Threatened and Endemic ORCHIDS of Sikkim and North-eastern India

BOTANICAL SURVEY OF INDIA

DEPARTMENT OF ENVIRONMENT

GOVERNMENT OF INDIA

THREATENED AND ENDEMIC

ORCHIDS

of

SIKKIM AND NORTH-EASTERN INDIA

by

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POSSCEF, Botanical Survey of India

Department of Environment

Government of India.

Cover photo : *Cymbidium mastersii* Griff. ex Lindl

– S. K. Kataki

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PREFACE

The Orchidaceae is one of the largest families of flowering plants comprising about 17,000 species. About 1000 species are estimated to occur in India and of these nearly 600 are reported from Sikkim and the north-eastern region. The Orchids were once in abudance in Sikkim and north-eastern India. In the recent past, many species, particularly the ornamental ones, have become rare in their original localities. In some places, they are even becoming extinct due to large scale collection for trade and damage to their habitat by clearing of forest areas for various developmental and other purposes.

The present work was undertaken in the Project on Study, Survey and Conservation of Endangered Species of Flora (POSSCEF) being operated in the BSI, to assess the present status of orchids in Sikkim and north-eastern India.

This work has been planned to serve as a preliminary account of the rare and threatened orchids of Sikkim and north-eastern India and their present status in their natural habitats. The aim of the booklet is also to create awareness among the public about the need for conservation of the rare taxa. The introductory pages provide a brief account of the work on orchids of this region. It is followed by an account of the rare species which are arranged alphabetically. Each species is provided with a short description, distribution data, general ecological note and the present status. While in some cases, it has been possible to assign the species to its correct and nearest IUCN category, in many cases it could not be done and such taxa are indicated as threatened, to simply denote that they are in need of conservation, specially in the area of study.

As far as practicable a line drawing or photograph of the species is provided with an inset map of Sikkim and north-eastern India, showing distribution and flowering time. Information on flowering time and distribution has been garhered from field work, literature, herbarium materials, as well as living specimens in the National Orchidarium at Shillong. In some cases, the information from these different sources was not comparable ; efforts have been made to correct such anomalies. But, in the absence of living material or recent collections of a number of species, some gaps exist.

The authors wish to record their sincere gratitude to Dr. T. N. Khoshoo, Secretary, Department of Environment, Government of India, for encouragement and to their colleagues in the BSI for useful suggestions. They are grateful to the authorities of the U.S. Fish & Wildlife Service for supporting the Project and this publication.

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INTRODUCTION

Orchidaceae is one of the largest families of flowering plants. The magnitude of species with a wide range of floral and vegetative parts is an extraordinary feature of the family.

Orchids are predominantly tropical, majority of the orchid species are distributed between 30° north and south of Equator. High rainfall, temperature and humidity are a few parameters of the climate which very greatly influence the growth of the orchids. Other factors like latitude, altitude, configuration of the ground and the density of forests have also a combined effect on the profuse growth of orchids.

Sikkim and the North-Eastern Indian region are situated within 22°-29°5" north latitude and 90°-97° east longitude covering an area of about 2,85,000 sq km with seven states in N.E. India* viz., Arunachal Pradesh (1), Assam (2), Meghalaya (3), Nagaland (4), Manipur (5), Mizoram (6), and Tripura (7). The wide range of altitudes from sea level to about 5000 m with very high rainfall and the geographical position make these areas the richest store house of botanical wealth. Within this, the orchids form a very noticeable element of the vegetation in this part of India.

Of the 17,000 known species (Hunt, 1965) of orchids in the world, the N.E. India contains about 600 species. Sir J. D. Hooker, the then Director of Kew Gardens, while exploring this area in 1850 remarked : "I doubt whether in any part of the globe, the species of orchids outnumber those of other natural order or form so large a proportion of the flora"

The unusual wealth of the plant species of the N.E. India has attracted the attention of many botanists and horticultural plant collectors in the past. In 1837, Wallich and Griffith collected orchids from this region on their way to Upper Assam to verify the occurrence of 'Wild Tea' John Gibson also collected ornamental orchids for the Duke of Devonshire during the same time. The Old British firm at Veitch was instrumental in the collection of orchids in this region and Thomas Lobb (1849-50) was their plant collector. In 1850, Hooker and Thomson made extensive collections, including orchids. Besides, C. J. Simons (1852), Thomas Oldham (1861), Gustav Mann (1876-88) and G. A. Gallately collected orchids in this region.

The orchid wealth of this region has not yet received the attention, it deserves. Perhaps, the earliest mention of the orchids of India is in Linneaus's 'Species Plantarum' (1735), where he mentions about a dozen from the Malabar area under the comprehensive name of *Epidendrum*, the source of his description being the celebrated 'Hortus Malabaricus' of van Rheede (1678-1703). Till

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*Assam in the earlier literature referred to the entire region under present 7 states in N. E. India ; as such for some species where precise locality is unknown, the distribution is given as 'Assam'.

today, there is no detailed account of this large family Orchidaceae except those of Hooker's 'Flora of British India' (vol. 5 & 6, 1890) and King & Pantling's 'Orchids of Sikkim Himalaya' in Annals of Royal Botanic Garden, Calcutta (1898) and a few other sporadic publications. In the Flora of Assam, Kanjilal and others (1934-40) did not include any account of Orchids. Pradhan in his 'Orchids of India' (1970) has included several orchids from N.E. India.

No doubt, these works have added to our knowledge on the orchids of N.E. India on the one hand but on the other have resulted in commercial exploitation of the rare and ornamental orchids. Hooker's account in his 'Himalayan Journals' on the occurrence of some of the orchids has served as an indicator for the verification of the present abundance of these orchids. He mentions of an oak tree near Jowai on which : "*Vanda coerulea* grows in profusion..... and we collected seven men's loads of this superb plant for the Royal Gardens at Kew" and now, there is not one plant of this 'Blue Vanda' at this spot. Similarly, many other interesting and ornamental orchids were commercially exploited in the past from this region. Moreover, the present large scale disturbance of natural vegetation has badly affected the orchids in wild. The net-work of vehicular roads, increased building activities, various industries and hydroelectrical projects in this hilly terrain have had their inevitable influence on the depletion of many orchid species in wild state.

Still, many rare and threatened orchids can be protected in their natural habitats by educating the common folk about conservation. Some of the endangered orchid species can also be shifted from their wild habitat to some protected reserve forests. Moreover, the species in few numbers can be collected, cultivated and multiplied in orchidaria and gardens. With this background, the National Orchidarium at Shillong (Jain & Kataki 1976) was established under the Botanical Survey of India and aims at :

(a) Exploration and collection of all available orchid species

(b) Cultivation in Orchidaria and gardens and then to study their taxonomic position

(c) Conservation of the rare and endangered species and to create 'Germplasm' collections

(d) Selection/Hybridization of possible promising varieties in horticulture

(e) Supply of seedlings/cut flowers to the market, thus protecting the rare and endangered ones in their natural habitats.

As part of the collection programme for the development of the National Orchidarium at Shillong under Botanical Survey of India, several field trips were undertaken by the various exploration parties of the Eastern Circle, B.S.I. to different parts in this N.E. region to observe the plants in their wild state. It is

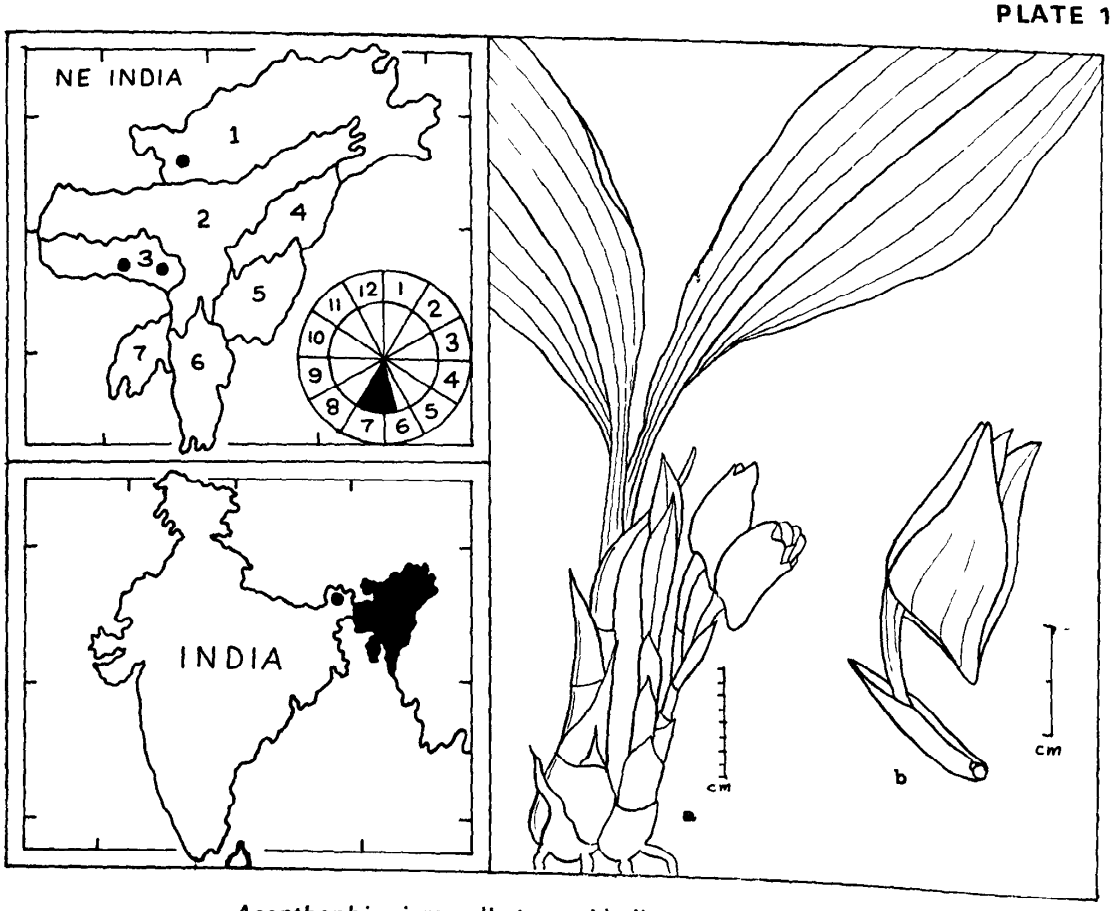
seen that many interesting and ornamental orchid species are becoming scarce in their original localities, where they were once common.

During the course of the studies on the orchids of this region, viz., 'Orchids of Khasi & Jaintia Hills (Meghalaya)' 'Orchids of Assam', 'The genus *Coelogyne* in India' and 'The Orchids of Nagaland', several species were found to be scarce or rare in their original habitats.

This work was undertaken at Shillong (the regional headquarters of the Eastern Circle of Botanical Survey of India) under a 'Project on Study, Survey and Conservation of the Endangered Species of Flora (POSSCEF). The study is based on the collections in the Kanjilal Herbarium (ASSAM) of the Eastern Circle and Central National Herbarium (CAL) of Botanical Survey of India and the live collections of the National Orchidarium of B.S.I., Shillong. Moreover, the available literature has been consulted to determine the rare, threatened and endemic orchid species in this region.

The period of flowering varies with altitude and climate ; effort has been made to give the more common condition. Further, in addition to the data available in various published literature, observations recorded in the National Orchidarium over 10 years, have also been taken into account.

PLATE 1



Acanthephippium sylhetense Lindl. a. habit; b. flower

Acanthephippium sylhetense Lindl., Bot. Mag. t. 2146, 1854; Hook. f., Fl. Brit. Ind. 6; 145, 1890.

Description : A terrestrial orchid with close pseudobulbs. Pseudobulbs long, few-leaved. Leaves large, elliptic-lanceolate. Inflorescences arise from the base of pseudobulbs, as long as pseudobulbs. Flowers few, large, dull white; lip 3-lobed, white with yellow tip; pollinia 8. *Plate 1*

Flowering : June-July.

Distribution : INDIA ('Assam', Arunachal Pradesh, Meghalaya, Sikkim), BURMA, CHINA, THAILAND.

Notes : Usually found in deep forest in humus covered soil in shady areas. Plants are under cultivation in National Orchidarium, B.S.I., Shillong. Clearance of forest areas may have destroyed its natural habitat. This resulted in the fast disappearance of this species from wild.

Status : Threatened.

ANOECTOCHILUS

The species of this genus are popularly known as 'Jewel Orchids' due to their highly ornamental often beautifully variegated leaves; their flowers are not very impressive. They often occur in obscure hidden corners of forests in deep shade and moist places. These delicate plants are not easy to cultivate. In nature, these plants are becoming extremely rare due to the gradual cutting of wooded forests and exposure of habitats.

About 40 species are distributed in India, Sri Lanka, Java and Malaya; *ca* 11 species in N.E. India & Sikkim of which *A. crispus* Lindl. and *A. sikkimensis* K. & P. are worth mentioning.

Anoectochilus crispus Lindl. in Journ. Linn. Soc. 1 : 180. 1857; *Odontochilus crispus* Hook. f., Fl. Brit. Ind. 6 : 99, 1890.

Description : Terrestrial. Stems slender, elongate, few-leaved. Leaves ovate, acute. Spikes few-flowered. Flowers dull white.

Flowering : June-July.

Distribution : INDIA (W. Himalaya, Arunachal Pradesh, Meghalaya, Nagaland, Sikkim), BURMA.

Notes : Grows in very moist places on humus covered soil. Depleted due to the destruction of its habitat.

Status : Rare.

Anoectochilus griffithii Hook. f., Fl. Brit. Ind. 6 : 96, 1890.

Description : Terrestrial. Stems slender. Leaves few, orbicular-ovate, apiculate. Flowers many, white.

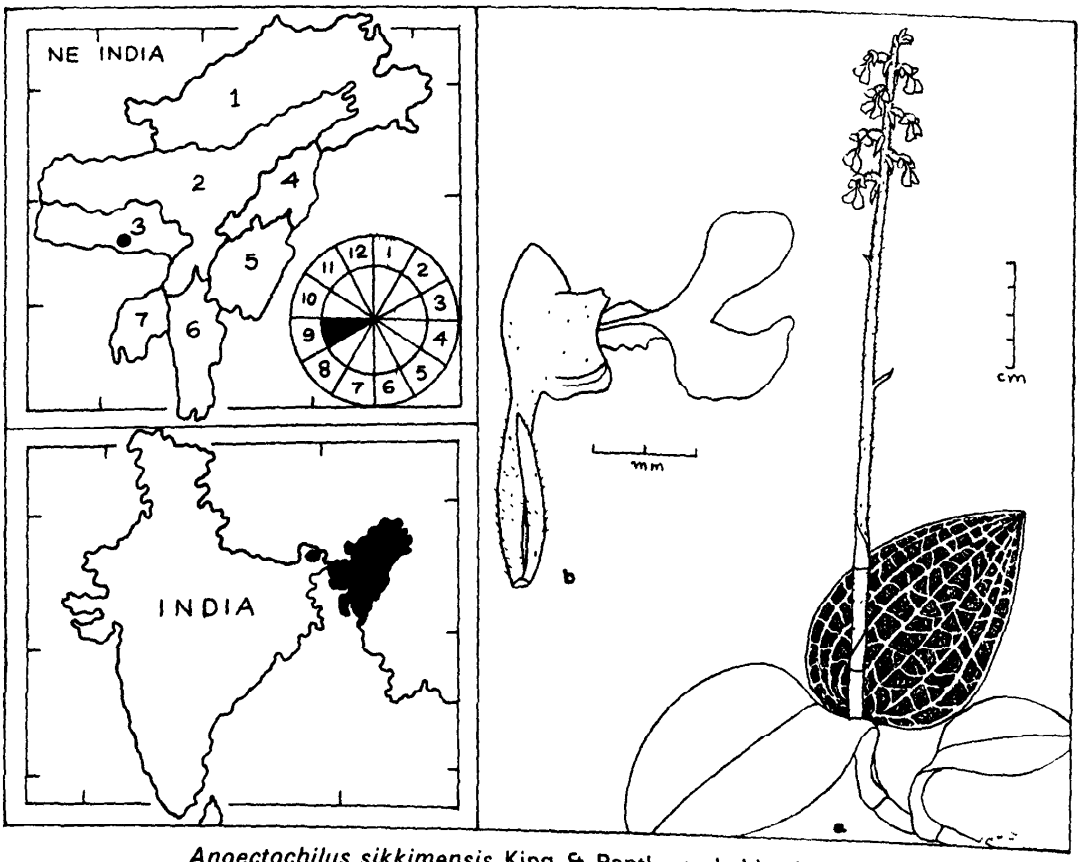
Flowering : June-July.

Distribution : INDIA (Mizoram, Nagaland).

Notes : Grows in moist shady areas on humus covered soil. Depleted due to loss of its habitat.

Status : Rare. Endemic.

PLATE 2



Anoectochilus sikkimensis King & Pantl. a. habit; b. lip

Anoectochilus sikkimensis King & Pantl. in Journ. Asiat. Soc. Bengal, 65 : 124. t. 2, 1895; Ann. Roy. Bot. Gard. Calcutta 8 : 294. t. 391, 1898.

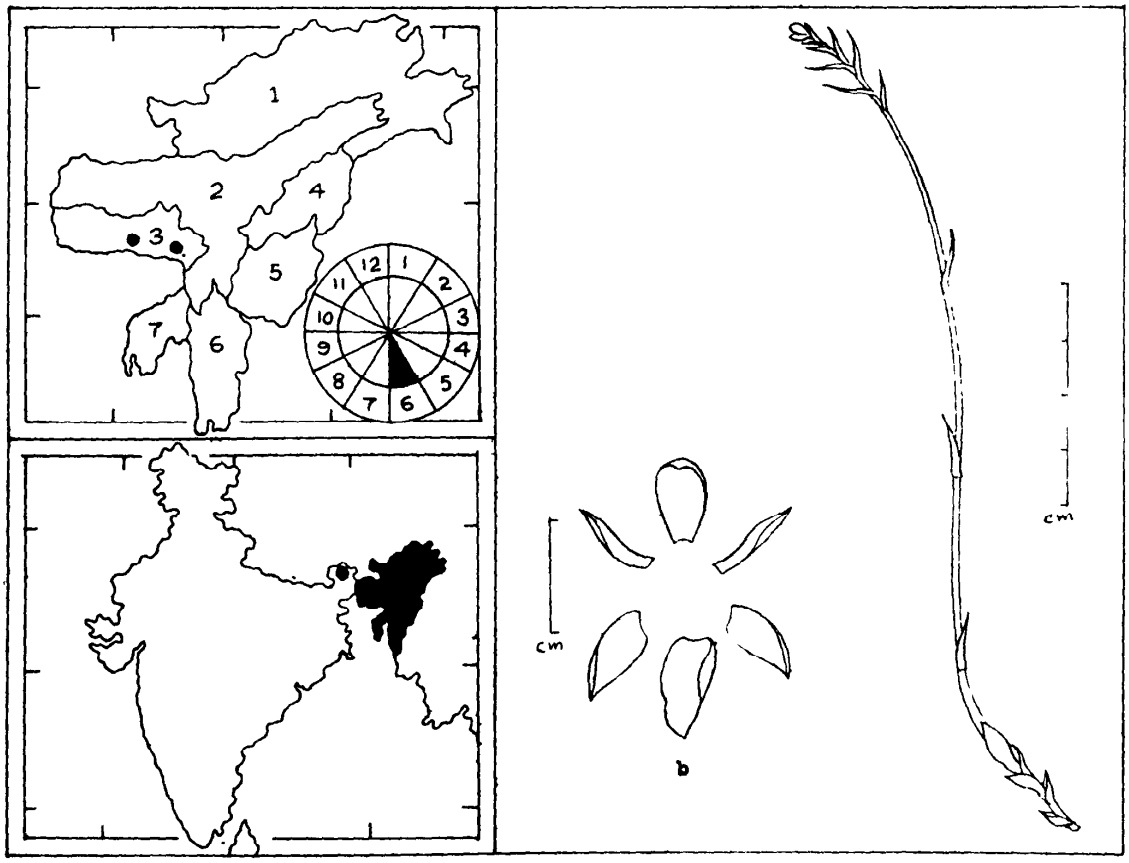
Description : Terrestrial. Stems erect above, creeping below. Leaves elliptic-ovate, upper surface reddish with golden veins; lower surface uniformly dull red. Flowers few, brown with white tip. *Plate 2*

Flowering : September.

Distribution : INDIA (Arunachal, Meghalaya, Sikkim), THAILAND.

Notes : Grows in moist humus covered soil. Flowers not long lasting. Fast depleted due to its habitat destruction.

Status : Threatened.



Aphyllorchis montana Reichb. f. a. habit; b. floral parts.

Aphyllorchis montana Reichb. f. in Linneaea, 61 : 58. 1877; Hook. f., Fl. Brit. Ind. 6 : 116, 1890.

Description : Terrestrial. Stems slender, erect, *ca* 40 cm long, sheathed, leafless. Racemes short, few-flowered. Flowers pale brown; lip obscurely 3-lobed; disc with 2 calli. *Plate 3*

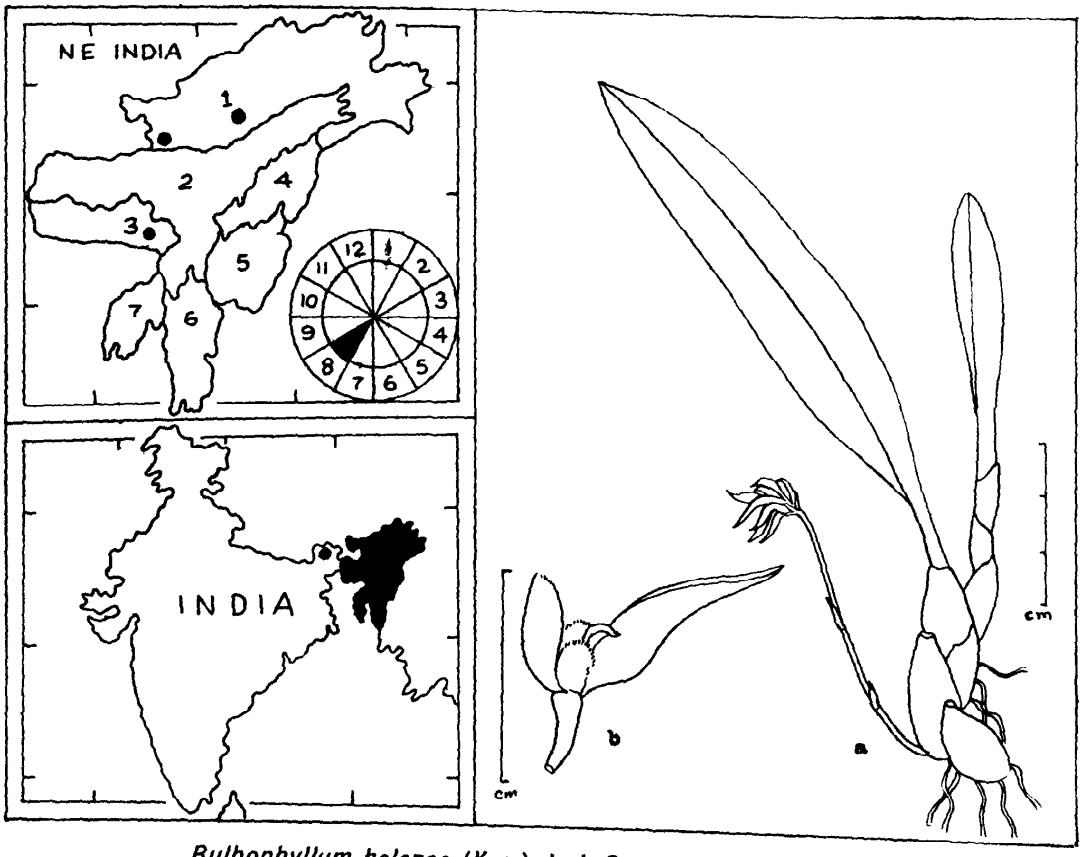
Flowering : June.

Distribution : INDIA (Meghalaya, Sikkim), BURMA, THAILAND.

Notes : A very delicate and inconspicuous species. It is becoming rare in wild due to its habitat destruction.

Status : Rare.

Aphyllorchis prainii Hook. f., Fl. Brit. Ind. 6 : 117, 1890, is recorded from Nagaland (India) which differs from *A. montana* Rchb. f. by its winged claw of the lip. It is a rare species in wild. Hooker recorded "I have seen but one specimen" No specimen in ASSAM herbarium.



Bulbophyllum helenae (Kze.) J. J. Sm. a. habit; b. flower.

Aphyllorchis vaginata Hook. f., Fl. Brit. Ind. 6 : 117, 1890, is recorded from Khasi Hills of Meghalaya (India). This differs from *A. montana* Rchb. f. by its sessile lip and shorter column. Hooker remarked : "I have seen but one specimen of this curious plant." A rare species. No specimen in ASSAM herbarium.

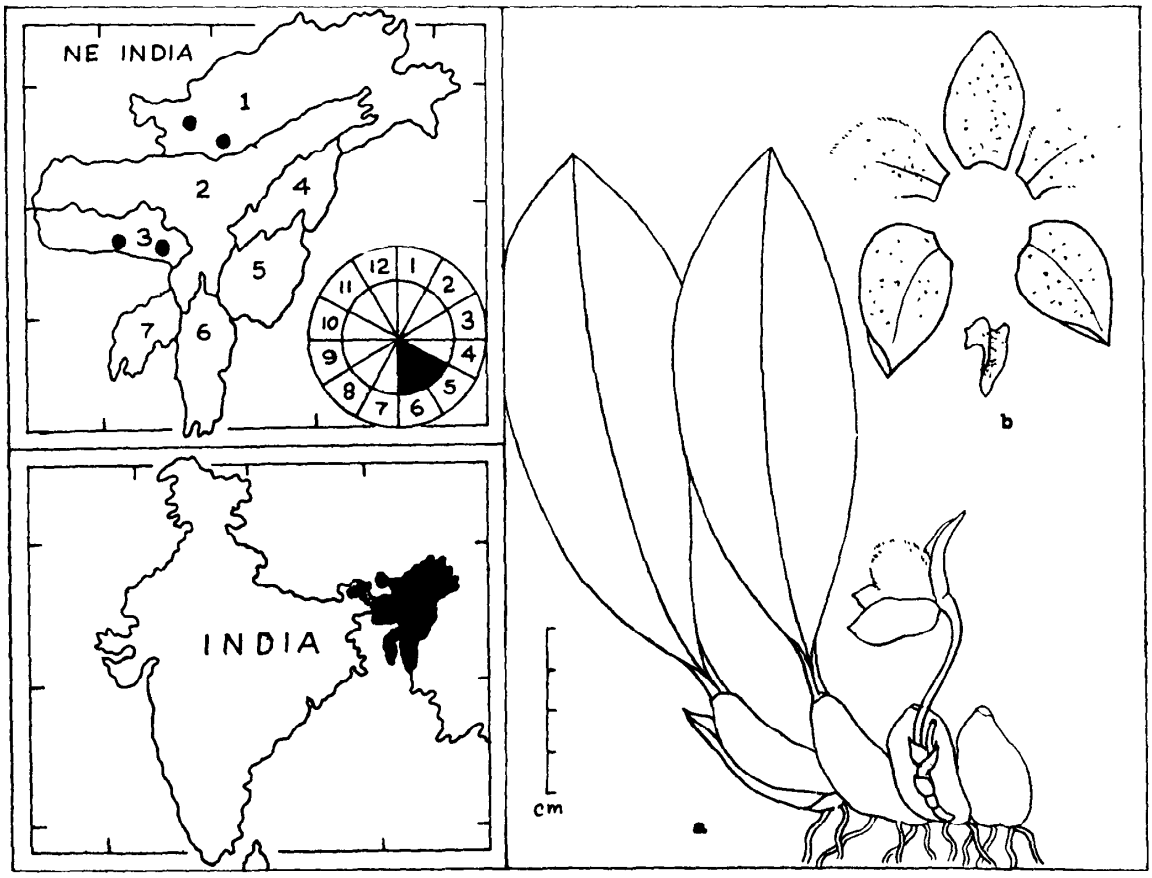
BULBOPHYLLUM

About 350 species are distributed in tropical region. *Cirrhopetalum* and *Bulbophyllum* are very near to each other and now *Cirrhopetalum* is treated under *Bulbophyllum*. Among many, the following species are getting depleted in wild.

Bulbophyllum helenae (Kze.) J. J. Sm., Bull. Buitenz.2. Ser. 8 : 25, 1912. *Bulbophyllum cornutum* Lindl. in Bot. Reg. Misc. 38. 1838; *Cirrhopetalum cornutum* Lindl.; Hook. f., Fl. Brit. Ind. 5 : 774, 1890.

Description: Epiphytes. Pseudobulbs ovoid, close, 1-leaved. Leaves petioled, linear-oblong. Scapes lateral, erect, few-flowered, capitate. Flowers brownish; lateral sepals much longer than dorsal sepal, connate, slightly free at base.

Plate 4



Bulbophyllum leopardinum (Wall.) Lindl.. a. habit; b. floral parts.

Flowering: August.

Distribution: INDIA ('Assam' Arunachal Pradesh, Meghalaya, Sikkim), BHUTAN, NEPAL, BURMA, THAILAND.

Notes: Gradual depletion is due to its habitat destruction.

Status: Threatened.

Bulbophyllum leopardinum (Wall.) Lindl., Gen. & Sp. Orch. 48. 1830; Hook. f., Fl. Brit. Ind. 5 : 756, 1890.

Description: Epiphytes. Pseudobulbs crowded, ovoid-oblong, 1-leaved. Leaves petioled, elliptic, acute. Scapes lateral, as long as or shorter than the pseudobulbs, few-flowered. Flowers yellowish with purple spots. *Plate 5*

Flowering: May-June.

Distribution: INDIA ('Assam', Arunachal Pradesh, Meghalaya, Sikkim), NEPAL.

Notes: This is one of the ornamental species with beautiful flowers amongst its numerous small-flowered relatives. Depleted mainly due to destruction of habitat.

Status: Threatened.

Bulbophyllum lobbii Lindl. in Bot. Reg. sub. t. 29. 1847 ; Hook. f., Fl. Brit. Ind. 5 : 755, 1890.

Description : Epiphytes. Pseudobulbs ovoid, 1-leaved. Leaves linear-oblong. Scapes almost absent. Flowers few, reddish-yellow with red nerves and yellow spots, colour variable.

Flowering : June-July.

Distribution : INDIA (Arunachal, Manipur, Mizoram, Nagaland), BURMA, SIAM, JAVA.

Notes : A species with large and showy flowers. Depleted due to habitat destruction.

Status : Threatened.

Bulbophyllum ornatissimum (J. E. Sm.) Lindl. in Bull. Jard. Bot. Buitenz. Ser. 2.8 : 26, 1812. *Cirrhopetalum ornatissimum* Rchb. f.; Hook. f., Fl. Brit. Ind. 5 : 773, 1890.

Description : Epiphytes. Pseudobulbs ovoid, angulate. Leaves linear-oblong, obtuse. Scapes lateral, short, flowers few on a semi-umbellate inflorescence. Flowers purplish with pale yellow streaks.

Flowering : April-May.

Distribution : INDIA (Assam, Nagaland, Sikkim).

Notes : Restricted in distribution. Occurs in small patches. Depleted due to destruction of its habitat.

Status : Rare.

Bulbophyllum viridiflorum (Hook. f.) Schltr. in Orchis 4 : 108, 1910. *Cirrhopetalum viridiflorum* Hook. f., Fl. Brit. Ind. 5 : 779, 1890.

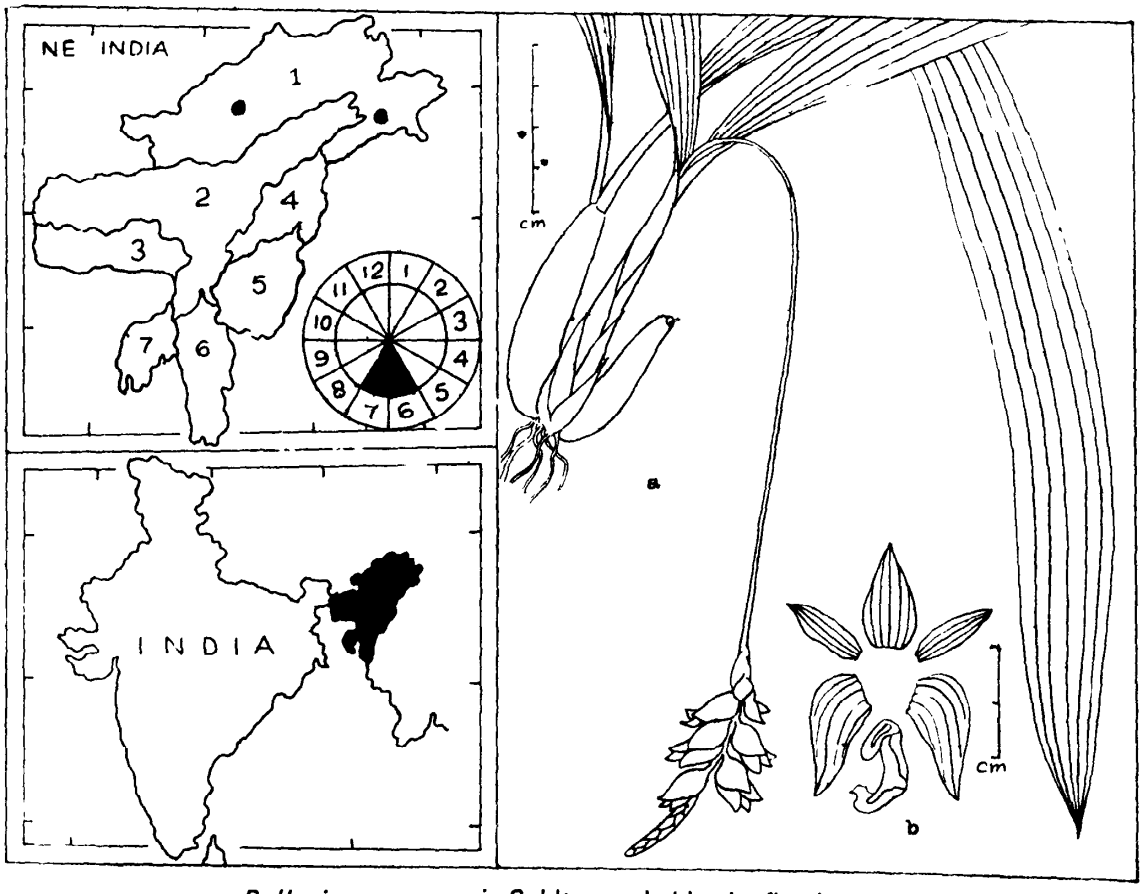
Description : Epiphytes. Pseudobulbs ovoid, crowded, 2-leaved. Leaves sessile, lanceolate. Scapes lateral, longer than the leaves; racemes pendent, many-flowered. Flowers greenish-purple; lip purple; lateral sepals longer than the dorsal sepal, connate.

Flowering : October.

Distribution : INDIA (Kumaon, Arunachal, Meghalaya, Mizoram, Nagaland, Sikkim), NEPAL.

Notes : A species of rare occurrence.

Status : Threatened.



Bulleyia yunnanensis Schltr. a. habit; b. floral parts.

Besides *Bulbophyllum andersonii* (Hook. f.) J. J. Smith, *B. blepharites* Rchb. f., *B. crassipes* Hook. f., *B. hymenanthum* Hook. f., *B. leptanthum* Hook. f., are poorly represented in ASSAM herbarium. There are no recent collections. These species are depleted due to the destruction of their habitats.

Bulleyia yunnanensis Schltr. in Notes R. Bot. Gard. Edin. **5** : 108. 1912.

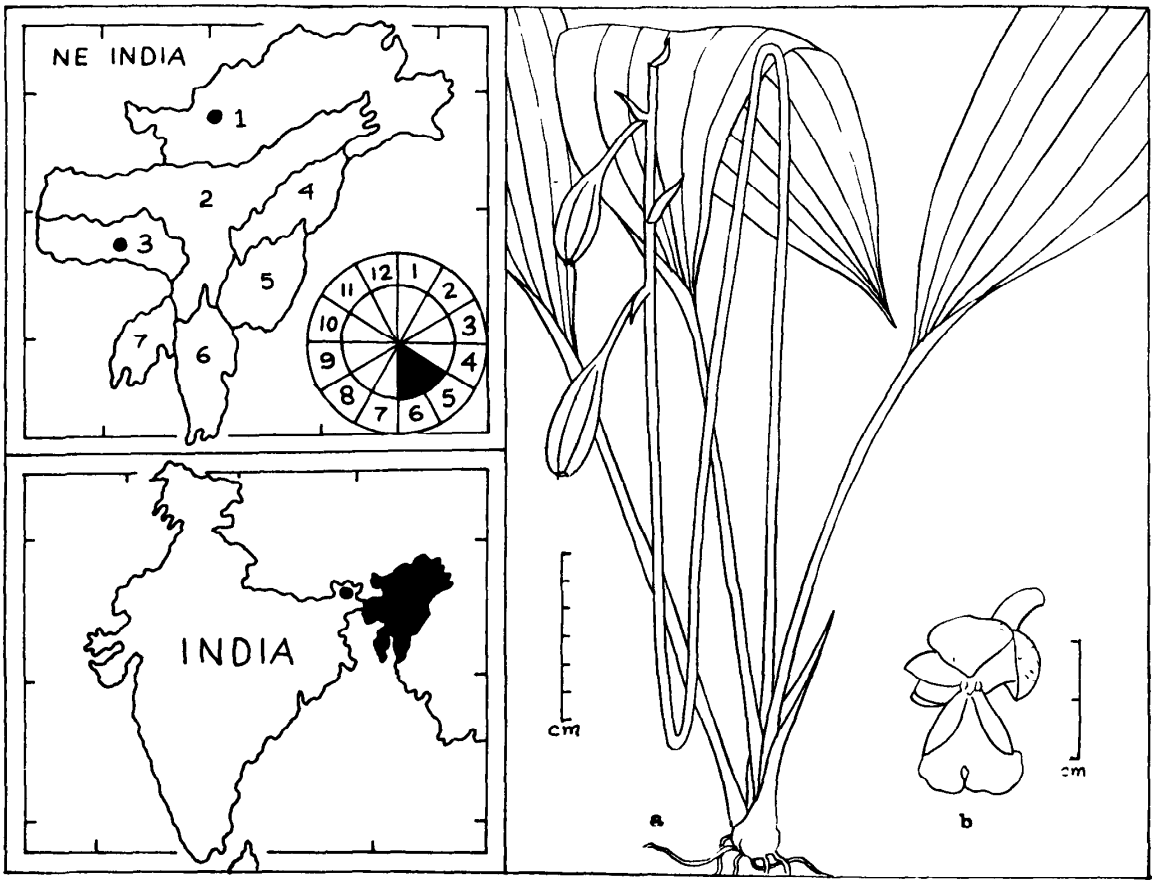
Description: An epiphyte with closed pseudobulbs. Leaves two, linear-lanceolate. Inflorescences arise with new shoots at the base of the old pseudobulbs, long, drooping, many-flowered. Flowers in biseriate arrangement, whitish or yellowish; bracts prominent. *Plate 6*

Flowering: June-July.

Distribution: INDIA (Arunachal Pradesh, West Bengal—Darjeeling), CHINA.

Notes: This species occurs mainly in the Eastern Himalayas with restricted distribution. The clearance of forest areas has affected its habitat.

Status: Vulnerable.



Calanthe alismaefolia Lindl. a. habit; b. flower.

CALANTHE

About 80 species distributed in tropical and subtropical regions of the world. Almost all the species are of ornamental interest. The gradual depletion of the species is mainly due to the habitat destruction. The following species are worth mentioning :

Calanthe alismaefolia Lindl., Fol. Orch. Cal. 8 : 1854; Hook, f., Fl. Brit. Ind. 5 : 849, 1890.

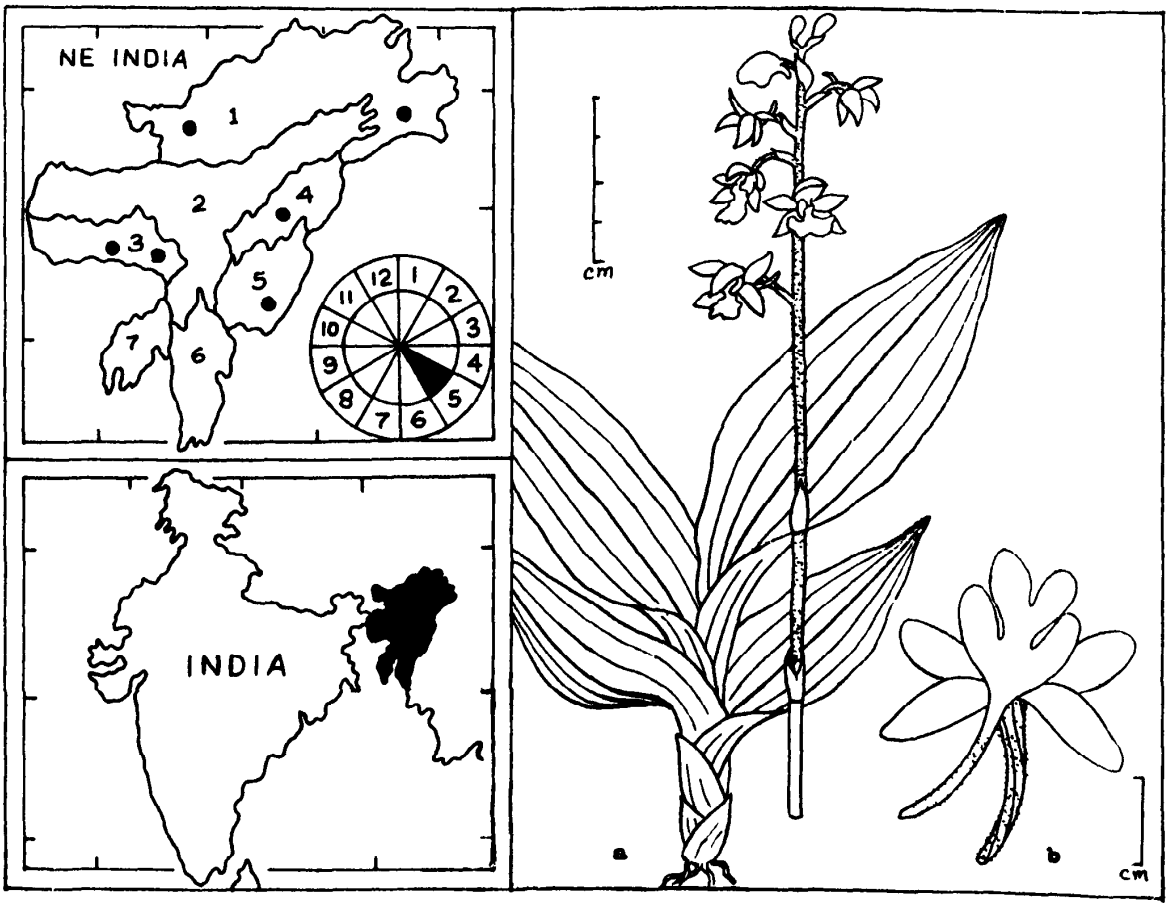
Description: Terrestrial, Pseudobulbs cylindric, tapering towards apex, few-leaved. Leaves elliptic, acuminate, long-petioled. Scapes as long as the leaves or shorter ; racemes corymbose, many-flowered. Flowers white. *Plate 7*

Flowering: May-June.

Distribution: INDIA (Kumaon, Arunachal Pradesh, Meghalaya, Sikkim.)

Notes: Rarely seen in wild state. The gradual depletion is mainly due to its habitat destruction.

Status: Threatened.



Calanthe angusta Lindl. a. habit; b. flower.

Calanthe alpina Hook. f., Lindl. Fol. Orch. 4. 1854; Hook. f., Fl. Brit. Ind. 5 : 850, 1890.

Description: Terrestrial. Stems short. Leaves sessile, elliptic-lanceolate. Scapes long erect, many-flowered. Flowers large, greenish-white; lip white with purple lines.

Flowering: July-August.

Distribution: INDIA (Garhwal, Arunachal Pradesh, Sikkim), BHUTAN, NEPAL.

Notes: Usually found at high elevations. Depleted due to habitat destruction.

Status: Threatened.

Calanthe angusta Lindl., Fol. Orch. 7 : 1856; Hook. f. Fl. Brit. Ind. 5 : 849, 1890.

Description: Terrestrial. Stems pseudobulbous, short. Leaves sessile, elliptic-lanceolate. Scapes long, erect, many-flowered. Flowers white; lip white with yellow tubercles at base. *Plate 8*

Flowering : May.

Distribution : INDIA (Arunachal Pradesh, Manipur, Meghalaya, Nagaland, Sikkim).

Notes : The destruction of its habitat rendered the species scarce in wild.

Status : Threatened.

Calanthe herbacea Lindl., Fol. Orch. 10. 1854 ; Hook. f., Fl. Brit. Ind. 5 : 852, 1890.

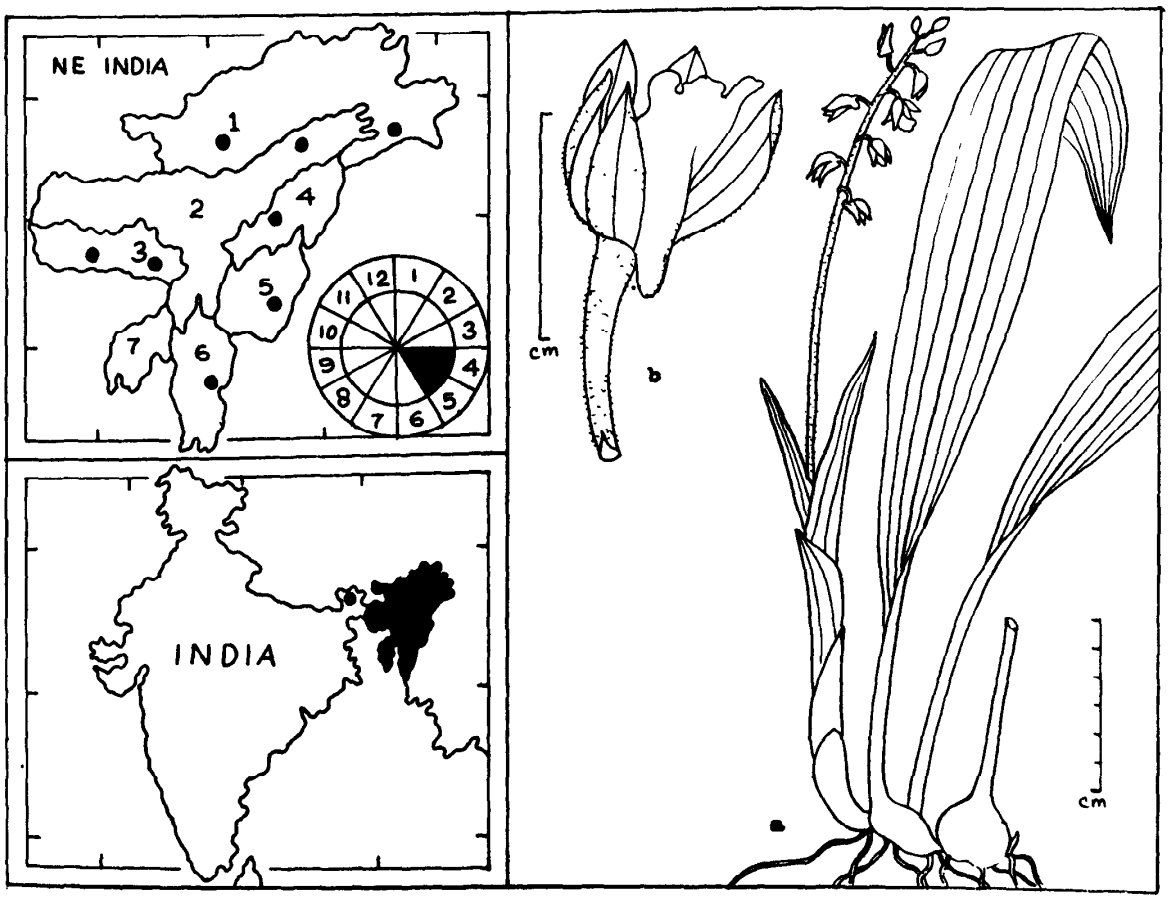
Description : Terrestrial. Stems robust, sheathed. Leaves large, elliptic-lanceolate, acuminate. Scapes long erect, lateral. Flowers green, lip white ; bracts large, green.

Flowering : June—July.

Distribution : INDIA (Arunachal, Sikkim).

Notes : Endemic. Grows usually at high elevations.

Status : Rare.



Calanthe mannii Hook. f. a. habit; b. flower.

Calanthe mannii Hook. f., Fl. Brit. Ind. 5 : 850, 1890.

Description: Terrestrial. Stems short, pseudobulbous. Leaves few, lanceolate. Scapes as long as or shorter than the leaves, few-flowered. Flowers pale brown, drooping; lip yellowish with purple tip. *Plate 9*

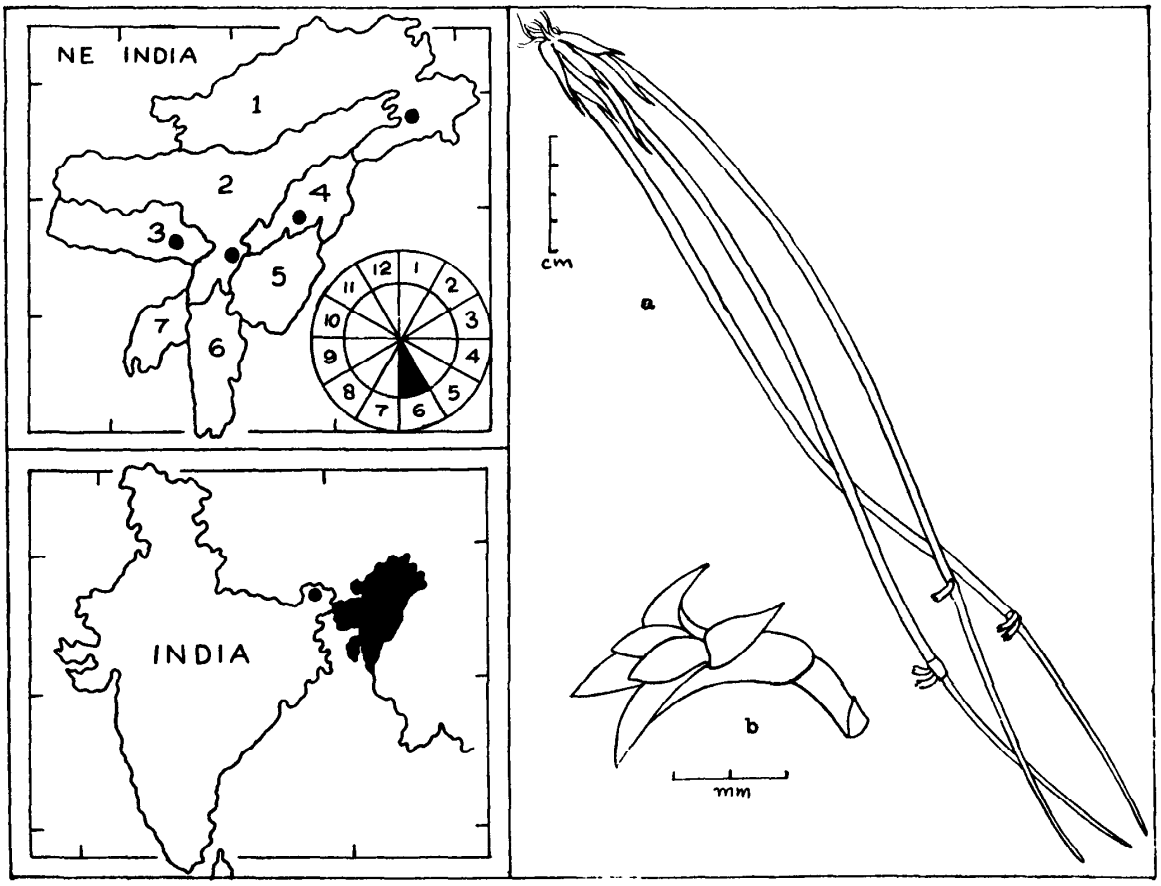
Flowering: April—May.

Distribution: INDIA (Kumaon, N. E. India, Sikkim), BHUTAN, NEPAL.

Notes: Once common; depleted due to habitat destruction.

Status: Rare.

Besides, *Calanthe uncata* Lindl. and *C. vaginata* Lindl. are not represented in ASSAM Herbarium. They were recorded from Sikkim and Assam respectively (Fl. Brit. Ind. 5 : 853 & 849. 1890). They are now very rare.



Ceratostylis teres Reichb. f. a. habit; b. flower.

Ceratostylis teres Reichb. f. in Bonpland. 2 : 89, 1854; Hook. f., Fl. Brit. Ind. 6 : 825, 1890.

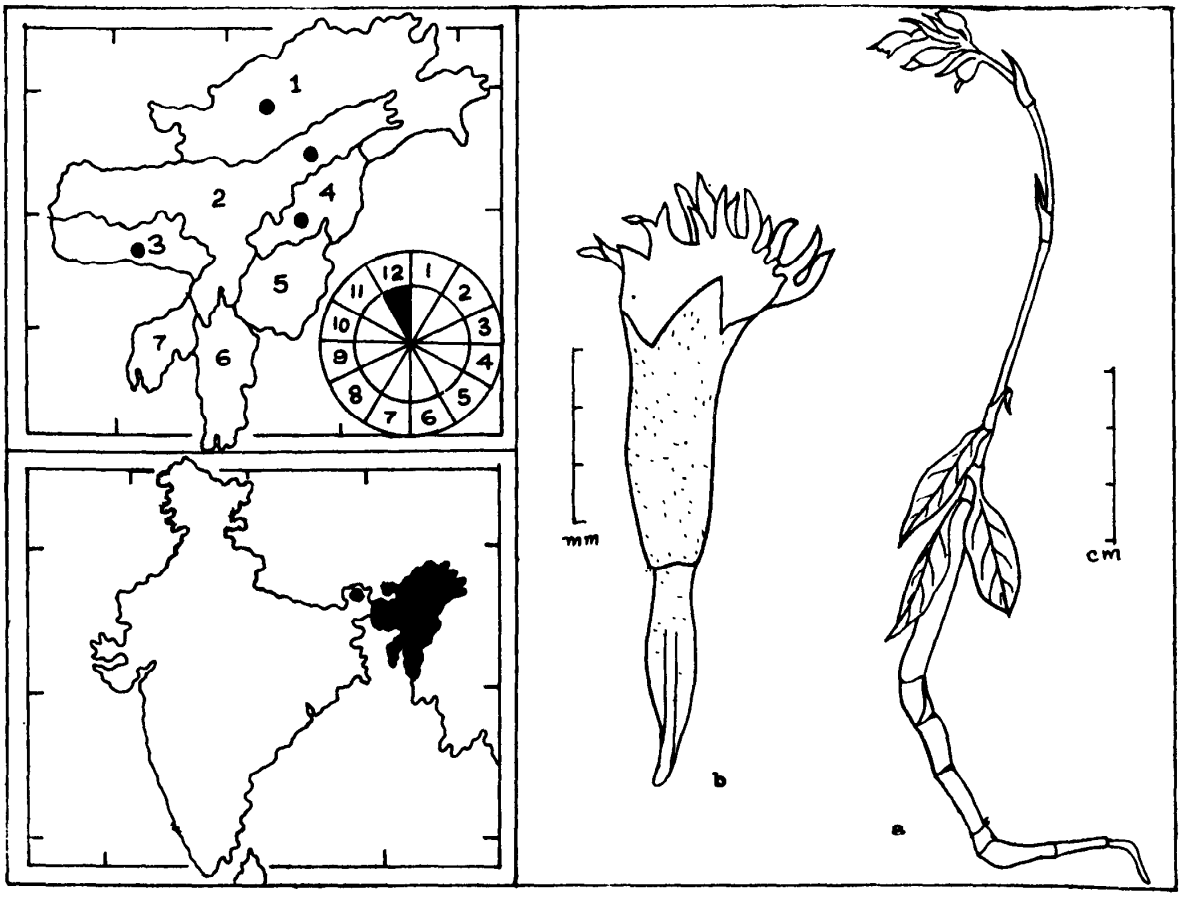
Description: Epiphyte. Stems terete, slender, erect, clustered, *ca* 15 cm long, sheathed at base. Leaves terete, ca 5 cm long. Inflorescence capitate, 1-2 flowered. Flowers small, sessile, pubescent, dull yellow; sepals connate upto half; lip narrowly spathulate. *Plate 10*

Flowering: June.

Distribution: INDIA (Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim).

Notes: It was abundant in wild. The main reason of its depletion is damage to the habitat.

Status: Threatened.



Cheirostylis griffithii Lindl. a. habit; b. flower.

Cheirostylis griffithii Lindl. in Journ. Linn. Soc. 1 : 188, 1857; Hook. f., Fl. Brit. Ind. 6 : 105, 1890.

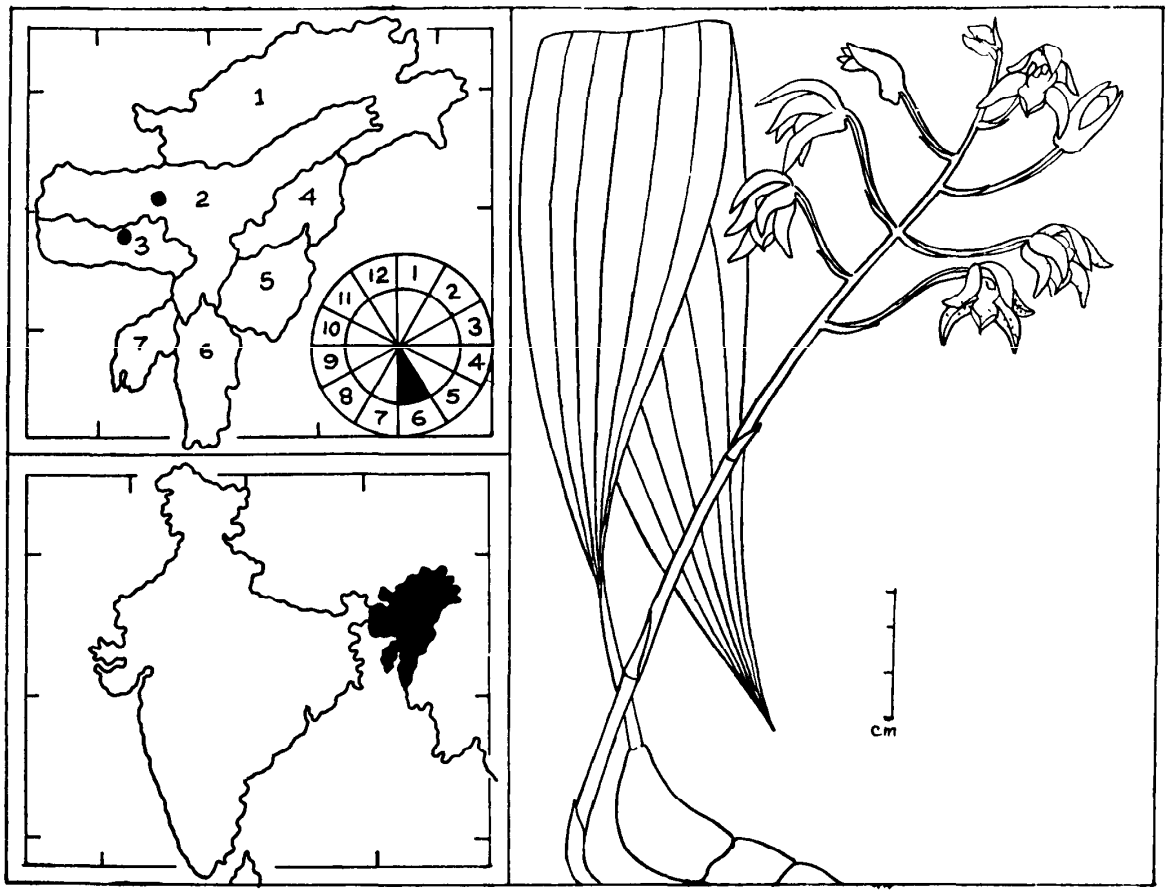
Description: Terrestrial. Stems prostrate. Leaves shortly petioled, membranous, reflexed. Racemes slender, few-flowered. Flowers white; sepals connate to more than half; lip clawed, apex toothed. *Plate 11*

Flowering: December.

Distribution: INDIA (Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim), BURMA, THAILAND,

Notes: It grows extensively in moist and shady places. With pale brown reflexed leaves, the plant looks *dead*, when it is devoid of flowers. It is becoming scarce due to clearing of forests.

Status: Threatened.



Chrysoglossum assamicum Hook. f.

Cheirostylis pusilla Lindl., Gen. & Sp. Orch. 489, 1835; Hook. f., Fl. Brit. Ind. 6 : 105, 1890.

Description: Terrestrial. Stems prostrate, glabrous. Leaves small, ovate, acuminate. Scapes slender, ciliate, 2-3-flowered. Flowers inclined, pink; lip white, 2-lobed.

Flowering: September (?)

Distribution: INDIA (Arunachal Pradesh, Meghalaya), THAILAND.

Notes: Grows in very moist shady areas on humus covered soil. The species is very scarce.

Status: Rare.

Chrysoglossum assamicum Hook. f., Fl. Brit. Ind. 5 : 784, 1890.

Description: Terrestrial. Leaf solitary, elliptic-lanceolate, long petioled. Scapes tall, erect, many-flowered. Flowers greenish-yellow, lip cuneatly 3-lobed. *Plate 12*

Flowering: June.

Distribution : INDIA (Assam, Meghalaya).

Notes : Grows in moist, shady areas. The clearence of forest areas exposes its habitat and as a result, it is disappearing in wild.

Status : Rare.

The other species *Chrysoglossum erraticum* Hook. f. (Fl. Brit. Ind. 5 : 784. 1890) is also a very rare plant in wild having its distribution in Sikkim (India), Thailand and Laos.

COELOGYNE

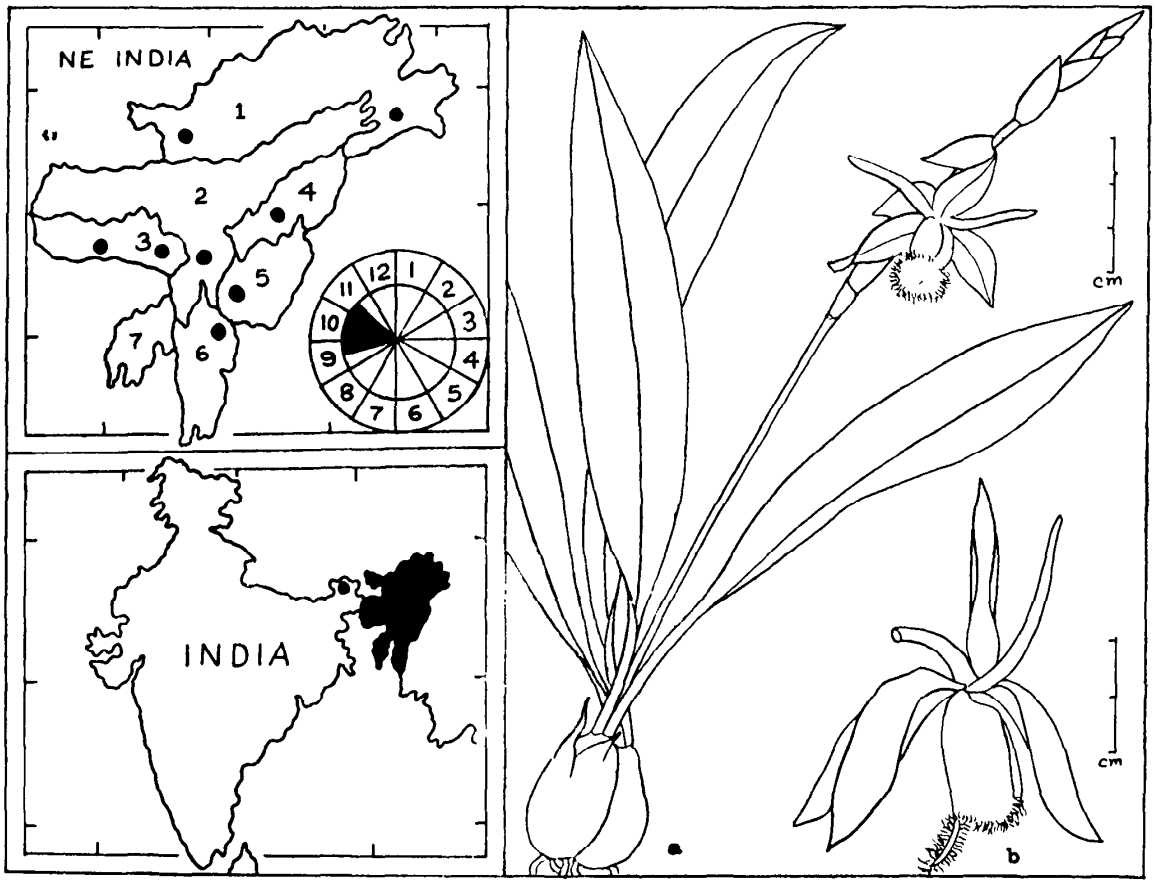
Epiphytes or epiliths. Pseudobulbs close or distant on the creeping rhizome. Pseudobulbs 2-leaved. Inflorescences arise from the base or at the top of pseudobulbs. Flowers 1—many, large or medium.

Many species are of horticultural value. About 115 species are cosmopolitan in distribution; *ca* 30 species in the Himalayan region.

Of these, *Coelogyne hitendrae* Das & Jain, *C. schultesii* Jain & Das, and *C. raizadae* Jain & Das are recently described as new species and these are known only from their type localities in N. E. India.

On the other hand, *Coelogyne assamica* Linden & Reichb. f., and *C. treutleri* Hook. f. are reported to occur in the N. E. India; but they are not represented in our herbaria. Even our repeated search for the last few years could not locate these species in wild; these species are considered *extinct* in this region. The main reason for their disappearence may be due to the clearence of forest areas.

A few species of this genus are commercially exploited from this region. These are *Coelogyne barbata* Griff., *C. cristata* Lindl., etc.



Coelogyne barbata Griff. a. habit; b. flower.

Coelogyne barbata Griff. Itin. Notes, 72. 1848; Hook. f., Fl. Brit. Ind. 5 : 839, 1890.

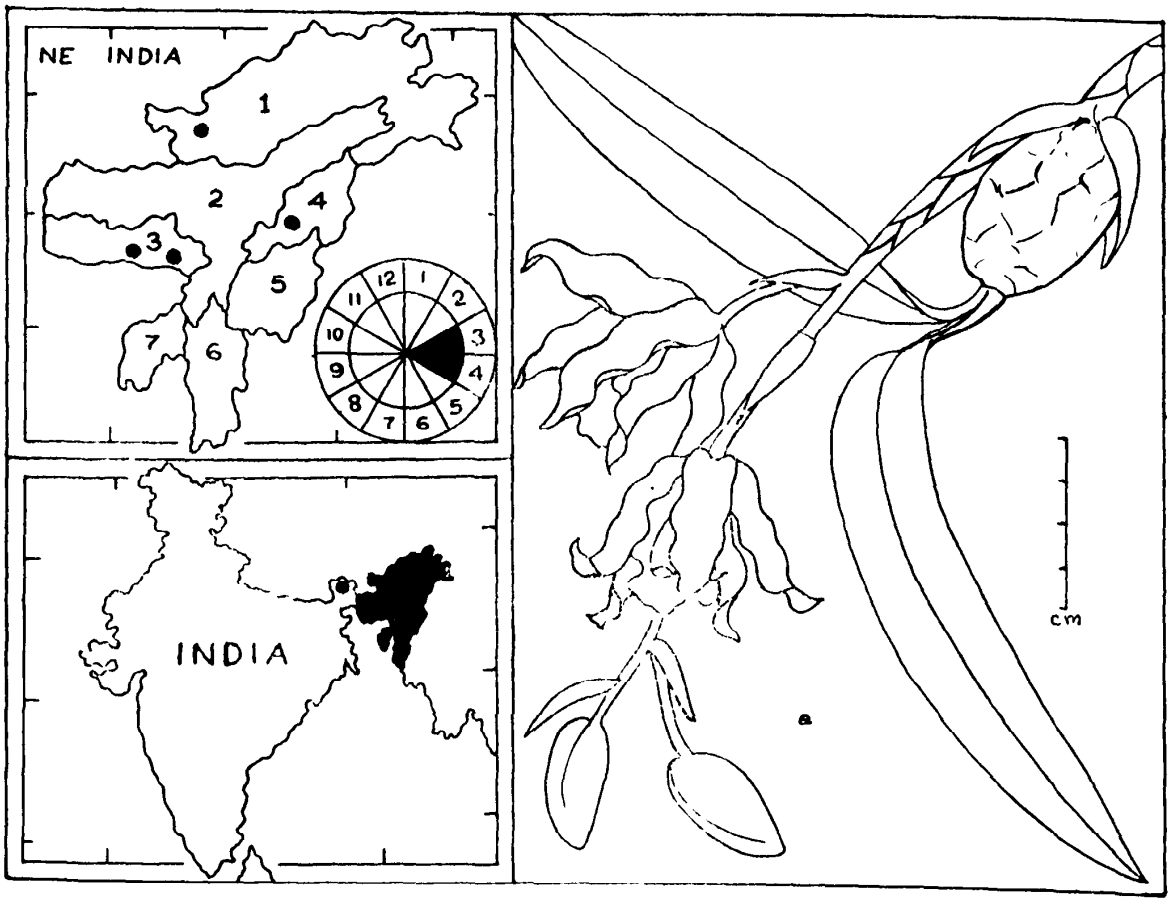
Description: Pseudobulbs large, 4-10 cm long, apart on a stout creeping rhizome, 2-leaved. Leaves long petioled, elliptic-lanceolate. Inflorescences arise from the top of pseudobulbs, many-flowered. Flowers large, white; lip 3-lobed, fimbriate with black hairs. *Plate 13*

Flowering: September—November.

Distribution: INDIA (N. E. India, Sikkim), BHUTAN, BURMA.

Notes: One of the large flowered and hardy *Coelogynes*. Once common; now, it is depleted due to habitat destruction and overcollection.

Status: Threatened.



Coelogyne cristata Lindl. a. habit.

Coelogyne cristata Lindl., Coll. Bot. t. 33. 1831 ; Hook. f., Fl. Brit. Ind. 5 : 829, 1890.

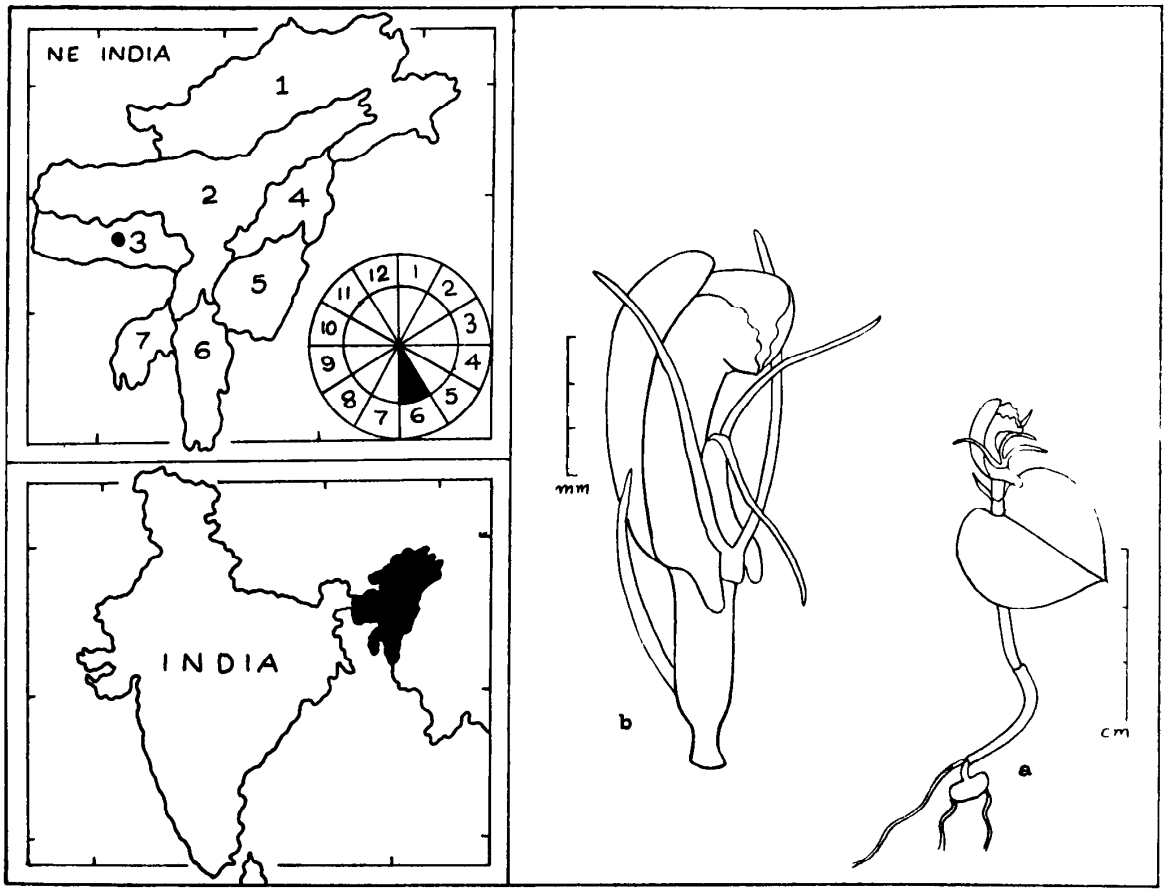
Description : Pseudobulbs ovoid-cylindric, obscurely angulate, 2-leaved. Leaves sessile, linear-lanceolate. Inflorescences arise at the base of pseudobulbs, many-flowered. Flowers large, white; lip 3-lobed, white with a yellow patch in the middle. *Plate 14*

Flowering : March—April.

Distribution : INDIA (N.W. Himalaya, Arunachal Pradesh, Meghalaya, Nagaland, Sikkim), BHUTAN, NEPAL.

Notes : This species is now seldom seen in wild due to repeated collection for its attractive large white flowers. Moreover, its habitat is also disturbed; it occurs in moist shady areas in forest.

Status : Threatened.



Corybas purpureus Jos. & Yog. a. habit; b. flower.

Corybas purpureus Jos. & Yog. in Ind. For. 96 (12) : 815. t. 1. 1967.

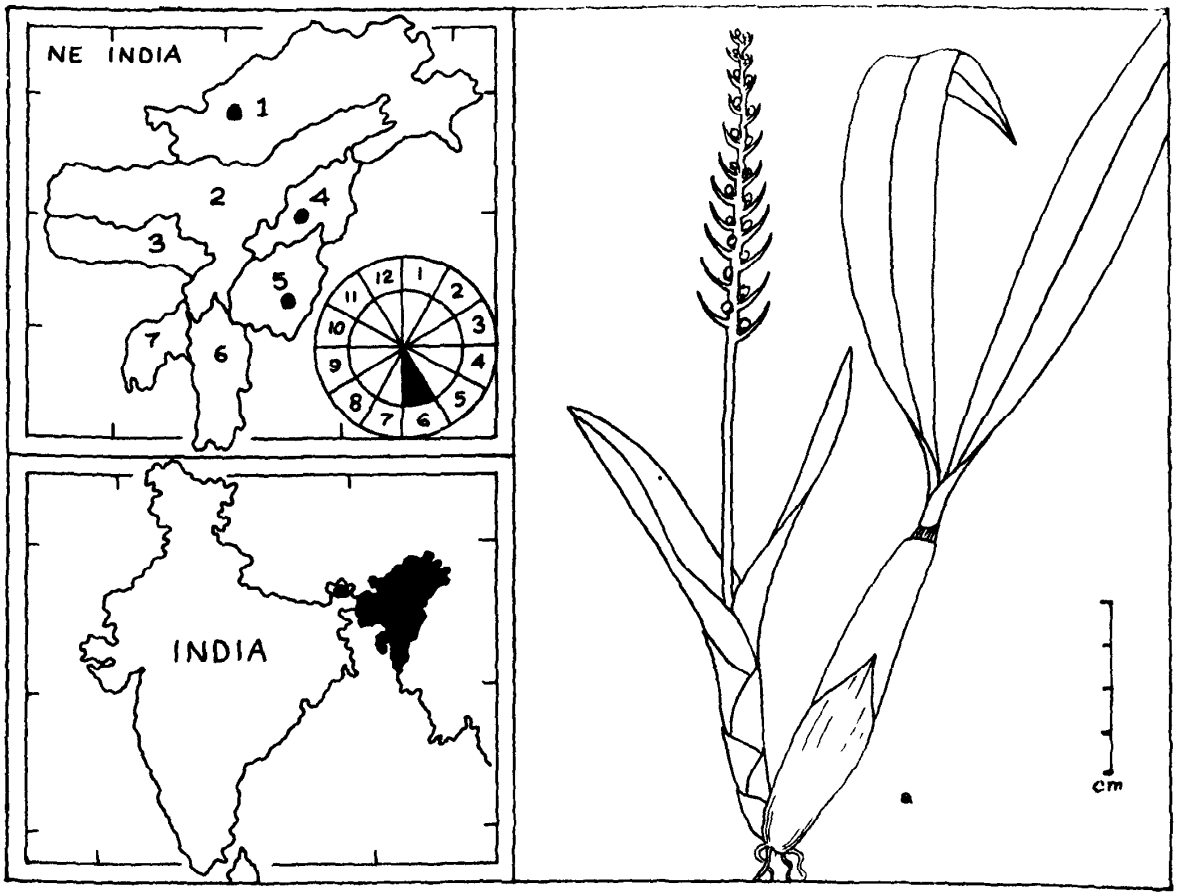
Description: Terrestrial ; grows amidst mosses. Tuber small. Stems very short. Leaves cordate, sessile. Flower solitary, pinkish-white. *Plate 15*

Flowering: June.

Distribution: INDIA (Meghalaya).

Notes: This species is very close to *C. himalaica* (King & Pantl.) Pradh. from Sikkim. The area where this species (*Corybas purpureus*) grows is much disturbed due to the frequent visits of the tourists (near Elephant falls, Khasi Hills—a tourist spot). These two species are becoming rare now.

Status: Rare. Endemic.



Cryptochilus luteus Lindl.. a. habit.

Cryptochilus luteus Lindl. in Journ. Linn. Soc. 3 : 21. 1859; Hook f., Fl. Brit. Ind. 5 : 827, 1890.

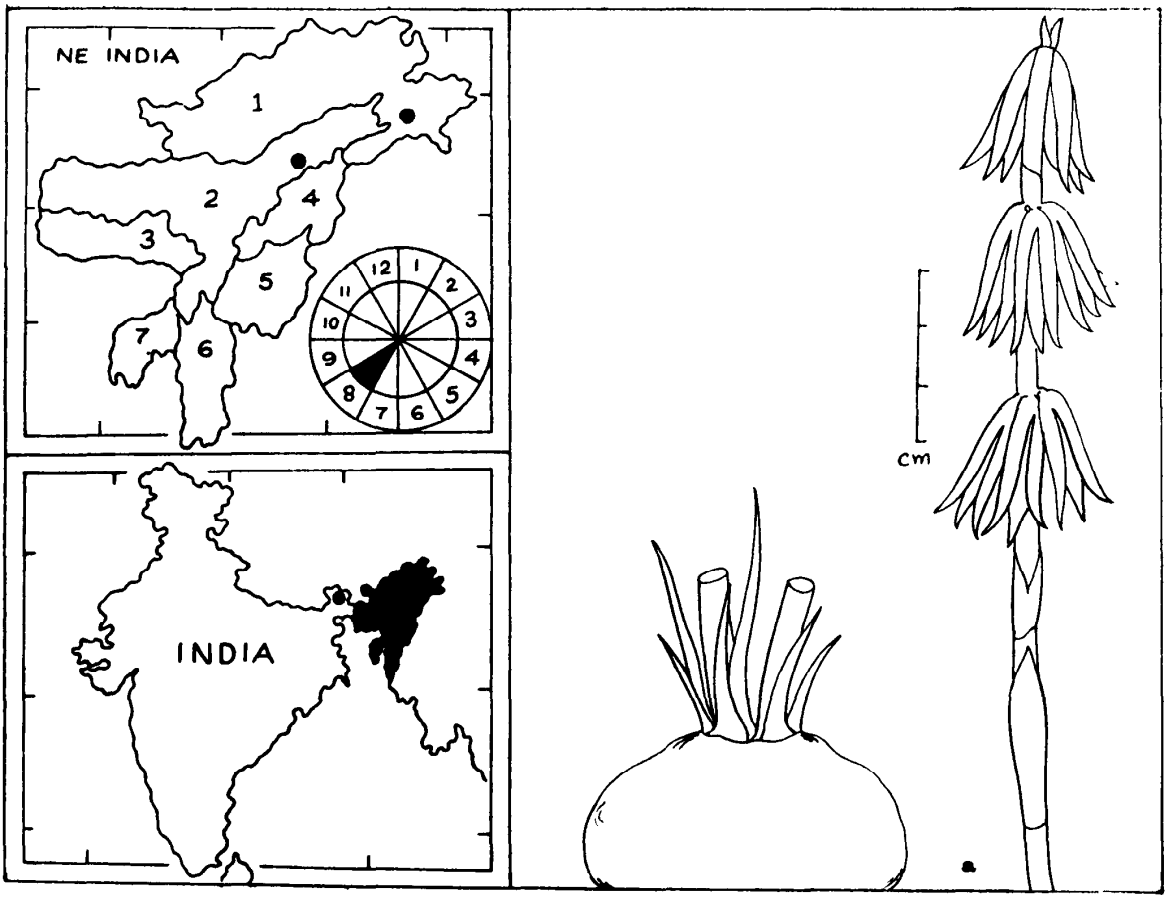
Description: Epiphytes. Pseudobulbs oblong, crowded. Leaves 1-2, linear-lanceolate, acute. Scapes terminal, erect, slender, many-flowered. Flowers yellow, glabrous. *Plate 16*

Flowering: June.

Distribution: INDIA (Arunachal Pradesh, Manipur, Nagaland, Sikkim), BUTAN, NEPAL.

Notes: Depleted due to the clearence of forest areas.

Status: Threatened.



Cremastra appendiculata (D. Don) Makino. a. habit.

Cremastra appendiculata (D. Don) Makino, *Cremastra wallichii* Lindl. Hook. f., Fl. Brit. Ind. 6 : 16, 1890.

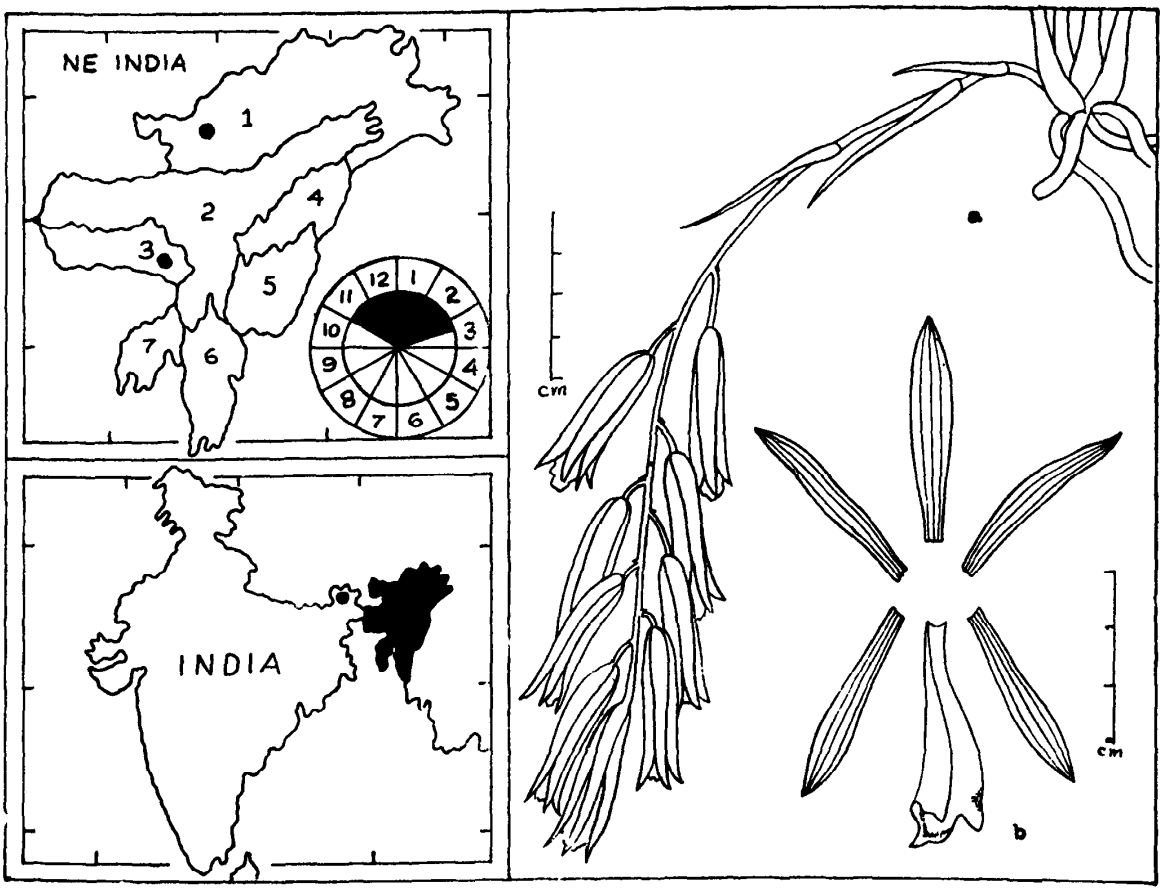
Description: Terrestrial. Stems bulbous at base, upper part of the stem elongate, erect. Leaves radical, elliptic. Inflorescences shorter than the leaves, many flowered. Flowers long, narrow, drooping, pink. *Plate17*

Flowering: August,

Distribution: INDIA (Arunachal Pradesh, Assam, Sikkim), BHUTAN, NEPAL, CHINA, BURMA, THAILAND, SRI LANKA.

Notes: A very widely distributed species; is becoming rare in this region due to habitat destruction.

Status: Threatened.



Cymbidium cochleare Lindl. a. habit; b. floral parts.

CYMBIDIUM

A widely distributed genus. Almost all the species are characterised by their long leaves and some have ornamental foliage.

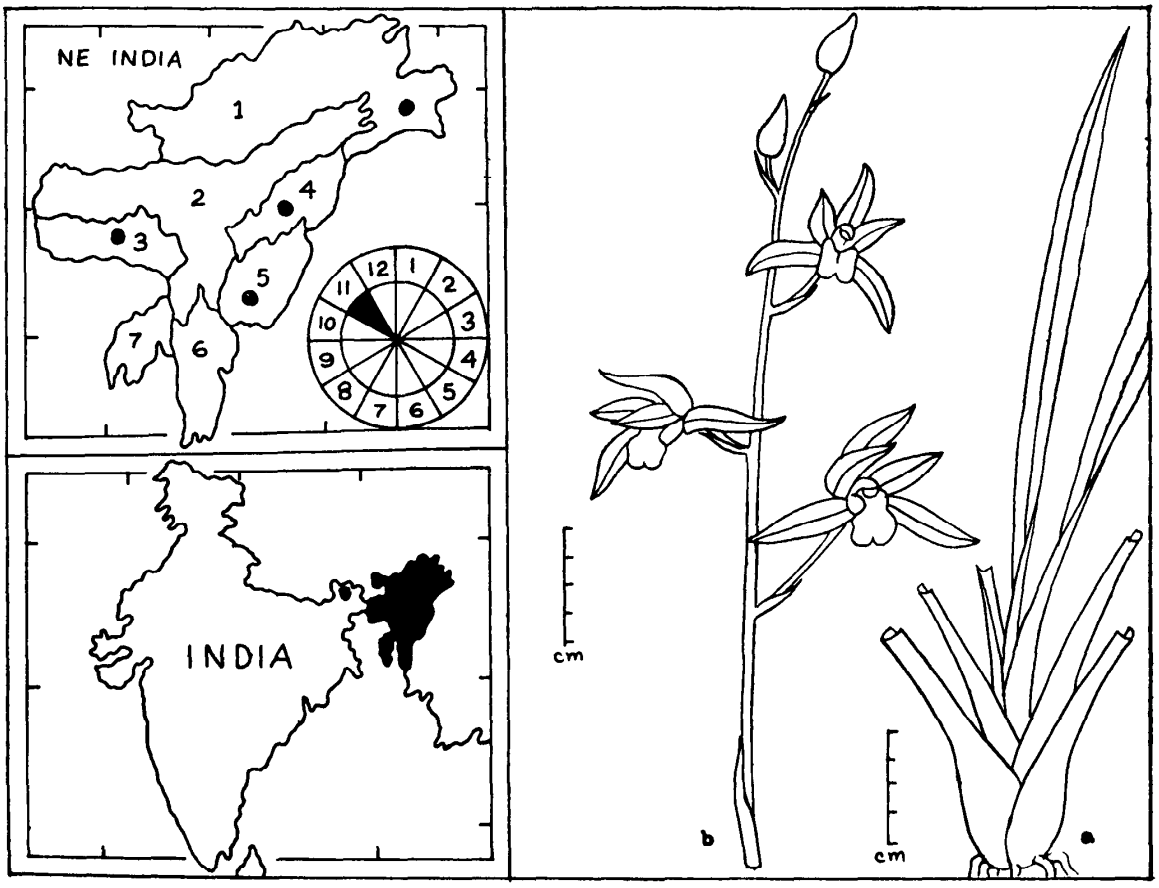
They are hardy plants and occur as epiphytes or terrestrials. Flowers are large and ornamental, long lasting and usually bloom during winter. Many hybrids are already well known amongst the orchid lovers.

The gradual depletion of the species from wild is due to habitat destruction and also uprooting from forests by the local collectors.

About 50 species distributed in India, Australia, Ceylon, Japan, Madagascar and Malaya etc.

Cymbidium cochleare Lindl. in Journ. Linn. Soc. 3 : 28, 1859. *Cyperorchis cochleare* Benth.; Hook. f., Fl. Brit. Ind. 6 : 15, 1890.

Description: Epiphytes. Pseudobulbs short. Leaves many, linear. Inflorescence lateral, pendulous, many-flowered. Flowers lax, greenish-brown; lip greenish-yellow with purple spots. *Plate 18*



Cymbidium cyperifolium Wall. ex Lindl. a. habit; b. a part of raceme.

Flowering: November—February.

Distribution: INDIA (Arunachal Pradesh, Meghalaya, Sikkim).

Status: Threatened.

Cymbidium cyperifolium Wall. ex Lindl., Gen. Sp. Orch. 163, 1833; Hook. f., Fl. Brit. Ind. 6 : 13, 1890.

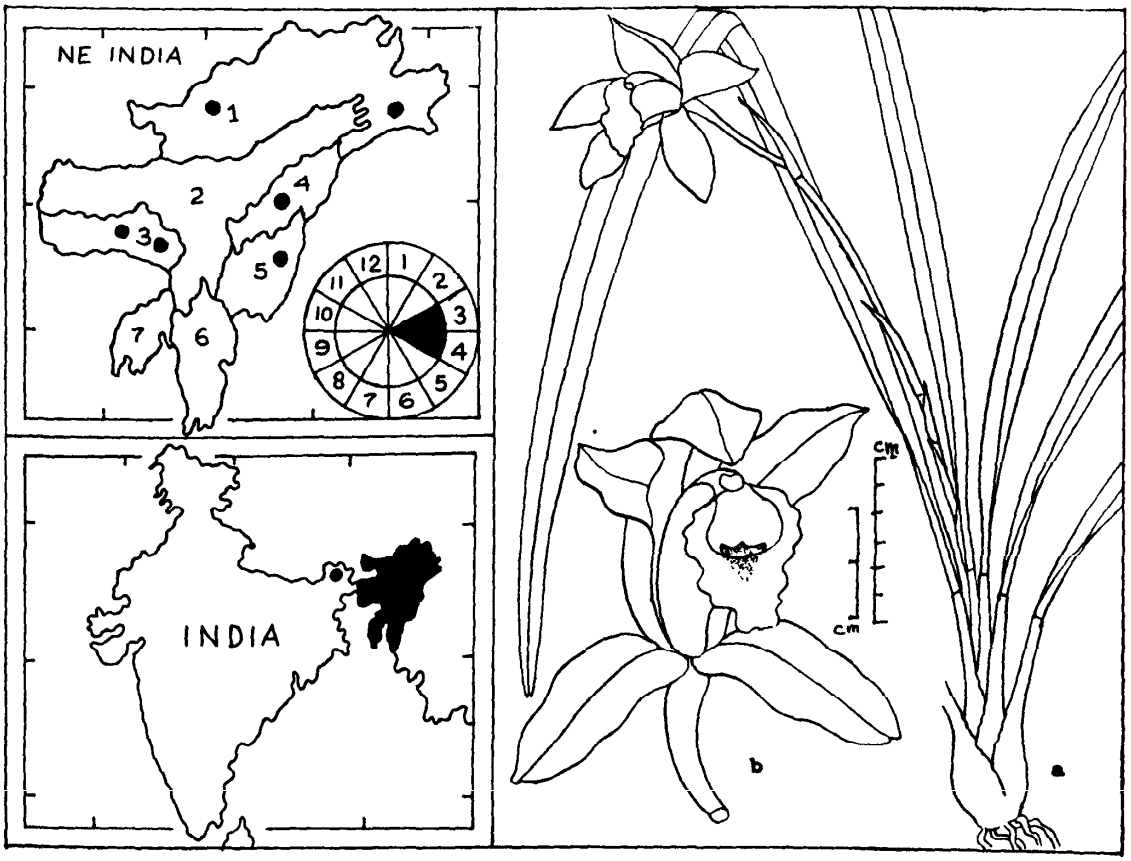
Description: Terrestrial. Pseudobulbs narrow. Leaves linear, finely acuminate. Inflorescence shorter than the leaves, erect, few-flowered. Flowers green, sweet-scented; lip purple spotted. *Plate 19*

Flowering: November.

Distribution: INDIA (Garhwal, Arunachal Pradesh, Manipur, Meghalaya Nagaland, Sikkim,), BHUTAN, BURMA.

Notes: A pretty green-flowered species; was once common.

Status: Threatened.



Cymbidium eburneum Lindl. a. habit; b. flower.

Cymbidium eburneum Lindl., Bot. Reg. t. 67, 1847; Hook, f., Fl. Brit. Ind. 6 : 11, 1890.

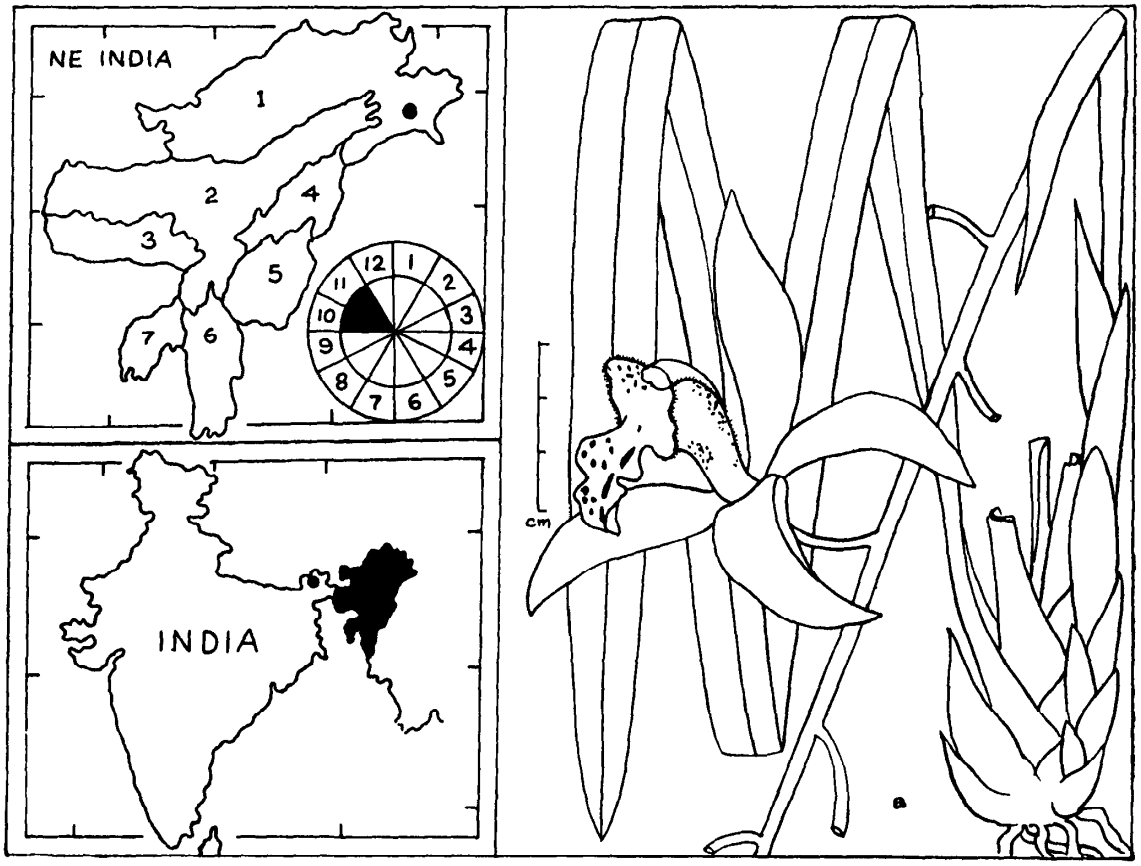
Description: Epiphytes or lithophytes. Pseudobulbs short, stout, many-leaved. Leaves linear, acute. Scape shorter than the leaves, 1-2-flowered. Flowers large, widely open, white. *Plate 20*

Flowering: March-April.

Distribution: INDIA (Arunachal Pradesh, Manipur, Meghalaya, Nagaland, ,Sikkim, W. Himalaya), NEPAL.

Notes: This was once a very common species in wild state. It is gradually depleted in its natural habitat due to overcollection and habitat destruction.

Status: Threatened.



Cymbidium hookerianum Reichb. f. a. habit.

Cymbidium hookerianum Reichb. f. in Gard. Chron. 7. 1866. *Cymbidium grandiflorum* Griff.; Hook. f., Fl. Brit. Ind. 6 : 12, 1890.

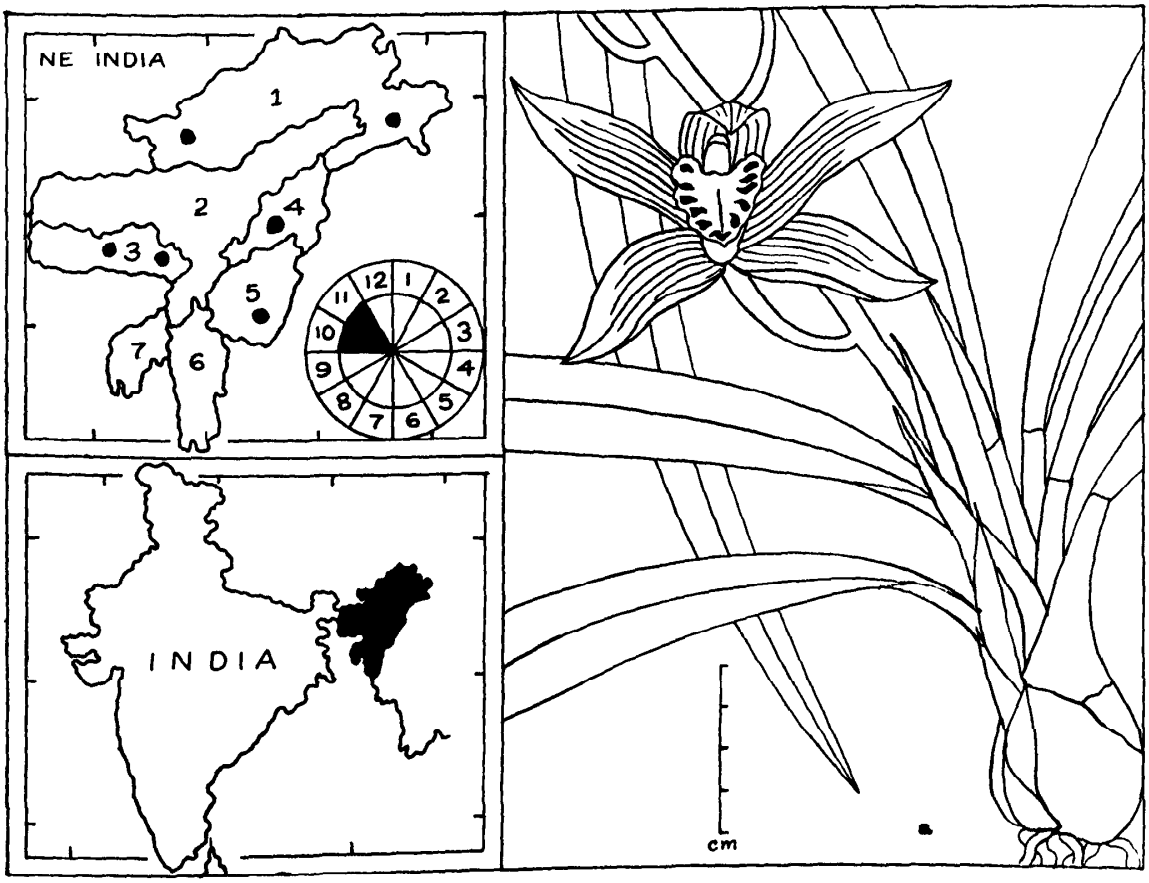
Description: Epiphytes. Pseudobulbs large, sheathed. Leaves many, oblong-lanceolate, acuminate. Flowers large, green; lip yellowish with red purple dotted lines. *Plate 21.*

Flowering: October-November.

Distribution: INDIA (Kumaon, Arunachal Pradesh, Sikkim), BHUTAN, NEPAL.

Notes: A very showy species with large and long lasting flowers, depleted due to large scale exploitation.

Status: Rare.



Cymbidium iridioides D. Don a. habit.

Cymbidium iridioides D. Don, Prodr. Fl. Nepal. 36. 1825. *Cymbidium giganteum* Wall. ex Lindl.; Hook. f., Fl. Brit. Ind. 6 : 12, 1890.

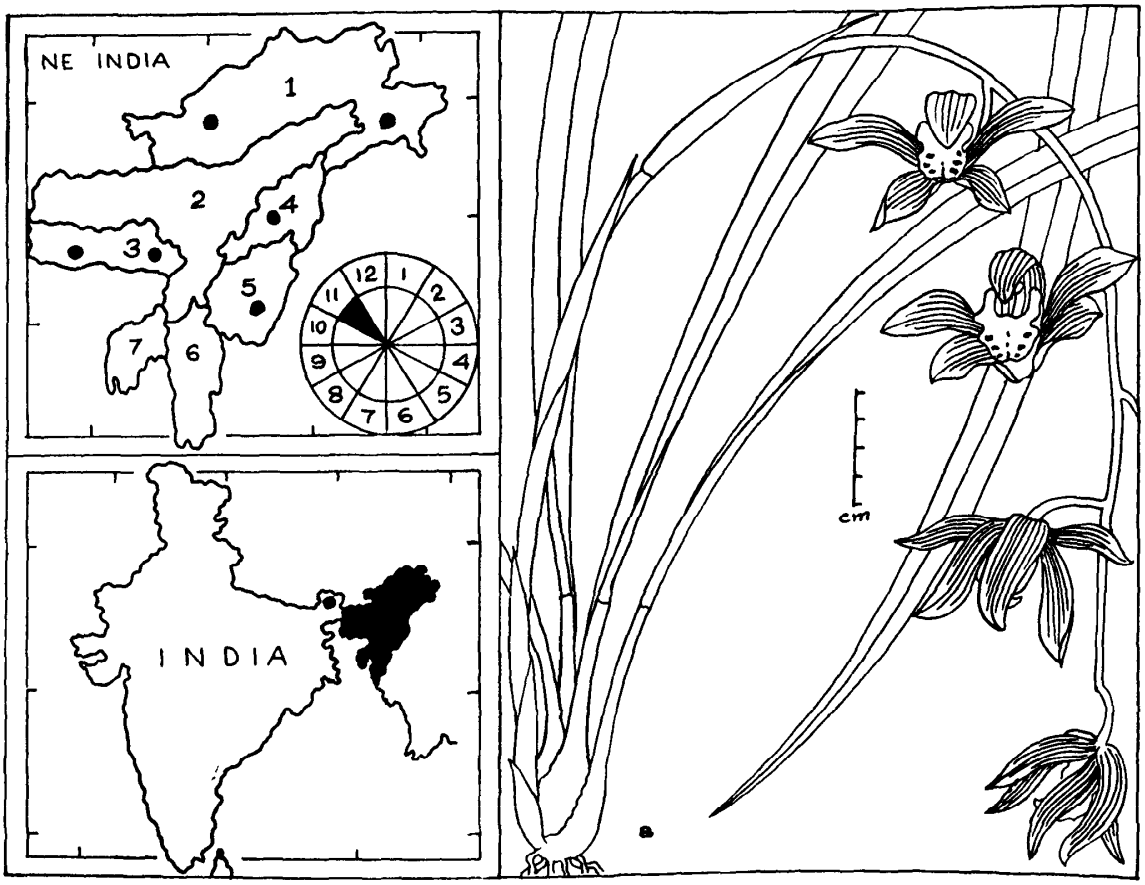
Description: Epiphytes. Pseudobulbs large, sheathed. Leaves oblong-lanceolate, acuminate. Scapes stout, erect or sub-erect, many-flowered. Flowers large, lax, purplish-red; lip yellowish-green with dark purple lines. *Plate 22.*

Flowering: October-November.

Distribution: INDIA (Meghalaya, Arunachal Pradesh, Nagaland, Manipur, Sikkim), BHUTAN, NEPAL, BURMA.

Notes: Flowers large and long lasting; depleted due to large scale exploitation.

Status: Threatened.



Cymbidium longifolium D. Don a. habit.

Cymbidium longifolium D. Don, Prodr. Fl. Nepal. 36. 1825; Hook. f., Fl. Brit. Ind. 6 : 13, 1890.

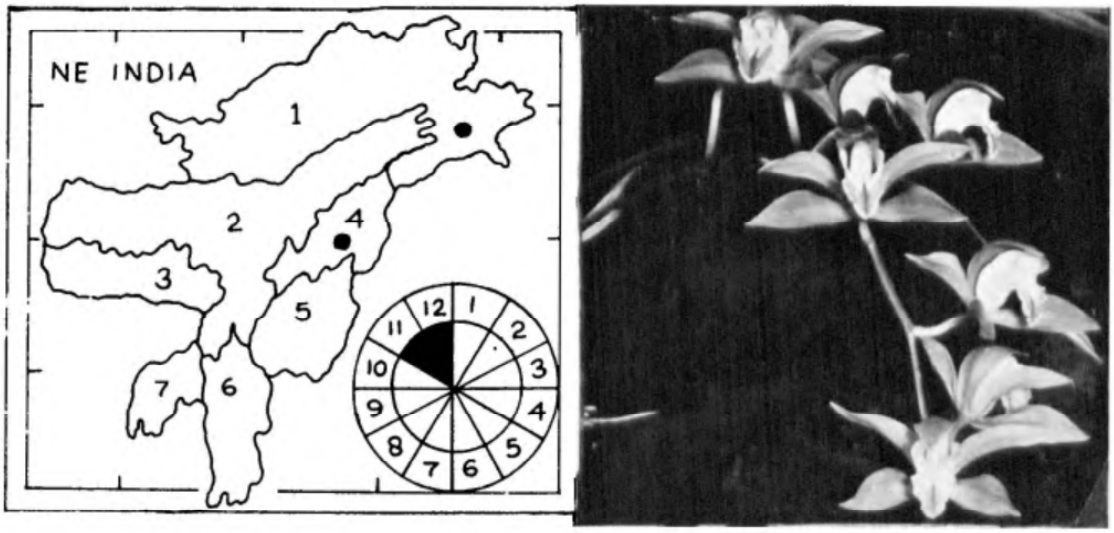
Description: Epiphytes. Pseudobulbs medium sized, sheathed. Leaves linear, acuminate. Scapes sub-erect, many-flowered. Flowers lax, greenish-purple with purple lines; midlobe of the lip white with purple dots. *Plate 23.*

Flowering: November.

Distribution: INDIA (Kumaon, Arunachal Pradesh, Manipur, Meghalaya, Nagaland, Sikkim), BHUTAN, NEPAL.

Notes: Depleted due to exploitation and damage to habitat.

Status: Threatened.



Cymbidium lowianum Reichb. f.

Cymbidium lowianum Reichb. f. in Gard. Chron. 332 : 405. t. 56. 1879; Hook. f., Fl. Brit. Ind. 6 : 13, 1890.

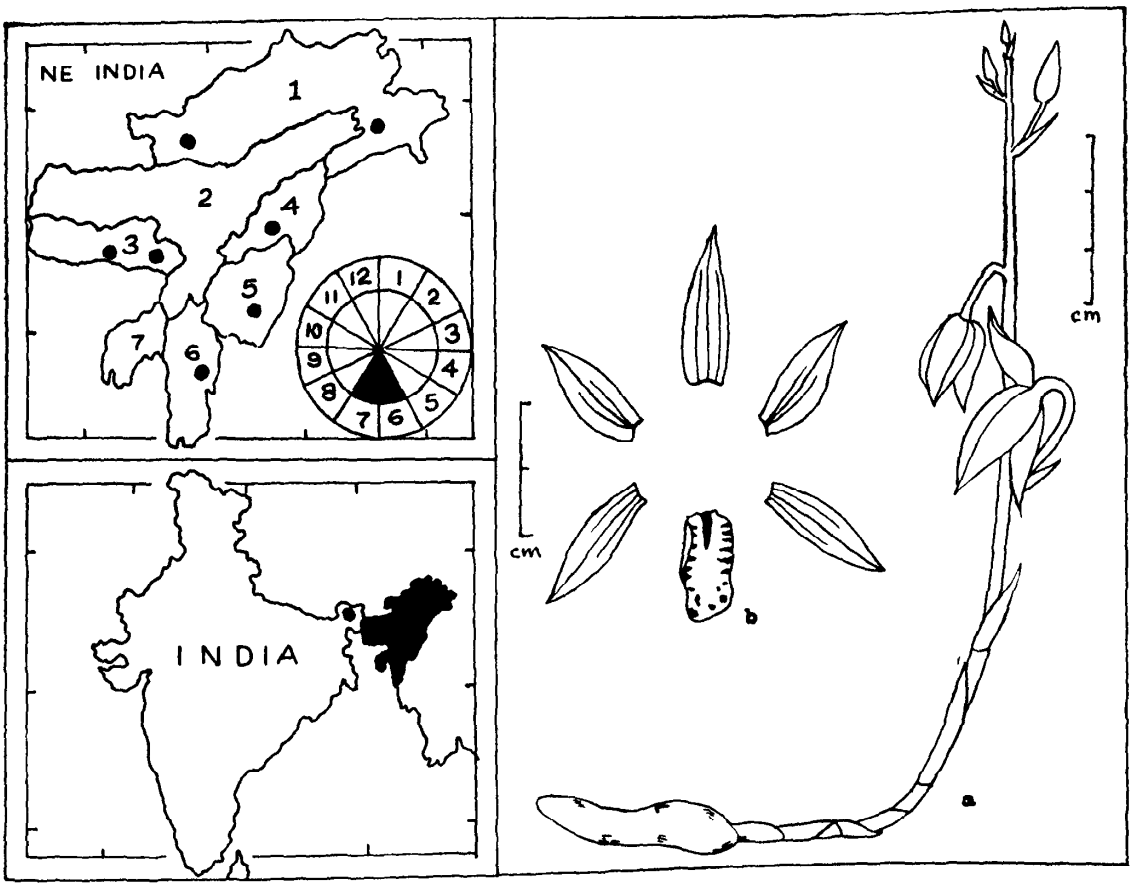
Description : Epiphytes. Pseudobulbs large, sheathed. Leaves elongate, lanceolate, acuminate. Scapes long, sub-erect, many-flowered. Flowers large, yellowish-green, vary in colour; sidelobes of lip pale yellow green, midlobe dark purple with golden margin. *Plate 24.*

Flowering : November-December.

Distribution : INDIA (W. Himalaya, Arunachal Pradesh, Nagaland,) BURMA, THAILAND, CHINA.

Notes : This species resembles *Cymbidium iridioides* in vegetative condition. Depleted due to exploitation.

Status : Threatened.



Cymbidium macrorhizon Lindl. a. habit; b. floral parts.

Cymbidium macrorhizon Lindl., Gen. & Sp. Orch. 162, 1833; Hook. f., Fl. Brit. Ind. 6 : 9, 1890.

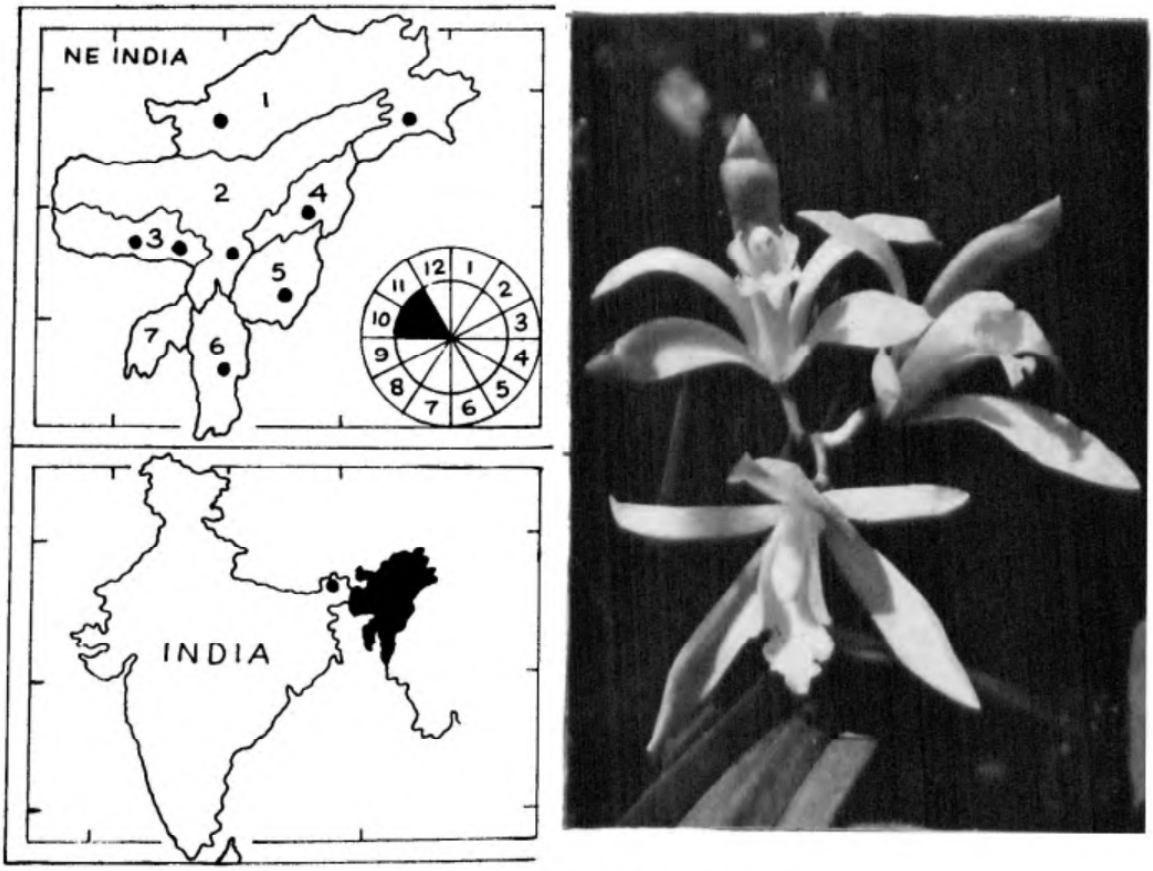
Description: Terrestrial. Leafless. Root-stock creeping, branched. Scapes erect, purple, few-flowered. Flowers white with pink median lines. *Plate 25*

Flowering: June-July.

Distribution: INDIA (Kumaon, N.E. India, Sikkim), LAOS, THAILAND.

Notes: Once common on forest floor. Depleted due to its habitat destruction. Difficult to cultivate being a saprophyte.

Status: Threatened.



Cymbidium mastersii Griff. ex Lindl.

Cymbidium mastersii Griff. ex Lindl. in Bot. Reg. t. 50. 1847; *Cyperorchis mastersii* Benth.; Hook. f., Fl. Brit. Ind. 6 : 15, 1890.

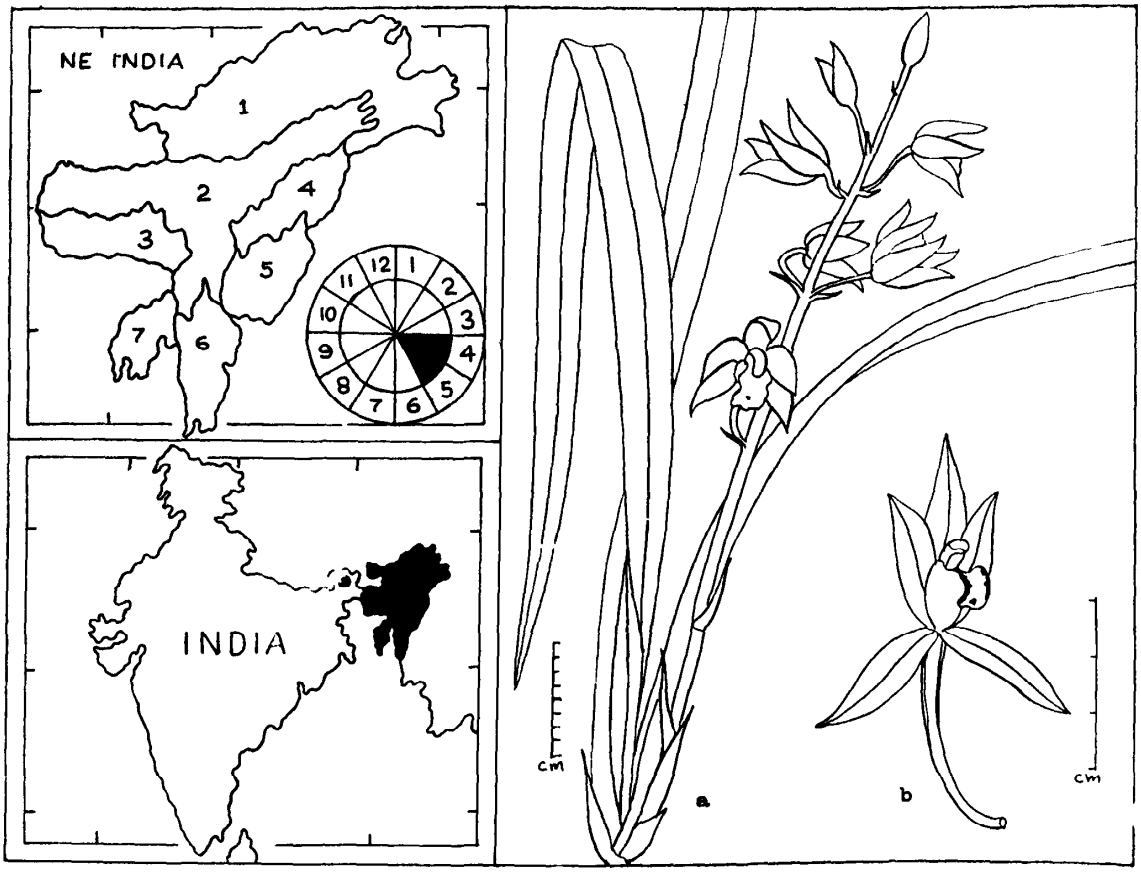
Description: Epiphytes. Pseudobulbs large, sheathed. Leaves long, linear, acuminate. Inflorescences shorter than the leaves; racemes decurved at the tip, few-flowered. Flowers white with a few red spots on the lip, sweet scented. *Plate 26.*

Flowering: October-November.

Distribution: INDIA (N. E. India, Sikkim), BHUTAN, THAILAND.

Notes: Very near to *Cymbidium eburneum* but the number of flowers is more and flowering time different in *C. mastersii.* Depleted due to habitat destruction and over collection.

Status: Threatened.



Cymbidium munronianum King & Pantl. a. habit; b. flower.

Cymbidium munronianum King & Pantl. in Journ. Asiat. Soc. Bengal, 64 : 338, t. 2. 1895.

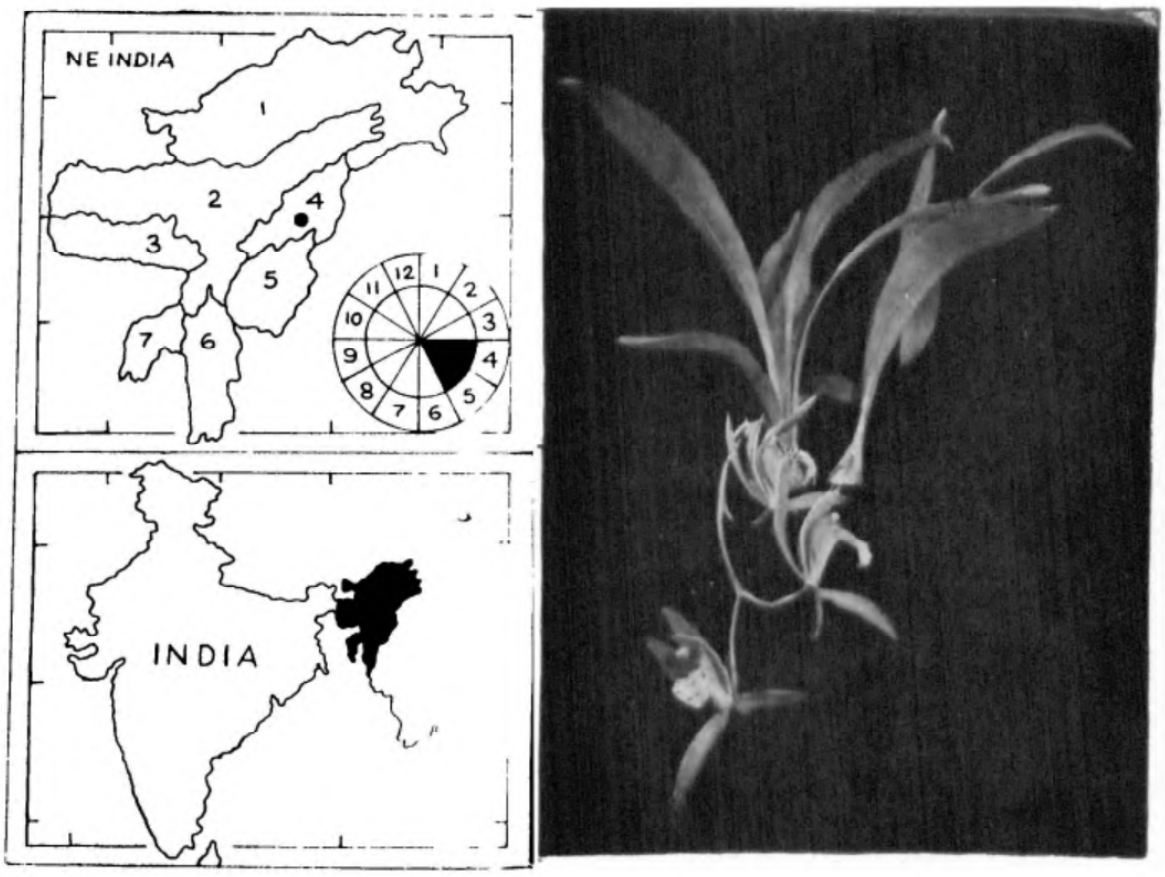
Description : Terrestrial. Pseudobulbs short, stout, many-leaved. Leaves linear, erect, acuminate. Scapes stout, erect, shorter than the leaves, many-flowered. Flowers straw-coloured with pink mid nerve. *Plate 27*

Flowering : April-May.

Distribution : INDIA ('Assam' Sikkim).

Notes : Flowers sweet scented. This species is depleted in wild due to loss of its habitat.

Status : Threatened.



Cymbidium tigrinum Parish

Cymbidium sikkimensis Hook. f., Fl. Brit. Ind. 6 : 9, 1890.

Description : Terrestrial. Rootstock stout. Leaves appear after flowering. Scapes sub-erect with a few loose basal sheaths. Flowers many, medium sized.

Flowering : May-June.

Distribution : INDIA (Sikkim).

Notes : So far, it is recorded only from Sikkim. Grows above 2000 m. Very rarely seen.

Status : Rare, Endemic.

Cymbidium tigrinum Parish in Bot. Mag. t. 5457. 1864; Hook. f., Fl. Brit. Ind. 6 : 9, 1890.

Description : Epiphytes. Pseudobulbs ovoid with 3-5 leaves. Leaves oblong-lanceolate, shortly petioled. Scapes suberect, few-flowered. Flowers greenish with red spots; lip yellow, stripped with red-brown bands. *Plate 28*

Flowering: April-May.

Distribution: INDIA (Nagaland), BURMA, THAILAND.

Notes: A distinct species from other *Cymbidiums*, depleted in wild due to its habitat destruction and overcollection.

Status: Rare.

Cymbidium whiteae King & Pantl. in Ann. Roy. Bot. Gard. Calcutta, 8 : 1898.

Description: Epiphytes. Stem pseudobulbous. Leaves many, linear, acuminate. Scapes from the base, pendulous, many-flowered. Flowers lax, yellowish-green with reddish spots.

Flowering: November-December.

Distribution: INDIA (Sikkim).

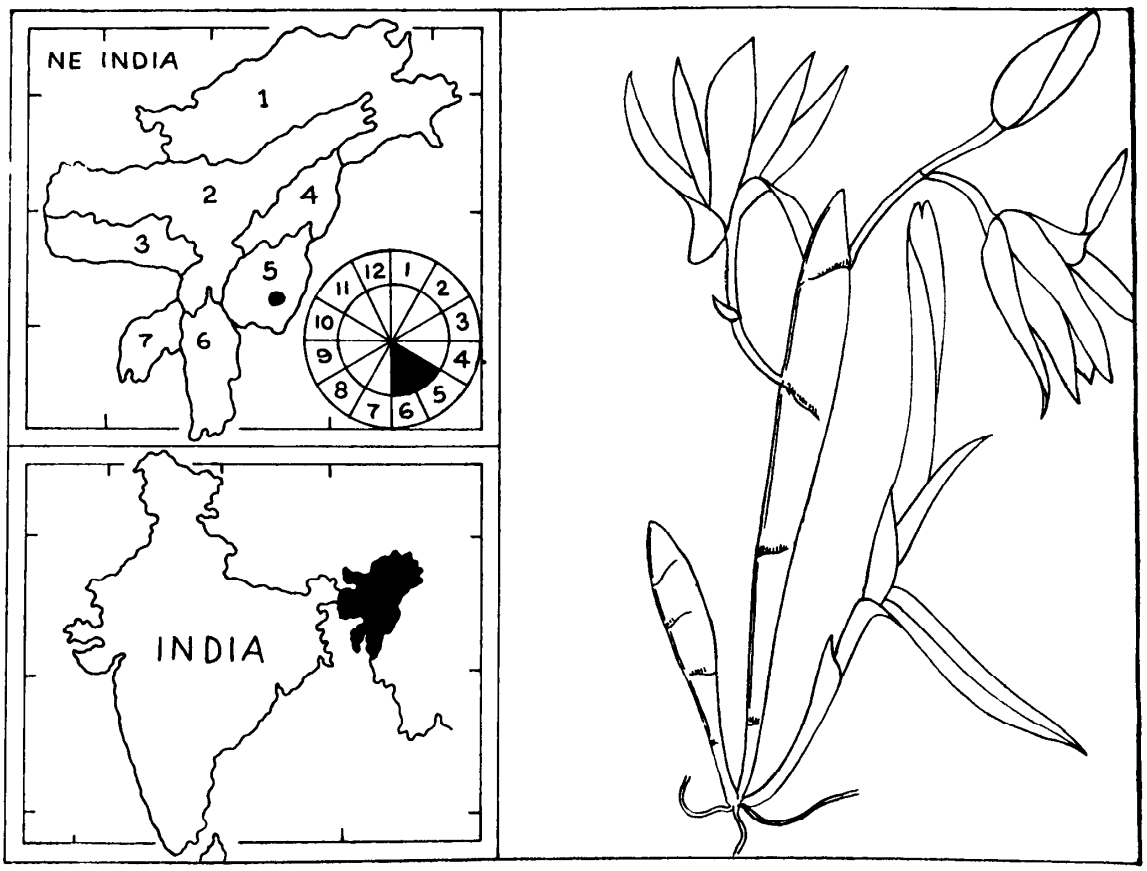
Notes: Endemic to Sikkim. Frequently reported; depleted due to its habitat destruction.

Status: Rare.

DENDROBIUM

One of the largest genera of the family Orchidaceae distributed all over South East Asia and the Pacific Islands. The species show a great range of variation and adaptation to many kinds of habitats. They have handsome sized flowers in varying colours and generally in eye-catching bunches. This is one of the most popular genera amongst orchid lovers and is seen in almost all home gardens with an orchid collection. Naturally this also happens to be a genus which has provided much material for hybridization. The wild species, particularly the ornamental ones, are gradually becoming rare and threatened in their natural habitats due to uprooting by plant collectors.

About 900 species are distributed throughout the world. The species described in this work are found to be rare or threatened. Besides, *Dendrobium miserum* Reichb. f. (F.B.I. 5 : 717.1890), *D. parciflorum* Reichb. f. (F.B.I. 5 : 725. 1890), *D. perula* Reichb. f. (F.B.I. 5 : 732.1890) and *D. spatella* Reichb. f. (F.B.I. 5 : 725.1890) are reported from Assam (India); whereas *D. bicameratum* Lindl. (F.B.I. 5 : 729.1890) is recorded from Sikkim. But repeated explorations in this region have not been fruitful to locate them.



Dendrobium arachnites Reichb. f. a. habit.

Dendrobium arachnites Reichb. f. in Gard. Chron. 2 : 554, 1874; Hook. f., Fl. Brit. Ind. 5 : 734, 1890.

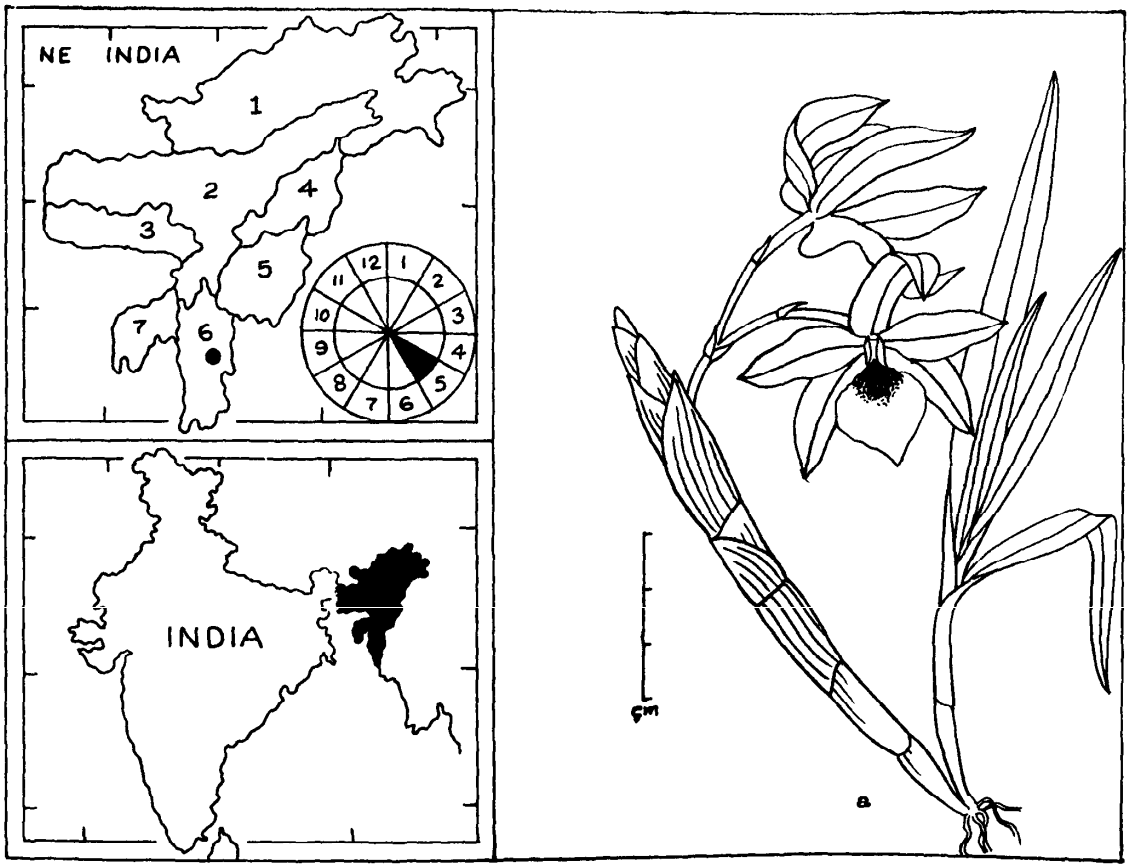
Description: Epiphytes. Stems short, 5-7 cm long. Leaves linear-lanceolate, acute. Flowers red, in fascicles of 2-3. *Plate 29*

Flowering: May-June.

Distribution: INDIA (Manipur), BURMA, MALAYA.

Notes: It was first discovered by Boxall in Moulmein (Burma) in 1873-74. A dwarf epiphyte with large red flowers; depleted due to overcollection and habitat destruction.

Status: Rare.



Dendrobium bensoniae Reichb. f. a. habit.

Dendrobium bensoniae Reichb. f. in Bot. Zeit. 230. 1867; Hook. f., Fl. Brit. Ind. 5 : 739, 1890.

Description : Epiphytes. Stems short, erect. Leaves linear, acute, deciduous. Flowers in fascicles of 2-3, snow-white with an orange yellow blotch and reddish spots on the disc of the lip. *Plate 30*

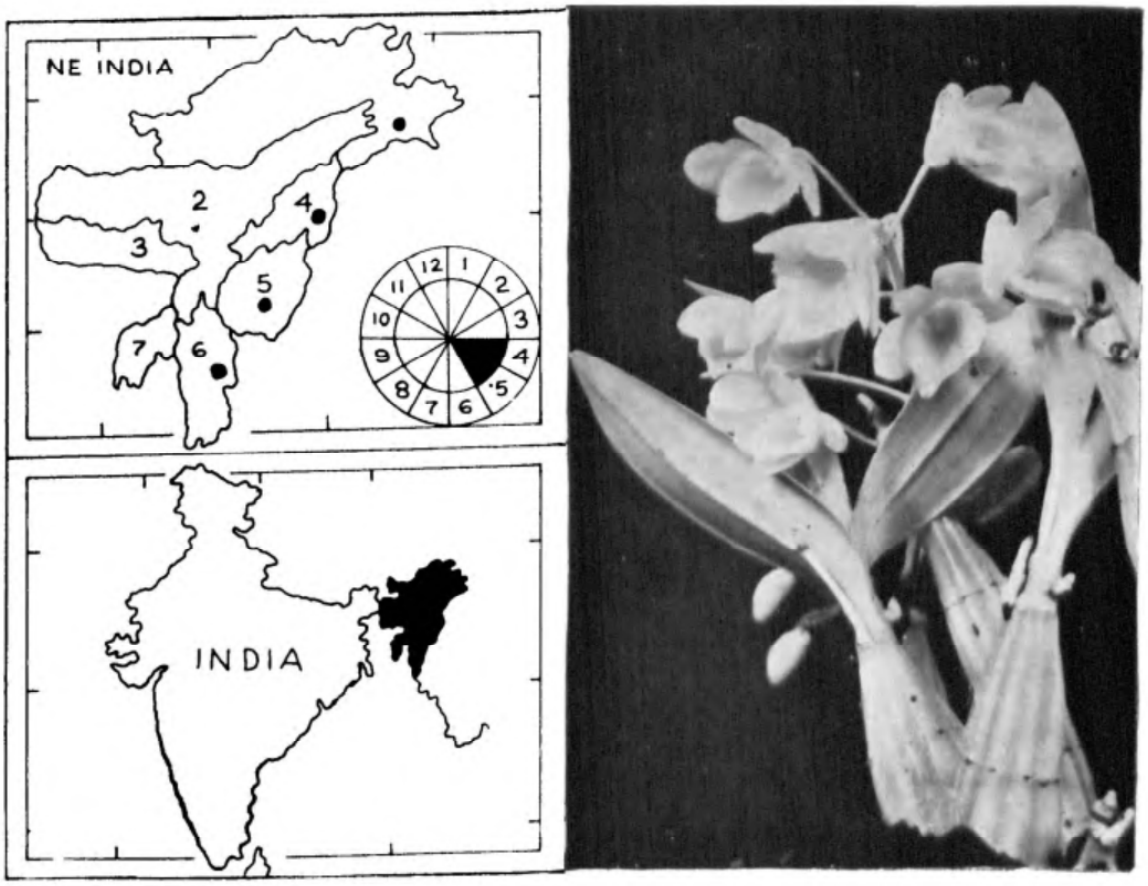
Flowering : May.

Distribution : INDIA (Mizoram), BURMA, THAILAND, PEGU.

Notes : This is one of the finest white flowered *Dendrobes*, depleted due to overcollection and habitat destruction.

Status : Threatened.

Recently collected in Manipur.



Dendrobium chrysotoxum Lindl.

Dendrobium candidum Wall. ex Lindl. in Bot. Reg. 54. 1838; Hook. f., Fl. Brit. Ind. 5 : 735, 1890.

Description : Epiphytes. Stems slender, flexuous, erect. Leaves linear-lanceolate, apex unequally lobed. Flowers in fascicles of 2-3, white.

Flowering : April-May.

Distribution : INDIA (Meghalaya, Sikkim, Kumaon), NEPAL, BHUTAN.

Notes : Very rarely seen in forests. Depleted due to overcollection and habitat destruction.

Status : Rare.

Dendrobium chrysotoxum Lindl. in Bot. Mag. t. 36. 1847; Hook. f., Fl. Brit. Ind. 5 : 750, 1890.

Description : Epiphytes. Stems clavate, ribbed, erect. Racemes lateral from near the apex of the stems, long, drooping, many-flowered. Flowers golden-yellow with an orange blotch on the lip. *Plate 31*

Flowering : April-May.

Distribution: INDIA (Arunachal Pradesh, Manipur, Mizoram, Nagaland), BURMA, THAILAND.

Notes: It was widely distributed in Arunachal Pradesh, Mizoram (India). Now, it is scarce in wild due to over collection and habitat destruction.

Status: Threatened.

Dendrobium crystallinum Reichb. f. in Gard. Chron. 572. 1868; Hook. f., Fl. Brit. 5 : 739, 1890.

Description: Epiphytes. Stems long, terete, pendulous. Leaves membranous, lanceolate, acute. Flowers 1-3-nate on short peduncle, white with purple tips.

Flowering: May-June.

Distribution: INDIA (Sikkim), BURMA, THAILAND.

Notes: This species resembles *Dendrobium gratissimum*, a plant reported from Manipur (India) and of rare occurrence.

Status: Threatened.

Dendrobium dalhousianum Paxt. Bot. Mag. 11 : 145. 1844; Hook. f., Fl. Brit. Ind. 5 : 743, 1890.

Description: Stems terete, long about 1 m. Leaves ovate-lanceolate, apex bifid. Racemes arise towards the apex of the stems, many-flowered. Flowers large, pale-yellowish, tinted with rose; lip with two maroon blotches.

Flowering: April-May.

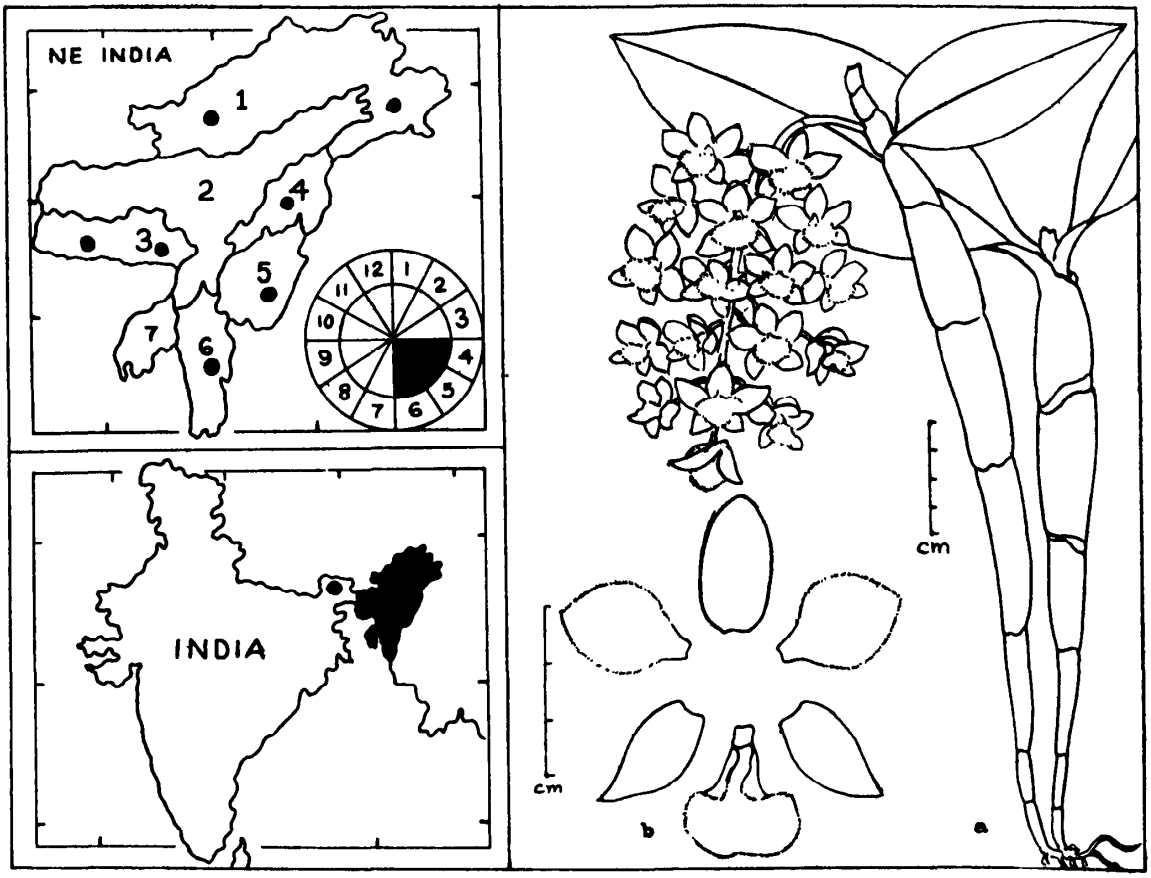
Distribution: INDIA (Manipur, Nagaland), BURMA.

Notes: A very hardy species, grows on tall trees. Gradual depletion is mainly due to clearing of forests.

Status: Threatened.

Dendrobium danneanum Kerr. in Siam. Soc. Nat. Hist. Supl. 9 : 229. 1933; *Dendrobium clavatum* Wall. ex Lindl.; Hook. f., Fl. Brit. Ind. 5 : 746, 1890.

Description: Epiphytes. Stems long, erect, slightly clavate. Leaves linear-oblong, obtuse, coriaceous. Racemes lateral, few-flowered on the leafless stems. Flowers large, yellow with a purple blotch on the lip.



Dendrobium densiflorum Lindl. a. habit; b. floral parts.

Flowering: May-June.

Distribution: INDIA (Kumaon, Arunachal Pradesh, Meghalaya, Sikkim), BHUTAN, NEPAL.

Notes: Restricted in distribution. Depleted mainly due to exploitation and habitat destruction.

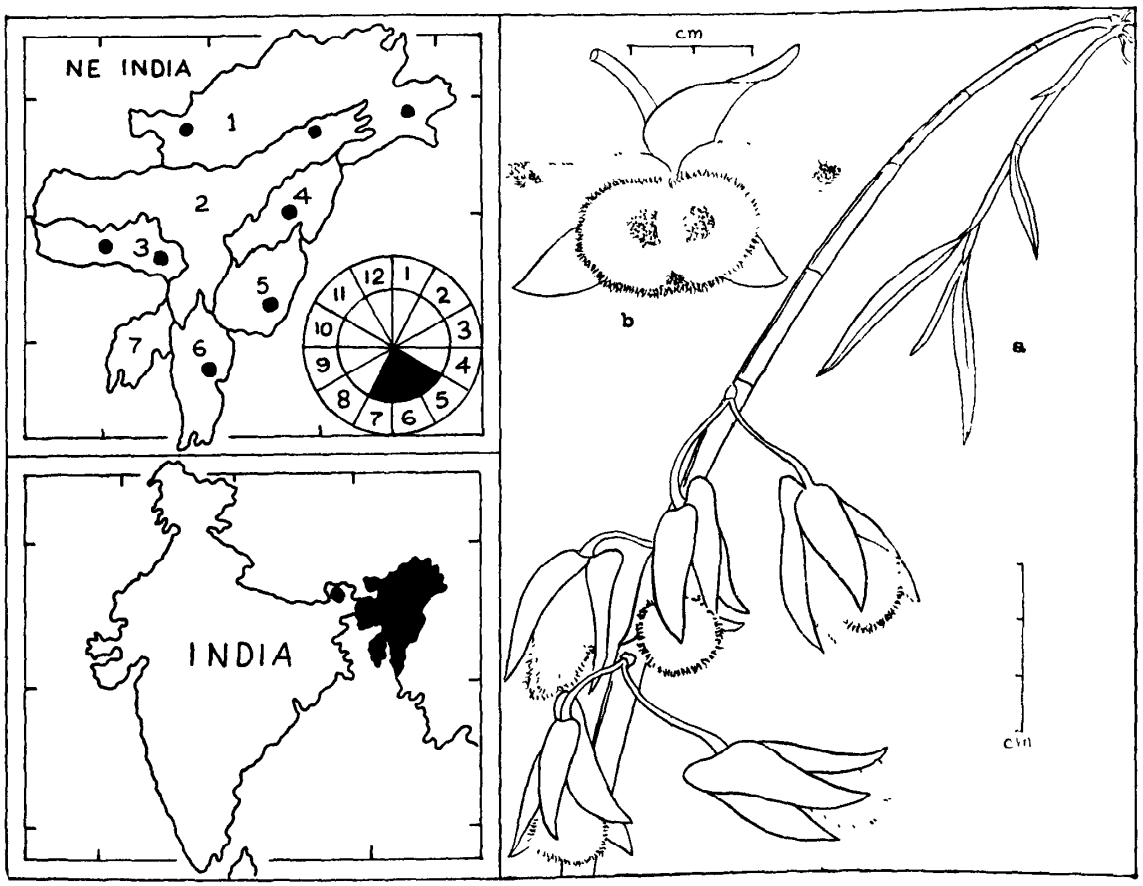
Status: Rare.

Dendrobium densiflorum Lindl. in Wall. Pl. Asiat. Rar. 1 : 34. t. 40. 1830; Hook. f., Fl. Brit. Ind. 5 : 748, 1890.

Description: Epiphytes. Stems erect, 4-angled, tapering towards base, few-leaved. Leaves sub-terminal, lanceolate-ovate, acute. Racemes 1-2, lateral, pendulous, many flowered. Flowers crowded, golden-yellow. *Plate 32*

Flowering: April-June.

Distribution: INDIA (Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim), NEPAL, BHUTAN, BURMA, THAILAND.



Dendrobium devonianum Paxt. a. habit; b. flower.

Notes: Popularly known as 'Pine apple orchid' for its many compact yellow flowers on drooping racemes. It was first recorded by Wallich from Nepal in 1828-29. The species is now becoming scarce due to felling of forests and overcollection.

Status: Threatened.

Dendrobium devonianum Paxt. in Bot. Mag. t. 169. 1840 ; Hook. f., Fl. Brit. Ind. 5 : 743, 1890.

Description: Epithytes. Stems long, slender, pendulous. Leaves linear-lanceolate, acuminate. Flowers 1 or 2 at nodes on the leafless stems towards the apex, white with purple tips ; lip with two yellow blotches on the disc. *Plate 33*

Flowering: May-July.

Distribution: INDIA (N. E. India, Sikkim) BHUTAN, BURMA, CHINA.

Notes: It was first discovered in Khasi Hills (Meghalaya) in 1837 by Gibson. One of the finest *Dendrobes*, is depleted mainly due to its habitat destruction.

Status: Threatened.

Dendrobium draconis Reichb. f. in Bot. Zeit. 214. 1862; Hook. f., Fl. Brit Ind. 5 : 722, 1890.

Description: Epiphytes. Stems stoutly clavate, erect, sheaths pubescent. Leaves lanceolate, coriaceous, unequally 2-lobed. Flowers in fascicles of 2-3 or sometimes solitary, large, white with reddish streaks at the base of the lip.

Flowering: June-July.

Distribution: INDIA (Manipur), BURMA, THAILAND.

Notes: Very restricted in distribution in Manipur.

Status: Rare.

Dendrobium falconeri Hook. in Bot. Mag. t. 4944. 1856; Hook. f., Fl. Brit. Ind. 5 : 742, 1890.

Description: Epiphytes. Stems long, slender, drooping, nodes swollen. Leaves linear, acute. Flowers in fascicles of 1-2, white with purple tips; lip with two orange blotches on the disc.

Flowering: May-June.

Distribution: INDIA (Arunachal Pradesh, Manipur, Meghalaya (?), Mizoram, Nagaland, Sikkim), BHUTAN, BURMA, THAILAND.

Notes: It was reported to occur in Khasi Hills (Meghalaya), but could not be located. Once common, now it is becoming scarce in wild.

Status: Threatened.

Dendrobium infundibulum Lindl. in Journ. Linn. Soc. 3 : 16. 1858; Hook. f., Fl. Brit. Ind. 5 : 721, 1890.

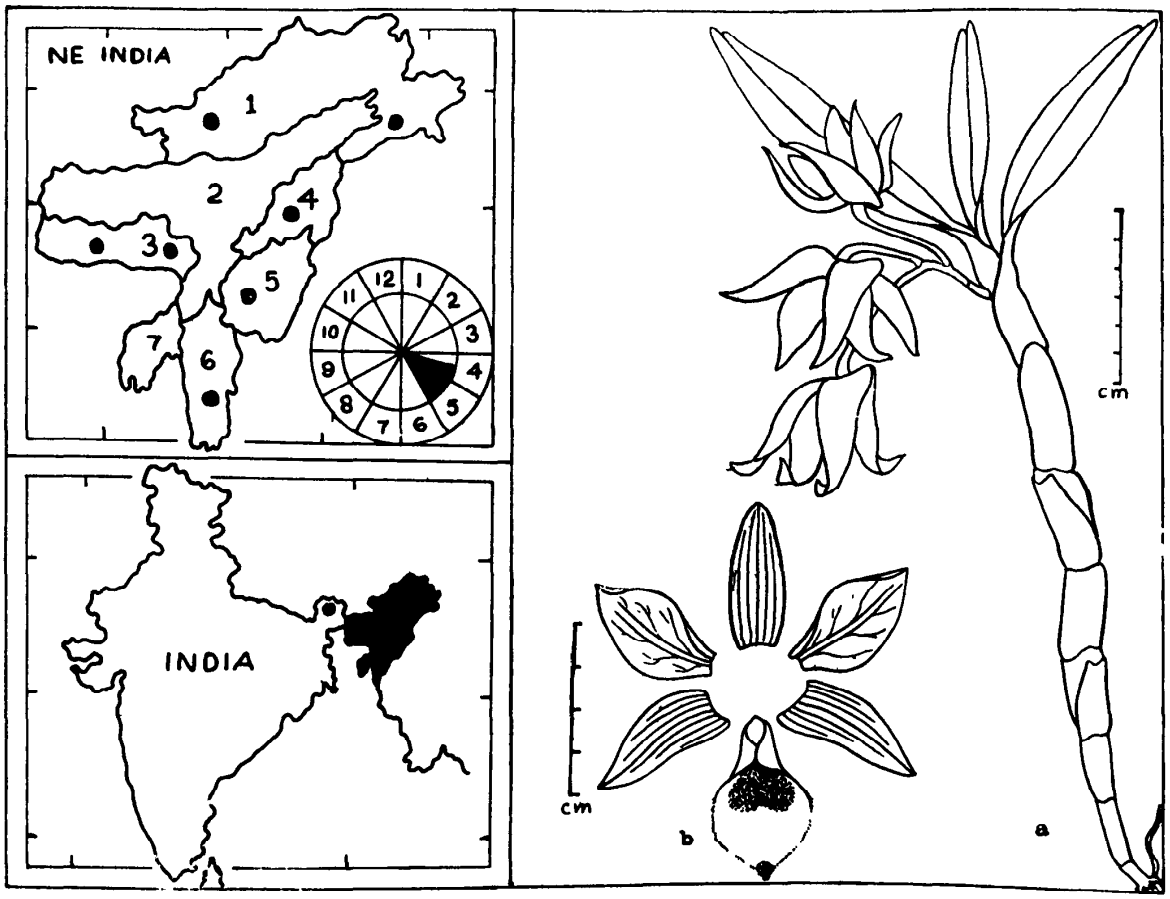
Description: Epiphytes. Stems stout, erect, hairy. Leaves lanceolate, apex unequally 2-lobed. Flowers few at the apex of the stems, large, white with a yellow blotch on the disc of the lip.

Flowering: May-June.

Distribution: INDIA (Manipur, Mizoram) BURMA, THAILAND.

Notes: Depleted in wild due to exploitation and habitat destruction.

Status: Threatened.



Dendrobium nobile Lindl. a. habit; b. floral parts.

Dendrobium nobile Lindl., Gen & Sp. Orch. 24. 1830; Hook. f., Fl. Brit. Ind. 5 : 740, 1890.

Description: Epiphytes or lithophytes. Stems short or long, stout, slightly laterally compressed, narrower towards the base. Leaves oblong, apex unequally 2-lobed. Flowers 2-4 on short fascicles at nodes on leafy or leafless stems, pinkish white, very variable in colour; lip ovate-oblong, pinkish with a dark maroon blotch on the disc. *Plate 34*

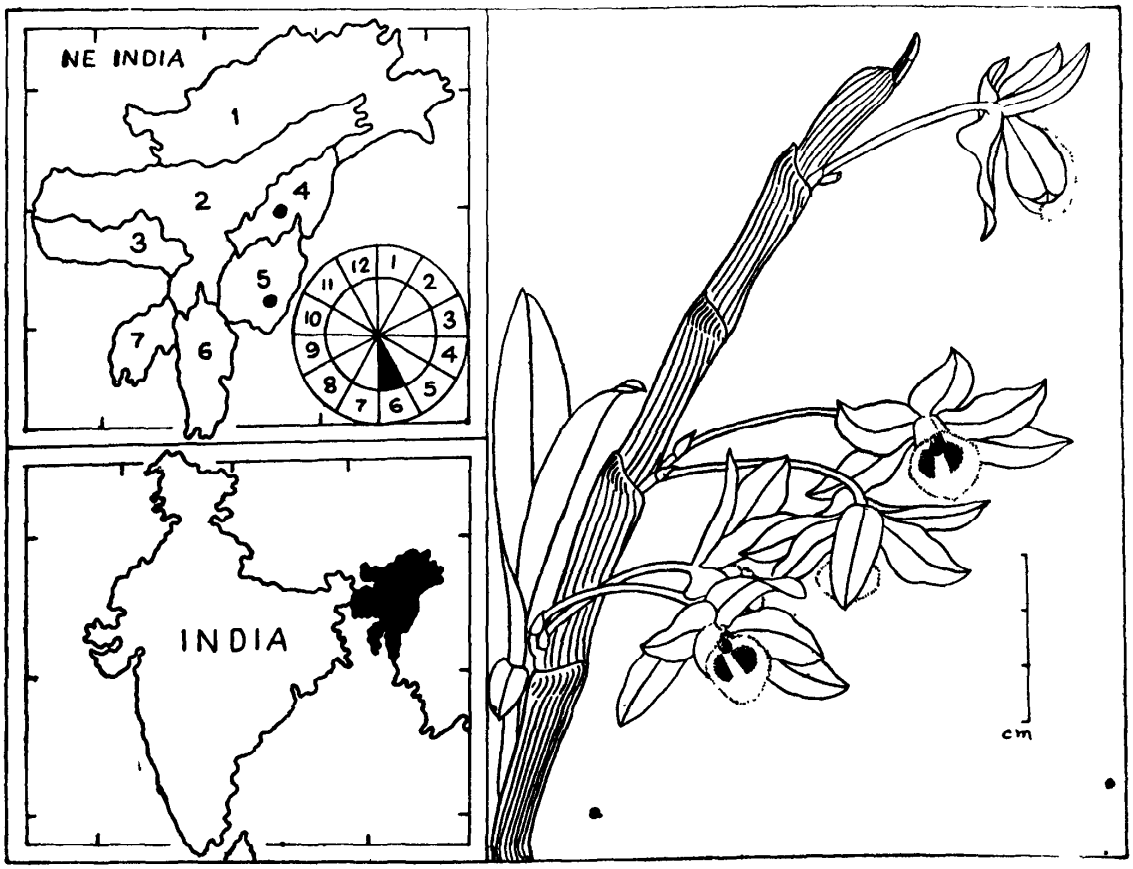
Flowering: April—May.

Distribution: INDIA (Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim), BHUTAN, NEPAL, CHINA, THAILAND.

Notes: This species is a wild parent of innumerable hybrids and cultivars. Overcollection coupled with habitat destruction rendered this species very scarce in wild.

Status: Threatened.

Dendrobium pauciflorum King & Pantl., distributed in the Sikkim Himalayas, is endangered or possibly extinct, this species is included in the IUCN Plant Red Data Book (ed. G. Ll Lucas & H. Synge, 1980, repri. ed.)



Dendrobium parishii Reichb. f. a. habit.

Dendrobium parishii Reichb. f. in Bot. Zeit. 237. 1863; Hook. f., Fl. Brit. Ind. 5; 740, 1890.

Description: Epiphytes. Stems stout, 15-30 cm long. Leaves oblong-lanceolate. Flowers 1-3 on a short peduncle on leafless stems, rose-purple or white-pink; lip with two maroon blotches. *Plate 35*

Flowering: June.

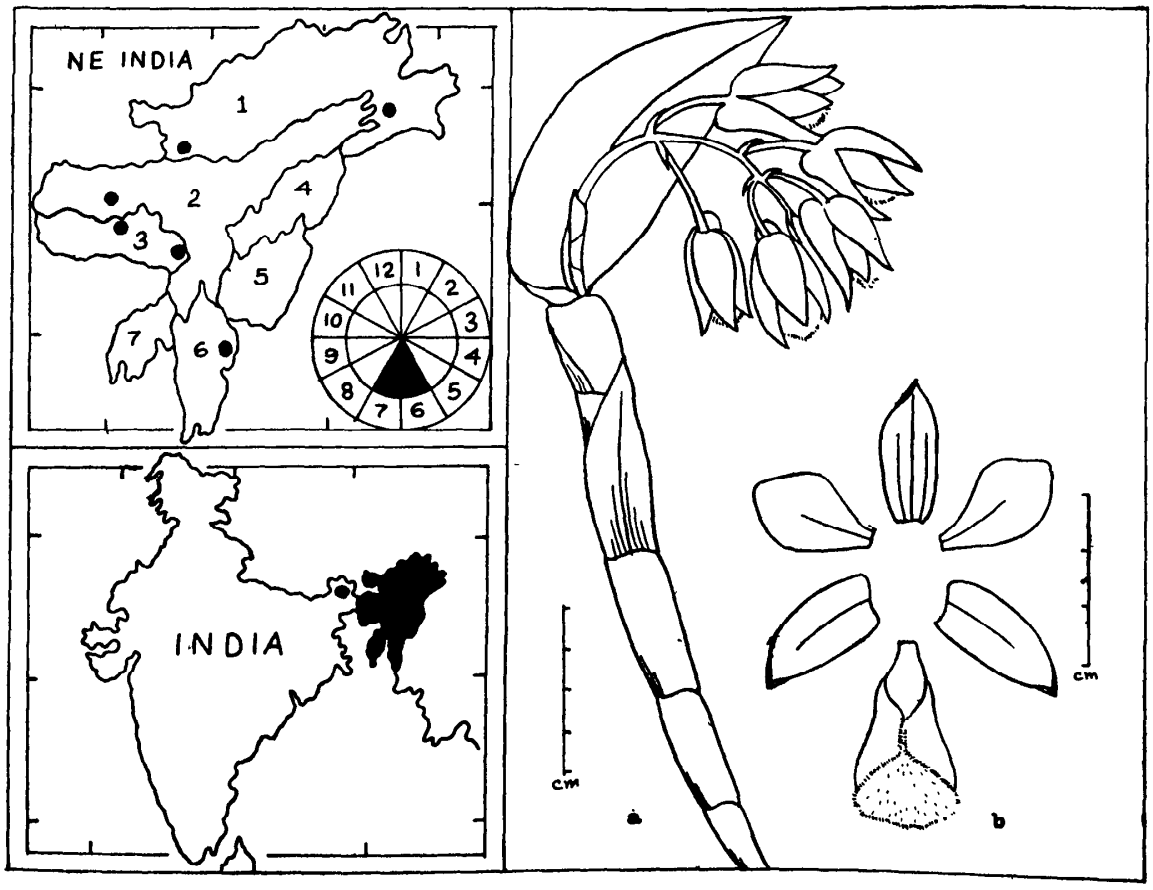
Distribution: INDÍA (Manipur, Nagaland), BURMA, THAILAND, MALAYA, LAOS, CHINA.

Notes: Depleted due to habitat destruction and overcollection.

Status: Threatened.

Dendrobium pendulum Roxb., Fl. Ind. 3. 484. 1832; Hook. f., Fl. Brit. Ind. 5 : 741, 1890.

Description: Epiphytes. Stems stout, decurved, nodes swollen, narrow at base. Leaves linear-lanceolate, membranous. Flowers 2-3 on a short peduncle on the leafless stems, white with purple on upper half; lip white with purple at apex and yellow on the disc.



Dendrobium sulcatum Lindl. a. habit; b. floral parts.

Flowering: March-April.

Distribution: INDIA (Manipur, Nagaland), BURMA, THAILAND, SIAM.

Note: Depleted mainly due to clearing of forests.

Status: Rare.

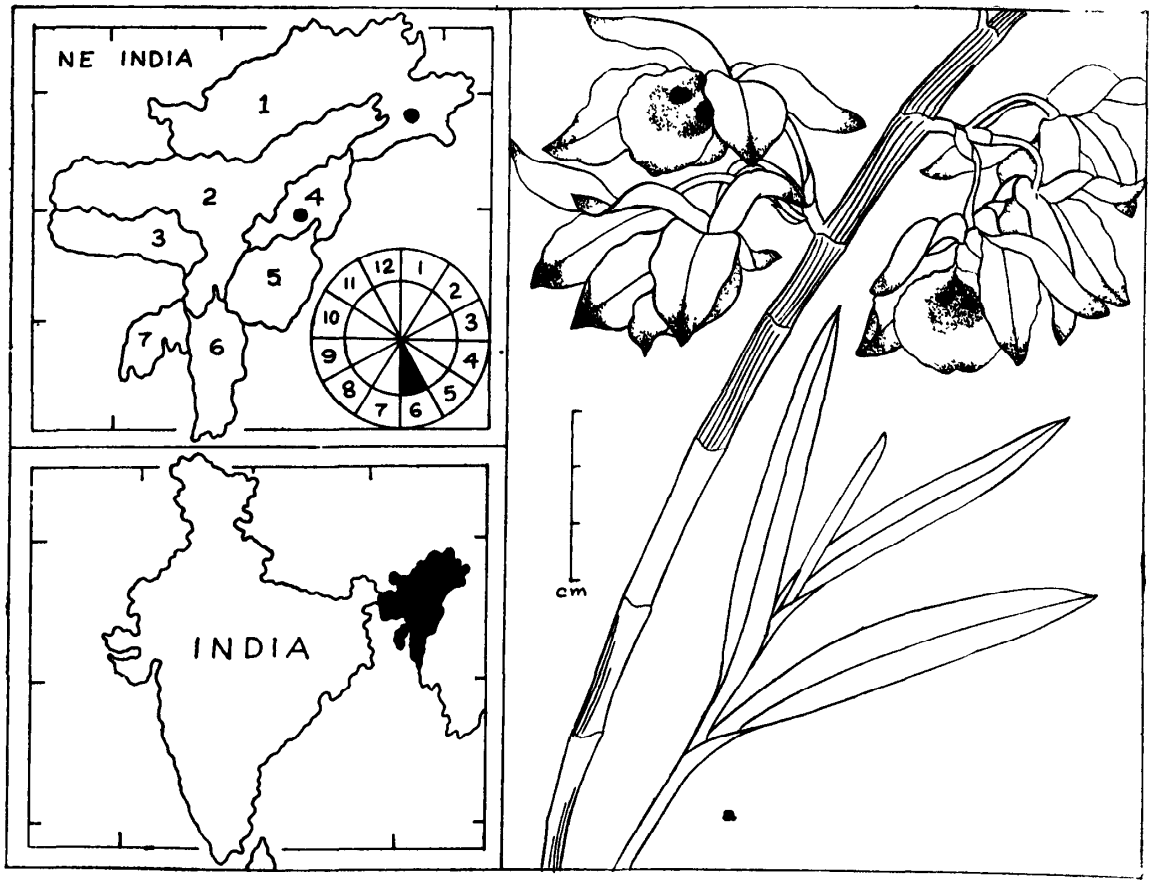
Dendrobium sulcatum Lindl. in Bot. Reg. t. 65. 1838; Hook. f., Fl. Brit. Ind. 5 : 749, 1890.

Description: Epiphytes. Stems compressed, stout, erect, tapering towards base. Leaves few, towards apex, ovate-oblong, acute. Inflorescences sub-terminal, pendulous, many-flowered. Flowers yellow; lip yellow. with orange blotches *Plate 36*

Flowering: June-July.

Distribution: INDIA (Arunachal Pradesh, Assam, Meghalaya, Mizoram, Sikkim).

Notes: This species is confined to lower altitudes in this hilly terrain. Depleted mainly due to its habitat destruction.



Dendrobium wardianum Warn. a. habit.

Status : Threatened.

Dendrobium wardianum Warn., Sel. Orch. 1. t. 19. 1862-65; Hook. f., Fl. Brit. Ind. 5 : 742, 1890.

Description : Epiphytes. Stems long, terete, stout, nodes swollen. Leaves oblong-lanceolate, acute. Flowers 2-3 at nodes, large, white with purplish tips; lip with two maroon blotches on the disc. *Plate 37*

Flowering : July.

Distribution : INDIA (Arunachal Pradesh, Nagaland), BURMA, THAILAND.

Notes : One of the finest species of *Dendrobes* scarcely found in wild.

Status : Rare.

Didiciea cunninghami King & Prain, in Journ. Asiat. Soc. Bengal 65 : 119. t. 2. 1895.

Description : Terrestrial. Pseudobulbs small with a leaf arising from its base. Leaf broadly-ovate, narrowed at base, petioled. Inflorescences 10-25 cm long, lax-flowered. Flowers small; sepals and petals subequal.

Flowering : July.

Distribution : INDIA (W. Himalaya, Sikkim).

Notes : Monotypic ; rarely collected.

Status : Threatened.

Didymoplexis pallens Griff. in Calc. Journ. Nat. Hist. 4 : 383. t. 17; Hook. f., Fl. Brit. Ind. 5 : 122, 1890.

Description : Terrestrial. Roots tuberous, branched. Stems erect, short, sheaths loose, blunt. Racemes terminal, few-flowered. Flowers shortly pedicelled, dull yellowish white.

Flowering : May-June.

Distribution : INDIA (Arunachal Pradesh, Assam, Meghalaya Sikkim, Bengal, Northern and Southern India), BURMA, THAILAND.

Notes : Though once common in many places, this species is now depleted mainly due to its habitat destruction. In wild, it is not easily noticeable and grows usually under bamboo clumps. The pedicel elongates during fruiting.

Status : Threatened.

Diglyphosa macrophylla King & Pantl. in Journ. Asiat. Soc. Bengal, 54 : 335. t. 2. 1895.

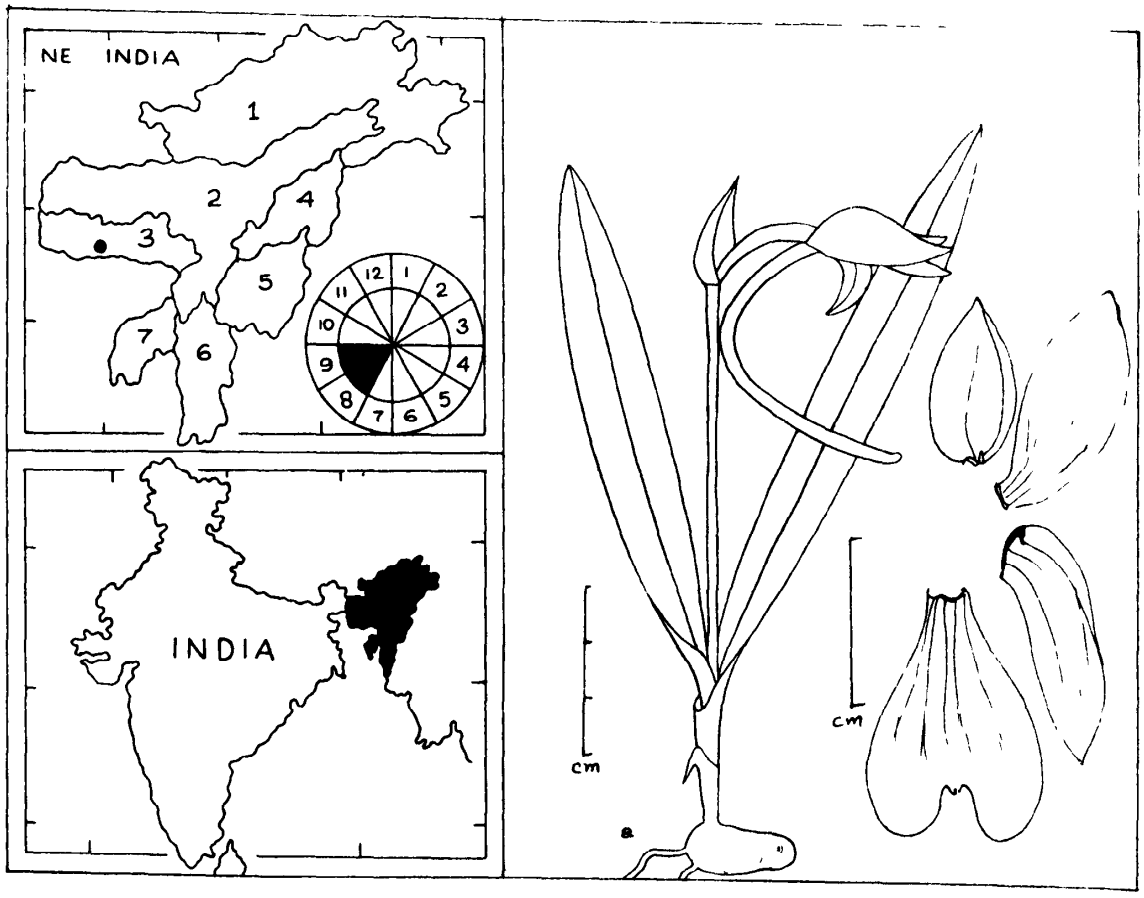
Description : Terrestrial. Rhizome creeping. Pseudobulbs narrow, 1-leaved. Leaves plaited, elliptic, long petioled. Scapes lateral, erect, racemes many-flowered. Flowers small, golden-brown.

Flowering : May.

Distribution : INDIA (Sikkim).

Notes : Depleted mainly due to habitat destruction.

Status : Threatened. Endemic.



Diplomeris pulchella D. Don a. habit.

Diplomeris pulchella D. Don, Prodr. Fl. Nep. 26. 1825; Hook. f., Fl. Brit. Ind. 6 : 166, 1890.

Description: Terrestrial. Roots tuberous. Stems slender with 1-2 leaves. Flowers terminal, large, white; spur long, slender. *Plate 38*

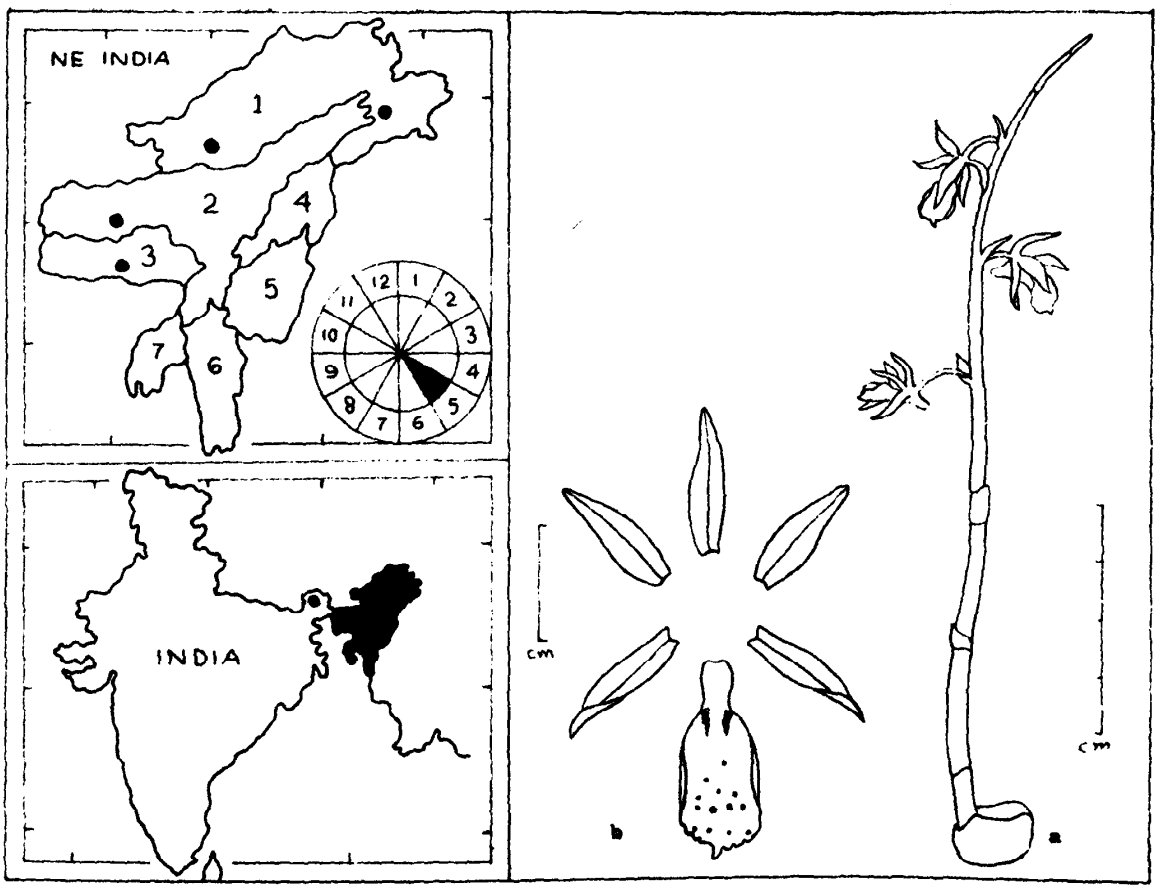
Flowering: August-September.

Distribution: INDIA (Meghalaya).

Notes: Grows in moist shady areas preferably near water source. This delicate species is becoming scarce in wild mainly due to its habitat destruction.

Status: Rare. Endemic.

Diplomeris hirsuta (Lindl.) Lindl. from eastern Himalayas, is included in the IUCN Plant Red Data Book (ed. G. Ll. Lucas & H. Synge, 1980, repri. ed.).



Epipogium roseum (D. Don) Lindl. a. habit; b. floral parts.

Epipogium roseum (D. Don) Lindl. in Journ. Linn. Soc. 1 : 177. 1857; *Epipogium nutans* Reichb. f.; Hook. f., Fl. Brit. Ind. 6 : 124, 1890.

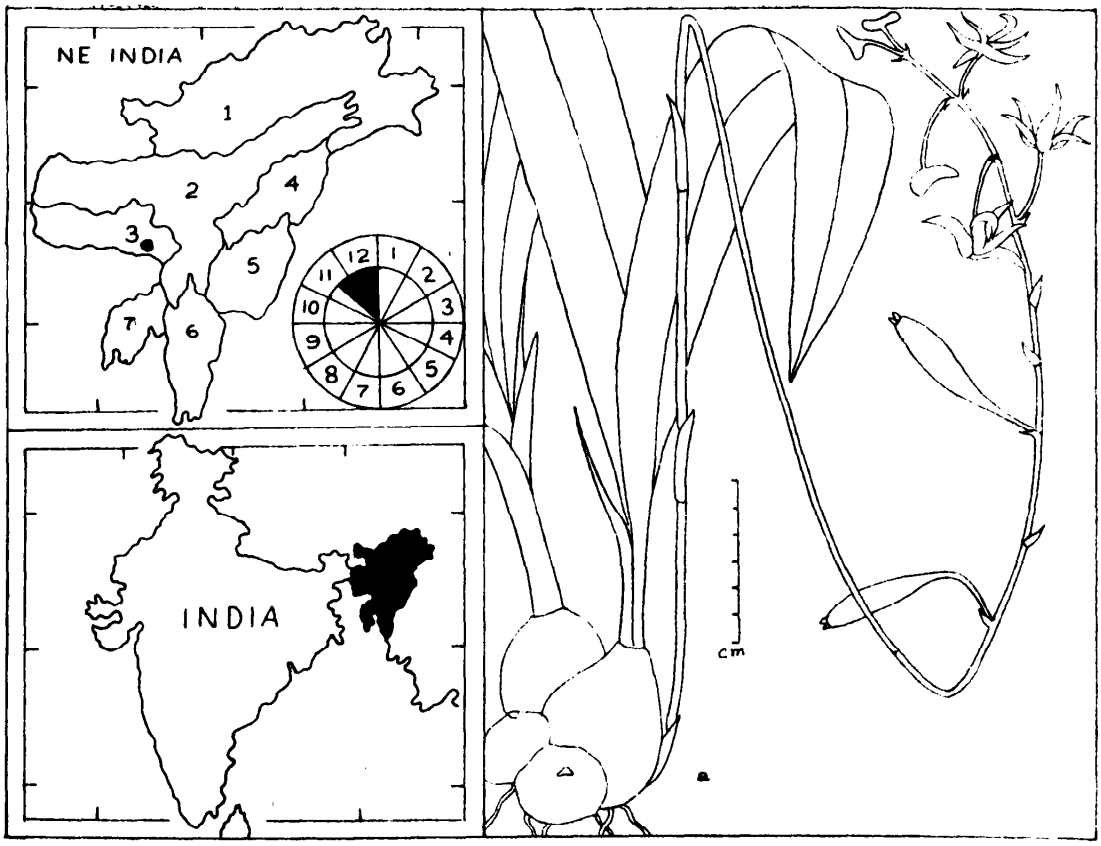
Description: Terrestrial. Stems annual arising from the underground bulb, leafless. Flowers few, white. *Plate 39*

Flowering: May.

Distribution: INDIA (Arunachal Pradesh, Assam, Meghalaya, Sikkim, Western Himalaya), BHUTAN, NEPAL, THAILAND, JAVA, MALAYA, AFRICA, AUSTRALIA.

Notes: Saprophytic on decaying humus covered soil. The flowers are very short lived. Depleted in wild due to change of habitat.

Status: Threatened.



Eria barbata (Lindl.) Reichb. f. a. habit.

Eria barbata (Lindl.) Reichb. f. in Walp. Ann. 6 : 270. 1861 ; Hook. f., Fl. Brit. Ind. 5 : 803, 1890.

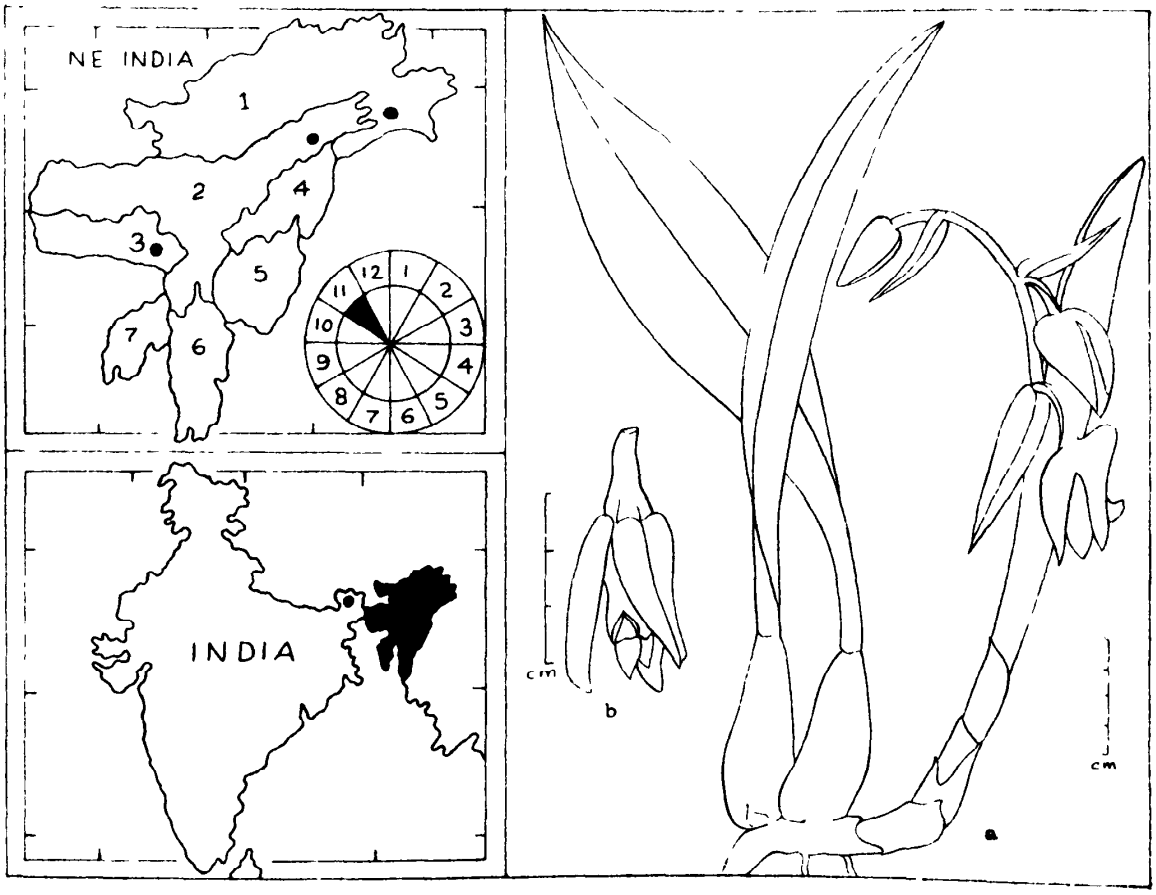
Description : Epiphytes. Pseudobulbs crowded, broadly ovoid, usually 2-leaved. Leaves long petioled, large, lanceolate, acuminate. Inflorescences arise from the base of pseudobulbs; racemes many-flowered. Flowers purplish yellow. *Plate 40*

Flowering : November-December.

Distribution : INDIA (Meghalaya), BURMA, THAILAND.

Notes : Gradual depletion is mainly due to its habitat destruction. Sometimes, this species grows on mossy rocks.

Status : Threatened.



Eria carinata Gibs. a. habit; b. flower.

Eria carinata Gibs. in Journ. Nat. Hist. Calcutta, 5 : 365. 1845; Hook. f., Fl. Brit. Ind. 5 : 808, 1890.

Description: Epiphytes. Pseudobulbs close, ovoid-oblong, sulcate, 1-leaved. Leaf petioled, lanceolate. Scapes lateral, few-flowered. Flowers pink, large, nodding; lip red-brown. *Plate 41*

Flowering: November.

Distribution: INDIA (Arunachal Pradesh, Assam, Meghalaya, Sikkim). BHUTAN, THAILAND.

Status: Threatened.

Eria pudica Ridl. in Journ. Linn. Soc. 32 : 294, 1896. Deori & Malh. in Journ. Bombay Nat. Hist. Soc. 74(1) : 205-206, 1974.

Description: Epiphytes. Pseudobulbs crowded, cylindric, covered with sheaths, 1-leaved. Leaves oblong-lanceolate, coriaceous, apex bifid. Inflorescences lateral, erect, shorter than the leaves, many-flowered. Flowers white, nodding; lip white, flushed with purple.

Flowering : June-July.

Distribution : INDIA (Meghalaya), BURMA.

Status : Rare.

Eria scabrilinguis Lindl. in Journ. Linn. Soc. 3 : 51. 1859; Hook. f., Fl. Brit. Ind. 5 : 792, 1890.

Description : Epiphytes. Pseudobulbs ovoid or ellipsoid, 2-leaved. Leaves elliptic-lanceolate, acuminate. Scapes arise in between the leaves, erect, stout, many-flowered. Flowers white; lip 3-lobed with side lobes pale rose and midlobe purple.

Flowering : July.

Distribution : INDIA (Sikkim).

Status : Rare.

ESMERALDA

The species of *Esmeralda* (*Arachnanthe*) are popularly known as 'Spider orchids' due to their flowers having brown transverse bands. These plants are much collected from the wild for their ornamental flowers and hence are becoming rare.

About 7 species distributed in India and Malaya; 4 species in N.E. India.

Esmeralda cathcartii (Lindl.) Reichb. f. in Xen. Orch. 2 : 39. 1862. *Arachnanthe cathcartii* Benth ; Hook. f., Fl. Brit. Ind. 6 : 27, 1890.

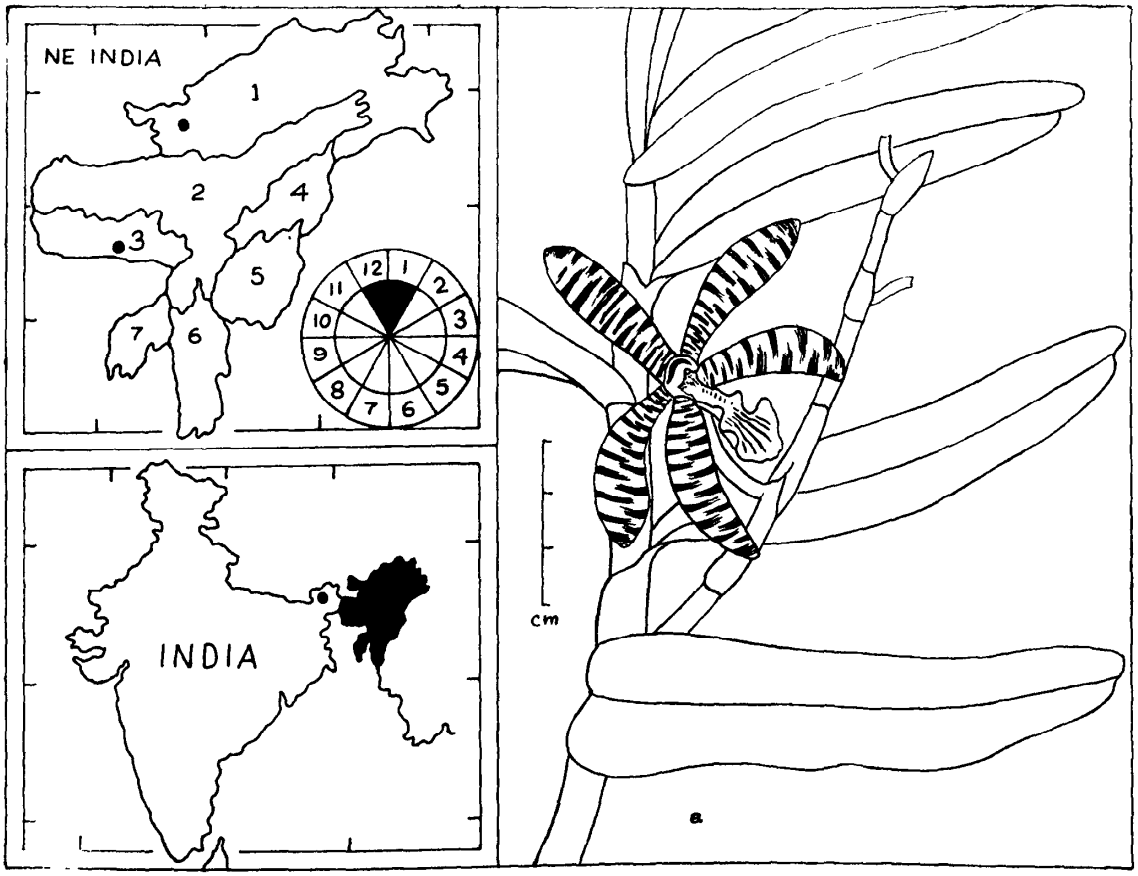
Description : An epiphyte on tall trees. Stems long with many leaves. Leaves linear-oblong, recurved, apex unequally 2-lobed. Racemes as long as leaves, few-flowered. Flowers dull yellow with brown transverse bands; lip 3-lobed.

Flowering : March-April.

Distribution : INDIA (Arunachal Pradesh, Sikkim), BHUTAN, NEPAL.

Notes : It prefers sunlight and grows on tall trees in forests. Clearance and felling of tall trees together with overcollection have resulted in rarity of the species.

Status : Threatened.



Esmeralda clarkei Reichb. f. a. habit.

Esmeralda clarkei Reichb. f. in Xen. Orch. 2 : 39. 1862. *Arachnanthe clarkei* Rolfe; Hook. f., Fl. Brit. Ind. 6 : 28, 1890.

Description: Epiphytes. Stems stout, arched or pendent, leafy. Leaves sessile, oblong, apex usually 2-lobed. Racemes almost equalling the leaves, few-flowered. Flowers yellowish with brown transverse bands; lip 3-lobed, slightly shorter than the outer perianth, almost white with red spots. *Plate 42*

Flowering: December-January.

Distribution: INDIA (Arunachal Pradesh, Meghalaya, Sikkim), BHUTAN, THAILAND.

Notes: It was first discovered by C. B. Clarke in Sikkim in 1875. Among the species of this genus, this species is remarkable. It is depleted in wild due to felling of its host trees for timber and also due to up-rooting for commercialisation.

Status: Threatened.

EULOPHIA

About 200 species are distributed throughout the tropics of which about 14 species are found in N.E. India.

Terrestrial. Most of the species are saprophytic. The species grow in moist, shady areas. The clearance of forest floor disturbs the habitat and makes these species scarce in wild. They are difficult to cultivate.

Eulophia candida (Lindl.) Hook. f., Fl. Brit. Ind. 6 : 6, 1890.

Description : Terrestrial. Rhizome tuberous. Leaves elliptic-lanceolate, caudate, deciduous before flowering. Scapes slender; racemes many-flowered. Flowers greenish-white.

Flowering : February-March.

Distribution : INDIA (Assam, Sikkim).

Notes : Depleted mainly due to habitat destruction.

Status : Threatened.

Eulophia graminea Lindl., Gen. Sp. Orch. 182, 1833; Hook. f., Fl. Brit. Ind. 6 : 2, 1890.

Description : Pseudobulbs large, many-leaved. Leaves linear, sheathing at base. Inflorescences longer than the leaves, branched, many-flowered. Flowers lax, small. *Plate 43*

Flowering : February-March.

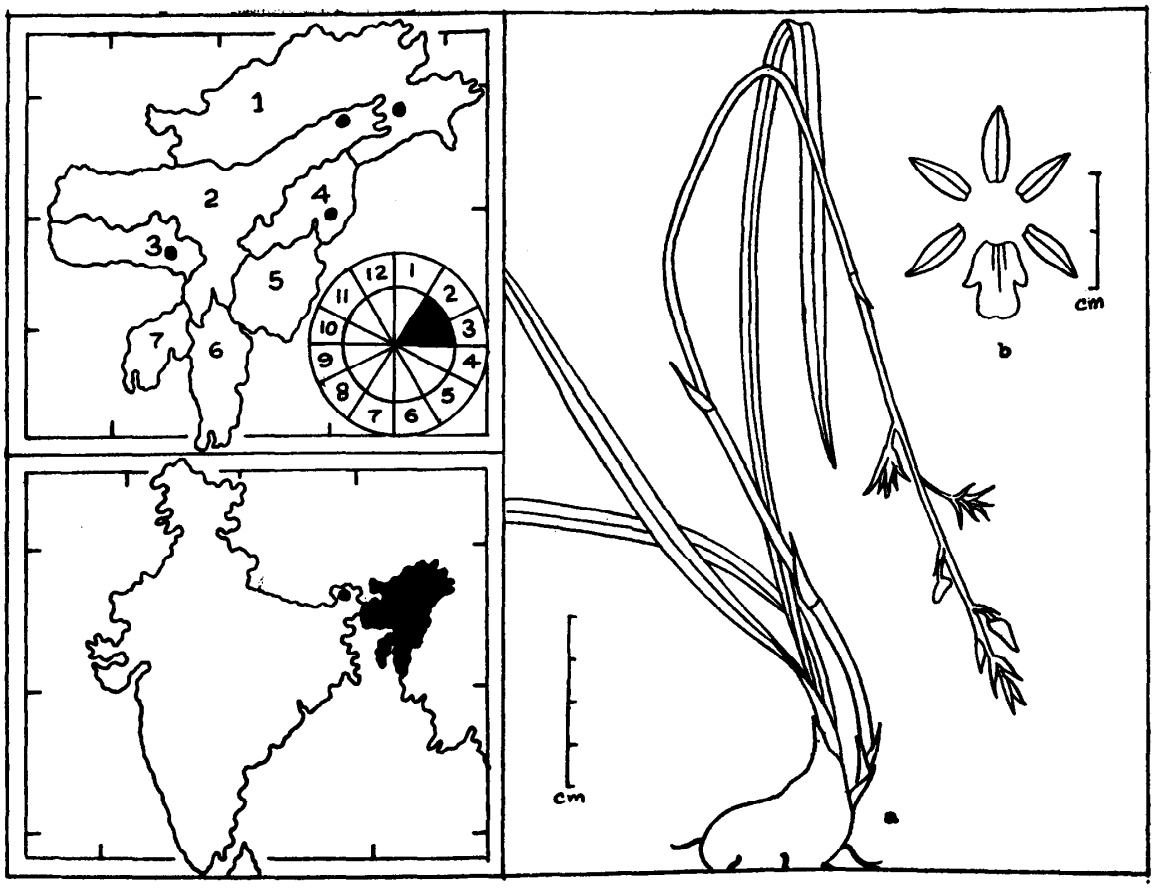
Distribution : INDIA (Garhwal, Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim) NEPAL, TENASSERIM, THAILAND, MALAYA, CHINA.

Notes : A widely distributed species, becoming scarce in wild due to its habitat destruction.

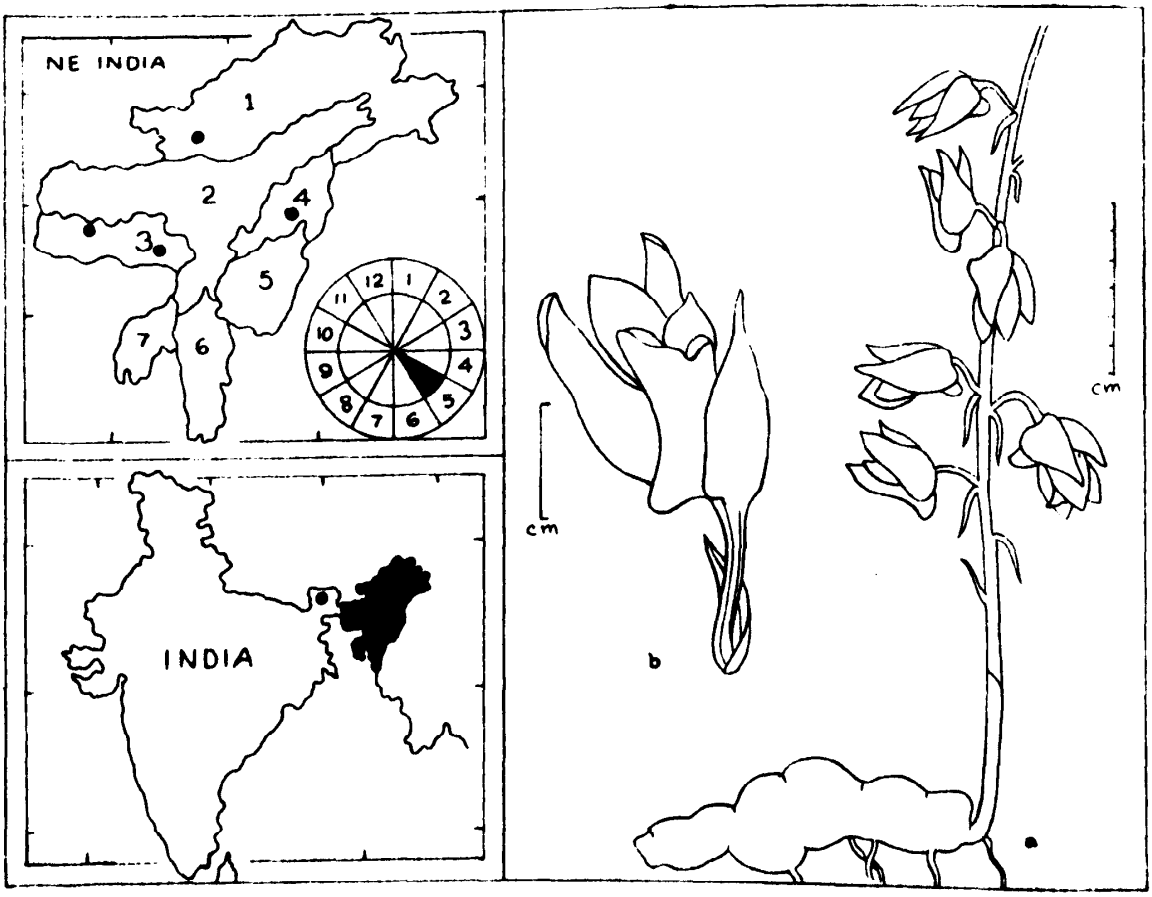
Status : Threatened.

Eulophia sanguinea Hook. f., Fl. Brit. Ind. 6 : 8, 1890.

Description : Saprophytes. Roots tuberous. Leafless. Stems stout, erect purple. Racemes branched, many-flowered. Flowers large, purple. *Plate 44*



Eulophia graminea Lindl. a. habit; b. floral parts.



Eulophia sanguinea Hook. f. a. habit; b. flower.

Flowering : May.

Distribution : INDIA (Arunachal Pradesh, Meghalaya, Sikkim, Nagaland), BHUTAN.

Notes : The main reason of depletion is due to loss of its habitat. They are difficult to grow.

Status : Threatened.

The other species, *Eulophia macrorhizon* Hook. f. from Sikkim (F.B.I. 6 : 7, 1890) and *Eulophia mannii* Hook. f. from Assam (F.B.I. 6 : 4. 1890) are scarce in wild. No specimens are available in ASSAM herbarium.

GALEOLA

About 12 species are distributed in India, Malaya and Australia. The species are terrestrial and saprophytic. Leafless. They grow in moist shady areas. The clearance of forest areas exposing their habitats and the saprophytic habit render the species rare in wild. They are equally difficult to cultivate. The following species are found to be more scarce.

Galeola cathcartii Hook. f., Fl. Brit. Ind. 6 : 89, 1890.

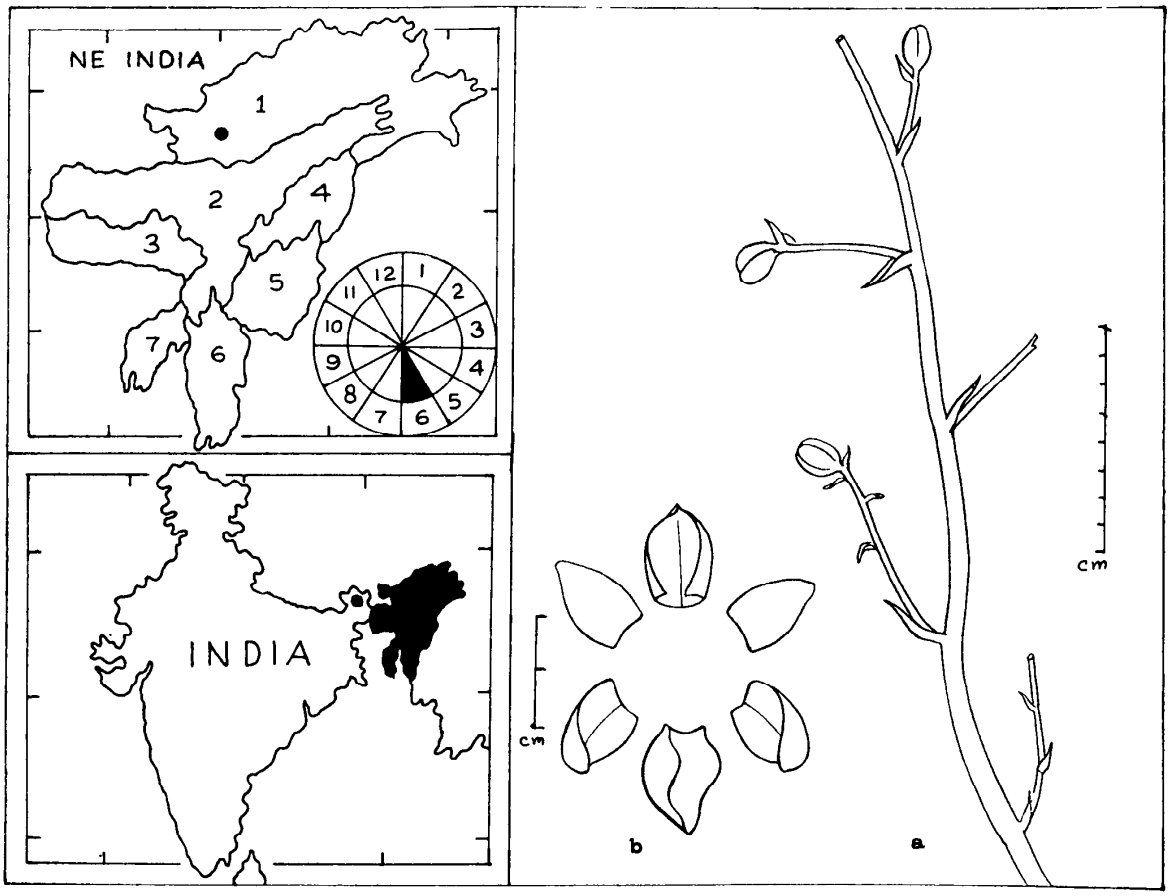
Description : Rhizome elongate, thick. Stems tall, erect, terminating in loosely branched and horizontal panicles. Panicle pubescent, sheathed, many-flowered. Flowers yellow with reddish lip.

Flowering : June-July.

Distribution : INDIA (Sikkim), THAILAND, MALAYA.

Notes : Depleted due to habitat destruction.

Status : Threatened.



Galeola falconeri Hook. f. a. a part of the plant; b. floral parts.

Galeola falconeri Hook. f., Fl. Brit. Ind. 6 : 88, 1890.

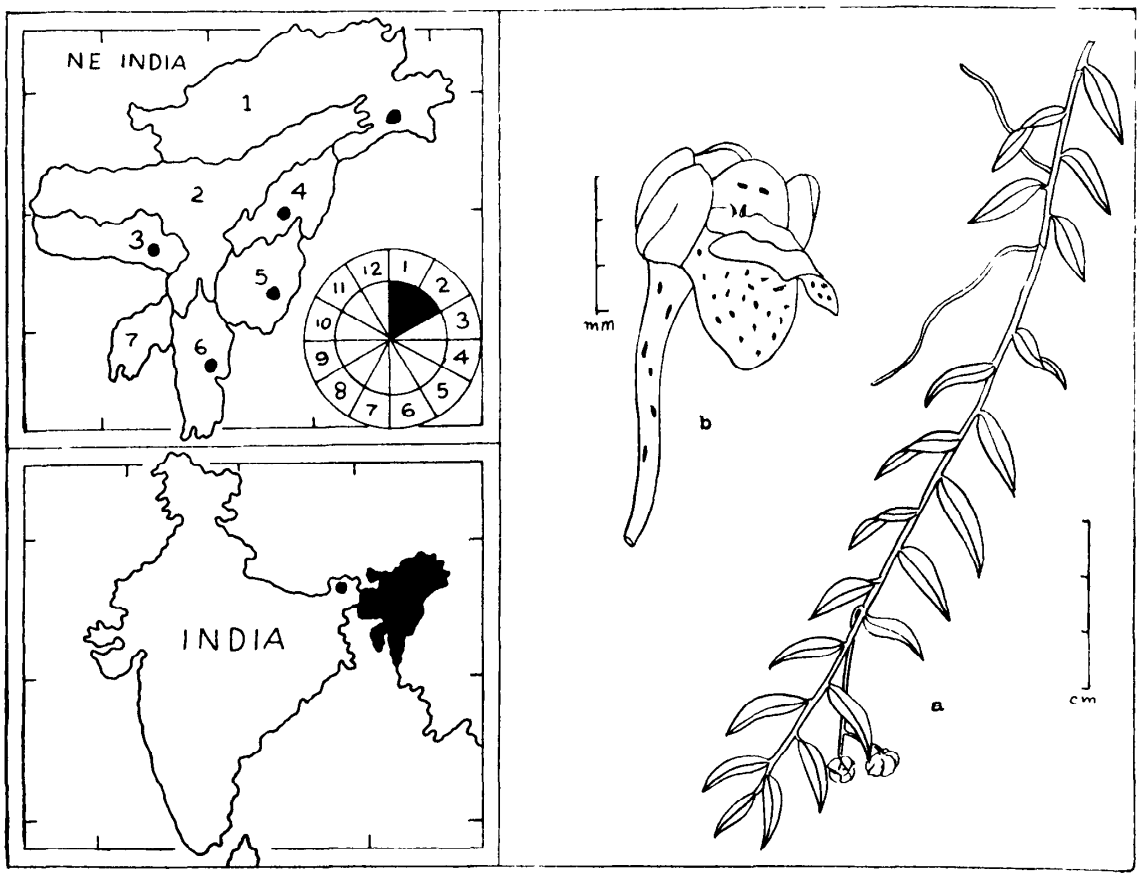
Description: Rootstock elongate, stout. Stems tall, erect, brown purple, Panicles long, branched, many-flowered. Flowers lax, yellow. *Plate 45*

Flowering: June.

Distribution: INDIA (Garhwal, Arunachal Pradesh, Sikkim).

Notes: Gradually depleted mainly due to habitat destruction.

Status: Threatened.



Gastrochilus distichus (Lindl.) Kze. a. habit; b. flower.

Gastrochilus distichus (Lindl.) Kze., Rev. Gen. 2 : 661. 1891. *Saccolabium distichum* Lindl.; Hook. f., Fl. Brit. Ind. 6 : 64, 1890.

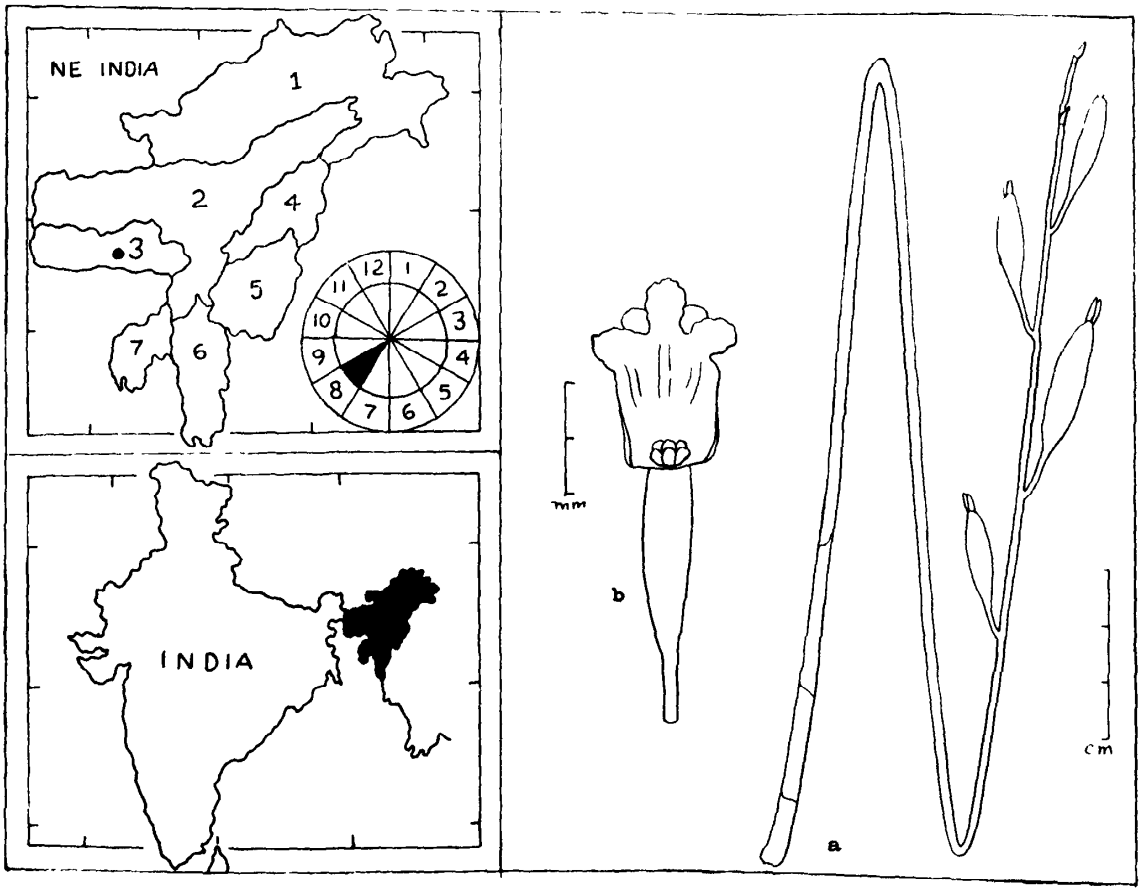
Description: Epiphytes. Stems slender, pendulous, many-leaved. Leaves lanceolate, acuminate, Peduncle leaf-opposed, 2-4-flowered. Flowers green with brown spots. *Plate 46*

Flowering: January-February.

Distribution: INDIA : (Kumaon, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim) BHUTAN.

Notes: This small flowered species is becoming rare due to its habitat destruction.

Status: Threatened.



Gastrodia exilis Hook. f. a. habit; b. flower.

Gastrodia exilis Hook. f., Fl. Brit. Ind. 6 : 123, 1890.

Description: Terrestrial. Roots tuberous. Stems filiform, about 25 cm long, erect. Leafless. Racemes few flowered. Flowers lax, minute, whitish.

Plate 47

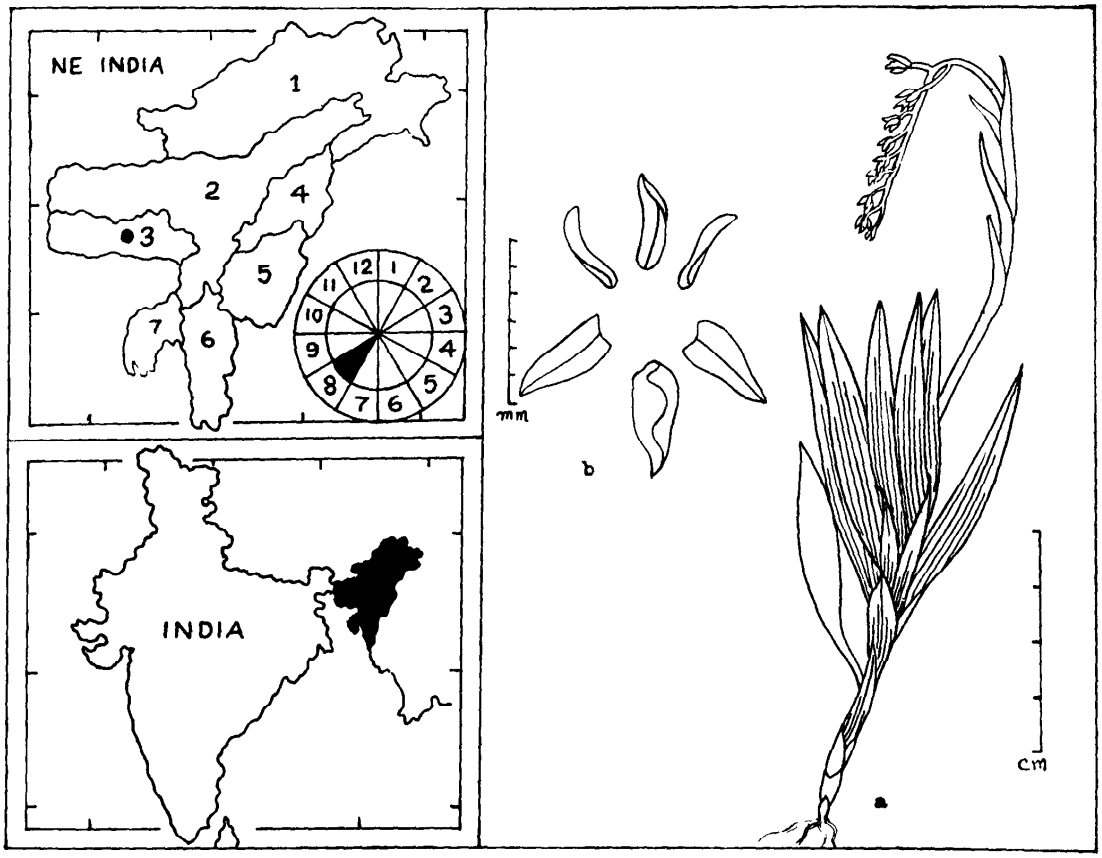
Flowering: August.

Distribution: INDIA (Khasi Hills—Meghalaya).

Notes: It grows in grassy hilly slopes. Depleted mainly due to habitat destruction.

Status: Rare and Endemic.

The other species, *Gastrodia dyeriana* King & Pantl. is recorded only from Sikkim.



Goodyera recurva Lindl. a. habit; b. floral parts.

Goodyera recurva Lindl. in Journ. Linn. Soc. 1 : 283. 1857: Hook. f., Fl. Brit. Ind. 6 : 112, 1890.

Description : Epiphytes. Stems slender, pendent. Leaves few, linear-lanceolate, acute· Spikes decurved, many-flowered. Flowers secund, brownish. *Plate 48*

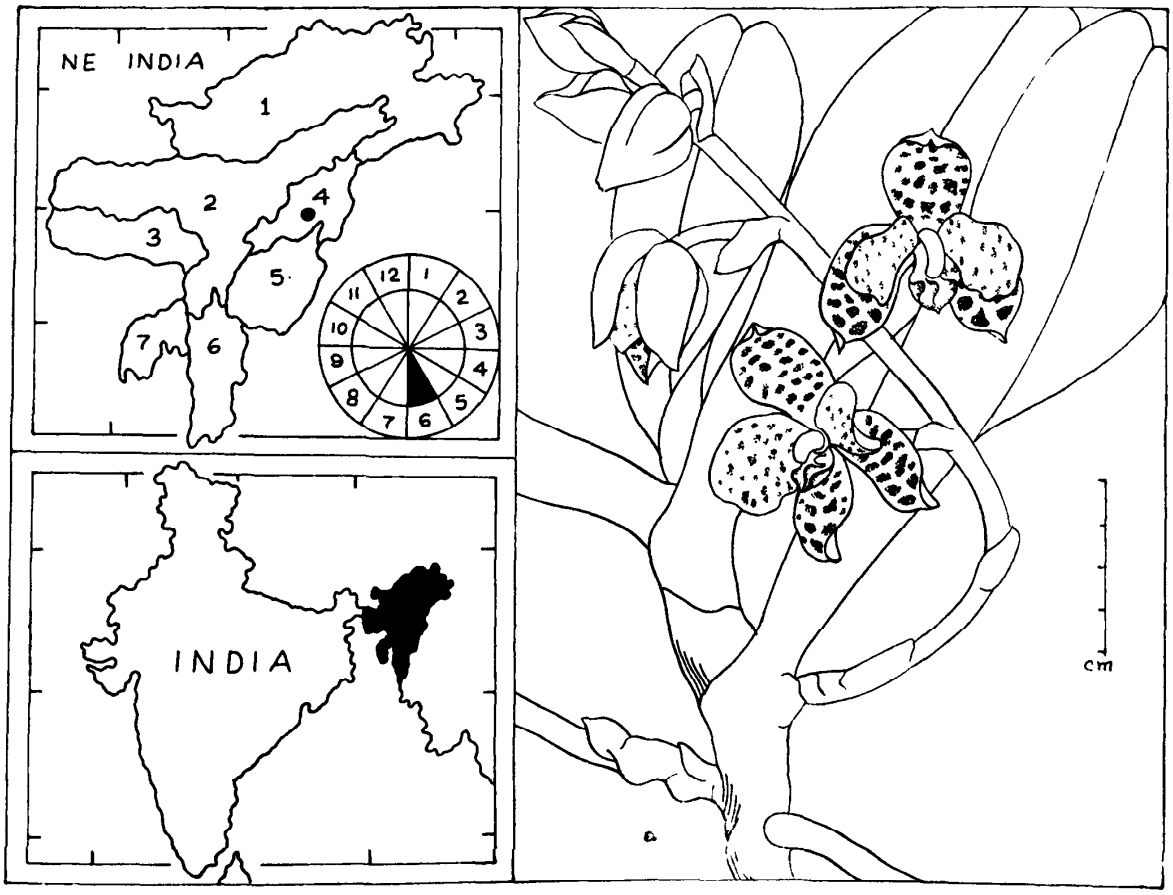
Flowering : August.

Distribution : INDIA (Meghalaya—Khasi Hills).

Notes : The other species of *Goodyera* are terrestrial in this region except this species. It was recorded from Mawphlong, a 'Sacred forest' in Khasi Hills. Still, this species occurs in this protected forest. So far, no other locality is recorded.

Status : Endemic.

Another species, *Goodyera prainii* Hook. f. (F.B.I. 6 : 112. 1890) is recorded from Nagaland (India), but no herbarium specimen is available.



Hygrochilus parishii (Veitch & Reichb. f.) Pfitz. a. habit.

HABENARIA

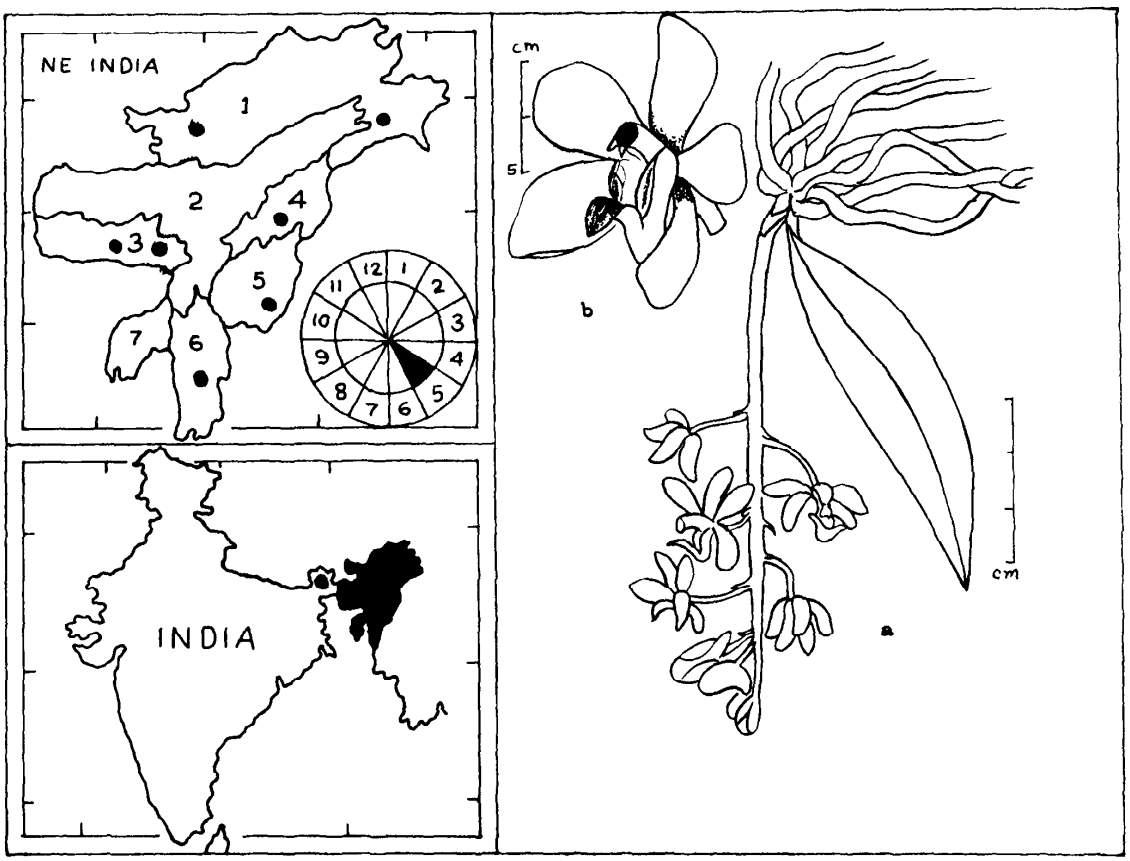
Terrestrial. Tubers uninodal or lobed into two. Stems erect, leafy. Leaves sessile or petioled, sheathing at base. Flowers many, sweet scented.

Most of the species are low herbs amongst grass bearing small or large tubers. Usually just after rains, the new shoots arise with leaves and produce flowers. They are difficult to cultivate. The clearance of forest areas and burning for various purposes destroy the root tubers of the species.

Amongst many, species like *Habenaria cubitalis* (L.) R. Br. from Meghalaya (F.B.I. 6 : 157. 1890), *H. cumminsiana* King & Pantl., *H. leptocaulon* Hook. f. (F.B.I. 6 : 154. 1890) and *H. oligantha* Hook. f. (F.B.I. 6: 154, 1890) from Sikkim are becoming scarce in wild due to their habitat destruction.

Hygrochilus parishii (Veitch & Reichb. f.) Pfitz., Engl. & Prantl. Pflanzf. Nachtr. 1 : 112. 1897. *Vanda parishii* Veitch & Reichb. f.; Hook. f., Fl. Brit. Ind. 6 : 51, 1890.

Description: Epiphytes. Stems stout, erect, many-leaved. Leaves elliptic-oblong, sessile and sheathing at base, apex unequally 2-lobed. Racemes suberect, few-flowered, as long as or longer than the leaves. Flowers fleshy, greenish-yellow with brown spots. *Plate 49*



Kingidium taenialis (Lindl.) Hunt a. habit, b. flower.

Flowering: June.

Distribution: INDIA (Nagaland), BURMA, THAILAND, CHINA.

Notes: It was first discovered from Moulmein (Burma) in 1862 and recorded as a rare plant. In N.E. India, this species is rarely seen in wild. Depleted mainly due to exploitation and habitat destruction.

Status: Rare.

Kingidium taenialis (Lindl.) Hunt in Kew Bull. 24(1) : 98. 1970. *Doritis taenialis* (Lindl.) Hook. f., Fl. Brit. Ind. 6 : 31, 1890.

Description: Stems minute or absent. Roots long, flat, zigzag. Leaves not seen. Scapes erect, 3-6 flowered. Flowers pink with dark pink spots. *Plate 50*

Flowering: May.

Distribution: INDIA (Kumaon, N.E. India, Sikkim), BHUTAN, NEPAL, BURMA, MALAYA.

Notes: A curious leafless orchid consisting of a bunch of roots and usually overlooked by the plant collectors when not in flower. The main reason of its depletion is due to habitat destruction.

Status: Threatened.

Liparis cordifolia Hook. f., Fl. Brit. Ind. 5 : 692, 1890.

Description : Terrestrial. Pseudobulbs crowded, small. Stems stout, 1-leaved. Leaf sessile, broadly ovate, cordate, acuminate. Racemes few-flowered. Flowers yellow-green.

Flowering : August.

Distribution : INDIA (W. Himalayas, Meghalaya, Sikkim),

Notes : Sparsely found.

Status : Threatened.

Liparis distans Clarke in Journ. Linn. Soc. 25 : 71. t. 29. 1889; Hook. f., Fl. Brit. Ind. 5 : 704, 1890.

Description : Epiphytes. Psudobulbs elongate, conical, 2-leaved. Leaves oblanceolate, acuminate. Scapes winged; racemes few-flowered, green.

Flowering : October-November.

Distribution : INDIA (Subansiri-Arunachal, Nagaland).

Notes : Endemic.

Status : Threatened.

Liparis mannii Reichb. f. in Flora, 275. 1872; Hook. f., Fl. Brit. Ind. 5 : 701, 1890.

Description : Epiphytes. Pseudobulbs small, cylindric, 1-leaved. Leaf linear-lanceolate, acuminate. Scapes winged; racemes many-flowered.

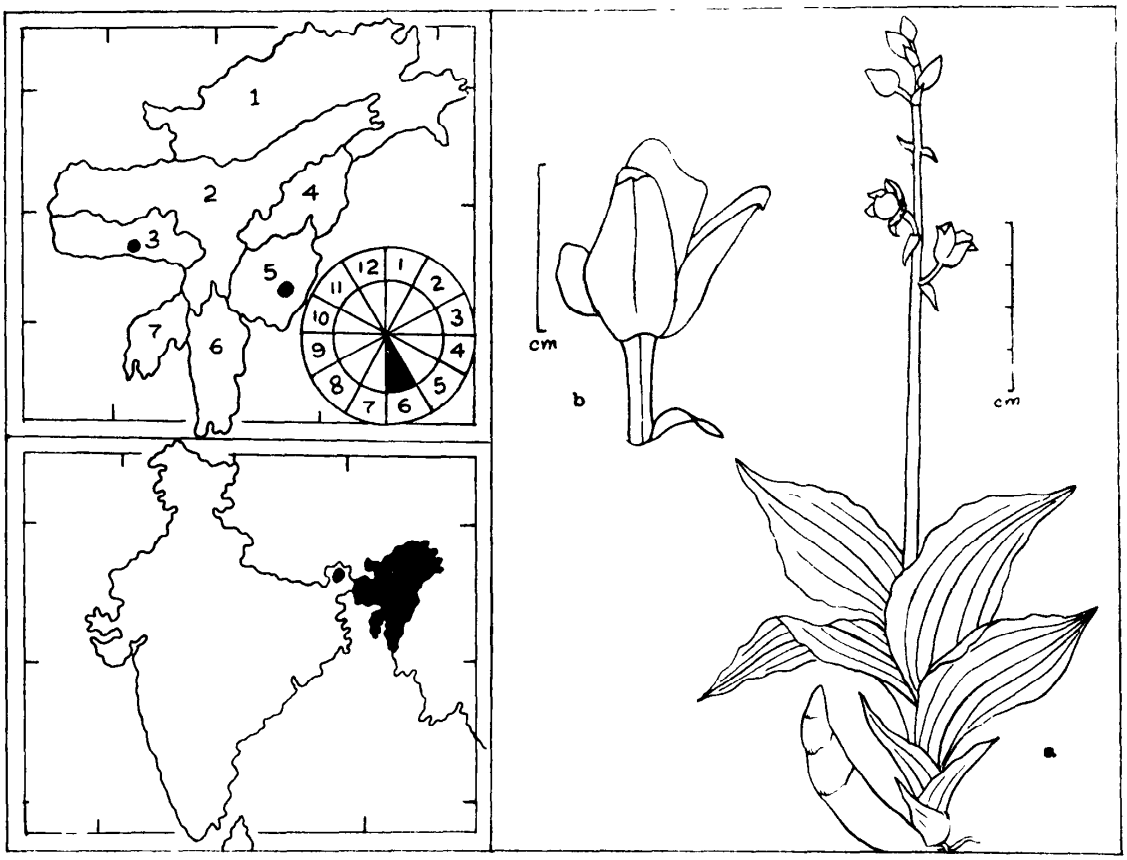
Flowering : July-August.

Distribution : INDIA ('Assam' Sikkim).

Notes : Rare occurrence in wild. Depleted due to habitat destruction.

Status : Threatened.

Liparis pulchella Hook. f., Icon. Pl. t. 1810. 1889; Fl. Brit. Ind. 5 : 693. 1890.



Malaxis josephiana (Reichb. f.) Kze. a. habit; b. flower.

Description: Terrestrial, Pseudobulbs sub-globose, compressed, 2-leaved, rarely 1-leaved. Leaves long petioled, ovate-cordate, acute. Inforescence longer than the leaves; racemes few-flowered. Flowers greenish-purple.

Flowering: August.

Distribution: INDIA (Meghalaya, Nagaland, Sikkim), BURMA, THAILAND.

Notes: Restricted in distribution.

Status: Threatened.

Malaxis josephiana (Reichb. f.) Kze. Rev. Gen. 2 : 673. 1891. *Microstylis josephiana* Reichb. f.; Hook. f., Fl. Brit. Ind. 5 : 687, 1890.

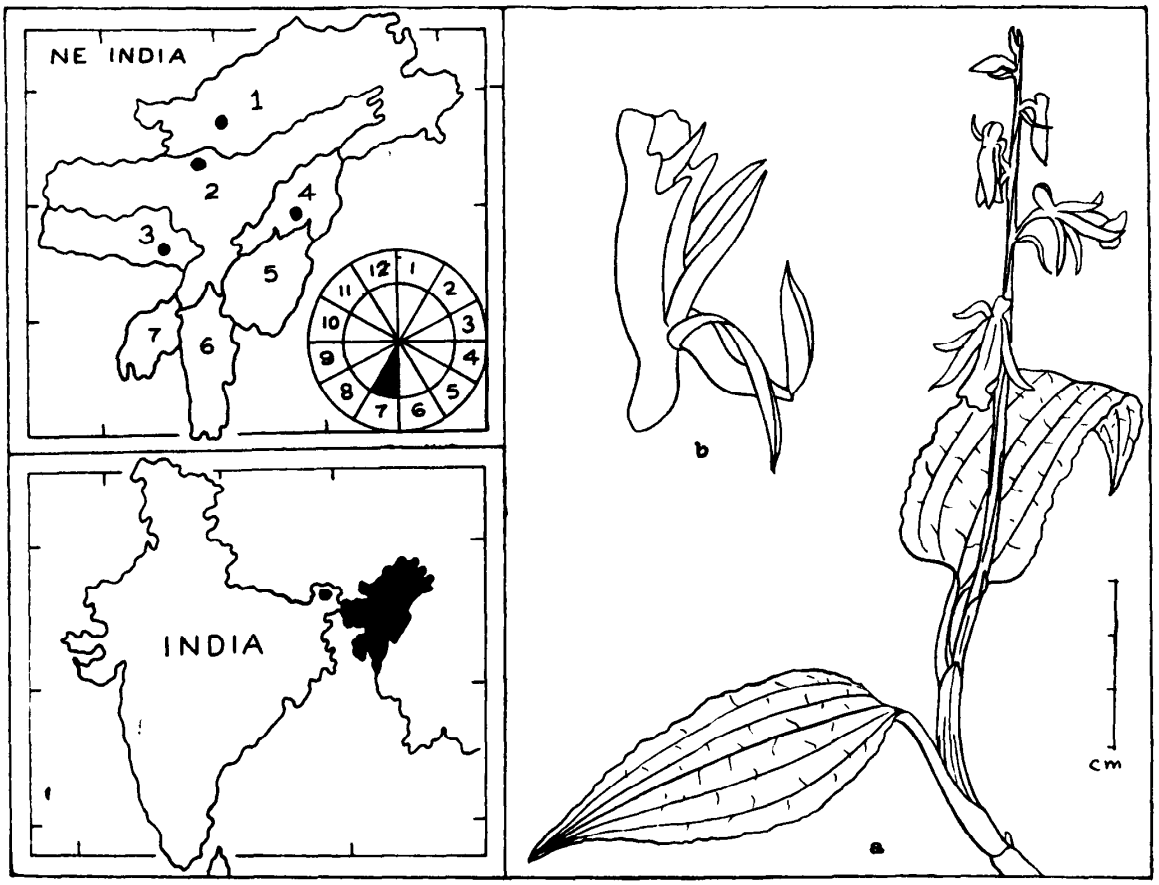
Description: Terrestrial. Pseudobulbs elongate, tapering towards apex. Leaves few, elliptic, acuminate. Inflorescence arises amongst the leaves many-flowered. Flowers small, brownish; bracts reflexed. *Plate 51*

Flowering: June.

Distribution: INDIA (Meghalaya, Manipur, Sikkim).

Notes: All the species of *Malaxis* grow on moist, shady and humus covered soil.

Status: Threatened



Nephelaphyllum cordifolium (Lindl.) Lindl. a. habit; b. flower.

Nephelaphyllum cordifolium (Lindl.) Lindl. in Journ. Linn. Soc. 3 : 23. 1859; Hook. f., Fl. Brit. Ind. 5 : 818, 1890.

Description: Terrestrial. Rhizome creeping, succulent. Stems erect or arched, sheathed. Leaves ovate-cordate, membranous, nerves distinct. Racemes few-flowered. Flowers nodding, pale-green with purple lines and dots; spur clavate. *Plate 52*

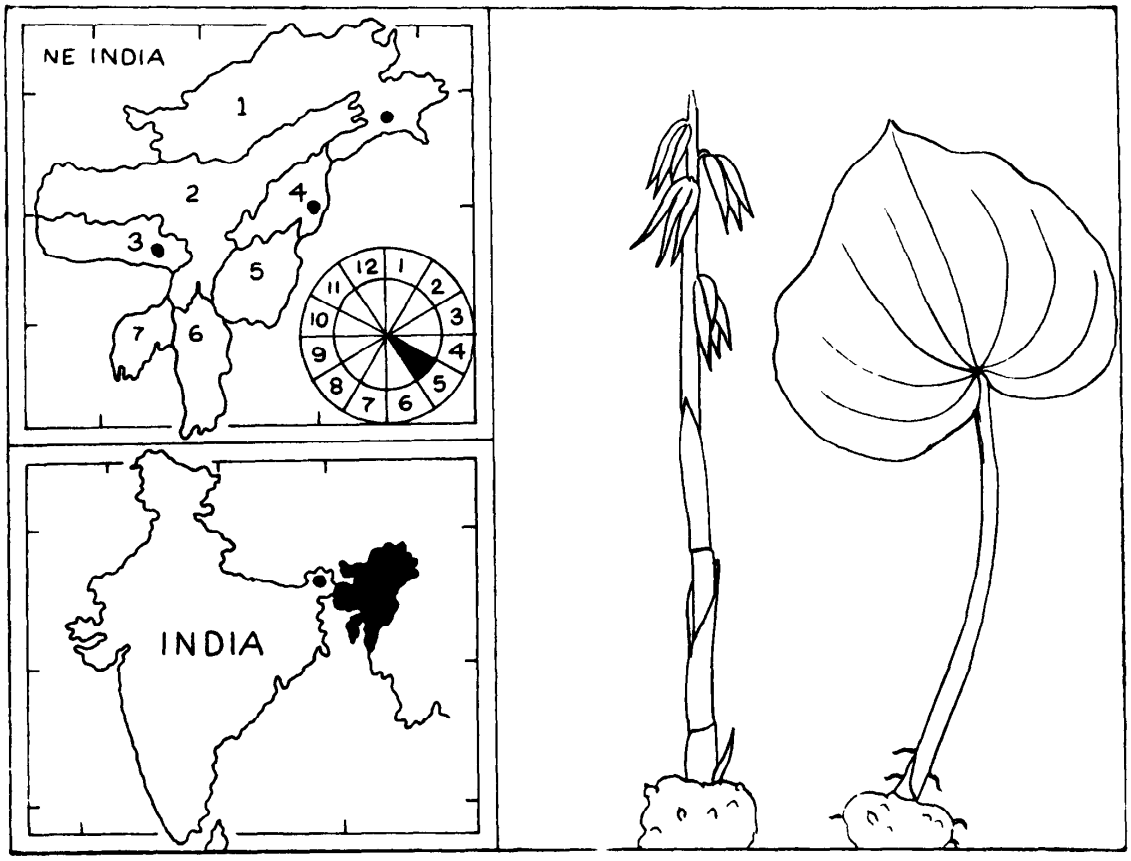
Flowering: July.

Distribution: INDIA (Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim).

Notes: It grows in very moist and shady areas. Depleted mainly due to habitat destruction.

Status: Threatened.

Two other species, *Nephelaphyllum grandiflorum* King & Pantl. is reported from Sikkim, whereas, *N. pulchrum* Bl. var. *sikkimensis* Hook. f. is recorded from Sikkim and Bhutan. These species are scarce in wild due to habitat destruction.



Nervilia hookeriana Schltr. a. & b. habit in two stages.

NERVILIA

The species of *Nervilia* grow in moist, shady areas within the forest floor. The tuber bears solitary leaf and falls off before flowering. Usually flowers are small and not showy. The species are becoming rare in this region due to destruction of their habitat.

Nervilia hookeriana Schltr. in Engl. Jahrb. 65 : 403. 1911.

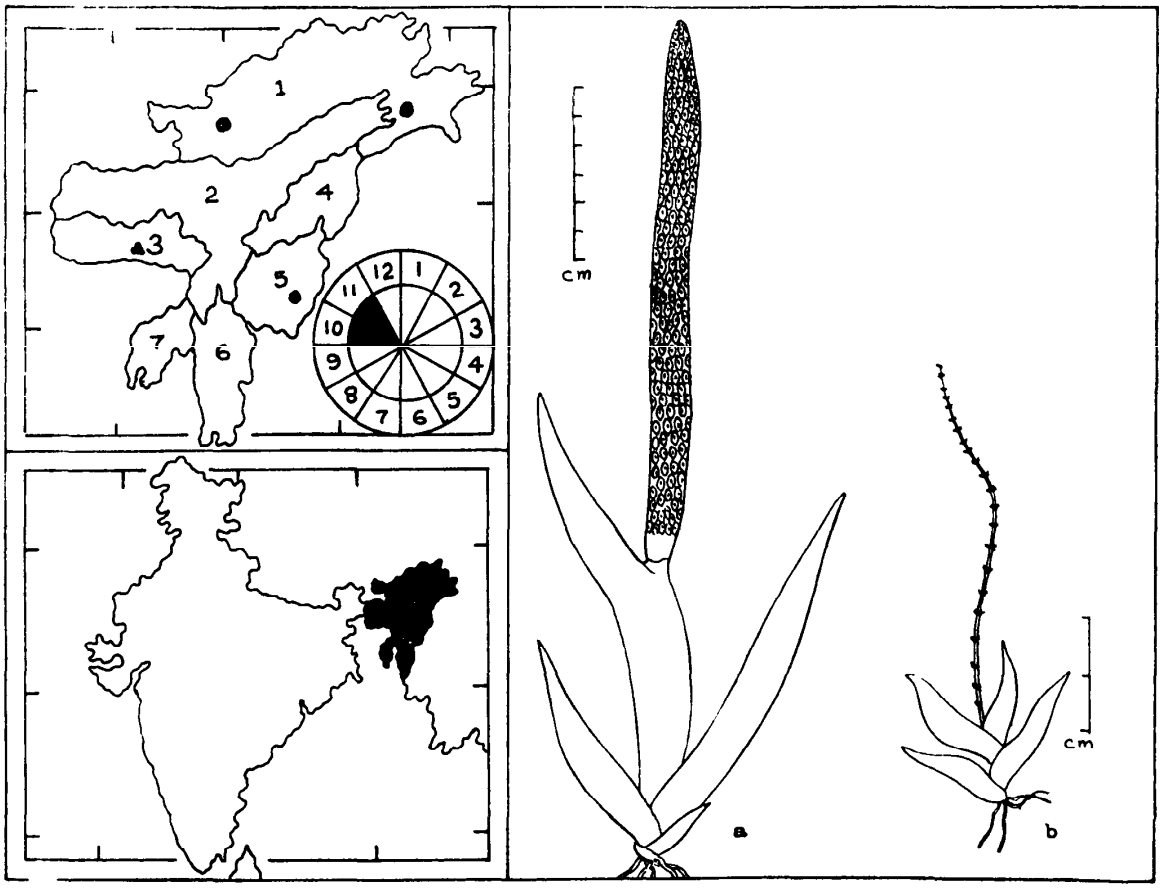
Description : Terrestrial. Tubers globose. Leaf long petioled, reniform, apex acuminate. Flowers small, pendent, dull green. *Plate 53*

Flowering : May.

Distribution : INDIA (Arunachal Pradesh, Meghalaya, Nagaland, Sikkim).

Notes : The species of *Nervilia* do not thrive well in cultivation. The main reason of their depletion in wild is due to habitat destruction.

Status : Threatened.



a. *Oberonia maxima* (Par.) Hook. f.; b. *Oberonia bicornis* Lindl. showing habit.

OBERONIA

The species of *Oberonia* with minute flowers. The fleshy, distichous, equitant leaves constitute the characteristic features of this genus. The species are gradually disappearing in their original localities due to the felling of trees in forests. About 30 species are recorded from this region.

Oberonia bicornis Lindl., Gen & Sp. Orch. 16. 1830; Hook. f., Fl. Brit. Ind. 5 : 682, 1890.

Description: Epiphytes. Stems few-leaved. Leaves radical, linear-oblong, 2-4 cm long. Inflorescence slender; racemes many-flowered. Flowers in whorls; bracts lanceolate, longer than the flowers. *Plate 54b*

Flowering: October-November.

Distribution: INDIA (Western ghats* Meghalaya), SRI LANKA.

Notes: It is one of the rarest species in this region. No specimen in ASSAM herbarium.

Status: Rare.

* Distribution shown by solid triangle.

Oberonia maxima Parish ex Hook. f., Fl. Brit. Ind. 5 : 677, 1890.

Description : Epiphytes. Stems short. Leaves long, broad, acute. Scapes stout, as long as or longer than the leaves, many-flowered. Flowers dense, apressed. *Plate 54a*

Flowering : October-November.

Distribution : INDIA (Arunachal Pradesh, Manipur), BURMA.

Notes : One of the largest leaved species in *Oberonia*. Restricted in distribution.

Status : Rare.

Oberonia clarkei Hook. f. (FBI 5 : 682. 1890) from N. E. India and *O. demissa* Lindl. (FBI 5 : 682. 1890) from Meghalaya and Sikkim are found to be scarce.

PAPHIOPEDILUM

Terrestrial, rarely epiphytic, perennial. Flowers large, showy, long lasting. Popularly known as "Lady's Slipper" Orchids. The species are becoming rare in wild due to large scale commercial exploitation.

Paphiopedilum fairieanum (Lindl.) Stein, Orchideenbuch. 467. 1892.

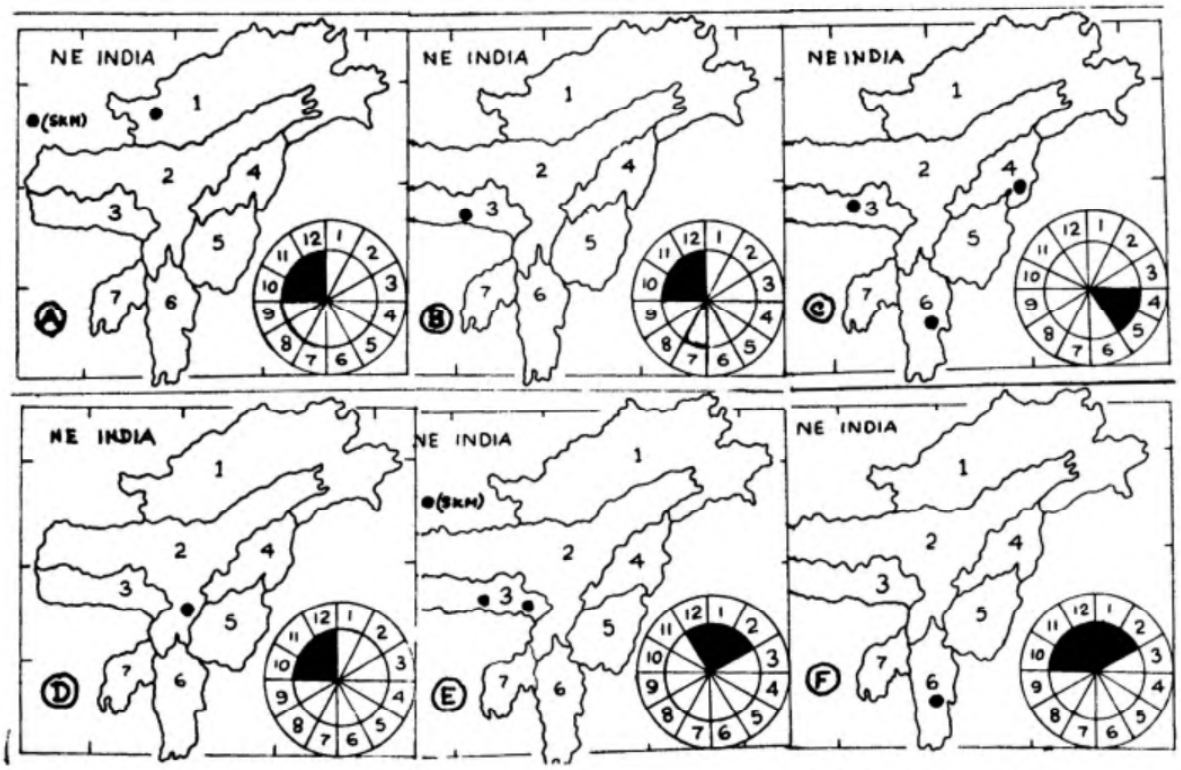
Paphiopedilum fairieanum (Lindl.) Pfitz. in Engler's Bot. Jahrb. 19 : 41, 1894. *Cypripedium fairieanum* Lindl. ; Hook. f., Fl. Brit. Ind. 6 : 173, 1890.

Description : Terrestrial. Leaves oblong, green. Scapes longer than the leaves, 1-flowered, rarely 2. Flowers green with dark purple lines; lip brownish. *Plate 55A & 61*

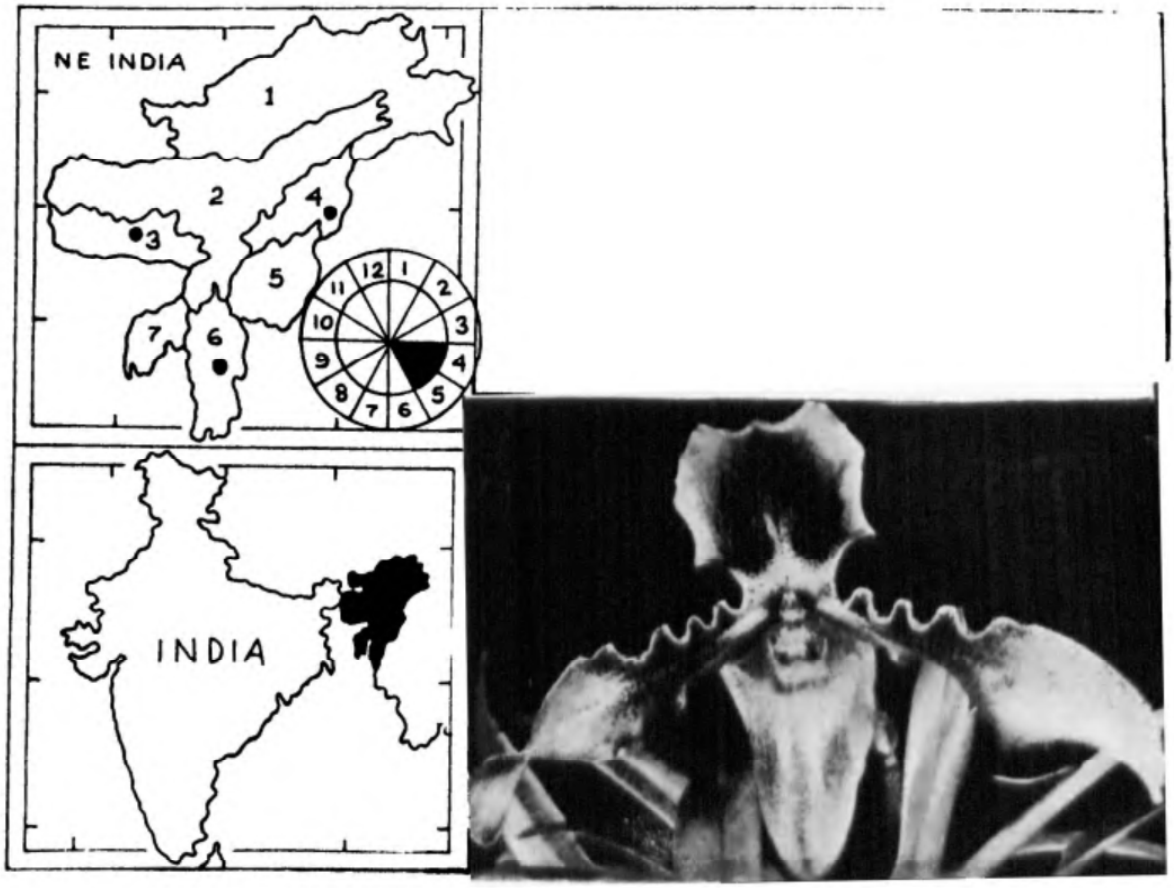
Flowering : October-December.

Distribution : INDIA (Arunachal Pradesh, Sikkim), BHUTAN.

Notes : Grows in hilly grassy slopes or in rock crevices ; depleted due to overcollection and destruction of habitat.



Map showing distribution of (a) *Paphiopedilum fairieanum* (Lindl.) Stein, (b) P. *insigne* (Wall. ex Lindl.) Pfitz., (c) *P. hirsutissimum* (Lindl. ex Hook.) Stein, (d) *P. spicerianum* (Reichb. f) Pfitz., (e) *P. venustum* (Wall. ex Sims.) Pfitz. & *P. villosum* (Lindl.) Stein



Paphiopedilum hirsutissimum (Lindl. ex Hook.) Stein

Paphiopedilum hirsutissimum (Lindl. ex Hook.) Stein, Orchideenbuch. 470. 1892. *Paphiopedilum hirsutissimum* (Lnidl.) Pfitz. in Engler's Bot. Jahrb. 19 : 41, 1894. *Cypripedium hirsutissimum* Lindl. ; Hook. f., Fl. Brit. Ind. 6 : 171, 1890.

Description : Terrestrial or epiphytes. Leaves linear-oblong, green. Scapes erect, hairy, 1-flowered. Flowers greenish with black dots at the base of sepals. *Plate 55C & 56*

Flowering : April-May.

Distribution : INDIA (Meghalaya, Mizoram, Nagaland), BURMA.

Notes : Grows on steep rock surfaces in shady areas. Depleted due to overcollection and habitat destruction.

Status : Rare.

Paphiopedilum spicerianum (Reichb. f.) Pfitz. in Engler's Bot. Jahrb. 19 : 41, 1894. *Cypripedium spicerianum* Reichb. f. ; Hook. f., Fl. Brit. Ind. 6 : 172, 1890.

Description : Terrestrial. Leaves linear-oblong. Scapes 1-flowered. Flowers greenish with white on the upper part of the dorsal sepal. *Plate 55D & 58*

Flowering : October-December.

Distribution : INDIA ('Assam.')*

Notes : Grows on steep rock surfaces. Its gradual depletion is mainly due to overcollection. Only known from one area.

Status : Rare. Endemic.

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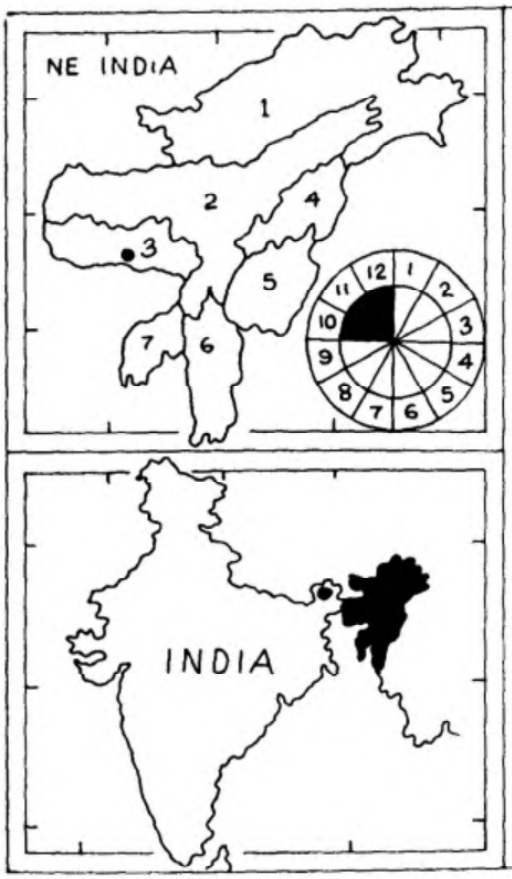
* Recently collected from Manipur.



Paphiopedilum insigne (Wall. ex Lindl.) Pfitz.

Paphiopedilum insigne (Wall. ex Lindl.) Pfitz. in Engler's & Prantl. Pfazfam. II. 6 : 84, 1889. *Cypripedium insigne* Wall. ex Lindl. ; Hook. f., Fl. Brit. Ind. 6 : 172, 1890.

Description : Terrestrial. Leaves linear-ligulate. Scapes 1-flowered, rarely 2. Flowers greenish white; dorsal sepal oval, upper part white with brown dots.

Plate 55B & 57

Flowering : October-December.

Distribution : INDIA (Meghalaya), BANGLADESH, NEPAL.

Notes : Grows on hilly slopes or in rock crevices preferably in shady areas. Depleted due to large scale exploitation and conversion of habitat.

Status : Rare.

Reported from Sikkim also.

PLATE 58

Paphiopedilum spicerianum (Reich b.f.) Pfitz.

PLATE 59

Paphiopedilum villosum (Lindl.) Stein

PLATE 60

Paphiopedilum venustum (Wall.ex Sims.) Pfitz.

PLATE 61

Paphiopedilum fairieanum (Lindl.) Stein

Paphiopedilum venustum (Wall. ex Sims.) Pfitz. in Engler's Bot. Jahrb. 19 : 41, 1894. *Cypripedium venustum* Wall. ex Sims. ; Hook. f., Fl. Brit. Ind. 6 : 173, 1890.

Description : Terrestrial. Leaves elliptic-oblong, green mottled with dark green patches on the upper side and pale green mottled with purplish on the lower surface. Scapes erect, 1-flowered. Flowers greenish with dark green veins. *Plate 55E & 60*

Flowering : December-February.

Distribution : INDIA (Meghalaya, Sikkim), BANGLADESH.

Notes : Grows in moist shady areas. Depleted due to habitat destruction and also overcollection

Status : Rare.

Paphiopedilum villosum (Lindl.) Stein, Orchideenbuch. 490. 1892.

Paphiopedilum villosum (Lindl.) Pfitz. in Engler's Bot. Jahrb. 19 : 41. 1894. *Cypripedium villosum* Lindl. ; Hook. f., Fl. Brit. Ind. 6 : 171, 1890.

Description : Terrestrial or epiphytes on moss covered tree branches. Leaves linear-ligulate, apex bifid. Scapes 1-flowered, hairy. Flowers large, yellowish-green with brownish-purple apices of sepals and petals. *Plate 55F & 59*

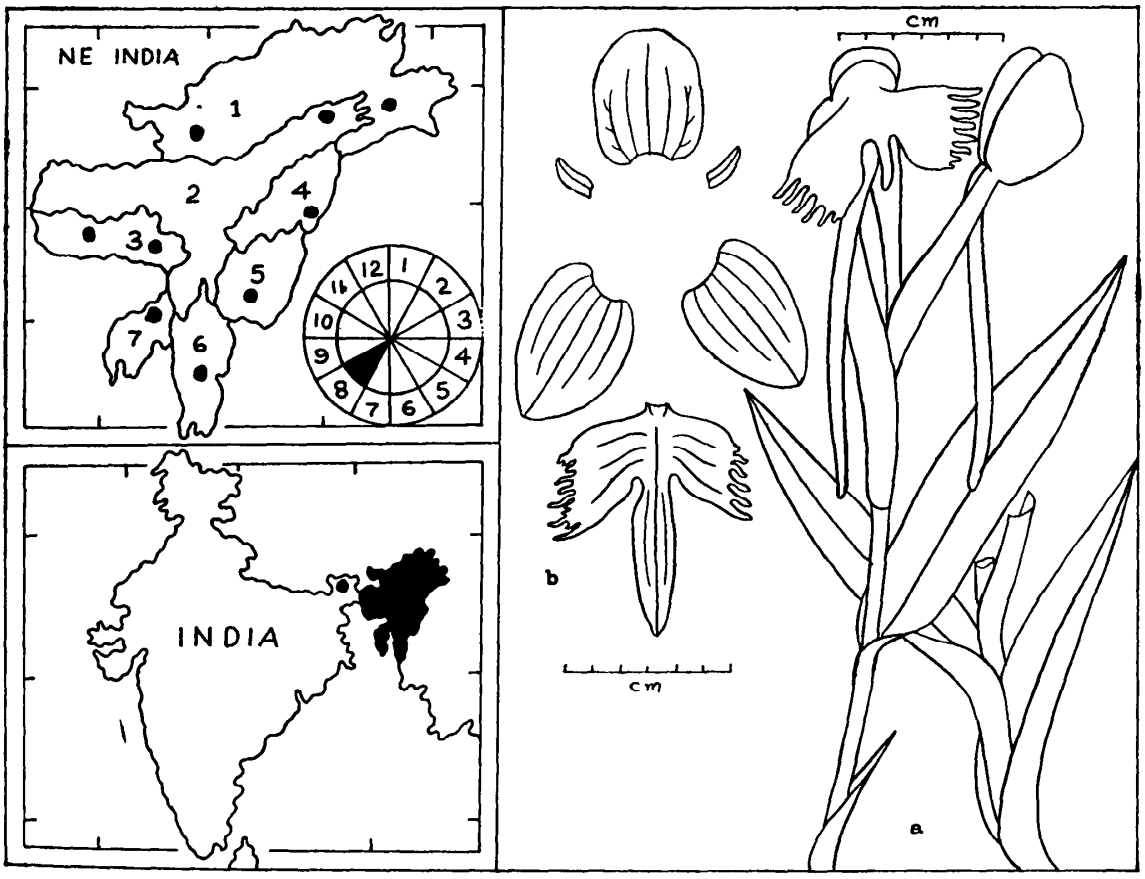
Flowering : October-February.

Distribution : INDIA (Mizoram), BURMA, THAILAND.

Notes : A very hardy species with long lasting flowers ; is becoming rare in wild due to large scale exploitation.

Status : Rare.

The other two species viz., *Paphiopedilum charlesworthii* (Rolfe) Pfitz., from Mizoram and *P. wardii* Summerh., from Arunachal Pradesh are reported to occur in this region (Pradhan). But no herbarium specimens of these two species are seen.



Pecteilis susannae (L.) Raffin. a. habit; b. floral parts.

Pecteilis susannae (L.) Raffin., Flor. Tellur. 2 : 38, 1837; *Habenaria susannae* (L.) R. Br. ; Hook. f., Fl. Brit. Ind. 6 : 137, 1890.

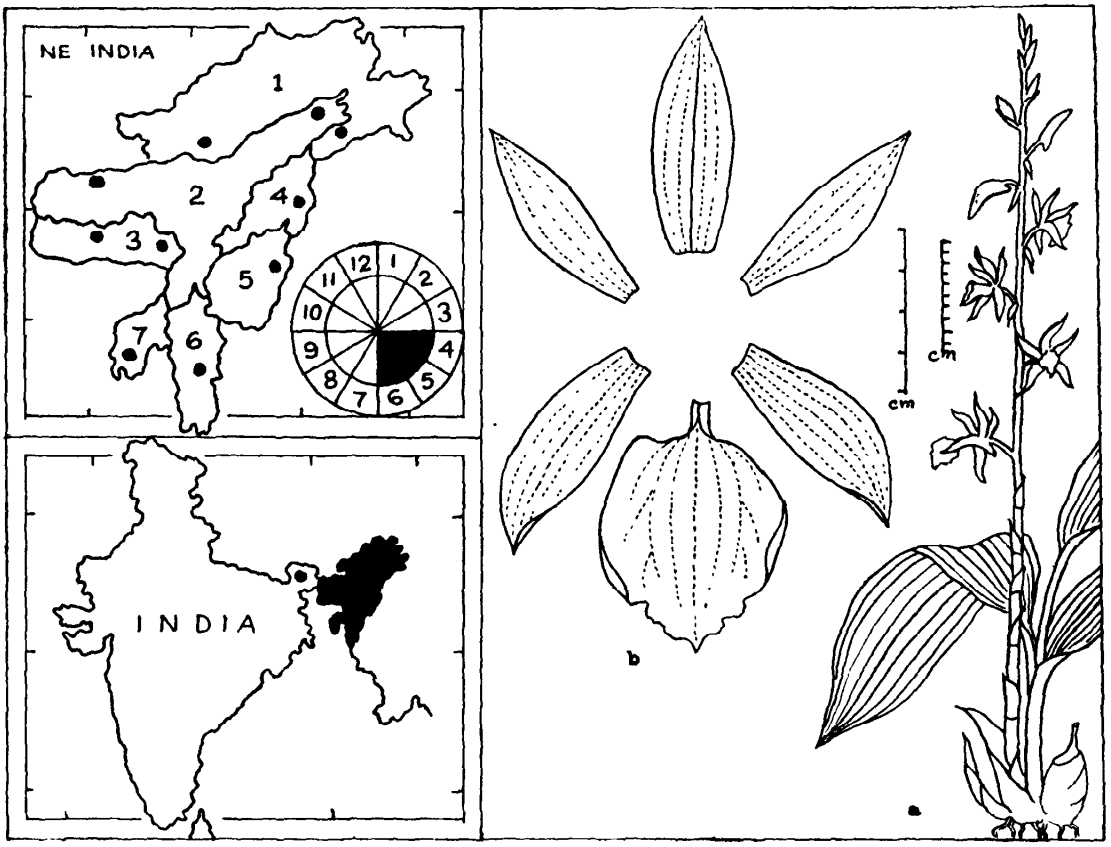
Description: Terrestrial. Tubers 2, elongated. Stems annual, tall, erect. Leaves sessile, ovate-oblong, acute. Flowers few, large, white, fragrant. *Plate 62*

Flowering: August.

Distribution: Throughout INDIA, MALAYA, THAILAND, CHINA.

Notes: Grows in grassy slopes. This is a large-flowered species with a very wide distribution. Once common, now rarely seen. The main reason is damage to its habitat.

Status: Threatened.



Phaius tankervilliae (Aiton) Bl. a. habit; b. floral parts.

Phaius tankervilliae (Aiton) Bl. Mus. 2. 177. 1852; *Phaius wallichii* Lindl. ; Hook. f., Fl. Brit. Ind. 5 : 816, 1890.

Description: Terrestrial. Pseudobulbs large, close, conical, sheated by the leaf bases. Leaves very large, elliptic-lanceolate, acuminate. Scapes lateral, tall, erect, as long as the leaves, many-flowered. Bracts spathaceous, caducous. Flowers large, white outside and brownish inside; spur short. *Plate 63*

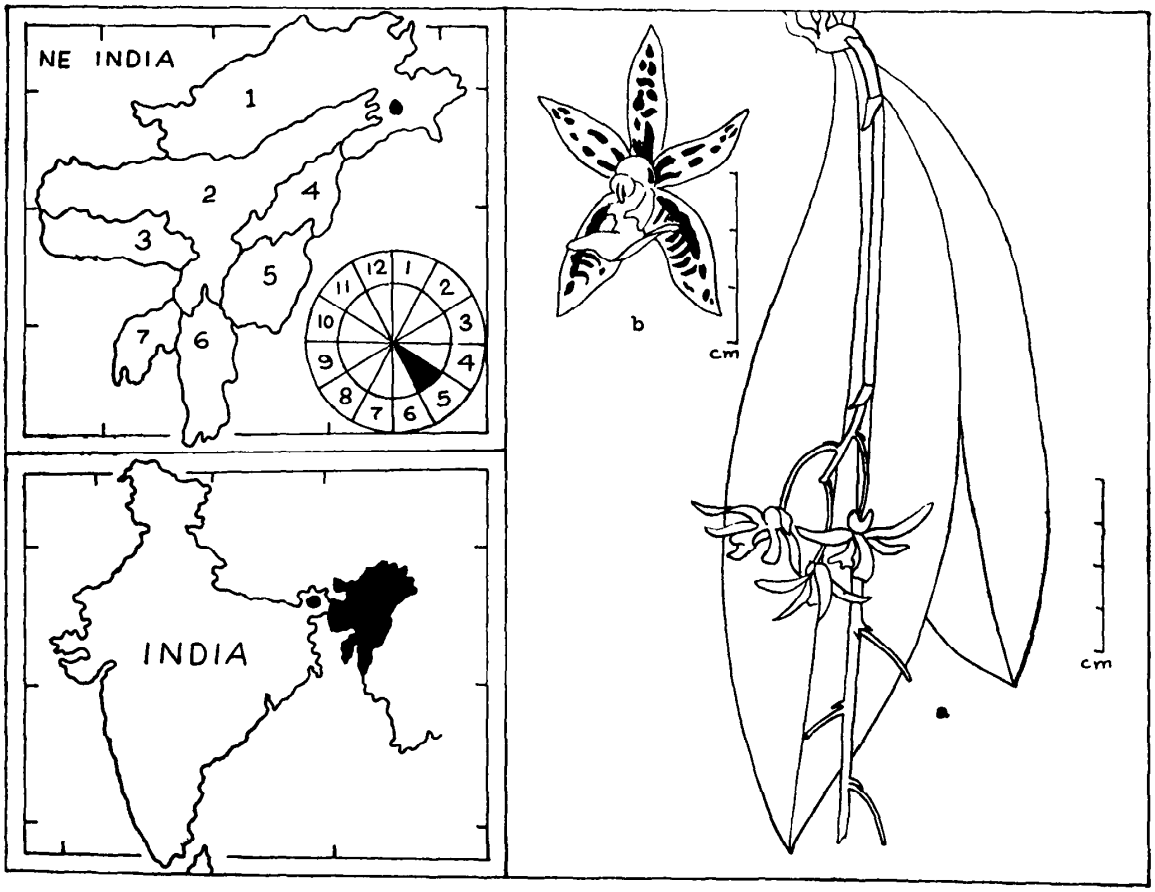
Flowering: April-June.

Distribution: INDIA (W. Himalayas, N.E. India, Sikkim,) BHUTAN, NEPAL, BURMA, THAILAND, MALAYA, SRI LANKA.

Notes: A large-flowered species with a very wide distribution. Depleted mainly due to habitat destruction and overcollection.

Status: Threatened.

The other species *Phaius flavus* (Bl.) Lindl. and *P. mishmensis* (Lindl.) Rchb. f. (FBI 5 : 817. 1890) are becoming scarce in wild due to deforestation, which affects its habitat.



Phaleonopsis mannii Reichb. f. a. habit; b. flower.

Phaleonopsis mannii Reichb. f. in Gard. Chron. 902. 1871 ; Hook. f., Fl. Brit. Ind. 6 : 30, 1890.

Description: Epiphyte. Stems almost absent. Leaves few, obovate-oblong, sub-clavate, acute, Racemes as long as or longer than the leaves, sometimes branched, many-flowered. Flowers golden-yellow, barred with brown; lip shorter than sepals, light yellow. *Plate 64*

Flowering: May.

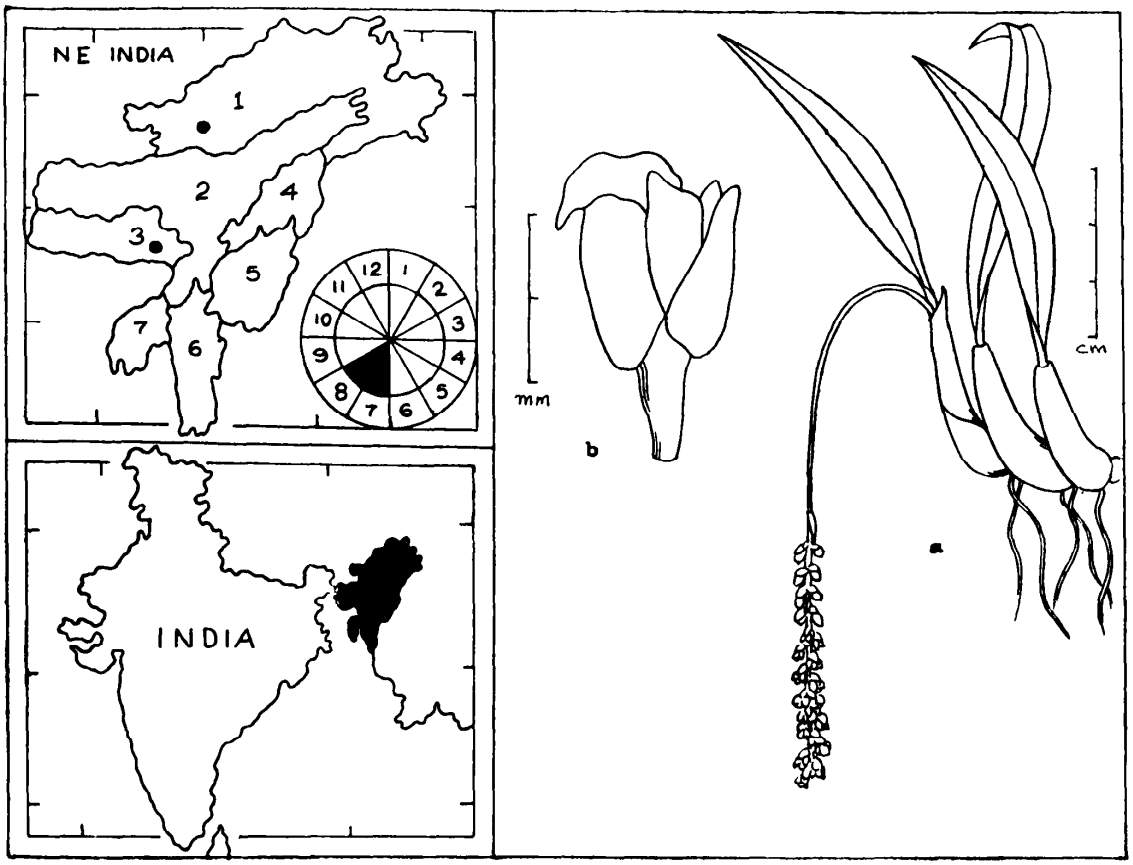
Distribution: INDIA (Arunachal Pradesh, Sikkim), NEPAL.

Notes: Grows on tall trees. Flowers long lasting. Depleted due to the felling of its host trees.

Status: Threatened.

Phaleonopsis parishii Reichb. f. in Bot. Zeit. 146. 1865; Hook. f., Fl. Brit. Ind. 6 : 31, 1890.

Description: Epiphytes. Stems almost absent. Leaves elliptic-oblong. Racemes as long as the leaves, few-flowered. Flowers white; lip mobile, yellowish with purple spots.



Pholidota calceata Reichb. f. a. habit; b. flower.

Flowering : April-May.

Distribution : INDIA (Assam, Arunachal Pradesh, Nagaland, Sikkim), NEPAL, BHUTAN, BURMA, THAILAND.

Notes : Depleted due to the destruction of its habitat.

Status : Threatened.

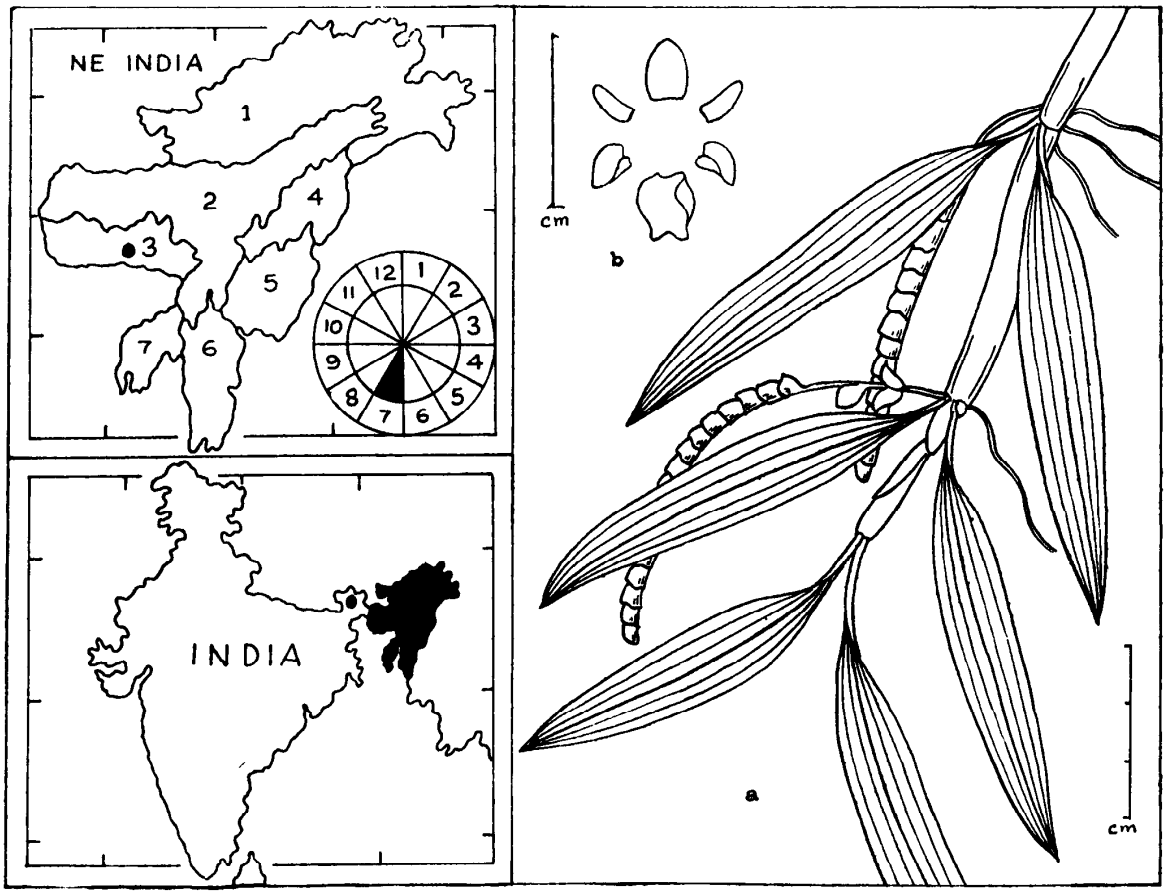
Pholidota calceata Reichb. f. in Bonpland. 4 : 329. 1856. ; Hook. f., Fl. Brit. 5 : 846, 1890.

Description : Epiphytes. Pseudobulbs uninodal, slender, curved, close 1-leaved. Leaves shortly petioled, linear-lanceolate. Scapes lateral, pendulous, many-flowered. Flowers whitish, membranous. *Plate 65*

Flowering : July-August.

Distribution : INDIA (Arunachal Pradesh, Khasi Hills—Meghalaya).

Notes : An endemic species.



Pholidota recurva Lindl. a. habit; b. floral parts.

Pholidota protracta Hook. f., Fl. Brit. Ind. 5 : 845, 1890.

Description: Epiphytes. Rhizome flexous, sheaths adpressed. Pseudobulbs sub-cylindric. Leaves elliptic-lanceolate, acuminate. Inflorescences flexuous, many-flowered. Flowers green.

Flowering: November-December.

Distribution: INDIA (Meghalaya, Nagaland, Sikkim, Darjeeling), BHUTAN, NEPAL.

Notes: Restricted in distribution; occurs in limited numbers.

Status: Threatened.

Pholidota recurva Lindl., Gen. & Sp. Orch. 37. 1830; Hook. f., Fl. Brit. Ind. 5 : 844, 1890.

Description: Epiphytes. Pseudobulbs branched, 2-leaved. Leaves shortly petioled, lanceolate, acute. Scapes from the top of pseudobulbs, many-flowered. Flowers secund, pale brownish; bracts broad, turncate, pale brown. *Plate 66*

Flowering: July.

Distribution : INDIA (Meghalaya, Sikkim, Darjeeling), BHUTAN. NEPAL, THAILAND.

Notes : A rare species in wild. Depleted mainly due to habitat destruction.

Status : Rare.

PLEIONE

The species of this genus occur in the Himalayas preferably at high elevations on moss covered rocks or on tree branches. In most of the species, the leaves fall off before flowering.

About 13 species distributed in the Himalayan region, Burma, & Thailand, and are popularly known as "Indian Crocuses"

Pleione hookeriana (Lindl.) Moor. in Wilhams, Orch. Grow. Man. 6 : 548, 1885. *Coelogyne hookeriana* Lindl.; Hook. f., Fl. Brit. Ind. 5 : 842, 1890.

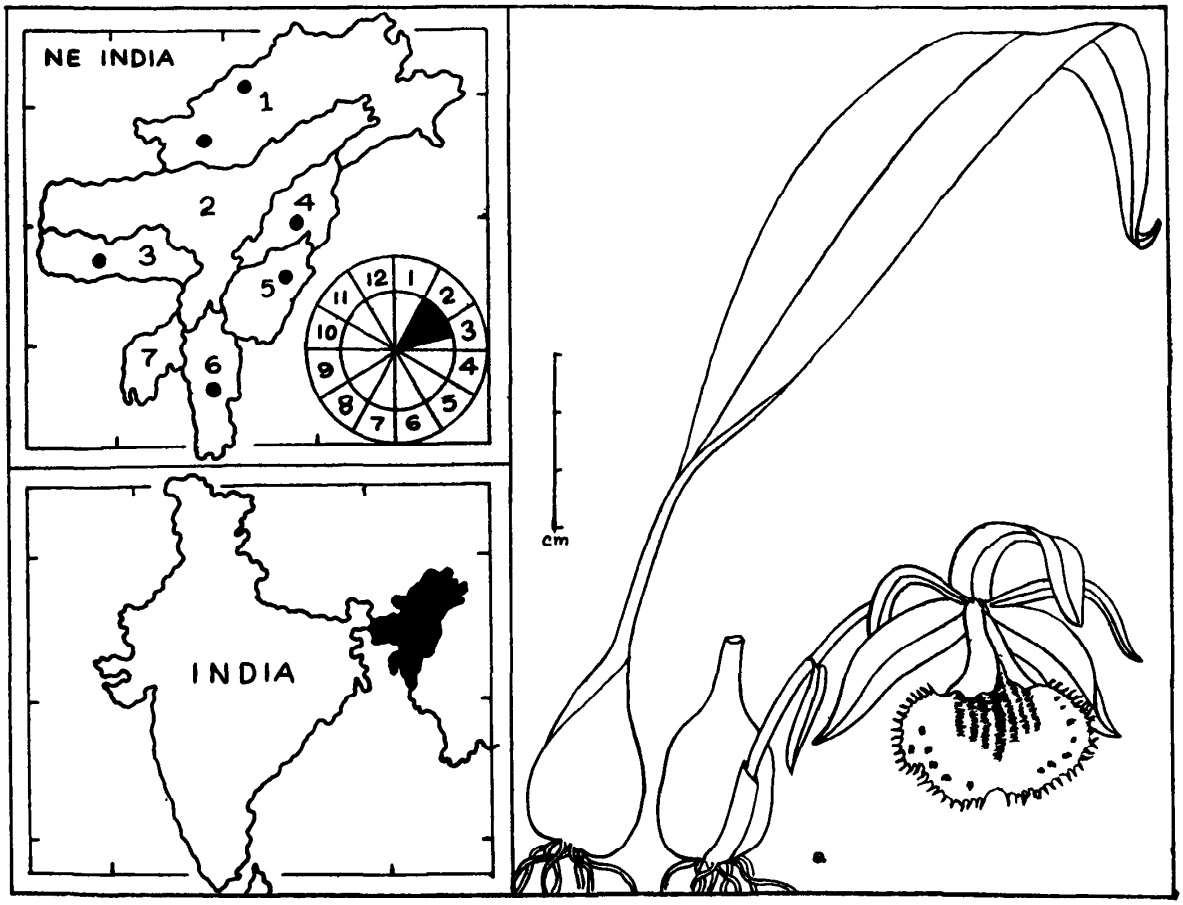
Description : Pseudobulbs ovoid, 1-leaved. Leaves elliptic-lanceolate, acuminate. Scape 1-flowered, lateral. Flowers rose-purple with a brown-purple blotch on the lip.

Flowering : May-June.

Distribution : INDIA (Arunachal Pradesh, Sikkim), BHUTAN, NEPAL, BURMA.

Notes : Gradual depletion is mainly due to its habitat destruction.

Status : Threatened.



Pleione humilis (Sm.) D. Don. a. habit.

Pleione humilis (Sm.) D. Don, Prodr. Fl. Nepal. 37. 1835. *Coelogyne humilis* Lindl.; Hook. f., Fl. Brit. Ind. 5 : 840, 1890.

Description: Pseudobulbs flask-shaped, green, 1-leaved. Leaves oblanceolate, acuminate. Scapes lateral, 1-flowered, rarely 2. Flowers pinkish-white or white, disc of the lip with purple lines. *Plate 67*

Flowering: February-March.

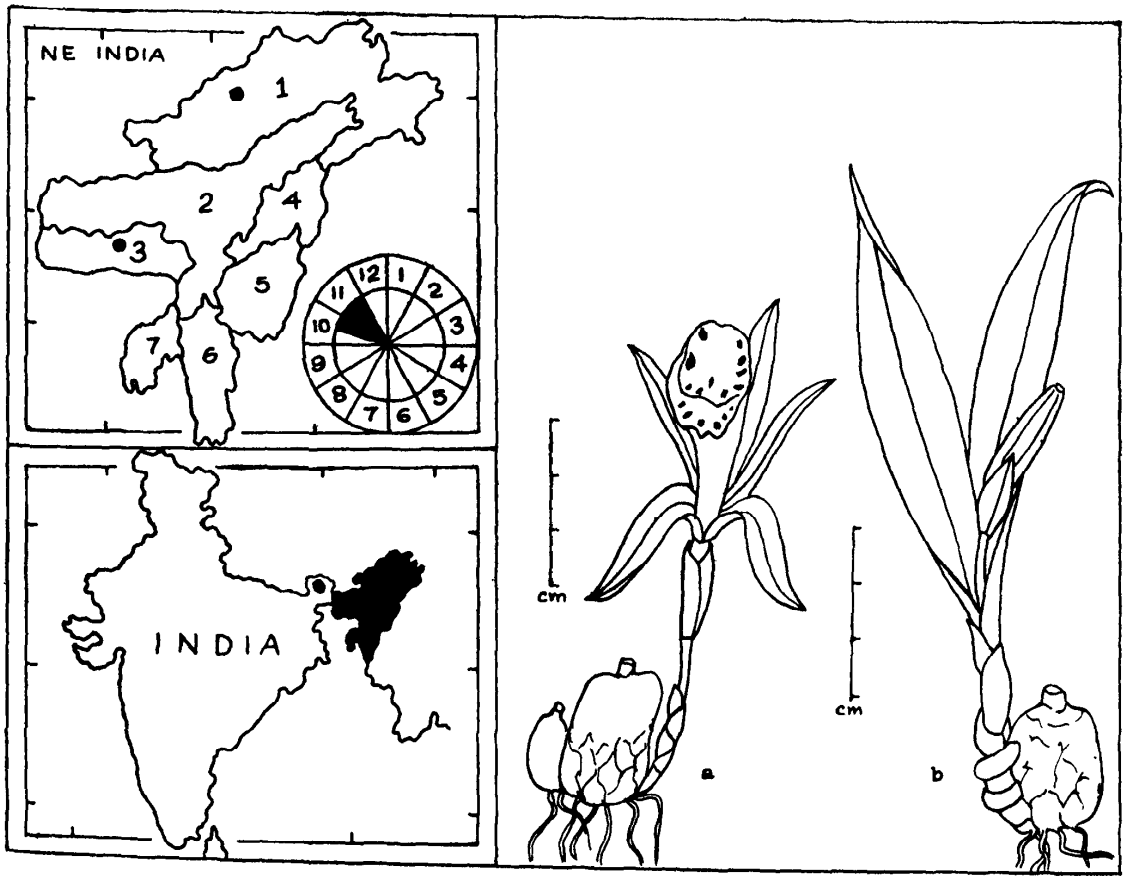
Distribution: INDIA (Arunachal Pradesh, Manipur, Meghalaya, Darjeeling, Mizoram, Nagaland) BHUTAN, NEPAL, BURMA.

Notes: Depleted due to habitat destruction.

Suatus: Threatened.

Pleione lagenaria Lindl. in Paxt. Fl. Gard. 2. t. 39. 1851. *Coelogyne lagenaria* Lindl.; Hook. f., Fl. Brit. Ind. 5 : 841, 1890.

Description: Epiphytes. Pseudobulbs bottle-shaped, small. Flowers rose coloured; the basal half of the lip convolute, the distal half open with undulate margin, purple streaked.



Pleione maculata Lindl. a & b. habit.

Flowering : October-November.

Distribution : INDIA (Meghalaya).

Notes : It was first discovered in Khasi Hills (Meghalaya) by Thomas Lobb in 1849 and recorded as "It is said to be restricted to one or two localities of very limited extent" So far, it is not reported from any other part.

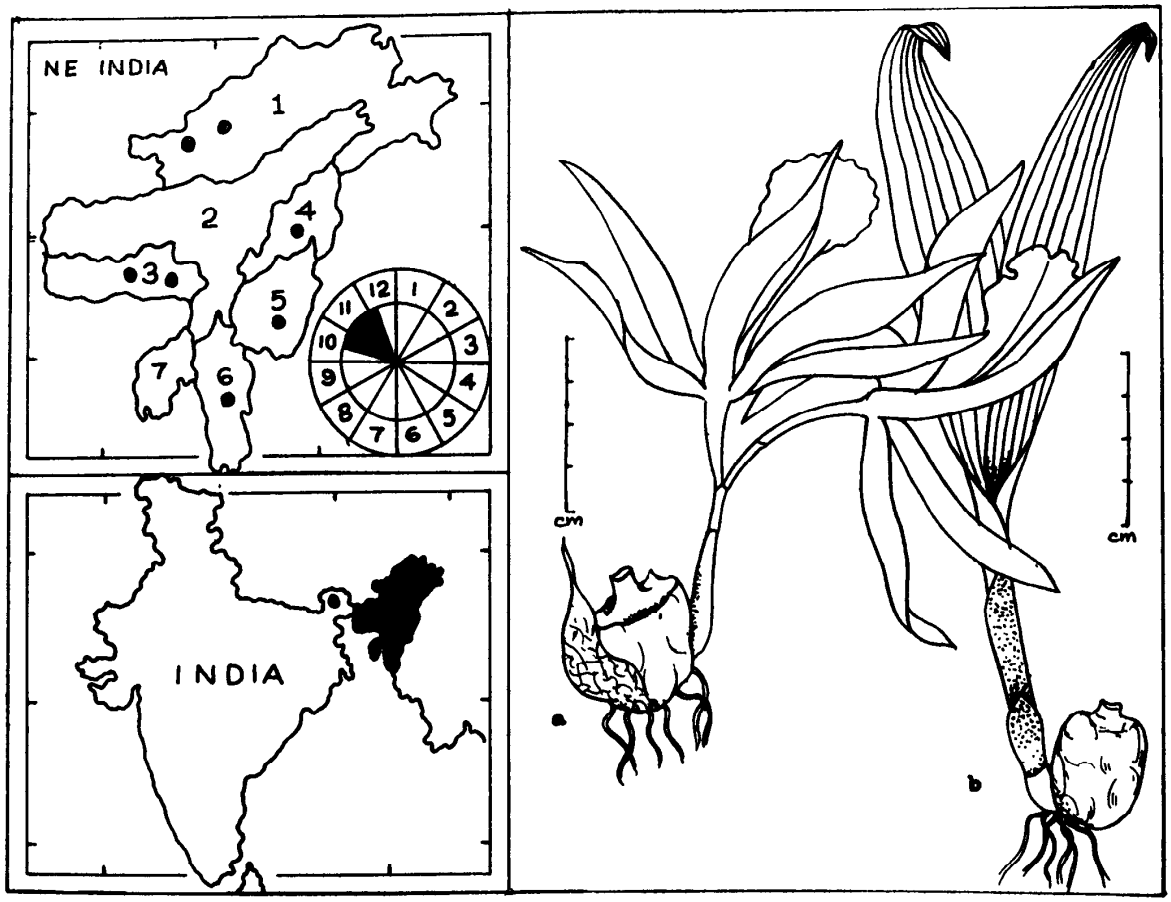
Status : Endangered.

Pleione maculata Lindl. in Paxt. Fl. Gard. 2. t. 39. 1851. *Coelogyne maculata* Lindl.; Hook. f., Fl. Brit. Ind. 5 : 841, 1890.

Description : Epiphytes or lithophytes. Pseudobulbs bottle-shaped, covered with fibrous net work of old sheaths, apex depressed, 2-leaved. Leaves lanceolate. Sheaths tubular, inflated. Scapes lateral, 1-flowered. Flowers white; lip white with yellow blotch. *Plate 68*

Flowering : October-November.

Distribution : INDIA (Arunachal Pradesh, Meghalaya, Sikkim, Darjeeling), BHUTAN, NEPAL, BURMA, THAILAND.



Pleione praecocox (J. E. Sm.) D. Don a & b. habit.

Notes: Once common in wild. It is fast depleted due to exploitation and habitat destruction.

Status: Threatened.

Pleione praecox (J.E.Sm.) D. Don, Prodr. Fl. Nepal. 37. 1825. *Coelogyne praecox* Lindl.; Hook. f., Fl. Brit. Ind. 5 : 840, 1890.

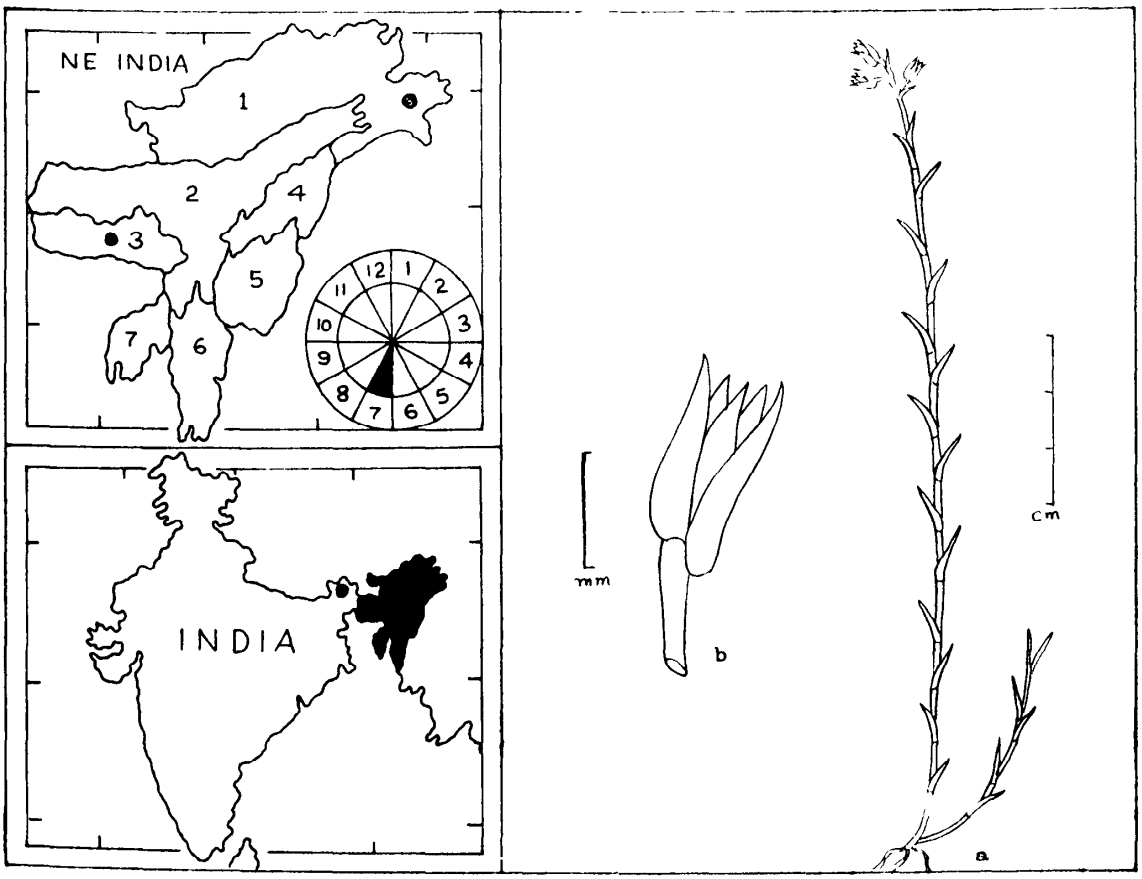
Description: Epiphytes or lithophytes. Pseudobulbs large, flask-shaped, apex depressed, green mottled with purple, 2-leaved. Leaves broadly lanceolate or oblanceolate, acuminate. Scapes lateral, usually 1-flowered, rarely 2. Flowers large, rose-purple, variable; lip pinkish white with purple blotches. *Plate 69*

Flowering: October-November.

Distribution: INDIA (Arunachal Pradesh, Manipur, Mizoram, Meghalaya, Nagaland, Sikkim, Darjeeling), BHUTAN, NEPAL, BURMA, THAILAND.

Notes: Once a very common species on moss covered tree branches, rocks or sometimes on ground. It is much depleted in its original localities due to its habitat destruction and overcollection.

Status: Threatened.



Podochilus khasianus Hook. f. a. habit; b. flower.

Podochilus khasianus Hook. f., Fl. Brit. Ind. 6 : 81, 1890.

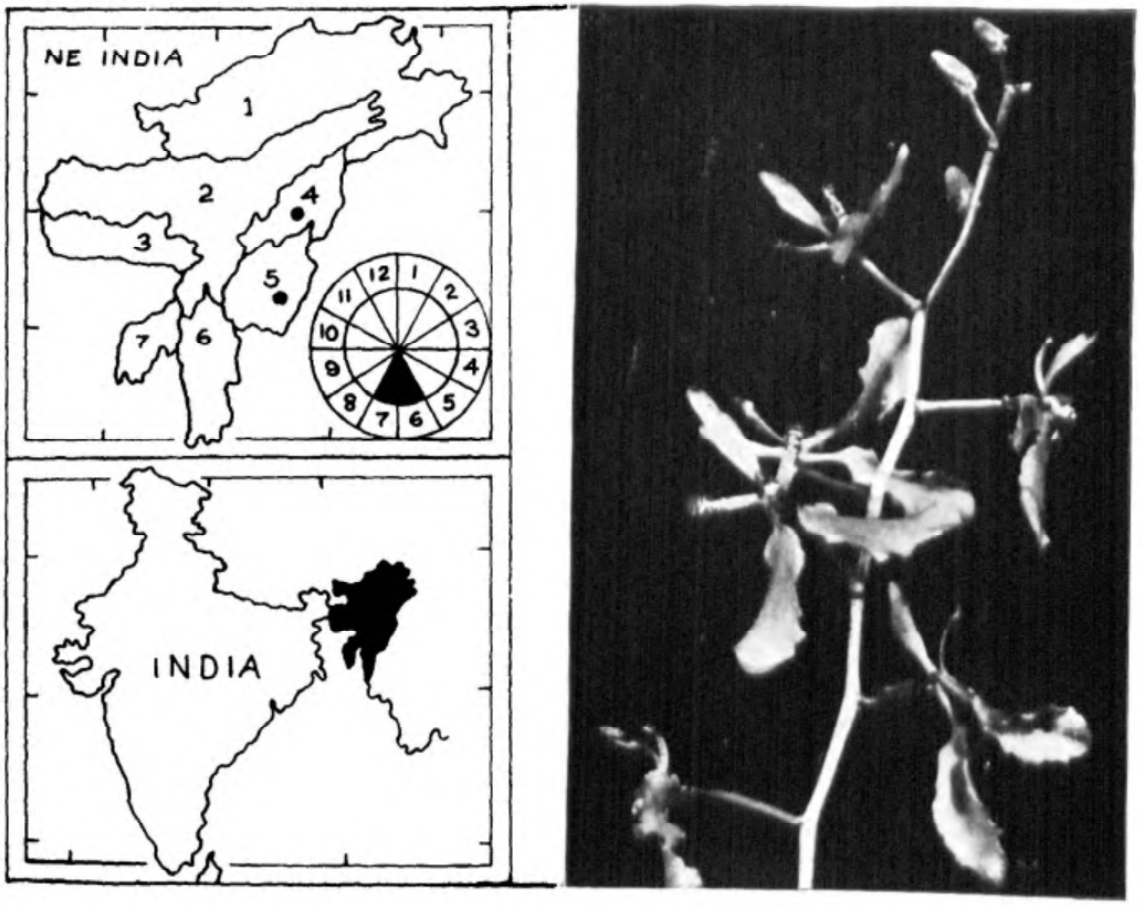
Description : Epiphytes. Stems slender, sub-erect, many-leaved. Leaves falcate, acuminate. Flowers few at the apex of the stem, small. *Plate 70*

Flowering : July.

Distribution : INDIA (Arunachal Pradesh, Meghalaya, Sikkim).

Notes : This species is rarely seen in wild.

Status : Threatened.



Renanthera imschootiana Rolfe

Renanthera imschootiana Rolfe in Kew Bull. 200. 1891.

Description : Epiphytes. Stems long, erect, few-leaved only towards the upper part. Leaves *ca* 10 cm long, oblong, apex unequally 2-lobed. Inflorescences lateral, longer than the leaves, sometimes branched, erect or sub-erect, many flowered. Flowers medium sized, blood red; lip much smaller than sepals. *Plate 71*

Flowering : June-July.

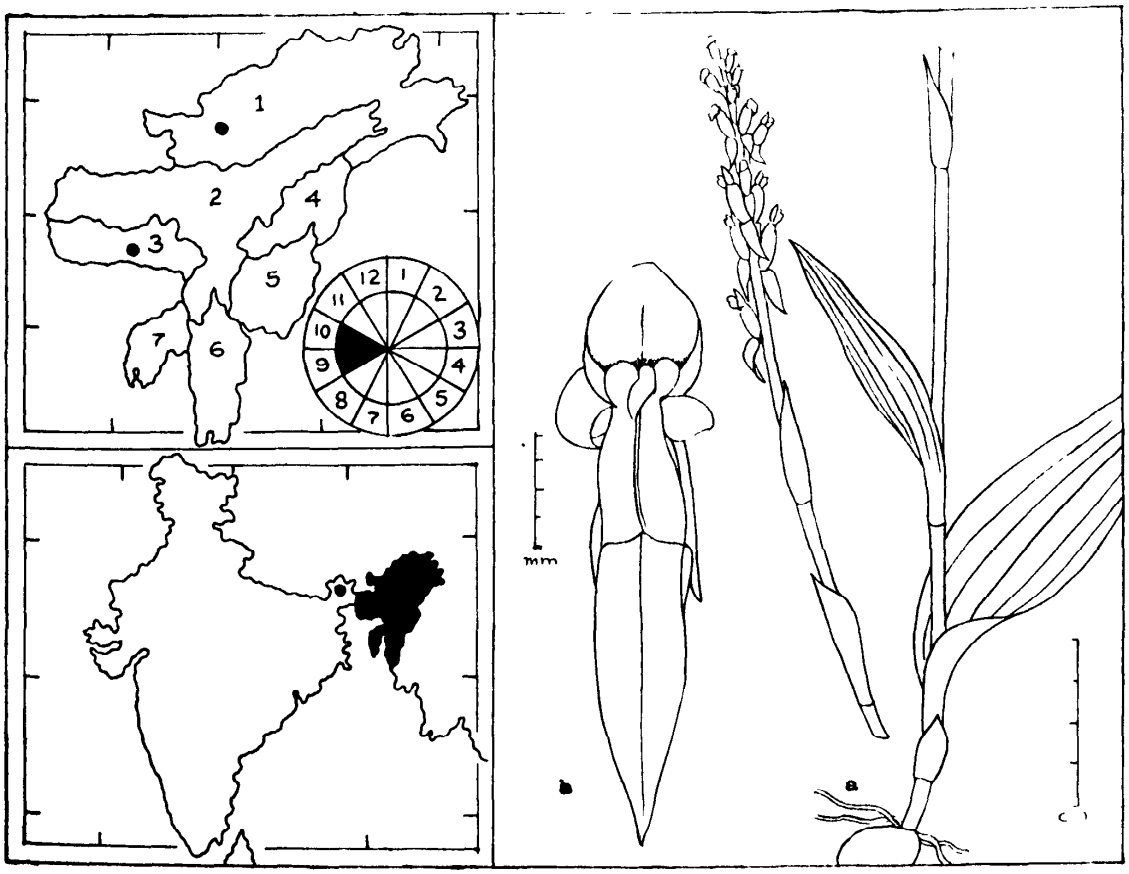
Distribution : INDIA (Manipur, Nagaland), BURMA.

Notes : It was in abundance in Manipur but gradually it is depleted in wild due to habitat destruction and exploitation.

Status : Threatened.

Risleya atro-purpurea King & Pantl. in Ann. Roy. Bot. Gard. Calcutta, 8 : 1898.

Description : Terrestrial. Leafless. Stems with inflorescences about 10 cm tall, densely-flowered. Flowers minute, dark purple.



Satyrium nepalense D. Don a. habit; b. flower.

Flowering: June-July.

Distribution: INDIA (Sikkim).

Notes: An endemic plant to Sikkim. Depleted due to habitat destruction

Status: Rare.

Satyrium nepalense D. Don, Prodr. Fl. Nepal. 26. 1825; Hook. f., Fl. Brit. Ind. 6 : 168, 1890.

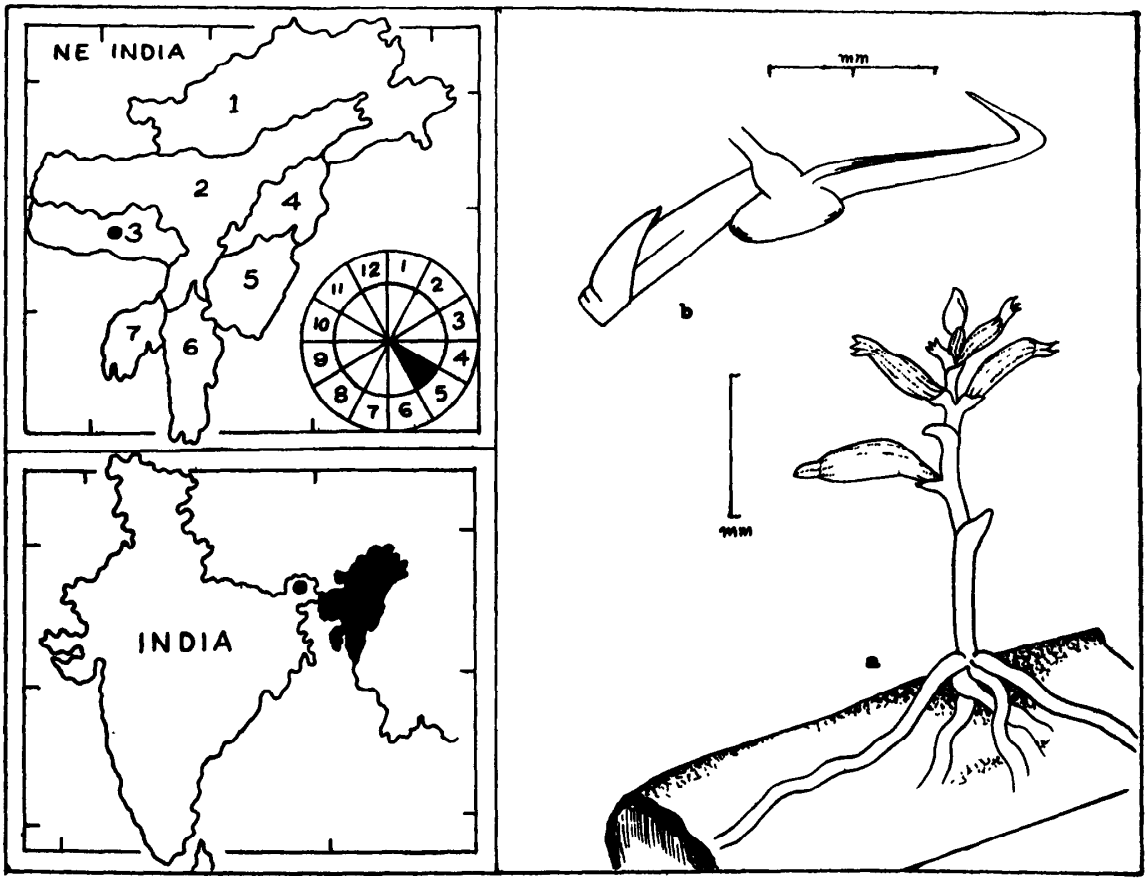
Description: Terrestrial. Roots tuberous, unequally paired. Stems tall, erect, sheathed. Leaves elliptic-lanceolate, acute. Scapes dense-flowered. Flowers white or pink; lip with 2 spurs. *Plate 72*

Flowering: September-October.

Distribution: INDIA (Arunachal Pradesh, Meghalaya, Sikkim, Garhwal, S. India), BHUTAN, NEPAL, BURMA, CHINA, SRILANKA.

Notes: Grows on grassy hilly slopes. Once common in wild. Depleted due to habitat destruction.

Status: Threatened.



Taeniophyllum khasianum Jos. & Yog. a. habit; b. lip.

Spathoglottis ixioides (D. Don) Lindl., Gen. Sp. Orch. 120. 1831 ; Hook. f., Fl. Brit. Ind. 5 : 814, 1890.

Description : Terrestrial. Pseudobulbs ovoid, small, few-leaved. Leaves linear-lanceolate, acuminate. Scapes lateral, erect, as long as the leaves; racemes few-flowered. Flowers yellow.

Flowering : June-August.

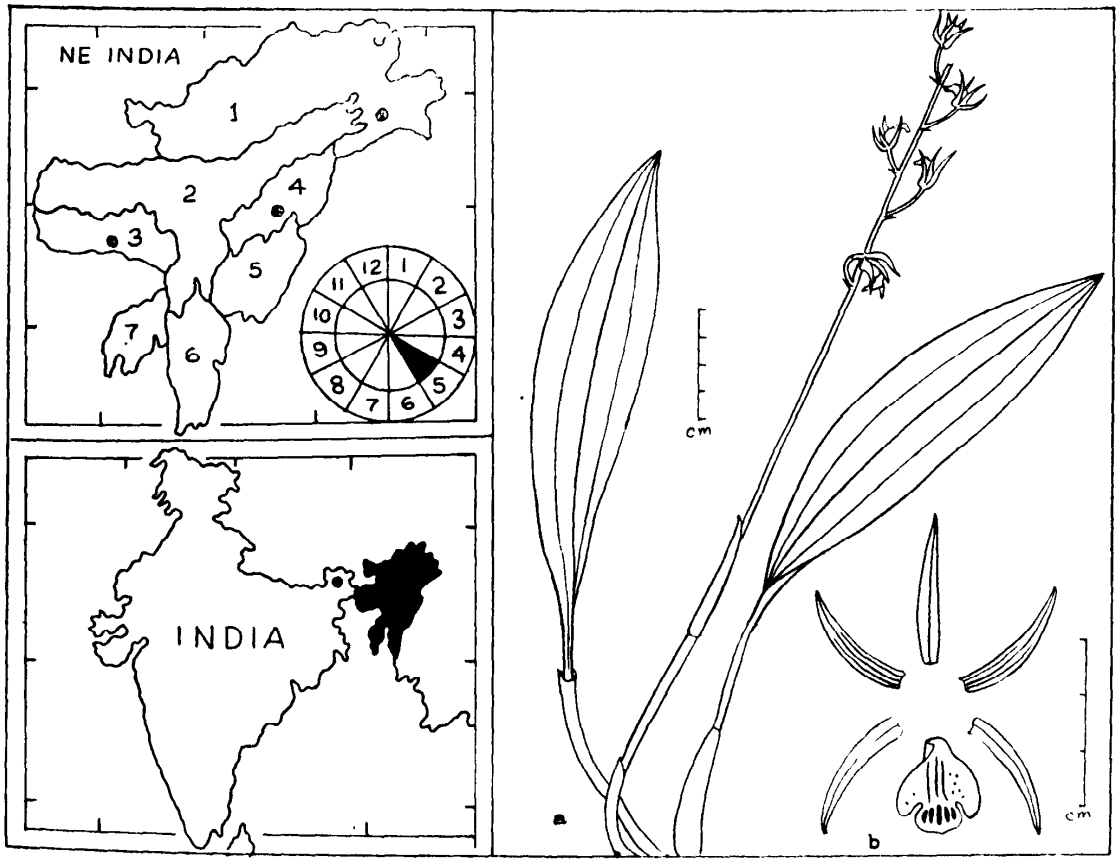
Distribution : INDIA (Arunachal Prodesh, Sikkim)

Status : Threatened.

The other species, *Spathoglottis pubescens* Lindl. (FBI. 5 : 814.1890), once a common species, is also becoming scarce in wild.

Taeniophyllum khasianum Jos. & Yog. in Journ. Ind. Bot. Soc. 66(1): 109. t. 1. 1967.

Description : Epiphytes. Stems absent. Leafless. Inflorescences filiform, few-flowered. Flowers tiny, greenish-yellow. *Plate 73*



Tainia minor Hook. f. a. habit; b. floral parts.

Flowering: May.

Distribution: INDIA (Meghalaya, Sikkim).

Notes: A curious orchid lacking leaves and stems with tiny flowers is usually overlooked by the plant collectors. Gradually depleted due to destruction of forests.

Status: Threatened.

Tainia minor Hook. f., Icon. Pl. t. 2091. 1889; Fl. Brit. Ind. 5 : 821, 1890.

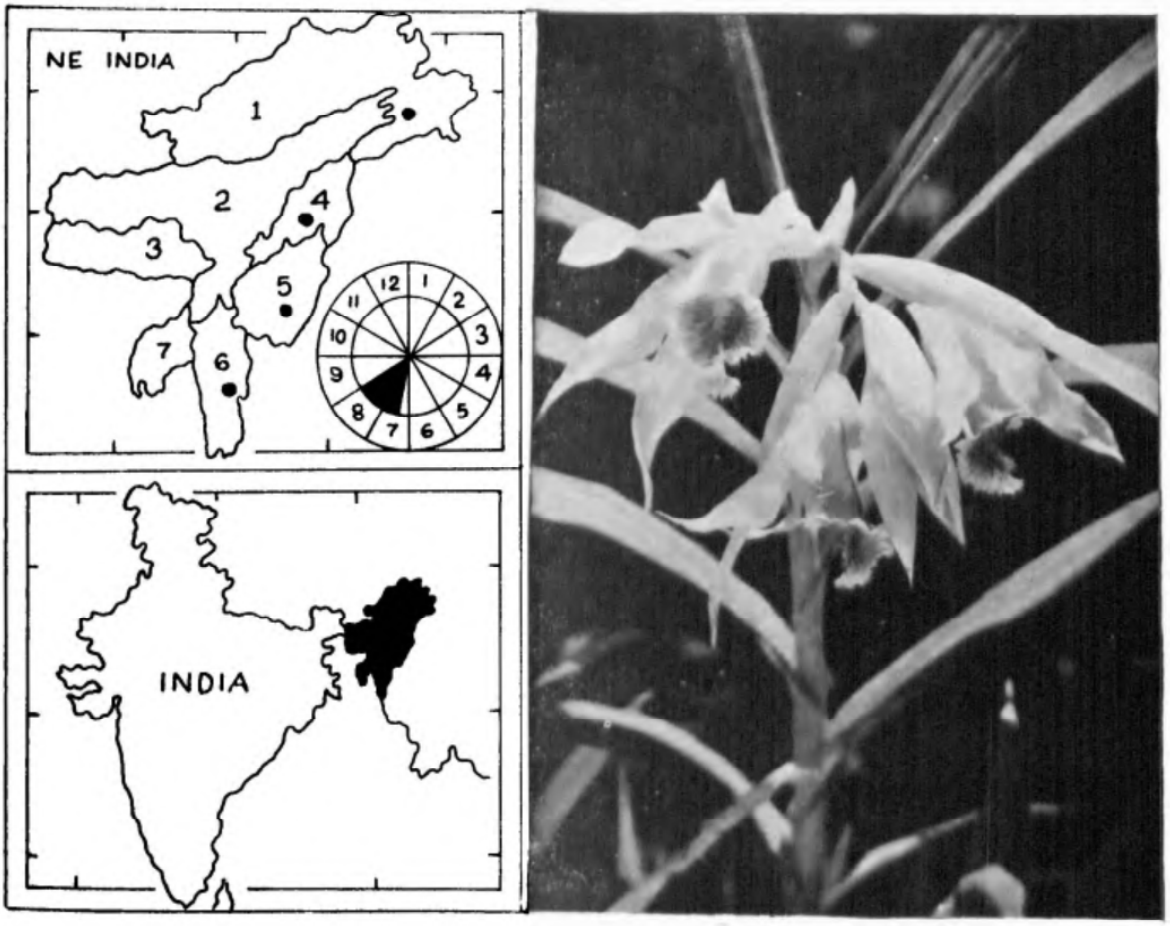
Description: Terrestrial. Pseudobulbs narrowly fusiform, 1-leaved. Leaves long petioled, narrowly elliptic. Inflorescences longer than the leaves; racemes few-flowered. Flowers lax, purplish-brown. *Plate 74*

Flowering: May.

Distribution: INDIA (Arunachal Pradesh, Meghalaya, Nagaland, Sikkim).

Notes: Grows in moist shady areas. Gradual depletion is due to habitat destruction.

Status: Threatened.



Thunia marshalliana Rolfe

The other species viz., *T. khasiana* Hook. f. from Meghalaya is becoming rare in wild due to habitat destruction.

Thunia marshalliana Rolfe in Linnea 12 : 65. 1877.

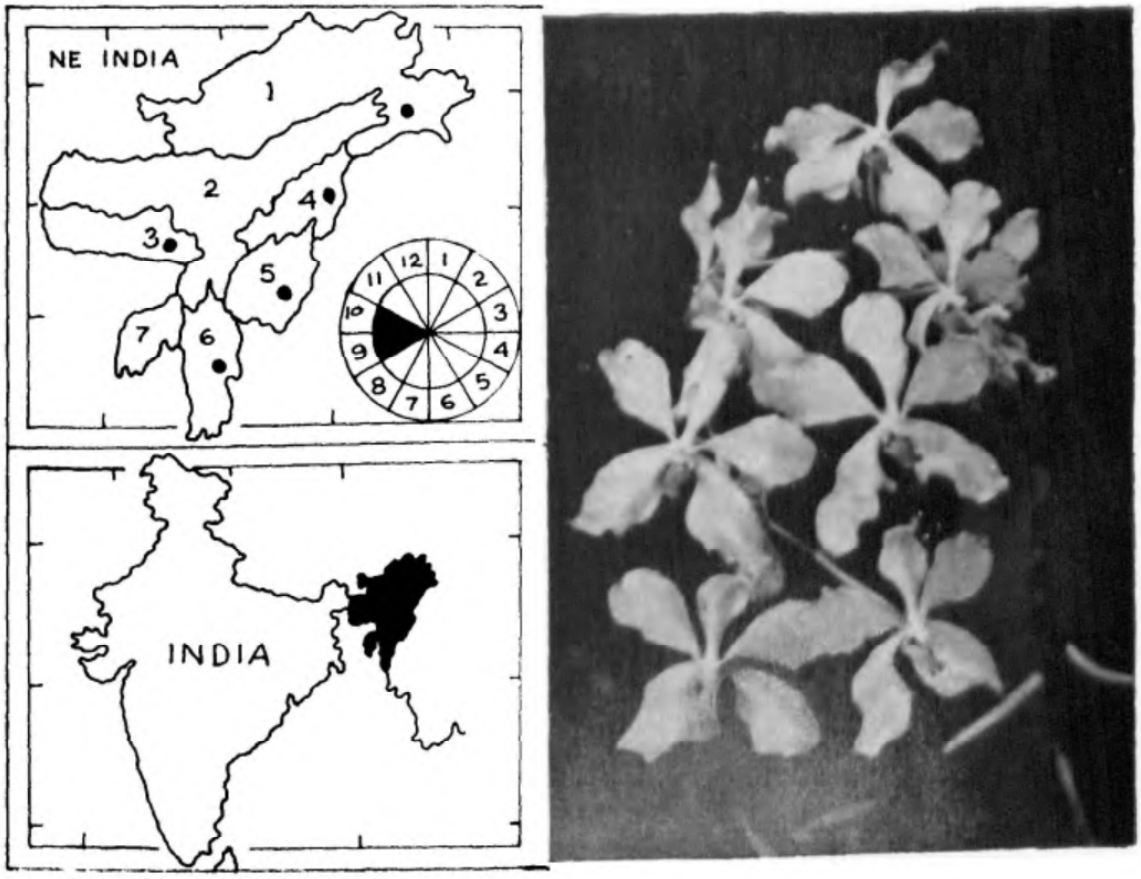
Description : Epiphytes. Stems long, fleshy, pendent, many-leaved. Leaves oblong-lanceolate, acuminate, nerves distinct, deciduous just after flowering. Flowers in terminal racemes, drooping, large, white; lip white with a yellow patch on the disc; bracts persistent. *Plate 75*

Flowering : July-August.

Distribution : INDIA (Arunachal Pradesh, Manipur, Mizoram. Nagaland), BURMA.

Notes : This species was once common. It is very near to *Thunia alba* (Lindl.) Rchb. f. but differes in having shorter stems, smaller flowers with an orange patch on the lip.

Status : Threatened.



Vanda coerulea Griff ex Lindl.

Vanda coerulea Griff. ex Lindl., Bot. Reg. sub. t. 30. 1847; Hook. f., Fl. Brit. Ind. 6 : 61, 1890.

Description : Epiphytes. Stems erect, few-leaved towards apex. Leaves oblong, apex unequally 2-lobed. Racemes lateral, erect or sub-erect, longer than the leaves, many-flowered. Flowers large, blue; lip much shorter than the petals. *Plate 76*

Flowering : September-October.

Distribution : INDIA (Arunachal Pradesh, Meghalaya, Manipur, Mizoram, Nagaland), BURMA, THAILAND.

Notes : This species is popularly known as 'Blue Vanda' It was first discovered by Griffith in Khasi Hills (Meghalaya) in 1857. It was once common in several localities in this region. Its Gradual depletion in wild is mainly due to large scale exploitation and habitat destruction.

Status : Threatened.

Vanda stangeana Reichb. f. in Bot. Zeit. 14 : 351. 1858; Hook. f., Fl. Brit. Ind. 6 : 54, 1890.

Description: Epiphytes. Stems stout, erect, few-leaved. Flowers large, golden green, tesselated with brown; lip white with red streaks at tip.

Flowering: July.

Distribution: INDIA (Manipur).

Notes: This species is imperfectly known. Rarely found in wild.

Status: Rare.

Yoania japonica Maxim. in Bull. Acad. St. Petersb. 18: 68, 1873; Hook. f., Fl. Brit. Ind. 6 : 123, 1890.

Description: Terrestrial. Leafless. Stems brownish-white. Racemes erect, few-flowered. Flowers small, very delicate.

Flowering: June-July.

Distribution: INDIA (Manipur, Nagaland), JAPAN.

Notes: A very delicate plant; scarce in wild due to habitat destruction. Similarly, the other species *Yoania prainii* King & Pantl. is also becoming rare in wild. This is recorded from Nagaland and Sikkim (India).

Status: Rare.

VANILLA

The species of *Vanilla* are found rarely in the regions of Sikkim and N.E. India. *Vanilla pilifera* Holtt., a climber was recorded from Mikir Hills of Assam (Borthakur & Hajra) for the first time. The species is becoming rare in wild due to habitat destruction.

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