



A New Generic Status to Section *Plectoglossa* (Orchidaceae: *Habenaria*)

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Abstract

Four 'abnormal' monotypic sections were published by Hooker in *Habenaria*. Three of them, namely, *Diphylax*, *Dipyla* and *Dithrix* were upgraded subsequently as three independent genera, viz., *Diphylax*, *Ponerorchis* and *Dithrix* respectively. The fourth section, *Plectoglossa*, represented by endemic (Western Ghats) *Habenaria perrottetiana*, is collected and studied in detail and presented it now under a new genus, *Plectoglossa*. Its diagnostics, distribution and conservation status are presented. A key to all 4 related genera and a review on their current status is given.

Keywords: Monotypic sections, Hooker, *Plectoglossa*, Peninsular India, Western Ghats

Introduction

Habenaria Willd. is one among the 3 large genera in the family Orchidaceae with c. 876 species (Batista *et al.*, 2013; Govaerts *et al.*, 2011). It is distributed in the tropical and subtropical regions of the Old and New World (Batista *et al.*, 2013; Pridgeon *et al.*, 2001) with centres of diversity in Brazil, southern and Central Africa and East Asia (Batista *et al.*, 2013). India is well represented with 72 species, 30 of them are endemic (Misra, 2007; Sathish Kumar & Manilal, 1994). The higher percentage of endemism, with 24 species, is found in the Shola forests of Western Ghats.

Hooker (1890) enumerated 106 species in *Habenaria* in two groups and under 10 different sections. Group 1 consists of 6 sections (*Ate*, *Platyglossa*, *Trimeroglossa*, *Hologlossa*, *Peristylus* and *Phyllostachya*) while the Group 2 consists of four monotypic aberrant sections (*Plectoglossa*, *Diphylax*, *Dipyla* and *Dithrix*). The latter four monotypic sections founded by him differ greatly, called them abnormal, and he expected them to be eventually regarded as monotypic genera. But due to 'insufficient knowledge' available to him and also due to views of Bentham (1881) on structure of the stigma and its modifications as qualifying features in founding new genera and difficulties in ascertaining these features in dried specimens, he preferred keeping them as sections, awaiting their confirmation as genera. The present status of these four monotypic sections is discussed below.

The Section *Diphylax* was represented by *Habenaria urceolata* C.B. Clarke. Clarke (1889) had reservations to include it under *Habenaria* as he felt that this plant strongly differs from other known *Habenaria* spp. Later, Hooker who happened to study Clarke's collections observed two linear processes pointing obliquely forward in the mouth of the corolla. Since the genus *Habenaria* exhibit no such processes near labellum, Hooker (1889) finally described it as a new genus *Diphylax* under the combination *Diphylax urceolata* (C.B. Clarke) Hook. f. But he (1890) reverted it to *Habenaria urceolata* under the influence of Bentham though *Diphylax urceolata* is currently the accepted name. Though *Diphylax* is synonymised under the genus *Platanthera* with a proposed new combination, *Platanthera urceolata* (Hook.f.) R.M. Bateman (Bateman *et al.*, 2009), recent molecular studies on Asian Orchidaceae (Jin *et al.*, 2014) negated this proposed synonymy and concluded that *Diphylax* is an independent genus.

Diphylax (as genus) Hook. f., Icon. Pl. 19: t. 1865. 1889. *Diphylax* (as section) Hook. f., Fl. Brit. Ind. 6: 133. 1890.

Type: *Diphylax urceolata* (C.B. Clarke) Hook. f.

Diphylax urceolata (C.B. Clarke) Hook. f., Icon. Pl. 19: t. 1865. 1889. *Habenaria urceolata* C.B. Clarke, J. Linn. Soc., Bot. 25: 73. 1889; Hook. f., Fl. Brit. Ind. 6: 165. 1890. *Platanthera urceolata* (Hook.f.) R.M. Bateman, Ann. Bot. (Oxford) 104: 439. 2009.

The Section, *Dipyla*, described by Hooker included a new species, *Habenaria secundiflora*, described from Sub-Alpine Himalaya based on specimens collected by him (Sikkim) and of Duthie (Kumoan) and King (Chumbi). Later Kraenzlin (1901) proposed new combinations based on Hooker's name, *Peristylus secundiflorus* and *Gymnadenia secundiflora*. Thereafter, Schlechter (1919) based on "Hooker's Icones (Plate 2321) described a new genus, *Neottianthe* and the combination, *N. secundiflora* (Hook. f.) Schltr. Jin et al. (2014) had taken it to *Ponerorchis* and proposed a new combination, *Ponerorchis secundiflora* (Hook. f.) X.H. Jin, Schuit. et W.T. Jin. This is current accepted name.

Ponerorchis Rchb. f., *Linnaea* 25: 227. 1852.

Neottianthe Schltr., *Repert. Spec. Nov. Regni Veg.* 16: 290. 1919. *Habenariasect. Dipyla* Hook. f., *Fl. Brit. Ind.* 6: 133. 1890.

Type: *Ponerorchis graminifolia* Rchb.f., *Linnaea* 25: 228. 1852.

Ponerorchis secundiflora (Hook. f.) X.H. Jin, Schuit. et W.T. Jin, *Mol. Phylogenet. Evol.* 77: 51. 2014. *Neottianthe secundiflora* (Hook. f.) Schltr., *Repert. Spec. Nov. Regni Veg.* 16: 291. 1919. *Habenaria secundiflora* Hook.f., *Fl. Brit. India* 6: 165. 1890. *Peristylus secundiflorus* (Hook. f.) Kraenzl., *Orchid. Gen. Sp.* 1: 518. 1901. *Gymnadenia secundiflora* (Kraenzl.) Kraenzl., *Orchid. Gen. Sp.* 1: 936. 1901.

In the Section *Dithrix*, Hooker (1890) included his new species *Habenaria decipiens* (6: 165), a later homonym of Wight plant. Since it was illegitimate, which Hooker realized later, a new name, *H. griffithii* (6: 197) was proposed by him. Later Kraenzlin (1901) transferred it to *Diphylax* as *D. griffithii* (Hook. f.) Kraenzl. Later Schlechter (1926) described the genus *Dithrix* Schltr. without referring to Hooker even indirectly. But, Brummitt (1993) gave due credence to Hooker and published it as *Dithrix* (Hook. f.) Schltr. ex Brummitt. Later, Gandhi & Ormerod (2012) resolved the nomenclatural issue on *Habenaria griffithii* and proposed the new combination *Dithrix griffithii* (Hook. f.) Ormerod & Gandhi which is currently the accepted correct name.

Dithrix (Hook. f.) Schltr. ex Brummitt, *Regnum Veg.* 129: 366. 1993. *Habenaria* sect. *Dithrix* Hook. f., *Fl. Brit. Ind.* 6: 133. 1890. *Nujiangia* X. H. Jin & D.Z. Li, *J. Syst. Evol.* 50(1): 68. 2012, *nom. superfl. & illegit.*

Type: *Dithrix griffithii* (Hook. f.) Ormerod & Gandhi

Dithrix griffithii (Hook.f.) Ormerod & Gandhi, *Phytoneuron* 61: 1-3. 2012. *Habenaria griffithii* Hook.f., *Fl. Brit. Ind.* 6: 197. 1890. *Diphylax griffithii* (Hook. f.) Kraenzl., *Orchid. Gen. Sp.* 1(10): 599. 1899; *Nujiangia griffithii* (Hook. f.) X.H. Jin & D.Z. Li, *J. Syst. Evol.* 50: 68. 2012.

The Section *Plectoglossa* has a single species, *Habenaria perrottetiana* A. Rich. Hooker well defined *H. perrottetiana* from other Indian *Habenaria* and diagnosed it by citing features such as very visible stigmatic processes and the formation of broad triangular acute plate by rostellum which extends across the column. Kraenzlin (1892) also followed Hooker's treatment as a separate section. Prior to Hooker, Wight (1844) described it as a new species under *Platanthera*, as *P. lutea* from Pulney mountains. Richard while describing species contended that this belonging to *Habenaria* since it has two fleshy appendages born of stigma. Since this species has fleshy appendages, its inclusion in *Platanthera* by Wight is not tenable. Bentham (1881) stated, *Habenaria lutea* (Wight) (= *Platanthera lutea* Wight), is very different in the whole *Habenaria* genus with the sepals and petals connive into a globular perianth and placed it under his proposed section *Phyllostachya*, characterised by leaves passing into large foliaceous bracts in the inflorescence. Many other South Indian botanists believed in the distinctive diagnostics of *Habenaria perrottetiana* that include Fyson (1920), Henry et al. (1989), Joseph (1987) and Sathish Kumar & Manilal (2004). Seidenfaden (1999) is of the opinion that fresh material should be studied prior to considering it as a new genus. Unfortunately, the monotypic section *Plectoglossa* remained included under *Habenaria* for want of fresh collections to clarify and ascertain features that deserve it to be treated as a new genus. In spite of its distribution restrictive to Shola forests in Western Ghats, a few fresh collections were made in recent years by general taxonomists and placed them in *H. perrottetiana* without attempting any in depth analysis on the identity. Even revisionary study undertaken on the genus *Habenaria* (Choudhury et al., 2011), failed to give any additional diagnostic inputs on the referred species.

Under a SERB-DST sponsored programme on South Indian genus *Habenaria*, one of the authors (KP) had collected fresh material of this species from Anamudi Shola forest. A detailed study points to the fact that *H. perrottetiana* varies in

multiple features, apart from stigma and its modifications pointed out by Hooker that qualifies it in describing it under a new genus, *Plectoglossa*. Unfortunately molecular phylogenetic data on *Habenaria* spp. was limited. Only 152 species from North America (Batista *et al.*, 2013) were taken up for such study.

Key to the Genera

1. Sepals, petals and lip coherent at the base; lip saccate; staminodes filiform, capitate, at the back of the anther..... **Dithrix**
1. Sepals, petals and lip free; lip spurred; staminodes not filiform and not capitate, at the side of the anther **2**
2. Lip unlobed, spur fusiform; staminodes linear, as long as anther **Diphylax**
2. Lip 3-lobed or fid, spur not fusiform; staminodes not as above **3**
3. Lip base papillose, spur conical; stigma lobes not stalked; rostellum 2-lobed; caudicles less than 1 mm long **Ponerorchis**
3. Lip not papillose at base, spur not conical; stigma lobes stalked; rostellum 3-lobed; caudicles more than 1 mm long **4**
4. Lip coriaceous, thickened in margins, mid and side lobes folded longitudinally down the middle, with the side lobes appressed to midlobe, claw long, geniculate; stigmas rhomboid reflex and adpress to the base of the lip **Plectoglossa**
4. Lip not as above; claw not geniculate; stigmas not reflexed **Habenaria**

Taxonomic treatment

Plectoglossa (Hook.f.) K. Prasad & Venu, *gen. nov.* & *stat. nov.*

Basionym: *Habenaria* sect. *Plectoglossa* Hook.f., Fl. Brit. India 6: 133. 1890.

Type species: *Plectoglossa perrottetiana* (A. Rich.) K. Prasad & Venu

Etymology: The generic name refers to twisted tongue shape of lip in flower bud (Greek: *Plecto*, twisted; *glossa*, tongue).

New genus is allied to *Habenaria*, but differs in following features: leaves passing into the large sheathing amplexicaul foliaceous bracts; inflorescences secund; flowers globose; pedicel with ovary erect and close to rachis; lip coriaceous,

not widely spreading, thickened in margins, 3-fid, triplicate and tongue shape in bud; mid and side lobes folded longitudinally down the middle, with the side lobes appressed to midlobe; claw long, geniculate; column as long as anther; stigmas large, rhomboid reflex and adpress to the base of the lip; rostellum forms a broad triangular plate, middle lobe reaching to the base of the anthers.

Plectoglossa perrottetiana (A. Rich.) K. Prasad & Venu, *comb. nov.*

Basionym: *Habenaria perrottetiana* A. Rich., Ann. Sci. Nat., Bot. II, 15: 74. 1841.

Synonym: *Platanthera lutea* Wight, Icon. Pl. Ind. Orient. 3: t. 919. 1844. *H. lutea* (Wight) Benth., J. Linn. Soc., Bot. 18: 354. 1881. **Fig. 1, 2**

Type: INDIA. Nilgiris hills (given as 'Nil Gherries' on sheet), Otacamund, Avalanchy, August, 1840, *Perrottet*, s.n. (P!)

Terrestrial herbs, 30–60 cm high; tubers 1 or 2, oblong or oblong-elliptic, 2–4 × 1–1.5 cm. Roots much branched, filiform. Stem erect, cylindrical, stout; lower half clothed with sheathing scales; upper half with imbricating amplexicaul leaf bases. Leaves many, sub plicate, ovate-lanceolate, 6–10 × 1–2.5 cm, acute-acuminate at tip; margins pale yellow, entire, faintly reflexed; leaves graduating upwards into foliaceous amplexicaul bracts. Inflorescence terminal, slender, unbranched, secund, few-flowered, c. 25 cm long; bracts green, foliaceous, gland dotted, broadly ovate, 4–5.5 × 2–2.5 cm, acuminate, 10–14 veined, enclosing the pedicel with ovary. Pedicel with ovary erect, close to rachis, light green, twisted, slightly curved, narrowly winged, 2.2–2.7 cm long. Flowers yellowish-green or yellow. Dorsal sepal, lateral sepals, petals and lip connive into a globular perianth, gland dotted. Dorsal sepal concave, ovate-oblong, 1.6–1.8 × 0.6–0.8 cm, obtuse, hooded, 7-veined; lateral sepals slightly concave, obliquely ovate-oblong, 1.6–1.7 × 0.6–0.8 cm, obtuse, 7-veined. Petals entire, sub-falcate, linear or linear-lanceolate, 1.8–1.9 × 0.2–0.3 cm, obtuse, 3-veined. Lip coriaceous, not widely spreading, thickened in margins, 3-fid, triplicate and tongue shaped in bud, 1.9–2 cm long; mid and side lobes folded longitudinally down the middle, with the side lobes appressed to midlobe; midlobe broad, triangular-ovate, c. 9 × 5 mm, obtuse; side lobes shorter than the midlobe, incurved, linear-oblong, c. 7 mm long, obtuse; claw long, geniculate; spur pendulous, slender, clavate, 1.6–1.8 cm long, included in bract, narrowed towards mouth. Column without foot,

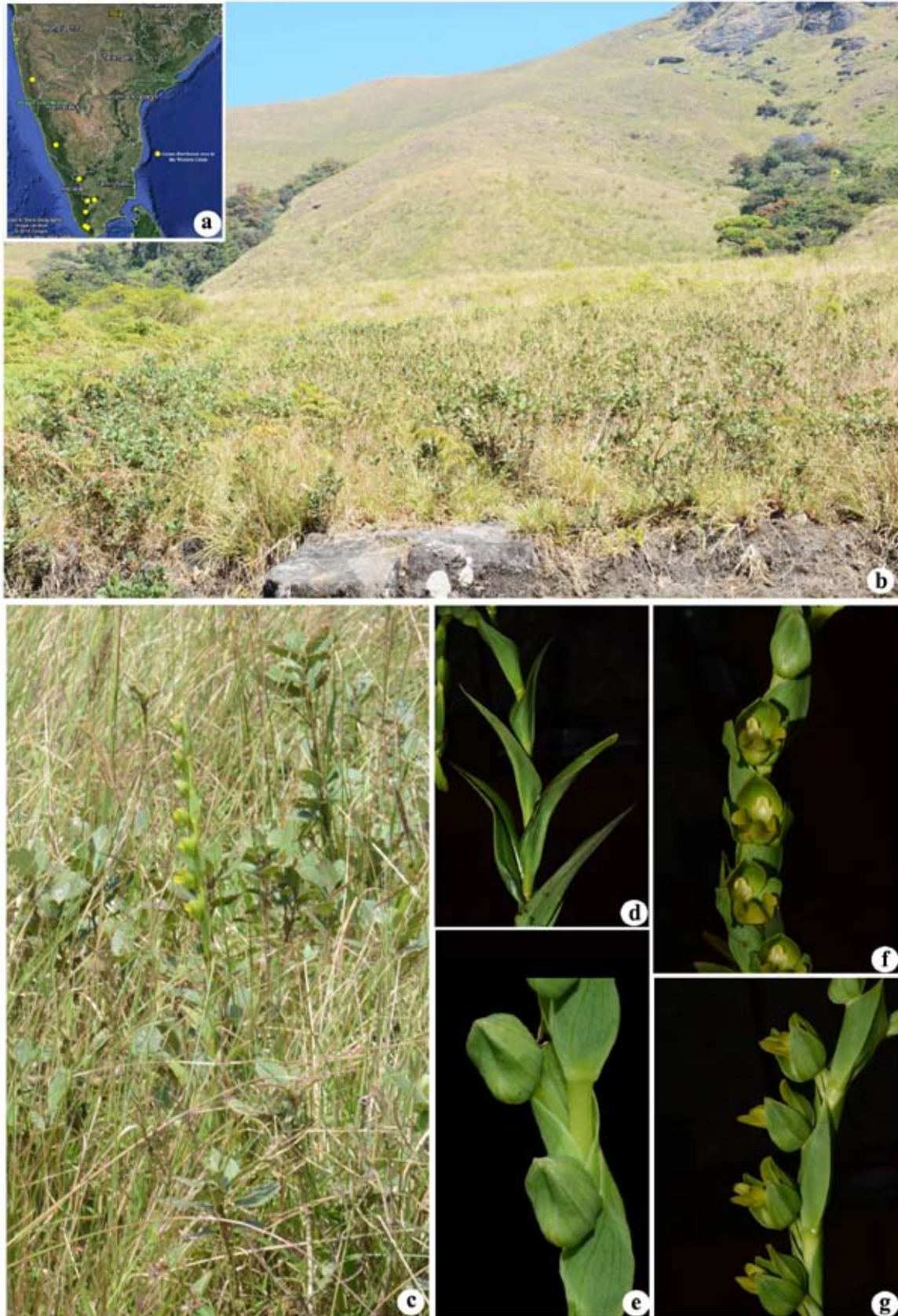


Fig. 1: *Plectoglossa perrottetiana* (A. Rich.) K. Prasad & Venu: **a.** Distribution map; **b.** Habitat; **c.** Habit; **d.** Upper portion of stem; **e.** Flower buds; **f-g.** Inflorescence: front & side views.

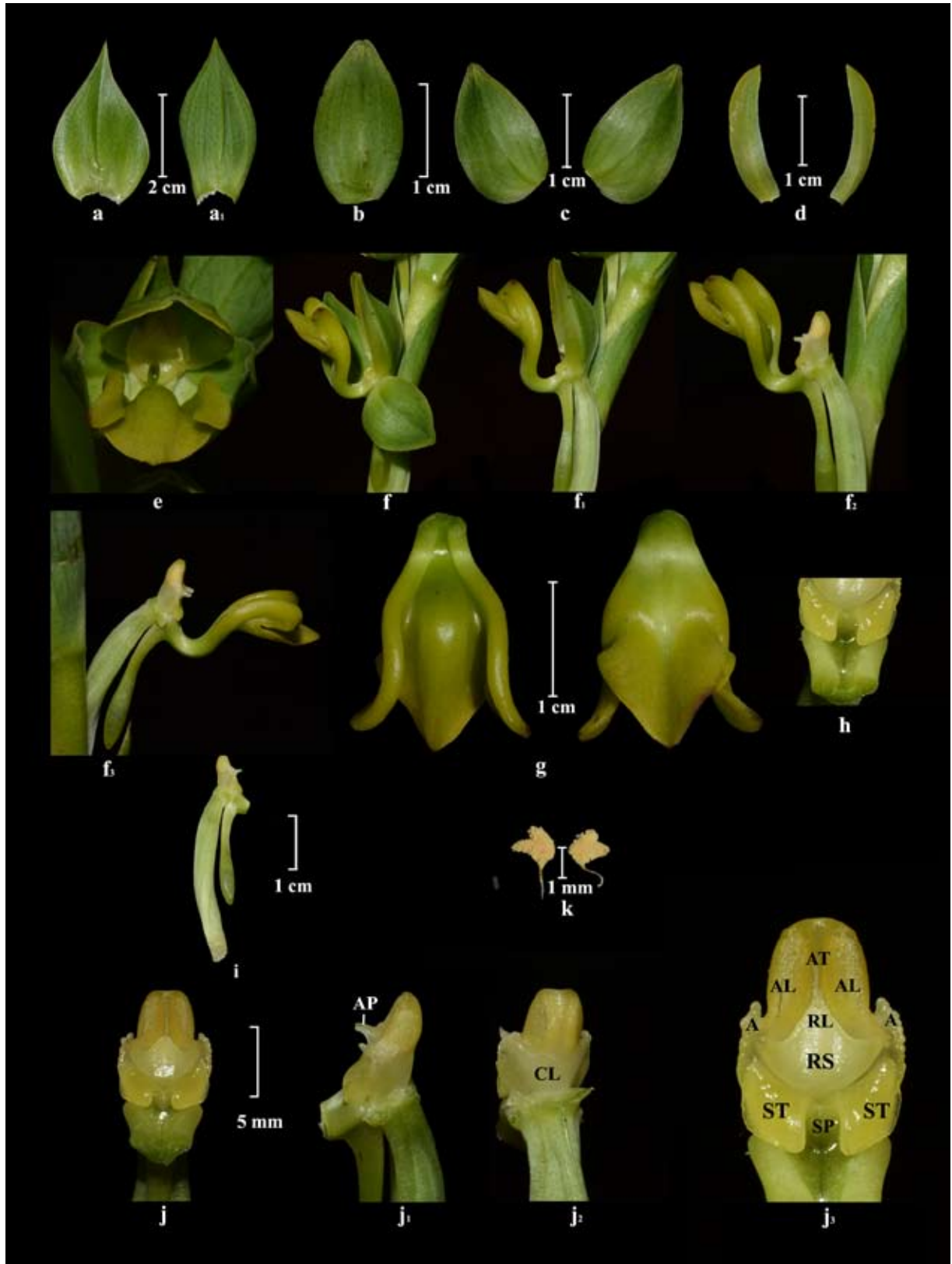


Fig. 2: *Plectoglossa perrottetiana* (A. Rich.) K. Prasad & Venu: **a-a1**. Bracts; **b**. Dorsal sepal; **c**. Lateral sepals; **d**. Petals; **e**. Flower; **f-f3**. Lip in different views; **g**. Lip dorsal and ventral side; **h**. Mouth of spur; **i**. Pedicel with ovary; **j-j3**. Column front, side and rear views; **k**. Pollinia (AT. Anther; AL. anther locules; AP. Antherophores; RS. Rostellum; RL. Rostellummidlobe; ST. Stigmas; SP. Stigmatophore; A. Auricles; CL. Column) .

whitish-yellow, as long as the anther. Anther confluent with the column, yellow, erect, *c.* 4 × 3 mm, broad; anther locules discrete, parallel, truncate at apex, bases often produced into short tubes (antherophores); antherophores upcurved, *c.* 1.6 mm long; auricles prominent, pale yellow, fleshy, entire below, verrucose above. Stigmas 2, distinct, yellow, reflex and adpress to the base of the lip, rhomboid, *c.* 2 × 3 mm, translucent and crenulate at margin. Rostellum light yellow, forms a broad triangular acute plate extending across the column then 3-lobed at apex, lightly yellow, *c.* 4 mm broad; mid-lobe reaching to the bases of the anther, triangular, *c.* 1.2 × 1.6 mm, acute; sidelobes small, triangular. Pollinia 2, yellow, ovoid, *c.* 1.4 × 1 mm long, apex divided into two unequal lobes at apex, grains large; caudicle *c.* 1.7 mm long, hyaline; viscidum small, brownish, orbicular.

Flowering: November-December; *Fruiting:* not noticed by authors (*vide* conservation status)

Habitat: Grows in Shola forests between 1600-2200m., rare.

Specimens examined: INDIA, Malabar, Concan, J.E. Stocks & J.S. Law s.n. (MVM); Malabar, Concan, Hooker law s.n. (MH); **Kerala**, 1600m, 06.11.1964, J. Renz 10244 (SOF); 07.11.1964, J. Renz 10245 (SOF); Idukki district, Near Anamudi (N 10° 08' 35.4"/ E 77° 02' 10.9") 1906m, 04.11.2014, K. Prasad 6446 (BSID); Medinella shola, S.D. Biju 36545 (TBGT); Upper Vaguvarai, 1900m, 16.12.1987, N. Bhargavan 87352 (CAL & MH); Uppupara, 1150m, 26.09.1972, B.D. Sharma 42002 (MH); Kulamanu, 08.06.1984, C.N. Mohanan 82021 (MH); Thiruvananthapuram district, Ponmudi shola, (N 8° 46' 05.9"/ E 77° 06' 37.9") 996m, 21.01.2015, K. Prasad 6457 (BSID); Bonaccord shola, 19.10.1995, N. Mohanan 11155 (TBGT); Bonaccord shola, 28.10.1992, N. Mohanan 11129 (TBGT); Ponmudi shola, 02.10.1984, K. Radhakrishnan s.n. (TBGT); Agasthyamalai, 19.10.1993, A. Ganga Prasad & S. William 18401 (TBGT); Kottayam district, Umaiymalai-Devicolam, 2125m, 19.11.1965, B.V. Shetty 26538 (MH). **Maharashtra**, Kolhapur district, Amba, 900m, M.M. Sardesai 4341 (SUK). **Tamil Nadu**, Indes Orientales, no specific locality, December 1839, Perrottet s.n. (A); Nelligherhy, Otacamund, Perrottet 37 & 860 (MVM); Nilgiris hills (given as Indes Orientales, 'Nil Gherries' on sheet), 1840, Perrottet 479 (P); Avalanchy, 1840, Perrottet 499 (P); Nilgiri district, Avalanche, 2000m, 16.10.1972, K. Vivekananthan 42986 (MH); Kanyakumari district, Muthukuzhivayal to Balamore, 1400m, 29.09.1980, A.N. Henry (MH); Kodaikanal, 1981m, 10.11.1959,

C. Saldanha 4790 (JCB); Kodaikanal, A. Anglade 1175 (K); Pulney, Shembaganur, 30.09.1897, A.G. Bourne 1185 (K & MH); Pulneys, P.F. Fyson 4452 (K); Shembaganur-Kodaikanal Levinge path, below Calvary, C. Saldanha 4671 (K); Palni hills, R. Wight (K); Palny Mountains, R. Wight 3002 (MVM); Shembaganur-Kodaikanal Levinge path, 2000m, Matthew & Charles 47717 (RHT); Perumal Peak, Northern slopes, 2050 m, Matthew 47907 (RHT).

Distribution: Kerala, Karnataka, Maharashtra and Tamil Nadu (Endemic to Western Ghats)

(Richard (1841), Wight (1844), Hooker (1890), Bentham (1881), Fyson (1920), Joseph (1987), Abraham & Vatsala (1981), Mohanan & Henry (1994), Seidenfaden (1999), Sathish Kumar & Manilal (2004) reported in Kerala and Tamil Nadu, Sardesai & Yadav (2005) reported from Maharashtra; Fischer (1928) and Nayar *et al.* (2014) reported it from Western Ghats without specifying locality. Choudhury *et al.* (2011) included its presence in Tamil Nadu, Kerala, Maharashtra and Karnataka.

Note: The species after collection in flowering was followed up for fruit setting; a trip to 2 known collection localities, near Anamudi Shola and Ponmudi Shola forests in Kerala was made in late January, 2015 and both the populations in these places were found wholly dried up in flowering and none bear any juvenile or mature fruits. Moreover, there are no specimens bearing fruits in any of the herbaria consulted by us. There appears to be no appropriate pollinator for this species and the populations in all possibility have been surviving solely on underground perennating tubers. Once these plants are uprooted with tubers, it shall possibly be the end of their sustained survival. Though Sardesai (2005) described the fruit very briefly, but even the published photograph did not show any fruits. It was assessed as 'Endangered' in the CAMP workshop (2001) and since the species is found on the margins of Shola forests, trampling by cattle is cited as threat for this species.

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