

The genus *Platanthera* (Orchidaceae) in India with two new species

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Abstract: The genus *Platanthera* Rich. (Orchidaceae) is revisited in India, describing two new species, *P. dambungensis* and *P. lachungensis*. Photo plates are provided for the new species along with a key for the identification of species occurring in India. Updated names, distributional data, and type information of other Indian members of this genus are provided. Lectotypes are designated here for the names *Habenaria juncea* King & Pantl., *Herminium angustilabre* King & Pantl. and *Herminium orbiculare* Hook.f.

Key words: *Habenaria juncea*, *Herminium angustilabre*, *Herminium orbiculare*, Lectotypification, *Platanthera dambungensis*, *Platanthera lachungensis*.

Introduction

Platanthera Rich. (Orchidaceae: Orchidoideae: Orchideae: Orchidinae) is distributed in the temperate, sub-temperate and high elevation tropics of Macronesia, North Africa, Eurasia, North and Central America, and Cuba (Chase *et al.*, 2015; POWO, 2023). It is one of the largest genera of the tribe Orchideae, represented by 142 species (POWO, 2023); of which 131 occur in Asia and North America, with only 11 species found in Europe, Africa, Central America, the Antilles and the Pacific. The Himalayan region has the highest diversity of *Platanthera*, represented by about 50 species (Efimov, 2016; Govaerts *et al.*, 2023). The infrageneric classification of *Platanthera* was proposed by Luer (1975) and Efimov (2016). Efimov (2016) recognized five subgenera under *Platanthera* namely, *Blephariglottis* (Raf.) Efimov, *Fimbriella* (Butzin) Efimov, *Platanthera*, *Limnorchis* (Rydb.) Efimov, and *Tulotis* (Raf.) Efimov. Of these, *Blephariglottis* and *Platanthera* have been

subdivided into sections. Subgen. *Platanthera* includes 10 sections (nine named sections and one uncertain section).

It is difficult to delimit *Platanthera* from its traditional morphological alliance, *Habenaria* Willd., *Herminium* L., and *Peristylus* Blume. However, recent molecular studies have shown that *Platanthera* is closely related to *Gymnadenia* R.Br., *Dactylorhiza* Neck. ex Nevski, and *Galearis* Raf. (Hapeman & Inoue, 1997; Bateman *et al.*, 2003, 2009). Phylogenetic studies of *Platanthera* are confusing as the genus is often considered polyphyletic (Pridgeon *et al.*, 1997, 2001, 2003; Bateman *et al.*, 2003, 2009). In a recent phylogenetic reconstruction, Jin *et al.* (2014, 2017) considered *Platanthera* monophyletic, and transferred five genera (*Diphylax* Hook.f., *Limnorchis* Rydb., *Piperia* Rydb., *Smithorchis* Tang & F.T.Wang and *Tulotis* Raf.) and three species (*Herminium orbiculare* Hook.f., *H. angustilabre* King & Pantl. and *Peristylus superanthus* J.J.Wood) into *Platanthera*.

In India, accepted names and synonyms of *Platanthera* species continue to be debated. Various species belonging to this genus have been treated in Indian orchid works and floras, but little effort has been made to undertake critical taxonomic studies because its members are small terrestrial herbs, producing non-showy flowers with a short flowering period and a narrow range of distribution along high-altitude regions of India. Traditionally four closely related species from the Himalayan region, *P. latilabris* Lindl., *P. edgeworthii* (Hook.f. ex Collett) R.K.Gupta, *P. clavigera* Lindl. and *P. cumminsiana* (King & Pantl.) Renz have been placed in the genus based on simple lip morphology. However, since the morphology of these species is close to *Habenaria*

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(globose tuberosids and gynostemium structure), their affinities are doubtful (Bateman *et al.*, 2003; Jin *et al.*, 2014; Misra, 2019). Raskoti *et al.* (2015) placed the four species under *Herminium* based on phylogenetic studies. Another well-known species, *Platanthera biermanniana* (King & Pantl.) Kraenzl. has been placed under *Peristylus* based on molecular phylogeny results (Jin *et al.*, 2014).

The taxonomic treatment of *Platanthera* can be traced back to “Mémoires du Museum d’Histoire Naturelle, Paris” by Richard (1818) wherein he published this genus. *Platanthera* in India was first published by Lindley (1835) who described eight species (*P. arcuata* Lindl., *P. brachyphylla* Lindl., *P. candida* Lindl., *P. clavigera*, *P. latilabris*, *P. obcordata* Lindl., *P. susannae* King & Pantl. Lindl., and *P. uniflora* Lindl.). Prior to this publication, his 19 names had been listed in the Wallich’s Catalogue from the Indian region (1829–1832). Wight (1844–1852) also described three species from Peninsular India under *Platanthera* (*P. lutea* Wight, *P. affinis* Wight, and *P. iantha* Wight), but these species were later transferred to *Brachycorythis* Lindl., *Habenaria*, and *Plectoglossa* (Hook.f.) K.Prasad & Venu (Summerhayes, 1955; Santapau, 1957; Prasad & Venu, 2015). Drury (1869) in his work followed Lindley (1835) and Wight (1844–1852). Hooker (1890) treated the genus *Habenaria* in a broad sense (*s.l.*) under which he included *Brachycorythis*, *Herminium*, *Pecteilis* Raf., *Peristylus*, and *Platanthera*. Following Hooker (*l.c.*), other Indian works on orchids accepted this broad concept (King & Pantling, 1895, 1896, 1898; Collett, 1902; Duthie, 1906, 1915; Bruhl, 1926; Rhizada *et al.*, 1981; Seidenfaden & Arora, 1982; Vij *et al.*, 1982; Chowdhery & Wadhwa, 1984; Hegde, 1984; Naithani, 1985).

Many works on Indian orchids treated *Platanthera* as a separate genus (Kraenzlin, 1901; Gupta, 1968; Mukerjee, 1972; Pradhan, 1976, 1979; Babu, 1977; Rao, 1979; Bose & Bhattacharjee, 1980; Jain & Mehrotra, 1984; Deva & Naithani, 1986; Karthikeyan *et al.*, 1989; Pangtey *et al.*, 1991; Kumar & Manilal, 1994; Srivastava, 1996; Hegde, 1997; Chowdhery, 1998; Basnet, 1998; Pearce & Cribb, 2002; Lucksom, 2007; Rao, 2007; Misra, 2007, 2019; Jalal *et al.*, 2008, 2010; Chowdhery *et al.*, 2009; Yonzon *et al.*, 2012; Chowdhery & Agrawala, 2013; Vij *et al.*, 2013; Ghosh &

Mallick, 2014; Rai *et al.*, 2014, 2015; Jalal & Jayanthi, 2015; Rao & Singh, 2015; Efimov, 2016; Swami, 2016, 2017, 2019; Dash & Singh, 2017; Bharali *et al.*, 2018; Maity *et al.*, 2018, 2019; Liden & Bharali, 2019; Singh *et al.*, 2019). Singh *et al.* (2019) reported 12 species of *Platanthera* which are distributed in the subtropical and temperate zones of the Himalayas and Northeast India. The present work on taxonomic revision of the genus *Platanthera* of India is based on the field observations and compilation of available information.

Materials and Methods

An extensive scrutiny of the literature as well as the examination of type, herbarium and live specimens was undertaken. The study began with the listing of all the published names in the genus *Platanthera* occurring in India with citations from IPNI (<https://www.ipni.org/>) and TROPICOS (2023). Type and other related materials were studied in various Indian herbaria: ARUN, ASSAM, BLAT, BSA, BSD, BSHC, BSI, CAL, CALI, DD, LWG, MH, OHT, SOF and WII. Digital images were procured from AMES, BM, BR, C, E, K, KW, L, LE, LINN, LIV, LWC, MCCH, P, PBI, RENZ, SOF, TI, W, and WU (acronyms as per Thiers, continuously updated). Explorations were conducted in various parts of India during 2017–2020. The collected specimens were made into herbarium voucher specimens and deposited in BSID and CAL. The nomenclature was updated according to ICN (Turland *et al.*, 2018) providing for each species the correct citation, type, basionym (if any) and synonyms. Distribution data and taxonomic notes have been provided at the end of each species.

Results

In the present analysis, 21 species of *Platanthera* have been recorded from India, including the two new species *P. dambungensis* K.Prasad and *P. lachungensis* K.Prasad. Most of the Indian species of *Platanthera* come under subgen. *Platanthera*, with three species under sect. *Diphylax*, nine species under sect. *Stigmatosae*, and eight species belonging to the uncertain section. Only one species, *P. japonica*, belongs to subgen. *Tulotis*. In India, plants of this genus dwell in the high-altitude Himalayan region and in Northeast India. The maximum diversity

occurs in the eastern Himalayan region: *P. bakeriana* (King & Pantl.) Kraenzl., *P. bhutanica* K.Inoue, *P. calceoliformis* (W.W.Sm.) X.H.Jin, Schuit. & W.T.Jin, *P. contigua* Tang & F.T.Wang, *P. dulongensis* X.H.Jin & Efimov, *P. handel-mazzettii* K.Inoue, *P. dambungensis*, *P. lachungensis*, *P. nematocaulon* (Hook.f.) Kraenzl., *P. orbicularis* (Hook.f.) X.H.Jin, Schuit. & Raskoti, *P. roseotincta* (W.W.Sm.) Tang & F.T.Wang, *P. sikkimensis* (Hook.f.) Kraenzl., *P. stenochila* X.H.Jin, Schuit., Raskoti & L.Q.Huang, *P. superantha* (J.J. Wood) X.H.Jin, Schuit., Raskoti & Lu Q.Huang and *P. uniformis* Tang & F.T.Wang. The three species which are found in both Himalayan regions are *P. japonica* (Thunb.) Lindl., *P. pachycaulon* (Hook.f.) Soó and *P. stenantha* (Hook.f.) Soó, while *P. leptocaulon* (Hook.f.) Soó is distributed in both the Himalayan regions and in Northeast India. Only two species, *P. concinna* (Hook.f.) Kraenzl. and *P. urceolata* (C.B.Clarke) R.M.Bateman, are distributed in the eastern Himalayas and in Northeast India.

The genus has phylogeographical affinities within the neighbouring countries of Nepal, Bhutan, China, and Myanmar. *Platanthera japonica* is found in Japan and South Korea, while *P. calceoliformis*, *P. concinna*, *P. contigua*, *P. handel-mazzettii*, *P. stenochila* and *P. uniformis* occur in India and China. Three species, *P. dulongensis*, *P. sikkimensis* and *P. superantha*, are distributed in India, China and Nepal; four species (*P. leptocaulon*, *P. pachycaulon*, *P. stenantha* and *P. urceolata*) in Bhutan, China, Myanmar, Nepal and India; *P. bhutanica* in Bhutan, China and India; *P. bakeriana* in China, Myanmar, Nepal and India, and two species (*P. nematocaulon* and *P. orbicularis*) in Bhutan, China, Nepal and India. Earlier *P. roseotincta* was known only from China and Myanmar, but now its distribution is recorded from India also.

Taxonomic Treatment

Platanthera Rich., De Orchid. Eur. 26. 1817, *nom. cons.* Type: *Platanthera bifolia* (L.) Rich. (= *Orchis bifolia* L.).

Diphylax Hook.f., Hooker's Icon. Pl. 19: t. 1865. 1889. Type: *Diphylax urceolata* (C.B.Clarke) Hook.f. (= *Habenaria urceolata* C.B.Clarke).

Smithorchis Tang & F.T.Wang, Bull. Fan Mem. Inst. Biol. Bot. 7: 139. 1936. Type: *Smithorchis calceoliformis* (W.W.Sm.) Tang & F.T.Wang. (= *Herminium calceoliforme* W.W.Sm.).

Key to the species of *Platanthera* occurring in India

1. Flowers non-resupinate..... 2
1. Flowers resupinate 4
2. Flowers whitish-pale pink..... *P. superantha*
2. Flowers yellow or yellowish-green or green..... 3
3. Racemes secund; flowers deep yellow with dull orange tips..... *P. calceoliformis*
3. Racemes non-secund; flowers yellowish-green or green *P. lachungensis*
4. Flowers deflexed; spur absent or replaced by small cavity *P. stenochila*
4. Flowers not deflexed; spur present..... 5
5. Spur > 3 cm long..... *P. japonica*
5. Spur < 2.5 cm long..... 6
6. Flowers white or greenish-white; spur amphora-like 7
6. Flowers green or yellowish-green; spur not amphora-like 10
7. Leaves basal or sub-basal *P. uniformis*
7. Leaves arranged below the middle or middle of stem..... 8
8. Stem arching; auricles almost as long as anther *P. urceolata*
8. Stem erect; auricles perfectly shorter than anther..... 9
9. Flowers greenish-white, bell-like..... *P. contigua*
9. Flowers white with rose tinge or not, not bell-like *P. roseotincta*
10. Spur < 2 mm long 11
10. Spur > 4 mm long..... 13
11. Lip orbicular or orbicular-ovate; spur 0.5–0.7 mm long..... *P. orbicularis*
11. Lip oblong-lanceolate or ovate-lanceolate or broadly lanceolate or narrowly deltoid; spur > 1 mm long..... 12
12. Viscidium absent..... *P. nematocaulon*
12. Viscidium present *P. handel-mazzettii*

13. Sepals ciliate or dentate along margins 14
13. Sepals entire (not ciliate) along margins 16
14. Lip distinctly arching; viscidium deeply concave (like a semi-circular tube) *P. dambungensis*
14. Lip not arching; viscidium flat 15
15. Leaves undulate at margins; spur strongly S-shaped, directed upwards *P. bhutanica*
15. Leaves entire at margins; spur not S-shaped
..... *P. pachycaulon*
16. Lip basally auriculate; floral bracts diminishing upwards *P. concinna*
16. Lip without basal auricles; floral bracts not diminishing upwards 17
17. Flowers < 1 cm across 18
17. Flowers > 1 cm across 20
18. Leaf 1; racemes laxly flowered *P. leptocaulon*
18. Leaves 2 or more; racemes densely flowered ... 19
19. Dorsal sepal oblong-lanceolate or ovate-elliptic; viscidium flat *P. bakeriana*
19. Dorsal sepal ovate or broadly ovate to sub-orbicular; viscidium concave *P. dulongensis*
20. Floral bracts as long as or slightly longer than flowers, not reflexed *P. stenantha*
20. Floral bracts much longer than flowers, spreading and reflexed *P. sikkimensis*

Subgen. *Platanthera* Sect. *Stigmatosae* (K.Y.Lang) Efimov, Novosti Sist. Vyssh. Rast. 40: 50. 2009. *Platanthera* subgen. *Stigmatosae* K.Y.Lang, Acta Phytotax. Sin. 36(5): 450. 1998. Type: *P. exelliana* Soó (= *P. pachycaulon* (Hook.f.) Soó).

Platanthera bakeriana (King & Pantl.) Kraenzl., Orchid. Gen. Sp. 1: 632. 1899. *Habenaria bakeriana* King & Pantl., J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 65: 132. 1896. Lectotype (designated by Efimov, 2016): INDIA, Sikkim, Lachen Valley, July 1895, Pantling 401 (CAL [CAL0000000765!]; isolecto CAL [CAL0000000764!], K [K000247399 digital image!]).

Distribution: India, Bhutan, China, Myanmar and Nepal.

Specimens examined: INDIA, Arunachal Pradesh, West Kameng district, Nekmadung, 20.07.1999,

A.N. Rao 30553 (OHT, ARUN); *s.loc.*, 31.08.1984, *Naithani* 1148 (RENZ digital image). Sikkim, *s.loc.*, 8-12000 ft., *s.d.*, *Hooker s.n.* (K, P digital images, CAL); *s.loc.*, *s.d.*, *Hooker* 312 (K digital image); *s.loc.*, *s.d.*, *Hooker* 316 (K digital image); *s.loc.*, *s.d.*, *King's coll. s.n.* (P digital image); East Sikkim district, Changu, 12000 ft., 16.07.1910, *Smith* 3503 (CAL); *Ibid.*, 3775 m, 07.08.1997, *D. Maiti & S.K. Rai* 18807 (BSHC); below Changu, 3750 m, 07.07.1997, *A. Maiti & S.K. Rai* 18823 (BSHC); Karponang, 21.07.1945, *Bor* 53 (DD); below Kyangnosla, 08.07.1996, *Long & Noltie* 79 (E digital image); Mindzar dara, 12000 ft., August 1888, *King's coll. s.n.* (CAL); Samdong, 3550 m, 16.07.1986, *D.C.S. Raju & S. Singh* 5930 (BSHC); Tsomgo, 18.08.1945, *Bor* 1031 (DD); North Sikkim district, Gnatong (Gnathang), August 1894, *Pantling* 401 (BM, P digital images, CAL); Lachen, 20.07.1909, *Smith & Cave* 2655 (CAL); *Ibid.*, *s.d.*, *Hooker* 149 (K digital image); Lachen Valley, 9000 ft., August 1895, *Pantling* 401 (CAL); Lachen to Tallam, near Gompa, 3100 m, 15.07.1986, *D.C.S. Raju & S. Singh* 5911 (BSHC); Lachong Valley, 9000 ft., July 1897, *Pantling* 401 (BM, E, K, P digital images, CAL); Lachung, way to Shivmandir, 3836 m, 31.07.2019, *K. Prasad* 86532 (CAL, BSID); *Ibid.*, 3824 m, 31.07.2019, *K. Prasad* 86533 (CAL, BSID); *Ibid.*, 3861 m, 31.07.2019, *K. Prasad* 86535 (CAL); *Ibid.*, 3868 m, 31.07.2019, *K. Prasad* 86537 (CAL, BSID); Lachung to Dombeyang, 3100 m, 27.07.1997, *A. Maity* 18543 (BSHC); Lowthang, 10000 ft., July 1897, *Pantling* 401 (BM, K digital images, CAL); Shingba Rhodo Sanctuary, 3300 m, 06.08.2014, *D.K. Agrawala* 38894A (BSHC); Zema-III to Samthang, 3220 m, 03.08.2014, *D.K. Agrawala* 38878 (BSHC); Yakchey to Yumthang, 3300 m, 10.07.1986, *D.C.S. Raju & S. Singh* 5713 (BSHC); Yakla, 15.10.1896, *Clarke* 10405 (K digital image); West Sikkim district, Bakhim to Dzongri, 3300 m, 25.07.1999, *A. Maity* 21689 (BSHC). **West Bengal**, Darjeeling district, Singalelah, 10-12000 ft., July 1896, *Pantling* 401 (CAL); *Ibid.*, 10-12000 ft., August 1896, *Pantling* 401 (K digital image, CAL); *Ibid.*, 12000 ft., July 1887, *King's coll. s.n.* (P digital image, CAL); *Ibid.*, 07.10.1870, *Clarke* 12550 (K digital image); Tonglo, 9500 ft., July 1882, *Gamble* 10363 (K digital image, CAL); *s.loc.*, 18.08.1962, *Renz* 18079 (RENZ digital image).

Notes: The vegetative characters of *Platanthera bakeriana* are variable, but the floral characters are constant. King and Pantling (1896) while

describing the species cited the material collected from “Lachen Valley, at an elevation of 9000 feet, flowering in July, Pantling No. 401”. A scrutiny of relevant specimens at various herbaria revealed three specimens, two at CAL (CAL0000000764, CAL0000000765), and one at K (K000247399). Efimov (2016) while lectotypifying the name chose the specimen CAL0000000765, collected from an elevation of 11000 feet, which is contrary to protologue. The above typification by Efimov (2016) was an error because there is another specimen at CAL (CAL0000000764) having the elevation absolutely matching with the protologue. This specimen also has handwritten notes by Robert Pantling, and Efimov overlooked this specimen.

Platanthera handel-mazzettii K.Inoue, J. Jap. Bot. 61: 195. 1986. *Type*: CHINA, Northwestern Yunnan, upper Tjiantong, 3600–3800 m, 08.08.1916, *Handel-Mazzetti* 9770 (holo W14770).

Distribution: India and China.

Specimen examined: INDIA, **Sikkim**, East Sikkim district, Yakla, 15.10.1896, *Clarke* 10405 (K digital image)

Notes: This species was collected from Sikkim 125 years ago and no later collections are available. It differs from *P. nematocaulon* by its larger flower, reflexed lateral sepals and unreduced viscidium.

Platanthera dambungensis K.Prasad, sp. nov. Figs. 1 & 2

Platanthera dambungensis is closely allied to *P. yadongensis* X.H.Jin & W.T.Jin but differs by having non-stoloniferous tuberooids (*vs.* stoloniferous), rachis with dentate ribs (*vs.* not dentate), ovate-lanceolate or narrowly lanceolate, 8–20 mm long floral bracts, with dentate margins (*vs.* linear-lanceolate, about 30 mm long with ciliate margins), ribs of pedicels and ovary dentate (*vs.* ribs not dentate), lateral sepals 3.8–4.4 mm long (*vs.* 3.5 mm long), lip distinctly arching with sub-entire margins, slightly longer than the sepals, 3.9–4.6 mm long (*vs.* slightly arching and entire, shorter than the sepals, *c.* 3 mm) and rostellar arms shallowly concave (*vs.* deeply concave).

Type: INDIA, **Sikkim**, North Sikkim district, Lachung, way to Dambung from Lachung, N 27°43'41", E 88°45'22", 2987 m, 01.08.2019, K. Prasad 86540 (holo CAL!; iso CAL!).

Terrestrial herbs, 25–45 cm high. Tuberooids not stoloniferous, narrowly fusiform, fleshy, gradually tapering from base to tip, 1–6 cm long, 1–3 mm thick. Stem erect, cylindric, with *c.* 1 cm long solitary tubular sheath at base. Leaves 3–5, alternate, scattered, unequal, sessile; lower largest leaf situated below the middle of stem, broadly oblanceolate or elliptic-oblanceolate, 4.5–10.5 × 0.8–3.5 cm, sheathing at base, entire along margins, acute at apex; upper leaves 2 or 4, gradually becoming smaller, uppermost bract-like, lanceolate or linear-lanceolate or oblong-lanceolate, 1.5–8.6 × 0.5–1.5 cm, acute or acuminate at apex. Racemes 8–12 cm long; rachis laxly 15–25-flowered, ribbed; ribs dentate. Flowers small, green or greenish-yellow, not fully opening. Pedicels with ovary narrowly cylindric-fusiform, 8–14 mm long, beaked and curved at tip, ribbed, ribs dentate. Floral bracts ovate-lanceolate or narrowly lanceolate, 8–20 × 2–5 mm, dentate along margins, acuminate at apex, 3-veined, lateral veins branched, lower ones longer than flowers, upper ones longer or as long as flowers. Sepals subequal, margins sub-equal, to minutely dentate, 3-veined, lateral veins branched or not; dorsal sepal oblong or ovate-oblong, 3.7–4.2 × 1.8–2.2 mm, apex obtuse, forming a hood with petals; lateral sepals obliquely oblong-lanceolate or oblong-elliptic, 3.8–4.4 × 1.2–1.6 mm, spreading, falcate, apex acute or obtuse. Petals obliquely ovate or ovate-elliptic to oblong, 3.2–3.7 × 1.1–1.8 mm, apex acute, with branched vein. Lip slightly longer than sepals, distinctly arching, oblong-lanceolate or narrowly lanceolate, 3.9–4.6 × 1–1.1 mm, base shortly clawed, minutely saccate, margins sub-entire, curved in the middle, apex obtuse; spur shorter than the ovary, slender, cylindrical, 4–5 mm long, slightly curved near the base, directed downwards. Column short, *c.* 1.3 mm high; rostellum erect, prominent; rostellar arms concave; anther thecae slightly divergent towards base, connective rather narrow; pollinia obovoid, caudicle short; viscidium sub-orbicular when spread out, margins more or less involute like a semi-circular tube; staminodes sub-globose; stigma with 2 lateral lobes and a small median lobe; lateral stigmatic lobes spreading on each side of base of lip, broadly oblong or sub-orbicular. Capsules obovoid.

Flowering & fruiting: July to September



Fig. 1. *Platanthera dambungensis* K. Prasad sp. nov.: **a.** Habit; **b.** Raceme; **c-e.** Flowers in different view (photos by K. Prasad).

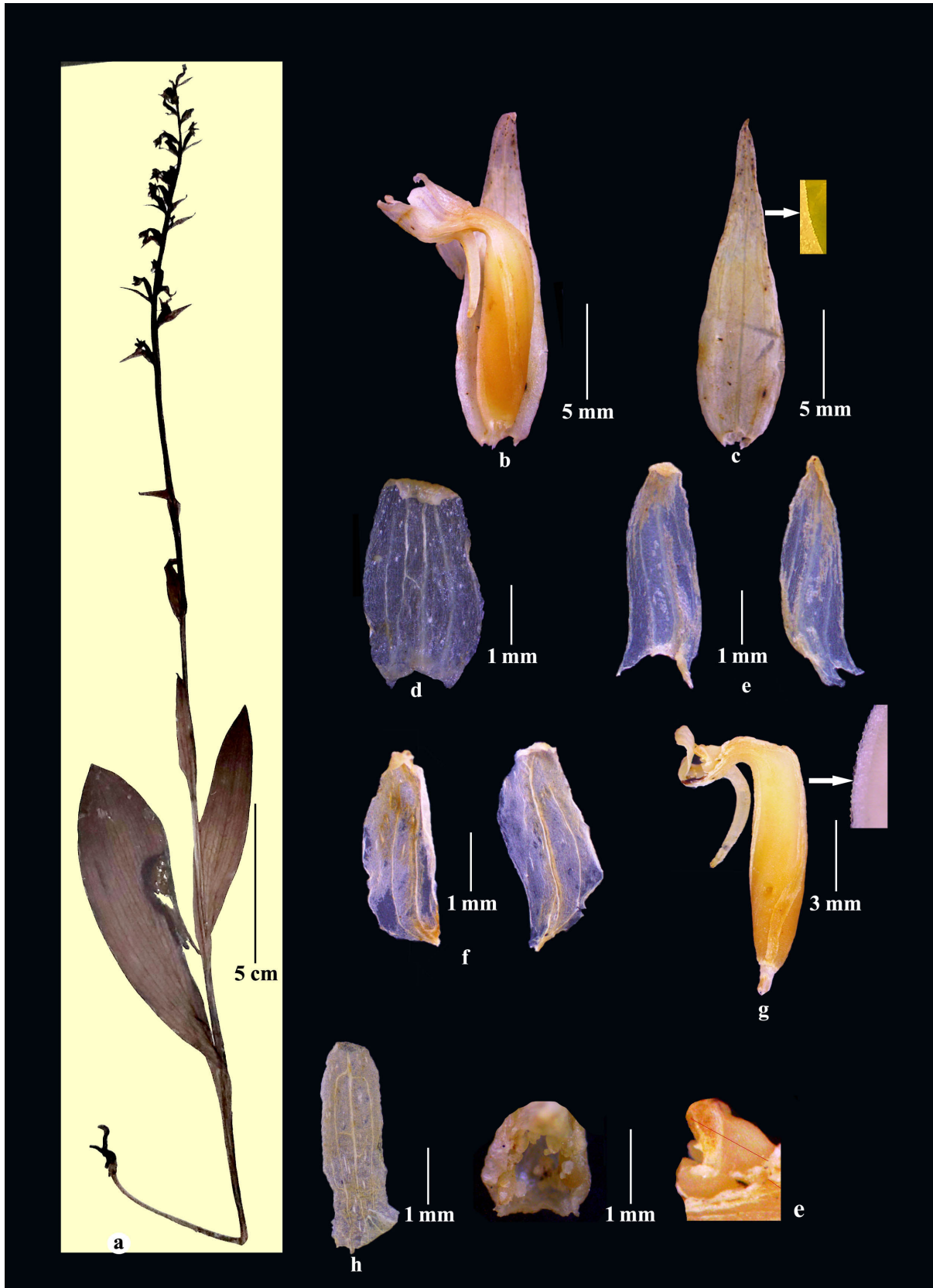


Fig. 2. *Platanthera dambungensis* K.Prasad *sp. nov.*: **a.** Habit; **b.** Flower; **c.** Floral bract; **d.** Dorsal sepal; **e.** Lateral sepals; **f.** Petals; **g.** Lip with spur and pedicel with ovary; **h.** Lip; **i** & **j.** Column front and side views (from *K. Prasad* 86540; photos by K. Prasad).

Habitat: It grows in open alpine pasture within grassy slopes at 2800–3300 m elevation.

Etymology: The specific epithet is chosen after the type locality, Dambung in North Sikkim.

Distribution: Hitherto known only from the type locality, Shingba Rhododendron Sanctuary and Dambung (Lachung), North Sikkim, India.

Specimen examined (paratype): INDIA, Sikkim, North Sikkim district, Lachung, Shingba Rhododendron Sanctuary, N 27°43'47", E 88°44'21", 3211 m, 21.08.2018, K. Prasad 86525 (CAL).

Conservation status: *Platanthera dambungensis* is known only from the type locality (North Sikkim, Lachung) which in 2018 and 2019 had about 150 individuals in two adjacent locations. All the individuals were observed in an area around 2 km². North Sikkim area is highly species-rich and threatened by human activity. The type locality is similarly exposed to grazing and other anthropogenic activities. Further rigorous survey should be carried out in this region to determine the actual population status of the new species; hence it is assessed here as 'Data Deficient' (DD) (IUCN, 2022).

Notes: *Platanthera dambungensis* is close to *P. yadongensis* in having a similar habit, two long and outstretching stigmatic lobes, and naked and involute viscidium. However, it is easy to distinguish the new species from the latter by the characters discussed in the diagnosis.

***Platanthera lachungensis* K. Prasad, sp. nov. Figs. 3 & 4**

Platanthera lachungensis is very similar to *P. calceoliformis* with its non-resupinate flowers but differs by its non-stoloniferous tuberooids (*vs.* stoloniferous), yellowish-green or green flowers (*vs.* deep yellow with dull orange tip), narrowly lanceolate or oblong or oblong-lanceolate sepals, more than 3 mm long (*vs.* ovate, less than 2 mm long), oblong-lanceolate or lanceolate, not concave lips (*vs.* broadly ovate when flattened, deeply concave), more than 5 mm long spur with closed mouth and rounded appendage (*vs.* 0.5 mm long, without appendage).

Type: INDIA, Sikkim, North Sikkim district, Lachung, way to Katao from Lachung, N 27°41'01", E 88°46'21", 3275 m, 02.08.2019, K. Prasad 86542 (holo CAL!; iso CAL!).

Terrestrial erect herbs, 10–15 cm high. Tubers narrowly fusiform or cylindrical-fusiform, 1.5–4 × 0.8–1.2 cm. Stems stout or slender, terete; basal sheaths 2, convolute, oblong-ovate, 1–2 × 0.6–0.8 cm, acute at apex. Leaves 2 or 3; lower leaf larger than the others, sub-basal, sessile, oblong, 4.5–6 × 1.2–1.5 cm, sheathing at base, entire or sub-entire along margins, acute at apex; upper leaves 1 or 2, oblong-lanceolate or lanceolate, 2–3 × 0.4–0.6 mm, sheathing at base, entire along margins, acute at apex. Inflorescence 8–10 cm long, slender; rachis laxly 5–8-flowered. Pedicel with ovary cylindrical, ribbed and beaked, 4–10 mm long, pedicel size increase towards the tip flower. Floral bracts variable (gradually decreasing in size upwards), longer or shorter than flower, linear-lanceolate or ovate-lanceolate, acute or acuminate at apex, 3-veined; lower large floral bracts as long as flowers, 1.2–1.5 × 0.2–0.3 cm; upper small floral bracts shorter than flowers, *c.* 5 × 2 mm. Flowers non-resupinate, yellowish-green or green, fragrant. Sepals sub-equal, fleshy, margins non-ciliate, apex sub-acute or obtuse, 1-veined; dorsal sepal hooded, narrowly lanceolate or oblong or oblong-lanceolate, 3–7 × 1–1.8 mm; lateral sepals obliquely oblong-lanceolate or lanceolate, 4–7.5 × 1–1.2 mm, longer than the dorsal sepal and petals, spreading, falcate, base with or without one side small triangular appendage. Petals broadly triangular-ovate, 4–6 × 1.2–2 mm, fleshy, margins entire, apex acute, 3-veined. Lip oblong-lanceolate or lanceolate, 4–6 × 0.8–1.4 mm, fleshy, curved near the base, apex obtuse, not dilated basally; spur shorter than or as long as the ovary, stout, incurved, cylindrical, 6–10 mm long; mouth of spur closed with rounded appendage. Column erect, 1.6–2 mm long; rostellum small, triangular, obtuse; anther locules situated close to each other, parallel or slightly divergent basally; pollinarium obovoid or pyriform, 0.8–1.1 mm long; caudicle short, *c.* 0.2 mm long; viscidium flat, narrowly oblong-lanceolate, *c.* 0.3 mm long; staminodes sub-orbicular; stigma globose, with protruding lateral lobes, median lobe inconspicuous. Capsules ovoid.

Flowering & fruiting: July to September.

Habitat: It grows on open slopes of moss-covered sub-alpine and alpine areas, at an elevation of more than 3000 m.



Fig. 3. *Platanthera lachungensis* K.Prasad sp. nov.: a. Habitat; b. Habit; c. Flowers (photos by K. Prasad).

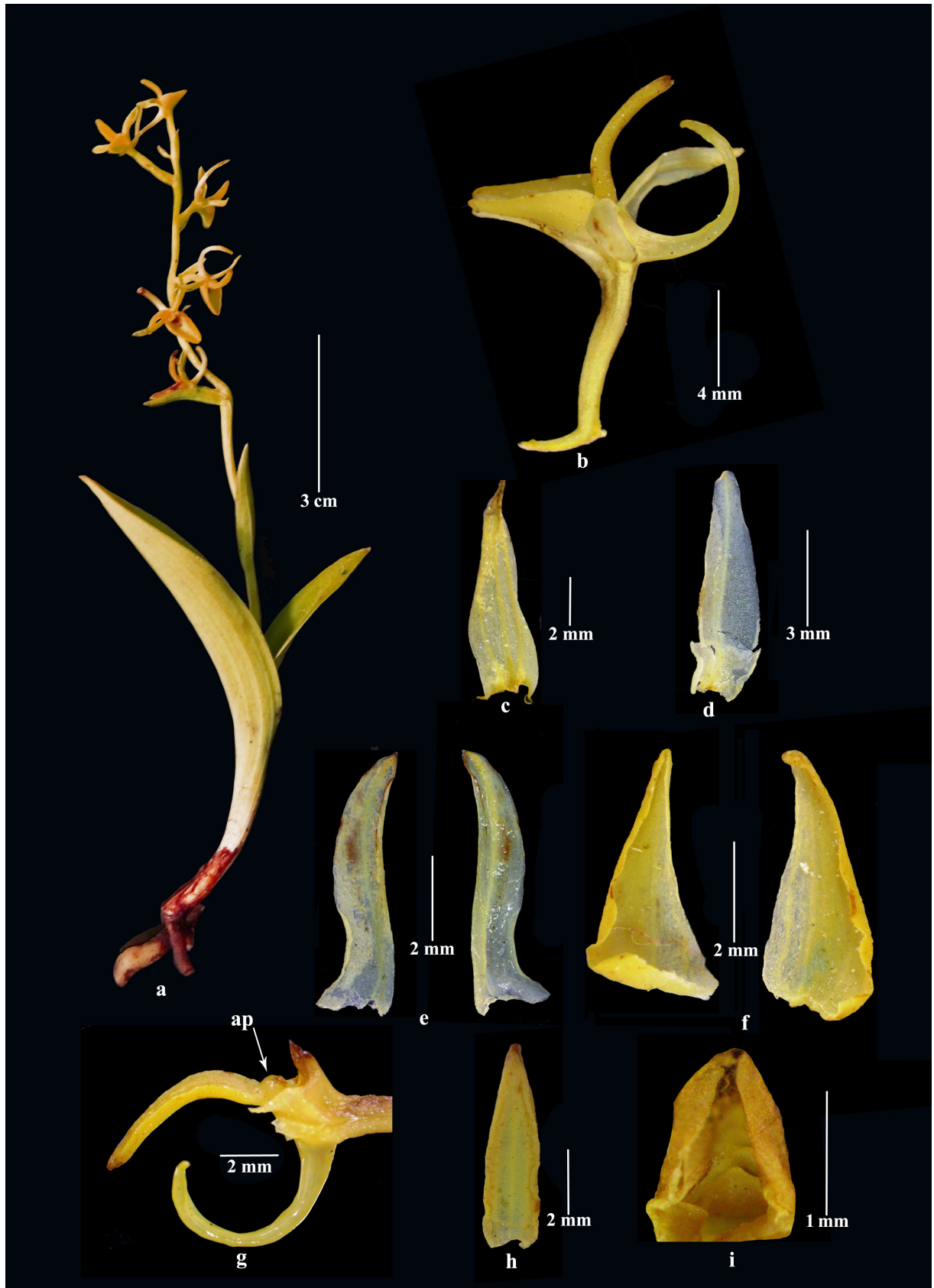


Fig. 4. *Platanthera lachungensis* K.Prasad *sp. nov.*: **a.** Habit; **b.** Flower; **c.** Floral bract; **d.** Dorsal sepal; **e.** Lateral sepals; **f.** Petals; **g.** Lip with spur; **h.** Lip; **i.** Column (ap: appendage) (from K. Prasad 86542; photos by K. Prasad).

Etymology: The species is named after the type locality, Lachung in North Sikkim.

Distribution: Hitherto known only from the type locality.

Conservation status: *Platanthera lachungensis* has about 50 individuals in the type locality area. All the individuals were observed in an area around 1 km². The type locality is a restricted area under the jurisdiction of the Indian army. Further explorations in the adjacent areas are necessary to ascertain its status, hence it is assessed here as 'Data Deficient' (DD) (IUCN, 2022).

Notes: Generally, species in this genus have resupinate flowers but present new species (*P. lachungensis*), *P. nivea* (Nutt.) Luer (America), *P. calceoliformis* and *P. superantha* (Asia) have non-resupinate flowers. The new species is closely allied to *P. calceoliformis* but it is easily distinguishable from the latter by the characters which are discussed in diagnosis. The new species also shows congruence with *P. pachycaulon* but differs by having 10–15 cm tall plants (*vs.* 12–45 cm tall), lower larger leaf sub-basal, oblong (*vs.* usually situated below the middle of the stem or rarely near the middle, ovate to narrowly lanceolate), non-resupinate flowers (*vs.* resupinate), margins of sepals entire (*vs.* papillose), mouth of spur with rounded appendage which is closed at the entrance (*vs.* without any appendage and stigma lobes closed at the entrance).

Platanthera leptocaulon (Hook.f.) Soó, Ann. Hist.-Nat. Mus. Natl. Hung. 26: 360. 1929. *Habenaria leptocaulon* Hook.f., Fl. Brit. India 6: 154. 1890. *Platanthera leptocaulon* (Hook.f.) Tang & F.T. Wang, Acta Phytotax. Sin. 1(1): 58. 1951, *comb. superfl.* *Lectotype* (designated by Efimov, 2016): INDIA, **Sikkim**, North Sikkim district, Lachen Valley, August 1849, *Hooker* 315 (K [K000247392 digital image!]).

Distribution: India, Bhutan, China, Myanmar and Nepal.

Specimens examined: INDIA, **Arunachal Pradesh**, Kurung Kumey district, Vadse hills, 3800 m, 05.08.2010, *S.S. Dash & A.A. Mao* 23299 (ARUN); West Kameng district, Baisakhi, near Seha, 31.08.1984, *Naithani* 1147 (RENZ digital image, DD). **Nagaland**, Dzukou valley, 2450 m, *A.A. Mao & R. Gogoi* 115018, 112593 (ASSAM). **Sikkim**,

North Sikkim district, Lachong Valley, 11000 ft., August 1895, *Pantling* 422 (E, K, P digital images, CAL, DD); Lachung, Shingba Rhododendron Sanctuary, 3443 m, 01.08.2019, *K. Prasad* 86539 (CAL, BSID); *Ibid.*, 3688 m, 06.08.2014, *D.K. Agrawala* 38887 (BSHC); Lachung Valley, 9000 ft., 30.07.1892, *Gammie* 343 (CAL); North Sikkim, *s.loc., s.d.*, *R.C. Srivastava s.n.* (BSHC); Shivamandir, 3900 m, 25.07.2011, *Mohan Gangopadhyay* 36118 (BSHC); Sikkim Himalaya, *s.loc., s.d.*, *Gammie s.n.* (CAL); *s.loc., s.d.*, *Hooker* 315 (K digital image); Pakyong district, below Zuluk, 2700 m, 28.07.1985, *D.C.S. Raju* 3987 (BSHC). **Uttarakhand**, Chamoli district, Bedini Meadows, 29.07.2009, *Jalal* 15018 (WII); Chamoli, 01.08.2009, *Jalal* 15049 (WII); Rudraprayag district, Kedarnath Wildlife Sanctuary, Tunganat, 19.07.2008, *I.D. Rai s.n.* (WII). **West Bengal**, Darjeeling district, Singalelah Range, 10000 ft., July 1896, *Pantling* 422 (K, LE, P digital images, CAL).

Notes: This species is closely related to *P. bakeriana* and is characterised by thin stems, narrow leaves, few-flowered secund racemes and narrow sepals and petals. Recently, this species was reported from Uttarakhand (western Himalaya) by *Jalal et al.* (2010).

Platanthera nematocaulon (Hook.f.) Kraenzl., Orchid. Gen. Sp. 1: 942. 1901. *Habenaria nematocaulon* Hook.f., Fl. Brit. India 6(17): 154. 1890. *Peristylus nematocaulon* (Hook.f.) Banerji & Prabha Pradhan, Orchids Nepal Himalaya 106. 1984. *Peristylus nematocaulon* (Hook.f.) J.J. Wood, Kew Bull. 41(4): 811. 1986, *comb. superfl.* *Lectotype* (designated by Efimov & Jin, 2014): INDIA, **Sikkim**, *s.loc., s.d.*, *Hooker* 14 (K [K000387513 digital image!]); isolecto K [K000387512 digital image!]).

Habenaria juncea King & Pantl., J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 65: 132. 1896. *Platanthera juncea* (King & Pantl.) Kraenzl., Orchid. Gen. Sp. 1: 942. 1901. *Lectotype* (designated here): INDIA, **Sikkim**, Lachen Valley, 11000 ft., August 1895, *Pantling* 406 (L [L0061416 digital image!]; isolecto L [L0061414 digital image!]), AME [AMES00099902 digital image!]).

Distribution: India, Bhutan, China and Nepal.

Specimens examined: INDIA, **Sikkim**, Bangerong, 10000 ft., September 1894, *Pantling* 341 (CAL); East Sikkim district, Tsomgo, 3933 m, 06.08.2006, *A.N.*

Rao 28518 (BSHC); Yakla, 15.10.1869, *Clarke* 10029 (K digital image); North Sikkim district, Lachen Valley, July 1897, *Pantling* 406 (BM, LE, K, P digital images); Lachung to Katao, 3276 m, 02.08.2019, *K. Prasad* 86543 (CAL, BSID); Ling too, 25.08.1878, *Demgloo s.n.* (CAL); Shingba Rhododendron Sanctuary, 3350 m, 07.08.2014, *D.K. Agrawala* 38896 (BSHC); *s.loc., s.d., Hooker* 271 (K digital image); *s.loc.*, August 1877, *King* 4446 (CAL); *s.loc.*, August 1886, *Elwes s.n.* (CAL); Pakyong district, Gnatong, August 1894, *Pantling* 406 (BM, K, P digital images). **West Bengal**, Darjeeling district, Phalut, 03.08.1972, *Kanai et al.* 726199 (TI digital image); Phalut-Ratho Chu-Ramam, 04.08.1972, *Kanai et al.* 726200 (TI digital image); Sandakphu-Sabargam-Phalut, 02.08.1972, *Kanai et al. s.n.* (TI digital image); Singalelah Range, 10000 ft., July 1896, *Pantling* 341 (CAL); *Ibid.*, 10000 ft., August 1896, *Pantling* 341 (CAL); *Ibid.*, 10000 ft., August 1896, *Pantling* 406 (BM, K, P, M digital images); Singalelah (Singalila), Phalut-Sabargam-Sandakphu, 19.07.1969, *Hara et al.* 726215 (TI digital image).

Notes: *Habenaria nematocaulon* was originally described by Hooker (1890) and placed in section *Hologlossa* Hook.f. Later King and Pantling (1896) described yet another species, *H. juncea* from Sikkim, which is closely allied to the previous one. The protologues and type specimens of *H. juncea* and *H. nematocaulon* are virtually matching. Kraenzlin (1901), in his revision, shifted both *P. juncea* and *P. nematocaulon* to *Platanthera*. Following the view of Seidenfaden (1977), Wood (1986) shifted *P. nematocaulon* to *Peristylus* and synonymised *P. juncea* under it. The recent molecular study (Jin *et al.*, 2014) has revealed that *P. nematocaulon* is nested within the *Platanthera* clade.

Further study revealed that there was also a need to typify *Habenaria juncea*. Wood (1986) considered the specimen at K as the holotype, but this is incorrect as this specimen is not a part of the original collection and was collected after the species described. Pearce and Cribb (2002) reported a specimen at CAL as the holotype but this specimen is not available. King and Pantling (1896) described *H. juncea* based on plants collected by Robert Pantling (no. 406) in August 1895 at 11000 feet from Lachen Valley (Sikkim Himalaya). Three relevant specimens are presently available at AMES and L. There are 14 more specimens

preserved at E, GH, K, LE, M, P and W with the same collection number (406), collected by Pantling from Sikkim Himalaya but they are devoid of the above collection information (as in the protologue). None of these specimens were specifically designated as type by King and Pantling (1896). Therefore, here the author designates the L specimen (L0061416) as lectotype as it fits best the description provided in the protologue.

Platanthera pachycaulon (Hook.f.) Soó, Ann. Hist.-Nat. Mus. Natl. Hung. 26: 364. 1929. *Habenaria pachycaulon* Hook.f., Fl. Brit. India 6: 154. 1890. *Lectotype* (designated by Efimov & Jin, 2014): INDIA, **Sikkim**, Nattong, 12.07.1877, *King's collectors* 4345 (K [K000247394 digital image!]; isolecto CAL [CAL0000000796!]).

Platanthera exelliana Soó, Ann. Hist.-Nat. Mus. Natl. Hung. 26: 359. 1929. *Habenaria oligantha* Hook.f., Fl. Brit. India 6: 154. 1890, *non* Turczaninow, 1854. *Lectotype* (designated by Efimov, 2016): INDIA, **Sikkim**, *s.d., Hooker* 311 (K [K000247391 digital image!]).

Distribution: India, Bhutan, China, Myanmar and Nepal.

Specimens examined: INDIA, **Arunachal Pradesh**, Lohit district, Jachup, 29.08.1987, *K. Haridasan* 3730 (OHT); West Kameng district, Poshing La, 21.07.1938, *Kingdon-Ward* 13960 (BM digital image); Tawang district, Tawang, 29.07.2002, *Bowes* 15078 (E digital image). **Himachal Pradesh**, Chamba District, Pangi, *herb. Watt s.n.* (E digital image). **Sikkim**, *s.loc., s.d., Hooker s.n.* (LE digital image); *s.loc., s.d., Gammie s.n.* (K, P digital images); Patang La, 17.07.1877, *King's collector* 4398 (K digital image); Toksup, July 1887, *King's collector s.n.* (CAL); East Sikkim district, Changu, 13000 ft., 14.07.1956, *Chatterjee's collector* 252 (CAL); below Changu, 3750 m, 07.08.1997, *A. Maity & S.K. Rai* 18823 (BSHC); near Changu, 12.06.1972, *Tibetian Medicine Collector s.n.* (K digital image); Daphuk, on Kiuchin, 15000 ft., July 1888, *King's collector s.n.* (CAL); Jankra Inf., 05.08.1892, *Gammie* 625 (BM, K digital images, CAL); Gnatung, 11000 ft., July 1894, *Pantling* 328 (CAL); Jelep La, 08.07.1877, *King's collector* 4202 (K digital image, CAL); Kupup East side meadow, 4000 m, 19.09.1998, *G.P. Sinha & B.K. Shukla* 20509 (BSHC); Kyangnosla Alpine Sanctuary, 3500 m, 25.06.2000, *S.S. Dash* 22773

(BSHC); *Ibid.*, 3500 m, 28.06.2000, S.S. Dash 20974 (BSHC); Nathula, 03.08.1877, *King's collector* 4573 (K digital image, CAL); North Sikkim district, Bijan, 1889, *King's collector s.n.* (CAL); Lachen, September 1849, *Hooker & Thomson s.n.* (K digital image); Lachoong valley, July 1895, *Pantling* 327 (BM digital image); Lachung, way to Shivmandir, 3861 m, 31.07.2019, K. Prasad 86534 (CAL, BSID); *Ibid.*, 3868 m, 31.07.2019, K. Prasad 86536 (CAL, BSID); Shingba Rhododendron Sanctuary, 3300 m, 06.08.2014, D.K. Agrawala 38894 (BSHC); *Ibid.*, 3900 m, R.C. Srivastava s.n. (BSHC); Shingba-Yumthang, 3688 m, 06.08.2014, D.K. Agrawala 38888 (BSHC); Thangu, 3967 m, 31.07.2014, D.K. Agrawala 38850 (BSHC); Yumtang, 24.07.1937, *Lowndes* 624 (E digital image); Pakyong district: Natang, 02.09.1882, *King's collector s.n.* (CAL, BM digital image); Thanangi, 12000ft., September 1888, *King's collector s.n.* (CAL); West Sikkim district, Bikbari, Choktsering Chhu valley, 12.07.1992, *Long et al.* 303 (E digital image); Dzongri, SE slope of Lapsa, 02.07.1983, *Alpine Garden Society's Expedition* 278 (K digital image); *Ibid.*, 18.08.2017, S. Lahiri 73117 (CAL); between Dzongri and Black Kabru, 18.07.1992, *Long* 452 (E digital image); Jongri, 14000 ft., August 1896, *Pantling* 328 (BM, K, P digital images, CAL); *Ibid.*, 12.08.1913, *Rohmoo Lepcha* 956 (E digital image); Kalijhal, Chewabhanyang, 3100 m, 19.06.2003, S.K. Rai & S. Pradhan 25042 (BSHC); Toksup, near Jongri, July 1887, *Pantling s.n.* (CAL); Yampung, 21.07. 1913, *Rohmoo Lepcha* 843 (E digital image). **Uttarakhand**, Rudraprayag district, Mandani (dagla), 3645 m, 08.08.2014, I.D. Rai 11457 (WII). **West Bengal**, Phullooh, 20.07.1884, *King s.n.* (K digital image, CAL).

Notes: This species was first described by Hooker (1890) under the genus *Habenaria* as *H. oligantha* (section *Hologlossa*), a later homonym of *H. oligantha* Turczaninow, 1854. Later, Soó (1929) shifted it to *Platanthera* and chose a different epithet, namely, *P. exelliana*. The type specimens of *P. exelliana* (= *H. oligantha*) and *P. pachycaulon* (= *H. pachycaulon*) are similar but distinguishable based on the number of sterile bracts and the shape of floral bracts (Hooker, 1890). Since these features are not taxonomically significant, Efimov (2013, 2016) considered them as conspecific. This species was recently reported from Uttarakhand (western Himalaya) by Rai *et al.* (2014) and earlier it was

only known from the eastern Himalayas. In the protologue, Hooker (1890) described the flowers as purple, but in the present study, it was found that they were green or greenish-yellow, which is the same as reported by earlier authors (Bose & Bhattacharjee, 1980; Chowdhery, 1998; Pearce & Cribb, 2002; Lucksom, 2007; Efimov, 2016). The purple colour may be an error due to changes caused by withering.

Platanthera roseotincta (W.W.Sm.) Tang & F.T.Wang, Bull. Fan Mem. Inst. Biol. Bot. 10: 30. 1940. *Habenaria roseotincta* W.W.Sm., Notes Roy. Bot. Gard. Edinburgh 13: 210. 1921. *Lectotype* (designated by Inoue, 1983): CHINA, Yunnan, Mekong-Salween divide, Doker-la, August 1917, *Forrest* 14743 (E [E00381994 digital image!]; isolecto E [E00381995 digital image!]).

Distribution: India, China and Myanmar.

Specimen examined: INDIA, **Arunachal Pradesh**, West Siang district, Domjee La, c. 13 km North Mechuka, alpine meadow, 3800-3950 m, 24.08.2014, *Bharali & Liden*, BL2014-3, 5 (CAL).

Notes: It was recently reported by Bharali *et al.* (2018) from West Siang (Arunachal Pradesh) and it was earlier known only from China (Tibet) and Myanmar. This small plant with solitary leaves and few-flowered racemes is distributed in the alpine meadow of Arunachal Pradesh.

Platanthera superantha (J.J.Wood) X.H.Jin, Schuit., Raskoti & Lu Q.Huang, Cladistics 32: 210. 2015. *Peristylus superanthus* J.J.Wood, Kew Bull. 41: 811. 1986. *Type:* NEPAL, Sankhuwasabha district, Sundanda, 20.08.1981, *Grey-Wilson et al.* 4104 (holo K [K000387519 digital image!]).

Habenaria nematocaulon sensu King & Pantl., Ann. Roy. Bot. Gard. Calcutta 8: 316, t. 416. 1898, *non* (Hook.f.) Banerji & P. Pradhan, 1984.

Distribution: India, China and Nepal.

Specimens examined: INDIA, **Sikkim**, Gangtok, 09.08.1877, *King* 4446 (K digital image). **West Bengal**, Darjeeling district, Singalelah Range, 3000 m, July 1896, *Pantling* 341B (K digital image).

Notes: Seidenfaden (1977) established four sections under *Peristylus* based on lip characters, of which the fourth section, has a simple lip. Wood (1986) described *P. superanthus* with a simple lip and placed

it under. Recent molecular studies (Jin *et al.*, 2015) revealed that this species falls under the *Platanthera* clade, and made the combination, *Platanthera superantha*. This species differs from *P. nematocaulon* in having a densely flowered raceme and non-resupinate flowers. Recently, Bharali and Liden (2018) reported it from Domjee La, West Siang (Arunachal Pradesh) with images but no specimens are collected.

Subgen. *Platanthera* Sect. *Diphylax* (Hook.f.) Efmov, *Phytotaxa* 254(1): 29. 2016. *Diphylax* Hook.f., *Hooker's Icon. Pl.* 19: t. 1865. 1889. *Type: Diphylax urceolata* (Clarke) Hook.f. (= *Habenaria urceolata* Clarke)

Platanthera contigua Tang & F.T.Wang, *Bull. Fan Mem. Inst. Biol. Bot.* 10: 28. 1940. *Diphylax contigua* (Tang & F.T.Wang) Tang, F.T.Wang & K.Y.Lang, *Vasc. Pl. Hengduan Mount.* 2: 2526. 1994. *Lectotype* (designated by Efmov, 2016): CHINA, **Yunnan**, Salween/Kiukiang divide, Lunguailaka, 3200 m, 16.09.1938, T.T. Yu 20328 (PE [PE00338168 digital image!]; isolecto PE [PE00338169, PE00338170 digital images!]).

Distribution: India and China.

Specimens examined: INDIA, **Arunachal Pradesh**, West Siang district, 13 km N Mechuka, Domjee La, Alpine Meadow, 3800–3900 m, 24.08.2014, Bharali & Liden 2014–4 (CAL); Upper Dibang district, NE Anini, 3650 m, 08.09.2017, Adhikari & Liden 136 (CAL).

Notes: The species was recently reported from two localities in Arunachal Pradesh, Domjeela North of Mechuka (Upper W. Siang) and Anini (Upper Dibang) by Liden and Bharali (2019). It closely resembles *P. urceolata* but differs in having an erect stem, greenish-white flowers and auricles shorter than the anther. It also shares similarities with *P. roseotincta* but differs by having greenish-white and bell-shaped flowers.

Platanthera uniformis Tang & F.T.Wang, *Bull. Fan Mem. Inst. Biol. Bot.* 10: 31. 1940. *Diphylax uniformis* (Tang & F.T.Wang) Tang, F.T.Wang & K.Y.Lang, *Bot. Res. Acad. Sinica* 4: 11. 1989. *Type:* CHINA, **Guizhou**, Fan Ching Shan, 03.09.1931, Steward, Chiao & Cheo 331 (holo PE).

Distribution: India and China.

Specimen examined: INDIA, **Arunachal Pradesh**,

Upper Dibang district, N.E., Anini, 3200 m, 08.09.2017, Adhikari & Liden 137 (CAL).

Notes: Liden and Bharali (2019) reported this species from Upper Dibang (Anini) and Lower Dibang (Mayudia pass) of Arunachal Pradesh. It is similar to *P. urceolata* but differs in floral bracts shorter than ovary, flowers 7–8 mm long and staminodes shorter than the anthers.

Platanthera urceolata (C.B.Clarke) R.M.Bateman, *Ann. Bot.* 104(3): 439. 2009. *Habenaria urceolata* C.B.Clarke, *J. Linn. Soc., Bot.* 25: 73, t. 30. 1889. *Diphylax urceolata* (C.B.Clarke) Hook.f., *Hooker's Icon. Pl.* 19: t. 1865. 1889. *Lectotype* (designated by Efmov, 2016): INDIA, **Nagaland**, Naga Hills, Jakpho, 9000 ft., 25.10.1885, Clarke 41272c (K [K000247409 digital image!]; isolecto CAL [CAL0000000732!], K [K00041272b digital image!])

Distribution: India, Bhutan, China, Myanmar and Nepal.

Specimens examined: INDIA, **Arunachal Pradesh**, Valley of Senighku, 01.10.1926, *Kingdon-Ward* 7524 (K digital image); Anjaw District, Delei River, 18.09.1928, *Kingdon-Ward* 8650 (K digital image); *Ibid.*, 19.09.1928, *Kingdon-Ward* 8544 (K digital image). **Assam**, *s.loc.*, August 1994, *s.coll.* 23487 (ASSAM). **Nagaland**, Dimapur District, Chakabama, *s.d.*, *Hynniewta* 74576 (ASSAM); Kohima District, Japfu hills, *s.d.*, *Hynniewta* 74587 (ASSAM); Kohima, *s.d.*, *Hynniewta* 79974, 79975 (ASSAM); Noklak district, Naga Hills, Japoo, 28.09.1935, *Bor* 6412 (K digital image). **Sikkim**, *s.loc.*, 3300 m, 16.09.2000, *D. Maity* 23247 (BSHC); East Sikkim district, Yakla, 12000 ft., 15.10.1869, Clarke 10244 (CAL); North Sikkim district, Zemu Chu, 05.10.1947, *Cave* 92 (K digital image); West Sikkim district, Megu, 1913, *Ribu & Rohmoo* 6442 (E digital image). **West Bengal**, Darjeeling district, Richi-La, September 1894, *Pantling* 347 (BM digital image).

Notes: Clarke (1889) originally described this plant as *Habenaria urceolata* and he felt that this plant strongly differed from other known *Habenaria* species. Hooker (1889), who happened to study Clarke's collections observed two linear processes pointing obliquely forward in the mouth of the corolla, a character which differs from *Habenaria*, and placed it under a new genus *Diphylax* as *D. urceolata* (C.B.Clarke) Hook.f. Later, Hooker

(1890) reverted the name to *Habenaria urceolata* under the aberrant section *Diphylax*. Presently *Diphylax* has been synonymised under *Platanthera* (*P. urceolata* (C.B. Clarke) R.M. Bateman), based on molecular data (Bateman *et al.*, 2009).

A related specimen was collected from Sikkim (*Rohmoo Lepcha* 1161 [E00008069]). According to the annotation on the herbarium sheet by Renz, 1995, the intention was to describe a new species, *Diphylax sikkimensis*. Unfortunately, this specimen is in poor condition. Both Renz (1995) and Pearce and Cribb (2002) examined its morphology and reported large 'staminodes' as an indication of its relationship to *Diphylax* (drawing in Pearce & Cribb, 2002). Further fresh collections are needed to establish this as a novel species.

Subgen. *Platanthera* section unclear

Platanthera bhutanica K. Inoue, J. Jap. Bot. 61: 193. 1986. *Type*: BHUTAN, Thimphu district, Parshary Jhurpe, 13000 ft., 27.07.1914, *Cooper & Bulley* 2596 (holo E [E00008108 digital image!]; iso BM [BM000033675 digital image!]).

Distribution: India, Bhutan and China.

Specimens examined: INDIA, **Sikkim**, *s.loc., s.d.*, *Hooker* 312 (K digital image); Gangtok district, Gangtok, way to Hanuman Mandir, 2089 m, 04.08.2019, *K. Prasad* 86547 (CAL, BSID); Tankra mountain, 05.08.1892, *Gammie* 625 (BM digital image); North Sikkim district, Lachoong ['Lachung'], 20.08.1849, *Hooker* 316 (K digital image).

Notes: *Platanthera bhutanica* has been collected from Sikkim twice, once by Hooker, 1849 and once by Gammie, 1892. Recently, it has been reported from Arunachal Pradesh (Bahrali *et al.*, 2018) but no supporting specimens are available.

Platanthera calceoliformis (W.W.Sm.) X.H. Jin, Schuit. & W.T. Jin, Molec. Phylogen. Evol. 77: 51. 2014. *Herminium calceoliforme* W.W.Sm., Notes Roy. Bot. Gard. Edinburgh 13: 211. 1921. *Smithorchis calceoliformis* (W.W.Sm.) Tang & F.T. Wang, Bull. Fan Mem. Inst. Biol., Bot. 7: 140. 1936. *Lectotype* (designated by Efimov, 2016): CHINA, **Yunnan**, Mekong-Yangtze divide, Kari Pass, 10000 ft., August 1914, *Forrest* 13110 (E [E00381991 digital image!]; isolecto E [E00381992 digital image!]).

Distribution: India and China.

Notes: This species is known from India by only a single collection from Bungeong (Sikkim)

by Pantling (*Pantling* 341, P). Pantling gave the field number 341 to many specimens collected in different seasons and are deposited in different herbaria. The herbarium specimen deposited at P is clearly *Platanthera calceoliformis* (Efimov, 2016). Molecular phylogenetics has shown that the monotypic genus *Smithorchis* (*S. calceoliformis*) is nested in the *Platanthera* clade, making it paraphyletic (Jin *et al.*, 2014). However, Jin *et al.* (2017) included *Smithorchis* in *Platanthera* in order to make *Platanthera* monophyletic.

Platanthera concinna (Hook.f.) Kraenzl., Orchid. Gen. Sp. 1: 621. 1899. *Habenaria concinna* Hook.f., Fl. Brit. India 6: 155. 1890. *Lectotype* (designated by Efimov, 2016): INDIA, **Meghalaya**, Khasia hills, Kala Pane, *Hooker & Thomson* 283 (K).

Platanthera dyeriana (King & Pantl.) Kraenzl., Orchid. Gen. Sp. 1: 636. 1899. *Habenaria dyeriana* King & Pantl., J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 65: 133. 1896. *Platanthera dyeriana* (King & Pantl.) Pradhan, Indian Orchids 2: 682. 1979, *comb. superfl.* *Lectotype* (designated by Singh *et al.*, 2014): INDIA, **Sikkim**, Lachen valley, 11-12000 ft., August 1895, *Pantling* 407 (CAL [CAL0000000744!]; isolecto CAL [CAL0000000741, CAL0000000742!, CAL0000000743!, CAL0000000745!, CAL0000000746!, CAL0000000747!, CAL0000000758! CAL0000000741!], AMES, K, L, LE, W[W1898-0005742, W1898-0005743 digital images].

Distribution: India, Bhutan and China.

Specimens examined: INDIA, **Meghalaya**, East Khasi Hills district, Laitlynkot, 09.07.1949, *T.R. Chand* 1768 (K digital image); Khasi hills, Kala Pane, 27.06.1850, *Hooker* 1281 (K digital image); near Mawsynram, 23.07.2010, *Singh & Kumar* 104025 (CAL). **Sikkim**, East Sikkim district, below Tankra La, 12000 ft., July 1897, *Pantling* 407 (BM, E, K, P digital images, CAL); North Sikkim district, Lachen, 3000 m, 15.07.2000, *D. Maity* 23104 (BSHC); Lachung to Katao, 3276 m, 02.08.2019, *K. Prasad* 86544 (CAL, BSID).

Notes: This distinct species was described by Hooker (1890) and placed in section *Hologlossa* (as *Habenaria concinna*), but Kraenzlin (1899) transferred it under the genus *Platanthera* (*P. concinna*). It is a poorly known species and is closely related to *P. dyeriana* (Jin & Efimov, 2012; Singh *et al.*, 2014), but can be distinguished by its more robust habit, many bract-like leaves and densely flowered racemes, but there

is really no qualitative difference between these two species. *Platanthera concinna* has been reported from Assam by Efimov (2016) and Arunachal Pradesh and West Bengal by Singh *et al.* (2019), but no herbarium specimens were found from these states.

Platanthera dulongensis X.H.Jin & Efimov, *Nordic J. Bot.* 30(3): 294. 2012. *Type*: CHINA, **Yunnan**, Gongshan County, Dulong river, 2800 m, 18.08.2006, X.H. Jin 8386 (holo PE [PE2280338 digital image!]).

Platanthera fugongensis Ormerod, *Taiwania* 58(1): 29. 2013. *Type*: CHINA, **Yunnan Province**, Fugong Xian, Lishadi Xian, Yaduo Cun, above Shidali along the North side of South fork of Yam He, East side of Gaoligong Shan, 2620 m, 15.08.2005, *Gaoligong Shan Biodiversity Survey Team* 28318 (holo CAS).

Distribution: India, China and Nepal.

Specimen examined: INDIA, **Arunachal Pradesh**, Anjaw District, Delei River, 28.08.1925, *Kingdon-Ward* 8584 (K digital image).

Notes: To date, there is no specimen available in Indian herbaria of this species. The single specimen available at K was collected by Kingdon-Ward in 1925 from Arunachal Pradesh. Recently, Swami (2019) reported it from Singalila National Park (West Bengal) with good images but no specimens are collected.

Platanthera orbicularis (Hook.f.) X.H.Jin, Schuit. & Raskoti, *PhytoKeys* 79: 72. 2017. *Herminium orbiculare* Hook.f., *Fl. Brit. India* 6: 130. 1890, *Icon. Pl.* 22: t. 2199b. 1894. *Monorchis orbicularis* (Hook.f.) O.Schwarz, *Mitt. Thuring. Bot. Ges.* 1: 95. 1949. *Peristylus orbicularis* (Hook.f.) Agrawala, H.J.Chowdhery & S.Choudhury, *Kew Bull.* 65: 106. 2010. *Lectotype* (designated here): INDIA or CHINA, Sikkim Himalaya, Chumbi valley, Rungboo (Kungboo), 08.07.1884, *King's collector* 164 (K [K000079022 digital image!]; isolecto CAL [CAL0000001003!, CAL0000001004!]).

Distribution: India, Bhutan, China and Nepal.

Specimens examined: INDIA, **Sikkim**, Dikehu valley, 11–12000 ft., 23.07.1910, *Smith* 3757 (CAL); Sikkim Himalaya, 10000 ft., September 1894, *Pantling* 348 (CAL). **West Bengal**, Darjeeling district, Singalila Range, 12000 ft., July 1896, *Pantling* 374 (CAL).

Notes: Hooker (1890) described this species under *Herminium* as *H. orbiculare* based on a specimen collected by King, 1884. Later, it was transferred to *Peristylus* by Agrawala *et al.* (2010) based on the presence of a short spur and column structure. Recent molecular systematics (Jin *et al.*, 2017) concluded that it should be placed under the genus *Platanthera*, as *P. orbicularis*.

Three specimens were collected from Chumbi valley, Rungboo which were labelled as “Type Material”, one at Kew (K000079022), and two at CAL (CAL0000001003, CAL0000001004) and all these specimens can be considered as syntypes. Pearce and Cribb (2002) and Agrawala *et al.* (2010) mentioned the Rungboo material as holotype but it is only the right of the original author to designate any specimen as holotype and this was not done by Hooker. Since it was done after 2001, and they did not use ‘designated here’, it is not valid, and lectotypification is necessary here. One of these specimens, K000079022, with the annotations and drawings of dissected parts by Hooker is designated here as the lectotype.

Platanthera sikkimensis (Hook.f.) Kraenzl., *Orchid. Gen. Sp.* 1: 621. 1899. *Habenaria sikkimensis* Hook.f., *Fl. Brit. India* 6: 155. 1890. *Type*: INDIA, **Sikkim**, Sikkim Himalaya, Sinchal, 8000–9000 ft., *s.d.*, *Thomsom s.n.* (K).

Distribution: India, Bhutan, China and Nepal.

Specimens examined: INDIA, **Arunachal Pradesh**, Anjaw district, Delei River, 27.07.1928, *Kingdon-Ward* 8497 (K digital image). **Sikkim**, Celepla, 08.07.1878, *King* 4203 (CAL); Lambteng, 9000 ft., July 1897, *Pantling* 421 (CAL); Ling too, 25.08.1878, *Demgloo s.n.* (E digital image, CAL); East Sikkim district, Powngong, 10000 ft., August 1894, *Pantling* 421 (BM, K digital images, CAL, DD); North Sikkim district, Dombeyang, 3000 m, 29.09.1997, *S.S. Dash & A. Maity* 18589 (BSHC); Lachong valley, 12000 ft., August 1895, *Pantling* 421 (CAL); Lachung-Yumthang, 3320 m, 16.07.2006, *S. Pradhan & R. Giri* 32250 (BSHC); Shingba Rhododendron Sanctuary, 3451 m, 22.07.2013, *C.S. Purohit* 37467 (BSHC); West Sikkim district, Mainom-R.F., 2200 m, 21.08.1986, *s.coll.* 5471 (BSHC); South of Dzungri, 26.07.1992, *Long et al.* 746 (E digital image). **West Bengal**, Darjeeling district, Singalelah, 12000 ft., July 1896, *Pantling*

421 (BM, E, P digital images, CAL); Tonglo, July 1884, *Gamble* 10434 (K digital image).

Notes: This species was first described under *Habenaria*, as *H. sikkimensis* by Hooker (1890) based on a single specimen collected by Thomson from Sikkim Himalaya, which was not traceable and is probably lost. Further attention is needed to locate its type specimen.

Platanthera stenantha (Hook.f.) Soó, Ann. Hist.-Nat. Mus. Natl. Hung. 26: 363. 1929. *Habenaria stenantha* Hook.f., Fl. Brit. India 6: 153. 1890. *Hemihabenaria stenantha* (Hook.f.) Finet, Rev. Gen. Bot. 13: 532. 1902. *Lectotype* (designated by Efmov & Jin, 2014): INDIA, Sikkim, Jongri, 15.10.1875, *Clarke* 25954 (K [K000247388 digital image!]). Residual syntypes: INDIA, Sikkim, Jongri, 15.10.1875, *Clarke* 25836a (K000247386 digital image!); Yakla, 17.10.1889, *Clarke* 9993 (K); INDIA, Sikkim, Lachen, 14.07.1849, *Hooker s.n.* (K); Lachong, 30.08.1849, *Hooker* 316 (K000247385 digital image!); Tongloo, 13.09.1875, *Clarke* 27411 (K000237387 digital image!), 27578 (K000247469 digital image!)

Distribution: India, Bhutan, China, Myanmar and Nepal.

Specimens examined: INDIA, **Arunachal Pradesh**, Kurung Kumey district, Vadse hills, 3800 m, *s.d.*, *S.S. Dash & A.A. Mao* 31863 (ARUN); Lohit district, Melinja, 30.08.1986, *K. Haridasan* 3530 (OHT); Upper Siang district, Kanebomgo-Pao camp, 3600 m, 09.09.2009, *M. Bhaumik* SN2 (ARUN); West Kameng district, Baisakhi, 31.08.1984, *A.N. Rao* 16143, 16144 (OHT); between Shangri La & Sela, 31.08.1984, *A.N. Rao* 16146 (OHT); near Sela, 31.08.1984, *Naithani* 1152 (RENZ digital image, DD); Sidaroa-Alpine Camp, 3200 m, 27.08.2011, *M. Bhaumik* 27022 (ARUN). **Sikkim**, *s.loc.*, 1857, *Thomson s.n.* (E, P digital images); *s.loc.*, 27.07.1874, herb. *Treutler* 433 (K digital image); *s.loc.*, 13.08.1875, *King* 2214 (K digital image); Sikkim Himalaya, *s.loc., s.d.*, *King s.n.* (CAL); Den, 08.10.1868, *Kurz s.n.* (BM digital image); Khedhen, 10.08.1877, *King's collector* 4452 (K digital image, CAL); Krumggong, 8000 ft., 27.07.1910, *Smith* 3898 (CAL); Ling too, 25.08.1878, *Demgloo s.n.* (CAL); East Sikkim district, Powngong, 10000 ft., August 1894, *Pantling* 233 (BM, P digital images, CAL, DD); North Sikkim district, Lachen, 8500 ft., 20.07.1909, *Smith &*

Cave 2656 (CAL); *Ibid.*, 3000 m, 28.08.1999, *G.P. Sinha & A. Maity* 22425 (BSHC); Lachung, 9000 ft., 29.08.1892, *Gammie* 1038 (CAL); Lachung to Dambung, 3000m, 01.08.2019, *K. Prasad* 86541 (CAL, BSID); Lachung-Katao, 3180 m, 08.08.2014, *D.K. Agrawala* 37857 (BSHC); Lachung-River road, 3250 m, 28.07.2011, *Mohan Gangopadhyay* 36192 (BSHC); Mindsardara, 12000 ft., September 1888, *King's collector s.n.* (CAL); West Sikkim district, above Choka, September 1983, *Macpherson* 25 (E digital image); *Ibid.*, 12.09.1983, *Alpine Garden Society's Expedition* 351 (K digital image); Chola Range, Dalamchan, 8000 ft., 23.09.1892, *Gammie* 1282 (K digital image CAL); Dzongri to Bikbari, 11.07.1990, *Kirkpatrick* 262 (RENZ digital image); Dzongri-Tsoka, 3000 m, 22.06.1993, *S. Pradhan* 15136 (BSHC); *Ibid.*, 3000 m, 22.06.1993, *S. Pradhan* 15136 (BSHC). **Uttarakhand**, Kumaon, 20.08.1894, *Duthie* 3405 (DD). **West Bengal**, Phullooh, 20.07.1884, *King s.n.* (K digital image, CAL); Darjeeling district, Palmajua-Barasi, 08.08.1972, *Kanai et al.* 726176 (TI); Sinchal, 8000 ft., July-September 1892, *Pantling* 233 (CAL); *Ibid.*, 12.08.1876, *King* 3031 (CAL); *Ibid.*, 08.08.1957, *s.coll. s.n.* (CAL); *Ibid.*, 8000 ft., July 1862, *Anderson* 1248 (CAL); *Ibid., s.d.*, *Kurz s.n.* (CAL); Singalelah Range, 10000 ft., July 1896, *Pantling* 233 (BM, E, K, P digital images, CAL); Tongloo, 8-9000 ft., *Kurz s.n.* (CAL); *Ibid.*, 8-10000 ft., 03.08.1862, *Anderson* 12143 (CAL); *Ibid.*, August 1874, *Gamble* 3995a (K digital image); *s.loc.*, 17.08.1962, *Renz* 10078 (RENZ digital image).

Notes: Rai *et al.* (2015) reported on the extended distribution of *Platanthera cumminsiana* to the western Himalaya region, but a scrutiny of the voucher specimen revealed that it is only *P. stenantha*.

Platanthera stenochila X.H.Jin, Schuit., Raskoti & L.Q.Huang, Cladistics 32(2): 210. 2015. *Herminium angustilabre* King & Pantl., J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 65: 131. 1896, Ann. Roy. Bot. Gard. Calcutta 8: 334. t. 439. 1898. *Androcorys angustilabris* (King & Pantl.) Agrawala & H.J.Chowdhery, Kew Bull. 65: 105. 2010. *Platanthera angustilabris* (King & Pantl.) X.H.Jin, Schuit. & W.T.Jin, Molec. Phylogen. Evol. 77: 51. 2014, *nom. illeg., non* Seidenfaden 1995. *Lectotype* (designated here): INDIA, **Sikkim**, Lingtu, July 1895, 11000 ft., *Pantling* 375 (CAL [CAL000000706!]; isolecto BR [BR0000006572006 digital image!], U [U1459598 digital image!]).

Distribution: India and China.

Specimens examined: INDIA, **Sikkim**, below Jankra La, 13000 ft., July 1897, *Pantling* 375 (BM, K digital images, CAL). **West Bengal**, Darjeeling district, Singalelah Range, 12000 ft., August 1896, *Pantling* 375 (K, L, U digital images, CAL).

Notes: This species was first described by King and Pantling (1896) under *Herminium* (as *H. angustilabre*) and remained in this genus for a long time because it has no spur, in contrast to all other *Platanthera* species that have a spur. However, the morphological structure of the rootstock and column is typical of *Platanthera*. Molecular based studies have shown that phylogenetically, *H. angustilabre* is nested in the *Platanthera* clade, making it paraphyletic (Jin *et al.*, 2014). Consequently, this species was shifted into *Platanthera*, as *P. angustilabris*. However, this name was a later homonym of *Platanthera angustilabris* Seidenfaden, 1995 and it cannot be used. Jin *et al.* (2015) rectified this error and chose a different epithet, *P. stenochila*.

Further study revealed that there was also a need to typify *H. angustilabre*. King and Pantling (1896) described *H. angustilabre* based on plants collected by Robert Pantling (no. 375) in July 1895 at 11000 feet (but gave “June” in the protologue) from Lingtu, Sikkim, India. Three specimens of *H. angustilabre* bearing those details are presently available in BR, CAL and U which forms the original collection of *Pantling* 375 (Lingtu, Sikkim, 1895) known so far, none of which was specifically designated as type by King and Pantling (1896). There are a few more specimens (labelled as ‘Type specimen’) preserved at BM, CAL, L, K and U with the same collection number (no. 375) collected by Pantling from the Singalelah Range (12000 ft., August 1896) and below Jankra La (13000 ft., July 1897), Sikkim but they do not belong to the original material as they post-date the protologue. Later Pearce and Cribb (2002) used the term ‘holo’, which is not correct according to the article of 9.9. Consequently, the author is designating the CAL specimen (CAL000000706) as lectotype of *H. angustilabre* as it fits best the description provided in the protologue. That specimen is also associated with two hand-written notations by Robert Pantling, one of which strongly supports its selection as lectotype. In some herbarium sheets, two leaves are seen but the protologue mentions

a solitary leaf. Probably King and Pantling (1896) considered the upper second leaf as sterile bract.

Subgen. Tulotis (Raf.) Efimov, *Phytotaxa* 254(1): 31. 2016. *Tulotis* Raf., *Herb. Raf.* 70. 1833. *Lectotype* (designated by Efimov, 2007): *Tulotis herbiola* (R.Br.) Raf. (= *Platanthera flava* var. *herbiola* (R.Br.) Luer).

Platanthera japonica (Thunb.) Lindl., *Gen. Sp. Orchid. Pl.* 290. 1835. *Orchis japonica* Thunb., *Syst. Veg. ed.* 14: 811. 1784. *Habenaria japonica* (Thunb.) A.Gray, *Mem. Amer. Acad. Arts, n.s.*, 6: 410. 1859. *Tulotis japonica* (Thunb.) Efimov, *Novosti Sist. Vyssh. Rast.* 40: 50. (2008) 2009. *Type:* JAPAN, *s.loc., s.d., Thunberg s.n.* (UPS).

Platanthera arcuata Lindl., *Gen. Sp. Orchid. Pl.* 289. 1835. *Habenaria arcuata* (Lindl.) Hook.f., *Fl. Brit. India* 6: 155. 1890. *Type:* INDIA, **Uttarkarhand**, Mussoorie, *s.d., Royle s.n.* (LIV).

Distribution: India, Bhutan, China, Japan, Nepal and South Korea.

Specimens examined: INDIA, **Himachal Pradesh**, Simla district, Dodra Kanwar, June 1968, *Som Deva* 3683 (DD). **Uttarakhand**, Almora district, Hot spring camp, 05.07.1951, *J.C. Thomas* 20797 (DD); Dehradun district, Mussoorie Range, 1869, *King s.n.* (CAL); Mussoorie, *King s.n.* (CAL); *Ibid., s.d., s.coll. s.n.* (DD); Uttarkashi district, Kidar Kantha, 30.06.1904, *Drummond* 22716 (K digital image); Nainital district, Nainital, June 1876, *David s.n.* (K digital image).

Notes: *Platanthera arcuata* was described by Lindley (1835) based on a solitary specimen collected by Royle from Mussoorie. However, the type and other collections of *P. arcuata* closely resemble the type of *P. japonica*. Generally, the difference between *P. japonica* and *P. arcuata* is the presence of a simple lip *vs.* a lobed lip respectively. In actuality the lip always has a pair of lateral lobes near its base in both species.

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