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Begonia arunachalensis (Begoniaceae), a new tuberous species of *Begonia* from Arunachal Pradesh, India

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ABSTRACT. A new species, *Begonia arunachalensis* D.Borah & Wahlsteen (Begoniaceae) is described and illustrated. It is distributed in Papum Pare District of Arunachal Pradesh where it grows near streams in rock crevices. *Begonia arunachalensis* is similar to *B. brevicaulis* A.DC. but differs in its pendent fruits, number of locules and capsule wings, and longer lateral wings. It belongs to *Begonia* sect. *Diploclinium*.

Keywords. Eastern Himalaya, morphology, Papum Pare, taxonomy

Introduction

Begonia L. with over 2035 accepted species (Hughes et al., 2015–) is one of the largest plant genera in the world and one of two genera in the family Begoniaceae (Taram et al., 2020). However, the total diversity of the genus is still poorly understood due to the high degree of endemism, high diversity and lack of proper documentation in the most species rich areas of the world, such as the Himalayas, Kalimantan and New Guinea. Northeast India has a total of 41 species of *Begonia* in four different sections (*Begonia* sect. *Diploclinium* (Lindl.) A.DC., sect. *Parvibegonia* A.DC., sect. *Platycentrum* (Klotzsch) A.DC. and sect. *Monophyllon* A.DC.) (Camfield & Hughes, 2018; Krishna et al., 2021; Taram et al., 2020, 2021; Borah, 2021a,b). *Begonia* sect. *Diploclinium* includes about 85 species distributed in Bhutan, China, India, Laos, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Sri Lanka, Taiwan, Thailand, Vietnam and West Papua. In northeast India about 10 species are present. The section is phylogenetically close to *Begonia* sect. *Platycentrum* and the former *B*. sect. *Sphenanthera* (Hassk.) Warb. and would form a monophyletic section if they were to be merged (Moonlight et al., 2018). However, such a treatment would result in a highly polymorphic section distinguished by no obvious morphological characters. The species of *Begonia* sect. *Diploclinium* are usually monoecious, tuberous and creeping. The inflorescence may be terminal or axillary with white or pink flowers,

and pistillate flowers have 3-locular ovaries and usually 3 styles. It is similar to species in *Begonia* sect. *Platycentrum* but differs in its 3-locular ovary (vs 2), connective not extended (vs extended) and tuberous habit (vs rhizomatous).

The authors collected several interesting specimens of *Begonia* spp. while conducting field trips in different districts of Arunachal Pradesh, Northeast India. One of them has recently been described as *Begonia oyuniae* Taram & N.Krishna (Taram et al., 2020) and others are in press. One such interesting tuberous specimen collected in Kimin, Papum Pare District was found to be a hitherto undescribed species. The taxonomic status was established after critical evaluation of relevant literature (Clarke, 1879; Gu et al., 2007; Camfield & Hughes, 2018) and type materials deposited in different herbaria (ASSAM, CAL, E, K and PE).

Taxonomy

Begonia arunachalensis D.Borah & Wahlsteen, **sp. nov.**
Similar to *Begonia brevicaulis* A.DC. but can be distinguished by its pendent (vs recurved) fruit, number of locules 3–4 (vs 2), capsule wings 2–5 (vs 3) and lateral wings to 3 cm (vs 0.7 cm). From *Begonia picta* Sm. it differs in lateral wings to 3 cm (vs 1.2 cm), pistillate flower with 4 tepals (vs mostly 5) and c. 25 stamens (vs numerous). – TYPE: India, Arunachal Pradesh, Papum Pare District, Kimin, 210 m, 22 August 2019, *D. Borah, M. Taram & L. Yama 5671* (holotype CAL; isotype CAL). (Fig. 1, 2)

Plant monoecious, tuberous, perennial, 3–20 cm tall. Stem 4–17 cm long, 2–5 mm thick, internodes 0.7–9 cm long. ***Stipules*** translucent, green, ovate, 1.8–2.0 × c. 1 mm, pubescent, margin entire, apex cuspidate. ***Petiole*** whitish green, terete, 0.5–10.5 cm long, 1–3 mm thick, pubescent, hairs white. ***Blade*** green, broadly ovate to orbicular, 4–11 × 3.5–10 cm, asymmetric, densely hairy on both surfaces; venation palmate, 7–9 veined; slightly cordate at base, lobes not overlapping, margin irregularly dentate, apex acuminate. ***Inflorescence*** axillary, 2.5–15 cm long, 1–3 branched, peduncles reddish green, densely pubescent, 1–3 mm in diam.; bracts ovate, 1.8–2 × 0.8–1 mm, pubescent on both sides, margin entire. ***Flowers*** 2–10 per inflorescence. ***Staminate flower:*** pedicel light green to reddish green, pubescent, flowers 1–3 cm in diam.; tepals 4; outer 2 larger, ovate, 8–11 mm long, pubescent outside, glabrous inside, whitish pink; inner 2 smaller, obovate, 4–7 mm long, glabrous, white; androecium 3–5 mm long, 1–2 mm wide, stamens 25+, filaments 1–2 mm long, anthers yellow, ovate, 0.8–1 mm, apex rounded. ***Pistillate flower:*** pedicel pink, pubescent, 2–4.5 cm long; flowers 0.8–1 cm in diam.; tepals (3–)4, pinkish white, pubescent outside, glabrous inside; outer 2 broadly ovate to round, 4–6 mm long; inner tepals broadly obovate, 2.5–5 mm long; styles fused, 1–3 mm long; stigma 3–4, yellow; ovary 4–5 mm long, pinkish green, densely pubescent, 2–5 winged. ***Capsule*** 0.7–1.1 cm long, pendent, lateral wings up to 3 cm; locules 3–4.

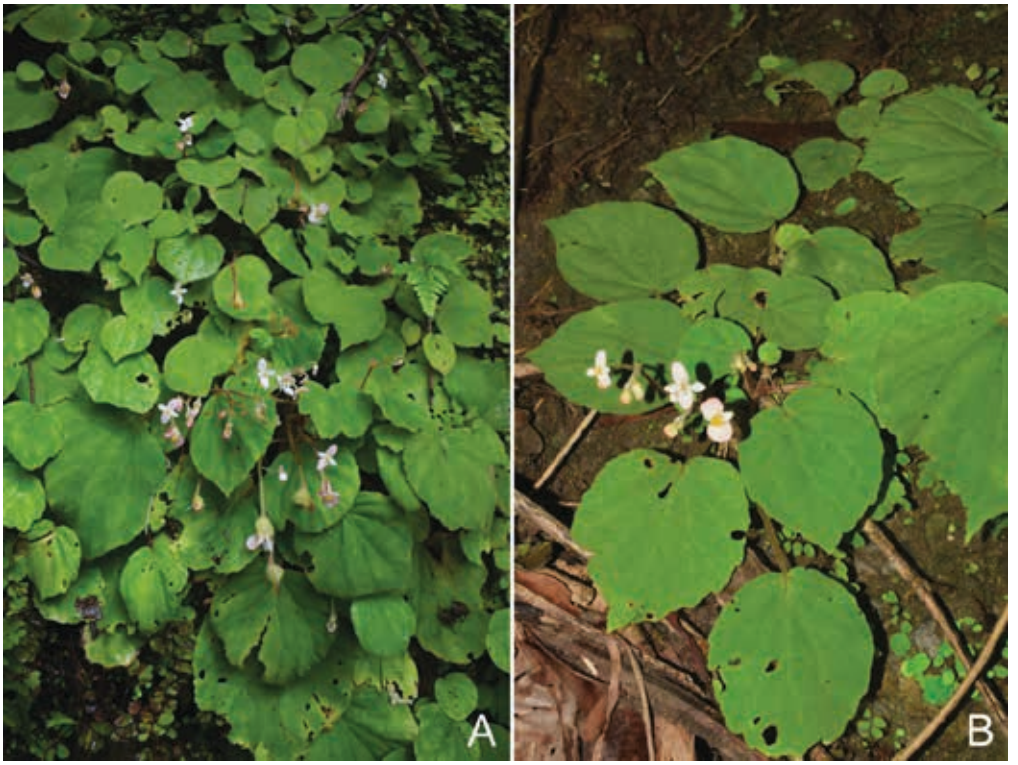

Fig. 1. *Begonia arunachalensis* D.Borah & Wahlsteen. **A.** Habitat. **B.** Habit. All photographed near Kimin, Papum Pare disctrict, Arunachal Pradesh. (Photos: D. Borah)

Distribution, habitat and phenology. The new species is endemic to Arunachal Pradesh. It grows near streams, waterfalls, and moist shaded areas at about 200 meters above sea level in rock crevices by the roadside. It is associated with *Henckelia hookeri* (C.B.Clarke) D.J.Middleton & Mich.Möller, *Globba multiflora* Wall., *Elatostema* sp., *Rhynchotechum ellipticum* (Wall. ex D.Dietr.) A.DC., *Monolophus coenobialis* Hance, etc. *Begonia arunachalensis* flowers and fruits from August to September.

Etymology. The specific epithet refers to the state of Arunachal Pradesh, where the species was discovered.

Provisional IUCN conservation assessment. Least Concern (IUCN Standards and Petitions Committee, 2019). Approximately 2000 individuals were found in several scattered locations in Kimin, Lower Subansiri District of Arunachal Pradesh over a range of 10 km.

Notes. Begonia arunachalensis belongs to *Begonia* sect. *Diploclinium* which is characterised by its tuberous habit, three locules and two placental branches per locule. Although *Begonia brevicaulis* is rather similar to the new species, it belongs

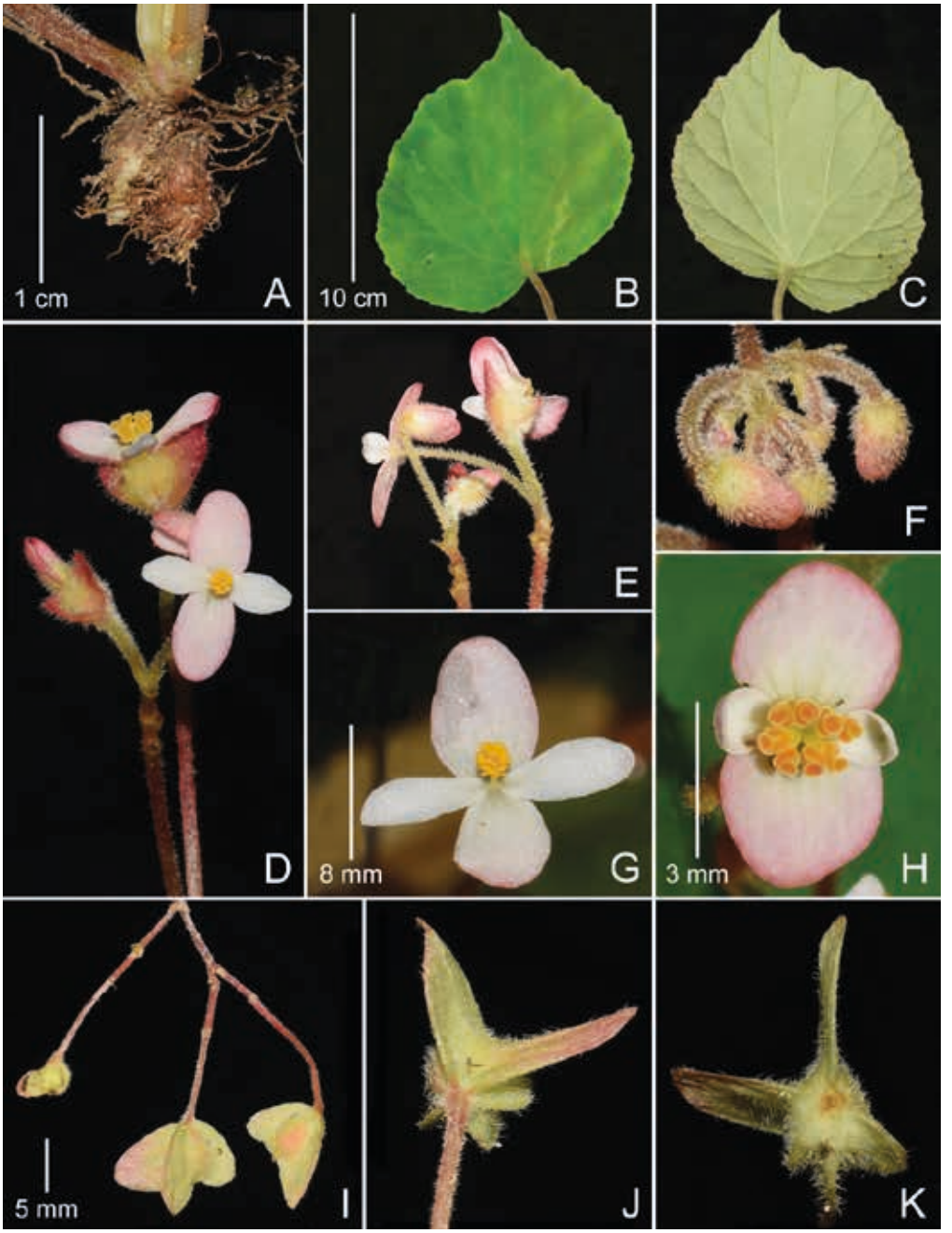

Fig. 2. *Begonia arunachalensis* D.Borah & Wahlsteen. **A.** Tuber. **B.** Leaf adaxial surface. **C.** Leaf abaxial surface. **D, E.** Inflorescence. **F.** Buds showing pubescence. **G.** Male flower. **H.** Female flower. **I–K.** Fruit. (Photos: D. Borah)

to *Begonia* sect. *Parvibegonia* with two locules and terminal inflorescences and is found in Meghalaya. *Begonia picta* is in the same section as the new species, and is also found in Arunachal Pradesh, but is easy to identify by its variegated leaves. The new finding adds to the species richness of Arunachal Pradesh and shows that ongoing botanical surveys of the area are essential for a better understanding of the species composition and ecology of the state.

Identification key to the species of *Begonia* sect. *Diploclinium* in Arunachal Pradesh

1a. Leaves peltate ..... *B. josephi*
1b. Leaves basifixed 2

2a. Plants rhizomatous ..... *B. scintillans*
2b. Plants tuberous 3

3a. Plant caulescent, stem upright, inflorescences born on the main stem ..... *B. pedunculosa*
3b. Plant acaulescent, inflorescences born directly from tuber 4

4a. Plant dioecious; capsule wings equal; petiole short (1–5 cm) ..... *B. dioica*
4b. Plant monecious; capsule wings unequal; petiole long (3–16 cm) 5

5a. Tepals glabrous, small (2–7 mm long) ..... *B. ovatifolia*
5b. Tepals hairy, long (5–21 mm long) 6

6a. Number of stamens 8–10; tepals 5–10 mm long ..... *B. labordei*
6b. Number of stamens 16–100; tepals 8–21 mm long 7

7a. Leaves often variegated; tepals serrate, female tepals 5 ..... *B. picta*
7b. Leaves plain green; tepals entire, female tepals 4 ..... *B. arunachalensis*

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References

Borah, D., Taram, M. & Wahlsteen, E. (2021a). *Begonia dicressine* (Begoniaceae): a new record for India. *Nat. Conservation Res.* 6(4): 1–2.

Borah, D., Taram, M. & Wahlsteen, E. (2021b). *Begonia limprichtii* Irmsch. (Begoniaceae) – a new record for India. *Biodivers. Res. Conservation* 61: 29–33.

Camfield, R. & Hughes, M. (2018). A revision and one new species of *Begonia* L. (Begoniaceae, Cucurbitales) in Northeast India. *Eur. J. Taxon.* 396: 1–116.

Clarke, C.B. (1879). Begoniaceae. In: Hooker, J.D. (ed.) *Flora of British India*, vol 2, pp. 636–656. London: L. Reeve & Co.

Gu, C., Peng, C.I & Turland, N.J. (2007). Begoniaceae. In: Wu, Z. & Raven, P. (eds) *Flora of China*, vol. 13, pp. 153–207. Beijing: Science Press; and St Louis: Missouri Botanic Garden Press.

Hughes, M., Moonlight, P.W., Jara, A. & Pullan, M. (2015–). Begonia *Resource Centre*. http://padme.rbge.org.uk/begonia/. Accessed 31 Aug. 2021.

IUCN Standards and Petitions Committee (2019). *Guidelines for Using the IUCN Red List Categories and Criteria.* Version 14. Prepared by the Standards and Petitions Committee. Available from http://iucnredlist.org/documents/RedListGuidelines.pdf.

Krishna, N., Pradeep, A.K., Amrutha, A. & Jayakrishnan, T. (2021). A new species and a new record of *Begonia* (sect. *Platycentrum*, Begoniaceae) from northeastern India. *Phytotaxa* 482(3): 261–267.

Moonlight, P.W., Ardi, W.H., Padilla, L.A., Chung, K.F., Fuller, D., Girmansyah, D., Hollands, R., Jara-Muñoz, A., Kiew, R., Leong, W.-C. et al. (2018). Dividing and conquering the fastest-growing genus: towards a natural sectional classification of the mega-diverse genus *Begonia* (Begoniaceae). *Taxon* 67(2): 267–323.

Taram, M., Borah, D., Krishna, N., Pradeep, A.K., Amrutha, A. & Hughes, M. (2020). *Begonia oyuniae* (*Begonia* sect. *Monophyllon*, Begoniaceae), a remarkable new species from Northeast India. *Gard. Bull. Singapore* 72: 109–115.

Taram, M., Borah, D. & Hughes, M. (2021). *Begonia kekarmonyingensis* (Begoniaceae), a new species from Arunachal Pradesh, Northeast India. *Phytotaxa* 494(3): 268–272.