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ORCHID FLORA OF ANDHRA PRADESH, INDIA

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ABSTRACT

The Orchid flora of Andhra Pradesh, consisting of 83 species in 40 genera is accounted in this paper. The enumeration provides correct names of the taxa dealt with, the basionym and synonyms, if any, as provided in the regional floras. Notes on ecology and phenology of flowering are followed with occurrence of the species in the state. 5 genera and 17 species form new record to the flora of Andhra Pradesh.

INTRODUCTION

The State of Andhra Pradesh is located in the middle of the Indian peninsula on the east between latitudes 12°-37′ N and 19°-54′ N; and longitudes 76°- 46′ E and 84°- 46′ E. Tamil Nadu binds the state in the south; Karnataka in the south and west; Maharashtra in the north and northwest; Chhatisgarh and Orissa in the north; and the Bay of Bengal in the east. It has an area of 2,75,068 sq km, with a long coastline of 968 km along the Bay of Bengal.

The State has a varied topography from coastal plain to extensive plateau (300-600 m) and hilly tracts (above 600 m). The Eastern Ghats of India, stretching in northeast to southwest of the Indian peninsula, for most of its length is situated in the state of Andhra Pradesh. It consists of innumerable hill ranges in a discontinuous manner in altitudes varying from 600 to 1350 m. The northern reach of the Ghats, varying in width from 60 to 70 m, is highly dissected by a number of valleys.

Climate and Rainfall

The State, located in the tropics, enjoys a warm climate with maximum and minimum temperature varying between 37 - 44°C and 14 -19°C in the summer and winter respectively. The mean daily temperature is around 18 - 20°C. The state receives two-thirds of its annual rainfall from the southwest monsoon between June to September and the rest mostly from the northwest monsoon between October to December. The mean annual rainfall of the state is 900m. In favourable areas it is however, higher between 1000-1250 mm. The rainy days are also different in different districts varying between 35 to 58 days.

Distribution of Orchids

The different forests are tropical in nature and are Tropical Semi-evergreen, Tropical Moist deciduous, Dry deciduous, Northern Mixed Dry deciduous, Dry Savannah, Dry Evergreen and Tropical Scrub Forest types There are, besides special types of forests like strand vegetation, Estuarine vegetation, Aquatic vegetation etc. (Pullaiah, 1997). The Tropical Moist deciduous forests and the Tropical Semi-evergreen forests only form favourable habitats for the growth of orchid flora. The Moist deciduous forests, found in average altitude of 600 m and average rainfall of 1000 mm, are spread mostly in the districts of Srikakulam, Vishakhapatnam, East Godavari, West Godavari, Kurnool, Cuddapah and Chittoor. The tropical semi-evergreen forests are indeed moist deciduous forests mixed with evergreen elements and are localized in small pockets in favourable climatic conditions with plenty of humus and moisture in the soil. These are generally met in valleys and along the banks of perennial watercourses in altitudes above 600 m. Such areas are seen mostly around Gudem,

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Sileru, Sapparala, Chinatapalli, Dharakonda, Galikonda, Minumuluru, Padavalasa in Vishakhapatnam district and Maredumilli in the East Godavari district. There are many smaller areas in the Rampa Agency, along the banks of Godavari River and other perennial hill streams. In other types of forests, mentioned earlier, orchids occur scarcely.

The districts of East Godavari (39), Vishakhapatnam (39), Chittoor (15), Vijaynagaram (10), Nellore (7) and Kurnool (6) bear favourable habitats (figure in parenthesis indicate number of orchid species found); the interior districts however, have barely any orchid flora. There are favourable pockets such as Maredumilli, Rampa Agency (EG); Chintapalli, Minumuluru (VSKP); Tirumala hills, Horsely hills, Yerlagada (CHT), which are found to be orchid-rich habitats.

Floristic Work

Andhra Pradesh is floristically one of the well-studied regions of India. Great botanists like W. Roxburgh, R. Wight, R. H. Beddome, A. G. Bourne, C. A. Barber, A. W. Lushington, J. S. Gamble, C.E.C. Fischer have immensely contributed to the flora of Andhra Pradesh through their work in the Pre-independence days of India, Andhra Pradesh was a part of the then Madras Presidency until it was formed in 1956. A number of scientists thereafter have worked and their findings have been published either in journals or in districts floras for the state. Mention may be made of A. M. Rao, B. S. Narayana, D. C. S. Raju, G. V. S. Rao, J. L. Ellis, K. N. Rao, K. Thothathri, M. S. Ramaswami, N. P. Balakrishnan, R. S. Rao, S. H. Sreeramulu, S. Sudhakar, and V. N. Swami etc. Pulliah (1997) in his work Flora of Andhra Pradesh has given details of these works.

The above floristic works provided account of Orchidaceae in the respective regions. Exclusive study of Orchidaceae of the state, like available for many of the Indian States, is however, not available for Andhra Pradesh. The Bhubaneswar unit, All India Coordinated Project, sponsored by the Ministry of Environment and Forests, aimed for Taxonomy Capacity Building of Indian Orchids, has taken up a modest beginning in this direction. It has conducted field visits in the districts of Chittoor, East Godavari and Vishakhapatnam. Besides, various herbaria like the Central National Herbarium Howrah (CAL), Madras Herbarium, Coimbatore (MH) and herbarium of the Botany Department, Andhra University, Vishakhapatnam (AU) have been consulted. The study revealed several additional record of **species (marked with an asterisk in the enumeration)** and genera (marked with double asterisk) to the orchid flora of Andhra Pradesh. All these species have been correctly identified and name changes occurred to several species (marked with a + sign) have been accounted for here. These collections are maintained in the orchidarium of the Regional Plant Resource Centre, Bhubaneswar. Some of these species have also been deposited in the herbarium of this institution (REPRECENT).

This communication aims at bringing an account of the orchid flora of Andhra Pradesh as known today. In what follows the correct name of the species, followed by the basionym and common synonyms as appear in the regional floras is provided. Occurrence of the species in the state, its frequency, brief ecology and the flowering period is followed thereafter. The localities of occurrence are taken from the literature. Additional localities, if any, based on the present field study as also from consultation of herbaria is also provided; the new field numbers are prefixed with TOB.

Artificial key to the Genera

1a.	Terrestrial plants	...2
1b.	Epiphytic plants	...19
2a.	Plants lacking green leaves and stems	...3
2b.	Plants with green leaves and stems	...4
3a.	Underground stem a slender rootstock, with a clump of spreading roots; plant up to 60 cm high, sepals and petals free, lip stipitate	... *Aphyllorchis*

3b.	Underground stem an irregular fleshy corm; roots a few, thread-like; plants to 12 cm high; sepals and petals connate at base into a 2-lipped tube; lip sessile	... *Didymoplexis*
4a.	Root-climbers; stem sub-cylindrical, branching; leaves reduced to scales	... *Vanilla*
4b.	Non-climbers; always leafy	...5
5a.	Plants with distinct corms or tuberoids	...6
5b.	Plants without corm or tuberoid	...13
6a.	Subterranean stem a corm	...7
6b.	Subterranean stem a root-stem tuberoid	...9
7a.	Leaves appear after flowering; leaf solitary, cordate or orbicular; stem with stolon; corm globose; roots rudimentary	... *Nervilia*
7b.	Leaves and flowers contemporaneous or so, leaves two or more, not orbicular or cordate; stolon absent; corm ovoid; roots normal	...8
8a.	Corm hypogeal or epigeal; inflorescence erect; flowers well spaced on a long rachis; lip inferior	... *Eulophia*
8b.	Corm always hypogeal; inflorescence decurved; flowers clustered on a short rachis; lip superior	... *Geodorum*
9a.	Lip with two spurs besides each other	... *Satyrium*
9b.	Lip with a single spur	...10
10a.	Plants to 100 cm tall, robust; flowers c. 10 cm across; spur c.10 cm long; lateral lobes of lip pectinately lobed	... *Pecteilis*
10b.	Plants and flowers medium or small-sized; lip not pectinately lobed	...11
11a.	Ovary erect and adpressed to rachis; flowers very small (6 mm); stigma sessile	... *Peristylus*
11b.	Ovary widely spreading at angle to the rachis; flowers medium-sized; stigma stalked	...12
12a.	Flowers not opening; green; spur saccate, small, laterally compressed	... *Odisha*
12b.	Flowers widely opening, white, green or yellow; spur elongate, sometimes up to 10 cm, tubular	... *Habenaria*
13a.	Stem not swollen or pseudobulbous	...14
13b.	Stem swollen above the ground to a pseudobulb, covered with sheaths	...17
14a.	Leaves grass-like, erect; plants very small	... *Zeuxine*
14b.	Leaves and plants otherwise	...15
15a.	Stem erect, slender; roots fascicled, coarse; leaves membranous, plicate	...16
15b.	Stem decumbent, fleshy, rooted on the nodes; leaves soft herbaceous	... *Goodyera*
16a.	Plants to 150 cm tall, leaves many, cauline; inflorescence lateral, axillary, branched; lip without a spur	... *Corymborkis*
16b.	Plants about 25 cm tall; leaves two, apical, sub-opposite; inflorescence terminal, simple; lip spurred	... *Tropidia*
17a.	Flowers resupinate; column long, slender winged above	... *Liparis* (in part)
17b.	Flowers non-resupinate; column short, stout, entire	...18
18a.	Lip sessile, apex notched, with large basal auricles stretching backwards on both sides of the column	... *Crepidium*
18b.	Lip narrow at base, apex fringed, without basal auricles,	... *Seidenfia*
19a.	Stem not fleshy or pseudobulbous; monopodial plants	...20
19b.	Stem fleshy or pseudobulbous; sympodial plants	...33
20a.	Stem scandent, 1-3 m tall; flowers large and showy	...21
20b.	Stem erect or sub erect, flowers large or small	...22
21a.	Leaves terete; raceme many flowered, flowers purple	... *Papilionanthe*
21b.	Leaves linear-oblong, raceme few-flowered restricted to the apex; flowers pure yellow	... *Taprobanea*
22a.	Leaves terete; raceme condensed, with a few small purplish flowers	... *Luisia*

22b.	Leaves dorsiventrally flattened, fleshy	...23
23a.	Stem short; leaves crowded at the base	...24
23b.	Stem elongate, leaves cauline	...29
24a.	Leaves elliptical, flat; stem highly reduced; lip with a pair of bilobed appendages	... *Kingidium*
24b.	Leaves linear-oblong, channeled; stem short; lip without appendages	...25
25a.	Inflorescence simple	...26
25b.	Inflorescence branching	...27
26a.	Inflorescence condensed, corymbose, few flowered; spur saccate, basin-shaped	... *Gastrochilus*
26b.	Inflorescence, elongated, racemiform, many flowered; spur conical	... *Cleisostoma*
27a.	Lip with two collateral spurs	... *Diplocentrum*
27b.	Lip with a single spur	...28
28a.	Panicle with very many filiform branches; flowers brown with a white lip	... *Staurochilus*
28b.	Panicle with a few branches, branches short, thick; flowers yellow with red blotches	... *Pomatocalpa*
29a.	Inflorescence simple	...30
29b.	Inflorescence branching	...31
30a.	Peduncle long; raceme erect; flowers a few, large, well-spaced, greenish yellow; spur conical	... *Vanda*
30b.	Peduncle short; raceme pendent, dense; flowers medium-sized, white with pink dots; spur laterally compressed	... *Rhynchostylis*
31a.	Peduncle much longer than the leaves, branched, each branch ending in a short raceme; lip subpanduriform, resembling a bee	... *Cottonia*
31b.	Peduncle much shorter than the leaves	...32
32a.	Flowers non-resupinate, small, fleshy, fragile; sepals and petals yellow, with transverse maroon bands; lip with a short spur	...*Acampe*
32b.	Flowers resupinate, medium-sized, showy, white or purple; lip with a forwardly curving spur	...*Aerides*
33a.	Leaves equitant, fleshy, stem reduced; inflorescence terminal, densely cylindrical; flowers minute, yellow	... *Oberonia*
33b.	Leaves dorsiventral, neither ensiform nor fleshy; inflorescence terminal or lateral, lax or dense; flowers small or large, variously coloured	...34
34a.	Inflorescence terminal	...35
34b.	Inflorescence lateral	...37
35a.	Pseudobulb uninodal; leaves terminal; flowers numerous, resupinate	...36
35b.	Psedobulb many-noded; leaves on the nodes; flowers many, non-resupinate	... *Polystachya*
36a.	Leaf single, coriaceous; bracts persistent; flowers small	... *Pholidota*
36b.	Leaves two, membranous; bracts deciduous; flowers minute	... *Liparis* (in part)
37a.	Pseudobulb short; inflorescence on a separate floral shoot from base of pseudobulb	...38
37b.	Pseudobulb elongate, stem-like; inflorescence of short fascicles, usually from upper nodes of leafy shoot	...39
38a.	Leaves two; inflorescence racemiform; lateral sepals free	... *Bulbophyllum*
38b.	Leaf single; inflorescence umbellate; lateral sepals basally free, then twisted abruptly to form a convex blade	... *Cirrhopetalum*
39a.	Flowers white or brightly coloured, glabrous; pollinia four	... *Dendrobium*
39b.	Flowers dull-coloured; pedicel, ovary and sepals outside puberulous; pollinia eight	... *Eria*

ENUMERATION

***Acampe carinata** (Griff.) Panigrahi, Taxon 34 (4): 689.1985; S.Misra, Orch. Orissa: 580. 2004. *Saccolabium carinatum* Griff., Notul. Pl. Asiat. 3: 334. 1851. *Saccolabium papillosum* Hook. f., Fl. Brit. India 6: 63. 1890, excl. syn.

Minumuluru; Wongasara coffee plantation TOB 0098 (VSKP). On roadside trees; occasional; flowers October – November.

Acampe ochracea (Lindl.) Hochr. Bull. New York Bot. Gard. 6: 270.1910; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 931. 1997; S. Misra, Orch. Orissa: 577. 2004. *Saccolabium ochraceum* Lindl., Edward's Bot. Reg. 28: Misc.2. 1842; Hook. f., Fl. Brit. India 6: 62. 1890, excl. syn. *Acampe wightiana* var. *longepedunculata* Thw.

Chintapalli; TOB 0099, Minumuluru, (VSKP). In moist forests along stream sides and road side trees; locally abundant; flowers December- January.

Acampe praemorsa (Roxb.) Blatt. & McCann, J. Bombay nat. Hist. Soc. 35: 495. 1932; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 931.1997; S.Misra, Orch. Orissa: 584. 2004. *Epidendrum praemorsum* Roxb., Pl. Corom.1: 34, t. 43. 1795. *Saccolabium praemorsum* (Roxb.) Hook. f., 6: 62. 1890 (excluding synon. *Acampe excavata* Lindl. & *Aerides undulata* J. E. Smith). *Saccolabiam wightianum* Hook. f., Fl. Brit. India 6: 62. 1890. *Acampe. wightina* Lindl., Fol. Orch. Acampe 2. 1853; C.E.C. Fisch. in Gamble, Fl. Madars :1447 .1928.

Maredumilli; Rampa (EG); Jarda (VJN); Gummada (SKLM); Lakshmipuram; Wongasava TOB 0100 (VSKP); Chittoor (CTR). In open and moist deciduous forests; common; flowers May – August.

*__Acampe rigida__ (Buch.- Ham. ex J. E. Sm.) Hun. Kew Bull. 24: 98. 1970; S.Misra, Orch. Orissa: 587. 2004. *Aerides rigida* Buch.- Ham. ex J. E. Sm. in Rees, Cyclopedia: 39 (78). 1819. *Saccolabium longifolium* (Lindl.) Hook. f., Fl. Brit. India 6: 62. 1890

Maredumilli; Bodhuluru (EG) TOB 0125. In moist forests; rare; flowers September – October.

Aerides multiflora Roxb.Corom. Pl. 3: 63, t. 271. 1820; Hook. f., Fl. Brit. India 6: 44. 1890 (excl. synon. *A. roseum*); Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 932. 1997; S.Misra, Orch. Orissa: 654. 2004

Yarlagada; Sesharayi – Nulakamaddi (EG). In hill forests; occasional; flowers March-June.

Aerides odorata Lour.Fl. Cochinch. 2: 525. 1790; Hook. f., Fl. Brit. India 6: 47. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1443 .1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 932. 1992; S.Misra, Orch. Orissa: 649. 2004

Maredumilli; Sesharays (EG); Chintapalli; Sunkarmetta; Gorapur; Tanjavanam (VSKP); Geddapalli (WG). In moist deciduous forests; occasional; flowers June.

Aerides ringens (Lindl.) C.E.C. Fisch. Kew Bull. 1928: 284. 1928 & in Gamble, Fl. Pres. Madras 3 (8): 1442. 1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 933. 1997; S.Misra, Orch. Orissa: 656. 2004. *Saccolabium ringens* Lindl., Gen. Sp. Orch. Pl.: 221.1833. *Aerides radicosum* A. Rich. Ann. Sci. Nat. Bot. ser. 2,15: 65. 1841; Hook. f., Fl. Brit. India 6: 46. 1890. 1890; pp. *Aerides lineare* Hook. f., Fl. Brit. India 6: 47. 1890.

West Godawari district. In cool and moist forests; rare; flowers July.

Aphyllorchis montana (Thw.) Rchb. f.Linnaea 41: 57. 1876; Hook. f., Fl. Brit. India 6: 116. 1890.1890; C.E.C. Fisch. in Gamble, Fl. Madars :1457.1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 933. 1997.

Tirumala - Papavinasanam; Thalakona (CTR). In undisturbed hill forests; rare; flowers February.

Bulbophyllum cariniflorum Rchb. f. Walp. Ann. 6: 253. 1861; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 934. 1997; S.Misra, Orch. Orissa: 480. 2004. *Bulbophyllum bisetum* auct non Lindl. 1842, Hook. f., Fl. Brit. India 5: 767. 1890.

Visakhapatnam district. In semi-evergreen forests, under shade; rare; flowers August.

*__Cirrhopetalum neilgherrense__ Wight, Ic. Pl. Ind. Or. 5(1): 7. t. 1654. 1851; Hook. f., Fl. Brit. India 5: 778. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1420.1928; *Bulbophyllum kaitense* Rchb. f., Walp. Ann. 6: 262. 1861; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 934. 1997.

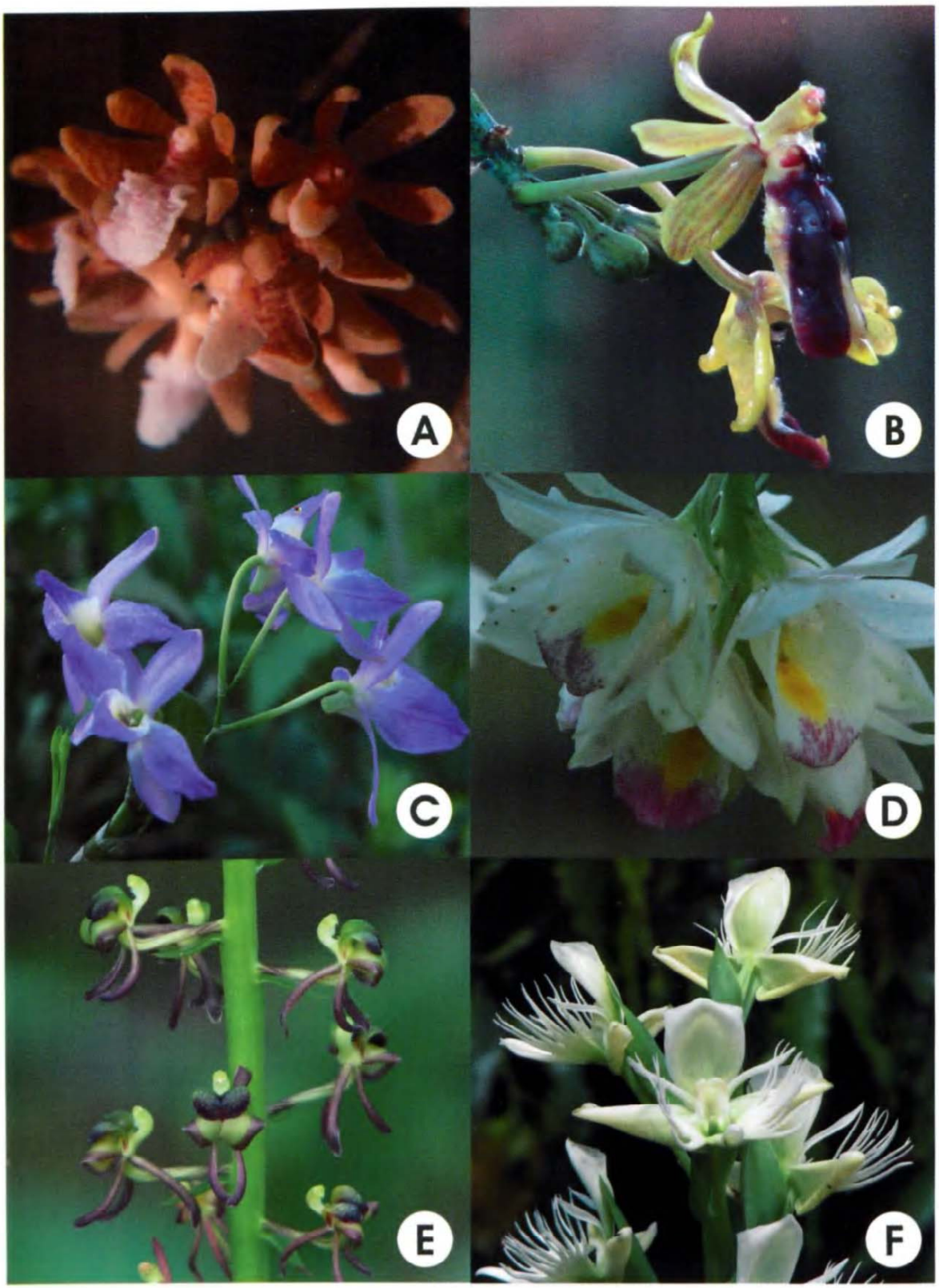


Plate 1. Orchids of Andhra Pradesh.
A. Acampe carinata; **B.** Cottonia peduncularis; **C.** Dendrobium regium; **D.** Geodorum recurvum; **E.** Liparis paradoxa; **F.** Pectilis gigantea

Tirumala hills (CTR). In semi-evergreen forest, near water course; rare; flowers June-October.

Cleisostoma tenuifolium (L.) Garay, Bot. Mus. Leafl. Harv. Univ. 23 (4): 175. 1972; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 934. 1997. *Epidendrum tenuifolium* L., Sp. Pl.: 952. 1753. *Sarcanthus pauciflorus* Wight, Ic. Pl. 5(1): 20. t. 1747. 1851. *Sarcanthus peninsularis* Dalz. in Hook., Kew J. Bot. 3: 343. 1851; Hook. f., Fl. Brit. India 6: 67. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1447.1928.

Tirumalla hills (CTR). In moist hill-forests; rare; flowers July.

Corymborkis veratrifolia (Reinw.) Blume, Coll. Orchid. Arch. Ind. 125. pl. 43, fig. 1& pl. 42, fig. ER. 1859; C.E.C. Fisch. in Gamble, Fl. Madars :1452.1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 935. 1997. *Hysteria veratrifolia* Reinw., Bot. Zeit. 2: 5. 1825. *Corymbis verartifolia* (Reinw.) Rchb.f., Flora 48: 184.1865; Hook. f., Fl. Brit. India 6: 91. 1890.

Cuddapah district. In moist forest; rare; flowers October.

"Cottonia peduncularis (Lindl.) Rchb. f. Cat. Orchid. Schiller: 52. 1857; S.Misra, Orch. Orissa: 572. 2004. *Vanda peduncularis* Lindl., Gen. Sp. Orch. Pl.: 216. 1833. *Cottonia macrostachya* Wight, Icon. 5(1): 21. t. 1755. 1851; Hook. f., Fl. Brit. India 6: 26. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1439.1928.

Bodhuluru TOB 0096; Maredumilli, Tiger Point (EG). In semi-evergreen forests; rare; flowers March-April.

"Crepidium acuminatum (D.Don) Szlach. Fragm. Flor. Geobot. Suppl.3: 128. 1995. *Malaxix acuminata* D. Don, Prodr. Fl. Nepal: 29. 1825; Seidenf. in Matthew, Fl. Tamil Carnatic 3: 1582. 1983; Indian J. For. 24 (1): III. 2001. *Microstylis wallichii* Lindl., Gen. Sp. Orch. Pl.: 20. 1830; Hook. f., Fl. Brit. India 5: 686. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1407.1928.

Maredumilli (EG). In moist forest as undergrowth; rare.

Cymbidium aloifolium (L.) Sw. Nova Acta Regiae Soc. Sci. Upsal 6: 73. 1799 (sensu lato); Hook. f., Fl. Brit. India 6: 10. 1890; Fisch. in Gamble, Fl. Madars :1436.1928.; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 935. 1997; S.Misra, Orch. Orissa: 523. 2004. *Epidendrum aloifolium* L., Sp. Pl: 953. 1753.

Maredumilli; Palagondi (EG); Borra - Anantagiri; Kotapalli; Minumuluru (VSKP); Manda (VJN). Common is moist deciduous forests; flowers March-April.

Dendrobium aphyllum (Roxb.) Fischer Fl. Pres. Madras 8: 1416.1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 936. 1997; S.Misra, Orch. Orissa: 448. 2004. *Limodorum aphyllum* Roxb., Corom. Pl. 1, 2: 34, t. 4. 1795. *Dendrobium pierardii* Roxb. ex Hook., ex Fl. 1: t. 9. 1822; Hook. f., Fl. Brit. India 5: 738. 1890.

Gurthedu (EG); Gudem valley; G. Madugula; Chintapalli (before Darakonda) *S. Misra* 1969 (VSKP). In moist deciduous mountainous forests; Srikakulam district; occasional; flowers March-April.

Dendrobium aqueum Lindl. Edw. Bot. Reg. 6, t. 54. 1843; Hook. f., Fl. Brit. India 5: 739. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1417 .1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 936. 1997.

Yarlagada (EG). In moist hill forests; rare; flowers September.

Note : This is included on the collection of *V. N. Swami* 170 (CAL). This being a sterile specimen, the identification is doubtful.

Dendrobium herbaceum Lindl. Edw. Bot. Reg. Misc. 69. 1840; Hook. f., Fl. Brit. India 5: 719. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1416.1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 937. 1997; S.Misra, Orch. Orissa: 435. 2004.

'Dendrobium macrostachyum Lindl. Gen. Sp. Orch. Pl.: 78. 1830; Hook. f., Fl. Brit. India 5: 735. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1416.1928; S.Misra, Orch. Orissa: 445. 2004.

Bodhuluru; Maredumilli - Tiger Point (EG); R. Nagar coffee plantation; Kotapalli TOB 0094; Sunkarmetta hills (VSKP). In moist deciduous forests; occasional; flowers May- June.

***Dendrobium moschatum** (Buch.- Ham.) Sw. Schr. Neue Journ. 1: 94.1806; S.Misra, Orch. Orissa: 427. 2004. *Epidendrum moschatum* Buch.- Ham. in Syme, Emb. Kingd. Ava, ed. 1: 478. 1800. *Dendrobium calceolaria* Carey ex Hook., Exot. Fl. 3: t. 184. 1827; Hook. f., Fl. Brit. India 5: 744. 1890.

Bodhuluru, Maredumilli (EG); Chintapalli (before Darakonda) *S. Misra* 1970 (VSKP). In semi-evergreen forests; under shade; rare; flowers May June.

Dendrobium ovatum (Willd.) Kranz. Pflanzenr. 45: 71. 1910; C.E.C. Fisch. in Gamble, Fl. Madars :1416.1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 937. 1997. *Cymbidium ovatum* Willd., Sp. Pl. 4: 101. 1805. *Dendrobium chlorops* Lindl., Bot. Reg. Misc. 44. 1844; Hook. f., Fl. Brit. India 5: 719. 1890.

Papavinasanam valley – Tirumala (CTR). In moist forest; rare; flowers September.

***Dendrobium regium** Prain. J. Asiat., Soc. Bengal 71 (1): 80. 1902; S.Misra, Orch. Orissa: 423. 2004.

Kotapalli TOB 0106 (VSKP). In moist semi-evergreen forest, rare; flowers May.

Didymoplexis pallens Griff. Calcutta J. Nat. Hist. 4: 383. 1844; Hook. f., Fl. Brit. India 6: 122. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1459.1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 937. 1997; S.Misra, Orch. Orissa: 267. 2004.

West Godavari district. In hill forests, under shade; rare; flowers June.

Diplocentrum recurvum Lindl. Edw. Bot. Reg.18: sub t. 1522. Hook. f., Fl. Brit. India 6: 78. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1449.1928; Ramakrishna 1997: 938.

Horsley hills; rare; flowers May.

Eria bambusifolia Lindl. J. Linn. Soc. 3: 61. 1859; Hook. f., Fl. Brit. India 5: 805. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1426.1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 938. 1997; S.Misra, Orch. Orissa: 393. 2004.

Minumuluru - Kappakonda; Kotapalli (VSKP). In semi-evergreen moist forest; rare; flowers August – November.

Eulophia epidendraea (Koen.) Schltr. Die Orchideen: 346. 1915 ('*epidendroides*'); C.E.C. Fisch. in Gamble, Fl. Madars :1434.1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 939. 1997. *Serapias epidendraea* Koen. in Retz., Obs. Bot. 6: 65. 1791. *Eulophia virens* (Roxb.) R. Br. ex Lindl., Edw. Bot. Reg. 7: sub. t. 573. 1821; Hook. f., Fl. Brit. India 6: 1. 1890.

Thalakona (CTR); Tada; Venkatagiri (NLR); Srikakulam district; Nattavaram (VSKP). In scrub jungles, sheltered among thickets; occasional; flowers December – February.

Note : *J. L. Ellis* 15744 (CAL) from Balapalle (CDP), labeled as *Eulophia epidendraea*, is found to be *E. graminea* Lindl.

Eulophia explanata Lindl. Gen. Sp. Orch. Pl: 180. 1832; Hook. f., Fl. Brit. India 6: 3 & 195. 1890; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 939. 1997; S.Misra, Orch. Orissa: 534. 2004.

Cheedipalem (EG); Vishakhapatnam district. In moist deciduous open forests; rare; flowers April.

Eulophia graminea Lindl. Gen. Sp. Orch. Pl.: 182. 1833; Hook. f., Fl. Brit. India 6: 2. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1435.1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3:939. 1997; S.Misra, Orch. Orissa: 542. 2004

Cuddapah [(*Ellis* 15744 (CAL)] and Nellore [(*Fischer* 4293 (CAL)] districts. In open scrub forests; rare; flowers March.

Eulophia ochreata Lindl. Journ. Linn. Soc. 3: 24. 1858; Hook. f., Fl. Brit. India 6: 2. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1435.1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 940. 1997; S.Misra, Orch. Orissa: 531. 2004.

Vishakhapatnam district. In hill forests, as undergrowth; rare; flowers March-April.

***Eulophia spectabilis** (Dennst.) Suresh in Nicolson & al. Interpret. Hort. Malab.: 300.1988; S.Misra, Orch. Orissa: 539. 2004. *Wolfia spectabilis* Dennst., Schlussel zum Hort. Int. Malabar.: 11, 25, 38. 1818. *Eulophia nuda* Lindl., Gen. Sp. Orch. Pl.: 180. 1833; Hook. f., Fl. Brit. India 6: 5. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1435.1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3:940. 1997.

Chintapalli (VSKP); Chittoor (CTR). In moist deciduous open hill forests; occasional; flowers May- June.

Gastrochilus calceolaris (Buch.- Ham. ex J. E. Sm.) D. Don Prodr. Fl. Nepal: 32. 1825; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 940. 1997. *Aerides calceolare* Buch.- Ham. ex J. E. Smith in Rees, Cyclop. 39. n. 11. 1818. *Saccolabium calceolare* (Buch.- Ham. ex J. E. Sm.) Lindl., Gen. Sp. Orch. Pl.: 223. 1833; Hook. f., Fl. Brit. India 6: 60. 1890.

Gudem valley (VSKP). In semi-evergreen hill forest; rare; flowers October.

Geodorum densiflorum (Lam.) Schltr. Fedde Repert. Beih 4: 259. 1919; C.E.C. Fisch. in Gamble, Fl. Madars :1437.1928; S.Misra, Orch. Orissa: 550. 2004. *Limodorum densiflorum* Lam., Encycl. Meth. Bot. 3 (1): 516. 1792. *Geodorum purpureum* R. Br. in W.T. Aiton, Hort. Kew ed. 2, 5: 207. 1813 (char. reform); Hook. f., Fl. Brit. India 6: 16. 1890.

Palagadda; Cheedipalam; (EG); GundlaBramheswaram; Chelama (KNL); Chittoor (CTR); Aklaspur (KNR). In moist deciduous open forests; frequent; flowers August.

***Geodorum recurvum** (Roxb.) Alston in Trimen Fl. Ceylon 6: 276. 1931; S.Misra, Orch. Orissa: 554. 2004. *Limodorum recurvum* Roxb., Corom. Pl.: 33. 1795 et Fl. Indica 3: 469, 1832. Nomencultural synonym: *Geodorum dilatatum* R. Br. in W. T. Aiton, Hort. Kew ed. 2, 5: 207. 1813; Hook. f. 6: 17 (in part).

Maredumilli – Kutravada; Matumanedi bridge site, on way to Maredimilli from Rampa Chodavaram (EG); Kotapalli (VSKP) TOB 0108. In moist deciduous forest floors; occasional; flowers June.

Note: Some of the species treated by Ramakrishna (*l.c.*) as *Geodorum densiflorum,* could be this species. In the former, the scape is longer than the leaves, flowers very many, opening gradually, smaller, not well opening, pale purple. In *Geodorum recurvum*, the inflorescence is shorter than the leaves, flowers many, widely opening, larger, white with purple and yellow flushing.

Goodyera procera (Ker Gawl.) Hook. Exot, Fl. t. 39. 1823; Hook. f., Fl. Brit. India 6: 111. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1456.1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 942. 1997; S.Misra, Orch. Orissa: 299. 2004. *Neottia procera* Ker Gawl., Bot Reg. 8: t. 639.1822.

Dharlammagudi; Kotapalli TOB 0110 (VSKP). In semi-evergreen forests; on edge of perennial stream; rare; flowers January – February.

Habenaria digitata Lindl. Gen. Sp. Orch. Pl.: 307. 1835; Hook. f., Fl. Brit. India 6: 134. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1469.1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 943. 1997; S.Misra, Orch. Orissa: 179. 2004.

Vatigadda (EG); Venkatagiri hills (NLR); West Godarani district. In moist deciduous forests, on moist sloppy ground; rare; flowers October.

***Habenaria diphylla** Dalz. Hook. J. Bot. 2: 262. 1850; Hook. f., Fl. Brit. India 6: 151. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1471.1928; S.Misra, Orch. Orissa: 205. 2004.

Araku, *Balakrishnan* 10856 CAL; Anantagiri. *Seshavataram* s. n. (VSKP). In moist deciduous forest; on moist shill slopes; rare; flowers October.

Habenaria furcifera Lindl. Gen. Sp. Orch. Pl.: 319. 1835; Hook. f., Fl. Brit. India 6: 149. 1890; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 943. 1997; S.Misra, Orch. Orissa: 227. 2004.

Rajavomangi; Elarthi – Donkarayi, *Sudhakar* 5422 (2), VV (EG); Gudivada *s. col.* 2251, VV; near Araku (VSKP). Srikakulum and Chittoor districts. In moist deciduous forests, under shade; occasional; flowers September.

+**Habenaria indica** Sathish & Manilal Taxon 35 (4): 719. 1986. *Habenaria hollandiana* Sant., Fl. Purandh.: 126. 1958; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 944. 1997. *Habenaria affinis* Wight, Ic. Pl. Ind. Or. 5(1): t. 1707. 1851. non Don 1825; Hook. f., Fl. Brit. India 6: 149. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1471.1928.

Ellarthi (EG); Nallamalais (KNL); Venkatagiri hills (NLR); Guntupaka (VJN). In moist deciduous forests; in moist localities; common; flowers September.

Habenaria longicorniculata Graham, Cat. Bombay Pl.: 202. 1839; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 944. 1997; S.Misra, Orch. Orissa: 215. 2004. *Habenaria longicalcarata* A. Rich., Ann. Sci. Nat. Bot. (ser. 2)15: 71. t. 38. 1841; Hook. f., Fl. Brit. India 6: 141. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1470 .1928.

Cherukonda (VSKP). In open moist deciduous forests; on hill slopes; rare; flowers September.

Habenaria marginata Coleb. Hook. Exot. Fl. T. 136. 1825; Hook. f., Fl. Brit. India 6: 150. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1471 .1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 944. 1997; S.Misra, Orch. Orissa: 223. 2004.

Araku valley (VSKP); Nallamalais (KNL); Narsapur (MDK); Kamareddy fields (NZB); Mahaboobnagar (MBNR). In moist deciduous open forests and hills; occasional; flowers September.

Habenaria ovalifolia Wight, Ic. Pl. Ind. Or. 5 (1): 13. t. 1708. 1851; Hook. f., Fl. Brit. India 6: 149. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1471.1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 945. 1997.

Dummukonda (EG). In moist deciduous forest, on hill slope, as undergrowth; rare; flowers September.

+**Habenaria panigrahiana** S. Misra Blumea 27: 213, fig. 1. 15 May 1981; S.Misra, Orch. Orissa: 189. 2004.

Matumanedi bridge site, on way to Maredumilli from Rampa Chodavaram (EG) TOB 0107 REPRECENT; rare; flowering October.

Habenaria plantaginea Lindl. Gen. Sp. Orch. Pl.: 323. 1835; Hook. f., Fl. Brit. India 6: 141. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1470.1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 945. 1997; S.Misra, Orch. Orissa: 198. 2004.

Rampa hills; Peddapore; Dummakonda; Maredumilli; Godavari – Sirivaka (EG); Anantagiri; Sunkarametta (VSKP); Guntupaka (VJN); Loyakondapalli (KSN); Papanasanam dam site (CHT). In moist deciduous forests, under shade, on moist forest floors; frequent; flowers October.

Habenaria ramayyana R. Chary & J.J. Wood, Kew Bull. 36: 325. 1981; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 946. 1997.

Amrabad forest reserve (MBNR). In moist deciduous forest; rare; flowers July.

Habenaria rariflora A. Rich. Ann. Sci. Nat. (ser. 2) 15: 70. t. 20. 1841; Hook. f., Fl. Brit. India 6: 136. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1469.1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 946. 1997.

Horsley hills (CTR). In moist deciduous hill forest; common; flowers July.

Habenaria roxburghii R. Br. Prodr. 1: 312.1810 as "(Pers.) R. Br."; Nicolson in Saldanha & Nicolson, Fl. Hassan dist.: 834. 1976 (as *roxburghii* Nicolson, nom. nov.); Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 946. 1997; S.Misra, Orch. Orissa: 212. 2004. *Habenaria platyphylla* Spreng. in L., Syst. Veg. (ed.16): 690. 1826. nom. superfl.; Hook. f., Fl. Brit. India 6: 140. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1470.1928.

Dharakonda (VSKP); Elwinpet (VJN); Chittoor (CTR); Sirpur (AB); Ghanapur RF (NZB); Venkatagiri hills (NLR); Nallamalais (KNL); Medak (*Sebastine* 6769 CAL!) and Warangal (*Sebastine* 13133 CAL!) districts. In rolling countries; often sheltered inside bushes; frequent; flowers July – August.

Habenaria virens (Lindl.) Hunt & Summerh. Kew Bull. 20: 51. 1966. *Ate virens* Lindl., Gen. Sp. Orch. Pl. : 327. 1825. *Habenaria barbata* Wight ex Hook. f. Fl. Brit. Ind. 6: 133. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1468.1928. *Habenaria virens* (Lindl.) Abeyw., Ceylon J. Sci. Biol. Sci. 2: 151. 1959, nom. invalid (wrong basionym provided); Ramakrishna 1997: 947.

Venkatagiri durg (NLR). Yatkalmandapam TOB 304; Tirumala TOB 305 (CTR). In moist deciduous hill forest; frequent locally; flowers December.

Kingidium deliciosum (Rchb. f.) Sweet, American Orch. Soc. Bull. 39: 1095. 1970; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 947. 1997; S.Misra, Orch. Orissa: 621. 2004. *Phalaenopsis deliciosa* Rchb. f., Bonpl. 2: 93. 1854. *Doritis wightii* Benth. in Benth. & Hook. f., Gen. Pl. 3: 574. 1883; Hook. f., Fl. Brit. India 6: 32. 1890. *Kingiella decumbens* (Griff.) Rolfe, Orchid Rev. 25: 197. 1917; C.E.C. Fisch. in Gamble, Fl. Madars :1439.1928 (excl. syn. *Aerides decumbens* Griff.)

In coastal districts (Fischer). In semi-evergreen forests; in moist and shaded localities; rare.

Note: Ramakrishna (*l.c.*) has doubts of its occurrence in Andhra Pradesh; this species is included on the authority of Fischer (*l.c.*)

Liparis deflexa Hook. f., Fl. Brit. India 5: 697. 1890; S.Misra, Orch. Orissa: 350. 2004. *Liparis prazeri* King & Pantl., J. Asiat. Soc. Bengal pt. 2, Nat. Hist. 66: 582. 1897; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 948. 1997.

Palagadda (EG); Nallamallais, GundlaBrahmeswaram (KVL). In dense moist deciduous forests; as undergrowth; rare; flowers July – August.

***Liparis elliptica** Wight, Ic. Pl. Ind. Orient. 5 (1): 17, t. 1735. 1851; S.Misra, Orch. Orissa: 362. 2004. *Liparis viridiflora* sensu Hook. f., Fl. Brit. India 5: 704. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1411.1928. non (Blume) Lindl. 1830.

Chintapalli (VSKP) *Ramakrishna* s.n, AU. In semi-evergreen forest, in moist and shaded situation; rare; flowers November – December.

***Liparis nervosa** (Thunb.) Lindl. Gen. Sp. Orch. Pl.: 26. 1830; C.E.C. Fisch. in Gamble, Fl. Madars :1410. 1928 (excluding synon. L. *paradoxa* Rchb. f.); S.Misra, Orch. Orissa: 353. 2004. *Ophrys nervosa* Thunb., Fl. Japan: 27. 1784. *Liparis bituberculata* (Hook.) Ker Gawl., Bot. Reg. Sub. T. 882. 1825; Hook. f. 5: 696 (except synon. *Empusa paradoxa* Wallich). Kotapalli (VSKP) TOB 0110. In semi-evergreen forest; on edge of a perennial stream; flowers July.

***Liparis paradoxa** (Lindl.) Rchb. f. Walp. Ann. 6: 218. 1861; Hook. f., Fl. Brit. India 5: 697. 1890; S.Misra, Orch. Orissa: 357. 2004. *Empusa paradoxa* Lindl. in Ker Gawl., Bot. Reg. 10: sub t. 825. 1824.

Near Sri Sailam dam; *van der Maesen* 3212 CAL; Yatkalmandapam TOB 0303; (CHT); in mixed forest; on moist forest floor; rare; flowers September.

Liparis viridiflora (Blume) Lindl. Gen. Sp. Orch. Pl.: 31. 1830; Hook. f., Fl. Brit. India 5: 704. 1890(in part); Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 948. 1997; S.Misra, Orch. Orissa: 308. 2004. *Malaxis viridiflora* Blume, Bijdr.: 392. t. 54. 1825. *Liparis longipes* Lindl. in Wallich, Pl. As. Rar. 1: 31. t. 35. 1830; Hook. f. 5: 703. 1890; Fischer 1928: 1411.

Near Olugupalli (VSKP); Tirupati hills (CHT) *J. Rao* s.n. CAL. In semi-evergreen forests; in moist and shady situations; rare; flowers September – February.

***Luisia trichorhiza** (Hook.) Blume, Rumphia 4: 50. 1849; Hook. f., Fl. Brit. India 6: 23. 1890; S.Misra, Orch. Orissa: 669. 2004.

Vejuda, near Marudumilli (EG); Chintapalli TOB 0090 (VSKP). In moist deciduous forests; in open situations; common; flowers March – April.

Luisia zeylanica Lindl. Fol. Orchid Luisia 3. 1853; Ramakrishna 1997: 949; S.Misra, Orch. Orissa: 665. 2004. *Luisia teretifolia* sensu Hook. f., Fl. Brit. India 6: 22. 1890, non Gaud.: 1826.

Madugala; Gudem valley; Kotapalli; Wongasara; Sunkarmetta; Minumuluru TOB 0101 (VSKP); Maredumilli – Tiger Point (EG). Vijaynagaram and Srikakulam districts. In moist deciduous forests; frequent; flowers February – March.

Nervilia aragoana Comm. ex Gaud. in Freycinet, Voy. Ant. Monde Bot.: 422. t. 35. 1829; C.E.C. Fisch. in Gamble, Fl. Madars :1459.1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3:950. 1997; S.Misra, Orch. Orissa: 259. 2004. *Pogonia carinata* (Roxb.) Lindl., Gen. Sp. Orch. Pl.: 414. 1840; Hook. f., Fl. Brit. India 6: 121. 1890.

Rampa hills; Maredumilli – Kutravada, TOB 0112 (EG). In moist deciduous forests; under moist and shaded condition; rare; flowers June.

Nervilia crociformis (Zoll. & Mor.) Seidenf. Dansk Bot. Ark. 32 (2): 151. fig. 92. 1978; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3:950. 1997; S.Misra, Orch. Orissa: 244. 2004. *Bolborchis crociformis* Zoll. & Mor. in Moritzi, Syst. Verz. Pl. Zoll.: 89. 1846.

Devarkonda (EG); Wongasava coffee plantation TOB 0113 (VSKP). In moist deciduous forest, on hill slope; rare; flowers June.

***Nervilia infundibulifolia** Blatt. & McCann J. Bombay nat. Hist. Soc. 35: 735. t. 3. 1932; S.Misra, Orch. Orissa: 238. 2004.

Wongasava coffee plantation TOB 0111 (VSKP). In moist deciduous open forest; on hill slope; rare; flowers June.

Nervilia plicata (Andr.) Schltr. in Engl. Bot. Jahrb. 45: 403. 1911; Fischer 1928: 1458; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 950. 1997; S.Misra, Orch. Orissa: 250. 2004. *Arethusa plicata* Andr., Bot. Repos. 5: t. 321. 1803. *Epipactis plicata* Roxb., Fl. Ind. 3: 545. 1832. *Pogonia plicata* (Roxb.) Lindl., Gen. Sp. Orch. Pl.: 415. 1840; Hook. f., Fl. Brit. India 6: 119. 1890. *Nervilia biflora* (Wight) Schltr., *l.c.*; Fischer *l.c.*: 1459.

Maredumilli (EG); Tyda RF (VSKP). In moist deciduous hill forests; in moist and shaded condition; rare; flowers June.

Oberonia arnottiana Wight, Ic. Pl. Ind. Or. 5(1): 3. t. 1698. 1851; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 951. 1997. *Oberonia wightiana* sensu Hook. f., Fl. Brit. India 5: 683. 1890. p.p. non Lindl.; sensu C.E.C. Fisch. in Gamble, Fl. Madars :1407.1928.

Ethakonda (EG); Ebul RF – north to Gudem (VSKP). In moist hill forests; rare; flowers June.

Oberonia brunoniana Wight, Ic. Pl. Ind. Or. 5 (1): 3. t. 1622. 1851; C.E.C. Fisch. in Gamble, Fl. Madars :1406.1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 952. 1997.

Near Sesharayi; Rampa hills (EG). In semi-evergreen forests; under dense shade; rare; flowers September- October.

Oberonia ensiformis (J. E. Sm.) Lindl. Fol. Orchid. Oberon: 8. 1859; Hook. f., Fl. Brit. India 5: 679. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1406.1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 952. 1997; S.Misra, Orch. Orissa: 333. 2004. *Malaxis ensiformis* J. E. Sm. in Rees, Cyclop. 22. n. 14. 1812.

Gurtedu; Rampa hills, *Gamble* 15945 (CAL), *Swami* 613 (CAL); Bodhuluru, Bakkuru TOB 103 (EG). Gudem valley, *Swamy* 470, 502 (CAL); G. Madugula, *S. Rao* 47287 (2) (CAL); Chintapalli; Kotapalli TOB 0108 (VSKP). Jarda (VJN). Srikakulum district. In moist deciduous to semi-evergreen forests; in shade; frequent; flowers July.

Oberonia falconeri Hook. f. Ic. Pl.: t. 1780, 1888 and Fl. Brit. Ind. 5: 678.1 878; C.E.C. Fisch. in Gamble, Fl. Madars :1406.1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3:953. 1997; S.Misra, Orch. Orissa: 343. 2004.

Sesharayi; Rampa hills; Bakkuru (EG). Kotapalli, TOB 0104 (VSKP). In moist deciduous forests; occasional; flowers July – October.

***Oberonia mucronata** (D. Don) Ormer. & Seidenf. in Seidenf. Contr. Orch. Fl. Thailand XIII: 20. 1997; S.Misra, Orch. Orissa: 337. 2004. *Stelis mucronata* D. Don; Prodr. Fl. Nepal: 32. 1825. *Cymbidium iridifolium* Roxb., Fl. Ind. 3: 58. 1832. *Oberonia iridifolia* (Roxb.) Lindl. sensu Lindl., Gen. Sp. Orch. Pl.:15. 1830 (p.p. excludo typo et synon. *Malaxis ensiformis* J. E. Sm. tantum). *Oberonia denticulata* Wight, Ic. Pl. Ind. Or. 5: t. 1625. 1852; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 952. 1997. *Oberonia iridifolia* var. *denticulata* (Wight) Hook. f., Fl. Brit. Ind. 5: 676; C.E.C. Fisch. in Gamble, Fl. Madars :1406.1928.

Palagondi (EG). Bhimavaram (VJN). Kotapalli, TOB 0105 (VSKP). In moist deciduous forests; usually on streamsides; locally frequent; flowers October – November.

****Odisha cleistantha** S. Misra Orch. India: 252, figs. 4 – 6. 2007.

Tuberous herbs, about 40 cm high; tuberoids oblong 30 × 10 mm. Leaves aggregated in the lower one-third of the plant, spiral, three to four, elliptic- lanceolate, margins translucent. Inflorescence few flowered. Flowers not opening, greenish. Sepals and petals ovate to oblong-lanceolate, acute, Lip erect, three-lobed; lateral lobes falcately ovate-lanceolate, sub acute; midlobe oblong-lanceolate, sub acute, shortly spurred; spur squarish, with a rounded apex, laterally compressed.

Peddavalia, *A. W. Lushington* s.n. K !

Note : This species closely resembles *Habenaria pelorioides* Par. & Rchb. f. *Habenaria* has two pollinia; caudicle long; viscidium prominent. *Odisha* has four pollinia; caudicle very short; viscidium none.

Papilionanthe teres (Roxb.) Schltr. Orchis 9: 78. 1915; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 953. 1997; S.Misra, Orch. Orissa: 644. 2004. *Dendrobium teres* Roxb., Fl. Ind. 3: 485. 1832. *Vanda teres* (Roxb.) Lindl., Gen. Sp. Orch. Pl.: 217. 1833; Hook. f. 6: 49. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1444.1928.

Vishakhapatnam hills, at 1100 m. In moist deciduous forest; rare; flowers June – July.

Pecteilis gigantea (J. E. Sm.) Rafin. Fl. Tell. 2: 238. 1837; Ramakrishna 1997: 953; S.Misra, Orch. Orissa: 140. 2004. *Orchis gigantea* J. E. Sm., Exot. Bot. 2: 79. t. 100. 1805. *Habenaria susannae* auct. non (L.) R. Br. ex Spreng. 1826; Hook. f., Fl. Brit. India 6: 137. 1890. *Platanthera susannae* sensu C.E.C. Fisch. in Gamble, Fl. Madars :1475.1928, non (L.) Lindl., 1835.

Madugukota; Maredumilli, opposite Medicinal Plantation Area (MPCA) TOB 0118 (EG). In moist deciduous forests; on hill slope; occasional; flowers September - October.

Peristylus goodyeroides (D.Don) Lindl. Gen. Sp. Orch. Pl.: 299. 1835; C.E.C. Fisch. in Gamble, Fl. Madars :1475.1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 954. 1997; S.Misra, Orch. Orissa: 157. 2004. *Habenaria goodyeroides* D. Don, Prodr. Fl. Nepal: 25. 1825; Hook. f., Fl. Brit. India 6: 161. 1890.

Nallamalais (KNL); Maredumilli, opposite MPCA TOB 0115 (EG). In moist deciduous forests; occasional; flowers August.

Peristylus plantagineus (Lindl.) Lindl. Gen. Sp. Orch. Pl.: 300. 1835; C.E.C. Fisch. in Gamble, Fl. Madars :1475.1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3:954. 1997; S.Misra, Orch. Orissa: 148. 2004. *Herminium plantagineum* Lindl., Bot. Reg. 18: sub t. 1499. 1832.

Rampa hills; Maredumilli (EG); Kotapalli TOB 120 (VSKP). In moist deciduous hill forests; occasional; flowers August.

***Pholidota imbricata** Hook. Exot. Fl. 2, (18) t. 138. 1825; Hook. f. 5: 845; C.E.C. Fisch. in Gamble, Fl. Madars :1431.1928; S.Misra, Orch. Orissa: 512. 2004.

Vejuvada; R. Nagar coffee plantation (EG); Kotapalli TOB 0120 (VSKP). In moist deciduous and semi-evergreen forests; in shade; locally abundant at Kotapalli, occasional elsewhere; flowers August.

Pholiodota pallida Lindl. Edw. Bot. Reg. 21: sub t. 177. 1836; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 955. 1997.

Bison hills; Peddakonda (EG). Srikakulam district. Gudem valley (VSKP). In hill forests; rare; flowers June – October.

Note : *Pholidota pallida* is an uncommon plant in the Eastern Ghats as has been observed in the field. It is characterized by thinner leaves; bracts with about 15-20 coarse veins; lateral sepals slightly connate at base etc. *Pholidota imbricata* has thick leaves; very many (40-50) fine veins in bracts and the lateral sepals are free. The above two species are easily mixed up. We have therefore a feeling that the species recorded here as *P. pallida* could in fact be the relatively common *P. imbricata.*

Polystachya concreta (Jacq.) Garay & Sweet Revista Soc. Colomb. Orquideol. 9 (3): 206. 1974; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 955. 1997; S.Misra, Orch. Orissa: 564. 2004. *Epidendrum concretum* Jacq., Enum. Syst. Pl.: 30. 1760. *Polystachya purpurea* Wight, Ic. Pl. Ind. Or. 5(1): 10. t. 1679. 1851; Hook. f., Fl. Brit. India 6: 21. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1437.1928. *Polystachya* wightii Rchb. f., Walp. Ann. 6: 640. 1864; Hook. f. *l.c.*; C.E.C. Fisch. *l.c.*

Cherukonda (VSKP). In moist deciduous hill forests; rare; flowers October.

***Pomatocalpa spicata** Breda Gen. Sp. Orch. Kuhl & Hasselt T.15 1827. *Pomatocalpa wendlandorum* (Rchb. f.) J. J. Sm., Nat. Tijdsschr. Ned. Ind. 72: 108. 1912. *Cleisostoma wendlandorum* Rchb. f. in Otto & Dietr. Allg. Gartenz. 24, 28: 218. 1856. Hook. f., Fl. Brit. India 6: 74. 1890; Ramakrishna 1997: 956.

Jumlakota, *Gamble* 13947 CAL (VSKP). In semi-evergreen forest, under moist and shaded condition; rare; flowers March.

Pomatocalpa mannii (Rchb. f.) J. J. Smith Nat. Tijdschr. Ned. Ind. 72: 108. 1912; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3:956. 1997. *Cleisostoma mannii* Rchb. f., Flora 55: 273. 1872; Hook. f., Fl. Brit. India 6: 74. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1448.1928.

Palakonda hills *Swamy* 121 MH (VSKP). In semi-evergreen hill forest; in moist and shaded locality; rare; flowers February.

Rhynchostylis retusa (L.) Blume, Bijdr. 286. t. 49. 1825; Hook. f., Fl. Brit. India 6: 32. 1890; Fischer 1928: 1440; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 957. 1997; S.Misra, Orch. Orissa: 640. 2004. *Epidendrum retusum* L., Sp. Pl.: 953. 1753.

Maredumilli; Sutalvada (EG); Kotapalli TOB 0088 (VSKP). In moist deciduous hill forests; rare; flowers May-June.

Satyrium nepalense D. Don, Prodr. Fl. Nepal: 26. 1825; Hook. f., Fl. Brit. India 6: 168. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1476.1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 957. 1997.

Nilavarampadu (VSKP). In hill forests; in open condition; rare; flowers July.

Note: *V. N. Swami* 548 (CAL) is a fruiting specimen, without leaves or tuberoids. The marcescent flowers on the capsule showed these to be larger for *Satyrium nepalense*. The paired spurs, characteristic for this genus, could not also be located in this specimen. This looked more like a species of *Habenaria* Willd.

"Seidenfia versicolor (Lindl.) Marg. & Szlach. Polish Bot. Jour. 46 (1): 47-162. *Microstylis versicolor* Lindl., Gen. Sp. Orch. Pl.: 21.1830; C.E.C. Fisch. in Gamble, Fl. Madars :1408.1928. *Malaxis rheedeii* auct non Sw.1800; Hook. f. 5: 690.1890; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 949. 1997. Seidenfia rheedii auct non (Sw.) Szlach.; S.Misra, Orch. Orissa: 387. 2004

Sunkarimetta (VSKP). Srikakulum, East Godavari and Chittoor districts. In semi-evergreen to moist deciduous forests; on the trunks or moss-covered rocks; in shade; rare; flowers July – September.

Note : This species is often mixed up with *Seidenfia rheedii*. In *S. versicolor* the medium segment of fimbriate apex of the lip is shortest; in *S. rheedii*, however, all these segments are nearly equal.

"Staurochilus ramosus (Lindl.) Seidenf. Op. Bot. 95: 95. 1988; S.Misra, Orch. Orissa: 596. 2004. *Saccolabium ramosum* Lindl., Gen. Sp. Orch. Pl.: 224. 1833. *Cleisostoma ramosum* (Lindl.) Hook. f., Fl. Brit. India 6: 72. 1890.

Maredumilli; Tiger Point (EG), TOB 0092. In semi-evergreen forests, by stream side, well shaded; rare.

Note : The species was collected in a sterile condition. The inflorescence with several small and slender branches is the characteristic of this species.

"Taprobanea spathulata (L.) Christ. Lindleyana 7 (2): 91. 1992. *Epidendrum spathulatum* L., Sp. Pl.: 952. 1753; *Vanda spathulata* (L.) Sprengl., Syst. Veg. (ed. 16) 3: 719. 1826; Hook. f., Fl. Brit. India 6: 50. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1444.1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 958. 1997.

Sri Harikota (NLR); Tirupati hills; Papanasanam dam site TOB 299 (CTR). In dry tracts of open deciduous forests; from sea-level to about 900 m; perched on thickets, often starting as terrestrials and latter becoming epiphytes; rare; flowers March.

Tropidia angulosa (Lindl.) Blume, Coll. Orchid. 122. 1859; Hook. f., Fl. Brit. India 6: 92. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1443 .1452; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 958. 1997; S.Misra, Orch. Orissa: 273. 2004. *Cnemidia angulosa* Lindl., Gen. Sp. Orch. Pl.: 463. 1840.

Maredumilli; Dummakonda (EG). In semi-evergreen hill forests; usually by stream side; under dense shade; rare; flowers August.

Vanda tessellata (Roxb.) Hook. ex G. Don in Loud. Hort. Brit.: 372. 1830; C.E.C. Fisch. in Gamble, Fl. Madars :1445.1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3:959. 1997; S.Misra, Orch. Orissa: 635. 2004. *Epidendrum tessellatum* Roxb., Pl. Corom.: t. 42. 1795. *Vanda roxburghii* R. Br., Bot. Reg. 6: t. 506. 1820; Hook. f. 6: 52. 1890.

In almost all the districts; in deciduous forests; common; flowers June – July.

Vanda testacea (Lindl.) Rchb. f. Gard. Chron. (n.s.) 8: 166. 1877; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 959. 1997; S.Misra, Orch. Orissa: 631. 2004. *Aerides testaceum* Lindl., Gen. Sp. Orch. Pl.: 238. 1833. *Vanda parviflora* Lindl., Edwards Bot. Reg. 30: misc. 57. 1844; Hook. f., Fl. Brit. India 6: 50. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1444.1928.

Rajavomangi; Rampa (EG); Galikonda; Minumuluru; Chintapalli, TOB 0087 (VSKP); Guntupaka (VJN); Horsley Konda *Gamble* 15203, *Fischer* 4648 CAL (CTR). In deciduous forests, in hilly tracts; occasional; flowers April.

***Vanilla walkeriae** Wight, Icon. Pl. Ind. Or. 3(2): t. 932. 1845; Hook. f., Fl. Brit. India 6: 90. 1890; C.E.C. Fisch. in Gamble, Fl. Madars :1451.1928. *Vanilla wightiana* sensu Ramakrishna in Pullaiah, Fl. Andhra Pr. 3: 960. 1997; non Lindl. 1840.

Rajavomangi; near Laborthi; Surampali (EG). In open forests, especially on river banks; or in thorny dry scrub forests, intertwined to form huge masses on thickets; locally abundant; flowers March - April.

Note : This species is easily mistaken for *Vanilla wightiana*, which is scandent on trees, grows to about 8 m tall; shoots robust; flowers smaller. *V. walkeriae* is intertwined on thickets in nest-like fashion, under 3 m tall; shoots less robust; flowers twice as large.

Zeuxine strateumatica (L.) Schltr. Fedd. Repert: 77. 1911; C.E.C. Fisch. in Gamble, Fl. Madars :1456.1928; Ramakrishna in Pullaiah, Fl. Andhra Pr. 3:960. 1997; S.Misra, Orch. Orissa: 304. 2004. *Orchis strateumatica* L., Sp. Pl.: 943. 1753. *Zeuxine sulcata* Lindl., Gen. Sp. Orch. Pl.: 485. 1840; Hook. f. 6: 106. 1890.

Anantapur, Adilabad and Hyderabad districts. On riverbanks, in moist places; in association with grasses; rare; flowers January – February.

Analysis of the Flora

83 species of orchids under 40 genera are known today from the State of Andhra Pradesh. This comprises of 30 terrestrial, 2 saprophytic and 42 epiphytic species; 22 of the epiphytes are with monopodial growth habit while 20 species are with sympodial growth habit. The number of species for one genus on an average comes to two. More than half (25) of the genera are known by two species; one genus is with three species; three genera by four species; three genera by five species; one genus by seven species and only one genus is known by more than ten (13) species. *Habenaria* Willd and *Dendrobium* Sw. are dominant among the terrestrial and epiphytic genera with 13 and 7 species respectively. *Liparis* is found to exhibit both terrestrial and epiphytic habit.

Most of the species are rare (41) or occasional (23) in their occurrence. Only a few species like the terrestrial *Habenaria roxburghii, Geodorum densiflorum;* or the epiphytic *Oberonia ensiformis* and *O. mucronata* are seen frequently. *Habenaria indica, Habenaria rariflora* and the epiphytic *Cymbidium aloifolium* and *Vanda tessellata* are common in their habitats. *Acampe ochracea* and *Pholidota imbricata* are known to occur locally abundant. Similarly the terrestrial climber *Vanilla walkeriae* is seen in abundance in its habitat.

There are several species, which are found to be habitat specific. Terrestrials like *Goodyera procera* and *Liparis nervosa* grow on the very edge of perennial watercourses. Other species, like *Seidenfia versicolor* and *Tropidia angulosa* (terrestial); *Kingidium deliciousum, Liparis elliptiaca, Liparis viridiflora. Pomatocalpa spicata, Bulbophyllum cariniflorum, Oberonia brunoniana* and *Staurochilus ramosus* (epiphytic), prefer to grow close to watercourses in moist and shaded areas. Species under *Eulophia, Geodourm, Nervilia, Peristylus* and most of the members of *Habenaria*, prefer to grow as undergrowths in open forests. *Habenaria longicorniculata* and *Habenaria rariflora* however, grow in the open among grasses on steep hill slopes. *Zeuxine strateumatica*, known as grass orchid, also grows in the open among grasses on moist soil, although found very rarely in the state.

Uncommon and Monotypic Species

Cottonia peduncularis is a monotypic species found in the semi-evergreen to moist deciduous forests of peninsular India and Sri Lanka. This species, known earlier from the states of Maharashtra, Karnataka, Kerala and Orissa, is recorded here for the first time. *Taprobanea spathulata* is yet another monotypic rare species occurring in this State. This is known elsewhere in India only from Tamil Nadu and Kerala. *Vanila*

walkeriae peculiarly grows abundantly on thorny shrub thickets in scrubby forests in a few areas. It is a very uncommon and rare species, not usually found any where other than the localities mentioned for it.

Dendrobium regium is a very rare species endemic to India from the States of Jharkhand, Chattishgarh and Orissa. Its occurrence in Andhra Pradesh, although from a solitary locality, is important, for this orchid with large and handsome flowers was sadly remained confined now to Orissa only. *Bulbophyllum cariniflorum* is a rare Himalayan orchid that has found its way to the Eastern Ghats in Orissa and Andhra Pradesh. This is the only species of *Bulbophyllum* found in Andhra Pradesh, although there are seven species of it in Orissa. Similarly *Eria* is represented by just one species. Genera like *Mastigion, Flickingeria, Thunia,* which are found in the adjoining State of Orissa, are conspicuously absent in this state. Several such species are elements from regions with moderately high rainfall. The lesser annual rainfall (900 mm) does not favour growth of the above genera, including the epiphytic *Coelogyne* or the terrestorial *Calanthe* here.

Odisha cleistantha is another monotypic and endemic terrestrial species found as undergrowth in moist deciduous forests. This species occurs in Manipur, Jharkhand and Orissa; Andhra Pradesh is the southern boundary of the range of this species in India.

Aphyllorchis montana and *Didymoplexis pallens* are two saprophytic species from this state. The former is an uncommon plant with limited distribution in India in the states of Arunachal Pradesh, Sikkim, W. Bengal and Kerala.

Excluded Species

Two specimens from Sesharaya – Yarlagadda from East Godavari district (*R. L. Proudlock* sine no. and *V. N. Swami* 676) are in CAL labelled as *Saccolabium curvifolium* Lindl. Ramakrishna (*l.c.*) has included *Saccolabium curvifolium* based on *V. N. Swami 676*. The former specimen in flowers (flowered in the Indian Botanic Garden, Howrah on 13.04.1892) is found to be *Vanda testacea* (Lindl.) Rchb. f. The latter specimen with deep-channeled leaves, thick white roots, inflorescences with several small buds indicated that this species was also *Vanda testacea,* which flowers in April. This specimen collected on 15.02.1947, was with juvenile buds that would have flowered around the first week of April. The above two specimens are identified here with *Vanda testacea.* We have therefore excluded *Saccolabium curvifolium* (correct name *Ascocentrum curvifolium* (Lindl.) Schllr. from the flora of Andhra Pradesh.

Concluding Remarks

The mountainous forests, with moderately high rainfall, in the state are found to harbor orchids with diverse form and in large numbers. Such forests, and consequently the orchid habitats, are fast shrinking in Andhra Pradesh due to unregulated deforestation. The slash and burn cultivation prevailing in many areas of the State with tribal population, extraction of wood for timber and fuel use are the major factors of deforestation. Opencast mining, industrial activities, construction of hydroelectric dam projects, canal systems and highways also account for large-scale deforestation. Other biotic factors like forest-fire, grazing, introduction of exotic plantation also contribute to this menace. Evergreen forests in the Araku and Rampa valleys have been converted into bare mountains within the past four to five decades. Climate-sensitive plants like orchids suffer most in the process of deforestation.

Some of these damages done are almost irreversible. But earmarking them as protectorates or orchid reserves can save some of the orchid-rich habitats. Orchid population from forests, where inevitable deforestation is in operation, can be brought and rehabilitated in such reserves.

Many forest areas in Andhra Pradesh have been converted to coffee plantations. For purpose of the above plantation clearance of the undergrowths have eradicated the terrestrial orchid population. The epiphytic orchids growing on the standing large trees have however, remained

unaffected in these areas. In several other forests Medicinal Plant Conservation Areas (MPCA) have been created. While raising such areas, care should be taken not clear the existing herbaceous flora. The above coffee plantations and MPCAs can be used as centres of rehabilitation for orchids as mentioned above.

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आंध्र प्रदेश, भारत के पीनशिफ (आर्किड) वनस्पतिजात

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इस शोधपत्र में आंध्र प्रदेश के आर्किड वनस्पतिजात के 40 वंशों में 83 जातियों के विवरण हैं। यह आकलन क्षेत्रीय वनस्पतिजातों में उपलब्ध टैक्सा के सठीक नामों के साथ यदि हैं तो बेसिओनिम एवं पर्याय प्रस्तुत करता है। पुष्पन के परिस्थितिकी एवं फेनोलॉजी के अलावा राज्य में जातियों की व्याप्ति-वंश एवं-आन्ध्र प्रदेश के वनस्पतिजात के नये अभिलेख से जातियों पर टिप्पणियाँ हैं।