

Schismatoclada spathulata (Rubiaceae), a new species from the Marojejy National Park (northeastern Madagascar)

Dennis Strid, Jennifer Kearey & Sylvain G. Razafimandimbison

Abstract

STRID, D., J. KEAREY & S.G. RAZAFIMANDIMBISON (2019). *Schismatoclada spathulata* (Rubiaceae), a new species from the Marojejy National Park (northeastern Madagascar). In English, English & French abstracts. *Candollea* 74: 203–208. DOI: <http://dx.doi.org/10.15553/c2019v742a8>

A new species *Schismatoclada spathulata* D. Strid & Razafim. (*Rubiaceae*) from the Marojejy National Park in northeastern Madagascar is described and illustrated. The new species differs from the other *Schismatoclada* Baker species by the combination of spatulate leaves and ellipsoid seeds that are bilaterally flattened and broadly winged all around. It is known only from the Beondrika Massif of the Marojejy National Park, and has not been seen below 1200 m altitude. It is assigned a preliminary conservation status of “Least Concern” following IUCN Red List, as no sign of degradation of its habitat has been observed.

Résumé

STRID, D. J. KEAREY & S.G. RAZAFIMANDIMBISON (2019). *Schismatoclada spathulata* (Rubiaceae), une nouvelle espèce du Parc National du Marojejy (Nord-Est de Madagascar). En anglais, résumés anglais et français. *Candollea* 74: 203–208. DOI: <http://dx.doi.org/10.15553/c2019v742a8>

Une nouvelle espèce, *Schismatoclada spathulata* D. Strid & Razafim. (*Rubiaceae*), du Parc National du Marojejy au Nord-Est de Madagascar est décrite et illustrée. Cette nouvelle espèce diffère des autres espèces du genre *Schismatoclada* Baker par la combinaison des feuilles spatulées et des graines ellipsoïdes qui sont bilatéralement aplaties et largement ailées tout autour. Elle est connue uniquement du Massif de Beondrika du Parc National du Marojejy et n'est pas encore recensée en dessous de 1200 m d'altitude. Il lui a été assigné le status de conservation préliminaire de «Préoccupation mineure» selon la Liste Rouge de l'UICN, car aucun signe de dégradation de son habitat est observé.

Keywords

RUBIACEAE – *Schismatoclada* – Western Indian Ocean – Taxonomy – New Species

Address of the authors:

Department of Botany, Swedish Museum of Natural History, Box 50007, SE-10405 Stockholm, Sweden. E-mail: dennis.strid@nrm.se

Submitted on May 16, 2019. Accepted on August 29, 2019.

First published online on October 7, 2019.

Introduction

The tribe *Danaideae*, belonging to the *Spermacoceae* alliance in the subfamily *Rubioideae*, (*Rubiaceae*), is a monophyletic group (BREMER & MANEN 2000; KRÜGER et al., 2012) containing three genera, *Danais* Comm. ex Vent, *Payera* Baill., and *Schismatoclada* Baker and about 60 species (BUCHNER & PUFF, 1993). This group of plants is exclusively restricted to the Western Indian Ocean, with the exception of a single species, *Danais xanthorrhoea* (K. Schum.) Bremek., confined to Tanzania (BUCHNER & PUFF, 1993; KRÜGER et al., 2012). Both *Payera* and *Schismatoclada* are endemic to Madagascar, and are exclusively found in the Malagasy rainforests.

A taxonomic revision of *Schismatoclada* is currently undertaken by one of us (SGR) and at least 15 new species need to be described. Six collections of *Schismatoclada* from the Marojejy National Park located in northeastern Madagascar could not be matched with any of the described *Schismatoclada* species (CAVACO, 1964), and therefore represent a new, undescribed species of the genus. These specimens possess the salient characters of *Schismatoclada* (e.g., valvate-reduplicate corolla lobes, beaked fruits, winged seeds) (BUCHNER & PUFF, 1993). We formally describe this new species, and provide field photographs to illustrate its distinctive characters and a preliminary conservation assessment using IUCN Red List Categories and Criteria (IUCN, 2012).

Material and methods

The description of the new species was based on herbarium specimens coupled with photos taken in the field and label information. Colours of inflorescence axes, flowers, and fruits of the species were based on the field photos (Fig. 1). All measurements were done using a stereomicroscope (Leica M80). The flowers and fruits were rehydrated before dissection. Photos of the dissected flowers and rehydrated fruits and seeds (Fig. 2) were taken with a Canon EOS-1D X. Additional morphological observations were conducted on the known *Schismatoclada* species, with particular emphasis on *S. marojejensis* Humbert and *S. humberiana* Homolle, which, like our new species, have relatively small leaves compared to all the other described species of the genus.

Taxonomic treatment

Schismatoclada spathulata D. Strid & Razafim., **spec. nova** (Fig. 1, 2).

Holotypus: MADAGASCAR. **Reg. SAVA [Prov. Antsiranana]:** Andapa Distr., Marojejy NP, between the Campement Simpona and Campement n° 5, c. 1200 m, 3.II.2006, brevistylous fl., Razafimandimbison & Ravelonarivo 619 (S [S07-87]!; iso-: TAN!).

Schismatoclada spathulata D. Strid & Razafim. differs from all other species of *Schismatoclada* Baker by the combination of spathulate leaves and ellipsoid seeds that are bilaterally flattened and broadly winged all around (vs ellipsoid, seeds with bifid wings at the base or rounded, bilaterally flattened seeds with broadly winged all around).

Subshrub 0.3–0.5 m tall, rarely shrub 1–2 m tall, much branched; completely glabrous (externally). *Stems* terete, nodes swollen, internodes 2–9 mm long, becoming shorter towards the apices; bark gray; stipules persistent, interpetiolar, narrowly triangular, 1–1.5 mm long, topped by narrow awns. *Leaf blades* mostly verticillate in whorls of 3, petiolate, 7–10 × 3–4 mm, persistent, spathulate, glabrous, coriaceous, pale green above, green-yellowish underneath, base cuneate, apex subacute, margins revolute, secondary veins invisible above, inconspicuous underneath; petioles 1–2 mm long. *Inflorescences* terminal, pedunculate, compound umbels, each umbel with 2–6 flowers; bracts absent; peduncles 15–28 mm long. *Flowers* 5-merous, hypocrateriform, pedicellate, pedicels 2–3 mm long; bracteoles c. 1 mm, narrowly triangular, small, paired. *Calyx* dark purple (*in vivo*), tube inconspicuous, lobes unequal, 1–1.5 mm long, linear to oblong, apex rounded to obtuse. *Corolla* white (*in vivo*), tube 15–16 mm long, puberulous inside, becoming denser towards the throat, glabrous outside, lobes 5, 3–4 mm long, linear, apex acute. *Stamens* 5, anthers elliptic, medifixed. *Ovaries* cup-shaped, c. 2 mm long, dark purple (*in vivo*), glabrous and smooth outside, placenta attached to the septum, ovules 3 to 5, pendulous, stigmas bifid, lobes 1–1.5 mm long. *Brevistylous flowers:* filaments c. 3 mm long, inserted above the middle of the corolla tube, anthers exerted beyond the tube; styles c. 13 mm long, stigmas included inside the tube. *Longistylous flowers:* filaments c. 2 mm long, attached below the throat of the tube, anthers included inside the tube; styles c. 18 mm long, stigmas exerted beyond the tube. *Fully mature fruits* unknown; *submature fruits* elliptic, purple-whitish (*in vivo*), c. 9 × 4 mm, glabrous, beak pronounced, almost half of the fruit length; calyx lobes present; bilocular with 3 to 5 seeds per locule. *Seeds* elliptic, c. 5 × 1.5 mm, reticulate, bilaterally flattened, mostly broadly winged all around, deeply bifid at the base, margins sinuate.

Etymology. – The epithet *spathulata* refers to the spathulate shape of the leaf blade of the species.

Distribution, ecology and phenology. – Beondrika Massif of the Marojejy National Park in the humid, low- and open-canopied forests between 1200 and 2132 m. Flowering collections have been seen from February to April and fruiting collections in April.



Fig. 1. – *Schismatoclada spathulata* D. Strid & Razafim. **A.** Flowering branch with floral buds and fully open flowers and showing the dark purple inflorescence axes, calyces, and ovaries; **B.** Fruiting branch with young fruits; **C.** Habit showing immature, light purple, immature fruits. [A: Razafimandimbison & Ravelonarivo 619; B–C: Bremer et al. 5305] [Photos: A: S. Razafimandimbison; B–C: K. Kainulainen].



Fig. 2. – *Schismatoclada spathulata* D. Strid & Razafim. **A.** Dissected corolla tube of a brevistylous flower showing the indumentum and the insertion of the stamens inside the tube; **B.** Brevistylous flower (corolla removed) showing pedicel, unequal calyx lobes, ovary, and style and stigma; **C.** Dissected corolla tube of a longistylous flower showing the indumentum and the insertion of the stamens inside the tube; **D.** A brevistylous flower showing a pedicel, unequal calyx lobes, an ovary, and a style and stigma; **E.** Young, beaked fruit with persistent calyx lobes; **F.** Broadly winged seed with irregular margins.

[**A–B:** Rasoavimbahoaka 526; **C–D:** Razafimandimbison & Ravelonarivo 619; **E–F:** Bremer et al. 5319]

Characters	<i>S. spathulata</i>	<i>S. marojejensis</i>	<i>S. humbertiana</i>
Habit [m]	subshrub 0.3–0.5 (1–2)	subshrub 0.2–0.5	shrub 1–2
Leaf shape	spathulate	lanceolate	elliptic
Leaf size [mm]	7–10 × 3–4	4–8 × 2–3	10–15 × 3–5
Petiole length [mm]	1–2	0.5–1	1–2
Inflorescence type	cyme, erect	not cyme (solitary flower), pendulous	cyme, erect
Flower colour	white	white-yellowish	pink-purplish
Calyx tube length [mm]	1–1.5	c. 5	c. 4
Corolla tube length [mm]	15–16	c. 30	c. 20
Number of corolla lobes	5	6(5)	4–5
Fruit shape	elongated	globose	globose
Seed wing shape	broadly winged all around; deeply bifid at the base	broadly winged only at both ends; shallowly bifid at the base	broadly winged only at both ends; shallowly bifid at the base

Table 1. – Comparison of the distinctive characters of *Schismatoclada spathulata* D. Strid & Razafim., *S. marojejensis* Humbert, and *S. humbertiana* Homolle.

Conservation status. – *Schismatoclada spathulata* is only known from the Mountain Beondrika, which is in the heart of the Marojejy National Park. No sign of degradation of its habitat has been observed. The species seems to be common locally, and has not been seen below 1200 m altitude. *Schismatoclada spathulata* has an extent of occurrence (EOO) of c. 2 km². Its area of occupation (AOO) is the same size as its EOO. However, it has only been collected along the sole trail leading to the summit of the park. It is likely that the species has a much larger EOO, and therefore is assigned a preliminary conservation status as “Least concern” [LC] using Red List Categories and Criteria (IUCN, 2012).

Notes. – *Schismatoclada spathulata*, *S. marojejensis*, and *S. humbertiana* differ from all the other described species of *Schismatoclada* by their markedly swollen nodes and very short internodes (2–9 mm long vs at least 10 mm long), and smaller leaves (4–15 × 2–5 mm vs at least 25 × 5 mm) with revolute margins and secondary and tertiary nerves invisible above and inconspicuous underneath. Table 1 summarizes the distinctive characters of these three species. *Schismatoclada humbertiana* is confined to southeastern Madagascar. The specimen from Marojejy (*Humbert 23504*, P) and that from the Andasibe area (*Perrier de la Bâthie 17097*, P) considered by HUMBERT (1955) to be *S. humbertiana* represent two different new undescribed species of *Schismatoclada*. Both *Schismatoclada spathulata* and *S. marojejensis* are endemic to the Beondrika Massif of the Marojejy National Park, but do not grow sympatrically, with the latter confined to the ericoid thicket near the summit while the former to the humid, low- and open-canopied forest. Finally, the floral buds of *S. spathulata* have white corolla tubes

and white-purplish lobes, while its open flowers have entirely white corollas (*in vivo*).

Paratypes. – MADAGASCAR. Rég. SAVA [Prov. Antsiranana]: Andapa Distr., Manantenina Comm., Marojejy NP, along the trail to the summit of Marojejy Est, NW of Mandena, 14°26'S 49°44'E, 1300–1600 m, 15.II.1989, longistylous fl., *Miller & Lowry 4126* (MO, P [P04934242], TAN); aux env. du sommet, 14°26'34"S 49°44'17"E, 1850–2000 m, 25.II.2003, brevistylous fl., *Rakotonasolo & Ravelonarivo 606* (G, MO, P [P04934241], TAN); trail between Camp n° 3 and the summit of the Park, 14°25'S 49°43'E, 20.IV.2008, brevistylous fl. & fr., *Bremer et al. 5305* (S [S09-42318], TAN); *ibid loco*, *Bremer et al. 5319* (S [S09-42332], TAN!); Maroambihy, 14°26'50"S 49°43'57"E, 2132 m, 23–24.III.1995, longistylous fl., *Rasoavimbaboaka 526* (S [S15-51091], MO, P [P04934222], TAN).

Acknowledgments

We thank the MO, P, S and TAN herbaria for giving access to their *Schismatoclada* collections. Kent Kainulainen for sharing his photos with us. Petra de Block for improving an earlier version of this manuscript.

References

- BREMER, B. & J.-F. MANEN (2000). Phylogeny and classification of the subfamily Rubioideae (Rubiaceae). *Plant Syst. Evol.* 225: 43–72.
- BUCHNER, R. & C. PUFF (1993). The genus complex Danais–Schismatoclada–Payera (Rubiaceae). Character states, generic delimitation and taxonomic position. *Bull. Mus. Natl. Hist. Nat., B, Adansonia* 15: 23–74.
- CAVACO, A. (1964). Contribution à l'étude des Rubiacées de Madagascar. I. Cinchonées. *Adansonia* ser. 2, 4: 184–195.
- HUMBERT, H. (1955). Une merveille de la nature à Madagascar – première exploration botanique du Massif du Marojejy et de ses satellites. *Mém. Inst. Sci. Madagascar, Sér. B, Biol. Vég.* 6.
- IUCN (2012). *IUCN Red List Categories and Criteria: Version 3.1*. Ed. 2. IUCN Species Survival Commission, Gland & Cambridge.
- KRÜGER, Å., S.G. RAZAFIMANDIMBISON & B. BREMER (2012). Molecular phylogeny of the tribe Danaideae (Rubiaceae: Rubioideae): Another example of out-of-Madagascar dispersal. *Taxon* 61: 629–636.