Endemic families of Madagascar. IV. A synoptic revision of *Asteropeia* (Asteropeiaceae)

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ABSTRACT
As part of an assessment of the conservation status of the vascular plant families endemic to Madagascar and the Comoro Islands, a synoptic revision is presented of *Asteropeia* (Asteropeiaceae). The genus was traditionally placed in Theaceae, but recent data from wood anatomy and chloroplast gene sequences indicate a probable sister relationship with another Malagasy endemic, *Physena* (the sole member of the family Physenaceae), the two taxa together forming a basal branch within Caryophyllales. Analysis of available herbarium material permits the recognition of eight species, two of which are described as new (*A. labatii* and *A. mcphersonii*) and one is elevated from the rank of variety (*A. matrambody*); three illegitimate varieties are placed in synonymy. A key to the species is provided in English and French.

KEY WORDS
Asteropeiaceae,
Asteropeia,
Madagascar,
endemism.

RÉSUMÉ

Familles endémiques de Madagascar. IV. Révision synoptique du genre Asteropeia (Asteropeiaceae).

Dans le cadre de l'évaluation, pour la conservation, des familles de plantes vasculaires endémiques de Madagascar et des Comores, la révision synoptique du genre *Asteropeia* (Asteropeiaceae) est présentée. Traditionnellement, le genre a été placé dans les Theaceae, mais des études récentes sur l'anatomie du bois et des séquences d'un gène chloroplastique suggère une proche affinité avec un autre genre malgache endémique, *Physena* (seul membre de la famille des Physenaceae) ; ces deux taxons constituent une branche basale au sein des Caryophyllales. L'examen des spécimens d'herbier disponibles permet la reconnaissance de huit espèces, dont deux nouvelles sont décrites ici (*A. labatii* et *A. mcphersonii*) ; une variété est élevée au rang d'espèce (*A. matrambody*) ; trois variétés illégitimes sont placées en synonymie. Une clé de détermination est fournie en anglais et en français.

MOTS CLÉS
Asteropeiaceae, *Asteropeia*, Madagascar, endémisme.

INTRODUCTION

In preparation for the publication of a Red Data Book on the plant families endemic to Madagascar and the Comoro Islands, a critical revision of the taxonomy of each genus is being undertaken in order to provide a reliable framework for assessing the conservation status of the approximately 95 species concerned (LOWRY et al., 1999; SCHATZ et al. 1998, 1999). For this, the fourth in our series, we have examined all the available material of *Asteropeia* Thouars (Asteropeiaceae) at the major herbaria with large holdings of Malagasy plants (K, MO, P, TAN and TEF), and we have reviewed and revised the circumscription of species as presented by PERRIER DE LA BÂTHIE (1951) and supplemented by CAPURON (1974).

Asteropeia has traditionally been placed in Theaceae, despite the fact that its colpate-spinulate pollen was anomalous within the family (indeed, such pollen is unknown in any other member of the order Theales), and that its wood anatomy was likewise distinctive. Based on an analysis of wood features, DICKISON & MILLER (1993) suggested a possible relationship between *Asteropeia* and the Malagasy endemic *Physena* Noronha ex Thouars (Physenaceae). Molecular sequence data from the chloroplast *rbc*L gene have subsequently corroborated a probable sister relationship between these two genera, which together comprise a basally branching lineage within Caryophyllales (MORTON et al. 1997). Morphologically, however, the flowers and fruit of the two genera appear to have little in common: species of *Asteropeia* are hermaphroditic and have relatively small but showy flowers with petals and sepals, and thus are almost surely adapted to insect pollination; in contrast, both species of *Physena* are dioecious, lack petals, and are clearly wind-pollinated. The gynoecium of *Asteropeia* appears to be composed of three fused carpels, with an incompletely 3-locular ovary and a common style with a 3-lobed capitate stigma or 3 sessile, stylar/stigmatic branches, whereas *Physena* has a unilocular ovary with 2 parietal placentae and 2 sessile, long stylar/stigmatic branches. Although fruits of both genera are single-seeded, those of *Asteropeia* are small, irregularly dehiscent capsules, whereas those of *Physena* are large, air-filled, indehiscent bladders.

Based upon our examination of the available material of *Asteropeia*, we propose the following revised taxonomy. Eight species are recognized here, two of which (*A. labatii* and *A. mcphersonii*) are newly described and one (*A. matrambody*) is elevated from the rank of variety. For the "Material examined" cited below under each species, abbreviations are as follows: PN = Parc National; RB = Réserve de la Biosphère; 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, is available on the World Wide Web through W3 TROPICOS (*http://mobot.mobot.org/Pick/Search/pick.html*). Images of several species are also provided on the Web (*http://www.mobot.org/MOBOT/Madagasc/astero.html*).

ASTEROPEIA Thouars

Hist. Vég. Isles Austr. Afr.: 51, pl. 15 (1805). *Rhodoclada* Baker, J. Linn. Soc. Bot. 21: 327 (1884).—Type: *Rhodoclada rhopaloides* Baker [= *Asteropeia rhopaloides* (Baker) Baill.]

TYPE.—*Asteropeia multiflora* Thouars.

Key to the species of *Asteropeia*

1. Inflorescence axes glabrous 2
1'. Inflorescence axes and lower surface of young leaves covered with dense, short, rusty brown ferruginous indumentum (older inflorescences occasionally subglabrous) 7
2. Flowers and fruits sessile 3
2'. Flowers and fruits with an evident pedicel at least (2.5-)5 mm long 5
3. Leaves narrowly oblanceolate, usually greater than 5 times as long as wide, subsessile; calyx lobes in fruit greater than 5 mm long; Tapia woodland, Itremo to Isalo, 800-1500 m ..... 3. **A. labatii**
3'. Leaves elliptic to obovate, never more than 3 times as long as wide, distinctly petiolate; calyx lobes in fruit less than 5 mm long 4
4. Leaves coriaceous, mostly 2 times as long as wide, 3.5-6 cm long, margins strongly revolute, at least some folded under in dried material; calyx lobes spreading to reflexed-convex in fruit; humid forest, Analamazaotra-Périnet, Ambatovy, Zahamena RNI, 800-1100 m ..... 5. **A. mcphersonii**
4'. Leaves subcoriaceous, mostly 3 times as long as wide, 7.2-11.3 cm long, margins weakly revolute to flat, rarely folded under in dried material; calyx cupuliform in fruit, the lobes ascending to erect, concave; littoral forest on sand, Tampolo STF to Fort Dauphin ..... 6. **A. micraster**
5. Ovary and fruit conical-ovoid, with three distinct ridges extending to the acuminate apex, surmounted by three sessile stigmatic branches; littoral forest on sand, and occasionally in humid forest at higher elevation on weathered quartzite sands, Sambava to Fort Dauphin ..... 7. **A. multiflora**
5'. Ovary and fruit depressed ovoid to subglobose, without distinct ridges, the apex rounded to somewhat indented, surmounted by an evident, slender style with a capitate, 3-lobed stigma 6
6. Calyx lobes in fruit (9-)11-15 mm long; mature fruit 4-5 mm in diam.; largest leaves 8.5-17.5 cm long; low elevation forest on sand and laterite, S of Vohemar to Ambila-Lemaitso ..... 4. **A. matrambody**
6'. Calyx lobes in fruit 6-9(-10) mm long; mature fruit 2.8-3.5(-4) mm in diam.; largest leaves 6.5-10(-12.5) cm long; subhumid to dry forest, N, NW (Ambongo-Boina region S to Soalala) and Center (Itremo S to upper Mandrare River basin) ..... 1. **A. amblyocarpa**
7. Pedicels with numerous, minute, caducous bracteoles at the base, leaving evident scars; fruit spherical to ellipsoid, broadest at the middle, hard, smooth and shiny-glabrous; usually gnarled shrubs 1.5-2.5 m tall, occasionally prostrate or forming small trees to 8 m tall; Ibity to Andringitra RNI, 1400-1800 m ..... 2. **A. densiflora**
7'. Pedicels without bracteoles at the base; fruit ovoid, broadest below the middle, verrucose and dull, occasionally with persistent indumentum; trees 6-25 m tall or rarely large shrubs 3-5 m tall; Sambirano, Marojejy, Beanjada, Analamazaotra-Périnet, Ambatovy, Anjozorobe, 800-1400 m ..... 8. **A. rhopaloides**

Clé des espèces d'*Asteropeia*

1. Axes de l'inflorescence glabres 2
1'. Axes de l'inflorescence et face inférieure des jeunes feuilles couverts d'un indument dense, court brun-rouille ferrugineux (les inflorescences plus âgées parfois subglabres) 7
2. Fleurs et fruits sessiles 3
2'. Fleurs et fruits à pédicelle apparent, mesurant au moins (2,5-)5 mm de long 5
3. Feuilles étroitement oblancéolées, la plupart au moins cinq fois plus longues que larges, subsessiles ; lobes du calice dépassant 5 mm de long dans le fruit ; bois de Tapia, de l'Itremo à l'Isalo, 800-1500 m d'altitude ..... 3. **A. labatii**
3'. Feuilles elliptiques à obovées, la longueur ne dépassant jamais trois fois la largeur, distinctement pétiolées; lobes du calice ne dépassant pas 5 mm de long dans le fruit 4

4. Feuilles coriaces, la plupart deux fois plus longues que larges, de 3,5-6 cm de long, marges fortement révolutées, quelques unes repliées sur le matériel sec ; lobes du calice étalés à recourbés vers le bas dans le fruit ; forêt humide, Analamazaotra-Périnet RS, Ambatovy, Zahamena RNI, 800-1100 m d'altitude ..... 5. **A. mcphersonii**
4'. Feuilles subcoriaces, la plupart trois fois plus longues que larges, mesurant 7,2-11,3 cm de long, marges lâchement révolutées à plates, rarement repliées sur le matériel sec ; calice cupuliforme dans le fruit, lobes relevés à dressés, concaves ; forêt littorale sur sable, de Tampolo STF à Fort Dauphin ..... 6. **A. micraster**
5. Ovaire et fruit coniques-ovoïdes, à trois côtes distinctes rejoignant l'apex acuminé, et surmontés de trois branches stigmatiques sessiles ; forêt littorale sur sable, parfois en forêt humide à plus haute altitude, sur sables quartzitiques exposés, de Sambava à Fort Dauphin ..... 7. **A. multiflora**
5'. Ovaire et fruit déprimés, ovoïdes à subglobuleux, sans côtes distinctes, à apex arrondi à un peu dentelé, surmonté d'un style mince et distinct, à stigmate tri-capité 6
6. Lobes du calice de (9-)11-15 mm de long dans le fruit; fruit mature de 4-5 mm de diam. ; les feuilles les plus grandes mesurant 8,5-17,5 cm de long ; forêt de basse altitude sur sable et latérite, S de Vohemar à Ambila-Lemaitso ..... 4. **A. matrambody**
6'. Lobes du calice de 6-9(-10) mm de long dans le fruit ; fruit mature de 2,8-3,5(-4) mm de diam. ; les feuilles les plus grandes de 6,5-10(-12,5) cm de long ; forêt subhumide à sèche, N, NW (du sud de la région d'Ambongo-Boina à Soalala) et Centre (du sud de l'Itremo au bassin supérieur de la rivière Mandrare) ..... 1. **A. amblyocarpa**
7. Pédicelles à nombreuses bractéoles à la base, minuscules et caduques, laissant des cicatrices apparentes ; fruit sphérique à ellipsoïde, plus large au milieu, dur, lisse, glabre et brillant ; arbustes habituellement noueux, de 1,5-2,5 m de haut, parfois prostrés ou formant de petits arbres atteignant 8 m de haut ; de l'Ibity à Andringitra RNI, de 1400-1800 m d'altitude ..... 2. **A. densiflora**
7'. Pédicelles sans bractéoles à la base; fruit ovoïde, plus large dans la partie inférieure, verruqueux et terne, portant parfois un indument persistant; arbres de 6-25 m de haut, plus rarement grands arbustes de 3-5 m de haut ; Sambirano, Marojejy, Beanjada, Analamazaotra-Périnet RS, Ambatovy, Anjozorobe, 800-1400 m d'altitude ..... 8. **A. rhopaloides**

1. Asteropeia amblyocarpa Tul.

Ann. Sci. Nat., sér. 4, 8: 81 (1857).—Type: *Bernier 281*, Madagascar, Ambanilalana (holo-, P!; iso-, P!).
Asteropeia amblyocarpa Tul. var. *longifolia* H. Perrier, Fl. Madagascar 134: 4 (1950), nomen inval., non rite publ. sine Latin.; ***syn. nov.***
Asteropeia rhopaloides (Baker) Baill. var. *angustata* H. Perrier, Fl. Madagascar 134: 10 (1950), nomen inval., non rite publ. sine Latin., pro parte (*Humbert 11654*); ***syn. nov.***

Asteropeia amblyocarpa is distributed in subhumid to dry forest in the NW from Ankarana RS to the Ambongo-Boina region, as well as on the Central High Plateau from Itremo to Andringitra RNI, with one collection from the upper Mandrare River basin in the region of Andohahela PN in the far SE (Fig. 1A). Despite its wide distribution, however, *A. amblyocarpa* has been collected only once since the early 1960s, most recently at Antafiambotry near Ambanja in 1971. It can be recognized by its pedicellate flowers with a depressed ovoid to subglobose ovary (and fruit) that is rounded to somewhat indented at the apex and surmounted by an evident, slender style.

PERRIER DE LA BÂTHIE (1950) recognized *Asteropeia amblyocarpa* var. *longifolia* based on *Humbert 14065* from the region of Andohahela PN, but failed to provide a Latin description or diagnosis. A second invalid name, *A. rhopaloides* var. *angustata*, was based on two specimens, one of which (*Humbert 11654*) is referable to *A. amblyocarpa* and the other (*Perrier 13713*) to *A. densiflora*. The low elevation east coast *A. amblyocarpa* var. *matrambody* described by CAPURON (1974) is here recognized at the species level (see below).

VERNACULAR NAMES.—Haraka, Hazonjia.

MATERIAL EXAMINED.—MADAGASCAR: *Baron 6726*, without precise locality; *Bernier 281*, Ambanilalana; *Boanarisolo 122*, Marokitrana; *Debray 1607*, Antafiambotry; *Decary 8123*, Bokorafa; *Douliot s.n.*, without precise locality; *Hildebrandt 3315*, Vavatobé; *Humbert 11654*, Vohipolaka, *13865*, Apiky, *14065*,

Andohahela PN, *28154*, Itremo; *Perrier de la Bâthie 6719*, *13469*, *16796*, Majunga; *Réserves Naturelles 2041*, *2083*, *2585*, Ankarafantsika RNI, *9929*, *11559*, Andringitra RNI; *Service Forestier 3632*, Antsoa, *9263*, Andilamboay, *11562*, Antanimena, *12035*, Ankarana RS, *15837*, Manérina, *15926*, Ankotikona, *18932*, Antsatrana; *19569*, Andilamboay.

2. **Asteropeia densiflora** Baker

J. Bot. 20: 49 (1882).—Type: *Baron 40*, Madagascar, without precise locality (holo-, K!; iso-, P!).

Asteropeia sphaerocarpa Baker, J. Linn. Soc. Bot. 22: 479 (1886).—Type: *Baron 3401*, Madagascar, without precise locality (holo-, K!; iso-, P!)

Asteropeia rhopaloides (Baker) Baill. var. *angustata* H. Perrier, Fl. Madagascar 134: 10 (1950), nomen inval., non rite publ. sine Latin., pro parte (*Perrier 13713*); ***syn. nov.***

Asteropeia densiflora is a gnarled shrub to small tree, or occasionally forms a prostrate carpet no more than 15 cm in height (Fig. 5). It occurs on granitic, quartzite, and marble outcrops from Ibity to Andringitra RNI (Fig. 1B), and has been

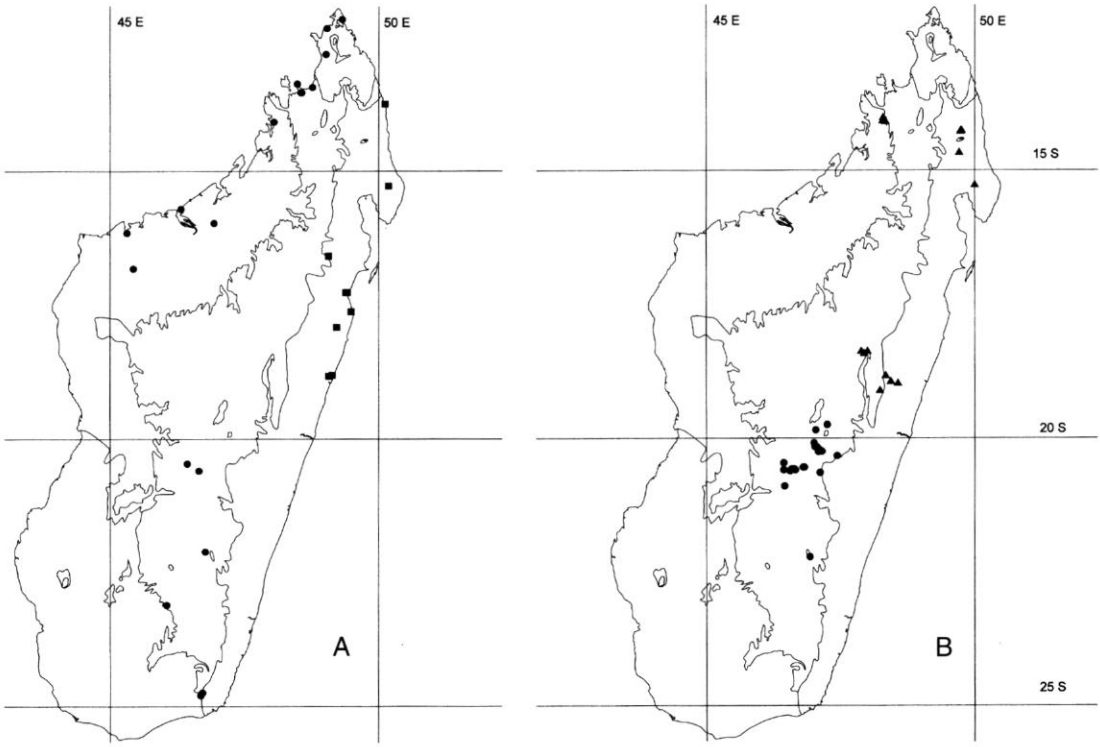

Fig. 1.—Distributions of ***Asteropeia***, mapped on the bioclimatic zones of Madagascar (after CORNET 1974). **A**, ***A. amblyocarpa*** (●), ***A. matrambody*** (■); **B**, ***A. densiflora*** (●), ***A. rhopaloides*** (▲).

most recently collected earlier this year at Itremo. *Asteropeia densiflora* can be distinguished from *A. rhopaloides*, with which it shares inflorescence axes covered with dense, short, rusty brown ferruginous indumentum, by its pedicels with numerous, minute, caducous bracteoles at the base, which leave evident scars, and by its spherical to ellipsoid, hard, smooth, shiny-glabrous fruits.

VERNACULAR NAMES.—Fandambana, Sapemadinika.

MATERIAL EXAMINED.—MADAGASCAR: *Baron 40, 3401*, without precise locality, *s.n.*, Betsileo; *Birkinshaw et al. 561*, Itremo; *Bosser 6053*, Antsirabe, *9880, 10016*, Itremo, *18768*, Col des Tapias; *Decary 13234*, Ambatofinandrahana; *Dorr 3839*, Ambohimanjaka, *3870, 4505*, Mont Ibity; *Guillaumet 4254*, Itremo, *4505*, Mont Ibity; *Humbert 7113*, Col des Tapias, *14491, 28007*, Faliarivo, *28095*, Ambatofinandrahana, *29960*, Itremo; *Labat et al. 3028*, Col des Tapias; *Morat 908*, Itremo; *Peltier 2162*, Fiadanana; *Perrier de la Bâthie 7098ter*, Ibity, *10143*, Ambatomainty, *13713*, Andringitra RNI, *18500*, Ibity; *Phillipson 4030*, Ibity; *Réserves Naturelles 2383, 3600, 9890*, Andringitra RNI; *Service Forestier 4721*, Antanimena, *11550*, Ambatofinandrahana, *23491*, Ampandrianombilapa, *29052*, Itremo; *Viguier 1504*, Ibity.

3. **Asteropeia labatii** G.E. Schatz, Lowry & A.-E. Wolf, **sp. nov.**

Asteropeia micraster H. Hallier var. *angustifolia* H. Perrier, Fl. Madagascar 134: 8 (1950), nomen inval., non rite publ. sine Latin.

Haec species inter congeneros inflorescentiae axibus glabris ad Asteropeiam mcphersonii *et* A. micrasterem *floribus fructibusque sessilibus maxime accedit, sed ab eis foliorum subsessilium plerumque 5-plo longiorum quam latiorum lamina juventute supra glauca, floribus bracteolis 8 ad 12 subtentis atque lobulis calycinis in fructu longitudine 5 mm excedentibus distinguitur.*

TYPUS.—*Labat, Du Puy & Andriantiana 2411*, Madagascar, Prov. Fianarantsoa, Ambatofinandrahana, versant E du massif de l'Itremo, 20°35'13"S, 46°35'23"E, 1500 m, 23 Nov. 1993, fl. (holo-, P!; iso-, K, MO!, TAN, TEF, WAG).

Shrub to small tortuous tree to 8 m tall, to 20(-25) cm dbh, bark to 4 cm thick, deeply fissured. Leaves subsessile, petiole to 1 mm long, terete, lamina glaucous above when young, becoming chartaceous to somewhat coriaceous, oblanceolate to narrowly oblanceolate, 1.7-8.5 × 0.5-1.9(-2.2) cm, base long attenuate with the lamina decurrent along petiole to nearly the base, margin slightly revolute, apex obtuse to rounded, occasionally emarginate, venation mostly obscure with 4-5 secondary veins per side. Inflorescences axillary at apex of stem and thus appearing terminal, solitary to as many as 7 in a cluster, the main axis to 11.6 cm long, with 7-10 secondary axes perpendicular to the main axis, the basal branch to 7.2 cm long, sometimes with short tertiary branches, the remaining secondary branches progressively shorter; flowers sessile, subtended by 8-12 tightly imbricate acute bracteoles; calyx of 5 sepals fused at their base, the lobes (4-)5 × 3 mm, green, persistent and accrescent in fruit; petals free, 3 × 2 mm, white, caducous; stamens 10, filaments fused into a ring at their base, free portion 1 mm long, anthers 1-2.3 mm long; ovary ellipsoid to subglobose, 1.2 mm long, 1.2 mm diam., style lacking, three sessile stigmatic branches 0.6 mm long, 0.3 mm diam. Fruit 2.5-3 mm diam., 2.5-2.8 mm tall, broadly ovoid to pyramidal, subtended by the persistent calyx, lobes spreading, (4-)5-6.6 × 2-3.8 mm, shiny scarious.—Figs 2, 5.

A member of the "*A. micraster* complex" by virtue of its sessile flowers subtended by bracteoles, *A. labatii* is well differentiated from both *A. micraster* and *A. mcphersonii* by its oblanceolate, subsessile leaves averaging 5 times as long as wide, and with the lamina glaucous when young, its flowers subtended by 8-12 bracteoles, and its calyx lobes that exceed 5 mm long in fruit (Fig. 2). *Asteropeia labatii* is distributed on rocky outcrops on the Central High Plateau from the Itremo Massif to the Isalo Massif (Fig. 3A). It has been collected several times within the last two decades (most recently earlier this year at Itremo).

ETYMOLOGY.—The species epithet honors our colleague Jean-Noël LABAT (P), among whose many important collections from the Itremo region we are pleased to designate the type of this distinctive new species.

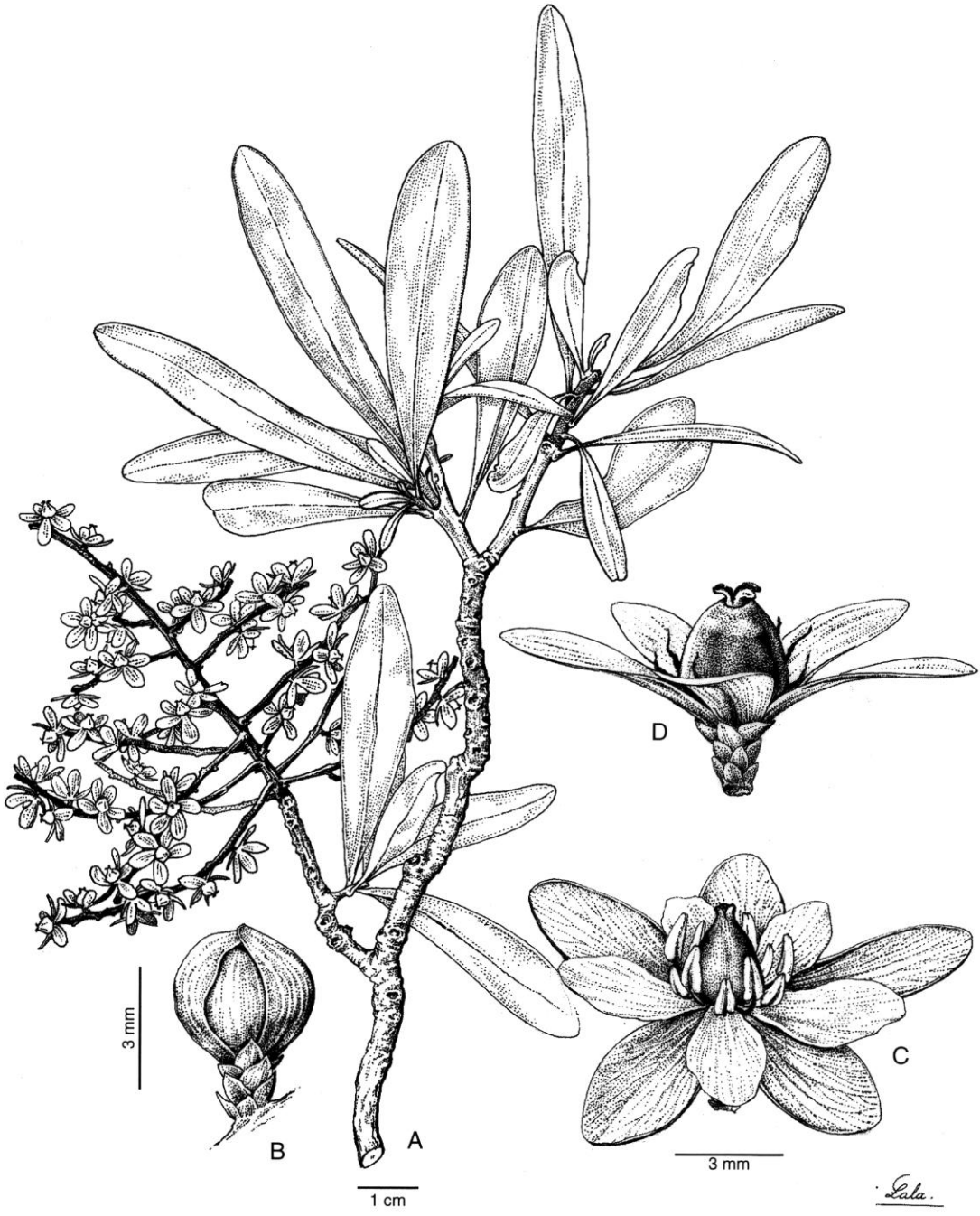

Fig. 2.—***Asteropeia labatii*: A**, leaves and infructescence; **B**, bud with bracts; **C**, flower; **D**, fruit with persistent calyx. (A, D, *McPherson 17528*; B, C, *Labat et al. 2411*).

VERNACULAR NAMES.—Hezana, Hezo.

PARATYPES.—MADAGASCAR. **Prov. Fianarantsoa:** *Baum 59*, Col d'Itremo, 2 km W of Vodiharana, E facing slope (24°), rocky, 20°35'30"S, 46°36'30"E, 2 Aug. 1984 (MO); *Cremers 3612*, lisière forestière sur la face W du Massif d'Ingaro, ouest Ambalavao, 21°36'S, 46°22'E, 830 m, 11 Dec. 1974, bd., fl. (P); *Decary 13037*, environs d'Ambatofinandrahana, gneiss, 20°33'S, 46°48'E, 1600-1800 m, 17 Feb. 1938, y.fr. (K, P); *Humbert 11226bis*, Plateau de l'Isalo, Col des Tapias au SW de Ranohira, rocailles (grès), 22°47'S, 45°01'E, 1000 m, Oct. 1933, st. (P); *Humbert 19512*, plateaux et vallées de l'Isalo, partie N: au S. de Sahanafo, 22°20'S, 45°18'E, 1000 m, 28 Nov.-4 Dec. 1946, bd., fl., y.fr. (K, P); *Humbert 28693*, plateaux et vallées de l'Isalo à l'Ouest de Ranohira, grès et sables siliceux, 22°31'S, 45°18'E, 1000-1200 m, 29 Jan. 1955, fr. (P); *Jacquemin 372*, Isalo, lisière E du Plateau de Korobe en bordure des cañons, 22°11'-22°43'S, 45°10'-45°21'E, 24 May 1967, bd. (P); *Labat, Haevermans, Rabenantoandro & Cooke 3036*, Massif de l'Itremo, 20°35'09"S, 46°35'46"E, 1440 m, 26 Mar. 1999, fr. (B, G, K, MO, P, TAN); *Lorence 2052*, route nationale no. 7, 9 km SW of Ranohira, rocky hills with *Uapaca bojeri*, 22°36'S, 45°23'E, 800 m, 6 Nov. 1978, st. (K, MO); *Lorence 2078*, Route Nationale no. 7, 90 km NE of Sakaraha, savannah of *Uapaca bojeri*, 22°40'S, 45°17'E, 800 m, 6 Nov. 1978, bd. (K, MO); *Morat 2500*, savane après Ranohira, Isalo, 22°11'-22°43'S, 45°10'-45°21'E, Feb. 1967, y.fr. (P); *Perrier de la Bâthie 12411*, Centre, environs d'Ambatofinandrahana, bois à Tapia, bois des pentes occidentales, sur schistes, 20°33'S, 46°48'E, 1200 m, y.fr., fr. (P); *Phillipson, Clement & Rafamantanantsoa 3842*, Itremo Massif, on Route Nationale 35, 19 km W of Ambatofinandrahana, SW-facing rocky slope with deep gully, 20°34'00"S, 46°42'40"E, 1250 m, 11 Mar. 1992 (MO, TAN); *Razafindramonjy 133*, Isalo, dans un peuplement de Tapia, 22°08'-22°40'S, 45°10'-45°24'E, 19 July 1954 (TEF); *RN (Rakotoson) 12509*, Andringitra RNI, Village d'Ampasy, canton Vohitsaoka, Ambalavao, 22°18'S, 47°01'E, 22 Mar. 1963, fl. (TEF); *SF 4722*, Forêt Antanimena, Canton Itremo, District d'Ambatofinandrahana, 20°28'-20°49'S, 46°26'-46°41'E, 5 Sep. 1951, bd. (P); *SF (Capuron) 11652*, Ouest: massif gréseux de l'Isalo, aux environs du col des Tapias, 22°47S, 45°01E, Feb. 1955, y.fr., fr. (K, P, TEF); *SF (Razafindrakoto) 13758*, Massif Ingaro, Ambalavao, 21°36'S, 46°22'E, 900 m, 13 Feb. 1955, y.fr., fr. (P); *SF (Capuron) 29038*, entre Ambatofinandrahana et Itremo, rive droite de l'Imorona, 20°34'S, 46°42'E, 19 Feb. 1970, fl. (TEF); *SF (Kasambo) 30799*, Isalo PN, Ankezabe, 22°08'-22°40'S, 45°10'-45°24'E, 9 Feb. 1972, fl. (TEF); *SF (Abraham) 31413*, Isalo PN, Fokontany de Ranohira, 22°08'-22°40'S, 45°10'-45°24'E, 9 Apr. 1997, bud (TEF). **Prov. Toliara:** *Dinard 190*, Benenitra, Isalo, près du village d'Ankarabato, canton de Benenitra, district de Betioky, 23°27'S, 45°05'E, 9 July 1954 (TEF); *Humbert 2854,* plateaux et vallées de l'Isalo (au N de Benenitra): gorges de la Sakamarekely et de la Sambalinieto, grès et sables siliceux, 23°18'S, 45°07'E, 700-1000 m, 19 Oct. 1924, st. (P).

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

Asteropeia amblyocarpa Tul. var. *matrambody* Capuron, Adansonia, sér. 2, 14: 291 (1974).—Type: *Service Forestier 8304*, Madagascar, Ambila-Lemaitso STF (holo-, P!; iso-, K!, MO!, P!, TEF).

Asteropeia matrambody is distinguished from *A. amblyocarpa* by its more robust habit and larger leaves, floral, and fruiting parts. It is distributed in low elevation humid forest on sand and laterite from S of Vohemar to Ambila-Lemaitso (Fig. 1A). It was recently recollected at Tampolo STF, and was found for the first time at Betampona RNI in 1994.

The combination of morphological, ecological and geographic discontinuity between *A. amblyocarpa* and *A. matrambody* is considered more than sufficient to recognize the latter as distinct at the species level.

The type material comprises several branches with a) young developing leaves and inflorescences at anthesis and b) mature leaves with young infructescences. LEROY (in herb.) considered these specimens to represent a mixture, presumably because the flowering material closely resembles (but does not perfectly match) that of *SF 8318*. While it is possible that the flowering and fruiting branches were gathered at different times or concurrently but from separate individuals, no indication of this appears on any of the specimens. We therefore regard all the material of *SF 8304* to comprise a single gathering.

VERNACULAR NAMES.—Haraka, Matrambody.

MATERIAL EXAMINED.—MADAGASCAR: *André 97*, Ambila-Lemaitso STF; *Andrianarisata 153*, Betampona RNI; *Bégué 746*, Brickaville; *Raholivelo & Schatz 44*, Tampolo STF; *Réserves Naturelles 2254*, Masoala PN, *10345*, Ambatovaky RS; *Service*

Forestier 8304, *8318*, *9747*, Ambila-Lemaitso STF, *13957*, Ifonty, *15697*, Tampolo STF, *32925*, *34295*, Mahatsara SF.

5. **Asteropeia mcphersonii** G.E. Schatz, Lowry & A.-E. Wolf, **sp. nov.**

Haec species inter congeneros inflorescentiae axibus glabris ad Asteropeiam micrasterem *floribus fructibusque sessilibus, foliis petiolatis ut maximum 3-plo longioribus quam latioribus atque lobulis calycinis in fructu minus quam 5 mm longis maxime accedit, sed ab ea lamina foliari coriacea minore plerumque duplo longiore quam latiore ad marginem valde revoluta atque lobulis calycinis in fructu patentibus ad reflexis distinguitur.*

TYPUS.—*McPherson 17528*, Madagascar, Prov. Toamasina, Ambatovy, NE of Moramanga, 18°50'54"S, 48°17'56"E, 1000 m, 1 Mar. 1998, fl. (holo-, MO!; iso-, K!, P!, TAN, WAG!).

Shrub to large tree to 25 m tall. Petiole 2-6 mm long, terete, lamina extremely coriaceous, obovate to sometimes elliptic, (2.5-)3-6 × (0.7-)1-3.3 cm, base cuneate to attenuate, margin strongly revolute, often folding back on itself in

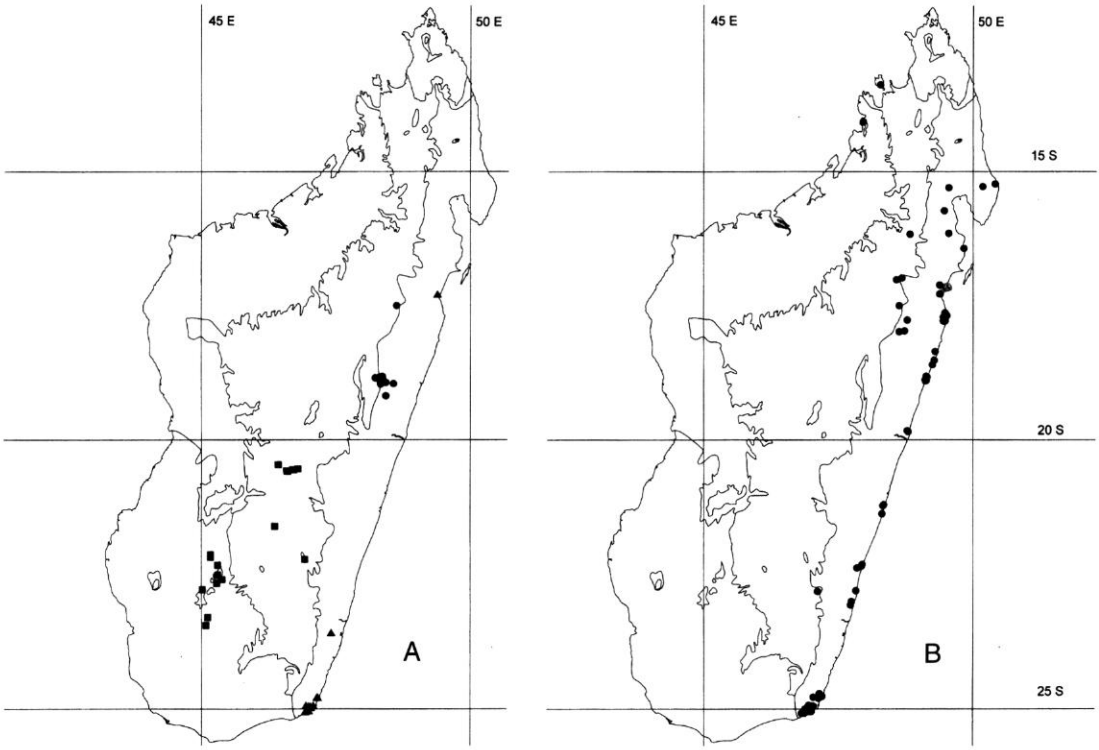

Fig. 3.—Distributions of ***Asteropeia***, mapped on bioclimatic zones of Madagascar (after CORNET 1974). **A, *A. labatii*** (■), ***A. mcphersonii*** (●), ***A. micraster*** (▲); **B, *A. multiflora*** (●).

dried specimens, apex rounded to truncate, occasionally emarginate, venation obscure, completely lacking on the lower surface, faintly visible and raised on the upper surface with 4-6 secondary veins per side, glossy glabrous above. Inflorescences axillary at apex of stem and thus appearing terminal, solitary, the main axis to 5 cm long, with 7-12 perpendicular secondary axes, each progressively shorter from base to apex; flowers sessile, subtended by 2-4 tightly imbricate, acute bracteoles; calyx of 5 sepals fused at their base, the lobes 2.5 × 1.2 mm, accrescent in fruit; petals free, 2.1 × 1.2 mm, caducous; stamens 10, filaments fused at their base into a ring, free portion 2.2 mm long, anthers 0.3 mm long; ovary pyramidal to ovoid, 1.5 mm diam, 1.5-1.7 mm tall, stigma sessile with 3 recurving lobes, 0.3 mm long. Fruit 2.8-3.3 mm diam, 2.5-3.2 mm tall, broadly ovoid to subglobose or nearly oblate, subtended by the persistent calyx, lobes spreading, 3.8-4.5 × 1.8-2.2 mm, shiny scarious.—Fig. 4.

Another member of the "*A. micraster* complex", *A. mcphersonii* can be distinguished from its presumed relatives by its smaller, more coriaceous leaves that are mostly twice as long as broad, with strongly revolute margins often folded back under the lamina in dried specimens, and by its spreading to reflexed calyx lobes (versus a cupuliform calyx with the lobes ascending to erect in *A. micraster*) (Fig. 4). *Asteropeia mcphersonii* is distributed in mid-elevation forest in a narrow band from Ambatovy to Zahamena RNI (Fig. 3A).

ETYMOLOGY.—The species epithet honors our colleague Gordon D. MCPHERSON (MO), among whose many beautiful Madagascar collections we are pleased to designate the type of this distinctive new species.

VERNACULAR NAMES.—Manoka, Manoka Mena, Manoko Fotsy, Manoko Mavo, Moara, Moara Mena.

PARATYPES.—MADAGASCAR. **Prov. Toamasina:** *Bosser 19626*, route de Lakato, PK 15 (E de Moramanga), 18°58'S, 48°20'E, May 1964, y.fr. (P, TAN[2 sheets]); *Botoalina 70*, Analamazaotra STF, 18°57'20"S, 48°34'30"E, 1000 m, 16 May 1950, fl. (TEF); *Cremers 1428*, Analamazaotra-Perinet RS, Route de Lakato, près de Perinet, 18°57'S, 48°21'E, 16 Feb. 1971, fl. (TAN); *McPherson 17473*, Madagascar, NE of Moramanga, Ambatovy, low, dense forest on lateritic soils, 18°51'12"S, 48°18'48"E, 1100 m, 26 Feb. 1998, fl. (K, MO, P, TAN); *Morat 3221*, Ambatovy (11 km NE de Moramanga), 18°50'S, 48°19'E, May 1969, y.fr. (P); *Perrier de la Bâthie 6717*, Est, Forêt d'Analamazaotra, 18°56'S, 48°26'E, 800 m, bd., fl., y.fr. (K, P); *Perrier de la Bâthie 14772*, Est/Centre, Forêt d'Analamazaotra, 18°56'S, 48°26'E, 600 m, July 1922, y.fr. (P); *Rakotomalaza 1379*, Fiv. Moramanga, Fir. Ampitambe, Forêt d'Analamay, 18°51'39"S, 48°18'00"E, 980 m, 2 July 1997, fl. (K, MO, P, TAN); *RN (Botoalina) 3739*, Zahamena RNI, Canton Sahatavy, District Fénérive, 17°30'S, 48°38'E, 22 Feb. 1952, y.fr. (P); *SF (Ratovoarison) 1394*, Menalamba-Andasibe, 18°56'S, 48°26'E, 1000 m, 29 May 1950, y.fr. (K, P); *SF (Ratovoarison) 2617*, Ampasimpotsy (=Masse, Andasibe), 18°57'S, 48°20'E, 1000 m, 19 June 1950, y.fr. (P); *SF 3774*, Beravina-Antsahatsaka, 18°56'S, 48°26'E, 2 June 1951, y.fr. (P); *SF 3833*, Sahamaloto-Périnet, 18°56'S, 48°26'E, 9 July 1951, y.fr., fr. (P); *SF 4640*, Sahamalota-Périnet, 18°56'S, 48°26'E, 18 Feb. 1952, bd., fl. (P); *SF (Ratovoarison) 5271*, Menalamba, Andasibe, 18°52'50"S, 48°22'38"E, 1000 m, 9 Apr. 1952, y.fr., fr. (P); *SF (Ratovoarison) 5586*, Menalamba, Andasibe, Périnet, 18°56'S, 48°26'E, 1000 m, 8 Apr. 1952, bd., fl., y.fr., fr. (P); *SF 8369*, km 15-Antaniditra-Périnet, 18°49'S, 48°22'E, 23 Mar. 1954, fr. (P); *SF (Sampana) 10351*, Sahamaloto, Perinet, Moramanga, 18°56'S, 48°26'E, 1000 m, 13 Mar. 1954, y.fr. (P); *SF (Sampana) 10355*, Sahamaloto, Perinet, 18°56'S, 48°22'E, 1000 m, 17 Apr. 1954, fl., fr. (TEF); *SF (Ratovoarison) 10369*, km 15 Antaniditra, Perinet-Moramanga, 18°51'25"S, 48°22'40"E, 1000 m, 21 Apr. 1954, fr. (P); *SF (Rakotondrainibe) 12889*, JB 5 Analamazaotra-Périnet, 18°56'S, 48°26'E, 1000 m, 12 Mar. 1955, bd., fl., y.fr. (P); *SF 14949*, Perinet-Moramanga, 18°56'S, 48°26'E, 18 Mar. 1955, bd., fl., y.fr. (P); *SF (Rabevohitra) 29720*, Lakoto, 1 km N d'Aniromaro, 19°11'S, 48°26'E, 14 Feb. 1980, fl. (TEF); *SF (Abraham) 31262*, Vatovy, village d'Ampitambe, Ambohibary, Moramanga, 18°51'S, 48°14'E, 3 Mar. 1987, fl., fr. (TEF [2 sheets]); *Thouvenot (Ramanantoavolana) 149*, Analamazaotra, 18°56'S, 48°26'E, Mar. 1919, bd., fl., y.fr. (P); *Ursch 60*, Forêt d'Analamazaotra, 18°56'S, 48°26'E, 3 Dec. 1934, bd., fl. (P).

6. *Asteropeia micraster* H. Hallier

Beih. Bot. Centralbl. 39, Part 2: 30 (1921).—Type: *Scott Elliot 2514*, Madagascar, Fort Dauphin (holo-, P!; iso-, K!).

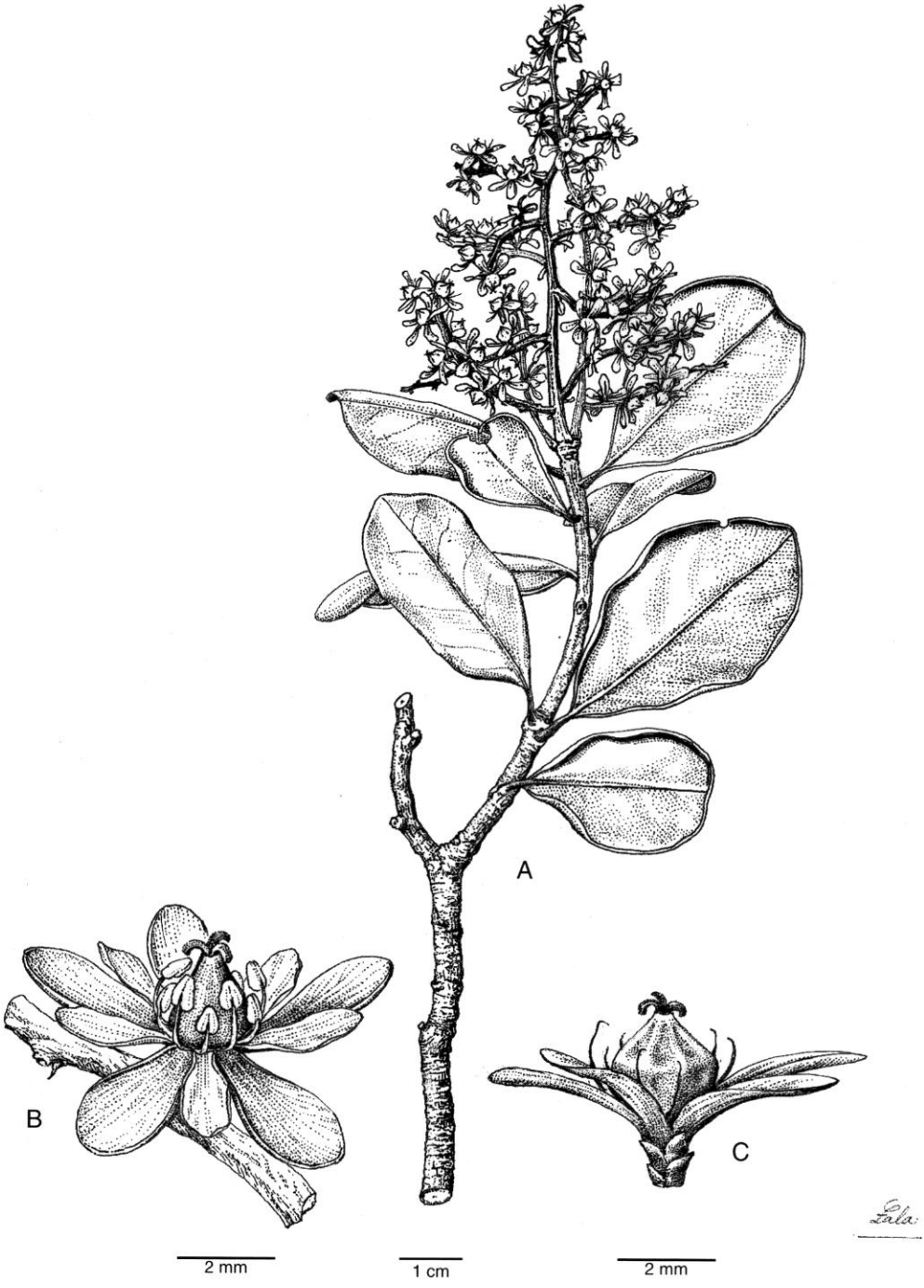

Fig. 4.—***Asteropeia mcphersonii*: A**, leaves and inflorescence; **B**, flower; **C**, fruit with persistent calyx. (A-C, *McPherson 17528*).

Asteropeia micraster is here considered to be restricted to littoral forest on sand from Tampolo STF to Fort Dauphin, where it is locally common and sympatric with *A. multiflora* (Fig. 3A). It has been gathered numerous times recently near Fort Dauphin, where littoral forest habitats are coming under increasing pressure.

Specimens previously included in *Asteropeia micraster* from mid-elevation forest at Analamazaotra-Périnet (as well as Ambatovy to the west of Périnet, and Zahamena RNI to the east of Périnet) and also from the Itremo Massif and Isalo PN are here treated as distinct species, despite the fact that they share the presence of sessile flowers subtended by bracteoles. Within the complex, *A. micraster* is distinguished by its subcoriaceous leaves that are 3 times as long as broad, and by a cupuliform calyx in fruit, with lobes that are ascending to erect, concave, and less than 5 mm long.

VERNACULAR NAMES.—Fanola, Fanola Mena.

MATERIAL EXAMINED.—MADAGASCAR: *Cloisel s.n.*, Fort Dauphin; *Debray 1956*, Ambinanibe; *Dumetz 500*, *581*, *676*, *1141*, Mandena STF; *Gereau 3268*, Mandena STF; *Lamarque 93*, *184*, *194*, Mandena STF; *McPherson 14376*, *14668*, *14792*, Mandena STF, *14806*, Sainte Luce; *Rabevohitra 2202*, Mandena STF; *A. Randrianasolo 561*, Sainte Luce; *Scott Elliot 2393"A"* (P), *2514*, Fort Dauphin; *Service Forestier 3356*, *7004*, *8083*, Mandena STF, *9985*, Vangain-drano, *17818*, Tampolo STF, *20529*, Ambinanibe (=Vinanibe), *28648*, Mandromodromotra; *Zarucchi 7610*, Mandena STF.

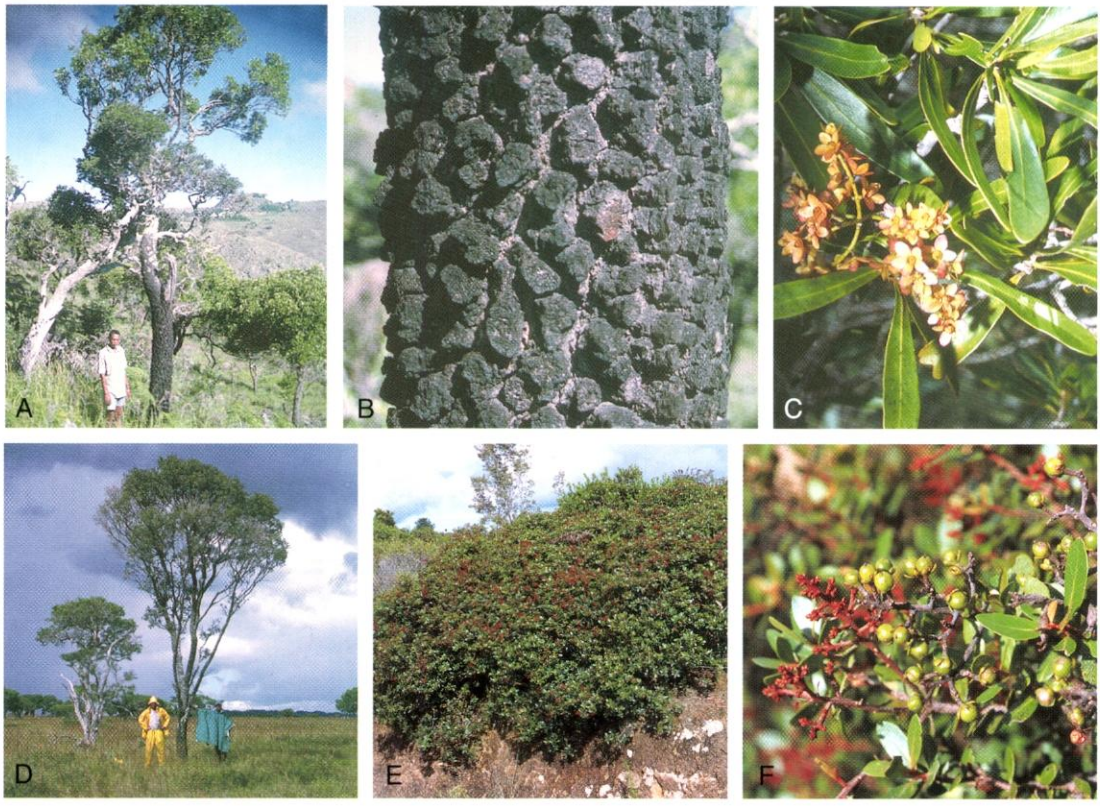

Fig. 5.—Photographs of ***Asteropeia***. A-C, ***A labatii***: **A**, habit; **B**, bark; **C**, inflorescence and leaves. (A-B, *Rabenantoandro et al. 61*; C, *Labat et al. 3036*).—D-F, ***A. densiflora***: **D**, habit; **E**, prostrate habit; **F**, young inflorescence and fruit. (D, *Birkinshaw et al. 561*, E-F *Labat et al. 3028*).—A, B, D, photos C. BIRKINSHAW; C, E, F, photos J.-N. LABAT.

7. **Asteropeia multiflora** Thouars

Hist. Vég. Isles Austr. Afriq., Pl. 15 (1805).—Type: *Thouars s.n.*, Madagascar, without precise locality (holo-, P!; iso-, P!).

Asteropeia bakeri Scott Elliot, J. Linn. Soc. Bot. 29: 6 (1891).—Lectotype (here designated): *Scott Elliot 2537*, Madagascar, Fort Dauphin (K!).

Asteropeia multiflora is easily recognized by its conical-ovoid ovary and fruit with 3 distinctive ridges extending to the acuminate apex, surmounted by three sessile stigmatic branches. It is common in littoral forest on sand from Sambava to Fort Dauphin, as well as in the Sambirano region, but also occasionally occurs at higher elevations, apparently on weathered quartzite sands (Fig. 3B). Many recent collections have been made from throughout the range of *A. multiflora*.

When THOUARS first published the name *Asteropeia* in the 1805 version of his *Histoire des Végétaux recueillis dans les Isles Australes de l'Afrique*, he did not cite a species, but did include a detailed drawing (plate 15) labeled "*Asteropeia multiflora*". Two specimens at P (*Thouars s.n.*) undoubtedly served as the basis for this plate, and are therefore here considered to represent the type material of *A. multiflora*.

SCOTT ELLIOT cited two collections (nos. *2334* and *2537*) in his description of *Asteropeia bakeri*. The first of these syntypes is the least fragmentary, and has therefore been selected as the lectotype.

VERNACULAR NAMES.—Andrampotsy, Andravola, Andrevola, Andrivola, Fanola, Fanola Fotsy, Haraka, Hazoseha, Jodo, Manoka Mavo, Manoko Fotsy, Matrambody, Merana, Mohara, Ramangaoka, Tambonana.

MATERIAL EXAMINED.—MADAGASCAR: *Alluaud 6*, Fort Dauphin; *Birkinshaw 345*, Mananara-Nord RB; *Bosser 16989*, Foulpointe; *Chapelier s.n.*, without precise locality; *Cloisel 110*, Fort Dauphin; *Cours 4164 (=Herb. St. Agric. Alaotra 4164)*, Andrabevava; *Cremers 2153*, Foulpointe; *D'Arcy 15407*, Fort Dauphin; *Decary 4287*, *4380*, Fort Dauphin, *5175*, Ifandana, *6341*, *6495*, Ambila-Lemaitso STF, *9981*, Fort Dauphin, *10765*, Soanierana, *10866*, Ambinanibe, *11000*, Ebakika; *Dequaire 27830*, Sahamalaza; *Dorr 4036*, Fort Dauphin, *4412*, Analalava; *Dumetz 648*, Petriky, *709*, Mandena STF, *760*, Sainte Luce; *Geay 7656*, *8149*, Mananjary; *Gentry 11364*, Ambila-Lemaitso STF; *Herb. St. Agric. Alaotra 4164 (=Cours 4164)*, Bemainty; *Humblot 138*, Nossivé; *Jacquemin 1164*, Sainte Luce; *Jonarson 32*, Manampano; *Lamarque 92*, Mandena STF; *Martine C17*, Ambila-Lemaitso STF; *McPherson 14116*, Petriky, *14143*, Mandena STF; *Miller 6202*, Manambaro; *Perrier de la Bâthie 15999*, Ambila-Lemaitso STF; *Rabevohitra 2144*, Sainte Luce; *Raharimalala 319*, Mananara-Nord RB; *A. Randrianasolo 200*, Sainte Luce, *548*, Mandena STF; *G. Randrianasolo 25*, Misevo; *Réserves Naturelles 3201*, Zahamena RNI, *8732*, *8808*, Masoala PN, *10606*, Zahamena RNI; *Schatz 1322*, *1960*, Ambila-Lemaitso STF, *3896*, Ankirindro; *Scott Elliot 2334*, *2537*, Fort Dauphin; *Service Agricole 1047*, Tampolo STF; *Service Forestier 1146*, Ambohitralanana, *1336*, Antetezana STF, *1356*, Anosikoraka, *2104*, Ambila-Lemaitso STF, *2562*, Andilamena, *2855*, Mandena STF, *2984*, *3258*, Ambila-Lemaitso STF, *3365*, Mandena STF, *4705*, Ambila-Lemaitso STF, *4759*, Mangatsiotra, *4851*, Zohakandra-Nord, *4925*, Ambila-Lemaitso STF, *5118*, Ampasimenaloka, *5890*, Nosy Ambariovato STF, *6458*, Ambila-Lemaitso STF, *7094*, Vohitrindry, *8082*, Mandena STF, *8288*, *8319*, *8573*, Ambila-Lemaitso STF, *9065*, Beanana, *9198*, Tampolo STF, *9478*, Canal des Pangalanes, *9519*, Ambakavontako, *9526*, Ambila-Lemaitso STF, *9595*, *10077*, Tampolo STF, *10587*, Mahatsara STF, *11757*, Ambinanibe, *13116*, Analamena, *15130*, Marotandrano, *15696*, Tampolo STF, *17541*, *17619*, Masoala PN, *19501*, Ambila-Lemaitso STF, *19523*, Ampangalana-Atsimo, *19622*, Androrangambo, *21215*, Ambila-Lemaitso STF, *29484*, Zahamena RNI, *32226*, Mahatsara STF, *32443*, Andranokoditra, *32674*, Tampolo STF, *33542*, Analalava (Foulpointe); *Thouars 15*, without precise locality; *Ursch 104*, Tampina; *Zarucchi 7529*, *7581*, Mandena STF.

8. **Asteropeia rhopaloides** (Baker) Baill.

Bull. Soc. Linn. Paris 1: 561 (1886).

Rhodoclada rhopaloides Baker, J. Linn. Soc. Bot 21: 328 (1884).—Lectotype (here designated): *Baron 3096*, Madagascar, without precise locality (K!; iso-, K!).

Asteropeia rhopaloides is a small to large tree 6-25 m tall, or rarely a large shrub 3-5 m tall, occurring in mid-elevation humid to subhumid forest from the Sambirano region to the Marojejy Massif, extending as far south as the Analamazaotra-Périnet RS region (Fig. 1B). Many recent collections have been made within the last 10 years, especially from Manongarivo

RS, Anjozorobe and Ambatovy-Analamay. *Asteropeia rhopaloides* can be distinguished from *A. densiflora*, with which it shares inflorescence axes covered with dense, short, rusty brown ferruginous indumentum, by its pedicels lacking numerous, minute, caducous bracteoles at the base, and by its ovoid, verrucose, dull fruits, sometimes with persistent indument.

BAKER cited two collections (*Baron 3094* and *3096*) in his description of *Rhodoclada rhopaloides*. The two mounted specimens at K each bear clearly labeled material of both numbers. The specimens of *Baron 3096* are less fragmentary, and have thus been selected as the lectotype.

VERNACULAR NAMES.—Manoka Fotsy, Manoka Mavo, Manoko, Manokofotsy, Tsararavina.

MATERIAL EXAMINED.—MADAGASCAR: *Baron 3094*, *3096*, without precise locality; *Gautier 2587*, *3081*, Manongarivo RS; *Gouvernement de Madagascar 36*, Analamazaotra-Périnet RS; *Humbert 24119*, Mt. Anjenabe, *24309*, *24350*, Betsomanga; *Malcomber 2607*, Manongarivo RS; *McPherson 16338*, *16371*, *16393*, Manongarivo RS; *Miller 8782*, Anjozorobe; *Perrier de la Bâthie 4643*, Analamazaotra-Périnet RS; *Rakotomalaza 46*, Manongarivo RS, *990*, *999*, Analamay; *Ravelonarivo 882*, Masiaposa; *Schatz 3513*, *3638*, Anjozorobe; *Scott Elliot 2393*, Fianarantsoa; *Service de Colonisation 46*, Analamazaotra-Périnet RS; *Service Forestier 838*, Betsomanga, *2096*, Beforona, *2255*, *2532*, *4659*, Analamazaotra-Périnet RS, *8802*, Beanjada, *11454*, Manongarivo RS, *24419*, Sandrangato; *Ursch 39*, Analamazaotra-Périnet RS; *van der Werff 13493*, Manongarivo RS.

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