

New taxa of *Impatiens* (Balsaminaceae) from Madagascar. II. A collection from Masoala Peninsula

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ABSTRACT

In a second paper as precursor to a revision of Balsaminaceae in Madagascar and the Comoro Islands, nine species of *Impatiens* (Balsaminaceae) from the Masoala peninsula are described as new (*I. purroi*, *I. mindiae*, *I. vebrowniae*, *I. benitae*, *I. luisae-echterae*, *I. callmanderi*, *I. kraftii*, *I. purpureolucida* and *I. rivularis*).

KEY WORDS

Impatiens,
Balsaminaceae,
Masoala Peninsula,
Madagascar.

RÉSUMÉ

Nouveaux taxons dans le genre Impatiens (Balsaminaceae) à Madagascar. II. Espèces de la presqu'île de Masoala.

Dans cette deuxième publication effectuée dans le cadre de la préparation d'une révision des Balsaminaceae de Madagascar et des Comores, neuf nouvelles espèces d'*Impatiens* de la presqu'île de Masoala sont décrites (*I. purroi*, *I. mindiae*, *I. vebrowniae*, *I. benitae*, *I. luisae-echterae*, *I. callmanderi*, *I. kraftii*, *I. purpureolucida* et *I. rivularis*).

MOTS CLÉS

Impatiens,
Balsaminaceae,
presqu'île de Masoala,
Madagascar.

INTRODUCTION

The Masoala Peninsula is a large area of mostly undisturbed lowland and submontane forest around the Bay of Antongil in North-East Madagascar. Closed-canopy forest remains in some places from sea-level up to 1200 m. The Masoala area is especially famous for its c. 25 endemic species of palms (DRANSFIELD & BEENTJE 1995). Also several species of *Impatiens* (Balsaminaceae) are known from the area near the Bay of Antongil (e.g. *Impatiens antongiliana* H. Perrier), but systematic surveys of the flora have not yet been taken place. In 1996, the second author, together with M. CALLMANDER and C. PURRO (Neuchâtel) visited the Masoala peninsula and made extensive collections of *Impatiens*. Surprisingly, nine species proved to be new to science and are described in this second paper of a series on *Impatiens* in Madagascar. A short history of exploration of *Impatiens* in Madagascar as well as details on terminology and measurements were provided by FISCHER & RAHELIVOLOLONA (2002).

IMPATIENS subg. IMPATIENS

Impatiens purroi Eb. Fisch., Wohlhauser & Rahelivololona, **sp. nov.**

Ab omnibus speciebus madagascariensibus differt calcaribus gibbosis apice obtuso.

TYPUS. — Purro & Wohlhauser 1003, Madagascar, Antsiranana, Masoala Peninsula Réserve Intégrale, 500 m above camp 1, 15°24'95''S, 49°56'84''E, 21 Sep. 1996 (holo-, NEU; iso-, TAN).

Erect herb. Stems lignous at base, up to 25–30 cm tall, pubescent. Leaves ovate, acuminate, margin crenate-dentate with fimbriae in the sinus between two teeth, petiole 25–30 mm long, lamina 80–115 × 30–48 mm, lower surface pale-green with distinct reticulate venation. Flowers pale pink to purple with greenish venation. Pedicels 18–25 mm long. Lateral sepals 2, 4 × 1.2 mm. Lower sepal 11 × 5 mm, hairy outside, with gibbose, obtuse and ± straight spur of 7 mm of length. Dorsal petal helmet-like, 9 × 4 mm, with

small apicule, hairy on crest. Lateral united petals 16 mm long, upper petal 10 × 4 mm, lower petal 12 × 8 mm. Anthers 3–4 mm long. Ovary 3 mm long. Fruit unknown. — Fig. 1.

HABITAT. — Epiphyte in dense evergreen forest, 720 m.

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

Impatiens purroi does not show close affinities to any known Madagascan *Impatiens*. The gibbose, ± straight and obtuse spur seems to be a unique feature.

Impatiens mindiae Eb. Fisch., Wohlhauser & Rahelivololona, **sp. nov.**

Impatiens manaharensis et *I. tsaratanensis* affinis, sed floribus majoribus, calcaribus curvato longiore et petalis lateralibus latioribus roseo-violaceis differt.

TYPUS. — Purro & Wohlhauser 1004, Madagascar, Antsiranana, Masoala Peninsula Réserve Intégrale, 15°25'31''S, 49°57'00''E, 21 Sep. 1996 (holo-, NEU; iso-, TAN).

Erect herb. Stems up to 45 cm tall. Leaves ovate, acuminate, petiole 7–13 mm long, lamina 55–70 × 23–27 mm, margin with 6–8 pairs of teeth and filiform fimbriae. Flowers with rose lateral united petals, two yellow spots in the centre, upper dorsal petal white with red dots. Pedicels 50–55 mm long. Lateral sepals 2, 6–7 × 2 mm. Lower sepal navicular, 16 × 5–6 mm, with 5 mm long spur-like apicule at lower base of mouth, spur up to 10 mm long, curved. Dorsal petal hood-like, 15 × 11 mm, with 5 mm long spur at apex. Lateral united petals 25 mm long, upper petal 8–10 × 4–5 mm, lower petal bilobed, 16–17 × 15 mm. Anthers 4–5 mm long. Ovary 4 mm long. Fruit unknown. — Fig. 2.

HABITAT. — Montane bamboo evergreen forest, 1073 m.

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

Impatiens mindiae is related to *I. manaharensis* Baill. and *I. tsaratanensis* H. Perrier, but differs in the longer curved spur and the broader, rose

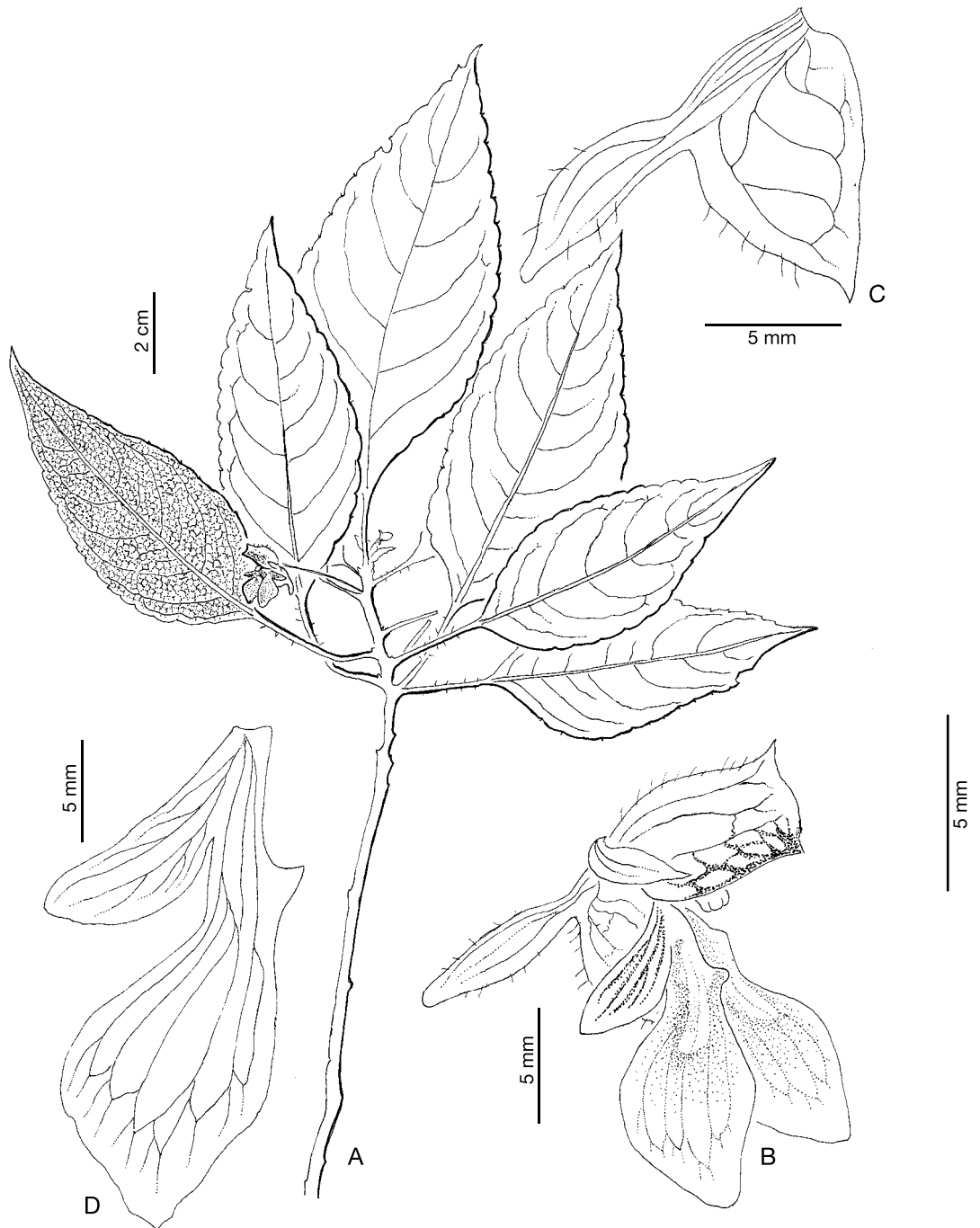


Fig. 1. — *Impatiens purroi* Eb. Fisch., Wohlhauser & Rahelivololona: **A**, habit; **B**, flower; **C**, lower sepal and spur; **D**, lateral united petals. (Purro & Wohlhauser 1003, NEU).

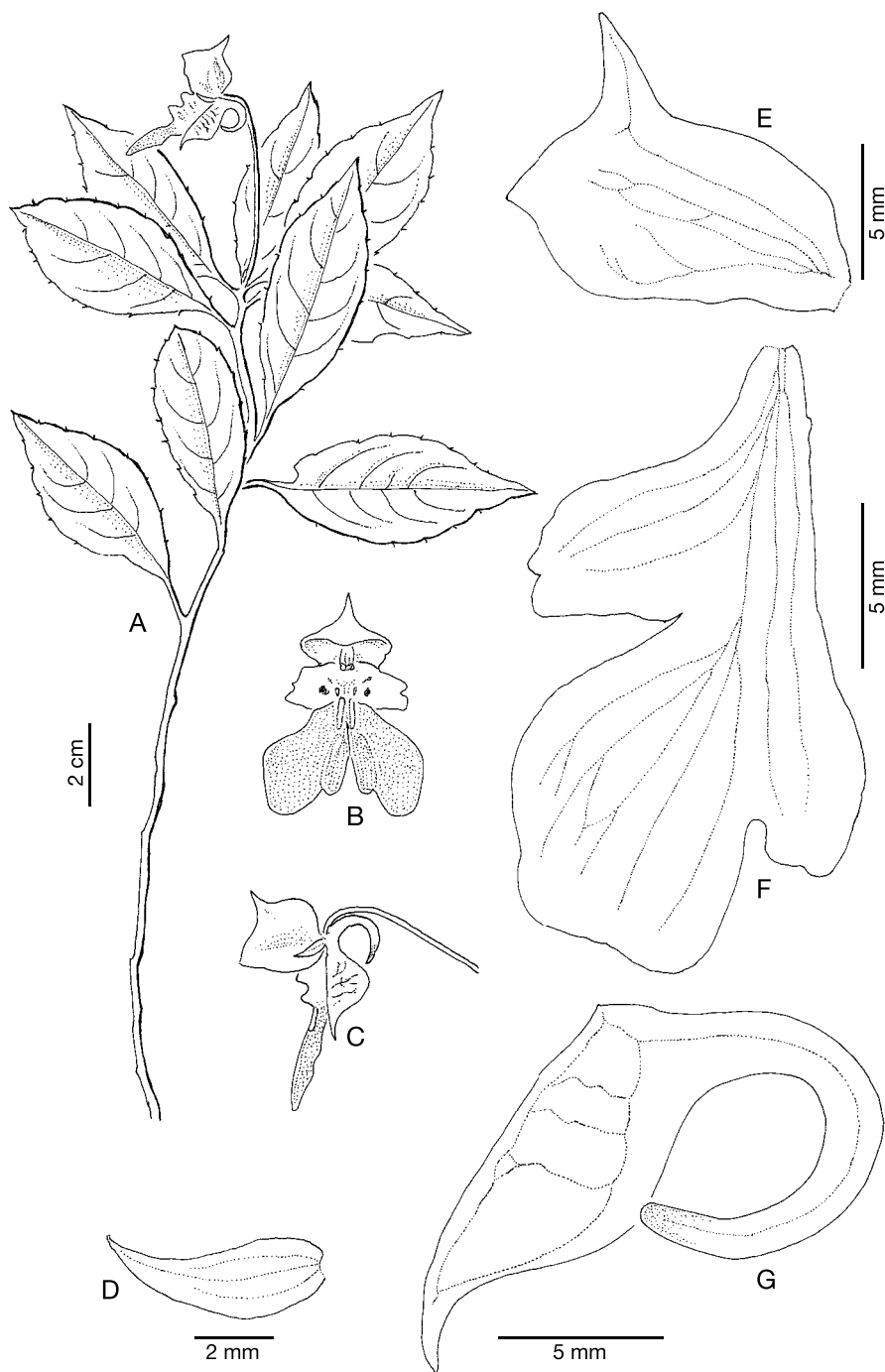


Fig. 2. — *Impatiens mindiae* Eb. Fisch., Wohlhauser & Rahelivololona: **A**, habit; **B**, flower, anterior view; **C**, flower, lateral view; **D**, lateral sepal; **E**, dorsal petal; **F**, lateral united petals; **G**, lower sepal and spur. (*Purro & Wohlhauser 1004*, NEU).

lateral united petals. *Impatiens manaharensis* is known from Eastern Madagascar, while *I. tsaratanensis* is restricted to the Tsaratanana Massif.

Impatiens vebrowniae Eb. Fisch., Wohlhauser & Rahelivololona, **sp. nov.**

Ab Impatiens viguieri calcari longiore, petalis lateralibus superioribus longioribus et angustioribus, sepalis lateralibus lanceolatis et foliis succulentis margine late-crenato sine petiolo et nectariis extrafloralibus differt.

TYPUS. — Purro & Wohlhauser 1014, Madagascar, Antsiranana, Masoala Peninsula Réserve Intégrale, SE of camp 2, 15°25'90"S, 49°58'14"E, 950 m, 22 Sep. 1996 (holo-, NEU; iso-, TAN).

Suffrutescent herb. Stems up to 150 cm tall. Leaves linear-lanceolate, medium to dark green above, light green below, the marginal fimbriae red, somewhat succulent, petiole up to 10 mm long, lamina 110-130 × 10 mm, margin crenate. Flowers white or very pale pink, the nectar spur light pinkish white, with nice smell. Pedicels 50-75 mm long. Lateral sepals 2, lanceolate, 3 × 1 mm. Lower sepal navicular, 17 × 7 mm, with 55-65 mm long filiform spur. Dorsal petal emarginate, dorsal crest with short apicule, 17 × 16-17 mm. Lateral united petals 24 mm long, upper petal oblanceolate, slightly bilobed, 20 × 9-10 mm, lower petal rounded, 19 × 14 mm. Anthers 4-5 mm long. Ovary 4-5 mm long. Fruit unknown. — Fig. 3.

HABITAT. — Montane evergreen forest, growing on boulder along river bed, 950 m.

DISTRIBUTION. — Madagascar, only known from the Masoala peninsula.

Impatiens vebrowniae belongs to the *Impatiens viguieri*-group. It differs from *I. viguieri* H. Perrier in the longer spur, the longer and narrower upper lateral petal, the lanceolate lateral sepals, the ± succulent leaves with broadly crenate margin lacking a distinct petiole and extrafloral nectaries. *Impatiens viguieri* occurs close to the type locality of *I. vebrowniae* in the Anove basin. Recent studies (FISCHER & RAHELIVOLOLONA in prep.) have shown a considerable geographical differentiation and the occurrence of vicarious *Impatiens* species within the Masoala Peninsula.

PARATYPES. — MADAGASCAR: Purro & Wohlhauser 1013, Antsiranana, Masoala Peninsula Réserve Intégrale, camp 3, 15°25'90"S, 49°58'14"E, 1174 m, 22 Sep. 1996 (NEU); Schatz, Dransfield & Du Puy 2812, 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 (MO, P, TAN); Zjhra & Hutcheon 379, Toamasina, Ambanizana, Masoala Peninsula, along Androka river S of MBG house, June 1993 (MO, P).

Impatiens benitae Eb. Fisch., Wohlhauser & Rahelivololona, **sp. nov.**

Impatiens baronii affinis, sed calcari longiore, petalis lateralibus superioribus longioribus latioribusque et fructibus non tuberculatis differt.

TYPUS. — Purro & Wohlhauser 1002, Madagascar, Antsiranana, above Mahalevona village on the way to Ambohitsitondroina, Masoala Peninsula Réserve Intégrale, 15°24'72"S, 49°56'33"E, 20 Sep. 1996 (holo-, NEU; iso-, TAN).

Annual herbs. Stems 45-50 cm long. Leaves ovate to ovate-lanceolate, petiole 18-30 mm long, with 3-4 pairs of extrafloral nectaries, lamina 62-70 × 20-25 mm, margin dentate. Flowers rose to purple, with yellow marks on lateral petals. Pedicels 40-45 mm long. Lateral sepals 2, 2.5-3 × 1 mm. Lower sepal 9 × 4 mm, with up to 25 mm long filiform spur. Dorsal petal 9 × 6 mm, slightly emarginate at apex, with small apicule. Lateral united petals 15 mm long, upper petal 10 × 6-7 mm, lower petal 10-11 × 6-7 mm. Anthers 4 mm long. Ovary 3-4 mm long. Young fruits smooth, mature fruit unknown. — Fig. 4.

HABITAT. — Secondary forest, open areas at path sides, 420 m.

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

VERNACULAR NAME. — Famakivato.

Impatiens benitae is related to *I. baroni* Baker, but differs in the longer spur, the longer and larger upper lateral petal and the smooth, not tuberculate fruits. While *I. baroni* is distributed over most parts of Madagascar and can be found even outside forests (e.g. on granitic inselbergs), *I. benitae* is restricted to Masoala Peninsula and the Marojejy Massif.

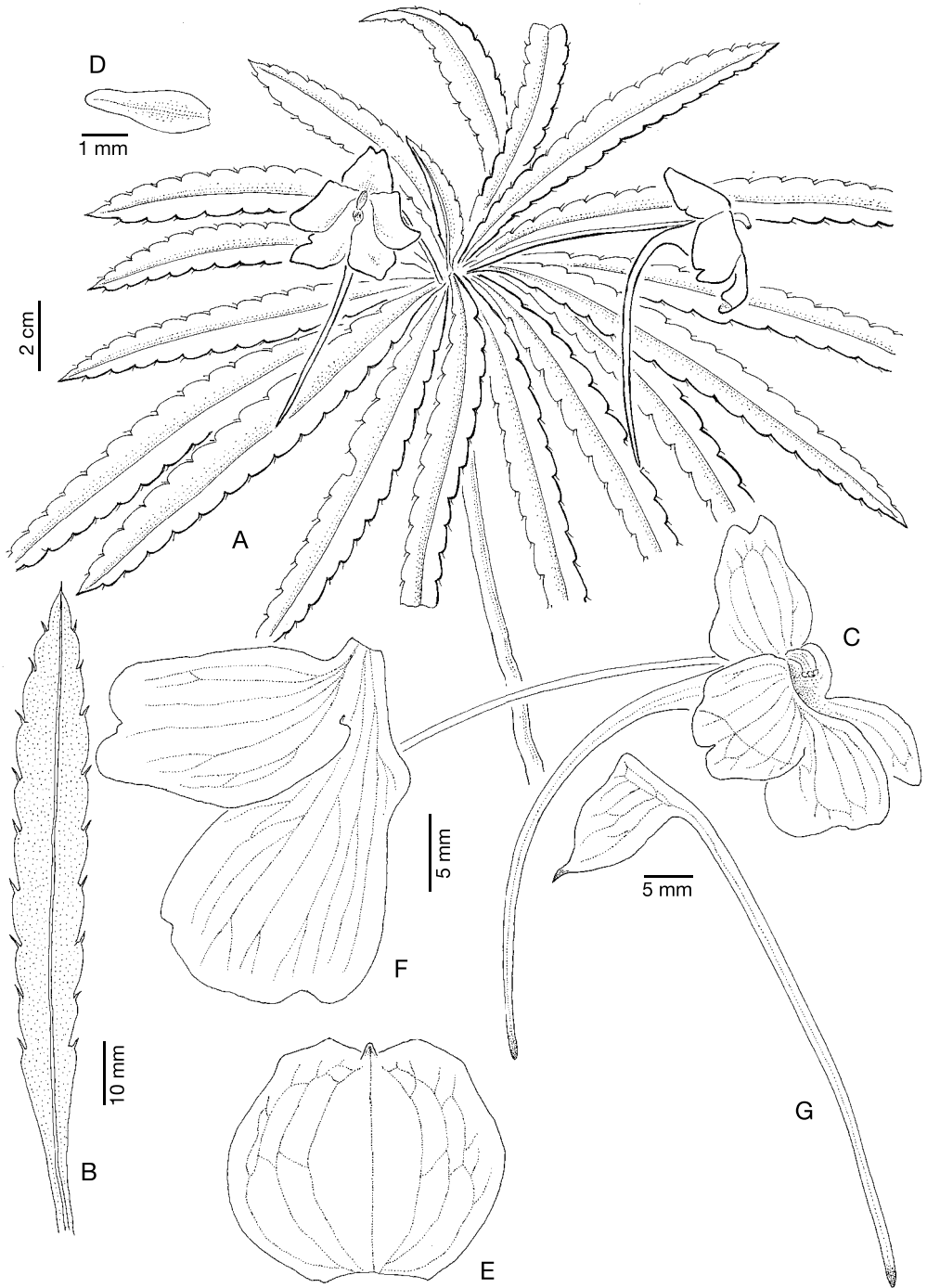


Fig. 3. — *Impatiens vebrowniae* Eb. Fisch., Wohlhauser & Rahelivololona: **A**, habit; **B**, leaf; **C**, flower; **D**, lateral sepal; **E**, dorsal petal; **F**, lateral united petals; **G**, lower sepal and spur. (Purro & Wohlhauser 1014, NEU).

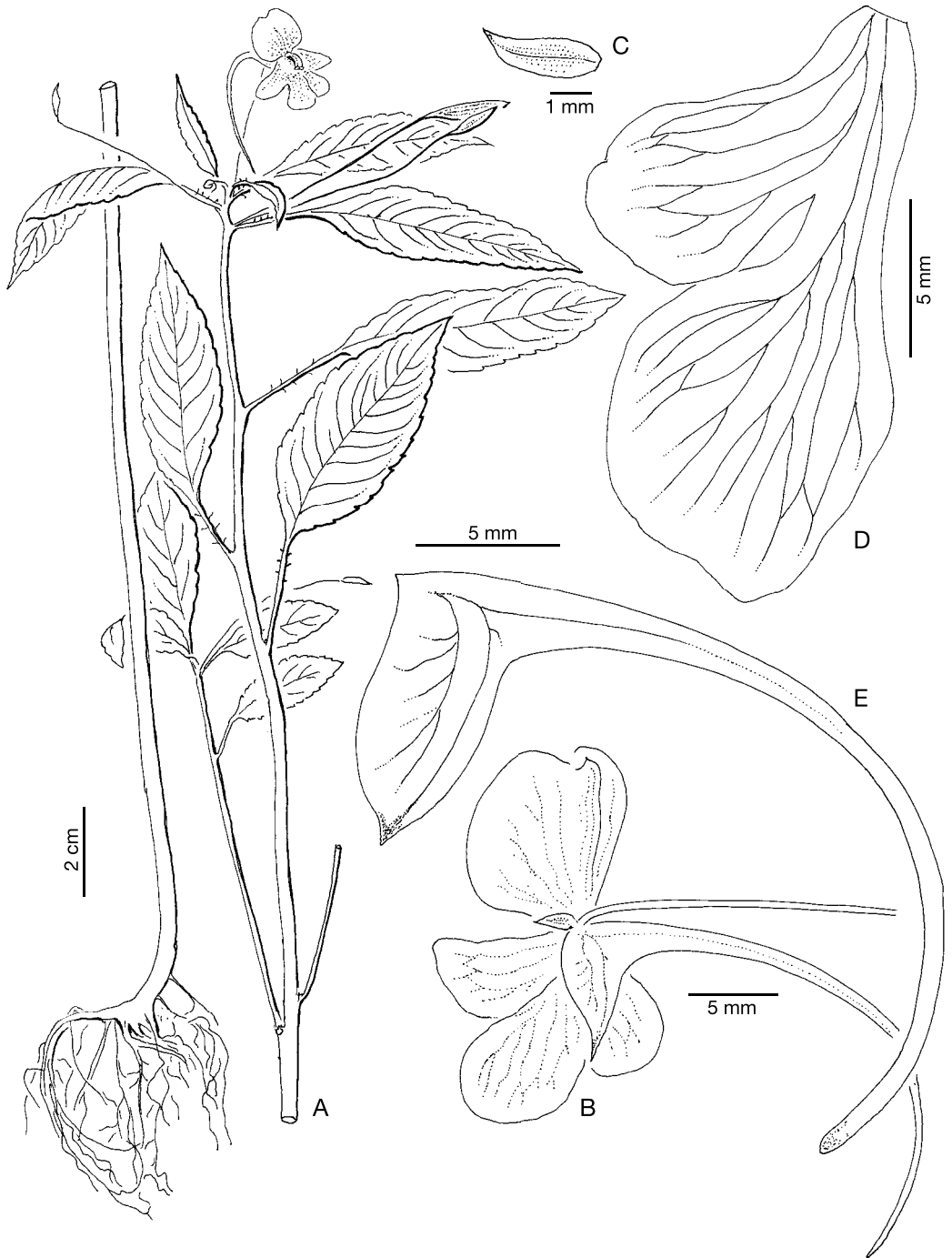


Fig. 4. — *Impatiens benitae* Eb. Fisch., Wohlhauser & Rahelivololona: A, habit; B, flower, posterior view; C, lateral sepal; D, lateral united petals; E, lower sepal and spur. (Purro & Wohlhauser 1002, NEU).

PARATYPES. — MADAGASCAR: *Humbert 23240*, contreforts occidentaux du massif de Marojejy, près du col de Doanyala, 500 m, 25 June-25 Feb. 1949 (P); *Purro & Wohlhauser 1016*, Masoala Peninsula Réserve Intégrale, W of Ampokafo, 15°19'30"S, 50°02'30"E, 25 Sep. 1996 (NEU).

IMPATIENS subg. TRIMORPHOPETALUM (Baker) Eb. Fisch.

Impatiens luisae-echterae Eb. Fisch., Wohlhauser & Rahelivololona, **sp. nov.**

Impatiens gibbosa affinis, sed petalo dorsali angustiore-elongato, petalis lateralibus surperioribus acuminatis et foliis lanceolatis differt.

TYPUS. — *Purro & Wohlhauser 1015*, Madagascar, Antsiranana, Masoala Peninsula Réserve Intégrale, above camp 3, Andranomaloto basin, 15°25'90"S, 49°58'14"E, 1174 m, 23 Sep. 1996 (holo-, NEU; iso-, TAN).

Erect herb, glabrous. Stems 25-50 cm tall. Leaves with petiole 15-25 mm long, lamina lanceolate to ovate, 75-110 × 28-40 mm, with acute apex, margin with 9-10 crenulations, the sinus each with a filiform fimbria. Flowers purple, yellowish-green purple veined. Pedicels 23-28 mm long, glabrous. Lateral sepals 2, 4 mm long, green. Lower sepal 15 mm long, yellowish with purple veins. Dorsal petal helmet-like, 26 × 7-8 mm, transparent greenish-yellow with purple nervation, dorsal crest in upper third with a geniculation. Lateral united petals 20 mm long, upper petal dark purple, lower petal 12 mm large, transparent greenish-yellowish with purple veination. Anthers 5 mm long. Ovary 4 mm long. Fruit unknown. — Fig. 5.

HABITAT. — Shadowed slope in montane moss evergreen rainforest, 1174 m.

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

Impatiens luisae-echterae belongs to the *Impatiens decaryana*-group and is closely related to *I. gibbosa* H. Perrier, from which it differs in the narrower and elongate dorsal petal, the acuminate upper lateral petal and

the lanceolate-ovate leaves. *Impatiens gibbosa* is a narrow endemic from Tsaratanana Massif.

Impatiens callmanderi Eb. Fisch., Wohlhauser & Rahelivololona, **sp. nov.**

Impatiens gibbosa affinis, sed petalo dorsali latiore, sepalis lateralibus lanceolatis, petalis lateralibus latioribus obtusisque et nervis secundariis a nervo mediano sub angulo 90° abeuntibus differt.

TYPUS. — *Purro & Wohlhauser 1027*, Madagascar, Antsiranana, Masoala Peninsula Réserve Intégrale, massif de Bevontsira, Antsahabefiana, 27 Sep. 1996 (holo-, NEU; iso-, TAN).

Erect herb, glabrous but covered with minute white scales, crest of dorsal petal with some hairs. Stems up to 25-50 cm tall. Leaves with petiole 7-15 mm long, lamina lanceolate-ovate, acute, 110-130 × 40-50 mm, margin crenulated with small filiform fimbriae. Flowers purple-blackish, with reddish-veined yellow lateral united sepals. Pedicels up to 28 mm long. Lateral sepals 2, large, 7 × 2 mm, green. Lower sepal yellowish with plackish spots, 12 mm long. Dorsal petal helmet-like, 15 × 10 mm, in lower third on crest with distinct geniculation at apex with small recurved spur. Lateral united petals 19 mm long, upper petal 2 × 5 mm, obtuse, purple-blackish, lower petal 11-12 mm long, transparent yellowish with purple-blackish veins. Anthers 5 mm long. Ovary 4-5 mm long. Fruit unknown. — Fig. 6.

HABITAT. — Montane moss evergreen forest, 900 m.

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

Impatiens callmanderi also belongs to the *Impatiens decaryana*-group and is related to *I. gibbosa* H. Perrier and *I. luisae-echterae* Eb. Fisch., Wohlhauser & Rahelivololona, from which it differs in the broader dorsal petal, the lanceolate-ovate lateral sepals, the broader and obtuse lateral united petals and the secondary nerves of leaf-lamina, arising in an angle of approximately 90° from mid-nerve.

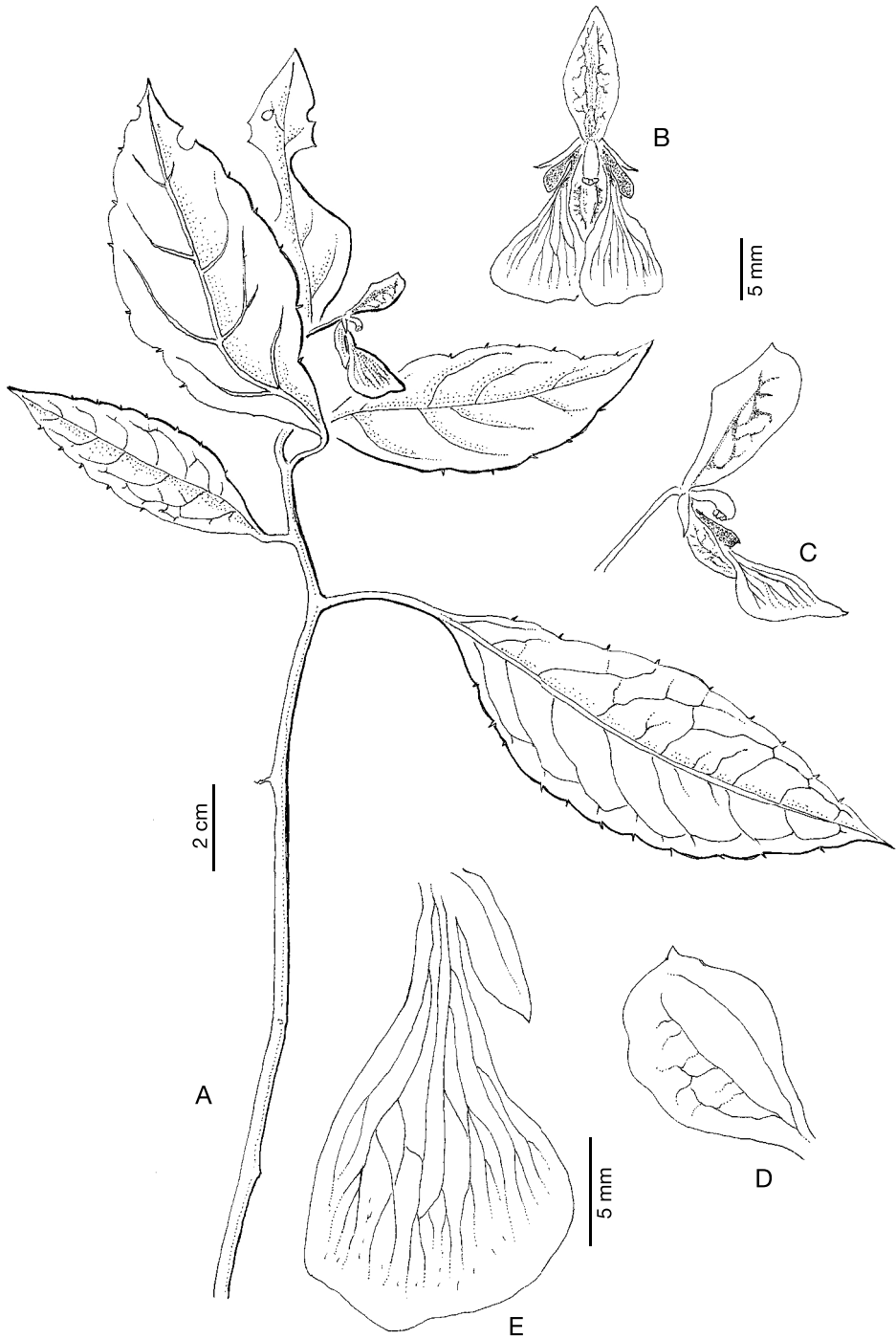


Fig. 5. — *Impatiens luisae-echterae* Eb. Fisch., Wohlhauser & Rahelivololona: A, habit; B, flower, anterior view; C, flower, lateral view; D, dorsal petal; E, lateral united petals. (Purro & Wohlhauser 1015, NEU).

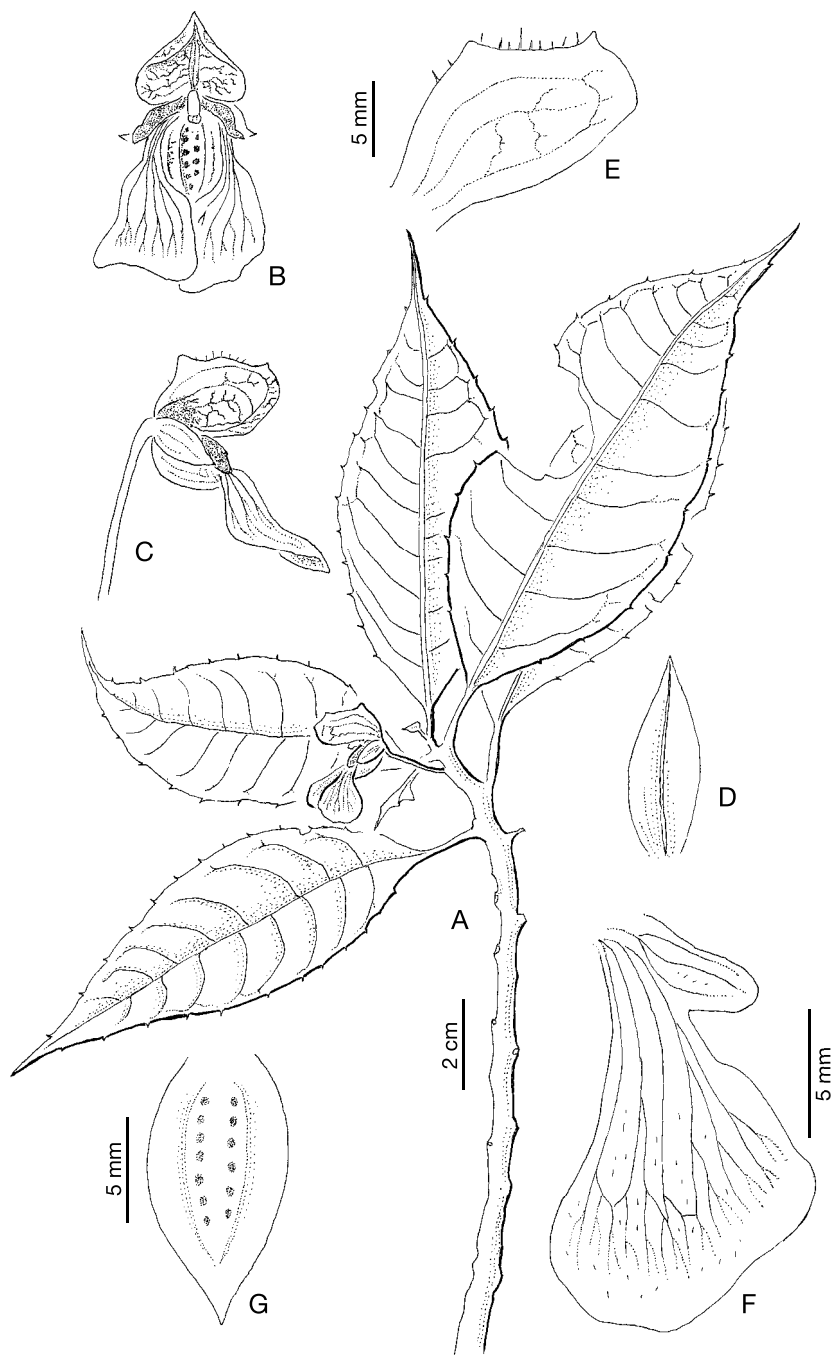


Fig. 6. — *Impatiens callmanderi* Eb. Fisch., Wohlhauser & Rahelivololona: **A**, habit; **B**, flower, anterior view; **C**, flower, lateral view; **D**, lateral sepal; **E**, dorsal petal; **F**, lateral united petals; **G**, lower sepal. (Purro & Wohlhauser 1027, NEU).

Impatiens kraftii Eb. Fisch., Wohlhauser & Rahelivololona, **sp. nov.**

Impatiens silvianae affinis sed petalis lateralibus superioribus acuminatis, sepalis lateralibus linearo-lanceolatis, basi laminae et nervis subtus distincte reticulatis differt.

TYPUS. — Purro & Wohlhauser 1007, Madagascar, Antsiranana, Masoala Peninsula Réserve Intégrale, camp 2, 15°25'95"S, 49°57'56"E, 1100 m, 21 Sep. 1996 (holo-, NEU; iso-, TAN).

Erect robust herb up to 25-30 cm tall. Stems broad green, pubescent. Leaves large, lower face of leaves hairy on nerves, with finely reticulate nerves, petiole 15-25 mm long, lamina ovate-lanceolate, (65-)90-110 × 29-48 mm, margin crenate with 14-17 pairs of filiform fimbriae. Flowers greenish-brown, with brown-red venation. Pedicels covered with white scales, up to 30 mm long. Lateral sepals 2, linear-lanceolate, 4 × 0.8 mm. Lower sepal 8 × 3-4 mm, with dark transverse bars formed by the nerves. Dorsal petal cucullate, hairy, 7-8 × 3-4 mm, with short spur at apex. Lateral united petals 12 mm long, upper petal 3 × 1 mm, lower petal 7 × 5 mm. Anthers 3 mm long. Ovary 2-3 mm long. Fruit unknown. — Fig. 7.

HABITAT. — Montane evergreen forest, growing on rocks in small streams, 1100 m.

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

Impatiens kraftii belongs to the *Impatiens decaryana*-group and differs from *I. silviana* Eb. Fisch. & Rahelivololona, which is also known from Masoala Peninsula, in the acuminate upper lateral petal, the linear-lanceolate lateral sepals, the shape of lamina with narrow base gradually tapering into petiole and the distinct reticulate nerves on lower leaf-surface.

Impatiens purpureolucida Eb. Fisch., Wohlhauser & Rahelivololona, **sp. nov.**

Ab Impatiens translucida differt petalis lateralibus angustioribus et caule petioloque pilosis, ab I. ranomafanae differt lamina glabra vel sparsim pilosa, petalo dorsali obtusi et petalis lateralibus latioribus.

TYPUS. — Purro & Wohlhauser 1025, Madagascar, Antsiranana, Masoala Peninsula Réserve Intégrale, E of Ampokafo, Bevontsira Range, 26 Sep. 1996 (holo-, NEU; iso-, TAN).

Erect herbs. Stems 4-6 cm tall, densely pilose. Leaves lanceolate, acuminate, coarsely dentate, petiole 9-10 mm, densely pilose, lamina 35-50 × 16-20 mm, with reddish veins on the lower side, glabrous or sparsely pubescent. Flowers minute, hidden by the leaves, translucent purple. Pedicels 6 mm long, pilose. Lateral sepals 2, 1 × 0.3 mm. Lower sepal 4 mm long. Dorsal petal 5 × 1.5-2 mm, hairy on crest. Lateral united petals 5-6 mm long, upper petal up to 2 mm, lower petal 3 × 2.5-3 mm. Anthers 1-1.5 mm. Ovary 1 mm long. Fruit unknown. — Fig. 8.

HABITAT. — Montane mossy evergreen rain forest, on stones in streams, 950 m.

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

Impatiens purpureolucida belongs to the *Impatiens fontinalis*-group and is closely related to *I. translucida* Eb. Fisch. & Rahelivololona and *I. ranomafanae* Eb. Fisch. & Rahelivololona. It differs from *I. translucida* in the narrower lateral united petals and the pilose stem and petiole. From *I. ranomafanae*, the new species differs in the glabrous or only sparsely hairy lamina, the obtuse dorsal petal and the broader lateral united petals. Both *I. translucida* and *I. ranomafanae* are only known from Ranomafana-National Park near Fianarantsoa.

Impatiens rivularis Eb. Fisch., Wohlhauser & Rahelivololona, **sp. nov.**

Impatiens ivohibensi affinis, sed petalo dorsali angustiore, petalis lateralibus longioribus acuminatisque et caule piloso differt.

TYPUS. — Purro & Wohlhauser 1018, Madagascar, Antsiranana, Masoala Peninsula Réserve Intégrale, between camp 3 and Ilampy, 23 Sep. 1996 (holo-, NEU; iso-, TAN).

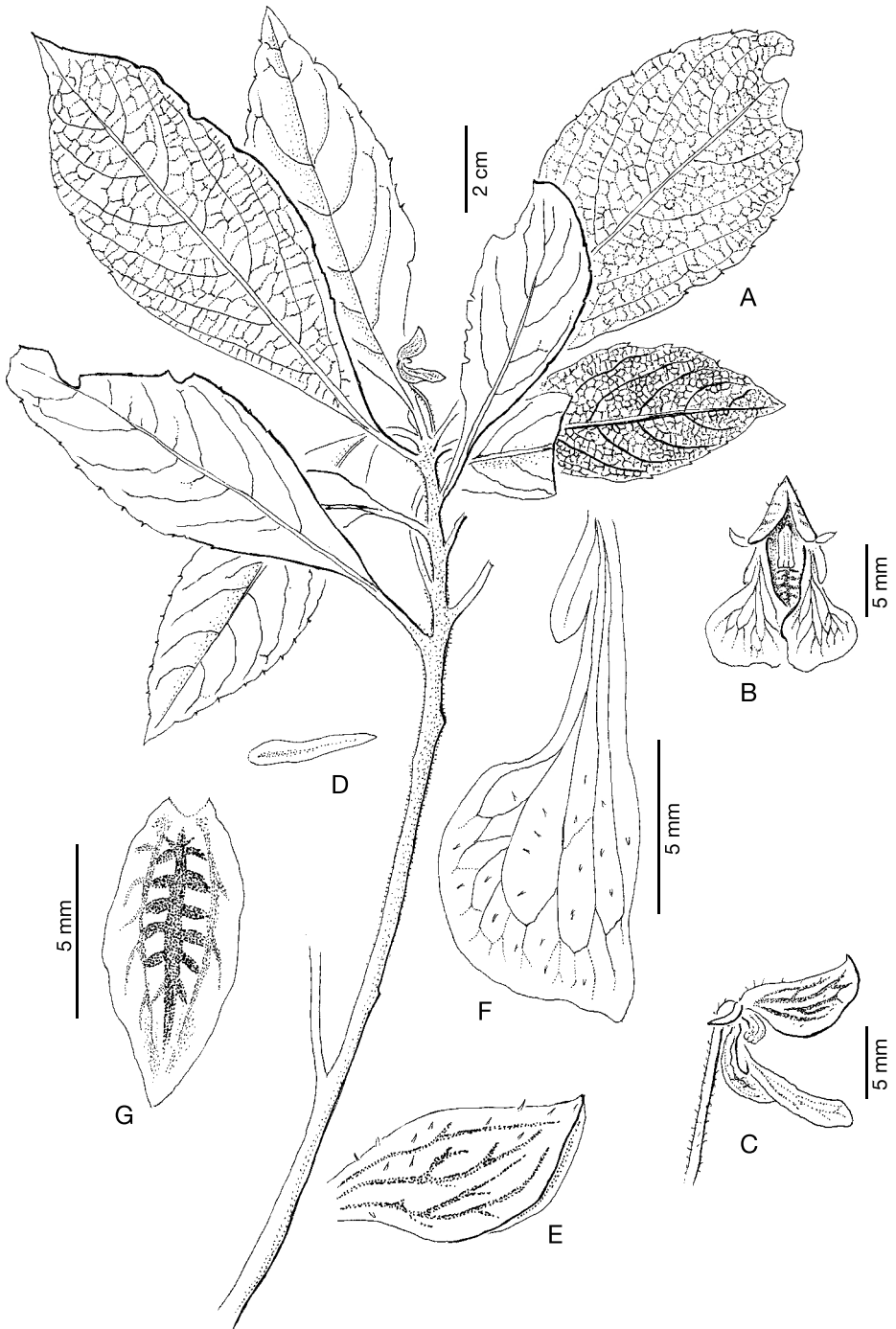


Fig. 7. — *Impatiens kraftii* Eb. Fisch., Wohlhauser & Rahelivololona: **A**, habit; **B**, flower, anterior view; **C**, flower, lateral view; **D**, lateral sepal; **E**, dorsal petal; **F**, lateral united petals; **G**, lower sepal. (Purro & Wohlhauser 1007, NEU).

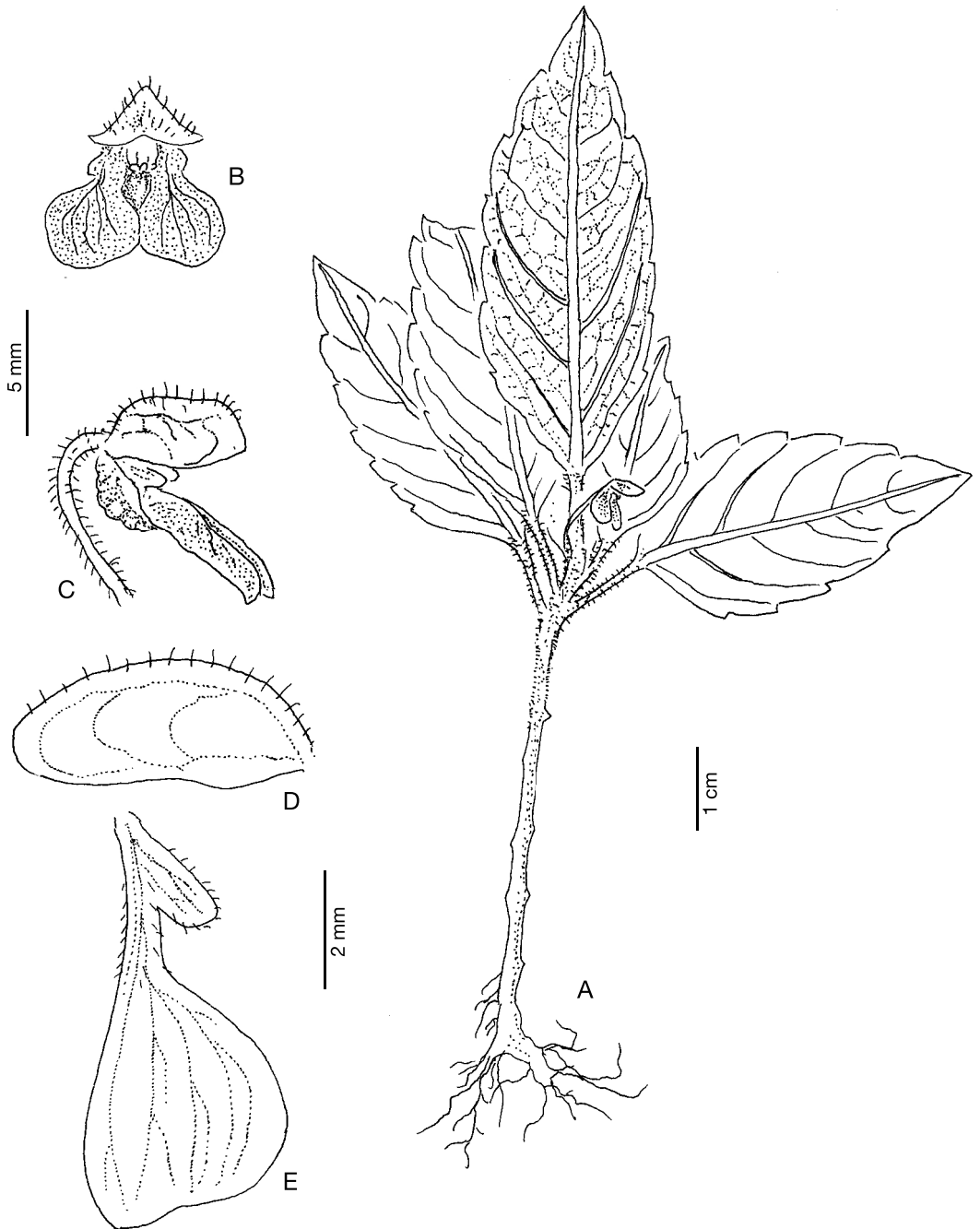


Fig. 8. — *Impatiens purpureolucida* Eb. Fisch., Wohlhauser & Rahelivololona: A, habit; B, flower, anterior view; C, flower, lateral view; D, dorsal petal; E, lateral united petals. (Purro & Wohlhauser 1025, NEU).

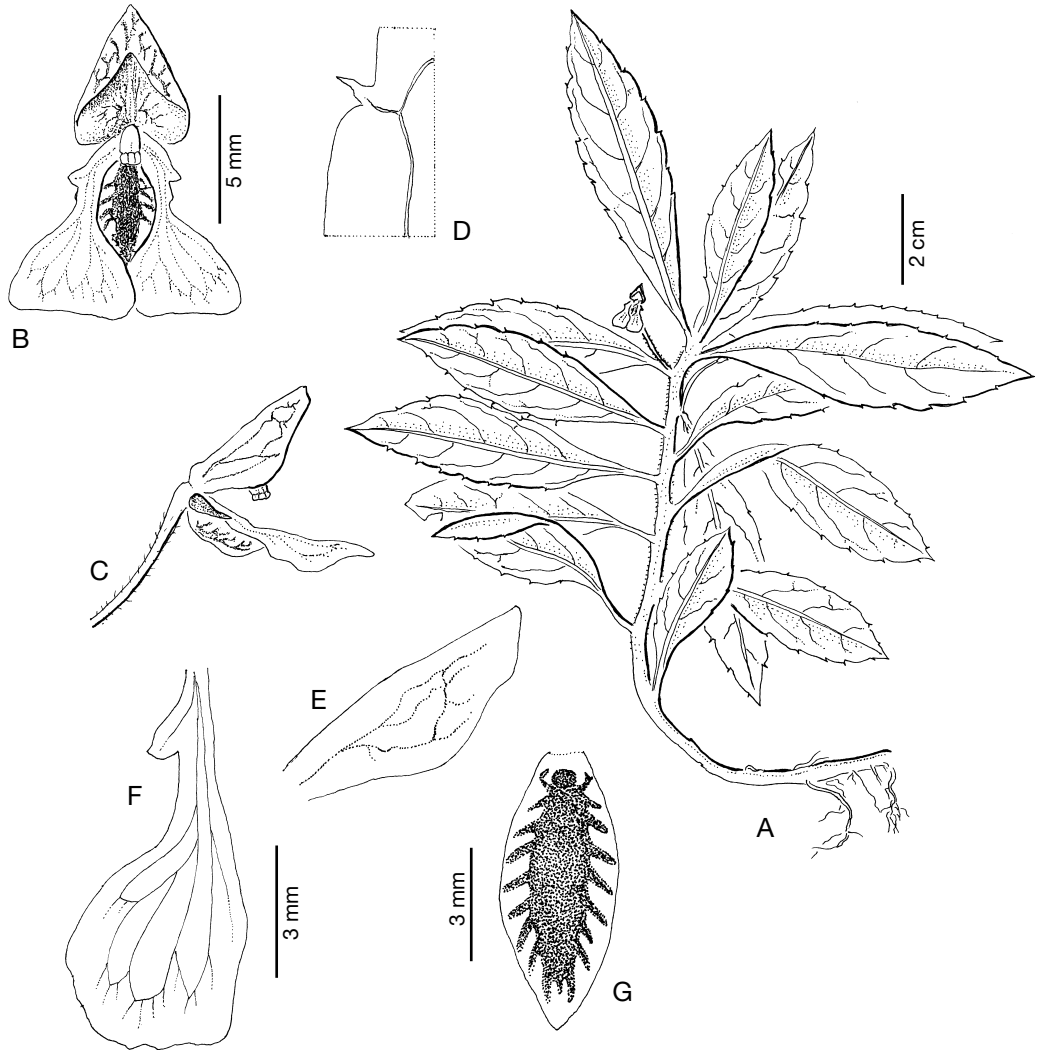


Fig. 9. — *Impatiens rivularis* Eb. Fisch., Wohlhauser & Rahelivololona: **A**, habit; **B**, flower, anterior view; **C**, flower, lateral view; **D**, leaf margin; **E**, dorsal petal; **F**, lateral united petals; **G**, lower sepal. (Purro & Wohlhauser 1018, NEU).

Erect herb. Stems up to 14 cm tall, pubescent. Leaves linear-lanceolate, acuminate, margin dentate, with small fimbriae, petiole 5-12 mm long, lamina 57-70 × 16-18 mm, covered with small whitish scales on upper surface. Flowers greenish-yellow, lower sepal with purple-blackish relief. Pedicels up to 15 mm long. Lateral sepals 2, 2 mm long. Lower sepal 7 × 3 mm, with relief formed by veins. Dorsal petal helmet-like, 7 ×

2 mm. Lateral united petals 7 mm long, upper petal 1 mm, lower petal 4 × 3 mm. Anthers 3 mm long. Ovary 2-3 mm long. Fruit unknown. — Fig. 9.

HABITAT. — Montane evergreen forest, in streams, growing on stones.

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

Impatiens rivularis is related to *I. ivohibensis* H. Perrier, but differs in the narrower dorsal petal, the ovate lower sepal, the longer and acuminate upper lateral petal and the pilose stems. *Impatiens ivohibensis* is restricted to the Pic d'Ivohibe in Central Madagascar.

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*Manuscript received 10 April 2002;
revised version accepted 12 July 2002.*