

# New taxa of *Impatiens* (Balsaminaceae) from Madagascar. I

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## ABSTRACT

In a first paper as precursor to a revision of Balsaminaceae in Madagascar and the Comoro Islands, fourteen species of *Impatiens* (Balsaminaceae) are described as new (*I. gautieri*, *I. bemarahensis*, *I. emiliae*, *I. begonioides*, *I. silviana*, *I. andohabelae*, *I. malcomberi*, *I. ranomafanae*, *I. translucida*, *I. albopurpurea*, *I. navicula*, *I. mandrakae*, *I. mananteninae*, and *I. pilosissima*). Two nomina nova (*I. mandrarenensis* for *I. acaulis*, and *I. bathiei* for *I. manongarivensis* var. *miniata*) are proposed. A short history of the exploration of *Impatiens* in Madagascar is provided.

## KEY WORDS

*Impatiens*,  
Balsaminaceae,  
Madagascar.

## RÉSUMÉ

*Nouveaux taxons dans le genre Impatiens (Balsaminaceae) à Madagascar. I.*

Dans cette première publication, dans le cadre de la préparation d'une révision des Balsaminaceae de Madagascar et des Comores, quatorze espèces d'*Impatiens* sont décrites comme nouvelles (*I. gautieri*, *I. bemarahensis*, *I. emiliae*, *I. begonioides*, *I. silviana*, *I. andohabelae*, *I. malcomberi*, *I. ranomafanae*, *I. translucida*, *I. albopurpurea*, *I. navicula*, *I. mandrakae*, *I. mananteninae*, et *I. pilosissima*). Deux nouveaux noms (*I. mandrarenensis* pour *I. acaulis*, et *I. bathiei* pour *I. manongarivensis* var. *miniata*) sont proposés. Un bref historique de l'étude des *Impatiens* à Madagascar est présenté.

## MOTS CLÉS

*Impatiens*,  
Balsaminaceae,  
Madagascar.

## INTRODUCTION

The genus *Impatiens* (Balsaminaceae) is considered to be one of the most difficult genera in the angiosperms as species are extremely variable and the preparation of herbarium specimens needs special treatment (GREY-WILSON 1980). Many species have very restricted distributions. HOOKER & THOMSON (1859) published the first serious study of the genus, in which they recognised only eight African taxa. However, they stated that “numerous species will yet be detected in Madagascar and tropical Africa”. Further important contributions mainly on Indian species are those of HOOKER (1874-1875, 1904, 1905, 1906). The only overview of the genus as a whole is that of WARBURG & REICHE (1895), who also proposed the only infrageneric classification. However, their sections and subsections seems to be much too artificial. The only modern treatment for the genus available is the important revision of African taxa by GREY-WILSON (1980).

The Balsaminaceae of Madagascar and the Comores have been neglected for a long time and only few species were described. At the beginning of the 20<sup>th</sup> century, only 23 taxa had been described, of which 15 are considered to represent valid species: *Impatiens auricoma* Baill., *I. baroni* Baker (= *I. emirnensis* Baker), *I. bisaccata* Warb., *I. comorensis* Baker (= *I. macradenia* Baill.), *I. delicatula* Baill., *I. dorstenioides* (Baker) Warburg (= *Trimorphopetalum dorstenioides* Baker), *I. firmula* Baker (= *I. filipes* Baill., *I. hildebrandtii* Baill.), *I. lantziiana* Baill., *I. lyallii* Baker (= *I. trichoceras* Baker), *I. manaharensis* Baill., *I. rutenbergii* O. Hoffm. (= *I. bakeri* Warb., *I. delphinii* Scott-Elliot ex H. Perrier, *I. salicifolia* Baill.), *I. sacculata* Warb., *I. catati* Drake, *I. humblotiana* Baill., *I. vilersii* Costantin & Poisson. *Impatiens dorstenioides* was the first and only species of an endemic Malagasy group without a spur and was originally described as *Trimorphopetalum dorstenioides* Baker 1887, Journ. Linn. Soc. Bot. 22: 454. However, WARBURG & REICHE (1895) did not recognize this special endemic group and they placed *I. dorstenioides* together with *I. auricoma*, *I. comorensis*, *I. sacculata* and *I. humblotiana* in the section *Microcentron* Warburg & Reiche.

The first comprehensive study of *Impatiens* in Madagascar began with PERRIER DE LA BÂTHIE (1934, 1948), who in two classic papers described 83 species, among them 48 taxa of Sect. *Trimorphopetalum* (Baker) H. Perrier, Arch. Bot., Caen 7, Mém. 1: 64, 1934. He also established the endemic section *Impatientella* (H. Perrier) H. Perrier with entirely cleistogamous flowers, first considered by him to represent even a new genus (Bull. Trimestrielle Acad. Malgache, N. S. 10: 22, 1927).

As a result of their numerous expeditions to Madagascar, HUMBERT & PERRIER DE LA BÂTHIE (1955) and HUMBERT (1956) could add seven new taxa. Thus, 105 species of *Impatiens* have been reported from Madagascar. HUMBERT also prepared, but never published a manuscript for the Balsaminaceae for “Flore de Madagascar et des Comores”, which remained unfinished at the time of HUMBERT’s death in 1967. Since then, numerous new collections have been made, but no systematic treatment has ever been published and *Impatiens* in Madagascar remained “a terror to botanists” (GREY-WILSON 1980).

Three years ago, the first author, who has some field experience with *Impatiens* in Central Africa (FISCHER 1997, CHEEK & FISCHER 1999), became responsible for the Balsaminaceae account in “Flore de Madagascar et des Comores”. It was evident, that such a revision could not be completed by studying only herbarium material and would require additional field work to study the variability of certain species. Kindly, the Muséum National d’Histoire Naturelle, Laboratoire de Phanérogamie gave on loan not only the types of Madagascan *Impatiens* and precious new collections housed at P, but also the draft manuscript left by HUMBERT. Within this manuscript he proposed several new taxa, which have not been published since and which will be validated in a future paper.

The second author is working in the herbarium of the Parc Botanique Zoologique Tsimbazaza at Antananarivo, preparing a PhD thesis on Malagasy *Impatiens* and she will cooperate with the ongoing revision. The aim of this series of papers is to validate the new species proposed by HUMBERT, but also to describe the new taxa collected by other botanists during the last years.

Also, some nomenclatural changes became necessary due to later homonyms and subsequently, two nomina nova are proposed. In this first paper on *Impatiens* in Madagascar, 14 new species are described. Another 36 new species will be described in forthcoming papers. While some species are known only from the holotype or the type locality, we have not hesitated to describe them, as they show clear morphological discontinuities and can be readily distinguished from related taxa. Field studies of other species provided insight on variability of single species.

## MATERIAL AND METHODS

The study is based on herbarium material from BR, G, NEU, P, TAN (acronyms according to HOLMGREN et al. 1990) and living plants collected during field trips to Marojejy in March 2000, to Andohahela and Ambohitantely in March 2001. The terminology in the descriptions follows GREY-WILSON (1980) as well as the measurements (Fig. 1). Thus the arrangement of floral parts is described after resupination. The terms used by PERRIER DE LA BATHIE (1934) as labellum (nacelle), vexillum (casque) and alae (ailes) are replaced by lower sepal, dorsal petal and lateral united petals. All specimens have been seen unless otherwise stated.

## IMPATIENS subg. IMPATIENS

### *Impatiens gautieri* Eb. Fisch. & Rahelivololona, sp. nov.

*Impatiens masoalensis* et *I. geniorum* affinis, sed foliis verticillatis, petalo laterale superiore brevior et calcar subcurvato differt.

TYPUS. — *Gautier & Chatelain* LG 2783, Madagascar, Réserve spéciale de Manongarivo, Ansatroto, 14°05'S, 48°23'E, entre le campement "Chris" et le sommet, forêt sclérophylle de pente, 1530 m, 25 May 1995 (holo-, G).

Erect herb. Stems 30-40 cm long. Leaves verticillate, each whorl with 3 leaves, dark green, lanceolate, acuminate, petiole 10-15 mm long, lamina

95-115 × 23-26 mm, margin crenate, with broad teeth and short filiform fimbriae. Flowers white, lateral petals with yellow marks, lower sepal and spur with red spots. Pedicels 55-57 mm long. Lateral sepals 2, 4 × 1-1.5 mm. Lower sepal 7-9 × 4 mm, with spur of 8 mm of length. Dorsal petal 7-8 × 4-5 mm. Lateral united petals 13 mm long, upper petal 5 × 3-4 mm, lower petal 7-8 × 5 mm. Anthers 3-4 mm long. Ovary 3-4 mm long. Fruits unknown. — Fig. 2.

HABITAT. — Montane evergreen forest, 1530 m.

DISTRIBUTION. — Madagascar, only known from the type collection.

*Impatiens gautieri* is related to the *Impatiens masoalensis*-group with *I. masoalensis* H. Perrier and *I. geniorum* Humbert, but differs in the verticillate leaves, shorter upper lateral petal and the only slightly curved spur. Both species are only known from North-East Madagascar. *Impatiens masoalensis* is known from Masoala Peninsula and the Marojejy Massif while *I. geniorum* is restricted to the Massif de l'Anjanaharibe West of Andapa and the Lokoho valley.

### *Impatiens bemarahensis* Eb. Fisch. & Rahelivololona, sp. nov.

*Impatiens bemarahensis* ab omnibus speciebus madagascariensibus calcar longe, forma cornu-copiae (*Impatiens humblotianae similis*) differt.

TYPUS. — *Du Puy, Du Puy, Andrianatina & Carlson* MB 766, Madagascar, Bemaraha massif, escarpment, c. 20 km W of Marerano on the Manambolo River, 19°06'S, 45°03'E, 20 Mar. 1990 (holo-, TAN; iso-, MO, P, not seen).

Annual herb 10-35 cm tall, stems fleshy. Leaves ovate, deep bronze green, with silver veins above, purple beneath, petiole 10-25 mm long, lamina 27-40 × 13-20 mm, margin crenate with short filiform fimbriae. Flowers c. 16 mm tall, spurred to 25 mm long, upper petal lilac pink, lateral united petals strong lilac pink, spur white. Pedicels 20-30 mm long. Lateral sepals 2, 1.8 × 1 mm. Lower sepal 5-6 × 3 mm, spur up to 13 mm long. Dorsal petal 6-7 × 2-2.5 mm.

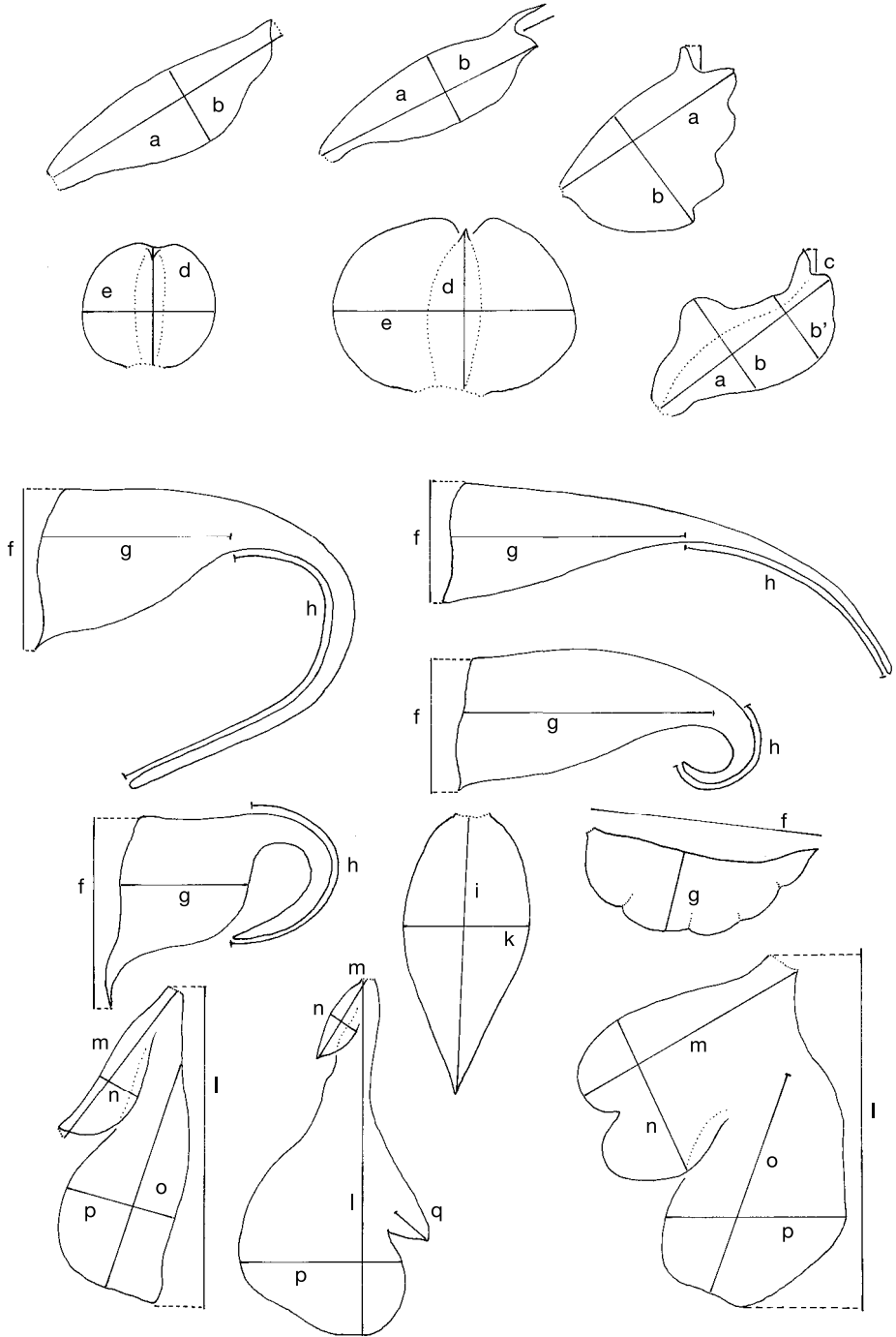


Fig. 1. — Measurements of *Impatiens* flowers: **a**, length of cucullate dorsal petal; **b**, width of cucullate dorsal petal; **c**, length of apicule; **d**, length of flat dorsal petal; **e**, width of flat dorsal petal; **f**, width of lower sepal; **g**, depth of lower sepal; **h**, length of spur; **i**, length of spurless lower petal; **k**, width of spurless lower petal; **l**, overall length of lateral united petals; **m**, length of upper petal; **n**, width of upper petal; **o**, length of lower petal; **p**, width of lower petal; **q**, length of petal lobe.

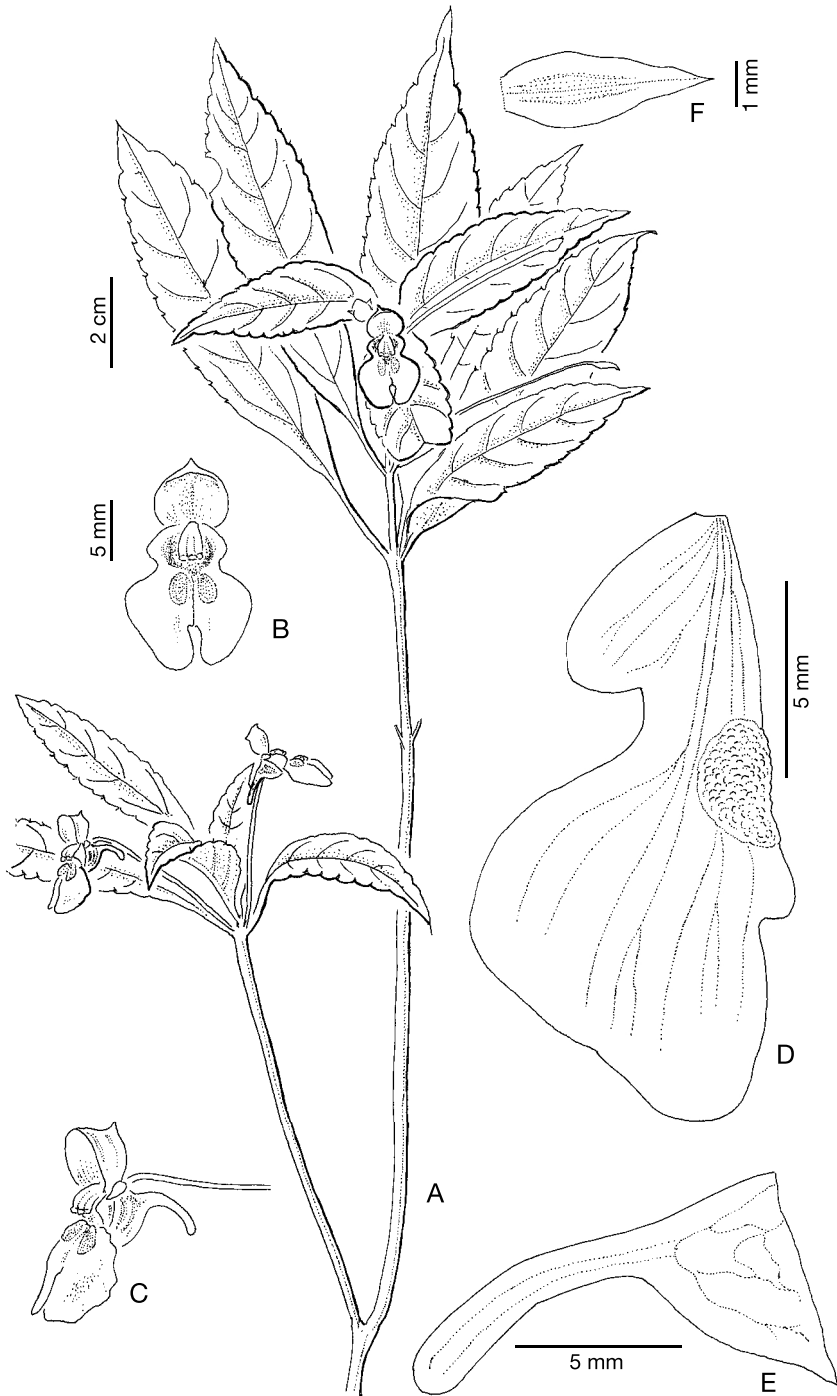


Fig. 2. — *Impatiens gautieri* Eb. Fisch. & Rahelivololona: **A**, habit; **B**, flower, anterior view; **C**, flower, lateral view; **D**, lateral united petals; **E**, lower sepal and spur; **F**, lateral sepal. (Gautier & Chatelain LG 2783, G).

Lateral united petals 10 mm long, upper petal  $3 \times 2.5\text{--}3$  mm, lower petal  $6\text{--}7 \times 5$  mm. Anthers 3 mm long. Ovary up to 3 mm long. Fruit  $11 \times 4\text{--}5$  mm, with minute white scales. — Fig. 3.

**HABITAT.** — Limestone karst, Tsingy, under canopy of *Bussia*, semi-deciduous forest, c. 560 m.

**DISTRIBUTION.** — Madagascar, only known from multiple collections at type locality.

*Impatiens bemarahensis* differs from all Madagascan species in the long, slightly tapering spur which superficially resembles that of the *Impatiens humblotiana*-group (*I. humblotiana* Baill., *I. catati* Drake, etc.). As an annual, *I. bemarahensis*, is adapted to the dry season in the Tsingy and is one of the few taxa outside the eastern rainforests or cloud forests.

***Impatiens emiliae* Eb. Fisch. & Rahelivololona, sp. nov.**

*Ab Impatiens manongarivensis et I. bathiei differt forma petalorum lateralium et numero nectariorum extrafloralium.*

**TYPUS.** — *Malcomber & Hemingway 2477*, Madagascar, Antsiranana, E of Ambanja, Réserve Naturelle Intégrale 4 Tsaratanana,  $14^{\circ}02'03''\text{S}$ ,  $48^{\circ}45'46''\text{E}$ , 1100–1600 m, 8–12 May 1993 (holo-, TAN; iso-, MO, P, not seen).

Herb to 100 cm tall. Leaves verticillate, each whorl with 3 leaves, ovate-lanceolate, with distinct acuminate apex, dark green above, paler beneath, petiole 25–40 mm long, lamina 130–170  $\times$  40–50 mm, margin dentate with short filiform fimbriae. Flowers orange. Pedicels 60–70 mm long. Lateral sepals 2, lanceolate, acuminate,  $6 \times 1.5$  mm. Lower sepal navicular,  $14 \times 10$  mm, with 23–25 mm long filiform and curved spur. Dorsal petal emarginate, dorsal crest with short apicule,  $18 \times 30$  mm. Lateral united petals 35 mm long, upper petal  $22 \times 18$  mm, lower petal  $25 \times 15\text{--}17$  mm. Anthers 6–7 mm long. Ovary 5 mm long. Fruit unknown. — Fig. 4.

**HABITAT.** — Montane rainforest, 1100–1600 m, on streamsides.

**DISTRIBUTION.** — Madagascar, only known from the type collection.

*Impatiens emiliae* is related to *I. manongarivensis* H. Perrier and *I. bathiei* Eb. Fisch. & Rahelivololona (see below), but differs in the shape of the lateral united petals and the extrafloral nectaries, which are lacking or only present in one pair at base of lamina. While *I. emiliae* is only known from the Tsaratanana-Massif, *I. manongarivensis* is restricted to Manongarivo and *I. bathiei* to the Sambirano area.

***Impatiens mandrarenensis* Eb. Fisch. & Rahelivololona, nom. nov.**

*Impatiens acaulis* Humbert, Notul. Syst. (Paris) 15: 114 (1956), non *Impatiens acaulis* Arn., in Hook., Companion Bot. Mag. I: 325 (1835). — Type: *Humbert 20534*, Madagascar, vallée du Mandrare, affluent de la Manampanihy (Sud-Est), montagne au sud de Tanandava, rochers en forêt ombrophile, 700–750 m, 11–16 Mar. 1947 (holo-, P).

**DISTRIBUTION.** — Madagascar, only known from the type collection.

As the epithet *acaulis* had been used yet for an Indian *Impatiens* species by ARNOTT, a new name had to be chosen for the Madagascan taxon. *Impatiens mandrarenensis* is related to *I. tuberifera* Humbert, which also lives as a geophyte with subterranean tubers.

***Impatiens bathiei* Eb. Fisch. & Rahelivololona, nom. nov.**

*Impatiens manongarivensis* H. Perrier var. *miniata* H. Perrier, Arch. Bot. Mém. 1: 48 (1934), non *I. miniata* Grey-Wilson, Kew Bull. 33: 645 (1979), type: *A.S. Thomas 510*, Uganda, Mt. Elgon, Bulambuli (holo-, K). — Type: *Perrier de la Bâthie 15118*, Madagascar, dans la haute vallée du Sambirano, rocailles humides, vers 200 m, Dec. 1921 (holo-, P).

The var. *miniata* of *Impatiens manongarivensis* H. Perrier differs in many respects from the typical species and is here considered to represent a species of its own. As the name *I. miniata* is no longer available on specific level, the nomen novum *I. bathiei* is proposed.

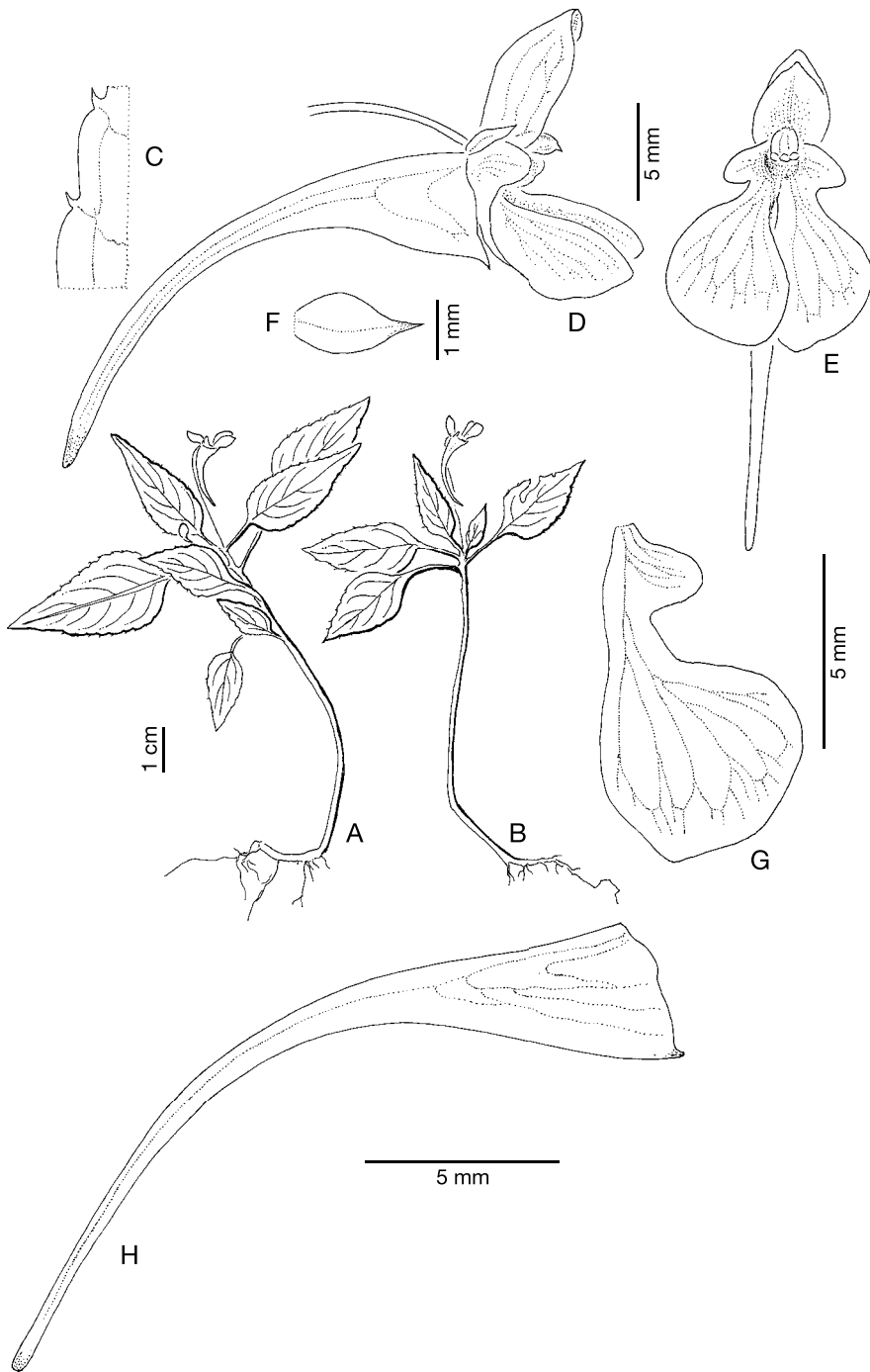


Fig. 3. — *Impatiens bemarahensis* Eb. Fisch. & Rahelivololona: **A, B**, habit; **C**, leaf margin; **D**, flower, lateral view; **E**, flower, anterior view; **F**, lateral sepal; **G**, lateral united petals; **H**, lower sepal and spur. (Du Puy, Du Puy, Andrianatina & Carlson MB 766, P).

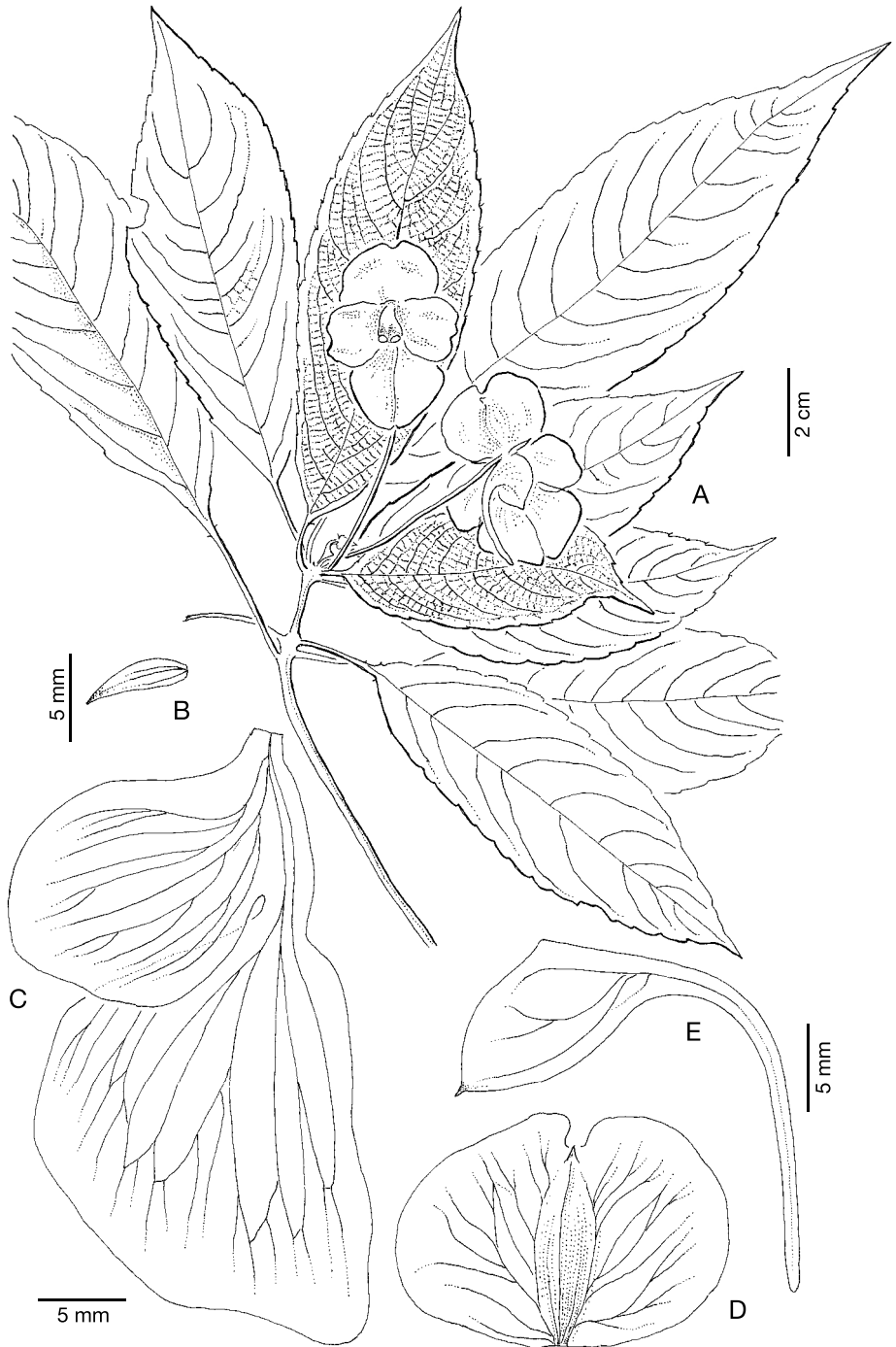


Fig. 4. — *Impatiens emiliae* Eb. Fisch. & Rahelivololona: **A**, habit; **B**, lateral sepal; **C**, lateral united petals; **D**, dorsal petal; **E**, lower sepal and spur. (Malcomber & Hemingway 2477, P).



**IMPATIENS subg. TRIMORPHOPETALUM**  
(Baker) Eb. Fisch., **stat. nov.**

*Trimorphopetalum* Baker, Journ. Linn. Soc. Bot. 22: 454 (1887).

**Impatiens begonioides** Eb. Fisch. & Rahelivololona, **sp. nov.**

*Ab omnibus speciebus madagascariensibus subg. Trimorphopetali differt foliis peltatis.*

TYPUS. — *Turk & Randrianasolo 584*, Madagascar, Fianarantsoa, Ranomafana National Park, parcelle 3, S of National Road 25 at 7 km W of Ranomafana, Vatoharanana trail system, 21°17'S, 47°26'E, 18 Nov. 1993 (holo-, MO; iso-, P, TAN).

Procumbent to ascending herb up to 15-30 cm tall, spreading by runners in leaf litter. Leaves peltate, dark green above, pale green below, petiole 19-30 mm long, lamina 35-47 × 20-25 mm, acuminate, margin slightly dentate with minute fimbriae. Flowers pale yellow-green with tuberculous dark purple-brown spots on lateral petals, ovary and staminal tube pale green, anthers pale yellow. Pedicels 20-25 mm long. Lateral sepals 2, 3-5 × 0.5-1 mm. Lower sepal 11-13 × 5-7 mm, with darker relief caused by veins. Dorsal petal helmet-like, crest with short spur at apex and sinus-like protuberance below middle. Lateral united petals 15-19 mm long, upper petal 5-7 × 1.5 mm, lower petal 12 × 10 mm, with darker nerves and tubercles. Anthers 5 mm long. Ovary 5-6 mm long. Fruit unknown. — Fig. 5.

PARATYPE. — *Rahelivololona, RMN 10*, Madagascar, Parc National de Ranomafana, piste W20-W15, SW du camp Vatoharanana, 17 May 2000 (TAN).

HABITAT. — Moist montane forest characterized by trees of *Weinmannia* sp., Monimiaceae (*Tambourissa*, *Decarydendron*, *Ephippiandra*), Lauraceae (primarily *Ocotea* and *Cryptocarya*); understorey with abundant *Psychotria* spp. and *Oncostemum* spp., 1100-1250 m.

DISTRIBUTION. — Madagascar, only known from the type locality.

*Impatiens begonioides* differs from all Madagascan *Impatiens* in the peltate leaves, resembling those of a *Begonia*.

**Impatiens silviana** Eb. Fisch. & Rahelivololona, **sp. nov.**

*Ab Impatiens decaryana differt petalis lateralibus superioribus latis et obtusis.*

TYPUS. — *Schatz, Dransfield & Du Puy 2783*, Madagascar, Toamasina, Masoala Peninsula, c. 3 km NE of Antalavia, along Antalavia River, 15°47'S, 50°02'E, 200-380 m, 13-16 Nov. 1989 (holo-, TAN; iso-, MO, P, not seen).

Herb with succulent stem growing on rock or epiphyte. Stems up to 50 cm tall. Leaves dark green above, light green below tinged light purple, petiole 17-60 mm long, lamina ovate-lanceolate, distinctly acuminate, 130-180 × 50-67 mm, margin broadly dentate with small fimbriae. Flowers with sepals green, lateral petals olive translucent green with purple striations and dorsal petal clear translucent with purple fenestration. Pedicels up to 20 mm long. Lateral sepals 2, 6 × 2.5 mm. Lower sepal 15 × 6 mm, with relief forming bars. Dorsal petal hood-like, 17 × 6 mm. Lateral united petals 24 mm long, upper petal 7 × 3 mm, lower petal 17 × 10 mm. Anthers 4-5 mm long. Ovary 3.5-4 mm long. Fruit unknown. — Fig. 6.

HABITAT. — Rainforest, growing on rock or epiphyte at 380 m.

DISTRIBUTION. — Madagascar, only known from the type collection.

*Impatiens silviana* belongs to the *Impatiens decaryana*-group, which represent large plants with rather large flowers. It differs from *I. decaryana* H. Perrier in the lateral united petals, which are narrow with reduced to lacking upper petal in *I. decaryana* and broad, obtuse and curved upper petal in *I. silviana*. Typical *I. decaryana* is restricted to Central Madagascar (Ikongo, Prov. Fianarantsoa), while *I. silviana* is endemic to Masoala Peninsula.

**Impatiens andohahelae** Eb. Fisch. & Rahelivololona, **sp. nov.**

*Ab omnibus speciebus ex grege Impatiens decaryanae petalo dorsali cum apice calcarato et basi laminae foliorum cordato differt.*

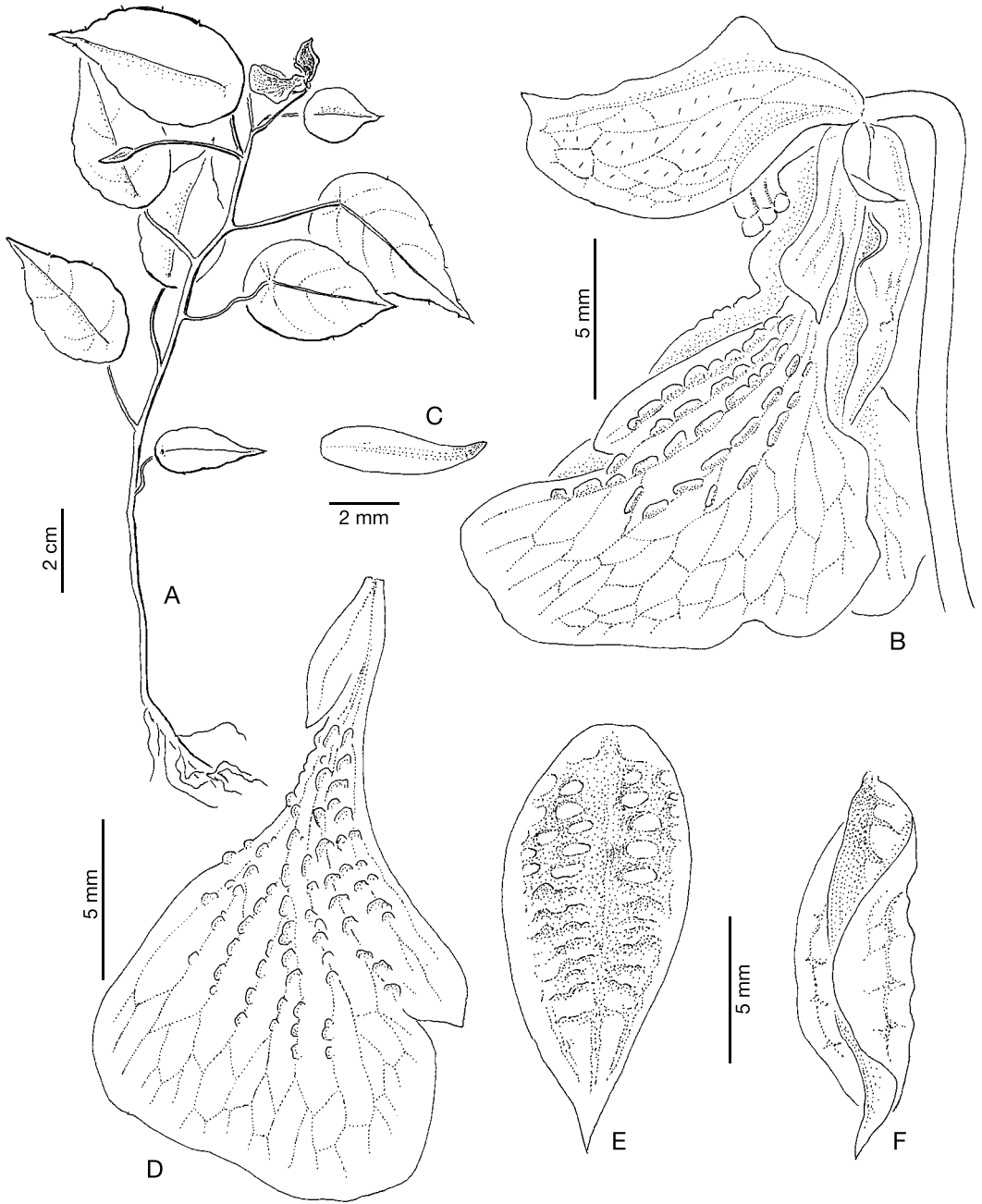


Fig. 5. — *Impatiens begonioides* Eb. Fisch. & Rahelivololona: **A**, habit; **B**, flower, lateral view; **C**, lateral sepal; **D**, lateral united petals; **E**, lower sepal, anterior view; **F**, lower sepal, lateral view. (A, Turk & Randrianasolo 584, TAN; B-F, Rahelivololona, RMN 10, TAN).

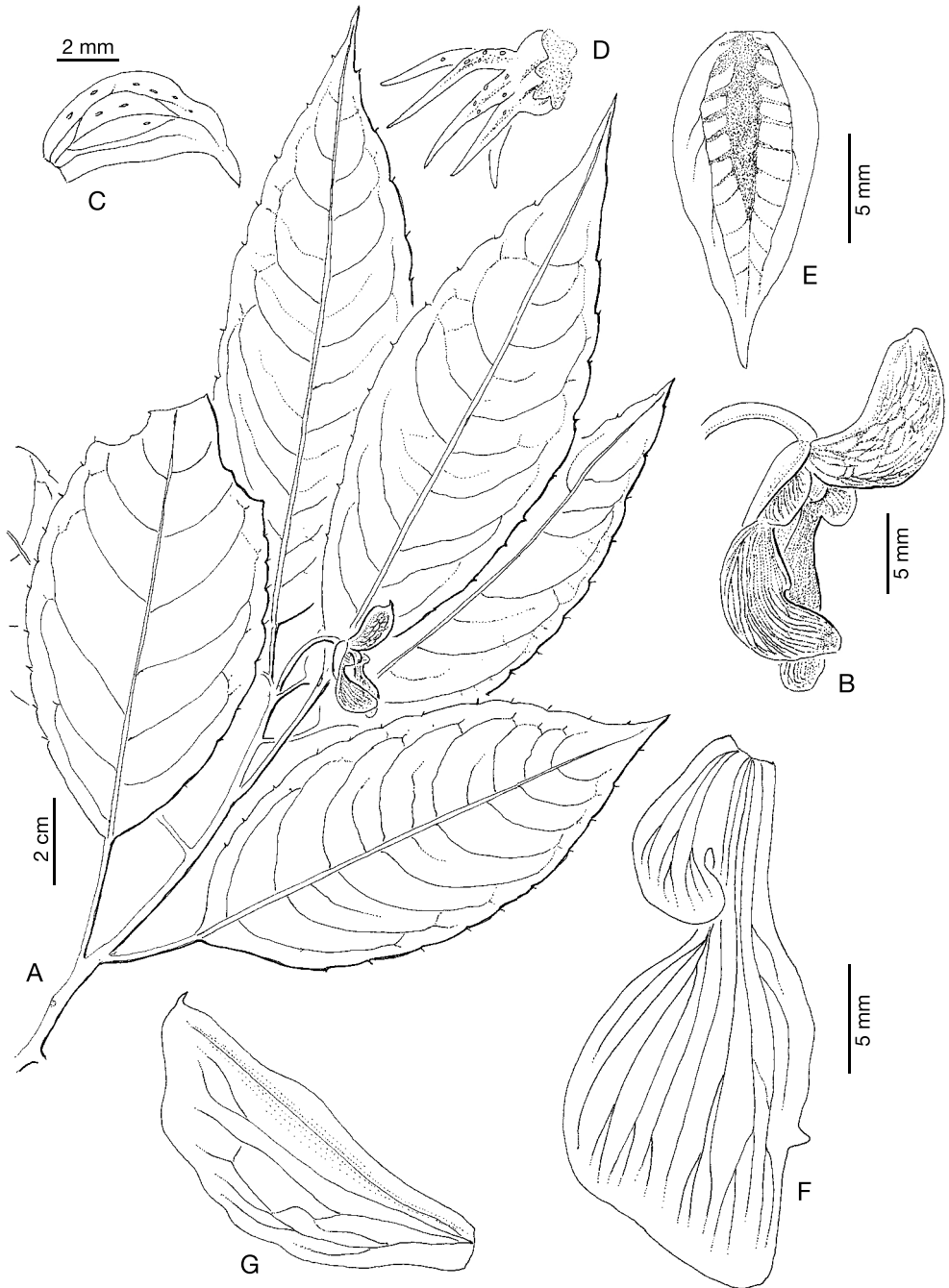


Fig. 6. — *Impatiens silvana* Eb. Fisch. & Rahelivololona: **A**, habit; **B**, flower, lateral view; **C**, lateral sepal; **D**, anthers; **E**, lower sepal, anterior view; **F**, lateral united petals; **G**, dorsal petal. (Schatz, Dransfield & Du Puy 2783, P).

TYPUS. — *Dransfield, Cooke, Cheek, Du Puy & Rafamantsoa JD 6781*, Madagascar, Tolanaro, Réserve Naturelle Andohahela, Parcelle 1, Col Tanatana, Andranomity, submontane rainforest, wet valley bottom, among boulders, 700 m, 8 Dec. 1989 (holo-, TAN; iso-, MO, P, not seen).

Erect succulent herb to 30 cm tall, pale green throughout. Stems glabrous. Leaves with petiole 20-70 mm long, lamina ovate-lanceolate, distinctly acuminate, broadly cordate at base, 80-145 × 28-50 mm, margin broadly crenate with fimbriae in sinus between two crenations. Flowers translucent pale green, lateral petals olive green with chocolate drawn lines, scented of *Sambucus*. Pedicels up to 19 mm long. Lateral sepals 2, 6 × 0.8-1 mm. Lower sepal 17 × 5-6 mm, green with dark brown relief formed by veins. Dorsal petal hood-like, 22 × 6 mm, with 3-4 mm long spur at apex. Lateral united petals 20 mm long, upper petal 5-6 × 1-1.5 mm, lower petal 15 × 8-10 mm. Anthers 5-6 mm long. Ovary 4-5 mm long. Fruit unknown. — Fig. 7.

HABITAT. — Submontane rainforest, growing on rock at 700 m.

DISTRIBUTION. — Madagascar, only known from the type collection.

*Impatiens andohabelae* is also a member of the *Impatiens decaryana*-group, but differs in the long, spur-like projection of the dorsal petal and the lamina, which is cordate at base. It is the only taxon of this group occurring in South-Eastern Madagascar. All the other species are only known from Northern and Central Madagascar.

***Impatiens malcomberi* Eb. Fisch. & Rahelivololona, sp. nov.**

*Ab omnibus speciebus ex grege Impatiens parvigaleatae differt forma petalorum lateralium, margine foliorum dentato et habitu epiphytico.*

TYPUS. — *Malcomber, Andrianantoanina & Rebety 2356*, Madagascar, SW of Antsiranana, near Joffreville, Parc National Montagne d'Ambre, near Sommet d'Ambre, 12°35'S, 49°09'E, 1400-1475 m, 9-13 Apr. 1993 (holo-, TAN; iso-, MO, P, not seen).

Epiphytic herb. Stems fleshy, red, 25-30 cm tall. Leaves ovate-lanceolate, acuminate, petiole

15-22 mm long, lamina 65-100 × 28-35 mm, margin dentate. Flowers bright yellow with darker purplish veins. Bracts filiform, 2 × 0.1 mm. Pedicels 10-18 mm. Lateral sepals 2, lanceolate, acuminate, 5 × 1-1.2 mm. Lower sepal acuminate, 6-8 × 2.5-3 mm. Dorsal petal hood-like, 6-9 × 2-3 mm. Lateral united petals 10 mm long, upper petal 1 × 0.8 mm, lower petal 7 × 5 mm. Anthers 3 mm long. Ovary 3 mm long. Fruit unknown. — Fig. 8.

HABITAT. — Epiphyte in montane rainforest, 1400-1475 m.

DISTRIBUTION. — Madagascar, known from only the type collection.

*Impatiens malcomberi* belongs to the *Impatiens parvigaleata*-group, comprising *I. parvigaleata* H. Perrier, *I. pellucidinervia* H. Perrier, *I. rubrolineata* H. Perrier, *I. luteo-viridis* H. Perrier and *I. asperipetala* H. Perrier. It differs in the shape of the lateral united petals, the dentate leaf margin (crenate with broad sinus in the remaining taxa) and the epiphytic habit, which is not known from any member of *I. parvigaleata*-group. *Impatiens malcomberi* is the only taxon of this group occurring in the Montagne d'Ambre. The centre of diversity of *I. parvigaleata*-group is found in the Tsaratanana Massif, where 3 species occur: *Impatiens parvigaleata*, *I. asperipetala* and *I. pellucidinervia*. *Impatiens rubrolineata* is known from the Onivé-bassin and *I. luteo-viridis* from Bemarivo.

***Impatiens ranomafanae* Eb. Fisch. & Rahelivololona, sp. nov.**

*Differt ab Impatiens fontinalii et I. dorstenioides caule et foliis dense pilosis et petalis lateralibus angustioribus cum petalo superiore breve.*

TYPUS. — *Malcomber, Rakoto, Randriamanantena & Rafamantanantsoa 1586*, Madagascar, Fianarantsoa, Parc National Ranomafana, Parcelle I, south of Ambohimiera, valley of Sakavolo River, 21°04'S, 47°29'E, 880-1100 m, 15-17 Sep. 1992 (holo-, P; iso-, MO, not seen).

Erect herb. Stems up to 9-12 cm tall, densely pilose. Leaves dark green, densely pilose, ovate

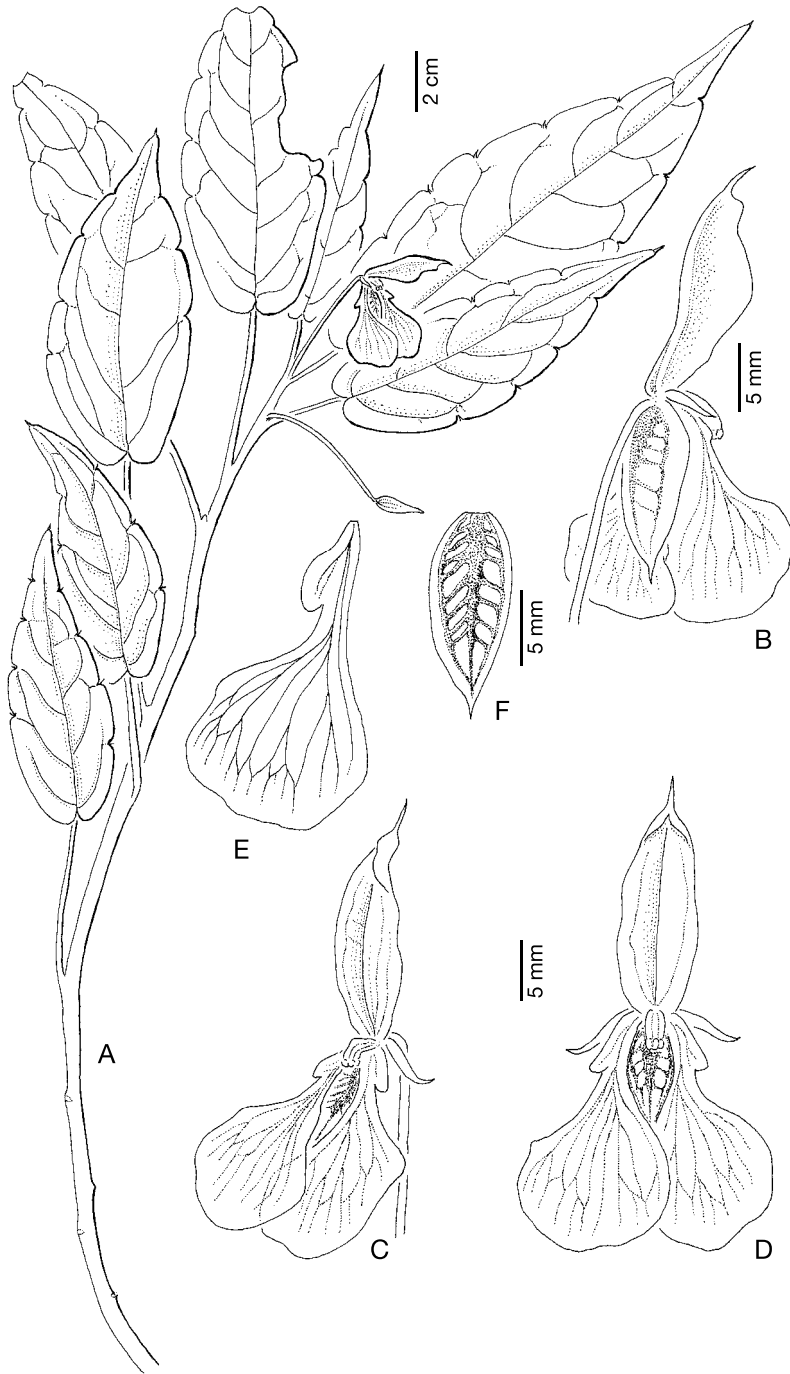


Fig. 7. — *Impatiens andohahelae* Eb. Fisch. & Rahelivololona: **A**, habit; **B-D**, flower; **E**, lateral united petals; **F**, lower sepal. (Dransfield, Cooke, Cheek, Du Puy & Rafamantsoa JD 6781, TAN).

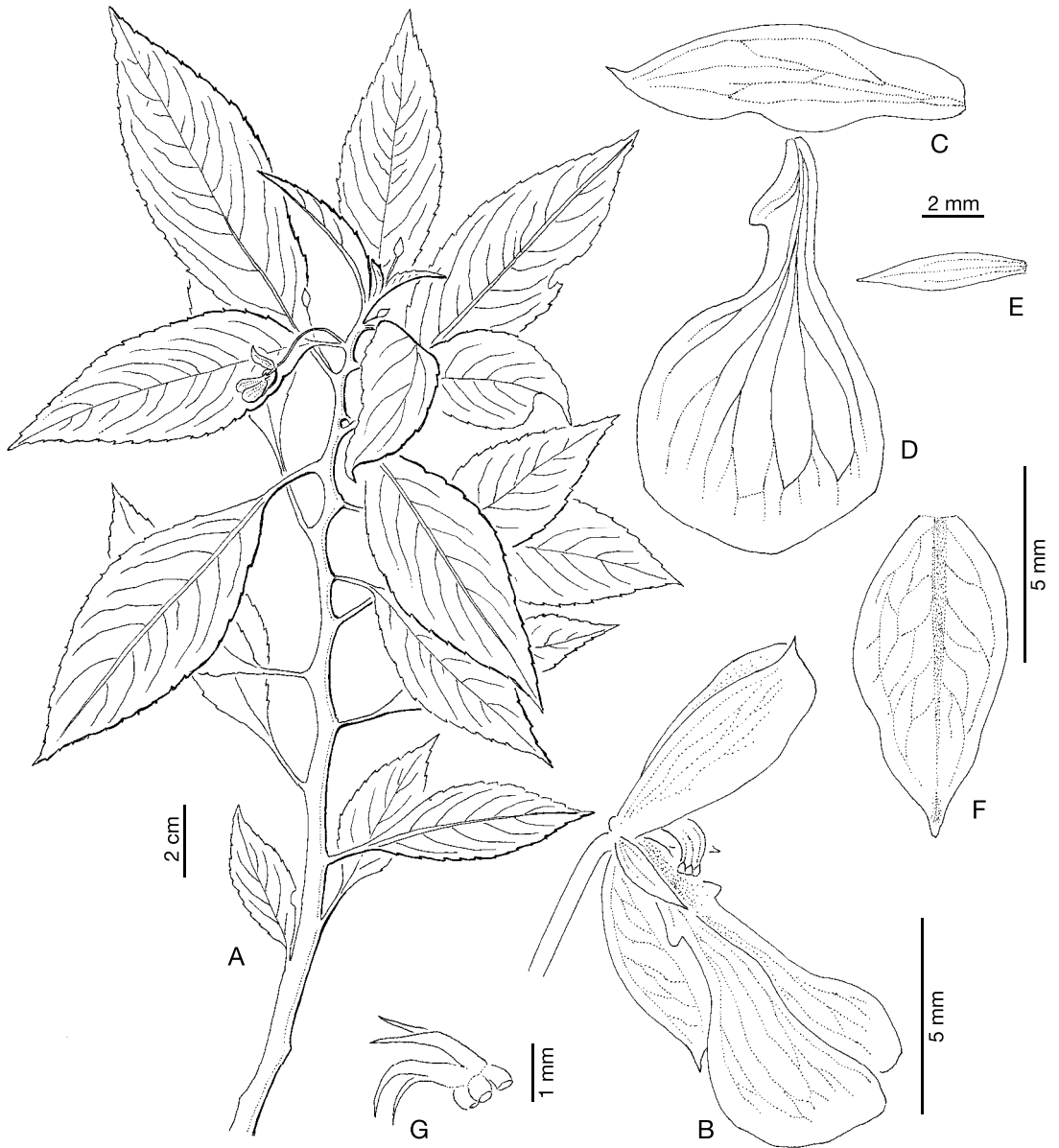


Fig. 8. — *Impatiens malcomberi* Eb. Fisch. & Rahelivololona: **A**, habit; **B**, flower; **C**, dorsal petal; **D**, lateral united petals; **E**, lateral sepal; **F**, lower sepal; **G**, anthers. (Malcomber, Andrianantoanina & Rebety 2356, P).

lanceolate, petiole 7-15 mm long, lamina 35-45 × 13-21 mm, margin dentate. Flowers dark olive green with maroon markings. Pedicels 11 mm long. Lateral sepals 2, linear-lanceolate, 2.2 × 0.2 mm. Lower sepal ovate, acuminate,

6-7 × 3 mm. Dorsal petal hood-like, 6 × 3 mm. Lateral united petals 7 mm long, upper petal 0.7 × 0.2 mm, lower petal 3 × 2 mm. Anthers 2.8 mm long. Ovary 3 mm long. Fruit unknown. — Fig. 9.

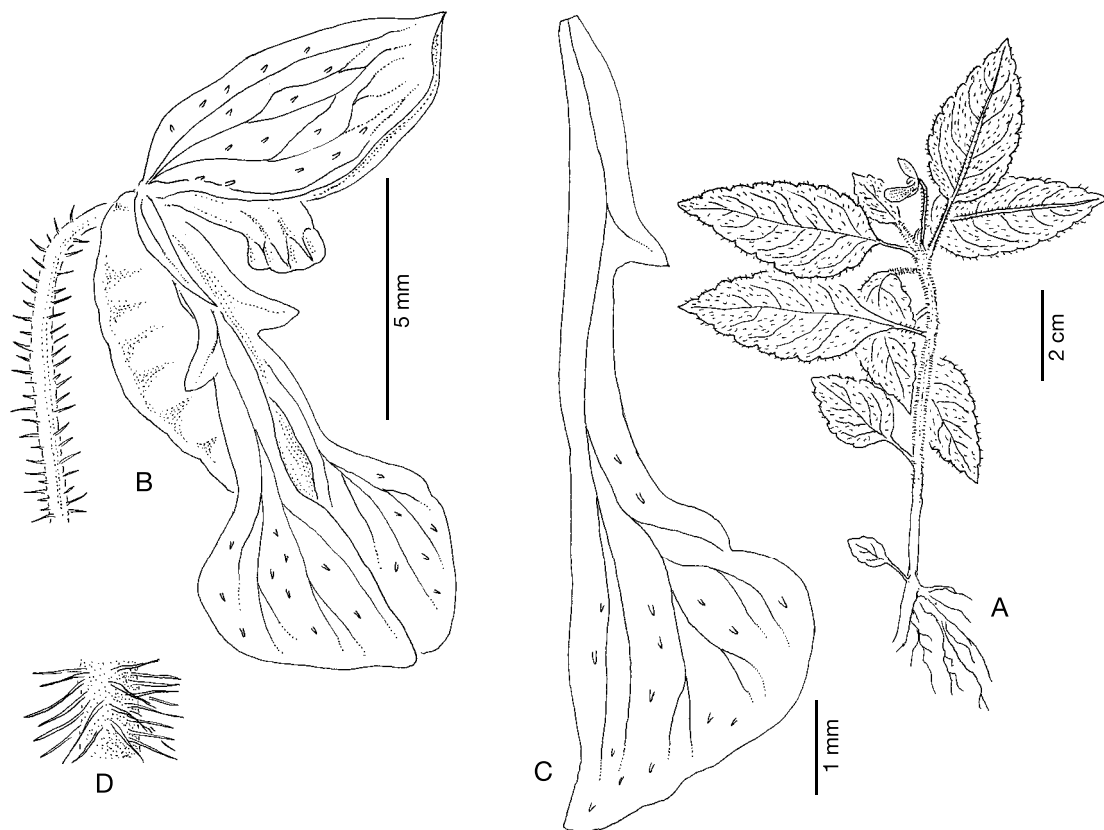


Fig. 9. — *Impatiens ranomafanae* Eb. Fisch. & Rahelivololona: **A**, habit; **B**, flower; **C**, lateral united petals; **D**, stem. Malcomber, Rakoto, Randriamanantena & Rafamantanantsoa 1586, P).

HABITAT. — Riverside herb growing on mossy boulders, 880-1100 m.

DISTRIBUTION. — Madagascar, only known from the type collection.

*Impatiens ranomafanae* belongs to the *Impatiens fontinalis*-group and differs from *I. fontinalis* H. Perrier and *I. dorstenioides* (Baker) Warburg in the densely pilose stems and leaves, and the narrow lateral petals with short and narrow upper petal. *Impatiens dorstenioides* is only known from the type specimen (Baron 4476, Central Madagascar, holo-, K; iso-, P) and the species has never been recollected. It might probably be extinct. *Impatiens fontinalis* is endemic to Masoala Peninsula.

***Impatiens translucida* Eb. Fisch. & Rahe-  
livololona, sp. nov.**

*Ab Impatiens fontinali et I. dorstenioides foliis subtus rubro-reticulatis, petalo dorsali cum apice obtuso, petalo laterali superiore latiore et brevioris et sepalo inferiore ovati-orbiculari differt.*

TYPUS. — Phillipson 2152, Fianarantsoa, Madagascar, Forest E of Ranomafana between Fianarantsoa and Ifandiana, 21°15'S, 47°24'E, 1200 m, 29 July 1987 (holo-, TAN; iso-, MO, P, not seen).

Erect herb with creeping rhizome. Stems succulent, up to 13 cm tall, covered with small white scales. Leaves dark green on upper surface, covered with small white scales, pale green with

darker reticulate veination on lower surface, petiole 7-14 mm long, lamina ovate-lanceolate, 50-55 × 18-19 mm, margin dentate-crenate with small fimbriae. Flowers bright green sepals translucent green shading to dark red. Corolla dark red with translucent bilobed lower lip. Ovary bright green with yellow stigma. Pedicels 7-15 mm long, covered with small white scales. Lateral sepals 2, 1-1.2 × 0.5 mm. Lower sepal 4-4.5 × 2-2.3 mm, with darker relief. Dorsal petal hood-like, 4-5 × 2 mm. Lateral united petals 7 mm long, upper petal 1.5 × 1 mm, lower petal 5 × 3 mm. Anthers 3 mm long. Ovary 2.5-3 mm long. Fruit unknown. — Fig. 10.

**HABITAT.** — Montane rainforest, growing on wet rocks, 1200 m.

**DISTRIBUTION.** — Madagascar, only known from the type collection.

*Impatiens translucida* belongs to the *Impatiens fontinalis*-group and differs from *I. fontinalis* H. Perrier and *I. dorstenioides* (Baker) Warburg in the leaves, which are finely reddish-reticulate below, the dorsal petal with obtuse apex, the broader and shorter upper lateral petal and the ovate-orbicular lower sepal. Beside *Impatiens ranomafanae* Eb. Fisch. & Rahelivololona (see above) it is the second species of this group from the Ranomafana-National Park near Fianarantsoa.

***Impatiens albopurpurea* Eb. Fisch. & Rahelivololona, sp. nov.**

*Impatiens* *perfecunda* *affinis*, sed *petiolo et lamina dense pilosis, petalo dorsale lineari et petalo laterali superiore linearo-lanceolato differt.*

**TYPUS.** — *Schatz, Dransfield & Du Puy 2788*, Madagascar, Masoala Peninsula, c. 3 km NE of Antalavia, along Antalavia River, 15°47'S, 50°02'E, 200-380 m, 13-16 Nov. 1989 (holo-, TAN; iso-, MO, P, not seen).

Erect to ascending herbs. Stems up to 5-6 cm tall, densely pilose. Leaves dark green above, light whitish green below, petiole 2-4 mm long, lamina lanceolate, obtuse to subapiculate, 35-55 × 8-9 mm, margin dentate, pilose. Flowers with lat-

eral sepals green, lower petal saccate, somewhat fleshy, magenta, lateral petals white with purple at base, upper petal clear translucent with purple markings (fenestrate). Pedicels 12-13 mm long. Lateral sepals 2, 1.5 × 0.5 mm. Lower sepal deeply navicular, 8 × 5.5 mm, pilose outside. Dorsal petal hood-like, pilose, 8-9 × 2 mm. Lateral united petals 10-11 mm long, upper petal 4 × 1.5 mm, lower petal 6 × 2.5-3 mm. Anthers 2-3 mm long. Ovary 2-3 mm long. Fruit 5-7 mm long, pilose. — Fig. 11.

**HABITAT.** — Herb growing on rock in river bed, 200-380 m.

**DISTRIBUTION.** — Madagascar, only known from the type collection.

*Impatiens albopurpurea* belongs to the *Impatiens perfecunda*-group. It differs from *I. perfecunda* H. Perrier in the densely pilose petiole and lamina, the narrow-linear dorsal petal and the linear-lanceolate upper lateral petal. *Impatiens perfecunda* occurs close to the Masoala Peninsula in the Bay of Antongil.

***Impatiens navicula* Eb. Fisch. & Rahelivololona, sp. nov.**

*Ab omnibus speciebus madagascariensibus differt petalis lateralibus navicularibus margine recurvato.*

**TYPUS.** — *Fischer & Rahelivololona, MJ 10*, Madagascar, Marojeje massif, below camp 3, c. 1100 m, 23 Mar. 2000 (holo-, TAN; iso-, P).

Erect herb, stems up to 6 cm tall, simple, densely pubescent. Leaves pubescent above, glabrous below, petiole 8-12 mm long, lamina 18-19 × 18 mm, broadly ovate to orbicular, lower face pale green, upper face darker green, margin with 4-5 teeth and filiform fimbriae. Flowers hidden by leaves, nodding. Pedicels up to 10 mm long. Lateral sepals 2, 3 × 1 mm, greenish-brown, hairy outside. Lower sepal 8 × 3 mm, with thickened dark brown longitudinal nerve on inner face and 10 dark brown lateral thickened bars on each side, the parts between these bars pale green and translucent. Dorsal petal 8 × 7 mm, dark green with reddish-brown venation, outside hairy on dorsal crest. Lateral united petals 8-9 mm long,



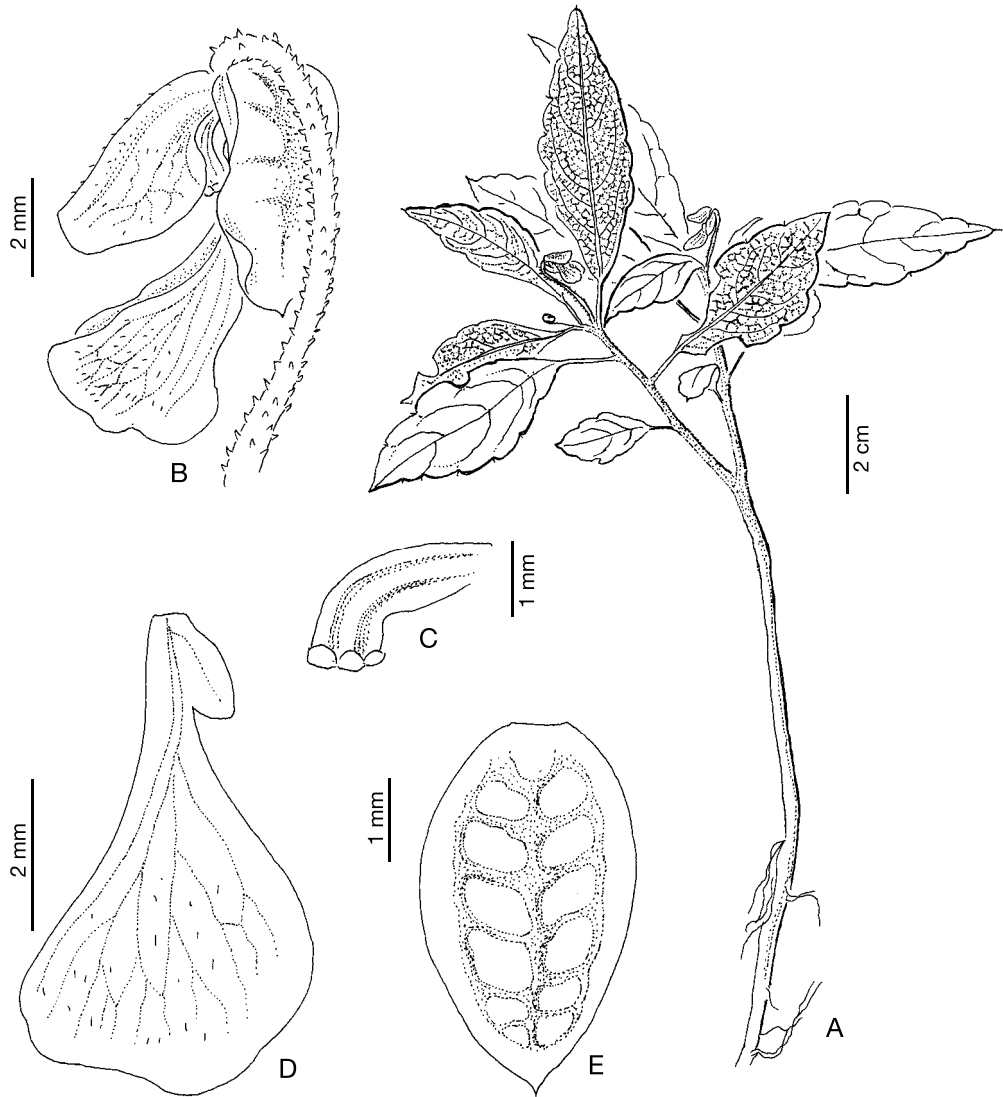


Fig. 10. — *Impatiens translucida* Eb. Fisch. & Rahelivololona: **A**, habit; **B**, flower; **C**, anthers; **D**, lateral united petals; **E**, lower sepal. (Phillipson 2152, P).

dark chocolate brown, upper petal  $4 \times 3$  mm, lower petal  $6 \times 5$  mm, margin of lower petal folded upwards thus resembling a leguminose navicule. Anthers 3 mm long. Ovary 2-3 mm long. Fruit hairy,  $5 \times 3$  mm. — Fig. 12.

**HABITAT.** — Montane rain forest, at 1100 m, growing between moss cushions.

**DISTRIBUTION.** — Madagascar, known from only the type collection from the Marojejy massif.

*Impatiens navicula* shows superficial resemblance to the insufficiently known *I. meeuseana* H. Perrier from Eastern Madagascar, but differs clearly in the dark chocolate brown flowers and the navicular lateral petals with upwards folded

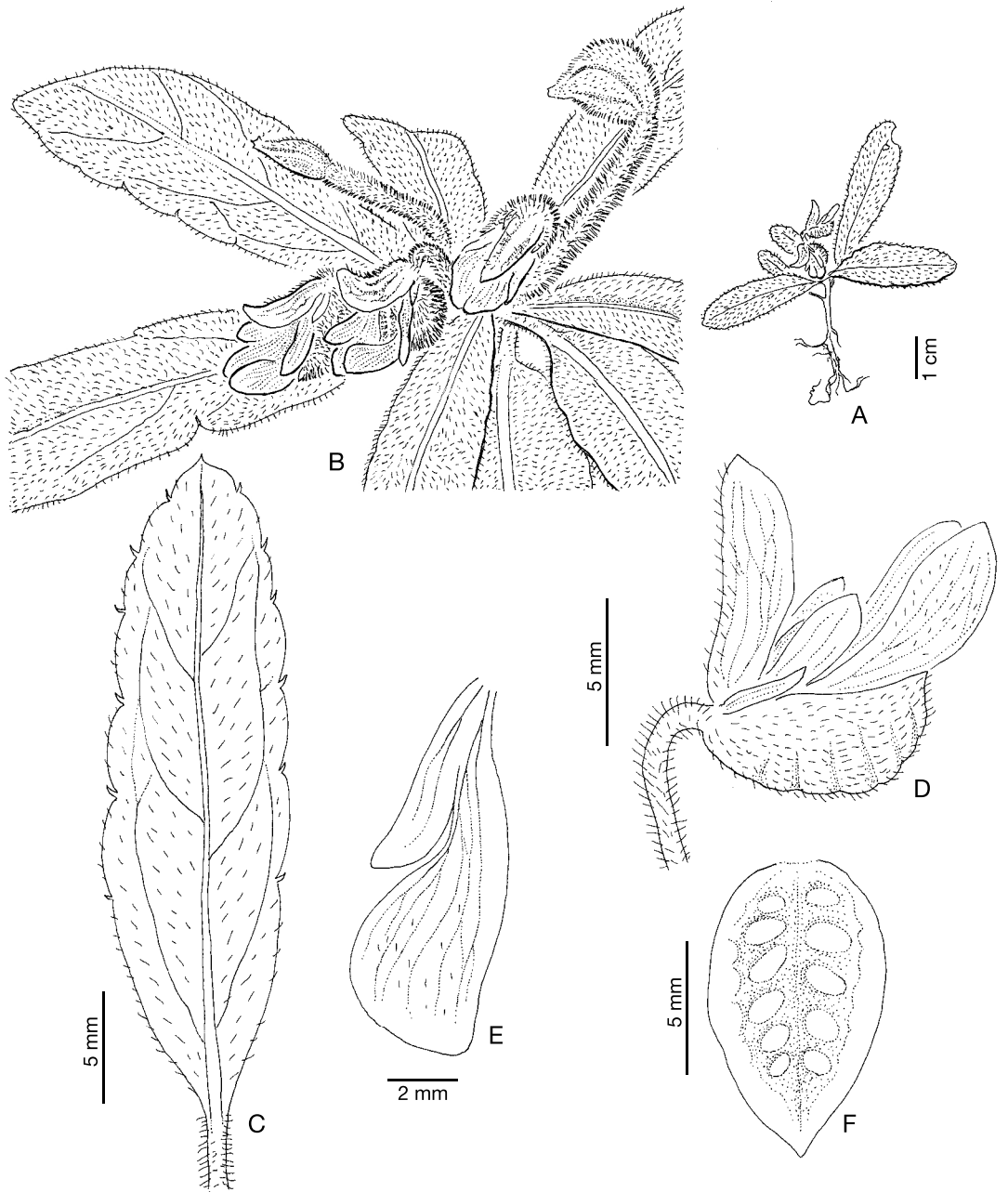


Fig. 11. — *Impatiens albopurpurea* Eb. Fisch. & Rahelivololona: A, B, habit; C, leaf; D, flower, lateral view; E, lateral united petals; F, lower sepal. (Schatz, Dransfield & Du Puy 2788, P).

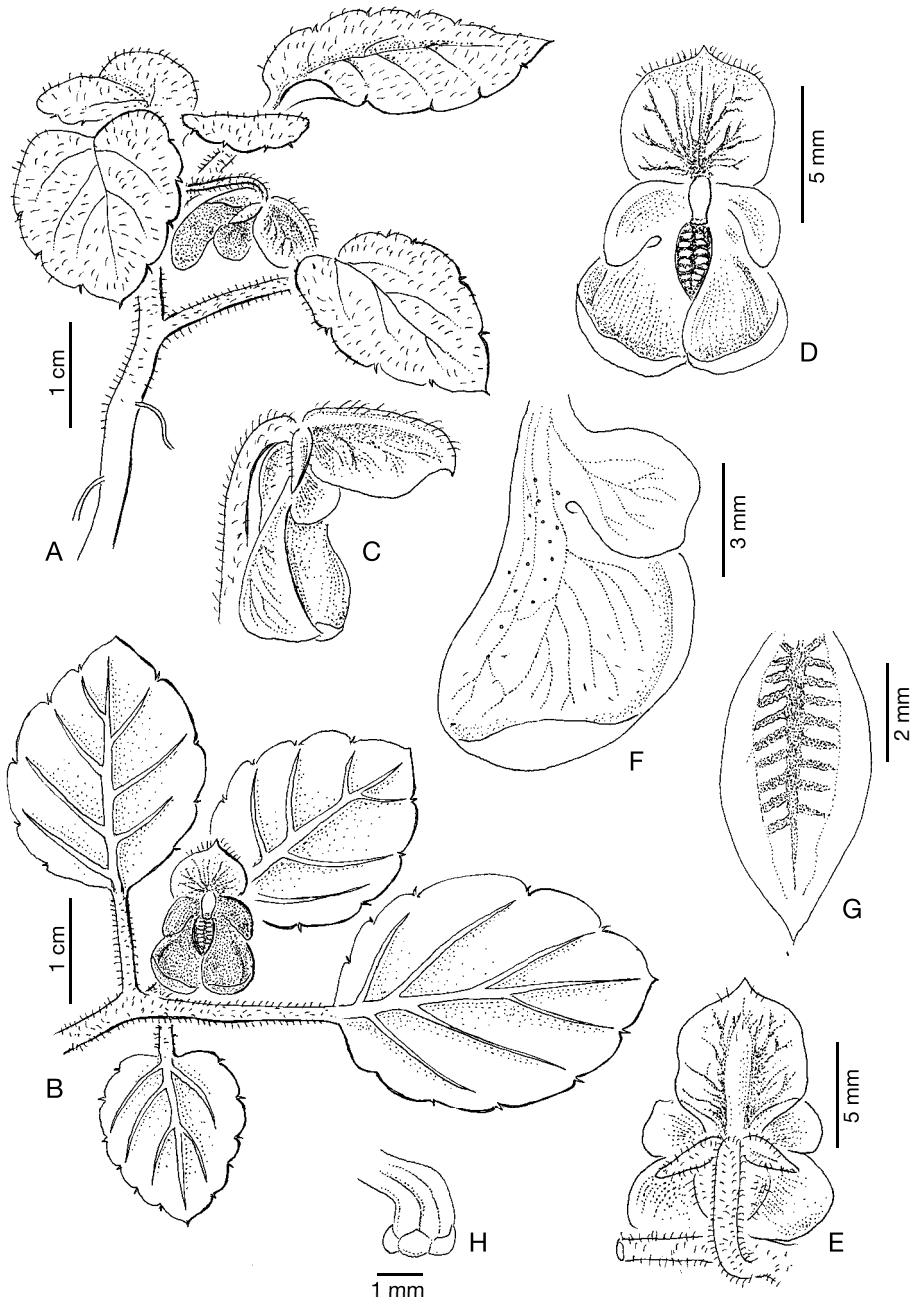


Fig. 12. — *Impatiens navicula* Eb. Fisch. & Rahelivololona: **A, B**, habit; **C**, flower, lateral view; **D**, flower, anterior view; **E**, flower, posterior view; **F**, lateral united petals; **G**, lower sepal; **H**, anthers. (Fischer & Rahelivololona MJ 10, TAN).

margin. The type specimen of *I. meeuseana* at P unfortunately lacks a flower and only a pencil sketch of the floral morphology is available. The protologue of this taxon, however, clearly indicates the mentioned differences to *I. navicula*.

**Impatiens mandrakae** Eb. Fisch. & Rahe-  
livololona, **sp. nov.**

*Differt ab Impatienti arachnoide foliis ovalibus, petalis lateralibus loriformibus longioribus cum petalo superiore lato-obtusio, petalo dorsale ovali-orbiculare et sepalis inferiore lato-ovalibus.*

TYPUS. — *Rahelivololona, Mk 1*, Madagascar, Mandraka village, station, 12 Apr. 2000 (holo-, TAN; iso-, P).

Procumbent to ascending herb, glabrous. Stems round, stoloniferous, greyish-green, up to 30 cm long. Leaves dark green with petiole reddish-green, 10-25 mm long, lamina 40-45 × 20-25 mm, margin slightly dentate. Flowers greenish, more or less transparent. Pedicels 8-13 mm long. Lateral sepals 2, 3 × 0.5 mm. Lower sepal ovate to orbicular, 4.5-5 × 3-3.5 mm. Dorsal petal emarginate with short apex, 3.5-4 × 2.5-3 mm. Lateral united petals (7-)9-11 mm long, upper petal 2 × 1.5 mm, lower petal 7-9 × 0.5 mm. Anthers 1.8 mm long. Ovary 1.5-1.8 mm long. Fruit unknown. — Fig. 13.

HABITAT. — Montane rain forest, at a small stream.

DISTRIBUTION. — Madagascar, only known from the type collection.

*Impatiens mandrakae* belongs to the *Impatiens arachnoides*-group and is closely related to *I. arachnoides* H. Perrier from Mt. Fody in the upper Mangoro basin, but differs in the ovate leaves, the longer loriform lateral petals with broad obtuse upper petal, the ovate-orbicular dorsal petal and the broadly ovate lower sepal.

**Impatiens mananteninae** Eb. Fisch. & Rahe-  
livololona, **sp. nov.**

*Ab omnibus speciebus ex grege Impatiens arachnoide differt foliis lanceolato-oblongis cum petiolo vaginato et petalo dorsale angustiore.*

TYPUS. — *Messmer, Rakotomalaza & Ravelonarivo NM 388*, Madagascar, Antsiranana, Marombihy, Mandena, Parc National de Marojejy, 11 km de Manantenina, à la source de la rivière Andranomifotatra, campement 5, 1950 m, 16 Nov. 1996 (holo-, G).

Erect herbs, glabrous. Stems up to 20 cm tall. Leaves oblanceolate, obtuse, petiole very short and indistinct, 1-2 mm long, with basal sheath surrounding the stem, lamina 13-20 × 4 mm, margin dentate. Flowers green-purple. Pedicels 10-11 mm long. Lateral sepals 2, 1 × 0.5 mm. Lower sepal 2.8-3 × 1-1.5 mm. Dorsal petal 3 × 1-1.5 mm. Lateral united petals 4.5 mm long, upper petal 0.8 × 0.3 mm, lower petal 3.5-3.7 × 0.3 mm. Anthers 1 mm long. Ovary up to 1 mm long. Fruit unknown. — Fig. 14.

HABITAT. — Ericaceous vegetation, on a crest, 1950 m.

DISTRIBUTION. — Madagascar, only known from the type collection at Marojejy massif.

*Impatiens mananteninae* also belongs to the *Impatiens arachnoides*-group, but can be readily distinguished from the related taxa *I. arachnoides* H. Perrier, *I. albopustulata* H. Perrier and *I. andringitrensis* H. Perrier by the narrow dorsal petal and the lanceolate-oblong leaves with basal sheath and usually two fimbriae per margin. *Impatiens mananteninae* is up to now the only species of this group known from Marojejy massif, while the other taxa are restricted to Eastern-Central Madagascar (Mangoro basin, Andringitra massif).

**Impatiens pilosissima** Eb. Fisch. &  
Rahelivololona, **sp. nov.**

*Ab omnibus speciebus subg. Trimorphopetali differt habitu grandiore (usque ad 50 cm alto) cum caulibus et foliis dense pilosis et floribus minutis.*

TYPUS. — *Rahelivololona, T5*, Madagascar, Tsaratanana, fond de ruisseau, vers 1850 m (holo-, TAN; iso-, P).

Erect herb up to 50 cm tall, densely pilose. Leaves dark green with greyish indumentum,

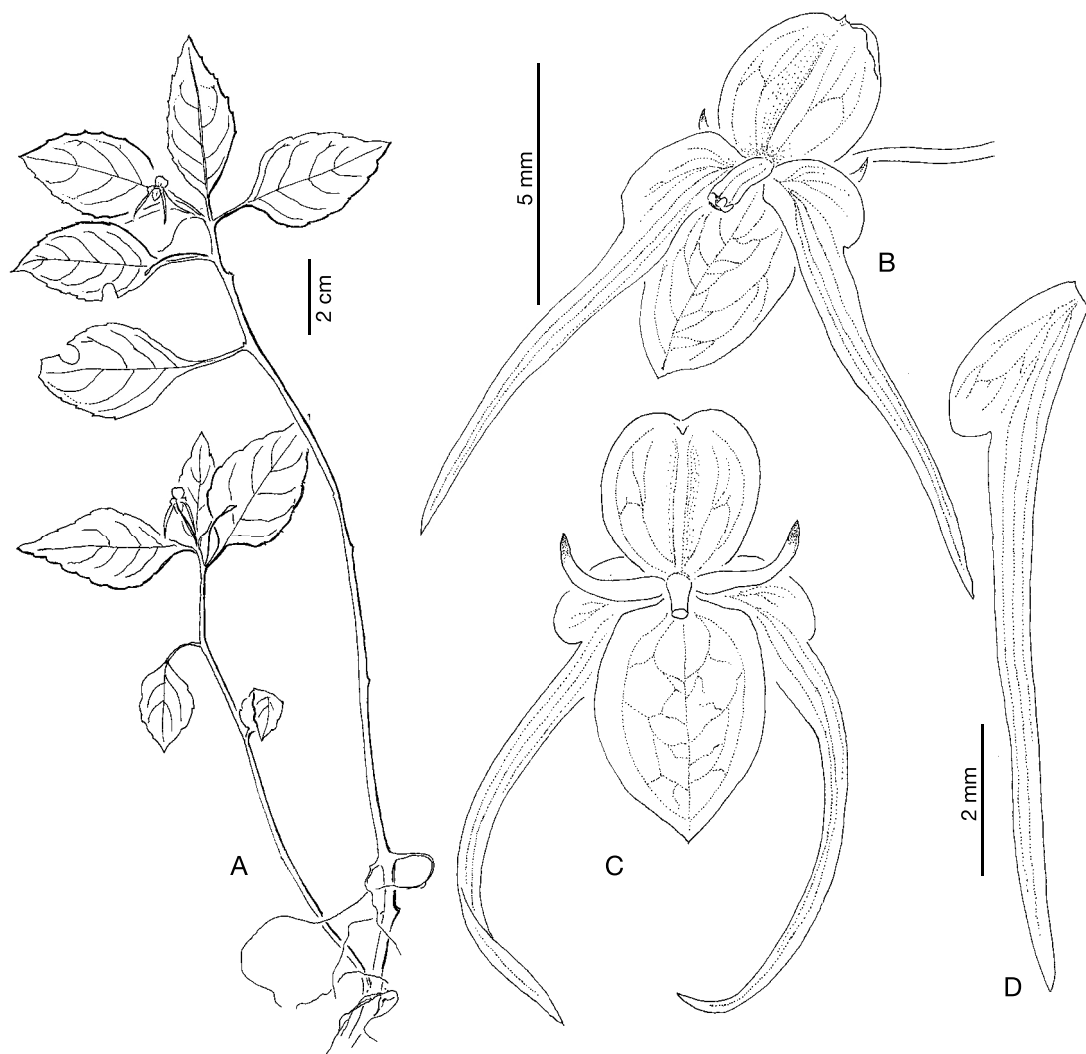


Fig. 13. — *Impatiens mandrakae* Eb. Fisch. & Rahelivololona: **A**, habit; **B**, flower, anterior view; **C**, flower, posterior view; **D**, lateral united petals. (*Rahelivololona Mk 1*, TAN).

petiole 5-13 mm, lamina 32-40 × 12-17 mm, ovate-lanceolate, acuminate, margin dentate. Flowers greenish with dark brown venation. Pedicels up to 13 mm long, covered with whitish scales. Lateral sepals 2, 1.5 × 0.5 mm. Lower sepal 4 × 2 mm, with darker relief forming bars and translucent windows. Dorsal petal hood-like, 5 × 2.5 mm, with hairs on dorsal crest. Lateral united petals 6 mm long, upper petal 1.5 × 0.5 mm, lower petal 4 × 2 mm, with tuberculous

crest on inner margin. Anthers 2 mm long. Ovary 1.5-2 mm long. Fruit unknown. — Fig. 15.

**HABITAT.** — Montane rain forest, at 1850 m.

**DISTRIBUTION.** — Madagascar, only known from the type collection.

*Impatiens pilosissima* differs from all Madagascan species of subg. *Trimorphopetalum* in the large habit (up to 50 cm tall) with densely pilose stems and leaves and the small flowers,

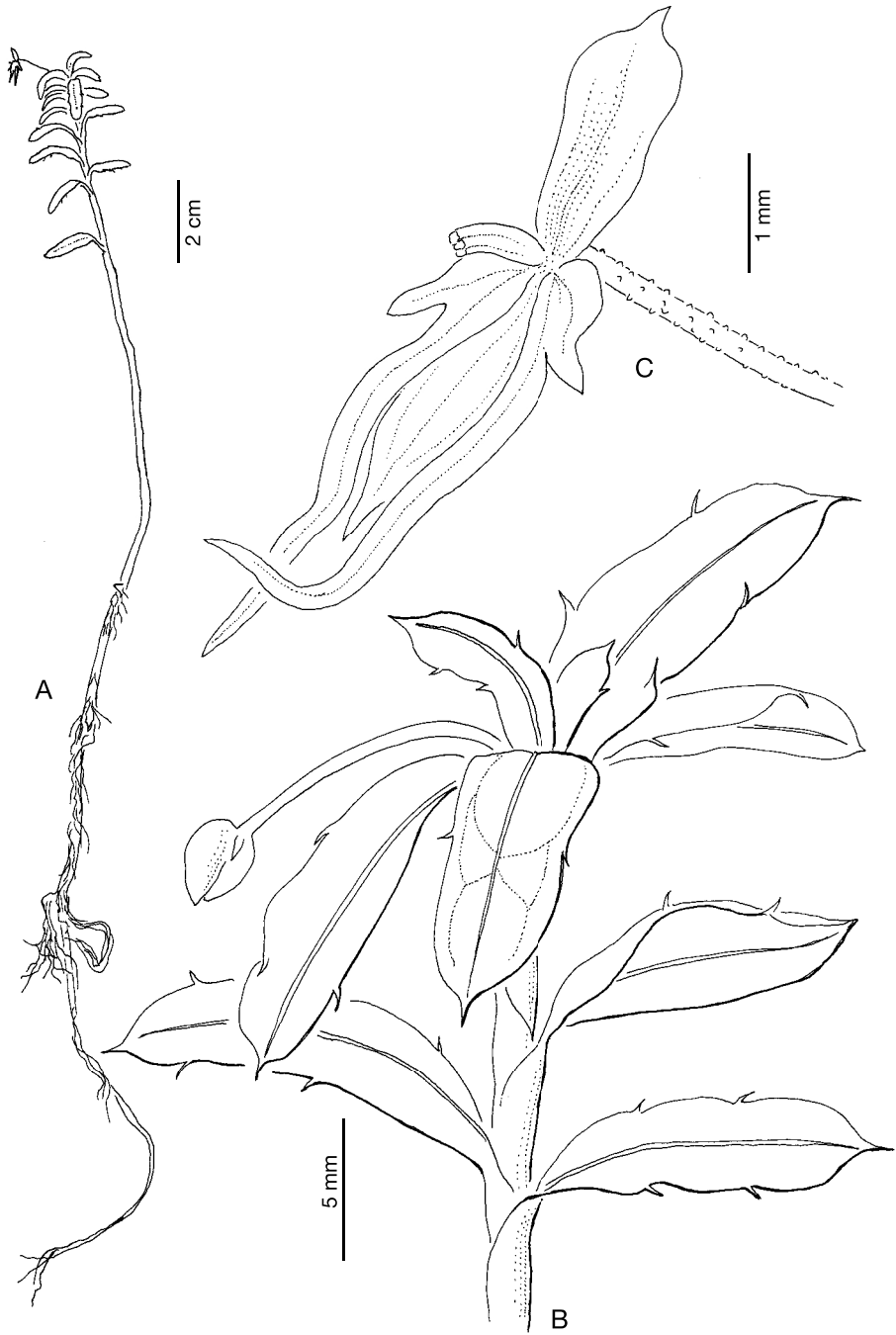


Fig. 14. — *Impatiens mananteninae* Eb. Fisch. & Rahelivololona: **A, B**, habit; **C**, flower. (Messmer, Rakotomalaza & Ravelonarivo NM 388, G).

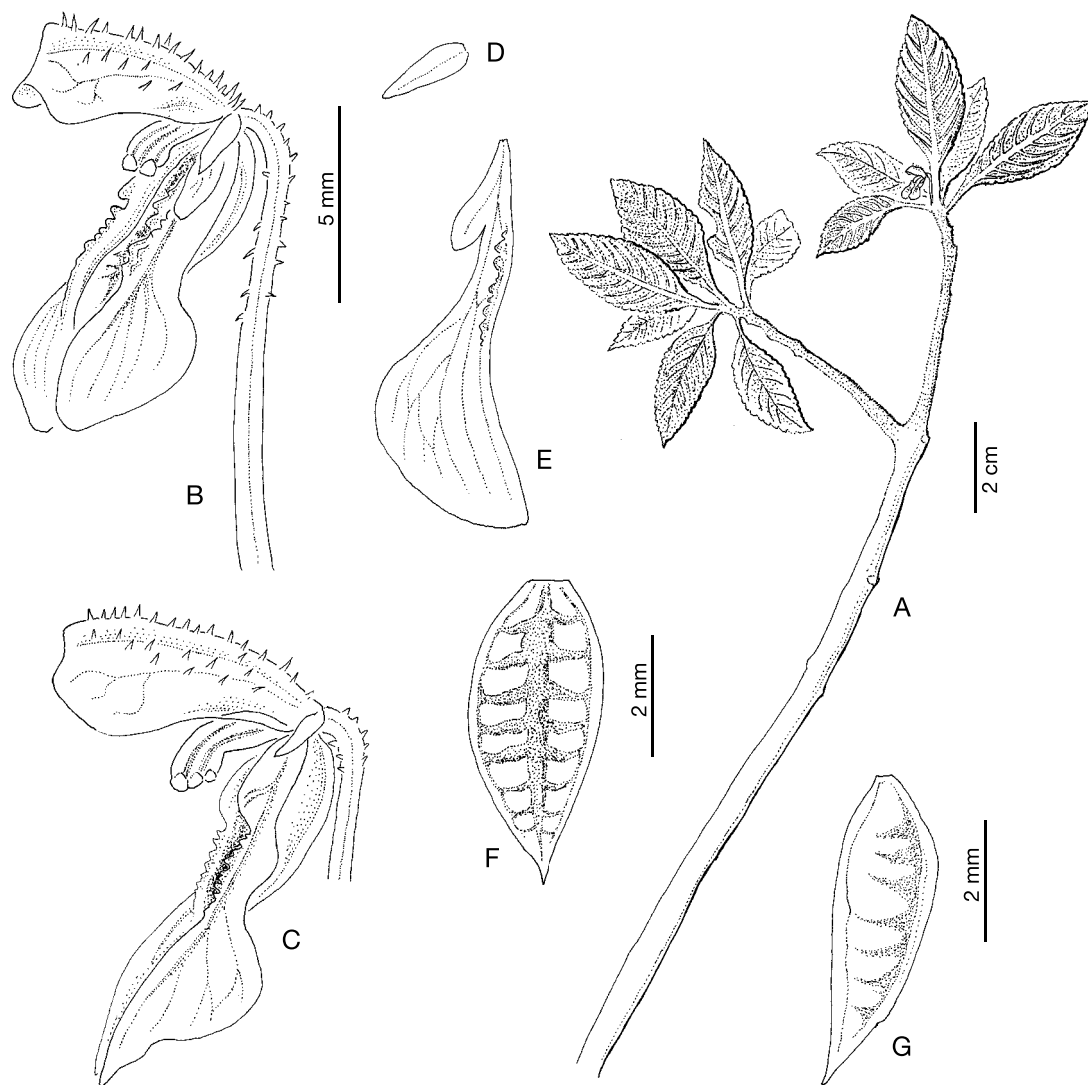


Fig. 15. — *Impatiens pilosissima* Eb. Fisch. & Rahelivololona: A, habit; B, C, flower; D, lateral sepal, E, lateral united petals; F, lower sepal, anterior view; G, lower sepal, lateral view. (Rahelivololona T5, TAN).

which bear a characteristic crest between upper and lower lateral petal.

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