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Bourreria scabra (Boraginaceae), a new species from southern Madagascar

Mats Thulin & Sylvain G. Razafimandimbison

Abstract

THULIN, M. & S.G. RAZAFIMANDIMBISON (2017). *Bourreria scabra* (Boraginaceae), a new species from southern Madagascar. *Candollea* 72: 345-350. In English, English and French abstracts. DOI: <http://dx.doi.org/10.15553/c2017v722a12>

Bourreria scabra Thulin & Razafim. (*Boraginaceae*), a new species from southern Madagascar, is described and illustrated. The plant was previously sometimes treated as conspecific with *Bourreria lyciacea* Thulin [= *Hilsenbergia lyciacea* (Thulin) J.S. Mill.] in Somalia and Kenya. However, *Bourreria scabra* differs markedly from *Bourreria lyciacea* by its smaller corolla, finely pubescent outside and with shorter lobes, by its practically unbranched style, by its smaller fruits more or less enclosed by the calyx, and by its smaller pyrenes with several low ridges forming an irregular reticulation on the outside. *Bourreria scabra* differs from all other species of *Bourreria* P. Browne in Madagascar by the very rough upper surface of the leaves. The species is widespread in spiny dry forests in southern Madagascar, with occurrences in the Andohahela and Tsimanampetsotsa National Parks and the Beza Mahafaly Reserve. The new species is assigned the category of “Near Threatened” using the IUCN Red List Criteria.

Résumé

THULIN, M. & S.G. RAZAFIMANDIMBISON (2017). *Bourreria scabra* (Boraginaceae), une nouvelle espèce du sud de Madagascar. *Candollea* 72: 345-350. En anglais, résumés anglais et français. DOI: <http://dx.doi.org/10.15553/c2017v722a12>

Bourreria scabra Thulin & Razafim. (*Boraginaceae*), une nouvelle espèce du sud de Madagascar, est décrite et illustrée. Précédemment, la plante a été parfois traitée comme étant conspécifique de *Bourreria lyciacea* Thulin [= *Hilsenbergia lyciacea* (Thulin) J.S. Mill.] en Somalie et au Kenya. Cependant, *Bourreria scabra* diffère nettement de *Bourreria lyciacea* par sa petite corolle à lobes plus courts finement pubescente à l'extérieur, par son style pratiquement non ramifié, par ses plus petits fruits plus ou moins entourés par le calice et par ses plus petits pyrènes à plusieurs crêtes basses formant une réticulation irrégulière à l'extérieur. *Bourreria scabra* diffère de toutes les autres espèces de *Bourreria* P. Browne à Madagascar par la surface supérieure très rugueuse de ses feuilles. Elle est répandue dans les forêts sèches épineuses du sud de Madagascar, avec des occurrences dans les Parcs Nationaux d'Andohahela et de Tsimanampetsotsa et la Réserve de Beza Mahafaly. La nouvelle espèce est considérée comme «Quasi Menacée» selon la Liste Rouge de l'UICN.

Keywords

BORAGINACEAE – *Bourreria* – *Hilsenbergia* – Madagascar – Taxonomy

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Introduction

Bourreria P. Browne (Boraginaceae) was long generally treated as an entirely American genus of some 50 species, the majority in Central America (THULIN, 1987). However, THULIN (1987) argued that five species of *Ehretia* P. Browne in eastern Africa are, for morphological reasons, better placed in *Bourreria*, and the new species *B. lyciacea* Thulin from Kenya and Somalia was described. This taxonomy, with a markedly disjunct *Bourreria*, was accepted by MARTINS (1990) and VERDCOURT (1991), and the trans-Atlantic disjunction was mapped by THULIN (1994). GOTTSCHLING & HILGER (2001) published a first molecular phylogeny of *Ehretia*, *Bourreria* and allied genera, which indicated that the New and Old World species of *Bourreria* together form a strongly supported clade, separate from *Ehretia*, thereby supporting a disjunct *Bourreria*. At the same time, the six New World species and two Old World species included in the study formed two well supported sister clades.

MILLER (2003, 2005) argued that the Old World members of *Bourreria* should be placed in a genus of their own, for which he resurrected the name *Hilsenbergia* Tausch ex Meisn. and accepted five species for Tropical Africa (APD, 2017) and 13 species for Madagascar (12 newly described), and one endemic new species to the Comoro Islands. Only a single species was shared between Continental Africa and Madagascar: *Hilsenbergia lyciacea* (Thulin) J.S. Mill (= *Bourreria lyciacea*).

A new molecular phylogeny presented by GOTTSCHLING et al. (2014) indicated that *Bourreria* without the Old World species is paraphyletic, and BWG (2016) and GOTTSCHLING et al. (2016) included *Bourreria* (incl. *Hilsenbergia*) as a genus of *Ehretiaceae*, one of several families recognized in Boraginales. However, APG IV (2016) argued for a broadly circumscribed *Boraginaceae* and this view is followed here. Following this new molecular evidence, MILLER & GOTTSCHLING (2017) provided the necessary nomenclatural new combinations in *Bourreria* for Madagascar and the Comoro Islands.

THULIN (2006) treated *Bourreria* in a wide sense (incl. *Hilsenbergia*) and questioned the occurrence of *Bourreria lyciacea* in southern Madagascar reported by MILLER (2003), stating that the plants in Madagascar are not conspecific. The aim of the present paper is to describe the new species *B. scabra* Thulin & Razafim. from Madagascar and to point out the differences between this species endemic to southern Madagascar and *B. lyciacea* endemic to eastern Africa.

Taxonomic treatment

Bourreria scabra Thulin & Razafim., **spec. nova** (Fig. 1, 2).

Typus : MADAGASCAR. **Prov. Toliara** : Androy Reg., between Ampanihy and Bevoalavo, S of turning to Befotaka, 10.XII.1969, fl., *Service Forestier 28987* (holo- : P [P03811118]!; iso- : G [G00426168]!, K!, MO-3849266!, MO-5617963!, WAG).

Bourreria scabra Thulin & Razafim. differs from *B. lyciacea* Thulin by its finely pubescent (not glabrous) smaller corolla (4.5–6 vs 7–9 mm long) with shorter lobes (lobes 1–1.5 vs 2.8–5 mm long), by its practically unbranched style (style not divided into two distinct branches 2.5–3.2 mm long), by its smaller fruits (4–5 vs 6–8 mm in diam.) ± enclosed by the calyx (calyx not becoming ± rotate in fruit), and by its smaller pyrenes (2.4–3 mm vs c. 4.8 mm long) with several low ridges forming an irregular reticulum on the outside (not with only a few prominent parallel ridges). Differs from all other species of *Bourreria* in Madagascar by the rough upper surface of the leaves.

Shrub or small tree, up to 6 m tall, much branched; bark fissured; older branches greyish white, striate, young branchlets ± densely pubescent. Leaves alternate, often fasciculate on short shoots; blades elliptic to narrowly or broadly obovate, 6–30(–40) × 3–16(–20) mm, rounded to emarginate at the apex, cuneate at the base, coriaceous; upper surface very rough with tubercle-based hairs, drying dark green, ± bullate with venation impressed; lower surface glabrous to densely pubescent, drying pale green, tertiary venation finely reticulate; margin entire, revolute; petiole 1–7 mm long, sparsely hispid to densely pubescent, grooved above. Inflorescences 2–5(–10)-flowered cymes or flowers solitary, mostly terminal on short shoots; pedicels 1–5 mm long, articulated just beneath the calyx, hispid with spreading hairs; peduncles up to 5(–15) mm long, hispid with spreading hairs. Flowers bisexual or sometimes functionally female, the buds ovoid, with the calyx closed. Calyx campanulate, 3–4.5(–5) mm long, glabrous to densely pubescent outside, glabrous to sparsely pubescent on the lobes inside; lobes 5, valvate in bud, triangular, acute, 1.5–2.5 mm long. Corolla white or cream with greenish centre inside, campanulate, 4.5–6 mm long; lobes 5, imbricate in bud, 1–1.5 mm long, broadly ovate, obtuse, with unevenly crenulate margin, finely pubescent outside, glabrous inside. Stamens 5, included, filaments glabrous, fused to corolla at the base, free parts filiform, 1.5–2 mm long in bisexual flowers, c. 0.8 mm long in functionally female flowers; anthers c. 1 mm long in bisexual flowers or c. 0.6 mm long in functionally female flowers, elongate, yellow. Ovary ovoid, 1.5–2 mm long, glabrous; style 2–2.5 mm long, unbranched or practically so, glabrous; stigmas 2, capitate, green. Fruits ± enclosed by the persistent calyx, globose, 4–5 mm in diam.; endocarp bony, with many low ridges forming an irregular reticulum on the outside, breaking up into 4 single-seeded pyrenes 2.4–3 × 1.5–1.8 mm.

Etymology. – The epithet of the new species refers to the very rough upper surface of the leaves, a unique feature among the Malagasy species of *Bourreria*.



Fig. 1. – *Bourreria scabra* Thulin & Razafim. **A.** Flowering branch; **B.** Flower; **C.** Inside of flower, showing anthers and tip of style; **D.** Fruits. [A: Ravelonarivo 4630; B, C: Ratovoson 1592; D: Ratovoson 1508] [Photos: A: D. Ravelonarivo; B-D: F. Ratovoson]

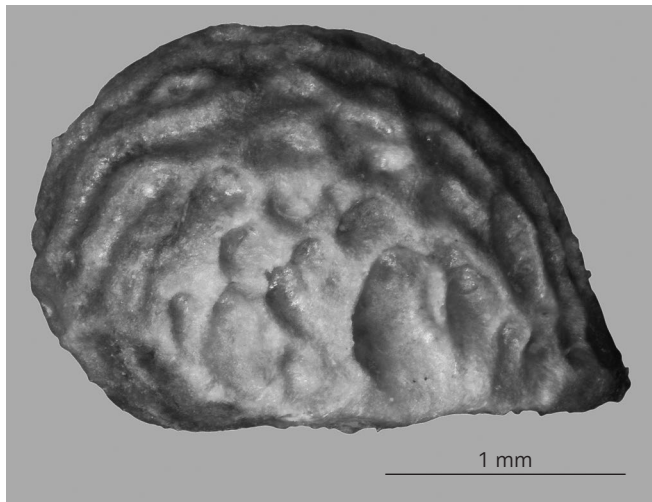


Fig. 2. – *Bourreria scabra* Thulin & Razafim. Pyrene, showing ornamentation of endocarp. [Humbert 20240, P]

Distribution and ecology. – *Bourreria scabra* is widespread in spiny dry forests in southern Madagascar (Fig. 3) at elevations from near sea level up to about 300 m.

Phenology. – Flowering collections have been seen from February, March, June and September to December, and fruiting collections from January, February and October to December.

Vernacular names and uses. – “Ndriamanindry” (Humbert 20240), “Hazomara” (*Réserves Naturelles 9428*) and “Nato” (*Service Forestier SF34-R-18*). According to Humbert 20240, the species is used to treat diarrhoea and haemorrhage.

Notes. – *Bourreria scabra* is easily distinguished from all other species of *Bourreria* in Madagascar by the upper surface of the leaves that is rough with tubercle-based hairs. In that respect as well as by the short and mostly few-flowered inflorescences it agrees with *B. lyciacea* in Somalia and Kenya. However, in various other respects *B. scabra* and *B. lyciacea* are markedly different and there can be no doubt that they are two distinct species. The corolla in *B. scabra* is finely pubescent (not glabrous) outside (Fig. 1B), smaller (4.5–6 mm versus 7–9 mm long) and more shallowly lobed (lobes 1–1.5 versus 2.8–5 mm long). The style in *B. scabra* is practically unbranched (Fig. 1C, D), whereas in *B. lyciacea* it is divided into two distinct branches 2.5–3.2 mm long, and the fruit in *B. scabra* is 4–5 mm in diam. and more or less enclosed by the calyx (Fig. 1D), whereas in *B. lyciacea* it is 6–8 mm in diam. and the calyx is becoming more or less rotate in fruit. Furthermore, the ornamentation of the endocarp is very different, with *B. scabra* having pyrenes with several low ridges forming an irregular reticulum outside (Fig. 2), whereas in *B. lyciacea* there are only a few prominent parallel ridges (THULIN, 1987: Fig. 2C), and

the pyrenes are smaller (2.5–3 vs c. 4.8 mm long).

On the labels of two collections by Capuron, *Service Forestier 28987* (said to be male) and *Service Forestier 28988* (said to be female), specimens from two individuals in the same population, he described the plant as dioecious. The specimen said to be male has flowers with well developed stamens and gynoecium and anthers and stigmas at about the same height, whereas the one said to be female has flowers with a well developed gynoecium, but reduced stamens with apparently sterile anthers (MILLER, 2003). This indicates gynodioecy, but as concluded by MILLER (2003), further field studies are needed to fully understand the breeding system of this species.

Miller *et al.* 10743 from 20 km NE of Toliara was cited as “*Hilsenbergia lyciacea*” by MILLER (2003). However, the flowers of this collection (seen as images) have a truncate calyx and cannot be a *Bourreria*.

Conservation status. – *Bourreria scabra* (as *Hilsenbergia lyciacea*) was provisionally treated as “Endangered” in Madagascar by MILLER (2003). In a more detailed assessment by MILLER & PORTER MORGAN (2011) it was assigned the preliminary conservation status “Least Concern”, but then also the assumed occurrences in Somalia and Kenya were considered. The species is confined to but fairly widespread in spiny dry forests in southern Madagascar (Fig. 3), with occurrences in the National Parks of Andohahela and Tsimanampetsotsa and the Beza Mahafaly Reserve. In April 2010, MT saw good populations of the species in both parcel I and parcel II of the Andohahela PN. With an extent of occurrence (EOO) of about 29,500 km² and an area of occupancy (AOO) probably greater than 2,000 km² it does not quite qualify for a threatened category following the IUCN Red List Categories and Criteria (IUCN, 2012). However, due to ongoing exploitation of its habitat at unprotected sites, the species is here preliminary assigned as “Near Threatened” [NT].

Paratypes. – **MADAGASCAR. Prov. Toliara:** Andatabo, 23°24'08”S 43°46'21”E, 16.I.2003, fr., *Andriamahay 458* (K); Sarodrano, 16.II.2004, fr., *Andriamahay 715* (K); Ifaty, 23°04'36”S 43°37'23”E, 30.I.2008, fr., *Andriamahay* & *Rakotoarisoa SNGF1886* (K); Behara, 1.IX.1924, fl., *Decary 3059* (P); *ibid. loc.*, *Decary 3069* (P); *ibid. loc.*, 29.VIII.1924, ster., *Decary 3076* (P); Beteny, 22.XI.1931, fl., *Decary 9354* (P); Ranopiso, Manatalinjio, 24°49'S 46°37'E, 26–30.X.1994, fr., *Eboroke 886* (GRA, MO, P, TAN); Tsimanampetsotsa, 14.II.1947, fr., *Humbert 20240* (MO, P); E of Betioky, 16.III.1955, ster., *Humbert* & *Capuron 29435bis* (P); Ampanihy, 29.X.1911, fl., *Methuen s.n.* (K); 14 km SE of Tuléar on the road to Sakaraha, 23°21'S 43°42'E, 12.XII.1988, fl., *Miller* & *Schatz 3744* (MO); *ibid. loc.*, 26.XII.1988, ster., *Miller* & *Miller 3782* (MO, P); Beza Mahafaly Reserve near Betioky, 23°40'S 44°35'E, 23.X.1987, fl., *Phillipson 2441* (K, MO, P); near Ihazofotsy, 24°50'S 46°32'E, 7.XII.1988, fl., *Phillipson 2835* (MO, P, TAN); *ibid. loc.*, 22.XII.1988, fr., *Phillipson 2961* (G, MO, P, TAN); NW corner of Reserve de Tsimanampetsotsa, 24°04'S 43°46'E, 11.I.1989, fr., *Phillipson* & *Rabesibanaka 3145* (G, MO, P, TAN); Ambovombe-Toliara road, 10–20 km from Tsihombe, 19.X.1990, fr., *Rabevohitra 2400* (MO, TAN); 10 km from Ihazofotsy on road towards Ambatoabo, 10.XI.1994, fl.

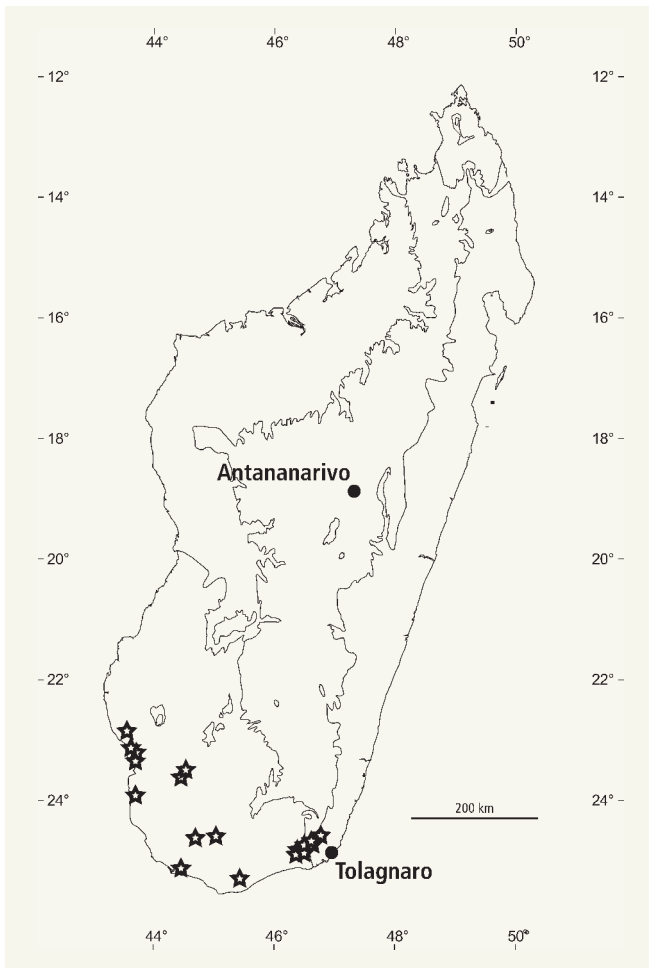


Fig. 3. – Geographic distribution of *Bourreria scabra* Thulin & Razafim. in southern Madagascar mapped on the bioclimatic zones of Madagascar (after CORNET, 1974; see SCHATZ, 2000).

& fr., Rakotomalaza 316 (G, MO, P); Andohahela RN, 16.XI.1994, fr., Rakotomalaza & Messmer 335 (G, MO, P); ENE of Ihazofotsy, 12.XII.1995, fl., Rakotomalaza 586 (MO); Ambatoabo, Ankoba, 2 km E of Imonty, 24°47'56"S 46°40'24"E, 17.XI.2009, fr., Ratovoson 1508 (MO, P, TAN); Ambatoabo, Ankatsaka, 2.5 km NE of Imonty, 24°47'14"S 46°41'41"E, 23.III.2010, fl., Ratovoson 1592 (G, MO, P, TAN); Amboasary Sud, Ranobe, forêt d'Anadabolava-Betsmalaho, 24°15'00"S 46°13'23"E, 12.II.2013, fl., Ravelonarivo 4630 (MO, P, TAN); Marotoka, 22.VI.1957, fl., Réserves Naturelles 9428 (P, TEF); 20 km on road between Ampanihy and Tranoroa, 11.XII.1953, ster., Service Forestier 34-R-18 (P); near Ambatoabo, 29.IX.1953, fl., Service Forestier 8534 (G, MO, P); Sarodrano, XII.1961, fl., Service Forestier 20833 (P); *ibid. loc.*, fr., Service Forestier 20838 (MO, P); La Table, 12.XII.1962, fr., Service Forestier 22263 (MO, P, TEF); between Amboasary and Ranomainty, 17.XI.1967, fr., Service Forestier 27999 (K, MO, P, TEF); between Ampanihy and Bevoalavo, S of turning to Befotaka, 10.XII.1969, fl., Service Forestier 28988 (G, K, MO, P, TEF); between Behara and Ihazofotsy, 24°55'S 46°25'E, 8.IV.2010, ster., Thulin & Razafindraibe 11791 (TAN, UPS); E of Amboasary, Tsimelaha, 24°57'S 46°38'E, 9.IV.2010, ster., Thulin & Razafindraibe 11822 (TAN, UPS).

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References

- APD (2017). *The African Plant database*. Conservatoire et Jardin botaniques de la Ville de Genève and South African National Biodiversity Institute, Pretoria [http://www.ville-ge.ch/musinfo/bd/cjb/africa].
- APG IV [Angiosperm Phylogeny Group] (2016). An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG IV. *Bot. J. Linn. Soc.* 181: 1–20.
- BWG [Boraginales Working Group] (2016). Familial classification of the Boraginales. *Taxon* 65: 502–522.
- CORNET, A. (1974). Essai de cartographie bioclimatique à Madagascar. *Notice Explicative No. 55*. ORSTOM.
- GOTTSCHLING, M. & H.H. HILGER (2001). Phylogenetic analysis and character evolution of Ehretia and Bourreria (Ehretiaceae, Boraginales) and their allies based on ITS1 sequences. *Bot. Jahrb. Syst.* 123: 249–268.
- GOTTSCHLING, M., F. LUEBERT, H.H. HILGER & J.S. MILLER (2014). Molecular delimitations in the Ehretiaceae (Boraginales). *Mol. Phylogenet. Evol.* 72: 1–6.
- GOTTSCHLING, M., M. WEIGEND & H.H. HILGER (2016). Ehretiaceae. In: Kadereit, J.W. & V. Bittrich (ed.). *Flowering plants. Eudicots, The families and genera of vascular plants* 14: 165–178. Springer International Publishing, Switzerland.
- IUCN (2012). *IUCN Red List Categories and Criteria: Version 3.1* ed. 2. IUCN Species Survival Commission, Gland & Cambridge.
- Martins, E.S. (1990). Bourreria. In: LAUNERT, E. & G.V. POPE (ed.), *Fl. Zambesiaca* 7(4): 72–74. Flora Zambesiaca Managing Committee, London.
- MILLER, J.S. (2003). Classification of Boraginaceae subfam. Ehretioidae: Resurrection of the genus Hilsenbergia Tausch ex Meisn. *Adansonia* ser. 3, 25: 151–189.
- MILLER, J.S. (2005). Validation of Hilsenbergia teitensis (Gürke) J.S. Mill (Boraginaceae). *Adansonia* ser. 3, 27: 129.

- MILLER, J.S. & M. GOTTSCHLING (2017). Generic transfers in Malagasy Boraginales. *Candollea* 72: 329-332.
- MILLER, J.S. & H.A. PORTER MORGAN (2011). Assessing the effectiveness of Madagascar's changing protected areas system: a case study of threatened Boraginales. *Oryx* 45: 201-209.
- SCHATZ, G.E. (2000). Endemism in the Malagasy tree flora. In: LOURENÇO, W.R. & S.M. GOODMAN (ed.), *Diversity and Endemism in Madagascar*: 1-9. Mémoires de la Société de Biogéographie, Paris.
- THULIN, M. (1987). *Bourreria* (Boraginaceae) in tropical Africa. *Nordic J. Bot.* 7: 413-417.
- THULIN, M. (1994). Aspects of disjunct distributions and endemism in the arid parts of the Horn of Africa, particularly Somalia. In: SEYANI, J.H. & A.C. CHIKUNI (ed.), *Proceedings of the XIIIth Plenary Meeting of AETFAT*: 1105-1119. National Herbarium and Botanic Gardens of Malawi, Zomba.
- THULIN, M. (2006). *Bourreria*. In: THULIN, M. (ed.), *Fl. Somalia* 3: 38-40. Royal Botanic Gardens, Kew.
- VERDCOURT, B. (1991). Boraginaceae. In: POLHILL, R.M. (ed.), *Fl. Trop. E. Africa*. A.A. Balkema, Rotterdam.