

A synoptic revision of the Malagasy species of *Scolopia* Schreb. (Salicaceae, Scolopieae)

Wendy L. APPLEQUIST

Missouri Botanical Garden, P. O. Box 299, St. Louis, MO 63166-0299 (USA)
wendy.applequist@mobot.org

George E. SCHATZ

Missouri Botanical Garden, P. O. Box 299, St. Louis, MO 63166-0299 (USA)
george.schatz@mobot.org

Published on 24 June 2016

Applequist W. L. & Schatz G. E. 2016. — A synoptic revision of the Malagasy species of *Scolopia* Schreb. (Salicaceae, Scolopieae). *Adansonia*, sér. 3, 38 (1): 99-115. <http://dx.doi.org/10.5252/a2016n1a6>

KEY WORDS

Flacourtiaceae,
Salicaceae,
Scolopia,
Madagascar,
new species.

ABSTRACT

A synoptic revision of the Malagasy species of *Scolopia* is presented. Fourteen species are recognized, of which all are endemic and ten are threatened. One species, *S. delphinensis* Appleq. & G.E.Schatz, sp. nov., is newly described and illustrated. An identification key to the Malagasy species of *Scolopia* is provided.

RÉSUMÉ

Révision synoptique des espèces malgaches du genre Scolopia Schreb. (Salicaceae, Scolopieae).

Une révision synoptique des espèces malgaches du genre *Scolopia* est présentée. Quatorze espèces sont reconnues, dont toutes sont endémiques et dix sont menacées. Une espèce, *S. delphinensis* Appleq. & G.E.Schatz, sp. nov., est nouvellement décrite et illustrée. Une clé de détermination des espèces malgaches de *Scolopia* est proposée.

MOTS CLÉS

Flacourtiaceae,
Salicaceae,
Scolopia,
Madagascar,
espèce nouvelle.

INTRODUCTION

Scolopia Schreb., which was traditionally placed within Flacourtiaceae, has recently been transferred to an expanded Salicaceae (Chase *et al.* 2002). The genus includes about 40 species of woody plants that are characterized by racemose or 1-3-flowered inflorescences, hermaphroditic flowers with petals present (and sepals and petals usually at least 4), numerous stamens, and superior ovaries with two or more placentas. A row of small glands is often present on an extrastaminal disk. The genus ranges from Africa, Madagascar and the Comoros and Mascarenes to southern and southeastern Asia and the Pacific, with one species in Australia (Sleumer 1972a).

The species of interest to the present synoptic revision are those native to Madagascar, all of which are endemic. The first publication related to the genus in Madagascar was by Sleumer (1938), who published a single species, *S. madagascariensis* Sleumer. Perrier de la Bâthie (1940, 1946) published a revision and *Flore de Madagascar* treatment recognizing nine Malagasy species, all newly described (*S. madagascariensis* was overlooked). A revision of the entire genus was published by Sleumer (1972a) in which 13 Malagasy species were recognized, six of them newly described; one of Perrier de la Bâthie's species was placed into synonymy and two others transferred to *Ludia*, where they were considered conspecific (Sleumer 1972b). An updated treatment of the Malagasy species was necessary because with many more specimens now available from Madagascar, it had become clear that some of Sleumer's species delimitations were not satisfactory. Also, better data regarding plant distributions can now be provided for conservation purposes.

MATERIAL AND METHODS

Herbarium specimens at Paris (P) and St. Louis (MO) were examined, as were then-undistributed duplicates for exchange available at those herbaria and images available through JSTOR of types held by other institutions. Definition of species utilized a taxonomic species concept (e.g., Grant 1981), the most widely used and usually most practical approach in plant taxonomy; three fixed differences are required to recognize taxonomic entities at the species level, with conspicuous ecological preferences potentially being considered as supporting characters. Preliminary evaluation of conservation status according to the IUCN Red List Categories and Criteria (IUCN 2012) was performed for each species recognized. The Extent of Occurrence was calculated as the area of a minimum convex polygon encompassing all known sites of extant occurrence. Within the Extent of Occurrence, a minimum Area of Occupancy based solely on the localities where herbarium specimens have been collected, and where the habitat appears to remain suitable, was calculated as the summed area of occupied grid squares using the recom-

mended 2 × 2 km grid cell. Because such a calculation of Area of Occupancy possibly underestimates the true Area of Occupancy, in some cases where extensive suitable habitat remains, an estimated potential maximum Area of Occupancy reflects the area of suitable habitat within the Extent of Occurrence that might be occupied by the taxon. As a location is considered to be an area that could be affected by a single threatening event, whether including one or multiple subpopulations, locations were defined in consideration of the most serious threats potentially affecting the taxon.

TAXONOMIC TREATMENT

Genus *Scolopia* Schreb.

Genera Plantarum 1: 335 (1789). — Type: *S. pusilla* (Gaertn.) Willd.

REMARKS

Scolopia strongly resembles *Ludia* Comm. ex Juss., which is confined to Madagascar, East Africa, and several groups of Indian Ocean islands, except that *Ludia* lacks petals. Sleumer (1972a) noted that species of *Scolopia* with caducous petals had been erroneously placed within *Ludia* in prior literature, while a few apetalous species known from inadequate material had been erroneously placed within *Scolopia*. He found that characters of the anther connective, style and venation did not correspond to generic boundaries, so the presence of petals is the only reliable distinction between the two genera. It seems possible that *Ludia* evolved within *Scolopia*, but in the absence of molecular evidence supporting that hypothesis, we maintain the traditional generic circumscriptions.

Fourteen species of *Scolopia* are herein recognized in Madagascar, one of them newly described and all endemic. These can be divided into two groups: the first consists of five species native to relatively dry habitats, which have single-flowered inflorescences and usually bear spines, while the second comprises nine species found usually in humid and littoral forests, which have more than one flower per inflorescence and lack spines. Flowering specimens are more easily identified than fruiting specimens, as known fruits of all species are similar in appearance (red, subglobose, the individual species' size ranges fairly large and overlapping too much to make size a useful character), while useful characters such as stamen number, flowering pedicel length, and anther morphology are obscured in fruit. (As far as can be determined, all Malagasy species have anthers with long extended connectives; this is not the case for all species of the genus, and the character helps to distinguish certain Malagasy species from similar species of the Mascarenes.) However, most herbarium specimens collected are fruiting, so the key presented here emphasizes vegetative features and those characters visible in fruit as much as possible.

KEY TO THE MALAGASY SPECIES OF *SCOLOPIA* SCHREB.

1. Shrub or small tree, usually spiny; inflorescences 1-flowered; W, S, or extreme N or SE Madagascar, in dry to transitional forests or bush 2
- Tree or seldom a large shrub, never spiny; inflorescences few- to several-flowered; E to extreme N or SE Madagascar, usually in humid or littoral forests 6
2. Ovary pubescent; glandular disk virtually absent; extreme SE and SW 8. *S. meridionalis* Capuron & Sleumer
- Ovary glabrous; glandular disk present, with small inconspicuous glands 3
3. Spines few or absent; leaves (2-)3-6(-8) cm, elliptical to subovate, the apex short-acuminate to subacute; NW Madagascar 5. *S. inappendiculata* H.Perrier
- Spines usually present; leaves 1-2.5 cm, obovate to oblanceolate-oblong or suborbicular, the apex obtuse and often crenate; S or extreme N Madagascar 4
4. Leaves sometimes suborbicular; secondary veins 2-4 pairs, more conspicuous than tertiary veins, usually slightly curving and forming relatively broad angle with midrib; abaxial surface of sepals glabrous; S Madagascar 12. *S. spinescens* Sleumer
- Leaves always much longer than broad; secondary veins several pairs, very fine, straight and forming a narrow angle with midrib; abaxial surface of sepals minutely pubescent; extreme N Madagascar 5
5. Leaves narrowly oblong-obovate to oblong-oblanceolate, (3-)4-6(-8) mm wide; stamens 40-60 11. *S. septentrionalis* Capuron & Sleumer
- Leaves obovate, 7-12 mm wide; stamens 80-120 1. *S. calcicola* Capuron & Sleumer
6. Adaxial surface of sepals and petals appressed-puberulent; perianth strongly accrescent in fruit; N Madagascar 7. *S. manongarivae* H.Perrier
- Adaxial surface of sepals and petals glabrous; perianth slightly or not accrescent 7
7. Leaves variable in shape and size, at maturity usually >6.5 cm long except in *S. delphinensis*, sp. nov. (where smaller leaves are common); pedicels >(3-)4.5 mm long in flower, >4.5 mm long in fruit; stamens 80-100 or more 8
- Leaves relatively small, at maturity <6.5 (in *S. montana* to 7.5) cm long; pedicels <3 mm long in flower, <4.5 mm (very rarely to 8 mm) long in fruit; stamens 20-50(-60) 11
8. Leaves narrowly elliptical to narrowly oblong-elliptical or oblanceolate (rarely elliptical), (2.5-)3.5-7.3(-9.3) × 1.3-2.9(-4.7) cm, with petiole 3-6(-8) mm long; apex acute to rounded (rarely obtuse or cuspidate); endemic to extreme SE near Fort-Dauphin 2. *S. delphinensis* Appleq. & G.E.Schatz, sp. nov.
- Leaves elliptical to oblong-elliptical, sometimes somewhat obovate, or broadly elliptical, usually with most leaves >7.3 cm long or >2.9 cm wide, if smaller then with petiole at least 6 (rarely 5) mm long; apex variable, sometimes acuminate; widely distributed 9
9. Leaves elliptical to broadly elliptical, (5.2-)7.5-12.4(-14) × (3.2-)3.8-7.7(-9.6) cm, usually less than twice as long as broad; apex cuspidate (rarely rounded or emarginate); base convex, usually broadly so, to rounded; littoral forests 6. *S. madagascariensis* Sleumer
- Leaves elliptical to oblong-elliptical or narrowly elliptical (to somewhat obovate), normally <11.5 cm long and more than twice as long as broad; apex variable, often mostly acuminate or mostly rounded; base convex, usually acutely (infrequently cuneate to attenuate) 10
10. Leaves usually drying brown (rarely green, mostly from near-coastal habitats); apex acuminate to long-cuspidate (rarely to obtuse or rounded); usually low- to mid-elevation humid forests, rarely coastal 4. *S. hazomby* H.Perrier
- Leaves normally drying pale, greenish to olive or gray-green; apex rounded to obtuse (infrequently cuspidate, emarginate); littoral and sublittoral forests 10. *S. orientalis* Sleumer
11. Leaves ovate to elliptical (lanceolate) with a usually long-caudate apex and rounded base 14. *S. thouvenotii* H.Perrier
- Leaves variable in shape, but not primarily ovate nor with a caudate apex 12
12. Leaves broadly elliptical (to elliptical or slightly ovate or obovate), usually less than twice as long as broad; apex rounded (obtuse, emarginate); base convex and obtuse (to round) 13. *S. taimbarina* H.Perrier
- Leaves obovate (to oblanceolate) or narrowly oblong to oblanceolate-oblong, usually at least twice as long as broad; apex mostly short-cuspidate or mostly rounded; base cuneate (to attenuate) 13
13. Leaves obovate (to oblanceolate), (1.7-)2.5-5.3(-6) × (0.9-)1.2-2.3(-3.2) cm, with apex usually rounded (to somewhat obtuse or emarginate); littoral and sublittoral forests 3. *S. erythrocarpa* H.Perrier
- Leaves narrowly oblong to oblanceolate-oblong, 3.5-7.5 × 1.4-3 cm, with apex short-cuspidate to rounded (seldom obtuse); low- to moderately high-elevation humid forests 9. *S. montana* Sleumer

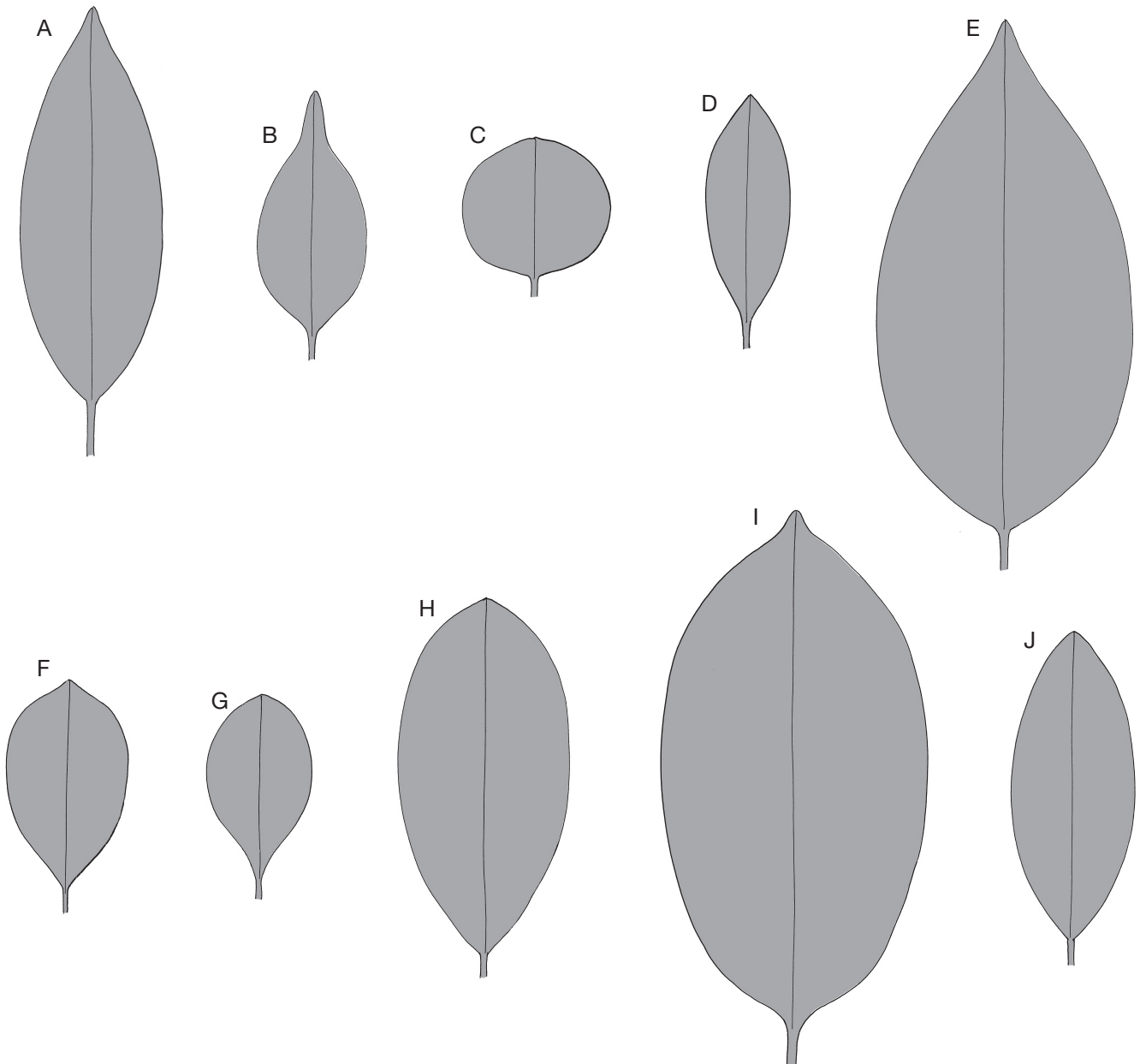


FIG. 1. — Representative leaf shapes from humid and littoral forest species of *Scolopia* Schreb.: **A**, *S. hazomby* (Razakamalala et al. 3507); **B**, *S. thouvenotii* (Schatz 2741); **C**, *S. taimbarina* (Antilahimena et al. 4309); **D**, *S. montana* (Randrianaivo et al. 608); **E**, *S. manongarivae* (Miller & Randrianasolo 4475); **F**, *S. manongarivae* of high elevation (Birkinshaw 885); **G**, *S. erythrocarpa* (Rabevohitra et al. 4800); **H**, *S. orientalis* (Ludovic 746); **I**, *S. madagascariensis* (Razakamalala et al. 160); **J**, *S. delphinensis*, sp. nov. (Ramison 475).

Leaf shape is a valuable character for identification of species. In the humid and littoral forest species, leaf shape can be quite variable within species and the ranges of variation in related species overlap, but significant average differences exist. As these differences can be difficult to describe verbally, a figure showing “typical” leaf shapes in these species (Fig. 1) has been provided to facilitate use of the key. The color of the leaves upon drying is not entirely consistent within species, but shows strong trends that are correlated with ecological preferences. Collections from low- to high-elevation humid

forests and dry bush almost always dry brown to dark brown, very rarely greenish brown, while most taxa of littoral and sublittoral forests almost always dry a pale color, usually greenish to gray-green or olive on at least one surface, or rarely dark-mottled. Since this pattern is observed from numerous localities and collections made over several decades, it is unlikely to be merely an artifact of varying specimen processing techniques; rather, it seems likely to reflect substantive differences in leaf anatomy or biochemistry correlated with adaptation to different habitats.

1. *Scolopia calcicola* Capuron & Sleumer

Blumea 20: 47 (1972). — Type: Madagascar. Prov. Antsiranana, Montagne des Français, vallon de l'Andavakoera (Diégo-Suarez), 20.XII.1963, fl., *Service Forestier* 23006 (holo-, P[P00077407]!; iso-, P×4[P00077408, P00077409]!; BR[BR00000624443]; K×2[K000231291, K000231292], L×3[L0011228, L0011229, L0539776], TEF[TEF000248], photos seen).

DISTRIBUTION AND HABITAT. — *Scolopia calcicola* is known only from a single collection, from Montagne des Français in the extreme north (Fig. 2).

REMARKS

Notes from the type indicate that *Scolopia calcicola* is a spiny large shrub or small tree ("arbuste") with platanoid bark. It is distinguished from other species in the xerophytic group by its small obovate leaves and glabrous ovary.

CONSERVATION STATUS

The preliminary assessment of the conservation status of *Scolopia calcicola* is Critically Endangered (CR B2ab(iii)). The single known location has not been protected, though efforts are currently underway to provide it some degree of protected status, and the area has suffered obvious anthropogenic degradation. Since the area of Montagne des Français is relatively often visited by botanical collectors, the lack of additional specimens is evidence that the population is likely to be small.

2. *Scolopia delphinensis* Appleg. & G.E.Schatz, sp. nov. (Fig. 3)

Tree without spines; leaves drying pale green, narrowly elliptical, up to 8.6 × 2.9 cm, with apex acute to somewhat cuspidate or rounded, base convex to cuneate, petiole 4-6(-8) mm; inflorescences 3-7-flowered; pedicels post-flowering 6-7 mm; sepals and petals glabrous except for minutely ciliolate margins; stamens very numerous, with connective 2 to 3 times longer than thecae.

TYPOS. — Madagascar. Prov. Toliara, about 10 km NNE of Fort-Dauphin (Tôlagnaro), Mandena region, 24°57'S, 47°02'E, 10 m, 14.VI.1991, post-fl., *Zarucchi et al.* 7618 (holo-, MO[MO4026737]!; iso-, P!, TAN n.v.).

PARATYPES. — Madagascar. Prov. Toliara, Préfecture de Tôlagnaro (Fort-Dauphin), Mandena, parcelles campement, 24°57'S, 47°00'E, 0-10 m, 17.IV.1989, *Dumetz et al.* 685 (MO, P, TAN n.v.). — Fokontany Sainte Luce, Fort-Dauphin, 24°46'05"S, 47°10'20"E, 17.XII.2000, fr., *Faliniaina et al.* 30 (MO, TEF n.v.). — Préfecture de Tôlagnaro (Fort-Dauphin), Canton Manambaro, Petriky Forest, due N of NE corner of Lake Andranany, NW of large dune at end of road, c. 11 km WSW of Tôlagnaro, 25°03'S, 46°53'E, 0-10 m, 12.IV.1989, *Gereau et al.* 3352 (MO, P). — Préfecture de Tôlagnaro (Fort-Dauphin), canton de Manambaro, Petriky Forest, c. 1.5 km W of large dune near N shore of Lake Andranany, c. 12 km WSW of Tôlagnaro, 25°03'S, 46°53'E, 0-10 m, 14.IV.1989, fr., *Gereau et al.* 3375 (MO, P, TAN n.v.). — St. Luce, proposed QIT Madagascar Minerals ilmenite mining conservation area, 24°46'42"S, 47°10'15"E, 0 m, 13.X.2000, fr., *Hoffmann et al.* 203 (MO). — N of Fort Dauphin, Ste. Luce region (Manafafy), 24°47'S, 47°10'E, 25 m, 19.X.1989, fr., *McPherson et al.* 14157 (MO, P, TAN n.v.). — Fort



FIG. 2. — Distributions of *Scolopia calcicola* Capuron & Sleumer (★), *S. meridionalis* Capuron & Sleumer (▲), *S. montana* Sleumer (■), and *S. thouvenotii* H.Perrier (●).

Dauphin (Tôlagnaro) region, near area called Mandena, beyond QIT camp, 24°57'S, 47°00'E, 20 m, 4.XI.1989, fr., *McPherson* 14372 (MO, P, TAN n.v.). — Forêt classée, M 15, Ampasy, Tôlagnaro, 24°57'12"S, 47°00'09"E, 0-10 m, 30.IX.2000, fr., *Rabenantoandro et al.* 291 (MO, P, TAN n.v.). — Mandena, Ampasy, Tôlagnaro, 24°57'06"S, 47°00'06"E, 0-10 m, 18.XII.2000, fr., *Rabenantoandro et al.* 396 (MO, P, TAN n.v.). — Fivondronana Fort-Dauphin, firaisana Mahatalaky, fokontany Sainte Luce, forêt de Sainte Luce, parcelle S9 de la zone de conservation QMM. 24°46'15"S, 47°10'15"E, 4 m, 5.XI.2003, fr., *Rabenantoandro et al.* 1584 (MO, P, TAN n.v.). — Anosy region, Tôlagnaro, Manambaro, Ambovo, forêt de Petriky, zone de conservation, 25°04'S, 46°51'E, 5 m, 20.III.2007, fr., *Rabenantoandro et al.* 1795 (G, MO, P, TEF n.v.). — Same loc., 5.IV.2007, fr., *Rabenantoandro et al.* 1799 (MO, P, TEF n.v.). — Préfecture de Tôlagnaro (Fort-Dauphin), forêt au NW de Ste. Luce, 24°46'S, 47°09'E, 10 m, 15-16.I.1990, fr., *Rabevohitra* 2147 (MO, P, TAN n.v.). — Anosy, Tôlagnaro, Manambaro, Petriky, 25°03'43"S, 46°52'06"E, 8 m, 16.XI.2006, fr., *Ramison* 73 (MO, P, TEF n.v.). — Anosy, Tôlagnaro, Ampasy Nahampoana, Mandena, forêt Mandena, M 16, 24°57'S, 47°00'E, 6.VII.2007, fr., *Ramison & Armand* 320 (G, K, MO, P, TEF n.v., USMS). — Anosy, Tôlagnaro, Manambaro, Ambovo, forêt de Petriky, 25°04'S, 46°51'E, 30.XI.2007, fr., *Ramison et al.* 475 (G, K, MO, P, TEF



FIG. 3. — *Scolopia delphinensis* Appleq. & G.E.Schatz, sp. nov.: **A**, flowering branch; **B**, flower, post-anthesis; **C**, stamen; **D**, abaxial leaf surface with major veins shown on right side, smaller veins on left; **E**, perianth in top view. **A-E**, Zarucchi et al. 7618 (holotype, MO). Scale bars: A, D, 2 cm; B, 2 mm; C, E, 1 mm.

n.v., USMS). — Préfecture de Fort-Dauphin, forêt de Petriky, 25°04'S, 46°51'E, 0-10 m, 3.IX.2001, fr., *Randriatafika* 289 (MO, P, TAN, TEF n.v.). — Anosy, Tôlagnaro, Manambaro, Petriky, 25°03'S, 46°53'E, 13.XI.2006, fr., *Randriatafika* 742 (MO, P,

TEF n.v.) — Fivondronana Fort-Dauphin, firaisana Manambaro, fokontany Petriky, 25°03'19"S, 46°51'55"E, 18.II.2004, fr., *Randriatafika* & *Ramisy* 407 (MO, TAN n.v.). — Forêt de Petriky, Ambovo, Manambaro, Fort-Dauphin, 25°03'39"S,

46°52'09"E, 10 m, 17.VI.1999, post-fl., *Randriatafika et al.* 74 (MO, P, TAN n.v.). — Fivondronana Fort-Dauphin, firaisana Manambaro, forêt de Petriky entre le village d'Ambovo et de Loharano, 25°03'57"S, 46°51'18"E, 10 m, 11.II.2004, fr., *Randriatafika et al.* 386 (MO, TAN n.v.). — Village latovy, canton Fort-Dauphin, district Fort-Dauphin, 7.XII.1954, *Réserves Naturelles 46-R-87* (P). — Mandena, Fort-Dauphin, 7.III.1957, fl., *Service Forestier 2850* (P). — Fort-Dauphin, 17.IV.1951, fr., *Service Forestier 3360* (P).

DISTRIBUTION AND HABITAT. — *Scolopia delphinensis*, sp. nov. is confined to the region around Fort-Dauphin in the extreme southeast; it occurs in littoral forest and humid coastal forest (Fig. 4).

DESCRIPTION

Tree to 12 m, dbh 22 cm, or less often a shrub; bark smooth; young twigs pale gray, glabrous. Leaves narrowly elliptical (to somewhat oblong, oblanceolate, or, in exceptional leaves, elliptical), (2.5-)4-7.5(-9.3) × (1-)1.4-2.9(-4.7) cm, persistent, drying pale green to olive (or pale greenish brown) on abaxial surface, green to gray-green or dull, usually greenish or grayish brown on adaxial surface; petiole 3-6(-8) mm, glabrous; apex acute to rounded (obtuse, cuspidate), base convex to cuneate, margins entire, both surfaces glabrous, venation pinnate with major secondary veins brochidodromous, the first pair arising above the base conspicuous, otherwise weak and poorly differentiated from intersecondary veins. Inflorescences single, (1-)3-8-flowered, 1.5-3(-3.5) cm long, not elongating in fruit, glabrous or minutely papillate; pedicels (5-)6-8.5(-10) mm, not elongating in fruit, glabrous (minutely papillate). Flowers 4-5-merous; sepals lanceolate to narrowly deltoid or deltoid, 1.2-1.8 mm, glabrous, margins ciliolate; petals ovate to deltoid or oblong, often slightly longer and broader than sepals, 1.5-1.8 mm, glabrous, margins ciliolate; receptacle pubescent; stamens probably >100, filaments *c.* 2.5 mm, anthers 0.6-0.8 mm with thecae only *c.* 0.2 mm, connective exceeding them 2-3 times; ovary glabrous; style 3.5-5 mm; stigma shallowly lobed. Fruit globose to subglobose, often with persistent style, 9-12(-15) mm diameter, red (orange) at maturity; perianth in fruit mostly caducous and remains not accrescent; seeds 1-4, tan with a pale annulus at base, broadly ellipsoid to ovoid with apex obtuse and base truncate, 3.5-5.2 mm.

REMARKS

Two collections of *Scolopia delphinensis*, sp. nov. were mentioned by Sleumer (1972a) under *S. orientalis*, though they were kept separate from Toamasina specimens and noted to differ in having smaller leaves. The leaves of *S. delphinensis*, sp. nov. are usually smaller and proportionately narrower than those of *S. orientalis* as herein circumscribed, and have shorter petioles when they overlap in size; the inflorescences are also smaller. Another littoral species, *S. erythrocarpa*, has relatively small leaves and occurs sympatrically with *S. delphinensis*, sp. nov. at two localities; *S. erythrocarpa* has obovate to oblanceolate leaves with usually rounded apices, much shorter pedicels (to 3 mm in fruit), and fewer than 40 stamens.



FIG. 4. — Distribution of *Scolopia delphinensis*, sp. nov. (▲); *S. orientalis* Sleumer (●); and *S. taimbarina* H.Perrier (■).

ETHNOBOTANY

The wood of *Scolopia delphinensis*, sp. nov. is used to make boards (*Réserves Naturelles 46-R-87*).

VERNACULAR NAMES

Lampivahatra (*Service Forestier 2850, 3360*); Lapivahatra (*Réserves Naturelles 46-R-87* [Antanosy dialect]); Mena-hihy (*Ramison et al.* 475); Zora (*Rabenantoandro et al.* 396, 1584; *Ramison & Armand 320*; *Randriatafika & Ramisy 407*).

CONSERVATION STATUS

The preliminary assessment of the conservation status of *Scolopia delphinensis*, sp. nov. is Endangered (EN B1ab(ii,iii,iv,v)+2ab(ii,iii,iv,v)). With an Extent of Occurrence of 174 km², and an Area of Occupancy of *c.* 36 km², the species currently exists at four locations. While some of the habitat is protected, the remainder is subject to ongoing degradation and clearing for mining; recent collections show that the species is still easily found in those areas.

3. *Scolopia erythrocarpa* H.Perrier

Mémoires du Muséum national d'Histoire naturelle, n.s., 13: 277-278 (1940). — Type: **Madagascar**. Prov. Toamasina, forêts côtières de l'Est, fl., *Louvel 213* (lecto-, designated by Sleumer [*Blumea* 20: 54 (1972)], P[P00077413]); fragment, L, photo seen).

Scolopia louvelii H.Perrier, *Mémoires du Muséum national d'Histoire naturelle*, n.s., 13: 279 (1940), as "*Louveli*". — Type: **Madagascar**. Prov. Toamasina, forêts côtières de l'E, fl., *Louvel 204* (holo-, P[P00077410]); fragment, L, photo seen).

Richeopsis perrierii Arènes, *Notulae Systematicae* 15: 3-4 (1954). — Type: **Madagascar**. Prov. Toamasina, environs de Maroantsetra, forêt littorale près de la mer, X.1912, fl., *Perrier de la Bâthie 2023* (holo-, P[P00077411]); iso-, P[P00077412]).

ADDITIONAL MATERIAL EXAMINED. — **Madagascar**. Prov. Antsiranana, forêt Ambodipont, Vinanivao, Antalaha, Parc Masoala, 15°44'45"S, 50°19'25"E, 0-10 m, 3.X.1996, fl., fr., *Bernard 375* (MO, P, USMS). —

Prov. Fianarantsoa. Fiv. Nosy Varika, fir. Ambahy, Ambahy, 20°46'20"S, 48°28'39"E, 13 m, 7.XII.2002, fr., *Koopman et al.* 126 (MO, P). — Sous-préfecture Nosy Varika, commune rurale Ambahy, 2.5 km au NE du village d'Ambahy, 20°44'22"S, 48°29'15"E, 14 m, 12.XI.2003, fl., *Ludovic 459* (MO, P). — Préfecture Farafangana, commune rurale Mahabo-Mananivo, fokontany Nosiala, zone forestière d'Ampandramadinika, 23°12'38"S, 47°42'44"E, 18 m, 11.IV.2004, fr., *Ludovic 710* (MO). — Préfecture Farafangana, commune rurale Mahabo-Mananivo, 23°11'06"S, 47°41'31"E, 21 m, 8.XII.2003, fr., *Ludovic & Bona Kondro 501* (MO). — Préf. Brickaville, com. Amboniaonana, fok. Andravokoditra, forêt de Vohibola, piste Ambodinanto, partie S de Vohibola, 18°34'54"-18°34'20"S, 49°14'42"-49°14'54"E, 53 m, 7.I.2003, fr., *Ludovic & Rakotoarivony 214* (MO). — Fivondronana Farafangana, firaisampokontany Mahabo Mananivo, fokontany Nosy Ala, forêt d'Analazaha, 23°10'13"S, 47°43'27"E, 22 m, 26.VIII.2003, *Rabehevitra et al.* 552 (MO, P). — Fivondronana Nosy Varika, firaisana Ambahy, fokontany Ambahy, forêt d'Andohan'I Martin, 20°48'07", 48°28'56"E, 9 m, 15.II.2004, fr., *Rabehevitra et al.* 891 (MO). — Environs 50 km de Farafangana, sur la route de Vangaindrano, 23°10'15"S, 47°42'29"E, 7.II.2001, fr., *Rabevohitra & Rabenantoandro 3829* (MO). — 13 km au N de Manakara, 22°01'41"S, 48°04'10"E, 8.II.2011, fr., *Rabevohitra & Rabenantoandro 3848* (MO). — Fivondronana Farafangana, commune rurale Mahabo-Mananivo, fokontany Mahabo, forêt de Mahabo, 23°10'36"S, 47°42'26"E, 16 m, 24.IX.2002, fl., *Rabevohitra et al.* 4089 (MO). — Fivondronana Nosy Varika, firaisana et fokontany Ambahy, forêt à l'E du village d'Ambahy, 20°46'47"S, 48°29'05"E, 23.III.2003, fr., *Rabevohitra et al.* 4709 (MO, P). — Fivondronana Mahanoro, commune rurale Ambodibonara, fokontany Ambalavontaka, forêt de Nakinà [Nankinana] à 5 km d'Ambalavontaka, 20°21'34"S, 48°36'21"E, 13.XI.2003, fl., *Rabevohitra et al.* 4764 (MO). — Fivondronana Nosy Varika, commune rurale Ambahy, fokontany Ambahy, forêt d'Ambahy à 500 m à l'E du fokontany, 20°46'57"S, 48°28'54"E, 17.XI.2003, fr., *Rabevohitra et al.* 4800 (MO, P). — Farafangana, Mahabo, 23°10'39"S, 47°42'24"E, 14 m, 11.XI.2002, fr., *Razakamalala & Ludovic 314* (MO). — Région Atsimo-Atsinana, district Farafangana, commune Ankarana, Antakohandra, Réserve Spéciale de Manombo, parcelle II, forêt d'Analazaha, 23°02'21"S, 47°46'11"E, 18 m, 23.IX.2005, *Razakamalala et al.* 2242 (MO). — Pangalane [Ampangalana] Sud, 12.XII.1953, fr., *Service Forestier 9899* (P). — Ambalavontaka, Mananjary, 7.I.1955, fr. *Service Forestier 15456* (P). — Tsiazondrano, Nosy-Varika, 26.X.1955, fr., *Service Forestier 15488* (P). — Nosiala, canton Efatsy, dist. Farafangana, 19.XI.1955, fr., *Service Forestier 16204* (P). — Près de Farafangana, 15.X.1964, fr., *Service Forestier 23572* (P).

Prov. Toamasina. N of Soanierana-Ivongo, near village of Antanambao-Ambodimanga, 16°45'39"S, 49°42'29"E, 10 m, 19.V.2003,

fr., *McPherson et al.* 18492 (MO). — Environs de Maroantsetra, X.1912, fl., *Perrier de la Bâthie 2023* (P×2). — Fivondronana Soanierana Ivongo, firaisana Manompana, fokontany Antanambao-Ambodimanga, forêt d'Andakibe, 16°47'01"S, 49°44'23"E, 3 m, 4.X.2003, fl., *Rabehevitra et al.* 625 (MO, P). — Fivondronana Brickaville, firaisana Ambinaninony, fokontany Andrononkoditra, forêt de Vohibola du côté de l'hôtel Pangalane, 18°35'32"S, 49°14'02"E, 5 m, 11.II.2003, fr., *Rabenantoandro et al.* 1247 (MO, P). — District Brickaville, Ambila-Lemaitso forestry station, W of intersection going to Andevoranto and Ambila-Lemaitso village, c. 200 m on trail going W, 18°53'47"S, 49°07'45"E, 0-5 m, 13.X.1999, fl., *Randrianasolo et al.* 610 (G, MO, P, USMS). — Analanjirofo region, commune Manompana, fokontany Antanambao-Ambodimanga, Pointe à Larrée, Ampanasanarato, 16°48'07"S, 49°44'32"E, 6-16 m, 22-29.IX.2010, fl., *Razanatsoa et al.* 517 (MO). — Ambila-Lemaitso, 14.X.1952, fl., *Service Forestier 5865* (P). — Jardin botanique no. 21, village le plus proche Tampolo, canton Ampasina, dist. Fénérive, 3 m, 20.XI.1957, fr., *Service Forestier 17806* (P). — Tampolo, au N de Fénérive, 28-29.VIII.1957, fl., *Service Forestier 18156* (P×2). — Environs de la Baie d'Antongil, Antoraka, 14.IX.1957, fl., *Service Forestier 18267* (P×2). — Aux environs du Varingotra à l'W de Maroantsetra, 5.XI.1963, fl., *Service Forestier 22877* (P×2). — Ambila-Lemaitso, 14.XII.1967, fr., *Service Forestier 28021* (P). — Île Sainte-Marie, partie N de la forêt de Kalalao, à l'E de Maromandia-Tafondro, 16.V.1969, *Service Forestier 28824bis* (P).

Prov. Toliara. district de Fort-Dauphin, forêt de Mandena, 24°57'S, 47°00'E, 0-10 m, 25.X.1989, fl., *Dumetz et al.* 780 (MO, P). — N of Ft. Dauphin, S of Ste. Luce in Marokoky region, block S-1 of QIT-FER, 24°54'S, 47°06'E, 15 m, 23.X.1990, *Faber-Langendoen et al.* 2439 (MO, P). Anosy region, Fort-Dauphin, Mahatalaky, Sainte Luce, Analavinaky Avaratra, 24°46'19"S, 47°08'55"E, 17 m, 20.X.2012, fl., *Ramananjanaahary et al.* 829 (MO). — Région Anosy, district de Fort-Dauphin, commune Iaboakoho, FKT Ambankhazo, 24°40'00"S, 47°12'25"E, 16 m, 22.XI.2011, fr., *Randrianaivo et al.* 1920 (G, MO). — Anosy region, Fort Dauphin, Mahatalaky, Tsiaoro Ampasy, Antongotranambo S6, Antongotranambo, 24°48'54"S, 47°08'32"E, 30 m, 22.X.2012, fl., *Ratovoson 1992* (MO). — Sainte Luce, QMM Forestry Station, parcel 59, 1-2 km from QMM Forestry trailhead, 24°46'05"S, 47°10'16"E, 11 m, 23.I.2006, *Rogers et al.* 956 (G, MO).

Unknown locality. Forêts côtières de l'E, fl., *Louvel 204* (P).

DISTRIBUTION AND HABITAT. — *Scolopia erythrocarpa* is confined to littoral and sublittoral forests, on sand; it is widely distributed on Madagascar's east coast where littoral forests survive (Fig. 5). Prior literature on this species (Perrier de la Bâthie 1940, 1946; Sleumer 1972a) wrongly states that it occurs at up to 800 or 900 m and that the types of both *S. erythrocarpa* and *S. louvelii* came from Analamazaotra. This arises from confusion involving *Perrier 5976*, originally a syntype of *S. erythrocarpa* that was collected at Analamazaotra; this collection is identifiable as *S. taimbarina*. *Scolopia erythrocarpa* is always found close to sea level.

REMARKS

Scolopia erythrocarpa is probably closely related to *S. orientalis* and *S. delphinensis*, sp. nov., likewise species of littoral forests. It is a tree growing to at least 15 m tall, with dbh to 80 cm; the bark is smooth and whitish, the flowers white to greenish, and the fruits red at maturity. It is distinguished by usually small, obovate to oblanceolate leaves with rounded apices and small dense inflorescences with very short pedicels even in fruit. The leaves do not dry greenish as consistently as those of the three other coastal species, and the stamens are 40 or fewer, rather than usually 100 or more as is typical of those species.

ETHNOBOTANY

The wood of *Scolopia erythrocarpa* is used for construction (Ludovic 710; Ludovic & Bona Kondro 501; Service Forestier 16204, 17806).

VERNACULAR NAMES

Aferonakavy (*Service Forestier* 17806 [Betsimisaraka dialect]); Aferonkavy à p[etites] f[euilles] (*Service Forestier* 18156); Fotsirony (*Service Forestier* 16204 [Taisaka dialect]); Fotsivony (Ludovic 710); Hazofotsy (Rabevohitra et al. 4089, 4800; Ratovoson 1992); Hazomainty (Randrianaivo et al. 1920); Hazomboatronaka (*Service Forestier* 15456); Menahy (*Service Forestier* 5865); Menavahatra (Rabevohitra et al. 4764); Voatronakala (Louvel 204; Louvel 213; Rabevohitra et al. 4709; *Service Forestier* 15488); Votronakala (Koopman et al. 126); Zora (Rabevohitra & Rabenantoandro 3829).

CONSERVATION STATUS

Scolopia erythrocarpa is known from 20 locations and has an Extent of Occurrence of 46 498 km². However, it is restricted to littoral forest, a highly threatened ecosystem of which only fragments remain, with an estimated minimum Area of Occupancy of 120 km². The degree of fragmentation suggests that *S. erythrocarpa* be assigned a preliminary assessment of Vulnerable (VU B2ab(iii)). The species occurs in the Protected Areas of Mahabo, Mandena, Masoala, and Sainte Luce.

4. *Scolopia hazomby* H.Perrier

Mémoires du Muséum national d'Histoire naturelle, n.s., 13: 280 (1940). — Type: **Madagascar**. Prov. Toamasina, Analamazaotra, X.1925[?], fl., Louvel 51 (holo-, P[P00077416]!).

ADDITIONAL MATERIAL EXAMINED. — **Madagascar**. Prov. Antananarivo, Réserve spéciale Ambohitantely, 18°10'42"S, 47°17'00"E, 1530 m, 23-24.XI.1993, fr., Schatz et al. 3555 (MO, P).

Prov. Antsiranana. Diego, Sava, Vohemar, Andrafainkona, forêt de Sorata, 13°44'28"S, 49°23'14"E, 1402 m, 28.X.2007, fr., Razakamalala et al. 3507 (MO). — Massif de la Montagne d'Ambre, crête entre les bassins de la rivière des Makis et de la rivière d'Ankazobe, 600-800 m, 26-27.V.1970, fl., *Service Forestier* 29188 (P×2).

Prov. Fianarantsoa. 7 km SW of Ranomafana, in proposed Ranomafana National Park, 21°16'S, 47°25'E, 1000-1100 m, 5.II.1990, *Kremen et al.* 62 (MO). — 7 km W of Ranomafana, just S of Namorona River, Duke University Primate Center study site, 21°16'S, 47°25'E, 1000 m, 27.X.1987, fr., Overdorff 34 (MO, P). — Fiv. and Fir. Ivohibe, Réserve Spéciale d'Ivohibe, 8 km E d'Ivohibe, piste entre campements II et III, sur la crête, 22°29'00"S, 46°58'06"E, 1210 m, 21.X.1997, fl., Rakotomalaza et al. 1441 (MO, P). — Ampamaherana (vallée), Fianarantsoa, 15.VI.1949, fr., *Service Forestier* 2043 (P). — Same loc., 29.II.1949, fl., *Service Forestier* 2065 (P). — Ampamaherana (versant), Fianarantsoa, 8.VIII.1949, fr., *Service Forestier* 2067 (P). — Same loc., same date, *Service Forestier* 2067bis (MO). — Andrambovato, Tolongoina B-15, 16.II.1954, fl., *Service Forestier* 9551 (P). — Ambodinifaka, Fort-Carnot, 22.VII.1953, *Service Forestier* 9678 (P). — Andraovato, district F-C, 28.IV.1954, fr., *Service Forestier* 10097 (P). — Andrambovato, F-C, 27.IV.1954, fr., *Service Forestier* 14453 (P). — Androrangavola, Ifanadiana, 24.VII.1954, fr., *Service Forestier* 14549 (P). — Andrambovato, Tolongoina, F-C, 14.III.1955, fr., *Service Forestier* 14677 (P). — Sahamaina, Ampasinambo, Nosy-Varika, 22.VII.1954, fr., *Service Forestier* 14737 (P). — Maindoha, forêt Ampasinambo-ouest, au S village Ampasimadinika, canton



Fig. 5. — Distribution of *Scolopia erythrocarpa* H.Perrier (●), *S. hazomby* H.Perrier (▲), and *S. septentrionalis* Capuron & Sleumer (■).

Ampasinambo, district Nosy-Varika, 750 m, 23.VII.1954, fr., *Service Forestier* 14740 (P×2). — Andrambovato, Fort-Carnot, 3.VIII.1955, fr., *Service Forestier* 15394 (P).

Prov. Toamasina. Fiv. Ambatofinandrahana, fir. Itremo, sommet à l'E d'Antsirakambiaty, à l'W d'Ambatoandranono, 17°33'33"S, 48°53'38"E, 697 m, 15.VII.2004, fr., Andriamihajarivo et al. 311 (MO). — Réserve Naturelle Intégrale de Betampona, piste Sahabefoza, 17°55'S, 49°13'E, 300-400 m, 1.XII.1994, fr., Andrianarisata et al. 257 (MO, P). — Fiv. Maroantsetra, comm. Anjahana, fok. Andranofotsy, Farankaraina forest, 15°26'30"S, 49°51'00"E, 20.VI.2003, fr., Antilahimena 1960 (MO). — Fiv. Maroantsetra, comm. Antsirabe Sahatany, fok. Anjahely, 1 km N Anjahely on way to Ambinanitelo, 15°24'01"S, 49°30'46"E, 392 m, 29.VI.2004, fr., Antilahimena 2605 (MO, P); — Alaotra-Mangoro region, fivondronana Moramanga, commune Andasibe, fokontany Menalamba, Ambatovy forest, 18°48'29"S, 48°15'50"E, 1060 m, 16.XII.2004, fr., Antilahimena et al. 3008 (MO, P). — Same loc., 18°50'15"S, 48°18'44"E, 1300 m, 20.XII.2004, fr., Antilahimena et al. 3063 (MO, P). — Same loc., Berano village, 18°50'36"S, 48°19'55"E, 979 m, 16.I.2005, fl., Antilahimena & Félix 3179 (MO, P). — Alaotra-Mangoro, Moramanga, Ambohibary, Ampitambe, Antaniditra, Ambatovy forest, 18°49'14"S, 48°17'27"E, 1025 m, 9.X.2008, fr., Antilahimena et al. 6637 (MO). — Alaotra-Mangoro, Moramanga, Ambohibary, Ambatovy forest, clearing zone 6, 18°51'59"S, 48°18'19"E, 1048 m, 17.XII.2008, fr., Antilahimena et al. 6968 (G, MO). — Alaotra-Mangoro, Moramanga, Andasibe,

Menalamba, Morarano PK 18, 18°50'25"S, 48°22'12"E, 1022 m, 25.VII.2009, fr., *Antilohimena et al.* 7149 (G, MO). — Ambatoharanana près d'Antsevebe, 1000 m, 5.III.1951, fl., *Cours 4049* (MO, P). — Near Andasibe, forest of Mantadia, beyond graphite mine, 18°55'S, 48°25'E, 900 m, 5.XI.1994, fr., *McPherson & van der Werff 16503* (MO). — Same loc., 6.XI.1994, fr., *McPherson & van der Werff 16518* (MO). — Same loc., 950-1150 m, 7.XI.1994, fr., *McPherson & van der Werff 16536* (MO). — Parc National de Zahamena, Antanandava, Ankosy, piste vers Bemoara, 17°28'58"S, 48°44'10"E, 997 m, 14.VII.2000, fr., *Rakotonandrasana et al.* 418 (MO, P). — Parc national de Zahamena, Antanandava, Ankosy, piste vers Antenina, 17°28'45"S, 48°44'09"E, 900 m, 17.VII.2000, fr., *Rakotonandrasana et al.* 427 (MO, P). — Parc National de Zahamena, Manakambahiny-Est, Andranomalaza, 3 km NE d'Antoby, 17°38'25"S, 48°38'34"E, 989 m, 28.III.2000, post-fl., *Randrianasolo et al.* 163 (MO, P). — Forestry station of Analamazaotra, sides of road between Andasibe and intersection from RN2, c. 500 m NW of forestry office, 18°56'S, 48°26'E, 900 m, 18.VII.1996, *Randrianasolo 445* (MO, P). — Ambodimangavalo, Mahaso, Ambatoharanana, Mongo, 17°33'57"S, 48°53'45"E, 740-1200 m, 25.X.2000, fr., *Ratovoson et al.* 318 (MO, P). — Ambatondrazaka, Antanandava, Ankosy, 2 km SW (PN Zahamena), 17°29'07"S, 48°44'02"E, 1107 m, 26.I.2001, fr., *Ratovoson et al.* 377 (MO, P). — RN I [Betampona], canton Ambodiriana, district Tamatave, sommet, 16.XI.1953, fr., *Réserves Naturelles 5890* (P). — R.N. I, canton Ambodiriana, district Tamatave, 24.VI.1954, fl., *Réserves Naturelles 6269* (P). — Perinet, 17.VII.1952, fr., *Service Forestier 139-B-R-172* (P). — Réserve Naturelle no I (Betampona) (Dct de Tamatave), vers 400 m d'alt, 6.XI.1953, fl., *Service Forestier 8594* (P). — Km 7 Antaniditra, Perinet, Moramanga, 5.VI.1954, fr., *Service Forestier 10375* (P×2). — Perinet, 11.VIII.1954, fr., *Service Forestier 12182* (P). — Antsampsandrano, canton Perinet, dist. Moramanga, forêt primaire sur le flanc, 5.XI.1962, *Service Forestier 21292* (P). — Village proche Ambalaharongana, canton Ampasina, district Fénérive, sommet, 600 m, 21.VI.1964, fl., *Service Forestier 21782* (P). — Environs de Sandrangato, au S de Moramanga, 13.XII.1964, fl., *Service Forestier 24001* (P). — Perinet, village Analamazaotra, canton Perinet, district Moramanga, II.1966, *Service Forestier 25727* (P×2). — Same loc., II.1966, *Service Forestier 25728* (P×2). — Same loc., II.1966, *Service Forestier 25729* (P×2). — Same loc., II.1966, *Service Forestier 25777* (P×2). — Same loc., 25.V.1966, *Service Forestier 25934* (P×2). — Au N de la Pisciculture, Perinet, canton Perinet, district Moramanga, III.1966, *Service Forestier 25769* (P×2). — Belahindolo, village plus proche Toby-Andasimanara, canton Moramanga, district Moramanga, 900 m, 6.II.1968, fr., *Service Forestier 26659* (P). — Vangaranana, canton Marovoay, district Moramanga, II. 1970, fr., *Service Forestier 26952* (P). **Prov. Toliara.** Manantenina, Fort-Dauphin, 5.IV.1954, fr., *Service Forestier 9667* (P). **Unknown province.** S.I., 8.XII.1908, fl., *Envoi du Gouvernement de Madagascar 30* (P×2). — Forêts montagneuses de l'est, s.d., fl., *Louvel 112* (P).

SPECIMENS AFF. *S. HAZOMBY*. — **Madagascar.** Prov. Antsiranana, DIANA, Nosy Be, Lokobe AP, 13°24'53"S, 48°19'00"E, 100 m, 30.XII.1995, fr., *Antilohimena & Devigny 268* (MO). — Antsahabe, Vohemar, 13.V.1955, post-fl., *Service Forestier 14057* (MO, P). **Prov. Fianarantsoa.** Fiv. Farafangana, Réserve spéciale de Manombo, parcelle #1, 23°01'42"S, 47°43'27"E, 30 m, 21.VIII.1995, fr., *Rakotomalaza et al.* 432 (MO, P). — Ambohiniaonana, Mananjary, 3.VI.1954, fr., *Service Forestier 14477* (P). — J. B. no 16 Manombo, village Manombo, canton Ihorombe, district Farafangana, station forêt côtière orientale, 28.VI.1956, imm. fr., *Service Forestier 16274* (P). **Prov. Toliara.** Anosy region, Tôlagnaro, Sarisambo, Amboavola, forêt d'Ambatotsirongorongo, 25°05'S, 46°47'E, s.d., fr., *Ramison et al.* 345 (MO). — Anosy, Tôlagnaro, Sarisambo, Ambohivola, forêt d'Ambatotsirongorongo, 25°05'00"S, 46°46'41"E, 151 m, 22.II.2009, fl., fr., *Razakamalala et al.* 4291 (G, MO).

DISTRIBUTION AND HABITAT. — *Scolopia hazomby* is widely distributed in low to middle elevation humid forests of eastern Madagascar (Fig. 5); it is reported on brown soil and quartzite. A few atypical specimens, discussed below, occur in littoral or sublittoral forests.

REMARKS

Scolopia hazomby is a large tree (to 20 m, 60 cm dbh) with relatively smooth, whitish or grayish bark; its leaves are usually oblong-elliptical to elliptical and usually have acuminate (to cuspidate, or rarely obtuse to rounded) apices. The leaves, which are variously stated to be persistent or caducous, generally dry brownish with the surfaces differently colored; the adaxial surface is sometimes olive and the abaxial surface sometimes reddish. The leaves never dry strongly red, which is one means of distinguishing this species from the similar-looking *Ludia scolopioides* Capuron & Sleumer; another is that its fruits never exceed 1.5 cm in diameter, whereas those of *L. scolopioides* may be over 2 cm and conspicuously bumpy. The long-pedicelled flowers are greenish white and the fruits red; the inflorescences are often relatively large. Most specimens have been labelled as *S. madagascariensis*, which represents a misapplication of that name following Sleumer's (1972a) excessively broad and heterogeneous circumscription (see discussion below); true *S. madagascariensis* is broader-leaved, with leaves usually cuspidate and drying greenish, and is consistently littoral.

Several specimens mentioned above as having affinities to *Scolopia hazomby* may represent variants of that species, hybrids, or a cryptic taxon; the available material does not suffice to clarify their status. They have leaves drying greenish, which is atypical of this species, and were collected in coastal or near-coastal forests, whereas *S. hazomby* is usually found at higher elevations farther inland. The leaves of these specimens are shaped like those of typical *S. hazomby*, usually with weak veins; flowers are only present on one specimen but are not obviously distinctive. This coastal form is easily mistaken for *S. orientalis*, a perhaps closely related species, except that the leaves are usually acuminate. One specimen (*Service Forestier 14057*), from the north, has a somewhat unusual leaf shape and very large styles; this may represent a distinct species or subspecies, but the specimen is in poor condition and would not serve as an adequate type. Further investigation of these populations would be highly desirable.

ETHNOBOTANY

The wood of *Scolopia hazomby* is used for the manufacture of boards and railroad ties (*Ratovoson et al.* 318; *Service Forestier 14740, 21782, 26659*) and for heating and charcoal (*Service Forestier 14740*). Leaves are used to treat stomachache (*Cours 4049*). The fruit is eaten by lemurs (*Overdorff 34*).

VERNACULAR NAMES

Ankamorika (*Ratovoson et al.* 318); Faritraty (*Overdorff 34*); Fasitraly (*Kremen et al.* 62); Hazomalany (*Antilohimena et al.* 3008); Hazomamiala (*Service Forestier 21782*); Hazomby (*Louvel 51*); Longotra mena (*Envoi du Gouvernement de Madagascar 30*); Menavahatra (*Antilohimena et al.* 3063; *Service Forestier 2043, 9551, 10097, 10375, 14453, 14677, 15394, 21292, 25729, 25769, 25934, 26659* [general dia-

lect], 26952); Menavahatra à F. M. (*Service Forestier* 139-B-R-172); Menavahitra (*Service Forestier* 25727, 25728, 25777); Nenavahatra (*Service Forestier* 2065); Pitsikahidambo (*Service Forestier* 14740); Pitsikahitra (*Service Forestier* 14740); Pitsikahitra à g[randes] f[euilles] (*Service Forestier* 14737, 14740); Ravinavetro (*Antilahimena* 1960); Ravinaviotra (*Service Forestier* 2067, 2067bis, 12182); Ravinavoatra (*Service Forestier* 9678); Sandramimena (*Service Forestier* 14549); Sary (*Réserves Naturelles* 5890, 6269); Tamenaka (*Service Forestier* 9667); Tavolosary (*Réserves Naturelles* 6269); Zora (*Ramison* 345).

CONSERVATION STATUS

The preliminary assessment of the conservation status of *Scolopia hazomby* is Least Concern (LC). The species is widespread, with an Extent of Occurrence of 165 186 km², and recent collections have been made in several areas. It is known from the Protected Areas of Ambohitantely, Andasibe-Mantadia, Betampona, Ivohibe, Montagne d'Ambre, Périnet-Analamazaotra, Ranomafana, and Zahamena; specimens of doubtful identity are also known from Manombo.

5. *Scolopia inappendiculata* H.Perrier

Mémoires du Muséum national d'Histoire naturelle, n.s., 13: 278 (1940). — Type: **Madagascar**. Prov. Mahajanga, bois sablonneux aux environs de Majunga, XI.1903, fl., *Perrier de la Bâthie* 1612bis (holo-, P[P00077430]!; fragment, L, photo seen).

ADDITIONAL MATERIAL EXAMINED. — **Madagascar**. Prov. Mahajanga, Antsely, district de Mitsinjo, 29.XI.1951, fr., *Service Forestier* 5403 (P). — Restes de forêts dans les vallons du plateau de Berivotra, au SE de Majunga, vers 150 m d'alt., 23.IX.1957, fr., *Service Forestier* 18456 (P). — Ambongo, lisière S de la forêt de Tsiombikibo (Mitsinjo), 18.XI.1965, fl., *Service Forestier* 24203 (P). — Vallon, sur le plateau de Berivotra, au S de Majunga, 24.XI.1965, post-fl., *Service Forestier* 24285 (P).

DISTRIBUTION AND HABITAT. — *Scolopia inappendiculata* occurs in dry forest in northwestern Madagascar (Fig. 6), on sand.

REMARKS

Scolopia inappendiculata is a small tree or large shrub with platanoid bark. It is the only species found around Mahajanga, and is distinguished from species of the xerophytic group known from the extreme north by its larger, often short-acuminate leaves and few or absent spines.

CONSERVATION STATUS

The preliminary assessment of the conservation status of *Scolopia inappendiculata* is Endangered (EN B1ab(iii)+B2ab(iii)). It is known from at most four locations in the region of Mahajanga, with an Extent of Occurrence of 1161 km² and a minimum Area of Occupancy of 16 km²; the maximum potential Area of Occupancy is certainly less than 500 km² given that much of the area within the EOO polygon consists of the delta of the Betsiboka River. The species has not been recollected for almost fifty years, despite the accessible terrain, and the limited remaining natural vegetation in the area is subject to continuing habitat degradation.



Fig. 6. — Distributions of *S. inappendiculata* H.Perrier (★), *S. madagascariensis* Sleumer (●), *S. manongarivae* H.Perrier (■), and *S. spinescens* Sleumer (▲).

6. *Scolopia madagascariensis* Sleumer

Repertorium Specierum Novarum Regni Vegetabilis 45: 14 (1938). — Type: **Madagascar**, s.l., fr., *Gerrard* 34 (holo-, K[K000231288], photo seen; fragment, L, photo seen).

ADDITIONAL MATERIAL EXAMINED. — **Madagascar**. Prov. **Antsiranana**, Sahaenjika, Ambodiazovola, Ampanavoana, Vinanivao, Antalaha, Parc Masoala, 15°41'33"S, 50°13'30"E, 12–100 m, 15.IX.1996, fr., *Bernard* 301 (MO, P). — Fiv. Vohémar, fir. Tsarabaria, fok. Manakana, Abondrombe, 13°42'58"S, 50°05'37"E, 3 m, 24.X.2002, fr., *Rabenantoandro et al.* 1013 (MO, P). — Parc National de Masoala, Fampotakely, piste vers Vinanivao, 15°35'S, 50°25'E, 0 m, 21.IX.1994, fr., *Rahajasoa et al.* 504 (MO, P). — Parc National de Masoala, Andrombazaha, 15°16'S, 50°29'E, 4.X.1994, fr., *Rahajasoa et al.* 755 (MO, P). — [Maramangy (Masomamangy?), Ambohi(tralalana?), district Antalaha, 4.IV.57, fl., *Réserves Naturelles* 9117 (P). — Antalaha-CR Vinanivao, Péninsule Masoala, 15°56'S, 50°13'E, 10 m, 10.IX.2003, *Wohlhauser et al.* 491 (MO).

Prov. **Toamasina**. fiv. Maroantsetra, comm. Anjahana, fok. Ambanizana, 2 km E Ambanizana, 15°37'15"S, 49°50'55"E, 190 m, 18.VI.2002, fl., *Antilahimena et al.* 1124 (G, MO, P). Fiv. Maroantsetra, comm. Anjahana, fok. Masindrana, 15°30'00"S, 49°53'30"E, 10 m, 26.VII.2002, fr., *Antilahimena et al.* 1258 (G, MO, P). — Préfecture Maroantsetra,

"Gemeinde" [commune] Ambanizana; pente au-dessus du Tampolo, près de la limite du Parc National Masoala, 15°42.524'S, 49°57.770'E, 21.I.2005, fr., *Aridy & Mora* 490 (MO, P). — Same loc., 15°44.785'S, 49°58.671'E, 22.I.2005, fr., *Aridy & Mora* 504 (P). — Préfecture Soanierana Ivongo, commune rurale Manompana, forêt de Tanambao Ambodimanga, station forestière Andronon'i Poeta, 16°45'10"S, 49°43'24"E, 11 m, 10.VI.2004, post-fl., *Ludovic et al.* 826 (MO). — Forêt d'Analava, 8 km W of Foulpointe, 17°42'33"S, 49°26'49"E, 60 m, 26.X.1996, fr., *Miller et al.* 8827 (MO×2). — Prov. Andasibe, près d'Antanambe PK 8, 4.XII.1989, fr., *Morat et al.* 8634 (P×3). — Antalavia, Ambanizana, Maroantsetra, presqu'île de Masoala, 15°47'S, 50°01'E, 23.XI.1994, fr., *Rabe* 166 (MO, P). — Analanjirofo, rive gauche de Tampolo, 17°17'S, 49°23'E, 12.X.2001, fr., *Rabevohitra et al.* 3900 (MO, P). — Manambia, Parc National de Masoala, 15°45'41"S, 49°59'40"E, 0 m, 21.XI.1994, fr., *Rajahasoja et al.* 959 (MO, P). — Comm. Foulpointe, forêt d'Analava à 7 km à l'W [de la] commune, 17°42'S, 49°26'E, 35 m, 19.V.2004, fr., *Randrianarivelo et al.* 4 (MO). — Fénérive-Est, Tampolo Station Forestière, 17°17'S, 49°23'30"E, 10 m, 29.VI.1995, fr., *Razafimandimbison* 155 (G, K, MO, P, USMS). — Fivondronana Tamatave II, firaisana Ampasimbe, station forestière de Mahatsara, 17°38'13"S, 49°29'03"E, 2 m, 7.VII.2011, post-fl., *Razakamalala et al.* 160 (MO). — Maroantsetra, Parc National de Masoala, piste de Tampolo à l'ICOS II (Ambodiforaha), bord de mer, mission Radeau des cimes, 22.XI.2001, fr., *Sauquet et al.* 60 (P). — 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.* 1801 (MO, P). — Antetsezana, Tamatave, 27.VI.1952, fr., *Service Forestier* 5542 (P). — [Jardin] B[otanique] 17 Maroantsetra, 4.X.1952, fr., *Service Forestier* 6155 (P×2). — Same loc., 25.III.1953, fr., *Service Forestier* 7241 (P). — Environs de Rantabe (Maroantsetra), IV.1954, fr., *Service Forestier* 9170 (P). — Farankaraina, Maroantsetra, 20.XI.1954, *Service Forestier* 12083 (P). — Antetsezana, Tamatave, 1.V.1955, fr., *Service Forestier* 14498 (P). — Forêt d'Analava, à l'W de Foulpointe, 22.V.1969, fl., *Service Forestier* 28882 (P).

DISTRIBUTION AND HABITAT. — *Scolopia madagascariensis* occurs in littoral forest along the northern part of the eastern coast of Madagascar, with most collections coming from Masoala (Fig. 6); it has been reported on sand and laterite. A single collection from the province of Fianarantsoa (*Service Forestier* 14753, Ambodilafakely, Ampasinambo, Nosy-Varika, 22.X.1954, fr.; P×2) resembles *S. madagascariensis*, but as it is both outside the otherwise-known geographic range and probably from a locality well inland, its identity is questionable; it might be a highly aberrant specimen of *S. hazomby*.

REMARKS

Scolopia madagascariensis belongs to the group of littoral species with usually greenish-drying leaves. It is distinguished by its large, broadly elliptical to elliptical leaves, which are usually less than twice as long as broad and usually have a cuspidate apex and broadly convex to rounded base. It is most similar to *S. orientalis*, a widespread species that has proportionately narrower, sometimes somewhat oblong leaves with attenuate to cuneate or convex bases; leaf apices in *S. orientalis* are highly variable but only seldom cuspidate. *Scolopia madagascariensis* also bears a superficial resemblance to the typically broad-leaved *S. manongarivae*, a species of humid forests, often found at high elevation; that species has pubescent sepals that are noticeably accrescent in fruit. At the time of Sleumer's (1972a) revision few specimens of *S. madagascariensis* as herein circumscribed were available, and most of the specimens that he placed within *S. madagascariensis* are herein transferred to *S. hazomby*. *Scolopia hazomby* has narrower, often somewhat oblong, usually acuminate leaves, which usually dry brown; it generally occurs in low- to mid-elevation humid forests.

VERNACULAR NAMES

Angavoady (*Service Forestier* 14753); Hompalahy (*Service Forestier* 5542); Lombiro zahana (*Bernard* 301); Masoave-la (*Service Forestier* 6155, 7241); Ravinavetro (*Antilahi-mena et al.* 1258); Sofindambo (*Service Forestier* 14498); Voasorindrina (*Rabevohitra et al.* 3900); Zelotsihy (*Réserves Naturelles* 9117)

CONSERVATION STATUS

Scolopia madagascariensis is known from seventeen locations and has an Extent of Occurrence of 22 166 km². However, it is restricted to littoral forest, a highly threatened ecosystem of which only fragments remain, and has a small minimum Area of Occupancy of 88 km². The degree of fragmentation suggests that *S. madagascariensis* be assigned a preliminary assessment of Vulnerable (VU B2ab(iii)). The species is fairly common in the Protected Area of Masoala.

7. *Scolopia manongarivae* H.Perrier

Mémoires du Muséum national d'Histoire naturelle, n.s., 13: 281 (1940). — Type: Madagascar. Prov. Antsiranana, Massif de Manongarivo, bords des torrents, gneiss vers 1900 m alt., s.d., fl., *Perrier de la Bâthie* 4608 (holo-, P[P00077431]!).

ADDITIONAL MATERIAL EXAMINED. — Madagascar. Prov. Antsiranana, Tsaratanana Massif along path to summit, 14°06'54"-14°06'56"S, 48°58'54"-48°59'08"E, 2400-2500 m, 27.IV.2001, post-fl., *Birkinshaw* 885 (MO, P). — Sommet du Marojejy, 1000 m, 31.III.1949, fr., *Cours* 3564 (P). — Antsatrotro (14°05'S, 48°23'E), entre le campement 'Chris' et le sommet, Coord. précises (Laborde): 609680/1331880, alt 1580 m, 24.V.1995, fl., *Gautier & Chatelain* 2782 (MO, P). — Massif de l'Anjanaharibe (pentes et sommet N) à l'W d'Andapa (haute Andramonta, bassin de la Lokoho: NE), sylvie à lichens, 1600-1800 m, 10.XII.1950-3.I.1951, fr., *Humbert et al.* 24785 (P). — Marojejy RNI no. 12, path from Mandena to summit of Marojejy, forest surrounding River Andranomifototra, 14°26'S, 49°45'E, 800-1000 m, 1.X.1994, fr., *Lewis et al.* 1233 (MO×2, P). — WNW of Andapa, NW of village of Ambodisatrana, 14°32'S, 49°26'E, 1100-1200 m, 3.VII.1997, fr., *McPherson* 17207 (MO×2). — Réserve Naturelle de Marojejy, W slopes of Mt. Beondroka, 14°27'S, 49°47'E, 750-900 m, 27.X.1989, fr., *Miller & Randrianasolo* 4478 (MO, P). — DIANA, Ambilobe, Beramanja, Anketrabe, village le plus proche Antanambao Belinta, versant W du campement II, 13°39'03"S, 48°40'20"E, 934 m, 1.XII.2007, fr., *Rakotovo et al.* 3873 (MO). — SAVA, Vohemar, Andrafainkona, forêt de Sorata, 13°41'46"S, 49°26'32"E, 1372 m, 4.XI.2007, fr., *Randriambololomamonjy et al.* 232 (MO). — SAVA, Vohemar, Andrafainkona, Ampisarahina, forêt de Maromaniry, 5 km N d'Ampisarahina, 13°38'33"S, 49°32'19"E, 1206 m, 7.XI.2007, fr., *Randriambololomamonjy et al.* 282 (MO). — Anjanaharibe-Sud Special Reserve, S of camp at Mandritsarhely, Andapa, 14°46'S, 49°30'E, 3.VII.1998, fr., *Razafimandimbison & Ravelonarivo* 377 (G, K, MO, USMS). — SAVA, Antalaha, Andapa, Bealampona, Befingotra, RS4 Anjanaharibe-Sud, 14°45'04"S, 49°27'56"E, 1062 m, 12.X.1998, fr., *Razafindramora* 54 (MO). — Tsaratanana RNI, fokontany Beangona, 8 km E de Beangona, Antsahamanara, 14°02'50"S, 48°47'09"E, 1408 m, 29.XI.2000, fr., *Razakamalala et al.* 33 (MO). — Ambavala, cant. Marovato, dist. Ambanja, fr., *Réserves Naturelles* 2247 (MO, P). — Massif du Tsaratanana: Crête (et ses abords) séparant les bassins du Sambirano et de la Mahavavy, entre l'Andohanisambirano et la cote 2362, 9-10.XI.1966, fr., *Service Forestier* 27017 (P).

Prov. Mahajanga. SW d'Antahivo, 14°14'50"S, 49°01'30"E, 1920 m, 3.XII.2005, fr., *Randrianarivony et al.* 122 (MO, P). — Sous-Préfecture de Befandriana-Nord, commune rurale de Matsoandakana, quartier de Belalona, SW d'Andapa, Réserve Spéciale Anjanaharibe-Sud, village d'Anjiamazava, suivant la route Nationale d'Andapa–Bealanana, piste vers le N approchant le sommet de Bevitsika, 14°42'S, 49°27'E, 1100 m, 14.XII.1994, fr., *Ravelonarivo & Rabesonina* 554 (G, MO, P). — Fivondronana Bealanana, commune Mangindrano, forêt de Mahatsabory aux environs du lac Majatsabory, 14°09'07"S, 48°57'25"E, 2086 m, 24.II.2003, fl., *Razafitsalama et al.* 289 (MO, P). — Fiv. Bealanana, commune Mangindrano, 14 km au N du village Mangindrano, aux environs de Matsabory no. 02, 14°09'03"S, 48°57'20"E, 2043 m, 17.IV.2003, fr., *Razafitsalama et al.* 364 (MO, P).

DISTRIBUTION AND HABITAT. — *Scolopia manongarivae* is restricted to the northern province of Antsiranana and a small adjacent portion of Mahajanga (Fig. 6); it is found at moderate to high elevations, sometimes along streambanks. Habitat types include sclerophyllous forest, moss forest, and at lower elevations cloud and valley forest; it is reported to occur on laterite.

REMARKS

Scolopia manongarivae is a tree to 15 m tall. The leaves are persistent and coriaceous, with many weak wavy secondary veins; they dry green, often to olive beneath, or less often brown. Most specimens from lower elevations have large, broad leaves (usually 5.5–9.5 cm long, but relatively short-petioled) with often conspicuous venation. A few specimens from the highest elevations, around Tsaratanana, have much smaller and more strongly coriaceous leaves; these may represent a genetically distinct local variety or a phenotypic response to extreme altitude. The flowers are white to pale yellow, with yellow to red glands. The adaxial surface of the sepals and petals is pubescent and the perianth is accrescent in fruit, with sepals elongating to 2.5–3 mm. Fruits are usually described as green, rarely as reddish, but fully ripe fruits may never have been collected.

VERNACULAR NAMES

Telotritry (*Gautier & Chatelain* 2782; *Miller & Randrianasolo* 4478).

CONSERVATION STATUS

Scolopia manongarivae is known to exist at 13 locations; though its minimum Area of Occupancy is only 64 km², it has an Extent of Occurrence of 12 005 km² and a potential maximum Area of Occupancy of c. 4500 km² based on the remaining area of possibly suitable forest within the EOO. The preliminary assessment of its conservation status is therefore Near Threatened (NT). While it occurs in the Protected Areas of Anjanaharibe-Sud, Manongarivo, Marojejy, and Tsaratanana, there is likely to be decline outside of those protected areas.

8. *Scolopia meridionalis* Capuron & Sleumer

Blumea 20: 46 (1972). — Type: **Madagascar.** Prov. Toliara, colline (gneiss) près d'Italy, baie de Ranofotsy, au SW de Fort-Dauphin, 10.I.1963, fl., *Service Forestier* 22372 (holo-, P[P00077424]!; iso-, P×2[P00077425, P00077426]!, L[L0011426], TEF[TEF000250], photos seen).

ADDITIONAL MATERIAL EXAMINED. — **Madagascar.** **Prov. Toliara,** Baie des Galions (Ranofotsy) au SW de Fort-Dauphin, bush xérophile, 1–100 m, 18–21.II.1955, fr., *Humbert & Capuron* 28979 (P×2). — Mont Vohitsandriana au S de Ranopiso, SW de Fort-Dauphin, forêt de transition sur granite, 200–500 m, 27.II.1955, fr., *Humbert & Capuron* 29134 (P). — Bassin de la Mananadabo dans le Massif de l'Analavelona, au N du Fiherenana, vers 1000–1300 m d'alt., 13–15.XII.1962, fr., *Service Forestier* 22196 (P). — Colline (gneiss) près d'Italy, baie de Ranofotsy, au SW de Fort-Dauphin, 10.I.1963, fl., fr., *Service Forestier* 22366 (P×3). — Pentes inférieures orientales du massif granitique du Vohitsandriana, au S de Ranopiso, 8.XII.1968, fr., *Service Forestier* 28587 (P×2).

DISTRIBUTION AND HABITAT. — *Scolopia meridionalis* occurs in transitional forest and dry bush in southern Madagascar (Fig. 2). Most collections are from two localities in the extreme southeast; a single collection from the southwest, at the massif of Analavelona, is atypical (see discussion below).

REMARKS

Scolopia meridionalis is usually a small tree to 6 m or a large shrub, often with spiny branches, that belongs to the group of xerophytic species with one-flowered inflorescences. It is distinguished from others in that group by its obovate to rhomboid, usually 2–5 cm long leaves and pubescent ovaries. The only collection from the disjunct population at Analavelona was a tree 15–20 m tall with platanoid bark. Although formal taxonomic recognition of this population was not possible given the very limited available material, it may be suspected that it represents at least a distinct subspecies. Further investigation would be desirable.

CONSERVATION STATUS

The preliminary assessment of the conservation status of *Scolopia meridionalis* is Endangered (EN B1ab(iii)+2ab(iii)), with an Extent of Occurrence of 1675 km², and a minimum Area of Occupancy of 12 km². It is known only from older collections at three locations, two very close together in an area of the extreme southeast subject to continuing habitat degradation and one, whose population may well be genetically and taxonomically distinct, far to the west at Analavelona.

9. *Scolopia montana* Sleumer

Blumea 20: 56 (1972). — Type: **Madagascar.** Prov. Toamasina [?], forêt orientale des cimes, massif du Beanjada (N de la presqu'île Masoala), vers 1000 m d'alt., XII.1953, fl., *Service Forestier* 8824 (holo-, P[P00077432]!; iso-, K[K000231289], L×2[L0011247, L0011248], TEF[TEF000249], photos seen).

ADDITIONAL MATERIAL EXAMINED. — **Madagascar.** **Prov. Antsiranana,** fiv. Sambava, commune Anjangoveratra, fkt. Ambodisambalahy, forêt d'Andohan'Ifosy, 14°04'59"S, 50°01'38"E, 190 m, 26.XI.2000, fr., *Randrianarivo et al.* 608 (MO, P). — Préfecture d'Antalaha, sous-préfecture d'Andapa, commune rurale de Bealampona, quartier de Befingotra, SW d'Andapa, Réserve Spéciale Anjanaharibe-Sud, village de Mandritsarahely, suivant la rivière de Andranomenabe de la route nationale approchant la chaîne d'Anjanaharibe-Sud [sic], 14°43'10"S, 49°27'12"E, 1700 m, 14.II.1995, fr., *Ravelonarivo & Rabesonina* 667 (G, MO, P).

Prov. Toamasina. Réserve Naturelle Intégrale de Betampona, entre les points kilométriques 1 et 2, 17°55'S, 49°13'E, 300-400 m, 5.X.1994, fr., *Andrianarisata et al.* 214 (MO, P). — Parc National de Zahamena, Antanandava, piste entre Ankosy et Antenina, 17°29'03"S, 48°44'48"E, 900 m, 13.VII.2000, fr., *Rakotondrajaona et al.* 124 (G, K, MO, P).

DISTRIBUTION AND HABITAT. — *Scolopia montana* is mostly known from low- to mid-elevation humid forests (Fig. 2); the highest-elevation collection (1700 m) was said to be on laterite.

REMARKS

Scolopia montana has small, oblanceolate to narrowly oblong leaves, with rounded to obtuse (or rarely cuspidate) apices and cuneate to convex bases, that dry greenish-brown to olive adaxially and brownish abaxially. The pedicels are short in flower; they remain under 2.5 mm in most fruiting specimens but reach 7-8 mm in one. The perianth is probably somewhat accrescent in fruit, but available material does not suffice to confirm this.

CONSERVATION STATUS

The preliminary assessment of the conservation status of *Scolopia montana* is Near Threatened (NT). Collections are known from only five locations, but these include the Protected Areas of Anjanaharibe-Sud, Betampona, Masoala, and Zahamena, which reduces the risk that it will be endangered in the near future. Its Extent of Occurrence is 24 078 km², and although its minimum Area of Occupancy is 20 km², the estimated potential maximum Area of Occupancy based on likely suitable habitat within the Extent of Occurrence exceeds 2000 km².

10. *Scolopia orientalis* Sleumer

Blumea 20: 54 (1972). — Type: **Madagascar.** Prov. Toamasina, forêt Ambila-Lemaitso, 8.III.1954, fl., *Service Forestier* 9527 (holo-, P[P00077438]); iso-, L[L0011253], TEF[TEF000252], photos seen).

ADDITIONAL MATERIAL EXAMINED. — **Madagascar.** Prov. **Antsiranana**, forêt Ambodipont, Ampanavoana, Antalaha, Parc Masoala, 15°44'45"S, 50°19'25"E, 0-10 m, 15-20.III.1996, fl., *Bernard* 260 (G, MO). — Fampotatrely, Ampanavoana, Vinanivao, Antalaha, Parc Masoala, 15°35'S, 50°25'E, 0-50 m, 7.V.1996, post-fl., *Bernard* 286 (MO, P, USMS).

Prov. Fianarantsoa. Préf. Farafangana, comm. rurale Mahabo-Mananivo, fok. Baboaka, forêt Marovahatry, au bord du marécage Andranokena, 23°10'41"S, 47°43'49"E, 23 m, 21.IV.2004, fl., *Ludovic* 746 (MO).

Prov. Toamasina. Atsinanana, Ambila-Lemaitso, vers la Station Forestière, à l'W du canal des Pangalanés, 18°49'28"S, 49°09'19"E, 10 m, 25.IX.2000, fr., *Andrianjafy* 109 (P). — Commune Brickaville, fokontany Andranokoditra, forêt de Volibola [Vohibola], grande piste tracteur [sic] vers Hotely Akaninofy, 18°34'24"S, 49°14'20"E, 7.I.2003, fr., *Ludovic & Rakotoarivony* 238 (MO). — Fivondronana Sainte Marie, fraisana Lokintsy, fokontany Ambohidena, forêt d'Ambohidena, 16°51'11"S, 49°57'10"E, 1.VI.2004, post-fl., *Rabehevitra & Poity* 1100 (MO, P). — Same loc., same date, post-fl., *Rabehevitra & Poity* 1154 (MO, P). — Fivondronana Brickaville, fraisana Andranokoditra, fokontany Ankanin'ny nofy, forêt de Vohibola, 18°33'56"S, 49°15'24"E, 8 m, 4.VIII.2003, fl., *Rabehevitra et al.* 370 (MO). — Fivondronana Soanierana-Ivongo, commune rurale Manompna, forêt d'Antanambao-Ambodiman-

ga, 16°46'24"S, 49°42'51"E, 30.I.2003, fr., *Rabevohitra et al.* 4323 (MO, P). — Fivondronana Sainte Marie, fraisana Lokintsy, fokontany Ambohidena, forêt d'Ambohidena, 16°51'11"S, 49°57'18"E, 18.II.2004, fl., *Rabevohitra et al.* 5051 (MO). — District Fénérive-Est, station forestière de Tampolo, 10 km N de Fénérive-Est, 17°16'52"S, 49°24'44"E, 0-150 m, 24.I.1995, fr., *Raholivelo et al.* 222 (MO). — Fiv. Brickaville, commune Brickaville, village Ambila-Lemaitso, à 2 km au SW de l'hôtel Les Alizés, 18°53'52"S, 49°07'48"E, 10 m, 22.IX.2000, fr., *Randrianaivo et al.* 536 (MO, P). — Vohibola, district de Brickaville, commune Ambinaninony, fokontany d'Andranokoditra, E of trail to Andranokoditra, 18°33'39"S, 49°14'33"E, 27 m, 28.X.2002, *Randrianasolo et al.* 760 (G, MO, P). — Nosy Mangabe, 15°30'S, 49°46'E, 0-330 m, 13-23.IV.1988, fl., *Schatz & Gentry* 2301 (MO, P). — 6-10 km S of Ambila-Lemaitso, 18°51'S, 49°08'E, 0-20 m, 6.III.1988, fl., *Schatz et al.* 1944 (MO, P). — Forêt de Tampolo au N de Fénérive, IV.1954, fr., *Service Forestier* 9194 (P). — Ambila-Lemaitso 36-J0B2, 25.IV.1954, fl., fr., *Service Forestier* 9748 (P). — Analamantsina, Tamatave, 12.VI.1954, fr., *Service Forestier* 10549 (P). — Tampolo, Fénérive-Est, 4.III.1955, fr., *Service Forestier* 13101 (P). — J[ardin] B[otanique] no 21, Tampolo, canton Ampasina, district Fénérive, 1.II.1957, fr., *Service Forestier* 16498 (P). — Same loc., 25.II.1957, fr., *Service Forestier* 16617 (P). — J[ardin] B[otanique] 2-Sect. C-4 Staforet-ABL, village le plus proche Ambila-Lemaitso, canton Andevoranto, dist. Brickaville, 3.XII.1954, fr., *Service Forestier* 16854 (P). — Ambila-Lemaitso, 8-10.VIII.1957, fr., *Service Forestier* 18069 (P). — Point Tampolo, Masoala Peninsula, 15°39'30"S, 49° 57'30"E, 0 m, VII.1993, fr., *Zjhra & Hutcheon* 421 (MO, P).

DISTRIBUTION AND HABITAT. — *Scolopia orientalis* is endemic to eastern littoral or sublittoral forests (Fig. 4), on sand.

REMARKS

Scolopia orientalis is a tree to 15 m, or occasionally a climbing shrub, with smooth blackish to brownish bark and persistent, elliptical to obovate-oblong leaves. It is the most widespread of the four littoral species, and as is common in that group, has leaves that dry greenish to grayish-green or olive. The flowers are fragrant and visited by bees (label data from *Schatz et al.* 1944); the calyx is white to pale pink, the petals white to yellowish white, the stamens white, and the gynoecium reddish purple. The fruits are reddish and relatively often have a persistent style. It may most easily be confused with the littoral species *S. delphinensis*, sp. nov. and *S. madagascariensis*, both of which have numerous stamens and usually greenish-drying leaves; the former has smaller and narrower leaves and is endemic to the extreme southeast (where *S. orientalis* does not occur), and the latter has broader leaves whose apices are usually cuspidate rather than rounded.

ETHNOBOTANY

The wood of *Scolopia orientalis* is used for construction (*Service Forestier* 16498, 16617).

VERNACULAR NAMES

Aferonakavy (*Service Forestier* 16498 [Betsimisaraka dialect]); Masompinengo (*Rabevohitra et al.* 4323); Menahily (*Raholivelo et al.* 222); Menahy (*Service Forestier* 9527, 9748, 16854); Menahy à [petites] [feuilles] (*Service Forestier* 10549); Tokokintsy (*Service Forestier* 16617 [Betsimisaraka dialect]).

CONSERVATION STATUS

The preliminary assessment of the conservation status of *Scolopia orientalis* is Vulnerable (VU B2ab(iii)). It is known from ten locations, and has an Extent of Occurrence of 30 311 km² and a minimum Area of Occupancy of 64 km². It is restricted to littoral forest, a highly threatened and fragmented ecosystem, which is mostly unprotected and subject to ongoing degradation; it occurs in the Protected Area of Masoala.

11. *Scolopia septentrionalis* Capuron & Sleumer

Blumea 20: 47 (1972). — Type: **Madagascar**. Prov. Antsiranana, forêt de Sahafary (bassin de la Saharenana, Diégo-Suarez), sur sables, 27.XII.1963, fr., *Service Forestier* 23053 (holo-, P[P00077433]!; iso-, P×2[P00077434, P00077435]!; L[L0011256], TEF[TEF000251], photos seen).

ADDITIONAL MATERIAL EXAMINED. — **Madagascar**. Prov. Antsiranana, bassin de la Saharenana, forêt de Sahafary, sur sables, 26.II.1964, fr., *Service Forestier* 23312 (P×2).

DISTRIBUTION AND HABITAT. — *Scolopia septentrionalis* is known only from two collections from a single locality, the Sahafary forest, in the extreme north (Fig. 5).

REMARKS

Scolopia septentrionalis is a large shrub or small tree (“arbuste”); the fruit may be reddish. It may be distinguished from other species of the single-flowered xerophytic group by its small and narrow leaves; it also has far fewer stamens than *S. callicola*, which occurs nearby.

CONSERVATION STATUS

The preliminary assessment of the conservation status of *Scolopia septentrionalis* is Critically Endangered (CR B1ab(iii)+B2ab(iii)). With an Extent of Occurrence of 16 km² and an Area of Occupancy of less than 10 km², *S. septentrionalis* is known from only a single location, the Sahafary forest, which is unprotected and subject to continuing degradation. It has not been recollected for almost fifty years.

12. *Scolopia spinescens* Sleumer

Blumea 20: 48, 49 (1972). — Type: **Madagascar**. Prov. Toliara, Ampandrandava (entre Bekily et Tsivory), Pisopiso, 800 m, XI.1943, fl., *Seyrig* 331 [“Decary 5374”] (holo-, P[P00077441]!; iso-, L[L0011257], P[P00077440], photos seen).

ADDITIONAL MATERIAL EXAMINED. — **Madagascar**. Prov. Toliara, vallée du Mandrare (Sud), *Aubréville s.n.* (P). — Antanimora, XII.1959, fr., *Bosser* 13929 (P). — Préfecture de Fort Dauphin, Réserve Intégrale d’Andohahely, parcelle 3, 17.XI.1990, fr., *Dumetz* 1410 (MO, P). — Mont Eromo près Beraketa entre Isoanala et Antanimora (Sud), gneiss, 500–1000 m, III.1934, *Humbert* 14174 (P). — Entre Antanimora et Ambovombe, 15.II.1949, fr., *Service Forestier* 352 (P). — Sur la crête de Marokaoho, vers 250 m d’alt. (rive droite de la Menarandra, à l’W de Tranoroa), 13.I.1962, *Service Forestier* 20662bis (P). — Route Tuléar-Sakaraha, vers les PK 55–65 (à l’W d’Andranovory), XII.1961–I.1962, *Service Forestier* 20726 (P×4). — Au PK. 45 de la route de Tuléar à Sakaraha, 12.XII.1962,

fr., *Service Forestier* 22281 (P×2). — Entre Imonty et Ankeba, bassin de la Mananara, affluent du Mandrare, 20.I.1963, fr., *Service Forestier* 22431 (P). — Forêt d’Analamatahitse (Analamatahotra) entre Bekily et la route Beraketa – Antanimora, 28.I.1963, fr., *Service Forestier* 22524 (P). — A 20 km env. au S de Beraketa, 18.XII.1968, fr., *Service Forestier* 28515 (P). — Environs d’Ampandrandava (entre Bekily et Tsivory), crête Est, 1000 m, XII.1943, fl., *Seyrig* 331B (P).

DISTRIBUTION AND HABITAT. — *Scolopia spinescens* is endemic to southern Madagascar (Fig. 6), where it occurs in dry forest, degraded bush, and transitional vegetation; one collection is reported from a gneiss substrate.

REMARKS

Scolopia spinescens is a small tree or shrub, sometimes spiny, with platanoid bark. It is distinguished from similar species by its small, often suborbicular, few-veined leaves and glabrous ovary. The only other southern xerophytic species is *S. meridionalis*, which has larger, proportionately narrower leaves and a pubescent ovary.

The holotype of *Scolopia spinescens* is numbered only as *Seyrig* 331. The isotype at P bears several labels, including a handwritten label with Seyrig’s number 331, later annotated “5374”; a *Herbier du Jardin Botanique* label numbered 5374; a printed Paris label with Decary’s name; and a typed slip by Sleumer indicating that “Decary 5374 = Seyrig 331”. Sleumer’s protologue of *S. spinescens* listed the type as “*Herb. Decary 5374, leg. Seyrig 331*” (Sleumer 1972a: 49). The actual collector’s number, 331, must be used in preference to the later-added cataloguing number, 5374, which is not present on all duplicates.

CONSERVATION STATUS

The preliminary assessment of the conservation status of *Scolopia spinescens* is Near Threatened (NT). It is known from thirteen locations and has an Extent of Occurrence of 57 289 km² and a minimum Area of Occupancy of 52 km², but an estimated potential maximum Area of Occupancy based upon likely suitable habitat that probably exceeds 2000 km². Except for one collection within the Protected Area of Andohahela, the habitat is almost completely unprotected and subject to ongoing degradation. Only one collection has been made since 1968. It is therefore plausible that this assessment underestimates this species’ actual risk.

13. *Scolopia taimbarina* H.Perrier

Mémoires du Muséum national d’Histoire naturelle, n.s., 13: 279, 280 (1940). — Type: **Madagascar**. Prov. Toamasina, Analamazaotra, IX.1925, fl., *Louvel* 117 (holo-, P[P00077443]!; iso-, WAG[WAG0004331], photo seen; fragment, L, photo seen).

ADDITIONAL MATERIAL EXAMINED. — **Madagascar**. Prov. Antsiranana, Réserve Naturelle Intégrale de Marojejy, 10.5 km NW Manantenina, along tributary at head of Andranomifototra River, Campement 4, 14°26’24”S, 49°44’30”E, 1625 m, 4–13.XI.1996, fl., *Rakotomalaza et al.* 894 (G, MO).

Prov. Toamasina. Moramanga, Ambohibary, Ampitambe, Ambatovy, forêt d’Analamay Sud, 18°48’18”S, 48°19’48”E, 1220 m, 18.XII.2004, fr., *Andriamahafarivo et al.* 52 (P). — Moraman-

ga, Andasibe, Menalamba, Ambatovy, Analamay forest on crust, 18°47'59"S, 48°19'52"E, 1142 m, 2.XII.2005, fr., *Antilabimena et al.* 4309 (MO, P). — Moramanga, commune Ambohibary, fokontany Ampitambe, Ambatovy, Saharevo forest without crust, 18°50'22"S, 48°17'52"E, 1136 m, 11.XII.2006, fr., *Antilabimena et al.* 5122 (P). — Alaotra-Mangoro, Moramanga, Ampitambe, Ambatovy, Zone de défrichement 27, 18°51'26"S, 48°17'53"E, 1093 m, 17.XII.2010, fr., *Miandrimanana et al.* 502 (G, MO). — Forêt Analamazaotra, 800 m, XII.year?, fr., *Perrier de la Bâthie* 5976 (P×2). — Alaotra Mangoro, Moramanga, Ambohibary, Ampitambe, forêt d'Analamay, 18°48'31"S, 48°20'53"E, 1009 m, 9.XI.2008, *Ratolojanahary* 164 (MO). — 17 km S of Route Nationale 2 (Antananarivo to Toamasina), along road to Lakato, 19°03'10"S, 48°22'20"E, 1080 m, 11.XI.2003, fr., *Schatz et al.* 4183 (MO, P).

DISTRIBUTION AND HABITAT. — *Scolopia taimbarina* is known from mid- to high-elevation northeastern humid forests (Fig. 4).

REMARKS

Scolopia taimbarina is a small tree or large shrub to 8 m tall. The small, persistent, brown-drying leaves are elliptical to broadly elliptical, sometimes tending toward ovate or obovate, with a rounded to obtuse apex. The sepals are reported to be reddish-green, while the stamens are white. It co-occurs at Analamazaotra with *S. thouvenotii*, a slightly more common species that also has fairly small brown leaves, flowers with only about 40 stamens and pedicels under 5 mm even in fruit. Leaves of *S. thouvenotii* are narrower, elliptical to ovate or lanceolate, with usually long-caudate apices; *S. taimbarina* seems to occur usually at higher elevations than *S. thouvenotii*, though there is some overlap in elevational range.

VERNACULAR NAMES

Hazomby (*Antilabimena et al.* 5122); Taimbarina p[etites] f[euilles] (*Louvel* 117).

CONSERVATION STATUS

The preliminary assessment of the conservation status of *Scolopia taimbarina* is Endangered (EN B1ab(ii,iii,iv,v)). It is known from only five locations and has an Extent of Occurrence of 3866 km² and a minimum Area of Occupancy of 28 km², though the potential maximum Area of Occupancy based on likely suitable habitat within the Extent of Occurrence is c. 3000 km². The habitat includes the current Protected Areas of Andasibe-Mantadia and Marojejy, but we project a decline at the Ambatovy mining site in the near future.

14. *Scolopia thouvenotii* H.Perrier

Mémoires du Muséum national d'Histoire naturelle, n.s., 13: 280 (1940), as "*Thouvenoti*". — Type: Madagascar. Prov. Toamasina, Analamazaotra, fr., *Thouvenot* 84 (lecto-, designated by Sleumer [Blumea 20: 55 (1972)], P[P00077444]!; isolecto-, P×3[P00077445, P00077446]!; fragments L, photo seen).

ADDITIONAL MATERIAL EXAMINED. — Madagascar. Prov. Toamasina, Alaotra-Mangoro, Moramanga, Ambohibary, Ambatovy, Sahavaharina, 18°51'39"S, 49°20'21"E, 1028 m, 31.VIII.2004, fr., *Antilabimena* 4235 (MO, P). — Alaotra-Mangoro, Moramanga, commune Ambohibary, fokontany Ampitambe, Ambatovy, Sahaviana forest, 18°50'32"S, 48°18'22"E, 1077 m, 13.II.2007, fr., *Antilabimena et al.*

5335 (MO, P). — Fivondronana Moramanga, commune Ambohibary, fokontany Ampitambe, Ambohimananarivo forest, Ambatovy, 18°50'54"S, 48°17'14"E, 1018 m, 23.I.2008, *Antilabimena et al.* 5962 (MO). — Atsinanana Region, Brickaville, Anjahamamay, Anivoranokely, Ankerana forest, 18°24'57"S, 48°48'53"E, 847 m, 28.I.2012, fr., *Antilabimena* 8133 (G, K, MO). — Analamazaotra, X.year?, fl., *Louvel* 119 (P). — Forêt d'Analamazaotra, XII.1923, fl., *Louvel* 190 (P). — Same loc., 800 m alt., XII.year?, *Perrier de la Bâthie* 4661 (P×3). — Atsinanana, Vatomanary, Ambalabe, Mahatsara, forêt d'Antsofotra, 19°13'50"S, 48°37'53"E, 252 m, 27.I.2012, *Rakotoarivelo & Randrianarimanana* 657 (MO). — Moramanga, Ambohibary, Ampitambe, Andranover, Ambatovy, clearing zone 5, 18°51'52"S, 48°18'47"E, 1000 m, 13.II.2008, *Rakotondrafara* 587 (MO). — Alaotra-Mangoro, Moramanga, Ambohibary, Ampitambe, Ambatovy, Mariera, 18°49'57"S, 48°18'16"E, 1145 m, 11.XII.2011, fr., *Rasoazanany et al.* 50 (G, MO). — Nosy Mangabe in Bay of Antongil, 5 km S of Maroantsetra, 15°30'S, 49°46'E, 0-330 m, 20-25.IX.1989, fl., *Schatz* 2741 (MO, P). — Environs de Sahamalaza (bassin de la Rantabe) vers 700 m, s.d., *Service Forestier* 9123 (P). — Environs de la Baie d'Antongil, restes de forêts à l'W d'Anandrovola, vers 100-150 m d'alt., 11.IX.1957, fl., *Service Forestier* 18235 (P×2). — Environs de la Baie d'Antongil, massif de Farankaraina, entre Navana et Andranofotsy, de 0 à 150 m d'alt., 16.IX.1957, fl., *Service Forestier* 18310 (P×2). — Forêt d'Analamazaotra, s.d., fl., *Ursch* 19 (P). — Masoala Peninsula, S of village of Ambanizana in Andranobe River watershed, 400-1700 m from seashore, 15°40'24"S, 49°57'51"E, 110-260 m, 7.I.1995, fr., *Vasey & Velo* 323 (MO, P).

DISTRIBUTION AND HABITAT. — *Scolopia thouvenotii* is found in humid eastern montane forests in the province of Toamasina at low to moderate elevations (Fig. 2).

REMARKS

Scolopia thouvenotii is a tree up to 30 m tall, with dbh to 40 cm. The ovate to elliptical or occasionally lanceolate leaves are small, persistent, and brown on drying, with a blunt-tipped long-caudate to narrowly acuminate apex. The flowers are white, the pedicels short, and the fruits reportedly green, though probably seen only when immature. Means of distinguishing it from *S. taimbarina* have been remarked above. It also could be confused with *S. hazomby*, which occurs in the same region, and which has more oblong to elliptical leaves and a usually convex (to cuneate) rather than rounded base. From existing material, the upper end of the leaf size range for *S. thouvenotii* is about 6.5 cm long with a 6 mm petiole, whereas this is the lower end of the typical mature leaf size range for *S. hazomby*, which also has much longer petioles.

VERNACULAR NAMES

Hazomby (*Louvel* 119, *Thouvenot* 84); Hazomby à petites [sic; probably "petites feuilles"] (*Louvel* 190); Menavahatra (*Antilabimena et al.* 5335); Taimbaritra (*Perrier de la Bâthie* 4661).

CONSERVATION STATUS

The preliminary assessment of the conservation status of *Scolopia thouvenotii* is Vulnerable (VU B1ab(i,ii,iii,iv,v)). It is known from no more than ten locations and has an Extent of Occurrence of 16 246 km² and a minimum Area of Occupancy of 56 km², with an estimated potential maxi-

imum Area of Occupancy based on likely suitable habitat that exceeds 2000 km². Most of the habitat is unprotected and subject to continuing degradation, although the species does occur in the Protected Areas of Andasibe-Mantadia, Masoala, and Nosy Mangabe. We project a decline in population size and suitable habitat at the Ambatovy mining site in the near future.

EXCLUDED NAMES

Scolopia pinnatinervia H.Perrier

Mémoires du Muséum national d'Histoire naturelle, n.s., 13: 278, 279 (1940). — *Ludia pinnatinervia* (H.Perrier) Capuron & Sleumer, *Adansonia*, sér. 2, 12: 93 (1972).

Scolopia urschii H.Perrier

Mémoires du Muséum national d'Histoire naturelle, n.s., 13: 278 (1940), as “*Urschi*”. — *Ludia pinnatinervia* (H.Perrier) Capuron & Sleumer, *Adansonia*, sér. 2, 12: 93 (1972).

Sleumer (1972b) treated these names, previously considered to represent two distinct Malagasy species, as referring to a single species of *Ludia* from humid forests of central and eastern Madagascar.

Acknowledgements

We thank the curators of the herbaria at P and MO for access to collections; Barbara Alongi for the illustrations; and Thierry Deroin and Zachary Rogers for helpful comments. SimpleMappr (Shorthouse, David P. 2010), was been used to produce maps for the article (<http://www.simplemappr.net>).

REFERENCES

- CHASE M.W., ZMARZTY S., LLEDÓ M. D., WURDACK K. J., SWENSEN S. M. & FAY M. F. 2002. — When in doubt, put it in *Flacourtiaceae*: a molecular phylogenetic analysis based on plastid *rbcL* DNA sequences. *Kew Bulletin* 57: 141-181.
- GRANT V. 1981. — *Plant Speciation*. Second edition. New York: Columbia University Press. xii + 563 p.
- IUCN 2012. — *IUCN Red List Categories and Criteria: Version 3.1*. Second edition. Gland, Switzerland and Cambridge, UK: IUCN. iv + 32 p.
- PERRIER DE LA BÂTHIE H. 1940. — Révision des Flacourtiacées de Madagascar et des Comores. *Mémoires du Muséum national d'Histoire naturelle*, n.s., 13: 261-301.
- PERRIER DE LA BÂTHIE H. 1946. — *Flacourtiaceae, Bixaceae*. Muséum national d'Histoire naturelle, Paris, 131 p. (Flore de Madagascar et des Comores; 140).
- SLEUMER H. 1938. — Vermischte Diagnosen. VI. *Repertorium Specierum Novarum Regni Vegetabilis* 45: 9-20.
- SLEUMER H. 1972a. — A taxonomic revision of the genus *Scolopia* Schreb. (Flacourtiaceae). *Blumea* 20: 25-64.
- SLEUMER H. 1972b. — Révision du genre *Ludia* Comm. ex Juss. (Flacourtiacées). *Adansonia*, sér. 2, 12: 79-102.

Submitted on 24 September 2013;
accepted on 8 December 2014;
published on 24 June 2016.