

# Concept of *Liparis torta* (Orchidaceae)– an Indian endemic: its rediscovery, extended distribution, relationship and red list assessment

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## लिपारिस टोर्टा (ऑर्किडेसी) की संकल्पना- एक भारतीय स्थानिक – इसका पुनः अन्वेषण, विस्तारित वितरण, संबंध एवं रेड लिस्ट मूल्यांकन

सी.एस. राव, डि.के. अग्रवाला एवं मुसादिक हुसैन भट्ट

### सारांश

लिपारिस टोर्टा हुक.एफ. [ ऑर्किडेसी- एपिडेन्द्रोइडी- मैलेक्सीडी- मैलेक्सीडिनेइ ] को मेघालय के खासी पहाड़ियों से 130 वर्ष पूर्व प्राप्त पुराने संग्रह के आधार पर ज्ञात किया गया था अब इसका पुनः अन्वेषण अरुणाचल प्रदेश से किया गया है। यह सम्पूर्ण आकृतिकी में लिपारिस बूटानेंसिस ग्रिफ. के जैसा प्रतीत होता है, लेकिन पुष्पीय विवरण एवं पुष्पण समय में भिन्नता पाया जाता है। यह शोध पत्र 130 वर्षों से भी अधिक अवधि बाद प्रजाति के पुनः अन्वेषण; अरुणाचल प्रदेश में इसके विस्तारण क्षेत्र; लिपारिस बूटानेंसिस के साथ इसका संबंध; एवं आईयूसीएन मानदंडों के आधार पर इसका रेड लिस्ट मूल्यांकन आदि का विवरण प्रस्तुत करता है। इस आलेख में इसके सुगम पहचान हेतु सचित्र व्याख्यायुक्त छायापट्टियों सहित आकृतिकीय विवरण प्रस्तुत है। इसमें पुष्पण समय, आवास, वितरण प्रक्षेत्र एवं संबंधित खतरों की भी सूचनाएँ प्रदान की गयी हैं। यह आलेख में इस प्रजाति का मूल वर्णन को शोधित किया गया है तथा इसका पहचान को और सरल बनाने हेतु एक एपीटाईप का भी चयन किया गया है।

### ABSTRACT

*Liparis torta* Hook.f. [ORCHIDACEAE-EPIDENDROIDEAE-MALAXIDEAE-MALAXIDINAE] which was known by more than 130 years old type collection from Khasi Hills, Meghalaya has been rediscovered from Arunachal Pradesh. It is a lookalike species of *Liparis bootanensis* Griff. in gross morphology, but with considerable differences in the floral details and phenological behaviour. Present paper reports its rediscovery after more than 130 years; its range extension in Arunachal Pradesh; its relationship with *Liparis bootanensis*; and the Red list assessment as per IUCN guidelines. A detail morphological description with illustrative photo plate has been provided for its easy identification. Its original description has been amended and an epitype has been designated as a supplement for its identity. This has also been provided with information on phenology, habitat, distribution and threats.

**Keywords:** *Liparis torta*, Orchidaceae, Taxonomy, Epitype, distribution, Endemic

### INTRODUCTION

*Liparis torta* was described by Hooker (1890) based on collection from Khasia Hills, Meghalaya. This is one of the single leaved epiphytic *Liparis* and was obsolete for more than a century. The species has never been collected after its type collection and also excluded by Katak (1986) from his book 'Orchids of Meghalaya'. During field survey at West Kameng district, Arunachal Pradesh in January 2015, few specimens of single leaved epiphytic *Liparis* were collected and tentatively identified as *Liparis bootanensis* Griff. Similar specimens, which were also

identified as *Liparis bootanensis* and collected from Arunachal Pradesh in October-January were also found in CAL, ASSAM, ARUN and Orchid Herbarium, Tipi. These specimens exhibit strikingly different flowering season (October - February) than that of *L. bootanensis* which flowers during July – September. Further, *L. bootanensis* is a species of frequent occurrence and wider distribution in NE India with yellowish-brown labellum instead of greenish perianth parts in these specimens. This led us to further investigate the identity of these winter flowering specimens by thorough morphological characterization. On comparison with *L. bootanensis*,

remarkable differences could be observed in floral morphology. Our specimens have cadmium yellow to pale yellowish green flowers with distinctly reflexed, 1-veined sepals *versus* the yellowish-brown flowers with 3-veined, erect sepals in *L. bootanensis* (Table-1). On further comparison with all one-leaved species of *Liparis*, our specimens matched perfectly with *Liparis torta* Hook.f. which was known so far from its type locality in Meghalaya and has never been reported since its original discovery. The identification was again confirmed after comparison with the type specimen and protologue of *Liparis torta*. Present collection of this species is its rediscovery after more than 130 years and also extends its distribution range in to Arunachal Pradesh. A detail description along with illustrative photo plate has been provided for its easy identification. The species has been assessed as 'Endangered' by following the IUCN Red Listing guidelines (IUCN, 2012; 2019).

## TAXONOMIC TREATMENT

***Liparis torta*** Hook.f., Icon. Pl. 21: t.2014. 1890 & Fl. Brit. India 6: 182. 1890; C.S. Rao & S.K. Singh, Wild Orch. Meghalaya: 37. 2015. *Stichorkis torta* (Hook.f.) Marg., Szlach. & Kulak., Acta Soc. Bot. Poloniae 77: 39. 2008. *Leptorkis torta* (Hook.f.) Kuntze, Revis. Gen. Pl. 2: 671. 1891.

**Type:** INDIA, Khasia hills, 3000 ft., October 1878, G. Mann s.n. (Holotype K000387798, Photo!); Meghalaya, K & J Hills, Cherra, 14.11.1968, *Anonymous* 37223 (Epitype designated here, ASSAM!).

Epiphytic herbs, up to 25 cm long. Pseudobulbs clustered, 1.5–3.5 × 0.8–1.5 cm, ovoid-conical to narrowly cylindrical, young ones covered with 3–4 imbricate sheaths. Leaf solitary, apical on pseudobulbs, thinly coriaceous, 10–18 × 3–3.5 cm, elliptic-lanceolate, entire, acute-acuminate, 9-veined; base sub-sessile, articulate, sheathing. Raceme terminal on developing shoot, as long as or longer than leaves, up to 25 cm long, erect or arched, glabrous; peduncle 3–4 cm long, terete, obscurely winged, covered at base with sheaths of developing shoot, ebracteate above; rachis prominently winged, straight or weakly flexuous, laxly few flowered. Floral bracts 6–8 × 1–1.5 mm, lanceolate, acute-acuminate, membranous, spreading. Flowers successively opening, 15–22 mm across, cadmium yellow to pale green, labellum yellowish-green. Pedicel and ovary 14–16 mm long, slender, strongly curved. Sepals sub-similar, free, spreading, strongly decurved, margins revolute, apex obtuse, 1-veined; dorsal sepal 10–12 × 2–2.5 mm, narrowly oblong; lateral sepals slightly shorter, oblique, projecting beyond labellum. Petals 9–11 × 0.5–0.7 mm, filiform, revolute, decurved, 1-veined. Labellum shorter than sepals, 8–10 × 7–9 mm, cuneate at base, broadly

obovate above, angles rounded, reflexed from base, margin obscurely crenulate above, apex sub-truncate to shallowly emarginate, slightly mucronate at sinus; base with erect margins forming two auricles, with 2 erect, dark-green, tooth-like calli. Column white, 4–5 mm long, erect, arched forward, winged at apex; wings prominently hooked (see notes below); anther yellowish-green, 1 mm long, with elongated truncate beak; pollinia 4, in two unequal pairs, yellow, waxy; rostellum broadly ovate-triangular; stigmatic cavity large, broadly oblong-elliptic. Capsules 1.5 - 2.5 cm long, ellipsoid, ridged, with long, slender, fruiting pedicel. (Fig.1)

**Flowering:** October – January. **Fruiting:** December – February.

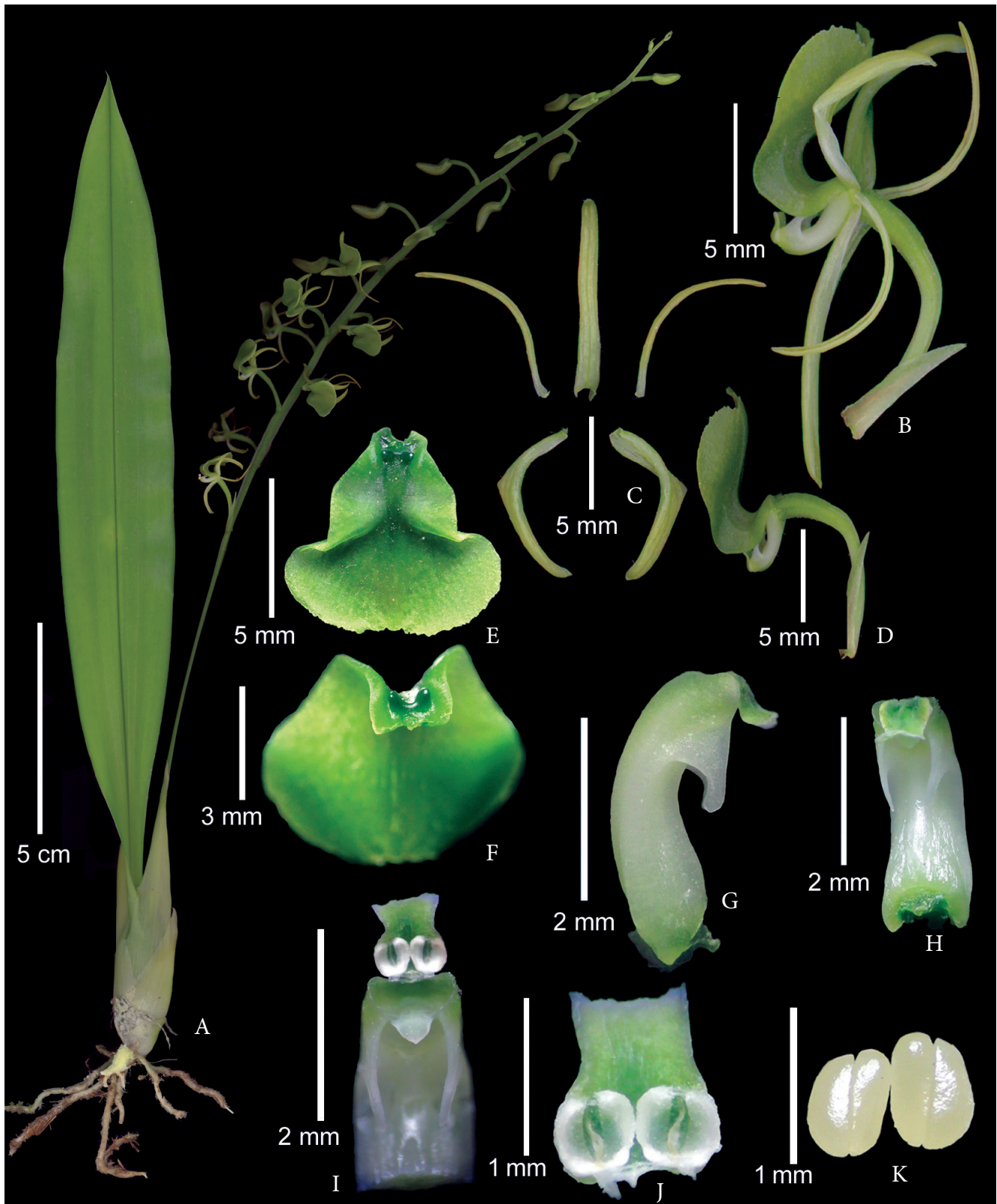
**Habitat:** Epiphytic; on trees and rock boulders in tropical and sub-tropical evergreen forests at 500 - 1000 m.

**Distribution:** INDIA: Arunachal Pradesh (present report), Meghalaya; ENDEMIC.

**Specimens examined:** Arunachal Pradesh: West Kameng district, Pinjuli nallah area, 600 m, 13.01.2015, D.K. Agrawala 37622 (cult. BSHC!); Foot Hills - Khellong, 30.01.1993, Hegde 6168, 6169 (APFH, OHT); Khellong, 31.01.1983, Hegde 6171, 6172 (OHT); Foot Hills, 24.01.1984, Hegde 6216 (OHT); 28.01.1984, Hegde 6209, 6230 (OHT); Tipi, 10.12.1990, Hegde 25721 (OHT); 01.02.1995, A.N. Rao 26103 (OHT); Koylajuli, 30.12.1987, Hegde 24196 (OHT); Papum Pare district, Itanagar, 30.12.2005, A.N. Rao & Chowlu 183 (OHT); West Siang district, Hiraro-Kying, 1000m, 19.11.2010, Bhaumik 25335 (ARUN); Tato - Menchuka, 1800 m, 09.11.2010, Bhaumik 25027 (ARUN); Dibang Valley district, Anini, 1800 m, 17.11.1996, Bhaumik 1375 (CAL); Alenye, 1540 m, 16.11.1999, Bhaumik 2636 (CAL); Meghalaya, Khasi Hills, Oct. 1878, Mann, 7/88 (K-photo!); Cherrapunjee, 14.11.1968, *Anonymous* 37223 (ASSAM).

## NOTES ON THE IDENTITY AND AMENDING DESCRIPTION OF *LIPARIS TORTA*

Hooker (1890) described *Liparis torta* based on G. Mann's single specimen from Khasia hills which was collected in October 1878. The type specimen (Figure 3A) consists of poorly preserved material with a fragment of rachis and four detached flowers along with the single plant. The rachis bears many persistent floral bracts. These empty bracts were described by Hooker as "*scape rather stout, with few lanceolate bracts ....*". The fresh specimens from Arunachal Pradesh have flowers with all the bracts at rachis and the peduncle is ebracteate up to its base. Further, Hooker described the columnar wing as not



**Fig.1.** *Liparis torta* Hook.f.: **A.** Habit; **B.** Flower (side view); **C.** Sepals and Petals; **D.** Column with ovary and labellum; **E.** Labellum (ventral view); **F.** Labellum (dorsal view); **G.** Column (side view); **H.** Column (front view); **I.** apical portion of column showing anther, rostellum and stigmatic cavity; **J.** Anther; **K.** Pollinia [source: *D.K. Agrawala* 37622, cult. BSHC].



**Table 1.** Morphological comparison of *Liparis torta* and *Liparis bootanensis*

	<b><i>Liparis torta</i></b> [DKA 37622, holotype, epitype and other specimens, Ic. Pl. t.2014]	<b><i>Liparis bootanensis</i></b> [Type materials, DKA 38827, 37679, Pearce & Cribb, 2002]
Pseudobulbs	1.5–3.5 × 0.8–1.5 cm, ovoid-conical to narrowly cylindrical, sheathed	1–5 × 0.4–2 cm, ovoid-oblong or ovoid to narrowly cylindrical, tapering above, sheathed
Leaf	10–18 × 3–3.5 cm, elliptic-lanceolate, entire, acute-acuminate, 9-veined; sub-sessile	8–25 × 1–4 cm, narrowly oblong to ellipticoblanceolate; petiole 1–5 cm long
Inflorescence	up to 25 cm long; peduncle 3–4 cm long, terete, obscurely winged; rachis straight or weakly flexuous, laxly few flowered	up to 28 cm long, narrowly winged; peduncle 3–15 cm long; rachis laxly 10-20-flowered
Floral bracts	6–8 × 1–1.5 mm, lanceolate, acute-acuminate, spreading	5–7 × 1–1.5 mm, lanceolate, acuminate
Flowers	successive, 15–22 mm across, cadmium yellow to pale green, labellum yellowish-green	successive, 8–13 mm across, yellowish-brown, orange with age, column white.
Pedicel and ovary	14–16 mm long, slender, strongly curved	6–16 mm long, slender
Sepals	strongly decurved, margins revolute, obtuse, 1-veined; dorsal sepal 10–12 × 2–2.5 mm, narrowly oblong; lateral sepals slightly shorter, oblique	Erect, straight, obtuse, 3-veined, 5–10 × 1.5–2.5 mm, narrowly lanceolate, margin revolute
Petals	9–11 × 0.5–0.7 mm, filiform, revolute, decurved, 1-veined	4.5–9 × 0.5–0.8 mm, linear, obtuse, reflexed, 1-veined
Lip	8–10 × 7–9 mm, cuneate at base, broadly obovate above, margin obscurely crenulate above, apex sub-truncate to shallowly emarginate, slightly mucronate at sinus; with 2 erect, dark-green, tooth-like calli	4–8 × 4–6 mm, cuneate-obovate, entire, shallowly emarginate, base with two green callii
Column	white, 4–5 mm long, erect, arched forward, winged at apex; wings prominently hooked	2–3.5 mm long, with 2 triangular-falcate, hook like, drooping wings at apex.
Capsules	1.5 - 2.5 cm long, ellipsoid, ridged, with long, slender, fruiting pedicel	Similar to <i>L. torta</i>

hooked and considered this as one of the diagnostic character in separating it from *Liparis bootanensis*. The poor and fragmented condition of type specimen could be the reason for the artist to interpret the columnar wing as not hooked. However, the drawing [Icon. Pl. t.2014] evidently indicate some damage (Figure 3B) at the columnar wing which might have led Hooker for such interpretation. The fresh specimens revealed well developed, hooked columnar wings, but the wings are of different appearance than those in *Liparis bootanensis* (see Fig. 1 and 2). Therefore, the original description and diagnosis of *Liparis torta* has been amended here. The holotype material is not complete enough to depict the hooked columnar wing, so for the purpose of correct and complete identification, the specimen (Anonymous 37223, ASSAM) has been designated here as epitype (Figure 3C) of *Liparis torta* Hook.f. The morphology

of this species has been compared with that of *Liparis bootanensis* in Table-1 for understanding of their close affinities.

## NOTES ON THE REDISCOVERY

By the time Hooker published *Liparis torta* (June 1890) in *Hooker's Icones Plantarum* t.2014, his treatment for the genus *Liparis* in Flora of British India was already published in Volume 5 (April 1890). Subsequently, Hooker included this species among the “Supplements to the Orchidaceae” in Volume 6 of Flora of British India (December 1890). Kataki (1986) probably did not refer to the supplements in volume 6 of Flora of British India and therefore not included *Liparis torta* in his book ‘Orchids of Meghalaya’. The holotype was collected in 1878 and all subsequent inclusion [Rao & Singh (2015); Singh & al. (2019); Misra (2019)] from Meghalaya and India were



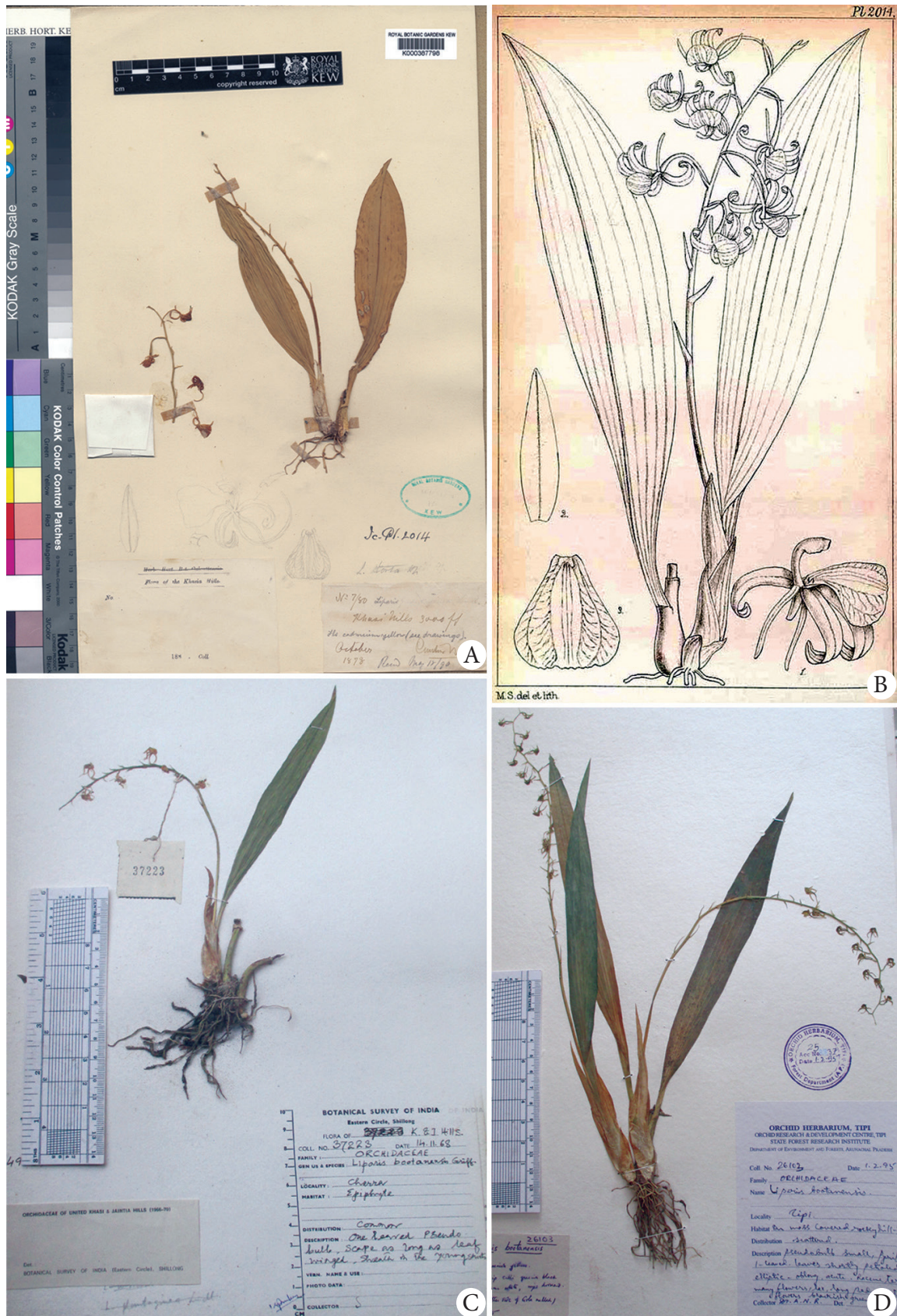
**Fig.2.** *Liparis bootanensis* Griff.: A – D depicting the morphology in different specimens.

based on the original collection only. The species was again collected from Cherrapunjee in 1968 [*Anonymous* 37223, ASSAM] but was erroneously identified as *Liparis bootanensis*. Some more collections of this species were made from Arunachal Pradesh during 1983 – 2005 (see details under specimens examined) but all were again misidentified as *Liparis bootanensis*. Therefore, the present finding not only brings out this species from obscurity, but also reports its extended distribution in Arunachal Pradesh. Earlier, it was considered as one of the obscurely known endemic species of Meghalaya.

## RED LIST ASSESSMENT AS PER IUCN CRITERIA (IUCN, 2012; 2019)

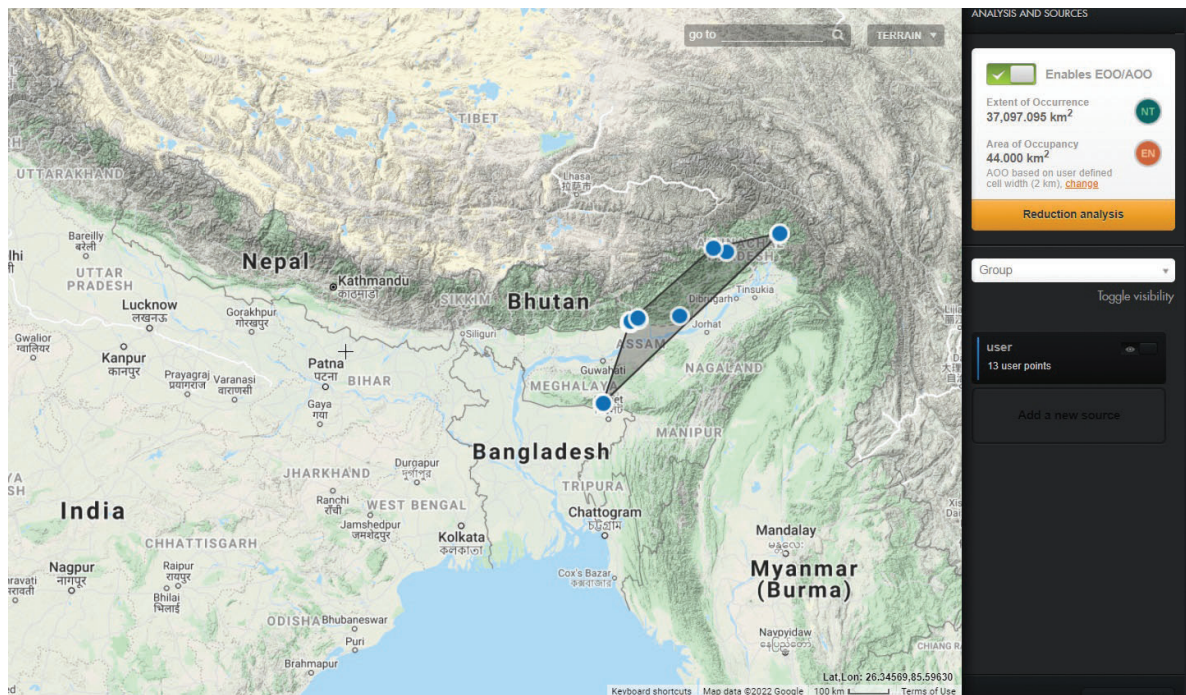
*Liparis torta* is endemic to India and is known by five sub-populations distributed in Arunachal Pradesh and Meghalaya. The one in Meghalaya is known by historic reports of 53 and 130 year old. From Arunachal Pradesh, the species has been reported from West Kameng, West Siang, Dibang Valley and Papum Pare districts. Present collection site at Pinjuli nallah area in West Kameng district harbor nearly 50 mature individuals. Its





**Fig.3.** *Liparis torta* Hook.f.: **A.** Holotype specimen [K000387798]; **B.** Original drawing in Icon. Pl. 21: t.2014. 1890]; **C.** Epitype specimen [Anonymous 37223 (ASSAM)]; **D.** A.N. Rao 26103 (OHT) originally identified as *Liparis bootanensis*.





**Fig.4.** Distribution map of *Liparis torta* with Extent of Occurrence (EOO) and Area of Occupancy (AOO) [Map created in GeoCAT, <http://geocat.kew.org>].

occurrence at other localities has also been observed as frequent (evident from the herbarium label information). The species is not known as commercially exploited for any purpose but has the potential of an ornamental species. The habitats are fragile and being epiphytic, its survival depends on that of host tree. All the known localities in Meghalaya and Arunachal Pradesh are under severe anthropogenic threats due to developmental work, tourism, coal mining and expansion of agricultural land. The Extent of Occurrence (EOO) and Area of Occupancy (AOO) have been estimated through GeoCAT map as 37097.095 km<sup>2</sup> and 44 km<sup>2</sup> respectively. The past population size and decline is not known for application of criteria A of IUCN. Considering the above data, the threat perspective of *Liparis torta* has been assessed as Endangered [EN B2ab(iii)]. Habitat management and further research is recommended for this species.

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