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Studies in Malagasy Eugenia L. (Myrtaceae) – V: Eugenia quadriphylla Snow & Callm., an unusual and rare new species from the northeast

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Abstract

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The new species *Eugenia quadriphylla* N. Snow & Callm. *(Myrtaceae)* is described from the Makira Protected Area in northeastern Madagascar. It is easily distinguished from its congeners on the island by its thickly quadrangular branchlets and four bullate leaves per node. The species also is atypical among the majority of *Eugenia* species in Madagascar by virtue of its basipetally splitting calyx lobes, a character that is, however, known elsewhere in the genus. A discussion on its morphology, a line drawing, a distribution map and a preliminary assessment of its conservation status following IUCN Red List Categories and Criteria is provided for the new species.

Résumé

SNOW, N. & M.W. CALLMANDER (2016). Etude du genre Eugenia L. (Myrtaceae) à Madagascar – V: Eugenia quadriphylla Snow & Callm., une nouvelle espèce inhabituelle et rare du nord-est. *Candollea* 71: 189-193. DOI: http://dx.doi.org/10.15553/c2016v712a4

La nouvelle espèce *Eugenia quadriphylla* N. Snow & Callm. *(Myrtaceae)* est décrite de l'aire protégée du Makira au nord-est de Madagascar. Elle est facilement reconnaissable par rapport à ses congénères de l'île par ses rameaux quadrangulaires épais, ses quatre feuilles par noeud et ses feuilles bullées. L'espèce est également atypique au sein de la majorité des espèces de *Eugenia* à Madagascar par ses lobes du calice qui se fragmentent basipétalement, un caractère qui se retrouve, néanmoins, ailleurs dans le genre. Une discussion sur sa morphologie, un dessin au trait, une carte de distribution ainsi qu'un statut préliminaire de conservation suivant les Catégories et les Critères de la Liste Rouge de l'UICN sont fournis pour la nouvelle espèce.

Keywords

MYRTACEAE – *Eugenia* – Madagascar – New species – Systematics – Conservation

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Introduction

Recent herbarium-based studies of *Eugenia* L. *(Myrtaceae)* have effectively doubled the number of known species in Madagascar (Miller, 2000; Snow, 2008, 2011; Snow et al. 2012, 2015), which reflects in part extensive field studies conducted during the past approximately 30 years by many teams of botanists. A recent visit to MO by the first author revealed another new and unusual species from north-west of Masoala Peninsula in northeastern Madagascar (Fig. 1). Staff members of the Missouri Botanical Garden (MBG) collected this new species in the context of an important botanical inventory in the Makira region. This inventory was undertaken as part of an effort to identify new and important sites for conservation (Birkinshaw et al., 2009) and the Makira region was recently added to the Malagasy protected area network. This inventory led to the discovery of many new species that still need to be described (Birkinshaw et al., 2009).

As *Eugenia* has been better characterized in Madagascar (Snow et al. 2012, 2015) it has become clear that many species are narrowly endemic, which mirrors the situation with many other species-rich genera (see Callmander et al., 2011). The genus is decidedly concentrated in wetter areas from the northern mountain massifs and low-lying areas, south mostly along and east of the escarpment. Most of the species are known from few collections overall, and only rarely do collection labels indicate a species as being locally common. In contrast, some relatively localized areas, such as sites in the Tolagnaro area, can harbor ten or more sympatric species (Snow et al. 2012). At the current time the authors are aware of at least several more undescribed species of *Eugenia* from Madagascar, but in most cases are awaiting additional fertile material before describing them.

The new species described here is unique in Madagascar by having thickly four-winged branchlets, four weakly bullate leaves per node, and four leafy bracteoles subtending the flower, as well as a closed hypanthium that splits basipetally, a feature seen in other *Eugenia* in Madagascar (Snow, 2008), New Caledonia (Snow et al. 2016) and South America (Landrum & Kawasaki, 1997). A line drawing, a distribution map, a discussion of its morphology and a preliminary risk of extinction assessment following IUCN Red List Categories and Criteria (IUCN, 2012) is provided for the new species.

Systematics

Eugenia quadriphylla N. Snow & Callm., **spec. nova** (Fig. 2).

Typus : Madagascar. Prov. Mahajanga : Ruisseau d'Andasinanantsomanga, Amparihy, Matsoandakana, 14°55'03"S 49°25'04"E, 1206 m, 24.II.2008, *Bernard, Ramiadana & Jocelyn 917* (holo-: MO-6475168!; iso-: P, TAN image seen).

Unique among species of Eugenia L. in Madagascar by the combination of its thickly four-winged branchlets, four narrowly oblong and weakly bullate leaves per node, four leafy bracteoles subtending the flower, and basipetally splitting calyx lobes.

Trees to 7 m. Bark unknown. Herbage glabrous and eglandular except where noted. Branchlets strongly quadrangular, the rounded ridges thickened and most pronounced beneath nodes. Leaves petiolate, coriaceous, 4 per node, somewhat bullate throughout, brochidodromous, elgandular, slightly discolorous, surfaces matte, evidently somewhat concentrated near tips of larger branches. Axillary colleters comprising a few to several thick ferrugineous projections. *Petioles* 5-7 mm, somewhat flattened or slightly sulcate adaxially. *Leaf blades* 12-15 × 2.8-3.8 cm, narrowly oblong, based rounded, margin slightly sinuous, apex obtuse; adaxial venation (midvein, secondaries and tertiaries) pronounced but impressed due to weakly bullate texture; abaxial venation protruding prominently, intramarginal vein 4-6(-8) mm from margin at midpoint of blade. *Inflorescence* of solitary flowers (ramiflorous or terminal) or somewhat clustered on short shoots. *Peduncles* rigid, 5-6 mm, tomentose. *Bracteoles* 4, 4–7 × c. 5 mm, very broadly ovate to broadly obovate, leafy, ascending, tomentose abaxially. *Hypanthium* 5-6 mm tall, cupuliform to urceolate and becoming longitudinally ribbed, tomentose to densely tomentose (trichomes whitish or somewhat ferrugineous). *Calyx lobes* 4, c. 5 mm long, broadly elliptic to broadly ovate, apex obtuse, adaxial surface glabrous, abaxially

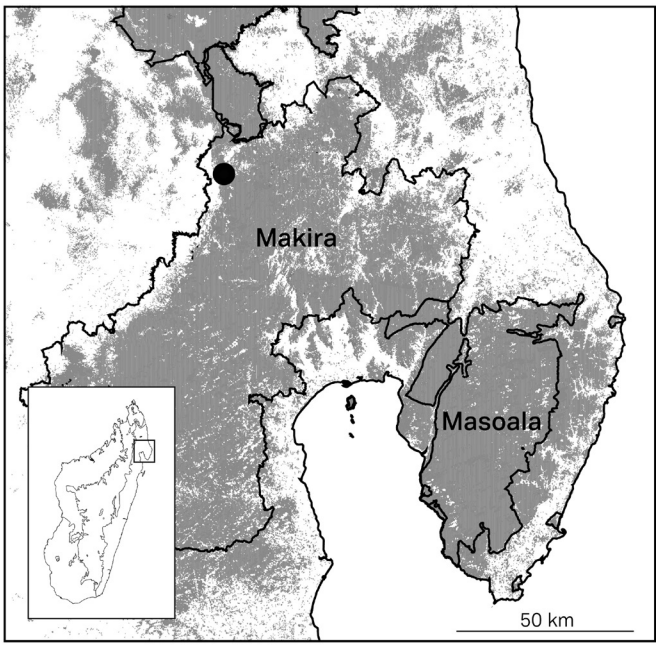

Fig. 1. – Distribution map of *Eugenia quadriphylla* N. Snow & Callm. (black circle) plotted on a map of forest cover in 2000 (grey) following Harper et al. (2007).

Fig. 2. – *Eugenia quadriphylla* N. Snow & Callm. **A.** Abaxial view of leaf; **B.** Branch and subtending (ramiflorous) inflorescence; **C.** Detail of flower showing longitudinally ribbed hypanthium, splitting calyx lobes, and four subtending bracteoles.
[*Bernard et al. 917*, MO & TAN] [Drawing: R.L. Andriamiarisoa]

surface tomentose; arising from radial splitting during anthesis. *Petals* (only 1 seen) c. 8 × 5 mm, obovate, sparsely sericeous (trichomes dibrachiate) adaxially, glabrous abaxially. Stamens 150+, multiseriate; anthers not seen; staminal disk glabrous. *Ovary* apically tomentose (surrounding base of style). *Style* (only 1 seen) c. 10 mm, stigma narrow. Fruits not seen (said to be green).

Etymology. – The specific epithet refers to the highly atypical situation of having four leaves arising per node.

Conservation status. – *Eugenia quadriphylla* is known from a single locality northwest of the Masoala Peninsula at an altitude of about 1,200 m. The montane evergreen forest at this locality is included within the newly established Makira Protected Area, but the habitat of this new species is nevertheless under threat due to human pressure, in particular unsustainable slash and burn agriculture. Recent satellite imagery from Google earth [https://www.google.com/intl/en/earth] suggests that the collection site and the surrounding area with in a radius of approximately 1 km is forested, but from a distance of c. 2 km the area is deforested or disturbed. Despite the intensive nature of the inventory conducted by MBG (Birkinshaw et al., 2009) in the region, the new species has been collected only once, suggesting it is rare in the wild. *Eugenia quadriphylla* is therefore preliminary assessed as "Endangered" [EN B2(ii, iii, iv)] following IUCN Red List Categories and Criteria (IUCN, 2012).

Notes. – Several morphological traits collectively make *E. quadriphylla* unmistakable with the genus overall, including thickened wings on the branchlets, four weakly bullate leaves per node, the four subtending leafy bracteoles (in contrast with two bracteoles, which is much more typical for *Eugenia*), and an evidently united (or mostly so) calyx tube that splits basipetally during anthesis. In addition, it appears that the fruits may be longitudinally ribbed at maturity (Fig. 2), which is atypical for species in Madagascar.

The splitting calyx lobes align the species morphologically in Madagascar most closely to *Eugenia ambanizanensis* N. Snow (Snow, 2008), which also has this trait, the two collections of which occur in the Masoala Peninsula at a distance of c. 75 km to the southeast. However, the stamens of *E. quadriphylla* are arranged in a distinct ring, typical of most species of *Eugenia*, whereas the stamens of *E. ambanizanensis* are spread nearly entirely across of the inside of calyx lobes (i.e., it lacks a well defined staminal ring). *Eugenia quadriphylla* also differs from *E. ambanizanensis* in lacking the numerous thick (probably succulent when fresh) bracts subtending the flower of the latter species, and its strongly and prominently thickened quadrangular branchlets and whorled (4 per node) leaf arrangement contrasts with the terete to slightly winged and opposite leaves of *E. ambanizanensis* (Snow, 2008).

The basipetally splitting calyx lobes found in *Eugenia quadriphylla* are also suggestive of a relationship with Mascarene species initially assigned to the genus *Monimiastrum* Guého & Scott (Scott, 1980), which van der Merwe et al. (2005) showed was nested within *Eugenia* based on ITS and ETS sequences, the species of which Snow (2008) later transferred into *Eugenia*. Basipetally splitting calyx lobes also occur in several species of *Eugenia* in New Caledonia (Snow et al., 2016) and in South American species once assigned to *Hexaclamys* L. (Landrum & Kawasaki, 1997). Given the significant geographical distance between Madagascar/Mascarenes and South America or New Caledonia, a hypothesis of convergence of the basipetally splitting calyx lobes seems equally likely as homology (singular origin) of the trait. However, recent research (Federman et al., 2015) has corroborated previous suggestions (Schatz, 1996) of strong biogeographic affinities across the Indo-Pacific region, suggesting that the presence of splitting calyx lobes may reflect an underlying phylogenetic relationship among species bearing this trait between New Caledonia and Madagascar, despite the geographical distance separating these regions. Tracing the evolutionary and phylogenetic history of species exhibiting this character will be a useful addition to preliminary studies that focused primarily on inflorescence structure among Neotropical members of *Eugenia* (Mazine et al., 2014). A silica gel preserved sample of *E. quadriphylla* is available for DNA analysis, although it must be noted that the leaves of the type collection are heavily infested with fungal growth.

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