

Endemic Families of Madagascar. X.

Two new species of *Rhopalocarpus* Bojer (Sphaerosepalaceae)

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ABSTRACT

Recent collections of Sphaerosepalaceae from NE Madagascar represent two new species of *Rhopalocarpus* Bojer. In the case of *R. mollis*, fruiting material from E of Mandritsara confirms previous doubts concerning the disjunct occurrence of *R. triplinervius* in the region, which was based on a single sterile specimen. Two fruiting collections from between Sambava and Vohemar represent the first material of *R. randrianaivoi*, reaffirming the importance of the region as a center of local endemism requiring immediate conservation action. The two new species are distinguished by their leaf size and shape, venation, and fruit surface.

KEY WORDS
Sphaerosepalaceae,
Rhopalocarpus,
conservation,
Madagascar,
new species.

RÉSUMÉ

Familles endémiques de Madagascar. X. Deux nouvelles espèces de Rhopalocarpus Bojer (Sphaerosepalaceae).

Des récoltes récentes du NE de Madagascar sont attribuées à deux nouvelles espèces de *Rhopalocarpus* Bojer. Pour *R. mollis*, des spécimens en fruits récoltés à l'est de Mandritsara confirment les doutes sur la présence d'un peuplement disjoint de *R. triplinervius* dans cette région, basée sur une unique récolte stérile. Deux récoltes en fruits faites entre Sambava et Vohemar représentent le matériel original pour *R. randrianaivoi* et soulignent l'importance de cette région comme centre d'endémisme local qui requiert des actions immédiates de conservation. Ces deux espèces nouvelles se distinguent par la taille, la forme et la nervation de leurs feuilles et la surface de leurs fruits.

MOTS CLÉS
Sphaerosepalaceae,
Rhopalocarpus,
conservation,
Madagascar,
espèces nouvelles.

INTRODUCTION

The family Sphaerosepalaceae is composed of two genera endemic to Madagascar, *Dialyceras* Capuron and *Rhopalocarpus* Bojer (Schatz *et al.* 1999). Its exact placement within the order Malvales is still uncertain, with various features indicating affinities to both Thymelaeaceae and a clade consisting of Bixaceae, Cochlospermaceae, and *Diegodendron* Capuron (Horn 2004). Whereas the three species of *Dialyceras* are narrowly restricted to humid forest in the northeast of Madagascar from Betampona Reserve to Antsirabe-Nord, *Rhopalocarpus* is distributed throughout the humid, subhumid, dry and subarid zones, and exhibits a remarkable diversity of leaf venation types among the 15 species currently recognized. Distinctive leaf venation, ranging from penninerved through palmatinerved to distinctly triplinerved, figures prominently in species circumscription, and permits relatively rapid identification to species groups. Recent collections from east of Mandritsara and between Sambava and Vohehar, in northeastern Madagascar, clearly represent two new species, which we describe here.

SYSTEMATICS

1. *Rhopalocarpus mollis*

G.E.Schatz & Lowry, sp. nov.

(Fig. 1)

Haec species a R. triplinervio laminis foliaribus ellipticis vel late ellipticis nervis primaris lateralibus basalibus valde arcuatis in quarta parte distali terminantibus et venatione tertiaria supra manifesta atque fructu extus protuberantibus rotundatis irregularibus ornato differt.

TYPUS. — **Madagascar.** Prov. Mahajanga, Fivondronana Mandritsara, Commune Antsiatsika, Fokontany Ambendrana, forêt d'Ampoakafobe, à 6 km W du village d'Antsiatsiaka, forêt dense humide sur sol rouge, 16°02'01.2"S, 49°04'01.5"E, 843 m, 7.XI.2004, fr., *A. Lehavana* 186 (holo-, MO!; iso-, GI, KI, PI, TEF!).

PARATYPES. — **Madagascar.** Prov. Mahajanga, dist. de Mandritsara, forêt Angi[n]jombarika, 20.IV.1956, ster., *Service Forestier 128-R-301* (PI, TEF!).

DESCRIPTION

Tree to 20 m, trunk to 40 cm dbh. Stems densely golden white velutinous, the trichomes to 1 mm long; stipules caducous, leaving a distinct annular scar. Leaves elliptic to broadly elliptic, (2.8-)4.4-13.4 × (2.5-)3.0-9.5 cm, coriaceous, sparsely puberulent above, the white to golden brown trichomes appressed on the blade to upright along midrib and secondary veins, densely soft tomentose below, the white to golden brown trichomes to 0.5 mm long, hirsute along veins, venation palmatinerved with three primary veins, strongly impressed above, prominently raised below, the midrib and two lateral primaries 1.5 mm thick, the lateral primary veins ending at 3/4 to 4/5 the length of the blade, then two slightly less thick, subopposite secondary veins located at 1/2 the length of the blade, with 4-6 additional secondary veins apically, base subcordate to cordate, margin entire, apex rounded with a caducous mucro. Petiole (3-)9-12 mm long, 2-3.5 mm in diam., densely golden white hirsute, the trichomes to 0.8 mm long. Flowers unknown. Inflorescence terminating primary shoots, c. 5.5 cm long, with a single axis bearing a terminal fruit and several evenly spaced scars. Fruits fleshy, indehiscent, green (in fresh material), brown (when dry), composed of either 1 or 2 mostly fused carpels, unilocular fruit spherical, 2.7-3.0 cm in diam., bicarpellate fruit 2-lobed, to 4.5 cm broad, the surface with irregular rounded tuberculate protuberances, initially sparsely tomentellous, glabrescent, the receptacle 6 mm in diam., the pedicel in fruit 13-26 mm long, 4 mm in diam.

REMARKS

In our synoptic revision of the genus (Schatz *et al.* 1999), this new species, *Rhopalocarpus mollis*, would key to *R. triplinervius* Baill. based upon its palmatinerved leaf venation with three primary veins (i.e. with two basal lateral primary veins equal to the midrib), and soft indumentum on the underside of the leaves. Indeed, the sterile paratype cited above (*Service Forestier 128-R-301*) was previously identified as *R. triplinervius*, but its locality east of Mandritsara constituted an anomalous disjunction in the species' distribution, which is otherwise restricted to the far north of the island, from Antsiranana S to Analafiana near Vohehar (Fig. 2). Lingering doubt about the identification

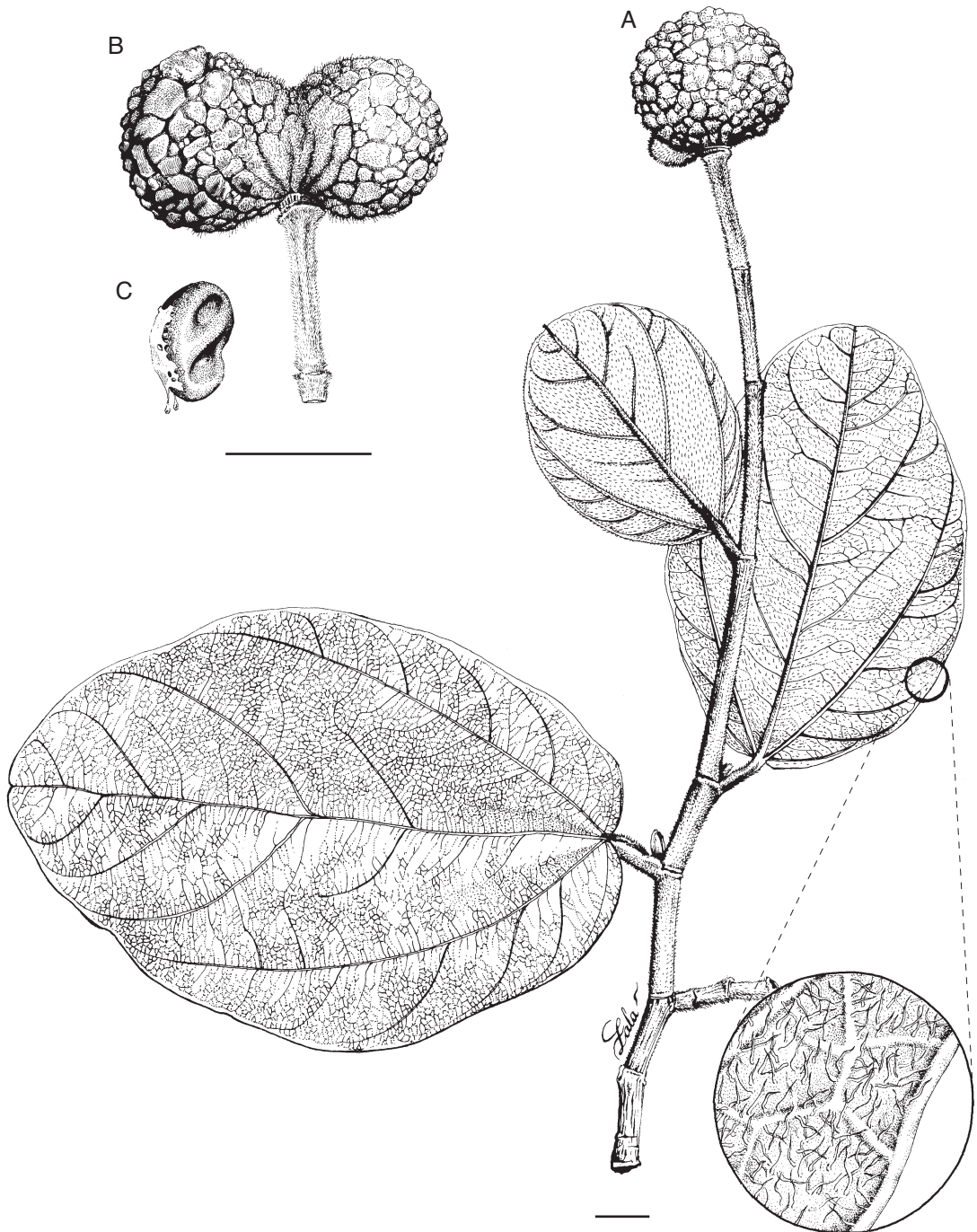


FIG. 1. — *Rhopalocarpus mollis* G.E.Schatz & Lowry: **A**, fruiting branch; **B**, bicarpellate fruit; **C**, seed. *Lehavana* 186. Scale bars: A, 1 cm; B, C, 2 cm.

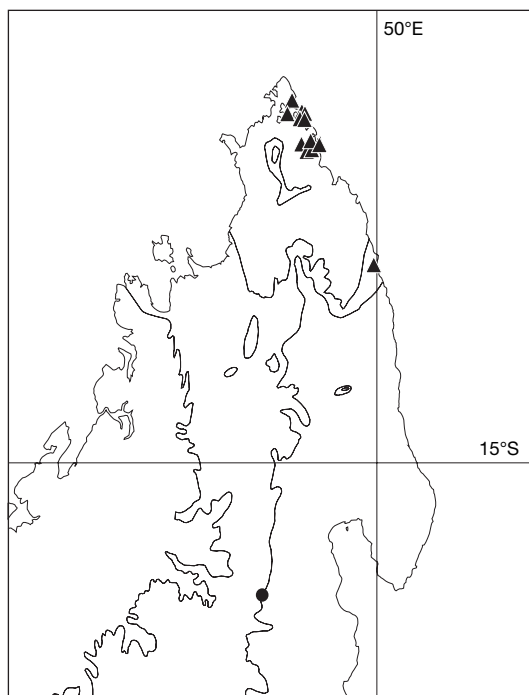


FIG. 2. — Distribution of *Rhopalocarpus* species, mapped on the bioclimatic zones of Madagascar (after Cornet 1974; see Schatz 2000): *R. mollis* G.E.Schatz & Lowry (●) and *R. triplinervius* Baill. (▲).

of this collection precipitated a request to relocate and collect fertile material of the “*triplinervius*”-like entity in the region to the east of Mandritsara, and our colleague Adolphe Lehavana seized upon the opportunity to combine botanical exploration with a family visit. The new species is easily distinguished from *R. triplinervius* by leaf size, venation, and shape, as well as fruit surface, as outlined in Table 1.

VERNACULAR NAMES

Lombiro, Lombiry.

CONSERVATION STATUS

Based on field observations recorded by the collector, *Rhopalocarpus mollis* is known from only a single locality (Fig. 2), which extends from Anginjombarika near the abandoned village of Ankoramena (15°59'23”S, 49°03'47”E) to the forest of Ampoakafobe near Ambendrana (16°02'01”S, 49°04'02”E). Within that area of *c.* 10 km², more than 2000 individuals

were counted. With such a restricted range, *R. mollis* should be considered Vulnerable (VU D2) by application of the IUCN Red List threat criteria (IUCN 2001). The new species may well exist within the Marotandrano Special Reserve, which is located *c.* 15 km to the S of the localities for the two existing collections. Marotandrano is among Madagascar’s least inventoried protected areas, but is likely to harbor a distinctive flora and fauna by virtue of its elevation, subhumid bioclimate, and west-facing aspect on the eastern edge of the Central High Plateau.

ETYMOLOGY

The species epithet refers to the extremely soft indumentum on the underside of the leaves.

2. *Rhopalocarpus randrianaivoi*

G.E.Schatz & Lowry, sp. nov.

(Fig. 3)

Haec species a R. alternifolio, R. coriaceo et R. crassinervio foliis ellipticis latioribus (longitudinis cum latitudine proportione minus quam 1.7) atque fructu protuberantibus complanatis ornato differt.

TYPUS. — Madagascar. Prov. Antsiranana, Fivondronana Vohemar, Commune de Fanambana, forêt d’Analava, 1 km W du PK 185, 5 km S de Fanambana, forêt dense humide, 13°35'47”S, 49°59'12”E, 245 m, 21.XI.2000, fr., *R. Randrianaivo et al.* 586 (holo-, MO!; iso-, P!, TEF!).

PARATYPES. — Madagascar. Prov. Antsiranana, massif of Tsihomanaomby, 3 km NW of Seranampotaka (2 km W of Route nationale from Sambava to Vohemar), dense humid evergreen forest on sand, 14°06'03”S, 50°02'52”E, 150 m, 8.V.2000, y.fr., *Birkinshaw et al.* 730 (G, MO!, P!, TEF!).

DESCRIPTION

Trees *c.* 15–25 m tall. Stems glabrous, stipules caducous, leaving a distinct annular scar. Leaves elliptic, (3-)6-9(-10) × (1.5-)4.5-6 cm, moderately coriaceous, glabrous, venation penninerved, brochidodromous, with a single central primary vein extending from the base of the blade to the apex, weakly channeled above, raised below, the 10–20 secondary veins visible on both surfaces, not raised above, slightly raised below, base rounded to oc-

TABLE 1. — Salient features distinguishing *Rhopalocarpus mollis* G.E.Schatz & Lowry from *R. triplinervius* Baill.

	<i>R. mollis</i>	<i>R. triplinervius</i>
Length of largest leaf (cm)	13-13.4	7-10(-13)
Leaf shape	Elliptic to broadly elliptic	Widely ovate to circular
Lateral primary veins	Strongly arcuate, terminating in distal 1/4 of leaf	Straight to weakly arcuate, terminating in distal 1/2-2/3 of leaf
Tertiary venation on upper surface of leaf blade	Evident	Obscure
Fruit surface	With irregular, rounded, tuberculate protuberances	With short, sharp, conical protuberances

TABLE 2. — Salient features distinguishing *Rhopalocarpus randrianaivoi* G.E.Schatz & Lowry from *R. alternifolius* (Baker) Capuron, *R. coriaceus* (Scott-Elliott) Capuron and *R. crassinervius* (Capuron) G.E.Schatz, Lowry & A.-E.Wolf.

	<i>R. randrianaivoi</i>	<i>R. alternifolius</i>	<i>R. coriaceus</i>	<i>R. crassinervius</i>
Length of largest leaf (cm)	7.5-9(-10)	(8.5-)9-15.5	(8-)9.5-14.5	(13-)16-23
Leaf length/width ratio	1.45-1.67	(1.67-)1.8-2.45	(1.6-)1.85-3	(1.65-)1.9-2.9
Fruit surface	With flat protuberances	Smooth, without protuberances	With rounded to pointed protuberances	With rounded to pointed protuberances

asionally subcordate, margin entire, flat to moderately undulate, apex rounded, sometimes minutely emarginate, occasionally with a short caducous mucro. Petiole 6-14 mm long, 1.2-1.8 mm in diam., glabrous or minutely sericeous, especially on the abaxial surface adjacent to the leaf blade. Flowers unknown. Inflorescence terminating primary and lateral shoots, 1.5-4.5 cm long, glabrous, with a single axis bearing a terminal fruit and 1-4 evenly-spaced scars. Fruit fleshy, indehiscent, brown (in both fresh and dry material), composed of either 1 or 2 fused carpels, unilocular fruit spherical, c. 2.5-2.7 cm in diam., with a single seed, bicarpellate fruit 2-lobed (with 2 seeds), the surface glabrous, covered with numerous rounded protuberances when young (smaller toward the base), smoother when mature, with irregularly shaped, flat polygons (corresponding to the protuberances) delimited by shallow grooves.

REMARKS

In our synoptic revision of the genus (Schatz *et al.* 1999), this new species would key to a group that includes *Rhopalocarpus alternifolius* (Baker) Capuron, *R. coriaceus* (Scott-Elliott) Capuron, and *R. crassinervius*

(Capuron) G.E.Schatz, Lowry & A.-E. Wolf based on its leaves with penninerved venation, the largest blade greater than 7 cm long, and flat to moderately undulate margins. Indeed, the two known collections were initially identified by their collectors as *R. alternifolius* and *R. coriaceus*, respectively. However, whereas *R. randrianaivoi* possesses clearly differentiated, widely spaced secondary veins, *R. alternifolius* is distinguished by its numerous, closely-spaced parallel secondary and inter-secondary veins ("calophyllous" venation). Both *R. coriaceus* and *R. crassinervius* exhibit distinctly longer and more coriaceous leaves than those of our new species, whose elliptic leaves display a smaller length to width ratio. The surface of mature fruits of *R. randrianaivoi* is marked by irregular, flattened protuberances, whereas that of *R. alternifolius* is smooth, i.e. lacking evident protuberances, and both *R. coriaceus* and *R. crassinervius* have fruits with a rough surface composed of numerous equal, pointed to rounded protuberances. Table 2 summarizes these differences, and the geographic distributions of these species are shown in Figure 4.

VERNACULAR NAME
Lombiro.

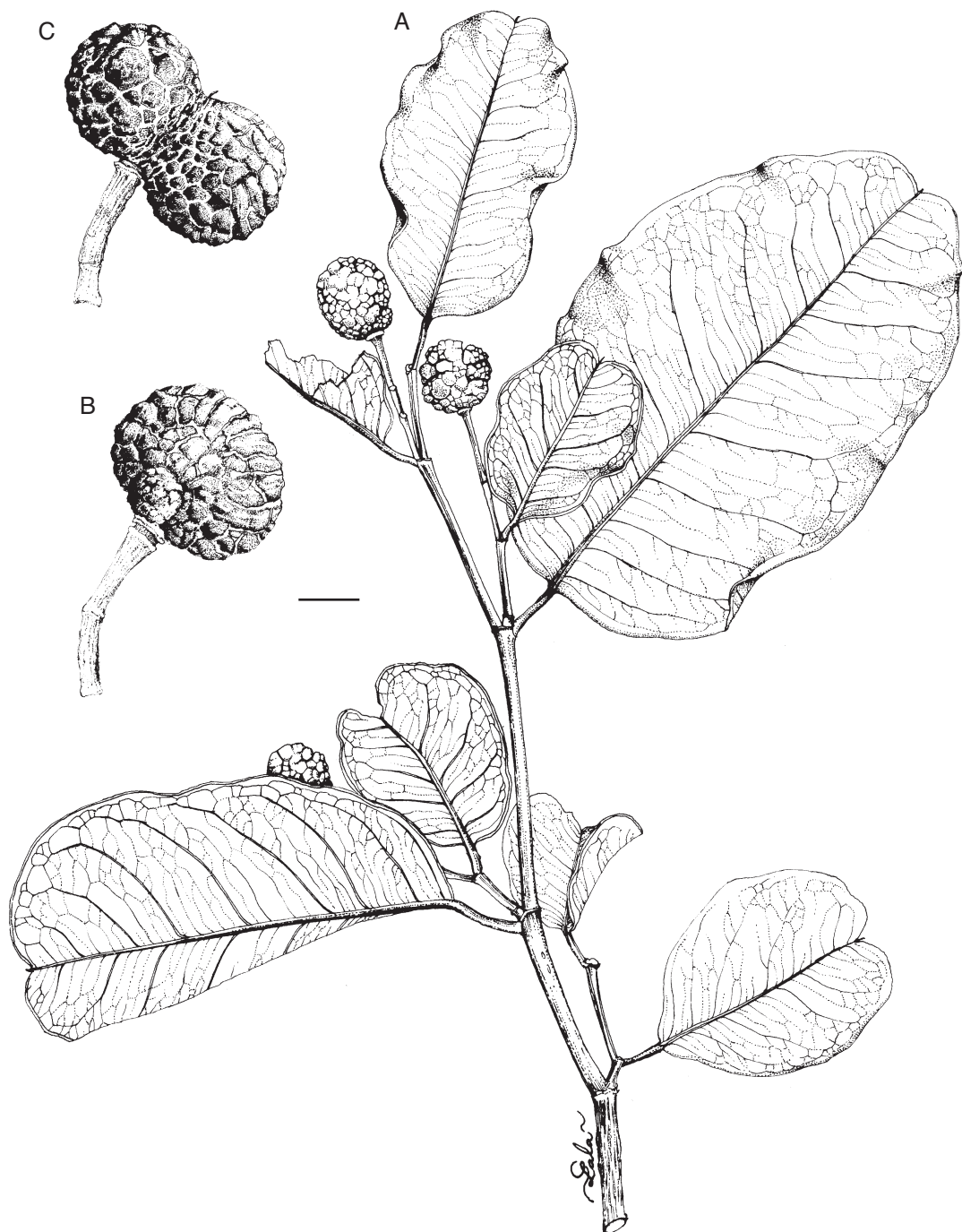


FIG. 3. — *Rhopalocarpus randrianaivoi* G.E.Schatz & Lowry: **A**, branch with immature fruit; **B**, unicarpellate fruit; **C**, bicarpellate fruit. A, Birkinshaw et al. 730; B, C, Randrianaivo et al. 586. Scale bar: 1 cm.

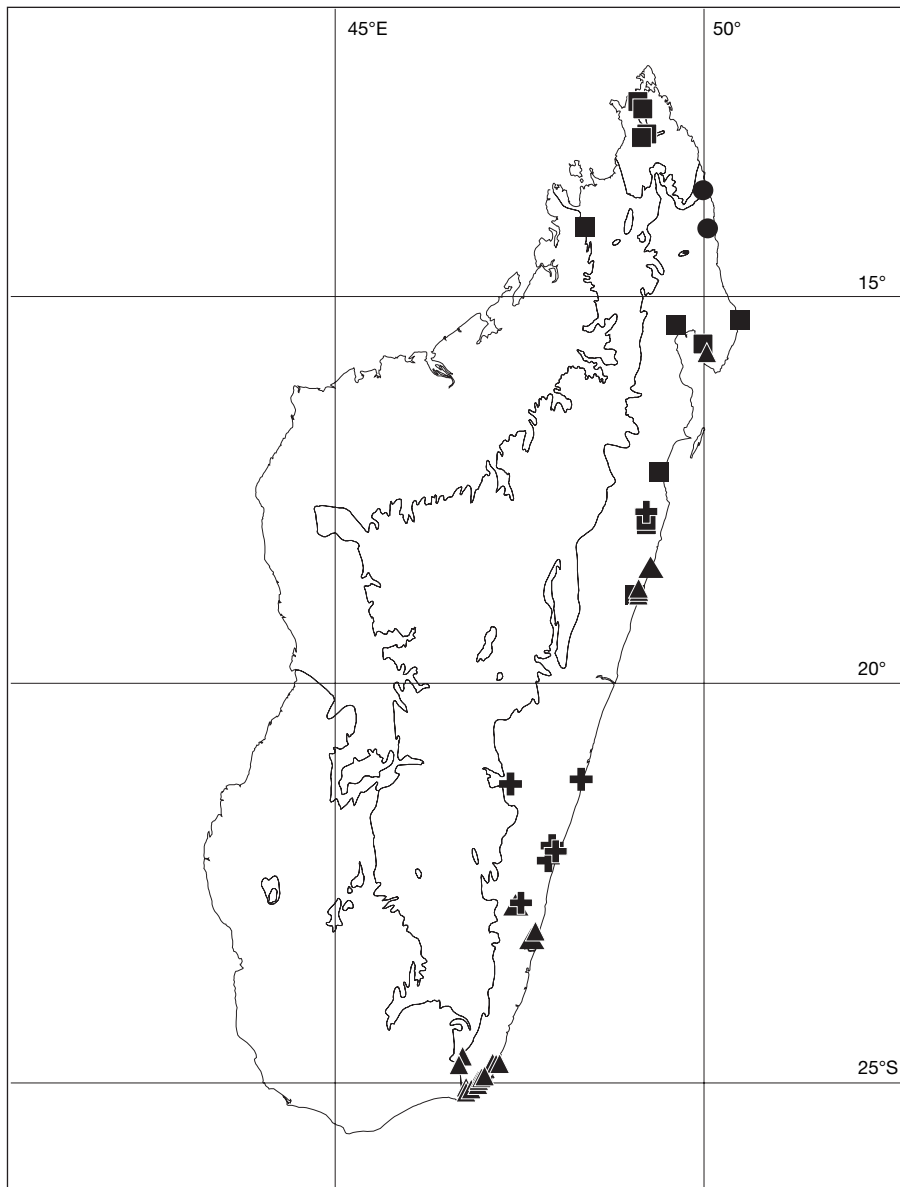


FIG. 4. — Distribution of *Rhopalocarpus* species, mapped on the bioclimatic zones of Madagascar (after Cornet 1974; see Schatz 2000): *R. alternifolius* (Baker) Capuron (■), *R. coriaceus* (Scott-Elliot) Capuron (▲), *R. crassinervius* G.E.Schatz, Lowry & A.-E.Wolf (⊕) and *R. randrianaivoi* G.E.Schatz & Lowry (●).

CONSERVATION STATUS

Rhopalocarpus randrianaivoi is known from only two localities in humid forest between Sambava and Vohémar in northeastern Madagascar (Fig. 4), a center of local endemism from which a number of

distinctive new species have recently been described, such as *Chouxia macrophylla* G.E.Schatz, Lowry & Gereau and *C. mollis* G.E.Schatz, Lowry & Gereau (Sapindaceae); *Rhodolaena macrocarpa* G.E.Schatz & Lowry (Sarcocaulaceae); and *Sterculia cheeki* Dorr

(Malvaceae *s.l.*). With an Area of Occupancy of less than 500 km² and projected continuing decline, *R. randrianaivoi* should be considered Endangered (EN B2ab(ii)), using the IUCN Red List threat criteria (IUCN 2001). Already highly fragmented and lacking any protection, the remaining low elevation humid forest between Sambava and Vohemar should be considered among Madagascar's highest priorities for immediate conservation action.

ETYMOLOGY

The species epithet honours our friend and colleague Richard Randrianaivo, who has collected extensively throughout Madagascar, making many fine specimens, including the type of this new species.

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