

Impatiens serusiauxii (*Balsaminaceae*), a new species from Marojejy National Park, Madagascar

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Article info

Received: 16 Oct. 2019
Revision received: 9 Jan. 2020
Accepted: 8 Feb. 2020
Published: 2 Jun. 2020

Associate Editor

Nicolas Magain

Abstract. The new species *Impatiens serusiauxii* is described from Marojejy National Park in NE Madagascar. *Impatiens serusiauxii* differs from the morphologically similar *I. manaharensis* in the distinctly coriaceous linear-lanceolate leaves, the larger white flowers with dark red and yellow spots, the shape of the dorsal petal and the lateral united petals, and the shape of the lateral sepals and the lower sepal with spur oriented upwards. *Impatiens serusiauxii* is restricted to sclerophyllous montane cloud forest above 1100 m.

Key words: Endemism, taxonomy, *Impatiens manaharensis*

Introduction

The genus *Impatiens* (Linnaeus 1753) (*Balsaminaceae*) is a monophyletic and diverse genus with more than 1000 species (e.g., Yuan et al. 2004; Janssens et al. 2009) and is represented by at least 260 endemic species in Madagascar (e.g., Fischer & Rahelivololona 2002, 2004, 2007a, b, 2015a, b, c, 2016; Fischer et al. 2003, 2017). This island is one of the centers of species diversity for the genus, which is also the largest flowering plant genus on the island (Perrier de la Bâthie 1934, 1948; Humbert 1955, 1956; Fischer & Rahelivololona 2002, 2004a, b, 2007a, b, 2015a, b, c, 2016; Fischer et al. 2003, 2017; Abrahamczyk & Fischer 2015). Most of the *Impatiens* species are narrow endemics and thus have a very high potential risk of extinction. Fischer & Rahelivololona (e.g., 2002, 2004a, b) initiated taxonomic studies of the Malagasy and Comorian members of *Impatiens* in an attempt to produce an updated flora of the family *Balsaminaceae* for Madagascar and the Comoros. Since then, 75 new species have been described and at least another 75 new species will be published in the near future (E. Rahelivololona & E. Fischer, unpubl. data). The majority of the Malagasy *Impatiens* occur in the montane regions of northern and eastern Madagascar (e.g., Tsaratanana National Park with 36 species, Marojejy National Park with 48 species, Masoala National Park with 59 species).

Marojejy National Park is located in northeastern Madagascar within the SAVA Region (a region with Sambava as the capital and composed of the first letters of the towns Sambava, Antalaha, Vohimaro and Andapa). With its tallest peak rising to 2137 m, the area is home to a diverse flora of upland species. The wide range of elevations and the rugged topography of Marojejy create diverse habitats (Humbert 1955), which transition quickly with changes in altitude. There are four types of forests within the park: lowland rainforest below 800 m; moist montane rainforest between 800 and 1100(–1400) m; sclerophyllous montane cloud forest between (1100–)1400 and 1800 m; and ericoid shrub above 1800 m (Fig. 1) (Humbert 1955; Rahelivololona et al. 2018). The higher summits are covered by subalpine grassland with small ericaceous shrubs, and they are home to numerous local endemic species of *Impatiens* and of other large genera such as *Streptocarpus* (*Gesneriaceae*) and *Helichrysum* (*Asteraceae*). The park has been recognized as a center of plant endemism. For example, 32 palm species found in the Marojejy area are endemic to Madagascar, seven of which are restricted to the park (Dransfield & Beentje 1995).

Material and methods

We investigated living plants in the field in Madagascar as well as dried specimens from BR, G, K, MO, NEU, P and TAN (herbarium acronyms after Thiers 2019). The standard terminology and measurements for *Impatiens* were described in detail by Fischer & Rahelivololona (2002).

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Results

Taxonomy

Impatiens serusiauxii Eb. Fisch., Raheliv. & Killmann, sp. nov. (Figs 1–2)

Diagnosis: *Impatiens serusiauxii* differs from *I. manaharensis* in the distinctly coriaceous linear-lanceolate leaves (vs. ovate ± herbaceous and soft leaves with a slightly crenate margin), the larger white flowers with dark red and yellow spots (vs. smaller pinkish flowers with dark pinkish to purple spots), the shape of the dorsal petal and the lateral united petals, and the shape of the lateral sepals and the lower sepal with spur oriented upwards (vs. spur curved downwards). *Impatiens serusiauxii* is restricted to sclerophyllous montane cloud forest above 1100 m, while *I. manaharensis* is found in lowland rainforest below 800 m.

Type: Madagascar, Antsiranana, Réserve Naturelle de Marojejy, along trail to summit of Marojejy Est, NW of Mandena, wet, evergreen forest between second and third camps, 14°26'S 49°15–16'E, 1100–1200 m, 13 Feb. 1989, J. Miller & P. P. Lowry 4034 (TAN – holotype!, MO!, P!, BR! – isotypes).

Description. Perennial herb, erect, glabrous. Stems succulent, green, up to 29–50 cm tall. Leaves alternate, fresh to dark green and shining above, pale green tinged purplish below, petiole 2–3 mm long, with 0–1 pair of extrafloral nectaries, lamina linear-lanceolate, widest at middle, base attenuate, apex acuminate, 2.3–5.5 × 0.4–0.9 cm, with 4–5 pairs of secondary veins, margin dentate, with 6–7 pairs of teeth with gland-tipped appendages. Inflorescence axillary, with 1–2 flowers. Peduncle 0.5 mm long.

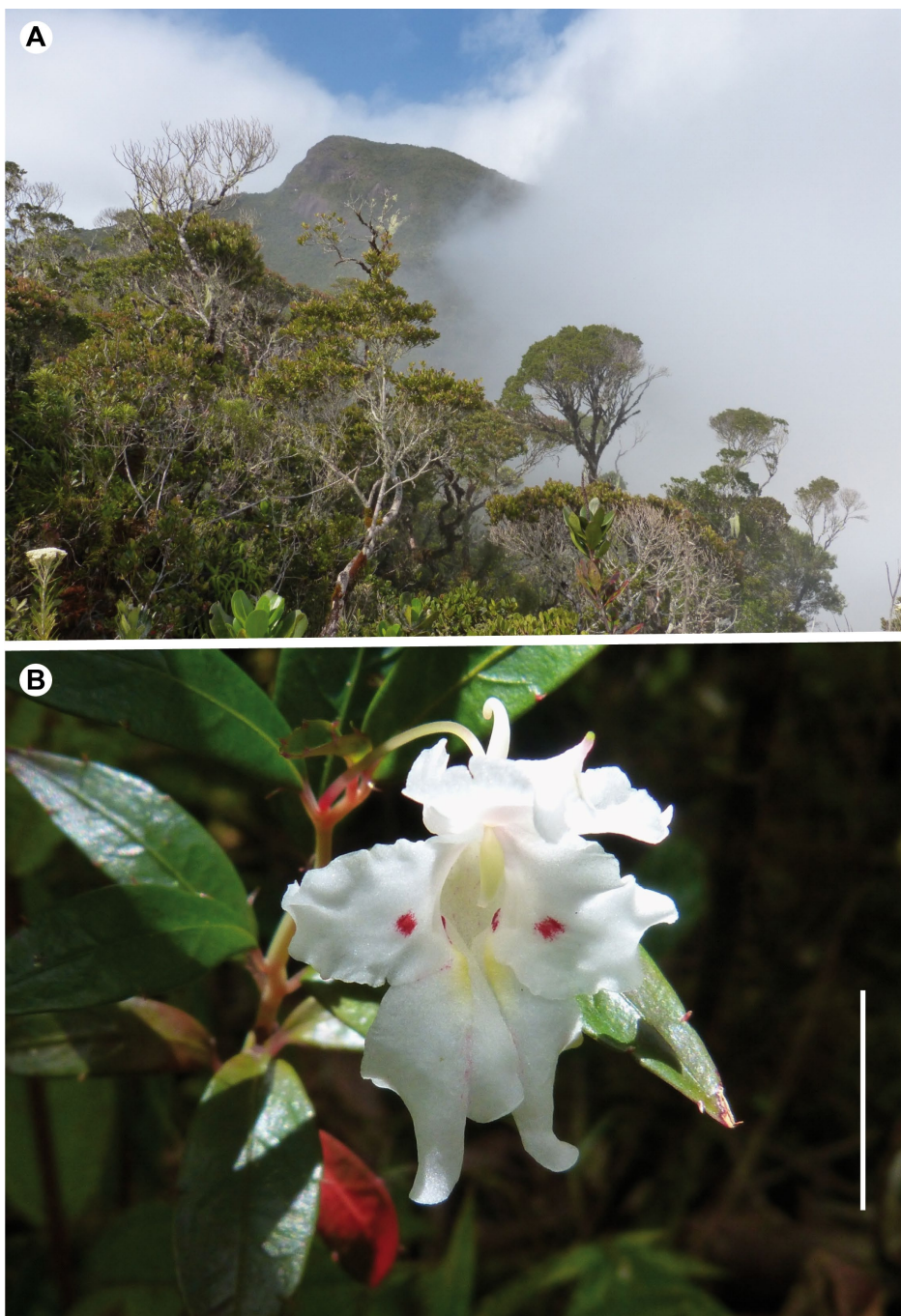


Figure 1. *Impatiens serusiauxii*. A – habitat above Camp III at 1250 m; B – flower. Scale bar: B = 1 cm. Photos by E. Fischer, 20.10.2014.

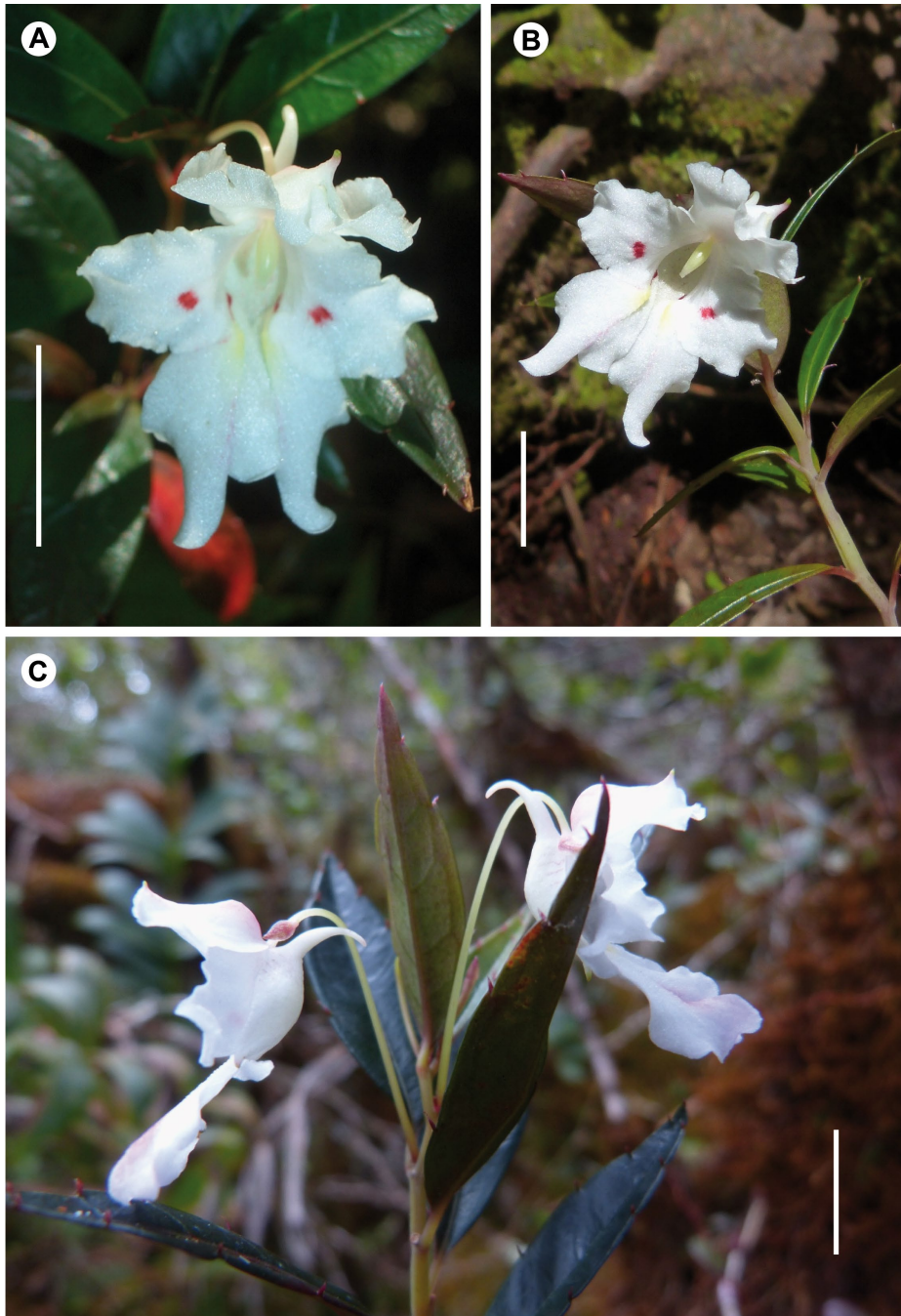


Figure 2. *Impatiens serusiauxii*. A – flower; B–C – detail of habit with inflorescence. Scale bar: A–C = 1 cm. Photos by E. Fischer, 20.10.2014.

Bracts linear-lanceolate, $1\text{--}2 \times 0.5\text{--}1$ mm. Pedicels ($2.6\text{--}3.5\text{--}4$ cm long, distinctly curved at apex. Flowers white with two deep red and two yellow dots on lateral united petals, dorsal petal with greenish crest and apicule, lateral sepals white. Lateral sepals lanceolate, acuminate, $3\text{--}4 \times 1\text{--}1.8$ mm. Lower sepal navicular, $13\text{--}15 \times 6\text{--}10$ mm, with apicule at base $1.5\text{--}1.8$ mm long. Spur bent upwards and slightly curved, $5\text{--}6$ mm long and 2 mm wide. Dorsal petal \pm cucullate, emarginate at apex and irregularly lobed at margin, $10\text{--}12 \times 5\text{--}7$ mm, dorsal crest distinct, 1.5 mm, apicule at apex $1\text{--}1.5$ mm long. Lateral united petals $17\text{--}20$ mm long, upper petal slightly emarginate at apex, $7\text{--}11 \times 12$ mm, irregularly lobed at margin, lower petal deeply bilobed at apex, $8\text{--}12 \times 5\text{--}8$ mm, inner lobe shorter and rounded, outer lobe longer and falcate,

$4\text{--}5 \times 2$ mm. Anthers $2\text{--}4$ mm long. Ovary $3\text{--}4$ mm long. Fruit not known.

Ecology and distribution. Upper montane sclerophyllous cloud forest to ericaceous shrub, (1100) 1200–1500 m, Madagascar, known only from Mt. Marojejy.

Etymology. Dedicated to Prof. Dr. Emmanuel Sérusiaux, who accompanied the first author on a field trip to Marojejy where this new species was discovered.

Vernacular name. Benga, Andriana fotsy.

Specimens examined. MADAGASCAR. Réserve Naturelle Intégrale 12 Marojejy, au Nord d'Andapa, aux environs du sommet de l'Est, $14^{\circ}29'S$ $49^{\circ}38'E$, 1300–1500 m, 21–22 Jan. 1994, F. Rasoavimbahoaka, B. Lewis, J. Mc Donagh, S. Malcomber

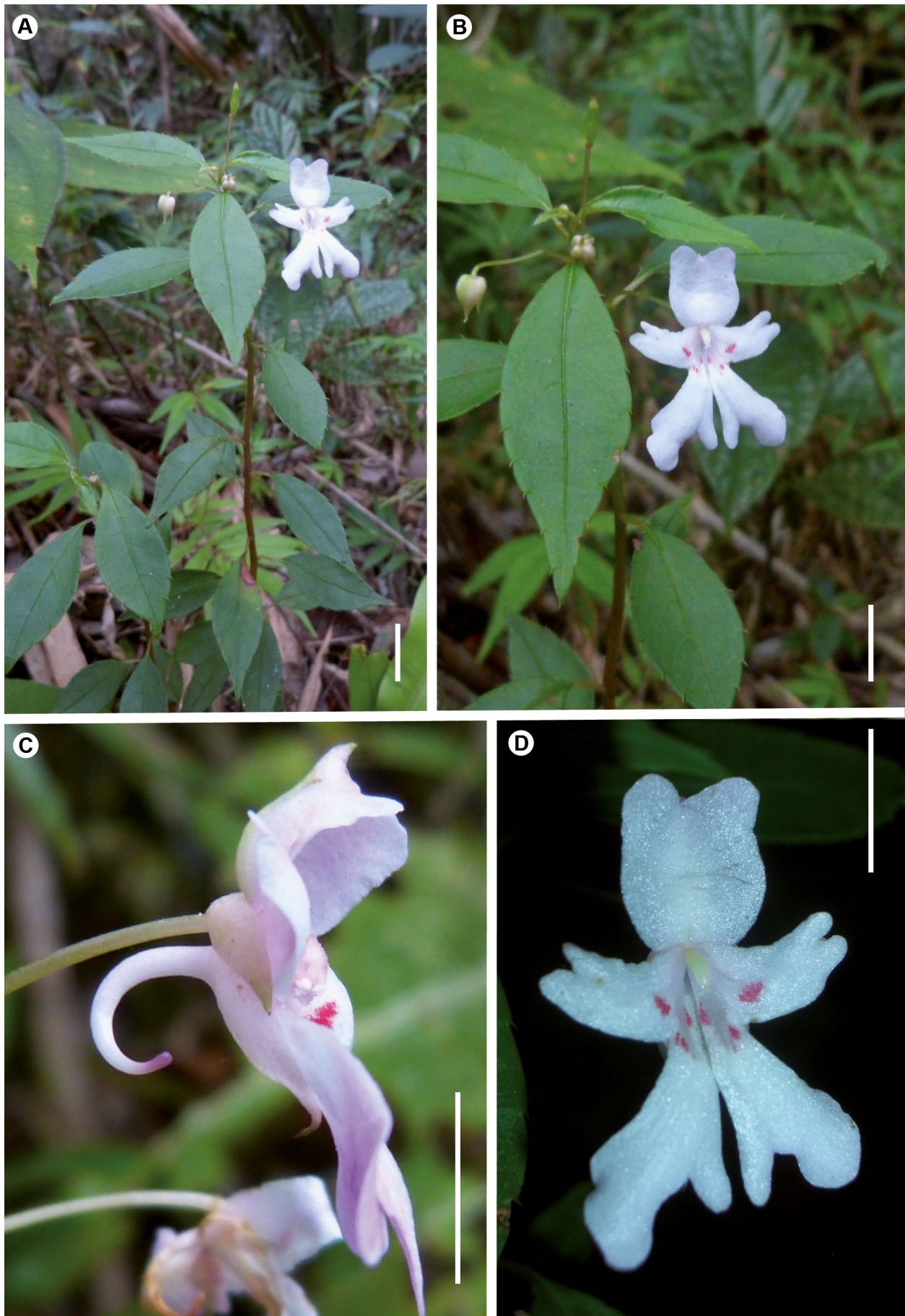


Figure 3. *Impatiens manaharensis*. A–B – habit; C – flower, lateral view; D – flower, frontal view. Scale bar: A–D = 1 cm. Photos by E. Fischer, 18.10.2014.

& C. Voninera 31 (TAN, MO, P); Réserve Nationale 12 Marojejy – sentier qui mène au 3ième camp, au dessus du village Manantenina, 1150–1300 m, 26 Mar 1990, A. Randrianasolo 89 (TAN, MO); Antsirana, Marojejy RNI, Sambava, environ à 13,5 km à vol d'oiseau au nord est de Maroambihy et 9,5 km à vol d'oiseau au nord est du fokotany de Mandena et le sommet de Marojejy, 1200 m, 14°26'10"S, 49°44'25"E, s.dat., F. Ras-oavimbahoaka 576 (TAN, MO).

Conservation status. EOO: not applicable, AOO: 9 km², number of locations: not applicable (IUCN 2016). With only one collecting site where *Impatiens serusiauxii* has been observed, it is not possible to calculate the extent of occurrence (EOO). The area of occupancy (AOO) falls within the limits for the Critically Endangered category under sub-criterion B2. However, as the single collecting site occurs inside a well-protected area (Marojejy National Park), it does not face degradation or loss of habitat and is not in decline. Thus, the necessary conditions required under sub-criterion B2 are not met, and the species cannot be placed in any threat category. Therefore it is listed as Least Concern (LC), and because its entire occurrence is within a protected area, the label Conservation Dependent (CD) has been added.

Discussion

Specimens of *Impatiens serusiauxii* were usually identified as *Impatiens manaharensis* Baillon (1886). However, *Impatiens manaharensis* differs in the ovate ± herbaceous and soft leaves with a slightly crenate margin (vs. distinctly coriaceous linear-lanceolate leaves), the pinkish flowers with dark pinkish to purple spots (vs. white flowers with dark red and yellow spots), the shape of the dorsal petal and the lateral united petals, and the shape of the lateral sepals and the lower sepal with a spur that is curved downwards (vs. spur oriented upwards) (Fig. 3).

Impatiens manaharensis also occurs at Mt. Marojejy but is found only in lowland rainforest below 800 m. The plants agree very well with the type (Madagascar, Manahar, Humblot 218, P – holotype!, K – isotype!). In a paper dealing with the phylogeny of *Impatiens* in Madagascar (Rahelivololona et al. 2018), *Impatiens manaharensis* is resolved in a sister clade to *I. serusiauxii* (there called *I. aff. manaharensis*) and *I. max-huberi*, also endemic to Marojejy and the adjacent Anjanaharibe-Sud area (Fischer & Rahelivololona 2016).

Acknowledgements

We thank the Directors of the following herbaria for loan of specimens (acronyms according to Thiers 2019): BR, G, K, MO, NEU, P, TAN. We are indebted to the Missouri Botanical Garden, Parc Botanique Zoologique Tsimbazaza and Madagascar National Parks for research and collection permits. The Akademie der Wissenschaften und Literatur Mainz kindly sponsored the field trip of the first author. Special thanks to our colleagues Emmanuel Sérusiaux (Liège), Damien Ertz (Meise), Bernard Goffinet (Connecticut) and Roger Lala Andriamiarisoa (Antananarivo), who accompanied us in the field in 2014. Without the skills of Roger Lala Andriamiarisoa, the field work would have been impossible.

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