

NOTES ON THE CORRECT IDENTITY OF *CERATOSTYLIS SIAMENSIS* (EPIDENDROIDEAE: PODOCHILEAE) FROM INDIA

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ABSTRACT. While conducting taxonomic studies on the tribe Podochileae (Orchidaceae) for the Flora of India, two species, *Ceratostylis siamensis* and *Ceratostylis himalaica* have been examined using types, protologues, fresh specimens, and authentic herbarium collections. *Ceratostylis siamensis* was previously reported and documented in Arunachal Pradesh, India. However, we determined upon closer examination that this record was based on erroneous identification. The correct identity of this species is *C. himalaica*. Consequently, *Ceratostylis siamensis* is excluded from the flora of India.

KEYWORDS / PALABRAS CLAVE: Arunachal Pradesh, *Ceratostylis himalaica*, identificación errónea, misidentificación, orchids, orquídeas, taxonomía, taxonomy

Introduction. The genus *Ceratostylis* Blume (Orchidaceae: Epidendroideae: Podochileae) comprises approximately 147 species distributed from India and China through Southeast Asia, New Guinea and the southwest Pacific islands (Chase *et al.* 2015, Pridgeon *et al.* 2005). Three species are found in India (Singh *et al.* 2019).

The genus is exclusively characterized by solitary, terete or dorsiventrally flattened leaf, midlobe of labellum swollen and bulbous. During a taxonomic revision of *Ceratostylis* in India under the National Mission on Himalayan studies, *Ceratostylis siamensis* Rolfe ex Downie and *Ceratostylis himalaica* Hook.f. have been studied with types, protologues, fresh specimens and authentic herbarium collections. Whether true *C. siamensis* distributed in China, Laos, Thailand, Tibet, Vietnam, has been found distinct by virtue of its short, erect, unbranched stems (1.5–5.0 cm long) with closely placed pseudobulbs forming a tuft; leaves obliquely emarginate with obtuse lobes, lateral sepals are 3-veined and the labellum is distinctly 3-lobed.

Gogoi and Riniya (2020) recorded *Ceratostylis siamensis* from the Ziro Valley, Lower Subansiri district of Arunachal Pradesh. This marked a new distributional record for India. Through meticulous examination of voucher specimens of *C. siamensis* deposited at the Herbarium of the Orchid Research Centre Tippi (not listed in “Index Herbariorum,” henceforth abbreviated as OHT) and the Herbarium of the Orchid Society of Eastern Himalaya (TOSEHIM), Regional Orchid Germplasm Conservation and Propagation (Assam Circle), as well as living specimens conserved in the conservatory of the CCF office at Hapoli in the Lower Subansiri district and with consultation of relevant literature (Chen *et al.* 2009, Chowdhery 1998, Hooker 1890, 1894, King & Pantling 1898, Pal 2013, Pearce & Cribb 2002, Pradhan 1979, Rao 2010, Seidenfaden 1986, Singh *et al.* 2019), it was identified as *C. himalaica* Hook.f. Therefore, *C. siamensis* has been excluded from Indian flora. A comprehensive description of *C. himalaica* and its relationship with *C. siamensis* has been discussed. Information on phenology, habitat, distribution & specimens are included to facilitate a better understanding for *C. himalaica*.

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Ceratostylis himalaica Hook.f., *Fl. Brit. India* 5: 826. 1890; *Ritaia himalaica* (Hook.f.) King & Pantl., *Ann. Roy. Bot. Gard. (Calcutta)* 8: 157, t.214. 1898; *Ceratostylis siamensis* auct. non Rolfe ex Downie. 1925: Gogoi & Riniya, *Richardiana*: 134, f. 1–2. 2020. *Eria ramosissima* Wall. ex Hook.f., *Fl. Brit. India* 5: 826. 1890.

TYPE: Bhutan, *Griffith 5214* (P!) [P00403825] **Lectotype** (inadvertent designation by Seidenfaden, 1986: 117 by reference to “P! Type”); *Griffith 5214* (syn. K-LINDL!) [K000810605]; *Griffith 1187* (syn. K-LINDL!) [K000810604]; East Nepal, 10th Dec., *Hooker 359* (syn. K-LINDL!) [K000810606]; *Hooker 359* (syn. K-LINDL!) [K000810603]; India, Khasia Hills, *Gibson s.n.* (syn. CAL).

Epiphytic, prostrate plants, 7–19 cm long. *Stems* 4–15 cm long, pendulous, dichotomously branched, branched stem is formed by the union of rhizome segments from the base of each pseudobulbs; the elongation of the stem continues with age by adding the fresh shoots every season, enveloped thoroughly by 0.5–1.5 cm long sheaths; sheaths many imbricate, scale-like, ovate-lanceolate, subacute with strongly veined, each branches bearing a single leaf. *Leaves* 5.4–6.6 × 0.5–0.7 cm, linear-oblong, fleshy, apex unequally bilobed, smaller lobe acute and larger lobe acute or rounded, base tapering towards 0.6–1 cm long petiole. *Inflorescence* 0.8–1.5 cm long, arising from base of the leaf, 1–2-flowered, subcapitate; peduncle 4–5 mm long, enveloped with two sheaths. *Floral bracts* 3.5–4.0 × 0.8–1.2 mm long, lanceolate, acute to acuminate, cymbiform, glabrous. *Flowers* 5.2–8.0 × 3.5–5.0 mm, externally pubescent, greenish-yellow, petals purplish-brown, lip yellowish with auricular obscure side lobes with purple margins, apical part with yellow thick cushion-like portion on the back side. *Pedicel and ovary* 1.7–3.2 mm long, densely pubescent. *Sepals* sub-equal, pubescent externally; dorsal sepal 2.8–3 × 1.3–2.0 mm, lanceolate, subacute, concave, 3-veined, often purple coloured; lateral sepals similar, 2.4–2.7 × 3–3.5 mm, broadly ovate, acuminate, 3–5 veined, often purple coloured, basal portion falcate, connate at the base to form a mentum. *Petals* 2.6–2.8 × 0.7–0.9 mm, linear, spreading, acute, glabrous, 3-nerved. *Labellum* 2.1–2.8 × 0.9–1.2 mm, obscurely 3-lobed,

fleshy, cymbiform, basal portion saccate, margin entire, apical portion consist of cushion-like callus on the abaxial side, side lobes are auricular, disc hairy. *Column* 0.8–1.0 mm long, erect, base with 1.05 mm long foot attached to the base of the labellum. *Clinandrium* 0.8 mm wide. *Stigma* broad. *Anther* 0.4–0.5 × 0.7–0.8 mm, 4-celled, ovate, terminal. *Pollinia* 8, unequal, ca. 0.5–0.7 × 0.1–0.2 mm, clavate, connected to an oblong small viscidium by granular stipe. *Capsules* 5–6 × 3–4 mm, ellipsoid. (Fig. 1).

PHENOLOGY: Plants flower from May to June; fruits were recorded in July.

HABITAT: Epiphytic, found on moss-covered tree trunks and rock boulders at elevations of 1000–2000 m. Host plant: observed growing on the trunks and branches of *Quercus griffithii* Hook.f. & Thomson ex Miq. (Fagaceae).

GLOBAL DISTRIBUTION: India, Bhutan, China, Laos, Malaysia, Myanmar, Nepal, Vietnam.

DISTRIBUTION IN INDIA: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, West Bengal.

SPECIMENS EXAMINED: **Arunachal Pradesh:** Jengging, 06 Nov 1990, *Hegde 26034* (Orchid Herbarium Tipi, not in “Index Herbariorum” and hence-forth abbreviated as OHT); Sangti, 1676 m, 05 Sep 1983, *Hegde 9662* (OHT); West Kameng, Sessa, 02 Oct 1980, *A. N. Rao 77239* (ASSAM); 09 Jun 1980, *Hegde 4017* (APFH); 09 Jul 1983, *A. N. Rao 9172* (OHT); 23 Jun 1982, *Hegde 2649* (OHT); 14 Jun 1980, *Hegde 2649* (OHT); Sessa Top, 27 Jul 1996, *A. N. Rao 29025* (OHT); Subansiri, Hapoli Behind D.C’s Office, 10 May 1966, *A. R. K Sastry 44873* (ASSAM, ARUN); Sayata to Paji, 20 Nov 1964, *A. R. K Sastry 40794* (ASSAM); Ziro to Begi, 04 Jun 1961, *G. V. Subba Rao 24746* (ASSAM); Begi, 26 Apr 1980, *G. D. Pal 78255* (ARUN); Kameng F.D, Dirang Dzong, 1829 m, 16 May 1957, *R. S. Rao 7538* (ASSAM); Sissini camp, 1219 m, 25 Mar 1957, *G. Panigrahi 5995* (ASSAM); Sismi, 10 Jun 1984, *Hegde 15862* (OHT); *Hegde 15863* (OHT); *Hegde 15864* (OHT); *Hegde 15865* (OHT); Baha Hill Kalaktang, 10 May 1958, *G. Panigrahi 15320* (ASSAM); Siang F.D, Geling to Kepangla, 823 m–1524 m, 10 Nov 1958, *R.S. Rao 17548* (ASSAM); Sirang-Geizing, 640 m–1372 m, 20 Nov 1958, *R.S. Rao 17923* (ASSAM); West Siang, Nyodo-Sibe near Basar, 28 Nov 2010, *M. Bhaumik 25537* (ARUN); Lohit, Forest Around Camp C5, 27 Dec 1969, *B. Krishna 48757* (ASSAM); Dibang

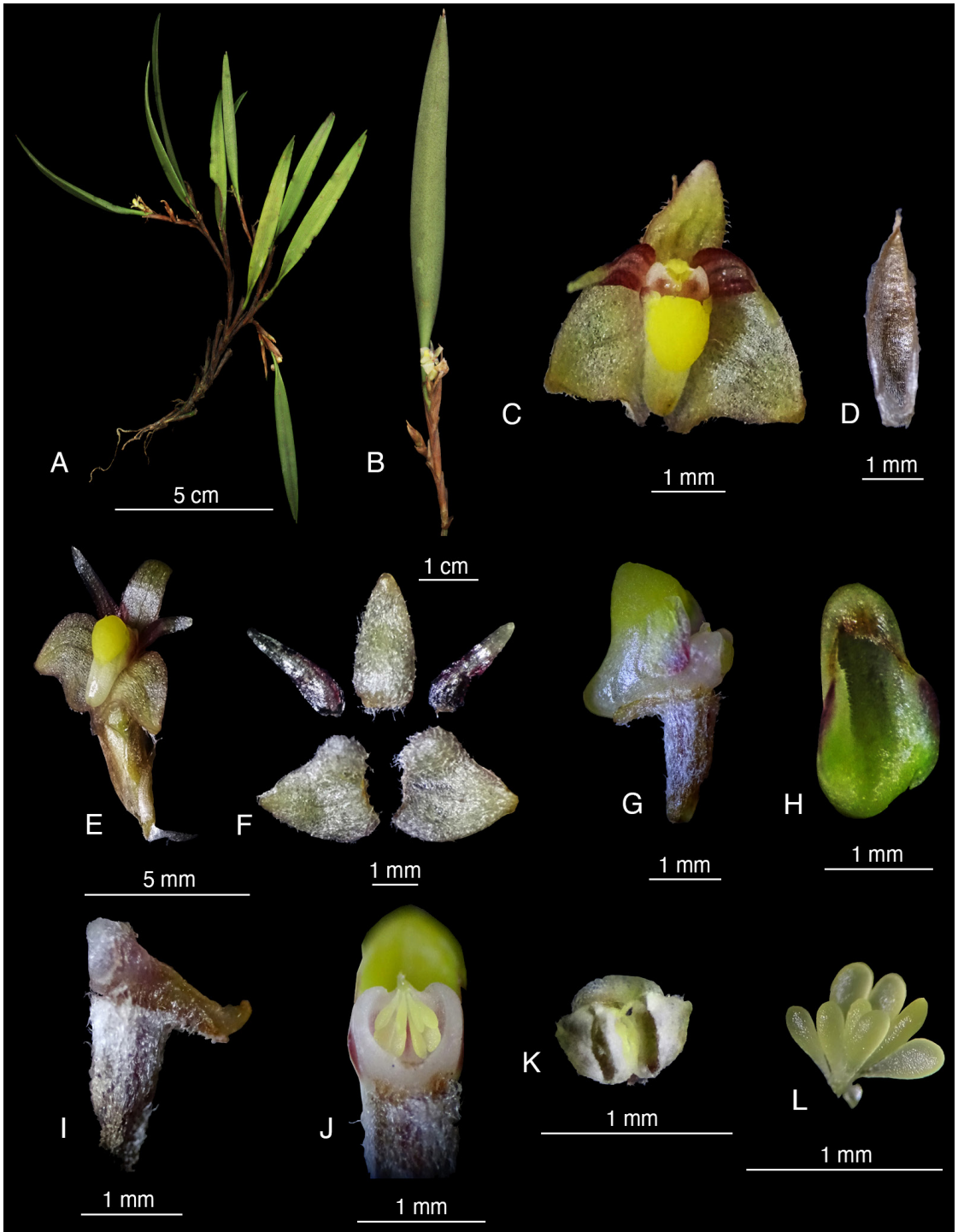


FIGURE 1. *Ceratostylis himalaica*. A. Habit. B. Leaf with inflorescence. C. Flowers (top view). D. Bracts. E. Flower. F. Dissected floral parts (Dorsal sepal, lateral sepals and petals). G. labellum with column. H. Labellum. I. Column with foot. J. Clinandrium with pollinia. K. Anther cap. L. Pollinia. Dissection and photo plate by Shuvadip Sarkar.



FIGURE 2. Type specimen of *Ceratostylis siamensis* from Kew [Barcode no: K000597122]. ©Board of Trustees of the Royal Botanic Gardens, Kew.

Valley, Mehao lake, 1500 m, 17 Apr 1999, *M. Bhaumik* 2428 (CAL); Mipi, 1500 m, 05 Sep 2000, *M. Bhaumik & M.K. Pathak* 3549 (CAL); 01 Apr 1984, *K. Haridasan* 652 (APFH); Deli valley, *Kingdon Ward* 8100 (K); Ziro valley, Tale wildlife Sanctuary, 03.13.2020 (in fl.), *Gogoi* 00806 (OHT; TOSEHIM); Lower Subansiri, Kardo forest, Hapoli, 778 m, 23 Sep 2021, *S. Sarkar* 94996 (Cultivated at CNH- Pargola). **Manipur:** *Chowlu s.n.* (Centre for Orchid gene conservation of Eastern Himalayan region, not in "Index Herbariorum" and hence-forth abbreviated as COGCEHR); Senapati Hills, 1435 m, 26 Mar 2003, *S. Phukan* 60281 (ASSAM). **Meghalaya:** Khasia Hills, Cherapunji, 1219 m, Jun 1897, *CG Foundlock s.n.* (CAL, P); 05 Apr 1972, *P.C. Pant* 50833 (ASSAM). **Mizoram:** Lushai Hills, *Parry* 563 (K); *Koelz* 32747 (K); Blue Mountain, Lushai Hills, 7000 ft, 21 Apr 1953, *Thakur*

Rup Chand 7005 (MICH). **Nagaland:** Reserve forest, Puliabadze, 1623 m, 20 Nov 1973, *T.M. Hynniewta* 56278 (ASSAM); Tseminyu, *Hynniewta* 80727 (ASSAM). **Sikkim:** *Pantling* 149 (BM, K, W); *J.D. Hooker s.n.* (P); 1220 m, *J.D. Hooker s.n.* (CAL, P); 1524 m, Jun 1899, *Pantling* 149 (CAL, GH); 1891, *Pantling* 149 (CAL, P); Tendong, *Pantling* 149 (K); Teesta Valley, *Pradhan* 1 (C); *Trudel* 598 (C); Rongli-Rorathang, 15 Sep 2018, *D.K.A* 40511 (Cultivated at BSHC). **West Bengal:** Sinchu La, 1767 m, 02 Mar 1934, *K. Biswas* 1950 (CAL).

NOTES: *Ceratostylis himalaica* differs from *C. siamensis* in several key characteristics: it possesses a prostrate, elongated stem (10–15 cm long), which branches and originates from the union of rhizome segments at



FIGURE 3. Illustration of *Ceratostylis himalaica*. Reproduced from *Icones Plantarum* (Pl. 2101).

the base of each pseudobulb. This elongation of the stem continues over time as fresh shoots are added each season. The leaves are obliquely emarginate at the apex with acute lobes, the lateral sepals are 5-veined and the labellum is obscurely 3-lobed or unlobed. In contrast, *C. siamensis* features short, erect, unbranched stems (1.5–5.0 cm long) with closely placed pseudobulbs forming a tuft. Its leaves are also obliquely emarginate but with obtuse lobes, the lateral sepals are 3-veined and the labellum is distinctly 3-lobed.

The specimens reported by Gogoi and Riniya (2020) exhibit the characteristics of *C. himalaica*. While describing *C. himalaica*, Hooker (1890) erroneously mentioned the lateral sepals as 3-veined, whereas his original illustration [Icon. Pl. t.2101] (Hook.f. 1894) depicts lateral sepals with 5 veins. This discrepancy is supported by fresh collections from Sikkim and Arunachal Pradesh and observations by Seidenfaden (1986), who noted specimens from Sikkim with 5 red stripes on the sepals. In contrast, *C. siamensis* is described as having lateral sepals with 3 purple veins. Dissected floral parts in Gogoi and Riniya (2020) also reveal 5-veined lateral sepals (Fig. 1D,F), indicating their identity as *C. himalaica*.

Based on the stem structure, leaf, petal and labellum characteristics, the specimens reported by Gogoi and Riniya (2020) as *C. siamensis* have been redetermined as *C. himalaica*, leading to the exclusion of the former from the Flora of India.

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CONFLICT OF INTEREST. The authors have no conflict of interest to declare.

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