Seven New Species of *Begonia* from Sumatra

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Abstract

Seven new *Begonia* species are described from northern and western Sumatra: *Begonia gracilicyma* Irmsch. ex M.Hughes (unplaced to section), *Begonia laruei* M.Hughes (sect. *Petermannia*), *Begonia multijugata* M.Hughes (sect. *Petermannia*), *Begonia pasamanensis* M.Hughes (sect. *Reichenheimea*), *Begonia puspitae* Ardi (sect. *Reichenheimea*), *Begonia tuberculosa* Girmansyah (sect. *Platycentrum*) and *Begonia verecunda* M.Hughes (sect. *Bracteibegonia*). The conservation status of each species is assessed.

Introduction

There are currently 45 species of *Begonia* known from Sumatra (Hughes, 2008a). This is certainly a vast underestimate of the true number, largely as a result of a lack of recent work on the genus and the propensity *Begonia* has for generating narrow endemics (Hughes, 2008b), but also due to the relatively low collection density over much of the island (Laumonier, 1997). However the extensive collections by de Wilde and de Wilde-Duyfies have provided much insight into *Begonia* diversity in the Gunong Leuser environs. Given the relentless pressure on forest habitats throughout Southeast Asia (Sodhi, 2004), there is an urgent need to provide taxonomic data as a basis for conservation efforts.

During recent expeditions to Sumatra, seven new species of *Begonia* have been discovered and are described here. They belong to sect. *Petermannia* (2 species); *Reichenheimea* (2 species); *Bracteibegonia* (1 species) and *Platycentrum* (1 species); there is a further rather enigmatic species which is unplaced to section. In common with most other *Begonia* from Sumatra, these new taxa are found in the mountainous spine of the

island along the Barisan Range, and also from the mountains in North Sumatra and Aceh (Fig 1). Herbarium material indicates that there are still a considerable number of undescribed taxa in sections *Bracteibegonia* and *Reichenheimea* from these areas, which may represent largely endemic radiations. The Tigapulu Mountains are also likely to harbour further endemic taxa, although the areas which remain most under-explored are the mountains and limestone karst regions in northern Aceh, from which hardly any material has been seen. All specimens cited are available as digital images via Hughes & Pullan (2007); Doorenbos *et al.* (1998) was consulted to assist with sectional placement.

Begonia gracilicyma Irmsch. ex M.Hughes, *sp. nov.* (not placed to section) B. divaricatae *maxime similis, sed foliis plus elongatis et minus dentatis, floribus parum rubescentibus non albis neque roseis differt.* – **Typus:** Sumatra, Padang, Ajer Mantjoer, *O. Beccari PS610* (holo, FI; iso, B, FI, K, L). **Fig. 2B.**

Plant erect, branching **herb**, 40 to 70 cm high. **Stem** woody, especially at base, glabrous, *ca* 5 mm wide, internodes 5-10 cm apart. Stipules lanceolate, 10-12 × 3 mm, glabrous, with a filiform extension at the tip, deciduous. **Leaves** alternate; petiole 1.5-5 cm long, glabrous; lamina elongate-lanceolate, strongly asymmetric, basifixed, cordate at base, lobes not overlapping, one lobe much larger giving an angular appearance, 10-18 × 2.5-5.5 cm, midrib 8-13 cm long, venation palmate-pinnate, upper surface matt green, glabrous; underside pale green sometimes marked with red, glabrous; margin glabrous, denticulate; apex acuminate. **Inflorescence** appearing adnate on the petioles, protandrous, bisexual; bracts 1-3 mm long, margin entire, deciduous. **Male flowers**: pedicel 5 mm, glabrous; tepals 4, outer tepals orbicular, white with a reddish tinge on the reverse, glabrous, *ca* 4 mm in diameter, margin entire; inner tepals oblong-obovate, white, 4 × 2 mm; androecium yellow, symmetric; stamens *ca* 30; filaments slightly fused at base, 0.75 mm long; anther about as long as the filament, dehiscing through slits about half the length of the anther, hooded, connective not extended. **Female flowers**: pedicel 10 mm long; ovary 3 locular, with three equal wings, placentae entire; tepals 5, pale green, 5 mm long, margin entire; stigma with three styles joined at the base, U-shaped, persistent. **Fruit** brown, dehiscent, pendulous on a hair-like pedicel when dry, rounded at base, truncate to retuse at the apex; wings extending along the pedicel, equal, 14 × 5 mm; capsule shape oval, length 8-9 mm, width 5 mm. **Seeds** unknown.

Other specimens examined: **Sumatera Barat**: Mt. Tandikat, 23 vii 1955, *W. Meijer 3812* (L); *ibid.*, 1955, *W. Meijer 391?* (BM); Talaman, *H.A.B.*

Bunnemeijer 372 (B, BO); Anai Nature Reserve, 9 xi 1991, *Anda collectors 25* (ANDA); *ibid.*, 9 xi 1991, *Anda collectors 37* (ANDA); *ibid.*, 23 xii 1983, *Niniek & Wardi 458* (BO); *ibid.*, 21 iii 1990, *Anda collectors 90* (ANDA); Anak Air Ambacang Badak, 15 viii 1995, *H. Okada 2004* (ANDA); Bukit Tambun Tulang, 8 xi 1998, *Anda collectors s.n.* (ANDA); *ibid.*, 29 x 1988 - 31 x 1988, *Anda collectors s.n.* (ANDA); *ibid.*, 7 xi 1998, *Anda collectors 15* (ANDA); *ibid.*, v 2006, *Anda collectors 17* (ANDA); *ibid.*, 8 xi 1998, *Anda collectors 18* (ANDA); *ibid.*, 8 xi 1998, *Anda collectors 23* (ANDA); *ibid.*, 28 iii 1987, *Anda collectors 24* (ANDA); *ibid.*, 8 xi 1998, *Anda collectors 42* (ANDA); *ibid.*, 26 v 1991, *Anda collectors 45* (ANDA); *ibid.*, 10 xi 1991, *Anda collectors 47* (ANDA); Bungus–Cindakir, 25 v 2002, *Anda collectors 35* (ANDA); Desa Sipisang, 19 xii 1992, *Anda collectors 21* (ANDA); *ibid.*, 6 iv 1997, *Anda collectors 23B* (ANDA); *ibid.*, 19 xii 1992, *Anda collectors 25* (ANDA); *ibid., 19* xii 1992, *Syofyan et al. 31* (ANDA); *ibid., Anda collectors 33* (ANDA); *ibid.*, 5 iv 1997, *Anda collectors 35* (ANDA); *ibid.*, 5 iv 1997, *Anda collectors 41* (ANDA); *ibid.*, 17 viii 1995, *Anda collectors 503* (ANDA); Gunung Gadut, 15 xii 1987, *H. Okada 4629* (ANDA); Gunung Gadut, Bt. Batu Bajolang, 12 i 1983, *M. Hotta, et al. 1326* (A, L); *ibid.*, 12 i 1983, *M. Hotta, et al. 1320* (ANDA); Gunung Gadut, Bukit Gambir, 15 xii 1987, *H. Okada 4625* (ANDA); Kandang Ampat, Kabupaten Padang Pisang, 27 xi 1994, *Anda collectors 10* (ANDA); *ibid.*, 27 xi 1994, *Anda collectors 5* (ANDA); Muko-muko, 5 x 1986, *Witnarti* 24 (ANDA [3]); Padang Pariaman, 30 iv 2004, *D. Girmansyah* 380 (BO); Road to Rimbo Panti, 27 v 2007, *M. Hughes & D. Girmansyah MH1407* (BO, E); Taman Hutan Raya, Ladang Padi, 16 v 1993, *Anda collectors 112* (ANDA); *ibid.*, 18 xii 2004–19 xii 2004, *Anda collectors 112*? (ANDA); *ibid.*, 22 v 2007, *M. Hughes & D. Girmansyah MH1403* (BO, E [3]); *ibid.*, 24 v 2003, *Anda collectors 23* (ANDA); *ibid.*, 24 v 2003, *Anda collectors 23* (ANDA); *ibid.*, 4 v 2002, *Anda collectors 27* (ANDA); *ibid.*, 24 v 2003, *Anda collectors 27*? (ANDA); *ibid.*, 14 vi 1998, *Anda collectors 29* (ANDA); *ibid.*, *D. Girmansyah, et. al. 3* (BO, E); *ibid.*, 16 v 1993, *Anda collectors 38* (ANDA); *ibid.*, 4 v 1998–5 v 1998, *Anda collectors 46* (ANDA); *ibid.*, 5 v 2002, *Anda collectors 72* (ANDA); Tambun Tulang, 10 xi 1991, *Anda collectors s.n.* (ANDA); *ibid.*, 29 x 1983, *Eliwiratma 09* (ANDA); *ibid.*, 10 xi 1991, *Anda collectors 43* (ANDA); *ibid.*, 10 xi 1991, *Anda collectors 51* (ANDA); *ibid.*, 10 xi 1991, *Anda collectors 52* (ANDA).

Distribution and ecology: Sumatera Barat: Agam, Padang Pariaman, Tanah Datar, Padang. At altitudes of 150 to 750 m (Fig 1). Terrestrial forest floor herb found in steep lower and mid-montane forest.

IUCN category: LC. *Begonia gracilicyma* is found at a number of sites within the Gunung Singgalang Protection Forest and the Kerinci Seblat National

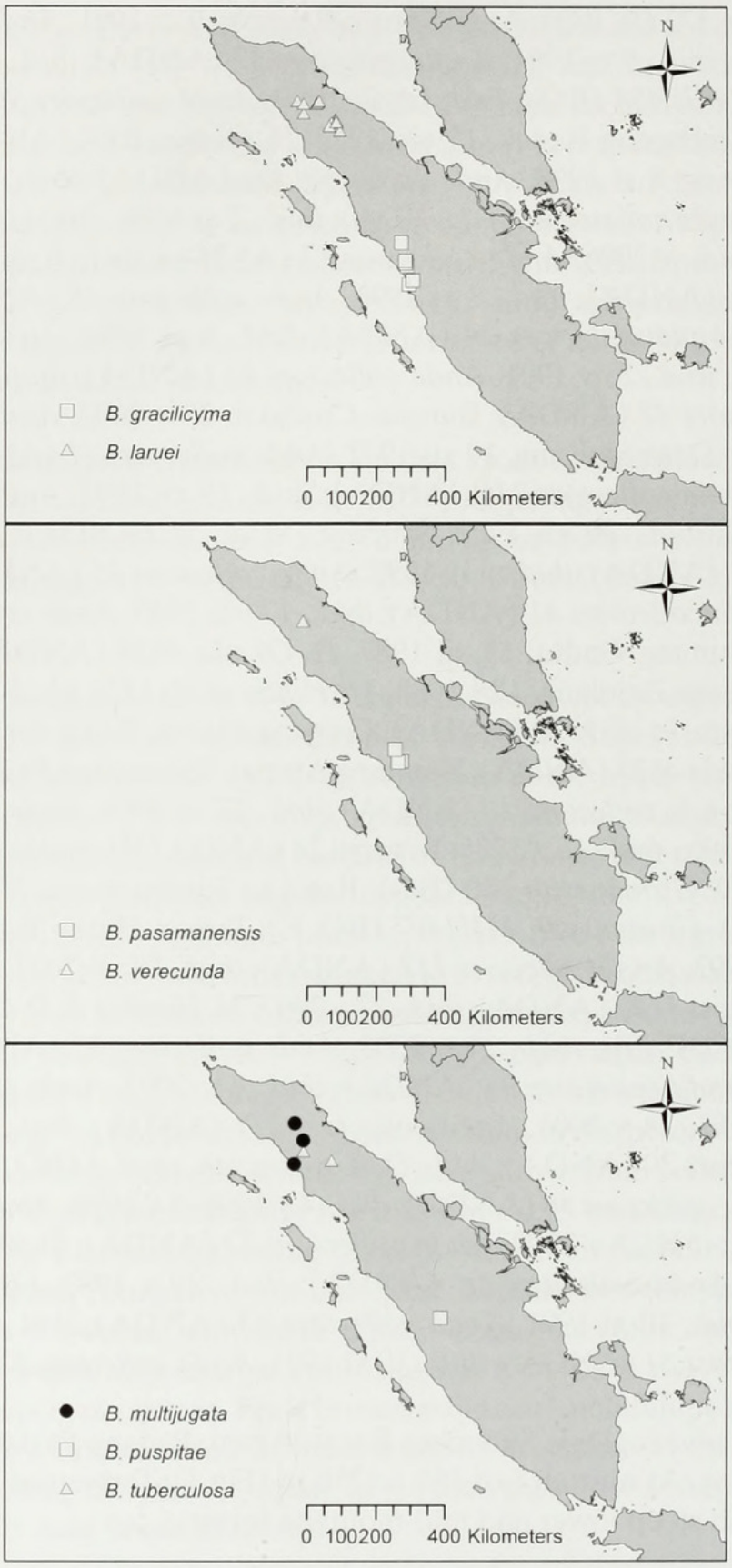

Figure 1. Distribution of *B. gracilicyma, B. laruei* (top); *B. pasamanensis, B. verecunda* (middle); *B. multijugata, B. puspitae, B. tuberculosa* (bottom).

Park.

Notes: Acording to unpublished manuscripts in the Berlin herbarium archives, Irmscher first coined the name *Begonia bünnemeijerii* for this species, based on a collection by H.A.B. Bünnemeijer from "Talaman". However, this epithet was later crossed out on the manuscript and specimens, and replaced with *B. gracilicyma*, referring to the hair-like nature of the peduncles and pedicels when dry. For unknown reasons, the taxon was left out of a paper by Irmscher (1953) which included several other new species from Sumatra, hence the name is validated here. The species is distinct from all other species currently described from Sumatra in its elongate leaf shape with a very large basal lobe which gives the lamina a distinctive outline, especially when pressed (Fig. 2). The leaves are tissue-thin and translucent when dry. Its highly branched growth form is suggestive of an affinity with *B. divaricata* Irmsch., also from the Padang region, which grows at much higher altitudes (around 1500–1700 m). The combination of caulescent habit, protandrous inflorescences and entire placentae makes *B. gracilicyma* impossible to place comfortably in any of the existing Asian sections of the genus. Irmscher annotated his manuscript with the unpublished section *Merrillia*, although we refrain from validating this name here; further study, including molecular work, is required before allocating *B. gracilicyma* to a section. "Anda collectors" refers to the large number of student collectors from the University of Andalas in Padang.

Begonia laruei M.Hughes, *sp. nov.* Sect. *Petermannia*
Ab omnibus speciebus Begoniae sectionis Petermanniae insulae Sumatrae foliis lobatis et habitu majore distincta. – **Typus:** Sumatra, North Sumatra Prov., Gunung Sibayak, 12 v 2007, 3° 13' 38" N 98° 31' 2" E *M. Hughes & D. Girmansyah MH1389* (holo, E; iso, BO, ANDA). **Fig. 2A.**

Plant erect, 50–100 cm high. **Stem** woody, especially at the base, glabrous, *ca.* 8 mm wide, internodes 4–10 cm apart. Stipules lanceolate, *ca.* 8 mm long, caducous. **Leaves** alternate; petiole 2.5–8 cm long, glabrous; lamina lanceolate, strongly asymmetric, usually with 2–4 pointed lobes extending to around 1–5 cm, basifixed, cordate at base, lobes not overlapping, 11–25 × 3.5–10 cm, midrib 9–15 cm long, venation palmate; upper surface dark green with silver markings between the veins or uniform green, glabrous; underside pale green, glabrous; margin glabrous, with small teeth between the lobes, apex acuminate. **Inflorescence** protogynous, bisexual, terminal, cymose, branching up to 6 times; bracts 4 × 5 mm, entire or slightly retuse, deciduous. **Male flowers**: pedicel 4 mm, glabrous, tepals 4; outer tepals reddish or dirty pink, more so towards the base, sometimes white, orbicular, truncate at base,

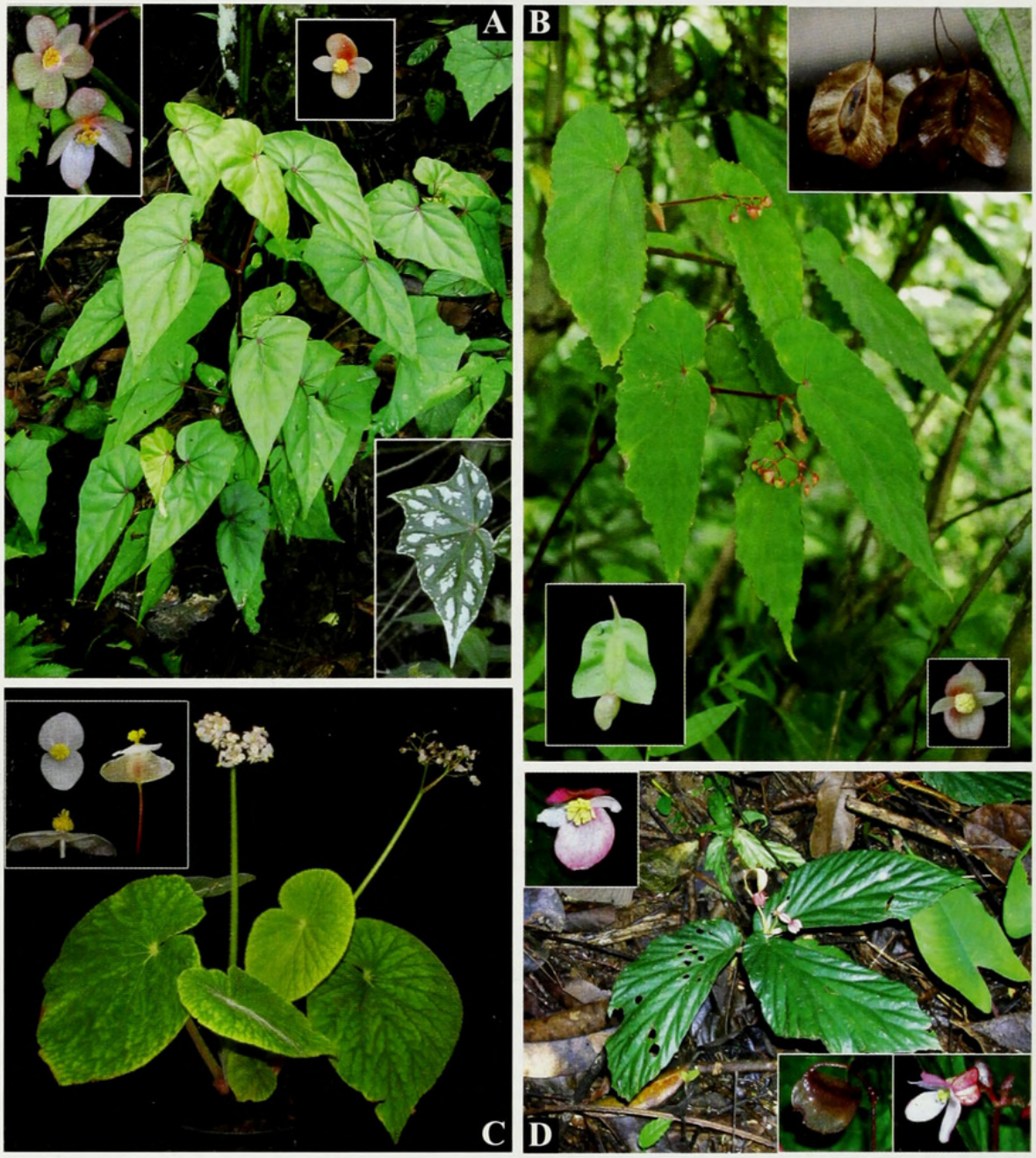

Figure 2. A. *Begonia laruei* (main picture and flowers, Ketambe Research Station environs; variegated leaf, inset, Gunung Sibayak; female flowers, top left, male, top right); B. *Begonia gracilicyma* (Padang, Ladang Padi; ripe fruit, top right; male flower, botom right; female flower after fruit set, bottom left); C. *Begonia puspitae* (cultivated in Bali Botanic Garden (main picture) and Bogor Botanic Garden (inset flowers); male flowers, left, front and side view; female, right); D. *Begonia verecunda* (Ketambe Research Station environs; male flower, top left; female flower, bottom right; ripe fruit, bottom left).

ca 5 × 5 mm, margin entire; inner tepals *ca* 4 × 2 mm, paler than the outer; androecium symmetric, yellow; stamens *ca* 30; filaments short, on a column; anthers hooded, *ca*. 1 mm long, lower ones sub-sessile, upper ones on a short filament. **Female flowers**: pedicel *ca* 4 mm long; ovary 3 locular, with three

equal wings, placentae bifid; tepals 5, obovate, *ca* 8 × 4 mm, margin entire; stigma with three styles, deciduous. **Fruit** truncate to slightly retuse at base, pale brown, dehiscent, pendulous, usually borne in pairs; wings equal, bases not extending along the pedicel, rounded at the tips, 14 × 6 mm; capsule shape broadly oval, 12 × 9 mm. **Seeds** barrel shaped, 0.3 mm long.

Other specimens examined: **Aceh**. Gunung Ketambe, 16 v 1972, *de Wilde & de Wilde-Duyfjes 12006* (BO, L [2]); *ibid.*, 19 vii 1972, *de Wilde & de Wilde-Duyfjes 13814* (BO, L); Gunung Leuser Nature Reserve, Gunung Mamas, 7 ii 1975, *de Wilde & de Wilde-Duyfjes 14632* (L); Gunung Leuser Nature Reserve, Ketambe Research Station, 28 vii 1979, *de Wilde & de Wilde-Duyfjes 19206* (BO); Lau Alas, 6 vi 1972, *de Wilde & de Wilde-Duyfjes 12627* (BO, L); Mamas River, 27 vi 1979, *de Wilde & de Wilde-Duyfjes 19164* (BO [2], L); Blang Kedjeren, 15 ii 1937, *C.G.G.J.v. Steenis 337* (BO); Bur ui Papandji, 23 vi 1930, *Frey-Wyssling 45* (BO); Gajolanden, 21 iii 1937, *C.G.G.J.v. Steenis 9914* (BO, L). **Sumatera Utara**. Brastagi, 3-17 iv 1925, *H.S. Yates 1400* (BO); Dolok Singgalang, 25 v 1922, *J.A. Lorzing 8863* (BO); Gunung Sibayak, 7 xii 1988, *P.J.A. Kessler 105* (B, L [2]); *ibid.*, 5 x 1928, *J.A. Lorzing 14038* (BO); Gunung Sinabung, 14 v 2007, *M. Hughes & D. Girmansyah MH1398* (BO, E); Lae Banalsal, 17 xi 1941, *H. Surbeck 554* (L); Sarinembah, 28 vi 1918, *H.H. Bartlett & C.D. La Rue 200* (A, L); Karoland, Petjeren, 22 vi 1928, *C. Hamel & Rahmat Si Toroes 782* (A); Bandar Baru, Sungai Tepi, 20 v 1981, *W. Meijer 15803* (BO, L).

Distribution and ecology: Aceh: Gayo Lues, Aceh Tengara. Sumatera Utara: Langkat, Karo, Simalungen. At altitudes of 400-1400 m. Terrestrial forest floor herb found in lower and mid-montane forest.

IUCN category: LC. The bulk of the distribution of *Begonia laruei* lies within the Gunung Leuser National Park, where it is known from a number of different localities.

Notes: Irmscher annotated a specimen (BO) of this taxon with the unpublished name *B. bartlettii*. However, as there is already a *B. bartlettiana* it has been decided to commemorate the second collector Carl Downey La Rue, who made the first herbarium collection of this species with H.H. Bartlett whilst working as a botanist for the U.S. Rubber Co. in Asahan. In common with many species in sect. *Petermannia, B. laruei* is usually found as single plants scattered throughout the forest, though small colonies can occasionally be found. On the herbarium sheet its leaves are instantly recogniseable, being lobed to a greater or lesser extent (Fig. 2). The fruit shape is also quite distinctive, being wider than long and fairly woody, and

often slightly retuse at both ends. There is variation in the leaf variegation, with some populations (e.g., Gunung Sibabyak) having leaves which are heavily blotched with silver on a dark green background with a thin silver margin, whereas others have paler leaves with no markings (e.g., Gunung Sinabung vicinity) or red veins on the upper surface (Ketambe environs).

Begonia multijugata M. Hughes *sp. nov.* Sect. *Petermannia*
A B. atricha fructibus minoribus et multijugatis diagnoscenda. – **Typus:** Sumatra, Aceh, Gunung Leuser Nature Reserve, Air Panas, 18 iii 2008, 3° 41' 44'' N 97° 39' 31'' *E P. Wilkie, M. Hughes, A. Sumadijaya, S. Rasnovi, Marlan & Suhardi PW768* (holo, BO; iso, E, SING). **Fig. 3B.**

Erect glabrous **herb** to 50 cm high. **Stem** slightly woody when dry, glabrous, 5-8 mm wide, internodes 5-20 cm apart, red. Stipules lanceolate, *ca* 20 × 6 mm, with minute glandular hairs on the reverse, with a very small extension at the tip, deciduous. **Leaves** petiole 1.5-6 cm long, glabrous; lamina ovate-lanceolate, asymmetric, basifixed, cordate at base, lobes not overlapping, length 12-22 cm, width 5-9 cm, midrib 10-17 cm long, venation palmate-pinnate; upper surface dark green with white spots between the veins, glabrous, underside wine-red, glabrous; margin glabrous, toothed at the end of the veins with smaller teeth between, apex acuminate. **Inflorescence** very compressed, protogynous, bisexual; bracts translucent white. **Male flowers**: pedicel length 10 mm, glabrous; tepals 2, white, glabrous, 6 mm long, obovate, margin entire; androecium pale yellow, symmetric, almost conical; stamens 30, filaments shorter than the anther at the base, becoming slightly longer toward the apex, anther 0.75 mm long, obovate, hooded, dehiscing through short slits less than half the length of the anther, connective retuse. **Female flowers**: pedicel up to about 1 cm long; ovary 3 locular, with three equal wings, wings rounded-triangular, 2-3 mm wide, placentae bifid; tepals 5, white, obovate-orbicular, 6 mm long, margin entire; stigma yellow, with three styles, once spirally twisted, deciduous. **Fruit** pale brown, dehiscent on all 3 faces, borne in a cluster of up to 5 pairs, each pair *ca* 5 mm apart; wings narrow, capsule broadly elliptic, 7-9 × 6-7 mm. **Seeds** rounded-barrel shaped, 0.25 mm long.

Other specimens examined: **Aceh**. Gajolanden, 25 ii 1937, *C.G.G.J.v. Steenis 9291* (BO, L); Lau Alas, 2 vi 1972, *de Wilde & de Wilde-Duyfjes 12537* (L [2]); Kloet Nature Reserve, 10 vii 1985, *de Wilde & de Wilde-Duyfjes 19910* (BO, L).

Distribution and ecology: Aceh: Gayo Lues, Aceh Tenggara, Aceh Seletan. At altitudes of less than 400 m (Fig. 1). Terrestrial herb found in lowland forest.

IUCN category: LC. As the entire known range of this species is within the Gunung Leuser National Park, it should be considered as Least Concern as long as the Park remains intact.

Notes: Vegetatively this glabrous species closely resembles *B. atricha*, both in leaf shape and colouring (dark green with evenly spaced white spots between the veins). However the infructescence differs considerably, being a congested cluster of small, paired fruits which make the species instantly recogniseable when fertile (Fig. 3); *B. atricha* has large bell-shaped fruits borne singly on long thin pedicels. *B. multijugata* is usually found as solitary plants on the forest floor. The eipthet refers to the paired fruits, being derived from *jugatus,* meaning yolked together in pairs.

Begonia pasamanensis M.Hughes, *sp. nov*. Sect. *Reichenheimea*
A B. stictopoda foliis plus late ovatis et adpressis, pedicellis pilosis differt. – **Typus:** Sumatra, West Sumatra, Road to Padang, 29 v 2007, 0° 2' 32'' N 100° 13' 5'' E *M. Hughes & D. Girmansyah MH1419* (holo, E; iso, BO, ANDA) **Fig. 3A**.

Repent **herb**, *ca* 20 cm tall. **Stem** rhizomatous, 3 mm wide, internodes 0.3-1 cm apart. Stipules persistent, triangular, *ca* 7 × 3 mm, glabrous, with a filiform extension at the tip, semi persistent. **Leaves** alternate; petioles densely hairy, 3-20 cm long, unequal on the same plant, being much longer on older leaves; lamina broadly ovate, basifixed, asymmetric, base cordate with lobes overlapping *in vivo*, length 4-9 cm, width 3.5-8 cm, midrib 3-6 cm long, venation palmate, upper surface mid green to blackish green, reddish when young, usually paler along the veins, glabrous, smoothly bullate between the veins, underside wine-red, hairy on veins only, margin with occasional short hairs, entire to denticulate, apex obtuse. **Inflorescence** cymose, axillary, protogynous, bisexual; bracts sub-orbicular, 1.5-3 mm long, 1.5-3 mm wide, margin fimbriate, deciduous. **Male flowers**: pedicel length 6 mm, hairy, tepals 4; outer tepals sub-orbicular, white or pale pink, with scattered colourless hairs, truncate at base, margin entire; inner tepals oblong-obovate, white; androecium yellow, symmetric; stamens *ca*. 50; filaments fused at base into a short column, 1 mm long, subequal; anther shorter than the filament, length 0.75-1 mm long, oblong, dehiscing through slits longer than half the length of the anther, slightly hooded, connective retuse. **Female flowers**: pedicel; ovary with three equal wings, 3 locular, placentae entire; bracteoles absent; tepals 3 or 4, white or pale pink with scattered colourless hairs; outer sub-orbicular 8-10 mm in diameter, often deeper pink at the base externally; inner tepals oblong-obovate, 7-10 mm long, *ca* 3 mm wide; stigma with three styles, styles deep yellow, u-shaped, stigmatic surface spiral. **Fruit** truncate

at base, recurved and held horizontally at maturity; *ca* 8 × 14 mm in total, capsule orbicular, *ca* 6 mm in diameter; wings rounded, equal to subequal. **Seeds** barrel shaped, 0.25 mm long.

Other specimens examined: **Sumatera Barat**. Rimbo Panti National Park, 28 v 2007, *M. Hughes & D. Girmansyah MH1411* (BO, E); *ibid.*, 28 v 2007, *M. Hughes & D. Girmansyah MH1411A* (BO, E); *ibid.*, 28 v 2007, *M. Hughes & D. Girmansyah MH1416* (BO, E); *ibid.*, 28 v 2007, *M. Hughes & D. Girmansyah MH1417* (BO, E); *ibid.*, 12 vi 1953, *J.v. Borssum Waalkes 1730* (BO, L); Road to Padang, 29 v 2007, *M. Hughes & D. Girmansyah MH1421* (BO, E); Road to Rimbo Panti, 27 v 2007, *M. Hughes & D. Girmansyah MH1410* (BO, E).

Distribution and ecology: Sumatera Barat, endemic to Pasaman, at altitudes of 200–500 m (Fig. 1). Lithophytic herb, on steep rocky banks with clay soil or on rocks near streams.

IUCN category: LC. Although *B. pasamanensis* has quite a narrow distribution, it is found within the Rimbo Panti Nature Reserve and the Malampah Alahan Panjang Nature Reserve. It also has the potential to colonise roadside banks where there is canopy cover and suitable substrate (clay soil on limestone).

Notes: In life this species has leaves which are slightly raised between the veins, with the veins on the upper leaf surface being a shade paler than the lamina. It grows gregariously on steep banks along the main road through the Rimbo Panti Nature Reserve (Fig. 3), where it co-occurs with a species tentatively identified as *B. stictopoda* (Miq.) A.DC. Although superficially similar, *B. pasamanensis* can be distinguished by its smaller, more broadly ovate leaves which are usually much darker and have a blunter apex; those of *B. stictopoda* are more elongate, especially on younger plants when their size is more similar. *B. pasamanensis* also tends to have its petioles and leaf laminas appressed against the substrate. As well as these vegetative characters, *B. pasamanensis* has hairy pedicels, as opposed to glabrous in *B. stictopoda*. Several plants along the roadside through Rimbo Panti were intermediate between the two species, and it is possible that this artificial environment has brought the species together where they would otherwise not naturally co-occur. However, large hybrid swarms were not observed. Observations in the field show that *B. pasamanensis* and some other Sumatran species in sect. *Reichenheimea* have fruits which are recurved at maturity, with one wing pointing downwards and the other two forming a small splash-cup.

Figure 3. A. *Begonia pasamanensis* (Rimbo Panti Nature Reserve; female flowers, inset); B. *Begonia multijugata* (Gunung Leuser Nature Reserve, Air Panas; male flower, top left; female flower, bottom left; ripe fruits, bottom right); C. *Begonia tuberculosa* (Gunung Sinabung; male flower, top right; female flower, bottom right).

Begonia puspitae Ardi, *sp. nov.* Sect. *Reichenheimea*
Ab omnibus speciebus Begoniae sectionis Reichenheimeae insulae Sumatrae foliis supra pilosis et stipulis gaudentibus pilis plumosis differt. – **Typus:** Sumatra, West Sumatra, Gunung Silungkang, Suaka Alam Batang Pangean, 28 viii 2005, *D.M. Puspitaningtyas DM1742* (holo, BO). **Fig. 2C.**

Repent **herb** *ca* 20 tall. **Stem** rhizomatous, glabrous, internodes *ca* 5 mm apart. Stipules persistent, broadly triangular *ca* 13 × 7 mm, covered with branched hairs 0.5-1.5 mm long. **Leaves**, petiole 7-22 cm long, green, with dense white to pink hairs up to 3 mm long; blade very asymmetric 8–22 × 5–13.5 cm, reddish green or green between the veins above and pale green below, broadly ovate, base cordate, margin hairy, denticulate, tip acuminate, venation palmate, pilose on both surfaces, hairs white, 1-2 mm long. **Inflorescence** axillary, cymose, covered with white dense hairs 0.5-1 mm, primary peduncle longer than the leaves, *ca* 23-28 cm long, protandrous; bracts ovate, *ca* 3 × 5 mm, white at base and pale green at tip, outer surface covered with dense pink hairs, *ca* 1 mm long, margin serrate and hairy, tip acuminate ending with a hair, falling before the male flowers open. **Male**

Flowers: pedicel 12-17 mm; tepals 2, white, sub-orbicular 7-8 × 8-9 mm, margin entire, tip rounded, with reddish stiff hairs 0.5-1 mm long externally; androecium yellow, symmetric, column *ca* 0.5 mm; stamens *ca*. 35; filaments *ca* 1 mm long; anthers yellow, elliptic, 0.8 mm long, tip truncate, opening by slits as long as the anther sac. **Female flowers**: pedicel 15-20 mm, greenish red; ovary pale pink to white, *ca* 4 mm long, wings 3, unequal, locules 3, placentation axile, placentae entire; tepals 2, white, glabrous, sub-orbicular 7-9 × 8-9 mm, margin entire, tip rounded; styles 3, styles and stigma yellow, *ca* 3.5 mm. **Fruits** with pedicel 2 cm long; dehiscent, capsule oval *ca* 7 mm long, hairless, locules 3, wings 3, unequal, splitting between locules and wings. **Seeds** barrel shaped, *ca* 0.5 mm long, collar cells ca 1/5 length of the seed.

Distribution and ecology: Sumatera Barat, only known from the type locality, Gunung Silungkang, between 600–700 m altitude (Fig 1).

IUCN category: DD. There is not enough information on the current condition and protection status of the type locality.

Notes: B. puspitae is unusual in having branched hairs covering the stipules, and thus, differs from the other known Sumatran species in sect. *Reichenheimea*. The presence of a fairly dense indumentum of short hairs on the upper leaf surface also marks it as distinct from other Sumatran species in this section (Fig. 2). The epithet is after the collector, Dwi Murti Puspitaningtyas.

Begonia tuberculosa Girmansyah, *sp. nov.* Sect. *Platycentrum*
A B. areolata *petiolis albopilosis, foliis mollibus et variegatis, radicibus tuberculosis differt.* – **Typus:** Sumatra, North Sumatra, Gunung Sinabung, 3° 10' 33'' N 98° 23' 31'' E *M. Hughes & D. Girmansyah MH1394* (holo, E; iso, E [2], BO, ANDA). **Fig. 3C**

Repent **herb** *ca* 45 cm high, with small *ca* 5 mm diameter tubercles on the roots. **Stem** rooting at the nodes, hairy, more so towards internodes, *ca* 6 mm wide, internodes up to 20 cm apart though usually shorter. Stipules lanceolate, 10 mm long, 5 mm wide, hairy, with a filiform extension at the tip, persistent. **Leaves** alternate but appearing opposite subtending the inflorescence; petioles around 10 cm long, with dense grey-white hairs becoming very light brown on drying; lamina ovate with an extended tip, basifixed, cordate at base lobes not overlapping, *ca* 13 × 8 cm, midrib *ca* 9 cm long, venation palmate, asymmetric, upper surface mid green with dark purple or sometimes dark green patterning along the veins, upper surface hairy all over, underside with red hairs denser on the veins, fading with age,

margin fimbriate–denticulate. **Inflorescence** cymose, terminal, bisexual; bracts *ca* 5 mm long, margin fimbriate, caducous. **Male flowers**: pedicel 15 mm, hairy; tepals 4, outer tepals sub orbicular, white with pale pink on the reverse, hairy, hairs denser towards the base, truncate to rounded at base, *ca*. 10 × 10 mm, margin entire, inner tepals oblong-elliptic, white, *ca* 15 × 8 mm; androecium yellow, symmetric; stamens *ca*. 80–100; filaments, 1.5-2 mm long, equal, fused at the base into a short column; anther shorter than the filament, *ca* 1.5 mm long, oblong elliptic, dehiscing through slits longer than half the length of the anther, connective extended. **Female flowers**: pedicel *ca* 2 cm long; ovary 3 winged, one wing much enlarged, covered in quite stout pinkish hairs, 2 locular; tepals 5, white, ovate *ca* 10 × 8 mm, with pinkish hairs on the reverse; stigmas 2, pale yellow-green or yellow, stigmatic surface convulted. **Fruit** not seen mature. **Seeds** unknown.

Other specimen examined: **Aceh**. Mamas River, 11 vii 1985, *de Wilde & de Wilde-Duyfjes 19075* (L).

Distribution and ecology: Aceh: Aceh Tenggara. Sumatera Utara: Karo. At altitudes of 1200–1400 m (Fig 1). Terrestrial herb of mid-upper montane forest, found in rich humus and often at the base of tree trunks.

IUCN category: VUD2. *Begonia tuberculosa* is currently known from only 2 sites, one of which (Gunung Sinabung) is being encroached despite being in the Leuser Ecosystem Conservation Area. The other site in the Gunung Leuser National Park is considered safe. It is recommended that (i) protection of the forest on Gunung Sinabung, especially at the lower elevations, be made a priority and (ii) the species be brought into cultivation.

Notes: *B. tuberculosa* is instantly recognisable as a member of sect. *Platycentrum*, with its two-locular fruit and large androecium on a short column. Its closest affinity is probably with *B. areolata* Miq., a widespread species at 1000–1800m in Sumatra and Java, as it shares the unusual character of having a pair of opposite leaves subtending the inflorescence. As well as having tubercles on the roots, *B. tuberculosa* differs from *B. areolata* in having variegated leaves (Fig. 3) and grey-white (not red) hairs on the petiole, which contrast with the claret-red hairs on the underside of the lamina. The lamina margin is also less lobed than *B. areolata*, and feels very different to the touch, being soft and velvety rather than bristly and bumpy. Sect. *Platycentrum* is especially species rich in Peninsular Malaysia (Kiew, 2005), and *B. tuberculosa* and other species in the section from Sumatra and Java probably represent a link with that flora, especially species with bullate leaves such as *B. wyepingiana* and *B. vallicola*.

Begonia verecunda M.Hughes *sp. nov.* Sect. *Bracteibegonia*
Differt a B. bracteata *stipulis angustis lanceolatis acuminatis (haud late ovatis); a* B. lepidella *fructibus recurvatis.* – **Typus:** Sumatra, Aceh, Gunung Leuser Nature Reserve, Ketambe Research Station, 7 iii 2008, 3° 40' 46'' N 97° 38' 37'' E *P. Wilkie, M. Hughes, A. Sumadijaya, S. Rasnovi, Marlan & Rabusin PW623* (holo, BO; iso, E, SING). **Fig. 2D.**

Low growing **herb**, 20 cm high. **Stem** slightly woody, densely hairy, *ca* 3 mm wide, internodes 1-2 cm apart. Stipules narrowly lanceolate, 10 mm long, with a filiform extension at the tip, laxly deciduous, appearing very narrow and almost filiform when dry. **Leaf** petiole around 1 cm long, densely hairy; lamina ovate-lanceolate, asymmetric, basifixed, cuneate to rounded on one side, lobed on the other, the short basal lobe crossing the petiole slightly, total length 6.5-10 × 3-4 cm, venation palmate-pinnate, upper surface dark green, usually glabrous but sometimes with one or two short fleshy hairs, underside deep red or pale green, with short fairly robust hairs on the veins, appressed in the direction of the apex, becoming sparser on the smaller veins, margin entire to minutely denticulate, apex acute. **Inflorescence** a short and compact cyme, protogynous, bisexual; bracts persistent at the base. **Male flowers**: pedicel length 5-10 mm, glabrous; tepals 4; outer tepals sub-orbicular, glabrous, 9 mm long, white tinged with deep pink, colouring zygomorphic, with top of flower being darker; margin entire; inner tepals white, *ca* 6 × 3 mm; androecium yellow, symmetric; stamens 30; filaments slightly fused at base, unequal, shorter or longer than the anther; anther about 1 mm long, oblong obovate, dehiscing through slits less than half the length of the anther, hooded, connective slightly retuse. **Female flowers**: pedicel *ca* 6 mm long; tepals 5, white tinged with pink, much deeper on the reverse, colouring zygomorphic, darker towards the top, elliptic-ovate, 7 mm long, margin entire; persistent and closed during fruit maturation, eventually deciduous; ovary green with the adaxial wing tinged deep pink, 3 locular, placentae bifid; stigma yellow, deciduous. **Fruit** dehiscent, recurved at maturity; wings subequal, 3-4 mm wide, the adaxial wing the larger; capsule shape narrowly elliptic, slightly curved, length 10 mm, width 4 mm. **Seeds** barrel shaped, 0.25 mm long.

Other specimens examined: **Aceh**. Gunung Leuser Nature Reserve, 16 v 1972, *de Wilde & de Wilde-Duyfjes 12010* (K, L); Gunung Leuser Nature Reserve, Air Panas, 18 iii 2008, *P. Wilkie, M. Hughes, A. Sumadijaya, S. Rasnovi, Marlan & Suhardi PW779* (BO, E, SING); Gunung Leuser Nature Reserve, Gunung Mamas, 7 ii 1975, *de Wilde & de Wilde-Duyfjes 14640* (L); Gunung Leuser Nature Reserve, Ketambe Research Station, 7 iii 2008, *P. Wilkie, M. Hughes, A. Sumadijaya, S. Rasnovi, Marlan & Rabusin PW617* (BO, E, SING); *ibid.*,

7 iii 2008, *P. Wilkie, M. Hughes, A. Sumadijaya, S. Rasnovi, Marlan & Rabusin PW621a* (SING); Lau Alas, 28 v 1972, *de Wilde & de Wilde-Duyfjes 12370* (L); *ibid.*, 4 ii 1975, *de Wilde & de Wilde-Duyfjes 14487* (L); *ibid.*, 21 iii 1975, *de Wilde & de Wilde-Duyfjes 15683* (L).

Distribution and ecology: Aceh: Aceh Tenggara. At altitudes of around 200–400 m (Fig 1). Terrestrial herb found scattered on the forest floor in lowland forest.

IUCN category: LC. As the entire known range of this species is within the Gunung Leuser National Park, it should be considered as Least Concern as long as the Park remains intact.

Notes: The epithet is derived from *verecundus* meaning shy or demure, referring to the way the female flowers close their tepals and bow away from sight after pollination (Fig. 2). The short petioles and peduncles, dense indumentum, bicoloured flowers and elongate fruit with quite narrow wings are characteristic for sect. *Bracteibegonia*. Judging from other herbarium collections, the variation in this section on Sumatra appears to be at once both complex and subtle, and there are undoubtedly many other species waiting to be described. Tepal number, colour and shape as well as fruit position at maturity are important characters in this group.

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