



Two new species of *Begonia* L. (Begoniaceae) from central Laos

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ABSTRACT: Two new species of *Begonia* are described and illustrated from Hin Nam No National Protected Area in the Khammouan Province, Central Laos. *Begonia hinnamnoensis* Souvann. & Lanors. and *Begonia khammouanensis* Souvann. & Lamxay, both belonging to *Begonia* sect. *Diploclinium* (Lindl.) A. DC. The two new species are endemic to the Khammouan limestone karst. The provisional IUCN status of both new species is here assessed as 'Vulnerable'.

KEY WORDS: *Begonia hinnamnoensis*, *Begonia khammouanensis*, Begoniaceae, Limestone flora, Laos, Taxonomy.

INTRODUCTION

Begonia L. is one of the largest genera in the angiosperms, comprising about 1839 species (Hughes *et al.* 2015–) widely distributed from tropical to warm-temperate Asia with a centre of diversity in monsoonal Asia. In Laos are so far recorded 15 species and one variety, belonging to 8 sections (Moonlight *et al.* 2018; Averyanov & Nguyen 2012; de Wilde *et al.* 2011; Hughes 2008a; b; Newman *et al.* 2007; Souvannakhoummane *et al.* 2016; Yang *et al.* 2018). Several new species were recently described from Thailand and Vietnam, where *Begonia* shows high diversification (Averyanov & Nguyen 2012; Chen *et al.* 2018; Lý *et al.* 2018; Peng *et al.* 2015a; b; 2017; Phutthai & Sridith 2010; Phutthai & Hughes 2017; Phutthai *et al.* 2012).

The Lao flora is so far poorly known, with one of the lowest collection densities in Asia. Several surveys carried out in the country have led to the discovery of various new species, including *Begonia viscosa* Aver. & H.Q. Nguyen, belonging to sect. *Ignota* (Averyanov & Nguyen 2012), but this species is unassigned to Section in Moonlight *et al.* 2018, *Begonia lamxayiana* Souvann., belonging to sect. *Petermannia* (Klotzsch) A. DC. (Souvannakhoummane *et al.* 2016), *Begonia afromigrata* J.J. de Wilde, belonging to sect. *Tetraphila* A. DC. (de Wilde *et al.* 2011), and *Begonia namkadingensis* C.-J. Yang, Souladeth & Tagane, belonging to sect. *Lauchea* (Klotzsch) A. DC. (Yang *et al.* 2018).

During recent floristic researches in Hin Nam No, a National Protected Area with a highly diverse vascular flora, some populations of *Begonia* characterized by reniform leaf-blades were observed in the limestone mixed dry evergreen forest. Herbarium specimens collected from these populations were examined and compared with specimens from the online database of

Begonia Resource Centre by Hughes *et al.* (2015–). Based on this investigation, material from Hin Nam No turned out to belong to two new species, which are here described.

TAXONOMIC TREATMENTS

***Begonia hinnamnoensis* Souvann & Lanors., sp. nov.**
Som Koung Khan Khak [*Bufo begonia*]
Figs 1 & 2.

Sect. *Diploclinium*.

Differs from the allied *Begonia gesneriifolia* Aver. in having a denser indumentum over all vegetative parts and fruit wings narrowly triangular (*B. gesneriifolia* has short scurfy hairs, sub-glabrous petioles, glabrous leaf lamina, inflorescence and flowers, and fruit wings distinctly larger). Also differs from *Begonia cladotricha* M. Hughes in having a stout rhizome, upper surface of lamina bullate between veins giving a rugose appearance and pistillate flowers smaller fruit wings (*B. cladotricha* has tuberous rhizome, upper surface of lamina not bullate between veins and pistillate flowers larger fruit wings). – **Type:** Laos, Khammouan province, Boualapha district, Hin Nam No National Protected Area, 17°27'24.4"N 105°46'13.1"E, 240 m, 9 October 2017, Lamxay *et al.* HNN 227 (holo HNL, iso FOF, E, SING).

Monoecious rhizomatous herb, 24–30 cm tall. *Rhizome* stout, c. 5–12 cm long, c. 5–8 mm in diam., erect near apex, c. 1.2 cm tall, with numerous fibrous roots. *Leaves* arranged in rosette-like cluster at the apex of rhizome; petiole 1.5–9 cm long, branched ginger hairs, fleshy, pale green to brown; lamina succulent, symmetrical, reniform, 2.4–6.8 × 3.2–9 cm, base shallowly cordate, apex rounded, margin crenate to undulate; adaxial surface lime green to olive green with sometime grey-white splotch, bullate between veins giving lamina a rugose appearance, abaxial surface pale green to brown, branched ginger hairs on both of surface;



Fig. 1. *Begonia hinnamoensis* Souvann. & Lanors. **A**, Habit in nature; **B**, habit; **C**, inflorescences (bud); **D**, staminate flowers; **E**, pistillate flowers. (A & E photo by K. Souvannakhoummane; B-D photo by S. Lanorsavanh, all from Lamxay *et al.* HNN 227).

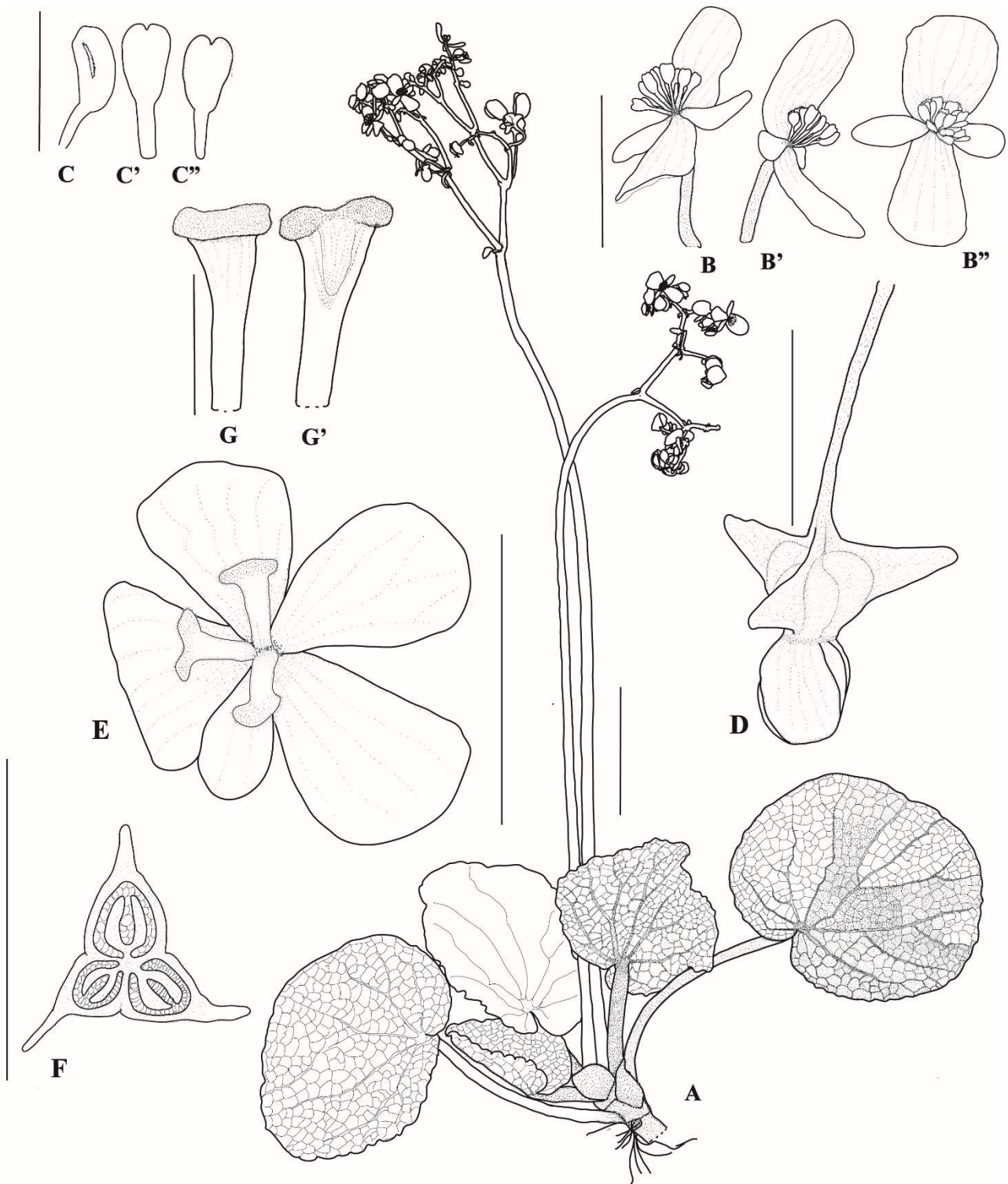


Fig. 2. *Begonia hinnannoensis* Souvann. & Lanors. **A**, habit; **B**, Staminate flowers; **C**, Anther; **D**, Pistillate flowers (not opening); **E**, Pistillate flowers (front view); **F**, cross-section of ovary in middle; **G**, stigma. Scale bars: **A**= 5 cm; **B**, **D**, **E**, **F** = 1 cm; **C**, **G** = 1 mm. Drawn by K. Souvannakhoummane from Lamxay et al. HNN 227.



venation palmate, veins 6–9, prominent beneath. *Stipules* persistent, membranous, lanceolate to triangular, 8–22 × 4–12 mm, apex acuminate to caudate, margin entire, outside surface branched ginger hairs, inside surface glabrous, pink to lightly green. *Inflorescences* compound cymes arising from top of rhizome, branched up to 4 times, bisexual, 25–35 cm long, staminate flowers distal and pistillate flowers basal, protandrous; peduncles 23–30 cm long, terete, branched ginger hairs, lightly brown to red. *Bracts* ovate to triangular, 4–8 × 1.5–2.5 mm, apex acute, margin entire, branched ginger hairs on outside surface, pale green to brown. *Staminate flowers*: pedicels 5–9 mm long, erect or occasionally ascending, with sparse branched ginger hairs, red; tepals 4, outer pair elliptic-obovate, 7–12 × 3–5 mm, apex obtuse to rounded, outside surface with sparse branched ginger hairs, inside surface glabrous, pale pink to white, inner pair narrowly elliptic, 3–4.5 × 1–1.8 mm, apex rounded, glabrous, pale pink to white; stamens c. 19, bright yellow, filaments clustered at the base, c. 0.3 mm long, free 0.5–1 mm long, anthers oblong-elliptic, 0.3–0.6 mm long, dehiscing by longitudinal slits near the tip. *Pistillate flowers*: pedicels 9–15 mm long, with branched ginger hairs, red; tepals 5, outer 2, oblanceolate-obovate, 6–11 × 4–8 mm, apex obtuse to rounded, outside branched ginger hairs, inner 3 unequal, obovate, 4–10 × 2.5–6 mm, apex rounded, glabrous, same colour as staminate flower; ovary lightly green to pale pink, with 3 subequal wings; 3-locular, placentation axillary, 2 branches per locule; styles 3, fused at the base, dark yellow, stigmatic band U-shaped and minutely papillose. *Fruits* capsules, subglobose, 4–7 × 3.5–6.8 mm; locules subglobose, 2.0–2.5 × 2.2–2.7 mm, wings triangular, c. 5 mm long, 2–3 mm wide at base, with branched ginger hairs, pale green to pink, drying pale brown. *Seeds* numerous, elliptic-oblong, 0.3–0.4 × c.0.1 mm, testa reticulate, brown.

Distribution. Endemic to Khammouan province, Boualapha district, Hin Nam No National Protected Area, only known from type locality.

Habitat and ecology. Occurring on limestone rock crevices in seasonally dry evergreen forest at 240 m elevation. Flowering September to October; fruiting October to January.

Notes. *Begonia hinnamnoensis* is closely allied with *B. cladotricha* and *B. gesneriifolia*, as shown by characters of reniform lamina and pistillate flowers with 5-tepals. The basally-branched hair type of this species is the same as in *B. cladotricha* (Hughes, 2008b). The specific epithet *hinnamnoensis* refers to the type locality.

Proposed IUCN category. VU D1. This new taxon is restricted to karst limestone and known only from the type locality in Hin Nam No National Protected Area.

Begonia khammouanensis* Souvann. & Lamxay, *sp. nov.
Som Koung Bai Boua [*Lotus leaf begonia*]
Figs 3 & 4.

Sect. *Diploclinium*.

A distinct species, closest to *Begonia crassula* Aver. in having succulent leaves, the same number of tepals in male and female flowers and bifid, axile placentae. It differs in being stemless (not succulent caulescent), and in having a symmetric reniform lamina, (not strongly asymmetric and narrowly ovate), and lanceolate and acuminate apex of tepals (not reniform and rounded apex of tepals). – **Type:** Laos, Khammouan province, Boualapha district, Hin Nam No National Protected Area, 17°26'35.6"N 105°47'30.2"E, 259 m., 10 October 2017, Lamxay *et al.* HNN 138 (holo HNL, iso FOF, E, SING).

Monoecious rhizomatous herb, 30–50 cm tall. *Rhizomes* stout, 3–12 cm long, 6–10 mm in diam., erect near apex, c. 2 cm tall, with numerous fibrous roots. *Leaves* arranged in rosette-like cluster at the top of rhizome; petiole 5–24 cm long, puberulous to glabrescence, dark red at base, paler red-green toward apex; lamina succulent, symmetrical, reniform, 4–6.5 × 6–8.6 cm, base shallowly cordate, apex rounded, margin undulate; adaxial surface, glossy, dark green, abaxial surface pale green, glabrous on both surface; venation palmate, veins 5–7, prominent beneath. *Stipules* persistent, herbaceous, ovate to triangular-cuneate, 14–25 × 6–12 mm, apex acute to acuminate, margin entire, outside puberulous, inside glabrous, pink to lightly green. *Inflorescences* compound cymes arising from top of rhizome, branched up to 4 times, bisexual, 35–40 cm long, staminate flowers distal and pistillate flowers basal, protandrous; peduncles 20–36 cm long, terete, with glandular hairs, dark red, glossy. *Bracts* ovate, 3–8 × 2–4 mm, apex acute, margin entire, glandular hairy outside, pale green. *Staminate flowers*: pedicels 10–12 mm long, erect or occasionally ascending, sparsely glandular hairy, dark red; tepals 2, lanceolate, 14–16 × 6–10 mm, apex acuminate, outside surface with glandular hairs, inside surface glabrous, pink flush inside and outer part darker; stamens c. 15, bright yellow, filaments clustered at the base, c. 2.5 mm, free 0.7–1 mm long, anthers oblong-elliptic, 0.8–1 mm long, dehiscing by longitudinal slits near the tip. *Pistillate flowers*: pedicels 12–18 mm long, with glandular hairs, dark red; tepals 4, outer 2 lanceolate, 12–15 × 8–12 mm, margin entire, apex acuminate, outside surface sparsely glandular hairy, inner 2 elliptic-lanceolate, 6–9 × 3–6 mm, margin entire, apex acuminate, glabrous, same colour as staminate flowers; ovary lightly red or pink, with 3 locular, with 3 wings, abaxial one narrowly rectangular, lateral 2 small ridges; 3-locular, placentation axillary, 2 branches per locule; styles 3, connate at the base into common stalk, dark yellow; stigmatic band U-shaped and minutely papillose.; *Fruits*

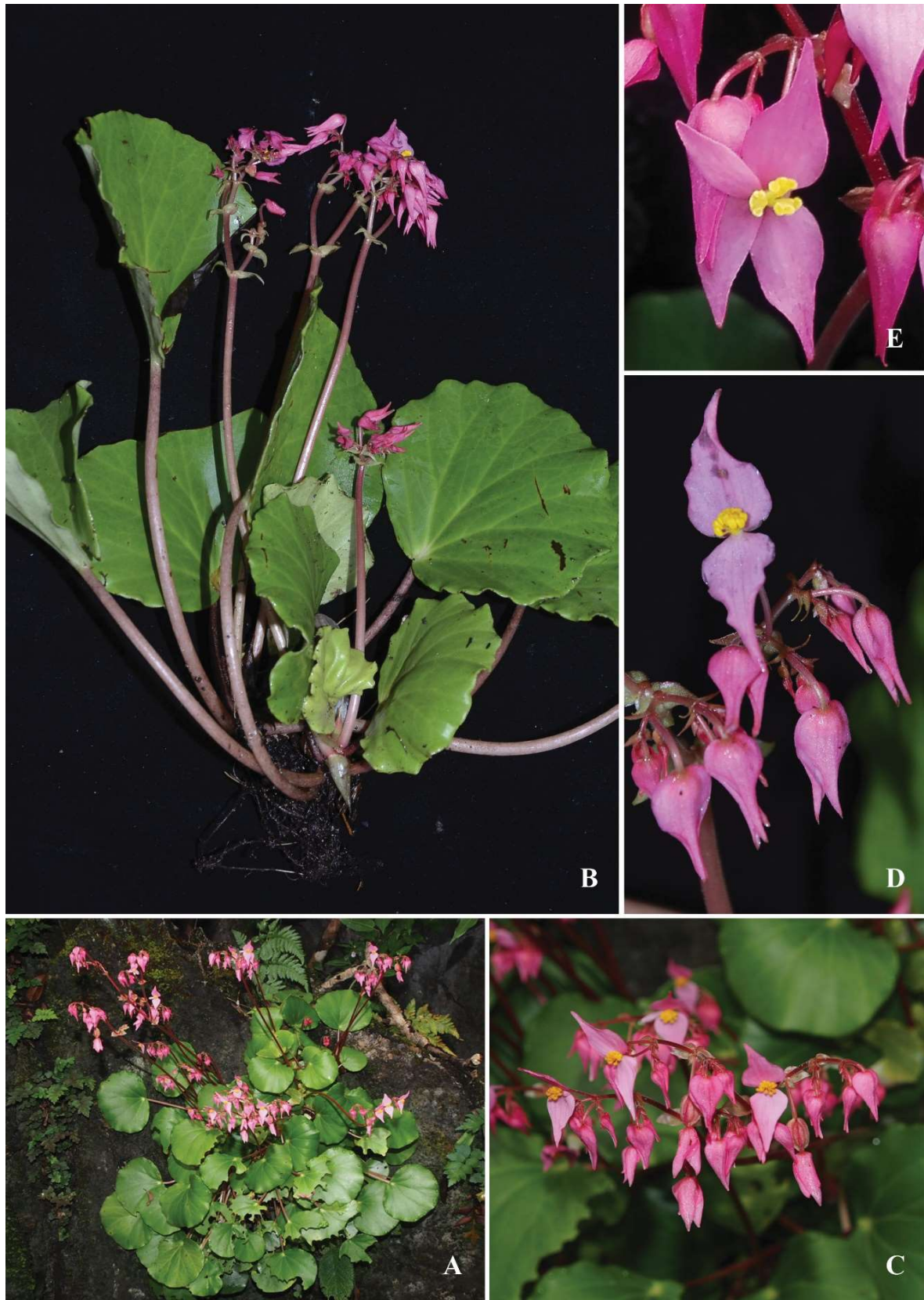


Fig. 3. *Begonia khammouanensis* Souvann. & Lamxay, A, habit in nature; B, habit; C, upper part of inflorescences; D, staminate flowers; E, pistillate flowers. A, C, E photo by K. Souvannakhoummane; B, D photo by S. Lanorsavanh from Lamxay et al. HNN 138.

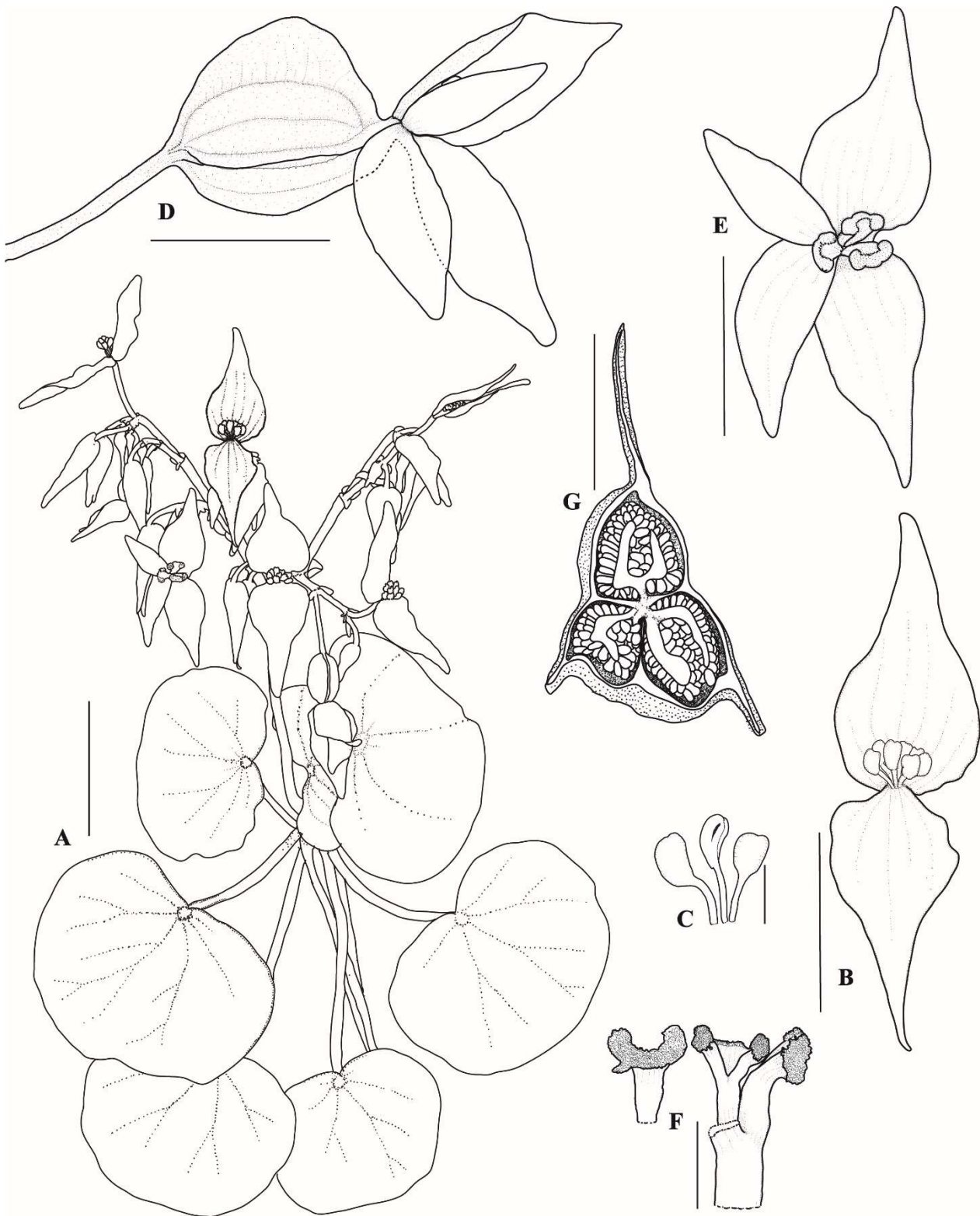


Fig. 4. *Begonia khammouanensis* Souvann. & Lamxay, **A**, habit; **B**, Staminate flowers; **C**, Anther; **D**, Pistillate flowers (lateral view); **E**, Pistillate flowers (front view); **F**, stigma, **G**, cross-section of ovary in middle. Scale bars: **A**= 5 cm; **B**, **D**, **E** = 1 cm; **C** = 1 mm; **F** = 2 mm; **G** = 4 mm. Drawn by K. Souvannakhoummane from *Lamxay et al.* HNN 138.



capsules, elliptic-oblong, 12–15 × 7–12 mm (including wings); locules subglobose, 3–4 × 3–4 mm, abaxial wing narrower, narrowly rectangular, curved along length of capsule, c. 14 mm long, 3.5–4 mm wide, 2 lateral wings reduced to ridges, wide at base, glossy, with glandular hairs, pale red to pink, drying pale brown. *Seed* numerous, elliptic-oblong, 0.3–0.4 × c. 0.1 mm, testa reticulate, brown.

Distribution. Endemic to central Laos; Hin Nam No National Protected Area with three additional populations in Boualapha district, Khammouan province.

Habitat and ecology. This species occurs on wet steep rocky slopes in limestone mixed deciduous forest and dry evergreen forest at 230–400 m elevation. Flowering September to October; fruiting October to January.

Notes. This species is distinct in its glabrous and glossy symmetrical reniform lamina, and petioles and inflorescences with glandular hairs. The specific epithet *khammouanensis* refers to the type locality.

Proposed IUCN category. VU D2. This new taxon is only known from two locations in very limited area and few populations.

Other material examined. LAOS, Khammouan province (Cammon prov. in label), Tham village, 160 m in altitude, December 1930, *Petelot, P.A. 7092* (B, B100238491); Khoun Kham village, 13 September 2012, *Sengvilai & Phonesack KKO 0473* (HNL); Boualapha district, Hin Nam No NPA, 17°25'25.1"N 105°47'38.1"E, 331 m, 11 October 2017, *Lamxay et al.* HNN 104 (Biology Herbarium of NUOL (including spirit).

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