

# *Peltiera* (Fabaceae), the coming and going of an “extinct” genus in Madagascar

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## ABSTRACT

*Peltiera* Du Puy & Labat is a Malagasy genus of two described species thought probably to be extinct at the time of its publication in 1997, when it was known only from a total of three pre-1950 collections. However, recent field work in east-central Madagascar has resulted in the discovery of still extant populations, and therefore it is now possible to reconsider the phylogenetic position and status of the genus and its two species. Phylogenetic analyses based on molecular (chloroplast *trnK* and nuclear ribosomal ITS sequences) and morphological data corroborate the close relationship between *Peltiera* and *Ormocarpopsis* R. Vig., a genus of six species, also endemic to Madagascar. *Peltiera* differs from *Ormocarpopsis* mainly by having articulated, dehiscent fruits, and the two genera together are, in turn, sister to the widespread but mainly African *Ormocarpum* P. Beauv. Morphological, distributional and habitat data gathered from the new collections show that only a single species of *Peltiera* can be recognized, and as this species shares important synapomorphies with all species of *Ormocarpopsis*, it is transferred to this genus as *O. nitida*, comb. nov. A distribution map and photographs of *O. nitida* comb. nov. are presented, and a conservation threat analysis of the species is provided. The name *Ormocarpopsis* is lectotypified and an amended description of the genus with its new circumscription is given.

## KEY WORDS

Fabaceae,  
*Ormocarpopsis*,  
*Peltiera*,  
Madagascar,  
endemism,  
phylogenetic analysis,  
conservation threat  
analysis,  
lectotypification,  
new combination.

## RÉSUMÉ

*Peltiera* (Fabaceae), *vie et mort d'un genre « éteint » à Madagascar.*

*Peltiera* Du Puy & Labat est un genre malgache, contenant deux espèces, supposé éteint à la date de sa publication en 1997, alors qu'il n'était représenté que par trois collections, toutes récoltées avant 1950. Toutefois, des travaux récents sur le terrain dans le centre-est de Madagascar ont révélé des populations encore vivantes, qui permettent la réexamination de la position phylogénétique et du statut du genre et de ses deux espèces. Les analyses phylogénétiques basées sur les études moléculaires (*trnK* chloroplastique et ITS du ribosome nucléaire) et les données morphologiques confirment la relation étroite entre *Peltiera* et *Ormocarpopsis* R. Vig., un genre de six espèces, également endémique à Madagascar. *Peltiera* diffère principalement d'*Ormocarpopsis* par ses fruits articulés et déhiscentes. Les deux genres ensemble sont frères du genre *Ormocarpum* P. Beauv., largement distribué, surtout en Afrique. Les données morphologiques de répartition et d'habitat, recueillies sur les nouvelles récoltes, montrent qu'une seule espèce de *Peltiera* peut être reconnue, et que celle-ci partage des synapomorphies avec l'ensemble des espèces d'*Ormocarpopsis*; elle est donc transférée dans le genre *Ormocarpopsis* sous le nom d'*O. nitida* comb. nov. Une carte de répartition et des photographies d'*O. nitida* comb. nov. sont présentées, et une évaluation du statut de conservation de cette espèce est proposée. Le nom *Ormocarpopsis* est lectotypifié et une description amendée du genre est donnée, avec sa nouvelle circonscription.

## MOTS CLÉS

Fabaceae,  
*Ormocarpopsis*,  
*Peltiera*,  
Madagascar,  
endémisme,  
analyse phylogénétique,  
évaluation du statut de  
conservation,  
lectotypification,  
combinaison nouvelle.

## INTRODUCTION

Twenty-two genera of Fabaceae were regarded as endemic to Madagascar by Du Puy *et al.* (2002). Among them, the woody genus *Peltiera* Du Puy & Labat had a special standing as it was thought probably to be extinct at the time of its publication (Labat & Du Puy 1997). According to these authors “this could be the first example of a modern genus which is described after it has become extinct”.

A total of three collections were known to Labat and Du Puy in 1997 and these had been made in, respectively, 1924, 1930 and 1944, and originated from three somewhat scattered localities in east-central Madagascar (Fig. 1). Two species were recognized, *P. alaotrensis* Du Puy & Labat from E of Menaloha and *P. nitida* Du Puy & Labat from near Mahatsinjo and from near Moramanga. These three localities are all situated in areas that are largely deforested today and field studies by several people (including one of us, MT) in the years just before

and after the publication of *Peltiera* were unsuccessful in locating any extant populations. Klitgaard & Lavin (2005) regarded *Peltiera* as “possibly extinct”, noting that “recent field investigations have failed to locate material of these rare species”, and Maberley (2008) added “extinct?” after the entry of the genus.

*Peltiera* was placed in the tribe Aeschynomeneae by Labat & Du Puy (1997), where it was regarded as a close ally of *Ormocarpum* P. Beauv. and *Ormocarpopsis* R. Vig. Lavin *et al.* (2001), in their study of dalbergioid legumes, and Thulin & Lavin (2001), in their study of the phylogeny and biogeography of the *Ormocarpum* group, included *Peltiera* in the analyses, but only on the basis of morphological characters. The results indicated a sister group relationship between *Peltiera* and *Ormocarpopsis*, the latter a genus of six species, also endemic to Madagascar (Du Puy & Labat 2002).

However, inventory work in Madagascar during the last decade has resulted in the discovery

of several populations of *Peltiera*, all in the same general region as the three original collections. The first of these to be identified was collected in highly degraded vegetation in an erosion gully (lavaka) between Ambakeriny and Morarano near Ambaton-drazaka in 2005 (Labat *et al.* 3577), a locality that lies roughly midway between the type localities of the two described species. Subsequently, at least 24 other new collections of *Peltiera* have been made. Most of them were collected near Moramanga, the collection locality of the paratype of *P. nitida*, and plants have also now been rediscovered near to the type locality of *P. alaotrensis*. However, *Peltiera* has still not been rediscovered at the type locality of *P. nitida*. So *Peltiera* is certainly still extant, and according to label information the plants are even abundant at some localities (e.g., in Ampangadian-trandraka Forest, *Antilabimena & Félix* 3587). It is important to note that many of the recently collected specimens are from the Ambatovy Forest, and this population will be depleted through nickel mining operations planned at this site. However, a substantial part of the population is fortunately present in areas adjacent to the mining zone.

Jean-Noël Labat sent leaf material of Labat *et al.* 3577 to one of us (ML) in 2006 for sequencing, but although sequences were produced, the matter was not further dealt with before Jean-Noël's untimely death in January 2011. In the present paper we reconsider the phylogenetic position and status of *Peltiera* and its two species in the light of both the molecular data and other information gathered from the new collections. We cannot say if Jean-Noël would have agreed with all of our conclusions, but as his friends and colleagues we wish to dedicate this paper to him, in memory of his important contribution to botany and Fabaceae research.

## MATERIAL AND METHODS

Protocols and procedures for DNA isolations, PCR amplifications of the chloroplast *trnK* locus (including *matK*) and the nuclear ribosomal 5.8S and flanking ITS sequences (ITS), and DNA sequencing of dalbergioid legumes are reported in Lavin

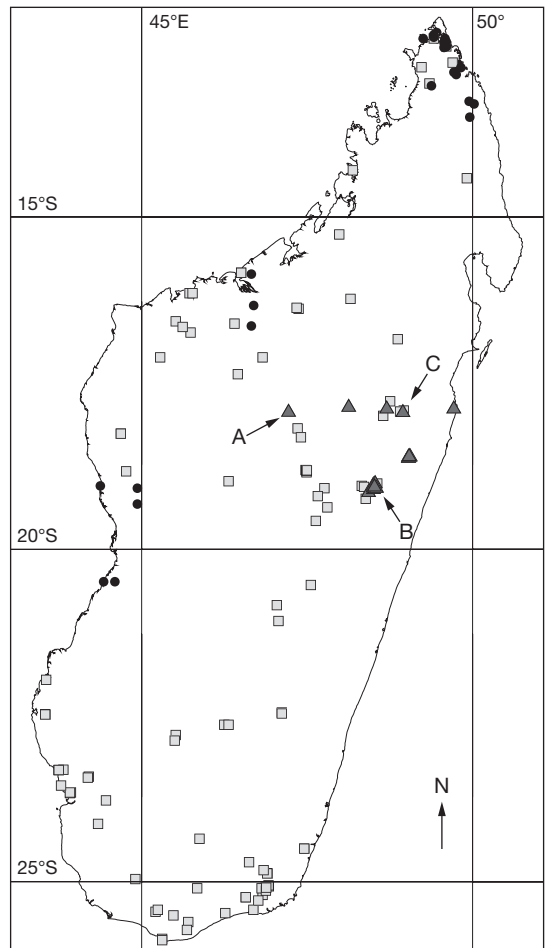


FIG. 1. — Distributions of *Ormocarpopsis* R. Vig. and *Ormocarpum* P. Beauv. in Madagascar: ▲, *Ormocarpopsis nitida* (Du Puy & Labat) Thulin & Lavin, comb. nov. (*Peltiera nitida* Du Puy & Labat), with the three pre-1950 collections indicated by black arrows: A, *Perrier de la Bâthie* 15898 (type of *O. nitida* comb. nov.); B, *Decary* 7233 (paratype of *O. nitida*); C, *Cours* 1812 (type of *Peltiera alaotrensis* Du Puy & Labat); □, collections of other species of *Ormocarpopsis*; ●, collections of *Ormocarpum*.

*et al.* (2001) and Thulin & Lavin (2001). These protocols are identical to those used to generate the sequence data for *Peltiera*. The phylogenetic analysis included a parsimony analysis of combined data. One combined data set consisted of *trnK* data and 55 morphological characters reported in Lavin *et al.* (2001), 44 of which were scored for *Peltiera*. The second data set included ITS data and

19 morphological characters. The combined *trnK* analysis involved a broad sampling of taxa to put the relationships of *Peltiera* into a larger taxonomic context, and the details of this analysis were presented in Lavin *et al.* (2001). The ITS analysis was more narrowly focused to show the relationships of *Peltiera* among the species representing the Old World *Ormocarpum* clade, and the details of this analysis followed Thulin & Lavin (2001). These analyses included newly generated DNA sequence data for *Peltiera*, which was missing from previous analyses of dalbergioid legumes.

Details of the parsimony analyses of combined data, including DNA sequence alignment and bootstrap analyses, also follow those of Lavin *et al.* (2001) for the combined morphology and *trnK* data, and Thulin & Lavin (2001) for the combined morphology and ITS data. All sequence data first reported in Lavin *et al.* (2001) and Thulin & Lavin (2001) and the newly generated *Peltiera* sequences were deposited in GenBank and TreeBASE (submission 13349). These GenBank accessions of *Peltiera* (see Figs 2, 3) include the identity of the voucher specimen [Madagascar: Toamasina, Ambaton-drazaka, Labat *et al.* 3577 (P). *trnK*: GU951672; ITS: GU951673].

For the morphological studies and the preparation of the map, all specimens of *Peltiera* presently available in the herbaria K, MO, P and UPS were studied.

A threat analysis was conducted and the conservation status was assessed using the current IUCN Red List Categories and Criteria (2001). Calculations of the area of occupancy (AOO), extent of occurrence (EOO) and number of subpopulations were based on the methods presented in Callmander *et al.* (2007).

## RESULTS

Analysis of the combined morphology and *trnK* sequence data resolves a well-supported clade containing two *Ormocarpopsis* and one *Peltiera* sequence, which is sister to the *Ormocarpum* sequences. The *Peltiera* sequence is nested within the *Ormocarpopsis* clade, but with weak boot-

strap support (<50%, although resolved in the strict consensus tree; Fig. 2). No informative insertion-deletion (indel) characters are shared by any subgroup of the *Ormocarpum* clade so the position of *Peltiera* is resolved strictly with nucleotide substitution variation.

Analysis of the combined morphology and ITS sequence data resolves a well-supported clade containing six *Ormocarpopsis* sequences as sister to the one *Peltiera* sequence. These are sister to the *Ormocarpum* sequences, which are weakly supported (62%, but resolved in the strict consensus tree; Fig. 3). One informative indel character, a “G” deletion at position 517 in the ITS 2 region, is fixed within and among the accessions of *Peltiera*, *Ormocarpopsis*, and *Ormocarpum*. The relationship of *Peltiera* with *Ormocarpopsis* is resolved only with nucleotide substitution variation.

## DISCUSSION

The results of the two analyses are unequivocal in resolving a well-supported relationship between *Peltiera* and *Ormocarpopsis* (Figs 2, 3), corroborating the results of the studies by Lavin *et al.* (2001) and Thulin & Lavin (2001). The analysis of the *trnK* combined data (Fig. 2) indicates that *Peltiera* may be nested within *Ormocarpopsis*, whereas the analysis of the more narrowly focused ITS combined data (Fig. 3) suggests that these two genera are sister groups.

*Ormocarpopsis* is apomorphically distinguished from *Peltiera* and other close relatives by having non-articulated fruits, whereas *Peltiera* is apomorphically characterized by having bracteoles inserted below the middle of the pedicel, and by having dorsiventrally compressed pods with dehiscent segments. Some of these apomorphies seem to be fairly weak. The position of the bracteoles may be close to the calyx or somewhere in the upper half of the pedicel in *Ormocarpopsis*, whereas it is mostly in the lower half or sometimes near the middle of the pedicel in *Peltiera*, suggesting a more or less continuous variation rather than two distinct character states. The non-articulated fruits with continuous valves in





*Ormocarpopsis* are striking, but pods with somewhat sinuate margins are found in some of the species. In the related genus *Ormocarpum*, apart from the articulated fruits normally found, there are also species with practically continuous valves (Thulin & Lavin 2001).

In contrast, *Ormocarpopsis* and *Peltiera* combined are strongly supported in both analyses, and are apomorphically distinguished from close relatives by accumulating tannin deposits along the abaxial midrib of the leaflets, by pods with inconspicuous venation on the valve walls (the valves are not prominently longitudinally striate), and by having ellipsoid-spherical (rather than lenticular) seeds. The general morphological similarity in the foliage and flowers of *Ormocarpopsis*, in particular *O. mandrarensis* Dumaz-le-Grand, and *Peltiera* is also very striking.

*Ormocarpopsis* and *Peltiera* are both endemic to Madagascar and, although *Peltiera* tends to occur in more easterly and humid situations, the two groups are somewhat overlapping both as regards distribution and habitat (Fig. 1). The most widespread of the species of *Ormocarpopsis*, *O. aspera* R. Vig., occurs in Toamasina and has been collected, for example, in Ambatondrazaka in a similar habitat and elevation as *Labat et al.* 3577 from this same area.

As *Ormocarpopsis* and *Peltiera* together constitute a group with a strong molecular, morphological and geographical integrity we argue that inclusion of *Peltiera* in *Ormocarpopsis* is warranted. This view is reinforced by our finding that only a single species of *Peltiera* can be recognized (see below), and thus expansion of *Ormocarpopsis* results in a phylogenetically more informative classification than retention of a monotypic *Peltiera*.

## TAXONOMIC TREATMENT

### *Ormocarpopsis* R. Vig.

*Notulae Systematicae* 14: 170 (1951). — Lectotype: *O. aspera* R. Vig. (designated here).

*Peltiera* Du Puy & Labat, *Adansonia*, sér. 3, 19: 88 (1997), syn. nov. — Type: *P. nitida* Du Puy & Labat.

## NOMENCLATURAL NOTE

Viguiier described posthumously three species of *Ormocarpopsis* in 1951, *O. aspera* R. Vig., *O. calcicola* R. Vig., and *O. perrieriana* R. Vig., but did not typify the name, and *O. perrieriana* was subsequently treated as a synonym of the variable *O. aspera* by Du Puy & Labat (2002). *Ormocarpopsis aspera* is much more widespread than *O. calcicola*, so we therefore designate *O. aspera* as the lectotype of *Ormocarpopsis*.

## DESCRIPTION

Shrubs or small trees; tubercle-based hairs sometimes present on leaves, flowers and pods. Leaves mostly clustered on short shoots covered by closely spaced and overlapping stipules, pinnate, with alternate leaflets or sometimes 1-foliolate; stipules scarious, striate, persistent; petiole and rachis terete; leaflets drying dark brown or black along the midrib beneath or with a brown or black blotch on the surface. Flowers in bracteate racemes or solitary; pedicels with a pair of bracteoles usually in the upper half or near the apex, sometimes in the lower half. Calyx 5-toothed, not distinctly 2-lipped, the lower tooth about as long as or longer than the others, with a short hypanthium. Corolla yellow, sometimes with darker veins; standard erect to reflexed; wings with crescent-shaped folds between the veins near the base; keel without spurs. Stamens fused into 2 lateral groups of 5 situated on either side of the ovary; anthers dorsifixed, longitudinally dehiscent. Ovary stipitate, glabrous to densely glandular-pubescent, 1-5-ovulate; style slender, curved, glabrous; stigma minute, capitate. Fruits stipitate, swollen, not or sometimes articulated, coriaceous to woody, with inconspicuous venation, indehiscent or with segments splitting into 2 valves, 1-3(-4)-seeded; endocarp pale, sometimes thickened. Seeds large, ellipsoid-spherical, with a small hilum.

## TAXONOMIC NOTES

According to the phylogenetic analyses (Figs 2, 3), *Ormocarpopsis* (including *Peltiera*) is sister to *Ormocarpum*. *Ormocarpum* is widespread in the Old World, mainly in Africa, but there are also two species in Madagascar (Du Puy & Labat 2002). *Ormocarpopsis* differs apomorphically from *Or-*

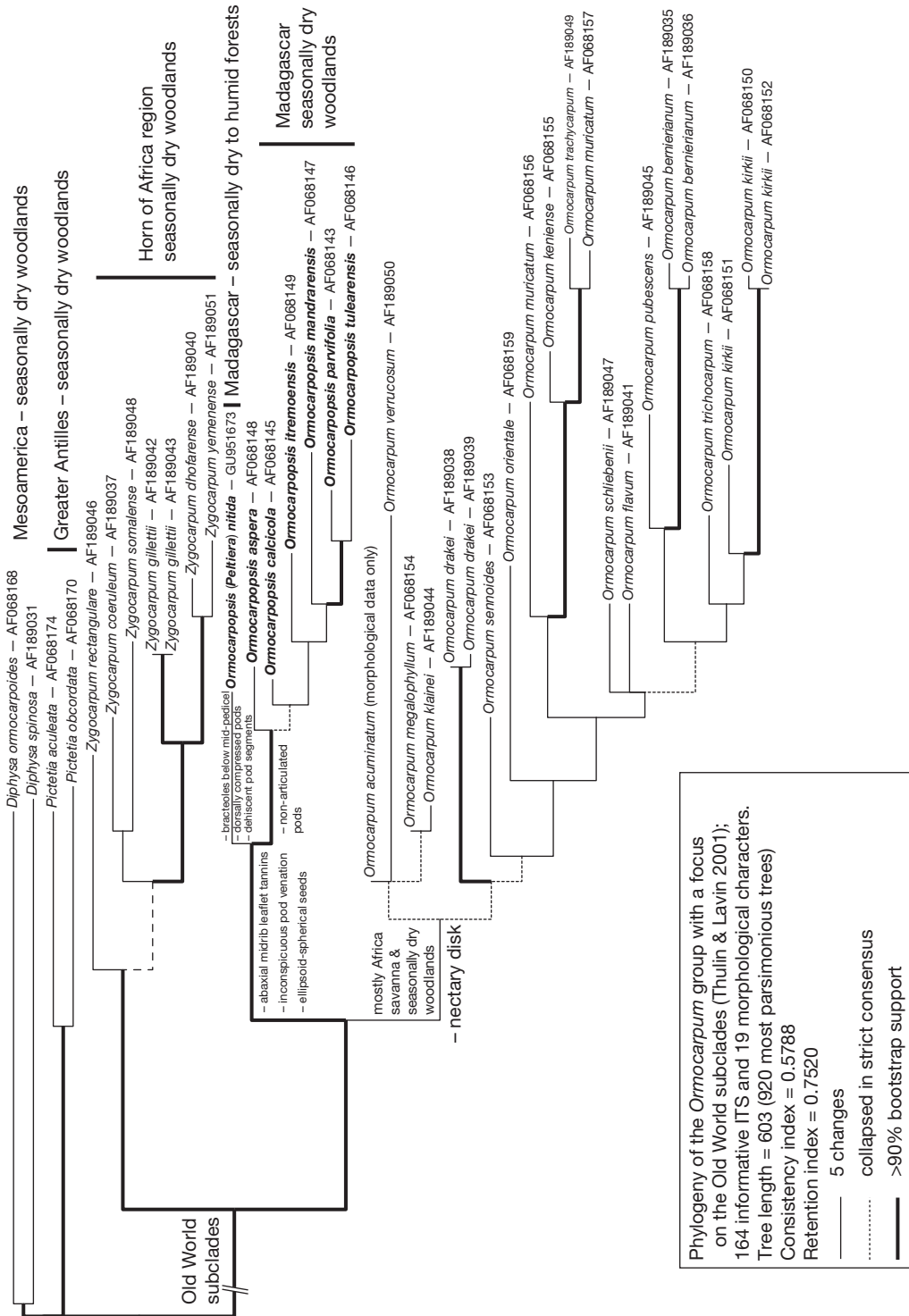


Fig. 3. — Combined morphology and ITS phylogeny of the *Ormocarpum* group resolving the relevant apomorphic character states that distinguish *Peltiera*, *Ormocarpopsis* and *Ormocarpum* (Thulin & Lavin 2001). Ecological and geographical distinctions are also indicated.

*mocarpum* by its leaflets with the midrib or part of the lower surface drying brown or black due to the accumulation of tannins, by its pods with inconspicuous venation on the valves (valves not prominently longitudinally striate), and by its ellipsoid-spherical (not lenticular) seeds. *Ormocarpum*, on the other hand, differs apomorphically from *Ormocarpopsis* and other close relatives by having a cylindrical nectary disk surrounding the base of the ovary (Thulin & Lavin 2001).

#### DISTRIBUTION AND ECOLOGY

*Ormocarpopsis* is here treated as a genus of seven species, all endemic to Madagascar. They are found in most parts of Madagascar (Fig. 1), at elevations from sea level to 1600 m (Du Puy & Labat 2002).

#### NEW COMBINATION

The inclusion of *Peltiera* in *Ormocarpopsis* and the placement of *P. alaotrensis* in synonymy under *P. nitida* (see further discussion below) make the following new combination necessary. For a comprehensive treatment of the other six species of *Ormocarpopsis*, see Du Puy & Labat (2002).

#### *Ormocarpopsis nitida* (Du Puy & Labat)

Thulin & Lavin, comb. nov. (Fig. 4)

**BASIONYM.** — *Peltiera nitida* Du Puy & Labat, *Adansonia*, sér. 3, 19: 90 (1997). — Type: Madagascar, Prov. Mahajanga, environs de Mahatsinjo, confins nord du Tampoketsa entre l'Ikopa et la Betsiboka, 900 m, I.1924, fr., *Perrier de la Bâthie* 15898 (holo-, P[P00048779]; iso-, K[K000393484], P[P00048780]).

*Peltiera alaotrensis* Du Puy & Labat, *Adansonia*, sér. 3, 19: 88 (1997), syn. nov. — Type: Madagascar, Prov. Toamasina, Rivière Menaloa, 1450 m, 11.XII.1944, fr., *Cours* 1812 (holo-, P[P00048785]; iso-, K[K000393485], P[P00048786], TAN).

**ADDITIONAL MATERIAL EXAMINED.** — **Madagascar.** Prov. Toamasina, Ambatondrazaka, vers 10 km de Ambakeriny vers Morarano, 17°40'38"S, 47°54'17"E, 1108 m, 21.XI.2005, *Labat et al.* 3577 (K, P[P00533615, P00533616, P00533617]); Ambatondrazaka, Manakambahiny-Est, Sahamalaza, Lahindrotra, à 18 km au Sud-Est d'Anosivola, 17°45'18"S, 48°42'28"E, 900 m, 3.III.2001, *Randrianasolo et al.* 215 (CNARP, MO, P[P00583275], TEF); Antsinanana, Forêt d'Analalava, piste Rabedona,

17°42'03"S, 49°27'22"E, 54 m, 21.III.2012, *Miandrimanana et al.* 547 (MO, P, TAN); Maroseranana, Ambodilendemy, Ankerana, 18°25'32"S, 48°47'17"E, 1010 m, 21.III.2011, *Antilahimena et al.* 7733 (TAN); s. loc., 18°25'32"S, 48°47'17"E, 1010 m, 21.III.2011, *Antilahimena* 7833 (MO, P); s. loc., 18°25'35"S, 48°47'17"E, 1019 m, 21.III.2011, *Ravelonarivo & Félix* 3769 (MO, P); Maroseranana, Ambodilendemy, piste vers Vohimananana, 18°24'49"S, 48°47'32"E, 1175 m, 24.III.2011, *Ravelonarivo et al.* 3845 (MO, P); Moramanga, 18°56'S, 48°12'E, 21.II.1930, *Decary* 7233 (K, MO, P[P00048781, P00048782, P00048783, P00048784]); Moramanga, forêt d'Ampangadiantrandraka, 18°51'26"S, 48°17'33"E, 1031 m, 15.I.2005, *Ranaivojaona et al.* 1091 (MO, P, UPS); Moramanga, Antsangimaso, 18°49'57"S, 48°19'47"E, 1056 m, 24.II.2005, *Razanatsoa et al.* 316 (MO, P, TAN, UPS); Andasibe, Ambatovy, Ampangadiantrandraka forest, 18°51'45"S, 48°17'44"E, 1035 m, 4.III.2005, *Antilahimena & Félix* 3587 (P); Moramanga, Ambohibary, Ampitambe, 18°51'39"S, 48°16'27"E, 943 m, 15.XII.2005, *Antilahimena et al.* 4380 (MO, P); Moramanga, forêt Ampangadiantrandraka, 18°52'00"S, 48°17'59"E, 1042 m, 8.XII.2006, *Razanatsoa & Marcellin* 248 (MO, P); Moramanga, Ambohibary, Ampitambe, Ambatovy Forest, 18°51'44"S, 48°17'10"E, 980 m, 28.II.2008, *Antilahimena et al.* 6083 (MO, P, TAN); Ambatovy, Antranolambo, 18°50'45"S, 48°17'25"E, 993 m, 8.V.2008, *Rakotonandrasana et al.* 1339 (MO, P, TAN); Moramanga, Ambohibary, Ampitambe, Ambatotsiandrora Forest, 18°49'22"S, 48°16'09"E, 1041 m, 8.X.2008, *Antilahimena et al.* 6612 (MO, P, TAN); Moramanga, Ambohibary, Ampitambe, Sahaviara Forest, 18°52'19"S, 48°16'43"E, 1033 m, 23.X.2008, *Antilahimena et al.* 6684 (MO, P, TAN); Moramanga, Ambohibary, Ampitambe, Ambatovy Forest, Ambatomainty, 18°52'29"S, 48°17'36"E, 1004 m, 10.XI.2008, *Antilahimena et al.* 6847 (MO, P, TAN); Moramanga, Ambohibary, Ampitambe, Ambatovy Forest, Sahaviara, 18°52'35"S, 48°17'29"E, 976 m, 11.XI.2008, *Antilahimena et al.* 6877 (MO, P, TAN); Moramanga, Morarano, Marovoay, Forêt de Mahatakatra, 18°48'06"S, 48°17'51"E, 1014 m, 14.XI.2008, *Ravelonarivo* 3149 (MO, P, TAN); Moramanga, Ambohibary, Ambatovy, 6 km à l'Est du village Befotsy, 18°53'25"S, 48°16'19"E, 1012 m, 15.XI.2008, *Rakotondrafara et al.* 864 (MO, P, TAN); Moramanga, Ambohibary, Ampitambe, Amboditavolo, 18°51'05"S, 48°16'36"E, 1016 m, 24.XI.2008, *Ravelonarivo et al.* 3180 (MO, P, TAN); Moramanga, Ambohibary, Ampitambe, Ambilona, Ambatovy, 18°50'31"S, 48°16'06"E, 985 m, 28.XI.2008, *Antilahimena et al.* 6946 (MO, P, TAN); Moramanga, Ambohibary, Ampitambe, Ampanadiofanantsy Forest, 18°51'36"S, 48°16'24"E, 956 m, 22.IV.2009, *Antilahimena et al.* 7060 (MO, P, TAN); Moramanga, Ambohibary, Ampitambe, Ambatovy, Ambatomainty, 18°52'20"S, 48°18'51"E, 1059 m, 2.III.2010, *Ramahenina et al.* 22 (MO, P, TAN); Mora-





FIG. 4. — *Ormocarpopsis nitida* (Du Puy & Labat) Thulin & Lavin, comb. nov. (*Peltiera nitida* Du Puy & Labat): **A, B**, showing shrubby habit in open habitat (**A**) and terminal inflorescence (**B**) (Labat 3577), photos: J.-N. Labat, MNHN; **C, D**, showing tree habit and inflorescences on short shoots arising from the trunk (**C**) (*Antilahimena* et al. 6083) and nearly mature fruit (**D**) (*Ravelonarivo* s.n.), photos: P. Antilahimena.

manga, Ambohibary, Ampitambe, Ambatovy, 18°50'51"S, 48°17'22"E, 1025 m, 30.III.2010, *Antilahimena et al.* 7307 (MO, P, TAN).

VERNACULAR NAME. — *Sefontsohy* (*Miandrimanana et al.* 574).

PHENOLOGY. — Flowering and/or fruiting collections are known from November to May.

#### DESCRIPTION

Shrub or tree, 1-10 m tall; bark grey, cracked; twigs glabrous. Leaves alternate on long shoots or mostly densely clustered on short shoots; stipules narrowly triangular with a tapering tip, (2.5-)4-10 mm long; petiole up to 15 mm long; rachis glabrous or with a few tubercle-based hairs, often somewhat zigzag; leaflets 1-8(-11), elliptic to obovate, 18-60 × 7-30 mm, cuneate to rounded at the base, obtuse to acuminate and mucronate at the apex, glabrous, more or less glossy, the midrib swollen and very prominent beneath, except near the apex, drying black; petiolules 1-1.5 mm long. Flowers 12-15(-18) mm long, in axils of leaves of long shoots or from tips of short shoots, solitary or in up to 20 mm long and up to 5-flowered racemes, borne on the young growth or on woody branches; bracts narrowly triangular-ovate, 2-4 mm long, striate; pedicels 10-20 mm long, glabrous; bracteoles inserted mostly on the lower half of the pedicel, subopposite, narrowly ovate, 1.5-2 mm long, striate, with scarious margins, ciliolate near the apex. Calyx 5-6 mm long, glabrous except for ciliolate teeth; hypanthium *c.* 1.5 mm long; teeth subacute, the lowest tooth about as long as the others or slightly longer. Corolla yellow; standard erect, subcircular, the limb 10-12 × 10-12 mm, notched at the apex, with 2 callous protuberances at the base inside, the claw *c.* 2 mm long; wings asymmetrically obovate, the limb 9-10 × 5-6 mm, rounded at the apex, oblique at the base, the lower margin rounded, with a claw *c.* 2 mm long; keel-limb semicircular, *c.* 9 × 4-6 mm, with a claw *c.* 2 mm long. Ovary with a 1.5-2 mm long stipe, linear, mostly with tubercle-based hairs along the margins, with 3 to 5 ovules; style 6-7 mm long. Fruits articulated, with 1-3(-4) segments developing, breaking between the segments at maturity; fertile segments

ellipsoid, dorsiventrally compressed, coriaceous to woody, reticulately veined, 15-21 × 7-9 × 14-18 mm, with whitish endocarp thickened particularly on the dorsal side, 1-seeded, splitting into 2 boat-shaped valves. Seeds *c.* 12 × 8-9 mm, dorsiventrally compressed.

#### TAXONOMIC NOTES

Labat & Du Puy (1997) simultaneously published two species of *Peltiera* on the basis of the three collections available to them: *P. nitida* with (1-)2-4 glossy leaflets, 33-55 × 20-30 mm, and ovary with swollen-based hairs, and *P. alaotrensis* with 7 or 8 non-glossy leaflets, up to 22 × 11 mm, and glabrous ovary. The new material shows a complete intergradation in all these characters, and only a single, fairly variable species can be recognized. One of the new collections, *Miandrimanana et al.* 547, even extends the variation of the species by having leaves with up to 11 leaflets. As *P. nitida* is the type of *Peltiera* we chose to use this name as a basionym when transferring the species to *Ormocarpopsis*.

According to Labat & Du Puy (1997) only a single segment of the pod develops, but the material now available shows that up to four segments may develop. The "white, fleshy structure" reported to surround the seed is, according to our observations, a whitish endocarp that is particularly thick on the dorsal side of the pod.

#### DISTRIBUTION AND ECOLOGY

Of the three pre-1950 collections of *O. nitida* comb. nov., *Cours 1812* and *Decary 7233* are from the Toamasina Province, whereas *Perrier de la Bâthie 15898* is from the Mahajanga Province. The new collections are all from Toamasina Province (Fig. 1), with the majority from the vicinity of Moramanga, but the species has not been recorded in the nearby protected areas of Analamazaotra or Mantadia. One collection has been made at the edge of the Zahamena National Park (*Randrianasolo et al.* 215), and another was discovered during the preparation of this article at the recently established Analava Forest Reserve. *Ormocarpopsis nitida* comb. nov. is also known from Ankerana, a site that has been proposed for formal future protection.



The habitat information of the three old collections given by Du Puy & Labat (2002) can be summarized as deciduous woodland remnants and more or less seasonal evergreen forest at elevations of 900-1450 m. Almost all the new collections were made in more or less seasonal to humid evergreen forest on lateritic soils, sometimes at forest margins or on cliffs and locally abundant, at elevations of 900-1175 m. One exception is *Labat et al.* 3577 that was collected in a deciduous woodland remnant in an erosion gully (lavaka) in an area of otherwise open, hilly grassland. In this locality the population was reduced to a single tree 5 m tall and 15 cm dbh along with some smaller individuals. However, the most notable exception is *Miandrimanana et al.* 547, a collection made in sublittoral forest at an elevation of only 54 m.

## CONSERVATION STATUS

With an EOO of 11 471 km<sup>2</sup>, an AOO of 140 (based on a 10 km<sup>2</sup> grid cell) km<sup>2</sup> and 4-5 subpopulations, two of which are situated within protected areas (Analalava and Zahamena), *Ormocarpopsis nitida* comb. nov. is assigned a preliminary status of Endangered (EN B2ab[i, ii, iii, iv, v]). This analysis is based on the assumption that the subpopulation represented by the type of *O. nitida* comb. nov., is now extinct. A second analysis was conducted with this subpopulation treated as extant, but despite increases in the estimated EOO and AOO, the species would still qualify as Endangered. It is of particular interest to note that the species occurs at the Ambatovy nickel mine, and that measures are being taken to ensure the preservation of the species in the adjacent conservation zone. The species also occurs at Ankerana, another site that has been proposed for formal protection.

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