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Six new species of *Begonia* from northern Vietnam

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ABSTRACT: Between the end of October and early November of 2023, we conducted a two-week-long survey of wild begonias in northern Vietnam, and found about 25 new taxa, in which, six new species are described and reported below with illustrations. They are *B. bacsonensis* D.K.Tian, T.S.Hoang & B.Chen, *B. maciejewskii* D.K.Tian, T.S.Hoang & W.G.Wang, *B. sui* T.S.Hoang, D.K.Tian & B.Chen, *B. thanxaensis* D.K.Tian, T.S.Hoang & W.G.Wang, and *B. vonhaiensis* T.S.Hoang, D.K.Tian & W.G.Wang, which belong to *Begonia* sect. *Coelocentrum*, and *B. pyramidata* D.K.Tian T.S.Hoang, W.G.Wang & B.Chen belonging to *B.* sect. *Platycentrum*. The new species are compared with their allied species and their conservation status is assigned to the Data Deficient Category on the IUCN Red List.

KEY WORDS: *Begonia*, new taxa, diversity, Karst mountain, northern Vietnam.

INTRODUCTION

Begonia is a mega-diverse genus comprising 2167 species (Hughes *et al.* 2015–), which are widely distributed in tropical and subtropical regions of Africa, America, Asia, and Oceania. Many new species are still waiting to be discovered and described, particularly in under-explored Asian countries like Vietnam, Myanmar, Laos, and Thailand. South Guangxi of China and the northern part of Vietnam are the diverse center of *Begonia* sect. *Coelocentrum* due to many karst mountains. So far, 93 species have been found in this section, including 38 in Vietnam. With funding support from the American Begonia Society, we spent two weeks between October 27 and November 10, 2023, in northern Vietnam exploring for wild begonias and found over 25 tentative new taxa and nine new records for Vietnam (Tian *et al.*, 2024a,b,c). Based on field surveys and examination of herbarium specimens, we here describe six new species from northern Vietnam. They are *B. bacsonensis* D.K.Tian, T.S.Hoang & B.Chen, *B. maciejewskii* D.K.Tian, T.S.Hoang & W.G.Wang, *B. sui* T.S.Hoang, D.K.Tian & B.Chen, *Begonia thanxaensis* D.K.Tian, T.S.Hoang & W.G.Wang, and *B. vonhaiensis* T.S.Hoang, D.K.Tian & W.G.Wang, which belong to *Begonia* sect. *Coelocentrum*, and *B. pyramidata* D.K.Tian T.S.Hoang, W.G.Wang & B.Chen belonging to *B.* sect. *Platycentrum*. On assessment of their conservation status, all new species are assigned as Data Deficient according to Guidelines for Using the IUCN Red List Categories (IUCN Standards and Petitions Committee, 2024).

TAXONOMIC TREATMENTS

1. Begonia bacsonensis D.K.Tian, T.S.Hoang & B.Chen, ***sp. nov.*** Sect. *Coelocentrum.* **Fig. 1**

Type: **Vietnam**. Lang Son province, Bac Son district, Tan Thanh commune (Fig. 2), 21°43'41"N, 106°14'36"E, alt. 120–180 m, on rock surfaces or in rock crevices of karst mountain, fruits, 9 Nov. 2023, *Daike TIAN, Bin CHEN, Son Thanh HOANG, TDK5527* (holotype: VAFS; isotypes: CSH).

Diagnosis: *Begonia bacsonensis* is most similar to *Begonia semiparietalis* Yan Liu, S.M.Ku & C.-I Peng (Ku *et al.*, 2006) in morphology, but differs by its internode inconspicuous (*vs*. 4–17 mm long), blade apex acute to obtuse (*vs*. shortly acuminate or acute, rarely obtuse), bracts persistent and margin short glandular ciliate (*vs*. caducous, margin ciliate), flower lightly greenish-yellow (*vs*. pink), stamens 51–74 (vs. 13–40), tepals of pistillate flower persistent (*vs*. deciduous)

Description: **Herb** evergreen, lithophytic, monoecious, adhering to rock surface, aerial stem absent; rhizome creeping, 6–12 cm long, 6–10 mm thick, internode inconspicuous. **Stipules** light pink, triangular, 7–9 × 3–6 mm, only visible at the terminal shoot, the others dried or invisible, abaxially glabrous, lower part of margin sparsely hairy, apex acute and awned, awn 3–4 mm long. **Leaf**: petiole greenish-brown or pinkish-green, 5–18 cm long, 2.5–6 mm thick, ungrooved, densely grayish-white villose, hairs ≤ 3 mm long; blade nearly ovate or oblate, 6–14.5 × 4.8–12.5 cm, extremely oblique, adaxially dark green, area along veins white or not, sparsely very short grayish-white pubescent, hairs ≤ 0.5 mm long; abaxially light green, red purple or veins red purple, grayish-white pubescent, hairs ≤ 1 mm, longer on main vein base; base overlapped to valvate, margin densely ciliate, hairs *ca*. 1 mm long, apex acute or obtuse; venation palmate, 7 or 8, adaxially raised in base of main veins, the other parts embedded, abaxially nearly spider-web-like, slightly raised, minute veins clear.

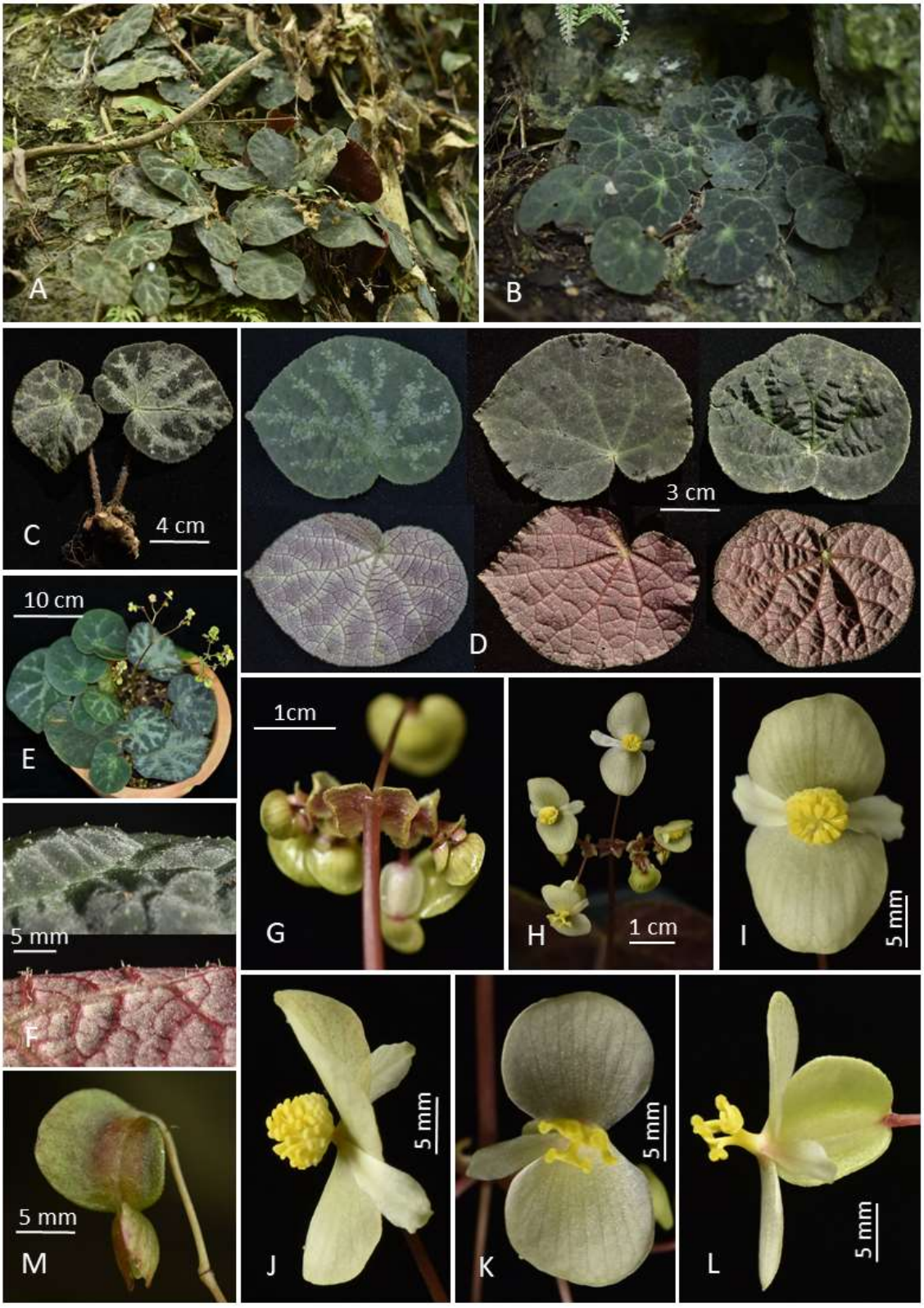

Fig. 1 Habitat and morphology of ***Begonia bacsonensis***. **A, B.** Habitat; **C.** Mature plant with leaf maculation; **D.** Adaxial and abaxial surfaces of leaves showing color and maculation variation; **E.** Flowering plant in cultivation; **F.** Sections of adaxial and abaxial leaf surfaces showing indumentum difference; **G.** Inflorescence showing flower buds and bracts; **H.** Inflorescence with open flowers; **I, J.** Front and side views of staminate flower; **K, L.** Front and side views of pistillate flower with 3 tepals; **M.** Fruit with persistent tepals. (Photos by Daike Tian)

Inflorescence: dichasial cyme , terminal, 1 per rhizome branch, far above leaf surface, 15–21 cm long, 1.5–2 mm thick, flowers *ca*. 13 per inflorescence, peduncle pinkish-brown, 2.5–3 cm long, 1.5–2 mm thick, glabrous. **Bracts** pinkish-green or light greenish-yellow, nearly persistent, ovate, 1.5–5 × 1.5–4 mm, margin denticulate or sparsely short ciliate; flower fragrance absent. **Staminate flower**: pedicel pink, 15–30 mm long, 0.6–1 mm thick, glabrous; flower 21–27 × 20–24 mm, tepals 4, glabrous, outer 2 larger, evenly greenish-yellow, ovate, 10–14 × 9–13 mm, slightly outward curved; inner 2 smaller, evenly light greenish-yellow, obovate-lanceolate, 10–12 × 2–4 mm; androecium capitate, actinomorphic, 3–4 mm long, 4–5 mm wide, stamens 51–74, filaments free, 1–1.5 mm long, anthers 0.8–1 mm long. **Pistillate flower**: pedicel pink, 10–12 mm long, 1 mm thick, glabrous; flower 18–22 ×13 –17 mm, tepals 3, glabrous, persistent, outer 2 larger, evenly light greenish-yellow, broadly obovate or ovate-rounded, 9–11 × 11–12 mm; inner 1, smaller, same color as outer tepals, oblanceolate, 7–10 × 3 mm; gynoecium (excluding ovary) 6–7 × 4–7 mm, styles 3, free, 2 mm long, stigma spirally twisted nearly one revolution each side; ovary light green, sparsely short pubescent or nearly glabrous, 1 locular, placenta parietal, 3-lobed. **Fruit**: stalk green, 12–19 mm long, 1 mm thick, capsule 6–8 × 4–6 mm, with persistent tepals and 3-wings, larger wing nearly semicircular, 5–8 × 10–12 mm, lateral wings falculate, 1–2 × 7 mm.

Etymology: The specific epithet refers to Bac Son, the name of the type locality in Lang Son province.

Phenology: The plants bloom from May to June, and the fruits ripen from June to July in cultivation conditions.

Distribution and ecology: Only one population with *ca.* 50 mature plants was observed, but more populations should be found in other places in the future. The plants grow on rock surfaces or in rock crevices under the forest canopy of karst mountain.

Conservation status: Data Deficient (DD).

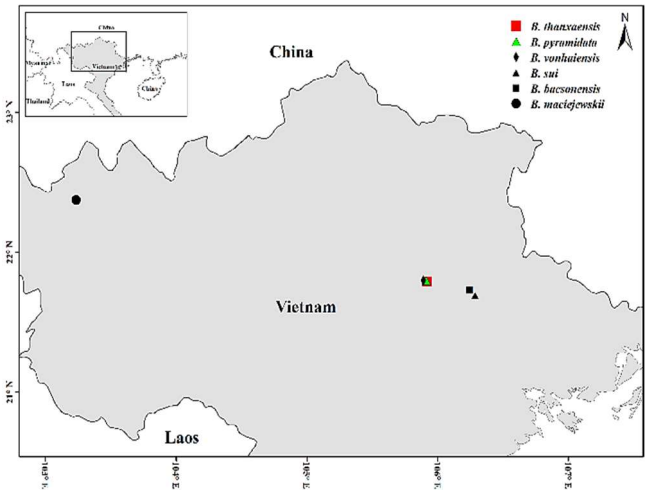

Fig. 2. Distribution map of six new species (by Yuhui Li)

2. *Begonia maciejewskii* D.K.Tian, T.S.Hoang & W.G.Wang, ***sp. nov.*** Sect. *Coelocentrum.* **Fig. 3**

Type: **Vietnam**. Tuyen Quang province, Chiem Hoa district, Tien's garden at Ngoc Ho, cultivation at nursery (introduced from Lai Chau province, Sin Ho district, Ta Phin commune (Fig. 2), 22°22'18"N 103°14'04"E, alt. 1172 m), 2 Nov. 2023, *Daike TIAN, Wenguang WANG, Bin CHEN, Son Thanh HOANG, TDK5440* (holotype: VAFS; isotypes: CSH).

Diagnosis: *Begonia maciejewskii* is most similar to *B. pseudodryadis* C.Y.Wu (Wu and Ku, 1995) in leaves with light green spots and pink flowers, but differs mainly by its leaf blade ovate (*vs*. narrow ovate), leaves larger 7–19 × 5.5–13.5 cm (*vs*. 5–15 × 4–8 cm), margin entire to subentire (*vs*. subentire, sometimes shallowly repand or angularly lobed), apex acute (*vs*. acuminate to caudate–acuminate), area along midvein unspotted (*vs*. full midvein length spotted), stamens fewer 26–31 (*vs*. 30–40), placentae axile (*vs*. parietal), flowering October to November (*vs*. August to September).

Description: **Herb** evergreen perennial, monoecious, *ca*. 30 cm tall, rhizome prostrate, internodes inconspicuous, aerial stem absent. **Stipules** light green, pinkish white, or pinkish green, glabrous, ovate-triangular, 10–22 × 7–12 mm, membranous, translucent, abaxially keeled, apex aristate. **Leaf**: 5–10 per rhizome branch, basal; petiole light green, sparsely short greenish-white line spotted, glabrous, ungrooved, very brittle 16–27 cm long, 3–6 mm thick; blade adaxially dark green with interveinally light green spots, glabrous, waxy, shinning, ovate, 7–19 × 5.5–13.5 cm, wider side 3.5–8.5 wide, narrower side 2.2–6.4 cm wide, decurrent base lobe 1.8–7.5 cm long; abaxially red purple, occasionally green red, glabrous, waxy; venation palmate, veins 9, adaxially slightly impressed to embedded, abaxially slightly raised; base overlapped, margin entire, apex acute. **Inflorescence**: dichasial cyme, 1–5 per rhizome branch, 17–26 cm long, peduncle green, glabrous, 11–15 cm long, 2–5 mm thick. **Bracts** greenish white, transparent, glabrous, ovate-rounded or ovate, bractlet, 5 × 3–5 mm. **Staminate flowe**r: pedicel pink, glabrous, 14–23 mm, 0.8–1 mm thick; flower 26–30 × 17–26 mm, tepals 4, outer 2 larger, evenly light pink, glabrous, ovate to cordate-ovate, 13–15 × 12–16 mm; inner two smaller, light pink, glabrous, obovate-elliptical or obovate-lanceolate, 9–12 × 5–9 mm; androecium capitate, actinomorphic, loosely arranged, 3–4 mm long, 5–6 mm wide; stamens 26–31, filaments free, 1–1.5 mm long, anther 0.8–1 mm long. **Pistillate flower**: very rare, pedicel pink, glabrous, tepals 5, gradually smaller inward, styles 3; ovary 3-locular, placentation axile, bilamellate. **Fruits** not seen.

Etymology: The specific epithet refers to the family name of Stephen Maciejewski, the president of the American Begonia Society and Co-Chair of the Conservation Committee for the American Begonia Society and the Gesneriad Society, in honor of his many contributions to global begonia conservation.

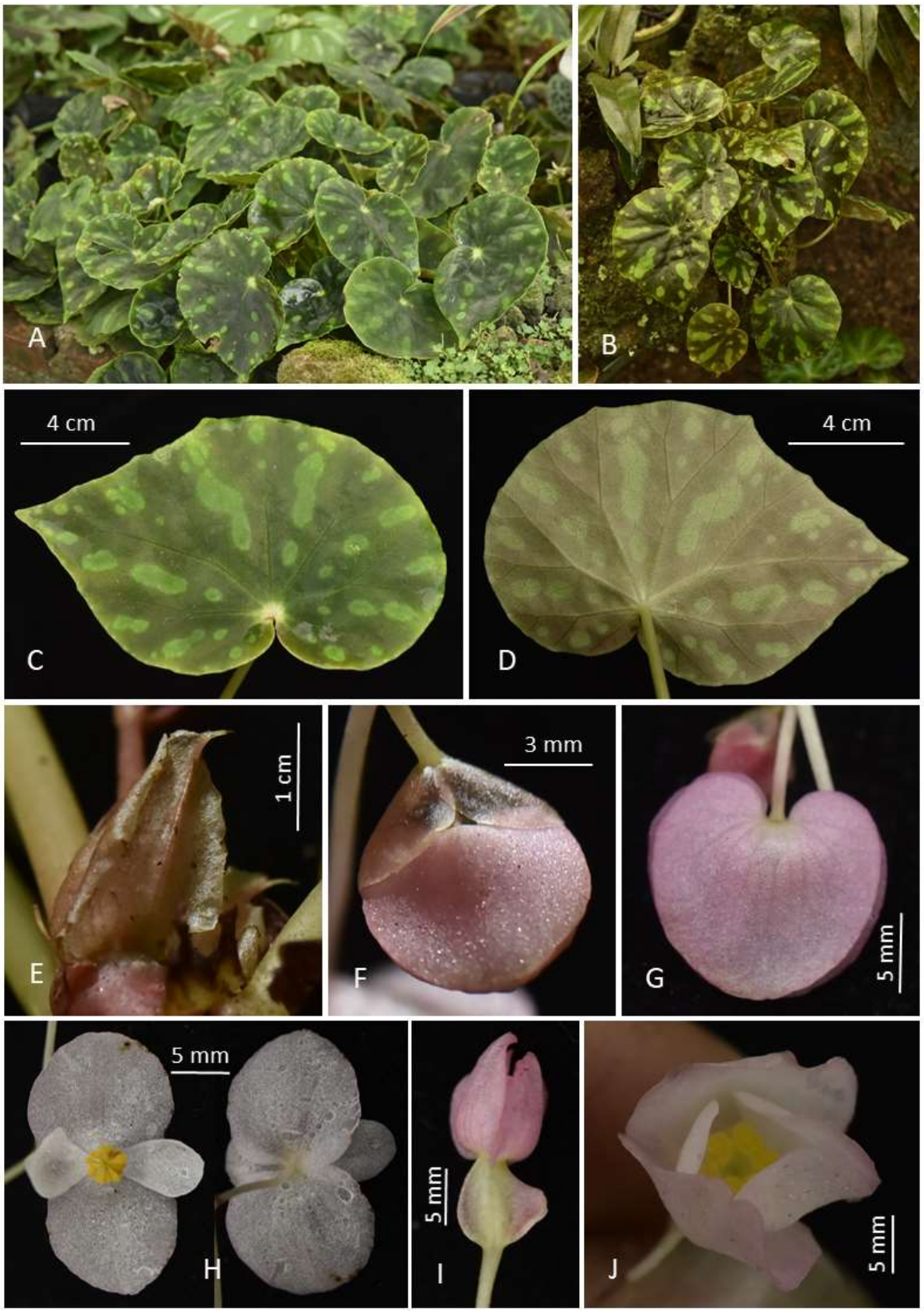

Fig. 3. Habitat and morphology of ***Begonia maciejewskii.*** **A, B.** Plants in cultivation; **C, D.** Adaxial and abaxial surfaces of leaves showing color and maculation; **E.** Keeled stipule; **F.** Staminate flower bud and bracts; **G.** Staminate flower bud; **H.** Front and back views of staminate flower; **I, J.** Side and front views of pistillate flower with 5 tepals. (Photos by Daike Tian)

Phenology: The plants bloom from October to November, and the fruits ripen from November to December in cultivation conditions.

Distribution and ecology: Collected from nursery, the wild plants are distributed in Ta Phin commune of Sin Ho district, Lai Chau province.

Conservation status: Data Deficient (DD).

3. *Begonia sui* T.S.Hoang, D.K.Tian & B.Chen, ***sp. nov.*** Sect. *Coelocentrum.* **Fig. 4**

Type: **Vietnam**. Lang Son province, Bac Son district, Nhat Tien commune (Fig. 2), 21°41'29"N, 106°17'7"E, alt. 136 m, rock surfaces or in rock crevices of karst mountain, early flowering, 29 Oct. 2023, *Daike TIAN, Bin CHEN, Son Thanh HOANG, TDK5523* (holotype: VAFS; isotypes: CSH).

Diagnosis: *Begonia sui* is mostly similar to *B. pseudodaxiensis* S.M.Ku, Yan Liu, & C.-I Peng (Ku *et al.*, 2006), but differs by its internodes inconspicuous (*vs*. 6–12 mm long), stipule distinctly keeled and densely pilose (*vs*. weakly keeled, nearly glabrous), petiole longer 17–50 cm (*vs*. 15–35 cm), flowers up to 150 (*vs*. 25–57), pedicel glabrous (*vs*. pilose), staminate flower smaller 21–33 × 19–25 mm (vs. 24–38 × 26–42 mm), androecium actinomorphic (*vs*. zygomorphic), stamens 38–62 (*vs*. 28–40), flowering November–December (*vs*. December–February).

Description: **Herb** evergreen, lithophytic, monoecious, 25–50 cm tall, aerial stem absent; rhizome creeping, stout, 10–25 cm long, 10–30 mm thick, internode inconspicuous. **Stipules** light green, only visible at the shoot, triangular, 10–20 × 8–12 mm, margin densely pubescent, keeled, apex acute and aristate, arista pilose. **Leaf**: petiole green, 17–50 cm long, 6–15 mm thick, glabrous, ungrooved, grayish-white linear spotted, blade nearly ovate, 12–33 × 9–26 cm, extremely oblique, wider side 6–14 mm wide, narrower side 2.5–10.5 mm wide, adaxially green, sparsely minute bristled; abaxially light green, very short grayish-white pubescent, hairs ≤ 0.5 mm long; base valvate to overlapped, margin entire, apex caudate; venation palmate, 9, adaxially raised in the base of main veins, the other parts slightly impressed, abaxially spider-web-like, distinctly raised, minute veins clear. **Inflorescence**: dichasial cyme, axillary and terminal, 1–3 per rhizome branch, nearly equal to leaf surface, 20–45 cm long, flowers up to 150 or more per inflorescence, pistillate flowers are rarely seen. peduncle light green, 7–27 cm long, 3–6 mm thick, nearly glabrous. **Bracts** caduceus, not seen. **Staminate flower**: pedicel light green, pink tinted in the upper part, 11–18 mm long, 0.8–1 mm thick, glabrous; flower 21–33 × 19–25 mm, tepals 4, outer 2 larger, pinkish-white, ovate, 10–16 × 9–12.5 mm, abaxial surface subglabrous, its color deeper; inner 2 smaller, pale white, glabrous, obovate-lanceolate or narrowly obovate, 9–12 × 5–6 mm, androecium nearly capitate, actinomorphic, loosely arranged, *ca*. 5 mm long, 4 mm wide, stamens 38–62, filaments free, 0.8–1 mm long, anthers 0.8–1 mm long. **Pistillate flower**: pedicel pinkish-green, 9–12 mm long, 1 mm thick, glabrous; flower 14–28 × 10–12 mm, tepals 2 or3, outer 2 larger, light pink, abaxial color deeper, broadly ovate, 7–9 × 10–12 mm, glabrous; inner absent or 1, smaller, nearly white, nearly ovate, *ca*. 9 × 5 mm; gynoecium (excluding ovary) 5–6 × 7–9 mm, styles 3, free, stigmas spirally twisted nearly one revolution each side; ovary greenish-pink, glabrous, 1 locular, placenta parietal, 3-lobed. **Fruits** not seen.

Etymology: The specific epithet refers to the family name of Mr. Nguyen Van Su, an experienced plant hunter from Lang Son of northern Vietnam.

Phenology: The plants bloom from early November to December, and the fruits ripen from December to January.

Distribution and ecology: Only two extremely small populations with *ca.* 10 mature plants were observed, but more populations should be found in other places in the future. The plants grow on rock surfaces or in rock crevices under forest canopy.

Conservation status: Data Deficient (DD).

4. *Begonia thansaensis* D.K.Tian, T.S.Hoang & W.G.Wang, ***sp. nov.*** Sect. *Coelocentrum* **Fig. 5**

Type: **Vietnam**. Thai Nguyen, Vo Nhai district, Than Sa Commune, Than Sa Phuong Hoang Nature Reserve (Fig. 2), near creek, 21°47'25"N, 105°55'0"E, alt. 124 m, growing on rock surfaces or in rock crevices under the forest canopy on a karst mountain, 29 Oct. 2023, *Daike TIAN, Wenguang WANG, Bin CHEN, Son Thanh HOANG, TDK5406* (holotype: VAFS; isotypes: CSH).

Diagnosis: *Begonia thanxaensis* is most similar to *Begonia persistens* Y.H.Tan, M.B.Maw & H.B.Ding from Myanmar (Maw *et al.*, 2021) in leaf shape and texture, but easily differs by its thicker (*vs*. thinner) leaf blade, pale greenish-yellow (*vs*. pink) flowers, 3 (*vs*. 5) petals of pistillate flower, 1 (*vs*. 2) locular ovary, and flowering time (October to November *vs*. November to January).

Description: **Herb** evergreen, lithophytic, monoecious, 10–20 cm tall, aerial stem absent; rhizome creeping, 15–50 cm long, 8–23 mm thick; brownish-green, light white-green spotted, unbranched or few branched, internodes very short or inconspicuous. **Stipules** caducous, only seen on shoot, pink, narrowly triangular, 9–13 × 5–7 mm, glabrous, margin entire, apex acuminate and awned, awn 2–3 mm long. **Leaf**: 4–10 per rhizome branch, petiole reddish-brown, 4.5–30 cm long, 2.5–10 mm thick, surface grooved, light whitish-green spotted, appressed brown villose; blade thicker and coriaceous, ovate-lanceolate or lanceolate, 8.5–23 × 3.8–13.5 cm, wider side 2.3–7.5 mm wide, narrow side 1.6–6 mm wide, adaxially green, waxy, glossy, interveinally sparsely strigose, veins slightly impressed; abaxially often red-purple, or gray-green with red-purple veins, base lobes slightly decurrent or nearly peltate, not overlapped,

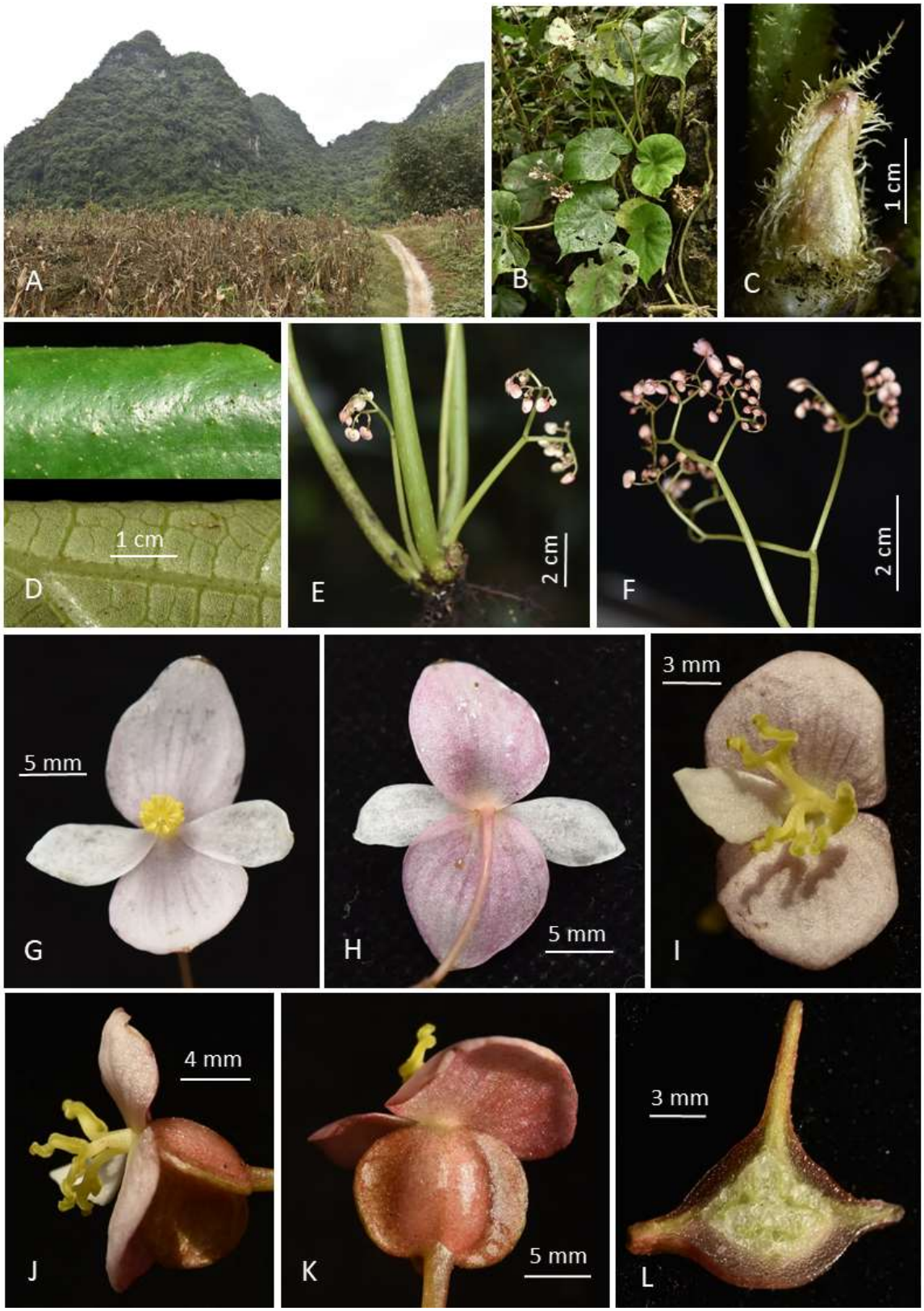

Fig. 4. Habitat and morphology of ***Begonia sui.*** **A.** Habitat; **B.** Flowering plant; **C.** Hairy stipule; **D.** Sections of adaxial and abaxial leaf surfaces showing indumentum difference; **E.** Inflorescence and petiole bases; **F.** Inflorescence; **G, H.** Front and back views of staminate flower; **I, J.** Front and side views of pistillate flower showing stigmas and ovary; **K.** Nearly back view of pistillate flower showing back color of outer tepals; **L.** Cross-section of the ovary. (Photos by Daike Tian)

Fig. 5. Habitat and morphology of ***Begonia thanxaensis***. **A–C.** Habitat (arrow indicates distribution area); **D.** Mature plant; **E.** Collected mature plant and petiole section; **F, G.** Adaxial and abaxial surfaces of leaves showing size and color variation; **H.** Sections of adaxial and abaxial leaf surfaces showing indumentum difference; **I.** Infructescence and fruits; **J.** Front and back views of staminate flower; **K.** Front view of pistillate flower with 3 tepals; **L.** Side view of pistillate flower; **M.** Cross-section of the ovary; **N.** Side view of dried fruits. (Photos by Daike Tian)

margin nearly entire, apex acuminate or caudate; venation palmate-pinnate, primary veins 5 or6, much raised, short pubescent, hairs ≤ 0.5 mm long, . **Inflorescence**: dichasial cyme, axillary, 1 or 2 per rhizome branch, 16–46 cm long, branched four times or more, flowers 25–150+ per inflorescence, peduncle green in the upper part, reddish-brown in the lower part, 11–27 cm long, 1.5–3 mm thick, short brown pubescent. **Bracts** caducous, triangular, pink, margin pubescent. **Staminate flower**: pedicel red, glabrous or nearly so, 5–7 mm long, 0.5–1 mm thick; flower 9–16 × 7–8 mm, tepals 4, light greenish yellow, glabrous, outer 2 larger, ovate, 4.5–8 × 6–7 mm; inner 2 smaller, obovate-lanceolate or long obovate, 3–4 × 2.5–3 mm, androecium capitate, actinomorphic, 2 mm long, 2–3 mm wide, stamens 25–30, filaments free, *ca*. 1 mm long, anther ≤ 1 mm long. **Pistillate flower**: pedicel pink, glabrous, *ca*. 8 mm long, 0.5–1 mm thick; flower *ca*. 15 × 7 mm, tepals 3, light greenish-yellow, glabrous, outer 2 larger, ovate, 7–8 × 7–8 mm; inner 1 smaller, oblanceolate, 3 × 25 mm; gynoecium (excluding ovary) *ca*. 3 × 3 mm, styles 3, free, *ca*. 2 mm long, stigma not twisted in both sides; ovary light yellow, glabrous, 1 locular, placenta parietal. **Fruit**: stalk red, glabrous, 15–20 mm long, 0.6–1 mm thick; capsule green, 9 × 4–5 mm, unequally three winged, larger wing green, glabrous, nearly semicircular, 5–11 × 7–13 mm; lateral wings falcate, 1–2 × 9–10 mm.

Etymology: The specific epithet refers to Than Sa, a commune name of the type locality in Vo Nhai district, Thai Nguyen province.

Phenology: The plants bloom from late September to November, and the fruits ripen from October to December.

Distribution and ecology: Only one population with *ca.* 50 mature plants was found in a karst mountain located at the Than Sa Phuong Hoang Nature Reserve in Thai Nguyen province (Fig. 2), but more populations should be found in other places in the future. The plants grow on rock surfaces or rock crevices near a creek outlet under the forest canopy.

Conservation status: Data Deficient (DD).

5. *Begonia vonhaiensis* T.S.Hoang, D.K.Tian & W.G.Wang, ***sp. nov.*** Sect. *Coelocentrum.* **Fig. 6**

Type: **Vietnam**. Thai Nguyen province, Vo Nhai district, Than Sa commune, Than Sa Phuong Hoang Nature Reserve (Fig. 2), 21°47'42"N, 105°54'42"E, alt. 34 m, growing on soil land of a shallow valley under the forest canopy, without flower and fruits, 29 Oct. 2023, *Daike TIAN, Wenguang WANG, Bin CHEN, Son Thanh HOANG, TDK5409* (holotype: VAFS; isotypes: CSH).

Diagnosis: *Begonia vonhaiensis* is mostly similar to *Begonia lui* S.M.Ku, C.I Peng & Yan Liu (Liu *et al.*, 2020) from China in sect. *Coleocentrum*, but differs mainly by its internode inconspicuous (*vs*. 4–20 mm long), flowers greenish-yellow (*vs*. pink to red), stamens *ca*. 34 (*vs*. *ca*. 20), ovary pilose (*vs*. nearly glabrous).

Description: **Herb**, evergreen, monoecious, lithophytic, nearly appressed to rock surface; rhizome creeping, 6–15 cm long, 8–15 mm thick, internodes inconspicuous; aerial stem absent. **Stipules** mostly dry, fresh ones only visible at the terminal shoot, reddish brown, narrowly triangular, glabrous, margin entire, nearly not keeled, apex aristate. **Leaf**: 3–6 per rhizome branch, extremely brittle and easy broken; petiole light green to reddish-brown, 5–21 cm long, 4–8 mm thick, ungrooved, densely grayish-white villose, hairs up to 5 mm long; blade broadly ovate or nearly rounded, 8.5–24 × 8–20 cm, oblique, wider side 4.8–13.8 mm wide, narrower side 3.2–8.5 mm wide; adaxially green, interveinally greenish-white spotted, color varies among individuals, main color rarely greenish-white, waxy, glossy, nearly glabrous; abaxially reddish purple, densely short red pubescent, hairs ≤ 1 mm long; base overlapped, margin short ciliate ≤ 1 mm long, apex rounded or acute; adaxially main veins slightly impressed, minute veins unclear; abaxially veins raised, minute veins clear, spider-web-like. **Inflorescence**: dichasial cyme, 1 per rhizome branch, ca. 15 cm long, peduncle dark red, *ca*. 11 cm long, 2 mm thick, erect red pubescent, hairs up to 1.5 mm. **Bracts** pink, triangular, *ca*. 5 × 2 mm, margin ciliate. **Staminate flower**: pedicel pink, *ca*. 25 mm long, 1 mm thick, subglabrous or very sparsely red pubescent, hairs up to 2 mm long; tepals 4, greenish-yellow, outer 2 larger, broadly ovate, *ca*. 8 × 9 mm, adaxially sparsely red pubescent, hairs ≤ 2 mm long; inner 2 smaller, pale yellow, obovate-lanceolate or narrowly obovate, *ca*. 6 × 3 mm, glabrous; androecium capitate, actinomorphic, 3 mm in diameter, stamens *ca*. 34, filaments free, *ca*. 1 mm long, anther 1 mm long, apex recessed. **Pistillate flower**: pedicel pink in the lower part, green in the upper part, ca. 20 mm long, 1 mm thick, sparsely red pubescent, hairs up to 2 mm long; flower *ca*. 15 mm in diameter, tepals 3, outer 2 larger, greenish-yellow, pinkish-yellow in the lower part, obovate or nearly rounded, 7–8 × 10 mm; inner 1 smaller, pinkish-yellow, oblanceolate or nearly lanceolate, *ca*. 5 × 2 mm, glabrous; gynoecium (excluding ovary) *ca*. 5 mm in diameter, styles 3, free, stigmas twisted one revolution in both sides; ovary pink, sparsely red pubescent, hairs ≤ 2 mm long, 1 locular, placenta parietal. **Fruits** not seen.

Etymology: The specific epithet refers to Vo Nhai, a district name of Thai Nguyen province, where the type specimens were collected.

Phenology: The plants bloom from late January to February, and the fruits ripen from February to March in cultivation conditions.

Distribution and ecology: Only one population with *ca.* 50 mature plants was found in a shallow valley, but more populations should be found elsewhere in the future. The plants grow on soil surfaces under the forest canopy.

Conservation status: Data Deficient (DD).

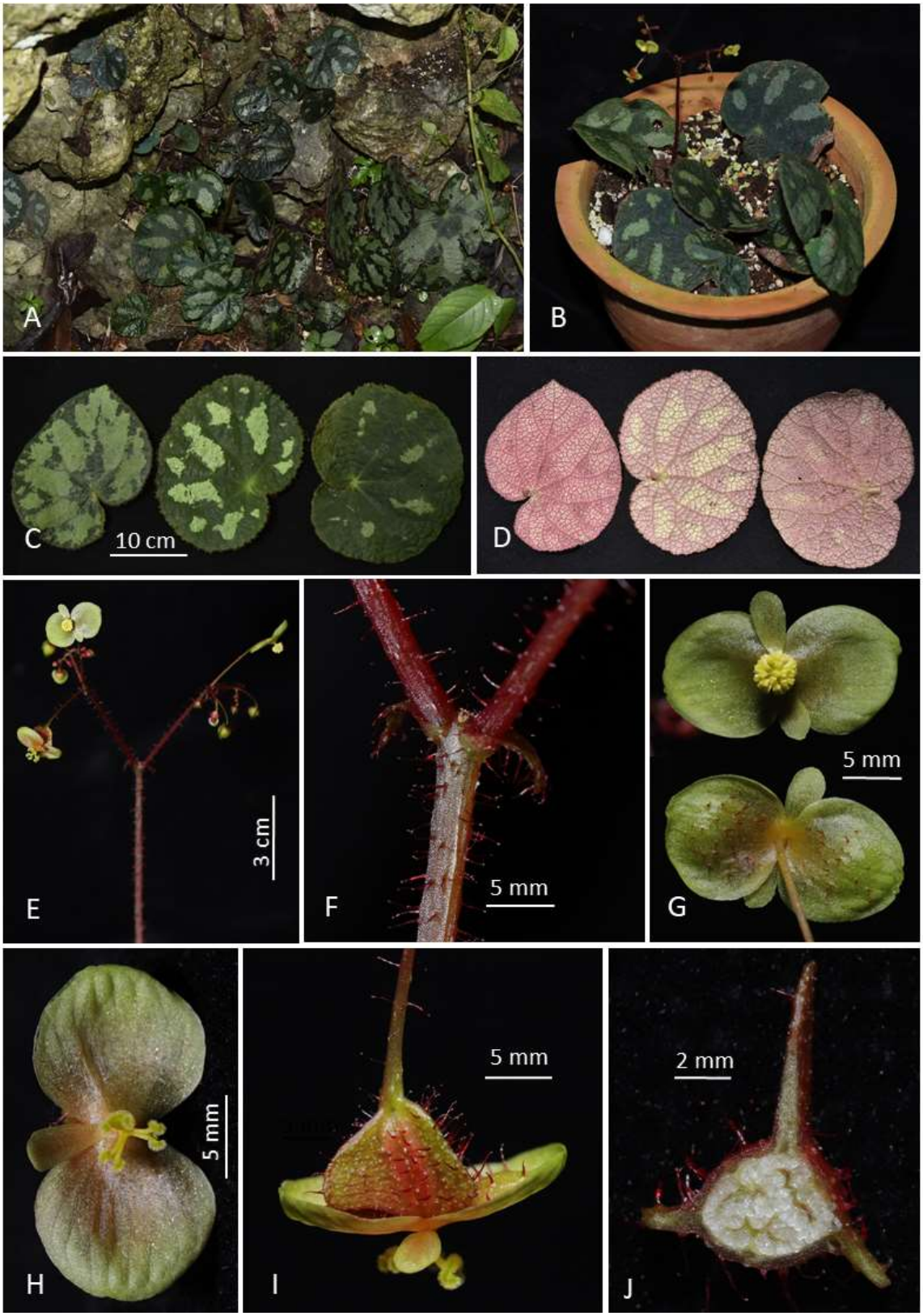

Fig. 6. Habitat and morphology of ***Begonia vonhaiensis.*** **A.** Habitat; **B.** Flowering plant in cultivation; **C,D.** Adaxial and abaxial surfaces of leaves showing color and maculation variation; **E.** Inflorescence; **F.** Hairy peduncle; **G.** Front and back views of staminate flower; **H.** Front view of pistillate flower with 3 tepals; **I.** Side view of pistillate flower; **J.** Cross-section of the ovary. (Photos A,C,D by Daike Tian; others by Wenguang Wang)

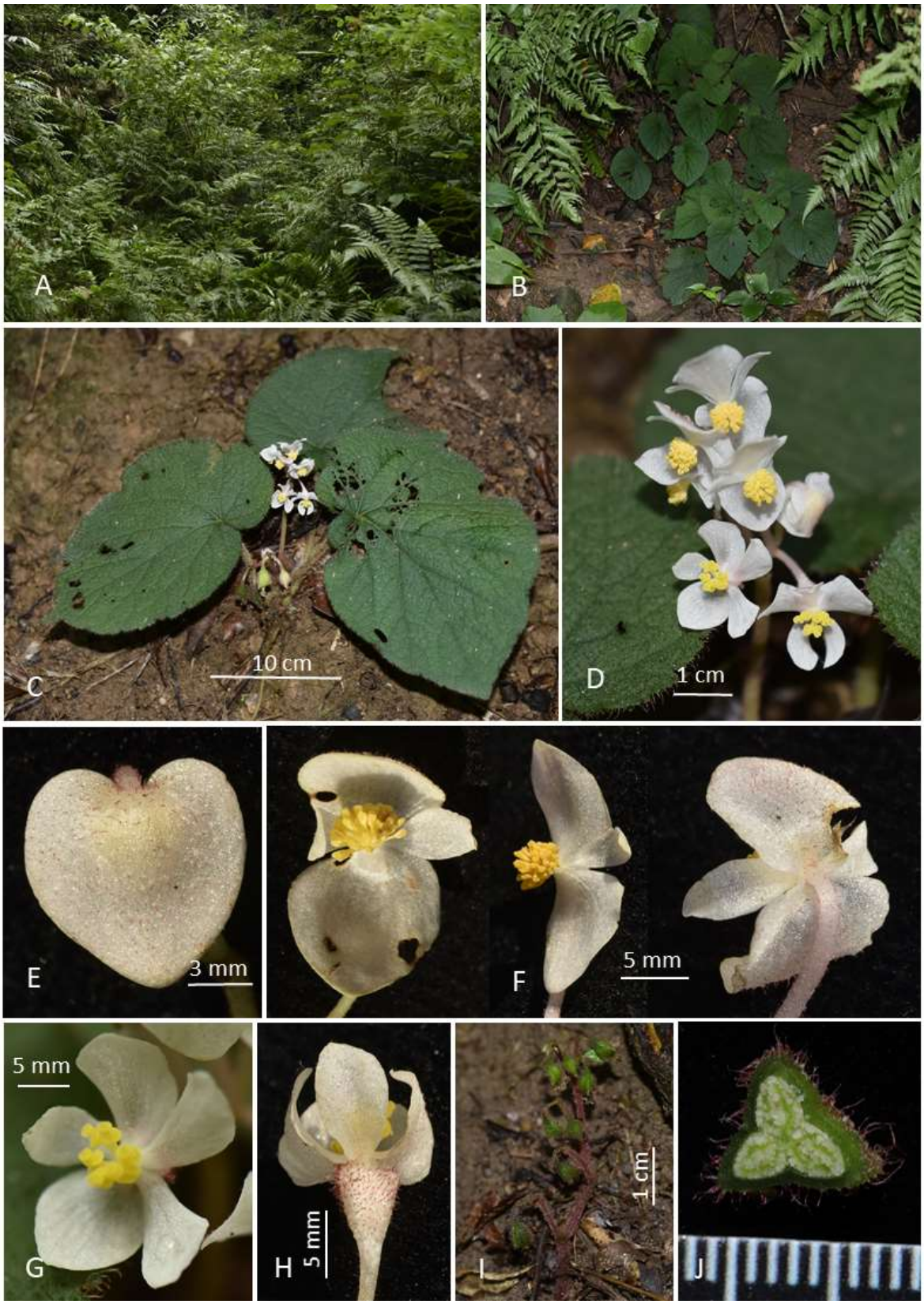

Fig. 7. Habitat and morphology of ***Begonia pyramidata.*** **A.** Habitat; **B.** Mature plants under shrubs; **C.** Flowering plant; **D.** Inflorescence; **E.** Bud of staminate flower; **F.** Front, side and back views of staminate flower; **G.** Front view of pistillate flower with 5 tepals; **H.** Side view of pistillate flower showing ovary; **I.** Infructescence and fruits; **J.** Cross-section of ovary. (Photos by Daike Tian)

6. *Begonia pyramidata* D.K.Tian T.S.Hoang, W.G.Wang & B.Chen, ***sp. nov.*** Sect. *Platycentrum* **Fig. 7**

Type: **Vietnam**. Thai Nguyen province, Vo Nhai district, Than Sa commune, Than Sa Phuong Hoang Nature Reserve (Fig. 2), 21°47'48"N, 105°53'24"E, alt. 44 m, growing adhering to rock surfaces or in rock crevices of karst mountain, 29 Oct. 2023, *Daike TIAN, Wenguang WANG, Bin CHEN, Son Thanh HOANG, TDK54089* (holotype: VAFS; isotypes: CSH).

Diagnosis: *Begonia pyramidata* is most similar to *Begonia pendens* H.Q.Nguyen, Y.M.Shui & W.H.Chen (Chen *et al.*, 2020) in the shapes of leaves and baccate fruits and same tepal number of flowers in the same section, but differs by its leaf blade adaxially densely grayish-white pilose (*vs*. sparsely and shortly setose), abaxially densely grayish-white villose (*vs*. red lanate and strigose) along veins, flower pure white (*vs*. pinkish-white), staminate flower pedicel 18–30 mm (*vs*. 35–50 mm) long, three placentae closely arranged (*vs*. nearly isolated).

Description: **Herb** evergreen, monoecious, *ca*. 10 cm tall, aerial stem absent or with one internode stem at anthesis; rhizome creeping, 3–9 cm long, 4–8 mm thick, few branched, internode inconspicuous or up to 1 cm long. **Stipules** green, narrowly triangular, 10–15 ×5–6 mm, abaxially villose and slightly keeled, margin sparsely villose, apex acuminate with 2–3 mm long awn. **Leaf**: 3–10 per rhizome branch; petiole green, ungrooved, 7–25 cm long, 3.5–10 mm thick, densely white villose, hairs up to 4 mm long; blade ovate, oblique, 12–27 × 8–20.2 cm, wider side 4.9–11.6 mm wide, narrow side 3.3–8.2 mm wide, adaxially green, densely grayish white villose, hairs up to 3 mm long; abaxially light green, densely grayish-white pubescent, hairs ≤ 1.5 mm long; base valvate to slightly overlapped, margin ciliate, apex acute, occasionally obtuse; venation palmate, 9–11, adaxially impressed, abaxially raised, minute veins clear. **Inflorescence**: dichasial cyme, axillary, 1–3 per rhizome branch, 3–14 cm long, flowers 3–25 per inflorescence, peduncle green, 2.5–3 cm long, 1.5–2 mm thick, short brown pubescent. **Bracts** light green, 7 × 3 mm, abaxially pubescent, margin ciliate. **Staminate flower**: pedicel greenish white, 18–30 mm long, 1–1.5 mm thick, pink pubescent; flower 21–27 × 13–17 mm, tepals 4, white, outer 2 larger, ovate or broadly ovate, 10–14 × 10–12 mm, adaxially red pubescent; inner 2 smaller, obovate-lanceolate or narrowly oblanceolate, 6–8 × 2.5–4 mm, glabrous, androecium nearly capitate, actinomorphic, 3–4 mm long, 5–6 mm wide, stamens 48–60, filaments free, 2–3 mm long, anthers ≤ 1–1.5 mm long. **Pistillate flower**: pedicel greenish white, ca. 9 mm long, 1 mm thick, short red pubescent; tepals 5, white, outer 2 larger, ovate, ca. 10 × 8 mm, red pubescent; inner 3 gradually decreased in size, oblanceolate, 7–10 × 6–8 mm; gynoecium (excluding ovary) ca. 4 × 4–5 mm, styles 3, free, stigma spirally twisted nearly 2 revolutions each side; ovary white, densely red pubescent, axile placentae, 3 locular, bilamellate. **Fruit**: stalk green, 8–12 mm long, 0.6–1 mm thick, densely red short pubescent; fruit baccate, green, triangular pyramid shaped, 5–9 × 4–5 mm, densely red pubescent, wingless.

Etymology: The specific epithet refers to its fruit shape like a triangular pyramid.

Phenology: The plants bloom from late October to November, and the fruits ripen from November to December.

Distribution and ecology: Only one population with *ca.* 50 mature plants was found in a shallow valley, but more populations should be found elsewhere in the future. The plants grow on soil surfaces under the forest canopy.

Conservation status: Data Deficient (DD).

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