

# Diversity, Current Distribution Record and Availability Status of the Genus *Cryptochilus* Wall. (Orchidaceae) in Darjeeling Himalaya of West Bengal, India

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**Abstract**—Extensive field surveys were conducted to study the Orchid flora of Darjeeling Himalaya during the years 2007 – 2016. The collected specimens were identified and authenticated with the help of the available literatures. The present paper deals with the diversity, current distributional record and availability status of the genus *Cryptochilus* Wall. (Orchidaceae) in Darjeeling Himalaya of West Bengal, India. The species of the genus *Cryptochilus* are *C. lutea* Lindl. and *C. sanguinea* Wall. The availability status of the former species is rare but the later is threatened throughout the regions. For conservation, study on habitat ecology of these two species requires precedence attention.

**Keywords:** *Orchidaceae*, *Cryptochilus*, Current Distribution Record, Availability Status, Darjeeling Himalaya.

## 1. INTRODUCTION

Orchids exhibit incredible diversity in shape, size, structure, colour and fragrance of flowers. Orchids belong to family Orchidaceae which is highly specialized, botanically significant, economically important and largest families of flowering plants with four habitat viz., epiphytic, terrestrial, saprophytic and subterranean. The family is widely distributed from the equator to the Arctic Circle and from lowland areas to the snowline but humid tropics and sub tropics are species rich regions of the world. The estimated number of Orchid species varies from 17,000 to 35, 000. Orchids are characterized by distinct floral morphology association with mycorrhiza for germination of seeds. Several environmental factors are responsible for the distribution and survival of Orchids e.g., climatic factors (rainfall, temperature), edaphic factors (soil pH, texture and moisture) and micro habitats. Eastern Himalaya, North East India, North-West Himalayas, Peninsular India and Andaman and Nicobar Islands are the Orchid species rich regions of India similarly Darjeeling Himalaya of West Bengal is also an Orchid rich region of India.

The genus *Cryptochilus* was established in 1826 by Nathaniel Wallich. It comprises two species distributed from North India to Indo-China (Pearce & Cribb, 2002). Plants of *Cryptochilus* is perennial, epiphytic herbs. Pseudobulbs crowded, ovoid or cylindrical. Leaves 2, arising from tip of pseudobulb, coriaceous, petiolate. Inflorescence terminal, racemes; floral bracts exceeding flowers. Flowers more than 5. Sepals connate to form a subcylindric to urceolate tube, the acute apices free. Petals similar, not connate. Lip simple, adnate to the short foot of the column. Column erect, slightly dilated at apex. Anther 2 or 4-celled; pollinia 8. Both species described briefly with their updated botanical names, habitat, protologues, phenology, specimen cited, altitudinal range, current distribution record, general distribution and their availability status within Darjeeling Himalaya. Availability status of former is rare and the later is threatened throughout the regions. In the present investigation records the diversity, current distribution and availability status of the genus *Cryptochilus* Wall., in Darjeeling Himalaya of West Bengal, India.

## 2. MATERIALS AND METHODS

To study Orchid diversity, several exploration tours to the regions were undertaken during the years 2007 – 2016 covering all the seasons in all parts of the Darjeeling Himalayas and Sub-Himalayan regions. The different species of the genus *Cryptochilus* Wall., were collected and the field characters related to the habitat, height, shape and size of leaves and flowers and flowering time were recorded in the field note book. The collected specimens were identified and authenticated with the help of the *Orchids of the Sikkim Himalaya* (King & Pantling, 1898); *Indian Orchids Guide to Identification and Culture*, Vol. II (Pradhan, 1979); *Orchid Flora of Arunachal Pradesh* (Chowdhery, 1998); *Orchids of India* (Bose et al. 1999); *The Flora of Bhutan* (Pearce &

Cribb, 2002); *Orchids of Sikkim and North East Himalaya* (Luckson, 2007). Finally, one set of Voucher specimens were deposited in the herbarium of Taxonomy and Ethnobiology Research Laboratory, Cluny Women's College, Kalimpong. All the recorded species of *Cryptochilus* Wall., are enumerated below alphabetically to their species epithet and with exsiccatae, altitudinal range, local distribution within Darjeeling, habitat, phenology and current availability status (Table 1).

### 2.1. Study Area

Darjeeling Himalayan region is the Northernmost district of West Bengal, India. The region is subdivided into two districts viz., Darjeeling and Kalimpong. The region lies between 26°31' and 27°31' North latitude and between 87°59' and 88°53' East longitude in the Eastern Himalayan region of India. It is bordered by Sikkim in the North, Terai and Dooras in the South, Bhutan in the East and Nepal in the West. The district has two topographical features. Darjeeling and Kurseong sub-divisions and Kalimpong district form the hill areas whereas Siliguri Sub-Division is stationed at the foothill in a vast stretch of the plains. The shape of the district is triangular. The hilly region covers 2320 sq. km. and the remaining 934.7 sq. km. of the area falls in the Terai and plains (Fig. 1). The altitudinal variations of the district range from ±130 m at Siliguri to 3660 m amsl at Sandakphu–Phalut with a sharp physiographic contrast between the plain and the mountainous regions. The climate of the region is conducive for growing of Orchids and it harbours numbers of Orchid species (Yonzon, 2015).

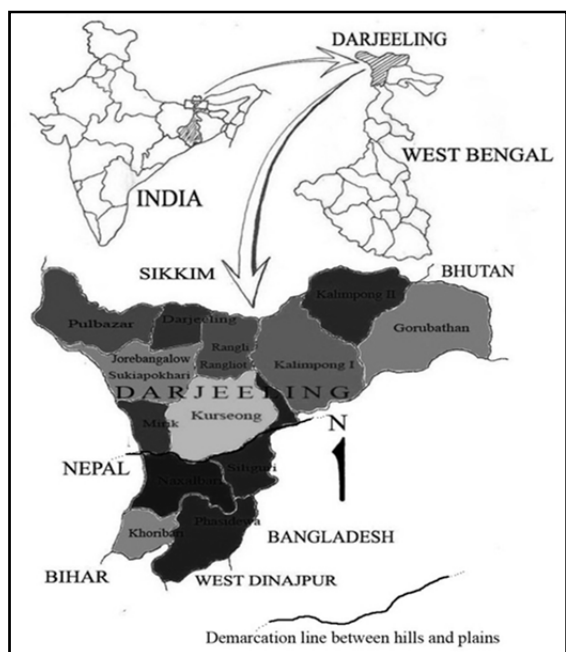


Fig. 1: Map of Darjeeling Himalayan regions showing different sub-divisions with demarcation line between hills and plains.

### 3. RESULTS AND DISCUSSION

During field studies in the Darjeeling Himalaya of India, two interesting epiphytic species of *Cryptochilus* Wall., were recorded. Of those, *C. lutea* Lindl., available at Tangta forest, Rachela, Manaybhanjang, Kafer, Samalbong busy having wider distribution of records within 1300 – 2500 m, flowering March – June and fruiting May – July and is rare status in habitat whereas another species *C. sanguinea* Wall., available at Dhotre forest, Birch Hill, Senchale within 1600 – 2450 m, flowering June – July and fruiting July – August and its status is threatened throughout the study regions. Indiscriminate collection, frequent landslides, deforestation, construction and extension of motorable roads, felling of epiphytic old host trees and different developmental activities are the major threats to these species in the regions. Habitat conservation, mass multiplication by in vitro propagation, replantation in nature and grass root level awareness are suggested for the survival of these species in the regions. Therefore, efficient and extensive conservation program considering the total genetic resources needs to be laid down to facilitate the process of natural system of regeneration.

#### Key to the species

Pseudobulbs cylindric; inflorescence shorter than the leaves; flowers less than 1 cm long; sepaline tube 0.6-0.8cm long, yellow; pollinia yellow..... *C. lutea*

1a. Pseudobulbs ovoid; inflorescence longer than the leaves; flowers more than 1 cm long; sepaline tube 1.7-2.2cm long, scarlet; pollinia green..... *C. sanguinea*

#### 3.1. Enumeration of species

*Cryptochilus lutea* Lindl., J. Proc. Linn. Soc., Bot. 3: 21. 1858; Hook. f., Fl. Brit. India 5: 827. 1890; King & Pantl. in Ann. Roy. Bot. Gard. (Calcutta) 8: 163, t. 221. 1898; Bruhl, Guide Orch. Sikkim. 102. 1926; Tuyama in Ohashi, Fl. E. Himal. 3: 140. 1975; Pradhan, Indian Orch. Guide Identif. Cult. 2: 368. 1979; Banerji, Orch. Nepal. 54. 1982; Hedge, Orch. Arun. Pradh. 52. 1984; Deva & Naithani, Orch. N.W. Himal. 237 – 240 t. 239. 1986; Pradhan & Pradhan, 100 Beaut. Orch. 55. 1997; Chowdhery, Orch. Fl. Arun. Pradh. 248. 1998; Bose *et al.* Orch. India. 172. 1999; Pearce & Cribb, Fl. Bhutan, 3(3): 365 & 367, t. 366. 2002; Luckson, Orch. Sikkim N.E. Himal. 534. t. 543, pl. 22. 2007; Misra, Orch. India. 290. 2007; Yonzon *et al.* Asian J. Pharm. Lif. Sci., 1(4): 456. 2011; *et Int. J. Pharm. Life Sci.* 3(3): 1539. 2012.

*Cryptochilus farreri* Schltr., Feddes Repert. Spec. Nov. Regni Veg. 20: 384. 1924. [Fig. 2. A]

Plant epiphytic herb, 11-23 cm tall. Pseudobulbs 1.9-2.4 × 0.4-0.7 cm, clustered, cylindrical, sheathed. Leaves 2, 9-19 × 1.8-2.5 cm, elliptic, acute, fleshy, petiolate. Inflorescence 20 to 38-flowered; peduncle 4-7 cm long, glabrous, slender; rachis 3.8-7.3 cm long; pedicellate-ovary 4-5 mm long, hairy. Flowers 0.6-0.8 cm long, secund, yellow; floral bracts linear-lanceolate. Sepals similar, 4-5 mm long, connate, forming an urceolate sepaline tube, apices triangular-acute, free. Petals 3-4 mm long, obliquely rhombic, narrowed at base. Lip 3-4 mm long, simple, oblong, curved at base, thickened towards apex. Column short, apex bifid; foot narrow. Anther 2 chambered; pollinia 8.

*Cryptochilus sanguinea* Wall., Tent. Fl. Nepal 2: 36, t.26. 1826; Hook. f., Fl. Brit. India 5: 827. 1890; King & Pantl., Ann. Roy. Bot. Gard. (Calcutta) 8: 163, t. 220. 1898; Bruhl, Guide Orch. Sikkim. 102. 1926; Pradhan, Indian Orch. Guide Identif. Cult. 2: 367. 1979; Banerji, Orch. Nepal. 54. 1982; Hedge, Orch. Arun. Pradh. 52. 1984; Pradhan & Pradhan, 100 Beaut. Orch. 56. 1997; Chowdhery, Orch. Fl. Arun. Pradh. 248-251. 1998; Bose *et al.* Orch. India. 174. 1999; Pearce & Cribb, Fl. Bhutan, 3(3): 367. 2002; M. Pradhan, 100 Sikkim Himal. Orch. 124-125. 2005; *et* 100 N.E. Indian Orch. 100-101. 2006; Lucksom, Orch. Sikkim N.E. Himal. 534. t. 544, pl. 22. 2007; Misra, Orch. India. 290. 2007; Yonzone *et al.* Asian J. Pharm. Lif. Sci., 1(4): 456. 2011; *et* Int. J. Pharm. Life Sci. 3(3): 1539. 2012. [Fig. 2. B]

Plant epiphytic herb, 18-33 cm tall. Pseudobulbs 2.8-4.5 × 0.7-1.2 cm, ovoid to ellipsoid-cylindrical, sheathed. Leaves 2, 11-18 × 3-3.6 cm, oblong to elliptic, acute, coriaceous, petiolate. Inflorescence subdensely 6 to 14-flowered; peduncle 8-18 cm long, glabrous; rachis 4-7 cm long; pedicellate-ovary 4-7 × 1.6-2 mm, pubescent. Flowers in 2 ranks, sepaline tube 1.7-2.2 cm long, scarlet, hairy externally; floral bracts linear-lanceolate. Sepals 1-1.5 cm long, connate to form a gibbous sepaline tube, free apices triangular, divergent, acute, puberulous externally. Petals 0.8-1 cm, oblanceolate-spathulate, obtuse, long. Lip 0.8-1.1 cm long, simple, oblong, entire, deflexed from a curved base, expanded slightly at apex. Column 3-5 mm long, stout; foot short. Anther dome shaped; pollinia 8.

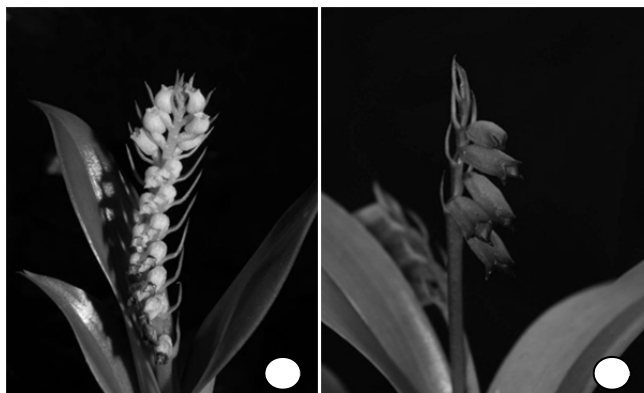


Fig. 2: A. *Cryptochilus lutea* Lindl. and B. *Cryptochilus sanguinea* Wall. in full blooming stages.

**Table 1: List of species of *Cryptochilus* Wall., recorded from Darjeeling Himalaya along with their habitat, reference voucher specimen, local distribution, altitudinal ranges, flowering and fruiting time and current availability status.**

Botanical name, Habitat, Exsiccatae	Occurrence in Darjeeling; altitudinal range (amsl)	General distribution	Flowering & Fruiting	Availability status
<i>Cryptochilus lutea</i> Lindl., [Epiphytic], Tangta forest 2600 m, Rajendra Yonzone 0411, dtd. 21.05.2008 & 06.05.2015.	Rachela, Kafer, Manaybhanjanga, Samalbong, 1300 – 2500 m	India (North India, Sikkim, West Bengal); Nepal, Bhutan.	[March – June] [May – July]	Rare
<i>Cryptochilus sanguinea</i> Wall., [Epiphytic], Dhotrey forest 2300 m, Rajendra Yonzone 0872, dtd. 04.06.2009 & 15.06.2016.	Birch hill, Senchale, 1600 – 2450 m	India (North East India, Sikkim); Bhutan, Myanmar, Nepal.	[June – July] [July – August]	Threatened

#### 4. ACKNOWLEDGEMENTS

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