

# Endemic families of Madagascar. II. A synoptic revision of Sphaerosepalaceae

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## ABSTRACT

As part of an assessment of the vascular plant families endemic to Madagascar and the Comoro Islands, a synoptic revision is presented of Sphaerosepalaceae, comprising two genera, *Dialyceras* (3 spp.) and *Rhopalocarpus* (15 spp.). Molecular sequence data suggest the family's relationship to Bixaceae and Cochlospermaceae (and also perhaps to the Malagasy endemic *Diegodendron*) in an expanded Malvales. Critical study of available herbarium material shows the diagnostic value of vegetative characters for delimiting species, especially within *Rhopalocarpus*, in which two new combinations are made and five formerly recognized taxa are placed in synonymy. All but five members of the family occur in the humid and subhumid forests of eastern Madagascar, especially around the Bay of Antongil and on the Masoala Peninsula, where all three *Dialyceras* and eight *Rhopalocarpus* have been recorded. Keys to the genera and species are provided in English and French.

## KEY WORDS

Sphaerosepalaceae,  
*Dialyceras*,  
*Rhopalocarpus*,  
Madagascar,  
endemism.

## RÉSUMÉ

*Familles endémiques de Madagascar. II. Une révision synoptique des Sphaerosepalaceae.*

Dans le cadre de l'évaluation des familles de plantes vasculaires endémiques de Madagascar et des Comores, la révision synoptique de deux genres appartenant aux Sphaerosepalaceae, est présentée : *Dialyceras* (3 spp.) et *Rhopalocarpus* (15 spp.). Les données moléculaires suggèrent des liens de parenté entre les Sphaerosepalaceae, les Bixaceae et les Cochlospermaceae (et peut-être aussi avec le genre endémique malgache *Diegodendron*) dans une vision plus élargie des Malvales. L'étude critique des spécimens d'herbier disponibles montre l'importance diagnostique des caractères végétatifs pour séparer les espèces. Ainsi dans le genre *Rhopalocarpus*, deux nouvelles combinaisons sont établies et cinq taxons précédemment reconnus sont mis en synonymie. Tous les membres de la famille, sauf cinq, sont présents dans les forêts humides et subhumides de l'Est de Madagascar, principalement autour de la Baie d'Antongil et sur la presqu'île de Masoala, où les trois *Dialyceras* et huit *Rhopalocarpus* ont été récoltés. Des clés de détermination des genres et des espèces sont établies en anglais et en français.

## MOTS CLÉS

Sphaerosepalaceae,  
*Dialyceras*,  
*Rhopalocarpus*,  
Madagascar,  
endémisme.

## INTRODUCTION

As a first step to compiling a Red Data Book on the eight plant families endemic to Madagascar and the Comoro Islands, we are undertaking a critical review of the taxonomy of each genus in order to provide an updated framework for an assessment of the conservation status of each of the approximately 90 species concerned (SCHATZ et al. 1998). For this, the second in our series, we have examined all the available material of Sphaerosepalaceae (comprising two genera, *Dialyceras* Capuron and *Rhopalocarpus* Bojer) at the major herbaria with important holdings of Malagasy plants (K, MO, P, TAN and TEF), and have reviewed the circumscription of species and infraspecific taxa, as presented by CAPURON (1962, 1963) and updated by BOSSER (1973) and LEROY (1973).

CAPURON's (1962, 1963) studies of Sphaerosepalaceae were based on many years of field experience and an intimate knowledge of nearly all the species involved, which gave him a unique perspective for evaluating the circumscription of the taxa he recognized. CAPURON was a keen observer of field characters, and he drew on them heavily for the preparation of descriptions

and keys. However, as in many of his studies, CAPURON strongly emphasized features of the flowers, fruits and seeds, especially of the endosperm, and as a consequence his keys are often difficult to use. More importantly, in delimiting certain species (e.g., *Rhopalocarpus thouarsianus* versus *R. pseudothouarsianus*), he relied upon several variable floral characters that are of little or no taxonomic significance, which led to the unnecessary recognition of too many taxa.

In the present study we have attempted to re-evaluate species circumscriptions within Sphaerosepalaceae by examining a broader set of characters and taking advantage of the substantial amount of additional herbarium material that has become available from Madagascar over the last several decades (MORAT & LOWRY 1997). We have also placed special emphasis on ecogeographic parameters, examining each species with regard to its distribution within Madagascar's bioclimatic zones (CORNET 1974; see also LOWRY et al. 1997) and the substrates on which it occurs (DU PUY & MOAT 1996). This approach has resulted in the elevation of two of CAPURON's infraspecific taxa to the rank of species and the placement of five previously recognized taxa in synonymy. It has also brought to light the

diagnostic value of numerous vegetative characters, including leaf venation, color and texture, among others, and has enabled us to write new keys emphasizing these more easily observed features.

Recent molecular sequence data have helped to clarify the relationships of Sphaerosepalaceae within an expanded Malvales (ALVERSON et al. 1998), although in that analysis the family was represented by only a single species of *Rhopalocarpus*. As CAPURON (1962) had earlier proposed on the basis of anatomical features, parsimony analysis of *rbcL* sequence data suggests an affinity to Bixaceae and Cochlospermaeae. In light of another recent study (FAY et al. 1998), affinities also appear to include the Malagasy endemic *Diegodendron*, which was shown to be most closely related to *Bixa* and perhaps best included with it in a more broadly defined Bixaceae. *Diegodendron* shares with *Dialyceras* a gynoeceum composed of separate carpels and a gynobasic style, as well as similarly shaped mericarps in fruit. Continued analysis of the sequence data, however, also reveals a possible relationship of *Rhopalocarpus* with

Thymelaeaceae (M.F. FAY pers. comm.). Clearly, inclusion of *Dialyceras* and additional species of *Rhopalocarpus* in *rbcL* studies, as well as new analyses of other gene sequences, are needed to resolve the interrelationships of these and other potentially related genera, including those of another Malagasy endemic family, Sarcocaulaceae.

Based upon our examination of the available material of *Dialyceras* and *Rhopalocarpus*, we propose the following revised taxonomy. For the "Material examined" cited below under each species, abbreviations are as follows: PN = Parc National; RNI = Réserve Naturelle Intégrale; RS = Réserve Spéciale; STF = Station Forestière. A full listing of exsiccatae for each species, with complete localities and latitude/longitude coordinates, has been compiled for the Madagascar Conspectus Project (SCHATZ et al. 1996), and is available on the World Wide Web through W3 TROPICOS (<http://mobot.mobot.org/Pick/Search/pick.html>). Images of several species are also available on the Web (<http://cissus.mobot.org/MOBOT/Madagasclsphaero.html>).

## TAXONOMIC TREATMENT

### Key to the genera of Sphaerosepalaceae

1. Gynoeceum of 4 entirely free ovaries, common style gynobasic; fruit of separate sessile mericarps, ovoid-pyriform to fusiform, the apex long attenuate to cuspidate; leaves penninerved ..... **Dialyceras**
- 1'. Gynoeceum a compound ovary of 2-4 completely fused carpels, style terminal; fruit more or less globose (single-seeded) or with 2-4 rounded lobes (multiple-seeded); leaves penninerved to often palmatinerved or distinctly dipli- or triplinerved ..... **Rhopalocarpus**

In order to facilitate identification of Sphaerosepalaceae in Madagascar, keys are also given in French.

### Clé des genres de Sphaerosepalaceae

1. Gynécée constitué de 4 ovaires entièrement libres, style commun naissant à la base (et entre les 4 carpelles); fruit constitué de méricarpes sessiles séparés, ovoïde-pyriforme à fusiforme, long apex atténué à cuspidé; feuilles penninerves ..... **Dialyceras**
- 1'. Gynécée constitué d'un ovaire composé de 2-4 carpelles soudés entre eux, style terminal; fruit plus ou moins globuleux (à une seule graine) ou à 2-4 lobes (à plusieurs graines); feuilles penninerves à souvent palmatinerves ou distinctement binerviées ou trinerviées ..... **Rhopalocarpus**

### DIALYCERAS Capuron

*Adansonia*, sér. 2, 2: 262 (1962).

TYPE.—*Dialyceras parvifolium* Capuron.

*Dialyceras*, a genus of three species, can be distinguished easily from *Rhopalocarpus* by its completely free ovaries with a common gynobasic style, a condition it shares with possibly related

*Diegodendron* Capuron (Diegodendraceae or Bixaceae s.l.). The genus is restricted to north-eastern Madagascar at low elevation, from Betampona RNI to Antsirabe-Nord.

**Key to the species of *Dialyceras***

- 1. Largest leaves up to 4 cm long, membranaceous; mericarps (partial fruits) rounded and swollen below, the distal half abruptly attenuate-cuspidate ..... 3. **D. parvifolium**
- 1'. Largest leaves at least 5.5 cm long, coriaceous; mericarps (partial fruits) weakly swollen below, tapering gradually to the acute to acuminate distal half ..... 2
- 2. Leaves only slightly darker above than below (in dried material), lateral and tertiary veins evident and slightly raised on upper surface; fruiting pedicels glabrous, fruits narrowly ovoid, straight to weakly curved ..... 1. **D. coriaceum**
- 2'. Leaves distinctly bicolored (in dried material), upper surface of at least some leaves dark brownish green with a reddish to purplish tint, lower surface and margin above khaki-tan, lateral and tertiary veins obscure on upper surface, hardly if at all raised; fruiting pedicels densely golden pubescent, fruits narrowly fusiform, curved ..... 2. **D. discolor**

**Clé des espèces de *Dialyceras***

- 1. Limbe atteignant 4 cm de long, membrancux ; méricarpes (fruits partiels) arrondis et renflés à la base, abruptement atténués-cuspidés dans la partie supérieure ..... 3. **D. parvifolium**
- 1'. Limbe atteignant au moins 5,5 cm de long, coriace ; méricarpes (fruits partiels) faiblement renflés à la base, se rétrécissant graduellement vers l'extrémité aiguë ou acuminée ..... 2
- 2. Limbe très légèrement plus foncé dessus que dessous (sur le matériel sec), nervures secondaires et tertiaires distinctes et légèrement saillantes dessus ; pédicelle fructifère glabre, fruits étroitement ovoïdes, droits ou faiblement courbés ..... 1. **D. coriaceum**
- 2'. Limbe nettement discoloré (sur le matériel sec), le dessus d'au moins quelques feuilles brun-vert foncé nuancé de rouge à pourpre, le dessous et la marge vert bronze, nervures secondaires et tertiaires indistinctes dessus, à peine saillantes ; pédicelle fructifère couvert de poils dorés, fruits étroitement fusiformes, courbés ..... 2. **D. discolor**

**1. *Dialyceras coriaceum* (Capuron) J.-F. Leroy**

**2. *Dialyceras discolor* J.-F. Leroy**

Adansonia, sér. 2, 13: 39 (1973).  
*Dialyceras parvifolium* var. *coriaceum* Capuron, Adansonia, sér. 2, 2: 265 (1962).—Type: *Service Forestier 18290* (holo-, P!).

Adansonia, sér. 2, 13: 39 (1973).—Type: *Service Forestier 13851* (holo-, P!; iso-, MO!, P[2 sheets]!).  
*Dialyceras parvifolium* fa. *discolor* Capuron, “*discolore*”, Adansonia, sér. 2, 2: 265 (1962), nomen inval., non rite publ. sine typus.

Known from only six collections, the most recent of which were made earlier this year, *Dialyceras coriaceum* is distributed from Rantabe to Ambohitsara near Antalaha (Fig. 1A). It can be distinguished by its large, concolorous leaves with evident and slightly raised secondary and tertiary venation on the upper surface, and narrowly ovoid, mostly straight mericarps.

Known from only five collections, the most recent of which was made in 1955, *Dialyceras discolor* is distributed from Ambodigavo to Antsirabe-Nord (Fig. 1B). It is easily distinguished by its strongly discolorous leaves, with the upper surface dark brownish green with a reddish to purplish tint, the lower surface and margin above khaki-tan, the secondary and tertiary venation obscure and hardly if at all raised on the upper surface, and its narrowly fusiform, mostly curved mericarps.

VERNACULAR NAME.—Lombiry.

This species was described by LEROY (1973), who designated a type and referred to the Latin

MATERIAL EXAMINED.—*Dequaire 1*, Ambohitsara; *Schatz 3848*, Fampanambo, 3875, Ankirindro; *Service Forestier 9158*, Andratambe, 18257, Ambodiatafana, 18290, Fahampanambo (=Fampanambo).

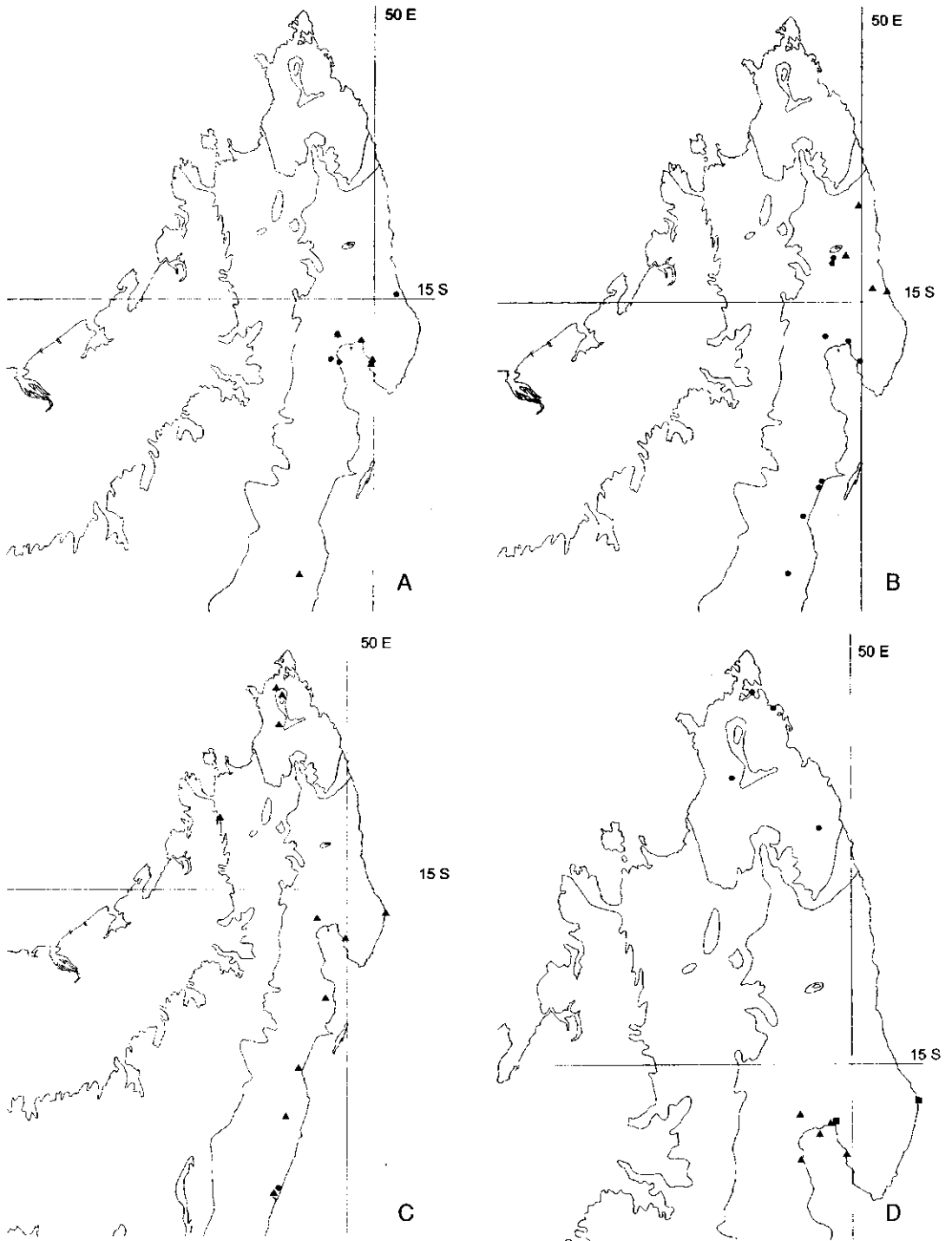


Fig. 1.—Distributions of *Dialyceras* and *Rhopalocarpus*, mapped on the bioclimatic zones of Madagascar (after CORNET 1974). A, *D. coriaceum* (circles), *D. parvifolium* (triangles); B, *D. discolor* (triangles), *R. macrorhamnifolius* (circles); C, *R. alternifolius* (triangles), *R. parvifolius* (circle); D, *R. binervius* (triangles), *R. longipetiolatus* (squares), *R. undulatus* (circles).

diagnosis provided by CAPURON (1962) for his name *D. parvifolium* fa. *discolore*. LEROY indicated that he was making a new combination based on CAPURON's forma, but since CAPURON had neglected to designate a type, his name was not valid, and LEROY thus unwittingly validated the species himself (R. BRUMMITT pers. comm.).

VERNACULAR NAMES.—Lombiry, Tsimandasa.

MATERIAL EXAMINED.—*Barot s.n.*, Antalaha; *Service Forestier 24-R-305*, Ambodigavo, 7777, Bemahitso (Bemahimatso), 13851, Ambodigavo, 27592, Antsirabe-Nord.

### 3. *Dialyceras parvifolium* Capuron

*Adansonia*, sér. 2, 2: 265 (1962).—Type: *Service Forestier 16523* (holo-, P!).

*Dialyceras parvifolium* is distributed from Betampona RNI to south of Ambanizana at Andranobe on the Masoala Peninsula (Fig. 1A), with recent collections made at both these localities. This species can be distinguished by its smaller, more thinly-textured leaves, and its rounded, basally swollen mericarps, with the distal half abruptly attenuate-cuspidate.

VERNACULAR NAMES.—Hafotrakora, Lombiro fotsy, Lombiry.

MATERIAL EXAMINED.—*Lewis 703*, Betampona RNI; *Ratovoson 46*, Betampona RNI; *Réserves Naturelles 2227, 9126*, Betampona RNI; *Schatz 3082*, Ambanizana; *Service Forestier 8654, 16431, 16523*, Farankaraina STF, 18126, Betampona RNI, 18299, Fahampanambo (=Fampanambo), 18329, Farankaraina STF; *Vasey 218, 264, 372*, Andranobe.

### RHOPALOCARPUS Bojer

Procès-Verbaux Soc. Hist. Nat. Ile Maurice: 149 (1846).

*Sphaerosepalum* Baker, J. Linn. Soc. Bot. 21: 321 (1884).—Type: *S. alternifolius* Baker.

TYPE.—*Rhopalocarpus lucidus* Bojer.

*Rhopalocarpus* is a genus of 15 species distributed throughout Madagascar's humid to sub-humid evergreen forest, as well as in dry to subarid deciduous forest and thicket, below 1,000 m elevation. It can be distinguished from *Dialyceras* by its compound ovary and terminal style. Fruits of the genus are either rounded or lobed depending upon the number of seeds that develop, and exude a sticky, mucilaginous to viscous resin when cut, as do the individual mericarps of *Dialyceras*.

Flower structure is rather uniform throughout the genus, and although the fruit surface varies markedly from completely smooth, to warty, to bearing sharp conical spines, these and other reproductive features differ both within and among species. As a consequence, the following key utilizes vegetative characters almost exclusively because they appear to be more constant, and offer the added advantage of enabling identification of material at any stage of development. Most striking among vegetative features is the range in venation patterns, which includes penninerved to palmatinerved and triplinerved leaves. These venation types are defined as follows:

**penninerved**: a single, central, primary vein running from the lamina base to the apex, and from which secondary veins branch.

**palmatinerved**: three or more primary veins originating from a common point at the lamina base, the lateral primaries extending to no more than 1/2-2/3 the length of the lamina, the central primary extending all the way to the apex with secondaries branching off of it.

**triplinerved** (or in the case of a single species, **diplinerved**): three (or rarely two) primary veins originating from a common point at the base of the lamina, the lateral two (or rarely one) primaries extending all the way to the apex or nearly so, the central primary lacking secondaries branching off of it.

The name *Rhopalocarpus* was first published by BOJER in his *Hortus Mauritianus* (1837: 44, as "*Rapolocarpus*"), but this and nearly all other new names proposed in his enumeration were *nomina nuda* and are thus invalid. The generic name was subsequently validated nine years later when BOJER provided a description.

Key to the species of *Rhopalocarpus*

1. Leaves penninerved, with a single primary vein originating from the base ..... 2
- 1'. Leaves palmatinerved, or dipli- or triplinerved, with 2 or 3 evident primary veins originating at the base .. 8
2. Leaves with an evident small mucron at the apex, densely pubescent below, soft to the touch ..... 5. **R. excelsus**
- 2'. Leaves without a mucron (occasionally present in *R. alternifolius*), glabrous below (to sparsely pubescent in some material of *R. similis*) ..... 3
3. Leaves with a broad, thickened midrib tinged dark purplish in dry material; fruits covered with sharp conical to pyramidal spines ..... 8. **R. lucidus**
- 3'. Leaves with a midrib not evidently thickened, greenish, not tinged dark purplish; fruits smooth to rough, but lacking sharp spines ..... 4
4. Leaves strongly discolorous, evidently darker above than below in dried material, glabrescent or sparsely pubescent; pedicels densely pubescent ..... 11. **R. similis**
- 4'. Leaves similar in color above and below, glabrous; pedicels glabrous ..... 5
5. Largest leaf blade less than 7 cm long (rarely to 14 cm), margins strongly undulate (plants from Ankarana, N of Vohémar, Antsiranana) ..... 15. **R. undulatus**
- 5'. Largest leaf blade at least 8.5 cm long, usually much larger, margins flat to moderately undulate ..... 6
6. Leaves with numerous, closely spaced, weakly differentiated secondary veins and  $\pm$  equally strong parallel intersecondary veins (calophyllous venation); fruits smooth ..... 1. **R. alternifolius**
- 6'. Leaves with widely spaced, well differentiated secondary veins, intersecondary veins smaller; fruits rough .. 7
7. Largest leaf blade to 14.5 cm long, coriaceous, tending to be longitudinally plicate along the arched midrib, often folded adaxially in dried material, secondary veins weakly raised on lower surface ..... 3. **R. coriaceus**
- 7'. Largest leaf blade at least 16 cm long, strongly coriaceous, flat, rarely if ever folded in dry material, secondary veins strongly raised on lower surface ..... 4. **R. crassinervius**
8. Leaves with 2 primary veins, one usually more prominent ..... 2. **R. binervius**
- 8'. Leaves with 3 primary veins (midrib and 2 laterals) ..... 9
9. Leaves palmatinerved, the two basal lateral veins extending to 1/2(-2/3) the length of the blade, with evident penninerved secondary veins developing along the central primary vein ..... 10
- 9'. Leaves triplinerved, the 2 basal lateral veins extending nearly to the apex, penninerved secondary veins absent ..... 12
10. Leaves pubescent below, soft to the touch, tertiary venation obscure on upper surface ..... 14. **R. triplinervius**
- 10'. Leaves glabrous below, tertiary venation evident on upper surface ..... 11
11. Leaves chartaceous to subcoriaceous, light greenish-gold in dry material, secondary veins purplish to blackish in dry material ..... 12. **R. suarezensis**
- 11'. Leaves strongly coriaceous, reddish brown in dry material, veins same color as the lamina ..... 13. **R. thouarsianus**
12. Longest petioles at least 3 cm, usually 4-11 cm long, largest leaf blade at least 12 cm long, stipules 10 mm long, broadly triangular, subpersistent ..... 6. **R. longipetiolatus**
- 12'. Longest petiole less than 1.7 cm long, largest leaf blade less than 11 cm long, stipules to 8 mm long, early caducous ..... 13
13. Leaf margins strongly undulate, lateral primary veins on lower surface equal in size to central one (or nearly so), usually sunken on the upper surface, tissue between primary veins raised corrugate above, tertiary venation usually evident on upper surface (rarely obscure) ..... 14
- 13'. Leaf margins flat, not undulate, lateral primary veins on lower surface smaller than central one, only weakly sunken on upper surface, tissue between primary veins flat, not corrugate, tertiary venation obscure on upper surface ..... 9. **R. macrorhamnifolius**
14. Largest leaf blade less than 4.5(-5) cm long, petiole less than 5 mm long ..... 10. **R. parvifolius**
- 14'. Largest leaf blade at least (6-)7 cm long, usually much larger, petiole 5-10 mm long ..... 7. **R. louvelii**

Clé des espèces de *Rhopalocarpus*

1. Feuilles penninerves, à une nervure basale ascendante ..... 2
- 1'. Feuilles palmatinerves, ou bi- ou trinerviées, à 2 ou 3 nervures basales distinctes ..... 8
2. Feuilles distinctement mucronées à l'apex, densément pubescentes dessous, douces au toucher ..... 5. **R. excelsus**

2. Feuilles non mucronées (sauf quelquefois pour *R. alternifolius*), glabres dessous (ou à poils clairsemés pour quelques échantillons de *R. similis*) ..... 3
3. Feuilles à nervure médiane large et épaisse, teintée de pourpre noir sur le matériel sec ; fruit couvert d'épines acérées, coniques à pyramidales ..... 8. **R. lucidus**
- 3'. Feuilles à nervure médiane non distinctement épaissie, verdâtre, non teintée de pourpre noir ; fruit lisse à rugueux, sans épines acérées ..... 4
4. Feuilles tout à fait bicolores, apparaissant plus foncées dessus que dessous sur le matériel sec, glabrescentes ou éparsément pubescentes ; pédicelles densément pubescents ..... 11. **R. similis**
- 4'. Feuilles de la même couleur dessus et dessous, glabres ; pédicelles glabres ..... 5
5. Limbes (les plus grands) mesurant moins de 7 cm de long (rarement 14 cm), marges fortement ondulées (spécimens provenant d'Ankarana, nord de Vohémar, Antsiranana) ..... 15. **R. undulatus**
- 5'. Limbes (les plus grands) mesurant au moins 8,5 cm de long, habituellement beaucoup plus grands, marges plates à modérément ondulées ..... 6
6. Feuilles à nervures secondaires nombreuses, rapprochées, faiblement différenciées et à nervures intersecondaires parallèles ± semblablement fortes (nervation calophylle) ; fruit lisse ..... 1. **R. alternifolius**
- 6'. Feuilles à nervures secondaires largement espacées, bien différenciées, nervures intersecondaires plus petites ; fruit rugueux ..... 7
7. Limbes (les plus grands) mesurant jusqu'à 14,5 cm de long, coriaces, tendant à être repliés le long de la nervure médiane, souvent pliés longitudinalement une fois secs, nervures secondaires faiblement saillantes en dessous ..... 3. **R. coriaceus**
- 7'. Limbes (les plus grands) mesurant au moins 16 cm de long, fortement coriaces, plats, rarement pliés une fois secs, nervures secondaires fortement saillantes en dessous ..... 4. **R. crassinervius**
8. Feuilles à deux nervures primaires, l'une d'habitude plus saillante que l'autre ..... 2. **R. binervius**
- 8'. Feuilles à trois nervures primaires (la nervure médiane et deux latérales) ..... 9
9. Feuilles palmatinerves, les deux nervures basales latérales dépassant la moitié (et jusqu'aux 2/3) de la longueur du limbe, avec des nervures secondaires penninerves distinctes le long de la nervure médiane ..... 10
- 9'. Feuilles triplinerves, les deux nervures basales latérales atteignant presque l'apex, pas de nervures secondaires ..... 12
10. Feuilles pubescentes en dessous, douces au toucher, nervures tertiaires indistinctes sur le dessus ..... 14. **R. triplinervius**
- 10'. Feuilles glabres en dessous, nervures tertiaires distinctes dessus ..... 11
11. Feuilles cartacées à subcoriaces, jaune doré clair sur le sec, nervures secondaires pourpres à noirâtres sur le sec ..... 12. **R. suarezensis**
- 11'. Feuilles fortement coriaces, brun-rouge sur le sec, nervures de la même couleur que le limbe ..... 13. **R. thouarsianus**
12. Pétioles les plus longs d'au moins 3 cm, d'habitude de 4 à 11 cm de long, les limbes les plus grands atteignant 12 cm de long, stipules de 10 mm de long, largement triangulaires, subpersistantes ..... 6. **R. longipetiolatus**
- 12'. Pétioles les plus longs de moins de 1,7 cm, les limbes les plus grands mesurant moins de 11 cm de long, stipules mesurant jusqu'à 8 mm de long, précocement caduques ..... 13
13. Marges des feuilles fortement ondulées, nervures principales latérales de la même taille que la nervure médiane dessous (ou presque), d'habitude non saillantes dessus, le limbe situé entre les nervures primaires saillantes réticulé dessus, nervures tertiaires distinctes d'habitude dessus (rarement indistinctes) ..... 14
- 13'. Marges des feuilles plates, non ondulées, nervures primaires latérales plus petites que la nervure médiane dessous, seulement faiblement imprimées dessus, limbe entre les nervures primaires lisse, non réticulé, nervures tertiaires indistinctes dessus ..... 9. **R. macrorhamnifolius**
14. Limbes (les plus grands) mesurant moins de 4,5(-5) cm de long, pétiole mesurant moins de 5 mm de long .. 10. **R. parvifolius**
- 14'. Limbes (les plus grands) mesurant au moins (6-)7 cm de long, d'habitude beaucoup plus grands, pétiole de 5-10 mm de long ..... 7. **R. louvelii**

**1. *Rhopalocarpus alternifolius* (Baker)**

Capuron

*Adansonia*, sér. 2, 2: 250 (1962).

*Sphaerosepalum alternifolius* Baker, J. Linn. Soc. Bot.

21: 321 (1884).—Type: *Baron 2412* (holo-, K!; iso-, P!).

*Rhopalocarpus alternifolius* var. *sambiranensis* Capuron, *Adansonia*, sér. 2, 2: 251 (1962).—Type: *Service Forestier 11507* (holo-, P!; iso-, K!, P[2 sheets]!); **syn. nov.**



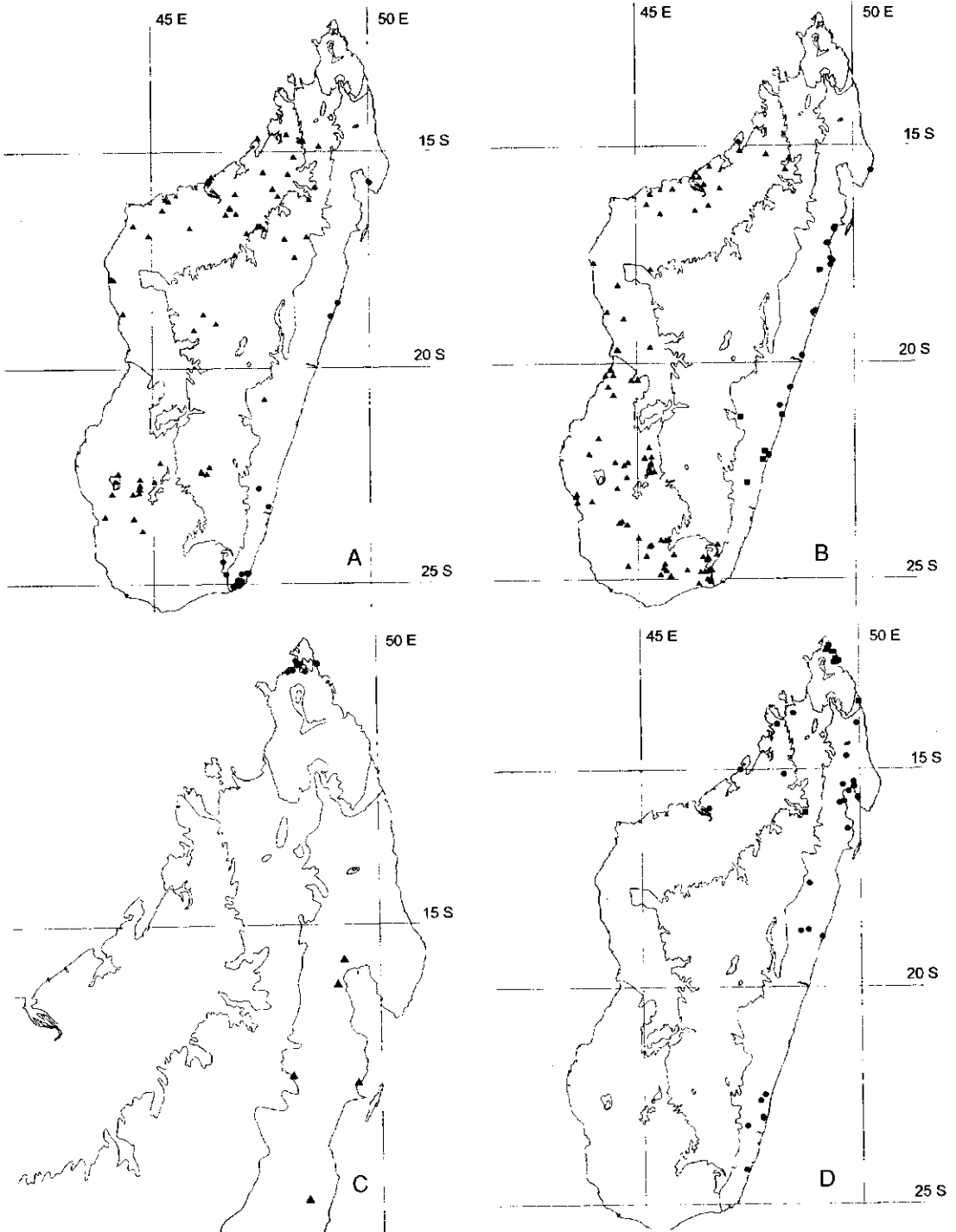


Fig. 2.—Distributions of *Rhopalocarpus*, mapped on the bioclimatic zones of Madagascar (after CORNET 1974). A, *R. coriaceus* (circles), *R. similis* (triangles); B, *R. crassinervius* (squares), *R. lucidus* (triangles), *R. thouarsianus* (circles); C, *R. excelsus* (triangles), *R. suarezensis* (circles); D, *R. louvelii* (circles), *R. triplinervius* (squares).

*Rhopalocarpus alternifolius* is easily recognized by its dense, closely spaced, parallel secondary and nearly equal intersecondary venation (the leaves are thus "calophyllous"). It is distributed in humid evergreen forest along the East coast at low elevation, from Betampona RNI to the Masoala Peninsula, as well as in dry to subhumid forest from the Sambirano region to Montagne d'Ambre PN, including Ankarana RS (Fig. 1C).

VERNACULAR NAMES.—Andrengitra, Fanavimaitso, Hafotrankora, Lombiro, Mantaditra.

MATERIAL EXAMINED.—*Baron 2412*, without precise locality; *Bernard 42*, Masoala PN; *Humbolt 201*, Mananara-Nord RB; *Réserves Naturelles 9047*, Betampona RNI; *Schatz 3070*, Ambanizana; *Service Forestier 205-R-152*, Les Roussettes STF; *10667*, *10705*, Ankarana RS, *11346*, Ankorefo, *11507*, Manongarivo RS, *12359*, Menagisy, *16016*, Tampolo STF, *18133*, Betampona RNI, *18293*, Fahampnambo (=Fampanambo), *18997*, Ankarana RS.

## 2. *Rhopalocarpus binervius* Capuron

*Adansonia*, sér. 2, 2: 252 (1962).—Type: *Service Forestier 9172* (holo-, P!; iso-, MO!, P[2 sheets!]).

*Rhopalocarpus binervius* is distributed in humid evergreen forest around the Bay of Antongil, from Rantabe to S of Ambanizana on the Masoala Peninsula (Fig. 1D). It can be recognized by its leaves with two evident primary veins from the base extending all the way to the apex, one of which is usually slightly more prominent; rarely some leaves on an individual have only a single, slightly off-center primary vein.

VERNACULAR NAME.—Lombiry.

MATERIAL EXAMINED.—*Schatz 3244*, Nosy Mangabe RS, *3849*, Fampanambo; *Service Forestier 9172*, Rantabe, *15942*, Farankaraina STF, *18285*, Fahampnambo (=Fampanambo); *Zjhra 393*, *394*, Masoala Peninsula.

## 3. *Rhopalocarpus coriaceus* (Scott Elliot) Capuron

*Adansonia*, sér. 2, 2: 254 (1962).  
*Sphaerosepalum coriaceum* Scott Elliot, J. Linn. Soc.

Bot. 29: 5, tab. 1 (1890).—Type: *Scott Elliot 2818* (holo-, K!; iso-, P!).

*Rhopalocarpus coriaceus* var. *trichopetalus* Capuron, *Adansonia*, sér. 2, 2: 252 (1962).—Type: *Service Forestier 9714* (holo-, P!; iso-, P!); *syn. nov.*

*Rhopalocarpus coriaceus* occurs in littoral forest on sand, and is distributed from W and SW of Fort Dauphin to the Masoala Peninsula (Fig. 2A). It can be recognized by its widely spaced, well-differentiated secondary venation, and coriaceous leaves that are often longitudinally folded along the arching midrib in dried specimens. The purportedly greater degree of pubescence ascribed to *R. coriaceus* var. *trichopetalus* by CAPURON for specimens in the region of Ambila-Lemaitso in fact occurs throughout the range of the species, and therefore the variety is here placed into synonymy. West of Fort Dauphin, as rainfall dramatically decreases, leaf size also decreases; *RN 8352*, without exact locality data, but probably collected in either the subarid parcel 2 or dry to subhumid parcel 3 of Andohahela PN, stands out in its dense reticulate tertiary venation, and may represent a distinct taxon. *Rhopalocarpus coriaceus* var. *crassinervius* is here raised to the rank of species (see below). Two collections assigned to *Rhopalocarpus coriaceus* (*SF 15294* and *23660*) show some characters that resemble *R. crassinervius*, and may represent cases of intergradation.

VERNACULAR NAMES.—Hazondady, Hazondandy, Mantaditra, Tavia, Tsilavombinato.

MATERIAL EXAMINED.—*Allorge 970*, Petriky; *Boiteau 2520*, Ambinanibe (=Vinanibe); *Cloisel 168*, Fort-Dauphin; *Decary 4322*, Fort-Dauphin; *Dumetz 634*, Ste. Luce (Manafiafy), *647*, Petriky; *Gereau 3274*, Mandena, *3366*, Petriky; *Humbert 14075bis*, Andohahela PN; *Louvel 85*, without precise locality; *McPherson 14128*, *14354*, *14759*, Petriky, *14886*, Mandena; *McWhirter 186*, Zafitsinana; *Phillipson 3955*, Ste. Luce (Manafiafy); *Rabevohitra 2109*, Petriky; *Randrianasolo 351*, Ste. Luce (Manafiafy); *Réserves Naturelles 8352*, Andohahela PN; *Schatz 1919*, Antalavia; *Scott-Elliot 2818*, Fort-Dauphin; *Service Forestier 1537*, Ipetaka, *3355*, Mandena STF, *8292*, *9652*, *9714*, Ambila-Lemaitso STF, *11773*, Ambinanibe (=Vinanibe), *15294*, Mahatsinjo, *20528*, Ambinanibe (=Vinanibe), *22752*, Ambila-Lemaitso STF, *23660*, Lopary, *Service Forestier s.n.*, Tampina; *Zarucchi 7498*, *7605*, Mandena.



Fig. 3.—Photographs of *Sphaerosepalaceae*: A, *Dialyceras coriaceum* (Schatz 3848); B, *D. parvifolium* (Schatz 3082); C, *Rhopalocarpus lucidus* (Schatz 2472); D, *R. thouarsianus* (Schatz 3634).—A, photo P. LOWRY; B-D, photos G. SCHATZ.

**4. *Rhopalocarpus crassinervius* (Capuron)**  
G.E. Schatz, Lowry & A.-E. Wolf, **comb. et  
stat. nov.**

*Rhopalocarpus coriaceus* var. *crassinervius* Capuron, *Adansonia*, sér. 2, 2: 256 (1962).—Type: *Service Forestier 13422* (holo-, P!).

*Rhopalocarpus crassinervius* can be distinguished from *R. coriaceus* by its larger, more coriaceous leaves, and secondary venation that is thicker and more conspicuously raised on the lower surface. Moreover, in contrast to *R. coriaceus*, which occurs on sand near the coast, *R. crassinervius* is distributed on lateritic soils inland

from the coast, from Ambohafandra to Betampona RNI (Fig. 2B).

VERNACULAR NAMES.—Havoha, Tavia, Taviaberavina, Tsvakimbinato.

MATERIAL EXAMINED.—*Decary 13713*, Mananjary; *Réserves Naturelles 2204*, Betampona RNI; *Service Forestier 13416*, Ivakoana STF, *13422*, Ifanadiana, *13425*, Ambohafandra, *15253*, *16045*, Belambo.

### 5. *Rhopalocarpus excelsus* Capuron

Adansonia, sér. 2, 2: 248 (1962).—Type: *Service Forestier 9156* (holo-, P!; iso-, K[2 sheets]!), MO!, P[2 sheets!].

*Rhopalocarpus excelsus*, distributed from Betampona RNI to the Bay of Antongil (Fig. 2C), is easily distinguished by leaves with dense, soft pubescence on the lower surface, and a fine mucron at the apex. It is a large, buttressed tree to 30 m tall.

VERNACULAR NAME.—none recorded.

MATERIAL EXAMINED.—*Andrianarisata 113*, Berampona RNI; *Réserves Naturelles 10343*, Ambatovaky RS; *Schatz 3881*, Ankirindro; *Service Forestier 9156*, Vohilava, *18280*, Fahampanambo (-Fampanambo), *22824*, Manompana.

### 6. *Rhopalocarpus longipetiolatus* Hemsley

Hooker's Icon. Pl. 28: 3, tab. 2774 (1903).—Type: *Baron 6479* (holo-, K!; iso-, P!).

*Rhopalocarpus longipetiolatus* is known from only eight collections in humid evergreen forest at the head of the Bay of Antongil and at Cap Est on the Masoala Peninsula (Fig. 1D). Among the species with exclusively triplinerved venation, it can be easily distinguished by its large, subpersistent stipules, large leaves, and long petioles.

VERNACULAR NAME.—None recorded.

MATERIAL EXAMINED.—*Baron 6479*, without precise locality; *Rahajasona 326*, Cap-Est, *428*, Masoala PN; *Schatz 3784*, *3789*, Cap Est; *3837*, Fampanambo; *Service Forestier 8883ter*, Navana, *27761*, Cap Est.

### 7. *Rhopalocarpus louvelii* (Danguy) Capuron

Adansonia, sér. 2, 2: 245 (1962), "*Louvelii*". *Sphaerosepalum louvelii* Danguy, "*Louvelii*", Bull. Mus. Hist. Nat. 31: 204 (1925).—Type: *Louvel 232* (holo-, P!).

*Rhopalocarpus macrorhamnifolius?* Capuron fa. *occidentalis* Capuron, Adansonia, sér. 2, 2: 250 (1962), nomen inval., non rite publ. sine typus et Latin; **syn. nov.**

*Rhopalocarpus louvelii* is widely distributed in humid evergreen forest from Analalava N of Fort Dauphin to Antsirabe-Nord, and in dry to sub-humid forest in the west from the Sambirano region to as far south as Berivotra S of Mahajanga (Fig. 2D), and possibly both further N in the tsingy of Ankarana RS and S in the tsingy of Bemaraha RNI, according to personal observations noted by CAPURON (1962). It is easily confused with *R. macrorhamnifolius*, with which it is sympatric at some localities. CAPURON discussed important field characteristics to distinguish the two species, but nevertheless erred (albeit with some doubt) in ascribing the western collections of *R. louvelii* to *R. macrorhamnifolius* as forma *occidentalis* (invalidly described by CAPURON and here placed into synonymy under *R. louvelii*).

*Rhopalocarpus louvelii* can be distinguished from *R. macrorhamnifolius* by its strongly undulate leaf margins, triplinerved venation with the two lateral main primary veins equally robust as the central one or nearly so, and all three veins strongly sunken on the upper surface, the lamina tissue in between markedly raised-corrugate, with tertiary venation usually evident and slightly raised on the upper surface. CAPURON described bark differences between the two species, citing the dark, nearly black, deeply fissured bark of *R. louvelii*, (an observation recently echoed by *Carlson 55* ("bark black, deep cracks"), versus the light, nearly smooth bark of *R. macrorhamnifolius*. The distinctive plants ascribed to *R. louvelii* var. *parvifolius* are excluded and here raised to rank of species (see below).

VERNACULAR NAMES.—Andriambavinaveotra, Hafotrakora, Havoa, Lahy, Lombiro, Lombiry, Mantaditra, Sariringitra, Tavia, Tsimandoasala.

MATERIAL EXAMINED.—*Carlson* 55, Nosy Mangabe; *Cours* 3244, Ambatosoratra; *Herb. Inst. Sci. Madag.* 3244 (= *Cours* 3244), Ambatosoratra, *Herb. St. Agric. Alaotra* 3244 (= *Cours* 3244 & *Herb. Inst. Sci. Madag.* 3244), Ambatosoratra; *Louvel* 232, Ambila-Lemaitso; *McPherson* 14287, Analalava; *Réserves Naturelles* 2801, Zahamena RNI; *Schatz* 1897, Sahavary, 2156, Nosy Mangabe RS, 3039, Ambanizana, 3785, Cap Est; *Service Forestier* 87-R-233, Andriantantely, 111-R-152, Antsahabeminko, 689-R-182, Lohariandava; 8883bis, Navana, 8928, Tenina, 9007, Amboditavolo, 10395, Ambondro Ampasy, 11393, Ambanja, 12938, Manombo RS, 13913, Amporofo, 13977, Manombo RS, 15246, Evato, 16064, Vohitrakora, 16069, Analavory, 17723, Farankaraina STF, 18201, Mananara-Nord RB, 18296, Fahampanambo (=Fampanambo), 18332, Farankaraina STF, 18530bis, Berivotra, 26287, Zahamena RNI, 27563, Antsirabe-Nord, 30046, Analarezy; *Vasey* 111, Andranobe.

## 8. *Rhopalocarpus lucidus* Bojer

Procès-Verbaux Soc. Hist. Nat. Ile Maurice: 150 (1846).—Lectotype (here designated): "in Madagas. cult. in Maurit.", herb. Bojer (BM!).

*Rhopalocarpus lucidus* was first published in BOJER's Hortus Mauritius (1837: 44), but was invalid because it lacked a description or diagnosis, a fact that appears to have escaped the attention of CAPURON (1962, 1963). BOJER later validated the name with a description in 1846, but did not cite any specimens. No authentic material could be located at MAU, but examination of Sphaerosepalaceae holdings at several other herbaria known to contain collections from BOJER's herbarium (including BM, G, K and W—based on information provided by J. BOSSER pers. comm.) revealed the presence of two specimens mounted on a single sheet at BM, both of which were gathered from cultivated plants growing on Mauritius and bear labels indicating "herb. Boj.". These are almost surely syntypes, an interpretation that is supported by the fact that BOJER (1837, 1846) indicated the presence of cultivated material in Mauritius. We have selected one of these specimens—the branch mounted on the left side of the sheet—as the lectotype of *R. lucidus*.

*Rhopalocarpus lucidus* is widely distributed in dry to subarid deciduous forest and thicket from W of Fort Dauphin to the southern limit of the

Sambirano region (Fig. 2B). It is easily distinguished by its broadly thickened midrib tinged purple in dried material, and sharp conical to pyramidal protuberances on the fruit.

VERNACULAR NAMES.—Hafopotsy, Hafotrahavao, Hazondrengitra, Hazondrengitsy, Hazondrenitra, Hazondrenitsy, Hazondringitra, Kosy, Masondrenetsa, Raingitralahy, Renditra be, Rengitra, Ringitra, Sely, Talafotsy, Tandria, Tsihonga, Tsiongaka, Tsongona, Vony.

MATERIAL EXAMINED.—*Alluaud* 22, Imanombo; *Andrianarisata* 99, Andohahela PN; *Aubréville* s.n. without precise locality; *Basse* s.n., Rokay; *Boiteau* 388, Bekily; *Bosser* 3774, Imanombo, 4410, Ifotaka; *Chauvet* 312, Antanimora, 383, Anjamala; *Cours* 5091, Bevato; *Croat* 28770, Tsimbazaza; *D'Alleizette* 1367, Majunga; *D'Arcy* 15331, Beraketa; *Decary* 2838, Ampasimpolaka, 4390, Antanimora, 4571, Vohitsiombe, 8861?, Antanimora, 9375, Ampilira, 9449, Bevia, 16167, Befandriana-Sud; *Descoings* 3480, Berivotra; *Dorr* 2722, 3172, Parc Tsimbazaza, 4125, Andrevo; *Dumetz* 1408, Andohahela PN; *B. Du Puy* MB246, Andranomena RS; *Grevé* 141, without precise locality; *Grey* s.n., without precise locality; *Guillaumet* 2494bis, Sakoa; *Homolle* 1479, Isalo PN; *Humbert* 5547, Ampanihy, 6801, Manambolo, 12822, Isomono, 19348, Ambalabe, 19490, 28659, Isalo PN; *Jacquemin* 348, Isalo PN; *Keraudren* 25851, Ankilizato, 25902, Morondava; *Lam* 6116, Marohogo STF; *Lavallée* 490, without precise locality; *Leandri* 389, Bemaraha RNI, 4249, 4412, 4421, Andohahela PN; *Malcomber* 1096, Andohahela PN; *Miller* 6115, Tsivonoakely; *Morat* 2509, Ankazoabo; *Peltier* 2870, Antanimora, 5385, Ampazony; *Perrier de la Bâthie* 1146, Namoroka RNI; *Phillipson* 1699, Beza Mahafaly RS, 2882, Manombo Atsimo, 3992, Antanimora; *Poisson* s.n., without precise locality; *Rahantamalala* 208, Morondava; *Rakotomulaza* 387, Mangabe, 594, Andohahela PN; *Randriamampionona* 148, 306, 506, Andohahela PN; *Randriamanantena* 52, Andohahela PN; *Réserves Naturelles* 2164, 3842, 7757, Namoroka RNI, 7928, Andohahela PN, 8001, Namoroka RNI, 10770, Andohahela PN; *Schatz* 2472, Andrevo; *Service Forestier* 21bis-R-276, Filanjara, 43-R-19, Befasy; 190, Ankarafantsika RNI, 314, Bekily, 3382, Sakaraha STF, 3615, Sambiravo, 4131, Andohahela PN, 4308, Sambiravo, 5023, Betsako, 5333, Jafaro, 7798, Tsimañana, 8257, Tsimembo, 8298, Lambomakandro, 9570, Manave, 9995, Mariarano, 10266, Morarano, 10271, Ranopiso, 10772, Ambalatsingy, 11153, Marofany, 11847, Bevilany, 12293, Tanambao, 12387, Ianandranto, 12772, Ambodimany, 12783, Fotadrevo, 12827, Filanjara, 12905, Vohipary, 13048, Betsiporika STF, 13502,

Ankazomanga, 14128, Belo sur Tsiribihina, 14379, Isalo PN, 14531, Ambilomavo, 14926, Andoharano, 15084, Antonibe, 16321, Ambararatakely, 16377, Tongay, 16631, Befasy, 17046, Andohahela PN, 17069, Namoroka RNI, 19064, Ambalafary, 19608, Tandra, 21371, Mahatsara, 24286, Berivotra; *Seyrig* 22, 262, Ampandranda; *L. Sussman* 115, Analafaly, 309, 314, Beza Mahafaly; *Villiers* 4984, Bemaraha RNI.

## 9. *Rhopalocarpus macrorhamnifolius* Capuron

*Adansonia*, sér. 2, 2: 247 (1962).—Type: *Service Forestier* 9184 (holo-, P!; iso-, MO!, P[2 sheets!]).

*Rhopalocarpus macrorhamnifolius* is distributed from Betampona RNI to Marojejy RNI (Fig. 1B). As discussed above, it can be easily confused with *R. louvelii*, but differs by its leaves with flat or only slightly undulate margins, triplinerved venation with the two lateral primary veins thinner than the central one, the three primaries not sunken on the upper surface, the blade flat without raised-corrugate tissue in between the veins, and obscure tertiary venation on the upper surface.

VERNACULAR NAMES.—Hafotrankora, Hafotrankora fanondambo, Havoha, Lombiro, Lombiry, Sary.

MATERIAL EXAMINED.—*Nicoll* 663, Marojejy RNI; *Rasoavimbahana* 477, Marojejy RNI; *Réserves Naturelles* 2203, 2630, 8743, Betampona RNI; *Schatz* 3051, Ambanizana, 3912, Ankirindro; *Service Forestier* 9184, Tanambao, 11054, Soanierana Ivongo, 15609, 15900, Tampolo STF, 17552, 18097, Betampona RNI, 18283, Fahampanambo (=Fampanambo), 18346, Farankarina STF, 22812, Tampolo STF.

## 10. *Rhopalocarpus parvifolius* (Capuron) G.E. Schatz, Lowry & A.-E. Wolf, **comb. et stat. nov.**

*Rhopalocarpus louvelii* var. *parvifolius* Capuron, *Adansonia*, sér. 2, 2: 246 (1962).—Type: *Service Forestier* 9715 (holo-, P!).

*Rhopalocarpus parvifolius* is known only from littoral forest at Ambila-Lemaitso (Fig. 1C), where it was collected earlier this year for the

first time since 1958. It is sharply distinguished from *R. louvelii* by having smaller leaves and shorter petioles.

VERNACULAR NAME.—Tavialahy.

MATERIAL EXAMINED.—*Ratovoson* 22, Ambila-Lemaitso STF; *Service Forestier* 1624, 1795, 8569, 9715, 15316, 17996, 19005, 19243, Ambila-Lemaitso STF.

## 11. *Rhopalocarpus similis* Hemsley

Hooker's Icon. Pl. 28: 3, tab. 2774 (1903).—Type: *Baron* 3361 (holo-, K!).

*Sphaerosepalum madagascariense* Danguy, Bull. Mus. Hist. Nat. Paris 31: 203 (1925).—Type: *Decary* 908 (holo-, P!; iso-, P!).

*Rhopalocarpus similis* Hemsley subsp. *velutinus* Capuron, *Adansonia*, sér. 2, 2: 244 (1962).—Type: *Réserves Naturelles* 2081 (holo-, P!; iso-, P!); **syn. nov.**

*Rhopalocarpus similis* is widely distributed throughout dry deciduous forest, from Sakaraha to the southern limit of the Sambirano region, and extends to higher elevations on the central plateau (Fig. 2A). It is most easily distinguished by its discolorous leaves, with the upper surface evidently darker brownish-purple than the light olive green lower surface. In the Boina region, specimens (perhaps associated with white sand substrates) exhibit more widely spaced and pronounced secondary veins, and served as the basis for Capuron's *R. similis* subsp. *velutinus*. However, both to the N and S of the Boina region, venation grades continuously into a pattern that is typical of the species elsewhere in its range, which has led us to place this subspecies in synonymy.

VERNACULAR NAMES.—Bemanefoka, Fanazava, Hafotrankanga, Hazondringitra, Lombirohazo, Raingitra, Raingitavavy, Rengitra, Ringitra, Talafotsy, Talofory, Taolandambo.

MATERIAL EXAMINED.—*Baron* 3361, without precise locality; *Boiteau* 1048, Ankarafantsika RNI, 2106, Antolohomiady; *Bosser* 9084, Sakaraha, 16492, 16496, Andilamena; *Cours* 2182, Analamanatrika; *Croat* 30690, 30739, Zombitsy; *Decary* 908, Majunga, 15962, Ankinany; *Descoings* 3783, Ivohibe;

*Dorr* 3831, Mahajanga; *Gentry* 11553, 11759, Antsahabe, 62113, 62122, Ampijoroa STF; *Herb. St. Agric. Alaotra* 2182, Analamanatrika; *Humbert* 2029, Majunga, 5066, Fihrenana, 7157, Caïman; *Keraudren* 1103, Isalo PN; *Leandri* 2271, Bemihia, 3584, Zombitsy, 3957, Isalo PN; *Morat* 3872, Besely; *Nicoll* 383, Ampijoroa STF; *Peltier* 5300, Amborovy; *Phillipson* 1933, Ampijoroa STF, 3646, Zombitsy; *Réserves Naturelles* 1032, 2081, 2583, 2975, Ankarafantsika RNI, 8559, Namoroka RNI; *Schatz* 1597, Port Bergé Vaovao; *Service Forestier s.n.*, Ambohiby, 105-R-281, Ampasindava, 2278, Ankarafantsika RNI, 3111, Antsanitia STF, 3410, Zombitsy, 3583, Mahamavo, 4010, Mangabory, 4573, Lambomakondro, 4972, Ampijoroa STF, 5163, Kitranga, 5261, Analavelona, 5356, Besalampy, 5954, Maintinandry, 6727, Analandraisoa, 6887, Bemihia, 7341, Ampijoroa STF, 7639, Ihosy STF, 8072, Namatsia, 9579, Marokoloy, 10406, Antetikirija, 11615, Kitranga, 11985, Babetville, 12563, Ambohimahavelona, 13455, Kitranga, 13812, Ankoratsaka, 14094, Mangona, 14146, Ampijoroa STF, 14525, Ambalafotaka, 14587, Ambato-Boeni, 15347, Herea, 15715, Tsarahoncnana, 15769, Analabé, 15808, Andrafia, 16372, Ampandra, 16514, Ambiky, 17415, Namoroka RNI, 18585, Isalo PN, 19063, Ambalavelona, 19143, Ampasindava, 19361, Mangoboka, 19363, Antsoa, 19461, Ambarijby, 19482, Ambohimitsinjo, 19493, Analobe, 19671, Maroboaly, 25931, Ambavarano, 30021, Ankobakobaka.

## 12. *Rhopalocarpus suarezensis* Capuron ex Bosser

*Adansonia*, sér. 2, 13: 55 (1973).—Type: *Service Forestier (Capuron)* 24463 (holo-, P!; iso-, K!, MO!, P [2 sheets]).

*Rhopalocarpus suarezensis* is restricted to dry deciduous forest in the region of Antsiranana in far northern Madagascar (Fig. 2C). Among the species with palmatinerved venation, it can be distinguished by its chartaceous to subcoriaceous, glabrous leaves, with venation that is strikingly purple to blackish against the light greenish-gold blade in dried material.

VERNACULAR NAME.—Hafompotsy, Lombiroala, Selivato.

MATERIAL EXAMINED.—*Cours* 5403, Orangéa; *Humbert* 32289 (= *Cours* 5403), Orangéa; *Randriantafika* 20, Windsor Castle; *Ratovoson* 30, Baie des Dunes-Orangéa; *Service Forestier* 9-R-143,

Namakia; 20138, Baie de Courrier, 20934, 23271, Orangéa, 23283, Andrakaka, 24453, Ambongoabo, 24463, Ankotekona, 24463bis, Ankingameloka, 24648, Ambongoabo.

## 13. *Rhopalocarpus thouarsianus* Baill.

*Bull. Soc. Linn. Paris* 1: 393 (1883).—Type: *Du Petit Thouars s.n.* (holo-, P!).

*Rhopalocarpus pseudothouarsianus* Capuron, *Adansonia*, sér. 2, 2: 34. (1962).—Type: *Service Forestier* 9896 (holo-, P!); **syn. nov.**

*Rhopalocarpus thouarsianus* is distributed in littoral forest on sand from N of Mananjary to the Masaola Peninsula (Fig. 2B). Among the species with palmatinerved venation, *R. thouarsianus* is distinguished by its coriaceous, glabrous leaves drying reddish-brown, with venation that is the same color as the blade. Floral pubescence and disc development vary only slightly throughout the range of the species, depending upon age of the flower, and consequently *Rhopalocarpus pseudothouarsianus* Capuron, which was based on minor differences in these characters, is here placed into synonymy.

VERNACULAR NAMES.—Hafotrakora, Hafotrankora, Lombiry, Mantaditra, Tavia.

MATERIAL EXAMINED.—*Anonymous* 1052, Tampolo STF; *Birkinshaw* 322, Soanierana Ivongo; *Debray* 1877, Tampolo STF; *Du Petit Thouars s.n.*, without precise locality; *Humboldt s.n.*, Foulpointe; *Miller* 8806, Tampolo STF; *Noyes* 948, Foulpointe; *Rahajaso* 428, Masoala PN; *Schatz* 3634, Tampolo STF; *Service Forestier* 699, 1363, Antetazana STF, 9896, Ambila-Lemaitso STF, 10301, Tampolo STF, 10590, Mahatsara, 10745, Menagisy, 11056, Soanierana Ivongo, 12536, 13081, Tampolo STF, 13433, Marosangy, 14497, Antetazana STF, 15126, 15617, 15901, Tampolo STF, 19533, Nosy-Varika, 23791, Sahavolamcnabe, 34148, Mahatsara.

## 14. *Rhopalocarpus triplinervius* Baill.

*Adansonia* 10: 106 (1871).—Type: *Bernier* 227 (holo-, P!; iso-, P!).

*Rhopalocarpus triplinervius* is restricted to the far North in the region around and SE of Antsiranana, with a disjunct occurrence near

Mandritsara (Fig. 2D). Among the species with palmatinerved venation, *R. triplinervius* is easily distinguished by the dense, soft pubescence on the leaf lower surface, and the obscure tertiary venation on the upper surface.

VERNACULAR NAMES.—Lombiro, Manondroala, Varoala-Lombiroana.

MATERIAL EXAMINED.—Bernier 227, Ambanilalana, Boivin 2596, Diégo Suarez; Harder 1672, Diego Suarez; Ratooson 45, Analajanana Forest; Service Forestier 128-R-301, Mandritsara; 9425, 11374, Antsahafary, 14004, 15835, 15964, Ambolobozobe, 22009, Sahafary, 22963, Ivovona, 23045, Antsoha, 27527, Analafiana.

**15. Rhopalocarpus undulatus Capuron**

Adansonia, sér. 2, 2: 251 (1962).—Type: Service Forestier 9380 (holo-, P!; iso-, P!).

*Rhopalocarpus undulatus* is restricted to the far North on limestone areas and old dunes in the region of Antsiranana and Ankarana RS (Fig. 1D). Among the species with penninerved venation, it can be distinguished by its strongly undulate margins.

VERNACULAR NAMES.—Andrengitra, Lombiroala.

MATERIAL EXAMINED.—Service Forestier 9380, 10526, Ankarana RS, 15966, Ambodivahibe, 27431, Andaingo; Ursch 145, Antsiranana.

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