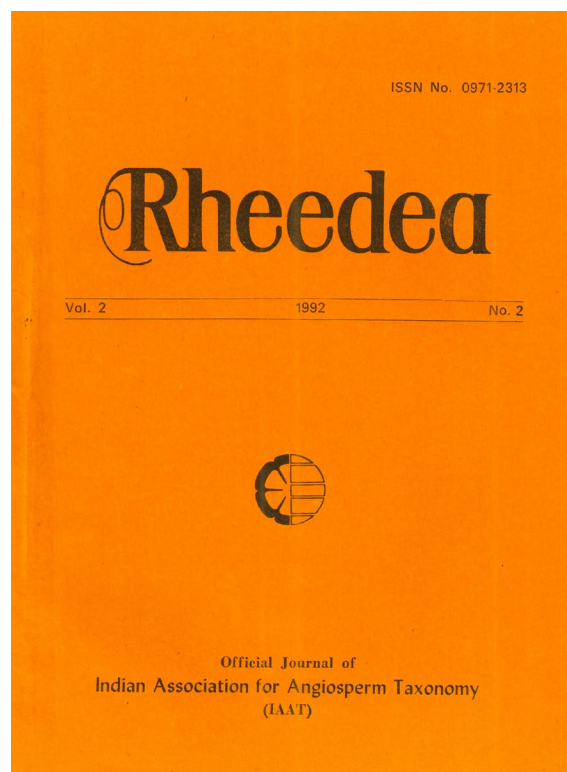




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Epiphytic Orchids of India

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Abstract

Orchids constitute a major share of the epiphytic flora of India with 630 species in 85 genera occurring from 5 m to 500 m, covering all types of vegetation except the alpine zone in the Himalayas and presenting a mixed conglomeration of various interesting elements. Pantropical genera are represented by *Bulbophyllum*, *Polystachya* and *Vanilla*; palaeotropic by *Acampe*, *Agrostophyllum*, *Oberonia* and *Taeniophyllum*; Indo-Sri Lankan by *Cottonia*, *Diplocentrum*, *Seidenfadeniella* and *Sirhookera* and endemic by *Jejosephia*, *Smithsonia* and *Xenikophyton*. The monotypic *Dickasonia* extends to Burma. *Rhinerhiza* is found only in Assam and eastern Australia. Others are Indo-Malesian. *Polystachya concreta* is the only pantropical species. Palaeotropic species is represented by *Acampe rigida*. Thirty species are in common with Sri Lanka. *Aerides emericii* extends from Andamans to Cocos Islands. The rest of the species extend to neighbouring, Indo-China and even Malesia. Genera-wise analysis is given with due emphasis on ecological data. Conservation efforts to save the rare taxa in Arunachal Pradesh, Meghalaya, Sikkim, West Bengal, Orissa, Tamil Nadu and Kerala are discussed.

INTRODUCTION

Epiphytes are a fascinating group representing 10% of known vascular plants coming under 7% of genera belonging to 19 families (Kress 1986). Orchids constitute the major share with 13,951 species in 440 genera (Atwood 1986). In India, this family is represented by 1140 species belonging to 161 genera (Manilal and Kumar 1986) of which 630 species in 85 genera are epiphytes. Of them 187 species are endemic (29.6%).

India, by virtue of its unique geographical position and geological history, has a confluence of various geographical

elements. An analysis of such elements among the epiphytic orchid genera is given below:

Pantropical genera : *Bulbophyllum*, *Polystachya* and *Vanilla*.

Palaeotropic genera : *Acampe*, *Agrostophyllum*, *Oberonia* and *Taeniophyllum*.

Indo - Malesian genera : *Acriopsis*, *Aerides*, *Appendicula*, *Arachnis*, *Ceratostylis*, *Chiloschista*, *Cleisostoma*, *Coeologyne*, *Cymbidium*, *Dendrobium*, *Eria*, *Flickingeria*, *Gastrochilus*, *Grossourdia*, *Luisia*, *Macropodanthus*, *Malleola*, *Micropera*, *Ornithochilus*, *Papilionanthe*, *Pelat-antheria*, *Pennilabium*, *Phalaenopsis*, *Pholidota*, *Phreatia*, *Podochilus*, *Pomatocalpa*,

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Pteroceras, Renanthera, Robiquetia, Saccolabiopsis, Sarcoglyphis, Schoenorchis, Smitinandia, Staurochilus, Thecostele, Thelasis, Thrixspermum, Thunia, Trachoma, Trichoglottis, Trichotosia, Vanda, Vandopsis.

Indo - South East Asian genera : *Ascocentrum, Biermannia, Diploprora, Doritis, Epigeneium, Kingidium, Monomeria, Otochilus, Rhynchostylis, Sunipia.*

Asian mainland genera : *Bulleyia, Cleisocentron, Eriodes, Esmeralda, Hygrochilus, Neogyna, Stereochilus, Trias, Uncifera.*

Indo-Burmese genus : *Dickasonia.*

Indo-Australian genus: *Rhinerhiza.*

Indo - Sri Lankan genera : *Cottonia, Diplocentrum, Seidenfadeniella* and *Sirhookera.*

Himalayan genera : *Cryptochilus, Trudelia.*

Indo - Thai genera: *Acrochaene* and *Porpax.*

Indo-Yunnan genus: *Panisea.*

Asian mainland - South China-Taiwan genus: *Pleione.*

Endemic genera: *Jejosephia, Smithsonia* and *Xenikophyton.*

The ten epiphytic genera which have maximum species diversity in India are given in Table 1.

Epiphytic orchids in India occur in most of the vegetation types and on a variety of host plants. However, maximum species diversity is seen between 850-1500 m. The following is a detailed analysis of the Indian genera of epiphytic orchids.

Table 1

Genera	Species	Endemics
<i>Dendrobium</i>	102	22
<i>Bulbophyllum</i>	92	36
<i>Oberonia</i>	52	24
<i>Coelogyne</i>	33	12
<i>Luisia</i>	17	4
<i>Cleisostoma</i>	16	1
<i>Gastrochilus</i>	14	2
<i>Cymbidium</i>	13	2
<i>Sunipia</i>	11	4
<i>Vanda</i>	10	2

Species distribution in other genera are given in Table 2.

Table 2

Number of Genera	Number of Species in each genus	Number of Endemic species
25	1	8
15	2	5
7	3	9
7	4	8
9	5	10
2	6	2
4	7	7
1	8	2
1	9	2
1	10	2

1. *Acampe* Lindley

A genus of 6 species, 5 are available in India: *A. congesta* (Lindl.) Lindl. (a poorly known species), *A. ochracea* (Lindl.) Hochr., *A. papillosa* (Lindl.) Hochr., *A. praemorsa* (Roxb.) Blatt. & McCann and *A. rigida* (Buch.-Ham. ex J. E. Sm.) Hunt. *A. praemorsa* extends to Sri Lanka. *A. ochracea* and *A. papillosa* extend to Indo - China with the former occurring in Sri Lanka also. *A. rigida* extends from Africa to Malasia.

Large epiphytes forming massive

clumps over trees and rarely on rocks at or near sea level to 500 m.

2. *Acriopsis* Reinw. ex Blume

Of the 6 species of the genus (Minderhoud & de Vogel 1986) 2 are reported from India: *A. harae* Tuyama (Sikkim, endemic) and *A. indica* Wight. Minderhoud & de Vogel have reduced *A. harae* into a synonym of *A. javanica* Bl.

Sympodial epiphytes with creeping, branched rhizomes and crowded pseudobulbs and many flowered inflorescence; occur in the primary and secondary forests at 10-1700 m.

3. *Acrochaene* Lindley

The only species of the genus, *A. punctata* Lindl., is found in Sikkim, Arunachal Pradesh, Darjeeling and presumably in Thailand (Seidenfaden 1986).

Pseudobulbous epiphytes with racemes of many, large, dull-green, spotted-striate flowers; occur at 1600-2000 m.

4. *Aerides* Loureiro

Christenson (1987) who reviewed this genus recognized 19 species in 4 sections. Eight species including 2 endemics are reported from India: *A. crispa* Lindl. (South India, endemic), *A. emericii* Reichb. f., *A. falcata* Lindl., *A. maculosa* Lindl. (South India, endemic), *A. multiflora* Roxb., *A. odorata* Lour., *A. ringens* (Lindl.) Fischer and *A. rosea* Lodd. ex Lindl. Only one species, *A. ringens* extends to Sri Lanka. *A. emericii* exhibits a very interesting distribution extending from Andamans to Cocos Islands at 12° 12' S latitude. Others extend to South East Asia.

Very robust and sturdy epiphytes

with beautiful flowers; occur from sea level to 2000 m. in the primary and secondary forests on trees or even on low bushes.

5. *Agrostophyllum* Blume

A genus of about 100 species, 5 occur in India: *A. brevipes* King & Pantl., *A. callosum* Reichb. f., *A. glumaceum* J. D. Hook., *A. myrianthum* King & Pantl. and *A. planicaule* (Wall. ex Lindl.) Reichb. f. Only one species, *A. myrianthum* is endemic, found in the Teesta Valley in Darjeeling. Other species extend to South East Asia.

Tufted epiphytes with flattened and sheathed leafy stems and crowded flowers in sessile terminal heads; occur at 500-2000 m.

6. *Appendicula* Blume

A large genus of about 150 species, 2 occur in India: *A. cornuta* Bl. and *A. reflexa* Bl., the former is known from Sikkim and the latter, Nicobar Islands, both extend further to Malesia and Pacific Islands.

Tufted epiphytes occurring in the forests of warm valleys. Based on Rottler's collection which supposedly originated from India, Hooker (1890) proposed the name *A. koenigii* for *Epidendrum hexandrum* Koenig following the Kew Rule. It is assumed that Rottler's specimen actually originated from Chandaburi in Thailand (Seidenfaden 1986) and its correct name is *A. hexandra* (Koenig) J. J. Sm.

7. *Arachnis* Blume

A small genus of about 13 species, 2 represented in India: *A. flosaeris* (L.) Reichb. f. and *A. labrosa* (Lindl. & Paxt.) Reichb. f., the former recorded from

Arunachal Pradesh and the latter from Sikkim, Meghalaya and Arunachal Pradesh. Both the species extend further to South East Asia and Eastern Islands.

Scandent monopodials with keeled coriaceous leaves and long scapes bearing beautifully striped or marked flowers; occur at 200-1200 m.

8. *Ascocentrum* Schlechter

A small genus of about 8 species, 3 recorded from India: *A. ampullaceum* (Roxb.) Schltr., *A. curvifolium* (Lindl.) Schltr. and *A. himalaicum* (Deb, Sengupta & Mallick) Christ., all from north eastern States extending further to South East Asia.

Short-stemmed epiphytes known for their brightly coloured flowers; occur at 300-1000 m. Pradhan (1979) reported an orange coloured variety of *A. ampullaceum* from Sikkim which he named *auranticum*.

9. *Biermannia* King & Pantling

A small genus of about 9 species, 3 endemic species occur in India: *B. bimaculata* (King & Pantl.) King & Pantl. (Sikkim, endemic), *B. jainiana* Hegde & Rao (Arunachal Pradesh, endemic) and *B. quinquecallosa* King & Pantl. (Meghalaya, endemic).

Pendulous epiphytes with 2-6 racemes of 3-6 laxly arranged white flowers; occur at 500-1500 m.

10. *Bulbophyllum* Du Petit-Thouars

A large genus of over 1000 species; 96 species including 36 endemic species occur in India: *B. acutiflorum* A. Rich. (South India, endemic), *B. affine* Lindl., *B. amplifolium* (Rolfe) Balakr. & Chowdh., *B. andersonii* (J. D. Hook.) J. J. Sm., *B.*

aurum (J. D. Hook.) J. J. Sm. (South India, endemic), *B. bisetum* Lindl. (North East India, endemic), *B. blepharistes* Reichb. f., *B. capillipes* Par. & Reichb. f., *B. careyanum* (Hook.) Spreng., *B. cariniflorum* Reichb.f., *B. caudatum* Lindl., *B. cauliflorum* J. D. Hook. (Sikkim, Meghalaya, endemic), *B. clarkeanum* King & Pantl. (West Bengal, endemic), *B. congestum* Rolfe, *B. cornucervi* King & Pantl., *B. crassipes* J. D. Hook., *B. cupreum* Lindl., *B. cylindraceum* Lindl., *B. delictescens* Hance, *B. depressum* King & Pantl. (Sikkim, Meghalaya, endemic), *B. devangiriensis* Balakr., *B. ebulbum* King & Pantl. (Darjeeling, endemic), *B. elassonotum* Summerh. (Assam, endemic), *B. elatum* (J. D. Hook.) J. J. Sm., *B. elegans* Thw. (Kerala, Sri Lanka), *B. elegantulum* (Rolfe) J. J. Sm. (South India, endemic), *B. emarginatum* (Finet) J. J. Sm., *B. eublepharum* Reichb. f. (E. Himalayas, endemic), *B. fimbriatum* (Lindl.) Reichb. f. (South West India, endemic), *B. fischeri* Seidenf. (South West India, endemic), *B. forrestii* Seidenf., *B. fuscopurpureum* Wight (South India, endemic), *B. gamblei* J. D. Hook. (E. Himalayas, endemic), *B. griffithii* Reichb.f., *B. guttulatum* Wall. ex J. D. Hook., *B. gymnopus* J. D. Hook., *B. hastatum* Tang & Wang, *B. helenae* (Kuntze) J. J. Sm., *B. hirtum* (J. E. Sm.) Lindl., *B. hookeri* (Duthie) J. J. Sm., *B. hymenanthum* J. D. Hook. (North East India, endemic), *B. kaitense* Reichb. f., (South India, endemic), *B. khasyanum* Griff., *B. kingii* J. D. Hook. (East Himalayas, endemic), *B. leopardinum* (Wall.) Lindl., *B. lepidum* (Bl.) J. J. Sm., *B. leptanthum* J. D. Hook. (East Himalayas, endemic), *B. lilacinum* Ridl., *B. lobbii* Lindl., *B. macraei* (Lindl.) Reichb. f. (Tamil Nadu, Sri Lanka), *B. macranthum* Lindl., *B. moniliforme* Par. & Reichb. f., *B. mysorensis* (Rolfe) J. J. Sm. (Karnataka,

endemic), *B. neilgherrense* Wight (endemic), *B. nodosum* (Rolfe) J. J. Sm. (Tamil Nadu, endemic), *B. obrienianum* Rolfe (Arunachal Pradesh, endemic), *B. odoratissimum* (J. E. Sm.) Lindl., *B. ornaticissimum* (Reichb. f.) J. J. Sm. (Assam, endemic), *B. panigrahanum* Misra (Orissa, endemic), *B. pectinatum* Finet, *B. penicillium* Par. & Reichb. f., *B. picturatum* King & Pantl., *B. piluliferum* King & Pantl. (Sikkim, endemic), *B. polyrhizum* Lindl., *B. protractum* J. D. Hook., *B. proudlockii* (King & Pantl.) J. J. Sm. (South India, endemic), *B. pulchrum* (N. E. Brown) J. J. Sm., *B. putidum* (Teijsm. & Binnend.) J. J. Sm., *B. rauli* Arora (North West Himalaya, endemic), *B. repens* Griff., *B. reptans* (Lindl.) Lindl., *B. rigidum* King & Pantl. (Sikkim, endemic), *B. retusiusculum* Reichb. f., *B. rheedei* Manilal & Sathish (South India, endemic), *B. rolfei* (Kuntze) Seidenf., *B. rothschildianum* (O'Brien) J. J. Sm. (Nagaland, endemic), *B. roxburghii* (Lindl.) Reichb. f. (Upper Gangetic Plains, endemic), *B. rufinum* Reichb. f., *B. sarcophyllum* (King & Pantl.) J. J. Sm., *B. scabratum* Reichb. f., *B. secundum* J. D. Hook., *B. sessile* (Koenig) J. J. Sm., *B. sikkimensis* (King & Pantl.) J. J. Sm., (Sikkim, Darjeeling, endemic), *B. spathulatum* (Rolfe) Seidenf., *B. striatum* Reichb. f. (Sikkim, Darjeeling, endemic), *B. thomsonii* J. D. Hook. (Sikkim, Darjeeling, endemic), *B. tremulum* Wight (South India, endemic), *B. trichocephalum* (Schltr.) Tang & Wang, *B. tricornis* Seidenf. & Smitin., *B. triste* Reichb. f., *B. umbellatum* Lindl., *B. virens* (Lindl.) J. D. Hook., *B. viridiflorum* (J. D. Hook.) Schltr. (North East Himalaya, endemic), *B. wallichii* Reichb. f., *B. xylophyllum* Par. & Reichb. f., and *B. yoksunense* J. J. Sm.

Trailing epiphytes with long rhizomes, 1 - 2 - leaves pseudobulbs and lateral

racemes or umbels of usually small flowers; occur from sea level to 3000 m.

11. *Bulleyia* Schlechter

A montypic genus extending from East Himalayas to South West China represented by *B. yunnanensis* Schltr., established based on a collection (*George Forest 4879* CALI) from W. Yunnan, China made in 1909. In India it is recorded from Darjeeling and Arunachal Pradesh.

Pseudobulbous epiphytes with drooping racemes of 2-seriately arranged flowers; occur at 900-1500 m.

12. *Ceratostylis* Blume

A genus of about 60 species extending to Polynesia; 3 species occur in India: *C. himalaica* J. D. Hook., *C. subulata* Bl. and *C. teres* (Griff.) Reichb. f. (North East India, endemic), the former two extend to Nepal and Yunnan and Malesia.

Clustered epiphytes with curious habit having slender terete stems and small sessile flowers; occur at 300-1500 m.

13. *Chiloschista* Lindley

A genus of about 20 species, 4 including one endemic species occur in India: *C. glandulosa* Blatt. & McCann (South India, endemic), *C. parishii* Seidenf., *C. pusilla* (Koenig) Schltr. (South India, Sri Lanka) and *C. usneoides* (D. Don) Lindl. the *C. parishii* and *C. usneoides* extend to Nepal, Bhutan and Thailand.

Epiphytic plants with flattened assimilatory roots and a tuft of flowers on a long inflorescence; occur at 800-1700 m.

14. *Cleisocentron* Bruhl

A small genus of 3 species extending

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from East Himalayas to peninsular Malayasia, only one species, *C. trichromum* (Reichb. f.) Bruhl, occurs in India (Darjeeling, Sikkim and Arunachal Pradesh to Bhutan). *C. collettianum* (King & Pantl.) Garay known from Burma may possibly be found in Mizoram and Manipur.

Pendulous epiphytes with short inflorescence bearing 6-8 pinkish brown secund flowers; occur at 300-800 m.

15. *Cleisostoma* Blume

A genus of about 80-85 species, 16 including one endemic species are reported from India: *C. appendiculatum* (Lindl.) Benth. & J. D. Hook. ex Jacks., *C. arietinum* (Reichb. f.) Garay, *C. aspersum* (Reichb. f.) Garay, *C. discolor* Lindl., *C. elegans* Seidenf., *C. filiforme* (Lindl.) Garay, *C. paniculatum* (Ker. - Gawl.) Garay, *C. parishii* (J. D. Hook.) Garay, *C. racemiferum* (Lindl.) Garay, *C. sagittiforme* Garay, *C. simondii* (Gagnep.) Seidenf., *C. striatum* (Reichb. f.) Garay, *C. subulatum* Bl., *C. tenuifolium* (L.) Garay, *C. tricallosum* Hegde & Rao (Arunachal Pradesh), *C. uraiensis* (Hayata) Garay & Sweet and *C. walliamsonii* (Reichb. f.) Garay. With the exception of *C. tricallosum* all others extend further to South East Asia.

Erect or pendulous epiphytes with branched or unbranched inflorescence bearing white to creamy flowers variously marked with red or brown; occur at 25-2350 m.

16. *Coelogyne* Lindley

A genus of about 200 species, 33 including 12 endemic species occur in India: *C. assamica* Lindl. & Reichb. f.,

C. barbata Griff., *C. breviscapa* Lindl. (South India, Sri Lanka), *C. corymbosa* Lindl., *C. cristata* Lindl., (North West Himalaya, endemic), *C. dayana* Reichb. f., *C. elata* Lindl., *C. fimbriata* Lindl., *C. flaccida* Lindl., *C. flavida* Wall. ex Lindl., *C. fuscescens* Lindl., *C. glandulosa* (South India, endemic), *C. griffithii* J. D. Hook., *C. hitendrae* Das & Jain (Nagaland, endemic), *C. longipes* Lindl., *C. micrantha* Lindl., (Assam, endemic), *C. mossiae* Rolfe (South India, endemic), *C. nervosa* A. Rich. (South India, endemic), *C. nitida* (Wall. ex Don) Lindl., *C. occultata* J. D. Hook. (Sikkim, Darjeeling, endemic), *C. odoratissima* Lindl., (South India, Sri Lanka), *C. ovalis* Lindl., (North West Himalaya to East India, endemic), *C. prolifera* Lindl., *C. punctulata* Lindl., *C. radicata* Ridl., *C. raizadae* Jain & Das (North East India, endemic), *C. rigida* Par. & Reichb. f., *C. schultesii* Jain & Das (North East India, endemic), *C. stricta* (D. Don) Schltr., *C. suaveolens* (Lindl.) J. D. Hook. (North East India, endemic), *C. thailandica* Seidenf., *C. treutleri* J. D. Hook. (Sikkim, endemic), *C. trinervis* Lindl. and *C. viscosa* Reichb. f. The non-endemic taxa enjoy a wider distribution outside India extending further to Indo-China, Thailand and Burma to South East Asia.

Tufted epiphytes, mostly with 2-leaved pseudobulbs and a raceme of white to creamy with differently speckled flowers; occur at 500-2300 m.

17. *Cottonia* Wight

Monotypic genus represented by *C. peduncularis* (Lindl.) Reichb. f. found in South India and Sri Lanka.

Epiphytic monopodials with very long peduncle bearing yellowish brown flo-

wers at apex: occurs at 300-800 m. in semi-evergreen forests.

18. *Cryptochilus* Wall.

A Himalayan genus of 2 species: *C. lutea* Lindl. and *C. sanguinea* Wall. occurring in North West Himalaya, North East India and Nepal.

Pseudobulbous epiphytes with erect scapes bearing tubular flowers: occur at 1300-2300 m.

19. *Cymbidium* Swartz

A genus of about 44 species, 24 are found in India of which 13 are epiphytic: *C. aloifolium* (L.) Sw., *C. bicolor* Lindl., *C. cochleare* Lindl., *C. dayanum* Lindl., *C. elegans* Lindl., *C. gammieanum* King & Pantl. (Sikkim, Arunachal Pradesh, endemic), *C. hookerianum* Reichb. f., *C. iridoides* D. Don, *C. lowianum* Reichb. f., *C. mastersii* Griff. ex Lindl., *C. tigrinum* Par. ex Hook., *C. traceyanum* L. Castle and *C. whiteae* King & Pantl. (Sikkim, endemic).

Epiphytic species produce pendulous racemes of beautiful flowers; occur from sea level to 2300 m. *C. aloifolium* occurs in plains forming massive clumps on crotches of way side trees. *C. mastersii* occurs at higher altitudes at or near 2500m.

20. *Dendrobium* Swartz

A genus of about 900 species, 102 including 21 endemic species occur in India: *D. acinaciforme* Roxb., *D. aduncum* Wall. ex Lindl., *D. amoenum* Wall. ex Lindl., *D. anamlayanum* Chandrabose, Chandrasekaran & Nair (South India, endemic), *D. anceps* Sw., *D. aphyllum* (Roxb.) Fischer, *D. aqueum* Lindl.

(South India, endemic), *D. barbatulum* Lindl. (South India, endemic), *D. bellatulum* Rolfe, *D. bensonae* Reichb. f., *D. bicameratum* Lindl., *D. candidum* Wall. ex Lindl. *D. capillipes* Reichb. f., *D. cariniferum* Reichb. f., *D. cathcartii* J. D. Hook., (North East India, endemic), *D. chrysanthum* Lindl., *D. chryseum* Lindl., *D. chrysotoxum* Lindl., *D. crepidatum* Lindl., *D. cretaceum* Lindl., *D. crumenatum* Sw., *D. chrystallinum* Reichb. f., *D. cumulatum* Lindl., *D. curviflorum* Rolfe, *D. darjeelingensis* Pradhan (West Bengal, endemic), *D. delacourii* Guillaum., *D. densiflorum* Lindl., *D. denu-dans* D. Don, *D. devonianum* Paxt., *D. diodon* Reichb. f. subsp. *kcdavarensis* Gopalan & Henry (Tamil Nadu, endemic), *D. draconis* Reichb. f., *D. eriiflorum* Griff., *D. falconeri* J. D. Hook., *D. farmeri* Paxt., *D. fimbriatum* Hook., *D. formosum* Roxb. ex Lindl., *D. gamblei* King & Pantl., *D. gibsonii* Lindl., *D. grande* J. D. Hook., *D. gratiotissimum* Wight, *D. griffithianum* Lindl., *D. haemoglossum* Thw. (South India, Sri Lanka), *D. herbaceum* Lindl. (South India, Sri Lanka) *D. heterocarpum* Wall. ex Lindl., *D. heyneanum* Lindl. (South India endemic), *D. hookerianum* Lindl. (North East India, endemic), *D. indragiriense* Schltr., *D. infundibulum* Lindl., *D. jenkinsii* Wall. ex Lindl., *D. jerdonianum* Wight (South India, endemic), *D. khasianum* Deori (Meghalaya, endemic), *D. lindleyi* Steud., *D. lituiflorum* Lindl., *D. longicornu* Lindl., *D. macrostachyum* Lindl. (South India, Sri Lanka), *D. manni* Ridl., *D. microbulbon* A. Rich., (South India, endemic), *D. miserum* Reichb. f., *D. monticola* Hunt & Summerh., *D. moschatum* (Buch.-Ham.) Sw., *D. nanum* J. D. Hook. (South India, endemic), *D. nareshbahadurii* Naithani (Arunachal Pradesh, endemic), *D. nathanielis* Reichb. f.

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D. nobile Lindl., *D. normale* Falc. (West Himalaya, endemic), *D. nutantiflorum* (South India, Sri Lanka), *D. ochreatum* Lindl., *D. ovatum* (L.) Kraenzlin (South West India, endemic), *D. palpebrae* Lindl., *D. panduratum* Lindl. (South India, Sri Lanka), *D. panduratum* Lindl. ssp. *villosum* Gopalan & Henry (Kerala, Tamil Nadu, endemic), *D. parciflorum* Reichb. f. ex Lindl., *D. parcum* Reichb. f., *D. parishii* Reichb. f., *D. pauciflorum* King & Pantl., *D. peguanum* Lindl., *D. pendulum* Reichb. f., *D. pensile* Ridl., *D. perula* Reichb. f., *D. podagraria* J. D. Hook., *D. porphyrochilum* Lindl., *D. primulinum* Lindl., *D. pubescens* J. D. Hook., *D. pulchellum* Roxb. ex Lindl., *D. regium* Prain (Central East India, endemic), *D. revolutum* Lindl., *D. rhodocentrum* Reichb. f., *D. ruckeri* Lindl., *D. secundum* (Bl.) Lindl., *D. seidenfadenii* Sengh. & Bockem., *D. spathaceum* Lindl., *D. strongylanthum* Reichb. f., *D. stuposum* Lindl., *D. sulcatum* Lindl., *D. tenuicaule* J. D. Hook. (Andamans, endemic), *D. terminale* Par. & Reichb. f., *D. thyrsiflorum* Reichb. f., *D. tortile* Lindl., *D. transparens* Lindl., *D. wardianum* Warner, *D. wattii* (J. D. Hook.) Reichb. f., *D. wightii* Hawkes & Heller (South India, endemic) and *D. williamsonii* Day & Reichb. f.

A polymorphic genus of small single-noded pseudobulbous herbs to large and thick plurinodal, variously shaped pseudobulbous plants forming woody clumps on branches or main trunks of trees in both tropical and subtropical forests. *D. macrostachyum* occurs at very low altitudes. *D. hookerianum* occurs at 1500-2000 m.

21. *Dickasonia* L. O. Williams

A monotypic genus represented by *D. vernicosa* L. O. Williams originally re-

ported from Burma. Pradhan (1977) who had a collection of this from Manipur erroneously thought it to represent a new genus which he named *Kalimpongia natarajitii* U. C. Pradhan. Deori (1986) found that *Kalimpongia* is congeneric with *Dickasonia*.

Pseudobulbous epiphytes with 3-7 white flowers; occur at 1700-2000 m.

22. *Diplozentrum* Lindley

A small genus of 2 species found restricted to South India and Sri Lanka, both species occur in India: *D. congestum* Wight (South India, endemic) and *D. recurvum* Lindl. (South India, Sri Lanka).

Epiphytic or lithophytic herbs with pink to rose coloured flowers; occur at 1000-1500 m. in evergreen forests or on rocky masses at high altitudes exposed to full sun.

23. *Diploprora* J. D. Hook.

A small genus of 2 species extending from India to South East Asia. Only one species, *D. championii* (Lindl.) J. D. Hook. occurs in India, recorded from South India, Andaman Islands, Sikkim and extending further eastwards to Taiwan.

Small pendent epiphytes with yellowish white flowers; occurs at 500 m.

24. *Doritis* Lindley

A small genus of 2 species: *D. pulcherrima* Lindl. alone occurs here, so far recorded only from Assam, further extending to South East Asia.

Short-stemmed epiphytes or lithophytes with long scapes bearing a few beautiful pink flowers; occurs at 1000 m.

25. *Epigeneium* Gagnepain

A genus of about 35 species, 6 occur in India: *E. amplum* (Lindl.) Summerh., *E. chapense* Gagnep., *E. fargesii* (Finet) Gagnep., *E. fuscescens* (Griff.) Summerh., *E. navicularis* (Balakr. & Chowdh.) Rao and *E. rotundatum* (Lindl.) Summerh., all extend from North West Himalaya to North East India, further eastward to Indo-China and South China.

Epiphytic herbs with elongated rhizomes bearing 1 or 2-leaved, ovoid pseudobulbs and medium sized to large showy flowers; occur at 1500-3300 m.

26. *Eria* Lindely

A genus of over 500 species extending to Polynesia and adjacent islands. India is reported to have 54 species including 22 endemics: *E. acervata* Lindl., *E. acutifolia* Lindl., *E. alba* Lindl., *E. albiflora* Rolfe (South India, endemic), *E. amica* Reichb. f., *E. andamanica* J. D. Hook. (Andamans, endemic), *E. apertiflora* Summerh., *E. bambusifolia* Lindl., *E. biflora* Griff., *E. bipunctata* Lindl., *E. bractescens* Lindl., *E. calamifolia* J. D. Hook. (Assam, endemic), *E. carinata* Lindl., *E. clausa* King & Pantl., *E. clavicaulis* Wall. ex Lindl., *E. connata* Joseph, Hegde & Rao (Arunachal Pradesh, endemic), *E. coronaria* (Lindl.) Reichb. f., *E. crassicaulis* J. D. Hook., *E. dalzellii* Lindl. (South West India, endemic), *E. discolor* Lindl., *E. excavata* Lindl., *E. exilis* J. D. Hook. (South West India, endemic), *E. ferruginea* Lindl. (Meghalaya, endemic), *E. glandulifera* Deori & Phukan (Meghalaya, endemic), *E. graminifolia* Lindl. (North West Himalaya, endemic), *E. hindei* Summerh., *E. javanica* (Sw.) Bl., *E. lacei* Summerh., *E. laniceps* Reichb. f., *E. meghasaniensis* (S. Misra) S. Misra (Orissa, endemic), *E.*

microchilos Lindl. (South West India, endemic), *E. muscicola* (Lindl.) Lindl., *E. muscicola* (Lindl.) Lindl. var. *brevilinguis* Joseph & Chandrasekaran (Kerala, endemic), *E. mysorensis* Lindl., (South West India, endemic), *E. nana* A. Rich. (South West India, endemic), *E. obesa* Lindl., *E. occidentalis* Seidenf., (Kumaon, endemic), *E. paniculata* Lindl., *E. pannea* Lindl., *E. pauciflora* Wight (South India, endemic), *E. polystachya* A. Rich. (South West India, endemic), *E. pseudoclavicaulis* Blatt. & McCann (South India, endemic), *E. pubescens* (Hook.) Steud., *E. pudica* Ridl., *E. pumila* Lindl., *E. pusilla* (Griff.) Lindl., *E. reticosa* Wight (South West India, endemic), *E. scabrilinguis* Lindl., (Sikkim, endemic), *E. spicata* (D. Don) Hand. - Mazz., *E. stricta* Lindl., *E. sute-pensis* Rolfe ex Downie, *E. tiagii* Manilal, Sathish & Wood (Kerala, endemic), *E. tomentosa* J. D. Hook. and *E. vittata* Lindl.

Epiphytic or lithophytic herbs with polymorphic habits, solitary flowered to many-flowered racemes or panicles; occur at 500-3000 m.

27. *Eriodes* Rolfe

A monotypic genus represented by *E. barbata* (Lindl.) Rolfe, extending from India, Thailand, Burma, Vietnam to China. In India it occurs in Meghalaya and Arunachal Pradesh. *Eriodes* has strange admixture of characters of *Bulbophyllum*, *Eria* and *Tainia*.

Pseudobulbous epiphytes with very long pubescent scapes bearing yellowish red flowers; occur at 1500 m.

28. *Esmeralda* Reichenbach f.

A small genus of 2 species extending

from India to Nepal, Bhutan, Burma, Thailand and South China, both occur in India: *E. cathcartii* (Lindl.) Reichb. f. and *E. clarkei* Reichb. f.

Large epiphytes or lithophytes with scandent stems, long inflorescence bearing large showy pale yellow flowers transversely marked with red brown stripes; occur at 1000-2700 m.

29. *Flickingeria* Hawkes

A genus of about 70 species, 7 including 2 endemics occur in India: *F. bancana* (J. J. Sm.) Hawkes, *F. fimbriata* (Bl.) Hawkes, *F. fugax* (Reichb. f.) Hawkes, *F. hesperis* Seidenf. (West Himalaya, endemic), *F. macraei* (Lindl.) Seidenf. (Karnataka, Sri Lanka), *F. nodosa* (Dalz.) Seidenf. (South India, endemic) and *F. ritanea* (King & Pantl.) Hawkes.

Epiphytic herbs characterized by creeping and rooting rhizomes with erect branches bearing single-flowered inflorescence on top of pseudobulbs close to foliage leaf and very peculiar lip for the flowers; occur at 300-1500 m.

30. *Gatrsochilus* D. Don

A genus of about 38 species (Christenson 1987b), 14 occur in India including 2 endemics: *G. acaulis* (Lindl.) Kuntze (South India, Sri Lanka), *G. acutifolius* (Lindl.) Kuntze, *G. affinis* (King & Pantl.) Kuntze (Sikkim, endemic), *G. bellinus* (Reichb. f.) Kuntze, *G. bigibbus* (Reichb. f. ex J. D. Hook.) Kuntze, *G. calceolaris* (J. E. Sm.) D. Don, *G. corymbosus* A. P. Das & Chanda (Darjeeling, endemic), *G. crassilabris* (King & Pantl.) Garay, *G. distichus* (Lindl.) Kuntze, *G. flabelliformis* (Blatt. & McCann) Saldanha (South West India, endemic), *G. incon-*

spicuous (J. D. Hook.) Kuntze, *G. intermedius* (Griff. ex Lindl.) Kuntze, *G. obliquus* (Lindl.) Kuntze and *G. pseudodistichus* (King & Pantl.) Schltr.

Epiphytic herbs characterized by the lip firmly attached to the short, footless column having a globose saccate hypochile with a prominent fan-shaped epichile at the front edge of the sac; occur at 500-2600 m.

31. *Grossourdia* Reichenbach f.

A genus of about 10 species, 2 occur in India: *G. appendiculata* (Bl.) Reichb. f. and *G. muscosa* (Rolfe) Garay, both extend from North East India to Malaysia and to Java.

Epiphytic herbs with terete peduncles bearing yellow flowers at apex, growing on trees in mangrove forests at lower elevations.

32. *Hygrochilus* Pfitzer

A monotypic genus represented by *H. parishii* (Vietch & Reichb. f.) Pfitz., found in Manipur, extending to Burma, Thailand and Indo-China.

Short-stemmed epiphytes with long inflorescence bearing 5-7 yellowish green flowers spotted with purple; occur at 1500 m. Much used in hybridization with *Aerides*, *Arachnis*, *Doritis*, *Phalaenopsis*, *Renanthera*, *Rhynchostylis* and *Vanada*.

33. *Jejosephia* Rao & Mani

A monotypic endemic genus proposed based on *Trias pusilla* Joseph & Deka from Meghalaya.

Small epiphytes with trailing rhizomes, small pseudobulbs and small flowers; occur at 1500 m.

34. Kingidium P. F. Hunt

Asian genus of about 7 species, five species occur in India: *K. braceanum* (J. D. Hook.) Seidenf., *K. deliciosum* (Reichb. f.) Sweet, *K. mysorensis* (Saldanha) Sathish (South India, endemic) *K. niveum* Sathish, ined. (South India, endemic) and *K. taeniale* (Lindl.) Hunt. The non-endemic taxa extend to South East Asia and South China.

Short stemmed epiphytes with flat leaves and 3-4 small flowers; occur at 900-2000 m in evergreen forests.

35. Luisia Gaudichaud

A genus of about 47 species, 17 including 4 endemic species occur in India: *L. abrahamii* Vatsala (Kerala, endemic), *L. amesiana* Rolfe, *L. birchaea* Bl., *L. brachystachys* (Lindl.) Bl., *L. evangelinae* Blatt. & McCann (South India, endemic), *L. macrantha* Blatt. & McCann (South India endemic), *L. macrotis* Reichb. f., *L. micrantha* J. D. Hook., *L. platyglossa* Reichb. f., *L. primulina* Par. & Reichb. f., *L. pulniana* Vatsala (Tamil Nadu, endemic), *L. thailandica* Seidenf., *L. trichrorhiza* (Hook.) Bl., *L. volucris* Lindl., *L. zeylanica* Lindl. and *L. zollingeri* Reichb. f.

Epiphytic herbs with terete leaves and short inflorescence bearing one or a few small to medium-sized flowers; occur at 50-1500 m.

36. Macropodanthus L. O. Williams

A small genus of about 6 species extending from Andamans, Malayan Peninsula to Indonesia and the Philippines. Two species occur in India: *M. alatus* (Holtt.) Seidenf. & Garay and *M. berkeleyi* (Reichb. f.) Seidenf. & Garay

(Nicobar Islands, endemic), *M. alatus* extends to Thailand and Malaysia.

Epiphytic herbs with laxly produced flowers characterized by elongated column - foot to which lateral sepals, petals and lip are attached, lip that is strongly saccate without inside callosities; occur at lower elevations.

37. Malleola J. J. Smith & Schlechter

A genus of about 30 species, a solitary endemic species occurs in India: *M. andamanica* Balakr. & Bhargava.

Epiphytes with densely flowered inflorescence, flowers white or creamy white with crimson stripes; occur in mangrove forests and on trees in inland forests in South Andamans.

38. Micropera Lindley

A genus of about 15 species, 4 including one endemic species occur in India: *M. mannii* (J. D. Hook.) Tang & Wang (Sikkim, Darjeeling, Meghalaya, endemic), *M. obtusa* (Lindl.) Tang & Wang, *M. pallida* (Roxb.) Lindl. and *M. rostrata* (Roxb.) Balakr. The non-endemic taxa extend to Thailand, Burma and *M. rostrata* is found only in India and Thailand.

Erect or pendulous epiphytes with white to rose or pink flowers; occur at 400-1000 m.

39. Monomeria Lindely

An Indo-South East Asian genus of 2 species, only one occurs in India: *M. barbata* Lindl. found also in Nepal, Burma and Thailand.

Pseudobulbous epiphytes with laxly flowered lateral racemes bearing yellow

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flowers with large brown markings: occur in the warm valleys.

40. *Neogyna* Reichenbach f.

A monotypic genus represented by *N. gardneriana* (Lindl.) Reichb. f. reported from Meghalaya, also found in Nepal and Thailand.

Pseudobulbous epiphytes with nodding racemes of 6-12 flowers; occur at 1300-1700 m.

41. *Oberonia* Lindley

A palaeotropic genus of about 300 species, 52 including 24 endemic species occur in India: *O. acaulis* Griff., *O. agastyamalayana* Sathish (Kerala, endemic), *O. anamalayana* Joseph (South India, endemic), *O. angustifolia* Lindl. (North East India, endemic), *O. anthropophora* Lindl., *O. auriculata* King & Pantl., *O. bellii* Blatt. & McCann (South West India, endemic), *O. bicornis*, Lindl., (South and North East India, endemic), *O. brachystachya* Lindl., *O. brunoniana* Wight (South West India, endemic), *O. caulescens* Lindl., *O. chandrasekharanii* V. J. Nair, V. S. Ramachandran & Ansari (South India, endemic), *O. clarkei* J. D. Hook. (Meghalaya, endemic), *O. emarginata* King & Pantl., *O. ensiformis* (J. E. Sm.) Lindl.; *O. falcata* King & Pantl., *O. falconeri* J. D. Hook., *O. gamniei* King & Pantl., *O. griffithiana* Lindl., *O. iridifolia* (Roxb.) Lindl., *O. jenkinsiana* Griff. ex Lindl., *O. josephii* Saldanha (Karnataka, endemic), *O. lobulata* King & Pantl., (Sikkim, endemic), *O. longibracteata* Lindl., *O. mannii* J. D. Hook., (North East India, endemic), *O. maxima* Par. & Reichb. f., *O. mysurus* Lindl., *O. myriantha* Lindl., *O. nayari* Ansari & Balakr. (South India, endemic), *O. obcordata* Lindl., *O. orbicularis* J. D.

Hook. (Sikkim, endemic), *O. pachyphylla* King & Pantl., *O. pachyrachis* Reichb. f. ex J. D. Hook., *O. platycaulon* Wight (South West India, endemic), *O. prainiana* King & Pantl., *O. proudlockii* King & Pantl., (South West India, endemic), *O. pyrulifera* King & Pantl., *O. recurva* Lindl., *O. rufilabris* Lindl., *O. santapau* Kapad. (South West India, endemic), *O. sebastiana* Shetty & Vivek. (South West India, endemic), *O. seidenfadeniana* Joseph (South West India, endemic), *O. sulcata* Joseph & Chowdh. (East Himalayas, endemic), *O. tenuis* Lindl., *O. thwaitesii* J. D. Hook. (South India, Sri Lanka), *O. verticillata* Wight (South India, endemic), *O. wallichii* J. D. Hook., (Meghalaya, endemic), *O. wightiana* Lindl., (South India, Sri Lanka), *O. wynadensis* Siva- & Balakrishnan (Kerala, endemic), and *O. zeylanica* Lindl. (South India, Sri Lanka). The non-endemic taxa extend to Thailand, Indo-China and Malaysia.

Fleshy epiphytes with equitant leaves and small flowers on a long spike or raceme; occur at 50-3000 m.

42. *Ornithochilus* (Lindl.) Benth.

A small genus of 3 species extending from India to Nepal, Bhutan, Indo-China, South China, Malaysia and Borneo. Only one species, *O. difformis* (Wall. ex Lindl.) Schltr. occurs in India from North West Himalaya to Arunchal Pradesh, extending further to South East Asia.

Short-stemmed epiphytes with many flowered branching raceme of brown banded greenish yellow flowers; occur at 1500-2000 m. in evergreen forests.

43. *Otochilus* Lindley

A genus of 4 species, all occur in

India: *O. albus* Lindl., *O. fuscus* Lindl., *O. lancilabius* Seidenf. and *O. porrectus* Lindl., extending from North West Himalaya and North East India to adjoining countries.

Pendulous epiphytes with cylindrical to fusiform 2-leaved pseudobulbs and laxly flowered pendulous racemes; occur at 1000-2000 m.

44. *Panisea* (Lindley) Steudel

A genus exclusive to Asian mainland and Yunnan with 7 species, revised recently by Lund (1987), three occur in India: *P. demissa* (D. Don) Pfitz., *P. tricallosa* Rolfe and *P. uniflora* (Lindl.) Lindl., all extend further to adjoining countries.

Tufted epiphytes with one to many flowers; occur at 1500-2300.

45. *Papilionanthe* Schlechter

An Indo-Malesian genus of about 10 species, 5 occur in India: *P. biswasiana* (Ghose & Mukerjee) Garay, *P. longicornu* (Lindl.) Garay, *P. subulata* (Koenig) Garay, (South India, Sri Lanka), *P. teres* (Roxb.) Schltr., *P. uniflora* (Lindl.) Garay and *P. vandarum* (Reichb. f.) Garay.

Erect or pendulous epiphytes with terete leaves and large white to purple rose or pink flowers; occur at 850-2000 m.

46. *Pelatantaria* Ridley

A genus of 5 species, only one, *P. insectifera* (Reichb. f.) Ridl. occurs in India, extending to Malaysia.

Epiphytic herbs with sessile racemes of 3-5 greenish yellow flowers striped with red; occur at 500-1000 m.

47. *Pennilabium* J. J. Smith

A genus of about 10-12 species, only one, *P. proboscideum* Rao & Joseph occurs in India, also extending to Thailand.

Epiphytic herbs with short inflorescence bearing yellow flowers with red spots; occur at about 600 m.

48. *Phalaenopsis* Blume

A genus of about 40 species, five including one endemic species occur in India: *P. cornucervi* (Breda) Bl. & Reichb. f., *P. mannii* Reichb. f., *P. parishii* Reichb. f., *P. speciosa* Reichb. f. (Andaman Islands, endemic), and *P. tetraopsis* Reichb. f. The non-endemic taxa extend to Burma, Thailand, Indo-China and Malaysia.

Epiphytic herbs with thick shining flat leaves and an inflorescence of strikingly beautiful flowers; at 400-1200 m.

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

An Indo-Malesian genus of about 29 species with 7 varieties (Seidenfaden 1986) 7 species occur in India: *P. articulata* Lindl., *P. bracteata* (D. Don) Seidenf., *P. convallariae* (Reichb. f.) J. D. Hook., *P. imbricata* W. J. Hook., *P. protracta* J. D. Hook., *P. recurva* Lindl. and *P. rubra* Lindl., all extend to neighbouring countries, Indo-China and South China regions.

Epiphytes forming massive clumps with 2-seriately arranged flowers; occur at 50-2500 m.

50. *Phreatia* Lindley

A genus of about 150 species, 2 occur in India: *P. elegans* Lindl., and

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P. secunda (Bl.) Lindl., both extend to neighbouring countries.

Tufted pseudobulbous epiphytes with long racemes of small white flowers; occur at 850-2000 m.

51. **Pleione** D. Don

A small genus of 14 species (Cribb, Tang & Butterfield 1983), exclusive to Asian mainland, South China and Taiwan, 7 species occur in India: *P. grandiflora* Rolfe, *P. hookeriana* (Lindl.) B. S. Williams, *P. humilis* (J. E. Sm.) D. Don, *P. maculata* (Lindl.) Lindl., *P. praecox* (J. E. Sm.) D. Don and *P. purpurea* Pfitz., all extend to neighbouring countries, *P. lagenaria* Lindl., originally described from Meghalaya, according to Cribb et al. is a natural hybrid between *P. maculata* and *P. praecox*.

Epiphytic or lithophytic pseudobulbous herbs with beautiful flowers, much sought after by the orchid fanciers; occur at 700-3500 m.

52. **Podochilus** Blume

A genus of about 60 species, 4 including one endemic species occur in India: *P. cultratus* Lindl., *P. khasiana* J. D. Hook. (North East India, endemic), *P. malabaricus* Wight (South India, Sri Lanka), and *P. microphyllus* Lindl. *P. cultratus* and *P. microphyllus* extend further to Indo-China and South East Asia.

Epiphytic herbs with equitant leaves and small flowers on a slender terminal raceme; occur at 600-2000 m.

53. **Polystachya** W. J. Hooker

A genus of over 200 species, only one species occurs in India: *P. concreta*

(Jacq.) Garay & Sweet, also found in South, North East India and Nicobar Island, and throughout tropics.

Epiphytic herbs with small pseudobulbs and a branched or unbranched raceme bearing small green, non-resupinate flowers; occur mostly in the semi-deciduous to moist evergreen forests at 50-1200 m.

54. **Pomatocalpa** Breda

A genus of about 35-40 species, 6 including one endemic species occur in India: *P. andamanica* (J. D. Hook.) J. J. Sm., *P. armigera* (King & Pantl.) Tang & Wang (Sikkim, Darjeeling, endemic), *P. bambusara* (King & Pantl.) Garay, *P. decipiens* (Lindl.) J. J. Sm., *P. mannii* (Reichb. f.) J. J. Sm., and *P. spicata* Breda. The non-endemic taxa extend to Indo-China and South East Asia.

Mostly short-stemmed epiphytes with small densely arranged flowers on a long branched or unbranched racemes; occur at 50-500 m.

55. **Porpax** Lindley

A small genus of about 12 species, 6 including one endemic species occur in India: *P. elwesii* (Reichb. f.) Rolfe, *P. fibuliformis* (King & Pantl.) King & Pantl., *P. gigantea* Deori (Meghalaya, Thailand), *P. jerdoniana* (Wight) Rolfe (South India, endemic), *P. meirax* King & Pantl. and *P. reticulata* Lindl. (South India, Laos). The non-endemic taxa extend to Burma and Thailand.

Epiphytic or lithophytic herbs with compressed, button-like pseudobulbs and very characteristic tubular flowers; occur at 300-1000 m.

56. Pteroceras Hasskarl

A genus of about 25 species, 3 including one endemic species occur in India: *P. leopardinum* (Par. & Reichb. f.) Seidenf. & Smitin., *P. muriculatum* (Reichb. f.) Hunt (Andamans, endemic) and *P. teres* (Bl.) Holtt., the latter extend from Burma, Thailand, Indo-China, Malaysia, Borneo to Philippines.

Small epiphytes with lateral racemes of white to yellow flowers characterized by very peculiar lip dominated by a spur pointing forwards in line with column-foot; at lower elevations to 1000 m.

57. Renanthera Louriero

An Indo-Malesian genus of about 15 species, only one occurs in India: *R. imshootiana* Rolfe, recorded from Manipur further extending to Indo-China.

Epiphytic plants with leathery leaves and long usually branching many-flowered raceme; occur at 200-1500 m.

58. Rhinerrhiza Rupp

A small genus of 2 species found in India and Queensland and New South Wales in Australia, only one species occurs in India: *R. freemanii* (Reichb. f.) Garay found only in Assam.

Epiphytic herbs with 2-toothed ligulate leaves and many flowered racemes 'like a yellow-brownish spotted broom'.

59. Rhynchostylis Blume

An Indo-South East Asian genus of 4 species, 2 occur in India: *R. gigantea* (Lindl.) Ridl. and *R. retusa* (L.) Bl., the latter spreads throughout South East Asia.

Short-stemmed epiphytes with long

festoons of brightly coloured dense flowers; occur at 300-1500 m.

60. Robiquetia Gaudichaud

A genus of about 40 species, 4 including one endemic species occur in India: *R. gracilis* (Lindl.) Garay (South India, Sri Lanka), *R. josephiana* Manilal & Sathish (South India, endemic), *R. spathulata* (Bl.) J. J. Sm. and *R. succisa* (Lindl.) Seidenf. & Garay. The non-endemic taxa extend to South East Asia, South China to Borneo.

Erect or pendent epiphytes with many small flowered racemes; occur at 300-1200 m.

61. Saccolabiopsis J. J. Smith

A small genus of about 12 species, only one, *S. pusilla* (Lindl.) Seidenf. & Garay occurs in India, recorded from Kerala, Sikkim and Arunachal Pradesh extending to Thailand.

Small pendulous epiphytes with slender racemes of creamy, purple blotched flowers; occur at 500-1000 m.

62. Sarcoglyphis Garay

A small genus of about 11 species extending from Arunachal Pradesh, its northern limit to Burma, Yunnan and Vietnam and South through Thailand and Malaysia to Sumatra, Java and Borneo. Only one species, *S. arunachalensis* A. N. Rao occurs in India described recently from Sessa in Kameng district in Arunachal Pradesh (Rao 1990).

Epiphytic herbs with white flowers; occur at 1100 m.

63. Schoenorchis Reinwardt

A genus of about 24 species, 5 in-

cluding one endemic species occur in India: *S. fragrans* (Par. & Reichb. f.) Seidenf. & Smitin. *S. gemmata* (Lindl.) J. J. Sm., *S. jerdoniana* (Wight) Garay (South India, endemic), *S. minutiflora* (Ridl.) J. J. Sm. and *S. nivea* (Lindl.) Garay (South India, Sri Lanka). The non-endemic taxa extend to South East Asia.

Small epiphytes with fleshy leaves and small flowers; occur at 800-1500 m.

64. **Seidenfadeniella** Sathish, *gen. nov. ined.*

A newly proposed genus of 2 species found in South India and Sri Lanka: *S. chrysantha* (Alston) Sathish and *S. rosea* (Wight) Sathish, the former extends from South India to Sri Lanka and the latter endemic to South India.

Pendulous epiphytes with terete leaves, decurved densely flowered racemes of orange yellow to purplish violet to rose flowers; occur at 1050-2300 m.

65. **Sirhookera** Kuntze

An Indo-Sri Lankan genus of 2 species; *S. lanceolata* (Wight) Kuntze and *S. latifolia* (Wight) Kuntze, both found in India.

Epiphytic herbs with coriaceous leaves and branched racemes of small flowers; occur at 650-1800 m.

66. **Smithsonia** Saldanha

An endemic genus of 3 Indian species: *S. maculata* (Dalz.) Saldanha, *S. straminea* Saldanha and *S. viridiflora* (Dalz.) Saldanha.

Short-stemmed epiphytes with many flowered lateral racemes; occur at 50-950 m.

67. **Smitinandia** Holttum

A small genus of 3 species extending from India to Nepal, Bhutan, Burma, Indo-China to Malaysia. Two species occur in India: *S. helferi* (J. D. Hook.) Garay and *S. micrantha* (Lindl.) Holtt., both are widely distributed.

Epiphytic herbs with branched or unbranched racemes of small flowers; occur at 600-1000 m.

68. **Staurochilus** Ridley ex Pfitzer

A genus of about 12-14 species, only one species, *S. ramosus* (Lindl.) Seidenf. occurs in India, recorded from Sikkim, Meghalaya and Orissa extending to Burma and Thailand.

Epiphytic herbs with branched racemes of yellowish brown flowers.

69. **Stereochilus** Lindley

A small genus of about 5 species, extending from India to Burma, Thailand and Vietnam, two species occur in India: *S. hirtus* Lindl. and *S. ringens* (Reichb. f.) Garay (Assam, endemic).

Epiphytes with fleshy semi-terete to flat leaves and pendulous racemes of pink or creamy green, pink-margined flowers; occur at 300-800 m.

70. **Sunipia** Lindley

A genus of about 18 species, 11 including 4 endemic species occur in India: *S. andersonii* (King & Pantl.) Hunt, *S. bicolor* Lindl., *S. candica* (Lindl.) Hunt (East India, endemic), *S. cirrhata* (Lindl.) Hunt, *S. fuscopurpurea* (Lindl.) Hunt (Assam, endemic), *S. intermedia* (King & Pantl.) Hunt (Sikkim, endemic), *S. jainii* Hynniewta & Malhotra (Nagaland, ende-

mic), *S. racemosa* (J. E. Sm.) Tang & Wang, *S. paleacea* (Lindl.) Hunt, *S. ri-manni* Seidenf., and *S. virens* (Lindl.) Hunt. The non-endemic taxa extend to South East Asia.

Epiphytic herbs with slender rhizomes, 1-leaved pseudobulbs and 1 to many flowers characterized by the special column structure; occur at 1000-2300 m.

71. *Taeniophyllum* Blume

A palaeotropic genus of about 120 species extending from Africa to Australasia, 7 including 4 endemic species occur in India: *T. alwisii* Lindl. (Tamil Nadu, Sri Lanka), *T. andamanica* Balakr. & Bhargava (Andamans, endemic), *T. crepidiforme* King & Pantl. (Sikkim, endemic), *T. filiforme* J. J. Sm., *T. glandulosum* Bl., *T. khasianum* Joseph & Yog. (Meghalaya, endemic) and *T. scaberulum* J. D. Hook. (Kerala, endemic). The non-endemic taxa viz. *T. filiforme* and *T. glandulosum* extend to Malesia.

Leafless epiphytes with a tuft of green roots on a minute central stem and erect raceme of small flowers; occur at 800-1700m.

72. *Thecostele* Reichenbach f.

A monotypic genus represented by *T. alata* (Roxb.) Par. & Reichb. f. extending from North East India to Burma, Thailand to Indo-china and Malaysia, Indonesia and Philippines.

Epiphytic herbs with 1-leaved pseudobulbs and long lateral racemes of greenish white flowers marked with pink; occur at 100m.

73. *Thelasis* Blume

A genus of about 25 species, 4 inclu-

ding 2 endemic species occur in India: *T. bifolia* J. D. Hook. (Sikkim, endemic), *T. khasiana* J. D. Hook., *T. longifolia* J. D. Hook. (North West Himalaya, Sikkim, Meghalaya, endemic) and *T. pygmaea* Lindl. The non-endemic taxa extend to Indo-China, Thailand to Hainan and Philippines.

Small pseudobulbous epiphytes with densely flowered racemes of pale green to creamy white flowers; occur at 500-1300 m.

74. *Thrixspermum* Louriero

A genus of about 165 species, 8 including one endemic species occur in India: *T. album* (Ridl.) Schltr., *T. amplexicaule* (Bl.) Reichb. f., *T. centipeda* Lour., *T. complanatum* (Koenig) Schltr. (South India, Sri Lanka), *T. musciflorum* Rao & Joseph (North East India, Thailand), *T. pulchellum* (Thw.) Schltr. (South India, Sri Lanka), *T. pygmaeum* (King & Pantl.) Holtt. and *T. trichoglottis* (J. D. Hook.) Kuntze. The non-endemic taxa extend further to Indo-China and Malesia.

Epiphytic herbs with long inflorescence bearing a few fugaceous flowers produced in succession; occur at 50-1000 m.

75. *Thunia* Reichenbach f.

A genus of about 4 species, three occur in India: *T. alba* (Lindl.) Reichb. f., *T. bracteata* (Roxb.) Schltr. and *T. bensoniae* J. D. Hook., all extend further to Burma, Thailand, Malesia and South China.

Large epiphytic or lithophytic herbs with light greyish green leaves and a terminal bunch of beautiful white to pink flowers; occur at 700-1300 m.

Epiphytic Orchids of India

76. *Trachoma* Garay

A genus of 7 species, a lone endemic species occurs in India: *T. coarctum* (King & Pantl.) Garay, found only in the Jaintea Hills at Amwee in Meghalaya.

Pendulous epiphytes with slender stems and extra-axillary, few-flowered racemes of fugaceous flowers; occur at 1000 m.

77. *Trias* Lindley

A small genus of 11 species extending from India, Sri Lanka to Burma, Thailand and Indo-China (Sathish Kumar 1989), 5 species including 2 endemics occur in India: *T. bonaccordensis* Sathish (South India, endemic), *T. disciflora* (Rolfe) Rolfe, *T. nasuta* (Reichb. f.) Stapf, *T. oblonga* Lindl. and *T. stocksii* Benth. ex J. D. Hook. (South West India, endemic). The non-endemic taxa extend to Burma and Thailand.

Small pseudobulbous epiphytes with solitary triangular-shaped flowers characterized by horn-like operculum; occur at 500-1500m. in semi-evergreen to evergreen forests.

78. *Trichoglottis* Blume

A genus of about 60 species, 3 including one endemic species occur in India: *T. cirrhifera* Teijsm. & Binnend., *T. orchidea* (Koenig) Garay (Nicobars, endemic) and *T. tenera* (Lindl.) Schltr. (South India, Sri Lanka). *T. cirrhifera* extends to Thailand, Vietnam, Malaya, Sumatra and Java.

Epiphytic herbs with long stems and short one to few-flowered inflorescence bearing creamy yellow to brown flowers; occur at 900-1500m.

79. *Trichotosia* Blume

A genus of about 50 species, 2 occur in India: *T. dasyphylla* (Par. & Reichb. f.) Kraenzlin and *T. pulvinata* (Lindl.) Kraenzlin, both occur in North East India extending further to South East Asia.

Much branched, hispid, creeping epiphytes with white to green flowers flushed with yellow or pink; occur at 500-1000 m.

80. *Trudelia* Garay

A monotypic genus proposed recently by Garay (1986) based on *Vanda alpina* Lindl. from North West Himalaya to North East India and Bhutan.

Epiphytic herbs with yellow flowers streaked with purple; occur at 1000-1600 m.

81. *Uncifera* Lindley

A small genus of 6 species extending from India to Nepal, Bhutan, Thailand, Vietnam and Burma. Three including 2 endemic species occur in India: *U. acuminata* Lindl. (North East India, endemic), *U. lancifolia* (King & Pantl.) Schltr. (Sikkim, endemic) and *U. obtusifolia* Lindl., that extends to Thailand.

Pendulous epiphytes with leaf opposed and densely flowered raceme of pale green to yellow flowers; occur at 1200-2300 m.

82. *Vanda* Jones ex Robert Brown

A genus of about 40 species, 10 including a little known species occur in India: *V. bicolor* Griff., *V. coerulea* Griff. ex Lindl., *V. coerulescens* Griff., *V. cristata* Lindl., *V. jainii* Chauhan (Assam, endemic), *V. pumila* J. D. Hook., *V. spathulata* (L.) Spreng, (South India, Sri Lanka),

V. stangeana Reichb. f., *V. tessellata* (Roxb.) Hook. ex G. Don, *V. testacea* (Lindl.) Reichb. f. and *V. wightii* Reichb. f. (Tamil Nadu, endemic). The non-endemic taxa extend to Malesia.

Large epiphytic or lithophytic herbs with attractive flowers; occur at 50-2000 m.

83. *Vandopsis* Pfitzer

A genus of about 5 species, only one, *V. undulata* (Lindl.) J. J. Sm. occurs in India extending to Bhutan.

Stout epiphytes with sharp-shaped leaves and many flowered racemes bearing large and showy flowers; occur at 1500-2300 m.

84. *Vanilla* Miller

A pantropical genus of about 100 species, 5 including 2 endemics occur in India: *V. andamanica* Rolfe (Andamans, endemic), *V. aphylla* Bl., *V. pilifera* Holtt., *V. walkeriae* Wight (South India, Sri Lanka) and *V. wightiana* Lindl. J. D. Hook. (South India, endemic). The non-endemic taxa extend to Malesia.

Scandent, vine-like branching epiphytes with large, ephemeral showy flowers; occur at 50-900 m.

85. *Xenikophyton* Garay

An endemic monotypic genus represented by *X. smeeanum* (Reichb. f.) Garay, proposed by Garay (1974) who found strange admixture of characters of *Sarcophyton* and *Cleisomeria* in *Saccolabium smeeanum*, so far recorded only from Kerala, Tamil Nadu and Karnataka.

Epiphytic herbs with short stems, flat slightly keeled leaves and simple or

branched racemes of small white flowers flushed with pink; occur at 800-1500 m.

Conservation Strategies in India

Although India has a rich and diverse orchid flora, no serious indepth study has been made to collate data on the vanishing species of Indian orchids coming under endemic category. Our earnest attempts to locate all taxa of orchids hitherto recorded from India gave us the appalling statistics that of the 630 species of epiphytic orchids 187 are endemic species and, of the endemics about half the number are endangered and are very rare. A dozen species are known from single collections only, evidently pointing to the fact that they are in extreme danger of extinction. They need to be rediscovered and protected as also the other rare taxa growing in their dwindling habitats so as to ensure their survival for posterity.

As said earlier, about 3% of the total geographical area of India is now declared protected as national parks and wildlife sanctuaries including representative habitat types. Together with this, the identification of 13 sites as Biosphere Reserves will give adequate protection to the flora and fauna if the rules of protection are properly implemented. Apart from this, many states have contributed much to the conservation of orchids in particular.

Sikkim, one of the smallest states in India established an orchidarium in a large area at Saramsa in the neighbourhood of Gangtok, its capital city, to protect native species from extinction. This orchidarium houses a good number of epiphytic orchids both in the hot house

and on trees and tree ferns. Private nurseries and orchid enthusiasts spread over Sikkim also have contributed to the conservation of native species by collecting, multiplying and cultivating many of the beautiful ones.

Darjeeling region of West Bengal State, particularly Kalimpong, is often considered as a haven for orchids. Private nurseries which sell orchids and other plants have an enormous collection from East Himalayas, eastern states and adjoining countries like Nepal and Bhutan. The century old Lloyd Botanic Gardens at Darjeeling has a number of epiphytic orchids on display. The Indian Botanic Gardens at Howrah under the auspices of Botanical Survey of India is the oldest of its type boasting several old collections passed through generations.

Meghalaya State has a national orchidarium at Shillong housing many species from all North Eastern States. The private nurseries at Shillong and amateur growers of the city and Cherrapunjee are engaged in the cultivation of many species. Sacred groves of Sikkim and Meghalaya, protected through centuries due to religious reasons afford haven for many species of plants including orchids.

Like Sikkim, the State of Arunachal Pradesh has a very rich orchid flora. Its Forest Department has established an Orchid Research and Development Center to exploit the economic potential of the rich group in the state. A natural sanctuary is maintained at Sessa for effective and meaningful conservation. Many rare species of orchids are found in this locality.

Orissa State has selected Similipal forest region in the Mayurbhanj district

as an orchid reserve. Out of the 122 species of orchids recorded from the state, 90 species including the endemic *Bulbophyllum panigrahanum* and *Eria meghasaniensis* occur here. The actual site for orchid sanctuary was selected at Gudugudia over an area of 12.14 hectares on a hilly terrain flanked by the river Khairi. They have an ambitious plan of bringing large number of native as well as exotic species and to establish a well-equipped laboratory for mass multiplication of rare and popular taxa.

The National Orchidarium at Yercaud in Tamil Nadu State houses about 225 species of orchids mainly from peninsular India and North Eastern States.

Tropical Botanic Garden & Research Institute situated at the picturesque site of Palode in Kerala State has 3 orchidaria for maintaining Indian species, hybrids and cultured seedlings. An open area with terraced beds has sun loving orchids on display. Species house has a massive collection of 425 species of Indian orchids including mounted blocks of epiphytic species from Kerala, Tamil Nadu, Karnataka, Assam, Sikkim, Kalimpong, Meghalaya, Nagaland and Arunachal Pradesh. Many rare species are now under cultivation.

Species variation is not taken in to account when conservation of a species is attempted in almost all cases mentioned above. Often, representation of a species is limited to a single individual or a few individuals. This does not represent a species in question and the whole range of variations of a species from throughout its distribution range has to be conserved for ensuring effective and meaningful conservation.

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