48°38'21"E, 850 m, 10.I.2002, fr., *Ratovoson et al. 638* (MO!, TEF). — Forêt de Vohibola, Brickaville, 18°34'12"S, 49°14'18"E, 16 m, 3.VIII.2003, imm. fl., *Razakamalala & Rabehevitra 661* (MO[2]!, P!, TEF!). — Ambila Lemaitso, 10 km E of Brickaville, 18°51'S, 49°08'E, 0-50 m, 4.IV.1987, fl., *Schatz & Lowry 1312* (MO!, P!). — Maroantsetra, 5-12 km SW of Maroantsetra along Route Nationale 5, 15°30'S, 49°39'E, 10 m, 28.XI.1987, fr., *Schatz et al. 1797* (MO!, P!, TAN!, US!). — Tampolo STF, au Nord de Fénérive, [17°17'S, 49°23'E], XI.1953, fl., *SF (Capuron) 8638* (P[2]!, TEF!). — Same locality, 6.III.1954, fl., *SF 9601* (P[2]!, TEF!). — Same locality, 25.VIII.1955, fl. galls, *SF (Zavah) 15125* (P!, TEF!). — Same locality, 26.IX.1956, imm. fr., *SF 16099* (P!, TEF!). — Antoraka, environs de la Baie d'Antongil, à Antoraka, [15°29'S, 49°39'50"E], [0-100 m], 14.IX.1957, fr., *SF (Capuron) 18275* (P[3]!, TEF!). — Ambila Lemaitso STF, [18°49'S, 49°08'E], [30 m], 26.X.1963, imm. fr., *SF (Capuron) 22745* (P!, TEF!). — Varingotra, à l'Ouest de Maroantsetra, [15°28'S, 49°40'E], 5.XI.1963, fl., *SF (Capuron) 22873* (P!, TAN!, TEF!). — Same locality, bud, *SF (Capuron) 22875bis* (TAN!). — Andilamena, village le plus proche Ampatakana, [17°01'S, 48°35'E], 14.XI.1966, fr., *SF 26230* (P!). — Tampina, partie méridionale de la forêt de Vohibola, [18°31'S, 49°17'E], 17.XII.1967, ster., *SF (Capuron) 28060bis* (P!, TEF!). — Andranokoditra, Akanin'ny Nofy, Ambila, Brickaville, 18°36'S, 49°15'E, 15.XII.1982, fl., *SF (Rabevohitra) 32483* (TEF!). — Masoala Peninsula, Point Tompolo, [15°39'30"S, 49°57'30"E], 0 m, VII.1993, fr., *Zjhra & Hutcheon 419* (MO!, P!, TAN).
Prov. Toliara, Zombitse National Park, near Sakaraha, 1 km N of National Route #7, 22°53'11"S, 44°41'32"E, 800 m, 13.I.2006, ster., *Rogers et al. 840* (MO!, P!, TAN!). — Miandrivazo, située au sud de Miandrivazo route Belo, Ampemasana, [19°31'S, 45°28'E], 0-100 m, 24.V.1957, fr., *SF (Ralaiarison) 16987* (P!, TEF!). — Zombitse, forêt de Zombitsy, à l'E de Sakaraha, [22°49'S, 44°40'E], 700-800 m, 20.VI.1958, ster., *SF (Capuron) 18597* (P!, TEF!). — Analavelona, bassin de la Mananadabo dans le Massif de l'Analavelona, au Nord du Fiherenana, [22°30'S, 44°03'E], 1000-1300 m, 13-15.XII.1962, fl., fr., *SF (Capuron) 22175* (P[2]!, TAN!, TEF!).

Description

Olax madagascariensis has flowers with 3 (rarely 4) petals and stamens, 6 (rarely 5 or 7) staminodes, and a non-accrescent calyx in fruit. This species is distinguished from *O. capuronii* by its larger, differently shaped leaves (4.5-11.5 cm long and ovate, rarely elliptic or obovate, vs. 1-4.2 cm long, obovate, rarely elliptic or ovate), acuminate or rarely acute apex (vs. broadly rounded, obtuse, or rarely acute or emarginate), more conspicuous venation, and by the spheroid fruit (vs. obovoid).

Remarks

Pseudaleia (Du Petit-Thouars 1806), based on type material collected by Du Petit-Thouars himself, was originally published without a species epithet and was illegitimate because *Olax* L. was mentioned in synonymy. Steudel (1821) cited the name *Olax pseudoleia*, which is invalid as it lacks a description. Even if we interpret the mention of "Pet. Th. Willd. Herb." in Steudel to be an indirect reference to the validly published *Pseudaleia* Thouars, the name cannot be considered valid since the genus was not recognized as monospecific, therefore part (c) of Art. 41.3 of the *Code* (Greuter *et al.* 2000) does not apply. De Candolle (1824) later validated the generic and specific names simultaneously with the description of *Pseudaleia madagascariensis*, citing Du Petit-Thouars' work and republishing his original description, almost word-for-word.

Cavaco & Keraudren (1955a) superfluously transferred *Pseudaleia madagascariensis* into *Olax* as they were unaware of Valeton's (1886) earlier valid combination. In a separate paper, Cavaco &

Keraudren (1955c) described *O. humbertii*. Their belief that *O. humbertii* represented a species distinct from *O. madagascariensis* appeared reasonable due to the variation in populations caused by different moisture regimes, combined with a lack of adequate fruiting material.

Distribution and phenology

Olax madagascariensis occurs in humid littoral forest, subhumid inland forest, and dry subarid forest from 0 to 1100 m elevation (Fig. 9). The majority of populations grow in the northern third of the island, but a few disjunct populations are found much further south in the Toliara province at Analavelona, Andohahela, and Zombitse. *Olax madagascariensis* has been recorded on several different substrate types (e.g., sand, laterite, calcareous limestone, granite). The species flowers and fruits from August through May.

Vernacular names

Ambavy (*SF 9601*); Fanavé (*Chapelier s.n.*); Kimbimbala (*Malcomber et al. 1263*); Kirandrambaiavy (*SF 18559*); Maitsokely (*Meyers & Boltz 268*; *SF 32483*); Maitsoririnina (*Rabevohitra et al. 5182*; *SF 8638*, *15125*, *16099*); Manarimbitana (*Meyers & Boltz 268*; *SF 32483*); Manary Toloho (*SF 16987*); Remaitso (*SF 11292*); Tsihanimboana (*Rakotonandrasana et al. 679*).

Use

Wood used for construction material (*SF 16099*, *16987*, *26230*).

Conservation status

Olax madagascariensis is known from 10 protected areas (Ambila Lemaitso, Andohahela, Ankarana, Lokobe, Mananara-Nord, Manongarivo, Masoala, Montagne d'Ambre, Tampolo, Zombitse). The species has an EOO of 390 000 km² and an AOO of 160 000 km² (grid cell size 100 × 100 km). These figures indicate that the species should be considered a species of Least Concern (LC).

Typification

In the *Flore*, Cavaco & Keraudren (1955a) cited the type of *Pseudaleia madagascariensis* as "Madagascar, sans indication : *Du Petit-Thouars s.n.* (type)". Two P specimens bear typewritten "Herbier du Petit-Thouars" labels and closely match the description of *P. madagascariensis*. One of those sheets, P-00148708, with a single immature fruit loose in the fruit envelope, was first annotated as "*O. madagascariensis*" by Cavaco in 1954 and sometime later by an anonymous worker as the type of "*O. pseudaleia* Steud.". The second annotation presumably belongs to Capuron, who recognized the species under the invalid Steudel name in his report (Capuron 1968). The other P sheet, P-00148707, is sterile and was annotated by Cavaco in 1955 as "*O. madagascariensis*".

In the Willdenow herbarium, two sheets filed under *Pseudaleia* (B-W 866) and *Pseudaleioides* (B-W 865) have been mislabelled. Sheet B-W 866 taxonomically belongs to *Pseudaleia madagascariensis* DC. (= *Olax madagascariensis* (DC.) Valeton) but bears the annotation "*Ol. Pseudalejoides*", while B-W 865 corresponds to *Pseudaleioides thouarsii* DC. (= *O. thouarsii* (DC.) Valeton, species no. 8) but was incorrectly annotated as "*Ol. Pseudaleja*". Sheet P-00148708 should be regarded as the holotype of *Pseudaleia madagascariensis*. Sheets P-00148707 and B-W 866 can be considered isotypes.

7. *Olax mayottensis*

Z.S.Rogers, Malécot & Sikes, sp. nov.
(Fig. 7)

Olax mayottensis *a* O. dissitiflora *in laminis 4.2-10 × 1.5-4.5 (haud 2-5 × 1-2) cm chartaceis vel interdum (prope apices ramulorum) membranaceo-chartaceis (haud laminis totis membranaceo-chartaceis vel semisucculentis), petiolis robustis 1-2 (haud c. 0.5) mm in transversis, pedicellis c. 1 (haud 0.3-0.5) mm in transversis quam corollis valde brevioribus (haud longioribus vel raro aequantibus), et fructibus ovoideis (haud ellipsoideis vel sphaeroideis), differt.*

Typus. — **Comoros.** Mayotte, Grande Terre, Mamoudzou, Réserve forestière de Majimbini, [12°47'S, 45°13'E], 24.I.2001, fl., fr., *Barthelat, M' Changama & Sifary 267* (holo-, P!; iso-, G!, K!, MO!).

Paratypes. — **Comoros.** Mayotte, Grande Terre, Mamoudzou, Convalescence, Réserve forestière de Majimbini, [12°47'S, 45°13'E], 30.I.2003, fl., *Barthelat et al. 1140* (G, K, MO, P!). — Bois de Banjoni, 1850, fl., imm. fr., *Boivin s.n.* (P!). — Without precise locality,

FIG. 6. — *Olax madagascariensis* (DC.) Valeton: **A**, flowering branch; **B**, adaxial and abaxial views of a petal, fertile stamen, and two staminodes. Note the pubescent petal ligule in the abaxial view (upper half of petal reflexed); **C**, galled calyx; **D**, **E**, external view of fruit; **F**, longitudinal section of fruit. A, B, *Service Forestier 9601*; C, *Service Forestier 11292*; D-F, *Service Forestier 24965*. Scale bars: A, D-F, 1 cm; B, 2 mm; C, 4 mm.

9.V.1999, fl., *Mas 150* (P!). — Dapani, [13°00'S, 45°12'E], 11.I.1996, fr., *Pascal 321* (P!). — Mlima Combani, [12°48'S, 45°10'E], 300 m, 17.I.1997, fl., *Pascal 862* (B, BR, G, K, MO!, NY, P!, PRE, WAG). — Hachiroungou, [12°43'S, 45°04'E], 500 m, 4.III.1997, fr., *Pascal 905* (G!, K, MO!, P!, WAG). — Maningoni, canton de M. Daperé, district de Mayotte, 27.III.1958, fr., *SF (Ahamada) 17989* (P!, TEF!).

Description

Trees to 10 m tall. Branches glabrous; young branches 4-sided, ± winged; older branches terete or subterete, darker; bark cracked, exfoliating. Leaves alternate, distichous, ovate, 4.2-10 cm long, 1.3-4.5 cm wide, *c*. 2-3 times longer than wide; leaf blades chartaceous, some blades near tips of branches membranous-chartaceous, both surfaces glabrous, darker adaxially, base obtuse to broadly rounded (shortly decurrent with petiole), apex acuminate, tip rounded; midrib depressed adaxially, raised abaxially, glabrous; venation conspicuous on both surfaces, more visible abaxially; secondary veins 5-8 pairs; fine venation densely reticulate, sometimes adaxially inconspicuous; petioles 3-6 mm long, 1-2 mm in diam., glabrous, concolorous compared to the midrib. Inflorescences racemose; axes weakly 4-sided or subterete, *c*. 0.8 mm in diam., reaching 1.6(-2.3) cm long, proliferating with up to 12(-16) flowers; bracts early caducous, semi-membranous, *c*. 0.5 mm long, *c*. 0.7 mm wide, glabrous; floral pedicel 2.5-3 mm long, *c*. 1 mm in diam. Flowers hermaphroditic, tubular, heterostylous; calyx cupuliform, 0.5-0.7 mm long, glabrous, margin entire, smooth or slightly wavy, semi-membranous; petals 5, white, oblong, (5.1-)6-7 mm long; petal lobes ovate or subtriangular, 2.3-3.2 mm long, 0.9-1.7 mm wide; petal ligule *c*. 0.1 mm long, puberulent, with a few much longer (*c*. 0.5 mm long), irregularly spaced trichomes; trichomes filamentous and twisted; free portion of filaments 0.8-1.5 mm long; fertile stamens 3; anthers oblong, 0.8-1.5 mm long, 0.6-0.7 mm wide, longitudinally dehiscent; staminodes (4) 5 (6), each bifid portion narrowly elliptic, 1.6-2.1 mm long, 0.5-0.6 mm wide, membranous, glabrous, base thick, dark, articulate with filament; nectary disc annular, 0.2-0.3 mm tall, glabrous; ovary ovoid or spheroid, 1.2-1.5 mm long, 1.2-1.4 mm wide; style *c*. 0.3 mm in diam. at midpoint (narrower near stigma), weakly articulate above ovary in late anthesis; long style 3.5-4.3 mm long; short style 2-2.5 mm long; stigma capitate, 3-lobed, 0.3-0.4 mm in diam., papillate. Drupes ovoid, 9-13 mm long, 7-9 mm in diam.; accrescent calyx completely encapsulating fruit, crustaceous and thick, adpressed but not fused to fruit wall, forming a "loose collar" at apex of fruit, leaving a 1.5-2 mm wide aperture; stylar remnants *c*. 0.2 mm long.

Remarks

Olax mayottensis differs from *O. dissitiflora* by its larger leaves (4.2-10 × 1.5-4.5 vs. 2-5 × 1-2 cm), chartaceous blades with only those near the branch tips membranous-chartaceous (vs. all leaves membranous-chartaceous or semi-succulent), robust petioles (1-2 vs. *c*. 0.5 mm in diam.), robust pedicels (*c*. 1 vs. 0.3-0.5 mm in diam.) markedly shorter than the corolla (vs. longer or rarely of equal length to the corolla), and by the ovoid (vs. ellipsoid or spheroid) fruits.

Most of the collections of this species have been made in the last 10 years and no one has critically evaluated the Mayotte material of *Olax* until now. Some specimens of *O. mayottensis* were previously identified as *O. andronensis* using the information available in the *Flore* (Cavaco & Keraudren 1955a), while others were determined using the older synonym, *O. dissitiflora*, recognized in Capuron's (1968) work.

Distribution and phenology

Olax mayottensis is endemic to Mayotte from 300 to 500 m elevation (Fig. 9). The species flowers and fruits from January through May.

Vernacular names

M'Kidrikidri (*Pascal 321*); Sary vavalouza (*Barthelat et al. 267*; *Pascal 862*, *905*).

Use

Wood used in carpentry (*SF 17989*).

Conservation status

Olax mayottensis has been collected inside Majimbini Forestry Reserve. The EOO for the species is 200 km^2 and the AOO is 36 km^2 (grid cell size 3 × 3 km).

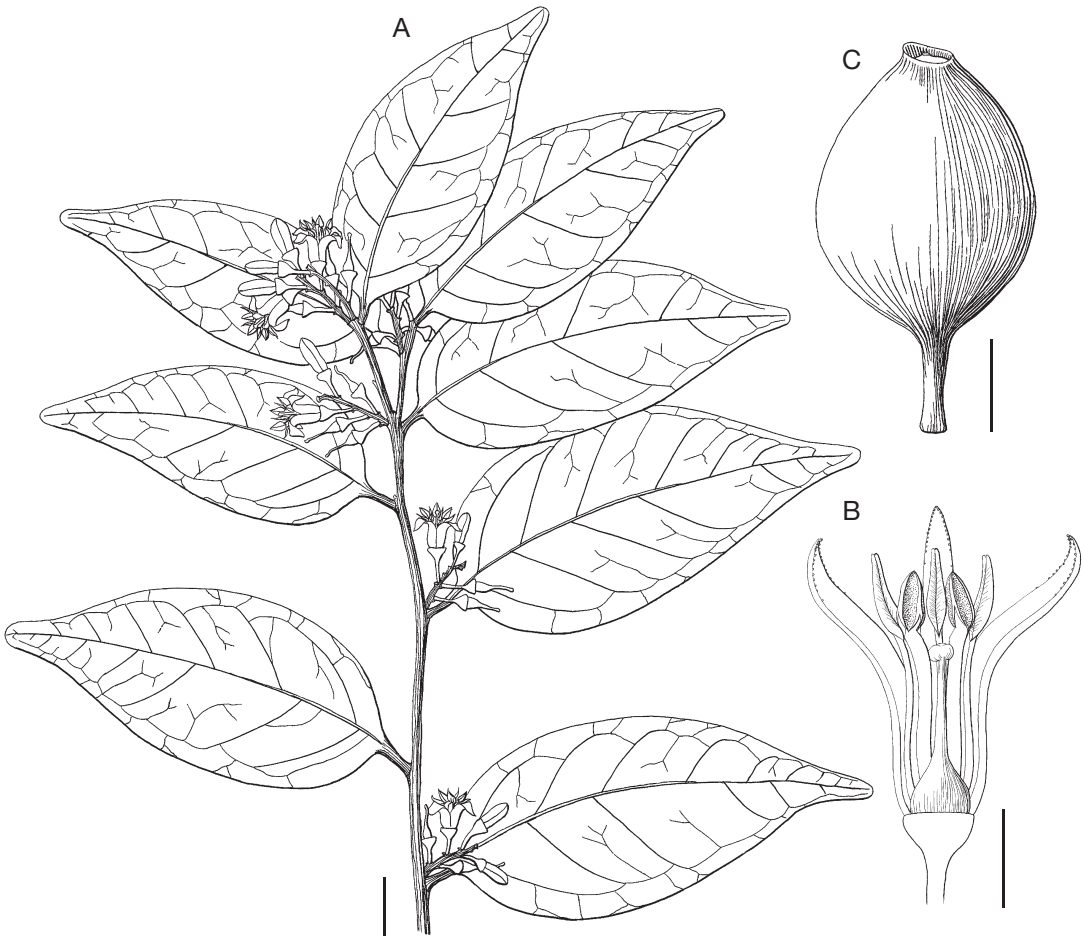

FIG. 7. — *Olax mayottensis* Z.S.Rogers, Malécot & Sikes: **A**, flowering branch; **B**, flower (two petals, one anther, and two staminodes removed); **C**, fruit. *Barthelat et al. 267* (type). Scale bars: A, 1 cm; B, 2 mm; C, 4 mm.

Olax mayottensis is assigned a provisional conservation status of Endangered (EN B1ab + B2ab).

8. *Olax thouarsii* (DC.) Valeton (Fig. 8)

Critisch Overzicht der Olacineae B. et H. 120 (1886). — *Pseudaleioides thouarsii* DC., *Prodromus* 1: 533 (1824). — Type: Madagascar, without precise locality, fl., *Du Petit-Thouars s.n.* (holo-, P-00148726!; iso-, B-W 865!).

Olax pseudaleioides Willd. ex Steud., as "*pseudoleioides*", *Nomenclator Botanicus* 1: 562 (1821), *nom. nud.*

Pseudaleia thouarsii Willd. ex Steud., *Nomenclator Botanicus*, ed. 2, 2: 208 (1841), *nom. inval. pro syn.*

Olax glabriflora Danguy, *Bulletin du Muséum d'Histoire naturelle* (Paris) 28: 248 (1922). — Type: Madagascar, Prov. Toamasina, Forêt d'Analamazaotra, [18°56'S, 48°26'E], [1000 m], 8.XII.1908, fl., *Thouvenot 32* [= *Gouvernement de Madagascar 32*] (lecto-, P-0048885!, here designated; iso-, P[2]!); **syn. nov.**

ADDITIONAL MATERIAL EXAMINED. — **Madagascar.** Prov. Antsiranana, Fivondronana Ambanja, Commune Ambodimanga Ramena, Fokontany Antsahabe, Tsaratanana RNI, 500 m N of junction of Andilambe and Ramena rivers, 13°51'41"S, 48°50'58"E, 536 m, 13.XI.2001, imm. fr., *Antilahimena & Birkinshaw 792* (G!, K!, MO!,

P, TAN, WAG!). — Marojejy RNI, Sambava, 14°26'10"S, 49°44'25"E, 1200 m, 29-31.III.1995, fr., *Rasoavimbahoaka 583* (MO, P, TAN!). — Antsirabe-Nord, environs Sud d'Antsirabe-Nord, route Vohémar-Sambava, [14°00'S, 49°58'E], 18.X.1966, fl., *SF (Capuron) 24902* (P[3]!, TEF!).
Prov. Fiananarantsoa, Ambohimanga Sud, Ankatsaoka, Analavory, [20°52'30"S, 47°35'30"E], 15.XI.1963, ster., *SF 17-R-497* (P!).
Prov. Toamasina, Ambatovy, Phelps Dodge project site, *c.* 15 air-km NE of Moramanga, *c.* 11 km E of Antanambao, 18°52'06"S, 48°18'23"E, 975 m, 15.II.1997, ster., *Andriatsiferana et al. 2138* (MO!). — Same locality, 18°49'48"S, 48°18'54"E, 1175 m, 28.II.1997, fr., *Rakotomalaza et al. 1199* (P!). — Same locality, 18°48'28"E, 48°20'03"E, 1100 m, 1.II.2006, ster., *Rogers et al. 1001* (MO!). — Andranobe, Masoala Peninsula, S of Ambanizana, 15°41'S, 49°58'E, 200-400 m, 20.II.1999, fr., *McPherson et al. 17635* (MO!, TAN). — Analamazaotra RS, Périnet-Moramanga, [18°56'S, 48°26'E], [1000 m], 22.I.1948, fl., *RN (Ratovoarison) 1319* (P!). — Same locality, 19.III.1951, fr., *SF (Zafindraboto) 3325* (P!, TEF!). — Same locality and date, fr., *SF 3735* (P!, TEF!). — Sahajinja, bassin de la Manonga (affluent rive gauche de la Rantabe), [15°38'S, 49°25'E], 850 m, 4.III.1954, fr., *SF (Capuron) 9100* (P!, TEF!). — Périnet-Analamazaotra RS, Périnet, Moramanga, [18°56'S, 48°26'E], [1000 m], 29.IV.1955, fr., *SF (Bégué) 13387* (P!, TEF!). — Mananara Avaratra PN, Sud de Mananara, [16°26'S, 49°50'30"E], 10.XI.1964, fl., *SF (Capuron) 23754* (MO!, P[3]!, TEF!). — Tampolo STF, au Nord de Fénérive, [17°17'S, 49°23'E], 9.III.1965, imm. fr., *SF (Capuron) 24046* (P!, TAN, TEF!). — Tampolo STF, Fénérive Est, 17°17'S, 49°23'E, I.1986, fl., *SF (Rabevohitra) 32775* (TEF!). — Analamazaotra, [18°56'S, 48°26'E], [1000 m], I.1919, fl., *Thouvenot 76* (K!, P[2]!) [syntype of *O. glabriflora*].

Description

Olax thouarsii has flowers with 5 or 6 (rarely 4) petals, 6 (rarely 5 or 7) stamens, 3-5 (rarely 0-2) staminodes, and an accrescent calyx (*c.* 7-11 mm in diam.) that surrounds only the base of the fruit and remains chartaceous. *Olax thouarsii* differs from *O. antsiranensis*, a species of close affinity, by its longer leaves (5-12 vs. 1.5-4 cm long), ovate or elliptic leaves and foliose bracts (vs. elliptic, ovate-elliptic or rarely obovate leaves and bracts), and by the larger (0.6-1 vs. 0-0.3 mm long), more pubescent, petal ligule. Some care should be taken when measuring leafy organs so as not to confuse true leaves with foliose bracts (see next paragraph).

Remarks

Morphology of leaf, bract, and inflorescence is strongly influenced by rainfall in the drier months (i.e. March to September). Plants in more humid areas (e.g., coastal and subcoastal populations around Tamatave and Masoala, where 100 mm of rain falls in the driest months) have large persistent leaves and normal racemose inflorescences with short internodes and small membranous bracts. However, on the central plateau (e.g., Andasibe-Périnet, Marojejy, where in the driest months less than 10 mm rain per month is received) true leaves are deciduous to prevent water loss through transpiration. Thus, flowering occurs in the absence of photosynthetically active leaves when the dry season is over (i.e. October through January), inflorescence bracts become leafy, and internodes along the axis elongate. During these times, true leaves remain absent from the infructescence as well. Most collections made from inland populations consist, in their entirety, of large, many-flowered, pseudosolitary inflorescences and no true leaves are present. These collections were previously considered to represent *Olax glabriflora* by Danguy (1922), Cavaco & Keraudren (1955a) and Capuron (1968). Foliose bracts in these specimens can reach 3.5 × 1.4 cm in size and resemble true leaves with respect to shape, venation, and often texture. Some true leaves can persist during the deciduous phase in portions of the plant where little or no flowering occurs, but these sterile branches are rarely collected for herbarium specimens.

We were first able to detect the effect of climate on morphology of the species by examining the P sheet of *SF 24902*, which possesses a large pseudosolitary inflorescence of consistently foliose bracts and a much smaller branch of true leaves intermixed with a few small pseudosolitary inflorescences. Surprisingly, Capuron failed to mention the presence of larger leaves in his discussion of the species, despite making the collection himself and using one of the branches in his illustration of *Olax glabriflora* (Capuron 1968: pl. 1, no. 1). A similar, albeit less dramatic, effect of climate on leaf and inflorescence morphology occurs on some specimens of *O. antsiranensis*, a putative Malagasy relative, and the African *O. subscorpioidea* Oliv.

FIG. 8. — *Olax thouarsii* (DC.) Valeton: **A**, flowering branch. Note the typical racemose inflorescences borne in axils of true leaves in the lower half of the branch and the pseudosolitary flowers borne in the axils of foliose bracts in the upper half of the branch; **B**, flower; **C**, adaxial and abaxial views of a petal, fertile stamen, and one staminode. Note the pubescent petal ligule in the abaxial view (upper half of petal reflexed); **D**, longitudinal section of the ovary, disk, and calyx; **E**, **F**, external view of fruit; **G**, longitudinal section of fruit. A, *Service Forestier 23754*; B-D, *Service Forestier 24902*; E-G, *Service Forestier 9100*. Scale bars: A, E-G, 1 cm; B, 3 mm; C, 2 mm; D, 1 mm.

The genus *Pseudaleioides* (Du Petit-Thouars 1806) was based on type material collected by Du Petit-Thouars, and first published validly without reference to a species name. Steudel (1821) invalidly published *Olax pseudaleioides*, as he had *O. pseudaleia* (see discussion under *O. madagascariensis*). De Candolle (1824) validated a specific epithet in the genus with the description of *Pseudaleioides thouarsii*, citing Du Petit-Thouars' original description, nearly word-for-word, and thereby indirectly referring to the same type material (application of Art. 7.7, and for a similar example see Art. 41.3, Ex. 3 in Greuter *et al.* 2000).

In the *Flore*, Cavaco & Keraudren (1955a) incorrectly attributed the authorship of the species' combinational name to Baillon, having overlooked Valeton's (1886) earlier valid combination in *Olax*. Baillon (1862) never made the combination, instead he cited *Olax pseudaleioides* as a correct name with *Pseudaleioides thouarsii* listed as a synonym.

Distribution and phenology

Olax thouarsii occurs at several mid-elevation sites along the eastern escarpment of the central plateau, with a few populations growing at lower elevation near the east coast (Fig. 11). The estimated elevational range for the species is 0 to 1200 m. *Olax thouarsii* flowers October through January and fruits from November through April.

Vernacular names

Maitsohely (*SF 9100*); Maitsoririnina (*Andriatsiferana et al. 2138*; *RN 1319*; *SF 3325*, *3735*, *13387*, *32775*); Manarombita (*SF 17-R-497*).

Conservation status

Olax thouarsii has been recorded in several of Madagascar's protected areas (Analamazaotra, Marojejy, Masoala, Tampolo, Tsaratanana, and possibly Mananara Avaratra). The EOO is 78 000 km^2, whereas the AOO is 80 000 km^2 (grid cell size 100 × 100 km). The species is assigned a provisional conservation status of Least Concern (LC).

Typification

In the *Flore*, Cavaco & Keraudren (1955a) cited the type of *Pseudaleioides thouarsii* as "Madagascar, sans indication : *du Petit-Thouars 533* (type)". However, "533" is not a collection number; it is the page number where the name appears in the protologue (De Candolle 1824). One flowering specimen at P (P-00148726) bears a typewritten "Du Petit-Thouars" label and matches the original description. Two anonymous annotations, "*O. thouarsii*" and "*O. pseudaleioides* Steud.", are inscribed on the sheet. The latter of the two was presumably written by Capuron, who chose to recognize Steudel's name as valid in his 1968 report.

Two sheets filed under *Pseudaleia* (B-W 866) and *Pseudaleioides* (B-W 865) in the Willdenow herbarium are mislabelled. Sheet B-W 865 taxonomically belongs to *Pseudaleioides thouarsii* DC. (= *Olax thouarsii* (DC.) Valeton) but was annotated as "*Ol. Pseudaleja*", while B-W 866 was incorrectly identified as *Pseudaleia madagascariensis* DC. (= *Olax madagascariensis* (DC.) Valeton, species no. 6) and annotated as "*Ol. Pseudalejoides*". Sheet P-00148726 should be regarded as the holotype of *Pseudaleioides thouarsii* and sheet B-W 865 probably represents an isotype.

Two collections (*Thouvenot 32*, *76*) were cited in the protologue of *Olax glabriflora*. Both closely match the description in the protologue (Danguy 1922). *Thouvenot 32* is in the best physical condition and three sheets of this particular syntype are deposited at P. One of these, P-00048885, bears some detailed notes on floral morphology and includes an illustration of a dissected flower, making it the most suitable choice for lectotype.

EXCLUDED NAMES

Olax bernieriana Baill.

Adansonia 3: 121 (1862) ≡ ***Diospyros bernieriana*** (Baill.) H. Perrier, as "*berneriana*" [Ebenaceae], *Mémoires de l'Institut scientifique de Madagascar*, sér. B, Biologie végétale 4: 154 (1952). — Type: Madagascar, without precise locality, *Bernier 259* (holo-, P!).

Olax boiviniana Baill.

Adansonia 3: 121 (1862), as "*Olax* ? *boiviniana*". — Type: Madagascar, without precise locality, 1846, *Bernier & Boivin s.n.*

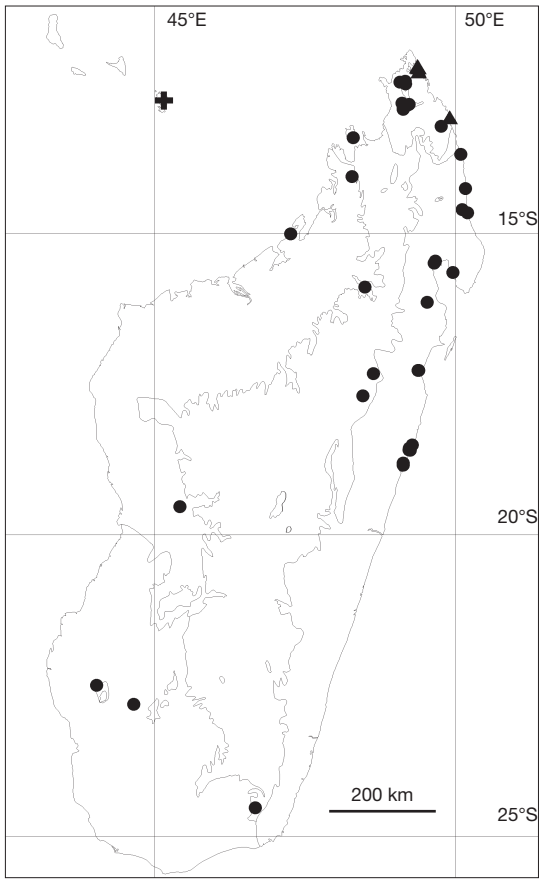

FIG. 9. — Distribution of *Olax* species: *O. capuronii* (▲); *O. madagascariensis* (●); *O. mayottensis* (✚).

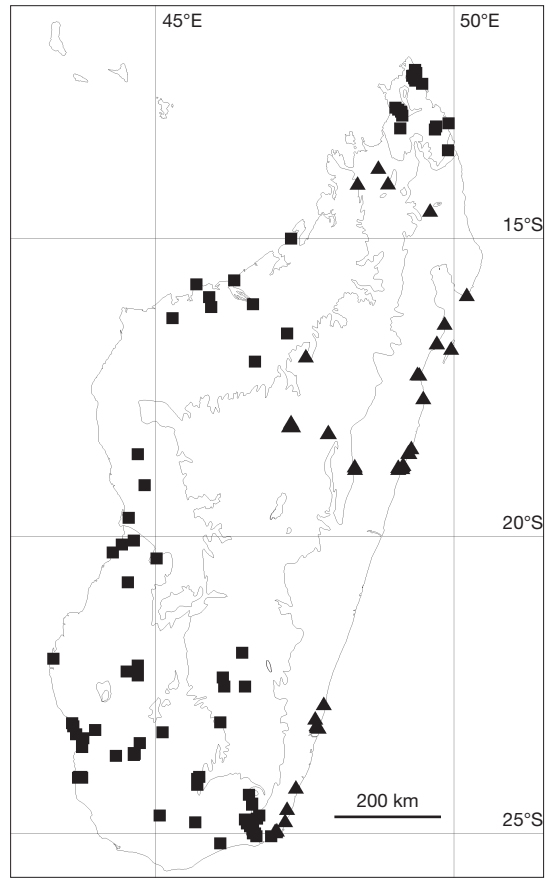

FIG. 10. — Distribution of *Olax* species: *O. dissitiflora* (■); *O. emirnensis* (▲).

REMARKS

We have been unable to find any mention of *Olax boiviniana* Baill. in the literature since the name was first published by Baillon (1862). Moreover, no potential original material for the name has been located in our searches of relevant herbaria. The specimen mentioned in the protologue was sterile judging from the description, which only included a brief account of the branches and leaves. Baillon described the branches as puberulent, which indicates that the collection probably did not belong to *Olax* because all known Malagasy species have completely glabrous vegetative organs.

Olax pervilleana Baill.

Adansonia 3: 120 (1862) ≡ ***Maba pervilleana*** (Baill.) H.Perrier [Ebenaceae], *Mémoires de l'Institut scientifique de Madagascar*, sér. B, Biologie végétale 4: 105 (1952). — Syntypes: Madagascar, Prov. Antsiranana, Nosy-Be, [13°17'S, 48°15'E], I.1841, *Bernier & Pervillé 513* (syn-, P!); same locality, *Boivin 2157* (syn-, P!).

Olax planchoniana Miers ex Palacký

Catalogus Plantarum Madagascariensium 5: 46 (1907), *nom inval. pro syn.* ≡ ***Desmostachys planchoniana*** Miers

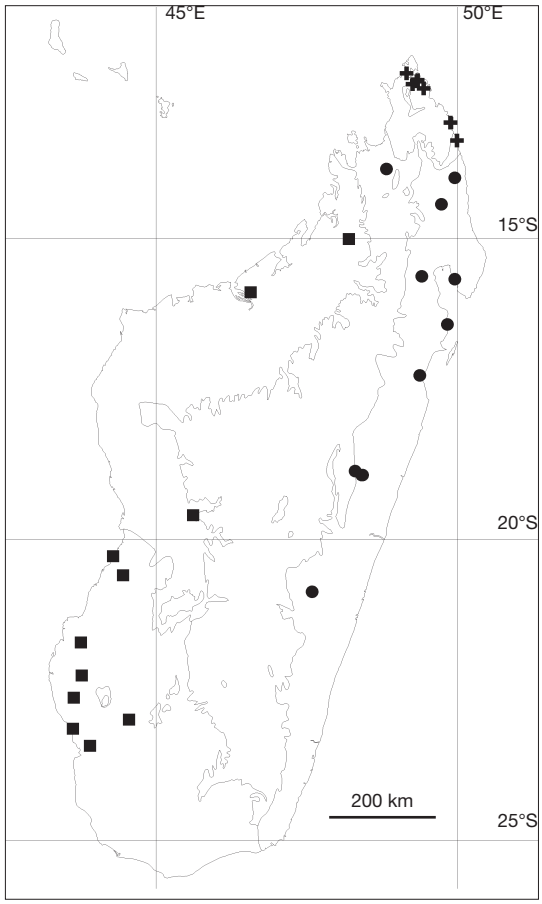

FIG. 11. — Distribution of *Olax* species: *O. antsiranensis* (✚); *O. lanceolata* (■); *O. thouarsii* (●).

[Icacinaceae], *Annals and Magazine of Natural History*, ser. 2, 9: 399 (1852). — Syntypes: Madagascar, without precise locality, *Forbes s.n.* (syn-, K); Madagascar, without precise locality, *Lyall s.n.* (syn-, K).

Olax psittacorum (Lam.) Vahl

Enumeratio Plantarum 2: 33 (1805). — *Fissilia psittacorum* Lam., *Tableau encyclopédique et méthodique* 1: 102, pl. 28 (1791). — Type: La Réunion, *Commerson s.n.* (holo-, P-LA!; iso-, MPU[3]!; P-00148744!, P-JU 11897!).

REMARKS

Cavaco & Keraudren (1955a) incorrectly reported the presence of *Olax psittacorum* (Lam.) Vahl in Madagascar based on a single Boivin collection (cited in their treatment as "Madagascar, sans indication : *Boivin 2617*, type"). Scott (1997) noted that the name was actually based on Commerson material from La Réunion deposited at P (duplicates listed above). Capuron (1968: 59) excluded *O. psittacorum* from Madagascar because of a sheet of *Boivin 2617* at P bearing the inscription, "Île Bourbon, hauts de la Rivière des Galets, Juin 1851". He provided further justification to reject the name for Madagascar because the number of anthers and staminodes cited for *O. psittacorum* in the *Flore* (6 stamens and 3 staminodes) does not correspond with those found in true *O. psittacorum* (3 stamens and 5 staminodes).

We have examined yet another P sheet (P-00148744) of *Olax* bearing the inscription *Boivin 2617* on a typewritten Madagascar label. The specimen on this particular sheet is fruiting and, without doubt, represents *O. dissitiflora*. However, this sheet cannot be the same material used by Cavaco & Keraudren to describe the species in the *Flore* because the dimensions of the leaves and fruits conflict with those mentioned in their description. Confusion surrounding the record of *O. psittacorum* from Madagascar must be due to inconsistent labelling among duplicates bearing *Boivin 2617* labels.

Olax quercina Baill.

Adansonia 3: 120 (1862), as "*Olax*? *quercina*" ≡ ***Maba quercina*** (Baill.) H.Perrier [Ebenaceae], *Mémoires de l'Institut scientifique de Madagascar*, sér. B, Biologie végétale 4: 99 (1952). — Type: Madagascar, Prov. Mahajanga, Ambogo, [16°30'S, 44°47'E], 1841, *Pervillé 683* (holo-, P!).

Olax thouarsiana Baill.

Adansonia 3: 121 (1862) ≡ ***Turraea thouarsiana*** (Baill.) Cavaco & Keraudren [Meliaceae], *Boletim da Sociedade Broteriana*, sér. 2, 29: 24 (1955). — Type: Mauritius?, *Du Petit-Thouars s.n.* (holo-, P!).

REMARKS

Olax thouarsiana Baill. was mistakenly treated by Scott (1997) as a synonym of *O. psittacorum*. Bosser

(2002) brought attention to this error and identified the original material of the name, *Du Petit-Thouars s.n.*, as *Turraea thouarsiana* (Baill.) Cavaco & Keraudren. The Du Petit-Thouars sheet lacks a place of collection, but Baillon (1862) thought that the locality was probably somewhere in the Mascareignes because he mentioned "Mauritius?" in the protologue. Palacký (1907), followed by Sleumer (1935) and Cavaco & Keraudren (1955b), incorrectly attributed the original collection of this taxon to Madagascar. Bosser's study confirmed the provenance of the collection as Mauritius and revealed that the species was previously known under the now superfluous name, *T. casimiriana* Harms.

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