

Synopsis of the genus *Tropidia* Lindl. (Orchidaceae) in Assam, India along with a newly recorded species

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Abstract

Present paper deals with the species diversity and distribution of the orchid genus *Tropidia* Lindl. in Assam, India. There are three species of *Tropidia* in the flora of Assam viz. *Tropidia angulosa* (Lindl.) Blume, *T. curculigoides* Lindl. and a new addition to India viz. *T. formosana* Rolfe ex Hemsl. This attempt is the first step to correct taxonomic identification to workout currently accepted botanical names, brief description with present ecological status, habitat, phenology and local and general distribution of *Tropidia* species.

Key words: *Tropidia*, Diversity, Distribution, Status, Assam.

INTRODUCTION

Orchids belong to the family Orchidaceae which is considered to be the most highly evolved in the floral specialization and diversified form among the monocotyledonous angiosperms. So, orchids have been occupying an important role in horticulture and floriculture for their exquisite beauty. *Tropidia* Lindl. is a genus with relatively less attractive flowers, but whose constituent species are getting rare due to the progressive loss of natural habitats (De & Hajra 2001).

The genus *Tropidia* was established by Lindley in 1849 in his work *Edwards's Botanical Register*. There are about 40 species (Misra 2004; Pridgeon *et al.* 2003; Holttum 1964) distributed mainly in tropical and subtropical Asia, with a few species extending to Australia and the Pacific islands and *T. polystachya* Ames is reported from Central and North America and is the only species known to be outside of Asia. According to De & Hajra (2001) and Misra (2007, 2012) six species are reported from India viz. *Tropidia angulosa* (Lindl.) Blume, *T. curculigoides* Lindl., *T. hegderaoi* S.Misra, *T. pedunculata* Blume, *T. thwaitesii* Hook.f. and *T. bambusifolia* (Thwaites) Trimen. Recently, Kumar *et al.* (2015) reported the occurrence of *T. namasiae* C.K. Liao, C.P. Lin & M.S. Tang from Manipur making the total number as seven. In Assam the genus was represented so far by two species viz. *T. angulosa* and *T. curculigoides* (Gogoi *et al.* 2015; De & Hajra 2001; Chowdhury, 2005; Hajra & De 2011). In the present paper, one more species viz. *T. formosana* Rolfe ex Hemsl., which is hitherto known endemic to South West Thiwan (Lin *et al.*, 2006) is reported for the first time as a new addition to the Indian orchid flora from Assam.

The intensive field surveys were carried out during 2006 – 2016 covering all seasons of the year in the forested areas of entire Assam. Collected Orchid specimens, along with species of *Tropidia*, were processed for herbarium specimens. Plants were basically

photographed the in the natural habitat and then in the laboratory during study. The specimens were identified along with latest nomenclature by consulting the literatures of Hooker (1890); King and Pantling (1898); Pradhan (1979); Pearce and Cribb (2002); Mishra (2007); Lucksom (2007); Chowdhery (1998) and from <http://www.theplantlist.org>. Herbarium specimens have been deposited in the Forest Department Herbarium at Karbi Anglong; Herbarium of Department of Botany, Guwahati University and Herbarium of The Orchid Society of Eastern Himalaya (TOSEHIM), Regional Orchid Germplasm Conservation and Propagation Centre (Assam Circle), Assam.

ENUMERATION

TROPIDIA Lindl., Edwards's Bot. Reg. 19: ad t. 1618. 1833.

Herbs terrestrial, autotrophic rarely mycotrophic. Rhizome ascending, stout; roots wiry, fibrous. Stem erect, rigid, branched or unbranched, noded, with sheaths at nodes. Leaves 2 to many, plicate, ovate to narrowly lanceolate, base contracted into amplexicaul sheaths. Inflorescence a short raceme or panicle, terminal or arising from leaf axils near apex of stem, several or many flowered. Flowers resupinate or not. Dorsal sepal free; lateral sepals free or connate to form a synsepal and embracing base of lip. Petals free, similar to sepals or slightly smaller; lip cymbiform, slightly shorter than sepals, entire, with or without a short spur, sometimes constricted at middle, base loosely embracing column, distally expanded, apex acuminate and reflexed. Column short; anther dorsal, erect; rostellum prominent, erect, bifid after viscidium removed; pollinia 2, granular-farinaceous, sectile, with slender caudicle and peltate viscidium.

About 20 species: mainly in tropical and subtropical Asia, with a few species extending to Australia and the Pacific islands and one in Central and North America; 8 species in India, 3 in Assam.

Key to the Species

- 1a. Leaves usually two; inflorescence many flowered raceme; lip spurred *T. angulosa*
- 1b. Leaves many; inflorescence spike or raceme; lip not spurred 2
- 2a. Leaves more than 10; inflorescence short, terminal or axillary, few flowered
..... *T. curculigoides*
- 2b. Leaves 3–5; inflorescence long, terminal, more than 20 flowered *T. formosana*

Tropidia angulosa (Lindl.) Blume, Coll. Orchid.: 122. 1859. Hook.f., Fl. Brit. India. 6: 92. 1890; Pradhan, Indian Orch. I: 101. 1976; Chowdhery, Orch. Fl. Arunachal Prad. 676. 1998; Lucksom, Orch. Sikkim North East Him. 73. 2007; Mishra, Orch. India, 318. 2007.

Cnemidia angulosa Lindl., Edwards's Bot. Reg. 19: t. 1618. 1833. *Decaisnea angulosa* Lindl. ex Wall., Numer. List: 7388. 1832, *nom. nud.*; *Cnemidia semilibera* Lindl., Edwards's Bot. Reg. 19: t. 1618. 1833. *Govindooia nervosa* Wight, Icon. Pl. Ind. Orient. 6: 34. 1853. *Tropidia govindovii* Blume, Coll. Orchid.: 122. 1859. *Tropidia semilibera* (Lindl.) Blume, Coll. Orchid.: 122. 1859. *Tropidia barbeyana* Schltr., Bull. Herb. Boissier, II, 6: 300. 1906. *Tropidia calcarata* Ames, Philipp. J. Sci., C 7: 7. 1912. *Tropidia bellii* Blatt. & McCann, J. Bombay Nat. Hist. Soc. 35: 730. 1932. [PLATE - I: Figure 1]

Plants 16–45 cm tall. Rhizome short, rigid. Stem erect, branched, internodes 3–6.5 cm; proximal nodes naked or with tubular sheaths, distal nodes enclosed in sheaths. Leaves 2, apical, subopposite, elliptic or ovate-elliptic, 10–17 × 4–9 cm, papery, base contracted into amplexicaul sheaths, apex long acuminate. Inflorescence a terminal raceme with more than

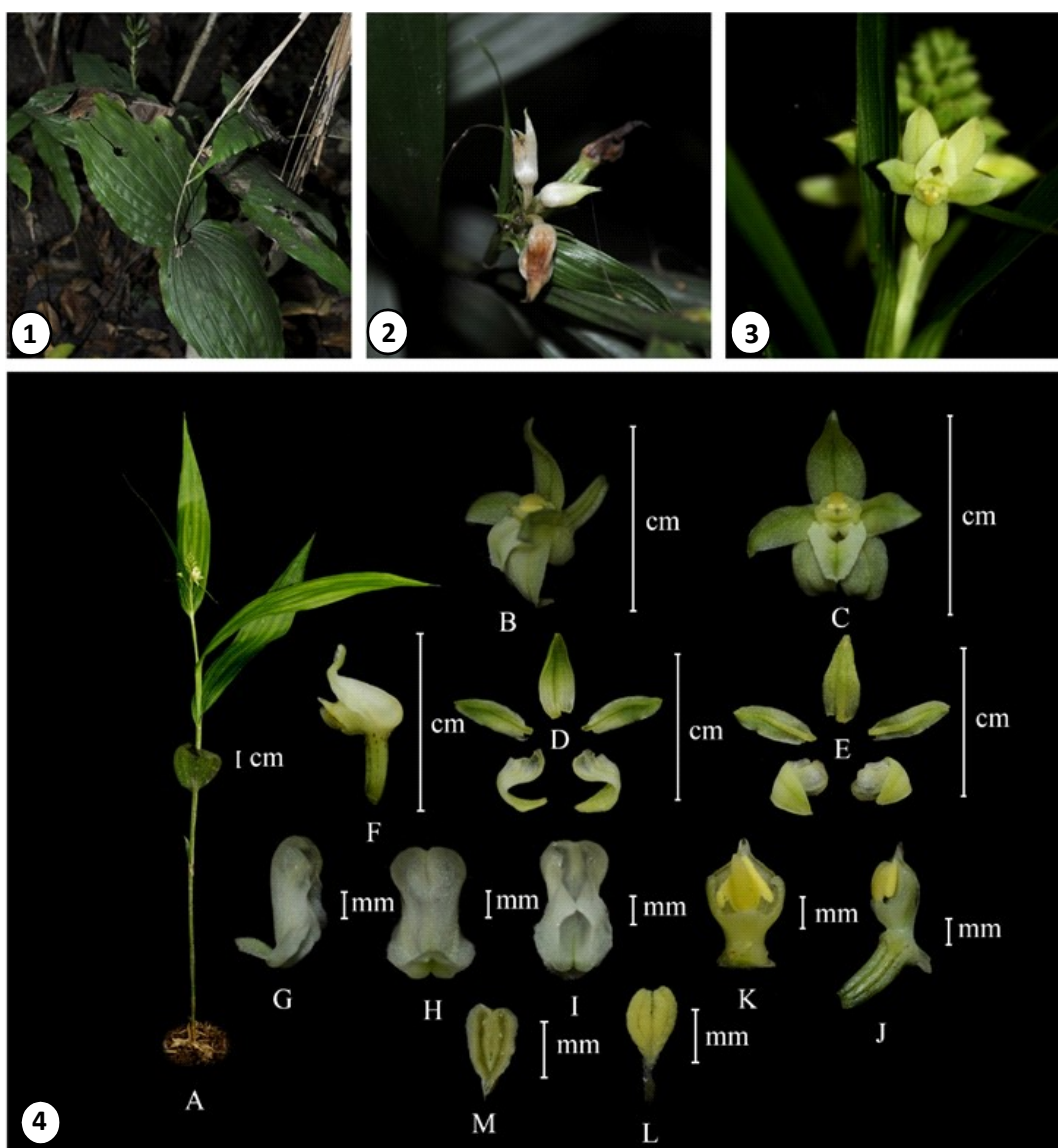


PLATE - I: Figures 1. *Tropidia angulosa* (Lindl.) Blume; 2. *Tropidia curculigoides* Lindl.; 3 & 4. *Tropidia formosana* Rolfe ex Hemsl.; 4. *Tropidia formosana* Rolfe ex Hemsl.: A. habit; B & C. flower; D & E. perigone, ventral and dorsal views; F. lip with ovary and column; G, H & I. lip; J. pedicel, ovary and column; K. column; L. Pollinia; M. anther cap.

10 flowers, 5–8 cm. Flowers not resupinate, greenish white; pedicel and ovary 6–9 mm. Dorsal sepal linear-lanceolate, 0.8–0.9 × 0.15 cm, apex acuminate or acute; lateral sepals almost completely connate and forming a synsepal; synsepal suboblong, 0.8–1 × 0.2–0.25 cm, apex shallowly 2-lobed, embracing lip and connected to spur at its base. Petals linear-lanceolate, 0.8–0.9 × 0.15 cm; lip suboblong, 0.6–0.7 × 0.2 cm, with 2 slightly thickened longitudinal ridges from middle to base, base spurred; spur cylindrical, 0.4 × 0.1–0.15 cm, apex obtuse. Column 0.6 cm; anther erect, ovoid-lanceolate, 0.35 cm; rostellum erect, lanceolate. Capsule oblong-ellipsoid, 1–1.5 × 0.6–0.7 cm.

Flowering: September.

Habitat: Terrestrial in dense humid evergreen forest and forest margins.

Distribution: China, Bhutan, India (Assam, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Orissa, Sikkim, Tamil Nadu, Tripura), Indonesia, Japan, Malaysia, Myanmar, Thailand, Vietnam.

Status: Rare, the species is found in some forested area mainly in Karbi-Anglong and Manas National park.

Specimen examined: India, Assam, Karbi-Anglong district, Dephu, *Gogoi- 0609*, dated 03.03.2011.

Tropidia curculigoides Lindl., Gen. Sp. Orchid. 497. 1840; Pradhan, Indian Orch. I: 101. 1976; Chowdhery, Orch. Fl. Arunachal Prad. 676. 1998; Lucksom, Orch. Sikkim North East Him. 73. 2007; Mishra, Orch. India, 318. 2007.

Tropidia assamica Blume, Coll. Orchid.: 124. 1859. *Tropidia graminea* Blume, Coll. Orchid.: 124. 1859. *Tropidia squamata* Blume, Coll. Orchid.: 123. 1859. *Tropidia hongkongensis* Rolfe, J. Linn. Soc., Bot. 36: 40. 1906. *Schoenomorphus capitatus* Thorel ex Gagnep., Bull. Soc. Bot. France 80: 351. 1933. [PLATE - I: Figure 2]

Plants 30–70 cm or taller. Rhizome short, rigid; roots 2–3 mm in diam., fleshy. Stem erect, unbranched or occasionally with branches, proximally often naked, distally enclosed in leaf sheaths, internodes 2–4 cm. Leaves many, often more than 10, distichous and well spaced along stem, narrowly elliptic-lanceolate to narrowly lanceolate, 10–25 × 2–4 cm, papery, base contracted into amplexicaul sheath, apex long acuminate- caudate. Inflorescence racemose, terminal or axillary, with few white flowers, 1–2.5 cm. Flowers not resupinate, greenish white; pedicel and ovary 0.5–0.6 cm. Sepals lanceolate or oblong-lanceolate, 0.7–1 × 0.15–0.2 cm, apex long acuminate; lateral sepals connate only at base, apex recurved. Petals oblong-lanceolate, 0.6–0.8 × 0.13 cm; lip ovate-lanceolate or oblong-lanceolate, cymbiform, 0.6–0.8 cm, concave-saccate at base, with 2 inconspicuous lamellae on disk, apex acuminate. Column 0.3 cm; anther ovoid, rostellum erect, obovate, apex 2-lobed-apiculate. Capsule suboblong, 2 cm × 0.5 cm.

Flowering: September- November.

Habitat: Terrestrial in dense humid evergreen forest and evergreen montane forest.

Distribution: India (North-East India and Eastern Himalayas, Andaman & Nicobar Islands, Assam, Bihar, Kerala, Madhya Pradesh, Orissa, Sikkim, West Bengal), Burma, China, Taiwan, Thailand, Cambodia, Vietnam, Peninsular Malaysia, Singapore, Java, Borneo, lesser Sunda Is., New Guinea, Australia.

Status: Very common, the species is found in all the forested areas of Assam.

Specimen examined: India, Assam, Tinsukia district, Dehing-Patkai, *Gogoi- 0479*, dated 10.10.2009.

Tropidia formosana Rolfe ex Hemsl., Ann. Bot. (Oxford) 9: 158. 1895; Lin, T.-P., H.-Y. Liu, C.-F. Hsieh & K. -H. Wang, in *Taiwania* 61(2): 78–126. 2016. *Tropidia nanhuae* W.M. Lin, Kuo Huang & T.P. Lin in *Taiwania* 51: 165. 2006; Chen *et al.*, in *Flora of China* 25: 76. 2009. [PLATE - I: Figure 3, 4]

Plants terrestrial, 20-30 cm tall. Rhizome short, ascending; roots filiform. Stem erect, slender, unbranched, internodes 1.7-5.5 cm, enclosed with leaf sheaths. Leaves 3-6, glossy dark

green, alternate, lanceolate-oblong, 2-17 × 0.5-3.5 cm, 5-7 nerved, apex acuminate, base rounded; sheaths long. Inflorescence terminal, densely many flowered, 2.5-3 cm, corymb. Flowers not resupinate, greenish-white, glabrous, 0.6 × 0.4 cm; pedicel and ovary about 0.4 cm, ovary with black hairs. Dorsal sepal free, 1 nerved, lanceolate, 0.5-0.6 × 0.25 cm, concave, apex acute; lateral sepals 1 nerved, lanceolate, 0.7 × 0.25 cm, connate at base and forming a synsepal, apex recurved; synsepal bilobed at apex, saccate at base. Petals 1 nerved, lanceolate, 0.5 × 0.2 cm, concave, keeled abaxially, apex acute. Lip 0.5-0.55 × 0.2 cm, bilobed, saccate at base, ligulate, apex recurved, disk bearing a pair of rounded calli toward apex, and with 2 longitudinal ridges toward base; column straight, 0.3 cm including rostellum; rostellum erect, obovate; anther ovate, fleshy, 0.15 × 0.1 cm, apex rounded; Pollinia 2, clavate, 0.15 × 0.2 cm, stipe slender; viscidium linear-lanceolate; stigma broadly triangular.

Flowering time: July – August

Habitat: This orchid was collected by the author, from Borhollong village, Tinsukia, Assam at an elevation about 180 m. It grows in shaded places of bamboo plantation, only 5 individuals have been found.

Distribution: India (Assam) and southwestern Taiwan.

Status: Rare; found only in one locality.

Specimen examined: India, Assam, Tinsukia district, Borhollong village, *Gogoi- 00766*, dated 21. 08. 2016.

Note: *T. formosana* is similar to *T. curculigoides* Lindl. *T. formosana* bears a long inflorescence with over 20 flowers in a dense raceme, and a greenish perianth. In contrast, the inflorescence of *T. curculigoides* is mostly axillary, and the raceme is almost sessile, with only a few white flowers in the inflorescence (Table 1).

Table 1. Distinguishing characters between *T. formosana* and *T. curculigoides*

Character	<i>T. formosana</i>	<i>T. curculigoides</i>
Habit	Plants is only 20-30 cm high	30–70 cm or taller
Inflorescence	Inflorescence with 20 (some times more) flowers, always terminal and densely flowered.	With 3 – 10 flowers, always axillary rarely terminal.
Flower	Flowers widely open	Not widely open.
Sepals	Lateral sepals connate at base and forming a synsepal.	Lateral sepals connate only at base not forming synsepal.

CONCLUSION

During recent field studies in Assam three species of *Tropidia* Lindl. viz. *T. angulosa* (Lindl.) Blume, *T. curculigoides* Lindl. and *T. formosana* Rolfe ex Hemsl. were recorded. Of these *T. formosana* is new record for Assam and also to India. Out of these *T. angulosa* and *T. formosana* found to be rare and *T. curculigoides* is a common species in the region.

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