

A survey on the orchids of Velliangiri hills, a part of Nilgiri Biosphere Reserve, India, with special reference to Indian endemics

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Abstract

Sixty eight species of endangered, rare and threatened orchids, spreading over 18 genera belonging to the family Orchidaceae strictly endemic to the hills of Indian subcontinent were recorded during (2003-2006) survey of Velliangiri hills, a part of Nilgiri Biosphere Reserve of Western Ghats, India. The nomenclature, vernacular name if any, description, status, and distribution with phenological data, specimen examined and critical notes if any, are given for each species.

Keywords : orchids, western ghats, Velliangiri hills, endemics, endangered

INTRODUCTION

Orchids are biologically very specialized group of plants with beautiful flowers. They are highly prized ornamental plants and have importance in pharmaceutical and food industries. They represent the highly evolved family (Orchidaceae) growing abundantly in association with established trees. They can grow on land, like plants; but the majority of them prefer to perch on other plants-on trees-and some times on moss covered rocks. Accordingly they are described as terrestrial or saprophytic or epiphytic or epilithic or lithophytic. The family Orchidaceae to which the orchids belong, is the largest family among monocotyledons containing 600-800 genera with a cosmopolitan distribution. Orchids are profuse, particularly in the humid tropics and subtropics. Among the 17,000 species that have been so far known in the world, about 1,500 are found in India. In Peninsular India, there are about 200 species belonging to 60 genera (Sarkar, 1995a,b). In Nilgiri Biosphere Reserve there are about 120 species under 59 genera (Joseph, 1987). Important contributions to the knowledge of orchids of India are those of Hooker (1897) Gamble and Fisher (1915 -1936), Rao (1966), Radhakrishnan and Chitra (1984), Kumar and Sasidharan (1986), Joseph (1987), Chandrabose and Nair (1988), Henry *et al.* (1989), Ansari and Balakrishnan (1990) and Sarkar (1995a,b). This paper gives an account of orchids of Velliangiri hills a part of Nilgiri Biospace Reserve, India.

STUDY AREA

Velliangiri hills comes under Bolampatti reserve forests of Coimbatore District and is the major hill range of Western Ghats, India. The study area occupies the southernmost part and the "spur" of Nilgiri Biosphere Reserve of Southern Western Ghats, which lies between the longitude 6°-40' and 7°-10' E and latitude 10°-55'

and 11°-10' N and forms a part of western boundary of Coimbatore District, Tamil Nadu bordering the Palghat District of the State of Kerala. This area is floristically very rich and socio-religiously important since a famous temple, called Velliangiri Andavar temple also called "Thenkailayam" (South Kailash) is situated at the peak of the hills (1840 m above MSL), which is the highest point of Velliangiri hills. The altitude varies from 520 and 1840 m above MSL. The forest types met within the study area are southern tropical thorn forests (scrub jungles), tropical dry deciduous forests, tropical wet evergreen forests, temperate forests (sholas) and southern montane humid grasslands (Champion and Seth, 1968). The soil type is red, loamy, acidic and ferruginous. The average rainfall in the hills is *ca* 3500 mm at the foothills and 4500 mm at the peak per year. Amount of rainfall increases with the increase of altitude.

METHODS

Intensive and extensive floristic diversity assessment study was conducted in Velliangiri hills during 2003 - 2006. The identity of orchids collected were confirmed with the herbarium specimens and type specimens deposited in Madras Herbarium (MH), Botanical Survey of India, Southern Circle, Coimbatore. The specimens are deposited at Kongunadu Arts and Science College Herbarium (KASCH), Coimbatore, Tamil Nadu. Their endemic status was confirmed with the help of relevant literature (Ahmedullah and Nayar, 1987; Nayar, 1996; Nayar and Sastry, 1987-1990; Sarkar, 1995, a,b).

RESULTS

Sixty eight species of orchids belonging to 18 genera were recorded. Among the 18 genera, the genus *Proteroceros* is monotypic, with one species *viz.*, *Proteroceros holttumii* that is strictly endemic to the present study area, Velliangiri hills. Among the 68 species, 9 species are endemic to Western Ghats, 28 are endemic to Southern India and 8 (including *P. holttumii*) are endemic to the State of Tamil Nadu. Twenty six species are rare and 4

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species are endangered.

Based on the morphological similarities, many taxonomically different species of the same genus are referred by single vernacular name by the local tribes and pilgrims. For example, all of the *Bulbophyllum* species found in the study area collected by tribes and purchased by pilgrims during festive seasons are called by the single vernacular name as "Thiroupathi manjal" and/or "Pon manjal". Likewise, *Coelogyne* species are collected and purchased as "Seethai manjal", *Dendrobium* species as "Yanaimiratti", *Eria* species as "Ivirali", *Malaxis* species as "Kattu vengayam", *Polystachya* as "Iruvirali", and *Oberonia* species as "Senkatthalai".

In order to facilitate future reference, nomenclature, description, vernacular names (if available), critical notes (where ever needed), status and distribution, specimens examined etc. are given below for each species of orchid collected.

The following abbreviations are used in the nomenclature of each plant species in the enumeration part given below.

- FBI - Hooker, J.D. (ed.) 1897. *The Flora of British India*. Vols. 1-7. Reeve & Co., London.
- FPM - Gamble, J.S. and Fischer, C.E.C. 1915-1936. *The Flora of the Presidency of Madras*. Adlard & Sons Ltd., London. (Repr.ed.vols.1-3.1957).
- ON - Joseph, J. 1987. *Orchids of Nilgiris*. Botanical Survey of India, Howrah.
- FTN - Henry, A.N., Chitra, V. and Balakrishnan, N.P. 1989. *Flora of Tamilnadu, India. Series I: Analysis Vol III*. Botanical Survey of India Southern Circle, Coimbatore.

Few of the important orchids recorded in the study area are shown in Figs. 1-12.

ENUMERATION

ANOECTOCHILUS Blume

1. *Anoectochilus elatus* Lindl. in Jour. Proc. Linn. Soc. Bot. 1:178.1857; FBI 6:95.1890 ("*elatior*"); FPM 3:1016.1957 (repr.ed.); 1: 244.1987; ON fig. 48. 1987; FTN 3:4.1989; 224.1996.

Erect, terrestrial herbs; stem decumbent, 20-35 cm high, with stout roots. Leaves 3-5, 4.0-7.0 × 1.5-3.5 cm, ovate-lanceolate, cuneate at base and attenuated in to short sheathing petiole, entire acute. Flowers in racemes, up to 25 cm long, glandular pubescent.

Ecology: Rare in shola forest border at Velliangiri at about 1800 m MSL. **Fl. & Fr.:** Nov.-Jan.

Distribution: South Deccan; **Status:** Rare and endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 2669

BRACHYCORYTHIS Lindl.

2. *Brachycorythis iantha* (Wight) Summerh. in Kew Bull. 10:238.1955; ON fig. 34 a-c. 1987; FTN 3:4.1989. *Plantanthera iantha* Wight, Icon. Pl. Ind. Orient. t.1692.1851. *Habenaria galeandra* Benth. var. *nilagirica* Hook. f., Fl. Brit. India 6:164.1890. *H. iantha* (Wight) Hook.f., Fl. Brit. India 6:164.1890. *Phyllomphax obcordata* Schltr. in Repert. Spec. Nov. Regni Veg. Beih. 4:119.1919; FPM 3:1031.1957 (repr.ed.).

Herb, up to 35 cm high; tubers 1 or 2, oblong, hairy, 1.3-3.5 × 1-1.3 cm. Leaves 5-8, imbricate, ovate-lanceolate. Flowers in spike, pink, sessile.

Ecology: Rare in open grasslands at Velliangiri top at about 1700 m MSL. **Fl. & Fr.:** July-Aug.

Distribution: Southern Western Ghats of Kerala & Tamil Nadu; **Status:** Rare and endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 669

Notes: One of the ephemerals found during active south-west monsoon with very sparse populations.

3. *Brachycorythis splendida* Summerh. in Kew Bull. 1955:240.1955; FTN 3:5.1989; *Habenaria iantha* Hook.f., Fl. Brit. India 6:164.1890. *Phyllomphax obcordata* Schltr. var. *iantha* Fischer in Gamble, Fl. Pres. Madras 1476.1928 et 3:1031.1957 (repr.ed.).

Herb, up to 15 cm high; Leaves ovate-lanceolate, 1-2.5 × 0.5-1.5 cm, amplexicaul, entire, acute, imbricate or rarely scattered, rarely reduced in to sheaths below the middle. Flowers axillary, white, with purple spotted or pale to lilac, puberulous.

Ecology: Rare in open grasslands at Velliangiri top at about 1840 m MSL. **Fl. & Fr.:** Aug.

Distribution: Southern Western Ghats of Tamil Nadu, Palnis, Velliangiri hills and Anamalais; **Status:** Rare & endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 404

BULBOPHYLLUM Thouars.

4. *Bulbophyllum acutiflorum* A.Rich in Ann. Sci. Nat. 2.s.15:18.t.7.1841; ON 127. fig. 65, 1-3. 1987. *B. albidum* (Wight) Hook. f., Fl. Brit. India 5:757.1890; FPM 3:992.1957 (repr.ed.); FTN 3:5.1989; *Chirropetalum albidum* Wight, Icon. Pl. Ind. Orient. t. 1653.1851. **Local name:** Ponmanjal

Epiphytic, rhizomatous herb, rhizome creeping with conical pseudobulbs. Pseudobulbs golden yellow. Leaves oblong, rarely linear-oblong, 2.5-9 × 1.2-2 cm, attenuate, entire, obtuse or acute at apex. Flowers in umbel scape 5-7 cm long. Flowers many, yellowish green.

Ecology: Rare on shola tree trunks at about 1600 m MSL. **Fl. & Fr.:** Nov.-Jan.

Figures 1-12. Important Orchids recorded in this study area



Fig. 1. *Anoectochilus elatus*



Fig. 2. *Bulbophyllum acutiflorum*



Fig. 3. *Bulbophyllum neilgherrense*



Fig. 4. *Coelogyne nervosa*



Fig. 5. *Eria polystachya*



Fig. 6. *Habenaria elliptica*



Fig. 7. *Habenaria perrottetiana*



Fig. 8. *Habenaria polyodon*



Fig. 9. *Oberonia wightiana*



Fig. 10. *Proteroceros holttumii*



Fig. 11. *Robiquetia josephiana*



Fig. 12. *Trias stocksii*

Distribution: Southern Western Ghats of Tamil Nadu and Kerala; **Status:** Endemic and endangered

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 507

Notes: This species was collected in large scale by the local tribes and sold in local market as medicinal plant during festive seasons.

5. *Bulbophyllum fusco-purpureum* Wight, Icon. Pl. Ind. Orient. t. 1651.1851; FBI 5:760.1890; FPM 3:992.1957 (repr.ed.); ON 121. fig. 60, 1-2. 1987; FTN 3:5.1989. **Local name:** Thiroupathi manjal

Epiphytic, rhizomatous herb, up to 15 cm high; rhizome creeping with pseudobulbs. Pseudobulbs ovoid-obovoid, 3-4 x 2-3 cm, scattered at long intervals on the creeping rhizome. Leaves simple, ca 10.5 x 3.5 cm, oblong-lanceolate, entire at margins, obtuse or acute at apex. Racemes terminal. Flowers dark purple.

Ecology: Very rare on shola tree trunks at about 1600 m MSL. **Fl. & Fr.:**Nov.-Jan.

Distribution: Southern Western Ghats of Tamil Nadu and Karnataka, Mysore, Nilgiris; **Status:** Endemic and endangered

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1152

6. *Bulbophyllum kaitiense* Reichb. f., Walp. Ann. 6:262.1861; ON 157. fig. 65, 4-6. 1987; FTN 1989; *Cirrhopetalum neilgherrense* Wight, Icon. Pl. Ind. Orient. t.1654.1851; FBI 5:778.1890; FPM 3:993.1957 (repr.ed.).

Herb, upto 10 cm high; rhizome slender. Pseudobulbs distant on the creeping rhizome, ovoid, 1.5-2.7 cm long. Leaves 5.5-7.5 x 1.2-2.3 cm, linear-oblong, attenuate at base, entire, obtuse or emarginate, 3-nerved. Inflorescence of terminal umbels. Flowers pale greenish-yellow, tinged with pink.

Ecology: Rare on tree trunks and branches in sholas at about 1700 m MSL. **Fl. & Fr.:**Oct.-Dec.

Distribution: Peninsular India; **Status:** Rare and endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 684

7. *Bulbophyllum neilgherrense* Wight, Icon. Pl. Ind. Orient. t.1650.1851; FBI 5:761.1890; FPM 3:992.1957 (repr.ed.); ON 125. fig. 60, 3-4. 1987; FTN Series I: Analysis 3:6.1989; *Bulbophyllum sterile* (Lam.) Suresh in D.H.Nicolson et al., Interpret. Hort. Malab. 291.1988; *Epidendrum sterile* Lam. in Encycl. 1:189.1783.

Local name: Thiroupathi manjal

Herb, up to 15 cm high. Pseudobulbs conical-ovoid. Leaves, 4-10 x 1.2-2.7 cm, oblong-elliptic or ovate-lanceolate, entire, obtuse or acute. Flowers in racemes, 4.5-8.5 cm long, yellow.

Ecology: Common on tree trunks in shola forests at about 1200 m MSL. **Fl. & Fr.:**Dec.-Feb.

Distribution: Peninsular India; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 583

8. *Bulbophyllum tremulum* Wight, Icon. Pl. Ind. Orient. t.1749.1851; FBI 5:763.1890; FPM 3:992.1957 (repr.ed.); ON 125. fig. 63, 1-3. 1987; FTN 3: 6.1989.

Herb, up to 12 cm high. Pseudobulbs at intervals, ovoid-conical to subglobose, 0.5-1.7 x 0.6-1.5 cm. Leaves oblong-lanceolate, 4-7 x 1.5-2 cm, obtuse-acute at apex. Flowers large, yellow-pinkish, in racemes, 7.5-15 cm long, much longer than the leaf, lax flowered; slender with few sterile bracts.

Ecology: Occasional on tree trunks in moist deciduous and evergreen forests at about 1000 m MSL. **Fl. & Fr.:**Dec.-Feb.

Distribution: Peninsular India; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 780

COELOGYNE Lindl.

9. *Coelogyne breviscapa* Lindl. in Fol. Orchid. 4. 1854; FBI 5:833.1890 p.p.; FTM 3:1000.1957 (repr.ed.); ON 157. fig. 80, 1-2. 1987; FTN 3:7.1989.

Herb, up to 12 cm high. Pseudobulbs 1.5-5 x 1-1.5 cm, ovoid-oblong. Leaves 2, on mature pseudobulbs, 5-12 x 1-2 cm, linear-elliptic, acute. Inflorescence a raceme from the base of the pseudobulb, ca 10 cm long, 3-9-flowered, lax; scape short, terete, slender.

Ecology: Very rare on tree trunks in sholas at about 1600 m MSL. **Fl. & Fr.:**Jan.-Mar.

Distribution: Throughout India; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 429

10. *Coelogyne glandulosa* Lindl., Fol. Orchid. 6.1854; FBI 5:835.1890; FPM 3:1000.1957 (repr.ed.); FTN 3:7.1989; *C. nervosa* sensu Wight, Icon. Pl. Ind. Orient. t. 1638.1851, non A. Rich. 1841.

Local name: Seethai manjal

Herb, up to 20 cm high. Pseudobulbs 3-7.5 x 1.2-3, ovoid or conical, rarely ellipsoid, golden yellow. Leaves oblong-lanceolate or elliptic-lanceolate, 9-16 x 2.5-4.5 cm, acute or obtuse. Inflorescence synanthous, 13-20 cm long. Flowers ca 4.5 cm across, white, fragrant.

Ecology: Occasional on tree trunks and rocks along shola forest border at Velliangiri top at about 1800 m MSL. **Fl. & Fr.:**May-June

Distribution: Southern Western Ghats of Tamil Nadu & Kerala; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 350

11. *Coelogyne mossiae* Rolfe, Kew Bull.1894:156.1894 p.p., emend. Das & Jain, Orchid Rev. 86:199.1978; FPM

3:999.1957 (repe.ed.); ON 155. fig. 79, 1-2. 1987; FTN 3:7.1989.

Local Name: Seethai manjal

Herb, up to 25 cm high. Pseudobulbs 4-7 x 1.7-2 cm, ovoid, wrinkled. Leaves 2 per pseudobulb, 13.5-20.5 x 2.5-3.5 cm, elliptic, linear-oblong obtuse. Flowers in racemes, 6-7-flowered, ca 20 cm long.

Ecology: Rare on tree trunks in shola forests at about 1700 m MSL. **Fl. & Fr.:** Oct.-Nov.

Distribution: Throughout Southern Western Ghats; **Status:** Endemic, rare and threatened

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 587

12. *Coelogyne nervosa* A.Rich. in Ann. Sci. Nat. Bot. Ser. 2:15:16.1841; FPM 3:1000.1957 (repr.ed.); ON 160. fig. 81, 1-2. 1987; FTN 3:7.1989; *C. corrugata* Wight, Icon. Pl. Ind. Orient. t. 1639.1851; FBI 5:835.1890. **Vernacular name:** Seethaimanjil

Herb, up to 20 cm high. Pseudobulbs oblong-ovoid, 2-leaved. Leaves 5-15 x 1.5-4 cm, elliptic or elliptic-lanceolate. Inflorescence a raceme. Flowers ca 3 cm across, white.

Ecology: Common on tree trunks and on rocks at about 1500 m MSL. **Fl. & Fr.:** July-Oct.

Distribution: Southern Western Ghats of Kerala, Tamil Nadu; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1142

13. *Coelogyne odoratissima* Lindl., Gen. Sp. Orchid. Pl. 41.1830; FBI 5:834.1890; FPM 3:1000. 1957 (repr.ed.) incl. var. *angustifolia* Lindl.; Das & Jain in Fasc. Fl. India 5: 22.1980; FTN 3:8.1989.

Herb, up to 20 cm high. Pseudobulbs in cluster, 1-2.5 x 0.5-1.5 cm, ovoid-conical. Leaves 2-15 x 0.5-3 cm, linear-elliptic or elliptic-lanceolate, narrowed at base. Inflorescence a raceme, 5-10 cm long, lax, 2-4 flowered. Flowers white, ca 2.5 cm across.

Ecology: Rare on tree trunks in shola forests at about 1600 m MSL. **Fl. & Fr.:** July-Nov.

Distribution: Southern Western Ghats of Tamil Nadu, Nilgiri Biosphere Reserve; **Status:** Endemic, rare and threatened

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 709

14. *Coelogyne uniflora* Lindl., Gen. Sp. Orchid. Pl. 42.1830; FBI 5:842.1890; FPM 3:1000.1957 (repr.ed.); Das & Jain in Fasc. Fl. India 5: 28.1980; ON 154. fig. 77, 3-5. 1987; FTN 3:8.1989.

Herb, up to 12 cm high. Pseudobulbs in clusters, oblong-ovoid. Leaves 2 per pseudobulb, ca 10 x 1.5 cm, narrowly elliptic-lanceolate acute to shortly acuminate.

Flower solitary.

Ecology: Very rare on tree trunks and on moist rocks in shola forests at Velliangiri top at about 1800 m MSL. **Fl. & Fr.:** Nov.-Dec.

Distribution: Throughout India; **Status:** Rare and endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 49

DENDROBIUM Sw.

15. *Dendrobium herbaceum* Lindl. in Edwards Bot. Reg. 26:69 et in Misc. 153.1840; FBI 5:719.1890; FPM 3:990.1957 (repr.ed.); ON 143. fig. 72, 1-3.1987; FTN 3:9.1989; *D. ramosissimum* Wight, Icon. Pl. Ind. Orient. t. 1648.1851. **Local name:** Yanaimiratti

Epiphytic herb, up to 35 cm high. Stem, yellowish, shining, leafless during flowering. Leaves 1-2.5 x 0.2-0.6 cm, linear-lanceolate, acute or acuminate at apex. Flowers in racemes, lateral at nodes. Flowers creamy white-yellowish, long pedicellate.

Ecology: Rare on tree trunks in sholas at about 1600 m MSL. **Fl. & Fr.:** Apr.-May

Distribution: Peninsular India ; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 147

16. *Dendrobium heyneanum* Lindl., Gen. Sp. Orchid. Pl. 90.1830; FBI 5:718.1890; FPM 3:990.1957 (repr.ed.); ON 139. fig. 71, 4-6.1987; FTN 3:9.1989;

Erect, epiphytic herb, 8-14 cm high. Leaves bifarious, 2-8 x 0.5-1 cm, linear-lanceolate, acute-short acuminate. Flowers in racemes, leaf opposed, 2.5-8.5 cm long; scape filiform. Flowers many, lax, white with pinkish lip.

Ecology: Rare on tree trunks in shola forest border at about 1500 m MSL. **Fl. & Fr.:** Oct.-Dec.

Distribution: Peninsular India; **Status:** Rare and endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 835

17. *Dendrobium macrostachyum* Lindl., Gen. Sp. Orchid. Pl. 78.1830; FBI 5:735.1890; FPM 3:990.1957 (repr.ed.); ON 143. fig. 72, 1-3.1987; FTN 3:9.1989.

Erect, epiphytic herb, up to 30 cm high; branchlets drooping. Leaves alternate, distichous, 2-10 x 1-3 cm, lanceolate, acute at apex, mouth of sheaths infundibular. Flowers pale yellowish green, 2 or 3 from the node, on a condensed peduncle. Fruits ellipsoid.

Ecology: Occasional on tree trunks in sholas at about 1500 m MSL. **Fl. & Fr.:** Jan.-Mar.

Distribution: Peninsular India; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 913

18. *Dendrobium nanum* Hook. f. in Hooker's Icon. Pl. t. 1853.1889 et FBI 5:717.1890; FPM 3:990.1957 (repr.ed.); ON 143. fig. 72, 1-3.1987; FTN 3:9.1989.

Epiphytic herb, caespitose. Leaves 2-4, distichous, elliptic-lanceolate, 1-4 x 0.3-0.7 cm. Inflorescence of racemes, ca 5 cm long. Flowers white with green labellum, ca 1 cm long, pedicellate.

Ecology: Rare on tree trunks in sholas at about 1500 m MSL. **Fl. & Fr.:** Aug.

Distribution: Peninsular India; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1024

19. *Dendrobium nutans* Lindl. in Gen. Sp. Orchid. Pl. 90.1830; FBI 5:734.1890; FPM 3:990.1957 (repr.ed.); ON 143. fig. 72, 1-3.1987; FTN 3:10.1989.

Erect, epiphytic herb, up to 15 cm high. Leaves alternate, bifarious, 2-5 x 0.5-1 cm, lanceolate, sheathing at base, entire at margins, acute-short acuminate. Inflorescence 2-3-flowered, on a condensed leaf opposed peduncle. Flowers yellow, long pedicellate.

Ecology: Occasional on tree trunks in sholas at about 1600 m MSL. **Fl. & Fr.:** Oct.-Nov.

Distribution: Southern India; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1304

DISPERIS Sw.

20. *Disperis neilgherrensis* Wight, Icon. Pl. Ind. Orient. t. 1719.1815; FBI 6:169.1890; FPM 3:1032.1957 (repr.ed.); ON 37. fig. 16, 1-3.1987; FTN 3:10.1989; *D. zeylanica* Trimen, J. Bot. 23:245.1885; FBI 6:169.1890. *D. monophylla* Blatter ex Fischer, 1478.1928 et FPM 3:1033.1957 (repr.ed.).

Herb, up to 25 cm high. Tubers oblong, ca 1.5 x 1 cm. Leaves 1 or 2, sessile, 0.5-2.5 x 0.4-2.2 cm, cordate and amplexicaul, acute. Flowers 2-6, in terminal racemes, white with pale purple tinged.

Ecology: Common in shola forests at about 1300 m MSL. **Fl. & Fr.:** May-June

Distribution: Peninsular India; **Status:** Rare, endemic and endangered

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1423

ERIA Lindl.

21. *Eria mysorensis* Lindl., J. Proc. Linn. Soc., Bot. 3:54.1858; FBI 5:793.1890; ON 153. fig. 78, 1-3.1987; FTN 3:11.1989; *E. pubescens* Wight, Icon. Pl. Ind. Orient. t. 1634.1851. non (Hook.) Steud. 1840; FPM 3:996.1957 (repr.ed.). **Local name:** Ivirali

Epiphytic, pseudobulbous herb, up to 10 cm high. Pseudobulbs caespitose, compressed, reddish brown.

Leaves 4-6, equitant, 10-15 x 2-3 cm, oblong-lanceolate or linear-elliptic, acute-mucronate. Racemes drooping, lax, axillary, 11-14 cm long. Flowers white, ca 1.3 cm long.

Ecology: Common on tree trunks in sholas at about 1500 m MSL. **Fl. & Fr.:** Dec.-Feb.

Distribution: Throughout Western Ghats; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1621

22. *Eria polystachya* A. Rich. in Ann. Sci. Nat. Bot. ser. 2.15:20. t. 9. 1841; FBI 5:792.1890; FPM 3:996. 1957 (repr.ed.); ON 153. fig. 77, 2-3.1987; FTN 3:11.1989.

Local name: Ivirali

Herb, up to 10 cm high. Pseudobulbs caespitose, sub-cylindric, wrinkled, Leaves crowded, 5-12 x 1.5-3 cm, elliptic-lanceolate or oblong, obtuse. Inflorescence of racemes. Flowers light yellow or creamy white.

Ecology: Common on tree trunks in moist deciduous, evergreen forests and sholas at about 1300 m MSL. **Fl. & Fr.:** Dec.-Feb.

Distribution: Throughout Southern Western Ghats ; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1634

23. *Eria reticosa* Wight, Icon. Pl. Ind. Orient. t. 1637.1851; FBI 5:787.1890; ON 47. fig. 75, 3-4.1987; FTN 3:11.1989; *E. bracteata* Dalz. & Gibs., Bombay Fl. 262.1861, non Lindl. 1859; FPM 3:996.1957.

Herb, up to 5 cm high. Pseudobulbs 0.5-1.5 cm across, orbicular, ovoid or discoid. Leaves 2, linear or elliptic, ovate-oblong, obtuse. Flowers ca 2.2 cm long, white, solitary, Fruits oblongoid, ridged, with the marcescent perianth.

Ecology: Common on tree trunks at about 1200 m MSL. **Fl. & Fr.:** July

Distribution: Southern India ; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1486

GASTROCHILUS D. Don

24. *Gastrochilus acaulis* (Lindl.) Kuntze, Rev. Gen. Pl. 2:661.1891; ON 153. fig. 83, 4-7.1987; FTN 3:12.1989; *Cleisostoma acaulis* Lindl., Gen. Sp. Orchid. Pl. 227.1833. *Saccolobium acaule* (Lindl.) Hook.f., Fl. Brit. India 6:61.1890. *Saccolobium pulchellum* (Wight) Fischer in Gamble, Fl. Pres. Madras 3:1011.1957 (repr.ed.). *Vanda pulchella* Wight, Icon. Pl. Ind. Orient. t. 1671.1851.

Epiphytic herb, up to 10 cm high. Leaves distichous, 5-14 x 0.5-1.5 cm, flat, succulent, linear-oblong, narrow, unequally 2-lobed at apex. Flowers in corymbose racemes, green with pink patches.

Ecology: Fairly common on tree trunks in sholas at about 1500 m MSL. **Fl. & Fr.:** Sept.-Jan.

Distribution: Throughout India; **Status:** Rare

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1510

25. *Gastrochilus calceolaris* (Buch.-Ham. ex J. E. Smith) D. Don, Prodr. Fl. Nep. 32:1825; FTN 3:12:1989. *Aerides calceolare* Buch.-Ham. ex J. E. Smith in Rees, Cyclop. 39: n.11.1818. *Saccolabium calceolare* (Buch.-Ham. ex J.E. Smith) Lindl. ex Hook.f., Fl. Brit. India 6:60.1890. *S. nilagiricum* Hook.f., Fl. Brit. India 6:60.1890. *S. pulchellum* (Wight) Fischer in Gamble, Fl. Pres. Madras 1446. 1928 & 3:1011. 1957 (repr.ed.). *Vanda pulchella* Wight, Icon. Pl. Ind. Orient. t.1671.1851.

Epiphytic herb, up to 7 cm high. Leaves falcate, 5-6 × 1-1.2 cm, ovate or linear-oblong, narrowly lanceolate, succulent, obtuse-subacute, unequally 2-lobed or emarginate at apex. Flowers in dense corymbose racemes, ca 10 cm long, greenish yellow. Lip white. Fruits ellipsoid or oblongoid.

Ecology: Rare on tree trunks in sholas at about 1400 m MSL. **Fl. & Fr.:** Nov.-Jan.

Distribution: India; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1372

HABENARIA Willd.

26. *Habenaria barnesii* Summerh. ex Fischer in Gamble, Fl. Pres. Madras.1887.1936 et 3:1306.1957 (repr.ed.); ON 85.1987; FTN 3:13.1989.

Tuberous herb, up to 15 cm high. Leaves 2-3, 2-3.5 × 1-1.3 cm, lanceolate, narrowly oblong, acute. Flowers 2-4, with yellow spur, green sepals and yellowish green petals.

Ecology: Very rare in open grasslands at about 1700 m MSL. **Fl. & Fr.:** July

Distribution: Southern Western Ghats of Tamil Nadu and Kerala, Travancore and Nilgiris; **Status:** Endemic, rare and endangered

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1282

27. *Habenaria cephalotes* Lindl., Gen. Sp. Orchid. Pl. 322. 1835; FBI 6:139.1890; FPM 3:1027.1957 (repr.ed.); ON 85. 1987; FTN 3:13.1989.

Tuberous herb, up to 20 cm high. Leaves usually 3, each 3-7 × 1.5-2.5 cm, ovate-elliptic, acute or apiculate. Inflorescence of dense-flowered raceme, 10-12 cm long. Flowers white shortly stalked, bracteate.

Ecology: Occasional in open marshy grasslands at about 1500 m MSL. **Fl. & Fr.:** July-Aug.

Distribution: Southern Western Ghats of Tamil Nadu; **Status:** Endemic, rare and threatened

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 888

28. *Habenaria crassifolia* A. Rich., Ann. Sci. Nat. Bot. ser. 2.15:72. t.3 c.1841; FBI 6:151.1890; FPM 3:1028. 1957 (repr.ed.); ON 71. 1987; FTN 3:13.1989.

Tuberous herb, up to 20 cm high. Leaves 2, broadly ovate, 2.2-4.8 × 1.5-5 cm, abruptly acute. Inflorescence of, lax racemes, 15-20 cm long. Flowers, white, bracteate.

Ecology: Very rare in open grasslands at about 1600 m MSL. **Fl. & Fr.:** July-Aug.

Distribution: Throughout Southern Western Ghats; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 998

29. *Habenaria crinifera* Lindl., Gen. Sp. Orchid. Pl. 323.1835; FBI 6:142.1890; FPM 3:1028.1957 (repr.ed.); FTN 3:13.1989;

Tuberous herb, up to 40 cm high. Leaves elliptic-lanceolate, 5-7 × 1-1.5 cm, cordate or amplexicaul at base, entire, acute-acuminate. Flowers 7-8, white, ca 1.9 cm across, in lax racemes.

Ecology: Occasional in open grasslands at about 1300 m MSL. **Fl. & Fr.:** Sept.-Oct.

Distribution: Throughout Western Ghats; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 927

30. *Habenaria decipiens* Wight, Icon. Pl. Ind. Orient. t. 5(1):14. (excl. t. 927) 1844-1845; FBI 6:197.1890; FPM 3:1027.1957 (repr.ed.); FTN 3:13.1989; *H. montana* auct. non A. Rich., 1841.

Tuberous herb, up to 35 cm high. Leaves linear to elliptic-lanceolate, 4-12 × 1-2 cm, amplexicaul or entire, obtuse to acute. Scape ca 3 cm long. Flower 1-7, white, ca 1.5 cm across.

Ecology: Common in open grasslands at about 1400 m MSL. **Fl. & Fr.:** July-Oct.

Distribution: Peninsular India & Western Ghats; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1281

31. *Habenaria digitata* Lindl. in Gen. Sp. Orchid. Pl. 307.1835; FBI 6:134.1890; FPM 3:1026.1957 (repr.ed.); ON 75. 1987; FTN 3:14.1989. *H. trinervia* Wight, Icon. Pl. Ind. Orient. t. 1701.1851.

Tuberous herb, up to 30 cm high. Leaves alternate, elliptic-lanceolate, 2.3-5.5 × 1.5-3 cm, acute to short acuminate; sheaths tubular, oblique at mouth. Inflorescence of raceme, ca 12 cm long. Flowers ca 1 cm across, green, bracteate, subsessile.

Ecology: Rare in open grasslands at Velliangiri hills at

about 1800 m MSL. **Fl. & Fr.:** Aug.

Distribution: India; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1327

32. *Habenaria elliptica* Wight, Icon. Pl. Ind. Orient. t.1706.1851; FBI 6:147.1890; FPM 3:1028.1957 (repr.ed.); ON 87.1987; FTN 3:14.1989.

Tuberous herb, up to 20 cm high. Leaves 3 to 4, 5-6 x 0.5-1.5 cm, elliptic-linear-lanceolate. Inflorescence of racemes. Flowers greenish white.

Ecology: Rare in open marshy grasslands at about 1500 m MSL. **Fl. & Fr.:** Aug.-Sept.

Distribution: Western Ghats of Tamil Nadu, Karnataka and Kerala, Mysore, Nilgiri & Palni

Hills, Velliangiri hills and Anamalais; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1422

33. *Habenaria grandifloriformis* Blatter & McCann in J. Bombay Nat. Hist. Soc. 36:17.1932; FTN 3:14.1989; *H. grandiflora* Lindl. ex Hook. f., Fl. Brit. India 6:136.1890, non Torr. ex Beck. 1823; FPM 3:1027.1957 (repr.ed.).

Tuberous herb, up to 20 cm high. Leaves 1 or 2, or rarely radical, oblong, ovate-lanceolate, glaucous, acute. Inflorescence of raceme, 6-8.5 cm long. Flowers ca 1.7 cm across, greenish white.

Ecology: Very rare in open grassland at about 1600 m MSL. **Fl. & Fr.:** Aug.

Distribution: Peninsular India; **Status:** Rare and endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1546

34. *Habenaria heyneana* Lindl., Gen. Sp. Orchid. Pl. 320.1835; 6:148.1890; FPM 3:1028.1957 (repr.ed.); ON 83.1987; FTN 3:14.1989.

Herb, up to 20 cm high. Tubers 1 or 2, ovoid-oblong. Leaves 4-6, ca 6 x 4 cm, oblong or narrowly lanceolate, acute to shortly acuminate. Inflorescence of racemes, up to 12 cm long. Flowers white.

Ecology: Occasional in open grasslands at about 1600 m MSL. **Fl. & Fr.:** July-Aug.

Distribution: Western Ghats, Konkan, Karnataka hills to Nilgiris and Velliangiri hills; **Status:** Rare & endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 175

35. *Habenaria longicorniculata* Graham, Cat. Pl. Bombay 202.1839. ON 89. fig. 45.1-3. 1987; FTN 3:15.1989. *H. longicalcarata* A. Rich., Ann. Sci. Nat. Bot. ser. 2.15:71. t. 3.1841; FBI 6:141.1890; FPM 3:1027.1957 (repr.ed.).

Tuberous herb, up to 45 cm high. Leaves ca 6, alternate, elliptic, narrowly obovate-oblong, 4-12 x 1.5-2.5 cm. Inflorescence of 3-5-flowered racemes. Flowers white, ca 2 cm across.

Ecology: Common in open grassland at about 1300 m MSL. **Fl. & Fr.:** Aug.-Sept.

Distribution: Peninsular India; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 275

Notes: The long spur which is about 12 cm long is unique.

36. *Habenaria longicornu* Lindl., Gen. Sp. Orchid. Pl. 322. 1835; FBI 6:139.1890; FPM 3:1027.1957 (repr.ed.); ON 93. fig. 46, 1-2.1987; FTN 3:1219.1999. *H. montana* A. Rich., Ann. Sci. Nat. Bot. ser. 2.15:73.1841.

Tuberous herb, up to 25 cm high. Leaves 4-5, oblong-lanceolate, 2.5-7 x 0.5-2 cm, alternate, entire, acute-mucronate. Inflorescence of racemes, 7-12 cm long. Flowers yellowish-white, 3-10, subsessile.

Ecology: Rare in open grasslands at about 1500 m MSL. **Fl. & Fr.:** Aug.-Sept.

Distribution: Peninsular India; **Status:** Rare & endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 62

37. *Habenaria marginata* Coleb. in Hook., Exot. Fl. t.136.1825; FBI 6:150.1890; FPM 3:1028.1957 (repr.ed.); FTN 3:15.1989.

Tuberous herb, up to 25 cm high. Leaves ovate-lanceolate, or oblong, 3-5, 3-6 x 2-2.5 cm, amplexicaul, entire, acute. Flowers in cylindrical spikes, 6-10 cm long. Flowers greenish-yellow.

Ecology: Rare in open marshy grasslands at about 1600 m MSL. **Fl. & Fr.:** Aug.-Oct.

Distribution: Throughout Western Ghats; **Status:** Rare and endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 50

38. *Habenaria pallideviridis* Seidenfeden in Kew Bull. 48:764.1993.

Tuberous herb, up to 15 cm high. Leaves oblong or ovate, ovate-narrowly lanceolate, ca 2.3 x 1.2 cm, cordate or amplexicaul at base, acute to acuminate. Inflorescence terminal, 3-5 cm long. Flowers, greenish white.

Ecology: Very rare in open grasslands at about 1700 m MSL. **Fl. & Fr.:** Aug.

Distribution: Southern Western Ghats of Tamil Nadu, Palni hills & Velliangiri hills; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 176

Notes: Previously this species was reported only from Palni hills. Hence the present collection other than type locality shows the extension of the range of distribution to Nilgiri Biosphere Reserve.

39. *Habenaria perrottetiana* A. Rich., Ann. Sci. Nat. Bot. ser. 2.15:74. t. 4B.1841; FBI 6:164.1890; FPM 3:1028.1957 (repr.ed.); ON 80. fig.32,1-2. 1987; FTN 3:15.1989.

Herb, up to 25 cm high. Tubers 1 or 2, oblong, or ovate. Leaves 5-7, ovate-lanceolate, ca 5 x 2 cm, amplexicaul, entire, acute-short acuminate. Inflorescence of raceme, ca 15 cm long. Flowers, yellowish green.

Ecology: Occasional in open grasslands at Velliangiri at about 1800 m MSL. **Fl. & Fr.:** Aug.-Sept.

Distribution: Southern Western Ghats, Mysore, Nilgiris, Palni hills; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 299

40. *Habenaria plantaginea* Lindl., Gen. Sp. Orchid. Pl. 323.1835; FBI 6:141.1890; FPM 3:1027.1957 (repr.ed.); ON 95.1987; FTN 3:16.1989.

Herb, up to 25 cm high. Tubers 1 or 2, oblong, hairy. Leaves radical, ca 6.5 x 3.4 cm, lanceolate-oblong, mucronate. Flowers white, ca 1.4 cm across, in racemes.

Ecology: Common in low elevations at moist shady places. **Fl. & Fr.:** Oct.-Nov.

Distribution: India; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 855

41. *Habenaria polyodon* Hook. f., Fl. Brit. India 6:139.1890; ON 87. fig. 43, 1-2. 1987; FTN 3:16.1989; *H. fimbriata* Wight, Icon. Pl. Ind. Orient. t. 1712.1851, non R. Br., 1813; FPM 3:1027.1957 (repr.ed.).

Tuberous herb, up to 10 cm high. Leaves ovate-lanceolate or oblong-lanceolate, acute-acuminate, ca 7.2 x 2.5 cm, channelled. Inflorescence a dense spike. Flowers white.

Ecology: Very rare in open grassland at Velliangiri top at about 1800 m MSL. **Fl. & Fr.:** July

Distribution: Southern Western Ghats of Tamil Nadu, Nilgiris & Velliangiri Hills; **Status:** Endemic, rare and threatened

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1000

Note : Wight, (1880) and Fischer (1926) reported this species from Nilgiri District of Tamil Nadu State. The present collection after a lapse of 80 years from the study area shows its rarity and rediscovery.

42. *Habenaria rariflora* A. Rich. in Ann. Sci. Nat. Bot. ser. 2.15:70. t. 2D.1841; Hook. f., Fl. Brit. India 6: 136.1890; FPM 3:1027.1957 (repr.ed.); ON 73.1987; FTN 3:16.1989.

Tuberous herb, up to 10 cm high. Leaves 3 or 4, subradical, ca 5 x 1.5 cm, linear-lanceolate or elliptic-oblong, entire, mucronate. Scape 5-10 cm long, Flowers white, ca 1.5 cm across. Fruits oblong, long stalked.

Ecology: Occasional in open grasslands at about 1300 m MSL. **Fl. & Fr.:** July-Aug.

Distribution: Peninsular India; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore

District, Velliangiri Hills, M. Murugesan, KASCH: 1306

43. *Habenaria richardiana* Wight, Icon. Pl. Ind. Orient. t. 1713.1851; FBI 6:139.1890; FPM 3:1027.1957 (repr.ed.); ON 89. fig. 44, 1-2. 1987; FTN 3:16.1989.

Herb, up to 15 cm high. Tubers 2, oblong. Leaves often subradical, 3-5, crowded, 3-6.5 x 1.5-2.2 cm, elliptic-lanceolate, entire, acute. Flowers in lax racemes, white or greenish white.

Ecology: Occasional in the open grasslands at about 1600 m MSL. **Fl. & Fr.:** Sept.-Oct.

Distribution: Southern Western Ghats of Tamil Nadu, Nilgiris, Velliangiri hills and Anamalais; **Status:** Endemic, rare and threatened

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 889

44. *Habenaria travancorica* Hook.f., Fl. Brit. India 6:135.1890. *H. digitata* Lindl., var. *travancorica* (Hook. f.) Fischer in Gamble, Fl. Pres. Madras 1469.1928 & 3:1026.1957 (repr.ed.); ON 77.1987; FTN 3:14.1989.

Tuberous herb, up to 15 cm high. Leaves alternate, ovate-oblong, ca 3.2 x 1.8 cm, entire, acute to short acuminate. Inflorescence of racemes, ca 4 cm long. Flowers greenish, ca 1.2 cm across.

Ecology: Rare in open marshy grasslands at about 1600 m MSL. **Fl. & Fr.:** Aug.

Distribution: Southern Western Ghats of Tamil Nadu and Kerala, Nilgiris, Anamalais, Velliangiri hills and Travancore hills; **Status:** Rare and endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1424

45. *Habenaria virens* (Lindl.) Abeyw., Ceylon J. Sci., Biol. Sci. 2:151.1959; FTN 3:16.1989; *Ate virens* Lindl., Gen. Sp. Orchid. Pl. 327.1835. Wight, Icon. Pl. Ind. Orient. t. 928.1844-1845. *H. barbata* Wight ex Hook.f., Fl. Brit. India 6:133.1890; FPM 3:1026.1957 (repr.ed.).

Tuberous herb, up to 15 cm high. Leaves ovate or narrowly lanceolate, 2.5-5 x 0.7-1.5 cm, entire, acuminate. Inflorescence of racemes, terminal, 3-5-flowered, ca 6 cm long. Flowers greenish-white, ca 2.2 x 1.3 cm.

Ecology: Rare in open marshy grasslands at about 1700 m MSL. **Fl. & Fr.:** July

Distribution: Throughout Western Ghats; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 125

MALAXIS Solander ex Sw.

46. *Malaxis acuminata* D. Don., Prodr. Fl. Nep. 29.1825; FBI 3:18.1889; ON fig. 17, 1-3. 1987. *Microstylis wallichi* Lindl. ex Hook.f., Fl. Brit. India 5:686.1888; FPM 3:1985.1957 (repr.ed.).

Herb, up to 20 cm high, with pseudobulbous base.

Leaves 3 or 4, elliptic-lanceolate, 6-10 × 2.3-3.5 cm, acute or shortly acuminate. Inflorescence of terminal racemes, 12-15 cm long. Flowers dark pink, crowded.

Ecology: Occasional in moist areas and sholas at about 1500 m MSL. **Fl. & Fr.:** July-Aug.

Distribution: India; **Status:** Threatened

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1559

47. *Malaxis densiflora* (A. Rich.) Kuntze, Rev. Gen. Pl. 2:673.1891; FPM 3:985.1957 (repr.ed.); ON fig. 19,1-3. 1987; FTN 3:19.1989. *Liparis densiflora* A. Rich., Ann. Sci. Nat. Bot. ser. 2.15:18. t. 1B.1841. *Microstylis versicolor* auct. non Lindl. 1830; FBI 5:691.1890.

Herb, up to 17 cm high with inflorescence. Leaves 2, ovate-lanceolate or elliptic-lanceolate, 3.5-12 × 1-2.8 cm, acute, plicate. Inflorescence of terminal racemes, 6-6.5 cm long; Flowers red.

Ecology: Occasional in open grasslands at about 1600 m MSL. **Fl. & Fr.:** July-Sept.

Distribution: Peninsular India; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1640

48. *Malaxis intermedia* (A. Rich.) Seidenfaden, Bot. Tidsskr. 73:99.1978; ON fig. 19, 4-6.1978; FTN 3:19.1989. *Liparis intermedia* A. Rich., Ann. Sci. Nat. Bot. ser. 2.15:17.1841. *Microstylis stocksii* Hook. f. in Hooker's Icon. Pl. t. 1833.1889 et FBI 5:691.1890; FPM 3:985.1957 (repr.ed.).

Herb, up to 25 cm high. Shoot with inflorescence ca 19 cm high. Leaves 2 or 3, ovate or elliptic-ovate or rarely ovate-lanceolate, 4.5-9.5 × 2.5-4.5 cm, entire, acute. Inflorescence of racemes, terminal, 9-12 cm long. Flowers pink, many, dense.

Ecology: Occasional in open grasslands and shola border at about 1500 m MSL. **Fl. & Fr.:** July-Aug.

Distribution: Southern Deccan; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 51

49. *Malaxis rheedi* Sw., Kongl. Vetensk. Acad. Nya Handl. 21:235.1800; ON fig. 18,1-3.1987; FTN 3:19.1989. *Microstylis versicolor* Lindl., Gen. Sp. Orchid. Pl. 21.1830; FPM 3:985.1957 (repr.ed.). *Microstylis rheedi* auct. non Lindl. 1830; FBI 5:690.1890.

Herb, up to 25 cm high. Leaves 5-12 × 2-5.5 cm, ovate-oblong to elliptic, sheathing at base, wavy at margins, shortly acuminate. Inflorescence of terminal racemes, 15-20 cm long, Flowers maroon colored; lip yellow with pungent smell.

Ecology: Common along shola forest border at about 1700 m MSL. **Fl. & Fr.:** July-Oct.

Distribution: India; **Status:** Threatened

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1356

OBERONIA Lindl.

50. *Oberonia anamalayana* Joseph in J. Indian Bot. Soc. 42:222.1963. FTN 3:20.1989.

Pendulous, tufted, epiphytic herb, up to 30 cm long. Leaves distichous, equitant, ca 5-17 × 2-2.5 cm, ensiform, jointed at base, acute-obtuse. Inflorescence of interrupted racemes, 15-20 cm long. Flowers lax, whitish-yellow.

Ecology: Occasional on tree trunks in sholas at about 1500 m MSL. **Fl. & Fr.:** Sept. -Nov.

Distribution: Southern Western Ghats, Kerala, Tamil Nadu; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1049

51. *Oberonia brunoniana* Wight, Icon. Pl. Ind. Orient. t.1622.1851; FBI 5:681.1888; FPM 3:984.1957 (repr.ed.); FTN 3:20.1989.

Erect or pendulous, tufted, epiphytic herb, up to 15 cm high. Leaves articulate, 7-12 × 1.2-1.8 cm, oblong-ensiform, jointed at base, acute. Inflorescence of spikes, ca 12 cm long. Flowers pedicellate, yellow to brick red, in verticils.

Ecology: Occasional on tree trunks in sholas at about 1600 m MSL. **Fl. & Fr.:** Aug. - Oct.

Distribution: Southern Western Ghats; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 975

52. *Oberonia chandrasekharanii* V. J. Nair, V. S. Ramachandran & R. Ansari in Blumea 28: 361-362.1983. *O. ranganniana* Murthy *et al.*, in Curr. Sci. 56:621.1987.

Pendulous, epiphytic herb, up to 10 cm high. Leaves articulate, 7-12 × 0.5-2 cm, oblong-ensiform, subacute, dirty or pale green; scape flattened. Inflorescence of racemes, ca 20 cm long, flattened. Flowers pale greenish-yellow, in verticals.

Ecology: Rare on tree trunks in shola forest at about 1700 m MSL. **Fl. & Fr.:** Aug.-Sept.

Distribution: Southern Western Ghats, Kerala, Tamil Nadu; **Status:** Endemic.

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1522

Notes: This neo-endemic species was described by V.J.Nair, V.S.Ramachandran & R.Ansari (l.c.) from Cannanore District of Kerala State during 1983. Subsequent to type collection this endemic species was recollected from Velliangiri hills, Coimbatore District of Tamil Nadu State indicates its occurrence on other parts of Western Ghats and also form a new record for Tamil Nadu.

53. *Oberonia nayarii* Ansari & Balak., in Orchid Monographs 4: 17.1990.

Erect or pendulous, acaulescent, tufted, epiphytic herb, up to 15 cm high. Leaves oblong-ensiform, 5-7 × 0.8-1.2 cm, articulate at base, acute. Inflorescence of spikes, erect or rarely pendulous. Flowers white, in verticils.

Ecology: Very rare on tree trunks in shola forests at about 1600 m MSL. **Fl. & Fr.:** Sept.-Dec.

Distribution: Southern Western Ghats of Kerala and Tamil Nadu; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 976

54. *Oberonia proudlockii* King & Pantl., J. Asiat. Soc. Bengal, Pt. 2. Nat. Hist. 66:580.1897; FPM 3:983.1957 (repr.ed.); FTN 3:20.1989.

Erect, epiphytic herb, up to 4 cm high. Leaves variable, ca 2 × 0.5 cm, oblong-lanceolate, ensiform, acute. Inflorescence ca 6 cm long. Flowers pedicelled, yellowish white, ca 1.5 mm across, sunk in the pits on rachis. Fruits ca 4 mm long, oblongoid-obovoid; seeds numerous, minute.

Ecology: Very rare on tree trunks in shola forest at about 1500 m MSL. **Fl. & Fr.:** Nov.-Jan.

Distribution: Southern Western Ghats of N. Kanara & Nilgiris; **Status:** Rare and endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 879

55. *Oberonia santapau* Kapadia, J. Bombay Nat. Hist. Soc. 57: 265. 1960; FTN 3: 20. 1989; *O. lindleyana* Wight, Icon. Pl. Ind. Orient. t. 1624.1851, non Brongm. ex Duperr. 1834; FBI 5:681.1888; FPM 3:984.1957 (repr.ed.).

Erect or rarely pendulous, epiphytic herb, up to 15 cm high. Leaves ensiform, 2-10 × 0.5-1.5 cm, fleshy, obtuse or acute, pale brown when dry. Inflorescence of spikes, ca 10 cm long. Flowers, straw coloured or orange to red, in verticils.

Ecology: Common on tree trunks in sholas at about 1700 m MSL. **Fl. & Fr.:** Sept.-Nov.

Distribution: Throughout Western Ghats; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 75

56. *Oberonia sebastiana* Shetty & Vivekananthan in Bull. Bot. Surv. India 17:157.1975 (1978); FTN 3: 20. 1989.

Erect, epiphytic herb, up to 8 cm high. Leaves ca 7, outer ones 1.5-5 × 0.5-1.2 cm, inner ones 5-20 × 1-1.3 cm, distichous, ensiform, acute-obtuse. Inflorescence of racemes, 15-25 cm long. Flowers ca 2.5 mm across, yellowish, subverticillate.

Ecology: Common on tree trunks at about 1600 m MSL.

Fl. & Fr.: July-Aug.

Distribution: Southern Western Ghats of Kerala and Tamil Nadu; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 199

57. *Oberonia wightiana* Lindl. in Edward's Bot. Reg. 25: Misc. 9.1839; FBI 5:683.1888; FPM 3:984.1957 (repr.ed.); FTN 3:21.1989.

Erect or pendulous, tufted, epiphytic herb, up to 10 cm high. Leaves distichous, ca 15 × 1 cm, linear-oblong or narrow-ensiform, falcate, articulate, acute-obtuse. Inflorescence of racemes, ca 15 cm long. Flowers whorled or loosely imbricated, yellowish.

Ecology: Common on tree trunks in sholas at about 1600 m MSL. **Fl. & Fr.:** July-Oct.

Distribution: Southern Western Ghats of Kerala and Tamil Nadu; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1414

PERISTYLUS Blume

58. *Peristylus brachyphyllus* A. Rich., Ann. Sci. Nat. Bot. ser. 2.15:70.t.2.1841; FPM 3:1030.1957 (repr.ed.); FTN 3:22.1989. *Hebenaria malabarica* Hook. f., Fl. Brit. India 6:159.1890.

Terrestrial tuberous herb, up to 20 cm high. Leaves alternate, 4-6, 1.5-4.8 × 0.7-1.3 cm, ovate-lanceolate, entire, acute-acuminate. Flowers in spikes. dull greenish yellow. Fruit ellipsoid- oblongoid, 2-4 cm long.

Ecology: Rare in marshy open grassland at about 1600 m MSL. **Fl. & Fr.:** Sept.

Distribution: Peninsular India; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1498

59. *Peristylus densus* (Lindl.) Sant. & Kapadia, Orchids of Bombay 46. 1966; FTN 3:22.1989. *Coeloglossum densum* Lindl., Gen. Sp. Orchid. Pl. 302.1835. *H. stenostachya* Benth., Fl. Hong. 362.1861; FBI 6:156.1890. *Peristylus stenostachyus* (Benth.) Kraenzl., Orchid. Gen. Sp. 1:502.1898; FPM 3:1030. 1957 (repr.ed.).

Erect, terrestrial, tuberous herb, up to 30 cm high. Leaves 6-12, lanceolate or ovate-lanceolate, 4-6 × 1-1.5 cm, entire, acute or acuminate.

Ecology: Occasional along open marshy grasslands at about 1600 m MSL. **Fl. & Fr.:** Aug.

Distribution: Peninsular India; **Status:** Rare & threatened

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1599

60. *Peristylus exilis* Wight, Icon. Pl. Ind. Orient. t. 1698.1851. *P. aristatus* Lindl., Gen. Sp. Orchid. Pl. 300.1835; FPM 3:1030.1957 (repr.ed.); FTN 3:22.1989.

Habenaria aristata (Lindl.) Hook. f., Fl. Brit. India 6:158.1890.

Tuberous herb, up to 40 cm high. Leaves 3-5, elliptic-lanceolate, 3-8 x 1.5-3 cm, acute-shortly acuminate. Inflorescence of racemes, 5-15 cm long. Flowers ca 1.5 cm across, greenish white. Fruits ellipsoid-oblongoid, 1.5 - 3.5 cm long.

Ecology: Rare in open marshy grasslands at about 1200 m MSL. **Fl. & Fr.:** Aug.-Sept.

Distribution: South Deccan; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 880

61. *Peristylus lawii* Wight, Icon. Pl. Ind. Orient. t.1695.1851; ON 50, 1-2.1987; FTN 3:22.1989. *Habenaria lawii* (Wight) Hook. f., Fl. Brit. India 6:162.1890.

Erect tuberous herb, up to 20 cm high. Leaves 3-4, clustered at the apex of the stem, unequal, 1.5-7 x 0.5-1.5 cm, oblong-elliptic, sheathing at base, entire, acute. Inflorescence a spike, 6-10 cm long. Flowers, dull white, sessile, bracteate.

Ecology: Rare in open marshy grasslands at about 1700 m MSL. **Fl. & Fr.:** Aug.

Distribution: Throughout Southern Western Ghats; **Status:** Rare & threatened

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1623

62. *Peristylus richardianus* Wight, Icon. Pl. Ind. Orient. t. 1697.1851; FPM 3:1030.1957 (repr.ed.); FTN 3:22.1989. *Habenaria bicornuata* Hook. f., Fl. Brit. India 6:156.1890.

Herb, up to 30 cm high. Leaves 2.8-6.5 x 0.7-2.7 cm, ovate-lanceolate or linear-lanceolate, acuminate. Inflorescence of spikes, ca 15 cm long. Flowers lax, ca 1.2 cm across, greenish yellow, bracteate.

Ecology: Rare in open marshy grasslands at about 1500 m MSL. **Fl. & Fr.:** July-Aug.

Distribution: Peninsular India, Western Ghats; **Status:** Rare and endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1398

POLYSTACHYA Hook.f.

63. *Polystachya concreta* (Jacq.) Garay & Sweet in Revista Soc. Colomb. Orquideol. 9(3): 206.1974; FTN 3:23.1989; *Epidendrum concretum* Jacq., Enum. Pl. Carib. 30.1760. *Polystachya purpurea* Wight, Icon. Pl. Ind. Orient. t.1679.1851; FBI 6.21.1890; FPM 3:1005.1957 (repr.ed.). *P. wightii* Reichb. f., Walp. Ann. 6:640.1861; FBI 6:21.1890; FPM 3:1005.1957 (repr.ed.).

Local name: Iruvirali

Pseudobulbous, epiphytic herb, up to 15 cm high. Leaves 4 or 5, distichous, 6-15 x 1.2-3 cm, elliptic-lanceolate or oblong-lanceolate, obtuse or subacute. Inflo-

rescence of panicles, 8-15 cm long. Flowers pale brown, ca 1.2 cm across.

Ecology: Common on tree trunks at low elevations at about 800 m MSL. **Fl. & Fr.:** May-July

Distribution: Peninsular India & Western Ghats; **Status:** Rare

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 2697

PROTEROCEROS Joseph & Vajravelu

64. *Proteroceros holttumii* Joseph & Vajravelu in J. Indian Bot. Soc. 53:189.1974; FTN 3:24.1989.

Epiphytic herb, up to 7 cm high. Leaves 1-10 x 1-2.2 cm, distichous, equitant, ovate to elliptic or elliptic-lanceolate, unequally bifid at apex. Inflorescence a spike, axillary. Flowers ca 1.5 cm long, white, sessile. Capsule ca 3 x 0.7 cm, ellipsoid-oblongoid.

Ecology: Rare on tree trunks in sholas at about 1600 m MSL. **Fl. & Fr.:** Dec.-Jan.

Distribution: Southern Western Ghats of Tamil Nadu, Velliangiri hills; **Status:** Rare & endemic.

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 146; MH:-LK 40808 B-H

Notes: This genus is strict endemic to Velliangiri hills since it is being the type locality.

ROBIQUETIA Gaud.

65. *Robiquetia josephiana* Manilal & Sathish Kumar in Orchid Rev. 92:293.1984; ON pl.84, fig.3-5.1987; FTN 3:24.1989.

Epiphytic, herb, up to 12 cm high. Leaves, distichous, 1.5-4.2 x 0.3-0.5 cm, linear or lanceolate, convolute along margins, oblique and acute. Inflorescence of racemes, 3.5-8.5 cm long. Flowers white; spur purplish pink.

Ecology: Very rare on tree trunks in shola forests at about 1600 m MSL. **Fl. & Fr.:** Oct.-Nov.

Distribution: Southern Western Ghats of Tamil Nadu and Kerala; **Status:** Rare and endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 839

SARCANTHUS Lindl.

66. *Sarcanthus peninsularis* Dalz. in Hook.f., Fl. Brit. India 6:67.1893; FPM 3:1012.1957 (repr.ed.).

Herb, up to 20 cm high. Leaves fleshy, linear or lanceolate, 6-12 x 0.4-0.7 cm, at base, obtusely acuminate. Inflorescence an extra-axillary racemes or panicles, ca 12 cm long. Flowers yellow with red margins.

Ecology: Rare in sholas on tree trunks at about 1600 m MSL. **Fl. & Fr.:** Sept.-Oct.

Distribution: Western Ghats of Kerala & Karnataka, Velliangiri hills; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1552

Notes: Previously this species was reported only from Kerala and Karnataka. Hence the present collection shows the extension of distribution and forms an addition to the flora of Tamil Nadu.

SIRHOOKERA O. Kuntze

67. *Sirhookera lanceolata* (Wight) Kuntze, Rev. Gen. Pl. 2:681.1891; FTN 3:24.1989. *Josephia lanceolata* Wight, Icon. Pl. Ind. Orient. t. 1743.1851; FBI 5:823.1890; FPM 3:909.1957 (repr.ed.).

Epiphytic herb, up to 15 cm high. Leaves oblanceolate or oblong-elliptic, 6-10 x 1.5-2.5 cm, obtuse or rarely acute. Flowers ca 4.5 mm long, greenish yellow, whitish tinged with purple and reddish-lilac lip. Capsule ovoid or ellipsoid, prominently ribbed.

Ecology: Common on tree trunks at about 1200 m MSL. **Fl. & Fr.:** Mar.-May

Distribution: Peninsular India; **Status:** Endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 1285

TRIAS Lindl.

68. *Trias stocksii* Benth. ex Hook. f., Fl. Brit. India 5:781.1890; FTN 3:25.1989;

Herb, up to 5 cm high. Pseudobulbs ovoid. Leaf solitary on pseudobulb, elliptic-oblong or obovate-oblanceolate, 1-2.5 x 0.7-1.2 cm, coriaceous, entire, acute-obtuse. Flowers 2-3 in racemes, pale purple-white. Fruits ovoid or ellipsoid; seeds numerous.

Ecology: Rare on tree trunks in sholas and evergreen forests at about 1500 m MSL. **Fl. & Fr.:** Nov.-Dec.

Distribution: Throughout Southern Western Ghats; **Status:** Rare and endemic

Specimen examined: India, Tamil Nadu, Coimbatore District, Velliangiri Hills, M. Murugesan, KASCH: 906

DISCUSSION

The IUCN Committee (2000) for threatened plants has identified 23 factors as possible threats to natural populations. In the present study area traditional destructive practice of commercial exploitation of wild plants for medicinal purpose is a major threat and it affects the existence of many endemic, endangered, rare and threatened plant species.

The major threat for Velliangiri hills is human interference during festival seasons. The tallest peak of this hill, where the Siva temple is situated is an important pilgrimage spot. Every year thousands of devotees from

the State of Tamil Nadu and other parts of the country visit this place. Mostly bamboos are cut by almost every pilgrim for using as walking sticks for climbing hills. The devotees cut and burn many plants including endemic and endangered species, to keep themselves warm during the cold winter nights. Large-scale collection of endemic medicinal plants and rare & threatened beautiful orchids are going on without any restriction. Most of the tribes around the Velliangiri hills are still dependent on these forests for their day-to-day life. Unemployment and low labour wage problems lead the tribes to heavy exploitation of these rare and endangered orchids for petty income to meet their daily needs. A significant amount of medicinal plants are being collected from Velliangiri hills and sold in local market at Poondi, the foothills of Velliangiri hills, without entering major market places and tribal co-operative societies. More than 61 plant species including many endemic, rare and threatened orchid species were found to be commercially exploited for sale, by Balasubramaniam and Murugesan, (2004). *Ex situ* or *in situ* conservation strategies must be taken immediately to conserve these endemic, endangered, rare and threatened species.

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