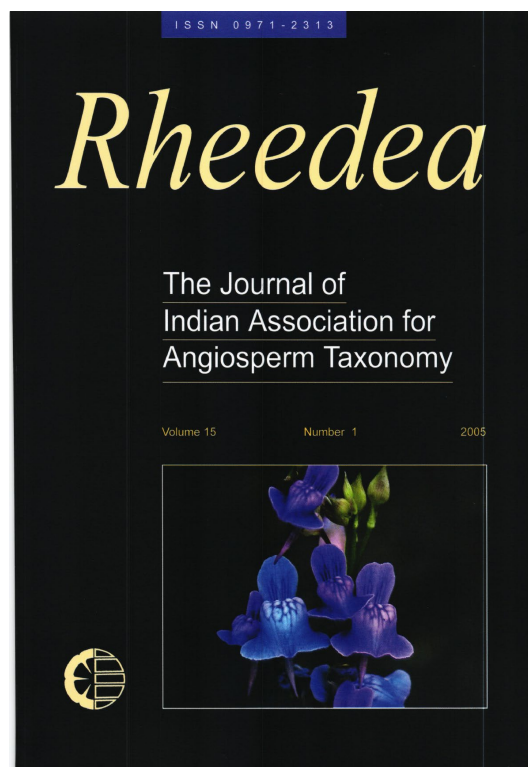




## An Orchid Digest of Manipur, Northeastern India

Sathish Kumar C. & P.C. Suresh Kumar



How to cite:

**Kumar C.S. & P.C. Suresh Kumar 2005.** An Orchid Digest of Manipur, Northeastern India. *Rheedeia* 15(1): 1–70.

<https://dx.doi.org/10.22244/rheedeia.2005.15.01.01>

*Received:* 12.02.2005

*Revised and accepted:* 15.09.2005

*Published in print:* 31.10.2005

*Published Online:* 01.01.2022

# An Orchid Digest of Manipur, Northeastern India

C. Sathish Kumar and P. C. Suresh Kumar

Tropical Botanic Garden and Research Institute  
Palode, Thiruvananthapuram 695 562, Kerala, India.

## Abstract

All orchids so far recorded from Manipur, Northeastern India are presented. This update has 280 species in 86 genera. It includes a new genus *Luisiopsis* Sathish & Suresh, one new species *Bulbophyllum manipurensense* Sathish & Suresh, two new records for India – *Bulbophyllum propinquum* Krzl. and *Phalaenopsis fasciata* Rchb.f., one new combination *Luisiopsis inconspicua* (Lindl.) Sathish & Suresh and several new state records. *Dendrobium* is the largest genus with 49 species followed by *Coelogyne* (20 spp.), *Cymbidium* (15 spp.), *Bulbophyllum* (14 spp.), *Eria* (14 spp.), *Oberonia* (10 spp.), *Vanda* (8 spp.), *Liparis* (8 spp.), *Habenaria* (7 spp.), *Peristylus* (6 spp.) and *Paphiopedilum* (5 spp.). A brief historical account of orchid collections in Manipur since George Watt's pioneer attempt of 1881-1882 is provided. The looming slash-and-burn cultivation practice prevalent in Manipur is the main threat to orchid flora. All the new and interesting taxa are illustrated and described.

Keywords: Orchids, New genus, New species, Country and state records, Manipur.

## Introduction

Manipur is a small state (23° 83' N latitudes and 93° 03' - 94° 78' E longitudes) in the Northeastern India (Fig. 1). It is bordered on the north by Nagaland, south by Mizoram and part of Myanmar, west by Assam and east again by part of Myanmar. It has a total geographical area of 22,327 sq. km with a central valley of 2,238 sq. km and is fortified on all sides by lofty mountains, the highest being Mount Tenupri of Iso which is 2999 m (9,822ft) above sea level. The valley is thickly populated by the Meities and the hills sparsely by the Nagas and Kukis. The recent spurt of violence by different insurgent outfits is making Manipur an unsafe place for field studies. Leaving this apart, Manipur is a botanical paradise and for orchid lovers, it is Nature's treasure trove opened.

Geologically, Manipur is made of Cretaceous lime stones on the eastern side with tertiary rocks and alluvium in the valleys. Average annual rainfall varies from 122 (Imphal) to 398 cm (Tamenglong). Temperature often goes down to -1°C in January and gradually rises to 30°C in September. Relative Humidity is the lowest in March (47%) and the highest in August (81%).

Geographic position, varying altitudes, presence of innumerable water bodies and the consequent micro-climates have jointly contributed to the richness of vegetation in Manipur. Sadly, the slash-and-burn cultivation in practice has already destroyed much of the primary forests of the state. The accounts of forests given by Watt (1888) and Keith (1936) are the things of the past.

## The Earlier Collectors

George Watt (1851-1930) was the first European to collect plants (1881-1882) from Manipur. His collections included orchids and most of them are now available at CAL and K. Watt did not publish any taxonomic account of plants of Manipur but his collections were studied by others, notably J. D. Hooker who immortalized Watt through *Dendrobium wattii* and *Impatiens wattii*, both based on Watt's collections from Manipur.

Charles Baron Clarke (1832-1906), a British botanist while working as Inspector of Schools at Shillong, explored Manipur in 1885 and made important

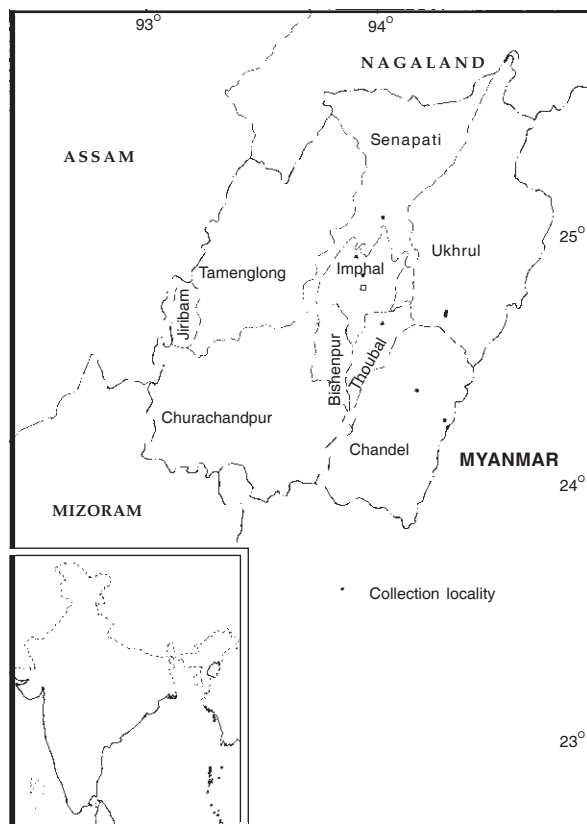


Figure 1. Map of Manipur

collections. In 1889, he published an exhaustive list of 'plants from Kohima and Muneypore' which included *Liparis spathulata* Lindl., *L. longipes* Lindl., *Agrostophyllum khasianum* Griff., *Pholidota calceolata* Lindl., *Aerides vandarum* Rchb.f., *Saccolabium ampullaceum* Lindl., *Zeuxine nervosa* Benth. ex Hook. f. and *Goodyera procera* Lindl. from Manipur. Clarke's specimens are at K. Alfred Karl Meebold (1863-1952) was a German world traveller who botanized Manipur during 1906-1907. His collections are available at CAL. Norman Loftus Bor (1893-1972), an agrostologist of Irish origin, was another botanist who visited Manipur several times between 1938 and 1945. His orchid collections, however, were studied by others like Summerhayes *et al.*

Francis (Frank) Kingdon-Ward (1885-1958) was a British traveller and 'plant hunter' who visited Manipur in 1927, 1946 and 1948 and made a very large collection of orchids and seeds, besides bulbs of other plants. Most of his collections are located at many European herbaria but a few stray collections are available at CAL. Like the earlier collectors, Kingdon-Ward did not publish any scientific account on his vast collections but wrote prolific travel accounts. 'Plant Hunter in Manipur' (1952) is one of his famous works. Summerhayes commemorated Kingdon-Ward by the orchid *Paphiopedilum wardii*.

Post independent India witnessed a few publications on orchids of Manipur. Important among them are those of Mukerjee (1953), Deb (1956, 1957, 1960, 1961), Chauhan (249 spp. in 60 genera: 2001) and Phukan (2002) (Fig. 2). State's website ([www.manipur.com](http://www.manipur.com)) contains many orchid photographs by Ranjan (Runjohn) Laishram.

## Materials and Methods

The senior author collected over 120 species of orchids from Manipur during a one month long expedition in 1996. These live specimens were brought down to TBGRI and reared. As and when flowered, they were critically studied, compared with authentic specimens at CAL and identified. Experts like the late Gunnar Seidenfaden and Paul Ormerod were consulted, if found necessary. All the specimens cited are deposited at TBGT unless otherwise mentioned. Spirit samples of flowers have also been maintained.

In this enumeration, detailed descriptions and illustrations are provided only for new and interesting taxa. The alphabetical enumeration part has the genus followed by a short paragraph on the general distribution, key features, number of species in the world, in India and Manipur. This is accompanied by key to species when there are more than one. Species enumeration has three components: nomenclature citation, a general statement indicating historical collections of species from Manipur and other details containing flowering & fruiting, habitat, occurrence within Manipur, general distribution, specimens examined and a note on key character of species, if any. If a species is included on the authority of an earlier worker it is cited. Artificial keys, analytical sketches, and photographs are given for easy identification.

Detailed study at CAL and TBGT, besides consultation of available literature on Manipur orchids, enabled us to enumerate 281 species in 86 genera. It included the following:

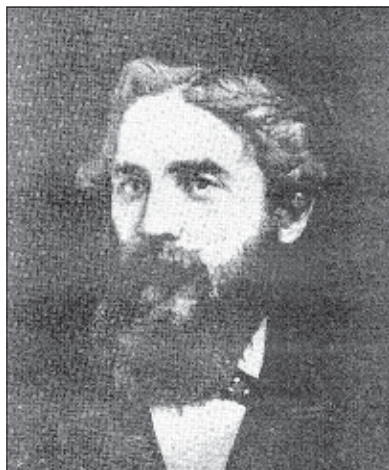
New genus: *Luisiopsis* Sathish *et* Suresh

New combination: *Luisiopsis inconspicua* (Hook. f.) Sathish *et* Suresh

New species: *Bulbophyllum manipurens* Sathish *et* Suresh

New records for India: 1. *Bulbophyllum propinquum* Krzl., 2. *Dendrobium parcum* Rchb. f. and 3. *Phalaenopsis fasciata* Rchb. f.

New records for Manipur: 1. *Cleisostoma discolor* Lindl., 2. *Cleisostoma williamsonii* (Rchb. f.) Garay, 3. *Eria globulifera* Seidenf., 4. *Vanda pumila* Hook. f. and 5. *Vanilla parishii* Rchb. f.



George Watt



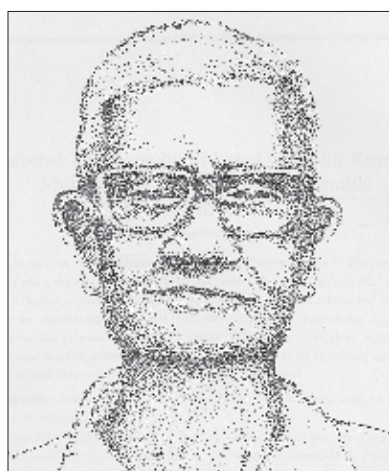
J. D. Hooker



C. B. Clarke



F. Kingdon-Ward

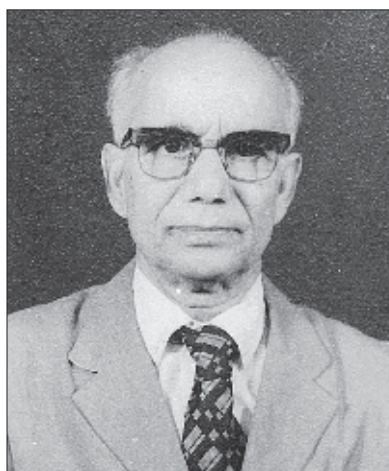


S. K. Mukerjee



N. L. Bor

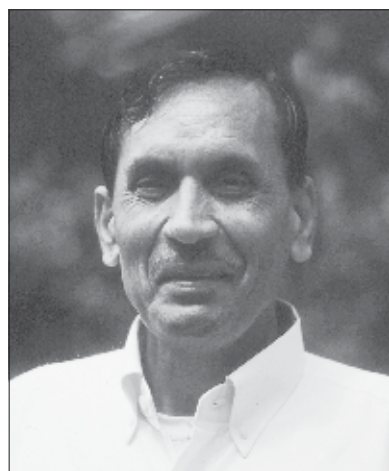
© Hunt Institute, 1999



D. B. Deb



S. J. Phukan



A. S. Chauhan

Figure 2. Pioneer orchid collectors of Manipur

## Key to Genera

- 1a. Flowers with two anthers; lip slipper shaped; lateral sepals fused to form a synsepal ..... **Paphiopedilum**
- 1b. Flowers with single anther; lip not slipper shaped; lateral sepals either free or if fused partially, not forming a synsepal.....**2**
- 2a. Leaves spirally arranged, convolute or altogether absent; pollinia soft and mealy, sectile or not .....**3**
- 2b. Leaves in two rows or rarely absent; pollinia hard and waxy, 2-8 ..... **18**
- 3a. Plants with root-stem tuberoids; rostellum shorter than the anther ..... **13**
- 3b. Plants without root-stem tuberoids; rostellum subequal to the anther .....**4**
- 4a. Flowers on a twisted spike; pollinia not sectile ..... **Spiranthes**
- 4b. Flowers not on twisted spike; pollinia sectile ..... **5**
- 5a. Stems woody; leaves plicate ..... **6**
- 5b. Stems fleshy, herbaceous; leaves conduplicate ..... **7**
- 6a. Stems branched; inflorescence unbranched; lip widest at base ..... **Tropidia**
- 6b. Stems unbranched; inflorescence branched; lip widest at apex .....**Corymborkis**
- 7a. Lip hairy or setose within ..... **Goodyera**
- 7b. Lip papillate within .....**8**
- 8a. Saprophytes; flowers in axillary racemes or fascicle..... **Cyrtosia**
- 8b. Autophytes; flowers in terminal racemes ..... **9**
- 9a. Leaves dark greenish-brown with golden or silver veins.....**12**
- 9b. Leaves uniformly green without coloured veins ..... **10**
- 10a. Tubers present, cylindric or ellipsoid ..... **Neottianthe**
- 10b. Tubers absent ..... **11**
- 11a. Lip with a long claw, stigmas on short processes; 1-or 2-flowered..... **Mymechis**
- 11b. Lip with a short claw, stigma sessile inflorescence many flowered ..... **Zeuxine**
- 12a. Lip spurred at base ..... **Anoectochilus**
- 12b. Lip spurless, saccate at base ..... **Odontochilus**
- 13a. Floral bracts larger than the flowers ..... **Brachycorythis**
- 13b. Floral bracts smaller than the flowers .....**14**
- 14a. Anther erect ..... **15**
- 14b. Anther bent back from column .....**Satyrium**
- 15a. Stigmalobes free, each on a stigmaphore extending from the column .....**Habenaria**
- 15b. Stigmalobes not free .....**16**
- 16a. Thecas at their base extending from column, rostellum forming a broad band above the coherent stigmalobes ..... **Pecteilis**
- 16b. Stigmalobes not freely extending in front of column .....**17**
- 17a. Stigmalobes connate with or adressed to hypochile of lip and staminodes, with short spur, ovary usually erect close to rachis .....**Peristylus**
- 17b. Stigmalobe not connate with base of lip, no spur, staminodes raising free above anthers ..... **Herminium**
- 18a. Anther erect in early bud, later becoming operculate; pollinia without stipes.....**19**
- 18b. Anther usually operculate; pollinia with a stipes .....**60**
- 19a. Large vines; stigma emergent ..... **Vanilla**
- 19b. Small herbs; stigma not emergent .....**20**
- 20a. Leaf solitary, appearing after flowering ..... **Nervilia**
- 20b. Leaves many, appearing together with flowers .....**21**
- 21a. Inflorescence terminal with large flowers; dorsal sepal 3.5-4 cm long..... **22**
- 21b. Inflorescence lateral with medium sized flowers, if terminal the flowers smaller; dorsal sepal less than 3.5 cm long ..... **24**
- 22a. Leaves conduplicate in bud ..... **23**
- 22b. Leaves convolute, plicate in bud..... **Cephalanthera**
- 23a. Pollinia elongate, soft and mealy; plants epiphytic or lithophytic ..... **Thunia**
- 23b. Pollinia clavate, hard or relatively soft; plants terrestrial ..... **Arundina**

- 24a. Epiphytic plants with 2, 4 or 8 pollinia; leaves not equitant .....25
- 24b. Terrestrial plants with 4 or 8 pollinia or epiphytic plants with equitant leaves and 4 pollinia.....36
- 25a. Pollinia 8.....26
- 25b. Pollinia 4 .....29
- 26a. Sepals joined into a tube; inflorescence usually of one flower .....27
- 26b. Sepals not joined into a tube; Inflorescence of many flowers.....28
- 27a. Pseudobulbs discoid, flowers 1-3.....**Porpax**
- 27b. Pseudobulbs ovoid to cylindrical; flowers many, second ..... **Cryptochilus**
- 28a. Pollinia joined by a long thin common caudicle ..... **Thelasis**
- 28b. Pollinia not with any long common caudicle ..... **Eria**
- 29a. Pollinia joined by caudicles .....30
- 29b. Pollinia without caudicles .....36
- 30a. Lip saccate at base ..... 33
- 30b. Lip not saccate at base .....31
- 31a. Lip base sigmoidally curved..... **Panisea**
- 31b. Lip base not sigmoidally curved..... 32
- 32a. Inflorescence single flowered; lip convolute around column .....**Pleione**
- 32b. Inflorescence many flowered; lip not convolute around column ..... **Coelogyne**
- 33a. Column short ..... **Pholidota**
- 33b. Column long .....34
- 34a. Pseudobulbs produced singly on a creeping rhizome .....35
- 34b. Pseudobulbs forming a chain, joined from apex to base ..... **Otochilus**
- 35a. Flowers funnel shaped at base ..... **Neogyna**
- 35b. Flowers not funnel shaped at base....**Dicksonia**
- 36a. Leaves laterally compressed.....**Oberonia**
- 36b. Leaves not laterally compressed .....37
- 37a. Flowers resupinate .....38
- 37b. Flowers non resupinate; column very short, straight .....39
- 38a. Green plants ..... 40
- 38b. Saprophytes ..... **Yoania**
- 39a. Sidelobes of lip produced backwards on both sides of the column ..... **Crepidium**
- 39b. Sidelobes altogether lacking ..... **Dienia**
- 40a. Pollinia 4 .....41
- 40b. Pollinia 8.....42
- 41a. Pollinia with caudicle, stipes and viscidium ..... **Anthogonium**
- 41b. Pollinia without caudicle, stipes or viscidium ..... **Liparis**
- 42a. Stems 1 leaved ..... 43
- 42b. Stems many leaved .....44
- 43a. Leaves long petioled, plicate, elliptic-lanceolate ..... **Tainia**
- 43b. Leaves sessile, cordate ..... **Nephelaphyllum**
- 44a. Sepals fused to form a jug shaped body, free at top; lip mobile..... **Acanthephippium**
- 44b. Sepals not forming as above; lip firmly attached to column ..... 45
- 45a. Plants with subterranean rhizome and grass like leaves ..... **Pachystoma**
- 45b. Plants without subterranean rhizome; leaves not grass like .....46
- 46a. Lip with a pair of calli at base ..... **Spathoglottis**
- 46b. Lip without such pair of calli at base ..... 47
- 47a. Column margins nearly the entire length connate with lip base ..... **Calanthe**
- 47b. Column margins free, lip connate only at or near base of column..... 48
- 48a. Pollinia 8 ..... 49
- 48b. Pollinia 4 ..... 50
- 49a. Lip spurred ..... **Phaius**
- 49b. Lip not spurred ..... **Cephalantheropsis**
- 50a. Lip with a transversal ridge between hypochile and epichile; inflorescence of many small flowers in a head ..... **Agrostophyllum**
- 50b. Lip with no such transversal ridge; inflorescence not a head ..... 50
- 51a. Pollinia joined by a long thin caudicle ..... 52
- 51b. Pollinia not joined by caudicle ..... 53
- 52a. Column foot distinct, short; operculum horizontal on top of column not beaked ..... **Phreatia**

- 52b. Column foot absent; operculum vertical below column, beaked ..... **Thelasis**
- 53a. Column with vertical arms or lobules containing the stigmata ..... **Ceratostylis**
- 53b. Column without vertical arms ..... **Eria**
- 54a. Pseudobulbs uninodal ..... **55**
- 54b. Pseudobulbs plurinodal ..... **58**
- 55a. Stipes two ..... **Sunipia**
- 55b. Stipes nil ..... **56**
- 56a. Inflorescence 1 flowered; lateral sepals attached to the apex of column foot.....**Drymoda**
- 56b. Inflorescence many flowered; lateral sepals attached to the lateral sides of the column foot..... **57**
- 57a. Lateral sepals elongate, involute, firmly united along both margins forming a horn or pouch like structure..... **Rhytionanthos**
- 57b. Lateral sepals not elongate and free along the margins ..... **Bulbophyllum**
- 58a. Stems branched; flowers last only a day ..... **Flickingeria**
- 58b. Stems unbranched; flowers long lasting ..... **59**
- 59a. Flowers solitary from between leaves ..... **Epigeneium**
- 59b. Flowers many on a raceme or a fascicle .....**Dendrobium**
- 60a. Plants always monopodial ..... **61**
- 60b. Plants sympodial ..... **85**
- 61a. Pollen masses completely divided ..... **62**
- 61b. Pollen masses not so ..... **75**
- 62a. Column foot distinct ..... **63**
- 62b. Column foot absent ..... **67**
- 63a. Lip with a distinct spur or sac..... **64**
- 63b. Lip with no distinct spur or sac ..... **65**
- 64a. Spur with a longitudinal septum.....**Cleisostoma**
- 64b. Spur without a septum ..... **Kingidium**
- 65a. Plants terrestrial or lithophytic; lip with a long claw at base ..... **Doritis**
- 65b. Plants epiphytic; lip without claw ..... **66**
- 66a. Plants leafy during flowering; operculum without any fine thread.....**Thrixspermum**
- 66b. Plants leafless during flowering; operculum with a lateral pair of fine threads.....**Chiloschista**
- 67a. Lip adnate to the column, immovable ..... **68**
- 67b. Lip not adnate to the column, movable ..... **70**
- 68a. Lip with distinct spur or sac ..... **69**
- 68b. Lip without spur or sac ..... **Vandopsis**
- 69a. Midlobe of lip fringed or dentate.....  
..... **Ornithochilus**
- 69b. Midlobe of lip not as above ..... **72**
- 70a. Sac of lip hairy within ..... **Acampe**
- 70b. Sac of lip not hairy ..... **71**
- 71a. Flowers red; lip much shorter than the dorsal sepal ..... **Renanthera**
- 71b. Flowers white with purple markings; lip as long or longer than the dorsal sepal..... **Schoenorchis**
- 72a. Sepals and petals broad, ovate, fleshy ..... **73**
- 72b. Sepals and petals narrow, spatulate, not fleshy ..... **74**
- 73a. Long-stemmed plants; stipes very broad ..... **Esmeralda**
- 73b. Short-stemmed plants; stipes narrow, spatulate ..... **Hygrochilus**
- 74a. Spur short, conical ..... **Arachnis**
- 74b. Spur long, cylindrical ..... **Armadorum**
- 75a. Pollinia whole, not cleft, split or porate.....  
..... **Luisiopsis**
- 75b. Pollinia more or less but not completely cleft or split or porate ..... **76**
- 76a. Pollinia porate ..... **77**
- 76b. Pollinia cleft or split ..... **80**
- 77a. Leaves terete ..... **Luisia**
- 77b. Leaves dorsiventral ..... **78**
- 78a. Spur short, saccate; epichile margined with hairs ..... **Gastrochilus**
- 78b. Spur long, cylindric or extincitoriform ..... **79**
- 79a. Midlobe ligulate ..... **Ascocentrum**
- 79b. Midlobe more or less elliptic .... **Holcoglossum**
- 80a. Column foot short, distinct ..... **81**
- 80b. Column foot absent or indistinct ..... **83**

- 81a. Leaves terete ..... **Papilionanthe**  
 81b. Leaves dorsiventral ..... **82**  
 82a. Flowers arranged on four sides; spur very  
 conspicuous ..... **Aerides**  
 82b. Flowers distichously arranged; spur lacking  
 ..... **Phalaenopsis**  
 83a. Stipes short and broad; viscidium broadly  
 orbicular ..... **Vanda**  
 83b. Stipes linear, often widening apically ..... **84**  
 84a. Large plants with broad and fleshy leaves  
 having many light coloured veins .....  
 ..... **Rhynchostylis**  
 84b. Small plants with small leaves and no light  
 coloured veins ..... **Uncifera**  
 85a. Inflorescence terminal, often branching  
 ..... **Polystachya**  
 85b. Inflorescence lateral, always unbranched  
 ..... **86**  
 86a. Pollinium with short strap shaped stipes  
 ..... **87**  
 86b. Pollinium without stipes..... **Cymbidium**  
 87a. Raceme erect; operculum with two small  
 processes at apex ..... **Eulophia**  
 87b. Raceme nodding; operculum with no such  
 processes ..... **Geodorum**

## Enumeration

### **Acampe Lindl.**

An Old World genus of about 6 epiphytic or lithophytic species characterized by woody habit, thick and fleshy leaves and brittle flowers marked by reddish brown stripes. Five species are known from India with three in Manipur.

- 1a. Leaves 4-6 cm broad; spur short, conical.....  
 ..... **A. rigida**  
 1b. Leaves less than 2.5 cm broad; spur long,  
 cylindrical ..... **2**  
 2a. Inflorescence much branched, as long as or even  
 longer than leaves ..... **A. ochracea**  
 2b. Inflorescence unbranched, much shorter than  
 the leaves ..... **A. papillosa**

1. **Acampe ochracea** (Lindl.) Hochr., Bull. N. Y. Bot. Gard. 6:270.1910; Seidenfaden, Opera Bot. 95:48.1988; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 85. 2001. *Saccolabium ochraceum* Lindl., Bot.

Reg. 28: misc. 2.1842; Hook. f., Fl. Brit. India 6:62.1890.

2. **Acampe papillosa** (Lindl.) Lindl., Fol. Orch. *Acampe* 2.1853; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 74. 1984; Ghatak & Devi in Vij (Ed.), Biol. Cons. Cult. Orch. 358. 1986; Seidenfaden, Opera Bot. 95:49.1988; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 85. 2001. *Saccolabium papillosum* Lindl., Bot. Reg., 18:T. 1552.1833 (excl.syn.); Hook. f., Fl. Brit. India 6:63. 1890 (excl. syn. *Sarcochilus praemorsus* Spreng.); King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8:219. Pl. 290. 1898.

Devi and Ghatak reported of this species in Sadar hills.

3. **Acampe rigida** (Buch.-Ham. ex J. E. Sm.) Hunt, Kew Bull. 24: 98.1970; Seidenfaden, Opera Bot. 95:45.1988; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 85. 2001. *Aerides rigida* Buch.-Ham. ex J. E. Sm. in Rees, Cyclop. 39. 1819. *Vanda longifolia* Lindl., Gen. Sp. Orch. 215. 1833. *Acampe longifolia* (Lindl.)Lindl., Fol. Orch. *Acampe* 1.1853; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing.74.1984; Ghatak & Devi in Vij (Ed.), Biol. Cons. Cult. Orch.358. 1986: *Saccolabium longifolium* (Lindl.)Hook. f., Fl. Brit. India 6:62. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 220, Pl. 202. 1898.

**Fig. 3a**

Devi and Ghatak collected this species from Mao in Northern Manipur. We collected it at Saikul and it flowered subsequently under cultivation at TBGRI.

*Specimens Examined:* INDIA, **Manipur:** Saikul, flowered under cultivation 20 June 1996 C. Sathish Kumar 28750 (TBGT!).

### **Acanthephippium Blume**

An Indo-Malesian genus of a dozen terrestrial species characterized by ovoid to clavate, fleshy pseudobulbs bearing more than 2 large elliptic-ovate leaves and a lateral raceme of large strikingly coloured, often jug-shaped flowers. Three species are known from India and one in Manipur.

**Acanthephippium sylhetense** Lindl., Gen. Sp. Orch. 117.1833; Hook. f., Fl. Brit. India 5: 815.1890; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 85. 2001.

### **Aerides Loureiro**

An Indo-Malesian genus of about 20 epiphytic species with fairly stout stems, thick, fleshy, loriform leaves and lateral, simple or branched racemes of large,



usually much showy, variously coloured, often sweet scented, long lasting flowers. Eight species are known to occur in India. Two species are available in Manipur.

- 1a. Flowers white to white suffused with pink; midlobe turning upwards, much smaller than sidelobes ..... **A. odorata**  
 1b. Flowers purple or pink; midlobe forward pointing, larger than sidelobes..... **A. multiflora**

1. **Aerides multiflora** Roxb., Pl. Corom. 3:68. pl. 271.1819; Hook. f., Fl. Brit. India 5:47. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 212. Pl. 283.1898; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing.74. 1984; Seidenfaden, Opera Bot. 95:249. 1988. **Fig. 3b**

Devi and Ghatak reported this species from Imphal.

*Specimens Examined:* INDIA: **Manipur:** Kangla C. Sathish Kumar 28712(TBGT!)

2. **Aerides odorata** Lour., Fl. Cochinch. 2: 525.1790; Hook. f., Fl. Brit. India 6: 47. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 212. Pl. 282.1898; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 74. 1984; Seidenfaden, Opera Bot. 95: 242.1988; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 85. 2001.

Devi and Ghatak recorded this species from Chandel. We collected it from Imphal and Thoubal. This species flowered many times under cultivation at TBGRI.

*Specimens Examined:* INDIA:**Manipur:** Kangla, flowered on 24.05.1996 C. Sathish Kumar 28739 (TBGT!)

### **Agrostophyllum** Blume

A genus of about 100 epiphytic species distributed from Seychelles through Indo-Malesia to the islands of the Pacific and characterized by long, flattened stems with 2-ranked leaves and terminal heads of small flowers with sac-shaped lip. Five species are known from India. Two species occur in Manipur.

- 1a. Leaves 15-25 mm broad; petals 3 veined.....  
 ..... **A. planicaule**  
 1b. Leaves to 10-11 mm broad; petals 5 veined.....  
 ..... **A. callosum**

1. **Agrostophyllum callosum** Rchb.f. in Seem. Fl. Vit. 296. 1868; Clarke, J. Linn. Soc. 25:72. 1889; Hook. f., Fl. Brit. India 5: 824, *p. p.* 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 155. Pl. 212.1898; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):150.1953; Deb, Bull. Bot. Surv. India 3(2): 126; Seidenfaden, Opera

Bot. 89:127.1986; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 85. 2001.

Clarke's report of this species was from Kohima, Nagaland. Mukerjee collected it from Lamlang at 2000 m. on 21 April 1948. Deb (1961) says it is common at 1050-2400m.

*Specimens Examined:* Manipur: 11.2.1954 D. B. Deb 1528 & 1894 (CAL!); 9.6.1948 Dr S K Mukerjee 3000 (CAL!); December 1907 A. Meebold 6904 (CAL!).

2. **Agrostophyllum planicaule** (Wallich ex Lindl.) Rchb.f., Walp. Ann. 6:909. 1864; Seidenfaden in Opera Bot. 89:128.1986. *Eria planicaulis* Wallich ex Lindl., Bot. Reg. 28:8. Misc. 4.1840. *Agrostophyllum khasianum* Griffith, Calc. J. Nat. Hist. 4: 378. T.19, 1844; Hook. f., Fl. Brit. India 5: 824.1890; Clarke, J. Linn. Soc. 25: 72. 1889; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 154. Pl. 210.1898; Deb, Bull. Bot. Surv. India 3(2):126. 1961; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 85. 2001.

Clarke collected it from the western part at 350 feet.

### **Anoectochilus** Blume

An Indo-Malesian genus of about 35-40 species of ground orchids with very attractive foliage and a terminal raceme of a few to many flowers. Thirteen species are known from India with one in Manipur.

**Anoectochilus roxburghii** (Wallich) Lindl., Gen. Sp. Orch. 499.1830; Hook. f., Fl. Brit. India 6: 95.1890; Clarke, J. Linn. Soc. 25:73. 1889; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 293. Pl. 390. 1898; Deb, Bull. Bot. Surv. India 3(2):126. 1961; Seidenfaden, Dansk Bot. Ark. 32(2): 52.1978; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 85. 2001. *Chryopaphus roxburghii* Wallich, Tent. Fl. Nepal. 37. fig. 27. 1826.

Clarke recorded this species from west Manipur at 1000 ft. Pradhan (1976) also tells of its occurrence in Manipur.

### **Anthogonium** Wallich ex Lindl.

An interesting monotypic genus represented by *A. gracile* Wallich ex Lindl. found only in Asian mainland from India to China through Nepal, Bhutan, Myanmar, Thailand and Vietnam. It is a ground orchid with tuberous rhizome bearing two plicate leaves, basally forming a long pseudostem and a long raceme of a few very attractive, deep pink to white flowers.

**Anthogonium gracile** Wallich ex Lindl., Gen. Sp. Orch. 426.1840; Hook. f., Fl. Brit. India 5:822. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8:



Figure 3. a. *Acampe rigida* (Buch.-Ham. ex J.E. Sm.) Hunt ; b. *Aerides multiflora* Roxb.; c. *Ascocentrum ampullaceum* (Roxb.) Schltr.; d. *Bulbophyllum manipurens* Sathish & Suresh; e. *Cymbidium tigrinum* Rchb. f.

96.Pl. 134. 1898; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):150. 1953; Deb, Bull. Bot. Surv. India 3(2):126.1961; Seidenfaden, Opera Bot. 89:67.1986; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 85. 2001.

Recording this species from Ukhrul at 2000 m, Mukerjee commented 'I saw flowers varying in colour from deep purple to pure white'. Deb collected it from East Manipur. We collected it in fruits and dried up condition in April at Kasom Khullen, East Manipur and it flowered under cultivation at TBGRI.

*Specimens Examined:* INDIA, **Manipur:** Ukhrul S. K. Mukerjee 5303 (CAL!); East Deb 2530 (CAL!); Khasom Khullen C. Sathish Kumar 28763 (TBGT!).

### Arachnis Blume

An Indo-Malesian epiphytic genus of about a dozen species characterized by *Vanda* like habit, fairly long simple or branched racemes of stunningly coloured flowers, popularly known as spider orchids. Two species are believed to occur in India and one in Manipur.

**Arachnis labrosa** (Lindl. & Paxt.) Rchb.f., Bot. Centralbl. 28:343. 1886; Tan, Selbyana 2: 367. 1976; Seidenfaden, Opera Bot. 95:140. 1988. *Arrhynchium labrosum* Lindl. & Paxt., Paxton Fl. Gard. 1:142. 1850. *Renanthera bilinguis* Rchb.f., Bonplandia 2:93.1854. *Arachnanthe bilinguis* (Rchb.f.) Benth., J. Linn. Soc.18:332.1881; Hook. f., Fl. Brit. India6:28. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 210. Pl. 280. 1898: *Armadorum labrosum* (Lindl. & Paxt.) Schltr., Fed. Repert. 10:197. 1911; Pradhan, Ind. Orch. Guide to Iden. Cult. 571.1979.

We collected this species from Imphal and it flowered under cultivation at TBGRI, one inflorescence lasting over two years.

*Specimens Examined:* INDIA, **Manipur:** Imphal C. Sathish Kumar 28747 (TBGT!).

### Armadorum Breda

An Indo-Malesian epiphytic genus of 3 species closely related to *Arachnis* and characterized by narrow and often spathulate sepals and petals with a long cylindrical spur. Only one species is found in India recorded only from Manipur.

**Armadorum senapatianum** Phukan & Mao, Orch. Rev. 110: 298. 2002.

Phukan and Mao described this new species. We haven't seen any specimen of it.

### Arundina Blume

*Arundina* is a monotypic Indo-Malesian genus of ground orchids with reedy habit, grass like leaves and a terminal raceme of large, showy, pinkish-purple flowers. It enjoys wide distribution in India.

**Arundina graminifolia** (D. Don) Hochr., Bull. N. Y. Bot. Gard. 6: 270. 1910; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):150. 1953; Deb, Bull. Bot. Surv. India 3(2): 126.1961; Pradhan, Ind. Orch. Guide to Iden. Cult. 439. 1979; Seidenfaden in Opera Bot. 89:16.1986; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 85. 2001. *Bletia graminifolia* D. Don, Prodr. Fl. Nepal. 29. 1825. *Arundina chinensis* Blume, Bijdr. 402. 1825; Hook. f., Fl. Brit. India 5: 857. 1890. *Arundina bambusifolia* Lindl., Bot. Reg. 27. misc.2.1841; Hook. f., Fl. Brit.India 5: 857.1890; Clarke, J. Linn. Soc. 25: 73. 1889; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 113. Pl. 156. 1898.

Clarke's report was actually from Kohima, Nagaland. Mukerjee recorded this from Ukhrul and said it was common at lower elevations.

*Specimens Examined:* INDIA, **Manipur,** Kangchup 26.11.1959 D. B. Deb 94 (CAL!); Imphal 16.1.1952 D. B Deb 306 (CAL!); Mongonyung 2.8.1953 D. B. Deb 806 (CAL!); Shunju 12.9.1956 D. B. Deb 2665 & 26668 (CAL!); Kachching hills D. B. Deb 1234 (CAL!); Carong 3500 ft., 16 May 1882 G. Watt 7135 (CAL!); Laireain 5 April 1882, G. Watt 6257 (CAL!); Ukhrul 1700 m. 25.6. 1948 Dr S K Mukerjee 3121 (CAL!).

### Ascocentrum Schltr.

A small Indo-Malesian genus of about 8 epiphytic species characterized by compactly arranged and exceedingly beautiful flowers with along cylindrical spur on lip. Three species are known from India. Two species and a distinct variety are found in Manipur.

- 1a. Leaves flat, usually dark spotted; spur equalling ovary ..... **A. ampullaceum**
- 1b. Leaves terete, unspotted; spur twice as long as ovary ..... **A. himalaicum**

1. **Ascocentrum ampullaceum** (Roxb.) Schltr., Fed. Repert. Beih. 1: 975.1913; Pradhan, Ind. Orch. Guide to Iden. Cult.560.1979; Christenson, Amer. Orch. Soc. Bull. 55(2):106. 1986; Seidenfaden, Opera Bot. 95: 314.1988; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 85. 2001. *Aerides ampullacea* Roxb., Fl. Ind. 3: 476. *Saccolabium ampullaceum* (Roxb.)Lindl., Sert. Orch. T. 17.1838; Hook. f., Fl. Brit. India 6: 64. 1890; Clarke, J. Linn. Soc. 25: 173. 1889; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 220. pl. 293. 1898; Deb, Bull. Bot. Surv. India 3(2):129.1961;

Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 74. 1984. **Fig. 3c**

Clarke collected this species from west Manipur (3000 ft.). Devi and Ghatak found it at Tengnoupal. We got specimens from H. B. Singh, the then Orchid Development Officer at Khongapatt. This is believed to be a variable species. Pradhan (1979) reported a deep orange red form from Nagaland and Manipur which he called *A. ampullaceum* var. *aurantiacum*.

*Specimens Examined*: INDIA: **Manipur**: Khongapatt 29.03. 1996 C. Sathish kumar 28732 (TBGT!).

2. **Ascozentrum himalaicum** (Deb, Sengupta & Mallick) Christ., Notes Roy. Bot. Gard. Edinburgh 44(2): 256.1987; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 86. 2001. *Saccolabium himalaicum* Deb, Sengupta & Mallick, Bull Bot. Soc. Bengal 22: 213.1968(1970). *Holcoglossum junceum* Tsi, Acta Phytotax. Sin. 20:442. 1982.

This was first collected from Manipur by Kingdon-Ward during his 1946 expedition when his trip was jointly sponsored by the New York Botanic Garden and the U. S. Army. This specimen is deposited in the Herbarium of New York Botanic Garden. At CAL there is an old collection from Sima, Kachin Hills, Upper Burma (at 6000' December 1899 *Shaik Mokim 71*, CAL!, paratype) and another one from Shemganga, Bhutan (18.11.1964 *D. B. Deb 424*, CAL!).

### **Brachycorythis Lindl.**

An Old World genus of 33 terrestrial species (Summerhayes, 1955) characterized by small tuberoids, long leafy stems which gradually transform into an inflorescence of brightly coloured flowers. Eight species are known from India. Only one species occurs in Manipur.

**Brachycorythis galeandra** (Rchb. f.) Summerh., Kew Bull. 2:242. 1955; Seidenfaden, Opera Bot. 114: 42. 1992 & Contr. Orch. Fl. Thailand XIII: 9. 1997. *Platanthera galeandra* Rchb. f., Linnaea 25: 266. 1852. *Habenaria galeandra* (Rchb. f.) Benth., Fl. Hongkong. 363. 1861; Hook. f., Fl. Brit. India 6:163. p. p. 1890. *Habenaria galeandra* var. *major* Hook. f., Fl. Brit. India 6: 164. 1890. *Phyllomphax galeandra* (Rchb. f.) Schltr., Fed. Repert. 4: 199.1919; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 154. 1953; Deb, Bull. Bot. Surv. India 3(2):129.1961.

Mukerjee says this species decorates the open slopes of Ukhrul at 1800-2100 m. Deb tells us of its occurrence in Nongmaiching.

### **Bulbophyllum Thouars**

A pantropical genus of about 900 epiphytic or lithophytic species with long, creeping rhizomes bearing a series of variously shaped, 1 or 2-leaved pseudobulbs having a lateral raceme or umbel of small but pretty flowers. Eighty six species are known from India. Fourteen occur in Manipur including a new species and a new record for India.

- 1a. Flower large, solitary.....2
- 1b. Flowers small in raceme or umbel .....4
- 2a. Leafy during flowering.....3
- 2b. Leafless during flowering.....**B. moniliforme**
- 3a. Pseudobulbs distantly arranged; lateral sepals falcate, sigmoid ..... **B. lobbii**
- 3b. Pseudobulbs closely arranged; lateral sepals not falcate ..... **B. leopardinum**
- 4a. Flowers on a raceme .....5
- 4b. Flowers on an umbel ..... 10
- 5a. Pseudobulbs 2-leaved .....**B. triste**
- 5b. Pseudobulbs 1-leaved .....6
- 6a. Flowers 2-3 on a loose inflorescence..... **B. reptans**
- 6b. Flowers many on a thick inflorescence ..... 7
- 7a. Pseudobulb much reduced.....**B. khasyanum**
- 7b. Pseudobulbs normal ..... 8
- 8a. Petals triangular acute with irregular edges ..... **B. propinquum**
- 8b. Petals aristate or subulate or with a long thread at apex ..... 9
- 9a. Inflorescence long peduncled; stelidia triangular .....**B. manipurense**
- 9b. Inflorescence short peduncled; stelidia not triangular, forwards curved, more or less obtuse at apex ..... **B. careyanum**
- 10a. Flowers sweet scented; petal 1-veined..... **B. odoratissimum**
- 10b. Flowers not scented; petal 3-veined ..... 11
- 11a. Lateral sepals more than 25 mm long; stelidia spatulate .....**B. reichenbachianum**
- 11b. Lateral sepals less than 20 mm long; stelidia narrow pointed ..... 12

- 12a. Petals cuspidate..... **B. guttulatatum**  
 12b. Petals obtuse..... **13**  
 13a. Scape ± 10 cm long, shorter than the leaves.....  
 .....**B. umbellatum**  
 13b. Scape above 20 cm long, longer than the leaves  
 .....**B. elatum**

**1. Bulbophyllum careyanum** (Hook.) Spreng., Syst. 3: 732.1826; Hook. f., Fl. Brit. India 5: 760. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 71. Pl. 97. 1898; Seidenfaden, Dansk Bot. Ark. 33(3):145.1979; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 86. 2001. *Anisopetalon careyanum* Hook., Exot. Fl. 2: Pl. 149. 1825.

*Specimens Examined:* INDIA, **Manipur:** Kasom Khullen 23.03.1996 C. Sathish Kumar 28719 (TBGT!).

**2. Bulbophyllum elatum** (Hook. f.) J. J. Smith, Bull. Buitenz. 2. s. 8:23.1912; Seidenfaden, Dansk Bot. Ark. 29(1): 210.1973; Garay *et al.*, Nord. J. Bot. 14(6):628. 1994. *Cirrhopetalum elatum* Hook. f., Fl. Brit. India 5: 775. 1890 & Ic. Pl. 21:T. 2052. 1891; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 93. Pl. 130.1898; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 86. 2001.

We found this species under cultivation at Thoubal.

**3. Bulbophyllum guttulatatum** (Hook. f.) Balakr., J. Bombay Nat. Hist. Soc. 67: 66.1970; Shukla & Baishya, J. Bombay Nat. Hist. Soc. 76: 227.1979; Garay *et al.*, Nord. J. Bot. 14(6): 631.1994. *Bulbophyllum umbellatum* Lindl., Bot. Reg. 31: t. 44. 1845, not Lindl. 1830. *Cirrhopetalum guttulatatum* Hook. f., F. Brit. Ind. 5: 776. 1890.

Shukla and Baishya reported this species as occurring in Tipaimukh road at 1350 m. on *Albizia* sp.

**4. Bulbophyllum khasyanum** Griffith, Not. 3:284. 1851; Seidenfaden, Dansk Bot. Ark. 33(3): 180. 1979. *B. cylindraceum* var. *khasyanum* Hook. f., Fl. Brit. India 5:765. 1890. *B. cylindraceum* auct. non Lindl.; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 70. Pl. 96. 1898.

**5. Bulbophyllum leopardinum** (Wallich) Lindl., Gen. Sp. Orch. 48.1830; Hook. f., Fl. Brit. India 6: 756. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 67. Pl. 92. 1898; Seidenfaden, Dansk Bot. Ark. 33(3): 28. 1979; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 86. 2001. *Dendrobium leopardinum* Wallich, Tent. Fl. Nepal. 1: 39. t. 28. 1824.

**6. Bulbophyllum lobbii** Lindl., Bot. Reg. sub T. 29.1847; Hook. f., Fl. Brit. India 5: 755. 1890; Seidenfaden, Dansk Bot. Ark. 33(3):21.1979; Kataki

*et al.*, Threat. End. Orch. Northeast Ind. 10.1984; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 86. 2001.

**7. Bulbophyllum manipurense** Sathish *et* Suresh, *sp. nov.* **Figs. 3d, 4**

*Pertinens sectorum* Careyana Pfitz. e *Bulbophyllum*. *Affinis* *Bulbophyllum careyanum*, *B. crassipes* et *B. nesiotetes* sed differt a omnis pedunculis longioribus (ad 7 cm), rhachis erectus, sepala dorsalis breviter et obtusa, petala ovata vel triangularis et margine erosa, ad apicem aristata, labium auriculae acuteque triangularis et stelidia triangularis et acuminata.

*Type:* INDIA, **Manipur;** East; Kason Khullen. 700 m. 18 April 1996. C. Sathish Kumar 28751 (Holotype and Isotypes, TBGT). Flowered under cultivation at TBGRI on 12 June 1997.

Belonging to Sect. Careyana Pfitz. of *Bulbophyllum* and allied to *B. careyanum*, *B. crassipes* and *B. nesiotetes* Seidenf. but differing in the longer peduncled inflorescence, erect rachis, much shorter and blunter dorsal sepal and triangular, 2 mm long stelidia.

*Pseudobulbous herbs.* Rhizome 4-5 mm thick, plurinodal and nodes ensheathed. *Pseudobulbs* 4.5-5 x 2-2.5 cm, ellipsoid, slightly laterally compressed, 4 angled, 1 leaved. *Leaves* oblong, shortly petioled, 20-20.5 x 2.5-3 cm, unequally and obtusely 2-lobed at apex. *Inflorescence* a lateral erect raceme of dense flowers; scape 7 cm long, subtended by copular bracts below. *Flowers* orange yellow to brown with dirty smell; floral bracts 5 x 2.8-3 mm, ovate, gland-dotted, 3-veined and acute at apex; dorsal sepal 3.5 - 4 x 2 mm, oblong-ovate, obtuse, 3-veined, gland dotted; lateral sepals 5 x 3 mm, elliptic ovate, boat-shaped, 4 veined, gland dotted, acute at apex; petals triangular ovate, 2.2 x 1.5 mm, 1-veined, margins erose, aristate at apex; lip thick and fleshy with two triangular auricles at base; auricles 2.5 x 2 mm, medianly grooved, obtuse at apex; column 2 mm long with 1 mm long stelidia above and 2 mm long column foot below to which lateral sepals, petals and lip are attached; operculum 1 mm, 2-celled with 2 pollinia. *Fruits* not observed.

*Flowering:* May-June

*Habitat:* Evergreen forests at 700 m.

*Occurrence:* India, Manipur, Kasom Khullen.

*Distribution:* Endemic.

*Specimens Examined:* INDIA, **Manipur,** Kasom Khullen: Flowered under cultivation on 12 June 1997, C. Sathish Kumar 28751 (holo and iso, TBGT!).

*Note:* We sent a series of sketches, photographs and

observations on our collection to Paul Ormerod (Australia) who discovered the novelty and commented on the affinities in 1999.

8. **Bulbophyllum moniliforme** Parish & Rchb. f., Trans. Linn. Soc.30:151.1874; Hook. f., Fl. Brit. India 5:757. 1890; Seidenfaden, Dansk Bot. Ark. 33(3):

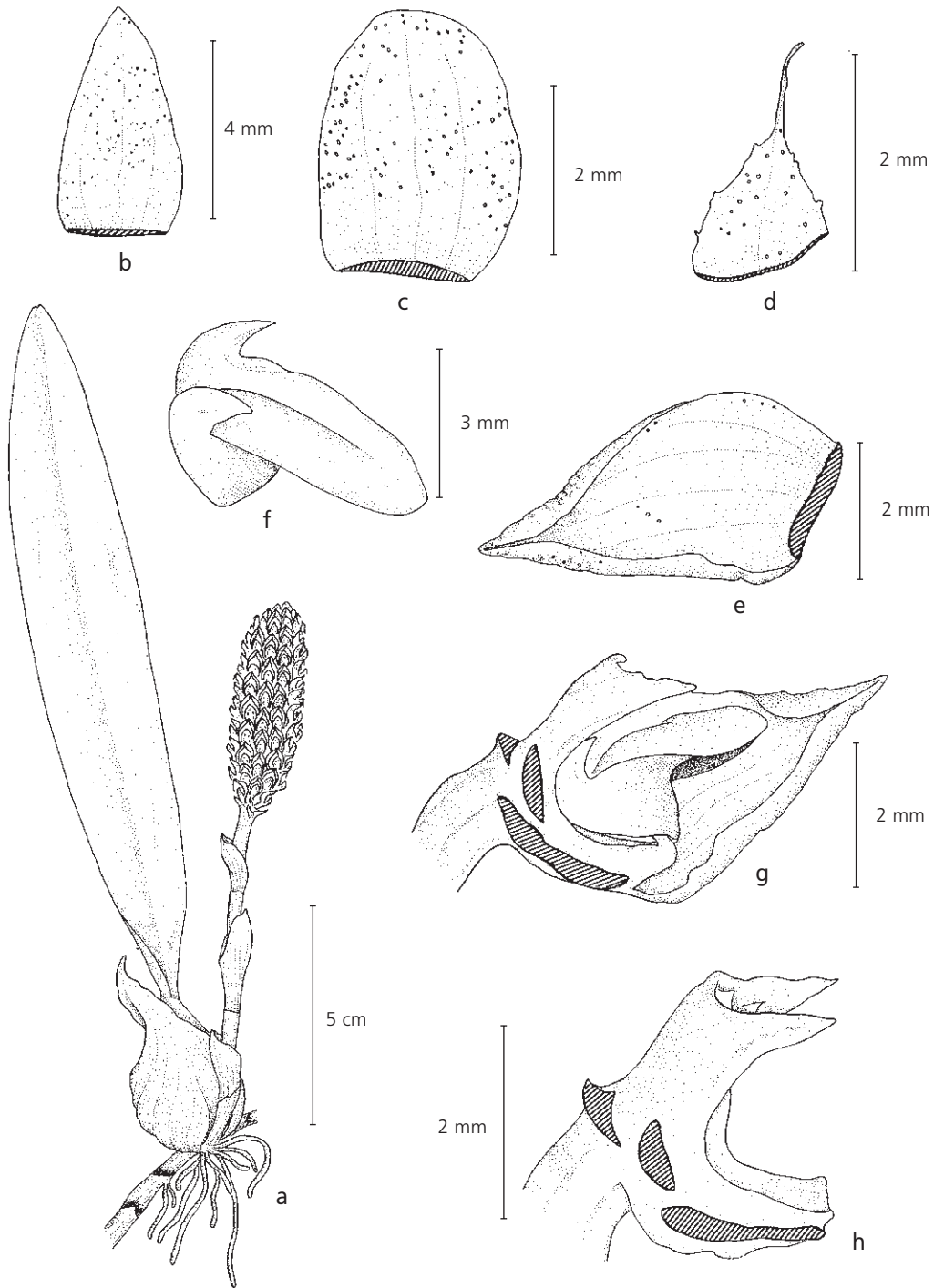


Figure 4. *Bulbophyllum manipurens* Sathish & Suresh. – a. Habit; b. Floral bract; c. Dorsal sepal; d. Petal; e. Lateral sepal; f. Lip; g. Flower, side view (sepals & petals removed); h. Column (after CSK 28751).

49.1979; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 86. 2001.

This species is leafless during flowering with closely arranged glossy green pseudobulbs, solitary flower having a fat blunt nose and a red lip.

9. **Bulbophyllum odoratissimum** (J. E. Sm.) Lindl., Gen. Sp. Orch. 55.1830; Hook. f., Fl. Brit. India 5:758. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 79. Pl. 109.1898; Seidenfaden, Dansk Bot. Ark. 33(3): 76.1979; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 86. 2001. *Stelis odoratissima* J. E. Sm. in Rensselaer Cyclop. 34:12. 1814.

Flower has an orange lip.

10. **Bulbophyllum propinquum** Krzl., Orchis 2:62. 1908; Seidenfaden, Dansk Bot. Ark. 33(3): 123. 1979.

**Fig. 5**

*Pseudobulbous epiphytes. Pseudobulbs* conical, pale green, 2.7 x 1.7 cm, 1-leaved. *Leaves* oblong, 14.2 x 1.8 cm, obtusely bilobed at apex. *Inflorescence* a lateral raceme; scape about 4 cm long, pale green, lower portion covered with 3-4 cupular bracts, fairly densely flowered, reddish brown in colour; bracts 5 x 2.5 cm, 3-veined, gland dotted, ovate, pale green with light brown at base; dorsal sepal 4.5 x 3 mm, 5-veined, thickly gland dotted, oblong-ovate with acute apex having deep violet striations on the dorsal side; lateral sepals 6.5 x 3.5-4 mm, 5-veined, sparingly gland dotted, widely obovate with rounded apex, joined at the apices; petals 1.2 x 2 mm, triangular, broader than long, 1veined, gland dotted, slightly oblique at base, acuminate at apex; lip thick and fleshy, 3.5 x 2 mm, auricled at base, papillate at the median region, papillae small, auricles with irregular edge, obtuse at apex; column 2.5 mm long, stelids 1 mm long with irregular edge, column foot 2 mm long to which lateral sepals and lip are attached; operculum less than 1 mm, grooved at apex, 2-celled with 2 pairs of pollinia. *Fruits* not seen.

*Flowering:* February-March

*Habitat:* In evergreen forests at 700 m.

*Occurrence:* India, Manipur, Kasom Khullen

*Distribution:* India and Thailand

*Specimens Examined:* INDIA, Manipur, Kasom Khullen: Forest near a military camp, C. Sathish Kumar 28755 (TBGT!).

*Note:* This was originally described by Kraenzlin based on Hosseus collection from Thailand where it was until now believed to be endemic. Our collection from Manipur is thus a new record for India. It was introduced into TBGRI where it flowered in 1998. Our

identification of this species was confirmed by Paul Ormerod who studied Hosseus' type from Doi Suthep, Thailand preserved at C. We checked at BKF but there was no specimen of this species available there.

11. **Bulbophyllum reichenbachianum** Krzl., Bot. Jahrb. 17:49. 1893; Garay *et al.*, Nord. J. Bot. 14(6): 627.1994. *Bulbophyllum mannii* Rchb. f., Flora 55: 275.1872, non Hook. f. 1864. *Cirrhopetalum mannii* (Rchb. f.) Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):151. 1953.

Garay *et al.* found this species distinct from *B. delictescens* Hance in which it was synonymized. Mukerjee found this species in Ukhrul at 1500 m.

12. **Bulbophyllum reptans** (Lindl.)Lindl., Gen. Sp. Orch. 51.1830; Hook. f., Fl. Brit. India 5:768. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 78. Pl. 106. 1898; Seidenfaden, Dansk Bot. Ark. 33(3): 109.1979; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 86. 2001. *Tribrachia reptans* Lindl., Coll. Bot. T. 41 a. 1826.

Flowers are 2-3 on a loose raceme.

13. **Bulbophyllum triste** Rchb. f., Walp. Ann. 6: 253. 1861; Hook. f., Fl. Brit. India 5:768. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 73. Pl. 98. 1898; Seidenfaden, Dansk Bot. Ark. 33(3): 213.1979; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 86. 2001.

This is a two-leaved species.

14. **Bulbophyllum umbellatum** Wallich ex Lindl., Gen. Sp. Orch. 56.1830; Seidenfaden, Dansk Bot. Ark. 29(1):178.1973; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 86. 2001. *Cirrhopetalum maculosum* Lindl., Bot. Reg. 27, misc. 81.1841; Hook. f., Fl. Brit. India 5: 776. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 95. Pl. 132. 1898.

**Calanthe R. Br.**

*Calanthe* is a pantropical genus of about 150 species of large terrestrial or rarely epiphytic orchids with or without pseudobulbs bearing large plicate leaves and a lateral raceme of large showy and variously coloured flowers. Twenty five species are known from India. Seven species occur in Manipur.

- 1a. Bracts caducuous.....**C. densiflora**
- 1b. Bracts persistent .....**2**
- 2a. Spur nil or minute ..... **3**
- 2b. Spur 4 mm or more long .....**5**

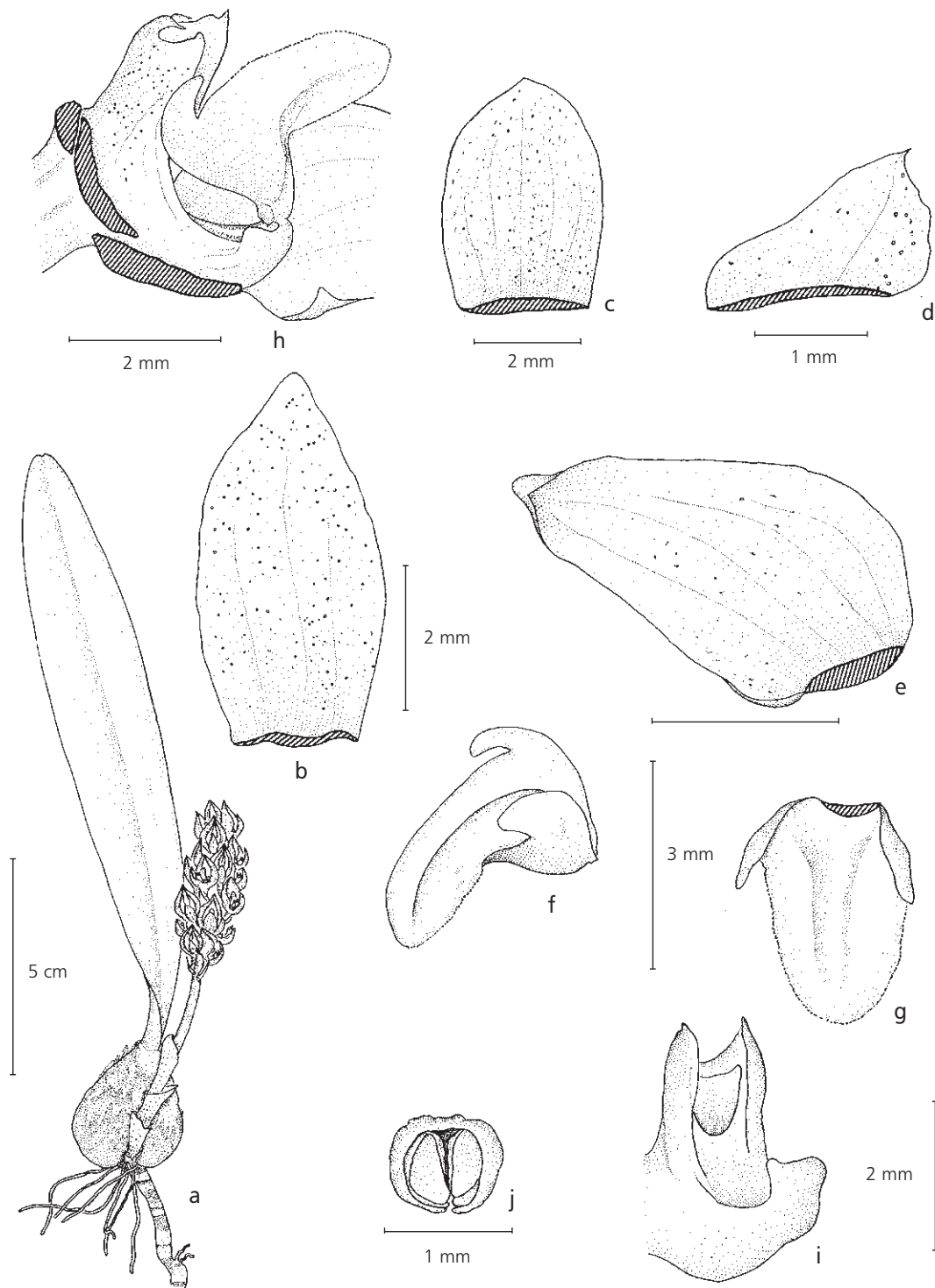


Figure 5. *Bulbophyllum propinquum* Krzl. – a. Habit; b. Floral bract; c. Dorsal sepal; d. Petal; e. Lateral sepal; f. Lip (side view); g. Lip front view; h. Flower (sepals and petals removed); i. Column; j. Operculum with pollinia (after CSK 28755).



- 3a. Lip with sidelobes ..... 4
- 3b. Lip without sidelobes.....**C. biloba**
- 4a. Disc with 3 small conical lamellae.....  
.....**C. brevicornu** var. **wattii**
- 4b. Disc with 3 large crenulate fleshy ridges  
..... **C. tricarinata**
- 5a. Spur short, conical, pubescent .....**C. mannii**
- 5b. Spur long (10-50 mm), terete, glabrous .....6
- 6a. Flowers white; sidelobes and lobules of midlobe  
subsimilar .....**angusta**
- 6b. Flowers mauve to purple/rose; midlobe much  
larger than sidelobes..... **C. sylvatica**

**1. Calanthe angusta** Lindl., Fol. Orch. *Calanthe* 7.1854; Hook. f., Fl. Brit. India 5:849. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8::171. Pl. 232.1898; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 150.1953; Seidenfaden, Dansk Bot. Ark. 29(2):12.1975; Katakai *et al.* Threat. End. Orch. Northeast Ind. 13.1984; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 86. 2001.

Watt collected this species in 1882 at an altitude of 3500 ft. Mukerjee recorded it from Ukhrul at 1700 m.

**2. Calanthe biloba** Lindl., Fol. Orch. *Calanthe* 3.1854; Hook. f., Fl. Brit. India 5:848. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 169.Pl. 228.1898; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 150. 1953; Deb, Bull. Bot. Surv. India 3(2):126.1961; Seidenfaden, Dansk Bot. Ark. 29(2):11.1975; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 86. 2001.

Mukerjee recorded this species from Ukhrul.

**3. Calanthe brevicornu** Lindl., Gen. Sp. Orch. 251.1830; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 150. 1953; Deb, Bull. Bot. Surv. India 3(2):126.1961; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 86.2001.

Mukerjee found this species at Sirohee, while Deb recorded it both from Sirohee and Koupru. J. D. Hooker (1890) described a var. *wattii* under this species based on Watt's collection from Manipur. This specimen is available at CAL. Mukerjee collected this variety also from Tuishar at 1800.

**4. Calanthe densiflora** Lindl., Gen. Sp. Orch. 250. 1833; Hook. f., Fl. Brit. India 5:855. 1890; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 86.2001; Ormerod, Oasis Suppl. 2: 7. 2001.

Ormerod added *Phaius epiphyticus* Seidenf. from Thailand as a synonym of this species.

**5. Calanthe mannii** Hook. f., Fl. Brit. India 5:850.1890; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 86. 2001.

J. D. Hooker based his description of this species on specimens collected by Duthie from Kumaon and Mann and Clarke from Meghalaya.

**6. Calanthe sylvatica** (Thouars) Lindl., Gen. Sp. Orch. 250.1833; Seidenfaden & Wood, Orch. Penin. Mal. Sing. 167. 1992; Seidenfaden, Opera Bot. 124:17. 1995. *Centrosis sylvatica* Thouars, Iles. Aust. Afr. T. 35, 36.1822. *Bletia masuca* D. Don, Prodr. Fl. Nepal. 30. 1825. *Calanthe masuca* (D. Don) Lindl., Gen. Sp. Orch. 249.1833; Hook. f., Fl. Brit. India 5:850.1890; Seidenfaden, Dansk Bot. Ark. 29(2):19.1975; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 86. 2001.

This is a species widespread from Africa to Asia.

**7. Calanthe tricarinata** Lindl., Gen. Sp. Orch. 252. 1833; Hook. f., Fl. Brit. India 5:847.1890; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 86. 2001.

Lip of this species is brown purple with disc bearing 3 large crenulate fleshy ridges.

### **Cephalanthera L. C. Rich.**

A Eurasian terrestrial genus of 14 temperate species characterized by creeping rhizome, conduplicate leaves and glabrous raceme of many white flowers. Three species are known from India and only one species occurs in Manipur.

**Cephalanthera longifolia** (L.) Fritsch in Oest. Bot. Zeitschr. 38: 81. 1888; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 86. 2001. *Serapias helleborine* var. *longifolia* L., Sp. Pl. 950. 1753. *Cephalanthera ensifolia* L. C. Rich. in Mem. Mus. Hist. Nat. 4: 60.1818; Hook. f., Fl. Brit. India 6:125. 1890.

This is a widely distributed species from temperate and Mediterranean Eurasia to the Himalayas.

### **Cephalantheropsis Guillaumin**

An Indo-Malesian genus of 5 species (Ormerod, 1998) of terrestrial orchids characterized by elongate, laxly leaved stems and axillary inflorescence of small flowers. Two species are known to occur in India and both are found in Manipur.

- 1a. Sidelobes of lip falcate to uncinata, acute; midlobe emarginate .....**C. obcordata**
- 1b. Sidelobes of lip truncate, rounded, crenate; midlobe flabelliform ..... **C. longipes**

**1. Cephalantheropsis obcordata** (Lindl.) Ormerod, Orch. Dig. 62(4): 157. 1998. *Bletia obcordata* Lindl., Gen.

Sp. Orch. 128. 1831. *Calanthe gracilis* Lindl., Gen. Sp. Orch. 251. 1833; Hook. f., Fl. Brit. India 5: 855. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 165. Pl. 222. 1898; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 151. 1953. *Calanthe tubifera* Hook. f., Fl. Brit. India 5: 855. 1890.

Ormerod who made a detailed study of the genus found that the oldest name which could be applied for the plant recorded from northeastern states was *Bletia obcordata* Lindl. originating from Sylhet in Bangladesh and accordingly effected its transfer to *Cephalantheropsis*.

**2. Cephalantheropsis longipes** (Hook. f.) Ormerod, Orch. Dig. 61(4):156. 1998. *Calanthe longipes* Hook. f., Fl. Brit. India 6:195. 1890. *Phaius longipes* (Hook. f.) Holtt., Gard. Bull. Str. Settl. 11:286. 1947; Deb, Bull. Bot. Surv. India 3(2): 129. 1961.

Deb reported two collections from Lamdom and Koupru.

### Ceratostylis Blume

An Indo-Malesio-Polynesian genus about 100 epiphytic species with densely tufted stems bearing thick and fleshy linear-lanceolate leaves and small flowers. Three species are known from India. Only one species has been recorded from Manipur.

**Ceratostylis himalaica** Hook. f., Fl. Brit. India 5:826. 1890 & Ic. Pl. T. 2101.1892; Pradhan, Ind. Orch. Guide to Iden. Cult. 431. 1979; Seidenfaden, Opera Bot. 89: 117.1986. *Ritaia himalaica* (Hook. f.) King & Pantl., Ann. Roy. Bot. Gard. Calcutta 8:157. Pl. 214. 1898; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 94. 2001.

### Chiloschista Lindley

An Indo-Malesian genus of about 20 epiphytic species with a bunch of green, often flattened roots on a small central stem bearing one or more clusters of attractive flowers. Leaves precede flowering. Four species are known from India. Only one species occurs in Manipur.

**Chiloschista parishii** Seidenf., Opera Bot. 95:176.1988; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 86. 2001.

### Cleisostoma Blume

An Indo-Malesian genus of about 100 epiphytic species characterized by the presence of variously ornamented backwall callus in the lip of flowers. Nineteen species are known from India. Four species are recorded earlier from Manipur. We add two more, *Cleisostoma discolor* Lindl. and *C. williamsonii* (Rchb. f.) Garay.

- 1a. Leaves dorsiventral..... 2
- 1b. Leaves terete ..... 3
- 2a. Leaf tip triangular, acuminate acute; scape pink in colour ..... **C. discolor**
- 2b. Leaf tip broad obtuse; scape light yellow in colour ..... **C. racemiferum**
- 3a. Stipes of pollinia mitre-shaped.... **C. williamsonii**
- 3b. Stipes of pollinia not mitre-shaped, linear..... **4**
- 4a. Backwall callus nearly pentagonal or heart-shaped .. ..... **C. filiforme**
- 4b. Backwall callus with side horns..... **5**
- 5a. Backwall callus sagittate, lower end bilobed with spiny projections ..... **C. rolfeanum**
- 5b. Backwall callus diamond shaped ..... **C. appendiculatum**

**1. Cleisostoma appendiculatum** (Lindl.) Benth. & Hook. f. ex Jacks., Ind. Kew. 1: 555. 1895; Seidenfaden, Dansk Bot. Ark. 29(2):58.1975; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 87. 2001. *Aerides appendiculata* Lindl., Gen. Sp. Orch. 242. 1833. *Sarcanthus appendiculatus* (Lindl.) Parish in Mason, Burma 2:181.1883; Hook. f., Fl. Brit. India 6: 67. 1890 & Ic. Pl. 2136. 1893.

**2. Cleisostoma discolor** Lindl., Edward's Bot. Reg. 31: misc. 59.1845; Hook. f., Fl. Brit. India 6:75. 1890; Seidenfaden, Dansk Bot. Ark. 29(2):12. 1975. *Sarcanthus termissus* Rchb. f., Hamb. Gartenz. 16: 15. 1860; Hook. f., Fl. Brit. India 6: 75. 1890. *Sarcanthus macrodon* Rchb. f., Gard. Chron. 1555. 1875. *Saccolabium rostellarum* Hook. f., Fl. Brit. India 6: 59. 1890 & Ic. Pl. T. 2132. 1893. *Sarcanthus auriculatus* Rolfe, Kew Bull. 1895: 9. 1895. **Fig. 6**

*Epiphytes* with 7 cm long stem. *Leaves* flat, 9.5-17 x 1.5-19 cm, unequally bilobed at apex with a mucro in between, lobes acute or acuminate at apex. *Inflorescence* 9.5-28.5 cm long, branched, arising from the base of the stem, deep purple in colour. *Flowers* yellow, 7 mm across sidelobes; floral bracts 1.25x 1 mm, triangular, pale brown; sepals and petals greyish yellow; dorsal sepal 4-4.5 x 2-2.25 mm, ovate, 3-veined, gland dotted, lateral sepals 4-4.25 x 2-2.25 mm, 3-veined, ovate, gland dotted; petals 3.25-4 x 2 mm, ovate, 3-veined, gland dotted, obtuse at apex; lip off white in colour, 3-lobed, sidelobes oblong with dentate margin and a callus plate within, midlobe triangular, folded upward towards the column; spur off white, 4.5 mm long, completely septate inside, backwall callus slightly bilobed at apex having

minute papillae; column 2 mm long, rostellum conical pink in colour, operculum 2 celled with a deep pink line, 1.75 x 1.25 mm; pollinia 4 in two equally divided halves, stipe 1.25 mm long, spatulate and transparent. *Fruits* not observed.

This is a new record for the state. We collected this species from Tupul and introduced it into TBGRI. It frequently flowers in the garden. Peduncle of the inflorescence is characteristically deep purple in colour, flimsy and often branched with creamy

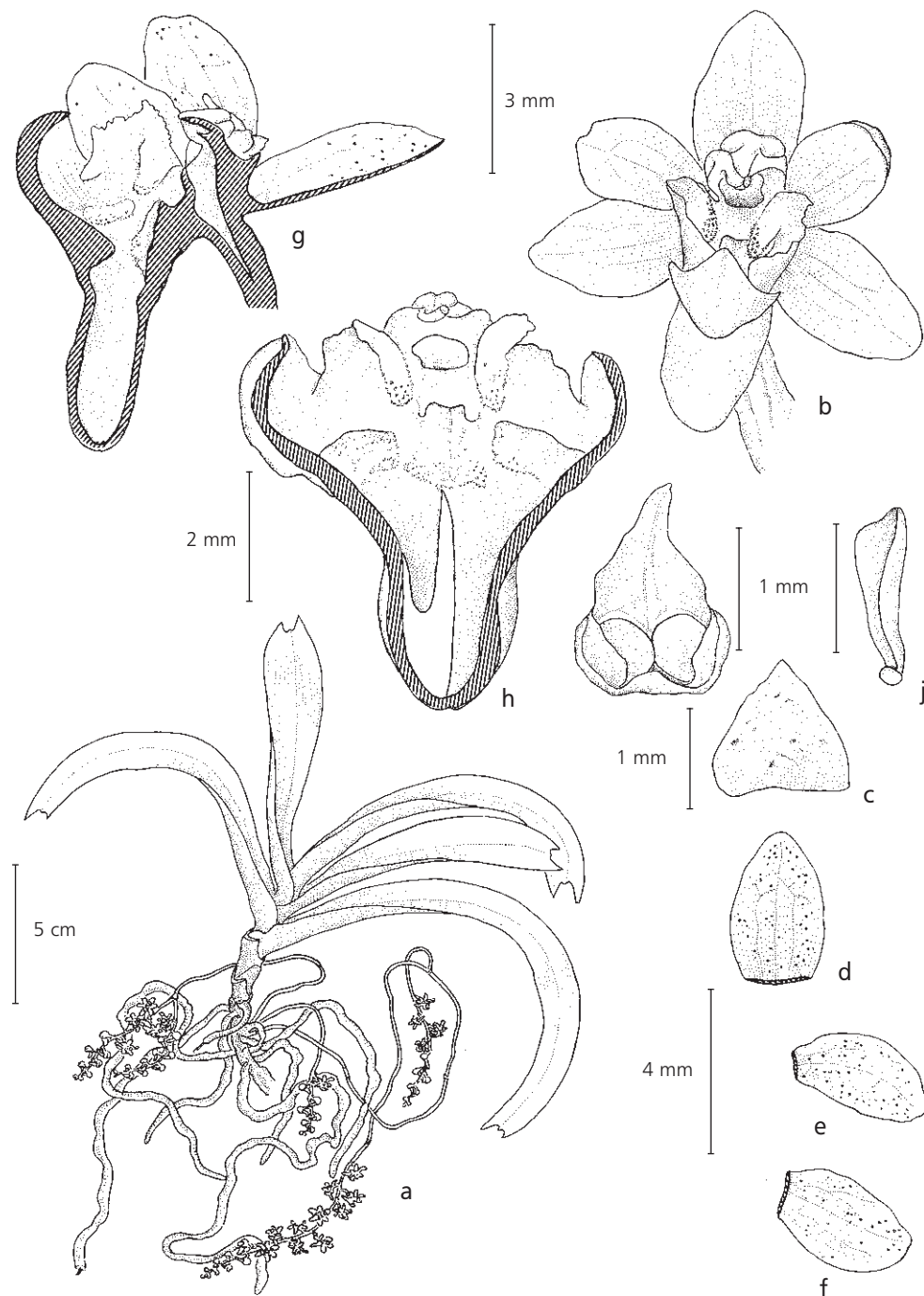


Figure 6. *Cleisostoma discolor* Lindl. – a. Habit; b. Flower (front view); c. Floral bract; d. Dorsal sepal; e. Petal; f. Lateral sepal; g. Flower (cut through column and lip); h. Column and lip (cut through spur) showing backwall callus (after CSK 28743).

yellow flowers. Ormerod sent us a series of sketches after types proving *C. discolor* Lindl. as the oldest name.

*Flowering*: May-June (under cultivation).

*Habitat*: Evergreen forests at 800 m.

*Occurrence*: India, Manipur, Tupul.

*Distribution*: India, Thailand, Cambodia, Malaya, Sumatra and Java.

*Specimens Examined*: INDIA, **Manipur**: Tupul. Flowered under cultivation 3 June 1996 C. Sathish Kumar 28743 (TBGT!); 2 June 1997, C. Sathish Kumar 28762 (TBGT!).

3. **Cleisostoma filiforme** (Lindl.) Garay, Bot. Mus. Leaf. Harv. Univ. 23(4):171.1972; Seidenfaden, Dansk Bot. Ark. 29(2):55; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 87. 2001. *Sarcanthus filiformis* Lindl., Bot. Reg. 28, misc. 61.1842; Hook. f., Fl. Brit. India 6: 66. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 240. Pl. 319. 1898.

Devi and Ghatak reported one '*Sarcanthus filiformis* Wight' from Khongampatt. Wight's type was from Southern India and it now belongs to a genus of its own called *Seidenfadeniella*, found only in Southern India and Sri Lanka. Devi and Ghatak's plant could be *C. filiforme* (Lindl.) Garay, recorded from the neighbouring states. We have not seen their specimen.

4. **Cleisostoma racemiferum** (Lindl.) Garay, Bot. Mus. Leaf. Harv. Univ. 23(4): 173. 1972; Seidenfaden, Dansk Bot. Ark. 29(3): 16.1975; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 87. 2001. *Saccolabium racemiferum* Lindl., Gen. Sp. Orch. 224. 1833. *Sarcanthus pallidus* Lindl., Bot. Reg. 27, misc. 78.1840; Hook. f., Fl. Brit. India 6:68. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 241. Pl. 320. 1898. *Sarcanthus lorifolius* Parish ex Hook. f., Fl. Brit. India 6: 69. 1890 & Ic. Pl. T. 2139. 1893.

We couldn't collect this species from Manipur and is included on the authority of Chauhan. We have a collection at TBGRI from Arunachal Pradesh flowering frequently.

5. **Cleisostoma rolfeanum** (King & Pantl.) Garay, Bot. Mus. Leaf. Harv. Univ. 23(4):174.1972; Seidenfaden, Dansk Bot. Ark. 29(2):57. 1975; Phukan & Mao, Orch. Rev. 112:115. 2004. *Sarcanthus rolfeanus* King & Pantl., Journ. Asiat. Soc. Bengal 66(3): 594. 1897. **Fig. 7**

*Pendulous epiphytes*. Stem slender, 6-30 cm long, 0.18-0.25 cm thick, internodes 1.5- 3 cm long, deeply purple dotted. Leaves terete, acute, 8-16 x 0.2-0.25 cm, green with purple spots. Inflorescence above the axil, opposite to the leaves, 5 cm long; peduncle purple

with tubular sheaths at the base. Flowers 7 mm in length and 5 mm across; ovary with pedicel 7 mm long, light purple; floral bract triangular, 1.5 x 1 mm, 1-veined; dorsal sepal 3 x 2 mm, 3 veined, entire, gland dotted, oblong, reflexed; lateral sepals 4 x 2.5 mm, reflexed, 3 veined, gland dotted, oblong, entire, dark purplish brown; petals 2.5 x 1 mm, linear, obtuse at apex, one veined, reflexed, dark purplish brown; lip 5 mm long, 3 lobed, white; sidelobes oblong with upper margins wavy, converging; midlobe triangular, 3 lobulate, sidelobes small and less than 1 mm, middle lobule 1.5 mm, inwardly folded towards the column, tinged with light purple; backwall callus sagittate, broader than long, the lower end bilobed with small spiny projections, a pair of papillate structures occur behind the backwall callus near the septum; septum near the base of the spur; spur 2-lobed, globose, 2 mm long; column short, white, 3 mm long with distinct column foot having small papillae; operculum 2-celled, 1.5 x 1.25, purple, acute at apex; pollinia 4 in two unequal pairs, stipe 1 mm long, transparent, mitre shaped, viscidium pink. Fruit not observed.

This species was reported as a new record for India from Manipur by Phukan and Mao (2004). It was originally described by King and Pantling based on Peche's collection from Moulmein, Myanmar. Seidenfaden (1975) recorded it from Thailand, its eastern limit. This species is very characteristic with its very peculiar backwall callus. We collected this species from Kasom Khullen.

*Flowering*: May-June

*Habitat*: Evergreen forests at 700 m.

*Occurrence*: India, Manipur, Kasom Khullen.

*Distribution*: India, Myanmar and Thailand.

*Specimens Examined*: INDIA, **Manipur**, Kasom Khullen: Cultivated at TBGRI, 3 June 1996 C. Sathish Kumar 28742 (TBGT!); Senapati Hills, A. A. Mao 68282 (ASSAM). MYANMAR: Moulmein: Peche s. n. (CAL!, type).

6. **Cleisostoma williamsonii** (Rchb. f.) Garay, Bot. Mus. Leaf. Harv. Univ. 23(4): 176.1972; Seidenfaden, Dansk Bot. Ark. 29(2):50.1975. *Sarcanthus williamsonii* Rchb.f., Hamb. Gaertnez. 21:353. 1865.

*Pendulous epiphytes*. Stems 20 cm long and 0.3 cm thick, cylindrical, internodes 1.5-2.5 cm apart. Leaves 4.5-8 cm long, terete, rounded at apex. Inflorescence 12 cm long arising from the middle of the internode, many flowered; floral bracts shorter than the ovary, ovate-lanceolate. Flowers white, 5 mm across; sepals ovate-oblong; petals smaller, oblong; lip 3-lobed, sidelobes

erect, oblong-obtuse, subfalcate, midlobe incurved fleshy, thickly clawed, spur globose, backwall callus bilobed at both ends having small papillae at the distal lobes; pollinia 2, minute, subglobose, unequally divided. *Fruit* not seen.

We found this species at Kasom Khullen near the Army Camp, growing pendulosly on lofty trees. This is a new state record.

*Flowering*: April-May

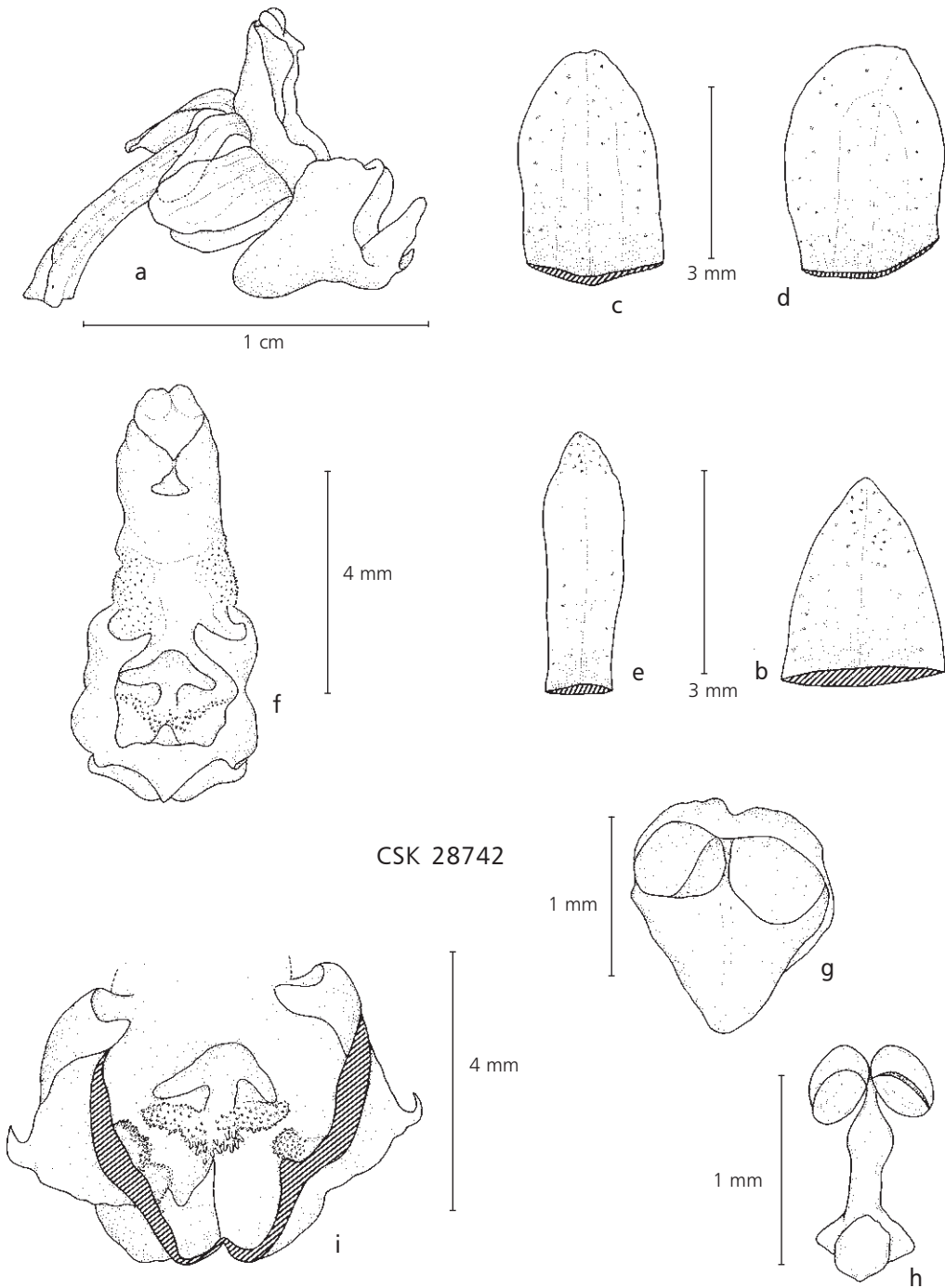


Figure 7. *Cleisostoma rolfeanum* (King & Pantl.) Garay – a. Flower (side view); b. Floral bract; c. Dorsal sepal; d. Lateral sepal; e. Petal; f. Column with spur mouth showing the backwall callus; g. Operculum; h. Pollinarium; i. Section of spur showing backwall callus and lateral calli.

*Habitat:* Evergreen forests

*Occurrence:* India, Manipur, Sikkim.

*Distribution:* India, Bhutan, Thailand, China, Malaya, Sumtra, Java, Borneo.

*Specimens Examined:* INDIA, **Manipur**, Kasom Khullen: Flowered under cultivation on 6<sup>th</sup> May 1996, *C. Sathish Kumar s. n.* (TBGT!).

### Coelogyne Lindley

An Indo-Malesian genus of about 200 species (Clayton, 2002) of epiphytic or lithophytic orchids with variously shaped and clustered, 2-leaved pseudobulbs on a thick rhizome and bearing terminal raceme of very showy flowers. India is known have 35 species. Twenty are found in Manipur.

- |  |                      |   |                      |
|--|----------------------|---|----------------------|
| 1a. All flowers opening at the same time .....   | 2                    | 9b. Flowers mostly yellow to yellowish green .....              | <b>C. prolifera</b>  |
| 1b. All flowers not opening at the same time .....   | 12                   | 10a. Midlobe margins fimbriate; keels 2 or 3 .....              | 11                   |
| 2a. Scape with imbricating sterile bracts at the junction of peduncle and rachis .....   | 3                    | 10b. Midlobe margins undulate; keels 3 or 4 .....               | <b>C. micrantha</b>  |
| 2b. Scape with imbricating sterile bracts mainly at the base of the peduncle.....  | 10                   | 11a. Lip fimbriate.....   | <b>C. fimbriata</b>  |
| 3a. Rachis producing single set of flowers .....   | 4                    | 11b. Lip margined with black hairs .....                        | <b>C. ovalis</b>     |
| 3b. Rachis extending with new imbricating bracts to produce further annual sets of flowers.....  | 8                    | 12a. Ovary hairy or papillate .....                             | <b>C. pulverula</b>  |
| 4a. Lip with 5 keels .....   | <b>C. griffithii</b> | 12b. Ovary glabrous .....                                       | 13                   |
| 4b. Lip with 2 or 3 keels .....  | 5                    | 13a. Sepals, petals and lip margins generally undulate .....    | <b>C. cristata</b>   |
| 5a. Dorsal sepal more than 1.5 cm long .....   | 6                    | 13b. Sepals, petals and lip margins not undulate .....          | 14                   |
| 5b. Dorsal sepal less than 1.5 cm long.....  | <b>C. ghatakii</b>   | 14a. Petals and sepals of equal width .....                     | 15                   |
| 6a. Lip with fimbriate keels.....  | <b>C. barbata</b>    | 14b. Petals always narrower than sepals .....                   | 17                   |
| 6b. Lip with crenulate or dentate keels .....  | 7                    | 15a. Inflorescence hysteranthous .....                          | <b>C. punctulata</b> |
| 7a. Midlobe of lip broadly ovate, 3 lobulate with 3 minute dentate to entire and undulate keels near the base, keels becoming irregular papillae ..... | <b>C. holochila</b>  | 15b. Inflorescence proteranthous to synanthous.....             | 16                   |
| 7b. Midlobe of lip suborbicular or cordate, margin erose, 2 crenulate keels terminating at the base of the midlobe .....                               | <b>C. stricta</b>    | 16a. Pseudobulbs 7.5-10 cm long .....                           | <b>C. nitida</b>     |
| 8a. Pseudobulbs ovoid or ellipsoid .....   | 9                    | 16b. Pseudobulbs 2.5-4 cm long .....                            | <b>C. corymbosa</b>  |
| 8b. Pseudobulbs cylindric or narrowly ovoid.....   | <b>C. longipes</b>   | 17a. Lip with thin membraneous margins.....                     | <b>C. suaveolens</b> |
| 9a. Flowers white to brown, sidelobes of lip brown.....  | <b>C. schultesii</b> | 17b. Lip with firm edges.....                                   | 18                   |
|  |                      | 18a. Inflorescence heteranthous .....                           | <b>C. flaccida</b>   |
|  |                      | 18b. Inflorescence proteranthous to synanthous.....             | 19                   |
|  |                      | 19a. Leaves lanceolate-linear with 3 very prominent veins ..... | <b>C. trinervis</b>  |
|  |                      | 19b. Leaves linear, finely nerved .....                         | <b>C. viscosa</b>    |

1. **Coelogyne barbata** Griffith, Itin. Not. 3: 280.1851; Hook. f., Fl. Brit. India 5:839.1890; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 151. 1953; Deb, Bull. Bot. Surv. India 3(2):126.1961; Das & Jain, Fasc. Fl. India 5: 7.1980; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 87. 2001 Clayton, The Genus *Coelogyne* 32. 2002.

Griffith's type originated in Mawsmi, Meghalaya. George Watt was the first to collect this species from Manipur (*George Watt 7452*, CAL!) followed by Meebold in December 1907 (*Meebold 6926*, CAL!) and Mukerjee (*Dr S. K. Mukerjee 3238*, CAL!). Deb also collected this species.

2. **Coelogyne corymbosa** Lindl., Fol. Orch. *Coelogyne* 7.1852; Hook. f., Fl. Brit. India 5: 831. 1890; King &

Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 134. T. 185.1898; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 161. 1953; Deb, Bull. Bot. Surv. India 3(2):126. 1961; Das & Jain, Fasc. Fl. India 5: 9. 1980; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 87. 2001; Clayton, The Genus *Coelogyne* 187. 2002.

Mukerjee recorded this species from Ukhrul at 2000 m.

3. **Coelogyne cristata** Lindl., Coll. Bot. sub t. 33.1821; Hook. f., Fl. Brit. India 5: 829. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 133. Pl. 184.1898; Das & Jain, Fasc. Fl. India 5:9.1980; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 74.1984; Ghatak & Devi in Vij (Ed.) Biol. Cons. Cult. Orch. 358.1986; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 87. 2001; Clayton, The Genus *Coelogyne* 173. 2002.

Devi and Ghatak reported this species from Ukhrul at 1900 m.

4. **Coelogyne fimbriata** Lindl., Bot. Reg. 11: T.868.1825; Hook. f., Fl. Brit. India 5:836.1890; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 151. 1953; Deb, Bull. Bot. Surv. India 3(2):126.1961; Das & Jain, Fasc. Fl.India 5: 10.1980; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 87. 2001; Clayton, The Genus *Coelogyne* 51. 2002.

Mukerjee recorded this species from Khangkhui at 2300 m.

5. **Coelogyne flaccida** Lindl., Gen. Sp. Orch. 39.1830; Hook. f., Fl. Brit. India 5: 829.1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 133. Pl. 183. 1898; Seidenfaden, Dansk Bot. Ark. 29(2):38. 1975; Das & Jain, Fasc. Fl. India 5: 10.1980; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 87. 2001; Clayton, The Genus *Coelogyne* 51. 2002.

Das and Jain included this species in the revision as occurring in Manipur.

6. **Coelogyne ghataki** Paul, Basu & Biswas, J. Bombay Nat. Hist. Soc. 86(3):425. 1989; Clayton, The Genus *Coelogyne* 34. 2002.

This species was described based on Dr J. N. Ghatak's collection from Imphal Valley. It is related to *C. griffithii* Hook. f. but differs in having a shorter inflorescence bearing yellow flowers, 3 veined sepals, smaller petals and lip with ovate-oblong sidelobes and 2 keels.

7. **Coelogyne griffithii** Hook. f., Fl. Brit. India 5: 838. 1890 & Ic. Pl. t. 2108.1894; Das & Jain, Fasc. Fl. India 5: 12.1980; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 87. 2001; Clayton, The Genus *Coelogyne* 35. 2002.

J. D. Hooker described this species based on Watt's collection (6780, CAL!) from Khongui Valley in Manipur and Griffith's collection from Patkoye Mts (5091, K), Upper Assam.

8. **Coelogyne holochila** P. F. Hunt & Summerh., Kew Bull. 20:52. 1966; Das & Jain, Fasc. Fl. India 5: 15. 1980; Clayton, The Genus *Coelogyne* 35. 2002. *C. elata* W. J. Hook., Bot. Mag. 83:t.5001.1857, non Lindl. 1830.

This species was described by Hunt and Summerhayes who found that one of the *Coelogyne*s drawn in Karenzlin and Pfitzer's monograph did not represent the true *C. elata* Lindl. Kew had several collections of this species which Hunt and Summerhayes used for drawing up a description.

9. **Coelogyne longipes** Lindl., Fol. Orch. *Coelogyne* 10.1954; Hook. f., Fl. Brit. India 5:839.1890; Seidenfaden, Dansk Bot. Ark. 29(2):80.1975; Das & Jain, Fasc. Fl. India 5: 16.1980; Ormerod, Austr. Orch. Rev. 62(1): 22. 1997; Clayton, The Genus *Coelogyne* 44. 2002.

Slender cylindrical to very narrowly ovoid pseudobulbs, lemon yellow flowers with lip broadly margined brown on sidelobes and epichile are very characteristic of this species. Mukerjee collected it from Ukhrul at 1900 m. on 4.9.1948 (*Dr S. K. Mukerjee* 3439, CAL!). Sinha reported it in 1954 from Mao at 8000' (*S. C. Sinha* 1893, CAL!)

10. **Coelogyne micrantha** Lindl., Gard. Chron. 173.1855; Hook. f., Fl. Brit. India 5: 836.1890 & 6:194.1890; Das & Jain, Fasc. Fl. India 5: 16. 1980.

Flowers of this species are pale brown, c. 1 cm across; lip has a broadly oblong and retuse midlobe, pale brown with dark brown spots.

11. **Coelogyne nitida** (Wallich ex D. Don) Lindl., Coll. Bot. Sub T. 33.1822; Seidenfaden, Dansk Bot. Ark. 29(2):53.1975; Das & Jain, Fasc. Fl. India 5: 19.1980; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 87. 2001; Clayton, The Genus *Coelogyne* 189. 2002. *Cymbidium nitidum* Wallich ex D. Don, Prodr. Fl. Nepal. 35. 1825. *Coelogyne ochracea* Lindl., Bot. Reg. T. 69, 1846; Hook. f., Fl. Brit. India 5:831. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 132. Pl. 182. 1898:

Devi and Ghatak reported this species from Mao at 1757 m. We got our specimens from Khongampatt.

*Specimens Examined*: INDIA: **Manipur**; Kason Khullen, flowered under cultivation 25.11.1996 *C. Sathish Kumar* 28752 (TBGT!).

12. **Coelogyne ovalis** Lindl., Bot. Reg. 24:91, misc. 171.1838; Hook. f., Fl. Brit. India 5:836. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 135. Pl. 187.1898; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):151.1953; Seidenfaden, Dansk Bot. Ark. 29(2):23.1975; Das & Jain, Fasc. Fl. India 5: 23.1980; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 87. 2001; Clayton, The Genus *Coelogyne* 53. 2002.

Mukerjee recorded it from Ukhrul.

13. **Coelogyne prolifera** Lindl., Gen. Sp. Orch. 40.1830; Hook. f., Fl. Brit. India 5: 838. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 137. Pl. 190.1898; Seidenfaden, Dansk Bot. Ark. 29(2):78.1975; Das & Jain, Fasc. Fl. India 5: 23.1980; Devi & Ghatak Proc. 5th ASEAN Orch. Cong. Sing. 74.1984; Ghatak & Devi in Vij (Ed.), Biol. Cons. Cult. Orch. 358. 1986; Ormerod, Austr. Orch. Rev. 62(1):21.1997; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 87. 2001; Clayton, The Genus *Coelogyne* 44. 2002. *C. flavida* Lindl., Fol. Orch. *Coelogyne* 10. 1854.

S. J. Das determined an old specimen (*A. Meebold* 9219, CAL!) from Lubza as belonging to this species from Manipur. Devi and Ghatak reported it from Chinanlong at 1054 m.

14. **Coelogyne punctulata** Lindl., Coll. Bot. Sub t. 33. 1821; Das & Jain, Fasc. Fl. India 5: 24. 1980; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 87. 2001; Clayton, The genus *Coelogyne* 191. 2002. *Cymbidium nitidum* Roxb., Fl. Ind. 3:612.1832, non Wallich ex D. Don 1825. *Coelogyne nitida* (Roxb.) Hook. f., Fl. Brit. India 5:837. 1890.

Das and Jain segregated two forms under this with the typical one occurring in Manipur.

15. **Coelogyne pulverula** Teijsm. & Binnend., Nat. Tijdschr. Ned. Ind. 24:300. 1862. *C. dayana* Rchb. f., Gard. Chron. 2: s. 21:826.1824; Seidenfaden, Dansk Bot. Ark. 29(2):65.1975; Ghatak & Devi in Vij (Ed.) Biol. Cons. Cult. Orch. 360. 1986; Clayton, The Genus *Coelogyne* 145. 2002.

Ghatak and Devi reported the occurrence of this otherwise Malayan species from Ukhrul.

16. **Coelogyne schultesii** Jain & Das, Proc. Ind. Acad. Sci. 87 B(5):119.1978; Das & Jain, Fasc. Fl. India 5: 28. 1980; Ormerod, Austr. Orch. Rev. 62(1):21.1997; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 87. 2001; Clayton, The Genus *Coelogyne* 46. 2002. *C. prolifera* auct. non Lindl.: Lindl., Fol. Orch. *Coelogyne* 10.1854 *p.p.*; Hook. f., Fl. Brit. India 5: 838.1890. *p. p.*; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 137, T. 190.1898; Seidenfaden, Dansk Bot. Ark. 29(2):78, f.

33. 1975. *C. flavida* auct. non Lindl.: Seidenfaden, Dansk Bot. Ark. 29(2):82, *p. p.* fig. 37 & 38. 1975.

This was described by Jain and Das who sorted out the allied species around *C. prolifera* Lindl. At CAL there is a specimen collected by Meebold (4766, CAL!) from Laimatak (5000') in February 1906 and determined by S. J. Das as belonging to this species. Ormerod clarified further that several authors have wrongly called *C. schultesii* as *C. prolifera* following an early misidentification. The flowerless type specimen of *C. prolifera* even has a sketch of a labellum representing *C. schultesii* glued on to it by Lindley.

17. **Coelogyne stricta** (D. Don) Schltr., Fed. Repert. Beih. IV. 184.1919; Das & Jain, Fasc. Fl. India 5: 28.1980; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 87. 2001; Clayton, The Genus *Coelogyne* 204. 2002. *Cymbidium strictum* D. Don, Prodr. Fl. Nepal. 35. 1825. *Coelogyne elata* Lindl., Gen. Sp. Orch. 40.1830; Hook. f., Fl. Brit. India 6: 838. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 136. Pl. 188. 1898.

18. **Coelogyne suaveolens** (Lindl.) Hook. f., Fl. Brit. India 5: 832.1890; Seidenfaden, Dansk Bot. Ark. 29(2): 52.1975; Das & Jain, Fasc. Fl. India 5: 29. 1980; Clayton, The genus *Coelogyne* 204. 2002. *Pholidota suaveolens* Lindl., Gard. Chron. 372. 1856.

Seidenfaden cited Clarke's collection from Manipur.

19. **Coelogyne trinervis** Lindl., Gen. Sp. Orch. 41.1830; Hook. f., Fl. Brit. India 5: 832.1890; Seidenfaden, Dansk Bot. Ark. 29(2): 44.1975; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 87. 2001; Clayton, The Genus *Coelogyne* 214. 2002.

This is a Burmese species.

20. **Coelogyne viscosa** Rchb. f., Berl. Allg. Gartenz. 24: 218. 1856; Hook. f., Fl. Brit. India 5: 832.1890; Seidenfaden, Dansk Bot. Ark. 29(2):37.1975; Das & Jain, Fasc. Fl. India 5: 30.1980; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 87. 2001; Clayton, The Genus *Coelogyne* 215. 2002. *Coelogyne graminifolia* Parish & Rchb. f., Trans. Linn. Soc. 30: 146.1874; Hook. f., Fl. Brit. India 5: 831.1890.

Flowers white with brown streaks on sidelobes and a yellow patch on the midlobe.

### Corymborkis Thouars

A pantropical genus of about 5 species (Rasmussen, 1977) of tall, woody ground orchids with a tuft of vermiform roots, a long reed like unbranched stem bearing narrow elliptic to ovate, leathery leaves and an axillary panicle of white, fragrant flowers. Only one species occurs in India including Manipur.



**Corymborkis veratrifolia** (Reinw.) Blume, Col. Orch. Arch. Ind. 125, pl. 42-43.1859; Rasmussen, Bot. Tidsskr. 71:170. 1977; Seidenfaden, Dansk Bot. Ark. 32(2):114.1978; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 87. 2001. *Hysteria veratrifolia* Reinw., Nov. Pl. Ind. Gen. Syll. Pl. Nov. 2:15. 1825-26. *Corymbis veratrifolia* (Reinw.) Rchb. f. in Flora 48:184.1885; Hook. f., Fl. Brit. India 6: 91. 1890.

### Crepidium Blume

An Indo-Malesian genus of over 200 species of ground orchids formerly included under *Malaxis* (*Microstylis*) and characterized by lip auricles stretching backwards on both sides of the gynostemium. Fourteen species are known to occur in India. Two species have been recorded from Manipur.

- 1a. Lip divided into sidelobes and midlobe by an indentation ..... **M. purpurea**
- 1b. Lip not divisible by indentation.....**M. acuminata**

1. **Crepidium acuminatum** (D. Don) Szlach., Syst. Orch. 123.1995. *Malaxis acuminata* D. Don, Prodr. Fl. Nepal. 29. 1825; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):153. 1953; Seidenfaden, Dansk Bot. Ark. 33(1):55.1978; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 92. 2001. *Microstylis wallichii* Lindl., Gen. Sp. Orch. 20.1830; Hook. f., Fl. Brit. India 5:686. 1890. *Malaxis wallichii* (Lindl.) Deb, Bull. Bot. Surv. India 3: 128. 1962.

Mukerjee recorded this species from Chammu at 1000 m. growing near bamboo groves.

2. **Crepidium josephianum** (Rchb. f.) Marg., Ann. Bot. Fenn. 39(1): 65.2002. *Microstylis josephiana* Rchb.f., Bot. Mag. 103: T. 6325.1877; Ridley, J. Linn. Soc. 24: 336.1887; Hook. f., Fl. Brit. India 5: 687. 1890. *Malaxis josephiana* (Rchb. f.) Kuntze, Rev. Gen. Pl. 2:673. 1891; Matthew, Kew Bull. 34(21): 76. 1979, *nom. superfl.* Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 92. 2001.

This species with its short, broad and rounded basal auricles, as per Szlachetko's characterization, comes within the genus *Crepidium*.

### Cryptochilus Wallich

A Himalayan genus of two epiphytic species characterized by pseudobulbous stems and erect scape bearing brightly coloured tubular flowers. Both the species are found in India extending from North West Himalaya to Manipur through Nepal.

- 1a. Flowers red .....**C. sanguinea**
- 1b. Flowers yellow .....**C. lutea**

1. **Cryptochilus lutea** Lindl., J. Linn. Soc. 3: 20.1838; Clarke, J. Linn. Soc. 25: 72. 1889; Hook. f., Fl. Brit. India 5: 827.1890; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 87. 2001.

Clarke collected this species from Kohima, Nagaland.

2. **Cryptochilus sanguinea** Wallich, Tent. Fl. Nepal. 36. t. 26.1822; Hook. f., Fl. Brit. India 5: 827.1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 163. Pl. 220.1898; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 151.1953; Deb, Bull. Bot. Surv. India 3(2): 126.1961; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 87. 2001.

Mukerjee recorded this species from Khayang at 2,300m.

### Cymbidium Sw.

An Indo-Malesio-Australian genus of 44 species (Du Puy & Cribb, 1988) of both terrestrial and epiphytic orchids characterized by clustering pseudobulbs bearing thick and fleshy, loriform leaves and drooping or erect racemes of strikingly colourful and showy flowers. Twenty four species and three subspecies are known from India. Manipur is known to have 15 species.

- 1a. Pollinia 2.....2
- 1b. Pollinia 4.....9
- 2a. Lip attached to base of column only or to a short column foot, hinged, moveable.....3
- 2a. Lip attached to base and sidelobes, not moveable .....5
- 3a. Leaves linear or ligulate; column without foot.....4
- 3b. Leaves broad lanceolate stoutly petiolate; column with a small foot ..... **C. devonianum**
- 4a. Midlobe of lip with pink to purple longitudinal stripes ..... **C. bicolor**
- 4b. Midlobe of lip with purple spots....**C. aloifolium**
- 5a. Pseudobulbs fusiform or subcylindric; flowers white or light greenish yellow with a median yellow line on disc..... **C. mastersii**
- 5b. Pseudobulbs ovoid; flowers of different colour with two prominent keels on lip.....6
- 6a. Leaves less than 20 cm long; petals correct forming a hood over column ..... **C. tigrinum**
- 6b. Leaves more than 25 cm long; petals spreading not forming a hood.....7

- 7a. Inflorescence erect; sepals and petals white or rose, dotted or lined with purple near base ..... **C. insigne**
- 7b. Inflorescence arcuate; sepals and petals yellow to green .....8
- 8a. Sepals and petals apple green; lip with red dots on sidelobes.....**C. hookerianum**
- 8b. Sepals and petals yellow to greenish yellow; lip unspotted on sidelobe ..... **C. lowianum**
- 9a. Leaves elliptic-lanceolate.....**C. lancifolium**
- 9b. Leaves linear or narrowly oblong.....10
- 10a. Inflorescence usually 1 flowered....**C. eburneum**
- 10b. Inflorescence more than 1 flowered .....11
- 11a. Lip saccate at base ..... 12
- 11b. Lip not saccate at base.....13
- 12a. Flowers pendent, campanulate.....**C. longifolium**
- 12b. Flowers erect, not campanulate.....**C. iridoides**
- 13a. Leaves 2-4 from each pseudobulb.....**C. munronianum**
- 13b. Leaves 5-10 from each pseudobulb .....14
- 14a. Floral bracts equalling or exceeding the ovary .....**C. cyperifolium**
- 14b. Floral bracts shorter than the ovary..... **C. ensifolium**

1. **Cymbidium aloifolium** (L.) Sw., Nov. Act. Soc. Sci. Upsal. 6: 73. 1799; Hook. f., Fl. Brit. India 6:10. 1890 p. p.; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 189. t. 252. 1898; Seidenfaden, Opera Bot.72: 77. 1983; Du Puy & Cribb, The Genus *Cymbidium* 62. 1988; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 87. 2001. *Epidendrum aloifolium* L., Sp. Pl. 2:953. 1753.

A widespread species of Indo-Malesia, this occurs commonly in Imphal Valley forming large clumps. Devi and Ghatak recorded it from Moreh.

2. **Cymbidium bicolor** Lindl., Gen. Sp. Orch. 164.1833; Hook. f., Fl. Brit. India 6: 11. 1890. p. p. excl. syn.; Du Puy & Cribb, The Genus *Cymbidium* 67. 1988.

This species has purple spotted flowers and is often mixed with *C. aloifolium* in herbaria.

3. **Cymbidium cyperifolium** Wallich ex Lindl., Gen. Sp. Orch. 163.1833; Hook. f., Fl. Brit. India 6:13. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 186. t. 248.1898; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing.74. 1984; Du Puy & Cribb, The Genus

*Cymbidium* 173.1988; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 88. 2001.

Devi and Ghatak reported this species from Tamenglong.

4. **Cymbidium devonianum** Paxt., Bot. Mag. 10: 97.1843; Hook. f., Fl. Brit. India 6: 10. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 190. Pl. 253.1898; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 88. 2001. *C. sikkimense* Hook. f., Fl. Brit. India 6: 9. 1890 & Ic. Pl. T. 2117. 1892.

Lip is obscurely 3 lobed ; disc with 2 ridges ending in 2 calli.

5. **Cymbidium eburneum** Lindl., Bot. Reg. 33:t. 67.1847; Hook. f., Fl. Brit. India 6: 11. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 133. 1898; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 74. 1984; Du Puy & Cribb, The Genus *Cymbidium* 133. 1988; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 88. 2001.

Devi and Ghatak recorded this species from Tamenglong at 1278 m.

6. **Cymbidium ensifolium** (L.) Sw., Nov. Act. Soc. Sci. Upsal. 6:77. 1799; Du Puy & Cribb, The Genus *Cymbidium* 156.1988; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 88. 2001. *Epidendrum ensifolium* L., Sp. Pl. 2: 954. 1753.

Ghatak and Devi reported this from Tamenglong at 1274 m.

7. **Cymbidium hookerianum** Rchb. f., Gard. Chron.7. 1866; Seidenfaden, Opera Bot. 72: 89. 1984; Du Puy & Cribb, The Genus *Cymbidium* 119. 1988; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 88. 2001. *C. grandiflorum auct. non Sw.*: Griffith, Notulae 3:342.1851; Hook. f., Fl. Brit. India 6: 12. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 192. Pl. 256.1898; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 151. 1953; Deb, Bull. Bot. Surv. India 3(2):126. 1961.

Mukerjee recorded it from Chammu at 1300 m. Deb collected it from Lamdam.

8. **Cymbidium insigne** Rolfe, Gard. Chron. 2: 387.1904; Kingdon-Ward, J. Roy. Hort. Soc. 73: 43. 1948; Seidenfaden, Opera Bot. 72: 90. 1984; Du Puy & Cribb, The Genus *Cymbidium* 128. 1988.

9. **Cymbidium iridoides** D. Don, Prodr. Fl. Nepal. 36. 1825; Hook. f. Fl. Brit. India 6: 14. 1890; Du Puy & Cribb, The Genus *Cymbidium* 115.1988; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 88. 2001. *C. giganteum* Wallich ex Lindl., Gen. Sp. Orch. 163.1833;

Hook. f., Fl. Brit. India 6:12. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8:191.1898; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 74. 1984.

Devi and Ghatak reported this species from Ukhrul.

10. **Cymbidium lancifolium** Hook., Exot. Fl. 1: T. 51.1823; Hook. f., Fl. Brit. India 6: 9. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 185. Pl. 247. 1898; Seidenfaden, Opera Bot. 72: 68.1984; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 88. 2001.

11. **Cymbidium longifolium** D. Don, Prodr. Fl. Nepal. 36. 1825. *C. elegans* Lindl., Gen. Sp. Orch. 163. 1833; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 1898:194. t. 259; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 151. 1953; Deb, Bull. Bot. Surv. India 3(2):126.1961; Ghatak & Devi in Vij (Ed.) Biol. Cons. Cult. Orch. 35. 1986; Du Puy & Cribb, The Genus *Cymbidium* 145.1988; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 88. 2001. *Cyperorchis elegans* (Lindl.)Blume, Rumphia 4:47.1848; Hook. f., Fl. Brit. India 6: 14. 1890.

Mukerjee collected this species from Ukhrul at 1600 m. Ghatak and Devi reported it from Jiribam at 50 m.

12. **Cymbidium lowianum** Rchb. f., Gard. Chron. n.s.11:332, 404. t. 56.1879; Seidenfaden. Opera Bot. 72: 86. 1984; Du Puy & Cribb, The Genus *Cymbidium* 123. 1988. *C. giganteum* var. *lowianum* (Rchb. f.) Rchb. f., Gard. Chron. n. s. 7: 684. 1887.

We saw a specimen under cultivation at Thoubal. This species is quite likely to be found in Manipur.

13. **Cymbidium mastersii** Griffith ex Lindl., Bot. Mag. 31:t. 50. 1845; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 195. t. 261.1898; Pradhan, Ind. Orch. Guide to Iden. Cult. 478. 1979; Seidenfaden, Opera Bot. 72: 91. 1984; Du Puy & Cribb, The Genus *Cymbidium* 140.1988; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 88. 2001. *Cyperorchis mastersii* Benth., J. Linn. Soc.18:318.1881; Hook. f., Fl. Brit. India 6:15. 1890.

Pradhan recorded this species from Manipur.

14. **Cymbidium munronianum** King & Pantling, J. As. Soc. Bengal 64:338.1895; Ann. Roy. Bot. Gard. Calcutta 8:187. t. 249.1898; Du Puy & Cribb, The genus *Cymbidium* 166. 1988; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 88. 2001.

Ghatak and Devi recorded this species from Tamenglong at 1274 m. as a new record for Manipur.

15. **Cymbidium tigrinum** Parish ex Hook., Bot. Mag. 90: T. 5457.1864; Hook. f., Fl. Brit. India 6: 9. 1890; Krishna & Sastry, Bull. Bot. Surv. India 14(1-4):179.1975; Hynniewta, Orch. Rev. 87:219. 1979;

Seidenfaden, Opera Bot. 72: 90. 1984; Du Puy & Cribb, The Genus *Cymbidium* 154. 1988. **Fig. 3e**

We got our specimens from Khongampatt.

*Specimens Examined* : INDIA: **Manipur**: Khongapatt C. Sathish Kumar 28733 (TBGT!)

### Cyrtosia Blume

An Asian saprophytic genus of about 7 species characterized by delicate habit and terminal inflorescence of gamotepalous flowers, succulent indehiscent fruits and wingless seeds. It was reinstated by Garay (1986). Three species are known from India. One is recorded from Manipur.

**Cyrtosia lindleyana** Hook. f. & Thoms., Illustr. Himalayan Plants t. 22. 1855. *Galeola lindleyana* (Hook. f. & Thoms.)Rchb. f., Xen. Orch.2:78. 1862; Hook. f., Fl. Brit. India 6: 88. 1890; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 91. 2001. *Erythrochis lindleyana* (Hook. f. & Thoms.) Rchb. f. in Bonplandia 5:37.1857.

This is a large saprophyte growing over trees and shrubs.

### Dendrobium Sw.

An Indo-Malesio-Australian genus of about 900 species of mostly epiphytic, but occasionally lithophytic orchids with plurinodal pseudobulbous stems and bifarious, variously shaped leaves and variously coloured flowers. India is known to have 102 species and two subspecies. Forty nine species have been reported from Manipur.

- 1a. Leaves with distinct sheaths, often covering most of the internodes.....2
- 1b. Leaf sheaths insignificant .....39
- 2a. Stems wiry, leaves laterally compressed .....3
- 2b. Stems with atleast some of the internodes fleshy and swollen; leaves not laterally compressed....4
- 3a. Stems with an upper floriferous part; flowers white .....**D. acinaciforme**
- 3b. Stems not as above, inflorescence lateral; flowers yellow to greenish yellow..... **D. anceps**
- 4a. Leaf sheaths and flowering region with black hairs .....5
- 4a. Leaf sheaths and flowering region without black hairs ..... 12
- 5a. Mentum saccate .....**D. bellatulum**
- 5b. Mentum extincitoriform.....6

- 6a. Width of epichile about equal to the width of sidelobes when flattened .....7
- 6a. Width of epichile less than width of sidelobes when flattened .....9
- 7a. Apical lobe of lip fimbriate.....**D. longicornu**
- 7b. Apical lobe of lip not fimbriate .....8
- 8a. Epichile of lip triangular, acute at apex .....**D. draconis**
- 8b. Epichile of lip orbicular, retuse at apex ..... **D. formosum**
- 9a. Petals ovate, much broader than the dorsal sepal .....10
- 9b. Petals ovate-lanceolate, not much broader than the dorsal sepal ..... **11**
- 10a. Epichile truncate with only an indistinct sinus, usually minutely mucronulate ..... **D. wattii**
- 10b. Epichile with a deep V-shaped sinus ..... **D. infundibulum**
- 11a. Midlobe obovate or rounded, crisped papillose, disk fimbriate..... **D. cariniferum**
- 11b. Midlobe orbicular ciliate, disk obscurely 3 ridged ..... **D. williamsonii**
- 12a. Large plants; sepals and petals greenish yellow; hypochile with some purple spots.....**D. parcum**
- 12b. Small plants; sepals and petals deep orange to bright yellow; hypochile without purple spots.....**13**
- 13a. Lip with or without sidelobes, usually with varying ornaments .....**43**
- 13b. Lip without sidelobes, upper surface papillose to pubescent, without ornaments except for callus at base.....**14**
- 14a. Sepals and petals strong yellow to copper or coral red.....**15**
- 14b. Sepals and petals purple or white with purple tips, rarely pure white or cream.....**28**
- 15a. Lip strongly plumose (branched)-fimbriate at edges.....**16**
- 15b. Lip erose to finely dentate on margin .....**17**
- 16a. Lip with a single purple blotch.....**18**
- 16b. Lip with two purple blotches....**D. hookerianum**
- 17a. Fimbriae on edges of lip short, dense .....**D. fimbriatum**
- 17b. Fimbriae on edges of lip long, distant .....**D. brymerianum**
- 18a. Sepals and petals deep orange to coral red.....**D. dickasonii**
- 18b. Sepals and petals bright yellow .....**19**
- 19a. Edges of lip incurved so as to form a..... pouch.....**D. moschatum**
- 19b. Edges of lip not incurved.....**20**
- 20a. Flowers many (4-15) in lax raceme .....**21**
- 20b. Flowers a few (1-5) subfascicled on a short raceme.....**22**
- 21a. Leaves obtuse to emarginate; lip lacking distinct blotches ..... **D. chryseum**
- 21b. Leaves acuminate; lip with 2 purple blotches ..... **D. gibsonii**
- 22a. Flowers after shedding the leaves; lip pubescent on veins and centre above, no dark blotch.....**D. heterocarpum**
- 22b. Flowers and leaves together; lip with very short and fat papillae and with a central dark blotch above ..... **23**
- 23a. Lip with a central dark blotch; operculum warty ..... **D. chrysanthum**
- 23b. Lip with two dark blotches; operculum glabrous .....**D. ochreatum**
- 24a. Stems with swollen nodes or internodes alternating with constrictions .....**24**
- 24b. Stems without swollen nodes or internodes and alternating constrictions.....**25**
- 25a. Stems branching, thin wiry, swollen at nodes, atleast on branches..... **D. falconeri**
- 25b. Stems not branching, fleshy.....**26**
- 26a. Column foot with a distinct nectar cavity at distal end.....**27**
- 26b. Column foot without any distinct nectar cavity.....**D. pendulum**
- 27a. Lip longer than dorsal sepal, upper surface finely papillose, lower surface only papillose at edges ..... **D. gratioitissimum**
- 27b. Lip shorter than dorsal sepal, both surfaces papillose except at base..... **D. wardianum**
- 28a. Petals finely ciliate or serrulate on margins.....**29**
- 28b. Petals entire on margins ..... **30**

- 29a. Lip longer than dorsal sepal, edges long-ciliate.....**D. devonianum**
- 29b. Lip shorter than dorsal sepal, edges short-ciliate ..... **D. parishii**
- 30a. Scape long (2-10 cm); lip with two dark blotches .....**D. pulchellum**
- 30b. Scape short (1-1.5 cm); with no or a single dark blotch ..... **31**
- 31a. Basal callus of lip divided into three keels.....**32**
- 31b. Basal callus of lip, if any, fading into lip.....**33**
- 32a. Petals broader than the dorsal sepal.....**D. aphyllum**
- 32b. Petals and sepals similar ..... **D. primulinum**
- 33a. Inflorescence one flowered; lip longer than dorsal sepal..... **D. cretaceum**
- 33b. Inflorescence more than one-flowered; lip shorter than dorsal sepal ..... **34**
- 34a. Petals twice as broad as the dorsal sepal or more ..... **35**
- 34b. Petals not twice as broad as the dorsal sepal.....**36**
- 35a. Lip 3-lobed or obscurely so.....**37**
- 35b. Lip simple.....**38**
- 36a. Lip with a purple patch at base....**D. transparens**
- 36b. Lip without any purple patch at base.....**D. candidum**
- 37a. Sepals and petals usually purple or purple tinted; lip with a papillous callus on claw .....**D. nobile**
- 37b. Sepals and petals pure white; without any papillous callus on claw ..... **D. bensonae**
- 38a. Lip with a basal papillous callus; dorsal sepal 3 cm or more long ..... **D. lituiflorum**
- 38b. Lip without basal callus; dorsal sepal less than 2 cm long ..... **D. crepidatum**
- 39a. Inflorescence 2-6 flowered.....**40**
- 39b. Inflorescence of many small flowers.....**41**
- 40a. Lip with a fat pubescent transverse wall separating hypochile from epichile; flowers 4 per scape ..... **D. linguella**
- 40b. Lip not as above; flowers two per scape ..... **D. stuposum**
- 41a. Stems pseudobulbous, ovoid to conical .....**D. porphyrochilum**
- 41b. Stems fusiform tapering towards apex or nearly cylindrical.....**42**
- 42a. Inflorescence leaf opposed, axillary, 10- to many flowered with long narrow sepals and petals; dorsal sepal more than 1.5 cm.....**D. denudans**
- 42b. Inflorescence lateral and terminal, 7-10 flowered with sepals and petals not as above ; dorsal sepal less than 1 cm ..... **D. eriiflorum**
- 43a. Pseudobulbs 1-leaved ..... **44**
- 43b. Pseudobulbs 2-5 leaved ..... **45**
- 44a. Inflorescence many flowered; lip pubescent only at base and centre, margins glabrous ..... **D. lindleyi**
- 44b. Inflorescence 1-2-flowered; lip pubescent throughout ..... **D. jenkinsii**
- 45a. Sepals and petals white with a flash of yellow, violet or rose..... **46**
- 45b. Sepals and petals yellow ..... **47**
- 46a. Stems with many ridges; flowers in dense inflorescence..... **D. thyriflorum**
- 46b. Stems 4 angled; flowers in lax raceme..... **D. farmeri**
- 47a. Flowers on a dense inflorescence; dorsal sepal about 15 mm long ..... **D. densiflorum**
- 47b. Flowers on a lax inflorescence: dorsal sepal about 18-20 mm long ..... **48**
- 48a. Stems much laterally compressed; petals with entire edges..... **D. sulcatum**
- 48b. Stems not laterally compressed; petals minutely dentate along edges ..... **D. chrysotoxum**
1. **Dendrobium acinaciforme** Roxb., Hort. Beng. 63. 1814, *nom. nud.*; Fl. Ind. 3:487.1832; Hook. f., Fl. Brit. India 5: 723. 1890; Seidenfaden, Opera Bot. 83:209. 1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 88. 2001. *D. spatella* Rchb. f., Hamb. Gartenz. 21:298. 1865; Hook. f., Fl. Brit. India 5:725. 1890.
2. **Dendrobium anceps** Sw., Kgl. Sv. Vet. Nya Handl. 21:246. 1800; Hook. f., Fl. Brit. India 5:724. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 41. Pl. 54. 1898; Seidenfaden, Opera Bot. 83:222. 1985.

We have seen a specimen under cultivation at Thoubal.

Characteristic of the section Aporum to which the above two species belong, they have leaves laterally flattened and arranged bifariouly on the stem.

**3. *Dendrobium aphyllum*** (Roxb.) Fischer in Gamble, Fl. Madras 8:1416. 1928; Seidenfaden 1985:70. *Limodorum aphyllum* Roxb., Corom. Pl. 1, 2: 34. T. 41. 1795. *Dendrobium pierardii* Roxb. ex Hook., Ex. Fl. 1:T. 9.1822; Hook. f., Fl. Brit. India 5:738. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 51. Pl. 72.1898; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing.75.1984; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 88. 2001.

This is a very common species. We found it at Thoubal, Saram, Tupul and Moreh. Roxburgh published two binomials – *Limodorum aphyllum* and *Dendrobium pierardii* – for the same species originating from two different localities at different times and hence, there is a lot of confusion around this species. We do not agree with Christenson in merging it under *D. macrostachyum* Lindl., an entirely different species.

*Specimens Examined:* INDIA, **Manipur:** Tupul 18.03.1996 C. Sathish Kumar (TBGT!).

**4. *Dendrobium bellatulum*** Rolfe in Forbes & Hemsley, J. Linn. Soc. Bot. 36:10.1903; Pradhan, Ind. Orch. Guide to Iden. Cult.330. 1979; Seidenfaden, Opera Bot. 83: 103. 1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 88. 2001.

Pradhan recorded this species from Manipur.

**5. *Dendrobium bensonae*** Rchb. f., Bot. Zeit. 25:230. 1867; Hook. f., Fl. Brit. India 5:739.1890; Katak & Krishna, Bull. Bot. Surv. India 12: 260. 1970; Pradhan, Ind. Orch. Guide to Iden. Cult. 314. 1979; Devi & Ghatak Proc. 5th ASEAN Orch. Cong. Sing.74. 1984; Seidenfaden, Opera Bot. 83: 86.1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 88. 2001.

Pradhan and later Devi and Ghatak recorded this species from Manipur; the latter reported the variety *xanthinum* Rchb. f. from Tengnoupal.

**6. *Dendrobium brymerianum*** Rchb. f., Gard. Chron. 2: 323.1875; Hook. f. in Bot. Mag. T. 638. 1878 & Fl. Brit. India 5: 745. 1890; Seidenfaden, Opera Bot. 83: 36. 1985:

**7. *Dendrobium candidum*** Wallich ex Lindl., Bot. Reg. Misc. 36.1838; Hook. f., Fl. Brit. India 5:735.890; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 151. 1953; Deb, Bull. Bot. Surv. India 3(2):126.1961; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 88. 2001.

There is a specimen at CAL collected by Dr S K Mukerjee (2855, CAL!) on 10 May 1948 from Phungum at 2000 m.

**8. *Dendrobium cariniferum*** Rchb. f., Gard. Chron. 611.1869; Hook. f., Fl. Brit. India 5: 720.1890; Mukerjee,

Notes Roy. Bot. Gard. Edinburgh 21(3):151.1953; Deb, Bull. Bot. Surv. India 3 (2):126. 1961; Seidenfaden, Opera Bot. 83: 120.1985. Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 88. 2001.

Watt collected this species on 13 April 1882 from Sirohi forests where it was growing on rocks in open places (*G. Watt 6500, CAL!*). A duplicate of this collection is available at Kew.

**9. *Dendrobium chrysanthum*** Lindl., Bot. Reg. 15:T. 1299.1830; Hook. f., Fl. Brit. India 5:747. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 55. T. 77.1898; Pradhan, Ind. Orch. Guide to Iden. Cult. 322. 1979; Seidenfaden, Opera Bot. 83: 53.1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 88. 2001.

This species is common in Manipur.

**10. *Dendrobium chryseum*** Rolfe, Gard. Chron. 1:233.1888; Hook. f., Fl. Brit. India 5:748. 1890. *Dendrobium clavatum* Lindl., Wall. Cat. No.2004. 1829 *nom. nud.*; Paxt. Fl. Gard. 2:104. T. 189, non Roxb; Hook. f., Fl. Brit. India 5:746. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 53. Pl. 60.1898; Seidenfaden, Opera Bot. 83:43.1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 88. 2001.

This species has a simple lip narrowed and clawed at base, orbicular-reniform, concave, minutely pubescent to tomentose with shortly fimbriate margin.

**11. *Dendrobium chrysotoxum*** Lindl., Bot. Reg. 33, sub T. 19 and T. 36.1847; Hook. f., Fl. Brit. India 5:750.1890; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):151. 1953; Deb, Bull. Bot. Surv. India 3(2):126.1961; Pradhan, Ind. Orch. Guide to Iden. Cult. 305.1979; Seidenfaden, Opera Bot. 83: 19.1985; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing.74. 1984.

This is fairly common in Manipur. Mukerjee collected it from Ukhrul at 1700 m. on 22.5. 1948 (*S K Mukerjee 2908, CAL!*). Devi and Ghatak recorded it from Sirohi Hill, Chakpikarong and Imphal. We collected it from Tupul, Thoubal and Moreh where it was plenty.

*Specimens Examined:* INDIA: **Manipur;** Khongtheng beyond Tengnoupal 25.03.1996 C. Sathish Kumar 28727 (TBGT!).

**12. *Dendrobium crepidatum*** Lindl. & Paxt., Paxt. Fl. Gard. 1:63. fig. 45.1850; Hook. f., Fl. Brit. India 5:740. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8:48. Pl. 66.1898; Pradhan, Ind. Orch. Guide to Iden. Cult. 319. 1979; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing.74.1984; Seidenfaden, Opera Bot. 83: 80.1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 88. 2001.

Devi and Ghatak record this species from Chakpikarong.

13. **Dendrobium cretaceum** Lindl., Bot. Reg. 33:T. 62. 1847; Hook. f., Fl. Brit. India 5:736.1890; Pradhan, Ind. Orch. Guide to Iden. Cult. 708. 1979; Seidenfaden, Opera Bot. 83: 75.1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 88. 2001.

Deb collected this species from Mao at 7000' on 11 February 1954 (*D. B. Deb 1891, CAL!*).

14. **Dendrobium densiflorum** Lindl. in Wallich, Pl. As. Rar. 1:34:T. 40. 1830; Hook. f., Fl. Brit. India 1890:748 (excl. syn.); King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 56. T. 79. 1898; Pradhan, Ind. Orch. Guide to Iden. Cult. 305. 1979; Seidenfaden, Opera Bot. 83: 23. 1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 89. 2001.

This is a species fairly common in Manipur.

15. **Dendrobium denudans** D. Don, Prodr. Fl. Nepal. 34. 1825; Hook. f., Fl. Brit. India 5: 715. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 1898:45. Pl. 62; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):151. 1953; Deb, Bull. Bot. Surv. India 3(2):127.1961; Pradhan, Ind. Orch. Guide to Iden. Cult. 338. 1979; Seidenfaden, Opera Bot. 83:148.1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 89. 2001.

Mukerjee recorded this species from Ukhrul.

16. **Dendrobium devonianum** Paxt., Bot. Mag. 7:169.1840; Hook. f., Fl. Brit. India 5:743.1890; Pradhan, Ind. Orch. Guide Iden. Cult. 1: 318.1976; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 74. 1984; Seidenfaden, Opera Bot. 83:64.1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 89.2001.

Devi and Ghatak reported this species from Khudenthabi at 1342 m.

17. **Dendrobium dicksonii** L. O. Williams, Bot. Mus. Leaf. Harv. Univ. 8:107.1940; Seidenfaden, Opera Bot. 124:24. 1995. *D. arachnites* Rchb. f., Gard. Chron. 2:354.1874, non Thouars; Hook. f., Fl. Brit. India 5:734.1890; Pradhan, Ind. Orch. Guide to Iden. Cult. 1:313. 1976. *D. seidenfadenii* Senghas & Bockemuhl, Die Orchidee 29(5): C.II.1978; Seidenfaden, Opera Bot. 83: 41.1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 90. 2001.

Pradhan recorded this species from Manipur.

18. **Dendrobium draconis** Rchb. f., Bot. Zeit. 214. 1862; Hook. 1890:722; Pradhan, Ind. Orch. Guide to Iden. Cult. 1:330.1976; Devi & Ghatak, Proc. 5th

ASEAN Orch. Cong. Sing. 75. 1984; Seidenfaden, Opera Bot. 83:110.1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 89. 2001

Devi and Ghatak found it at Tengnoupal. Pradhan recorded it from Manipur.

19. **Dendrobium eriiflorum** Griffith, Not. 3:316. & Ic. T. 307.1851; Hook. f., Fl. Brit. India 5:715.1890 & Ann. Roy. Bot. Gard. Calcutta 5:5. T.7.1895; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 1898:44. T. 61; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):151. 1953; Deb, Bull. Bot. Surv. India 3(2):127.1961; Pradhan, Ind. Orch. Guide to Iden. Cult. 1:338. 1976; Seidenfaden, Opera Bot. 83: 149.1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 89. 2001.

Mukerjee found this species in Ukhrul at 1800 m.

20. **Dendrobium falconeri** Hook., Bot. Mag. T. 4944.1856; Hook. f., Fl. Brit. India 5: 742. 1890; Pradhan, Ind. Orch. Guide to Iden. Cult. 1:318.1976; Seidenfaden, Opera Bot. 83:55.1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 89. 2001.

It was J.D. Hooker who first cited its occurrence in Manipur.

21. **Dendrobium farmeri** Paxt., Paxton's Bot. Mag. 15:241.1849; Hook. f., Fl. Brit. India 5:750. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 57. Pl. 80. 1898; Pradhan, Ind. Orch. Guide to Iden. Cult. 2:306.1979; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 75.1984; Seidenfaden, Opera Bot. 83: 24.1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 89. 2001.

Devi and Ghatak reported this species from Jiribam.

22. **Dendrobium fimbriatum** Hook., Exot. Fl. 1:T.71.1823; Hook. f., Fl. Brit. India 5:745. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8:58. 1898; Seidenfaden, Opera Bot. 83: 36. 1985. *D. fimbriatum* var. *oculatum* Hook., Bot. Mag. T. 4160.1845; Hook. f., Fl. Brit. India 5: 745. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 59. T. 82.1898; Pradhan, Ind. Orch. Guide to Iden. Cult. 309. 1979; Devi & Ghatak Proc. 5th ASEAN Orch. Cong. Sing. 75. 1984; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 89. 2001. **Fig. 9a**

This is fairly common in Manipur.

*Specimens Examined:* INDIA: **Manipur:** Thoubal 25.03.1996 *C. Sathish Kumar 28735* (TBGT!).

23. **Dendrobium formosum** Roxb. ex Lindl. in Wallich, Pl. As. Rar. 1:24. T. 29.1830; Hook. f., Fl. Brit. India 5:721. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 47. Pl. 65.1898; Pradhan, Ind. Orch.

Guide to Iden. Cult. 328. 1979; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 75. 1984; Seidenfaden, Opera Bot. 83:111. 1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 89. 2001.

Devi and Ghatak reported this species from Churachandpur.

24. **Dendrobium gibsonii** Lindl., Paxt. Bot. Mag. 5: 169. 1838; Hook. f., Fl. Brit. India 5:746. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 58. T. 81. 1898; Pradhan, Ind. Orch. Guide to Iden. Cult. 47. 1979; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 75. 1984; Seidenfaden, Opera Bot. 83:47. 1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 89. 2001.

Devi and Ghatak reported it from Laimakhong.

25. **Dendrobium gratiotissimum** Rchb. f., Bot. Zeit. 23:99. 1865; Hook. f., Fl. Brit. India 5:743. 1890; Pradhan, Ind. Orch. Guide to Iden. Cult. 314. 1979; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 75. 1984; Seidenfaden, Opera Bot. 83: 58. 1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 89. 2001. *D. boxallii* Rchb. f., Gard. Chron. 1:5. 1874; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 74. 1984.

Devi and Ghatak recorded this species from Laimaton.

26. **Dendrobium heterocarpum** Lindl., Gen. Sp. Orch. 73. 1830; Hook. f., Fl. Brit. India 5:737. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8:53. T. 74. 1898; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 75. 1984; Seidenfaden, Opera Bot. 83: 50. 1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 89. 2001.

Devi and Ghatak reported this species from Imphal. We collected it from between Saram and Kasom Khullen.

*Specimens Examined:* INDIA: **Manipur**, Ukhrul District: About 20 Kms before Kasom Khullen C. Sathish Kumar 28722 (TBGT!) 24.03.1996.

27. **Dendrobium hookerianum** Lindl., J. Linn. Soc. 3: 8. 1859; Hook. f., Fl. Brit. India 5:745. 1890; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 89. 2001.

Lip is orbicular with a cuneate base, deeply fringed with two purple blotches.

28. **Dendrobium infundibulum** Lindl., J. Linn. Soc. 3: 16. 1859; Hook. f., Fl. Brit. India 5:721. 1890; Pradhan, Ind. Orch. Guide to Iden. Cult. 330. 1979; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 75. 1984; Seidenfaden, Opera Bot. 83: 117. 1985; Chauhan in

Pathak *et al.* (Ed.), Orch. Sci. & Com. 89. 2001. *D. jamesianum* Rchb. f., Gard. Chron. 554. 1869. *D. infundibulum* Lindl. var. *jamesianum* (Rchb. f.) Veitch, Orch. Man. 50. 1837; Hook. f., Fl. Brit. India 5: 721. 1890. **Fig. 8**

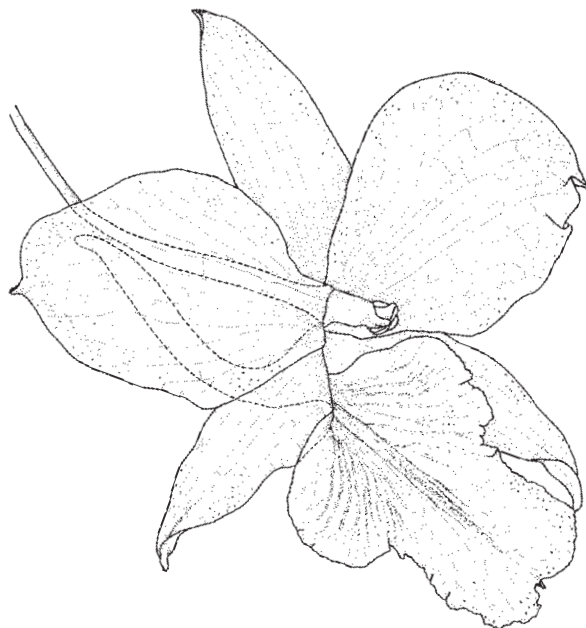


Figure 8. *Dendrobium infundibulum* Lindl. - Flower showing lip details (after CSK 28726).

Devi and Ghatak reported this species and its variety from Tengnoupal. We got a plant from near Moreh growing on open rocks.

*Specimens Examined:* INDIA: **Manipur**: 4 Kms ahead of Tengnoupal 25.03.1996 C. Sathish Kumar 28726 (TBGT!).

29. **Dendrobium jenkinsii** Wallich ex Lindl., Bot. Reg. 25: T. 37. 1839; Pradhan, Ind. Orch. Guide to Iden. Cult. 303. 1979; Seidenfaden, Opera Bot. 83:17. 1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 89. 2001. *D. aggregatum* Roxb. var. *jenkinsii* (Wallich ex Lindl.) King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 6. T. 85. 1898.

30. **Dendrobium lindleyii** Steud., Nomencl. Bot. 2. ed. 2: 490. 1840; Pradhan, Ind. Orch. Guide to Iden. Cult. 303. 1979; Seidenfaden, Opera Bot. 83:16. 1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 89. 2001. *D. aggregatum* Roxb., Fl. Ind. 2 Ed. 3:477. 1832, non HBK; Hook. f., Fl. Brit. India 5:749. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 60. Pl. 85. 1898.

Devi and Ghatak reported this species from Tengnoupal.

*Specimen Examined:* INDIA: **Manipur**, Thoubal: C. Sathish Kumar 28735 (TBGT!)



31. **Dendrobium linguella** Rchb. f., Gard. Chron. n.s.18:552.1882; Seidenfaden, Opera Bot. 83:90. 1985; Ghatak & Devi in Vij (Ed.), Biol. Cons. Cult. Orch. 360. 1986.

Ghatak and Devi reported it from Jiribam at 50 m.

32. **Dendrobium lituiflorum** Lindl., Gard. Chron. 372.1856; Hook. f., Fl. Brit. India 5: 740.1890; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 151.1953; Deb, Bull. Bot. Surv. India 3(2): 127.1979; Pradhan, Ind. Orch. Guide to Iden. Cult.316. 1979; Devi & Ghatak Proc. 5th ASEAN Orch. Cong. Sing.:75. 1984. Seidenfaden, Opera Bot. 83: 81.1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 89. 2001.

**Fig. 9b**

*Specimen Examined:* INDIA; **Manipur**, Khongampatt 23.03.1996 C. Sathish Kumar 28736 (TBGT!).

33. **Dendrobium longicornu** Lindl., Gen. Sp. Orch. 80.1830; Hook. f., Fl. Brit. India 5: 720. 1890; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):151. 1953; Deb, Bull. Bot. Surv. India 3(2):127.1961; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing.75.1984; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 89. 2001.

Watt collected this species from Manipur in 1881 and J.D. Hooker described a variety *hirsuta* under it.

34. **Dendrobium moschatum** (Buch.-Ham.)Sw., Schrader Neues Journ. 1:94. 1805; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 60. T. 84.1898; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 152. 1953; Deb, Bull. Bot. Surv. India 3(2): 127.1961; Pradhan, Ind. Orch. Guide to Iden. Cult. 308. 1979; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing.75.1984; Seidenfaden, Opera Bot. 83:43.1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com.89. 2001. *Epidendrum moschatum* Buch.-Ham. in Symes:Emb. Kingd. Ava 1 Ed. 478. 1800. *Dendrobium calceolaria* Carey ex Hook., Exot. Fl. 3:T. 184.1827; Hook. f., Fl. Brit. India 5:744. 1890.

**Fig. 9c**

Lip of this species is very peculiar in being calceolar pyriform or hemispheric with broadly incurved fimbriate margins.

35. **Dendrobium nobile** Lindl., Gen. Sp. Orch. 34.1830; Hook. f., Fl. Brit. India 5:740. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 51, T. 71.1898; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):152. 1953; Deb, Bull. Bot. Surv. India 3(2): 127.1961; Pradhan, Ind. Orch. Guide to Iden. Cult. 315. 1979; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 75. 1984; Seidenfaden, Opera Bot. 83: 83.1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 89. 2001.

H. B. Singh showed a pure *alba* form of this found in Manipur.

36. **Dendrobium ochreatum** Lindl., Bot. Reg. 21: sub T 1756.1835; Hook. f., Fl. Brit. India 5:747. 1890; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):152. 1953; Deb, Bull. Bot. Surv. India 3(2):127.1961; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 75. 1984; Seidenfaden, Opera Bot. 83:55.1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 89. 2001.

Mukerjee recorded this species from Phungum at 1800 m.

37. **Dendrobium parcum** Rchb. f., Gard. Chron. 1042.1866; Hook. f., Fl. Brit. India 5:720. 1890; Seidenfaden, Opera Bot. 83:158. 1985.

*Epiphytic herbs.* Stems 50 cm or more, usually thin, purple and furrowed when old, sheaths grey, often branching. *Inflorescence* very short subterminal and at nodes, with 2-5 creamy yellow flowers; dorsal sepal 4-5 mm, 3-veined; petals linear-spathulate; lip nearly twice as long, spathulate, slightly retuse at apex without side lobes, the base fleshy with two ridges; hypochile green with dark purple spots, epichile pure yellow; mentum sac-shaped; column very broad with a much concave front side, rostellum rather large with squarish front edge; operculum triangular, conical. *Fruits* not seen.

*Flowering:* March-April

*Habitat:* Evergreen forests at 800 m.

*Occurrence:* India, Manipur, Thoubal.

*Distribution:* India, Myanmar, Thailand and Vietnam.

*Specimens Examined:* INDIA, **Manipur**, Thoubal: 22 March 1996, C. Sathish Kumar 28708 (TBGT!).

*Note:* Type of this species was from Tenasserim, Myanmar. A few samples we could collect are not good for illustration. It is a new record for India.

38. **Dendrobium parishii** Rchb. f., Bot. Zeit. 21. no. 31: 237.1863; Hook. f., Fl. Brit. India 5:740.1890; Pradhan Ind. Orch. Guide to Iden.Cult.62.1979; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 75. 1984; Seidenfaden, Opera Bot. 83:62.1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 89. 2001.

Devi and Ghatak reported it from Ukhrul at 1900 m. Pradhan also recorded it from Manipur.

39. **Dendrobium pendulum** Roxb., Fl. Ind. 2 Ed. 3: 484.1832; Hook. f., Fl. Brit. India 5:741.1890 (excl. syn. *D. wardianum*); Pradhan, Ind. Orch. Guide to Iden. Cult. 319. 1979; Seidenfaden, Opera Bot. 83: 60.1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 89.



Figure 9. a. *Dendrobium fimbriatum* Hook. ; b. *Dendrobium lituiflorum* Lindl. ; c. *Dendrobium moschatum* (Buch.-Ham.) Sw.; d. *Dendrobium thysiflorum* Rchb. f.

2001. *D. crassinode* Benson Rchb. f., Gard. Chron. 164.1869; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 74. 1984.

Devi and Ghatak reported it from Tengnoupal.

40. ***Dendrobium porphyrochilum*** Lindl., J. Linn. Soc. 3:18.1858; Hook. f., Fl. Brit. India 5:716. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 44.Pl. 59.1898; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):152. 1953; Deb, Bull. Bot. Surv. India 3(2):127.1961; Pradhan, Ind. Orch. Guide to Iden. Cult. 340. 1979; Seidenfaden, Opera Bot. 83:138.1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 89. 2001.

Mukerjee recorded this species from Ukhrul.

41. ***Dendrobium primulinum*** Lindl., Gard. Chron. 223.1858; Hook. f., Fl. Brit. India 5:735.1890; Pradhan, Ind. Orch. Guide to Iden. Cult. 320. 1979; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 75. 1984; Seidenfaden, Opera Bot. 83:69.1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 89. 2001.

We collected this species from Thoubal.

42. ***Dendrobium pulchellum*** Roxb. ex Lindl., Gen. Sp. Orch. 82.1830; Hook. f., Fl. Brit. India 5:186.1890; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):152. 1953; Deb, Bull. Bot. Surv. India 3(2):127.1961; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 75. 1984; Seidenfaden, Opera Bot. 83: 65.1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 89. 2001. *D. dalhousieanum* Wallich, Paxt. Bot. Mag. 11: T. 145.1844; Hook. f., Fl. Brit. India 5: 743. 1890. *p. p.*

Mukerjee reported this species from Ukhrul.

43. ***Dendrobium stuposum*** Lindl., Bot. Reg. 24:52. misc. 94. 1838; Hook. f., Fl. Brit. India 6:186.1890; Ann. Roy. Bot. Gard. Calcutta 5: 13. T. 20; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8:54. T. 75.1898; Pradhan, Ind. Orch. Guide to Iden. Cult. 324. 1979; Seidenfaden, Opera Bot. 83: 93.1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 90. 2001.

This species has characteristically two flowered inflorescences; flower is pure white with a yellow patch on lip.

44. ***Dendrobium sulcatum*** Lindl., Bot. Reg. 24:T. 65.1838; Hook. f., Fl. Brit. India 5:749. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 55. T. 78.1898; Pradhan, Ind. Orch. Guide to Iden. Cult. 304. 1979; Seidenfaden, Opera Bot. 83: 19.1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 90. 2001.

This species is closely related to *D. chrysotoxum* Lindl. also found in Manipur but can be distinguished on

the basis of its laterally compressed stems and petals with entire edges.

45. ***Dendrobium thyrsoflorum*** Rchb. f. in André, Ill. Hort. 22:88. T. 207. 1875; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 52.1898; Pradhan, Ind. Orch. Guide to Iden. Cult. 306. 1979; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 75. 1984; Seidenfaden, Opera Bot. 83: 25.1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 90. 2001. *D. densiflorum* var. *albolutea* Hook. f., Bot. Mag. 3: s. 25:5780.1869; Hook. f., Fl. Brit. India 5: 748. 1890. **Fig. 9d**

Mukerjee recorded this species from Ukhrul.

46. ***Dendrobium transparens*** Wallich ex Lindl., Gen Sp. Orch. 79.1830; Hook. f., Fl. Brit. India 5:738. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 50 T. 70.1898; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 90. 2001.

Wallich's type was from Nepal. Lip of this species is broadly elliptic-obovate to sagittate and obscurely 3 lobed, clawed at base and pubescent.

47. ***Dendrobium wardianum*** Warner, Sel. Orch. 1:T. 19.1862; Hook. f., Fl. Brit. India 5:742.1890; Pradhan, Ind. Orch. Guide to Iden. Cult. 319. 1979; Seidenfaden, Opera Bot. 83: 56.1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 90. 2001.

Pradhan recorded this species from Manipur.

48. ***Dendrobium wattii*** (Hook. f.) Rchb. f., Gard. Chron. 2:724.1888; Hook. f., Fl. Brit. India 5:721. 1890; Deb, Bull. Bot. Surv. India 3(2):127. 1961; Seidenfaden, Opera Bot. 83:113. 1985 & Opera Bot. 124: 29.1995; Pradhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 90. 2001. *D. cariniferum* var. *wattii* Hook. f., Bot. Mag. Pl. 6715. 1883.

The original specimen collected by Watt (*G. Watt 5944*, CAL! K) from 'on ascent to Suripheri at 9000 ft' in January 1882 was the basis for J.D. Hooker's description of eponymous variety under *Dendrobium cariniferum*. This was elevated to the rank of a species by Reichenbach f., a view immediately accepted by Hooker. On the type sheet at CAL Pantling remarked 'very doubtfully *D. wattii* as figured in the Bot. Mag. t. 6715. The Bot. Mag. shows a small oblong anterior lobe of the lip, whereas in this specimen it is large, bifid with cucullate margin. *Watt 5944* does not agree with any species described in the FBI' – RP April 1897. This is a very rare species and poorly represented in herbaria.

49. ***Dendrobium williamsonii*** Day & Rchb. f., Gard. Chron. 78.1869; Hook. f., Fl. Brit. India 5: 721. 1890; Pradhan, Ind. Orch. Guide to Iden. Cult. 326.

1979; Shukla & Baishya, J. Bombay Nat. Hist. Soc. 76:221.1979; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 75. 1984; Seidenfaden, Opera Bot. 83:121.1985; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 90. 2001.

Shukla and Baishya recorded this species from Manipur.

*Specimens Examined*: INDIA: Manipur: Imphal 30.03.1996 C. Sathish Kumar 28734 (TBGT!).

### Dickasonia L. O. Williams

A monotypic epiphytic genus with clustered 1-leaved pseudobulbs and lateral racemes of 3-7 white flowers originally described from Myanmar.

**Dickasonia vernicosa** L. O. Williams, Bot. Mus. Leaflet. Harv. Univ. 9: 37.1941; Deori, Bull. Bot. Surv. India 26(1-4):230.1984 (1986). *Kalimpongia natarajitii* Pradhan in Orchid Dig. 41(5):172.1977; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 75. 1984.

Pradhan's original record was from Manipur without precise locality. Devi and Ghatak reported it from Laimaton. Pradhan who had a collection of this from Manipur wrongly believed it to represent a new genus which he called *Kalimpongia*. Deori (1986) found it congeneric.

### Dienia Blume

An Indo-Malesian genus with one highly variable species characterized by 3 lobed lip with transverse callus. This genus was till recently merged under *Malaxis* and was resurrected by Szlachetko (1995). This is the only species under this genus and it is found in Manipur. It is a terrestrial herb with many plicate leaves around a thick stem having a terminal inflorescence bearing congested reddish flowers.

**Dienia ophrydis** (Koenig) Ormerod & Seidenf., Contr. Orch. Fl. Thailand 13:18. 1997. *Epidendrum ophrydis* Koenig in Retz., Obs. 6:46. 1771. *Malaxis latifolia* J. E. Sm. in Rees Cyclop. 22. 1812; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):153. 1953; Seidenfaden, Dansk Bot. Ark. 33(1): 45. 1978. *Dienia congesta* Lindl., Bot. Reg. 10 sub t 825. 1824. *Microstylis congesta* (Lindl.) Rchb. f., Walp. Ann. 6:206.1861; Hook. f., Fl. Brit. India 5: 689. 1888. *Malaxis congesta* (Lindl.) Deb, Bull. Bot. Surv. Ind. 3:123. 1961.

Mukerjee reported this species from Ukhrul.

### Doritis Lindley

An Indo-Malesian genus of two lithophytic species characterized by a long column foot equalling the

column and four pollinia. Christenson (2001) prefers to keep this under *Phalaenopsis*. Only one species is known from India, which is also recorded from Manipur.

**Doritis pulcherrima** Lindl., Gen Sp. Orch. 178.1988; Hook. f., Fl. Brit. India 6:31. 1890; Seidenfaden, Opera Bot. 95: 31.1988; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 90. 2001. *Phalaenopsis mastersii* King & Pantl., J. As. Soc. Beng. 66:591. 1897.

King and Pantling described their novelty based on Masters' collection made at the Nambur Falls in Assam made February 1845.

### Drymoda Lindley

An Indo-SE Asian genus of three epiphytic species characterized by small discoid pseudobulbs and one-flowered inflorescence on a thin scape from the base; column-foot long with lateral sepals attached to it at the end. Only one species occurs in India including Manipur.

**Drymoda gymnopus** (Hook. f.) Garay, Hamer & Siegerist, Nord. J. Bot. 14(6):641. 1994. *Bulbophyllum gymnopus* Hook. f., Fl. Brit. India 5:764. 1890.

This species has pale greenish white flowers with an obtuse yellow lip.

### Epigeneium Gagnepain

An Indo-Malesian genus of about 35 species of epiphytic orchids with elongated stems bearing 1 or 2 leaved pseudobulbs and 1 to many medium sized to large, showy flowers. Six species are found in India. Two occur in Manipur.

1a. Dorsal sepal 3.5-6.5 cm long ..... **E. amplum**

1b. Dorsal sepal less than 3 cm long.....**E. fuscescens**

**1. Epigeneium amplum** (Lindl.) Summerh., Kew Bull. 2:260. 1957; Seidenfaden, Dansk Bot. Ark. 34(1):71. 1980. *Dendrobium amplum* Lindl. in Wallich, Pl. As. Rar. 1:25. T. 29.1829; Hook. f., Fl. Brit. India 5:711. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 63. T. 89. 1898. *Dendrobium coelogyne* Rchb. f., Gard.Chron.136.1871; Hook. f., Fl. Brit. India 5:712. 1890.

Type specimens were gathered from Nepal and Bangladesh.

**2. Epigeneium fuscescens** (Griffith) Summerh., Kew Bull. 2:262. 1957. *Dendrobium fuscescens* Griffith, Not. Pl. Asiat. 3: 308.1851; Hook. f., Fl. Brit. India 5:712. 1890.

Griffith collected the type from Churrapunji in Meghalaya.

**Eria Lindley**

An Indo-Malesian genus of about 500 species of epiphytic or lithophytic orchids with pseudobulbous stems bearing 1 to many leaves and axillary or terminal racemes or fascicles of small or medium sized flowers. India is known to have 55 species and 2 varieties. Fourteen species are known from Manipur.

- 1a. Stems consisting of one distinct internode only .....2
- 1b. Stems consisting of several internodes..... 6
- 2a. Leaves plicate ..... **E. javanica**
- 2b. Leaves conduplicate, sometimes terete .....3
- 3a. Small plants with less than 1 cm high pseudobulbs .....**E. muscicola**
- 3b. Large plants with tall pseudobulbous stems.....4
- 4a. Lip simple, unlobed ..... **E. vittata**
- 4b. Lip 3 lobed ..... 5
- 5a. Flowers white to pale purple; lip flushed with purple ..... **E. coronaria**
- 5b. Flowers pale cream; lip with yellow red markings ..... **E. excavata**
- 6a. Plants reed like; stems more than 7 leaved ..... 7
- 6b. Plants pseudobulbous; stems less than 7 leaved ..... 8
- 7a. Inflorescence densely flowered.....**E. paniculata**
- 7b. inflorescence laxly flowered.....**E. bambusifolia**
- 8a. Leaves terete ..... **E. pannaea**
- 8b. Leaves flat, dorsiventral ..... 9
- 9a. Inflorescence glabrous .....10
- 9b. Inflorescence woolly, tomentose or pubescent .....11
- 10a. Flowers cream coloured; lip with a broad orbicular midlobe.....**E. globulifera**
- 10b. Flowers white with a purplish flash; lip with a triangular midlobe .....**E. spicata**
- 11a. Inflorescence densely or softly tomentose ..... **E. discolor**
- 11b. Inflorescence pubescent, not tomentose.....12

- 12a. Leaf acute at apex; sepals and petals whitish with purple lines ..... **E. amica**
- 12b. Leaf obtuse at apex or emarginate; sepals and petals white tinged with green ..... **E. acervata**

**1. Eria acervata** Lindl., J. Hort. Soc. 6:57. 1851; Hook. f., Fl. Brit. India 5:796. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 123: Pl. 170. 1898; Pradhan, Ind. Orch. Guide to Iden. Cult. 359. 1979; Seidenfaden, Opera Bot. 62: 106. 1982; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 90. 2001. **Fig. 10**

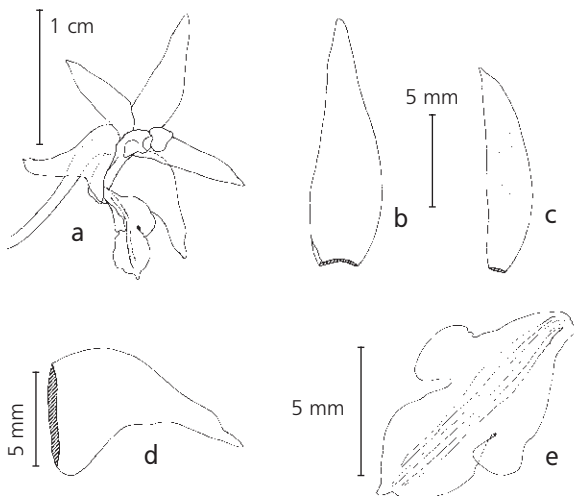


Figure 10. *Eria acervata* Lindl. - Flower showing lip details; a. Flower; b. Dorsal sepal; c. Petal; d. Lateral sepal; e. Lip (after CSK 28745).

We got our specimens from Tupul which later flowered under cultivation at TBGRI.

*Flowering:* April-June

*Habitat:* Primary forests at Tupul at 760 m.

*Occurrence:* Manipur: Tupul

*Distribution:* India, Myanmar, Thailand, Cambodia, Vietnam and China.

*Specimens Examined:* INDIA, **Manipur:** Tupul C. Sathish Kumar 28745, 28758 (TBGT!).

**2. Eria amica** Rchb. f., Xen. Orch. 2:162. T. 168 III, 6-9, 1870; Hook. f., Fl. Brit. India 5:800. 1890; Pradhan, Ind. Orch. Guide to Iden. Cult. 364. 1979; Seidenfaden, Opera Bot. 62: 115. 1982; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 90. 2001. *E. confusa* Hook. f., Ic. Pl. T. 1850, 1889 & Fl. Brit. India 5: 796. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8:122 Pl. 169. 1898. *E. andersonii* Hook. f., Fl. Brit. India 5:795. 1890 & Ic. Pl. T. 2069. 1891.

Type of this species was procured by John Day from Assam.

3. *Eria bambusifolia* Lindl., J. Linn. Soc.3:61.1859; Hook. f., Fl. Brit. India 5: 805. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8:119.Pl.163.1898; Pradhan, Ind. Orch. Guide to Iden. Cult. 366. 1979; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 90. 2001.

Types were collected from Khasia hills of Meghalaya.

3. *Eria coronaria* (Lindl.)Rchb. f. in Walp. Ann. 6:272. 1861; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 124. Pl. 172.1898; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 152. 1953; Deb, Bull. Bot. Surv. India 3(2):127.1961; Pradhan, Ind. Orch. Guide to Iden. Cult. 357. 1979; Seidenfaden, Opera Bot. 62:40. 1982; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 90. 2001. *Coelogyne coronaria* Lindl., Bot. Reg. 27:178. misc. 83. 1841. *Trichosma suavis* Lindl., Bot. Reg. 28:T. 21.1842; Hook. f., Fl. Brit. India 5: 827.1890 & 6:193. 1890.

Mukerjee reported this species from Khangkhui at 1300 m.

5. *Eria discolor* Lindl., J. Linn. Soc. 3:51. 1859; Hook. f., Ann. Roy. Bot. Gard. Calcutta 5:21. 1985; Seidenfaden, Opera Bot. 62:49. 1982. *Tylostylis discolor* (Lindl.)Hook. f., Ann. Roy. Bot. Gard. Calcutta 5:22. 1895 (in syn.); King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 130. Pl. 180. 1898; Pradhan, Ind. Orch. Guide to Iden. Cult. 341. 1979. *Eria pulchella auct. non* Lindl.: Hook. f., Fl. Brit. India 5: 801. 1890

We got our specimens from Thoubal.

6. *Eria excavata* Lindl., Gen. Sp. Orch. 67. 1830; Hook. f., Ic. Pl. t. 1846. 1889 & Fl. Brit. India 5: 795. 1890; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):152.1953; Deb, Bull. Bot. Surv. India 3(2):127. 1961; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 90. 2001.

Mukerjee reported this species from Sirohi at 2600 m.

7. *Eria javanica* (Sw.)Blume, Rumphia 2:23.1836; Pradhan, Ind. Orch. Guide to Iden. Cult. 352. 1979; Seidenfaden, Opera Bot. 62: 26. 1982. *Dendrobium javanicum* Sw., Kgl. Sv. Vet. Akad. Nya Handl. 21:247. 1800. *Eria fragrans* Rchb. f., Bot. Zeit. 22:415. 1864; Hook. f., Fl. Brit. India 5: 794. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 122. Pl. 168. 1898; Shukla & Baishya, J. Bombay Nat. Hist. Soc. 76: 227. 1979.

Shukla and Baishya recorded this species from Moreh.

8. *Eria globulifera* Seidenf., Opera Bot. 62:125.1982;

Naithani, Nageswara Rao & Haridasan, Ind. J. For. 8(4): 333. 1985.

Fig. 11

*Epiphytic herbs.* Stems usually plurinodal, close together, 10-15 x 1-2 cm, cylindrical with broad transparent acute sheaths. *Leaves* 3-5, oblong-lanceolate, 10-22 x 2-3.5 cm, 11-veined, midvein prominent having distinct sheathing leaf base. *Inflorescence* 3.5-4.5 cm long, 2-3 together arising from the axil of the leaf behind the apex, curved towards one side, many flowered and densely packed, globular; floral bracts white and petaloid, 5-8 x 2.5-4.5 mm, 5-veined, ovate-oblong, margin slightly erose, acute at apex; ovary + pedicel 4 mm long and faintly pubescent. *Flowers* white or off white, 9 mm long and 8 mm broad with spreading lateral sepals; dorsal sepal 6 x 3.5-4 mm, ovate, 3-veined, gland dotted, obtuse; lateral sepals broadly ovate, 5-5.5 x 3.5-4 mm, 3-veined, acute; petals 4-4.5 x 2-2.5 mm, oblong-lanceolate, 1-veined, obtuse; lip 3-lobed, 2 x 3 mm across the sidelobes, 3-veined; sidelobes folded upwards, white semicircular, midlobe broad, orbicular, broad at base, strongly yellow and cushion like; column 1 mm long with a distinct thickening on either side; column foot 2 mm long, attaching lateral sepals and lip; operculum 1.5 mm broad, 8-celled, pollinia 8 in two packets of four each. *Fruits* not seen.

*Flowering:* August

*Habitat:* Evergreen forests at 800 m.

*Occurrence:* India, Manipur, Tupul; Arunachal Pradesh.

*Distribution:* India, Thailand, Laos and Vietnam.

*Specimens Examined:* INDIA, **Manipur:** Tupul 18 March 1996 C. Sathish Kumar 27362 (TBGT!); flowered under cultivation on 21 August 1996 C. Sathish Kumar 28748 (TBGT!).

*Note:* Naithani *et al.* reported this species first time for India from Arunachal Pradesh. This is a new record for Manipur. Our identification was confirmed by Paul Ormerod who studied Seidenfaden's type from Thailand.

9. *Eria muscicola* (Lindl.)Lindl., J. Linn. Soc.3:47.1859; Hook. f., Fl. Brit. India 5: 789. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 117. Pl. 159. 1898; Deb, Bull. Bot. Surv. India 3(2):127. 1961; Seidenfaden, Opera Bot. 62:32.1982; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 90. 2001. *Dendrobium muscicola* Lindl., Gen. Sp. Orch. 75. 1830.

Deb reported this species from Kangpokpi (Maohing 15.8.1953 D. B. Deb 935, CAL!)

10. *Eria paniculata* Lindl. in Wallich, Pl. As. Rar. 1:32. T. 36.1830; Hook. f., Fl. Brit. India 5:789. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8:26.Pl.174. 1898; Pradhan, Ind. Orch. Guide to Ident. Cult. 356. 1979; Seidenfaden, Opera Bot. 62:67.1982; Chauhan

in Pathak *et al.* (Ed.), Orch. Sci. & Com. 90. 2001.

Type originated from Bangladesh.

11. *Eria pannaea* Lindl., Bot. Reg. 28:64. misc.79.1842; Hook. f., Fl. Brit. India 5: 804. 1890; King & Pantling,

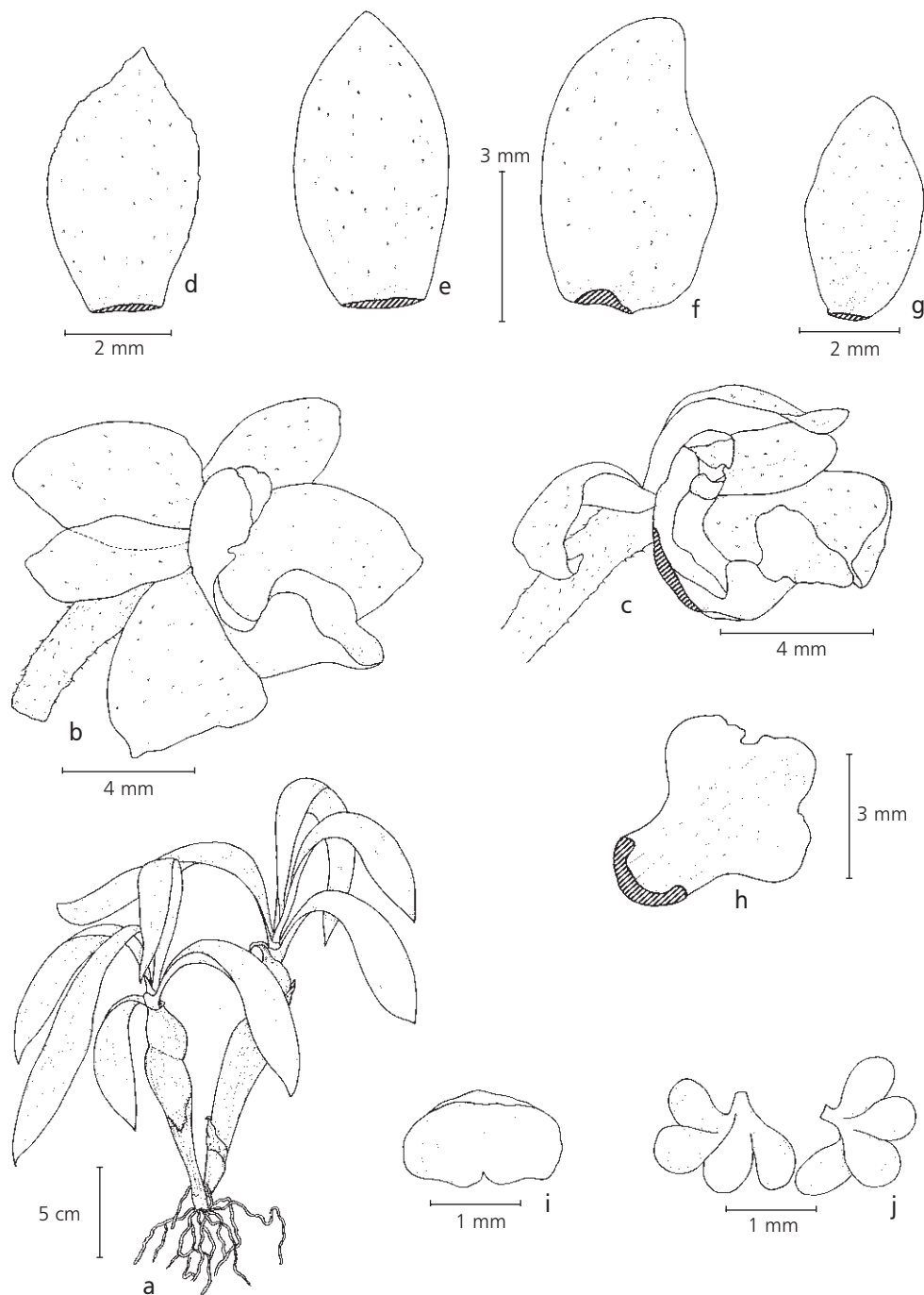


Figure 11. *Eria globulifera* Seidenf. - a. Habit; b. Flower; c. Flower (with one sepal removed); d. Floral bract; e. Dorsal sepal; f. Lateral sepal; g. Petal; h. Pollinia; i. Operculum (after CSK 27362).

Ann. Roy. Bot. Gard. Calcutta 8: 127. Pl. 176.1898; Pradhan, Ind. Orch. Guide to Iden. Cult. 356. 1979; Seidenfaden, Opera Bot. 62: 45.1982; Ghatak & Devi in Vij (Ed.) Biol. Cons. Cult. Orch. 358. 1986; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 90. 2001.

We saw specimens under cultivation at Thoubal in a military camp.

*Specimens Examined:* INDI: Manipur: Thoubal 22.03.1996 C. Sathish Kumar 28707 (TBGT!)

12. **Eria spicata** (D. Don) Hand. Mazz., Symb. Sin. 7:1353. 1936; Pradhan, Ind. Orch. Guide to Iden. Cult. 365. 1979; Seidenfaden, Opera Bot. 62: 126.1982; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 90. 2001. *Octomeria spicata* D. Don, Prodr. Fl. Nepal. 31. 1825. *Eria convallaroides* Lindl., Gen. Sp. Orch. 70.1830; Hook. f., Fl. Brit. India 5: 791. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 118. Pl. 161. 1898.

This is closely allied to *E. globulifera* Seidenf. but has a different lip with a thickened midlobe.

13. **Eria vittata** Lindl., J. Linn. Soc.3:51.1859; Hook. f., Fl. Brit. India 5: 794. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 120. Pl. 165.1898; Pradhan, Ind. Orch. Guide to Iden. Cult. 365. 1979; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 90. 2001.

Watt collected this species for the first time from Manipur.

14. **Eria** sp.

**Fig. 12a**

We could not identify this species so far. It was collected from Thoubal.

### Esmeralda Reichenbach f.

An Asian mainland genus of two epiphytic species with strikingly beautiful flowers distributed from India, Nepal, Bhutan, Burma through Thailand to South China. Both the species occur in India. One is believed to occur in Manipur.

**Esmeralda clarkei** Rchb. f., Gard. Chron. 2:552. 1886; Seidenfaden, Opera Bot. 95:136. 1988. *Arachnanthe clarkei* (Rchb. f.) Rolfe, Gard. Chron. 567.1888; Hook. f., Fl. Brit. India 6:28. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 209. Pl. 279. 1898. *Arachis clarkei* (Rchb. f.) J. J. Sm., Nat. Tijdschr. Ned. Ind. 72:73.1912; Pradhan, Ind. Orch. Guide to Iden. Cult. 500. 1979.

We could not collect or study any specimen from Manipur.

### Eulophia R. Br. ex Lindley

An Old World genus of about 200 species of terrestrial

orchids with tubers or pseudobulbs bearing mostly plicate or grass like leaves and a lateral raceme of large variously shaped, coloured flowers. Twenty six species are known from India. Three have been found to occur in Manipur.

1a. Column with a distinct foot ..... 2

1b. Column without a foot ..... **E. dabia**

2a. Leaves present during flowering....**E. spectabilis**

2b. Leaves absent during flowering..... **E. bicallosa**

**1. Eulophia bicallosa** (D. Don) Hunt & Summerh., Kew Bull. 20:60. 1966; Seidenfaden, Opera Bot. 72: 38. 1984; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 91. 2001. *Bletilla bicallosa* D. Don, Prodr. Fl. Nepal. 30. 1825; Hook. f., Fl. Brit. India 6:196. 1890. *Cyrtopera bicarinata* Lindl., Gen. Sp. Orch. 189.1833. *Eulophia bicarinata* (Lindl.) Hook. f., Fl. Brit. India 6:6. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 180. Pl. 244. 1898; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 152. 1953; Deb, Bull. Bot. Surv. India 3(2):127. 1961.

Watt first collected this species from Manipur. Mukerjee reported it from Chammu at 1300 m.

**2. Eulophia dabia** (D. Don) Hochr. in Bull. New York Bot. Gard. 6:270. 1910; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 91. 2001. *Bletia dabia* D. Don, Prodr. Fl. Nepal. 30. 1825. *Eulophia campestris* Wallich ex Lindl., Gen. Sp. Orch. 185.1830; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 52. 1953; Deb, Bull. Bot. Surv. India 3(2):127. 1961.

Mukerjee recorded this species from Ukhrul.

**3. Eulophia spectabilis** (Dennst.) Suresh, Regn. Veg. 119:300. 1988. *Wolffia spectabilis* Dennst., Schlüssel Hortus Malab. 11, 25, 38. 1813. *Eulophia nuda* Lindl., Gen. Sp. Orch. 180.1833; Hook. f., Fl. Brit. India 5:5. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 180. Pl. 243.1898; Pradhan, Ind. Orch. Guide to Iden. Cult. 457. 1979; Seidenfaden, Opera Bot. 72:40.1984; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 91. 2001.

Watt collected this species from Manipur.

### Flickingeria Hawkes

An epiphytic genus extending from tropical Asia to Oceania with about 70 species characterized by creeping and rooting rhizomes with erect branches bearing single-flowered inflorescence at top of pseudobulbs close to foliage leaf and very characteristic lip. Seven species are known from India. One species occurs in Manipur.



**Flickingera fugax** (Rchb. f.) Seidenf., Dansk Bot. Ark. 34(1):46.1980; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 91. 2001. *Dendrobium fugax* Rchb. f., Gard. Chron. 1257. 1871; Hook. f., Fl. Brit. India 5:752. 1890. *Dendrobium macraei* auct. non Lindl.: King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 61. Pl.86. 1898.

Lip is dilated from a cuneate base with obtusely angled sidelobes and a clawed midlobe abruptly hastate – flabelliform, dilated, emarginate - retuse with undulate sides having two membranous keels running from base to top of the claw.

### Gastrochilus D. Don

An Indo-Malesian genus of about 50 epiphytic species (Tsi, 1996) with short or long stems, linear oblong leaves and often short subumbellate inflorescence of very attractive flowers. Fifteen species are reported from India. Four species occur in Manipur.

- 1a. Epichile of lip smooth ..... *G. distichus*
- 1b. Epichile of lip papillose ..... **2**
- 2a. Stems reduced; sepals and petals yellow with large chocolate blotches ..... **G. bellinus**
- 2b. Stems elongate; sepals and petals greenish yellow or brown with brown or purplish dots..... **3**
- 3a. Leaves acute..... **G. acutifolius**
- 3b. Leaves unequally 2 lobed ..... **G. calceolaris**

1. **Gastrochilus acutifolius** (Lindl.) O. Kuntze, Rev. Gen. 2:661. 1891; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 91. 2001. *Saccolabium acutifolium* Lindl., Gen. Sp. Orch. 223. 1833; Hook. f., Fl. Brit. India 6:61. 1890 King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 226. t. 303. 1898.

Ghatak and Devi reported this species from Khudengthabi as a new record for Manipur.

2. **Gastrochilus bellinus** (Rchb. f.) O. Kuntze, Rev. Gen. 2:661.1891; Christenson, Amer. Orch. Soc. Bull. 54(9): 1112.1985; Ghatak & Devi in Vij (Ed.), Biol. Cons. Cult. Orch. 360. 1986; Seidenfaden, Opera Bot. 95:287. 1988. *Saccolabium bellinum* Rchb.f., Gard. Chron. 1:174. 1884; Hook. f., Fl. Brit. India 6: 61. 1890.

This was reported as a new record for India by Ghatak and Devi from Khudaengthabi, Manipur at 1340 m.

3. **Gastrochilus calceolaris** (Buch.- Ham. ex J. E. Sm.) D. Don, Prodr. Fl. Nepal. 32. 1825; Pradhan, Ind. Orch. Guide to Iden. Cult. 557. 1979; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 75.1984; Christenson, Amer. Orch. Soc. Bull. 54(9):1113. 1985; Seidenfaden,

Opera Bot. 95:289. 1988; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 91. 2001. *Aerides calceolaris* Buch.-Ham. ex J. E. Sm. in Rees Cyclop. 39. 1818, non Teijsmann & Binnend. *Epidendrum calceolare* Buch.-Ham. in D. Don, Prodr. Fl. Nepal. 32. 1825 in syn. *Saccolabium calceolare* (Buch.-Ham. ex J. E. Sm.) Lindl., Gen. Sp. Orch. 223. 1833; Hook. f., Fl. Brit. India 6:60. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 225. Pl. 300. 1898.

**Fig. 12b**

Devi and Ghatak reported this species from Lamakhong at 1000 m.

*Specimens Examined:* INDIA, **Manipur:** Kasom Khullen C. Sathish Kumar 28712 (TBGT!). .

4. **Gastrochilus distichus** (Lindl.) O. Kuntze, Rev. Gen. 2:661.1891; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 91. 2001. *Saccolabium distichum* Lindl., J. Linn. Soc. 3:36.1859; Hook. f., Fl. Brit. India 6:64. 1890.

### Geodorum Jacks.

An Indo-Malesian genus of ten species of terrestrial orchids with epigeal pseudobulbs bearing many plicate leaves and a lateral, apically curved inflorescence of pink to white or yellow flowers. India is known to have 3 species. Two have been reported from Manipur.

- 1a. Flowers rose coloured ..... **G. densiflorum**
- 1b. Flowers white coloured ..... **G. recurvum**

1. **Geodorum densiflorum** (Lam.) Schltr., Fed. Repert. Beih. 4:259. 1919; Seidenfaden, Opera Bot. 72: 61 (1983)1984; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 91. 2001. *Limodorum densiflorum* Lam., Enc. 3:516. 1792.

2. **Geodorum recurvum** (Roxb.) Alston in Trimen, Flora of Ceylon 6:276.1931; Seidenfaden, Opera Bot. 72:61 (1983)1984. *Limodorum recurvum* Roxb., Corom. Pl. 33. Pl. 39. 1795. *Geodorum dilatatum* R. Br. in Aiton, Hort. Kew. Ed. 2, 5:207. 1813; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):152. 1953.

Mukerjee recorded this species from Kachai at 1440 m.

### Goodyera R. Br.

A widespread genus of about 160 species of ground orchids occurring mostly in the warmer parts except Africa. Twenty species are known from India with three in Manipur.

- 1a. Inflorescence dense; lip with pellucid glands ..... **G. procera**
- 1b. Inflorescence lax; lip pilose or papillose within ..... **2**



Figure 12. a. *Eria* sp.; b. *Gastrochilus calceolaris* (Buch.-Ham. ex J. E. Sm.) D. Don; c. *Hygrochilus parishii* (Veitch & Rchb. f.) Pfitz.; d. *Paphiopedilum hirsutissimum* (Lindl. ex Hook.) Stein

2a. Leaves lanceolate with white blotching .....**G. schlechtendaliana**

2b. Leaves ovate-lanceolate without white blotching .....**G. foliosa**

1. **Goodyera foliosa** (Lindl.) Benth. ex C. B. Clarke, J. Linn. Soc. 25:73. 1889; Hook. f., Fl. Brit. India 6:113. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 281. T. 374. 1898; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):152. 1953; Deb, Bull. Bot. Surv. India 3(2):127. 1961; Pradhan, Ind. Orch. Guide to Ident. Cult. 1:108. 1976; Seidenfaden, Dansk Bot. Ark. 32(2):29. 1978; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 91. 2001. *Georchis foliosa* Lindl., Gen. Sp. Orch. 496. 1840.

Mukerjee found this species at Lamlong at 1800m.

2. **Goodyera procera** (Ker-Gawl.) Hook., Exot. Fl. 1. 3:T. 39. 1823; Clarke, J. Linn. Soc. 25:73; Hook. f., Fl. Brit. India 6:111. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 282. T. 378. 1898; Deb, Bull. Bot. Surv. India 3(2):127. 1961; Pradhan, Ind. Orch. Guide to Ident. Cult. 1:109. 1976; Seidenfaden, Dansk Bot. Ark. 32(2):22. 1978; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 91. 2001. *Neottia procera* Ker-Gawl., Bot. Reg. 8:T. 639. 1822.

Clarke collected this species from west Manipur.

3. **Goodyera schlechtendaliana** Rchb. f., Linnaea 22:861. 1849; Seidenfaden, Dansk Bot. Ark. 32(2):26. 1978; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 91. 2001. *Goodyera secundiflora* auct. non Griffith: Hook. f., Fl. Brit. India 6:113. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 288. T. 376. 1898; Pradhan, Ind. Orch. Guide to Ident. Cult. 1: 110. 1976.

Watt collected this species from Manipur in 1882 (*Watt 5889*, K).

### Habenaria Willd.

A large pantropical genus of about 600-800 species of terrestrial orchids characterized by underground tuberoids, a leafy shoot and a terminal inflorescence of variously coloured, spurred or rarely non-spurred flowers. Seventy two species and one variety are known from India. Seven species are reported from Manipur.

1a. Sidelobes of lip deeply lacinate..... **H. trichosantha**

1b. Sidelobes when present not lacinate, sometime toothed .....2

2a. Leaves radical and adpressed to ground .....**H. reniformis**

2b. Leaves subradical, spreading or clustered about middle of stem .....3

3a. Lip simple with a raising tongue in between two stigmas .....**H. mandersii**

3b. Lip tripartite without tongue.....4

4a. Large flowered plants; lateral sepals more than 10 mm long .....5

4b. Small flowered plants; lateral sepals less than 10 mm long .....**H. acuífera**

5a. Spur reduced; lip unlobed .....**H. pelorioides**

5b. Spur well developed; lip 3 lobed.....6

6a. Petals pubescent or glandular pubescent .....**H. arietina**

6b. Petals not pubescent ..... **H. dentata**

1. **Habenaria acuífera** Wallich ex Lindl., Gen. Sp. Orch. 325. 1835; Hook. f., Fl. Brit. India 6:146 (excl. syn. *H. linguella*). 1890; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):152. 1953; Deb, Bull. Bot. Surv. India 3(2):127. 1961; Seidenfaden, Dansk Bot. Ark. 31(3):106. 1977; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 91. 2001.

Mukerjee first reported this species from Manipur.

2. **Habenaria arietina** Hook. f., Fl. Brit. India 6:138. 1890; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):152. 1953; Deb, Bull. Bot. Surv. India 3(2):127. 1961; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 91. 2001.

Mukerjee first collected this species from Ukhrul.

3. **Habenaria dentata** (Sw.) Schltr., Fed. Repert. Beih. 4:125. 1919; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):152. 1953; Deb, Bull. Bot. Surv. India 3(2):127. 1961; Seidenfaden, Dansk Bot. Ark. 31(3): 98. 1977; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 91. 2001. *Orchis dentata* Sw., Vet. Akad. Nya Handl. 21:207. 1800. *Habenaria geniculata* D. Don, Prodr. Fl. Nepal. 25. 1825; Clarke, J. Linn. Soc. 25: 74. 1889; Hook. f., Fl. Brit. India 6:138. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8:309. Pl. 405. 1898.

This is said to be a common species in Manipur at 1500-1800 m.

4. **Habenaria pelorioides** Parish & Rchb. f., Trans. Linn. Soc. 30:135 & 139. T. 27, Fig. 1, 1-3. 1874; Hook. f., Fl. Brit. India 6:166. 1890. *H. malintana* auct. non (Blanco) Merrill: Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):153. 1953; Deb, Bull. Bot. Surv. India 3(2):127. 1961; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 91. 2001.

Mukerjee reported this species from Ukhrul and Sirohi in Manipur. We feel Parish & Rchb. f.'s species is different from *H. dentata* (Blanco) Merrill to which it was sunken.

5. **Habenaria mandersii** Collett & Hemsley, J. Linn. Soc. 28:133. 1890; Hook. f., Fl. Brit. India 6:146. 1890; Seidenfaden, Dansk Bot. Ark. 31(3): 126. 1977; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 91. 2001.

6. **Habenaria reniformis** (D. Don) Hook. f., Fl. Brit. India 6:152. 1890; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):153. 1953; Deb, Bull. Bot. Surv. India 3(2):128. 1961; Seidenfaden, Dansk Bot. Ark. 31(3):132. 1977; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 91. 2001. *Listera reniformis* D. Don, Prodr. Fl. Nepal. 28. 1825.

Mukerjee reported this species from Sungshung at 1500 m.

7. **Habenaria trichosantha** Lindl., Gen. Sp. Orch. 324. 1835; Hook. f., Fl. Brit. India 6:138. 1890; Deb, Bull. Bot. Surv. India 3(2):128. 1961; Seidenfaden, Dansk Bot. Ark. 31(3):86. 1977; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 91. 2001.

Deb reported this species from Manipur.

*Note:* We visited Manipur during March-April much ahead of flowering of *Habenaria* spp. And hence we could not collect any species.

### Herminium R. Br.

A terrestrial genus of about 40-50 species found in the high latitudes of Asia. About fifteen species are known from India. Only one species has been recorded from Manipur.

**Herminium lanceum** (Thunb. ex Sw.) Vujik, Blumea 11(1):228. 1961; Seidenfaden, Dansk Bot. Ark. 31(3):20. 1977; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 91. 2001. *Ophrys lancea* Thunb. ex Sw., Kgl. Akad. Vet. Nya Handl. 21:223. 1800. *Aceras angustifolia* Lindl., Bot. Reg. sub T 1525. 1832. *Herminium angustifolium* (Lindl.) Benth. Hook. f., Gen. Pl. 3:622. 1880; Hook. f., Fl. Brit. India 6:129. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 332. Pl. 434. 1898; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):153. 1953; Deb, Bull. Bot. Surv. India 3(2):128. 1961.

Mukerjee reported this species from Sirohee at 2000 m.

### Holcoglossum Schltr.

An Indo-Southeast Asian genus of eight epiphytic species characterized by short footless column with

prominent wings. Only one species occurs in India which is also found in Manipur.

**Holcoglossum amesianum** (Rchb. f.) Christ., Not. Roy. Bot. Gard. Edinburgh 44(2):255. 1987; Seidenfaden, Opera Bot 95:308. 1988. *Vanda amesiana* Rchb. f., Gard. Chron. 1:764. 1887; Hook. f., Bot. Mag. 116:T. 7139. 1890; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 76. 1984; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 95. 2001.

This species was reported by Devi and Ghatak from Churachandpur at 831 m.

### Hygrochilus Pfitzer

A monotypic genus found in mainland Asia from India, Burma, Thailand to Indo-China and China characterized by the elongate and arcuate column, movable hinged lip and two pollen masses each completely divided in more or less unequal semiglobular free halves. It is represented by *Hygrochilus parishii*, long known under the name *Vanda parishii* and has been recorded from Manipur and Mizoram.

**Hygrochilus parishii** (Veitch & Rchb. f.) Pfitz., Nat. Pflanzenfam. II. 6. Nachtr. I: 112. 1897; Garay, Bot. Mus. Leafl. Harv. Univ. 23(10): 374. 1974; Pradhan, Ind. Orch. Guide to Iden. Cult. 498. 1979 & Ind. Orch. J. 2(1):8. 1987; Seidenfaden, Opera Bot. 95:138. 1988. *Vanda parishii* Veitch & Rchb. f., Gard. Chron. 180. 1867; Hook. f., Fl. Brit. India 6:51. 1890; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):154. 1953; Deb, Bull. Bot. Surv. India 3(2):129. 1961; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 91. 2001. **Fig. 12c**

Mukerjee recorded this species from Kachai at 1080 m.

*Specimens Examined:* INDIA, Manipur: Khongampatt C. Sathish Kumar s. n. (TBGT!); Kachai Mukerjee 2946 (CAL!).

### Kingidium P. F. Hunt

A small Indo-Malesian genus of about 10 species of epiphytic orchids with short stem, flat and broad leaves but attractive pink to white or yellowish flowers. Christenson (2001) prefers to keep this genus under *Phalaenopsis*. Seidenfaden (1988) and Garay accept this as a natural genus. Five species are known from India. One species occurs in Manipur.

**Kingidium taeniale** (Lindl.) Hunt, Kew Bull. 24:98. 1970; Pradhan, Ind. Orch. Guide to Iden. Cult. 2:550. 1979; Seidenfaden, Opera Bot. 95:185. 1988. *Aerides taeniale* Lindl., Gen. Sp. Orch. 239. 1833. *Doritis taenialis* (Lindl.) Hook. f., Fl. Brit. India 6:31. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 199. Pl. 266. 1898.

### Liparis L. C. Rich.

A pantropical genus of about 250 species of both terrestrial and epiphytic orchids having pseudobulbs or rhizomes with plicate or fleshy leaves and a terminal raceme of cream to pink flowers. Forty five species are known from India. Eight species have been recorded from Manipur.

- 1a. Plants terrestrial; leaves non jointed, ovate to lanceolate-ovate ..... **L. paradoxa**
- 1b. Plants epiphytic; leaves jointed ..... **2**
- 2a. Pseudobulbs 1-leaved ..... **3**
- 2b. Pseudobulbs 2 or more leaved ..... **4**
- 3a. Sepals 1 veined..... **L. cespitosa**
- 3b. Sepals 3 or more veined ..... **L. bootanensis**
- 4a. Lip truncate to emarginate ..... **L. bistriata**
- 4b. Lip orbicular..... **5**
- 5a. Dorsal sepal 9-12 mm long ..... **6**
- 5b. Dorsal sepal less than 8 mm ..... **7**
- 6a. Flowers yellowish brown; lip margin erose..... **L. distans**
- 6b. Flowers green; lip margin dentate.....  
..... **L. plantaginea**
- 7a. Column wing with a long downward turned subulate tooth ..... **L. resupinata**
- 7b. Column wing without any tooth.. **L. viridiflora**

**1. Liparis bistriata** Parish & Rchb. f., Trans. Linn.Soc.30:155.1874; Hook. f.5:702. 1888 & Ic. Pl. T. 1858. 1889; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8:30. T. 39.1898; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):153. 1953; Deb, Bull. Bot. Surv. India 3(2):128. 1961; Seidenfaden, Dansk Bot. Ark. 31(1):73.1976; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 92. 2001.

Parish's type specimen was collected from Moulmein, Myanmar.

*Specimens Examined:* INDIA, **Manipur:** Ukhrul Dr S K Mukerjee 2881(CAL!); Maohing Deb 995(CAL!).

**2. Liparis bootanensis** Griffith, Itin. Not. 98. 1848 (descri. & Not. 3:278. 1851(name); Hook. f., Fl. Brit. India 5:700. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 30. Pl. 40. 1898; Seidenfaden, Dansk Bot. Ark. 31(1): 50.1976; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 92. 2001.

Griffith's type originated in Bhutan.

**3. Liparis cespitosa** (Lam.) Lindl., Bot. Reg. 11:sub t. 882. 1825; Seidenfaden, Dansk Bot. Ark. 31(1):61. 1976. *Epidendrum cespitosum* Lam., Encycl. 1:187. 1783. *Liparis prainii* Hook. f., Icon. Pl. ser. 3(19): t. 1857A. 1889. *L. duthiei* Hook. f., Icon. Pl. ser. 3(19): t.1857B. 1889.

### Fig. 13

Our sketches were commented on by Ormerod as matching with this species. Though nearer to *L. fargesii* Finet on account of its pseudobulb characters lip and other floral characters are exact match for *L. cespitosa* as proved by Ormerod.

*Specimens Examined:* INDIA, **Manipur:** Tupul 03.06.1996 C. Sathish Kumar 28744 (TBGT!).

**4. Liparis distans** C. B. Clarke, Journ. Linn. Soc. 25:71. T. 29.1889; Hook. f., Fl. Brit. India 5:704.1890; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):153. 1953; Deb, Bull. Bot. Surv. India 3(2):128. 1961; Seidenfaden, Dansk Bot. Ark. 31(1):76.1976; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 92. 2001.

Clarke's type specimen was from Kohima, Nagaland.

*Specimens Examined:* INDIA, **Manipur:** Ukhrul S K Mukerjee 3540 (CAL!).

**5. Liparis paradoxa** (Lindl.) Rchb. f., Walp. Ann. 6:218.1861; Hook. f., Fl. Brit. India 5:697. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 27. Pl. 34.1898; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):153. 1953; Deb, Bull. Bot. Surv. India 3(2):128. 1961; Seidenfaden, Dansk Bot. Ark. 31(1):38.1976; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 92. 2001. *Empusa paradoxa* Lindl., Bot. Reg. 10, sub T. 825. 1824. f., Fl. Brit. India 6:182. 1890. *Liparis paradoxa* var. *parishii* Hook. f., Fl. Brit. India 5: 698. 1890. *Liparis parishii* (Hook. f.) Hook

Mukerjee reported this species from Ukhrul and Limboi at 2000 m and 1500 m. respectively.

*Specimens Examined:* INDIA, Manipur: Ukhrul S K Mukerjee 3258 (CAL!); Lomboi S K Mukerjee 3386 (CAL!).

**6. Liparis plantaginea** Lindl., Gen. Sp. Orch. 29.1830; Hook. f., Fl. Brit. India 5: 702. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 29. Pl. 36. 1898; Seidenfaden, Dansk Bot. Ark. 31(1): 75.1976; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 92. 2001.

This species was based on Wallich drawing available at Kew. We haven't seen any specimens and it is included on the authority of Chauhan.

**7. Liparis resupinata** Ridley, Journ. Linn. Soc. 22:290.1886; Hook. f., Ic. Pl. T.1888.1889 & Fl. Brit. India 5: 705 & 6: 183. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 36. Pl. 48. 1898;

Seidenfaden, Dansk Bot. Ark. 31(1): 88.1976; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 92. 2001.

Ridley's type was from Meghalaya.

8. *Liparis viridiflora* (Blume) Lindl., Gen. Sp. Orch.

31.1830, *p. p.*; Hook. f., Fl. Brit. India 5:704, *p. p.* 1890;

Seidenfaden, Dansk Bot. Ark. 31(1):82.1976; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 92. 2001.

*Malaxis veiridiflora* Blume, Bijdr. 392. 1825. *Liparis longipes* Lindl. in Wallich, Pl. As. Rar. 1:31. T. 35.1830;

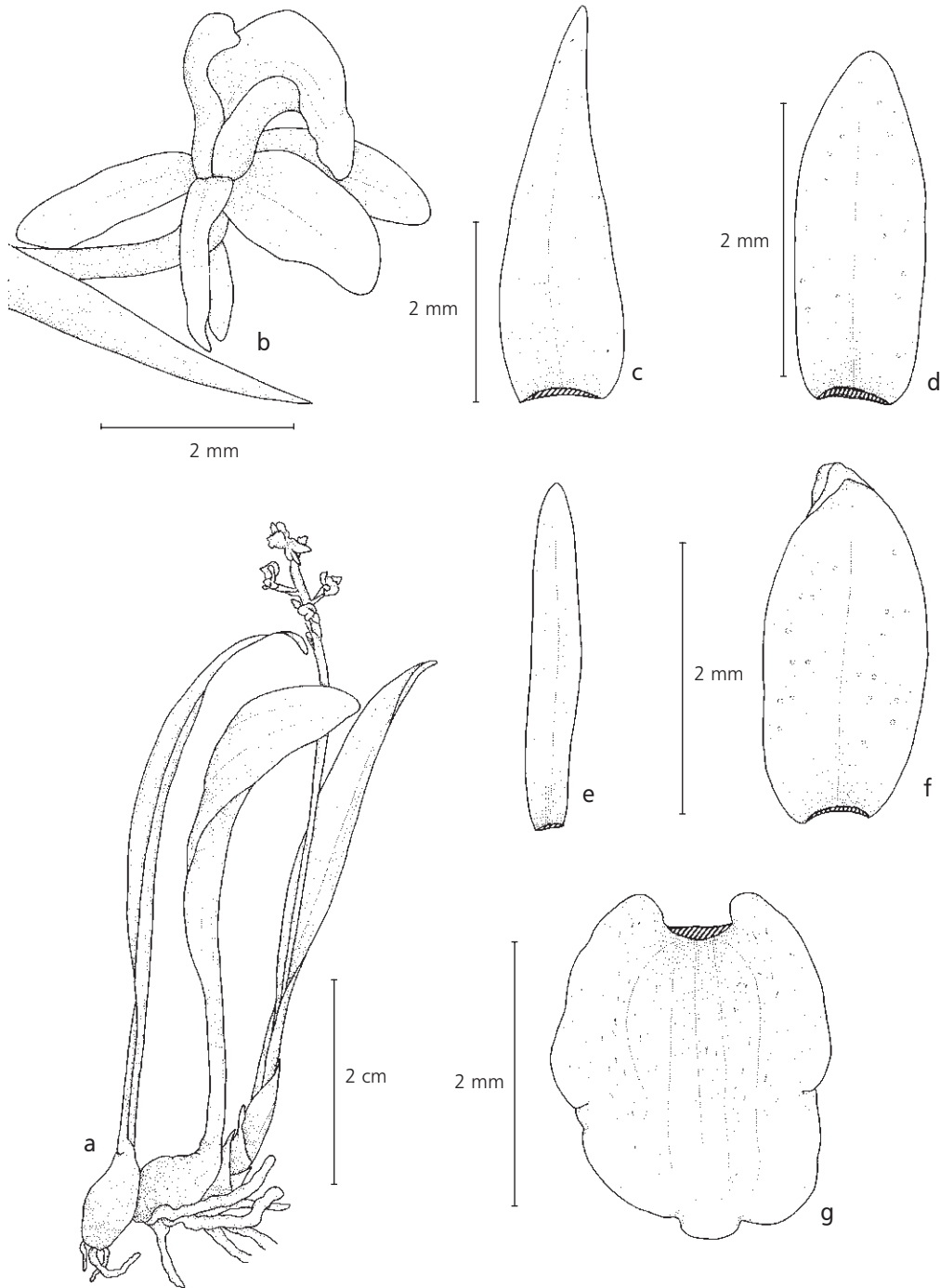


Figure 13. *Liparis cespitosa* (Lam.) Lindl. - a. Habit; b. Flower; c. Floral bract; d. Dorsal sepal; e. Petal; f. Lateral sepal; g. Lip (after CSK 28744).

Clarke, J. Linn. Soc. 25:71. 1889; Hook. f., Fl. Brit. India 5: 703. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 29. Pl. 37. 1898. *L. spathulata* Lindl., Bot. Reg. 28: misc. 189.1842; Clarke, J. Linn. Soc. 25:71. 1889.

Blume's type was collected from Krakatau, Java.

*Specimens Examined*: INDIA, **Manipur**: *George Watt s. n.* (CAL!); Barak C. B. Clarke 42262 (CAL!); Irong A. Meebold 6482(CAL!).

At CAL there is another *Liparis* sp. from Manipur collected by S.K. Mukerjee without flower. It is a large plant almost filling the herbarium sheet.

### **Luisia Gaudichaud-Beaupré**

An Indo-Malesian genus of about 40 species of epiphytic orchids characterized by short stems, terete leaves and a short fascicle of very attractive flowers. Sixteen species are known from India. Two species occur in Manipur.

1a. Epichile of lip glossy ..... **L. jonesii**

1b. Epichile of lip rugose ..... **L. antennifera**

1. **Luisia antennifera** Blume, Rumphia 4:50. 1849, *nom. nud.*; Mus. Bot. Lugd. 1:61. 1849; Hook. f., Fl. Brit. India 6: 25.1890; Seidenfaden, Dansk Bot. Ark. 27(2): 70.1971; Ghatak & Devi in Vij (Ed.), Biol. Cons. Cult. Orch.360. 1986; Seidenfaden, Opera Bot. 95:277. 1988.

Ghatak and Devi reported it as a new record for India from Khudengthabi at 1340 m. We have not seen any specimen.

2. **Luisia jonesii** J. J. Smith, Blumea 5:311. 1943; Seidenfaden, Dansk Bot. Ark. 27(2): 27.1971; Ghatak & Devi in Vij (Ed.) Biol. Cons. Cult. Orch. 360. 1986.

Ghatak and Devi reported this from Moreh at 200 m. as a new record for India.

### **Luisiopsis Sathish et Suresh**

Capt. Francis Jenkins (1793-1855) was a British Agent to the Governor General of the erstwhile British India at Gauhati in Assam. He was avid collector of plants including tea from Manipur and used to send the consignments to Wallich. One of his collections from Lower Assam flowered at Indian Botanical Garden which Wallich passed on to his artist Lutchman Singh to prepare a water colour painting. Lutchman Singh made a beautiful painting on which Wallich wrote '*Cymbidium inconspicuum*' which was never published. While working on the Orchidaceae for *Flora of British India*, J. D. Hooker described it under *Saccolabium* with

a question mark. Kuntze (1891) immediately transferred this to *Gastrochilus*. Later, while supplying a full description of the plant and reproducing part of Lutchman Singh's drawing as well, J. D. Hooker (1895) confirmed his stand in *Saccolabium* and commented it as 'a remarkable species, quite unlike any other' and added 'in the shape of the lip and especially the hemispheric hypochile it precisely accords with that of the section *Calceolaria* (= *Gastrochilus*), but it resembles no species of that group in foliage and inflorescence, and further in the perfectly smooth epichile'. King and Pantling (1898) placed it under *Luisia* mainly because of the gross vegetative morphology. While revising the genus *Luisia*, Seidenfaden (1971) felt it better placed in *Gastrochilus* and even proposed a superfluous new combination overlooking Kuntze's prior name. Tsi (1996) who summarized the genus *Gastrochilus* preferred to treat it under *Luisia*. Pearce and Cribb (2002) and Misra (2004) follow Kuntze in treating it under *Gastrochilus*.

We made a critical study on the concept of J. D. Hooker's *Saccolabium inconspicuum* which was shifted between *Gastrochilus* and *Luisia* with no permanent abode, in comparison with a fresh collection from Sagol Mangu at Saikul in Manipur. The characters of *Saccolabium inconspicuum* such as its *Luisia*-like habit, two solid pollinia, lip with saccate hypochile and unornamented epichile with keeled sepals and petals keep it different from both *Luisia* and *Gastrochilus* where it was placed lately. We are convinced that it is best placed in a genus of its own. We therefore propose a new generic status for *Saccolabium inconspicuum* Hook. f. As it very much resembles *Luisia* superficially we name it *Luisiopsis Sathish et Suresh* evidently denoting its relationship.

**Luisiopsis Sathish et Suresh, gen. nov.**

Type: *Saccolabium inconspicuum* Hook. f.

Etymology: *Luisia*= a generic name, *opsis* = like, in reference to the superficial similarity in vegetative morphology.

Affinis *Luisia* et *Gastrochilus* e tribus Vandeeae, sed differt a characteris combinatio similis *Luisia* in habitato, folia tereta, flos caespitosus, supra-axilaris, 6-8, succulentus, sepala carinatus, labius saccatus hypochile et epichile succulentae et non ornamentae, pollinia duo, solida.

*Luisiopsis Sathish & Suresh* is obviously related to *Luisia* in gross vegetative morphology and keeled nature of sepals. The similarity ends there. The two entire pollinia and a lip divisible into a saccate

hypochile and an unornamented epichile are unique features which when combined with its terete leaves sufficiently demarcate this genus from the allied ones of the tribe Vandeeae. The two solid pollinia of *Luisiopsis* are also seen in genera belonging to the

Series I of Dressler (1993) - *Ascochilopsis*, *Ceratocentron*, *Chamaeanthus*, *Chroniochilus*, *Grosourdyia*, *Hemnorchis*, *Malleola*, *Megalotis*, *Microtatorchis*, *Omoea*, *Parapteroceras*, *Pennilabium*, *Porrerachis*, *Saccolabium* and *Tuberolabium*.

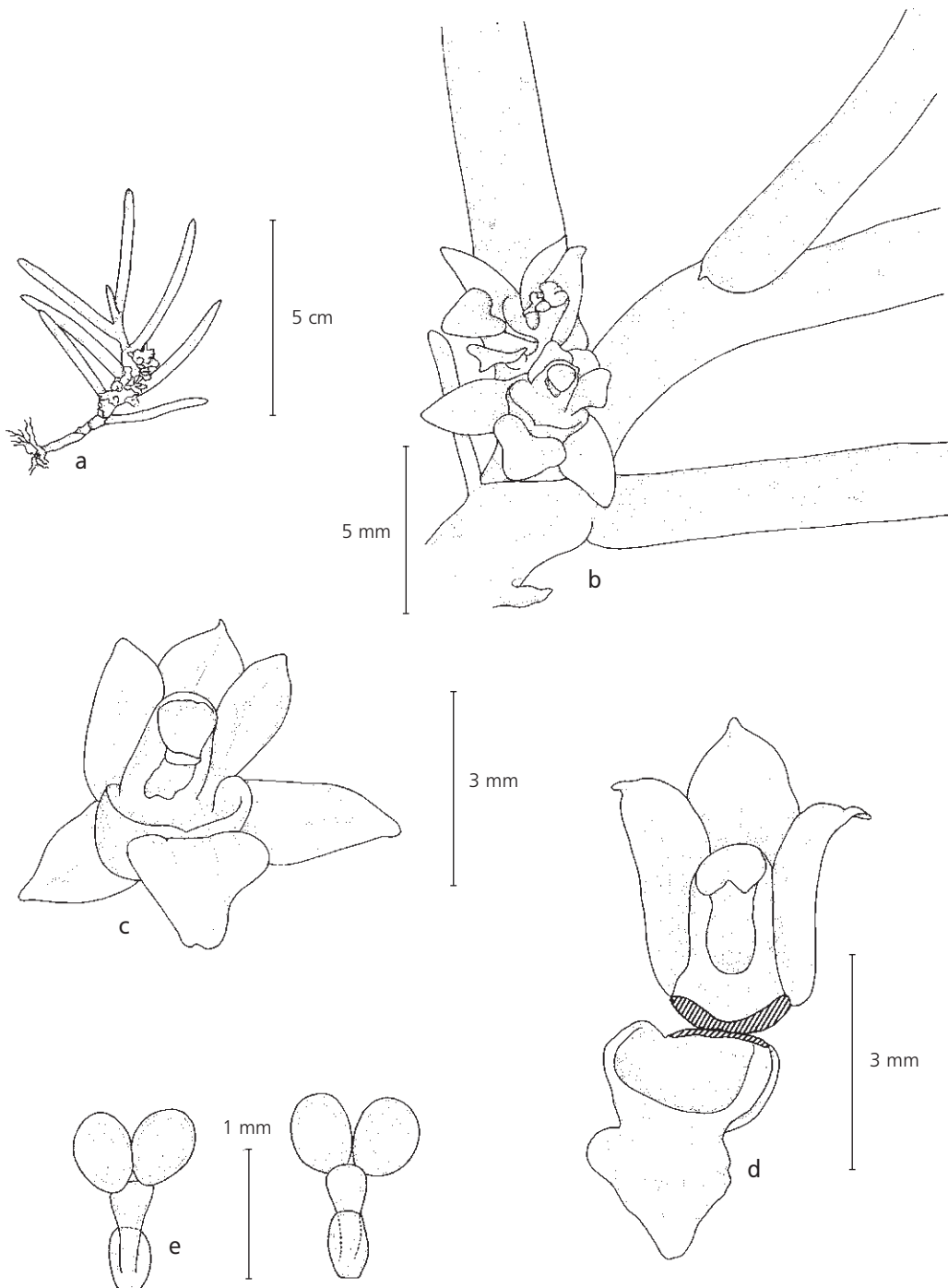


Figure 14. *Luisiopsis inconspicua* (Hook. f.) Sathis & Suresh. - a. Habit; b. A portion of inflorescence; c. Flower; d. Front view of column & lip; e. Pollinarium



**Luisiopsis inconspicua** (Hook. f.) Sathish *et* Suresh, *comb. nov.*

*Saccolabium? inconspicuum* Hook. f., Fl. Brit. India 6:56. 1890; Ann. Roy. Bot. Gard. Calcutta 5(1):46. 1895. *Gastrochilus inconspicuus* (Hook. f.) Kuntze, Rev. Gen. Pl. 2:661. 1891; Seidenfaden, Dansk Bot. Ark. 27(4): 94. 1971 (*Gastrochilus inconspicuum* (Hook. f.) Seidenfaden, *nomen superfl.*); Hynniewta *et al.*, Orch. Nag. 189. 2000; Pearce & Cribb, Orch. Bhutan 521. 2002; Misra, Orch. Orissa 684. 2004. *Luisia inconspicua* (Hook. f.) Hook. f. ex King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8:203.t. 272. 1898; Tsi, Guihaia 16(2): 151. 1996. **Fig. 14**

*Epiphytic plants* to 35 cm high. *Stems* to 15 cm long, terete, sometimes branching. *Leaves* terete, dark green, sessile, 2.5-10 x 0.1-0.2 cm. *Inflorescence* supra axillary tufts with short and sheathed peduncle bearing 6-8 flowers. *Flowers* 4 mm across with greenish white sepals and petals; dorsal sepal 1.5-3 x 1-2 mm, ovate to ovate lanceolate, acute, 1-3-veined; lateral sepals 2.75-5 x 1-2 mm, obliquely ovate, keeled at back and undulate on margin, obtuse, 1-3 veined; petals oblong to ovate-elliptic, 2-3 x 1-1.2 mm, acute, spreading and 1-veined; lip 2-3.5 x 1.5-2 mm, firmly attached with the column base with a fleshy and cup-shaped hemispherical hypochile, green with a flash of purple on margins without sidelobes; epichile as broad as hypochile, broadly ovate, flat, without any ridges, wart or hairs, 2.2 x 1.5 mm, margin minutely hispid, obtuse or slightly 2-lobed at apex; column erect, 0.5-1.5 x 0.5-0.7 mm, very stout, without a foot; anther cap shortly beaked; pollinia 2, entire, subglobose on a 0.75 mm long and thin stipes; viscidium subquadrate or ovate; stigma oblong. *Fruits* ellipsoid capsules, 5-6 x 2 mm, shortly stalked.

*Flowering & Fruiting*: June-October

*Habitat*: Plains on trees.

*Occurrence*: Manipur, Sagol Mangu, Saikul.

*Distribution*: India, Nepal and Bhutan.

*Specimens Examined*: INDIA, **Manipur**: Sagol Mangu, Saikul C. Sathish Kumar 28740 (TBGT!).

**Assam**: s. coll. s. n. (CAL!); Burkill 37693 (CAL!). **Nagaland**: Koio Hynniewta 80717 (ASSAM); Wakching Hynniewta 79943 (ASSAM). **Meghalaya**: Prain 142 (CAL!). **Arunachal Pradesh**: Burkill 38216 (CAL!). **Orissa**: S. Misra 165, 335 (CAL!). **Sikkim**: Pantling 159 (CAL!); Smith & Cave 820 (CAL!). **West Himalaya**: Inayat 24114 (CAL!)

*Note*: While studying a specimen at CAL (Pantling 159) Tsi commented 'This species in respect of

pollinia, especially the shape of stipe and pollen mass as well as stipe longer than pollen mass, appear to resemble those of genus *Gastrochilus*, but its more characters, such as terete leaves, raceme strikingly shortening and thick lateral sepals at backside with a keel arising towards apex, not bifid gland adhered at backside of rostellum by its upper surface and shape of lip are uniform with those of genus *Luisia*, so my opinion, it should be kept in genus *Luisia* rather than transferring it to genus *Gastrochilus*'. This was followed in his revision of the genus *Gastrochilus* (Tsi, 1996).

The new genus *Luisiopsis* with its combined characters such as terete leaves, supra-axillary tufts of greenish white flowers, footless column, saccate hypochile, smooth epichile with hispid margin and inconspicuously two lobed apex and two solid and entire pollinia can be placed in subtribe Vandinae of tribe Vandae Lindl., subfamily Vandoideae Endl. (Szlachetko, 2003) along with *Luisia*, *Ascolabium*, *Papilionanthe* etc.

### Myrmechis Blume

An Indo-East Asia-Malesian genus of 15 species (Ormerod, 1998b) of terrestrial orchids characterized by slightly nodose stems, a few scattered leaves and a terminal pubescent raceme of 1-2 flowers and a lip having a long claw. Only one species, *M. pumila* (Hook. f.) Tang & Wang, is known from India, recorded from Manipur and Sikkim.

**Myrmechis pumila** (Hook. f.) Tang & Wang, Act. Phytotax. Peking 1(1): 69. 1951; Seidenfaden, Dansk Bot. Ark. 32(2): 76. 1978; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 92. 2001. *Odontochilus pumilus* Hook. f., Fl. Brit. India 6: 99. 1890; Ic. Pl. T. 2163. 1894; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 153. 1953; Deb, Bull. Bot. Surv. India 3(2): 128. 1961. *Cheirostylis franchetiana* King & Pantl., J. As. Soc. Bengal 64(3): 341. 1895. *Zeuxine pumila* (Hook. f.) King & Pantl. King & Pantl., Ann. Roy. Bot. Gard. Calcutta 8: 292. Pl. 398. 1898; Pradhan, Ind. Orch. Guide to Iden. Cult. 1: 117. 1976. *Anoetochilus pumilus* "King & Pantl" *auct.*: W. W. Smith & Cave, Rec. Bot. Surv. India 4: 243. 1911.

*Specimens Examined*: INDIA, **Manipur**: Sirohee Capt. Kingdon-Ward 3267 (CAL!).

### Neogyne Reichenbach f.

A monotypic epiphytic genus found in Asian mainland from India to Indo-China through Nepal, Bhutan, Burma, Thailand and China characterized by sidelobes folded around the column and the sepals saccate base. This species has been recorded

from many northeastern states of India including Manipur.

**Neogyna gardneriana** (Lindl.) Rchb. f., Bot. Zeit 10:931. 1852; Pradhan, Ind. Orch. Guide to Iden. Cult. 282. 1979; Seidenfaden in Opera Bot. 89:76. 1986; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 92. 2001. *Coelogyne gardneriana* Lindl. in Wallich, Pl. As. Rar. 1:33. T. 38.1830; Hook. f., Fl. Brit. India 5:828 & 6:193. 1890.

*Specimens Examined:* INDIA, Manipur: Kupra George Watt 5871 (CAL!).

### Neottianthe (Reichenbach. f.) Schlechter

This is a temperate Eurasian genus of 11 species of terrestrial orchids with 2 species extending into the Himalayas. Only one species is believed to occur in Manipur.

**Neottianthe secundiflora** (Hook. f.) Schltr., Fed. Repert. 16:291. 1919; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 92. 2001.

### 49. Nephelaphyllum Blume

An Indo-Malesian genus of 18 species (Seidenfaden & Wood, 1992) of terrestrial orchids characterized by creeping rhizome, slender pseudobulbs bearing beautifully patterned leaves and dense or lax raceme of creamy yellow flowers. Three species with a variety are known to occur in India. One species is found in Manipur.

**Nephelaphyllum pulchrum** Blume, Bijdr. 373. t. 36. Fig. 22.1825; Hook. f., Fl. Brit. India 5:818. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8:105. T. 145 (var. *sikkimense*). 1898; Pradhan, Ind. Orch. Guide to Iden. Cult. 244. 1979; Seidenfaden, Opera Bot. 89:22. 1986.

Meebold collected this species from Nasun Naga Hills at 4000' quite close to Manipur on Dec. 1907 (*A Meebold 7636*, CAL!) in fruits. It is likely to occur in Manipur.

### Nervilia Commerson ex Gaudichaud-Beaupre

An Old World genus of about 100 species of terrestrial orchids characterized by underground tubers, appearance of leaves and flowers at different seasons, cordate reniform leaves and long erect inflorescence of 1, 2 or many differently coloured flowers. Sixteen species are known from India. Four species occur in Manipur:

- 1a. Inflorescence bearing a single flower ..... 2
- 1b. Inflorescence bearing more than a single flower ..... 3
- 2a. Midlobe of lip with entire edges ..... **N. falcata**
- 2b. Midlobe of lip fimbriately incised and plaited crispy ..... **N. crociformis**
- 3a. Leaves green throughout with coarse hairs on both sides; flowers always 2 ..... **N. plicata**
- 3b. Leaves green above, pink below, glabrous on both sides; flowers 3-20 ..... **N. aragoana**

1. **Nervilia aragoana** Gaudich. in Freycinet, Voy. Bot. 422. T. 35. 1829; Pradhan, Ind. Orch. Guide to Ident. Cult. 1:146. 1976; Seidenfaden, Dansk Bot. Ark. 32(2): 164. 1978. *Pogonia scottii* Rchb. f., Flora 55, 18:276. 1872; Hook. f., Fl. Brit. India 6: 120. 1890 & Ann. Roy. Bot. Gard. Calcutta 5: 62. T. 93. 1895; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 269. T. 360. 1898. *Nervilia scottii* (Rchb. f.) Schltr., Engl. Bot. Jahrb. 45:404. 1911; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 92. 2001.

This is a widespread species throughout Indo-Malesia.

2. **Nervilia crociformis** (Zoll. & Mor.) Seidenf., Dansk Bot. Ark. 32(2):151. Fig. 92.1978; Petterson, Nord. J. Bot. 9: 494. 1998. *Bulborchis crociformis* Zoll. & Mor. in Morintzi, Syst. Vez. Pl. Zoll. 89. *Pogonia prainiana* King & Pantl., Journ. As. Soc. Bengal 65:129. 1896; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 267. T. 355. 1898. *Nervilia prainiana* (King & Pantl.) Seidenf., Dansk Bot. Ark. 32(2):149. 1978. *Nervilia crispata* auct. non (Blume) Schltr.: Deb, Bull. Bot. Surv. India 3(2):128. 1961.

Deb once found this species 'very common all over the hills of territory at 900-2500 m'.

3. **Nervilia falcata** (King & Pantl.) Schltr. in Engl. Jahrb. 45:402. 1911; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 92. 2001. *Pogonia falcata* King & Pantling, Journ. As. Soc. Bengal 64(2):129. 1896.

King & Pantling described their novelty based on latter's collection from Western Dooar of Bhutan, east of the Jaldacca River. Leaf was unknown to the authors. This species is included here on the authority of Chauhan.

4. **Nervilia plicata** (Andr.) Schltr., Engl. Bot. Jahrb. 45:403. 1911; Pradhan, Ind. Orch. Guide to Ident. Cult. 1:147. 1976; Seidenfaden, Dansk Bot. Ark. 32(2):156. 1978; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 92. 2001. *Arethusa plicata* Andr., Bot. Rep.

5: T. 321. 1803. *Pogonia plicata* (Andr.) Lindl., Gen. Sp. Orch. 415.1840; Hook. f., Fl. Brit. India 6:119. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 268. T. 358.

This is again a widespread species distributed throughout Indo-Malesia.

### Oberonia Lindley

A palaeotropical genus of about 300 epiphytic species with uniform habit and a pendulous spike or raceme of small and unattractive flowers. Fifty two species are known from India. Ten species occur in Manipur:

- 1a. Leaves jointed .....2
- 1b. Leaves not jointed.....8
- 2a. Leaves laterally compressed ..... 3
- 2b. Leaves terete or subterete ..... **O. myosurus**
- 3a. Flowers sessile, sunken in pits on a fleshy rachis .....4
- 3b. Flowers pedicellate, not sunken in pits. Rachis not fleshy ..... 5
- 4a. Leaves very long (15-40 cm); lip truncate at apex..... **O. maxima**
- 4b. Leaves less than 15 cm long; lip triangular at apex ..... **O. pachyrachis**
- 5a. Midlobe with lateral calli in the middle.....**O. ensiformis**
- 5b. Midlobe without calli .....6
- 6a. Sidelobes of lip fringed .....**O. mucronata**
- 6b. Sidelobes of lip not fringed ..... 7
- 7a. Lip very much broadening from the middle with midlobe split in to two nearly circular lobules ..... **O. acaulis**
- 7b. Lip not very broadening from the middle .....**O. pyrulifera**
- 8a. Sidelobes of lip raised above like vertical horns ..... **O. bicornis**
- 8b. Sidelobes of lip not raised above like vertical horns .....9
- 9a. Sidelobes of lip lacinate .....**O. clarkei**
- 9b. Sidelobes of lip rounded to slightly erose .....**O. longibracteata**

1. **Oberonia acaulis** Griffith, Itin. Not. 76. Pl. I. 1848 & Not. 3:275 & Ic. T. 286. Fig.1. 1851; Seidenfaden, Dansk Bot. Ark. 32(2):20; Chauhan in Pathak *et al.*

(Ed.), Orch. Sci. & Com. 92. 2001. *O. myriantha* Lindl., Fol. Orch. *Oberonia* No. 23.1859; Hook. f., Fl. Brit. India 5: 679. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 10. T. 12. 1898; Seidenfaden, Dansk Bot. Ark. 25(3): 56. Fig. 34. 1968.

Meebold collected this species from Kappu at 7000' in Nov. 1907 (*A. Meebold 6651, CAL!*). Seidenfaden (1968:56) cites the same number available at E and K.

2. **Oberonia bicornis** Lindl., Gen. Sp. Orch. 16. 1830; Seidenfaden, Dansk Bot. Ark. 25(3): 85.1968; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 92. 2001. *Malaxis bicornis* (Lindl.)Hook. f., Fl. Brit. India 5:682. 1888.

3. **Oberonia clarkei** Hook. f., Ic. Pl. T. 1779. 1888 & Fl. Brit. India 5: 76. 1890; Seidenfaden, Dansk Bot. Ark. 25(3): 107.1968; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 107. 2001.

Clarke's type was collected from Shillong in Meghalaya. Chauhan included it from Manipur.

4. **Oberonia ensiformis** (J. E.Sm.) Lindl., Fol. Orch. *Oberonia* No. 21.1859; Hook. f., Fl. Brit. India 5: 679. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 8. Pl. 9. 1898; Seidenfaden, Dansk Bot. Ark. 25(3): 53. Fig.32. 1968 & Dansk Bot. Ark. 33(1):13.1978; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 93. 2001. *Malaxis ensiformis* J. E. Sm. in Rees Cyclop. 22(1):14. 1812.

5. **Oberonia longibracteata** Lindl., Gen. Sp. Orch. 15. 1830; Hook. f., Fl. Brit. India5:678. 1890; Seidenfaden, Dansk Bot. Ark. 25(3):83. Fig.52. 1968 & Dansk Bot. Ark. 33(1):39.1978; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 93. 2001.

6. **Oberonia maxima** Parish ex Hook. f., Fl. Brit. India 5:677. 1888; Deb, Bull. Bot. Surv. India 3(2):128. 1961; Seidenfaden, Dansk Bot. Ark. 25(3):21. 1968 & Dansk Bot. Ark. 33(1): 13. 1978; Deori & Hajra, Bull. Bot. Surv. India 17(1-4):170.1978; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 93. 2001. **Fig. 15**

*Epiphytic herbs. Leaves jointed, 22.5 x 2.5 cm, sword shaped, laterally compressed, acute at apex. Inflorescence arising from the middle, scape winged, stout, 17.5 cm long. Flowers numerous, sessile, greenish, closely adpressed to the rachis, 3 mm long; opening of flowers basipetal, sepals and petals imbricate, reflexed;floral bract oblong, 3 x 2 mm, longer than the ovary + pedicel, margin erose, apex reflexed, gland dotted; dorsal sepal 1.25 x 1 mm, ovate, gland dotted, entire on margin and rounded at apex; lateral sepals1.25 x 1 mm, ovate, gland-dotted, acute at apex; petal 1.25 x 0.75 mm, narrowly*

ovate, obtuse and wavy at apex; lip orbicular, 1.5 x 2 mm, broader than long, wavy at margins, gland-dotted, 3-veined with a depression at base; pollinia 2. Fruits not seen.

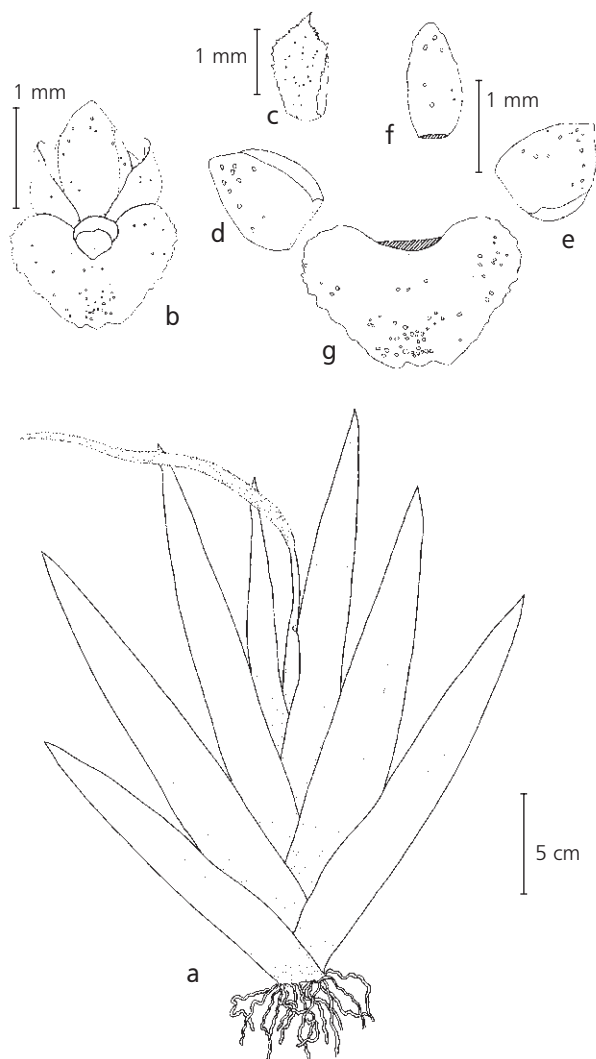


Figure 15. *Oberonia maxima* Parish ex Hook. f. - a. Habit; b. Flower; c. Floral bract; d. Dorsal sepal; e. Lateral sepal; f. Petal; g. Lip

**Flowering:** July-August.

**Habitat:** Evergreen forests at 700 m.

**Occurrence:** India: Manipur, Kasom Khullen

**Distribution:** India, Myanmar and Thailand.

**Specimens Examined:** INDIA, **Manipur:** Kason Khullen, flowered under cultivation on 26 August 1996, C. Sathish Kumar 28750 (TBGT!); Maoking D. B. Deb 994 (CAL! No flower left).

**Note:** The type was a Parish collection (287 K) from Moulmein, Myanmar. This species is characterized

by an entire and heart shaped lip which is greenish yellow in colour. This is a giant sized species.

7. ***Oberonia mucronata*** (D. Don) Ormerod & Seidenfaden, Contr. Orch. Fl. Thailand XIII: 20.1997. *Stelis mucronata* D. Don, Prod. Fl. Nepal.32.1825. *Cymbidium iridifolium* Roxb., Fl. Ind. 3:458. 1832. *Oberonia iridifolia* (Roxb.)Lindl., Gen Sp. Orch. 15. 1830. p. p.; Hook. f., Fl. Brit. India 5: 675. 1890; Seidenfaden, Dansk Bot. Ark. 25(3): 42. 1968 & Dansk Bot. Ark. 33(1): 16. 1978. *Oberonia denticulata* Wight, Ic. Pl. Ind. Or. 5(1):3. t. 1625.1851; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 92. 2001.

Till recently, this species was known under the name *O. iridifolia*.

8. ***Oberonia myosurus*** Lindl., Gen. Sp. Orch. 16. 1830 p. p.; Hook. f., Ic. Pl. T. 1786B. 1888 & Fl. Brit. India 5: 685. 1890; Seidenfaden, Dansk Bot. Ark. 25(3): 14. Fig. 1. 1968 & Dansk Bot. Ark. 33(1):10.1978; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 93. 2001.

9. ***Oberonia pachyrachis*** Rchb. f. ex Hook. f., Fl. Brit. India 5:681. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 4. Pl. 3. 1898; Seidenfaden, Dansk Bot. Ark. 25(3): 19. Fig.5. 1968 & Dansk Bot. Ark. 33(1): 11. 1978.

10. ***Oberonia pyrulifera*** Lindl., Fol. Orch. *Oberonia* 3.1859; Hook. f., Fl. Brit. India 5: 678. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8::14. Pl.16B.1898; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):153. 1953; Deb, Bull. Bot. Surv. India 3(2):128. 1961; Seidenfaden, Dansk Bot. Ark. 25(3): 38. 1968 & Dansk Bot. Ark. 33(1):23.1978; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 93. 2001.

Watt collected this species from East Manipur (*George Watt 6438, CAL!*). Mukerjee found it in Zolloi at 1700m. on 15 May 1848 (*Dr S K Mukerjee 2880, CAL!*).

## Odontochilus Blume

An Indo-Malesian genus of about 20 species of terrestrial orchids most closely related to *Anoectochilus* to which it has been sunken until Ormerod came up with distinguishing combination of characters such as nodose and leafy stem, a terminal raceme of small flowers with prominently pectinate flange on the claw of lip which has a small saccate hypochile and a normally bilobed epichile. About six species are found in India with one reported from Manipur.

***Odontochilus grandiflorus*** Benth. & Hook. f. ex Hook. f., Fl. Brit. India 6:100.1890; *Anoectochilus grandiflorus* Lindl., J. Proc. Linn. Soc. Bot. 1:179. 1857; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8:296.

Pl. 393.1898; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 85. 2001.

Originally reported from Sikkim and Meghalaya, this was later found to occur in Manipur, Arunachal Pradesh and Mizoram.

### **Ornithochilus (Lindley) Bentham**

An Indo-Malesian genus of three epiphytic species characterized by short stem, large fleshy leaves and many flowered branching inflorescence. Only one species has been recorded from India including Manipur.

**Ornithochilus difformis** (Wallich ex Lindl.) Schltr., Fed. Repert. Beih. 4:277. 1919; Seidenfaden, Opera Bot. 95: 43.1988; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 93. 2001. *Aerides difforme* Wallich ex Lindl., Gen. Sp. Orch. 242. 1833. *Ornithochilus fuscus* Wallich ex Lindl., Gen. Sp. Orch. 242. 1833. in syn; Hook. f., Fl. Brit. India 6:76. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 200.Pl. 268.1898; Pradhan, Ind. Orch. Guide to Iden. Cult. 551. 1979.

### **Otochilus Lindley**

A small genus of five epiphytic species (Seidenfaden, 1976) distributed from India to Indo-China and characterized by articulate stem, 2 leaved nodes and a subterminal raceme of small white to creamy yellow flowers. Four species are known from India. Three species are found in Manipur.

- 1a. Flowers large; rostellum and operculum long beaked..... **O. porrectus**
- 1b. Flowers small; rostellum and operculum not long beaked ..... **2**
- 2a. Leaves linear-lanceolate.....**O. fuscus**
- 2b. Leaves ovate-lanceolate.....**O. albus**

1. **Otochilus albus** Lindl., Gen. Sp. Orch. 35.1830; Hook. f., Fl. Brit. India 5:843. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 143.Pl. 200.1898; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):153.1953; Seidenfaden, Bot. Tidsskr. 71(1-2):10.Fig. 9.1976; Pradhan, Ind. Orch. Guide to Iden. Cult. 288. 1979; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 75. 1984; Seidenfaden, Opera Bot. 89:91.1986; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 93. 2001.

Mukerjee reported this species from Ukhrul and Devi and Ghatak reported it from Pheding at 700 m.

2. **Otochilus fuscus** Lindl., Gen. Sp. Orch. 35.1830; Hook. f., Fl. Brit. India 5: 844. 1890; King & Pantling,

Ann. Roy. Bot. Gard. Calcutta 8: 143. Pl. 199.1898; Seidenfaden, Bot. Tidsskr. 71(1-2): 9. Fig. 8. 1976; Pradhan, Ind. Orch. Guide to Iden. Cult. 287. 1979; Devi & Ghatak, Proc. 5<sup>th</sup> ASEAN Orch. Congr.76. 1984; Seidenfaden, Opera Bot. 89:90.1986; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 93. 2001.

Watt collected this species from Manipur (*Watt 6482*, K). Devi and Ghatak reported it from Phedinga at 700 m.

3. **Otochilus porrectus** Lindl., Gen. Sp. Orch. 36.1830; Hook. f., Fl. Brit. India 5:844.1890; Seidenfaden, Bot. Tidsskr. 71(1-2): 10.Fig. 10.1976; Pradhan, Ind. Orch. Guide to Iden. Cult. 287. *p. p.* 1979; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 75. 1984; Seidenfaden, Opera Bot. 89:91.1986; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 93. 2001.

Devi and Ghatak reported this species from Phedinga at 700 m.

### **Pachystoma Blume**

An Indo-Malesian genus of 2-5 species of terrestrial orchids with subterranean tubers, grass like leaves and a lateral raceme of greenish white to yellow to pink flowers which are more or less secundly arranged. Two species are found in India. One species occurs in Manipur.

**Pachystoma pubescens** Blume, Bijdr. 376. Pl. 29. 1825; Seidenfaden, Opera Bot. 89:54. 1986. *Apturaria senilis* Lindl., Gen. Sp. Orch. 130. 1831. *Pachystoma senile* (Lindl.) Rchb. f., Bonplandia 3:251.1855; Hook. f., Fl. Brit. India 5:815. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 101.Pl. 140.1898; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 93. 2001.

### **Panisea (Lindl.) Steudel**

An Indo-Indo-Chinese genus of seven epiphytic species (Lund, 1987) characterized by congested pseudobulbs with one or two duplicate and narrowly elliptic leaves and an inflorescence of one to many white or greenish yellow flowers. India is known to have three species. Two species have so far been recorded from Manipur.

- 1a. Flowers white; lip 2 tubercled ..... **P. demissa**
- 1b. Flowers yellow; lip with 3 calli..... **P. tricallosa**

1. **Panisea demissa** (D. Don) Pfitz. in Pfitzer & Kranzlin, Orch.-Coelog. Pflanzenr. Heft 32:141.1907; Hegde & Rao, Ind. J. For. 7(1):77. 1984; Seidenfaden, Opera Bot. 89:86.1986; Lund, Nord. J. Bot. 7(5):517.1987. *Dendrobium demissum* D. Don, Prodr. Fl. Nepal. 34. 1825.

Meebold collected this species from Phalang Naga Hills at 5-6000ft in December 1907 (*A. Meebold 7091, CAL!*).

2. ***Panisea tricallosa*** Rolfe, Kew Bull. 1901:148; Seidenfaden, Opera Bot. 89:86.1986; Lund, Nord. J. Bot. 7(5): 525.1987; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 93. 2001. **Fig. 16**



Figure 16. *Panisea tricallosa* Rolfe - a. Flower showing 3 callose lip

Devi and Ghatak reported this species from Khudangthabi at 1340 m.

**Paphiopedilum Pfitzer**

An Indo-Malesian genus of about 90 predominanatly terrestrial herbs characterized by a unique slipper shaped lip and a characteristic staminode. Some species have mottled leaves. Nine species are known from India and five species occur in Manipur.

- 1a. Leaves uniformly green..... 2
- 1b. Leaves mottled with dark green and grey-green ..... **P. venustum**
- 2a. Dorsal sepal white with a median maroon vein ..... **P. spicerianum**
- 2b. Dorsal sepal not as above..... 3
- 3a. Petals half twisted near the apex, strongly undulate on basal margins.....**P. hirsutissimum**
- 3a. Petals not twisted near the apex ..... 4
- 4a. Petals spathulate, obtuse, undulate on upper margin in basal two-thirds.....**P. insigne**
- 4b. Petals obovate-spathulate, retuse-emarginate, not undulate..... **P. villosum**

1. ***Paphiopedilum hirsutissimum*** (Lindl. ex Hook.)Stein, Orchideenbuch 470. 1892; Pfitzer in Engler, Bot. Jarhb. 19:41. 1894 & Engler, Das Pflanzenr. IV, 50:69. 1903; Pradhan, Paph. World 2:84. 1972; Pradhan, Ind. Orch. Guide to Ident. Cult. 39. 1976; Kataki, Lady’s Slipper orch. 16. 1984; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 75. 1984;Cribb, The Genus Paph. 138. 1987 & 220. 1998; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 93. 2001. *Cypripedium hirsutissimum* Lindl.ex Hook. in Curtis’s Bot. Mag. 83: t. 4990. 1857; Hook. f., Fl. Brit. India 6: 171. 1890. **Fig. 12d**

Devi and Ghatak reported this from Moreh at 200 m.

2. ***Paphiopedilum insigne*** (Wallich ex Lindl.) Pfitz. in Engler & Prantl, Nat. Pflanzenfam. 2(6):84. 1889 & Engler, Das Pflanzenr. IV, 50:73. 1903; Pradhan, Ind. Orch. Guide to Ident. Cult. 36. 1976; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing.75.1984; Kataki, Lady’s Slipper Orch.13. 1984; Cribb, The Genus *Paph.* 220. 1987 & 231.1998; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 93. 2001. *Cypripedium insigne* Wallich ex Lindl., Collect. Bot. t. 32.1821; Hook. f., Fl. Brit. India 6: 172. 1890. **Fig. 20a**

Devi and Ghatak recoreded this species from Imphal.

3. ***Paphiopedilum spicerianum*** (Rchb. f. ex Masters & T. Moore)Pfitz. in Pringsh. Jarhb. Wiss. Bot. 19:164.1888; in Engler, Pflanzenr. Orch. Pleon. 76. 1903; Pradhan 1976:38; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 75. 1984; Kataki, Lady’s Slipper Orch. 17. 1984; Cribb, The Genus *Paph.* 155. 1987; 269.1998; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 93. 2001. *Cypripedium spicerianum* Rchb. f. ex Masters & T. Moore in Gard. Chron. n. s. 12:505. 1879; Hook. f., Fl. Brit. India 6:172. 1890. **Fig. 20b**

Devi and Ghatak reported this species from Nungba at 831 m.

4. ***Paphiopedilum venustum*** (Wallich ex Sims)Pfitz. in Jahrb. Wiss. Bot. 19:163. 1888; Stein, Orchideenbuch 489.1892; Pfitz. in Engler, Bot. Jahrb.19:41.1894 & in Engler, Pflanzenr. Orch. Pleon. 81. 1903; Pradhan in Orch. Dig. 38:195.1974; Pradhan in Orch. Dig. 40:92. 1976; Kataki, Lady’s Slipper Orch. 12.1984; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing.75. 1984; Cribb, The Genus Paph. 211. 1987 & 392. 1998.*Cypripedium venustum* Wallich in Curtis’s Bot. Mag. 47:t. 2129. 1820;Hook. f., Fl. Brit. India 6:173. 1890

Devi and Ghatak recorded it from Imphal.

5. **Paphiopedilum villosum** (Lindl.) Stein, Orchideenbuch 490. 1892; Pfitz. in Engler, Bot. Jahrb. 19:41. 1894 & in Engler, Pflanzenr. Orch. Pleon. 72. 1903; Pradhan, Ind. Orch. Guide to Iden. Cult.1:37.1976; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 75. 1984; Kataki, Lady's Slipper Orch. 14. 1984; Cribb, The Genus *Paph.* 150.1987 & 254. 1998. *Cypripedium villosum* Lindl. in Gard. Chron. 1854:135. 1854: Hook. f., Fl. Brit. India 1890:171.

Devi and Ghatak recorded this species from Imphal.

### **Papilionanthe Schlechter**

An Indo-Malesian genus of ten epiphytic species characterized by terete leaves, highly colourful flowers that have a long column-foot and a curious lip. India is known to have five species with two in Manipur.

- 1a. Flowers pinkish white with darker lip having yellow throat..... **P. teres**
- 1b. Flowers pure white..... **P. vandarum**

**1. Papilionanthe teres** (Roxb.) Schltr., Orchis 9:78. Fig. 12.1915; Garay, Bot. Mus. Leafl. Harv. Univ. 23(10): 371.1974; Pradhan, Ind. Orch. Guide to Iden. Cult. 563. 1979; Seidenfaden, Opera Bot. 95:230. 1988. *Dendrobium teres* Roxb., Fl. Ind. 3:485. 1832. *Vanda teres* (Roxb.) Lindl., Gen. Sp. Orch. 217.1833; Hook. f., Fl. Brit. India 6:49. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 214. Pl. 285.1898; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 93. 2001.

We collected this species from the Military Campus at Imphal growing on old trees.

*Specimens Examined:* INDIA, **Manipur:** Imphal C. Sathish Kumar s.n. (TBGT!).

**2. Papilionanthe vandarum** (Rchb. f.) Garay, Bot. Mus. Leafl. Harvard Univ. 23(10):372.1974; Christenson, Amer. Orch. Soc. Bull. 63:1375. 1994; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 93. 2001. *Aerides vandarum* Rchb. f. in Gard. Chron. 997. 1867.

We collected this species from between Kasom Khullen and Saram growing on road side trees. It is quite close to *P. biswasiana* but petals are broad with a narrow base, 3 lobed lip has two erect sidelobes and bilobulate midlobe, lobules are heart-shaped, disc 1 keeled and keel rounded.

*Specimens Examined:* INDIA, **Manipur:** Near Saram C. Sathish Kumar 28723 (TBGT!); Sirohee S. K. Mukerjee 2779 (CAL!).

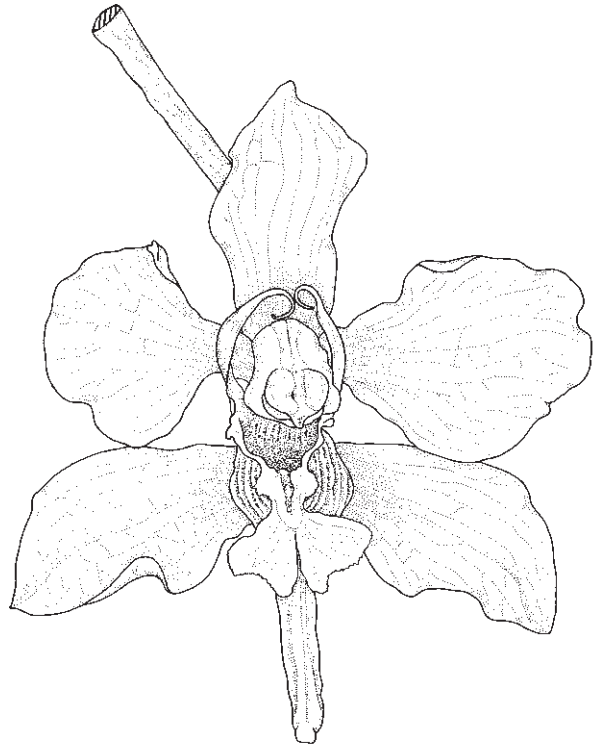


Figure 17. *Papilionanthe vandarum* (Rchb. f.) Garay - a. Flower (after CSK 28723).

### **Pecteilis Rafinesque**

An Indo-Malesian genus of 6-7 terrestrial species characterized by short stigma lobes and a variously lacinate or rarely entire lip with a long spur at base. Four species are known from India. Two are found in Manipur.

- 1a. Flowers small with sepals about 2 cm or less ..... **P. henryi**
- 1b. Flowers large with sepals about 3 cm or more..... **P. susannae**

**1. Pecteilis henryi** Schltr., Fed. Repert. Beih. 4:45. 1919; Seidenfaden, Dansk Bot. Ark. 31(3):23.1977; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 93. 2001.

**2. Pecteilis susannae** (L.) Rafin. Fl. Tell. 2:38. 1837; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 153. 1953; Deb, Bull. Bot. Surv. India 3(2):128. 1961; Seidenfaden, Dansk Bot. Ark. 31(3):22.1977; Seidenfaden & Wood, Orch. Peinins. Mal. Sing. 108. 1992. *Orchis susannae* L., Sp. Pl. 939. 1753. *Habenaria susannae* (L.) R. Br., Prodr. 312. 1810; Hook. f., Fl. Brit. India 6: 137. 1890. *Platanthera susannae* (L.) Lindl., Gen. Sp. Orch. 295.1835 (excl. some syn.); Pradhan, Ind. Orch. Guide to Iden. Cult. 56. 1976.

Mukerjee reported this species from Khayang at 2000 m.

### **Peristylus Blume**

An Indo-Malesian genus of some 60-70 species of ground orchids characterized by variously shaped tuberoids, ensheathed stem, fleshy leaves and aterminal inflorescence of mostly green to creamy yellow flowers. Twenty seven species and two varieties are known from India. Six species are so far reported from Manipur.

- 1a. Sidelobes of lip thread like, longer than midlobe .....2
- 1b. Sidelobes of lip not thread like, shorter than midlobe .....3
- 2a. Spur slender, cylindrical, acute ..... **P. densus**
- 2b. Spur globular, slightly bifid at base ..... **P. tipuliferus**
- 3a. Lip with a callus on disc.....**P. lacertiferus**
- 3b. Lip without any callus on disc .....4
- 4a. Leaves linear, grass like ..... **P. mannii**
- 4b. Leaves lanceolate to ovate, not grass like.....5
- 5a. Entrance to spur wide opened, naked.... **P. affinis**
- 5b. Entrance to spur minute with a triangular nectary ..... **P. goodyeroides**

1. **Peristylus affinis** (D. Don) Seidenf., Dansk Bot. Ark. 31(3):48.1977; Chauhan in Pathak et al. (Ed.), Orch. Sci. & Com. 93. 2001. *Habenaria affinis* D. Don, Prodr. Fl. Nepal. 25. 1825. *Habenaria goodyeroides* var. *affinis* King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 327. Pl. 430. 1898. *Habenaria goodyeroides* auct. p. p.: Hook. f., Fl. Brit. India 6: 161. 1890.

2. **Peristylus densus** (Lindl.)Santapau & Kapadia, J. Bombay Nat. Hist. Soc. 57:128. 1960; Seidenfaden, Dansk Bot. Ark. 31(3):32.1977; Chauhan in Pathak et al. (Ed.), Orch. Sci. & Com. 93. 2001. *Coeloglossum densum* Lindl., Gen. Sp. Orch. 302. 1832. *Platanthera stenostachya* Lindl. ex Benth., Hooker's J. Bot. & Kew Misc. 7:37. 1855. *Habenaria stenostachya* (Lindl. ex Benth.)Benth., Fl. Hongk. 362. 1861; Hook. f., Fl. Brit. India 6: 156. 1890. *Peristylus stenostachyus* (Lindl. ex Benth.)Krzl., Orch. Gen. Sp. 502.1901; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 153. 1953; Deb, Bull. Bot. Surv. India 3(2):128. 1961.

Mukerjee reported this species from Sirohee.

3. **Peristylus goodyeroides** (D. Don)Lindl., Gen. Sp. Orch. 299. 1835; Deb, Bull. Bot. Surv. India 3(2):128. 1961; Seidenfaden, Dansk Bot. Ark. 31(3):53.1977; Chauhan in Pathak et al. (Ed.), Orch. Sci. & Com. 93. 2001. *Habenaria goodyeroides* D. Don, Prodr. Fl. Nepal.

25. 1825; Hook. f., Fl. Brit. India 6:161. 1890 (excl. syn. *H. grandis*); King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 326. Pl. 430. 1898.

Deb found this species to be common in Manipur.

4. **Peristylus lacertiferus** (Lindl.)J. J. Sm., Bull. Buitenz. 3. s. 9:23. 1927; Seidenfaden, Dansk Bot. Ark. 31(3): 58.1977; Chauhan in Pathak et al. (Ed.), Orch. Sci. & Com. 93. 2001. *Coeloglossum lacertiferum* Lindl., Gen. Sp. Orch. 302. 1835. *Habenaria lacertifera* (Lindl.)Benth., Fl. Hongk. 362. 1861; Hook. f., Fl. Brit. India 6: 163 (incl. var. *robusta*). 1890; Deb, Bull. Bot. Surv. India 3(2):127. 1961.

J. D. Hooker studied material from Manipur for his treatment in *Flora of British India*. Deb collected it from Mao at 1800 m.

5. **Peristylus mannii** (Rchb. f.) Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 153. 1953; Seidenfaden, Dansk Bot. Ark. 21(3): 45.1977; Chauhan in Pathak et al. (Ed.), Orch. Sci. & Com. 93. 2001. *Celoglossum mannii* Rchb. f., Linnaea 41:54. 1877. *Peristylus* "Hook. f." Clarke, J. Linn. Soc. 25:73. 1889. *Habenaria gracillima* Hook. f., Fl. Brit. India 6:163. 1890.

Mukerjee reported this species from Ukhrul.

6. **Peristylus tipuliferus** (Parish & Rchb. f.)Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):158. 1953; Seidenfaden, Dansk Bot. Ark. 31(3): 41.1977; Chauhan in Pathak et al. (Ed.), Orch. Sci. & Com. 94. 2001. *Habenaria tipulifera* Parish & Rchb. f., Trans. Linn. Soc. 30:139.1974; Hook. f., Fl. Brit. India 6:157. 1890. *Habenaria brandisii* Hook. f., Fl. Brit. India 6:162. 1890.

Mukerjee reported this species from Litan and Ukhrul.

### **Phaius Loureiro**

An Old World genus of about 50 terrestrial species characterized by a leafy plurinodal stem, variously shaped leaves and a lateral raceme of brightly coloured flowers. Five species are known from India. Three species occur in Manipur.

- 1a. Scape axillary or from amongst the leaves, not exceeding the leaves ..... **P. mishmensis**
- 1b. Scape from side of the pseudobulb, tall stout.....2
- 2a. Leaves spotted with dull yellow; flowers golden yellow ..... **P. flavus**
- 2b. Leaves uniformly green without spots; flowers buff and purple ..... **P. tankervilleae**

1. **Phaius flavus** (Blume)Lindl., Gen Sp. Orch. 128.1831; Mukerjee, Notes Roy. Bot. Gard. Edinburgh



21(3):154. 1953; Deb, Bull. Bot. Surv. India 3(2):128.1961; Pradhan, Ind. Orch. Guide to Iden. Cult. 703. 1979; Seidenfaden, Opera Bot. 89:41.1986; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 94. 2001. *Limodorum flavum* Blume, Bijdr. 375. 1825. *Phaius maculatus* Lindl., Gen. Sp. Orch. 127.1831; Hook. f., Fl. Brit. India 5:817.1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8:107. T. 149. 1898.

Mukerjee reported this species from Lamlang at 2000m.

2. **Phaius mishmensis** (Lind. & Paxt.) Rchb. f., Bonplandia 5:43.1857; Hook. f., Fl. Brit. India 5:817.1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 109. Pl.152. 1898; Pradhan, Ind. Orch. Guide to Iden. Cult. 703. 1979; Devi & Ghatak, Proc. 5<sup>th</sup> ASEAN Orch. Cong. Sing. 75. 1984; Seidenfaden, Opera Bot. 89:47.1986; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 94. 2001. *Limatodis mishmensis* Lindl. & Paxt., Flower Gard. 3:36. 1852.

Devi and Ghatak reported this species from Tami at 690 m.

3. **Phaius tankervilleae** (Banks ex l'Heritier) Blume, Mus. Bot. Lugd. 2(12):177.1856; Pradhan, Ind. Orch. Guide to Iden. Cult. 703. 1979; Devi & Ghatak in Vij (Ed.), Orch. Biol. Cons. Cult. 75. 1986; Seidenfaden in Opera Bot. 89: 43. 1986; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 94. 2001. *Limodorum tankervilleae* Banks ex l'Heritier, Sert. Ang. 28. 1789. *Phaius grandifolius* Lour., Fl. Cochinch. 2:529. 1790; Devi & Ghatak, Proc. 5<sup>th</sup> ASEAN Orch. Cong. Sing. 75. 1984. *Phaius wallichii* Lindl. in Wallich, Pl. As. Rar. 2:46. T. 158.1831; Hook. f., Fl. Brit. India 5:816 & 6: 191. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8:108. Pl. 150.1898; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 154. 1953; Deb, Bull. Bot. Surv. India 3(2):129. 1961.

Mukerjee collected this species from Ukhrul.

### Phalaenopsis Blume

An Indo-Malesian genus of some 40 epiphytic species characterized by short stems, thick, shining, flat and broad leaves and an inflorescence bearing strikingly beautiful flowers (Christenson, 2001). Five species are known from India. Two species could be collected from Manipur including a new record for India.

1a. Lip white with parallel red stripes on sidelobes, red on front of central appendage and base of column..... **P. cornucervi**

1b. Lip yellow at base with deep orange on sidelobe region and pale rose at apex; light violet or pink at base of column ..... **P. fasciata**

1. **Phalaenopsis cornucervi** (Breda) Blume & Rchb. f., Hamb. Gartenz. 16:116. 1860; Devi & Ghatak, Proc. 5<sup>th</sup> ASEAN Orch. Cong. Sing. 75. 1984; Seidenfaden, Opera Bot. 95:239. 1988. *Polychilos cornucervi* Breda in Kuhl & v. Hasselt, Gen. Sp. Pl. 1. 1827; Shim, Mal. Nat. J. 36: 23. 1982.

Devi and Ghatak reported this species from Jiribam.

2. **Phalaenopsis fasciata** Rchb. f., Gard. Chron. n.s. 18:134.182; Christenson, *Phalaenopsis* A mono. 17. 2001. *Polychilos fasciata* (Rchb. f.) Shim, Mal. Nat. J. 36:25. 1982. **Figs. 18, 20c**

*Epiphytes. Leaves* 15-20 x 4-6 cm, elliptic to obovate, channelled above, obtuse rounded at apex. *Inflorescence* arising from the base of the stem, arching, shorter than the leaves, sometimes longer, a few flowered, pleasantly fragrant; floral bract 4 x 3 mm, triangular with acute apex; pedicel plus ovary 1.8 cm, offwhite; sepals and petals spreading with yellow background and deep brown stripes; dorsal sepal 2.4 x 1 cm, elliptic, 7-veined, backwardly folded, acute at apex; lateral sepals 2.4 x 1.4 cm, ovate-elliptic, 7-veined, margin slightly wavy, acuminate at apex; petals 2.1 x 0.9 cm, elliptic to ovate, 7-veined, acute at apex; lip 3 lobed, 2 x 1.5 cm across sidelobes region, sidelobes oblong-ovate, erect, parallel, obliquely truncate with pointed apex, 0.6 x 0.4 cm, yellowish at base and pale rose at apex having small brown dots within, a small furrow in the middle as a projection, a bunch of orange yellow fleshy tubercles in the middle of the two sidelobes; midlobe oblong-obovate with a central keel and an apical pad of raised tissue having a few scattered trichomes just behind the apical pad; basal portion with two pairs of thorn like projection placed one above the other with the smaller being above and forward pointing; column arching, pale rose, club shaped, 1.2 cm long. *Fruits* not seen.

*Flowering:* December-January

*Habitat:* Evergreen forests at 800 m.

*Occurrence:* India, Manipur, Tupul.

*Distribution:* India and Philippines.

*Specimens Examined:* INDIA, Manipur, Tupul: C. Sathish Kumar 28259 (TBGT!); 23 December 1998, C. Sathish Kumar 28764 (TBGT!).

*Note:* We got our specimens from Tupul at an altitude of 760 m. It flowered under cultivation at TBGRI. Identification of this species posed some problems

as there were many species with the same colour pattern. Dr Eric Christenson, USA who studied our sketches and photos confirmed it to be *Phalaenopsis*

*fasciata* Rchb. f. known only from the Philippines. Thus, the present discovery forms a new record for India.

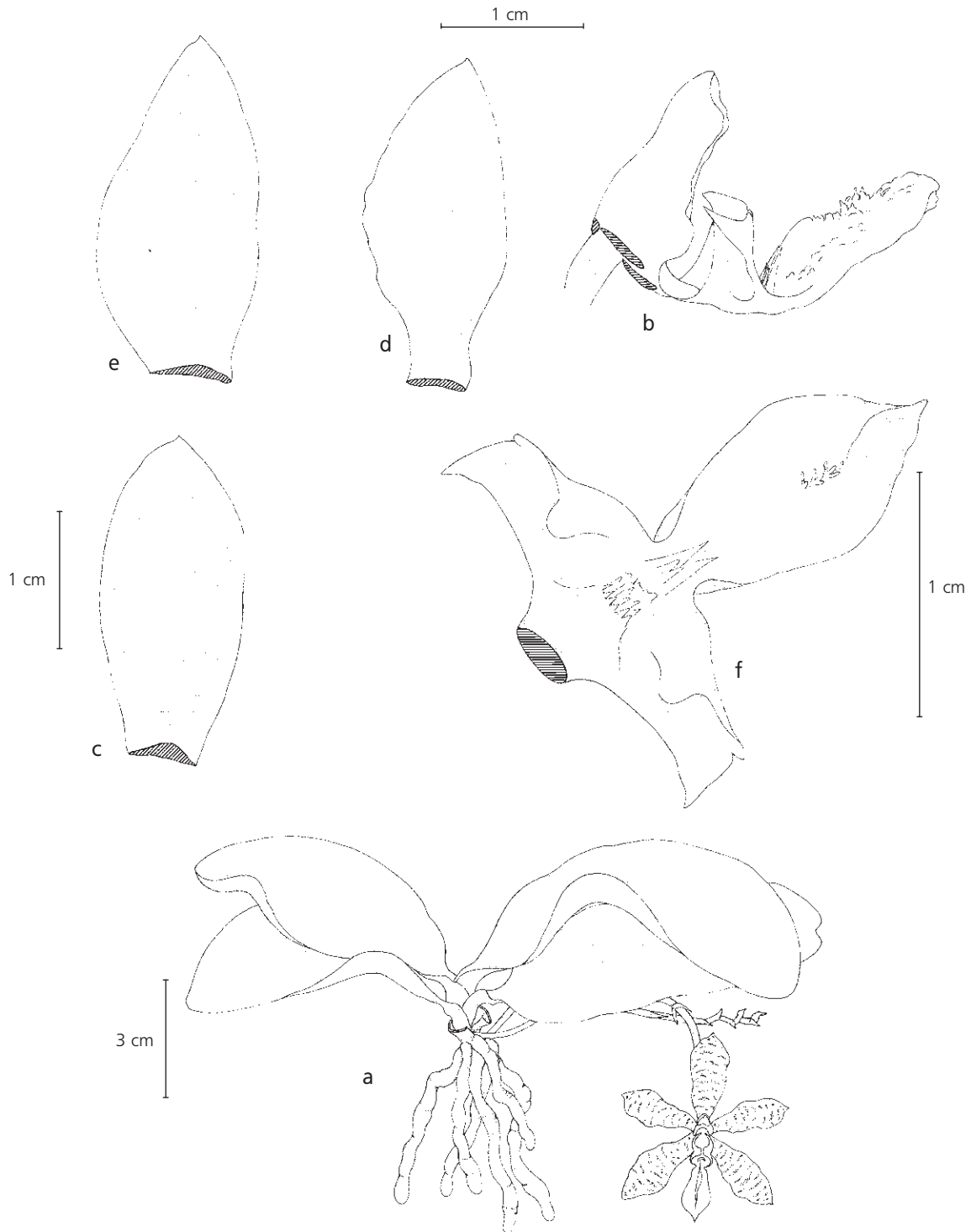


Figure 18. *Phalaenopsis fasciata* Rchb. f., Gard. - a. Habit; b. Flower showing column and lip (sepals and petals removed); c. Dorsal sepal; d. Petal; e. Lateral sepal (after CSK 28259).

**Pholidota Lindley ex W. J. Hooker**

An Indo-Malesian genus of about 29 epiphytic species with seven varieties (Seidenfaden, 1986) characterized by the bifariouly arranged flowers with conspicuous bracts. Seven species with one variety are known from India. Four species are so far recorded from Manipur.

- 1a. Pseudobulbs caespitose; new ones from the side of a pseudobulb ..... 2
- 1b. Pseudobulbs superposed; new ones from apex of previous pseudobulb ..... 3
- 2a. Leaves leathery; lateral sepals free at base ..... **P. imbricata**
- 2b. Leaves thin; lateral sepals connate near base ..... **P. bracteata**
- 3a. Scapes arising from the sheaths of the internodes ..... **P. protracta**
- 3b. Scape arising from the top of the pseudobulbs between the leaves ..... **P. articulata**

**1. Pholidota articulata** Lindl., Gen. Sp. Orch. 38. 1830; Hook. f., Fl. Brit. India 5:884. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 146. Pl. 205. 1898; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):154. 1953; Deb, Bull. Bot. Surv. India 3(2):129. 1961; Pradhan, Ind. Orch. Guide to Iden. Cult. 294. 1979; Seidenfaden, Opera Bot. 89:96.1986; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 94. 2001: *Pholidota griffithii* Hook. f., Ic. Pl. T. 1881. 1889 & Fl. Brit. India 5: 845.1890; Pradhan, Ind. Orch. Guide to Iden. Cult. 294. 1979; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 94. 2001; *P. obovata* Hook. f., Fl. Brit. India 5:845. 1890. *P. lugardii* Rolfe, Kew Bull. 1893:6. 1893. *P. articulata* var. *griffithii* (Hook. f.) King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8:147. Pl. 204. 1898. **Fig. 20d**

*Flowering:* April-May.

*Habitat:* Primary and secondary forests at 600-2000 m.

*Occurrence:* Manipur, Thoubal, Sirohee.

*Distribution:* Indo-Malesia.

*Specimens Examined:* INDIA, **Manipur:** Thoubal C. Sathish Kumar 28737, 28760 (TBGT!); Sirohee S. K. Mukerjee 3212(CAL!)

**2. Pholidota bracteata** (D. Don) Seidenf., Opera Bot. 89:100.1986. *Ptilonema bracteatum* D. Don, Prodr. Fl. Nepal. 33. 1825. *Pholidota pallida* Lindl., Bot. Reg. 21. sub T. 177. 1835. *Pholidota imbricata* auct. non W. J. Hook. : Lindley, Bot. Reg. T. 1213. 1829. *P. calceata*

Rchb. f., Bonplandia 4:329.1856; Hook. f., Fl. Brit. India 5:846.1890; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 154. 1953; Pradhan, Ind. Orch. Guide to Iden. Cult. 292. 1979; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 94. 2001 *P. imbricata* var. *sessile* Hook. f., Fl. Brit. India 5: 846. 1890.

Mukerjee recorded this species from Ukhrul at 2000 m.

**3. Pholidota imbricata** W. J. Hook., Exot. Fl. 2:T. 138. 1825; Deb, Bull. Bot. Surv. India 3(2):129. 1961; Seidenfaden, Opera Bot. 95:98. 1988. *P. imbricata* var. *coriacea* Hook. f., Fl. Brit. India 5:846. 1890.

Deb reported it from Kairengi at 900 m.

**4. Pholidota protracta** Hook. f., Ic. Pl. T.1877.1889; Hook. f., Fl. Brit. India 5:845.1890; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 154. 1953; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 94. 2001.

Mukerjee reported this species from Khangkhui.

**Phreatia Lindley**

An Indo-Malesian genus of about 150 species of epiphytic orchids characterized by minute flowers, very simple and unornamented lip and eight pollinaria. It is represented in India by three species. Only one species has been recorded from Manipur.

**Phreatia elegans** Lindl., Gen. Sp. Orch. 63.1830; Hook. f., Fl. Brit. India 5:810.1890; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 93. 2001.

Lindley described this species based on Macrae's collection from Sri Lanka. We haven't seen any specimen from Manipur. CAL has specimens from Meghalaya and Sikkim, besides Dr A. Henry's collections from China and Taiwan.

**Pleione D. Don**

An Asian mainland genus that extends to South China and Taiwan with its 14 epiphytic species (Cribb, Tang & Butterfield, 1983) and characterized by short habit and large and stunningly beautiful flowers. Five species are known from India. Four are reported to occur in Manipur.

- 1a. Pseudobulbs 1 leaved ..... 2
- 1b. Pseudobulbs 2 leaved ..... 3
- 2a. Leaves hysteranthous; lip base saccate..... **P. humilis**
- 2b. Leaves synanthous; lip base not saccate ..... **P. hookeriana**

- 3a. Sepals and petals creamy white, sometimes with streaks of pink .....**P. maculata**
- 3b. Sepals and petals pink to pinkish purple .....**P. praecox**

1. **Pleione hookeriana** (Lindl.) B. S. Williams, *Orchid Grow. Man. Ed. 6*, 548. 1885; Mukerjee, *Notes Roy. Bot. Gard. Edinburgh* 21(3): 154. 1953; Cribb, Tang & Butterfield, *Curtis's Bot. Mag.* 184(3):112. 1983; Seidenfaden, *Opera Bot.* 114:106. 1992; Chauhan in Pathak *et al.* (Ed.), *Orch. Sci. & Com.* 94. 2001. *Coelogyne hookeriana* Lindl., *Fol. Orch. Coelogyne* 14. 1854; Hook. f., *Fl. Brit. India* 5: 842. 1890.

Mukerjee reported this species from Sirohee at 2600 m.

*Specimens Examined*: INDIA, **Manipur**: Sirohee Dr S K Mukerjee 3238 (CAL!).

2. **Pleione humilis** (J. E. Sm.) D. Don, *Prodr. Fl. Nepal.* 37. 1825; Cribb, Tang & Butterfield, *Curtis's Bot. Mag.* 184(3): 119. 1983; Chauhan in Pathak *et al.* (Ed.), *Orch. Sci. & Com.* 94. 2001. *Epidendrum humile* J. E. Sm., *Exot. Bot. T.* 98. 1806. *Coelogyne humilis* (J. E. Sm.) Lindl., *Gen. Sp. Orch.* 43. 1830; Hook. f., *Fl. Brit. India* 5: 840. 1890.

Cribb *et al.* recorded this species from Manipur.

3. **Pleione maculata** (Lindl.) Lindl. *Paxt. Fl. Gard.* 2: 5. T. 39. 1851; Pradhan, *Ind. Orch. Guide to Iden. Cult.* 281; Cribb, Tang & Butterfield, *Curtis's Bot. Mag.* 184(3): 106. Fig. 1B. T. 860. 1983; Seidenfaden, *Opera Bot.* 89: 77. 1988; Chauhan in Pathak *et al.* (Ed.), *Orch. Sci. & Com.* 94. 2001. *Coelogyne maculata* Lindl., *Gen. Sp. Orch.* 43. 1830; Hook. f., *Fl. Brit. India* 5: 841 & 6: 194. 1890; King & Pantling, *Ann. Roy. Bot. Gard. Calcutta* 8: 140. T. 195. 1898:

Meebold collected this species from Manipur in November 1907 at 5000 ft.

*Specimens Examined*: INDIA, **Manipur**: Ningba A. Meebold 6562 (CAL!).

4. **Pleione praecox** (J. E. Sm.) D. Don, *Prodr. Fl. Nepal.* 37. 1825; Mukerjee, *Notes Roy. Bot. Gard. Edinburgh* 21(3): 154. 1953; Cribb, Tang & Butterfield, *Curtis's Bot. Mag.* 184(3): 110. 1983; Chauhan in Pathak *et al.* (Ed.), *Orch. Sci. & Com.* 94. 2001. *Epidendrum praecox* J. E. Sm., *Exot. Bot.* 2: 23. T. 97. 1806. *Coelogyne praecox* (J. E. Sm.) Lindl., *Coll. Bot. sub T.* 37. 1826; Hook. f., *Fl. Brit. India* 5: 840 & 6: 194. 1890; King & Pantling, *Ann. Roy. Bot. Gard. Calcutta* 8: 141. Pl. 196. 1898.

Mukerjee collected this species from Sirohee at 2500 m.

## Polystachya W. J. Hooker

A pantropical genus of some 200 epiphytic species of orchids with a mean centre of distribution in Africa characterised by pseudobulbous stems bearing a few leaves and a single or branched inflorescence of variously coloured (creamy green to light pink in Asia) flowers. Only one species has been recorded from India, also occurring in Manipur.

**Polystachya concreta** (Jacq.) Garay & Sweet, *Orcquideologia* 9(3): 206. 1974; Seidenfaden in *Opera Bot.* 95: 14. 1988. *Epidendrum concretum* Jacq., *Enum. Syst. Pl.* 30. 1760. *Onychium flavescens* Blume, *Bijdr.* 325. 1825. *Polystachya flavescens* (Blume) J. J. Sm., *Fl. Buitenz.* 6: 285. Fig. 218. 1905; Pradhan, *Ind. Orch. Guide to Iden. Cult.* 371. 1979.

This is a pantropical species.

## Porpax Lindley

An Indo-Malesian genus of 13 epiphytic or lithophytic species characterized by discoid and compressed pseudobulbs and tubular flowers. Six species are known from India. Only one species has been so far recorded from Manipur.

**Porpax gigantea** Deori, *Bull. Bot. Surv. India* 17: 174. 1978; Seidenfaden, *Bot. Tidsskr.* 72(1): 6. 1977 & *Opera Bot.* 89: 120. 1986.

Deori recorded this species from Manipur.

## Renanthera Loureiro

An Indo-Malesian genus of about 15 species of epiphytic orchids characterized by monopodial habit and an often branched inflorescence of strikingly coloured, often red flowers. One species occurs in India, known from Manipur, Arunachal Pradesh, Mizoram and Nagaland.

**Renanthera imschootiana** Rolfe, *Kew Bull.* 1891: 200. 1891; Devi & Ghatak, *Proc. 5th ASEAN Orch. Cong. Sing.* 76. 1984; Seidenfaden, *Opera Bot.* 114: 367. 1992; Chauhan in Pathak *et al.* (Ed.), *Orch. Sci. & Com.* 94. 2001. *R. papilio* King & Prain, *Journ. Asiat. Soc. Bengal* 64(3): 328. 1895.

**Figs. 19, 22a**

A fairly common species in Manipur, *R. imschootiana* is much exploited by orchid traders for breeding experiments. Several intergeneric hybrids involving this species have been produced and they, like the parent, are a hot favourite of orchid lovers. Flowers of this species are scarlet red. Dorsal sepal is light brownish yellow, petals light cream with pink spots towards tip, lateral sepals scarlet red, very small, saccate lip 3-lobed, sidelobes sharp, erect, deep scarlet

red and midlobe apex scarlet red. There are two keels at sidelobes region and three at midlobe region.

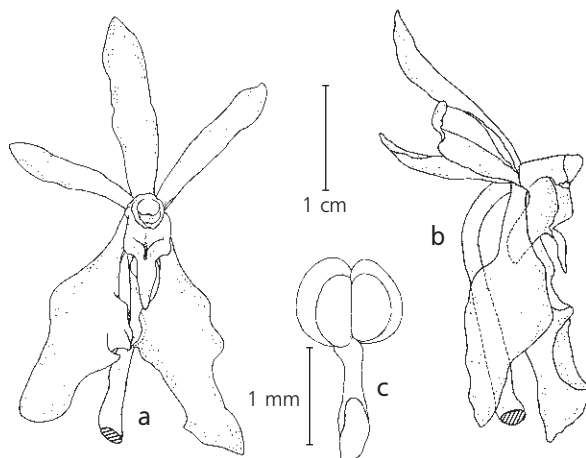


Figure 19. *Renanthera imschootiana* Rolfe - a. Flower (front view); b. Flower side view; c. Pollinarium (after CSK 28738).

*Specimens Examined:* INDIA, **Manipur:** Khongya near Moreh C. Sathish Kumar 28738 (TBGT!); Between Khairung and Maitiphun-Manipur-Naga Hills frontier May 1892 Lt. Lugard s. n. (Acc. No. 457529, CAL!); Munnipore Hills June 1899 Capt. Chatterton s. n. (Acc. No. 457524, CAL!). **Assam:** 18 May 1895 Lt. Chatterton 558 (CAL!, Type of *Renanthera papilio* King & Prain). **Mizoram:** South Lushai Hills near Fort Lungh 3000 ft. April 1899 A. T. Gage 230 (CAL!). BURMA(MYANMAR), **Taunggyi:** May 1938 F. G. Dickason 9332 (Acc. No. 457525, CAL!).

### Rhynchostylis Blume

An Indo-Southeast Asian genus of four epiphytic species characterized by short stems, thick and fleshy leaves and lateral inflorescence of closely arranged flowers. Two species have been recorded from India and both found in Manipur.

- 1a. Lip apex 3-lobed..... **R. gigantea**
- 1b. Lip apex notched/ slightly retuse or apiculate ..... **R. retusa**

1. **Rhynchostylis gigantea** (Lindl.)Ridley, J. Linn. Soc. 32:356.1896; Devi & Ghatak, Proc. 5<sup>th</sup> ASEAN Orch. Cong. Sing. 74. 1984; Seidenfaden, Opera Bot. 95:217. 1988. *Saccolabium giganteum* Lindl., Gen. Sp. Orch. 221. 1833.

Devi and Ghatak reported this species from Khongampatt.

2. **Rhynchostylis retusa** (L.) Blume, Bijdr. 286. Fig. 49.1825; Hook. f., Fl. Brit. India 6:32. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 213. Pl. 284. 1898; Devi & Ghatak, Proc. 5<sup>th</sup> ASEAN Orch. Cong.

Sing.76.1984; Seidenfaden, Opera Bot. 95:214.1988; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 94. 2001. *Epidendrum retusum* L., Sp. Pl. 953. 1753.

This species is common at Thoubal.

*Specimen Examined:* INDIA; **Manipur:** Imphal C. Sathish Kumar 28737 (TBGT!)

### Rhytionanthos Garay *et al.*

An Indo-Malesian genus of about a dozen species of epiphytic orchids characterized by non twisted involute, lateral sepals firmly united along both margins and presenting a horn or pouch-like appearance. Eight species are known from India. Only one species has been recorded from Manipur.

**Rhytionanthos cornutum** (Lindl.)Garay, Hamer & Siegerist, Nord. J. Bot. 14(6):637. 1994; Seidenfaden, Opera Bot. 124: 51. 1995. *Cirrhopetalum coruntum* Lindl., Bot. Reg. 24: misc. 75. 1838. *Bulbophyllum cornutum* (Lindl.) Rchb. f. in Walp. Ann. 6:261. 1861. *Phyllorchis helenae* Kuntze, Rev. Gen. Pl. 2:676. 1891. *Bulbophyllum helenae* (Kuntze)J. J. Sm., Bull. Buitenz. Ser. 2. 8:24. 1912; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 86. 2001.

### Satyrium Swartz

An Old World genus of about 100 species of terrestrial orchids with a centre of distribution in Africa and characterized by tuberoid rhizomes, fleshy stems and leaves, and a terminal inflorescence of varying colours with two collateral spurs on the lip. Only a single species occurs in India, which is also recorded from Manipur at high altitudes.

**Satyrium nepalense** D. Don, Prodr. Fl. Nepal. 26. 1825; Hook. f., Fl. Brit. India 6:168.1890; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 154. 1953; Deb, Bull. Bot. Surv. India 3(2):129.1961; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 94. 2001.

Mukerjee recorded this species from Sirohi at 2500 m. on grassy fields.

### Schoenorchis Reinw.

An Indo-Malesio-Australasian genus of about 24 epiphytic species characterized by small flowers with spurred and fleshy lip firmly jointed to very short footless column. Five species are known from India. Two species have been recorded from Manipur.

- 1a. Epichile of lip with a large semicircular callus ..... **S. fragrans**
- 1b. Epichile without any callus ..... **S. gemmata**

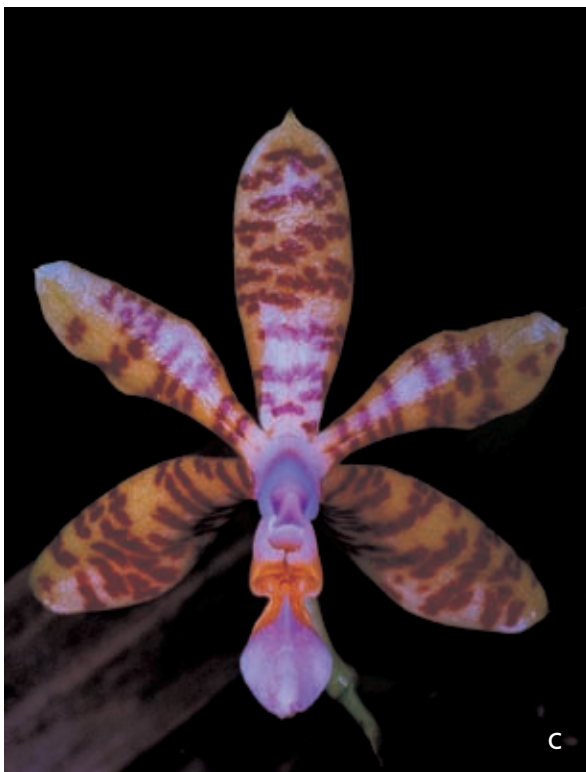
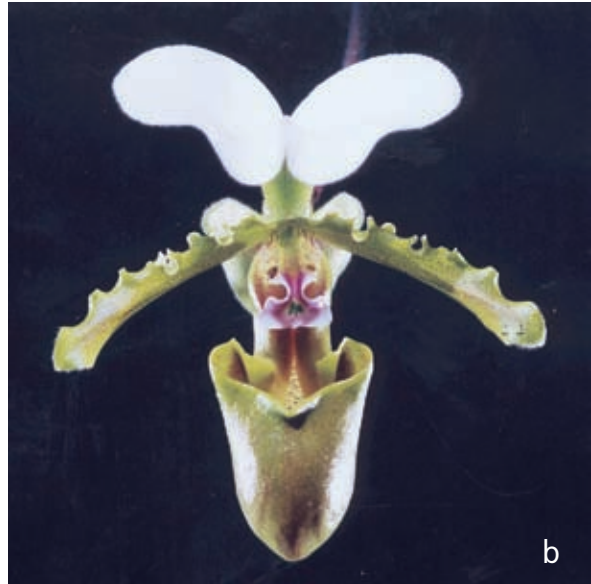


Figure 20. a. *Paphiopedilum insigne* (Wallich ex Lindl.) Pfitz.; b. *Paphiopedilum spicerianum* (Rchb. f. ex Masters & T. Moore) Pfitz.; c. *Phalaenopsis fasciata* Rchb. f.; d. *Pholidota articulata* Lindl.

**1. *Schoenorchis fragrans*** (Parish & Rehb.f.) Seidenf. & Smitin., Orch. Thailand 4(i): 611. 1963, *p. p.*; Hook. f., Fl. Brit. India 6: 58. 1890. *Schoenorchis manipurensis* U. C. Pradhan, Amer. Orch. Soc. Bull. 47:912. Fig. 1. 1978 & Ind. Orch. Guide to Ident. Cult. 529, 729. 1979; Devi & Ghatak, Proc. 5<sup>th</sup> ASEAN Orch. Cong. Sing. 76. 1984.

Pradhan's Manipur plant was found to be identical with the Myanmar plant *Saccolabium fragrans*. Devi and Ghatak reported this species from Tuyai-Waichong area at 122 m.

**2. *Schoenorchis gemmata*** (Lindl.) J. J. Sm., Nat. Tijdschr. Ned. Ind. 72:100. 1912; Pradhan, Ind. Orch. Guide to Iden. Cult. 526. 1979; Seidenfaden, Opera Bot. 95:71. 1988; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 94. 2001. *Saccolabium gemmatum* Lindl., Bot. Reg. 24. misc. 50. 1838; Hook. f., Fl. Brit. India 5: 55. 197. 1890 & Ann. Roy. Bot. Gard. Calcutta 5: 46. T. 70. 1895. *Cleisostoma gemmatum* (Lindl.) King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 234. Pl. 313. 1898.

### **Spathoglottis Blume**

An Indo-Malesio-Pacific genus of about 30 species of terrestrial orchids characterized by often subterranean pseudobulbs, linear to lanecolate plicate leaves and a lateral inflorescence of beautiful flowers having lip with twin calli at base of midlobe. Three species are known from India. Only one species occurs in Manipur.

***Spathoglottis pubescens*** Lindl., Gen. Sp. Orch. 120. 1831; Hook. f., Fl. Brit. India 5: 814. 1890; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):21(3):154. 1953; Deb, Bull. Bot. Surv. India 3(2):129. 1953; Pradhan, Ind. Orch. Guide to Iden. Cult. 249. 1979; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 94. 2001. *S. bensonii* Hook. f., Fl. Brit. India 5:814. 1890; Ic. Pl. T. 2087. 1892. *S. parvifolia* Lindl., Bot. Reg. 31: sub T. 19. 1845. *S. pubescens* var. *parvifolia* (Lindl.) Hook. f., Fl. Brit. India 5:814. 1890. *S. pubescens* var. *berkeleyi* Hook. f., Fl. Brit. India 5:814. 1890 & 6:191. 1890.

Mukherjee reported this species from Ukhrul at 2000m.

### **Spiranthes L. C. Rich.**

A world wide genus of about 42 species of terrestrial orchids characterized by soft tuberoids, fleshy stems and leaves, and a terminal inflorescence of spirally arranged variously coloured, often white to pink flowers. Two species occur in India and one is recorded from Manipur.

***Spiranthes sinensis*** (Pers.) Ames, Orchis 2:53. 1908; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):154. 1953; Deb, Bull. Bot. Surv. India 3(2):124. 1953; Seidenfaden, Dansk Bot. Ark. 32(2):105. 1978; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 95. 2001. *Neottia sinensis* Pers., Syn. Pl. 2: 511. 1807. *N. australis* R. Br., Prodr. 319. 1810. *Spiranthes australis* (R. Br.) Lindl., Bot. Reg. 10:sub t. 823. 1824; Hook. f., Fl. Brit. India 6:102. 1890

Mukerjee recorded this species from Sirohee at 2300 m.

### **Sunipia Lindley**

An Indo-Malesian genus of about a dozen species characterized by a short subquadrate-truncate to emarginate rostellum with pollinia attached to it through a Y-shaped caudicle and a single gland. Three species are known from India. Only one species has been recorded from India.

***Sunipia bicolor*** Lindl., Gen. Sp. Orch. 179. 1833; Pradhan, Ind. Orch. Guide to Iden. Cult. 485. 1979; Seidenfaden, Opera Bot. 89: 176. 1986. *Ione bicolor* (Lindl.) Lindl., Fol. Orch. *Ione* 6. 1853; King & Pantling, Ann. Roy. Bot. Grd. Calcutta 8: 159. T. 216. 1898; Seidenfaden, Bot. Tidsskr. 64(2-3): 216. 1969. *Bulbophyllum bicolor* (Lindl.) Hook. f., Fl. Brit. Ind. 5: 770. 1888, non Lindl.; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 150. 1953; Deb, Bull. Bot. Surv. India 3(2):126. 1961.

Mukerjee recorded this species from Tosen at 2700 m.

### **Tainia Blume**

An Indo-Malesian genus of about 25 species of terrestrial orchids characterized by fleshy and variously shaped pseudobulb bearing a single, long petioled, variously shaped leaf and a long lateral raceme of brightly coloured flowers. Six species are known from India. Two species are reported from Manipur.

1a. Lip with 3 keels, lateral keels raising lamellately at middle ..... **T. latifolia**

1b. Lip with 5 keels, raising lamellately at distal region ..... **T. viridifusca**

**1. *Tainia latifolia*** (Lindl.) Rehb. f., Bonplandia 5:54. 1857 (excl. syn. *Calanthe visidifusca*); Hook. f., Fl. Brit. India 5:820 & 6:192. 1890; Ann. Roy. Bot. Gard. Calcutta 5:24. T. 35. 1895; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 103. Pl. 142. 1898; Pradhan, Ind. Orch. Guide to Iden. Cult. 273. 1979. *Ania latifolia* Lindl., Gen. Sp. Orch. 130. 1831.

Though Deb collected this species from Manipur, he did not include it in his account on the monocot flora of Manipur. At CAL there is a beautiful painting of this species after a Sikkim plant first flowered in 1867 at Indian Botanic Garden. Lip is 3-lamellate with two outer ones dilated. Pantling's pencil sketches are found on *s. coll. s. n.* (accession no. 454064, CAL!).

*Flowering:* August-September

*Habitat:* Forest floor in shade.

*Occurrence:* Manipur, Koirengi.

*Distribution:* India, Bhutan, Myanmar, Thailand and Laos.

*Specimens Examined:* INDIA, **Manipur:** Koirengi Deb 2583(CAL!).

2. ***Tainia viridifusca*** (W. J. Hook.) Benth. ex Hook. f., Fl. Brit. India 6:820.1890; Pradhan, Ind. Orch. Guide to Iden. Cult. 241. 1979; Seidenfaden, Opera Bot. 89:28. 1986. *Calanthe viridifusca* W. J. Hook., Bot. Mag. 78:T. 4669. 1852.

*Pseudobulbs* 2.5-5 cm long, obliquely conical. *Petiole* about 60 cm long with 45-60 long linear-elliptic many veined blade. *inflorescence* about equaling the petioled leaf; peduncle and rachis 45-60 cm long and glaucous; midlobe of lip apiculate.

*Flowering:* January-March.

*Habitat:* Forest floor.

*Occurrence:* Manipur, no precise locality.

*Distribution:* India, Myanmar, Thailand, Vietnam and China.

*Specimens Examined:* INDIA, **Manipur:** George Watt 6293 (K). **Nagaland:** Naga Hills F. Kingdom-Ward 11209 (CAL!). **Meghalaya:** Jarain, beyond Jowai R. Pantling *s. n.* (Acc. No. 454051, CAL!).

### Thelasis Blume

An Indo-Malesian genus of about 25 epiphytic species characterized by not fully opening flowers arranged at the end of a long scape, lip with a longitudinal thickening and a beaked operculum. Four species have been recorded from India. Only one is known to occur in Manipur.

***Thelasis pygmaea*** (Griffith) Blume, Fl. Jav. 23.1858; Hook. f., Fl. Brit. India 5:86. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 249. Pl. 331.1898; Pradhan, Ind. Orch. Guide to Iden. Cult. 443. 1979; Seidenfaden, Opera Bot. 89:156.1979; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 95. 2001. *Euproboscis pygmaea* Griffith, Calc. J. Nat. Hist. 5:371.

T. 26. 1845. *Thelasis elongata* Blume, Bot. Mus. Lugd. 2:187. 1856; Hook. f., Fl. Brit. India 5:86. 1890. **Fig. 21**

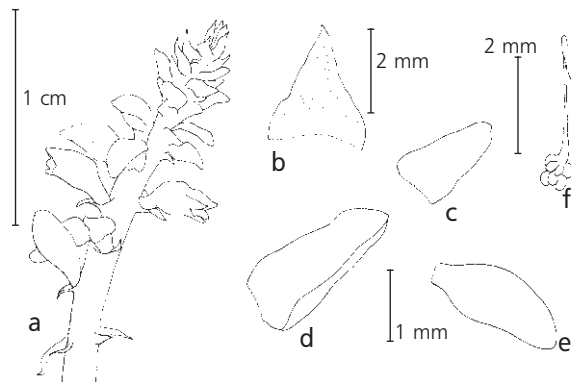


Figure 21. *Thelasis pygmaea* (Griffith) Blume - a. A portion of the inflorescence; b. Floral bract; c. Dorsal sepal; d. Lip; e. Petal; f. Pollinarium

Griffith's type was collected from Nepal. We got our specimens in vegetative condition, which flowered under cultivation at TBGRI. Two leaved polished green pseudobulbs, a long lateral spike of creamy green flowers never fully opening and strongly keeled boat shaped lateral sepals are very characteristic of this species .

*Flowering:* May-June.

*Habitat:* Primary forest behind an army camp

*Occurrence:* Manipur, Tupul.

*Distribution:* India, Myanmar, Thailand, Vietnam, China, Hong Kong, Malaya, Sumatra, Borneo and the Philippines.

*Specimens Examined:* INDIA, **Manipur:** Tupul C Sathish Kumar 28741 (TBGT!).

### Thrixspermum Loureiro

An Indo-Malesian genus of about 165 species of epiphytic orchids characterized by short or long inflorescence bearing a few fugacious flowers opening successively. Eight species are known from India. Only one species is known to occur in Manipur.

***Thrixspermum centipeda*** Lour., Fl. Cochinch. 520. 1590; Seidenfaden, Opera Bot. 95:152. 1988; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 95. 2001. *Dendrocolla arachnites* Blume, Bijdr. 287. Fig. 67. 1825. *Sarcochilus arachnites* (Blume) Rchb. f. in Walp. Ann. 6:498.1863; Hook. f., Fl. Brit. India 6:41. 1890. *Thrixspermum arachnites* (Blume) Rchb. f., Xen. Orch. 2:121. 1867; Pradhan, Ind. Orch. Guide to Iden. Cult. 503. 1979.



**Thunia Reichenbach f.**

An Indo-Malesian genus of four epiphytic or lithophytic species characterized by light grayish green leaves and a terminal bunch of beautiful white to pink flowers. Three species have been reported from India and one from Manipur.

**Thunia alba** (Lindl.) Rchb. f., Bot. Zeit. 10:764. 1852; Deb, Bull. Bot. Surv. India 3(2):129. 1961; Pradhan, Ind. Orch. Guide to Iden. Cult.439. 1979; Devi & Ghatak, Proc. 5th ASEAN Orch. Cong. Sing. 76. 1984; Seidenfaden, Opera Bot. 89:14.1986; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 2001:95. *Phaius albus* Lindl. in Wallich, Pl. As. Rar. 2: T. 198.1831; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21 (3): 154.1953; Hook. f., Fl. Brit. India 5:818 p. p. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 110. Pl. 153. 1898. p. p. *Thunia marshalliana* Rchb. f., Linnaea 41:65.1877; Pradhan, Ind. Orch. Guide to Iden. Cult. 439. 1979; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 95. 2001.

Mukerjee recorded this species from Ukhrul at 1200 m.

**Tropidia Lindley**

A pantropical genus of 6 species of terrestrial orchids characterized by often branched stems, broadly elliptic to cordate-ovate leaves and a terminal inflorescence of white to pale yellow flowers. India is known to have four species. Only one has been recorded from Manipur.

**Tropidia curculigoides** Lindl., Gen. Sp. Orch. 497.1840; Hook. f., Fl. Brit. India 6: 93. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 275.Pl. 366.1898; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3):154. 1953; Deb, Bull. Bot. Surv. India 3(2):129.1961; Pradhan, Ind. Orch. Guide to Iden. Cult.101. 1979; Seidenfaden, Dansk Bot. Ark. 32(2):110.1978; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 95. 2001.

Mukerjee found this species at Chatrik at 1000m.

**Uncifera Lindley**

An Indo-South East Asian genus of six epiphytic orchids characterized by pendulous leafy stems and leaf opposed and densely flowered racemes of pale green to yellow flowers. Three species occur in India and one in Manipur.

**Uncifera acuminata** Lindl., Journ. Linn. Soc.3:40.1859; Hook. f., Fl. Brit. India 6:65. 1890; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 95. 2001.

**Vanda Jones ex R. Br.**

An Indo-Malesian genus of about 40 species of epiphytic or lithophytic orchids characterized by long profusely rooting stems, loriform leaves and axillary racemes of variously coloured beautiful flowers. Twelve species are known from India. Eight species occur in Manipur.

- 1a. Flowers blue; lip much shorter than dorsal sepal ..... **V. coerulea**
- 1b. Flowers not blue; lip same length as dorsal sepal ..... **2**
- 2a. Epichile of lip broadly ovate, fleshy, concave with longitudinal purple streaks..... **V. pumila**
- 2b. Epichile pandurate or broadening towards apex ..... **3**
- 3a. Midlobe of lip with a basal narrow neck longer than broad, widening into the strongly bilobulate apical part ..... **V. liouvillei**
- 3b. Midlobe not as above ..... **4**
- 4a. Spur long, cylindrical ..... **5**
- 4b. Spur short, conical ..... **6**
- 5a. Front of epichile deeply notched, edges recurved ..... **V. coerulescens**
- 5b. Front of epichile broad, rotundate, edges finely erose-dentate ..... **V. testacea**
- 6a. Lip apex produced into two lobed processes ..... **V. cristata**
- 6b. Lip apex not produced into long processes ..... **7**
- 7a. Sepals and petals golden green, tessellated with chestnut brown ..... **V. stangeana**
- 7b. Sepals and petals yellowish green or greenish white without tessellation ..... **V. alpina**

1. **Vanda alpina** (Lindl.) Lindl., Fol. Orch. *Vanda* 10.1853; Hook. f., Fl. Brit. India 6: 43. 1890; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 95. 2001. *Luisia alpina* Lindl. in Bot. Reg. 24: Misc. 56. 1838. *Stauropsis alpina* (Lindl.) Tang & Wang in Acta Phytotax. Sin. 1: 93. 1951. *Trudelia alpina* (Lindl.) Garay, Orch. Dig. 50(2): 76. 1986.

Garay (1986) treats this under *Trudelia*.

2. **Vanda coerulea** Griffith ex Lindl., Bot. Reg. sub T. 30.1847; Clarke, J. Linn. Soc. 25:73.1889; Hook. f., Fl. Brit. India 6:51.1890; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 153. 1953; Deb, Bull. Bot. Surv. India 3(2):129.1961; Pradhan, Ind. Orch. Guide to



Photographs by C. Suseendran

Figure 22. a. *Renanthera imschootiana* Rolfe; b. *Vanda coerulea* Griffith ex Lindl.; c. *Vanda pumila* Hook. f.; d. *Vanilla parishii* Rchb. f.

Iden. Cult. 567. 1979; Seidenfaden, Opera Bot. 95:196. 1988.

**Fig. 22b**

This is a common species in Manipur.

*Flowering & Fruiting:* August-December.

*Habitat:* Primary forests at 1300-1800 m.

*Occurrence:* Manipur: Ukhrul, Imphal.

*Distribution:* India, Myanmar, Thailand and China.

*Specimens Examined:* INDIA, **Manipur:** Ukru Mukerjee 3480 (CAL!); Deb 1957(CAL!); Imphal C. Sathish Kumar s.n. (TBGT!).

3. **Vanda coerulescens** Griffith, Not. 3:352. Ic. T. 331.1851; Hook. f., Fl. Brit. India 6:50. 1890; Pradhan, Ind. Orch. Guide to Iden. Cult. 567. 1979; Seidenfaden, Opera Bot. 95:208.1988; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 95. 2001.

Devi and Ghatak found it at Thoubal. It is common in Imphal particularly on trees along Kangla river.

*Flowering:* April-October.

*Habitat:* Primary forests, occasionally on exotic trees at 700 m.

*Occurrence:* Manipur: Thoubal, Imphal.

*Distribution :* India, Myanmar, Thailand and China.

*Specimens Examined:* INDIA, **Manipur:** Bor 18456 (K); Kangla Riverside C. Sathish Kumar 28706 (TBGT!).

4. **Vanda cristata** Lindl., Gen. Sp. Orch. 216.1833; Hook. f., Fl. Brit. India 6:53.1890; Pradhan, Ind. Orch. Guide to Iden. Cult. 570. 1979; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 95. 2001. *Trudelia cristata* (Lindl.) Senghas in Die Orchideen 1(19-29):1211. 1988.

5. **Vanda liouvillei** Finet, Not. Syst. (Paris) 2: 299. Fig.6. 1913; Seidenfaden, Opera Bot. 95:204. 1988; Phukan, Orch. Rev. 104(1209): 189. 1998.

Phukan (1998) reported this species as a new record for India from Manipur.

6. **Vanda pumila** Hook. f., Fl. Brit. India 6: 53.1890; Ann. Roy. Bot. Gard. Calcutta 5: 45. Pl. 68. 1895; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 216. Pl. 288.1898; Pradhan, Ind. Orch. Guide to Iden. Cult. 570. 1979; Seidenfaden, Opera Bot. 95 :209. 1988. *Trudelia pumila* (Hook. f.) Senghas in Die Orchideen 1(19-20):1211. 1988.

**Figs. 22c, 23**

Flowers 2-4, fragrant, creamy yellow/white; sepals and petals with pink markings at base; lateral sepals with pink spotted lines in the half region; lip spurred with pink or purple markings.

*Flowering:* March –April.

*Habitat:* Primary forests.

*Occurrence:* Manipur: Tupul.

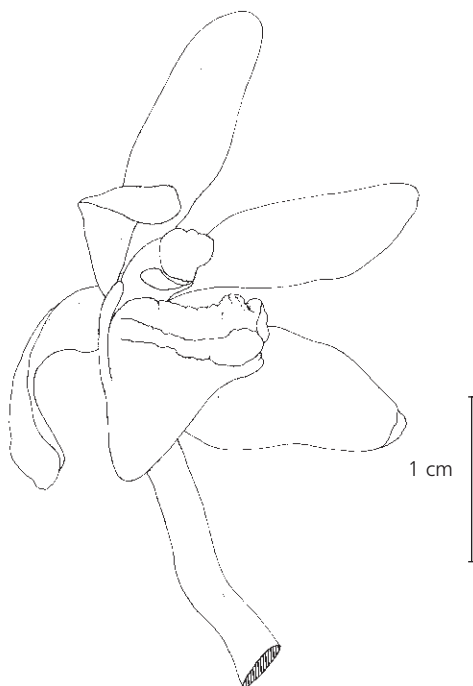


Figure 23. *Vanda pumila* Hook. f. - Flower

*Distribution:* India, Nepal, Bhutan, Myanmar, Thailand, Laos, Vietnam, China and Sumatra.

*Specimens Examined:* INDIA, **Manipur:** Tupul C. Sathish Kumar 28703 (TBGT!).

This is a new record for Manipur.

7. **Vanda stangeana** Rchb. f., Bot. Zeit. 14:351. 1858; Hook. f., Fl. Brit. India 1890:54; Pradhan, Ind. Orch. Guide to Iden. Cult. 569. 1979; Kataki, Jain & Sastry, Threat. End. Orch. Northeast Ind. 92.1984; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 95. 2001.

Devi and Ghatak found this species at Tengnoupal at 1390 m.

8. **Vanda testacea** (Lindl.) Rchb.f., Gard.Chron. 166.1877; Pradhan, Ind. Orch. Guide to Iden. Cult. 567, 637. 1979; Seidenfaden, Opera Bot.95: 208.1988; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 95. 2001. *Aerides testacea* Lindl., Gen. Sp. Orch. 238. 1833. *Vanda parviflora* Lindl., Bot. Reg. 30:misc. 45.1844; Hook. f., Fl. Brit. India 6:50 (excl. var. *albiflora*). 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 215, Pl.286. 1898.

Devi and Ghatak reported this species from Churachandpur.

### Vandopsis Pfitzer

An Indo-Malesian genus of five epiphytic species characterized by short footless column to which the lip is firmly adnate with geniculately bent lip, more or less canaliculated, gibbous at base. Only one species occurs in India which is also found in Manipur.

*Vandopsis undulata* (Lindl.) J. J. Sm. in Nat. Tijd. Ned. Ind. 72:77. 1912. *Vanda undulata* Lindl., Journ. Linn. Soc. 3: 42. 1859. *Stauroopsis undulatus* Benth. ex Hook. f., Fl. Brit. India 6: 27. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8:205. Pl. 275. 1898; Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21(3): 154. 1953

Mukerjee recorded this species from Nongbi and Khamsang at 1600-2000 m.

### Vanilla Plumier ex Miller

A pantropical genus of about 100 species of climbing orchids characterized by the winy habit, thick and fleshy stems with or without leaves and an axillary fascicle of fairly large flowers of varying colours, lip always fused halfway with the long column with different kinds of fleshy plates on the disc. India is known to have five species. One is reported from Manipur.

*Vanilla parishii* Rchb. f., Oria Bot. Hamb. 1:39. 1878; Ormerod, Oasis Suppl. 2:9. 2001. *Vanilla pilifera* auct. non Holtt. :Seidenfaden, Dansk Bot. Ark. 32(2):142, fig. 88. 1978; Borthakur & Hajra, Bull. Bot. Surv. India 18(1-4): 228. 1979(1976); Seidenfaden & Wood, Orch. Penins. Mal. Sing. 125 p. p. Fig. 51B. Pl. 5C. 1992; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 95. 2001.

**Figs. 22d, 24**

This species was first noted in Manipur by Kingdon-Ward who wrongly believed it to represent *V. planifolia*. We got our samples from Khongampatt, thanks to H.B. Singh. Fresh flowers enabled us a detailed study in comparison with the type at Kew, copy of which was sent to us by Ormerod, confirming that the species was *Vanilla parishii* Rchb. f.

*Climbing herbs.* Stems green, fleshy and leafy and rooting throughout. *Leaves* simple, alternate, 5.5-10 x 1.8-2.5 cm, many veined, midvein prominent. *Inflorescence* axillary, scape deep green 3.5-4 x 0.6 mm, bracteate; floral bracts ovate oblong, 3 x 4-6 mm, acute at apex. *Flowers* 7-9 in number, open successively from base upwards; ovary + pedicel 3.7-5 cm, white; dorsal sepal 2.7 x 0.8 cm, obovate, 12-veined, basally white, otherwise green, margin inwardly folded, obtuse at apex; lateral sepals 2.6 x 0.9-1 cm, boat shaped, 12-veined, colour same in dorsal sepal, hooded at apex;

petals 2.7 x 0.7 cm, oblong obtuse, green, midvein of the petal thickened on dorsal side and ends in a hove like structure just beneath apex, obtuse; lip 2.8 x 2.7 cm, 3-lobed; sidelobes oblong-orbicular, fused with the column upto its  $\frac{3}{4}$  length, having pink hairs inside; midlobe oblong, margin wavy, with a tuft of long pink hairs, truncate at apex; mesochile with 7 batch of flat many lobed, backwardly projected scales; column white with pink lines on ventral side, 2-2.2 cm long, stigma crescent shaped, slightly winged at apex with very broad and prominent rostellum; operculum green, 4 x 3 mm, 3-lobed at apex; pollinia 4 in two pairs. *Fruits* fleshy, 6-10 cm long.

*Flowering & Fruiting:* December-April

*Habitat:* Evergreen forests

*Occurrence:* Manipur, Khongampatt

*Distribution:* India, Bangladesh, Myanmar, Thailand.

*Specimens Examined:* INDIA, **Manipur:** Khongampatt C. Sathish Kumar 28270 (TBGT!).

### Yoania Maxim.

A saprophytic genus of two delicate species found in the Himalayas, Japan and New Zealand characterized by the aphyllous habit, densely clothed scales and white flowers on a raceme. Two species occur in India. Only one species has been reported from Manipur.

*Yoania japonica* Maxim., Bull. Acad. St. Petersburg. 18:68. 1873; Hook. f., Fl. Brit. India 6: 123. 1890; Pradhan, Ind. Orch. Guide to Iden. Cult. 436. 1979; Katakai, Jain & Sastry, Threat. End. Orch. Northeast Ind. 92. 1984; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 95. 2001.

Prain's collectors recorded this species from Manipur at the crest of Bareil range (s. w. of Japoo) at 7000 ft and from Kohima, Nagaland.

### Zeuxine Lindley

A widespread genus of about 40-50 species of delicate ground orchids characterized by trailing and nodose stem with thin leaves and a terminal inflorescence of white to pale yellow flowers. Fifteen species are known from India and two species from Manipur.

- 1a. Leaves linear, grass like ..... **Z. strateumatica**
- 1b. Leaves not linear or grass like, but obliquely ovate-lanceolate, acute with a grey band along midrib ..... **Z. nervosa**

1. **Zeuxine nervosa** (Wallich ex Lindl.) Benth. ex C. B. Clarke, J. Linn. Soc. 25:73. 1889; Hook. f., Fl. Brit. India 6:108. 1890 & Ic. Pl. T. 2174. 1894; King &

Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 289. T. 385. 1898; Deb, Bull. Bot. Surv. India 3(2):219.1961; Pradhan, Ind. Orch. Guide to Ident. Cult. 119. 1976; Seidenfaden, Dansk Bot. Ark. 32(2):79.1978; Chauhan

in Pathak *et al.* (Ed.), Orch. Sci. & Com. 95. 2001. *Etaeria nervosa* Lindl., Wall. Cat. 7381. 1832. *nom. nud.* *Monochilus nervosum* Wallich ex Lindl., Gen. Sp. Orch. 487. 1840.

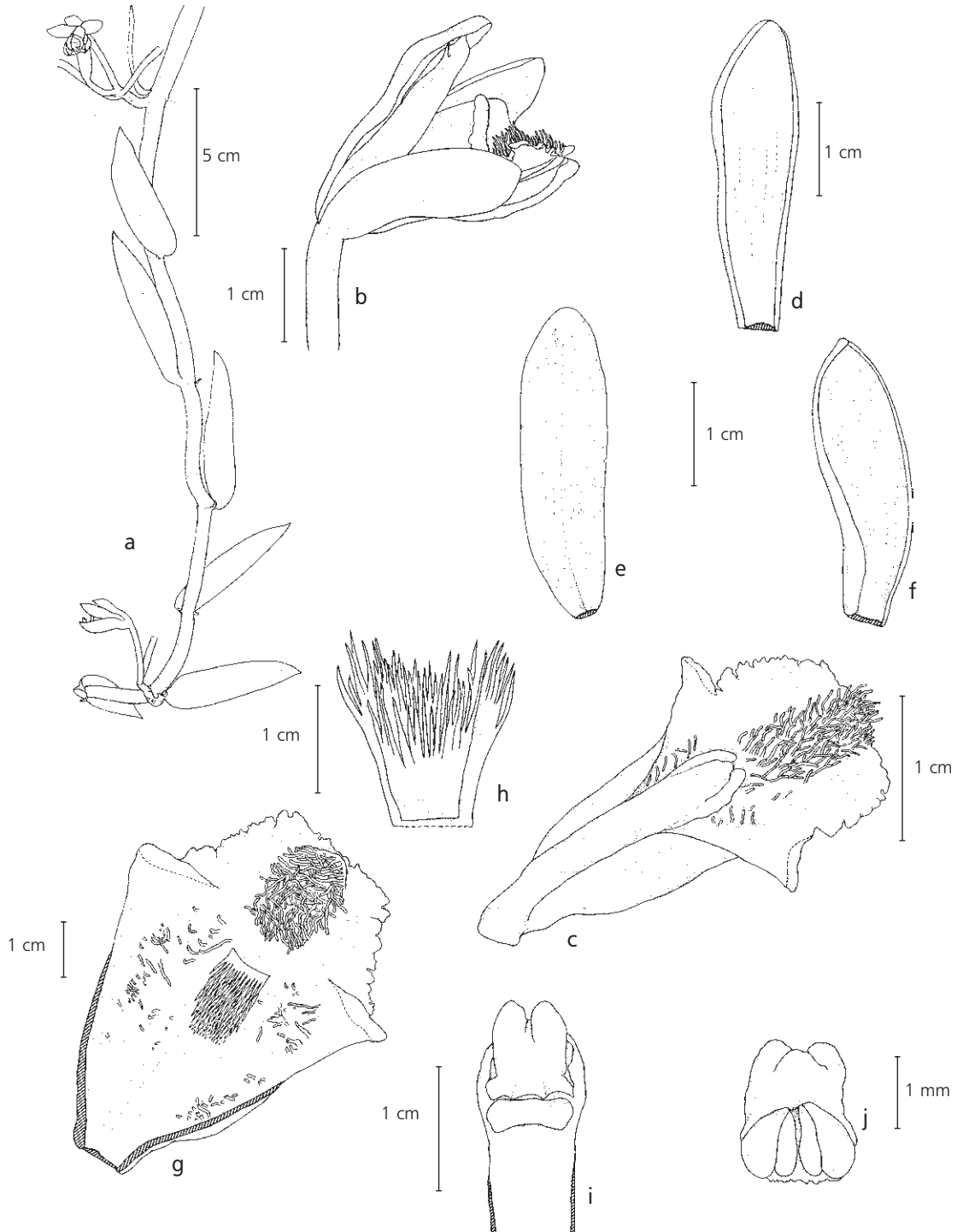


Figure 24. *Vanilla parishii* Rchb. f. - a. Habit; b. Flower, side view; c. Flower, front view; d. Dorsal sepal; e. Petal (back view showing projection of midvein); f. Lateral sepal; g. Lip; h. A single scale of the brush on centre of lip; i. Column; j. Operculum showing pollinia (after CSK 28270).

*Specimens Examined*: INDIA, **Manipur**: West 'Muneypore' (fide C. B. Clarke 1889); Tupul C. Sathish Kumar 28746 (TBGT!).

2. ***Zeuxine strateumatica*** (L.)Schltr., Engl. Bot. Jahrb. 45:394. 1911; Pradhan, Ind. Orch. Guide to Iden. Cult. 1:115. 1976; Seidenfaden, Dansk Bot. Ark. 32(2):79. 1978; Chauhan in Pathak *et al.* (Ed.), Orch. Sci. & Com. 95. 2001. *Orchis strateumatica* L., Sp. Pl. 943. 1753. *Pterygodium sulcatum* Fl. Ind. 3:452. 1832. *Zeuxine sulcata* (Roxb.)Lindl., Gen. Sp. Orch. 485. 1840; Hook. f., Fl. Brit. India 6:106. 1890; King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8:286. T. 381.1898.

## Acknowledgements

We are deeply grateful to Brig. M. V. Gangadharan and the Indian Army for all the logistic support extended to our team when we explored Manipur; Mr H B Singh, formerly Orchid Development Officer at Khongapatt State Orchidarium for his assistance in getting many species that we would have otherwise missed; Hunt Institute for Botanical Documentation for kindly providing a portrait of N.L. Bor and permission to use it in this paper; Dr Hosagowder for providing the Latin translation of the new taxa. Financial assistance by the Western Ghats Development Cell and the Ministry of Environment and Forests, Government of India, New Delhi under AICOPTAX programme is thankfully acknowledged.

## Literature Cited

- Chauhan, A. S. 2001.** A conspectus of orchids of Manipur: Their status and conservation. In: P. Pathak, R. N. Sehgal, N. Shekar, M. Sharma & A. Sood (ed.), *Orchids Science and Commerce*. Bishen Singh mahendra Pal Singh, Dehra Dun. Pp. 81-99.
- Christenson, E. A. 2001.** *Phalaenopsis A Monograph*. Timber Press, Portland.
- Clarke, C. B. 1889.** On the plants of Kohima and Muneypore. *J. Linn. Soc.* 25:71-74.
- Clayton, D. 2002.** The Genus *Coelogyne* A synopsis. Natural History Publications (Borneo), Kota Kinabalu. Pp. 1-316.
- Cribb, P. J., Tang, C. Z. & I. Butterfield 1983.** The genus *Pleione*. *Curtis's Bot. Mag.* 184 :93-147.
- Das, S. J. & S. K. Jain 1980.** Orchidaceae: Genus *Coelogyne*. Fasc. Fl. Ind. Fasc.5:1-35. Botanical Survey of India. Howrah.
- Deb, D. B. 1956.** *Floristic study of Manipur*. Thesis for D. Phil. Calcutta University.
- 1957. Studies on the flora of Manipur. *Bull. Bot. Soc. Bengal* 11:15-24.
- 1960. Forest type studies in Manipur. *Ind. For.* 86:94-111.
- 1961. Monocotyledonous plants of Manipur Territory. *Bull. Bot. Surv. India* 3:126-129.
- Devi, R. K. J. & J. Ghatak 1984.** A preliminary study on orchids of Manipur. Proc. 5<sup>th</sup> ASEAN Orchid Congress, Singapore. Pp. 72-78.
- Dressler, R. L. 1993.** *Phylogeny and Classification of the Orchid Family*. Cambridge University Press. Pp. 1-314.
- Du Puy, D. & P. J. Cribb 1988.** *The genus Cymbidium*. Christopher Helm, London.
- Garay, L. A. 1986.** Olim Vanillaceae. *Bot. Mus. Leaflet. Harv. Univ.* 30:223-237.
- Garay, L. A., Hamer, F. & E. S. Siegerist 1994.** The genus *Cirrhopetalum* and the genera of the *Bulbophyllum* alliance. *Nord. J. Bot.* 14:609-646.
- Ghatak, J. & R. K. J. Devi 1986.** Orchids of Manipur. In: S. P. Vij (Ed.) *Biology, Conservation and Culture of Orchids*. Affiliated East West Press Pvt. Ltd., New Delhi.
- Hooker, J. D. 1888-1890.** Orchidaceae In: *The Flora of British India* 5:667-858 & 6:1-198. Ashford, Kent.
- 1895. *A Century of Indian Orchids*. Ann. Roy. Bot. Gard. Calcutta.
- Kataki, S. K., Jain S. K. & A. R. K. Sastry 1984.** *Threatened and Endemic Orchids of Sikkim and Northeastern India*. Botanical Survey of India, Howrah.
- Keith, K. C. 1936.** Report on the working of Manipur Forests. Rec. Forest Dept., Government of Manipur.
- King, G. & R. Pantling 1898.** The Orchids of Sikkim Himalaya. Ann. Roy. Bot. Gard. Calcutta 8:1-342.
- Kingdon-Ward, F. 1952.** *Plant Hunter in Manipur*. Jonathan Cape, London.
- Kuntze, O. 1891.** *Revisio Genera Plantarum* 2. Würzburg.
- Lund, I. D. 1987.** The genus *Panisea* (Orchidaceae), a taxonomic revision. *Nord. J. Bot.* 7:511-527.
- Misra, S. 2004.** *Orchids of Orissa*. Bishen Singh Mahendra Pal Singh, Dehra Dun. Pp. 1- 774.
- Mukerjee, S. K. 1953.** An enumeration of the orchids of Ukhrul, Manipur. *Notes Roy. Bot. Gard. Edinb.* 21: 149-154.
- Naithani, H. B., Nageswara Rao, A. & K. Haridasan 1985.** Some additions to the orchid flora of Arunachal Pradesh. *Ind. J. For.* 8:333:334.
- Ormerod, P. 1997.** A review of *Coelogyne* Lindl. Section *Proliferae* (Lindl.)Pfitz. *Austr. Orch. Rev.* 62:19-25.
- 1998. A review of *Cephalantheropsis*. *Orch. Dig.* 62: 155-159.
- 1998 b. Miscellaneous Goodyerinae studies. *Australian Orch. Rev.* 63:10-11.
- 2001. A memorial contribution to the orchid flora of Thailand. *Oasis Suppl.* 2:7-10.
- Pearce, N. R. & P. J. Cribb 2002.** *The Orchids of Bhutan*. RBG, Edinburgh. Pp. 1-643.

- Phukan, S. J. 1996.** *Vanda liouvillei* Finet- A new record from India. *Orch. Rev.* **104**:189-190.
- & **A. A. Mao 2002.** *Armadorum senapatianum*- a new species from India. *Orch. Rev.* **110**:298-300.
- & ----- **2004.** *Additions to the Indian Orchid Flora.* *Orch. Rev.* **112**: 115-118.
- Pradhan, U C 1976.** Indian Orchids: Guide to Identification and Culture. **1.** Faridabad.
- 1979.** Indian Orchids: Guide to Identification and Culture. **2.** Kalimpong.
- Ramakantha, V. 1995.** A report on the threatened orchids of Manipur. *J. Bombay Nat. Hist. Soc.* **92**:144-145.
- Rasmussen, F. N. 1977.** The genus *Corymborkis* Thou. *Bot. Tidsskr.* **71**:161-192.
- Seidenfaden, G. 1971.** Notes on the genus *Luisia*. *Dansk Bot. Ark.* **27**:1-101.
- 1975.** Contributions to a revision of the orchid flora of Cambodia, Laos and Vietnam. **1.** Fredensborg. 117 pp.
- 1976.** Contributions to the orchid flora of Thailand **7.** *Bot. Tidsskr.* **71**:1-130.
- 1986.** Orchid Genera in Thailand XIII. Thirty three epidendroid Genera. *Opera Bot.* **89**:1-216.
- 1988.** Orchid Genera in Thailand XIV. Fifty-nine Vandoid Genera. *Opera Bot.* **95**:1-398.
- Seidenfaden, G. & J. J. Wood 1992.** *Orchids of Peninsular Malaysia and Singapore.* Fredensborg.
- Shukla, U. & A. K. Baishya 1979.** A contribution to the flora of Manipur. *J. Bombay Nat. Hist. Soc.* **76**:224-229.
- Summerhayes, V S 1955.** A revision of the genus *Brachycorythis*. *Kew Bull.* **1955**:221-264.
- Szlachetko, D. L. 1995.** *Systema Orchidaliium.* Fragmenta Floristica et Geobotanica, Supplementum 3. Krakow.
- 2003.** *Gynostemia Orchidaliium III.* *Acta Bot. Fennica* **176**:1-311.
- Tsi, Z. 1996.** A preliminary revision of *Gastrochilus* (Orchidaceae). *Guihaia* **16**:123-154.
- Watt, G. 1888.** The forests of Manipur. *Ind. For.* **14**:291-299; 338-344; 387-394.

---

Received 12.2.2005

Accepted 15.9.2005