

Checklist of orchids of Lakhimpur district of Assam (India) with the addition of two rare orchids

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Abstract

The present study is an outcome of repeated surveys carried out during 2018-2020 in Lakhimpur district of Assam. A total of 140 orchid species divided into 62 genera have been inventoried. *Gastrochilus arunachalensis* A.N. Rao and *Cymbidium sinense* (Jackson ex Andrews) Willdenow are reported as new records for the flora of the state. A brief description, taxonomic note and regional distribution with color photographs are provided for these two species.

Résumé

La présente étude est le résultat d'enquêtes répétées menées au cours de la période 2018-2020 dans le district de Lakhimpur en Assam. Au total, 140 espèces d'orchidées réparties en 62 genres ont été inventoriées. *Gastrochilus arunachalensis* A.N. Rao et *Cymbidium sinense* (Jackson ex Andrews) Willdenow sont signalés comme de nouveaux enregistrements pour la flore de l'état. Une brève description, une note taxinomique et une répartition régionale accompagnées de photographies en couleur sont fournies pour ces deux espèces.

Keywords: *Cymbidium sinense*, *Gastrochilus arunachalensis*, orchid flora of Lakhimpur, taxonomy.

Mots clés : *Cymbidium sinense*, flore d'orchidées de Lakhimpur, *Gastrochilus arunachalensis*, taxinomie.

Introduction

Assam the heart of Northeast India is the most studied amongst all the States of this sector in terms of biodiversity. It has been the focus of numerous researchers such as W. Griffith, J.D Hooker, K.N Kanjilal and many others. Our knowledge on the Flora of Assam was established through the publication of Flora of British India by Hooker (1872-1897) in its 7 monumental volumes and the Flora of Assam by Kanjilal *et al.* (1934–1940) where many collections from the Lakhimpur district have been studied and cited. The district flora as enumerated in the works of Carter & Carter (1921) and Singh (1993) is very rich. These works provide a glimpse of the useful plants and a dicot flora and are the only botanical references for the region established to date.

Especially concerned with the orchid flora of the Assam region, which has always attracted botanists, Chowdhury (2005) published a list of 293 species divided into 75 genera. Later Gogoi (2019) proposed a revised checklist enumerating 398 taxa belonging to 102 genera. This last inventory revealed the presence of a very large number of orchids in the state of Assam. In addition, the orchid flora of several districts and protected areas in the Assam region have been the subject of numerous other inventories (Barua, 2001; Gogoi & Borah, 2010; Gogoi, 2012 and 2014; Gogoi & Yonzon, 2013; Gogoi *et al.*, 2009 and 2012). The orchid flora of the Lakhimpur district, unlike the other districts, has only been very little studied: only Gogoi (2019) mentioned a few species for the district. Here we propose for the first time a checklist of wild orchids. We also report two new regional records for the flora of the state.

Methods

Data were collected through repeated field surveys, in the forests, at all seasons from 2018 to 2020. The plant specimens collected were photographed in the field, pressed and dried and mounted on herbarium sheets following the standard methods of Jain & Rao (1977). The

nomenclature follows POWO (2021) and WFO (2021) and the species are classified as per Angiosperm Phylogeny Group system, APG IV (Chase *et al.*, 2016). Identifications were achieved using relevant literature (King & Pantling, 1898; Deva & Naithani, 1968; Pradhan, 1979; Hegde, 1984; Deorani & Naithani, 1995; Chowdhery, 1998; Pearce & Cribb, 2002; Lucksom, 2007; Chen *et al.*, 2009; Swami, 2017; Gale *et al.*, 2018; Misra, 2019; Gogoi, 2019) and scrutiny of the herbarium specimens housed in the collections of ASSAM, ARUN, E, HAU, K, & PE. Information on the conservation status was noted with reference to the International Union for Conservation of Nature (IUCN, 2021) Red List. The collected specimens were deposited in the herbarium of TOSEHIM, Regional Orchids Germplasm Conservation & Propagation Centre (Assam).

Results

A total of 140 species of wild orchids have been recorded (Table 1) distributed into 62 genera. *Dendrobium* Swartz (1799: 82) was the most dominant genus with 16 species, followed by the genus *Bulbophyllum* Thouars (1822: t.3) with 13 species, then the genera *Coelogyne* Lindley (1821: t.33) and *Cymbidium* Swartz (1799: 70) with 4 species each.

Table 1. Annotated checklist of Orchids of Lakhimpur district

Abbreviations used: no.-Voucher n°; H-Habit [E-Epiphytic, T-Terrestrial]; O-Occurrence [C-Common, R-Rare, VR-Very Rare].

Taxon	no.	H	Localities	O
<i>Acampe carinata</i> (Griffith) Panigrahi	815	E	Dirgha, Dulung	C
<i>Acampe ochracea</i> (Lindley) Hochreutiner	812	E	Dirgha, Sesa	R
<i>Acampe praemorsa</i> (Roxburgh) Blatter & McCann var. <i>longepedunculata</i> (Trimen) Govaerts	820	E	Dirgha, Tariyoni, Sesa, Dulung	C
<i>Acanthophippium sylhetense</i> Lindley	826	T	Dirgha, Dulung	R
<i>Aerides multiflora</i> Roxburgh	844	E	Dirgha	R
<i>Aerides odorata</i> Loureiro	821	E	Dirgha, Dulung	C
<i>Aerides rosea</i> Loddiges ex Lindley & Paxton	823	E	Dirgha, Tariyoni, Sesa, Dulung	C
<i>Agrostophyllum brevipes</i> King & Pantling	825	E	Dirgha	C

<i>Agrostophyllum planicaule</i> (Wallich ex Lindley) Reichenbach f.	824	E	Dirgha, Dulung	C
<i>Anoectochilus roxburghii</i> (Wallich) Lindley ex Wallich	822	T	Dirgha	VR
<i>Appendicula cornuta</i> Blume	845	E	Dirgha, Dulung	R
<i>Arachnis labrosa</i> (Lindley & Paxton) Reichenbach f.	847	E	Dirgha	R
<i>Arundina graminifolia</i> (D. Don) Hochreutiner	813	T	Dirgha	C
<i>Bryobium pudicum</i> (Ridley) Y. P. Ng & P. J. Cribb	848	E	Dirgha, Dulung	C
<i>Bulbophyllum affine</i> Wallich ex Lindley	846	E	Dirgha, Dulung	C
<i>Bulbophyllum apodum</i> Hooker f.	849	E	Dirgha, Dulung	C
<i>Bulbophyllum careyanum</i> (Hooker f.) Sprengel	843	E	Dirgha, Dulung	C
<i>Bulbophyllum caudatum</i> Lindley	850	E	Dirgha	R
<i>Bulbophyllum crassipes</i> Hooker f.	852	E	Dirgha, Tariyoni, Sesa, Dulung	R
<i>Bulbophyllum delitescens</i> Hance	854	E	Dirgha, Dulung	R
<i>Bulbophyllum odoratissimum</i> (J. E. Smith) Lindley ex Wallich	856	E	Dirgha	C
<i>Bulbophyllum protractum</i> Hooker f.	814	E	Dirgha	C
<i>Bulbophyllum pteroglossum</i> Schlechter	855	E	Dirgha	R
<i>Bulbophyllum reptans</i> (Lindley) Lindley ex Wallich	853	E	Dirgha	R
<i>Bulbophyllum roxburghii</i> (Lindley) Reichenbach f.	851	E	Dirgha, Dulung	C
<i>Bulbophyllum scabratum</i> Reichenbach f.	857	E	Dirgha	C
<i>Bulbophyllum spathulatum</i> (Rolfe ex E.W. Cooper) Seidenfaden	859	E	Dirgha, Dulung	R
<i>Calanthe lyroglossa</i> Reichenbach f.	828	T	Dirgha	R
<i>Calanthe sylvatica</i> (Thouars) Lindley	858	T	Dirgha, Dulung	C
<i>Calanthe triplicata</i> (Willemet) Ames	861	T	Dirgha	R
<i>Callostylis rigida</i> Blume	829	E	Dirgha, Dulung	C
<i>Ceratostylis himalaica</i> Hooker f.	862	E	Dirgha	R
<i>Ceratostylis radiata</i> J. J. Smith	863	E	Dirgha	R
<i>Ceratostylis subulata</i> Blume	860	E	Dirgha	R

<i>Chrysoglossum ornatum</i> Blume	830	T	Dirgha	R
<i>Cleisocentron pallens</i> (Cathcart ex Lindley) N. Pearce & P. J. Cribb	865	E	Dirgha, Dulung	R
<i>Cleisostoma appendiculatum</i> (Lindley) Bentham & Hooker f. ex B. D. Jackson	867	E	Dirgha, Dulung	C
<i>Cleisostoma filiforme</i> (Lindley) Garay	869	E	Dirgha, Dulung	R
<i>Cleisostoma linearilobatum</i> (Seidenfaden & Smitinand) Garay	871	E	Dirgha	R
<i>Cleisostoma simondii</i> (Gagnepain) Seidenfaden	864	E	Dirgha, Dulung	R
<i>Cleisostoma subulatum</i> Blume	827	E	Dirgha, Sesa, Dulung	C
<i>Coelogyne fimbriata</i> Lindley	870	E	Dirgha	C
<i>Coelogyne ovalis</i> Lindley	866	E	Dirgha	C
<i>Coelogyne prolifera</i> Lindley	842	E	Dirgha	C
<i>Coelogyne suaveolens</i> (Lindley) Hooker f.	872	E	Dirgha	R
<i>Collabium chinense</i> (Rolfe) Tang & F. T. Wang	868	T	Dirgha, Dulung	C
<i>Corymborkis veratrifolia</i> (Reinwardt) Blume	841	T	Dirgha, Dulung	R
<i>Crepidium acuminatum</i> (D. Don) Szlachetko	874	T	Dirgha	C
<i>Crepidium purpureum</i> (Lindley) Szlachetko	876	T	Dirgha	C
<i>Cryptochilus acuminatus</i> (Griffith) Schuiteman, Y. P. Ng & H. A. Pedersen	878	E	Dirgha	C
<i>Cylindrolobus biflorus</i> (Griffith) Rauschert	881	E	Dirgha	C
<i>Cymbidium aloifolium</i> (Linnaeus) Swartz	883	E	Dirgha, Tariyoni, Sesa, Dulung	C
<i>Cymbidium bicolor</i> Lindley	880	T	Dirgha, Dulung	C
<i>Cymbidium munronianum</i> King & Pantling	884	T	Dirgha	VR
<i>Cymbidium sinense</i> (Andrews) Willdenow	810	E	Dirgha	VR
<i>Dendrobium acinaciforme</i> Roxburgh	887	E	Dirgha, Tariyoni, Sesa, Dulung	C
<i>Dendrobium aduncum</i> Lindley	911	E	Dirgha, Dulung	C
<i>Dendrobium aphyllum</i> (Roxburgh) C. E. C. Fisch	882	E	Dirgha, Tariyoni, Sesa, Dulung	C
<i>Dendrobium cumulatum</i> Lindley	879	E	Dirgha, Dulung	VR
<i>Dendrobium densiflorum</i> Lindley	875	E	Dirgha	VR
<i>Dendrobium farmeri</i> Paxton	886	E	Dirgha	VR

<i>Dendrobium fimbriatum</i> Hooker	889	E	Dirgha, Tariyoni, Sesa, Dulung	C
<i>Dendrobium fugax</i> Reichenbach f.	885	E	Dirgha, Dulung	C
<i>Dendrobium lituiflorum</i> Lindley	873	E	Dirgha, Tariyoni, Sesa, Dulung	C
<i>Dendrobium mannii</i> Ridley	831	E	Dirgha	R
<i>Dendrobium moschatum</i> (Banks) Swartz	890	E	Dirgha, Tariyoni, Sesa, Dulung	C
<i>Dendrobium nobile</i> Lindley	877	E	Dirgha, Dulung	R
<i>Dendrobium polyanthum</i> Wallich ex Lindley	891	E	Dirgha	R
<i>Dendrobium salaccense</i> (Blume) Lindley	897	E	Dirgha	R
<i>Dendrobium sulcatum</i> Lindley	888	E	Dirgha, Dulung	R
<i>Dendrobium transparens</i> Wallich ex Lindley	898	E	Dirgha, Tariyoni, Sesa, Dulung	C
<i>Dendrolirium ferrugineum</i> (Lindley) A. N. Rao	901	E	Dirgha, Dulung	C
<i>Dendrolirium lasiopetalum</i> (Willdenow) S. C. Chen & J. J. Wood	832	E	Dirgha, Tariyoni, Sesa, Dulung	C
<i>Didymoplexis pallens</i> Griffith	902	T	Dirgha, Tariyoni, Sesa, Dulung	C
<i>Dienia ophrydis</i> (J. Koenig) Seidenfaden	899	T	Dirgha, Dulung	C
<i>Diploprora championii</i> (Lindley) Hooker f.	892	E	Dulung	R
<i>Epipogium roseum</i> (D. Don) Lindley	833	T	Dirgha	R
<i>Eria javanica</i> (Swartz) Blume	912	E	Dirgha, Dulung	R
<i>Erythrodes blumei</i> (Lindley) Schlechter	917	T	Dulung	R
<i>Erythrodes hirsuta</i> (Griffith) Ormerod	925	T	Dulung	R
<i>Eulophia dabia</i> (D. Don) Hochreutiner	900	T	Dulung	C
<i>Gastrochilus arunachalensis</i> A. N. Rao	811	E	Dulung	VR
<i>Gastrochilus calceolaris</i> (Buchanan-Hamilton ex J. E. Smith) D. Don	919	E	Dirgha	VR
<i>Gastrochilus inconspicuus</i> (Hooker f.) Kuntze	926	E	Dirgha, Tariyoni, Sesa, Dulung	C
<i>Gastrochilus obliquus</i> (Lindley) Kuntze	916	E	Dirgha, Dulung	C
<i>Gastrochilus obliquus</i> (Lindley) Kuntze var. <i>suavis</i> (Seidenfaden) Z. H. Tsi	927	E	Dirgha, Dulung	C
<i>Geodorum densiflorum</i> (Lamarck) Schlechter	918	T	Dirgha, Dulung	C
<i>Goodyera procera</i> (Ker Gawler) Hooker	932	T	Dirgha, Dulung	C

<i>Goodyera viridiflora</i> (Blume) Blume	910	T	Dirgha	R
<i>Hetaeria affinis</i> (Griffith) Seidenfaden & Ormerod	920	T	Dirgha, Dulung	C
<i>Liparis bootanensis</i> Griffith	924	E	Dirgha, Dulung	R
<i>Liparis mannii</i> Reichenbach f.	933	E	Dirgha, Dulung	R
<i>Liparis plantaginea</i> Lindley	939	E	Dirgha	R
<i>Liparis viridiflora</i> (Blume) Lindley	834	E	Dirgha, Tariyoni, Sesa, Dulung	C
<i>Luisia trichorrhiza</i> (Hooker) Blume	940	E	Dirgha, Tariyoni, Sesa, Dulung	C
<i>Micropera obtusa</i> (Lindley) Tang & F. T. Wang	934	E	Dirgha, Dulung	C
<i>Micropera pallida</i> (Roxburgh) Lindley	909	E	Dirgha, Dulung	C
<i>Micropera rostrata</i> (Roxburgh) N. P. Balakrishnan	941	E	Dirgha, Dulung	C
<i>Mycaranthes floribunda</i> (D. Don) S. C. Chen & J. J. Wood	943	E	Dirgha, Dulung	C
<i>Oberonia acaulis</i> Griffith	839	E	Dirgha	R
<i>Oberonia mucronata</i> (D. Don) Ormerod & Seidenfaden	915	E	Dirgha, Tariyoni, Sesa, Dulung	C
<i>Oberonia rufilabris</i> Lindley	944	E	Dirgha	R
<i>Otochilus fuscus</i> Lindley	908	E	Dirgha, Tariyoni, Sesa, Dulung	C
<i>Otochilus lancilabius</i> Seidenfaden	942	E	Dirgha	R
<i>Papilionanthe teres</i> (Roxburgh) Schlechter	935	E	Dirgha, Tariyoni, Sesa, Dulung	C
<i>Phaius tankervilleae</i> (Banks) Blume	840	T	Dirgha	C
<i>Phaius wallichii</i> Lindley	945	T	Dirgha	R
<i>Phalaenopsis deliciosa</i> Reichenbach f.	896	E	Dirgha, Dulung	R
<i>Phalaenopsis lobbii</i> (Reichenbach f.) H. R. Sweet	947	E	Dirgha, Dulung	R
<i>Phalaenopsis mannii</i> Reichenbach f.	914	E	Dirgha, Dulung	R
<i>Pholidota articulata</i> Lindley	948	E	Dirgha, Tariyoni, Sesa, Dulung	C
<i>Pholidota imbricata</i> Hooker	907	E	Dirgha, Tariyoni, Sesa, Dulung	C
<i>Pinalia acervata</i> (Lindley) Kuntze	923	E	Dirgha	C
<i>Pinalia amica</i> (Reichenbach f.) Kuntze	949	E	Dirgha, Dulung	C

<i>Pinalia bractescens</i> (Lindley) Kuntze	837	E	Dirgha	R
<i>Pinalia pumila</i> (Lindley) Kuntze	946	E	Dirgha	C
<i>Podochilus cultratus</i> Lindley	937	E	Dirgha, Tariyoni, Sesa, Dulung	C
<i>Podochilus khasianus</i> Hooker f.	838	E	Dirgha, Dulung	C
<i>Pomatocalpa spicatum</i> Breda	938	E	Dirgha, Dulung	R
<i>Pomatocalpa undulatum</i> (Lindley) J. J. Smith	936	E	Dirgha	C
<i>Pteroceras teres</i> (Blume) Holttum	835	E	Dirgha	R
<i>Rhynchostylis retusa</i> (Linnaeus) Blume	931	E	Dirgha, Tariyoni, Sesa, Dulung	C
<i>Robiquetia spathulata</i> (Blume) J. J. Smith	895	E	Dirgha, Dulung	C
<i>Spiranthes sinensis</i> (Persoon) Ames	906	T	Dirgha, Sesa, Dulung	C
<i>Stereochilus hirtus</i> Lindley	930	E	Dirgha	R
<i>Strongyleria pannea</i> (Lindley) Schuiteman, Y. P. Ng & H. A. Pedersen	817	E	Dirgha, Dulung	C
<i>Taeniophyllum crepidiforme</i> (King & Pantling) King & Pantling	929	E	Dirgha	C
<i>Taeniophyllum glandulosum</i> Blume	905	E	Dirgha	C
<i>Tainia latifolia</i> (Lindley) Reichenbach f.	836	T	Dirgha	C
<i>Thelasis pygmaea</i> (Griffith) Lindley	894	E	Dirgha	C
<i>Thrixspermum centipeda</i> Loureiro	922	E	Dirgha, Dulung	C
<i>Thrixspermum pygmaeum</i> (King & Pantling) Holttum	928	E	Dirgha	C
<i>Thunia alba</i> (Lindley) Reichenbach f.	818	E	Dirgha	R
<i>Trichotosia velutina</i> (Loddiges ex Lindley) Kraenzlin	921	E	Dirgha	C
<i>Tropidia angulosa</i> (Lindley) Blume	904	T	Dulung	C
<i>Tropidia curculigoides</i> Lindley	913	T	Dulung	C
<i>Zeuxine clandestina</i> Blume	819	T	Dulung	C
<i>Zeuxine flava</i> (Wallich ex Lindley) Trimen	903	T	Dulung	R
<i>Zeuxine nervosa</i> (Wallich ex Lindley) Bentham ex Trimen	893	T	Dirgha, Dulung	C
<i>Zeuxine strateumatica</i> (Linnaeus) Schlechter	816	T	Dulung	C

The total number of species inventoried is greater than the number reported for the States of Tripura (51 species), Bihar (36 species) and Maharashtra (104 species) (Singh *et al.*, 2019). Out of the 140 taxa listed

during this study *Gastrochilus calceolaris* Don (1825: 32) is assessed as Critically Endangered, six species are designated under 'Least Concern', and others ones are Not Evaluated as per IUCN (2021).

Taxonomic note

Two species have never been recorded in Assam earlier:

1. *Gastrochilus arunachalensis* A.N. Rao, *Journal of Economic and Taxonomic Botany* 16: 723. 1992.

Type: India, West Kameng District, tropical rain forest, about 150 m a. s. l., epiphytic on tree trunks. A. N. Rao 24220 (holotype: Orchid Herbarium, Tipi).

Material studied: India, Assam, Lakhimpur district, Dulung reserve forest, 18.11.2020, R. Gogoi 00811 (Herbarium of TOSEHIM).

Description (plates 1 & 2): Epiphytic herbs. Stem, erect, 4 cm long and 1 cm in diameter, with 3-4 leaves. Leaves nearly basal, distichous, oblong, 8-15 × 1.7–2.3 cm, slightly fleshy or leathery, apex obtuse and unequally 2-lobed. Inflorescences sub-umbellate, 1-4, from base of stem, often 8-10-flowered; peduncle straight, 1-2 cm long, stout, with 2 cupular sheaths. Flower yellow or yellow green, with dark brown or purplish spots. Sepals similar, oblanceolate, 0.68-7 × 0.32-0.35 cm, base contracted, apex obtuse. Petals oblanceolate, 0.62-0.65 × 0.23-0.25 cm, apex obtuse. Lip with an epichile and a saccate hypochile; epichile triangular, 0.25-0.3 × 0.54-0.6 cm, fleshy, adaxially glabrous, with a central cushion, margin irregularly fimbriate and erose, apex rounded; hypochile cupular, ca. 0.4 cm in diameter and ca. 0.6 cm tall, white tinged with pale yellow at bottom, outside with 3 ridges. Column ca. 0.4 cm long, stout; rostellum deeply 2-lobed; pollinia 2, ca. 0.1cm in diameter; stipe elongate, ca. 0.2 cm long; anther cap nearly subglobose, apex narrowed into a beak. Fruit cylindrical, ridged, 5-6 cm in length and 1.2-1.4 cm across.

Flowering: October - November.

Habitat: mixed deciduous tropical forest.

Distribution: India (Assam, Arunachal Pradesh), Myanmar.



Plate. 1. *Gastrochilus arunachalensis* Habit

Note: *Gastrochilus arunachalensis* is a species discovered 30 years ago in Arunachal Pradesh and the key morphological characters of the flowers are hard to interpret. This plant is closely related to *G. pechei* (Reichenbach f., 1889: 447) Kuntze (1891: 661) in having a lip with a triangular epichile and a hypochile not laterally compressed. However, it can be easily distinguished from the latter by its small size, its leaves less than 15 cm (*versus* 15–20 cm), its green to yellow green flowers (*versus* yellow flowers), oblanceolate sepals and petals (*versus* spathulate), epichile triangular without central cushion (*versus* sub triangular epichile with central cushion) (Kuntze, 1891; Rao, 1992). It was so far known from Arunachal Pradesh (Rao, 1992) in India and Myanmar (Liu *et al.*, 2020). It was collected from Dulung area of Lakhimpur district during our floristic survey. This species is the sixth representative of *Gastrochilus* reported in Assam.

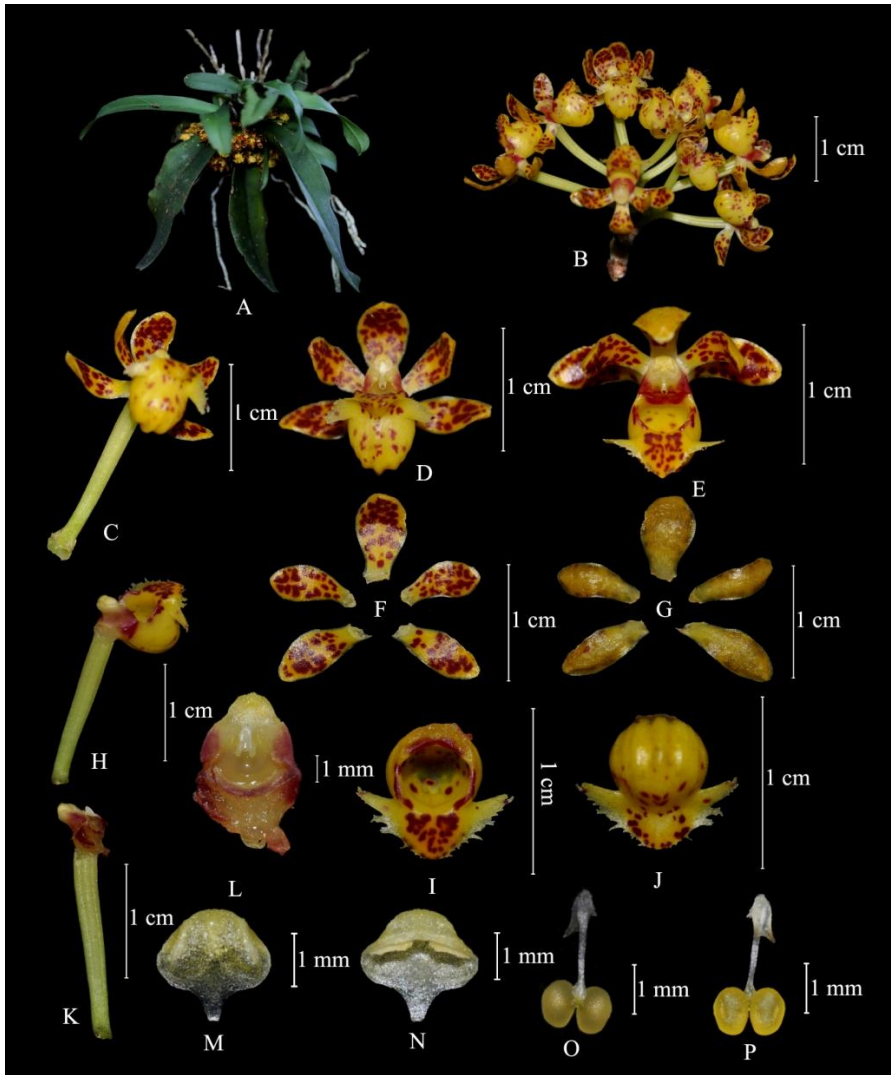


Plate. 2. *Gastrochilus arunachalensis*

A: habit; B: inflorescence; C, D, E: different views of the flower; F, G: perianth; H: lip with ovary and column; I, J: lip; K: ovary and column; L: column; M, N: anther; O, P: pollinia.

2. *Cymbidium sinense* (Jackson ex Andrews) Willdenow, *Species Plantarum*, ed. 4, 4: 111. 1805.

Basionym: *Epidendrum sinense* Jackson ex Andrews, *Botanist's Repository, for new, and rare plants* 3: pl. 216. 1802.

Type: ex China, cult. G. Hibbert, imported to London by J. Slater in 1793. Icon. in Andrews, *Botanist's Repository, for new, and rare plants* 3: pl. 216. 1802.

Material studied: India, Lakhimpur district, Dirgha, 10.02.2020, R. Sonowal 00810 (Herbarium of TOSEHIM).

Description (plates 3 & 4): Plants terrestrial. Pseudobulbs ovoid, 2.5-6 × 1.5-2.5 cm, enclosed in leaf bases. Leaves 3-5, deep green, lorate, 45-150 × 2-4 cm, thinly leathery, articulate. Inflorescence arising from base of pseudobulb, erect, somewhat robust, 40-90 cm long; rachis 10-20- or more flowered; floral bracts 0.4-0.8 cm long. Flowers strongly fragrant, variable in color, usually dark purple or purplish brown with a paler lip; pedicel and ovary 2-2.5 cm long. Sepals narrowly oblong or narrowly elliptic, 2.2-3.5 × 0.5-0.7 cm, apex acute. Petals nearly narrowly ovate, 2-2.7 × 0.6-1 cm, apex acute; lip ovate-oblong, 1.7-3 cm long, not fused to basal margins of column, obscurely 3-lobed; lateral lobes surrounding and enclosing the column very loosely; mid-lobe recurved, oblong-ovate, ca. 1.4 × 1.0 cm, margin slightly undulate; disk minutely papillate-pubescent, with 2 longitudinal lamellae extending from near the lip base to the base of midlobe; lamellae converging in their apical half and forming a short tube. Column slightly arcuate, 1.2-1.5 cm long, narrowly winged; pollinia 4, in 2 pairs, broadly ovoid. Capsule narrowly ellipsoid, 6-7 × 1.5-2 cm.

Flowering: November - March.

Habitat: Wet and well-drained shaded places in thickets along streamside.

Distribution: India (Assam - from Dirgha area of Lakhimpur district - and according to Lu *et al.*, 2011 and Iwatsuki *et al.*, 2016, Sikkim, Uttarkhand, Arunachal Pradesh and Manipur); Nepal; Bhutan; Myanmar; Thailand; Vietnam; China; Japan (Ryukyu Islands).

Notes: From the other six wild species of terrestrial *Cymbidium* growing in the forests of Assam *Cymbidium sinense* can be recognized by its larger size with up to 200 cm long and 3 cm broad leaves (*versus* up to 100 cm long and 2.5 cm wide), strongly fragrant (*versus* unscented or lightly fragrant).

Kumar *et al.* (2018) had reported the presence of *Cymbidium sinense* in Manipur and cited its presence in Assam. The authors had however used The Flora of British India by Hooker (1872-1897) as reference. At the time, Assam was undivided encompassing the eight northeastern states of Assam (including Arunachal Pradesh and Manipur). No other author dealing with orchids in the state has so far taken up this data and mentioned its distribution in Assam as defined by the current geographical limits. Our observation in the district of Lakhimpur of populations of *C. sinense* represents an addition to the flora of Assam.



Plate. 3. *Cymbidium sinense*

A: habit; B: inflorescence

Conclusion

With the new taxa included here, the current orchid species number in Assam is brought to 400 species. The tropical climate and position in the Eastern Himalayan biodiversity hotspot are a likely explanation for the state's great diversity. An increasing surge in collection of wild orchids has been seen, which apart from conservation has pushed the native species towards peril. Several growers have been developing an interest in planting wild species. This has been a serious concern as many of these species are already threatened by habitat loss and climate change. There is still a gap in the research conducted so far to determine the approximate orchid wealth of Assam, with new records added each year. So far no protected areas are

designated in the Lakhimpur district, and much of the biodiversity finds its place in reserve forests, which offers the smallest protection from illegal activities and exploitation. Otherwise, the human population boom has created a need for new settlements as well as agricultural lands which poses serious threats to the present biodiversity in the area.

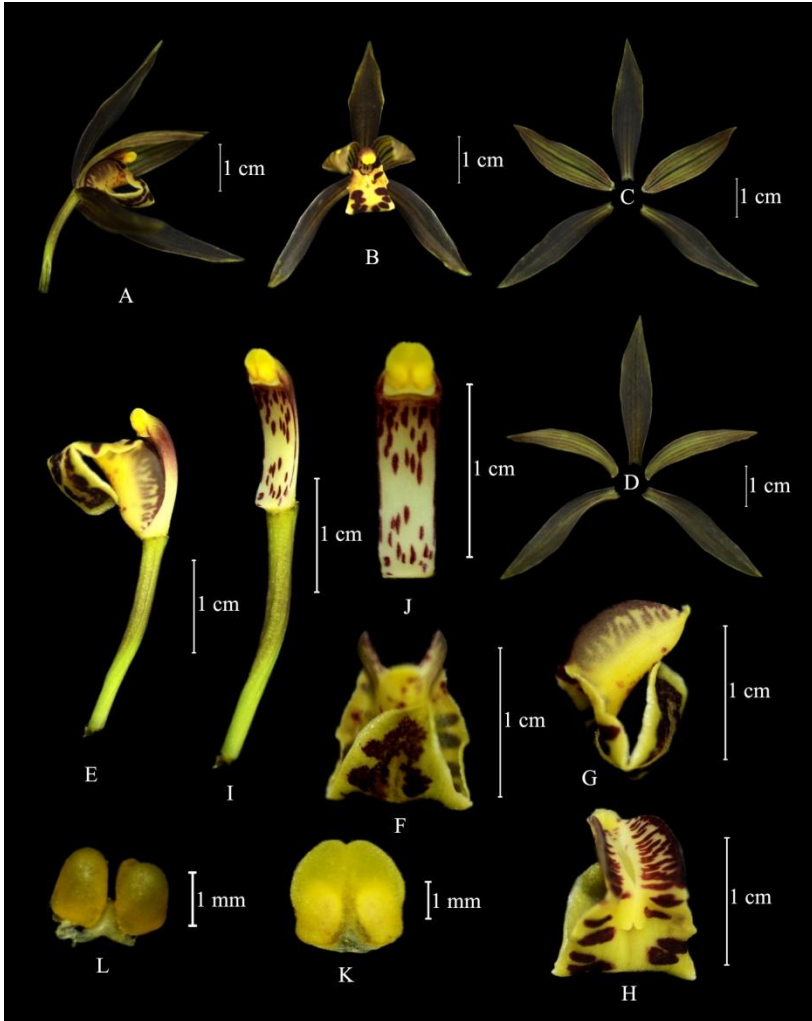


Plate 4. *Cymbidium sinense*

A, B: different views of the flower; C, D: perianth; E: lip with ovary and column; F, G, H: different views of the lip; I: ovary and column; J: column front view; K: anther; L: pollinia.

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