

ORCHIDS OF THE PLAINS OF NORTH BENGAL

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ABSTRACT

The present paper deals with the Orchids of North Bengal. There are 54 species growing in that area. These fall under 24 genera ; 23 species are epiphytic and 31 are terrestrial. Among the terrestrials, one is saprophytic, viz. *Didymoplexis pallens* Griff.

India is rich in Orchids. All along the Himalayas in the temperate and tropical regions, in the vast hilly tract lying east of Bangladesh, in Peninsular India, especially on the Malabar Hills, Orchids are abundant. The sub-Himalayan belt also harbours a fair number of members of this family. A survey of the plains adjacent to the E. Himalaya, comprising the Terai-region of Darjeeling district, the Jalpaiguri district, Cooch Bihar, Maldah and W. Dinajpur of W. Bengal reveals that as many as 54 species of Orchids grow in that area.

This tract of land is one of the 11 divisions of Bengal as understood by Prain and he called it North Bengal which included, in addition to districts noted above, the district of Purnea on the west and a small portion of Bangladesh on the east and south-east. Prain recorded 109 species of Orchids from the whole of Bengal as it was meant at that time and only 17 from North Bengal. As a result of later explorations 37 more species have been added from the same area.

Of the 54 species found to grow in N. Bengal, 23 are epiphytes and 31 are terrestrials and of the latter group one is a saprophyte, viz. *Didymoplexis pallens*. These are distributed under 24 genera. Some have large and showy flowers. In a few although the flowers are small, they are of beautiful colour and as a large number of them bloom

simultaneously in densely crowded inflorescences the plants look very pretty. Others have unattractive and inconspicuous flowers.

Orchids thrive in a warm climate saturated with moisture. The hills in the tropical belt of the Himalaya are ideal in that respect. Therefore the number of Orchids at lower elevations in the E. Himalaya is much greater than that in the plains just south of the same. In the Terai and Duars the rainfall is very high and the climate is damp for several months of the year but the summer is hot and the month of May is dry. For about 2 months from the middle of April to middle of June the high temperature and low humidity prove detrimental to the growth of many Orchids. The present survey of the Orchid flora of the plains of N. Bengal may not give a complete picture as it is possible that a few epiphytes growing on lofty trees might have escaped the hands of collectors and some terrestrials with inconspicuous flowers failed to attract their attention. However an account of the 54 Orchids so far recorded is given below.

The present work forms a part of the project, viz. Flora of the Plains of Northern Bengal undertaken by me under the auspices of the Council of Scientific and Industrial Research, New Delhi. The work was carried on the Central National Herbarium, Botanical Survey of India where I was permitted

to consult the preserved specimens. With the kind permission of the Deputy Director, Indian Botanic Garden, I have fully utilised the library to my best advantage. I therefore express my deep gratitude to the Director, Botanical Survey of India, the Deputy Director, Indian Botanic Garden and the Deputy Director and the Keeper, Central National Herbarium for giving me all facilities to work. I am also thankful to the Librarian, Indian Botanic Garden for readily complying with my requests for literature consultation.

KEY TO GENERA

- Pollen granular; anther persistent :
 Caudicle and viscidium arising from the base of pollinia; labellum usually spurred :
 Stigmas bilobed; labellum flat ... *Habenaria*
- Stigmas simple; labellum concave :
 Sepals and petals free, subsimilar; (flowers small, spur short) ... *Peristylus*
- Sepals unequal, petals narrower than posterior sepal and adpressed to it (flowers large, spur very long) ... *Platanthera*
- Caudicle and viscidium arising from the apex of the pollinia (often rudimentary or o); labellum not spurred :
 Anther bent forward :
 Leaf solitary; broadly cordate, appearing after flowering time ... *Nervilia*
- Leafless saprophyte ... *Didymoplexis*
- Anther erect :
 Sepals and petals not forming a hood; (spike spirally twisted) ... *Spiranthes*
- Sepals and petals forming a hood :
 Labellum hairy inside ... *Goodyera*
- Labellum glandular inside ... *Zeuxine*
- Pollen waxy or bony; anther deciduous :
 Inflorescence terminal or subterminal :
 Sepals not forming a sac or mentum :
 Small herbs with stem creeping below ... *Malaxis*
- Tall reed-like plants with numerous leaves ... *Arundina*
- Sepals forming a sac or mentum :
 Pollinia 4; caudicle 0 ... *Dendrobium*
- Pollinia 8; caudicle present ... *Eria*
- Inflorescence lateral, arising near the base of the pseudobulb or in the axils of the lower leaves or sheaths :
 Terrestrial; leaves plicate :
 Pollinia 8 :
 Leaves 1 or 2, following the flowers ... *Pachystoma*

Leaves several, contemporaneous with flowers :

- Anther incompletely 4-celled, not conical, tip not acuminate ... *Phajus*
- Anther 2-celled, conical, tip acuminate ... *Calanthe*

Pollinia 2 or 4 :

- Lip saccate or shortly spurred at base ... *Eulophia*
- Lip cymbiform, broadly ventricose at base ... *Geodorum*

Epiphytes; leaves not plicate :

- Pollinia 2 :
 Pollinia cleft or didymous :
 Base of labellum hairy, side-lobes 0; caudicle slender ... *Rhynchostylis*
- Base of labellum not hairy; side-lobes usually large; caudicles stout ... *Vanda*

Pollinia entire :

- Lip spurred :
 Column footless; anther 1 or imperfectly 2 celled ... *Saccolabium*
- Column with a foot, anther 2-celled ... *Aerides*
- Lip not spurred ... *Luisia*

Pollinia 4 :

- Spur with an erect ligulate structure; anthers beaked ... *Pomatocalpa*
- Spur without a ligulate structure; anthers not beaked ... *Acampe*

ACAMPE Lindl.

Epiphytic orchids with stout, branched or unbranched, usually long stems. Leaves thick, coriaceous, keeled, often unequal at apex. Flowers fleshy, not wide-open, in cymbose racemes, rarely in panicles. Sepals and petals yellow with red or brown transverse bands and spots; lateral sepals slightly keeled. Lip spurred at the base; side lobes short, erect; midlobe reniform or ovate, bent, hairy at base often with warted or papillose disc. Column short with small horns. Pollinia 4, globose, unequal in 2 pairs; caudicle short, linear.

- Leaves 10 cm long or less, spreading and horizontal ... *papillosa*
- Leaves 15 cm or much longer, erect ... *longifolia*

A. longifolia (Lindl.) Lindl. Fl. Orch. Acampe 1. 1853; Mitra, Fl. Pl. E. Ind. 1: 356. 1958. *Vanda longifolia* Lindl. Gen. Sp. Orch. 215. 1833. Holttum, Fl. Mal. 1: 621. 1953. *Saccolabium longifolium* (Lindl.) Hk. f. Fl. Brit. Ind. 6: 62. 1890.

Stem stout, branched or not. Leaves thick, linear-oblong, upto 30 cm long, unequal at apex, rather stiff and erect. Flowers subcorymbose on a stout simple or sparingly branched peduncle; sepals and petals fleshy, pale lemon yellow with crimson bands. Lip white with few purple spots; lip and other floral segments pointing upwards and not wide-opening.

Seldom on the plains, mostly at low elevations on the hills; flowering: April-May.

A. papillosa (Lindl.) Lindl. Fl. Orch. Acampe 2. 1853; Mitra, Fl. Pl. E. Ind. 1: 356. 1958. *Saccolabium papillosum* Lindl. in Bot. Mag. 1552. 1840; Hook. f. Fl. Brit. Ind. 6: 63. 1890; Prain, Beng. Pl. 1022. 1903.

Stem stout erect, clustered, upto about a metre tall. Leaves many, spreading and horizontal, coriaceous, elliptic-oblong, obliquely notched or truncate at apex, upto 10 cm long, conduplicate. Flowers subcorymbose, yellow with brown bars and spots; peduncle leaf-opposed, upto 5 cm long bracts triangular. Sepals spreading. Lip decurved, white with transverse purple bars; spur cylindric, straight, half as long as ovary.

Frequent all over the area; flowering: April-May.

AERIDES Lour.

Epiphytes with leafy stems. Leaves terete or linear, coriaceous. Flowers showy, many in dense or lax decurved racemes or rarely solitary; bracts minute. Sepals broad, spreading, the laterals adnate to the foot of the column. Petals broad, spreading. Lip spurred, side-lobes present or not, midlobe incurved. Column short, rostellum bifid; anther 2-celled, beaked or not; pollinia 2, globose, sulcate; caudicle strap-shaped; gland large or small.

Midlobe of lip large ovate-rhomboid
or triangular-hastate, side-lobes very
small ...

Midlobe small oblong lanceolate,
incurved between the much larger
side lobes ...

multiflorum

odoratum

A. multiflorum Reichb. f. Gard. Chron. 1866: 997. 1866; Roxb. Cor. Pl. 63, t. 271. 1795; Hook. f. Fl. Brit. Ind. 6: 47. 1890; Prain, Beng. Pl. 1020. 1903.

Stem stout clothed with imbricate leaves. Leaves narrowly oblong, conduplicate, recurved, slightly tapering to the bifid apex, 15-25 cm long. Racemes longer than leaves, simple, axillary, dense and many-flowered, long-peduncled. Flowers pink or rose-purple, about 2 cm in diam. Lip twice as long as the sepals, entire, ovate-rhomboid or triangular-hastate; basal half thick, a retrorse tooth present at the mouth of the spur.

Frequent in mixed forests in Darjeeling Terai and Duars, also in Cooch Behar; flowering: April-May, fruiting: June-July.

A. odoratum Lour. Fl. Cochinch 2: 525. 1790; Hook. f. Fl. Brit. Ind. 6: 44. 1890; Prain, Beng. Pl. 1020. 1903; Haines, Bot. Bihar Oris. Repr. ed. 1235. 1961; Mitra, Fl. Pl. E. Ind. 1: 345. 1958.

Stem stout upto 45 cm long. Leaves thickly coriaceous 15-25 cm long, 2 lobed at apex, keeled, lorate. Racemes dense-flowered, up to 30 cm long; peduncle short, stout, supra axillary, deflexed. Flowers fragrant, 1.8-2 cm in diam. white with rose-purple at the tips of the perianth segments; sepals and petals broadly oblong-obovate, spur hollow, with upturned tip with a 2-fid gland at the throat; midlobe of lip small oblong-lanceolate embraced by the truncate side-lobes.

Forests of Darjeeling Terai and Jalpaiguri district; flowering: May, fruiting: June-July.

ARUNDINA Bl.

Tall reed-like terrestrial orchids with closely leafy stem. Flowers large, racemose often in panicles. Sepals free, subequal, spreading; petals broader, spreading. Labellum convolute at base, enclosing the column, cuculate, mouth wide, bilobed at apex. Column long, slender, without a foot, narrowly winged. Anther cells 4; pollinia 8 in 2 superposed unequal rows.

A. graminifolia (D. Don) Hochr. in Bull. N. Y. Bot. Gard. 6: 270. 1910; Hara, Fl. E. Him. 425. 1966. *A. bambusifolia* Lindl. Gen. Sp. Orch. 125. 1831; Hook. f. Fl. Brit. Ind. 5: 857. 1890.

Tufted, about 2 m high, stout and woody below, often more than 2 cm in diam. at base. Leaves membranous, narrowly oblong lanceolate, upto 30 cm long, acuminate. Flowers few, in lax panicle, pale pinkish purple and rosy-purple near the tips, 5-8 cm across and about 5 cm long.

At the foot of the hills and at low elevations; flowering and fruiting: April-Sept.

CALANTHE Lindl. Nom. Cons.

Terrestrial orchids with pseudobulbs or pseudostems. Leaves membranous, plicate, usually elliptic-oblong. Racemes erect, axillary or extra-axillary, or coming from the side of the pseudobulb. Sepals subequal, spreading, rarely connivent. Lip variously attached to the column, at base only or to its whole length, usually 3-lobed; apical lobe often bifid, the disc usually lamellate. Column short, dilated at the base or apex. Pollinia 8, waxy, cohering in fours to a granular caudicle or all the 8 inserted on a single caudicle and attached to a gland.

C. angusta Lindl. Fl. Orch. 7. 1853; Hook. f. Fl. Brit. Ind. 5: 849. 1890; Prain, Beng. Pl. 1015. 1903.

Pseudobulbs small, caespitose, conical. Leaves oblong lanceolate upto 28 cm long and 8 cm broad. Raceme with stout peduncle upto 37 cm high, many-flowered. Flowers white, 2.5 cm across. Lip spurred, longer than the sepals, adnate to the column throughout its whole length.

In open grass-lands along the foot of the hills and at low elevations on the hills, flowers sweet smelling; flowering: April-May, fruiting: May-June.

DENDROBIUM Sw. Nom. Cons.

Epiphytic herbs with short and fleshy pseudobulbs, or pseudobulbs may be elongate

and stem-like; usually tufted. Leaves sessile or subsessile, never plicate. Flowers solitary or in fascicles or racemes, often large and showy. Sepals subequal, the laterals obliquely adnate to the foot of the column forming a sac or mentum. Petals usually similar to sepals. Lip sessile, contracted at the base, adnate to and incumbent on the foot of the column; side-lobes embracing the column or spreading or absent; terminal lobe variously formed; the disc or palate often lamellate. Column short with a foot angled or toothed at the top. Anther 2-celled, at first erect ultimately opercular and versatile; pollinia 4 in free pairs or slightly coherent, ovoid or oblong, slightly compressed waxy.

Flowers in racemes:

Flowers large 5 cm across or larger:

Lip calceolar (or slipper-shaped) ...

moschatum

Lip flat:

Raceme lateral, pendulous ...

fimbriatum

Raceme terminal erect ...

formosum

Flowers small, 1 cm across or smaller:

Pseudobulbs short, upto 2.5 cm long ...

peguanum

Stem elongate, upto 10 cm long ...

bicameratum

Flowers solitary or 2-3 together:

Stem compressed, flowers 1 cm across, greenish yellow ...

anceps

Stem terete, flowers 3-4 cm across, pinkish, with or without purple spots:

Margin of lip ciliate on upper half ...

pierardi

Margin of lip not ciliate ...

transparens

D. anceps Sw. in Act. Holm. 246. 1800; Hook. f. Fl. Brit. Ind. 5: 724. 1890.

Stems stout, flattened, upto 100 cm long. Leaves lanceolate or ovate-lanceolate, 2-4 cm long. Flowers greenish yellow, solitary, axillary, very shortly pedicelled, about 1 cm across. Sepals and petals very short. Lip cuneately oblong, faintly 3-lobed with crisped margin.

Frequent all over the area; flowering: March-April, fruiting: May-June.

D. bicameratum Lindl. in Bot. Reg. 59. 1839 Hook. f. Fl. Brit. Ind. 5: 729. 1890.

Stem clavate or fusiform, 30-50 cm long, clustered. Leaves coriaceous, elliptic oblong or lanceolate, obliquely and minutely 2-fid at apex, upto 10 cm long. Flowers densely clus-

tered in short raceme, lateral or subterminal, greenish yellow with rows of crimson spots; peduncle sheathed; floral bracts sheathing the shortly pedicelled ovary; about 1 cm across. Lateral sepals deltoid, concave; dorsal ovate-oblong. Petals about as long as sepals, broadly elliptic. Lip fleshy, concave, 3-lobed; side-lobes triangular, erect, crimson; midlobe yellow, truncate; palate fleshy.

Occasional in our area; flowering: April-May.

D. fimbriatum Hook. Exot. Fl. t. 71. 1834; Hook. f. Fl. Brit. Ind. 5: 745. 1890.

An epiphyte with long tufted stems terete and grooved, swollen at base, upto 1 metre or more long. Leaves distichous, ovate-lanceolate, acuminate, 10-15 cm long. Racemes 7-12-flowered, pendulous on leafy or leafless stems; flowers orange-yellow, about 5 cm in diam.; bracts minute. Petals erose, larger than sepals. Lip 3.5 cm long, orbicular, fimbriate.

Wild in Jalpaiguri district (Haines).

D. formosum Roxb. Fl. Ind. 3: 485. 1832; Hook. f. Fl. Brit. Ind. 5: 721. 1890.

Stems stout, fleshy, cylindrical, more or less furrowed, upto 60 cm long with pubescent sheaths. Leaves bifarious, sub-amplexicaul, ovate-lanceolate or oblong, 7-12 cm long. Flowers very large 8-12 cm in diam. in terminal few-flowered racemes, pure white with a yellow palate. Sepals lanceolate or oblong-lanceolate, acuminate; petals broader and larger, undulate-cuspidate; mentum very large half as long as dorsal sepal. Lip broadly obovate with small rounded side-lobes; midlobe dialate, retuse; disc with 2 tubercled ridges.

Frequent in Darjeeling Terai and Jalpaiguri district; flowering: May-June.

D. moschatum (Buch.-Ham.) Wall. in Don Prodr. Fl. Nep. 34. 1825. *D. calceolaria* Carey in Hook. Exot. Fl. t. 184. 1823; Hook. f. Fl. Brit. Ind. 5: 744. 1890. *Epidendrum moschatum* Buch.-Ham. in Symes Embassy 3: 315. 1800.

An epiphyte with tufted, stout, erect, striate, leafy stem, upto 2 metre long. Leaves

distichous, oblong, coriaceous upto 15 cm long, with 9 strong parallel nerves. Racemes lateral, 1 or 2 from a node very near the apex of stem, laxly 8-16-flowered; peduncle stout near base, clothed with imbricating sheaths; rachis deflexed, often zigzag; pedicels slender, upto 5 cm long, floral bracts scarious, 6-8 mm long; flower fragrant, large, upto 5 cm long and across, sometimes larger, variable in colour, usually golden yellow with 2 brownish spots in the lip inside. Sepals elliptic oblong; petals broader than sepals. Lip slipper-shaped, margin slightly fimbriate.

Usually at low elevations on the hills, occasionally in the plains; flowering: June-July.

D. peguanum Lindl. in Journ. Linn. Soc. 3: 19. 1839. *D. pygmaeum* Lindl. Gen. sp. Orch. 85. 1830; Hook. f. Fl. Brit. Ind. 5: 717. 1890 non Rees.

A small epiphyte with dense'y tufted oblong tapering pseudobulbs, about 2.5 cm long. Leaves 2-3 linear, 5-8 cm long, caducous. Racemes short, dense-flowered, terminal on the pseudobulbs; bracts exceeding the ovary; flowers small, greenish or white, 8 mm across. Lateral sepals decurved, often purplish. Lip obovate, midlobe very short triangular with decurrent green side lobes marked with red-lines.

Along the foot of the hills, usually at low elevations on the hills; flowering: Oct.-Nov.

D. pierardi Roxb. in Hook. Exot. Fl. f. 9. 1822; Hook. f. Fl. Brit. Ind. 5: 738. 1890; Prain, Beng. Pl. 1009. 1903.

Stem slender, pendulous, 50-100 cm long, pinkish grey. Leaves caducous, lanceolate, upto 12 cm long. Flowers solitary or 2-3 together, 3-4 cm across, pale purple with yellow lip. Sepals oblong-lanceolate; petals elliptic, as long as the sepals slightly broader. Lip with a very short claw, shortly ciliate on the margin on the upper half, side lobes absent.

Frequent in the plains in the northern section and at low elevations in the hills; flowering: April-May, fruiting: June.

D. transparens Wall. ex Lindl. Gen. Sp. Orch. 79. 1830; Hook. f. Fl. Brit. Ind. 5: 738. 1890.

Epiphyte with slender pendulous stems; leafless at flowering time, 30-45 cm long; internodes 3-4 cm long. Leaves linear-lanceolate, acute, 8-10 cm long. Flowers in pairs at the nodes 3.5 cm in diam.; bracts 1-1.2 cm long; pedicels shorter than bracts. Sepals lanceolate, pink; petals ovate, pale pink. Lip purple within, clawed elliptic oblong from a convolute base.

Jalpaiguri district and Darjeeling Terai; flowering: April-May.

DIDYMOPLEXIS Griff.

Leafless terrestrial saprophytic herb with tuberous roots; root nodules infected with bacteria. Scape simple, flexuous, bearing a few-flowered raceme; pedicel greatly elongating in fruit. Dorsal sepal united with the lateral petals forming a 3-fid upper lip; lateral sepals united to form a mentum with the foot of the column. Lip broad, entire, shorter than perianth tube, inserted on the foot of the column, dotted with small calli at the base and on the disc. Column long, narrowly winged upwards and 2-toothed. Anthers 2-celled depressed, shortly stipitate; pollinia 4, reniform, caudicle and gland absent. Capsule elliptic.

D. pallens Griff. Cal. Journ. Nat. Hist. 4: 383, t. 17 (1844); Hook. f. Fl. Brit. Ind. 6: 122. 1890; Prain, Beng. Pl. 1025. 1903.

A small slender herb; roots branching and tuberous. Flowers white. Fruiting pedicel much elongating.

Frequent all over the area in shady thickets; flowering and fruiting: summer.

ERIA Lindl. Nom. Cons.

Epiphytic orchids, pseudobulbous, creeping below, leafy near the apex or throughout. Leaves elongate, membranous or coriaceous. Racemes lateral, often apparently terminal; flowers 1-many; rachis and flowers often

densely woolly. Lateral sepals produced at the base, connate with the foot of the column to form a more or less prominent mentum; dorsal sepals and petals similar, free. Lip adnate to the elongate foot of the column; spur absent. Anther 2-celled, each again falsely 2-celled or 4-celled, pollinia 8, pyriform, united in 2 groups of 4; anther cap loose.

Pedicel and ovary terete; flowers woolly outside	...	<i>flava</i>
Pedicel and ovary 3-winged, flowers polished outside	...	<i>carinata</i>

E. carinata Gibs. in Cal. Journ. Nat. Hist. 5: 365. 1845; Hook. f. Fl. Brit. Ind. 5: 365. 1890. *E. fordii* Rolfe in Gard. Chron. 1886(2): 584. 1886. *Xyphosium acuminatum* Griff. Notul 3: 332. 1845.

Rhizome very short, woody, covered with dark scarious sheaths; pseudobulbs oblong-ovoid, 5-8 cm long, ridged when mature. Leaf thickly coriaceous, elliptic-oblong, acute, tapering at base into a long channelled petiole; lamina 18-30 cm long; petiole 3-9 cm long. Racemes usually with 3 drooping flowers, coming from the top of immature pseudobulb; peduncle 3-8 cm long, enclosed by the conduplicate young leaf, sheathed by many large bracts. Sepals and petals yellowish, polished outside. Lip pale purple. Ovary stalked 3-winged.

Occasional; flowering and fruiting: Nov.-Jan.

E. flava Lindl. Gen. Sp. Orch. 65. 1830; Hook. f. Fl. Brit. Ind. 5: 801. 1890; Prain, Beng. Pl. 1013. 1903.

Rhizome stout with imbricating tubular sheaths; pseudobulbs much compressed; 7-10 cm long; ridged. Leaves not more than five, subcoriaceous, narrowly oblong, acuminate tapering to the base, upto 22 cm long. Raceme erect, stout from the base of the pseudobulb as long as the leaves, sheathed at the base densely tomentose. Flowers distant, yellow; 15-17 mm across; sepals and petals white villous outside. Ovary pilose, pinkish in colour.

Along the foot of the hills and at lower elevations; flowering and fruiting: April-May.

EULOPHIA R. Br. Nom. Cons.

Terrestrial orchids with fleshy tubers or rhizomes, rarely, pseudobulbous. Leaves long, plicate, often appearing after flowers. Scapes lateral, tall and erect, sheathed, terminating in a raceme or panicle. Sepals free, subequal and spreading. Petals more or less like the sepals. Lip adnate to the foot of the column, saccate or shortly spurred at the base; side-lobes erect rarely suppressed; midlobe spreading or recurved; disc usually ridged or crested; column with or without a foot apex entire often oblique occasionally winged or lobed at the margin. Anther terminal, 2-celled, often with 2 apical processes. Pollinia 2, globose, attached by caudicle to the flat gland of rostellum.

Leaves appearing with flowers :

Pseudobulb large	...	<i>graminea</i>
Pseudobulb absent	...	<i>bracteosa</i>

Leaves appearing long after flowers :

Column without a foot	...	<i>dabia</i>
Column produced into a foot	...	<i>bicarinata</i>

E. bicarinata (Lindl.) Hook. f. Fl. Brit. Ind. 6: 6. 1890; Prain, Beng. Pl. 1016. 1903; Duthie, Fl. Upp. Gang. Pl. 3(2): 200. 1920. *Cyrtopera bicarinata* Lindl. Gen. Sp. Orch. 189. 1835.

Tubers compressed, irregularly lobed, about 5 cm long. Leaves appearing after flowers, linear acuminate, narrowed to a long petiole; lamina upto 30 cm long; petiole upto 18 cm long. Scape erect, upto 50 cm high, with 2 tubular inflated sheaths near base and a few shorter ones above. Racemes dense-flowered; flowers about 2.5 cm across, yellowish green, tinged with purplish brown. Sepals linear-oblong, keeled, with undulate and reflexed edges; laterals inserted on the foot of the column. Lip adnate to the foot of the column, slightly saccate at base, 3-lobed, side-lobes shallow. Anther apiculate in front.

All along the Duars region. Flowering and fruiting: March-June.

E. bracteosa Lindl. Gen. Sp. Orch. 180. 1835; Hook. f. Fl. Brit. Ind. 6: 3. 1890; Prain, Beng. Pl. 1016. 1903; Mitra, Fl. Pl. E. Ind. 1: 338. 1958.

Small terrestrial orchid with a short sheathed stem and 1-3 linear lanceolate leaves; petiole 2-4 cm long. Lamina 3-nerved, upto 45 cm long. Racemes few-flowered; flowers fleshy; floral bracts 2.5-3.5 cm long. Sepals oblong with rounded tips, 1.7 cm long, yellow. Lip narrowly obovate-oblong, obscurely 3-lobed, white or lilac, spur short obtuse. Column without a foot.

Occasional in Duars region; flowering and fruiting: April-June.

E. dabia (D. Don) Hochr. in Bull. N.Y. Bot. Gard. 6: 270. 1910; Sant. & Kapadia in Journ. Bombay nat. Hist. Soc. 58(1): 58. 1961. *E. campestris* Wall. ex. Lindl. Gen. Sp. Orch. 185. 1835; Hook. f. Fl. Brit. Ind. 6: 4. 1890; Prain, Beng. Pl. 1016. 1903; Mitra, Fl. Pl. E. Ind. 1: 339. 1958. *Bletia dabia* D. Don Prodr. Fl. Nep. 30. 1825.

Pseudobulbs tuberous, oblong, usually irregularly lobed. Leaves 2, appearing long after the flowers on apex of a pseudostem, linear, acuminate, plicate, upto 40 cm long. Scape upto 45 cm long, with closely appressed sheaths; racemes laxly many-flowered; flowers subsecund drooping, yellowish green with purple markings; floral bracts membranous. Sepals slightly attached to the base of lip, linear-lanceolate, 5-7 nerved. Lip as long as sepals, cuneate-obovate or oblong; side lobes short incurved round the footless column. Spur short, narrow, obtuse.

Frequent in the northern sector; flowering and fruiting: March-May.

E. graminea Lindl. Gen. Sp. Orch. 182. 1835; Hook. f. Fl. Brit. Ind. 6: 2. 1890; Prain, Beng. Pl. 1016. 1903; Mitra, Fl. Pl. E. Ind. 1: 338. 1958.

Plants with large obpyriform pseudobulb. Leaves grass-like, many, narrowly linear, upto 15 cm long, midrib stout. Scape appear-

ing in leafy plants, upto 80 cm long; bracts very small lanceolate; flowers white with reddish nerves. Sepals linear oblong, 1.5 cm long. Lip obovate-oblong, with small side-lobes; midlobe rounded, fimbriate. Column without a foot.

Frequent in the southern sector. Flowering: April-May, fruiting: August.

GEODORUM Jacks.

Terrestrial with tuberous rootstock and plicate leaves; leaf-sheaths forming a false stem. Scape from the rootstock, erect, shorter than leaves, bearing decurved dense-flowered, bracteate racemes. Petals as long as sepals but broader, conniving or spreading; lip sessile on the base or on short foot of the column, cymbiform membranous, with involute margins, broadly ventricose at base, with or without spur, column short, stout, anther 2-celled; pollinia 2, broad, faveolate, sessile or subsessile on a broad strap or gland.

G. densiflorum (Lamk.) Schltr. in Fedde Rept. Beih. 4: 259. 1929. *G. dilatatum* R. Br. in Ait. Hort. Kew ed. 2, 5: 207. 1813; Hook. f. Fl. Brit. Ind. 6: 17. 1890; Prain, Beng. Pl. 1017. 1903.

Rootstock a chain of ovoid tubers. Leaves lanceolate upto 45 cm long. Scape appearing with young leaves. Flowers 3-3.5 cm across in decurved raceme which becomes erect in fruit; white with pink veins in the lip and yellow palate.

Balurghat, rare in our area; flowering: June-July, fruiting: Oct.-Nov.

GOODYERA R. Br.

Terrestrial leafy orchid with decumbent or creeping stem. Flowers small in terminal often twisted spikes. Sepals subequal, the dorsal concave, forming a hood with the petals. Lip cymbiform or subsaccate, sometimes with filiform appendages or setae within. Column short, cylindric or with cupular top. Rostellum deeply cleft, erect. Pollinia pendulous from a gland. Stigma broad.

G. procera Hook. Exot. Fl. 39. 1823; Hook. f. Fl. Brit. Ind. 5: 111. 1890; Prain, Beng. Pl. 1027. 1903; Mitra, Fl. Pl. E. Ind. 1: 287. 1958.

Small plants, often upto 75 cm high with inflated leaf-sheaths at base. Spikes dense flowered; flowers small subglobose, white, fragrant. Lip with a saccate base and a small entire triangular apical lobe; the interior of the basal sac with two rows of long teeth at the sides and a callus at the apex of each row.

At foot of the hills on rocky soil, more common above; flowering and fruiting: April-May.

HABENARIA Willd.

Terrestrial orchids with underground tubers and leafy erect stem; leaves with sheathing bases. Flowers in lax or dense spikes or racemes, usually small, bracts mostly narrow. Sepals subequal, free, the laterals spreading or reflexed, the posterior often forming a hood with the petals. Petals simple or bilobed. Lip continuous with the column, often adnate to it, produced at the base into a spur; limb spreading or pendulous, entire or 3-lobed or -partite; side lobes pectinate or fimbriate. Pollinia granular, with short or elongate caudicles and exserted naked glands. Rostellum trilobed; middle lobe subulate or tooth-like situated between the anther cells, side-lobes much longer.

Leaves with white or yellow margin ; (fl. yellow)	...	<i>marginata</i>
Leaves not margined :		
Side-lobes of lip linear or filiform:		
Petals 2-partite :		
Sepals with filiform tips	...	<i>stenopetala</i>
Sepals with acute tips	...	<i>digitata</i>
Petals entire :		
Leaves only 2, closely adpressed to the ground	...	<i>diphylla</i>
Leaves more than 2, not adpressed to the ground :		
Spur slender, longer than ovary	...	<i>furcifera</i>
Spur thickened below, as long as ovary	...	<i>viridiflora</i>
Side-lobes of lip semicircular	...	<i>longifolia</i>

H. digitata Lindl. Gen. Sp. Orch. 307. 1835; Hook. f. Fl. Brit. Ind. 6: 134. 1890; Prain, Beng. Pl. 1033. 1903.

Stem leafy, upto 60 cm high. Leaves ovate or ovate-oblong or lanceolate, rarely almost orbicular. Raceme laxly many-flowered; flowers green, 1.2-1.5 cm across; pedicels very short; bracts lanceolate, exceeding the flowers. Lateral sepals ovate, acute, dorsal suborbicular; petals bipartite, segments subequal or the upper broader. Lip tripartite, segments linear, spur subclavate, equalling to ovary, with an erect ligule at the mouth. Rostellum erect, triangular.

Occasional; flowering and fruiting: May-July.

H. diphylla Dalz. in Hook. Journ. Bot. 2: 262. 1890; Hook. f. Fl. Brit. Ind. 6: 151. 1890; Prain, Beng. Pl. 1033. 1903.

A slender scapigerous orchid, about 25 cm high. Leaves usually 2 closely adpressed to the ground, orbicular or broadly elliptic blue-green, nerveless, cordate at base, upto 5 cm long. Flowers small, greenish white in many-flowered raceme; sheaths many; floral bracts small, acute. Sepals subequal, laterals oblong, 3-nerved, dorsal ovate, conniving with the smaller petals. Lip 3-partite, much longer, with a ligulate mid-lobe and linear fleshy side-lobes; spur about 1.2 cm long. Ovary as long as spur, inflated, acute, scarcely beaked.

Occasional in southern sector; flowering and fruiting: Sept.-Oct.

H. furcifera Lindl. Gen. Sp. Orch. 319. 1835; Hook. f. Fl. Brit. Ind. 6: 149. 1890; Prain, Beng. Pl. 1033. 1903.

About 45 cm long; stem sheathed at the base. Leaves crowded below the middle of the stem, narrowly elliptic, acute, upto 12 cm long. Racemes elongate, laxly many-flowered; bracts lanceolate, those below the raceme about 3 cm long, lanceolate, acuminate; floral bracts narrower, shorter; flowers green 1.2 cm across. Sepals unequal, the laterals spreading, lanceolate, dorsal forming a hood with the petals over the column. Lip longer than sepals, 3-partite; the laterals curved, filiform, diverging, longer than the

middle; spur longer than ovary, very slender, compressed curved towards the apex.

Fairly common among grasses, more common at lower elevations on the hills; flowering and fruiting: July-August.

H. longifolia Buch.-Ham. ex Lindl. Gen. Sp. Orch. 324. 1835; Hook. f. Fl. Brit. Ind. 6: 141. 1890; Prain, Beng. Pl. 1032. 1903.

Stem slender, leafy, upto 45 cm high. Leaves erect, scattered, linear, acuminate, 8-12 cm long. Spike laxly few-flowered floral bracts linear, longer than ovary. Flower white, small. Lateral sepals, oblong-lanceolate, 3-nerved, longer than the dorsal. Petals gibbously ovate, as long as dorsal sepals, 3-nerved. Lip flabelliform, side-lobes semicircular, entire; midlobe linear, shorter. Spur slender twice as long as ovary, green. Rostellum long, erect, spathulate.

Reported from Purneah and therefore likely to be found in our area.

H. marginata Coleb. in Hook. Exot. Fl. t. 136. 1825; Hook. f. Fl. Brit. Ind. 6: 150. 1890; Prain, Beng. Pl. 1033. 1903.

Small plant with few subbasal leaves and many lanceolate sheaths. Leaves oblong, with a white or yellow margin, upto 10 cm long. Spikes many-flowered, bracts ciliolate; flowers 1.2 cm across, yellow. Lateral sepals oblong-lanceolate, 3-5 nerved, dorsal broadly ovate; petals 2-nerved. Lip 3-partite, with slender side-lobes. Spur stout, clavate or fusiform below the middle.

Rare in our area; flowering and fruiting: Sept.-Oct.

H. stenopetala Lindl. Gen. Sp. Orch. 324. 1835; Hook. f. Fl. Brit. Ind. 6: 134. 1890; Prain, Beng. Pl. 1032. 1903.

Whole plant about one metre high; stem sheathed at the base, leafy upwards. Leaves lanceolate, sessile and sheathing at base, membranous, upto 20 cm long, gradually smaller upwards and bract-like below the dense raceme; floral bracts as long as ovary. Flower varying in size, some about 2.5 cm in diam., some smaller, green with a brown

lip. Sepals spreading or reflexed, tips filiform; petals shorter than sepals, linear, produced as a wing downwards. Lip hastately 3-partite, segments filiform; spur as long as ovary, slender, compressed, 2-ridged, upturned.

In open grass lands and outskirts of jungles, occasional; flowering and fruiting: towards the close of rainy season.

H. viridiflora R. Br. Prodr. 312. 1827; Hook. f. Fl. Brit. Ind. 6: 150. 1890; Prain, Beng. Pl. 1033. 1903.

Small herbs with ovoid underground tubers 30-40 cm high. Leaves many linear-lanceolate, upto 10 cm long, acuminate, nerves obscure. Raceme many-flowered; sheaths many; bracts, lanceolate; flowers greenish yellow, 8 mm across. Sepals 3-nerved, laterals reflexed, longer than the ovate-orbicular dorsal sepal. Lip longer than sepals, 3-partite with linear, segments; spur as long as the beaked ovary, thickened below.

Occasional in southern sector.

LUISIA Gaud.

Epiphytes with tufted stems, pseudobulbs absent; stems stiff, sheathed and usually woody below. Leaves terete, long and fleshy, spreading and distant. Flowers small, drooping, in an extra axillary or axillary spike; peduncle very stout and covered with imbricating thick persistent bracts; floral bracts scarious, rarely flowers solitary. Dorsal sepal decurved, equalling or slightly smaller than laterals. Petals spreading, as long as or longer than sepals. Lip sessile on the base of the column; the lower basal part or the hypochile flat or concave or saccate, epichile broad, decurved and ridged. Column short, truncate, anther 2-celled, pollinia 2, subglobose, seated on a replicate short strap. Stigma large. Capsule narrow, ridged.

Lip saccate below, distinctly constricted at the junction of hypochile and epichile ...

Lip not saccate, not or indistinctly constricted at the junction of hypochile and epichile ...

teretifolia

brachystachys

L. brachystachys Bl. Rumph. 4: 50. 1848; Hook. f. Fl. Brit. Ind. 6: 23. 1890.

Stem slender with slender leaves which are upto 15 cm long. Lateral sepals with winged keel; petals linear oblong, hardly longer than sepals, sepals and petals purple. Lip obovate-oblong, yellow at base and purple above, almost flat grooved; epichile broadly ovate, very slightly constricted at base. Column very short. Capsule 2-2.5 cm.

Occasional; flowering: May-June.

L. teretifolia Gaud. Bot. Freye. Voy. 427 t. 37. 1929; Hook. f. Fl. Brit. Ind. 6: 22. 1890.

Stem and leaves stout. Lateral sepals with winged keel, sepals and petals yellowish green. Lip dark purple or violet; hypochile rhomboid, with broad subtruncate apex, saccate below; epichile broadly cordate. Capsule 2-3.5 cm long, distinctly constricted at base.

Occasional in the southern sector; flowering: May-June.

MALAXIS Soland ex Sw.

Terrestrial or epiphytic orchids with creeping stem. Leaves broad, near the apex of stem, often unequal at base, sepals spreading. Petals much smaller than sepals, spreading. Lip flat, posterior, lobes hollow and auricled. Column winged, short. Anther on the back of the column; pollinia free 4, not appendiculate, not deciduous. Viscidium and caudicle absent.

Terrestrial, leaves 10-17 cm long, flowers not in whorls ...

latifolia

Epiphytic, leaves upto 4 cm long, flowers in distinct whorls ...

rufilabris

M. latifolia Sm. in Rees Cyclop. 22, no. 3. 1812; Mitra, Fl. Pl. E. Ind. 1: 295. 1959. *Microstylis congesta* (Lindl.) Reichb. f. in Walp. Ann. 6: 206. 1861; Hook. f. Fl. Brit. Ind. 5: 689. 1890.

Terrestrial, tuberous at base, with stout stem upto 15 cm. Leaves 3-6, elliptic, sessile or short-petioled, upto 17 cm long, strongly 6-7-nerved. Raceme with peduncle upto 30 cm long, dense-flowered, bracts close, much

reflexed. Flowers minute, pale dirty red or greenish yellow. Ovary trigonous and grooved.

Along the foot of the hills and at low elevations; flowering: June-July.

M. rufilabris (Lindl.) Reichb. f. in Walp. Ann. 4: 213. 1861; Mitra, Fl. Pl. E. Ind. 1: 295. 1958. *Oberonia rufilabris* Lindl. Sert. Orch. t. 8, A. 1838.

Epiphytic with short stem. Leaves small, narrowly oblong, upto 4 cm long. Flowers minute densely arranged in distinct whorls in a spike-like raceme with slender and short peduncle; bracts many, short and setaceous, spreading. Lip red-brown, oblong with filiform lateral lobes near base of deeply cleft terminal lobe.

Frequent in Darjeeling Terai and in Jalpaiguri district, occasional in Cooch-Bihar and W. Dinajpur, flowering: Feb.-March.

NERVILIA Comm. ex Gaud. Nom. Cons.

Terrestrial tuberous herbs with a single broad, cordate and plicate leaf which disappear before the flowers come. Flowers solitary or few in a lax raceme, usually nodding. Sepals and petals conniving or spreading, subequal, narrow. Lip entire at the base, sessile or indistinctly clawed, adnate to the base of the column. Column elongate, broadening upwards. Anther substipitate; pollinia 2 or 4 granular. Caudicle or disc absent.

Scape 1-3 flowered :	
Lip without side lobes	...
Lip 3-lobed :	
Scape 6 cm or less, midlobe of lip broadly obovate	...
Scape 8 cm or more, midlobe of lip rhomboid	...
Scape 7-10 or more flowered	...
	<i>plicata</i>
	<i>falcata</i>
	<i>juliana</i>
	<i>carinata</i>

N. carinata (Roxb.) Schltr. in Engl. Bot. Jahrb. 45: 404. 1911. *Pogonia carinata* (Roxb.) Lindl. Gen. Sp. Orch. 414. 1834; Hook. f. Fl. Brit. Ind. 6: 121. 1890. *Epipactis carinata* Roxb. Fl. Ind. 3: 452. 1832.

Tuber globose, about 2 cm in diam. Leaf orbicular or broadly cordate, 3-6 cm across, cuspidate, glabrous, 7-9-nerved; petiole 3-5

cm long. Scape with raceme 15-30 cm long; flowers about 10 or more. Sepals and petals green, 2-4 cm long, lanceolate. Lip white with purple veins, 3-lobed about the middle, pubescent, side-lobes very short, midlobe broadly ovate, crenate.

Common on open damp soil, frequent on river banks, flowering: April, fruiting: June. **N. falcata** (King & Pantling) Schltr. in Eng. Bot. Jahrb. 45. 1911. *Pogonia falcata* King & Pantl. in Journ. As. Soc. Beng. 65(2): 129. 1897.

Tuber less than 1 cm in diam. globular, warted. Scape with a single flower, upto 6 cm high with a few sheathing membranous bracts. Flower about 1.2 cm long with the ovary; sepals and petals subequal, linear. Lip oblong, lateral lobes falcate, terminal lobe broadly obovate.

Collected by Pantling east of Jaldacca river; flowering: April.

N. juliana (Roxb.) Schltr. in Eng. Bot. Jahrb. 45: 402. 1911. *Pogonia juliana* (Roxb.) Hook. f. Fl. Brit. Ind. 6: 119. 1890. *Epipactis juliana* Roxb. Fl. Ind. 3: 453. 1832.

Tuber globose. Leaf ovate, cordate, 5-7-nerved, glabrous, purplish beneath, 5-8 cm long. Flowers 1-3 on an 8-15 cm long scape; bracts ensiform. Sepals and petals green, lanceolate, lip 3-lobed, white mottled with pink; side-lobes narrow, falcate, midlobe narrowly rhomboid, hairy at base.

Frequent on damp open places, common on river banks; flowering: March-April, fruiting: June-July.

N. plicata (Roxb.) Schltr. in Eng. Bot. Jahrb. 45: 403. 1911. *Pogonia plicata* Lindl. Gen. Sp. Orch. 415. 1834. *Epipactis plicata* Roxb. Fl. Ind. 3: 454. 1832.

Tuber globose, 1-1.5 cm in diam. Leaf orbicular, cordate, hairy, 7-10 cm across; petiole broader above, upto 5 cm long. Scape 10-15 cm long. Enclosed in 2-3 tubular sheaths with a single linear lanceolate bract below a few flowered raceme. Flowers 2-3, 1.5-1.8 cm long; sepals and petals green. Lip lilac with a yellow line along midrib,

tip dilated, shallow 2-lobed or emarginate.

In open jungles under partial shade, all over the area; flowering after the first summer-rains, fruiting: June-July.

PACHYSTOMA Blume

Terrestrial herbs with nodose rhizome or pseudobulbs. Leaves 1 or 2, plaited, appearing after flowering. Flowers small, pendulous on racemes with long slender peduncle; bracts scarious, several on the peduncle and subtending each flower. Sepals subequal, laterals adnate to the base of the column, swollen at base to form a false mentum or sac. Lip sessile on the footless column, erect with acute lateral lobes; midlobe small, deeply crested or fimbriate. Column short dilated above. Anther 4-celled, deciduous; pollinia 8, pyriform.

P. senile (Lindl.) Reichb. f. in Bonpl. 3: 250. 1858; Hook. f. Fl. Brit. Ind. 5: 812. 1890; Prain, Beng. Pl. 1014. 1903. *Apaturia senilis* Lindl. Gen. Sp. Orch. 130. 1840.

Rhizome stout, producing a few scapes at intervals of 5-7 cm. Leaf solitary, membranous, linear, 4-5 nerved, upto 35 cm long. Scape slender, about 30 cm often many flowered. Flowers about 2 cm long with ovary, white or pink. Sometimes almost purple.

At the foot of the hills on the northern sector, more common on the hills at low elevations; flowering: March-April. fruiting: May-June.

PERISTYLUS Bl.

Terrestrial orchids, with usually linear leaves and very small flowers in spikes or racemes. Sepals free, usually of the same length, the dorsal wider. Petals free, slightly wider than lateral sepals. Lip continuous with the column, free or slightly adnate to it, limb erect or spreading; spur short,

column short, footless. Pollinia granular, shortly caudicled with exserted glands. Stigma sessile in the form of small swelling on the edge of the lip. Rostellum subulate or tooth-like between the anther lobes. Ovary and capsule more or less erect and parallel to the rachis.

P. goodyeroides (D. Don) Lindl. Gen. Sp. Orch. 299. 1835. *Habenaria goodyeroides* D. Don Prodr. Fl. Nep. 25. 1825; Hook. f. Fl. Brit. Ind. 6: 161. 1890; Prain, Beng. Pl. 1039. 1903.

Stem upto 40 cm high with the spike. Leaves crowded below the middle of the stem, elliptic or ovate-elliptic, acute, upto 12 cm long; usually 7-nerved; margin entire yellowish, minutely papillose. Flowers lax, sessile, bracteate. Sepals and petals 3-4 mm long; lip 3 fid; spur saccate, twice as long as ovary. Ovary twice as long as sepals.

At foot of the hills and at low elevations; flowering and fruiting: Aug.-Sept.

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