Taiwania 66(2): 214–231, **2021**
DOI: 10.6165/tai.2021.66.214

Taxonomic studies on *Begonia* (Begoniaceae) in Myanmar II: seven new species from Myanmar

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(Manuscript received 12 November 2020; Accepted 4 May 2021; Online published 10 May 2021)

ABSTRACT: This paper presents the result of consecutive floristic survey in Myanmar. Seven new species of *Begonia* (Begoniaceae), *B. casseabri* Y.H.Tan, M.B.Maw & H.B.Ding, *B. persistens* Y.H.Tan, M.B.Maw & H.B.Ding, *B. latibracteata* Y.H.Tan, M.B.Maw & H.B.Ding from Putao District, Kachin State, *B. natmataungensis* Y.H.Tan, M.B.Maw & H.B.Ding from Natma Taung National Park, Chin State, *B. amnicola* Y.H.Tan, M.B.Maw & H.B.Ding, *B. sagaingensis* Y.H.Tan, M.B.Maw & H.B.Ding and *B. chindwinensis* Y.H.Tan, M.B.Maw & H.B.Ding from Htamanthi Wildlife Sanctuary, Sagaing Region, are described and illustrated. All of the new species belongs to *Begonia* section *Platycentrum* (Klotzsch) A.DC. Detailed descriptions, colored photographs, habitat and distribution data for the seven new species are provided. A diagnostic key to species of *Begonia* sect. *Platycentrum* in Myanmar is presented.

KEY WORDS: *Begonia* Sect. *Platycentrum*, biodiversity, Myanmar (Burma), bracteole, CAS-SEABRI.

INTRODUCTION

Begonia Linnaeus (1753: 1056) is the sixth largest genus of angiosperms, and the number of accepted species of *Begonia* currently reaches 2001 species (Hughes *et al.* 2015–). This genus is widely distributed in tropical and subtropical regions throughout the world. The annotated checklist of Southeast Asian *Begonia* by Hughes (2008) presented 57 species were found in Myanmar and 33 species are endemic to Myanmar. Thereafter, more and more species have been found and described in Myanmar (Tanaka and Hayami, 2011; Peng *et al.*, 2014; Tanaka and Peng, 2016; Tseng *et al.*, 2017; Phutthai and Hughes, 2017; Li *et al.*, 2018; Hughes *et al.*, 2019; Wahlsteen, 2018, 2019; Maw *et al.*, 2020). At present, 83 *Begonia* species of 8 sections (sect. *Alicida, Apterobegonia, Dysmorphia, Monophyllon, Parvibegonia, Platycentrum, Petermannia, Putzeysia*) have been recorded in Myanmar (Hughes *et al.*, 2019; Aung, 2020) following the updated taxonomic system by Shui *et al.*, 2019. *Begonia* sect. *Platycentrum* (Klotzsch 1855: 243) A.DC. (in de Candolle 1859: 134) is the most dominant section in Myanmar and comprising 52 (including 7 new species in this paper) species to date. It is widely distributed in Asia, Himalayan regions, extending to mainland Southeast Asia and its adjacent islands and comprises 205 species (Shui *et al.*, 2019). This section is characterized by terrestrial habit with rhizomatous or upright stems; inflorescences axillary, dichasial at the base and monochasial at apex; the flowers white, pink, orange or yellow; male flowers tepals 4, rarely 2, stamens actinomorphic; female flowers tepals 3–8, rarely 2, ovary 2 (–4)-loculed, placentation axillary, placental branches 2(–4) per locule, styles usually 2 or rarely more than 4; fruit berry-like or not, 3-winged, wings very unequal (Shui *et al.*, 2019).

Since 2014, the joint expedition team from Xishuangbanna Tropical Botanical Garden (XTBG), Chinese Academy of Sciences (CAS) and Forest Research Institute, Forest Department, Ministry of Natural Resources and Environmental Conservation, Myanmar conducted botanical surveys focusing in Myanmar, mainly focusing in Northern part, including the Hkakabo Razi National Park and its contiguous areas, Hponkan Razi Wildlife Sanctuary, Putao District, Kachin State; Htamanthi Wildlife Sanctuary, Sagaing Region, and Natma Taung National Park, Chin State. The project is ongoing and aims to support reliable scientific information for the future flora of Myanmar. From 2014 to 2020, Southeast Asia Biodiversity Research Institute (SEABRI), CAS has conducted nine field investigations and has been discovered 47 new species (e.g. Tan *et al.*, 2015; Yang *et al.*, 2017; Mu *et al.*, 2019; Ding *et al.*, 2020a; Yang *et al.*, 2020), 3 newly recorded families (Jin and Zaw, 2018; Jin *et al.*, 2018; Ding *et al.*, 2019a), 11 newly recorded genera (Ding *et al.*, 2019a, 2020b) and 11 newly recorded species (He *et al.*, 2018, Yang *et al.*, 2019, Liu *et al.*, 2020, Ding *et al.*, 2019b, 2020b).

MATERIALS AND METHODS

From 2014 to 2019, we have collected around 158 *Begonia* specimens in total: 122 collections from Putao District, Kachin State, 31 collections from Hkamti District, Sagaing Region and 5 collections from Natma Taung National Park, Chin State. Morphological examination of these species was initially conducted based on living plants observation in the field. Further morphological investigations were made based on literature, herbarium specimens, and cultivated plants. The collected materials of the species have been compared with morphologically similar species by affinities inferred using descriptions (Huang and Shui, 1994; Tebbitt and Dickson, 2000; Kiew, 2005, Ku *et al.*, 2007) and type specimens. Protologues and images of type specimens were gathered from JSTOR Global Plants (http://plants.jstor.org) and the Virtual Herbaria of BM, E, HITBC, K, KUN, NYBG, PE. After all the collected materials are carefully reviewed and examined, the seven new species have been confirmed as new species to sciences and described here. The specimens are deposited in the herbarium of Xishuangbanna Tropical Botanical Garden (HITBC) and the herbarium of Forest Research Institute, Myanmar (RAF).

TAXONOMIC TREATMENT

1. *Begonia casseabri* Y.H.Tan, M.B.Maw & H.B.Ding, ***sp. nov.*** **Fig. 1**

Begonia Sect. ***Platycentrum*** (Klotzsch) A.DC.

***Type*: MYANMAR**. Kachin State: Putao District, Camp 1 to Namhti (Camp 2), in tropical montane forest, 97°37′56.29″E 27°24′40.43″N, 607 m, 12 December 2017, *Y.H. Tan, B. Yang, H.B. Ding et al. M3429* (holotype: HITBC!; isotypes: RAF!).

***Diagnosis*:** *Begonia casseabri* is morphologically similar to *B. dicressine* Wahlsteen (2019: 242) from Northern Myanmar under the section *Platycentrum.* But it can be distinguished from the similar species by lacerate bracteoles under the ovary (*vs.* without) and tomentose capsule (*vs.* glabrous).

Description: Perennial herb, rhizomatous, creeping, unbranched, rooting at nodes. Rhizome ca. 10 cm long, puberulent, 0.4–1.5 cm thick, internode 0.8–1.5 cm long. **Stipule** deciduous, triangular, red, fleshy, 0.9–1.2 × 0.4–0.5 cm, glabrous, keeled, margin not toothed, tip narrowing, ending in a hair. **Leaf** tufted, **petiole** 5–15 cm long, reddish brown, densely rusty tomentose; **blade** asymmetric, broadly ovate, 8–15 × 7–14 cm, apex acute or acuminate, base very oblique, cordate, upper surface green, glabrous, lower surface paler, subglabrous but with rusty tomentose on the midrib and veins, margin wavy and crenate, edged by hairs, venation palmate, 7- or 8-veined. **Inflorescence** axillary, peduncle 8–13 cm long, slightly to densely rusty tomentose, flowers pinkish white; **bract pair** completely enclose the young inflorescence, deciduous, 0.8–1.2 × 0.5–0.8 cm, broadly triangular, red, fringed by hair. **Staminate flower:** pedicel 0.8–1.3 cm, red, glabrous or slightly tomentose, tepals 4, unequal, outer 2, ovate, 1.1–2 × 1.2–1.6 cm, inner 2, elliptic or obovate, 1–1.4 × 0.7–1 cm, red pilose on the lower surface of outer tepals, margin entire, tip rounded; **stamens** numerous, ca. 200, filaments ca. 1 mm long, fused at base into a column, anthers yellow, obovate, ca. 1 mm long, apex emarginate, almost equal to the filaments, with two longitudinal slits. **Pistillate flower:** pedicel 1.3–2.3 cm; with 2 **bracteoles** under the ovary, red, subglabrous, ovate, 0.8–0.9 × 1–1.4 cm, margin slightly lacerate, fringed by hair, persistent; tepals 4 or 5, subequal, ovate, outer 2 or 3, 1.3–1.5 × 1.2–1.3 cm, inner 2 smaller, 1.1–1.4 × 0.4–1.1 cm, sparsely red pilose on the outer surface (sometimes glabrous); **ovary** 2-loculed, placentae axillary, placentae 2 per locule, tomentose; **styles** 2, connective ca. 1 mm and stigma ca. 4 mm long, stigma bifid with twisted bands, yellow. **Capsule** nodding, ovoid, slightly tomentose, wings 3, unequal, oblong, tip rounded, 1.3–1.5 × 0.7–0.9 cm, smaller two triangular, 0.2–0.4 × 0.5–0.8 cm.

***Phenology*:** Flowering from December to January; fruiting from January to February.

***Distribution*:** This species is known only from the type locality, Putao District, Kachin State, Northern Myanmar (Fig. 8).

***Ecology*:** Growing on the granite rocks of tropical montane forest at about 600–1200 m altitude.

***Etymology*:** The species epithet is derived from the abbreviation of Southeast Asia Biodiversity Research Institute, Chinese Academy of Sciences (CAS-SEABRI); noun in apposition.

Vernacular: မြဧကရီငြေပန်း (mya ekare kywawy paann).

***Additional specimens examined*: MYANMAR**. Kachin State: Putao District, around Namhti (Camp 2), in tropical montane forest, 97°54′01.08″E 27°40′41.32″N, 1158 m, 14 December 2017, *Y.H. Tan, B. Yang, H.B. Ding et al. M3685* (HITBC, RAF).

2. *Begonia persistens* Y.H.Tan, M.B.Maw & H.B.Ding, ***sp. nov.*** **Fig. 2**

Begonia Sect. ***Platycentrum*** (Klotzsch) A.DC.

***Type*: MYANMAR**. Kachin State: Putao District, Upper Shankhaung, along the river side in tropical lowland forest, 97°15′05.87″E 27°26′09.35″N, 635 m, 18 December 2017, *Y.H. Tan, B. Yang, H.B. Ding et al. M3782* (holotype: HITBC!; isotypes: RAF!).

***Diagnosis*:** *Begonia persistens* is morphologically similar to *B. rheophytica* M.Hughes (in Hughes *et al.* 2019: 286, Maw *et al.* 2020) from Northern Myanmar in having symmetric leaves with grooved petiole and with 2 bracteoles under the ovary but it can be distinguished

Fig. 1. ***Begonia casseabri*** Y.H.Tan, M.B.Maw & H.B.Ding, *sp. nov.* (photographed by H.B. Ding and R.B. Zhu (B)). **A.** habitat (wild); **B.** habit (cultivated); **C–D.** male flowers (front and back view); **E.** female flower (back view, showing bracteoles); **F.** stipules; **G.** bracts; **H.** bracteoles of female flowers; **I–J.** female flowers (front and back view); **K.** capsule with unequal wings; **L.** serial cross section of ovary; **M–N.** single leaf (front and back view); **O.** leaf (abaxial), showing margin; **P.** leaf (abaxial), showing tomentose on veins and petiole.

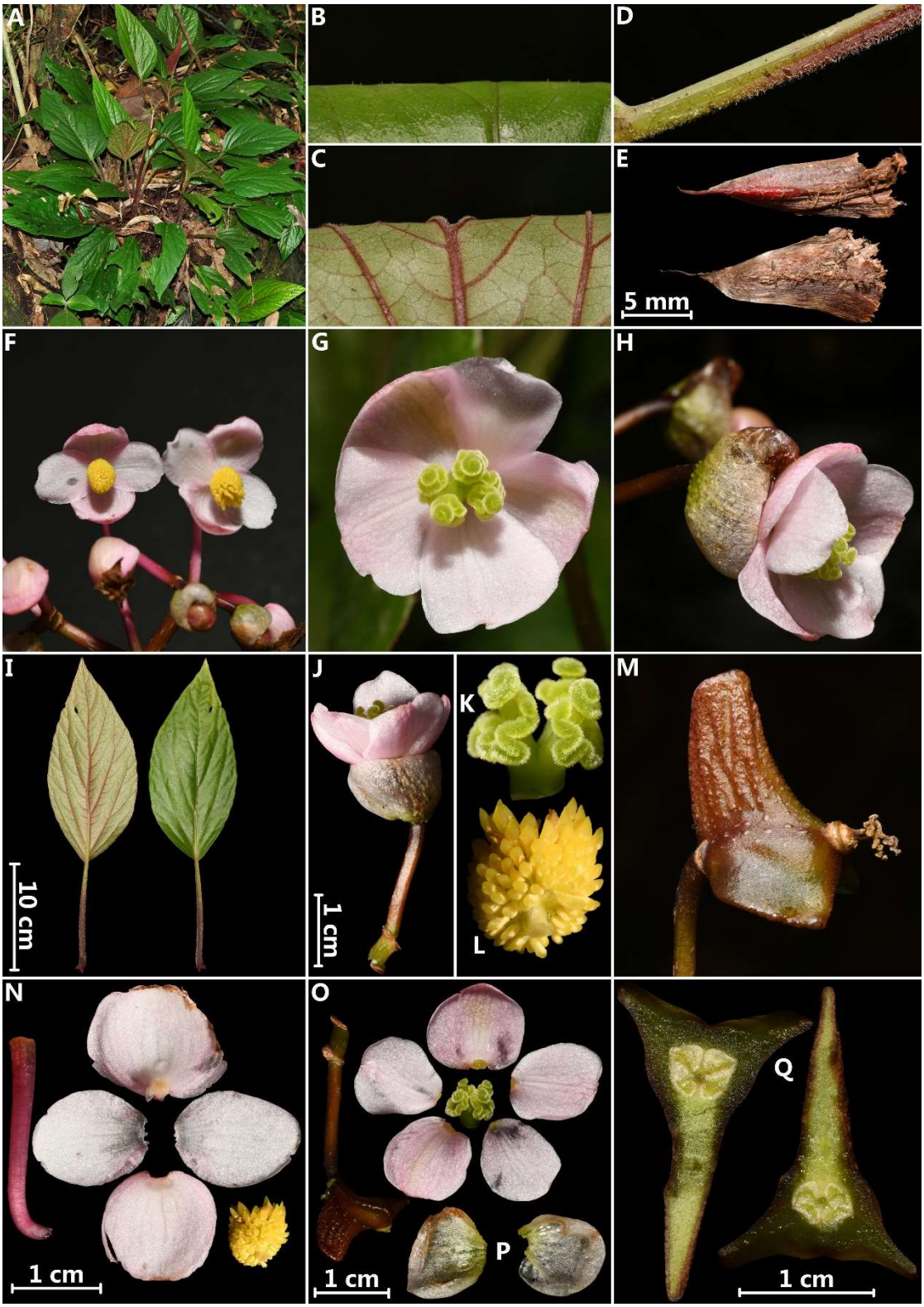

Fig. 2. ***Begonia persistens*** Y.H.Tan, M.B.Maw & H.B.Ding, *sp. nov.* (photographed by H.B. Ding). **A.** habitat; **B.** leaf (adaxial), sparsely whitish scabrid; **C.** leaf (abaxial), showing sparsely whitish scabrid, tomentose on the midrib and veins; **D.** petiole, showing grooved front; **E.** stipule (front and back view); **F.** male flowers (front view); **G.** female flower (front view); **H.** female flower, showing bracteoles; **I.** single leaf (front and back view); **J.** female flower (side view); **K.** stigma (side view); **L.** androecium (side view); **M.** fruit with unequal wings; **N.** tepals of male flower, pedicel, androecium; **O.** tepals of female flower, stigma, ovary with pedicel; **P.** bracteoles; **Q.** serial cross section of ovary.

by the following distinct characters including leaf blade broadly oval to ovate, 14–22 × 9–10 cm (*vs.* narrowly lanceolate, 13.3–18.2 × 2.2–4.0 cm), larger bracteoles under the ovary, 0.8–1.8 × 1–1.4 cm (*vs.* 0.6−0.8 × 0.3−0.5 cm) and white pilose stipule (*vs.* glabrous).

Description: Perennial herbs, monoecious. Rhizome, 5–15 cm long, creeping, red, fleshy, puberulent, ca. 1.2 cm thick, unbranched, internode 0.8–2.3 cm long. Leaves mostly basal, sometimes with 1 cauline leaf. **Stipule** deciduous, red, ovate 1.0–1.5 × 0.5–0.7 cm, keeled, succulent, whitish pilose on the outer surface especially along midrib, margin not toothed, along with red pilose, apex attenuate. **Leaf** tufted or distant; **petiole** red to green, grooved front, rounded back, 9–15 cm long, fleshy, densely to sparsely tomentose, narrowly winged on both sides; **blade** not oblique, symmetric, adaxially dull plain green, sparsely white scabrid, abaxially paler, sparsely whitish scabrid, tomentose on the midrib and veins, juvenile blade folding inward, crimson, mature blade flat, broadly oval to ovate, broadest just below midway, 14–22 × 9–11 cm, apex acuminate, base rounded, margin with sparse red short pilose and widely spaced minute teeth; venation pinnate, red on midrib and lateral veins, with densely white tomentose. **Inflorescence** axillary, cymose, peduncle 8–25 cm long, with two main branches, 3.5–4.5 cm, red to green, white tomentose. **Staminate flower:** pedicel 2–3.6 cm long, pink, subglabrous or sparsely white tomentose, tepals 4, subequal, pink, outer 2, sub-circular, 1.2–1.3 cm in diam., sparsely villose on the outer surface, inner 2, broadly ovate, 1.3–1.5 × 1.0–1.1 cm, glabrous, margin entire, tip rounded; **stamens** many, filaments ca. 2 mm long, fused at base into a column, anthers yellow, narrowly oblong, 1–1.5 mm long, apex acuminate, shorter than filaments, with longitudinal slits. **Pistillate flower:** pedicle 1.5–2.2 cm long, red, glabrous or sparsely white tomentose, with 2 bracteoles under the ovary, greenish white, ovate 0.8–1.8 × 1–1.4 cm, completely enclose the ovary, persistent in florescence; tepals 4 or 5, pink, glabrous, subequal, outer 2, sub-circular, 1.2–1.5 cm in diam., inner 2 or 3, broadly ovate, 0.9–1.2 × 1–1.2 cm, glabrous, margin entire, tip rounded, **ovary** reddish green, 2-locular, placentation axillary, placentae 2 per locule, sparsely tomentose, **styles** 2, fused at base, stigma bifid with twisted bands, styles and stigmas yellowish green. **Capsule** nodding, trigonous-ellipsoid, green or red when fresh, puberulous; 3-winged, unequal, larger wing oblong, tip rounded, 1.7–2.5 × 0.9–1.1 cm, smaller two triangular, 0.3–0.7 × 0.9–1 cm.

***Phenology*:** Flowering and fruiting from November to January.

***Distribution*:** The species can be found only in the type locality, Putao District, Kachin State, Northern Myanmar (Fig. 8).

***Ecology*:** Growing on the large rock under light to medium shade of lowland forest at about 500–700 m altitude.

***Etymology*:** The species epithet '*persistens*' refers to its persistent bracteoles under the ovary.

Vernacular: **ပွင့်ခံရွက်တည်ကြွေပန်း** (pwint hkan rwat tai kywawy paann).

***Additional specimens examined* (paratypes):** MYANMAR. Kachin State: Putao District, Upper Shankhaung, along the river side in tropical montane forest, 97°15′41.15″E 27°25′47.42″N, 505 m, 4 May 2017, *Y.H. Tan, B. Yang, H.B. Ding et al. M1383* (HITBC; RAF, TAI).

***Notes*:** *Begonia persistens* also shows some morphological affinities with *B. yingjiangensis* S.H.Huang (in Shui & Huang 1999: 18) from China (Yunnan) in having symmetric leaves. But can be distinguished by its filaments fused at base (*vs.* free) and larger capsule (major wing 17–25 mm long, lateral wings 3–7 mm long *vs.* major wing ca. 5 mm long, lateral wings ca. 3 long).

3. *Begonia latibracteata* Y.H.Tan, M.B.Maw & H.B.Ding, ***sp. nov.***

Fig. 3

Begonia Sect. ***Platycentrum*** (Klotzsch) A.DC.

***Type*: MYANMAR**. Kachin State: Putao District, Shinsanku, in tropical montane forest, 97°52′48.11″ E, 27°38′11.77″ N, 1035 m, 14 December 2016, *Y.H. Tan, S.S. Zhou M0924* (holotype: HITBC!).

***Diagnosis*:** *Begonia latibracteata* is morphologically similar to *B. pedatifida* H.Lév. (in Léveillé 1909: 21) in having similar lacerate leaves under the section *Platycentrum.* But it can be distinguished from the similar species by the following characters: white linear papillae and rusty tomentum on petiole and peduncle (*vs.* densely or sparsely villous), larger stipules (1.8–3 × 1–1.7 cm *vs.* ca. 1 × 0.8 cm), with 2 bracteoles under the ovary (*vs.* without), ovary with densely reddish succulent strigose hairs (*vs.* glabrous or pilose).

Description: Perennial herb, rhizomatous, rhizomes elongate, ca. 2.5 cm in diameter, puberulent. Leaves basal, **stipule** persistent, ovate, 1.8–3 × 1–1.7 cm, membranous, apex acute, keeled, margin entire, with densely tomentose along keeled and margin. **Leaf** petiole 15–40 cm, red to lime green, with white linear papillae and rusty tomentum; **blade** oblate-orbicular to broadly ovate, 10–30 × 16–30 cm, upper surface plain green, subglabrous, lower surface paler, tomentose along midrib and veins, margin remotely serrulate, red hirsute along margin, apex acuminate, venation palmate, 6- or 7-veined, base cordate, distinctly divided to 2/3 of leaf length; lobes 6 or 7; lobules present. **Inflorescence** axillary cymose, peduncle 5–13 cm tall, red to green, with white linear papillae and rusty tomentum; **bract** caducous. **Staminate flower**: pedicel 1.5–5 cm long, sparsely red tomentose, tepals 4, white to pink, unequal,

Fig. 3. ***Begonia latibracteata*** Y.H.Tan, M.B.Maw & H.B.Ding, *sp. nov.* (photographed by Y.H. Tan). **A.** habitat; **B.** petiole, showing whitish linear dots; **C.** rhizomes; **D.** male flowers (front view); **E.** male flowers (back view); **F.** female flower (front view); **G.** female flower (side view, showing bracteoles under the ovary by arrows); **H.** inflorescence; **I.** stigma (side view); **J.** stipule (front and back view); **K.** ovary, showing reddish succulent strigose; **L.** tepals of male flower, androecium with pedicel; **M.** tepals of female flower, gynoecium and ovary with pedicel; **N.** serial cross section of ovary; **O.** capsule with unequal wings.

Table 1. Morphological character comparison among superficial similar species, ***Begonia latibracteata***, ***B. pedatifida***, ***B. macrotoma***, ***B. natmataungensis***, ***B. koelzii***, ***B. longialata*** and ***B. shilendrae***.

Affinities	*B. latibracteata*	*B. pedatifida*	*B. macrotoma*	*B. natmataungensis*	*B. koelzii*	*B. longialata*	*B. shilendrae*
Cauline leaf	no	no	yes	no	no	yes	no
Bubils	no	no	no	yes, occasionally	yes, frequently	no	no
Stipules	1.8–3×1–1.7 cm with densely tomentose along keeled and margin	ca. 1×0.8 cm	ca. 1.9×1.2 cm glabrous	1.3–2.4×1.0–1.3 cm subglabrous	1–1.9×0.8–1.2 cm glabrous	1.6–1.9×1.2–1.3 cm glabrous	unseen
Leaf blade	oblate-orbicular to broadly ovate, 10–30×16–30 cm	Suborbicular 10–40×15–45 cm	broad ovate 12–15×14–18 cm	ovate to broadly ovate 15–25 × 16–24 cm	ovate to broadly ovate 20–40×20–30 cm	suborbicular 24–44 × 24–41 cm	broad ovate 18–35×8–30 cm
Leaf lobes	lobules present deeply incised ivided to 2/3 of leaf length	lobules present deeply incised divided to 2/3 of leaf length	lobules present shallowly incised divided to 2/3 of leaf length	shallowly incised divided to 1/3-1/2 of leaf length	lobules present deeply incised divided to 2/3 of leaf length	lobules present deeply incised divided to 2/3 of leaf length	lobules absent deeply incised divided to 2/3 of leaf length
Leaf upper surface	subglabrous	hispidulous	sparsely hirsute	whitish pilose all over	sparsely strigose	glabrous	glabrous
Leaf lower surface	tomentose along midrib and veins red hirsute along margin	hispidulous	glabrous	sparsely pilose densely on the veins	sparsely strigose denser on the veins	glabrous	pubescent on veins
Petiole	15–40 cm rusty tomentose with white linear papillae	10–55 cm densely or sparsely villous	7–15.5 cm glabrous	19–25 cm long, whitish pilose with red linear dots	30–50 cm sparsely puberulous with red linear dots	13–31 cm glabrous with red linear spots	up to 40 densely to sparsely villose
Male flower tepals	4	4	4	4	4	4	2
Feamal flower tepals	5–6	5	3–5	5	4–6	5	2
Bracteoles	present, under the ovary	absent	absent	absent	present, under the female flower	absent	absent
Style	2	2	2	2	3	2–3	2–3
Capsule	densely reddish succulent strigose	glabrous or pilose	glabrous	covered by red papillose	strigose along the base of the main wing otherwise glabrous	glabrous	glabrous
Abaxial wing	1.8–2 cm	1.2–2.4 cm	ca. 1.5 cm	2–3.2 cm	1–3 cm	3–5 cm	1.5–2 cm

outer 2, ovate, 1.7–2.5 × 1.5–2.3 cm, sparsely red vilose on the outer surface, margin entire, tip rounded, inner 2, elliptic, 1.8–2.7 × 1.2–1.4 cm, glabrous, margin entire, tip rounded; stamen numerous; filaments fused at base into a column; anther obovate, yellow, apex obtuse, shorter than filaments, with longitudinal slits. **Pistillate flower**: pedicel 1–3 cm long, sparsely red tomentose, with 2 bracteoles under the ovary, pink, broadly ovate, caducous, tepals 5 or 6, white or pink, outer 3, ovate, 2.0–2.4 × 1.3–1.7 cm, sparsely red vilose on the outer surface, margin entire, tip rounded, inner 2 or 3, similar but smaller, 2.0–2.3 × 1.2–1.4 cm, glabrous, **ovary** 2 locular, placentation axillary, placentae 2 per locule, densely red succulent strigose, **styles** 2, fused at base, stigma bifid with twisted bands, highly convolute, yellow or golden yellow. **Capsule** nodding, obovoid, red, ca. 2.5 × 1.4 cm, unequally 3-winged, larger wing broadly triangular, 1.8–2 × 1.3–1.4 cm, smaller wings, triangular, 0.4–0.6 × 1–1.2 cm wide, covered by red succulent strigose especially on smaller wings.

***Phenology*:** Flowering from November to December; fruiting from December to January.

***Distribution*:** This species known only from the type locality, Putao District, Kachin State, Northern Myanmar (Fig. 8).

***Ecology*:** Growing on rocky slopes in shaded moist environment of tropical montane forest at about 1000 m altitude.

***Etymology*:** The species epithet refers to its ovate bracteoles under the ovary.

Vernacular: **ပွင့်ခံရွက်ကြီးကြွေပန်း** (pwint hkan rwat kyee kywawy paann).

Notes*: *Begonia latibracteata is allied to several others which share lacerate leaves; *B. pedatifida* H.Lév.from Southwest China, *Begonia macrotoma* Irmsch. (in Irmscher 1951: 41) from China (Yunnan), India (NE), Nepal and Vietnam, *Begonia longialata* K.Y.Guan & D.K.Tian from China (Yunnan) (in Guan and Tian 2000: 132), *Begonia shilendrae* R.Morris & P.D.McMillan (in Morria and McMillan 2012: 63) from China (Tibet) and *Begonia koelzii* R.Camfield from India (Northeast) (in Camfield and Hughes 2018: 51). The detail comparison of *B. latibracteata* and its allied species is described in the following table 1.

4. *Begonia natmataungensis* Y.H.Tan, M.B.Maw & H.B.Ding, ***sp. nov.***

Fig. 4

Begonia Sect. ***Platycentrum*** (Klotzsch) A.DC.

***Type*: MYANMAR**. Chin State: Natma Taung National Park, near mountain top, 93°55′07.01″E 21°13′31.88″N, 3063 m, 22 October 2019, *Y.H. Tan, B. Yang M5913* (holotype: HITBC!; isotypes: RAF!).

***Diagnosis*:** *Begonia natmataungensis* shares similar morphological characters to *B. koelzii* R.Camfield (in Camfield and Hughes 2018: 51) in having lacerate leaves with bulbils. But it can be easily distinguished from the similar species by lamina lobes, shallowly incised, divided to 1/3−1/2 of leaf length (*vs.* deeply incised, divided to 2/3 of leaf length), without bracteoles (*vs.* with 2 small bracteoles under the female flower) and styles 2 (*vs.*3).

Description: Perennial herb, monoecious, rhizomatous, 20–50 cm high. **Rhizome**: elongate and swell, 2–3 cm in diam., puberulent. **Stipule:** deciduous, ovate to triangular, 1.3–2.4 × 1.0–1.3 cm, subglabrous, margin entire, keeled, apex acuminate to caudate. **Leaf:** petiole 19–25 cm long, white pilose with red linear dots; **blade** ovate to broadly ovate, 15–25 × 16–24 cm, asymmetric, basifixed, base cordate, bulbils present occasionally, adaxially dark green, white pilose all over, abaxially green to pale green, sparsely pilose, densely on the veins, venation palmate, 7–8 primary veins, midrib 15–23 cm long; margin shallowly incised, divided to 1/3–1/2 of leaf length, with ca. 6 major lobes with few smaller lobelets, margin serrulate, with hairs; apex attenuate. **Inflorescence:** cymose, 18–40 cm long; peduncle subglabrous or sparsely puberulous on upper part, with red linear dots, branching 1–3 times, primary peduncle 16–30 cm long, secondary 2–6 cm long, with 5–15 flowers; **bract** ovate, 9–15 × 6–11 mm, deciduous. **Staminate flower:** pedicel 1.5–2.5 cm long, subglabrous with red linear dots; tepals 4, unequal, outer 2, ovate, 1.6–1.9 × 1.2–1.7 cm, rosy pink or pink, adaxially glabrous, abaxially white pilose, margin entire; inner 2, obovate, 1.4–1.6 × 0.7–1 cm, rosy pink or pink, glabrous, entire; **androecium** actinomorphic, 70–100 stamens; filaments 1.5–1.8 mm long, subequal, fused at base into a column; anther oblong-elliptic, 1.5–2.0 mm long, apex obtuse, almost equal to the filaments, with longitudinal slits. **Pistillate flower:** pedicel 0.9–2.9 cm long, glabrous with red linear dots; tepals 5, unequal, ovate, outer tepals 3 (2), 1.2–1.6 × 0.9–1.3 cm, rosy pink or pink, glabrous, margin entire, inner tepals 2(3), obovate, similar but smaller, 1.0–1.1 × 0.8–1.0 cm; **ovary** 2-locular, placentation axillary, placentae 2 per locule, extremely sparsely strigose near base of main wing otherwise glabrous; **styles** 2, fused at base, stigma bifid with twisted bands, yellow or greenish yellow. **Fruit:** capsule nodding, ellipsoid, pedicel 1.8–3 cm long, recurved, capsule ellipsoid, covered by red papillose, 3 wings, extremely unequal, longest wing oblong-elliptic, 2–3.2 × 1.5–2 cm; shortest wings lunate, 0.3–0.4 × 0.9–1 cm.

***Phenology*:** Flowering from October to November; fruiting from December to January.

***Distribution*:** This species is known only from the type locality, Natma Taung National Park, Chin State, Myanmar (Fig. 8).

***Ecology*:** Growing on rocky cliffs of evergreen forest at about 1500–3100 m altitude.

***Etymology*:** The species epithet refers to its type locality, Natma Taung National Park, Chin State, Myanmar.

Vernacular: **ခေါ်ငူးစုမ်ငကြောပန်း (**khaw nu m'cong kywawy paann).

***Additional specimens examined* (paratypes):** MYANMAR. Chin State: Natma Taung National Park, 94°01′35.07″E 21°11′37.79″N, 1595 m, 28 November 2018, *Y.H. Tan, B. Yang, H.B. Ding et al. M5003* (HITBC, RAF, TAI); Chin State: Natma Taung National Park, 94°00′50.68″E 21°11′14.16″N, 1405 m, 28 November 2018, *Y.H. Tan, B. Yang, H.B. Ding et al. M5050* (HITBC, RAF); Chin State: Natma Taung National Park, 94°01′35.07″E 21°11′37.79″N, 1595 m, the voucher from a cultivated plant at Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences, China, 23 July 2019, *M.B. Maw XTBG0153* (HITBC).

***Notes*:** *Begonia natmataungensis* is mostly similar in morphological characters to *Begonia koelzii* under the sect. *Platycentrum.* The detailed comparison of the key morphological characters of *B. natmataungensis* and its allied species which share lacerate leaves is described in the following table 1.

5. *Begonia amnicola* Y.H.Tan, M.B.Maw & H.B.Ding, ***sp. nov.***

Fig. 5

Begonia Sect. ***Platycentrum*** (Klotzsch) A.DC.

***Type*: MYANMAR**. Sagaing Region: Hkamti District, Htamanthi Wildlife Sanctuary, Nam E Zu, Near Camp 2, 95°32′39.04″E 25°29′40.87″N, 186 m, 17 December 2019, *Y.H. Tan, H.B. Ding, P.S. Maung M6514* (holotype: HITBC!; isotypes: RAF!).

***Diagnosis*:** *Begonia amnicola* is mostly similar to *Begonia pellionioides* Y.M.Shui & W.H.Chen (in Wang *et al.* 2015: 564) from China (Yunnan) in having erect stem, cauline leaves and elliptic-lanceolate to lanceolate leaves but it can be easily distinguished by the following characters including 2-locular ovary (*vs*. 3-locular

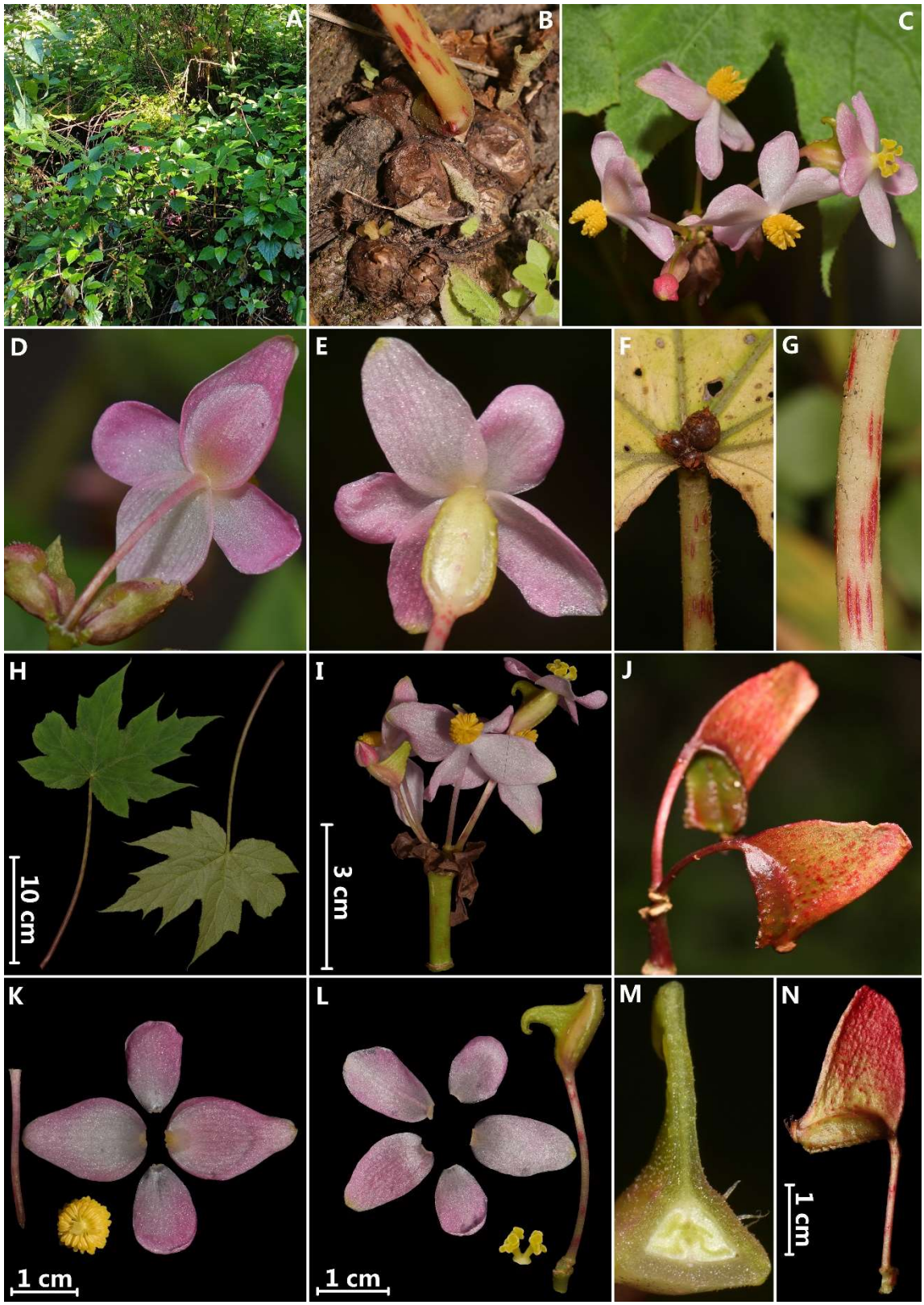

Fig. 4. ***Begonia natmataungensis*** Y.H.Tan, M.B.Maw & H.B.Ding, *sp. nov.* (photographed by H.B. Ding and Y.H. Tan). **A.** habitat; **B.** rhizomes; **C.** male flowers (frond and side view); **D.** male flower (back view); **E.** female flower (back view); **F.** bulbils; **G.** petiole, showing reddish linear dots; **H.** single leaf (front and back view); **I.** inflorescence; **J.** fruits with unequal wings; **K.** tepals of male flower, androecium, pedicel; **L.** tepals of female flower, gynoecium, ovary with pedicel; **M.** serial cross section of ovary; **N.** capsule.

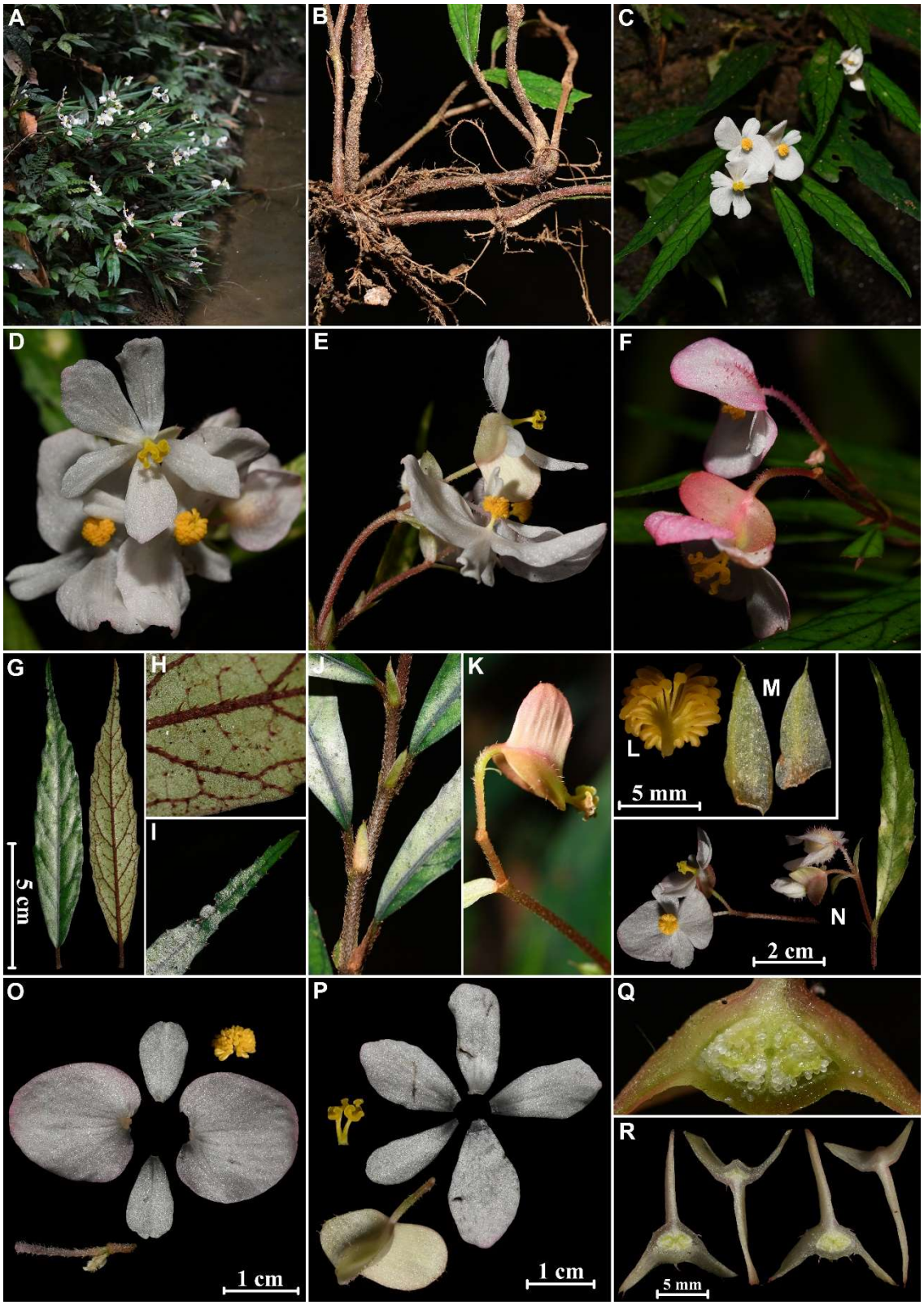

Fig. 5. ***Begonia amnicola*** Y.H.Tan, M.B.Maw & H.B.Ding, *sp. nov.* (photographed by H.B. Ding). **A.** habitat; **B.** rhizomes; **C.** flowers; **D.** flowers (close-up view); **E–F.** flowers (side view); **G.** single leaf (front and back view); **H.** leaf (abaxial), showing red hispid on veins; **I.** leaf (adaxial), showing remotely serrate margin with reddish hispid; **J.** stipules; **K.** capsule with unequal wings; **L.** androecium (back view); **M.** bracts; **N.** inflorescence; **O.** tepals of male flowers, androecium, pedicel; **P.** tepals of female flower, gynoecium, ovary with pedicel; **Q.** serial cross section of ovary (close-up view); **R.** serial cross section of ovaries.

ovary), styles 2 (*vs*. 3) and unequal wings (*vs*. equal or slightly unequal wings).

Description: Perennial herb, monoecious, rhizomatous, rhizome elongate, 0.5–1.5 cm in diam., densely reddish and greenish brown pilose. **Stem** erect, dark red, up to 40 cm tall, densely reddish and greenish brown pilose, branched or not, nodes slightly swollen. **Stipule** pale green, ovate to lanceolate, 5–10 × 3–5 mm, keeled, glabrous or sometimes with extremely sparsely hispid along keeled and one side margin, margin entire, apex acuminate or cuspidate. **Leaf** cauline, alternate and distichous; petiole dark red, 0.5–3 cm long, densely red and greenish brown pilose; **blade** almost symmetric, elliptic-lanceolate to lanceolate, 7–15 × 1–3 cm, adaxially dark green, glabrous, abaxially pale green, red hispid on veins, base cuneate, margin remotely serrate with reddish hispid at the teeth, apex acuminate to caudate, venation pinnate, sunken adaxially, prominent abaxially, 7–9 veins on either side of the midrib. **Inflorescence** cymose, axillary, shorter than the leaves, 1–3-flowered; peduncle red, 1.2–3.0 cm long, white or red villous; **bract**, ovate-lanceolate, 5–8 × 3–5 mm, succulent, whitish or greenish, margin very slightly whitish short hair, apex mucronate or sparsely serrate. **Staminate flower:** pedicel 1–2.2 cm long, pinkish, densely white or red hairs; tepals 4, white to pink, unequal, outer 2 suborbicular, apex obtuse, margin entire, 1.6–2.2 × 1.5–1.9 cm, minutely spiny-pilose on abaxial surface; inner 2 obovate-elliptic, apex obtuse, margin entire, 1.0–1.6 × 0.6–0.7 cm, glabrous; **androecium** actinomorphic, **stamen** numerous, yellow, filaments ca. 1 mm long, subequal, fused at base into a column, anthers ca. 2 mm long, oblong, apex obtuse, almost equal to the filaments, with longitudinal slits. **Pistillate flower:** pedicel 0.7–1 cm long, pinkish or greenish, whitish or pinkish translucent hairs; tepals 5, white to pink, unequal, outer 2 (3), suborbicular to obovate, apex obtuse, margin entire, 1.1–1.5 × 1.0–1.4 cm, glabrous or extremely sparsely spiny-pilose on abaxial surface; inner 3 (2) obovate, 1.2–1.8 × 0.6–0.9 cm, apex obtuse or rounded, glabrous; **styles** 2, golden yellow, ca. 5 mm long, stigma bifid with twisted bands; **ovary** sub-glabrous or sparsely spiny-pilose, 2-locular, placentation axillary, placental branch 2-lobed per locule. **Fruit:** nodding, capsule ovoid, pinkish or greenish; 3-winged, unequal, largest wing ovate-orbicular, tip rounded, 8–11 × 7–11 mm, smaller wings lunate, tip rounded, 4–5 × 9–10 mm, sub-glabrous or sparsely spiny-pilose, especially along the tip of the wings.

***Phenology*:** Flowering from November to December; fruiting from December to January.

***Distribution*:** This species is known only from the type locality, Htamanthi Wildlife Sanctuary, Hkamti District, Sagaing Region, Northern Myanmar (Fig. 8).

***Ecology*:** It grows on moist soil nearby or in stream at about 100–200 m altitude.

***Etymology*:** The specific epithet refers to the habitat in which this species occurs.

Vernacular: ကြယ်စင်ကြွေပန်း (kyal sin kywawy paann).

Additional specimens examined **(paratypes):** MYANMAR. Sagaing Region: Hkamti District, Homalin Township, Nam Sa Bi village management area, 95°21′50.3″E 25°19′03.4″N, 247 m, 5 April 2017, *K. Armstrong, T.Y. New, Y.M.M. Kyaw, M. Khaing, P.L. Pyae, T.T. Oo, L. Zaw, A. Kyi 2659* (NY02655167); Sagaing Region: Hkamti District, Htamanthi Wildlife Sanctuary, Nam Ei Zu, Near Camp 2, 95°32′39.36″E 25°29′39.37″N, 149 m, 16 December 2019, *Y.H. Lwin M6502* (HITBC, RAF); Sagaing Region: Hkamti District, Htamanthi Wildlife Sanctuary, Nam Ei Zu, Near Camp 2, 95°32′37.81″E 25°29′38.49″N, 155 m, 17 December 2019, *Y.H. Tan, H.B. Ding, P.S. Maung M6525* (HITBC, RAF, TAI); Sagaing Region: Hkamti District, Htamanthi Wildlife Sanctuary, Nam Ei Zu, Near Camp 2, 95°32′35.72″E 25°29′38.63″N, 123 m, 17 December 2019, *Y.H. Tan, H.B. Ding, P.S. Maung M6528* (HITBC, RAF).

6. *Begonia sagaingensis* Y.H.Tan, M.B.Maw & H.B.Ding, ***sp. nov.***

Fig. 6

Begonia Sect. ***Platycentrum*** (Klotzsch) A.DC.

***Type*:** MYANMAR. Sagaing Region: Hkamti District, Htamanthi Wildlife Sanctuary, Nam Ei Zu, near camp 1, 95°26′34.45″E 25°30′47.95″N, 147 m, 10 December 2019, *Y.H. Tan, H.B. Ding, H.M. Aung, P.S. Maung M6226* (holotype: HITBC!, isotypes: RAF!, TAI).

***Diagnosis*:** *Begonia sagaingensis* is morphologically similar to *Begonia menglianensis* Y.Y. Qian (2001: 461) from China (Yunnan) in its rhizomatous habit and broadly ovate leaf with densely villous petiole. But it can be easily distinguished by white to pinkish-white flower (*vs.* pinkish), overlapping leaf base (*vs.* without overlapping), serrate apex of female flower tepals (*vs.* entire) and free filaments (*vs.* fused at base).

Description: Perennial herb, monoecious, stemless, rhizomatous. **Rhizome** elongate, 5–10 cm long, puberulent, ca. 0.5 cm thick, internode 0.5–1 cm long. **Stipule** persistent, reddish-green, triangular, 5–11 × 5–7 mm, sub-membranous, keeled, abaxially villous, especially along midrib, margin entire, apex caudate, up to 1 cm. **Leaf** alternate, petiole terete, red, 8–20 cm long, densely villous and puberulous; lamina ovate to broadly ovate, basifixed, asymmetric, 16–20 × 8–16 cm, adaxially plain, darker green, sparsely hispid, abaxially pale green, densely rusty villous and puberulous on reticulate veins; venation palmate, red, 7–8 primary veins, base cordate, slightly or deeply overlapping, margin minutely serrate with red pilose, apex acute to acuminate. Inflorescence cymose, axillary, peduncle red, 5–15 cm long, erect, whitish or rusty villous; bract pairs persistence, ovate-narrowly lanceolate, ca. 8 × 2 mm, densely rusty villous; secondary bract similar, smaller. **Staminate flower:** pedicel 2.2–2.6 cm long, pink, white

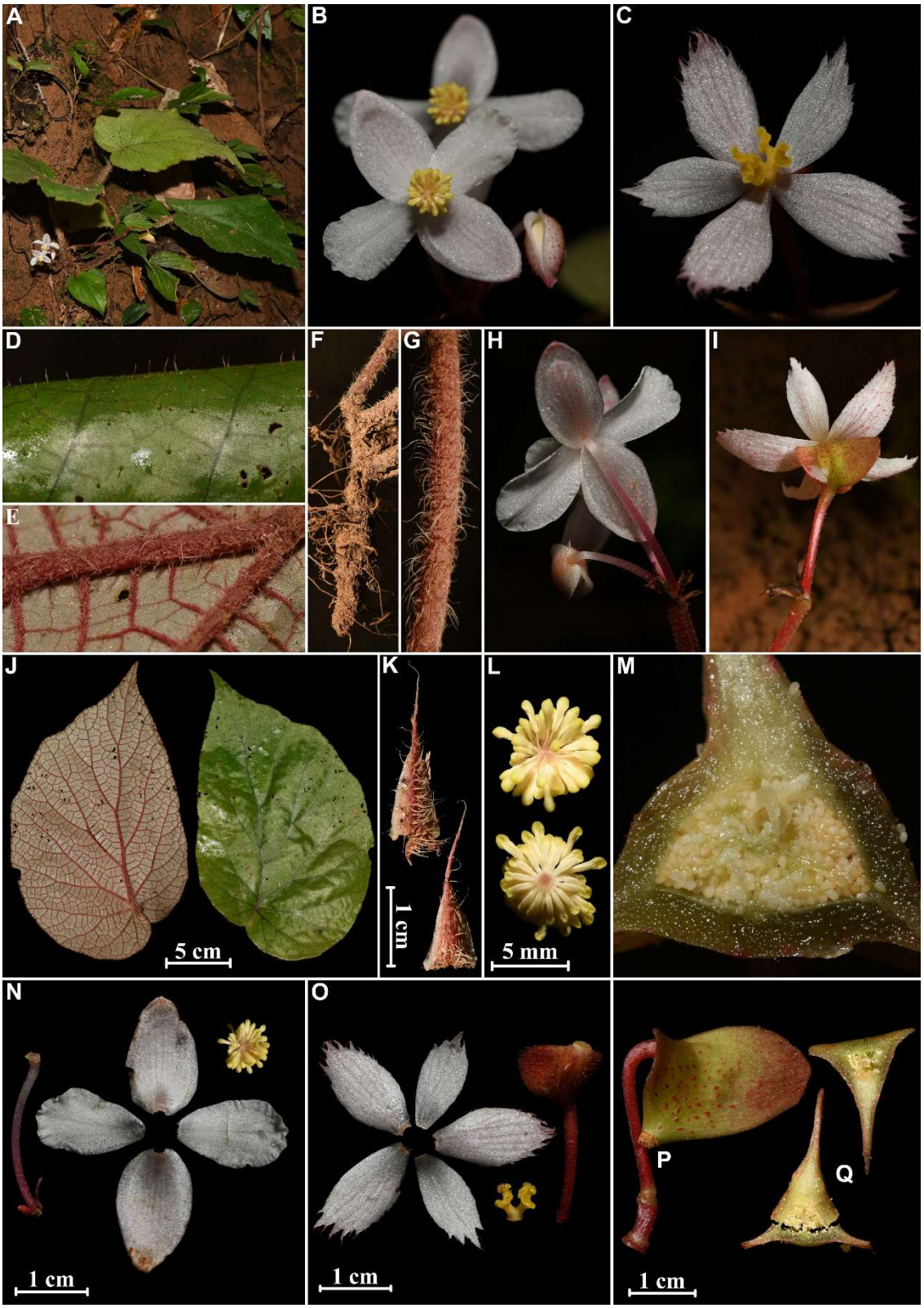

Fig. 6. ***Begonia sagaingensis*** Y.H.Tan, M.B.Maw & H.B.Ding, *sp. nov.* (photographed by H.B. Ding). **A.** habitat; **B.** male flowers; **C.** female flower; **D.** leaf (adaxial), showing sparsely hispid; **E.** leaf (abaxial), showing rusty villous on veins; **F.** rhizome; **G.** petiole; **H.** male flower (back view); **I.** female flower (back view); **J.** single leaf (front and back view); **K.** stipules; **L.** androecium (front and back view); **M.** serial cross section of ovary (close-up view); **N.** tepals of male flower, androecium, pedicel; **O.** tepals of female flower, gynoecium, ovary with pedicel; **P.** capsule; **Q.** serial cross section of ovary.

Table 2. Comparison of key morphological characters of ***Begonia sagaingensis***, ***B. menglianensis*** and ***B. augustinei***.

Affinities	*Begonia sagaingensis*	*Begonia menglianensis*	*Begonia augustinei*
Leaf	cordate, overlapping	cordate	cordate
Leaf upper surface	plain dark green, sparsely hispid	blackish green	green, pale greenish to whitish along main veins against reddish
Leaf lower surface	pale green, densely rusty villous and puberulous on reticulate veins	dark green, densely ferruginous hair	brownish purple of pale green, reddish along the veins
Bract pairs	persistence	caducous	deciduous
Flower	white to pinkish-white	pinkish	pinkish
Filaments	free	fused at base	fused at base
Female flower tepals	5, apex serrate	5, apex entire	5 or 6, apex entire
Styles	golden yellow	yellow	golden yellow or greenish yellow
Capsule	unequally 3-winged, major wing ovate-orbicular, apex rounded	unequally 3-winged, major wings nearly oblong, apex rounded, upper edge with broadly falcate flat and nearly triquetrous surface	unequally 3-winged, major wing

or red puberulent; tepals 4, white to pinkish-white, unequal, outer 2 broadly ovate to obovate, 1.5–1.7 × 0.9–1.2 cm, apex obtuse, margin entire, adaxially glabrous, abaxially red villous; inner 2 obovate, 1.5–1.6 × 0.7–0.9 cm, glabrous, apex rounded, margin entire; androecium actinomorphic, stamens numerous, yellow, filaments 0.5–2 mm long, unequal, free, anthers 1.5–2 mm long, obovate, apex obtuse, longer than filaments, with longitudinal slits. **Pistillate flower:** pedicel 1.8–2.2 cm long, red, whitish or reddish puberulent; tepals 5, white to pinkish-white, obovate to lanceolate, apex serrate with reddish pilose; outer 3, 1.6–2.0 × 0.7–1 cm, adaxially glabrous, abaxially red villous; inner 2, smaller, 1.4–1.9 × 0.5–0.7 cm, adaxially glabrous, abaxially sparsely red villous; **styles** 2, golden yellow, ca. 5 mm long, fused at base, stigma bifid with twisted bands; **ovary** reddish, with reddish hispid and papillose, 2-locular, placentation axillary. **Fruit:** nodding, capsule ovoid, reddish to greenish, covered by reddish papillose, 3-winged, unequal, abaxial wing ovate-orbicular, 1.3–2 × 1.2–1.5 cm, tip rounded, lateral wings lunate, 0.3–0.5 × 1–1.2 cm.

***Phenology*:** Flowering from November to December; fruiting from December to January.

***Distribution*:** The species is only known from the type locality, Htamanthi Wildlife Sanctuary, Hkamti District, Sagaing Region, Northern Myanmar (Fig. 8).

***Ecology*:** The species was discovered on the moist soil slope of deep shaded environment of tropical hill forest.

***Etymology*:** The species epithet '*sagaingensis*' refers to its type locality, Sagaing Region, Myanmar.

Vernacular: **စစ်ကိုင်းငြွပန်း** (sagaing kywawy paann).

***Additional specimens examined* (paratypes):** MYANMAR. Sagaing Region: Hkamti District, Htamanthi Wildlife Sanctuary, above Nam Eizu camp 2, 95°37′42.5″E 25°28′29.4″N, 140 m, 15 September 2016, *K. Armstrong, D. Daly, P.P. Hnin, T.Y. Nwe, K.Z. Aung, L. Pyae, H. Aung 1487* (NY02654911).

***Notes*:** *Begonia sagaingensis* shares similar characteristics with *B. menglianensis* Y.Y. Qian (Qian 2001, Yang *et al.* 2015) and *B. augustinei* Hemsl. (Hemsley 1900: 286) from China (Yunnan). The detailed comparison is described in the following table 2.

7. *Begonia chindwinensis* Y.H.Tan, M.B.Maw & H.B.Ding, ***sp. nov.***

Fig. 7

Begonia Sect. ***Platycentrum*** (Klotzsch) A.DC.

***Type*: MYANMAR**. Sagaing Region: Hkamti District, Htamanthi Wildlife Sanctuary, Nam Ei Zu, Near Camp 2, 95°25′16.21″E 25°29′41.13″N, 185 m, 1 June 2019, *B. Yang, H.B. Ding M5742* (holotype: HITBC!; isotypes: RAF!).

***Diagnosis*:** The new species is similar to *Begonia gulinqingensis* S.H. Huang & Y.M. Shui (in Huang & Shui 1994: 334) from China (Yunnan) in the rhizomatous habit, thick texture of leaves and suborbicular shape of leaves, but differs in filaments free (*vs.* fused at base), styles 2 (*vs*. 3) and ovary 2-loculed (*vs.* 3-loculed).

Description: Perennial herb, rhizomatous, rhizomes elongate, puberulent. **Stipule** deciduous, triangular, red or brown, adaxially subglabrous, abaxially rusty villous. **Leaf** basal, slightly thick texture, petiole terete, red, densely rusty villous, 3–12 cm long; **blade** asymmetric, widely suborbicular, 8–15 × 7–12 cm, upper surface green, extremely sparsely short setulose, lower surface pale green, velutinous, densely red strigose on reticulate veins; base cordate, overlapping, apex obtuse, margin short ciliate; venation palmate, 6–7 primary veins, reticulate. **Inflorescence** dichasial cyme, peduncle red, 2.5–8.7 cm, villous; **bracts** caducous, ovate or triangular, 4–5 × 2–3 mm, densely strigose abaxially. **Staminate flower:** pedicel 0.7–1.1 cm, red, setulose; tepals 4, white to pink, unequal, outer 2, broadly ovate, 0.8–1.0 × ca. 0.8 cm, red hirsute-villous on outer surface, apex rounded, margin entire, inner 2, elliptic or obovate, 0.6–0.8 × 0.4–0.7 cm, glabrous, apex rounded; **stamens** numerous,

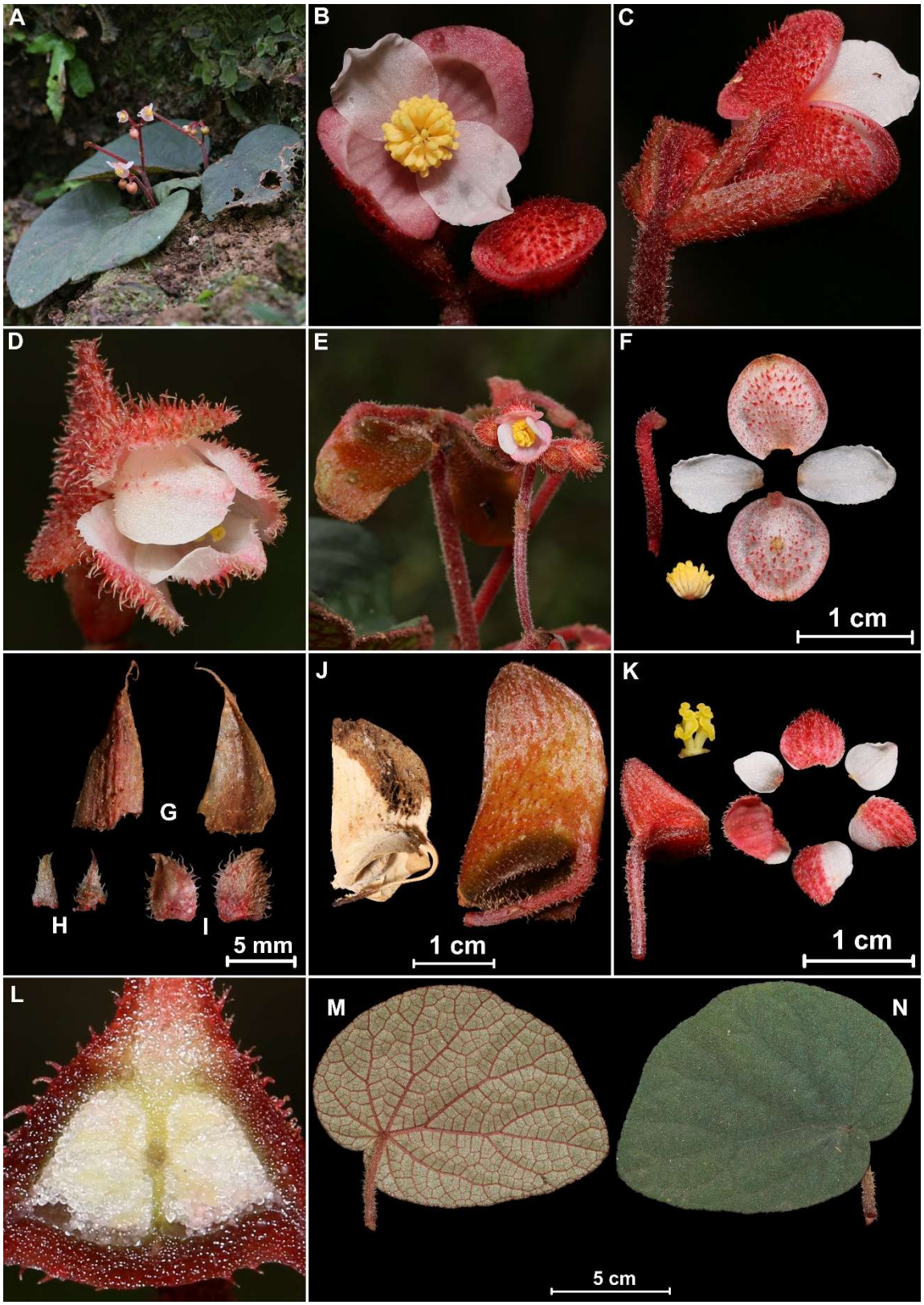

Fig. 7. ***Begonia chindwinensis*** Y.H.Tan, M.B.Maw & H.B.Ding, *sp. nov.* (photographed by H.B. Ding). **A.** habitat; **B.** male flowers (front view); **C.** male flower (back view); **D.** female flower (front view); **E.** inflorescence; **F.** tepals of male flower, androecium, pedicel; **G.** stipules; **H-I.** bracts; **J.** capsule; **K.** tepals of female flower, gynoecium, ovary with pedicel; **L.** cross section of ovary; **M.** single leaf (back view); **N.** single leaf (front view).

Table 3. Comparison of key morphological characters of ***Begonia chindwinensis***, ***B. gulinqingensis*** and ***B. forrestii***.

Affinities	*Begonia chindwinensis*	*Begonia gulinqingensis*	*Begonia forrestii*
Rhizomes	non-moniliform	non-moniliform	moniliform
Stipules	triangular, red or brown, adaxially subglabrous, abaxially rusty villous	triangular-lanceolate, margin ciliate	broadly ovate to subtriangular, glabrous
Leaf	suborbicular, cordate, overlapping	suborbicular, cordate	ovate to oval, cordate
Upper surface	subglabrous, extremely sparsely short setulose	several pale green spots, sparsely hispidulous	sparsely hispidulous
Lower surface	densely red strigose on reticulate veins	sparsely hirsute	densely hirsute
Petiole	3–12 cm, densely rusty villous	5.5–15 cm, red hairy	10–15 cm, densely red villous
Filaments	free	fused at base	fused at base
Female flower	tepals 5 or 6	tepals 5	tepals 5
Styles	2, fused at base	3, fused at base	2, fused at base
Ovary	2-loculed	3-loculed	2-loculed

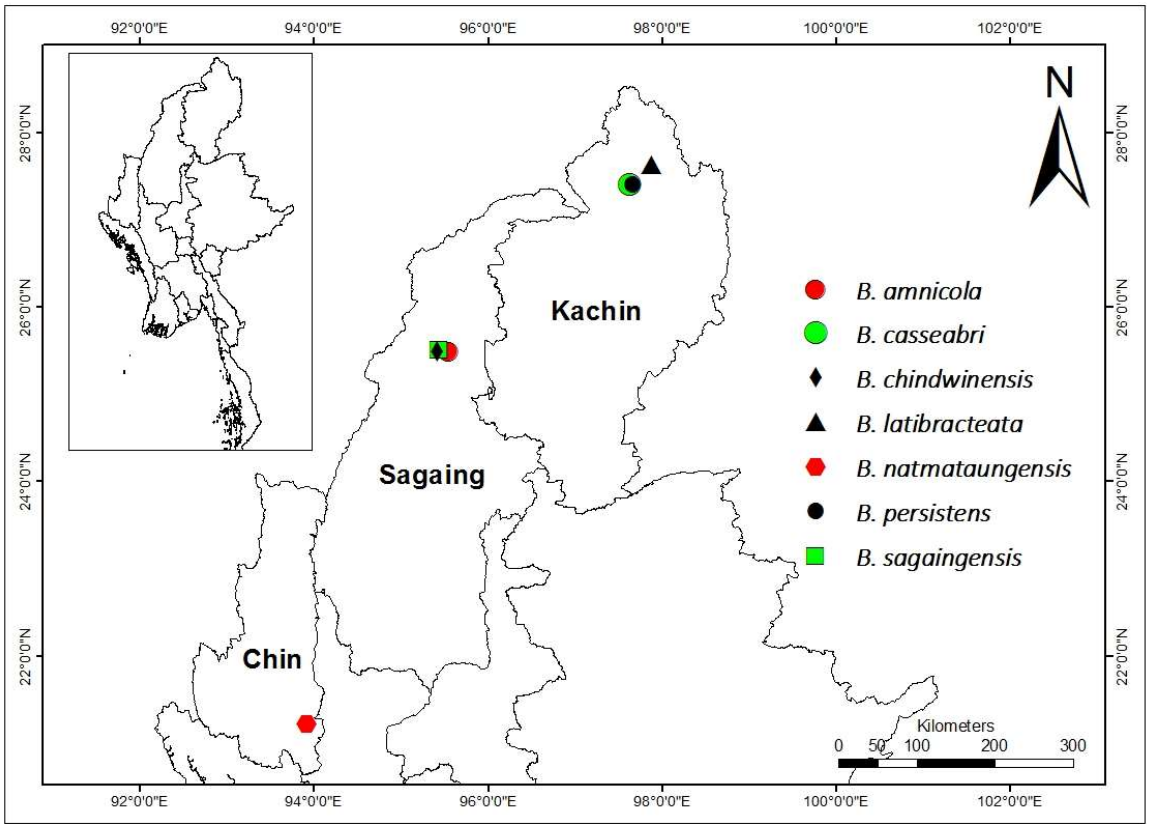

Fig. 8. Distribution map of the new species.

filaments free, ca. 1.5 mm long, anthers yellow, obovate, ca. 1.5 mm long, apex obtuse, apex obtuse, longer than filaments, with longitudinal slits. **Pistillate flower:** pedicel 0.9–1.4 cm, tepals 5 or 6, pink or white, outer 2, broadly ovate, 0.5–0.8 × ca. 0.7 cm, red hirsute-villous on outer surface, apex acute, margin entire fringed by hirsute especially near tip, inner 3 or 4, ovate, ca. 0.8 × 0.5 cm, densely to slightly hirsute-villous on the outer surface (sometimes glabrous), apex acute, margin entire fringed by hirsute especially near tip; **ovary** red, densely red villous, 2-loculed; placentation axillary; **styles** 2, fused at base, stigmas spirally twisted. **Capsule** ellipsoid, 3-winged, unequal; abaxial wing oblong-elliptic, ca. 0.7 × 0.5 cm; lateral wings lunate, ca. 0.4 × 0.7 cm.

***Phenology*:** Flowering from May to June; fruiting from June to July.

***Distribution*:** The new species is only found in the type locality, Htamanthi Wildlife Sanctuary, Hkamti District, Sagaing Region, Northern Myanmar (Fig. 8).

***Ecology*:** It grows in cool and moist environment in evergreen forest at about 185 m altitude.

***Etymology*:** The specific epithet refers to its type locality, Htamanthi Wildlife Sancturay is one of the key biodiversity area in Chindwin River Basin.

Vernacular: ချင်းတွင်းဧကြွပန်း (chindwin kywawy paann).

***Notes*:** *Begonia chindwinensis* shares similar characteristics to *B. gulinqingensis* S.H.Huang & Y.M.Shui from China and *B. forrestii* Irmsch. (in Irmscher 1939: 548) from China and Myanmar. See table 3 for the detailed comparison of new species to its morphologically allied species.

A diagnostic key to species of *Begonia* sect. *Platycentrum* in Myanmar

1a. Leaves peltate ..... ***B. wui-senioris***
1b. Leaves basifixed **2**
2a. Leaves compound ..... ***B. hemsleyana***
2b. Leaves simple **3**
3a. Leaves base symmetric or sub-symmetric **4**
3b. Leaves base asymmetric, oblique **9**
4. Fruit fleshy, berry-like; ovary 3 or 4-loculed **5**
4b. Fruit capsular; ovary 2-loculed **6**
5a. Plant with erect stem; leaves cauline, lanceolate to oblong ..... ***B. hayamiana***
5b. Plant without erect stem; leaves basal, pliciform ..... ***B. kingdon-wardii***
6a. Petiole sulcate; bracteoles present, under the ovary **7**
6b. Petiole not sulcate; bracteoles absent **8**
7a. Leaves blade narrowly lanceolate, 2−4 cm wide ..... ***B. rheophytica***
7b. Leaves blade broadly oval to ovate, 9–11 cm wide ..... ***B. persistens***
8a. Plant with erect stem; leaves cauline, lanceolate ..... ***B. amnicola***
8b. Plant without erect stem; leaves basal, ovate to elliptic .. ***B. togashii***
9a. Bracteoles present, under the ovary **10**
9b. Bracteoles absent **11**
10a. Leaves blade deeply lobed, divided to 2/3 of leaf length ..... ***B. latibracteata***
10b. Leaves blade not lobes, broadly ovate ..... ***B. casseabri***
11a. Fruit fleshy, berry-like; ovary 3 or 4-loculed **12**
11b. Fruit capsular; ovary 2-loculed **22**
12a. Plant monoecious **13**
12b. Plant dioecious **16**
13a. Petiole sulcate; leaves basal ..... ***B. hahiepiana***
13b. Petiole not sulcate; leaves cauline **14**
14a. Leaves blade deeply lobed ..... ***B. obovoidea***
14b. Leaves blade not lobes **15**
15a. Petiole 8–15 cm; leaves blade abaxially pale green ... ***B. longifolia***
15b. Petiole 1.5–3 cm; leaves blade abaxially red ..... ***B. chenii***
16a. Both male and female flowers with 2 tepals ..... ***B. kachinensis***
16b. Male flowers with 4–6 tepals, female flowers with 4–7 tepals . **17**
17a. Plant with erect stem; leaves cauline **18**
17b. Plant without erect stem; leaves basal **20**
18a. Leaves blade ovate to broadly ovate, margin entire to denticulate ..... ***B. roxburghii***
18b. Leaves blade lanceolate-ovate to lanceolate, margin serrate ... **19**
19a. Leaves adaxial surface green with white patches and dots, abaxial surface deep red with light green areas ..... ***B. chenii***
19b. Leaves adaxial surface green, abaxial surface pale green ..... ***B. acetosella***
20a. Leaves adaxial surface variegated green ..... ***B. burkillii***
20b. Leaves adaxial surface green without patches **21**
21a. Leaves blade broadly ovate, base cordate and overlapping ..... ***B. silletensis*** subsp. ***mengyangensis***
21b. Leaves blade ovate to lanceolate-ovate, base cordate but not overlapping ..... ***B. handelii***
22a. Flower yellowish color ..... ***B. flaviflora***
22b. Flower white to pink, or red color **23**
23a. Leaves margin lobed or incised **24**
23b. Leaves margin not lobed **30**
24a. Leaves deeply incised up to 2/3 of leaf length **25**
24b. Leaves shallowly incised less than 1/2 of leaf length **26**
25a. Plant more than 100 cm tall; stipules lanceolate .... ***B. sikkimensis***
25b. Plant less than 100 cm tall; stipules ovate ..... ***B. macrotoma***
26a. Leaves shallowly incised, less than 1/3 of leaf length **27**
26b. Leaves incised more than 1/3 of leaf length **28**
27a. Stem and petiole glabrous ..... ***B. megaptera***
27b. Stem and petiole villous ..... ***B. palmata***
28a. Plant without erect stem; leaves basal ..... ***B. natmataungensis***
28b. Plant with erect stem; leaves cauline **29**
29a. Leaves adaxially and abaxially with densely long villous ... ***B. villifolia***
29b. Leaves adaxially hispidulous, abaxially hirsute ..... ***B. difformis***
30a. Leaves blade lanceolate, elliptic, lanceolate-ovate or ovate-lanceolate **31**
30b. Leaves blade ovate, cordate, broadly ovate or suborbicular ... **37**
31a. Plant dioecious ..... ***B. mariachristinae***
31b. Plant monoecious **32**
32a. Stem glabrous **33**
32b. Stem hairy or puberulous **35**
33a. Male flowers with 2 tepals ..... ***B. nepalensis***
33b. Male flowers with 4 tepals **34**
34a. Petiole 1–3 cm, venation pinnate ..... ***B. sandalifolia***
34b. Petiole 8–10 cm, venation palmate ..... ***B. goniotis***
35a. Leaves adaxial surface dark green with white spots, abaxially red-purple ..... ***B. hatacoa***
35b. Leaves adaxial surface green, abaxially pale green **36**
36a. Leaves blade apex acuminate, margin serrulate or with small teeth ..... ***B. griffithiana***
36b. Leaves blade apex caudate, margin nearly entire to sparsely denticulate ..... ***B. medogensis***
37a. Plant with erect stem, leaves cauline or at least with some cauline leaves **38**
37b. Plant without erect stem; all leaves basal **45**
38a. Plant tuberous ..... ***B. paleacea***
38b. Plant rhizomatous **39**
39a. Petiole 0.9–5 cm, venation palmate-pinnate ..... ***B. discrepans***
39b. Petiole up to 15 cm, venation palmate **40**
40a. Stem and petiole covered by whitish soft spine **41**
40b. Stem and petiole without whitish soft spine **42**
41a. Leaves blade base with overlapping lobes, margin denticulate ..... ***B. crassitepala***
41b. Leaves blade base not overlapping, margin entire to slightly serrate ..... ***B. siamensis***
42a. Stipules with densely rusty tomentose ..... ***B. putaoensis***
42b. Stipules glabrous **43**
43a. Stem and leaves blade with red strigose hairs ..... ***B. cathcartii***
43b Stem and leaves blade without red strigose hairs **44**
44a. Leaves blade margin irregularly serrate, ciliate ..... ***B. dux***
44b. Leaves blade margin minutely serrate, glabrous ..... ***B. foveolata***
45a. Filaments free **46**
45b. Filaments fused at base **48**
46a. Leaves abaxial surface red to maroon ..... ***B. dicressine***
46b. Leaves abaxial surface pale green **47**
47a. Female flower 5 tepals, apex acute, margin entire with hirsute .... ***B. chindwinensis***
47b. Female flower 5–6 tepals, apex serrate with reddish pilose ..... ***B. sagaingensis***
48a. Rhizomes moniliform ..... ***B. forrestii***
48b. Rhizomes non-moniliform **49**
49a. Ovary and tepals glabrous ..... ***B. longiciliata***
49b. Ovary and outer tepals abaxially hairy **50**
50a. Leaves adaxial surface without spots, dark red to green ..... ***B. thomsonii***
50b. Leaves adaxial surface with spots or band **51**
51a. Leaves adaxial surface with brownish scattered spots .... ***B. rockii***
51b. Leaves adaxial surface with white/silver spots or band **52**
52a. Leaves adaxial surface green with blue iridescence and large silver spots ..... ***B. iridescens***
52b. Leaves adaxial surface dark green with a white/silver band ..... ***B. annulata***

ACKNOWLEDGMENTS

The authors are grateful to the Forest Research Institute of Myanmar for permission to conduct this study in the Northern Myanmar, and for their support and collaboration. We are grateful to Xiao-Dong Zeng, Ye Htet Lwin, Phyo, Kyaw Win Moung, Ye Tin Tun, Thin Su Tin, Kyaw Swar, Myint Zaw and Myo Khaing for their kind help in the field work. We also thank Dr. Dai-Ke Tian for his precious suggestion on new species identification and Dr. Ren-Bin Zhu for providing the photos. This work was financially supported by National Natural Science Foundation of China (Grant no. 31970223 and 32000162), and Lancang-Mekong Cooperation (LMC) Special Fund (Biodiversity Monitoring and Network Construction along Lancang-Mekong River Basin project) and the CAS 135 program (No. 2017XTBG-F03), CAS "the Belt and Road" Master Fellowship Program and CAS President's International Fellowship Initiative (PIFI) and the project of the Southeast Asia Biodiversity Research Institute, Chinese Academy of Sciences (Y4ZK111B01).

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