

THE GENUS *CLEISOSTOMA* BLUME (ORCHIDACEAE) IN INDIA

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ABSTRACT

The genus *Cleisostoma* Blume (Orchidaceae) is represented by about 100 species in the world, of which 18 species occur in India. Taxonomic account including detailed citations, synonymy, description, phenology, distribution and key to species along with line drawings and colour plates is presented in this paper.

Key words: *Cleisostoma*, Orchidaceae, India.

INTRODUCTION

The genus *Cleisostoma* was established in 1825 by Blume in his *Bijdragen tot de flora van Nederlandsch Indië*. But most of the species of the genus for a long time were known under the genus *Sarcanthus* Lindl. Garay (1972) in his work on the Monopodial Orchids clarified the position and made a series of new combinations. Seidenfaden (1975) revised the genus for the species of Thailand which has been the basis of all subsequent works. All collections examined are deposited in ASSAM herbarium, unless otherwise mentioned.

Cleisostoma Blume, Bijdr. Fl. Ned. Ind. 362. 1825. *Echioglossum* Blume, Bijdr. Fl. Ned. Ind. 362. 1825. *Sarcanthus* Lindl., Coll. Bot. t. 39B. 1826, *non. illeg.*

Epiphytes without pseudobulbs. Stem elongated. Leaves oblong, flat or terete, coriaceous or fleshy, usually bilobulate at apex. Inflorescence racemose or paniculate, lax, many flowered. Sepals and petals subequal, spreading. Lip 3-lobed, fleshy, with a large saccate or infundibuliform spur, the backwall at spur with a large callus which is more or less grooved, with or without septum. Column short and stout, often pyramidal i.e. widened at base, footless or with distinct foot. Anthers depressed. Pollinia 2, each unequally split in halves, on distinct stipe.

Type: Cleisostoma sagittatum Blume.

About 100 species distributed from Himalaya to South East Asian countries. Only 18 species are reported from India.

Key to the species

- | | | |
|-----|---|----------------------------|
| 1a. | Leaves terete | ... 2 |
| 1b. | Leaves flat or v-shaped, not terete | ... 8 |
| 2a. | Stipes of pollinia mitre-shaped, less than 0.5 mm long, the column with two small stylids on each side rostellum | ... 3 |
| 2b. | Stipes of pollinia not mitre-shaped, more than 0.5 mm long, column without significant stylids | ... 5 |
| 3a. | Mid lobe of lip with upwards and inwards curved spatulate prolongation | ... <i>C. elegans</i> |
| 3b. | Mid lobe of lip straight or slightly curved without any spatulate prolongation | ... 4 |
| 4a. | Short upright plants with very fat and usually recurved leaves | ... <i>C. arietinum</i> |
| 4b. | Usually slender pendant plants; leaves slender, not recurved | ... <i>C. williamsonii</i> |
| 5a. | Stipes of pollinia as broad as or broader than long, rather squarish with a broad triangular upper side carrying the pollinia | ... <i>C. simondii</i> |

- 5b. Stipes of pollinia slender with backward curved edges upwards ... 6
- 6a. Back wall callus broader than long, with a small vertical median keel, without side horns ... *C. filiforme*
- 6b. Back wall callus with side horns ... 7
- 7a. Arms of backwall callus directed obliquely in an acute angle, slender, much longer than broader at base; mid lobe light pink ... *C. rolfeanum*
- 7b. Back wall callus with broader-based triangular horizontally directed horns; mid lobe pinkish ... *C. appendiculatum*
- 8a. Leaves narrowly acuminate at apex, not bilobed ... 9
- 8b. Leaves slightly mucronate, truncate or obtusely bilobed at apex ... 10
- 9a. Side lobes of lip with subulate tips, the spur conical, the dorsal callus longer than broad ... *C. subulatum*
- 9b. Side lobes of lip slightly wavy truncate, spur cylindric obtuse, the dorsal callus squarish ... *C. tenuifolium*
- 10a. Leaves flat, slightly mucronate; mid lobe of lip with a slender bicuspidate tongue at apex ... *C. striatum*
- 10b. Leaves otherwise, bilobed at apex; mid lobe of lip without any tongue, etc. ... 11
- 11a. Stipes of pollinia complicate, with large gland, operculum not beaked ... 12
- 11b. Stipes of pollinia rather simple, broadening upwards, concave at back side, with a small gland ... 13
- 12a. Spur broad conical; mid-lobe more or less at right angle to the spur, straight, lateral tip at base of mid lobe inconspicuous, obtuse; septum in spur complete ... *C. duplicilobum*
- 12b. Spur straight, cylindrical; mid lobe at an obtuse angle to the spur, upwards and inwards bent, lateral tip at base of mid lobe subulate; septum in spur not complete ... *C. paniculatum*
- 13a. Leaves with truncate-acuminate apex ... 14
- 13b. Leaves obtusely bilobed at apex ... 16
- 14a. Inflorescence unbranched and shorter than leaves ... 15
- 14b. Inflorescence branched and longer than leaves ... *C. discolor*
- 15a. Apical lobes of leaves acuminate; flowers yellowish, sepals and petals purple tinged externally along the midrib; lateral lobes of lip broad erose; spur partly septate; calli of spur glabrous; rostellum long, twisted ... *C. aspersum*
- 15b. Apical lobes of leaves obtuse; sepals and petals pale greenish white; lateral lobes of lip with violet blotch on each side on inner side, margin not erose; spur not septate; calli of spur pubescent; rostellum not twisted ... *C. tricallosum*
- 16a. Stem long; leaves with long internodes; flowers minute 2 - 4 mm across ... *C. uraiense*
- 16b. Stem short; leaves closely distichous; flowers 5 - 10 mm across ... 17
- 17a. Inflorescence as long as leaves; the dorsal callus lip longer than broad and with small lateral horns ... *C. linearilobatum*
- 17b. Inflorescence much longer than leaves; the dorsal callus of lip broad in the front, without any horn ... *C. racemiferum*

Cleisostoma appendiculatum (Lindl.) Benth & Hook. f. ex B.D. Jacks., Index Kew. 1: 555.1893; Seidenf. in Dansk Bot. Ark. 29. (3): 58. 1975. *Aerides appendiculata* Lindl., Gen. Sp. Orchid. Pl. 242. 1833. *Sarcanthus hincksianus* Rchb. f. in Gard. Chron.n.s.9: 73. 1878. *Sarcanthus appendiculatus* (Lindl.) Hook. f., Fl. Brit. India 6: 67. 1890. *Cleisostoma hincksianum* (Rchb. f.) Garay in Bot. Mus. Leaflet. 23: 171. 1972. (Fig.1)



Plate.1: A & B. *Cleisostoma appendiculatum* (Lindl.) Benth. & Hook. f. ex B.D. Jacks.; C & D. *Cleisostoma aspersum* (Rchb.f.) Garay; E & F. *Cleisostoma racemiferum* (Lindl.) Garay; G & H. *Cleisostoma duplicilobum* (J.J. Sm.) Garay.

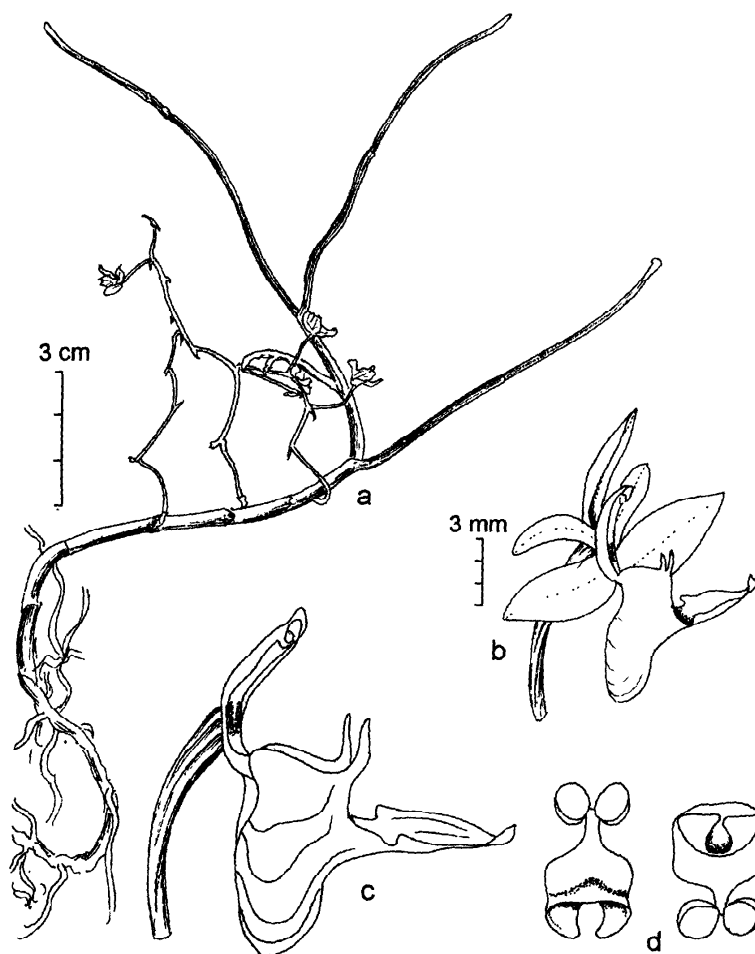


Fig.1. *Cleisostoma appendiculatum* (Lindl.) Benth. & Hook. f. ex B.D. Jacks.: A. plant; B. flower; C. lip with column; D. pollinia with stipe. (drawn from Balakrishnan 46817).

Type: Myanmar, Tavoy (Wallich 7315 Herb. Lindley, K).

Epiphytic. Stem erect, 15 - 35 cm long, 3 - 4 mm thick, slender, rigid, covered with internodal leaf sheaths; sheaths 1.5 - 2.5 cm long, striated. Leaves fleshy, terete, obtuse, 6 - 10 cm long, 2 - 3 mm thick. Inflorescence in axillary or supraxillary, 6 - 9 cm long, 5 - 7-flowered, simple lax racemes; peduncle 1.5 - 2 cm long with 1 or 2 sheaths at base. Bracts minute, persistent. Flowers 9 - 11 mm across; pedicellate ovary 11 - 15 mm long. Sepals 6 - 7 mm long, spreading, yellow, brown-veined. Petals 4 - 5 mm long, yellow, brown-veined. Lip 6 - 7 mm long, spurred, 3-lobed; side lobes erect, tips slender incurved, mid lobe ovate, acute, apiculate, fleshy, pinkish; spur with maroon streaks; dorsal callus large, hairy at base. Column short, thick, 3 - 4 mm long. Anthers 2-chambered, purple. Pollinia 2-paired, rounded; stipe broad, squarish. Capsule 3 - 3.5 × 7 - 10 mm, cylindric.

Fl.: August.

Distribution: India: Arunachal Pradesh, Assam, Meghalaya, Myanmar and Nagaland.

Specimens examined: Meghalaya, Garo Hills, Nokrek, *S.Phukan* 113011; Jaintia Hills, Jorain, *N.P.Balakrishnan* 46817; Khasi Hills, Barapani, BSI Botanical Garden, *S.Phukan* 102880. Nagaland, Phulebadje, *T.M.Hynnietwta* 56273.

Cleisostoma arietinum (Rchb. f.) Garay in Bot. Mus., Leaf. 23: 169. 1972; Seidenf. in Dansk Bot. Ark. 29. (3): 49. 1975; Karthik. & al., Fl. Ind. Enum. Monocot. 119. 1988. *Sarcanthus arietinus* Rchb.f., Gard. Chron. 416. 1869; Hook.f., Fl. Brit. India 6: 70. 1890. *Sarcanthus kunstleri* King & Pantl. in J. Asiat. Soc. Bengal, Pt.2, Nat. Hist. 66: 594. 1897.

Distribution: Laos; Malaysia; Myanmar, Thailand and Vietnam.

Note: Although the type specimen (Hort. Day, Herb. *Reichenbach* 53528) gives locality as Assam, no such herbarium specimen or live collection was available from any part of India. *Sarcanthus kunstleri* King & Pantl. included in synonymy by Seidenfaden was described on the basis of plants collected from Perak in Malaya.

Cleisostoma aspersum (Rchb.f.) Garay in Bot. Mus. Leaflet. 23: 169. 1972; Seidenf. in Dansk Bot. Ark. 29 (3): 12. 1975; Pradhan, Indian Orch. 2: 516. 1979; Deva & H.B. Naithani, Orch. N.W. Himalaya 353. 1986; N. Pearce & P.J. Cribb, Orch. Bhutan 508. 2002. *Sarcanthus aspersus* Rchb.f., Hamburger Garten.-Blumenzeitung 21: 297. 1865; Hook.f., Fl. Brit. India 6: 70. 1890. *Cleisostoma bicuspidatum* Hook.f., Fl. Brit. India 6: 75. 1890. *Stereochilus bicuspidatus* (Hook.f.) King & Pantl. in Ann. Roy. Bot. Gard. (Calcutta) 8: 236, t. 314. 1898. *Sarcanthus bicuspidatus* (Hook.f.) J.J. Sm., Natuurw. Tijdschr. Ned.-Indie 72: 84. 1912. *Sarcanthus khasiaensis* Tang & F.T. Wangin, Acta Phytotax. Sin. 1: 98. 1951, nom. illeg. *Cleisostoma parishii* Seidenf. & Arora in Nordic J. Bot. 2: 11. 1982 non (Hook.f.) Garay, 1972. (Fig.2)

Type: Myanmar, Moulmein, *Veitch* 39 (holo. W).

Plant 7–10 cm long, with many roots at base. Stem covered with overlapping 3–5 cm long leaf-sheaths. Leaves 5–8, narrowly oblong, coriaceous, 9–15 × 1.2–2 cm, only the midnerve prominent, deeply and obliquely bilobed at apex, lobules acute. Inflorescence in simple raceme or shortly branched panicle from the stem below the leaves, slender, slightly zig-zag, 3–4 cm long; peduncle with 3–4 minute distant sheaths.

Bracts 1–1.5 mm long, ovate-triangular, subacute. Flowers 7–8 mm across, lax, yellowish, externally marked with pink along the midrib of sepals and petals. Sepals subequal, spreading; dorsal sepal obovate-elliptic, obtuse, 4–5 × 2.5 mm; the laterals broadly elliptic, obtuse to subacute, 5-nerved, 4–5 × 3 mm. Petals oblanceolate, obtuse, smaller than sepals, 4 × 2.5 mm. Lip adnate to the column, 3-lobed, 8 mm long (with spur); lateral lobes broad, rounded, erose, pale yellow; mid lobe ovate, concave, sub-acute, slightly upwards bent, yellowish; spur white, parallel to the ovary, cylindric, obtuse, non-septate, with a smooth low callus below the column and a larger opposite one on the anterior wall almost touching each other and occluding the spur entrance. Column 1–1.5 mm long, thick, white, purple tinged on margin of stigma; rostellum purple, conical with an oblique apex holding the minute viscidium at the left side of the tip. Anthers depressed with a long beak in front, c. 1.5 mm long, two chambered, purple striped on dorsal side; Pollinia 4, in 2-pairs, orbicular, attached to c. 2 mm long, concave stipe which is broad in the middle and tapered to the apex, gland small. Capsules cylindric, ridged, 9–12 mm long.

Fl.: July – September.

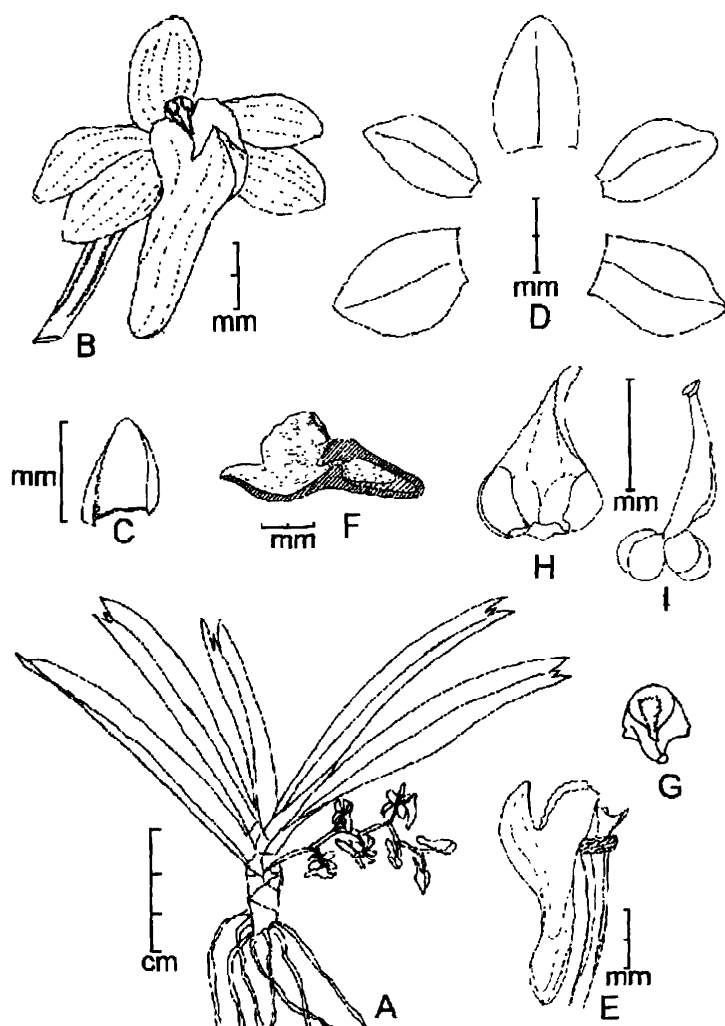


Fig.2. *Cleisostoma aspersum* (Rchb.f.) Garay: A. plant; B. flower; C. bract; D. sepals & petals; E. lip with column; F. L.S. of lip; G. column top view; H. anther; I. pollinia with stipe.

Distribution: India: Arunachal Pradesh, Meghalaya, Mizoram, Myanmar, Sikkim, Thailand, Uttaranchal.

Specimen examined: A live plant grown in B.S.I. Garden at Shillong.

Cleisostoma discolor Lindl. in Edwards's Bot. Reg. 31 (Misc.): 59. 1845; Hook.f., Fl. Brit. India 6: 75. 1890; Seidenf. in Dansk Bot. Ark. 29. (3): 12. 1975; S.N.Hegde & A.N.Rao in J. Econ. Taxon Bot. 4: 1983. *Saccolabium rostellatum* Hook.f., Fl. Brit. India 6: 59. 1890. *Sarcanthus discolor* (Lindl.) J.J.Sm. in Natuurw. Tijdschr. Ned.-Indie 72: 85. 1912.

Type: India, Loddiges s.n. (holo.K).

Epiphytic. Stem terete, up to 30 cm long. Leaves oblong, channelled, coriaceous, 9–14 × 1–2 cm, unequally obliquely bilobed at apex; lobes triangular, acute. Inflorescence axillary, long; peduncle and rachis deep purple. Flowers small, many, yellow with a greenish tinge, becoming brown in older ones. Sepals orbicular-ovate, obtuse, spreading. Petals elliptic, obtuse. Lip 3-lobed, side lobes broad, truncate, plicate with erose edges; mid lobe very short, without basal wings, ovate, acute, concave, thin, without calli, the back wall callus triangular without a median furrow; spur cylindric, obtuse, longer than the sepals, nearly white. Anthers beaked; Pollinia 4, in two pairs; stipe clavate with recurved margin, gland minute, c.2 mm long.

Fl.: July – August.

Distribution: India: Arunachal Pradesh, Tamil Nadu, West Bengal (Darjeeling); Cambodia, Java, Malaya, Sumatra and Thailand.

Note : No specimen of this species are found in Indian herbaria; however the species is mentioned here vide Seidenfaden (l.c.) and Hegde & Rao (l.c.)

Cleisostoma duplicilobum (J.J. Sm.) Garay in Bot. Mus. Leaflet. 23: 171. 1972; Seidenf. in Dansk. Bot. Ark. 23 (3): 36. 1975; Opera Bot. 114: 390. 1992; Phukan & Odyuo, Bull. Bot. Surv. India 48: 219. 2006. *Sarcanthus duplicilobium* J.J.Sm. in Bull. Dept. Agric. Indes Neerl. 13: 64. 1907. *S. carinatus* Rolfe ex Downie, Bull. Misc. Inform. Kew 1925: 408. 1925. *Cleisostoma carinatum* (Rolfe ex Dowae) Garay in Bot. Mus. Leaflet. 23: 170. 1972. (Fig.3)

Epiphytic; stem erect, 4–5 mm thick, c.20 cm long, older portion covered with sheaths of fallen leaves, leafy upwards, internodes c.5 mm long, sheaths 1–18 cm long; roots arise from lower portion of the stem, smooth, 4–5 mm thick. Leaves distichous, 5–8 × 1.5–2 cm, linear-oblong, unequally bilobed with obtuse lobes. Inflorescence extra-axillary, up to 22 cm long, branched, many flowered, peduncle purple dotted, with 2–3 distant sterile bracts. Flowers 10–12 mm across, spreading, sepals and petals dark purple-brown with yellow apices and a median line. Dorsal sepal c.4 × 2 mm, oblong, obtuse, hooded over the column; lateral sepals 4 × 3 mm, broadly oblong, obtuse. Petals c.4 × 1 mm, linear, sub-acute. Lip light yellow, 6 mm long, 3 lobed; lateral lobes obtuse, purplish on margins, the front edge slightly inwards curved, at the proximal and horizontal edge a rather conspicuous flap and a conical or subulate callus below the tip; mid lobe more or less at a right angle to the spur, the apical part slightly upwards bent with a small mucronate tip; with a fat rounded median keel towards base and highest at the front edge of the sidelobes, continuing as a fattened back, septum complete, the back wall callus bilobed, papillous at its lower end. Column yellow with purple-brown tinge on the inner side, c.2 mm long. Anthers 2-lobed, with wavy trilobed front edge, c.1.25 × 1.25 mm. Pollinia 4, in two pairs; stipe mitre-shaped with vertical flanges on the front side of the basal arms, which connect to the saddle shaped disc.

Fl.: July.

Distribution: India: Nagaland; Laos, Thailand and Vietnam.

Specimens examined: Nagaland: Kiphir district, Penkim to Thanamir village, December, 2003; National Orchidarium, Shillong 8.7.2005, Phukan & Odyuo 102868.

Cleisostoma elegans Seidenf. in Dansk Bot. Ark. 29: 46. 1975; Karthik. & al., Fl. Ind. Enum., Monocot. 120. 1988; C.S.Kumar & Manilal, Indian Orch. 68. 1994; Diwakar & Sumathi in J. Econ. Taxon. Bot. 30: 180. 2006.

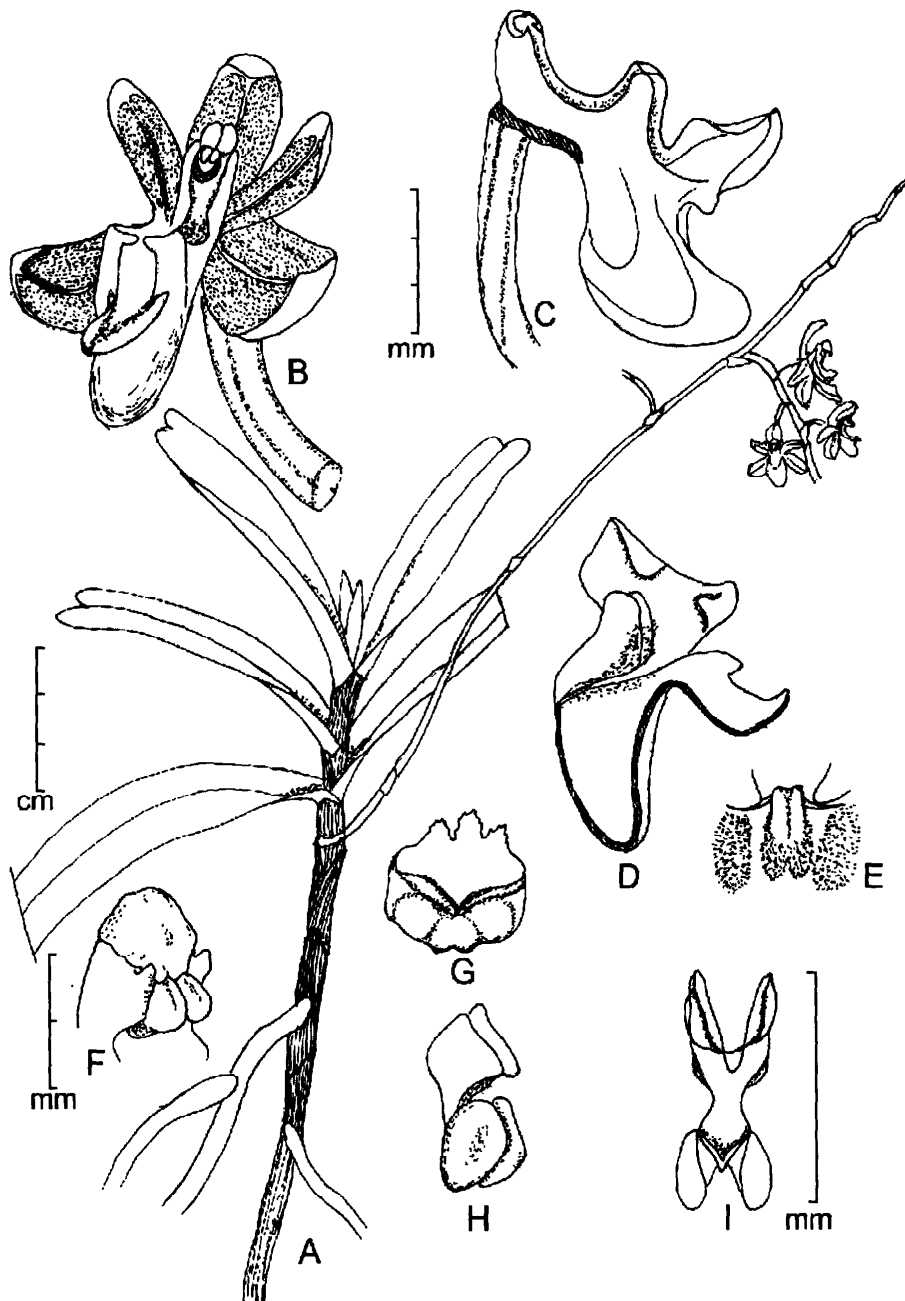


Fig.3. *Cleisostoma duplicilobum* (J.J. Sm.) Garay: A. plant; B. flower; C. side view of lip & column; D. L.S. of lip; E. dorsal callus; F. column; G. anther; H & I. pollinia.

Type: Myanmar, Moulmein, *Parish* 272, Herb. Rchb. 53523, icon 53524.

Epiphytic erect herbs. Leaves distichous, terete, 10 - 12 cm long, green with purple blotches. Inflorescence in axillary, pendulous, branched, lax raceme, much longer than leaves, 25 - 30 cm long. Flowers c.8 mm across, pedicellate, ovary 6 - 7 cm long. Dorsal sepal ovate, obtuse, concave, c.2.7 × 1.7 mm, greenish-yellow, brown veined; lateral sepals spreading, oblique, broadly ovate, obtuse, 3 × 2 mm. Petals narrowly obovate or ovate oblanceolate, obtuse, c.2.5 × 1 mm. Lip 3-lobed; lateral lobes falcately triangular, incurved, 0.8 - 1 mm high, mid lobe triangular-sagittate, acute, uncinat at apex; spur subglobose, dorsal callus two horned, woolly. Column slightly arched, c.2.25 mm long; operculum triangular with apex; pollinia 4 in two pairs.

Fl.: August.

Distribution: India: Northeast India, Andaman and Nicobar Islands; Myanmar and Thailand.

Note: Seidenfaden (1975) mentioned *E. H. Man* 196 (CAL) from Andaman Islands under this species. *P. C. Pant* 50818 (ASSAM), a specimen from BSI-EC, Orchidarium was found to be identical to this

species. This species has recently been collected from Kalpong in North Andamans, P.G.Diwakar 18883 (PBL).

Cleisostoma filiforme (Lindl.) Garay in Bot. Mus. Leaf. 23: 171. 1972; Seidenf. in Dansk Bot. Ark. 23 (3): 55, f. 24. 1975; Pradhan, Indian Orch. 2: 509. 1979. *Sarcanthus filiformis* Lindl., in Edwards's Bot. Reg. 28. (Misc.) 61. 1842; Hook.f., Fl. Brit. India 6: 66. 1890; King & Pantl. in Ann. Roy. Bot. Gard. (Calcutta) 8: 240, t. 319. 1898. (Fig.4)

Type: India, Feilding s.n. (holo. K-Lindl.).

Pendulous epiphytes. Stem slender, terete, 10 - 180 cm long, rooting at base; internodes 1.5 - 4 cm long, sheaths striated. Leaves more or less one sided, terete, obtuse, 8 - 25 cm long, 1.5 - 2 mm thick. Inflorescence extra-axillary, sheathed at base, 13 - 22 cm long, in laxly many flowered simple raceme; peduncle 1.5 - 4 cm long. Flowers 7 - 9 mm across; the pedicellate ovary 4 - 6 mm long. Bracts minute, scarious, persistent. Sepals and petals chocolate-brown with yellowish or buff on the edges, all reflexed. Sepals oblong, obtuse, the dorsal $c.3 \times 2$ mm, concave hooded at apex; laterals 4×2.5 mm. Petals smaller than sepals, linear, acute

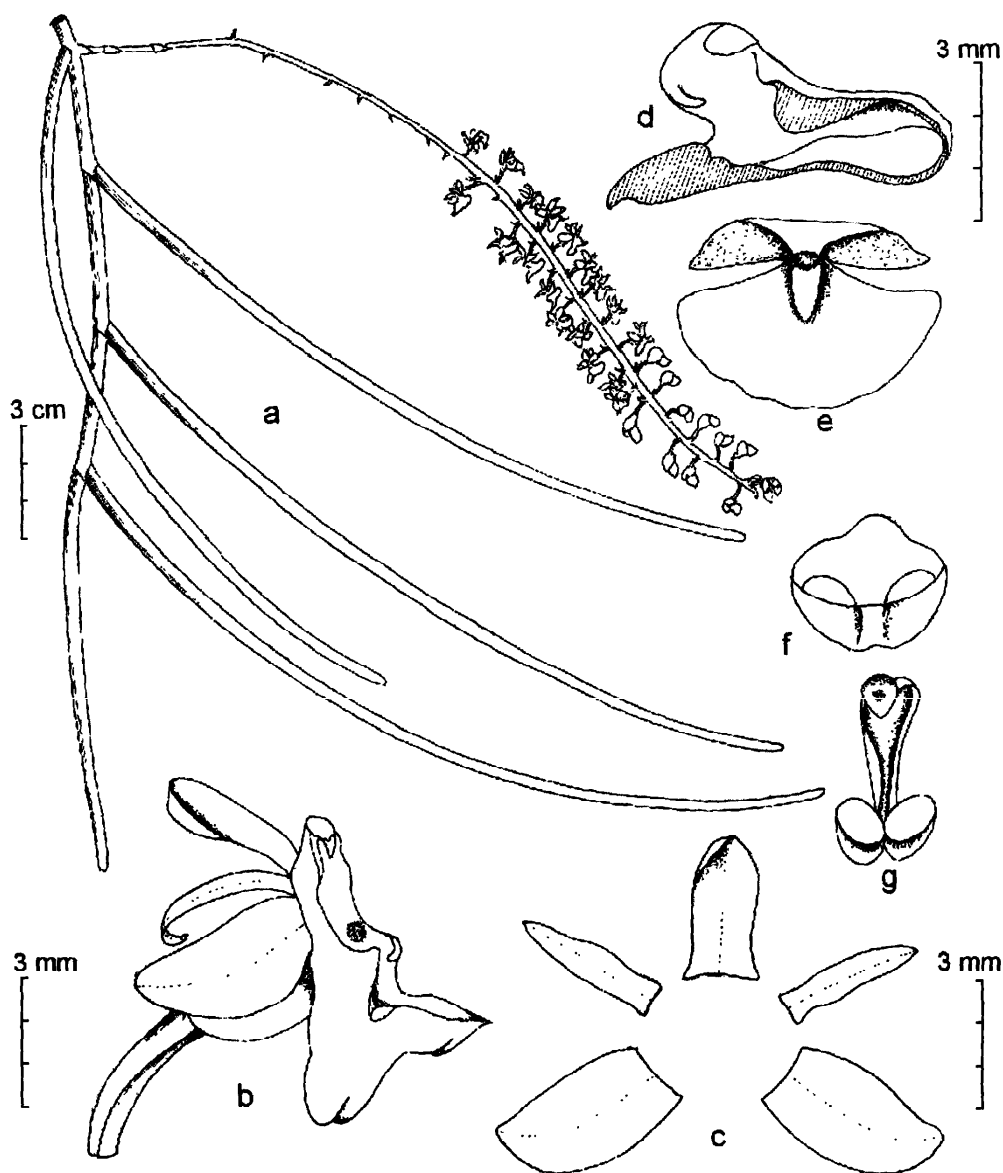


Fig.4. *Cleisostoma filiforme* (Lindl.) Garay: A. plant; B. flower; C. sepals & petals; D. l.s. of lip; E. dorsal callus; F. anther; G. pollinia with stipe. (drawn from Rabha 60291).

c.3 × 2.5 mm. Lip attached to the foot of column, fleshy, white flushed with pink or violet on the apical lobe, with a long infundibuliform compressed spur; the spur tinged with violet, 2-celled inside, the back wall callus c.3 mm broad, nearly pentagonal with a vertical small median keel; the side lobes oblong, auriculate, infolded; the mid lobe small, triangular, lilac, fleshy. Column with a broad base, narrow towards apex, yellow, stigmatic cavity, coloured as sepals. Anthers depressed, beaked. Pollinia 2, elliptic, attached obliquely to the somewhat twisted caudicle, the gland small, oblong.

Fl.: July - September.

Distribution: India: Arunachal Pradesh, Assam, Meghalaya, Sikkim, West Bengal (Darjeeling); Bhutan, Myanmar, Nepal and Thailand.

Specimens examined: Meghalaya, Nongpoh, G.K.Deka s.n. (ASSAM 36190, 36189). Assam, Darrang Dist., Kadabil R.F., N.N.Rabha 60291; Nameri, S.Phukan 102883. Arunachal Pradesh, Tirap, D.B.Deb 26653; Tripura, Tlangsang, D.B.Deb 27147.



Plate 2. A & B. *Cleisostoma filiforme* (Lindl.) Garay; C & D. *Cleisostoma simondii* (Gagnep.) Seidenf.; E & F. *Cleisostoma subulatum* Blume.

Cleisostoma linearilobatum (Seidenf. & Smitinand) Garay in Bot. Mus. Leaf. 23: 172. 1972. *Sarcanthus linearilobatus* Seidenf. & Smitinand, Orch. Thail. (Prelim. List): 684, f. 506. 1965. *Sarcanthus sagittatus* King & Pantl. in J. Asiat. Soc. Bengal, Pt.2, Nat. Hist. 66: 595. 1897. *Cleisostoma sagittiforme* Garay in Bot. Mus. Leaf. 23: 174. 1972; Seidenf., Dansk Bot. Ark. 29 (3): 19, f. 5. 1975; Pradhan, Indian Orch. 2: 515. 1979. *Cleisostoma sikkimense* Lucksom in Indian J. Forest. 15: 27. 1992.

Type: Thailand, Kwang He, Chienmei, Kerr 363 (holo. K).

Stem short, c.5 cm long. Leaves 2 or 3, linear-oblong, blunt and obscurely bilobed at apex, narrowed to the base, 12–15 × 1.1–1.5 cm. Inflorescence as long as leaves, peduncle slender, the raceme short, lax, c.12-flowered. Flowers 5–6 mm across. Bracts minute, much shorter than the slender pedicellate ovary. Sepals subequal, elliptic, blunt, dorsal sepal erect, dark brown with a green median line; laterals reflexed, distal half dark brown, proximal half green with a few brown spots. Petals shorter than sepals, oblong, blunt, reflexed, dark brown with a green median line. Lip 3-lobed, mid lobe and base of side lobes dark purple, rest whitish yellow; mid lobe sagittate, apex curved upwards; side lobes triangular, acuminate, forward pointing; spur light purple, narrowly infundibuliform, septate to near its bifid apex. Column stout, light purple; the basal callus large, smooth, 2-lobed, with two divergent horns at its apex. Anthers white, truncate, ciliate; pollinia oblong, attached to a tapering caudicle; gland ovate.

Fl.: June - July.

Distribution: India: Meghalaya, Sikkim; Bhutan, China (Yunnan) and Thailand.

Specimen examined: Meghalaya, Khasi hills, Pantling 629 (CAL).

Cleisostoma paniculatum (Ker Gawl.) Garay in Bot. Mus. Leaf. 23: 173. 1972; Deori & Malhotra in Bull. Bot. Surv. India 15: 274. 1976 (1973); Pradhan, Indian Orch. 2: 513. 1979. *Aerides paniculatum* Ker Gawl., Bot. Reg. 3: t. 220. 1817. *Vanda paniculata* (Ker Gawl.) R. Br., Bot. Reg. 6: t. 506. 1821. (Fig.5).

Type: China, Bank's collection anno 1817 Herb. Lindl.(K).

Epiphytes. Stem covered with leaf-sheaths, up to 35 cm long, 0.4–0.6 cm thick, aerial roots long, c.0.3 cm thick. Leaves 8–23 × 1.3–2.2 cm, linear, distichous, coriaceous, unequally bifid at apex, lobes round. Inflorescence in simple panicles, axillary, 15–60 cm long, scape stout with 2–3 tubular sheaths at base and one bract at each branching node. Flowers 8–12 mm across, greenish, inner surfaces of sepals and petals golden yellow except the purple blotches along the middle, pedicellate ovary 6–10 mm long; floral bracts minute. Dorsal sepals 4 × 2 mm, cuculate, 5-nerved, crenate at apex; laterals 5 × 2.5 mm, spreading, oblong, 5-nerved. Petals 3.5 × 1.5 mm, linear-oblong, 3-nerved. Lip yellow, 3-lobed, side lobes obtuse, purplish-brown tinged; mid lobe uncinat, triangular acuminate at apex, with 2 subulate process, golden yellow; callus at the mouth of the spur, 2-lobed, hairy; spur 5–8 mm long, subcylindric, non-septate with 3–5 faint brown nerves. Column purple, very short; anther whitish, depressed, obovate, cordate at base; pollinia 4, in 2 pairs; stipes broad, acuminate; glands large, forked, exposed. Capsules 1.5–2.5 × 5 cm, 6-ridged, ellipsoid-obovoid.

Fl.: June - September.

Distribution: India: Arunachal Pradesh, Assam, Meghalaya, Mizoram; China, Indo-China and Taiwan, Thailand.

Note: Nectar drops accumulate on both side of mid lobe of lip, forms crystal-like bodies after getting dried up.

Specimens examined: Arunachal Pradesh, Lohit, Hyuling, J. Joseph 51772, 48487; Namdapha B.R. (grown in BSI EC Garden), S. Phukan 102895. Assam, North Lakhimpur, Dulong RF, G. Panigrahi 11339; Nameri, S. Phukan 60287. Meghalaya, Khasi Hills (grown in BSI EC Garden), S. Phukan 60288; Pongtung, G.K. Deka s.n. (ASSAM 36193, 36161). Mizoram, Aizwal, G.K. Deka s.n. (ASSAM 41047).

Cleisostoma racemiferum (Lindl.) Garay in Bot. Mus. Leaf. 23: 173. 1972; Seidenf. in Dansk Bot. Ark. 29 (3): 16. 1973; Pradhan, Indian Orch. 2: 515. 1979. *Saccolabium racemiferum* Lindl., Gen. Sp. Orchid. Pl. 224. 1833. *Sarcanthus pallidus* Lindl. in Edwards's Bot. Reg. 27. (Misc.) 78: 1840; Hook.f.,

Fl. Brit. India 6: 68. 1890; King & Pantl. in Ann. Roy. Bot. Gard. (Calcutta) 8: 241, t. 320. 1898. *Sarcanthus tricolor* Rchb. f. in Bonplandia (Hannover) 3: 219. 1855. *Sarcanthus racemiferum* (Lindl.) Rchb.f. in W.G. Walpers, Ann. Bot. Syst. 6: 891. 1864. *Sarcanthus chrysomelas* Rchb.f. in Gard. Chron. 1869: 662. 1869. *Sarcanthus lorifolius* C.S.P. Parish ex Hook.f., Fl. Brit. India 6: 69 1890. *Sarcanthus affinis* Wall. ex Hook.f. in Ann. Roy. Bot. Gard. (Calcutta) 5: 53. 1895. *Sarcanthus yunnanensis* Schltr. in Repert. Spec. Nov. Regni Veg. Beih. 4: 77. 1919. *Sarcanthus manlinensis* Guillaumin in Bull. Mus. Nat. Hist. Nat., II, 28: 239. 1956. *Cleisostoma chrysomelas* (Rchb. f.) Garay in Bot. Mus. Leaflet 23: 170. 1972.

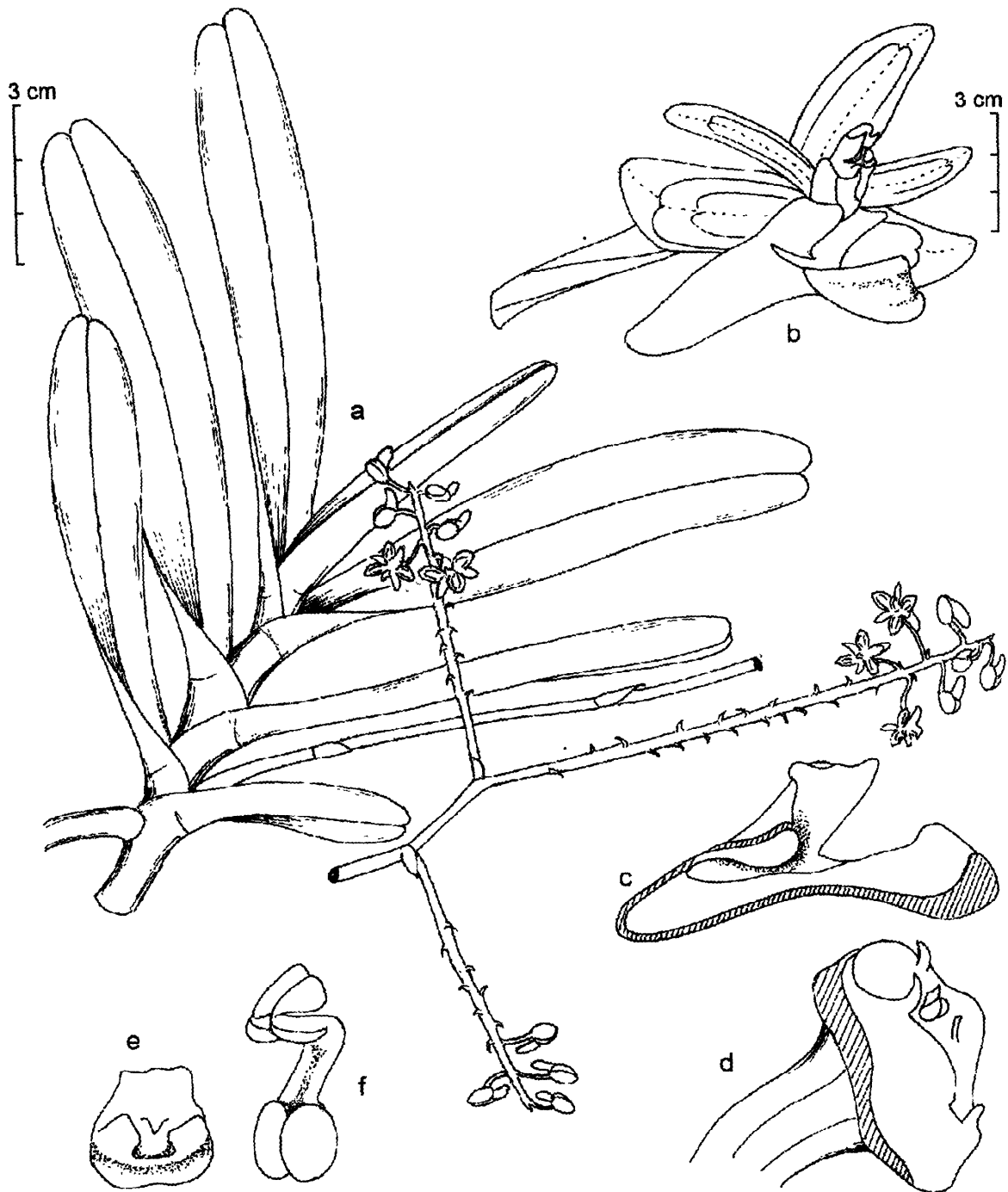


Fig.5. *Cleisostoma paniculatum* (Ker Gawl.) Garay: A. plant; B. flower; C. l.s. of lip; D. column; E. pollinia. (drawn from Phukan 60287).

Type: India, Wallich 655 (holo. K).

Epiphytic. Stem very short, 10 - 25 cm long; leafy to the base, clothed with embricating leaf sheaths; with stout roots at base. Leaves thickly coriaceous, flat, linear-oblong, obliquely bifid at the obtuse apex, 10 - 25 × 2 - 4 cm, only the midnerve prominent. Inflorescence axillary, paniced raceme, the upright stout peduncle with few tubular sheaths, much longer than leaves, copiously branched, laxly-numerous flowered, 20 - 60 cm long. Flowers 8 - 10 mm across, bracts very short, broad. Sepals equal, spreading, dark purple to dull brown, edged with yellow and a median line, whitish on outer side, oblong, obtuse c. 3 - 4 × 2 - 2.5 mm, the dorsal concave. Petals slightly smaller than sepals, dark-purple to dull brown, edged with yellow and faint median line, 3 × 2 mm. Lip fleshy, white, becoming yellowish in older flowers, 5 - 6 mm long, 3-lobed; side lobes incurved, triangular with subulate tips touching each other, yellowish; apical lobe fleshy, with an incurved apical beak; white, sometimes light purple or maroon tinged; the spur cylindric, septate by vertical lamella which is extending from spur tip to middle of mid lobe; back wall callus large protruding, fleshy, 2-lobed. Column short, stout, 2 mm long, rostellum obscure. Anthers triangular with acute tip; pollinia 2, oblong, caudicle thin dilated above, less than c. 1 mm long, gland small. Capsules 1.2 - 1.6 mm long, obovoid, shortly stalked.

Fl.: May - August.

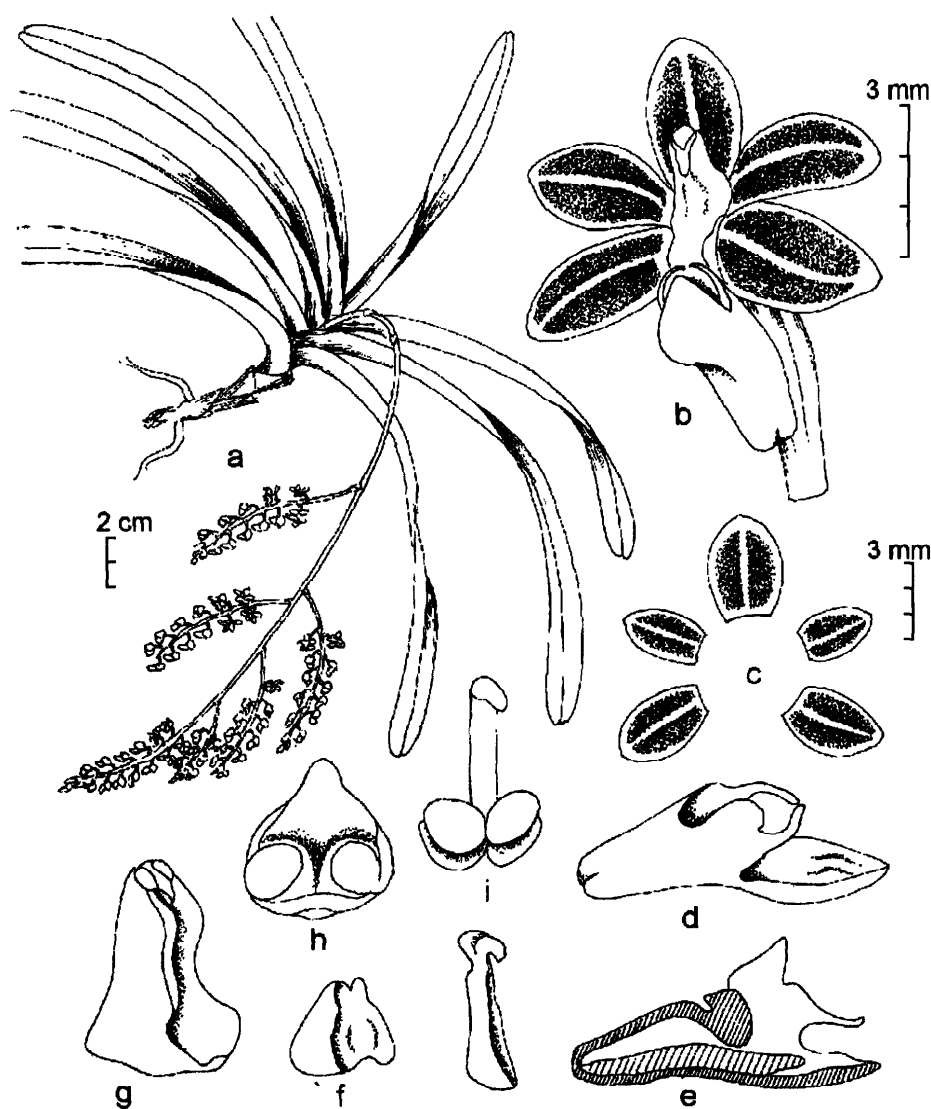


Fig.4. *Cleisostoma racemiferum* (Lindl.) Garay: A. plant; B. flower; C. sepals & petals; D. lip; E. l.s. of lip; F. dorsal callus; G. column; H. anther; I. pollinia; J. stipe of pollinia.

Distribution: India: Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Sikkim, West Bengal (Darjeeling); Bhutan, Laos, Myanmar, Nepal, Thailand, Vietnam and Yunnan.

Note: The lip in fresh flowers white with faint pink tinged on mid lobe and pale yellow lateral lobes. In older flowers colour of lip becomes golden yellowish.

Specimens examined: Arunachal Pradesh, Kameng, Dirang-Dzong, *R.S.Rao* 8037; Kameng, Ankling, *P.K.Hajra* 54376. Meghalaya, Jaintia Hills, Jowai, *R.S.Rao* 2576; Khasi Hills, Umsaw, *G.K.Deka* s.n. (ASSAM 36194); *S.K.Kataki* 49413; National Orchidarium Shillong, *S.Phukan* 60289. Eastern Bhutan, Shali, *N.P.Balakrishnan* 41299, 42000; Nyoth, *N.P.Balakrishnan* 44153; Grown in Orchidarium Shillong, *H.J.Basu* 53061, *T.M.Hynniewta* 51807.

Cleisostoma rolfeanum (King & Pantl.) Garay in Bot. Mus. Leaf. 23: 174. 1972; Seidenf. in Dansk Bot. Ark. 29. (3): 57 t. 25. 1975; Phukan & A.A.Mao in Orchid Rev. 112: 115.2004. *Sarcanthus rolfeanus* King & Pantl. in J. Asiat. Soc. Bengal, Pt.2, Nat. Hist. 66: 594. 1897. (Fig.7)

Type: Myanmar, Moulmein, *Peche* s.n.(CAL).

Epiphytic. Stem slender, branched, 6 - 30 cm long, 2 - 2.5 mm thick, older portion covered with scarious leaf-sheaths; internodes 1.2 - 3 cm long, purple dotted to purplish; sheaths striated. Leaves terete, acute, green to purplish, purple-dotted, 7 - 14 × 0.2 - 0.25 cm. Inflorescence supra-axillary, 5 - 13 cm long, simple lax raceme, peduncle purplish with 1 or 2 tubular sheaths at base. Flowers 4 - 8 mm apart, 8 - 10 mm across, spreading, pedicellate ovary 5 - 6 mm long, purplish. Sepals c.4 × 2 - 2.5 mm, oblong, dark purplish-brown; the dorsal obtuse and hooded, the laterals blunt, reflexed. Petals 3 × 1 mm, linear, obtuse, reflexed, colour same as sepals. Lip 6 mm long, white, 3-lobed; lateral lobes large, oblong, their tips converging, yellowish; mid lobe ovate, thick, acute, light purple tinged; dorsal callus sagittate with a straight line of short stiff hairs in front of

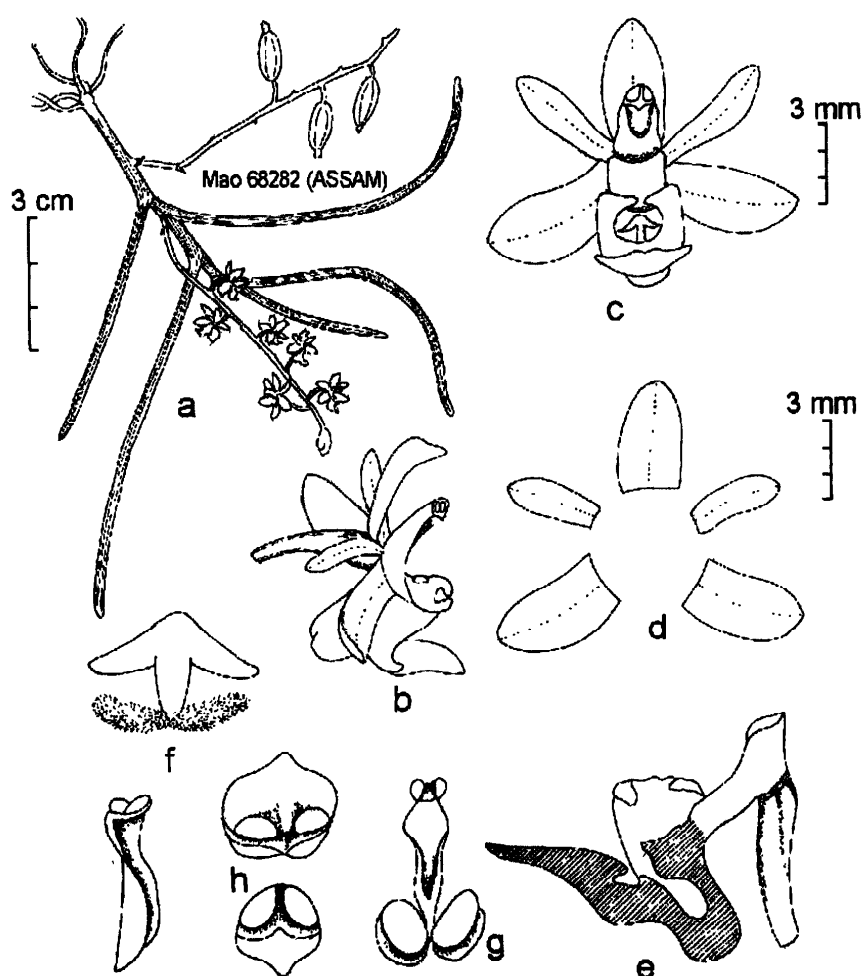


Fig.7: *Cleisostoma rolfeanum* (King & Pantl.) Garay: A. plant; B & C. flower; D. sepals & petals; E. lip with column; F. dorsal callus; G. pollinia; H. anther. (drawn from A.A.Mao 68282).

it, pubescent at base; spur with a short lamella. Column short, thick, white. Anthers 2-chambered, purple, tip acute. Pollinia 4, in 2 pairs; stipe 1 mm long. Capsules 1 1.5 × 0.2 - 0.3 cm, slender, fusiform.

Fl.: June - July.

Distribution: India: Manipur; Myanmar.

Specimen examined: Manipur, Senapati Hills, Mao area (grown in BSI Garden, Shillong), *S. Phukan* 67711, 102865.

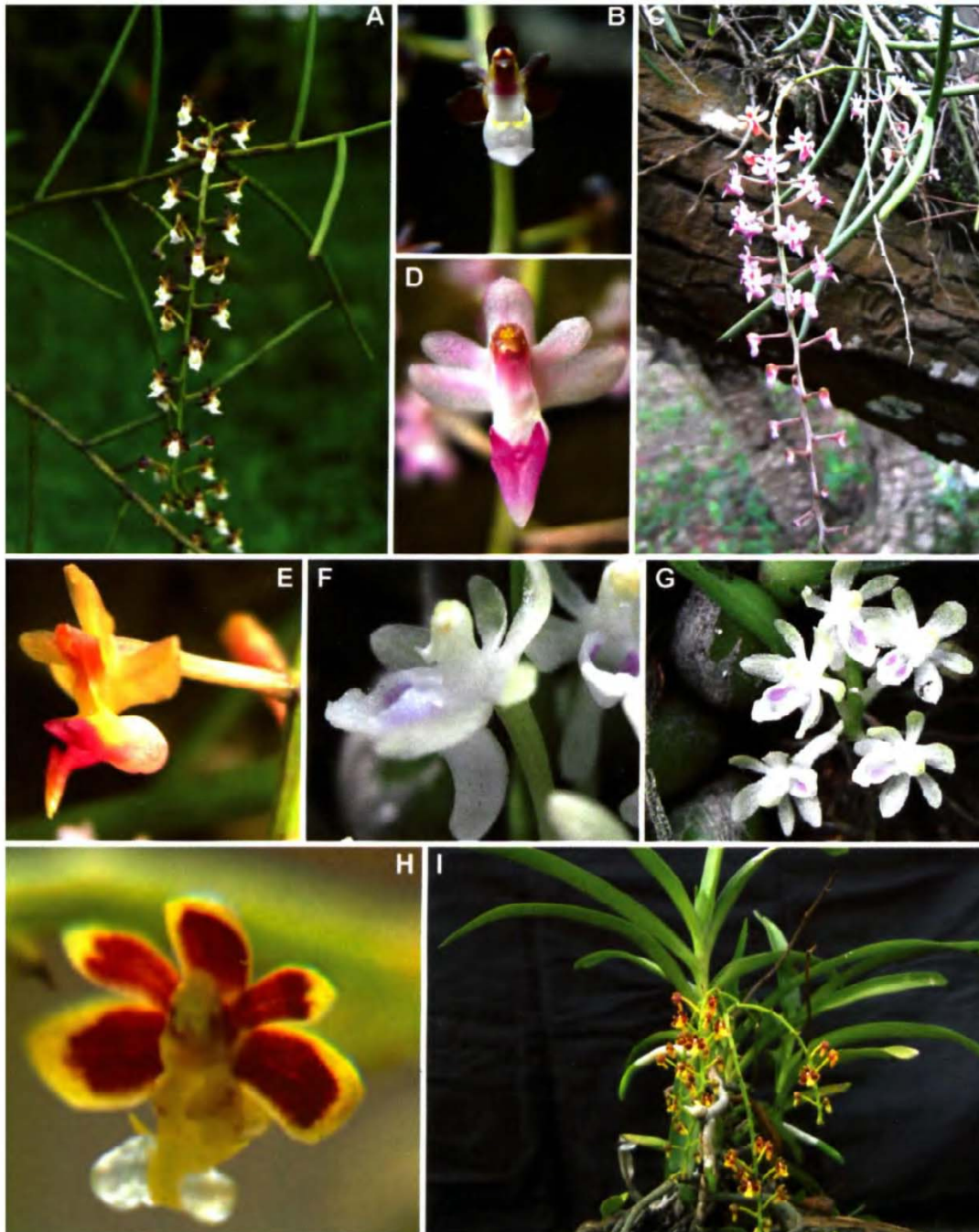


Plate 3. **A & B.** *Cleisostoma rolfeanum* (King & Pantl.) Garay; **C, D & E.** *Cleisostoma williamsonii* (Rehder, f.) Garay; **F & G.** *Cleisostoma tricallosum* S.N. Hegde & A.N. Rao; **H & I.** *Cleisostoma paniculatum* (Ker Gawl.) Garay.

Note: Flowers of this species at first sight resemble to *C. filiforme*, but distinct in lip characters.

Cleisostoma simondii (Gagnep.) Seidenf. in Dansk Bot. Ark. 29 (3): 66, t. 30. 1975; Pradhan, Indian Orch. 2: 510. 1979. *Vanda simondii* Gagnep. in Bull. Mus. Natl. Hist. Nat., II, 22: 628. 1951. *Sarcanthus teretifolius* (Lindl.) Lindl., Gen. Sp. Orchid. Pl. 324. 1833. *Sarcanthus appendiculatus* sensu King & Pantl. in Ann. Roy. Bot. Gard. (Calcutta) 8: 240, t. 318. 1898, non (Lindl.) Hook. f., 1890. *Sarcanthus siamensis* Rolfe ex Downie in Bull. Misc. Inform. Kew 1925: 405. 1925. *Cleisostoma seidenfadenii* Garay in Bot. Mus. Leaflet 23: 175. 1972. (Fig.8)

Type: Vietnam, Upper Tonkin, Rives fide icon, *Simond* 56 (holo: P).

Epiphytic. Stem erect, rigid, 20–35 cm long, c.3 mm thick, covered with 1.5–3 cm long internodal sheaths. Leaves terete, obtuse, 6–10 cm long, 2–3 mm thick. Inflorescence extra-axillary, sheathed at base, 11–14 cm long, drooping; peduncle short; raceme lax, 10–14 flowered. Flowers 1.5–2 cm across, 0.5–1.2 cm apart; pedicellate ovary 1.2–1.8 cm long, purplish, resupinate. Bracts broadly ovate, obtuse, minute. Sepals spreading, 7–8 × 4 mm, oblong, obtuse, brownish-yellow or buff coloured with 3–4 reddish or brownish-purple streaks. Petals spreading 7–8 × 3–3.5 mm, oblong, obtuse, colour same as sepals. Lip attached to the foot of the column, slightly longer than the sepals, pink, spurred, 3-lobed; lateral lobes broad at base, narrowed to a conical tip; mid lobe fleshy, broadly triangular, decurved; spur infundibuliform, obtuse, streaked with reddish or brownish-purple on outer side; dorsal callus large, hairy at base. Column 4–5 mm

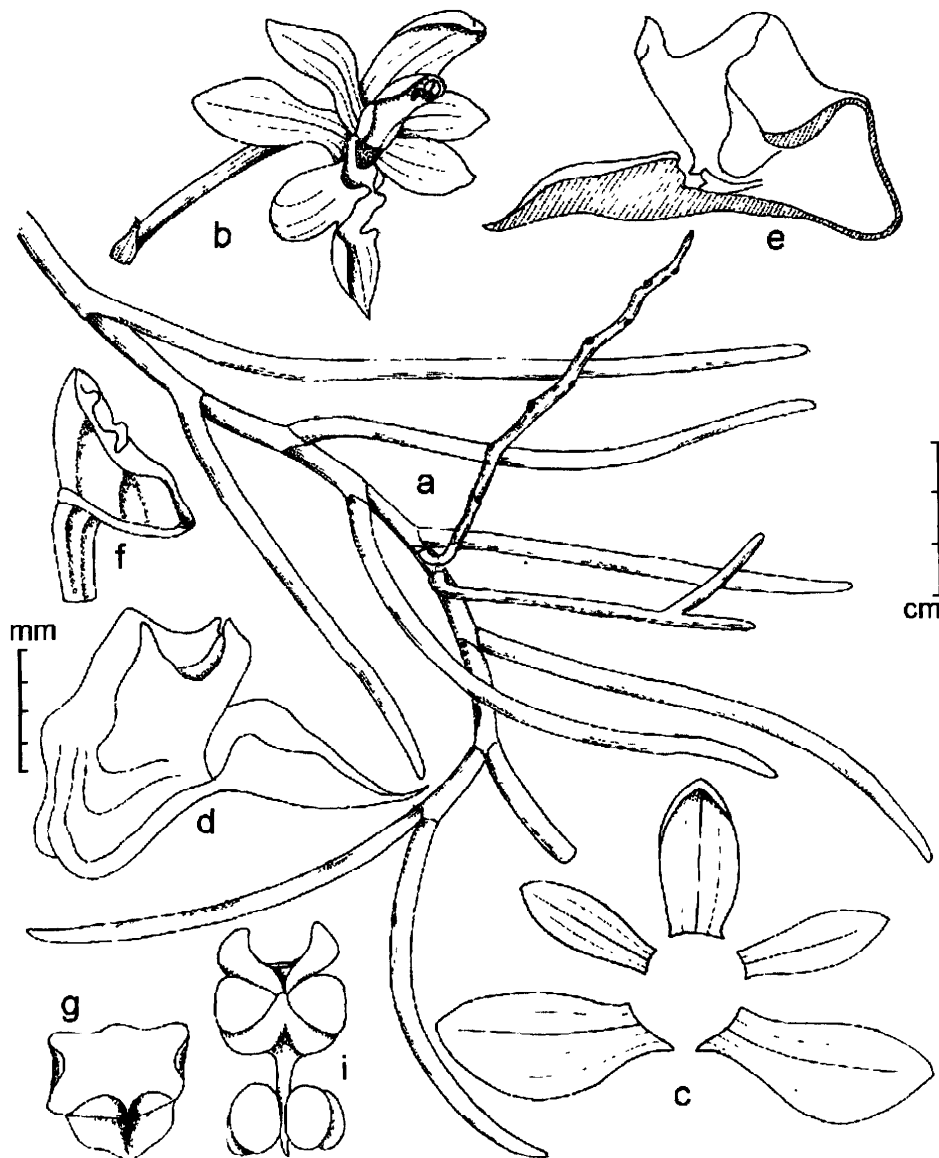


Fig.8. *Cleisostoma simondii* (Gagnep.) Seidenf.: A. plant; B. flower; C. sepals & petals; D. lip; E. l.s. of lip; F. column; G. anther; H. pollinia. (drawn from Phukan 60264).

long, thick, with a thick short foot, light pink; anther depressed, the anterior edge forming a short- broad appendage; pollinia 2, stipe contracted between the pollinia, gland broad, quadrate, operculum, protruding. Capsules c.3 cm long, fusiform, ridged.

Fl.: August - September.

Distribution: India: Arunachal Pradesh, Meghalaya, Sikkim; Hongkong, Laos, Myanmar, Thailand and Vietnam.

Specimen examined: Meghalaya, grown in BSI EC Garden, S.Phukan 60264.

Cleisostoma striatum (Rchb.f.) N.E. Br., Suppl. Johnson's Gurd. Dict. 901. 1882; Seidenf. in Dansk Bot. Ark. 29. (3): 42, t. 18. 1975; Pradhan, Indian Orch. 2: 512. 1979. *Echioglossum striatum* Rchb. f. in Gard. Chron. n.s. 12: 390. 1879; Hook.f., Fl. Brit. India 6: 73. 1890; Hook.f., Ic. Pl. t. 2142. 1893; King & Pantl. in Ann. Roy. Bot. Gard. (Calcutta) 8: 231, t. 307. 1898. *Cleisostoma brevipes* Hook.f., Fl. Brit. India 6: 73. 1890. (Fig.9)

Type: Sikkim; sine loc. (Hort. MacLeary/Green 728 (holo. W). Herb. Rchb.f. no. 53401).

Epiphytic. Stems tufted, roots aerial, elongate, 20 - 60 cm long, with internodes 2 - 2.5 cm, rugulose. Leaves erecto-patent, sessile, linear-lanceolate, flat, thickly coriaceous, mucronate at apex, 6 - 12 × 1 - 1.5 cm. Inflorescence in axillary dense spikes with a few basal sheaths, drooping; rachis very thick, 3 - 4 cm long. Bracts persistent, brown, broad, c.2 mm long. Flowers c.8 mm across, yellow to orange yellow, streaked with purple. Sepals oblong, obtuse or subacute, 4 - 5 × 2 mm, the dorsal sepal concave. Petals oblong, obtuse 4 - 5 × 1.5 - 2 mm; both sepals and petals yellow to orange yellow with two purple bands. Lip pale yellow,

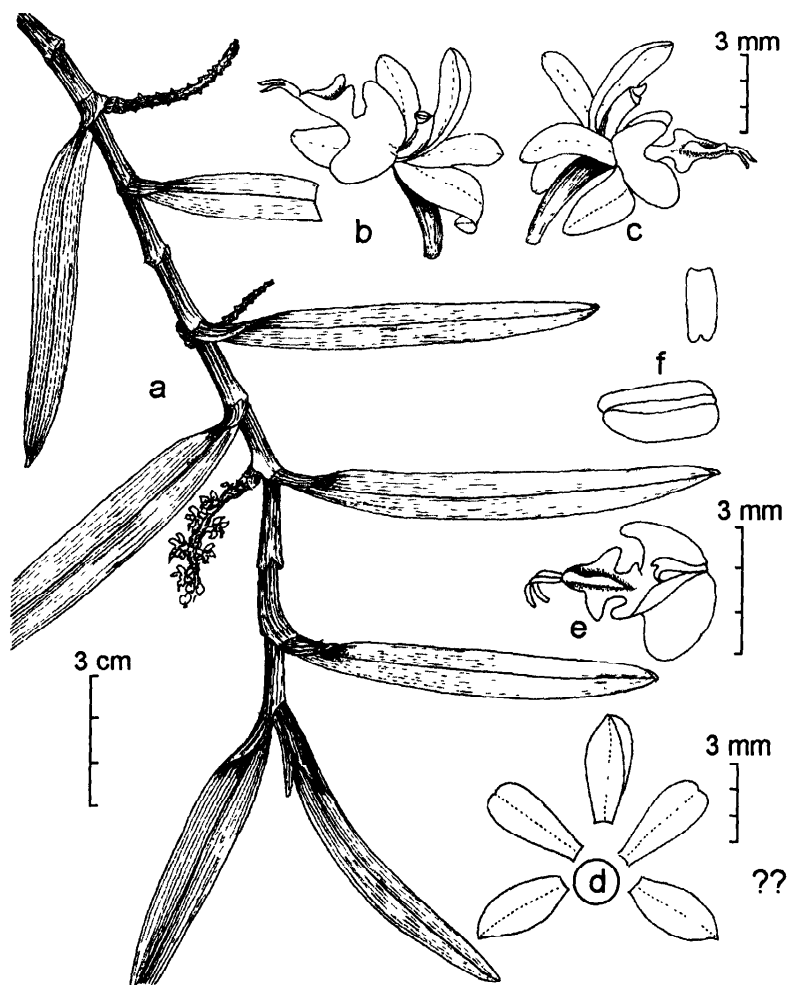


Fig.9. *Cleisostoma striatum* (Rchb.f.) N.E. Br.: A. plant; B & C. flower; D. sepals & petals; E. lip; F. dorsal callus.

4 - 5 mm long, 3-lobed; side lobes falcate, acute; mid lobe hastately triangular with a membranous, slender, bicuspidate tongue at apex; spur sac short, shining, tip rounded; disc thickened extending backward. Column short, stout, the callus ligulate. Pollinia subquadrate, strap linear, gland large, 2-partite. Capsules 1.5 - 2 cm long, fusiform, terete, striate.

Fl.: August.

Distribution: India: Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim; Bhutan, China, Malaysia and Vietnam.

Specimens examined: Arunachal Pradesh, Lohit, *A.S.Rao* 48169; *R.S.Rao* 10344, 10800, 10606; Bhutan, East Bhutan, cultivated in National Orchidarium at Shillong, *N.C.Deori* 50817.

Cleisostoma subulatum Blume, Bijdr. Fl. Ned. Ind. 363. 1825; Lindl., Gen. Sp. Orchid. Pl. 226. 1833; Seidenf. in Dansk Bot. Ark. 29 (2): 25. 1975; Pradhan, Indian Orch. 2: 514. 1979; N.Pearce & P.J.Cribb, Orch. Bhutan 511. 2002. *Sarcanthus secundus* Griff., Not. Pl. Asiat. 3: 362. 1851. Hook.f. in Fl. Brit. India 6: 67. 1890 & in Ann. Roy. Bot. Gard. (Calcutta) 5: 51, t. 77. 1895; King & Pantl. in Ann. Roy. Bot. Gard. (Calcutta) 8: 241, t. 321. 1898. *Sarcanthus subulatus* (Blume) Rchb.f. in Bonplandia (Hannover) 5: 41. 1857; Holtt., Orch. Malaya 654. 1957. *Saccolabium secundum* (Griff.) Ridl., Mat. Fl. Malay. Penins. 1: 168. 1907. (Fig.10)

Type: Java, Tjilele, Parang, Tjanjor, *Blume* s.n. (holo. L).

Epiphytic. Stems 10 - 40 (-85) cm long, slender, pendulous, covered with sheaths of fallen leaves. Leaves

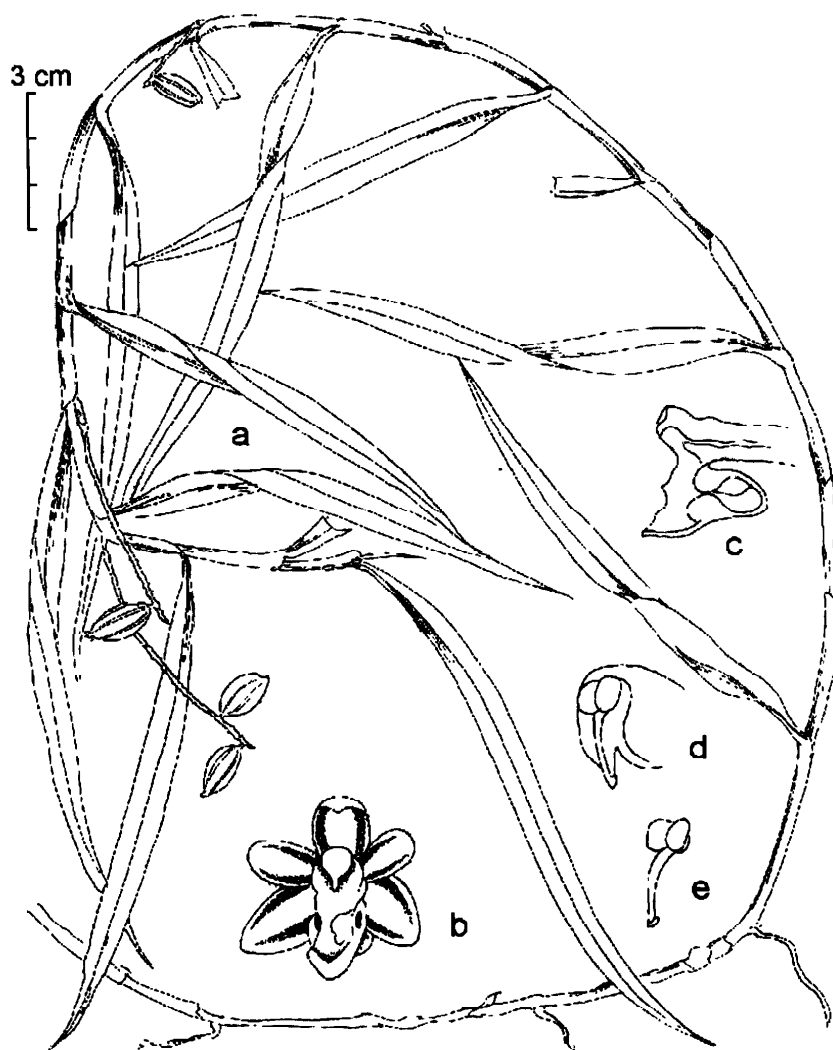


Fig.10. *Cleisostoma subulatum* Blume: A. plant; B. flower; C. l.s. of lip; D. pollinia on top of column; E. pollinia. (drawn from Hajra 52492).

alternate, 6 - 16 × 0.5 - 1.1 cm, linear-lanceolate, acuminate, constricted little below the tip; internode sheaths 1.5 - 2.5 cm long, persistent. Inflorescence pendulous, extra-axillary, 4 - 11 cm long, 10 - 20-flowered, shorter than leaves. Flowers 6 - 7 mm across, whitish to yellowish with brown bands on perianth. Bracts ovate, acute, 1 mm long. Sepals subequal, c. 4 × 2 mm, elliptic-ovate, subacute. Petals smaller, oblong-obovate. Lip 3-lobed, spurred; lateral lobes triangular with apiculate tips pointing each other, apical lobe broad-triangular, acute or mucronate, pink; spur short, cylindric, septate with calli. Capsules 1 - 1.5 × 0.4 - 0.5 cm, oblong-ellipsoid.

Fl.: July.

Distribution: India: Arunachal Pradesh, Assam, Meghalaya, Sikkim, West Bengal (Darjeeling); Bangladesh, Myanmar, Thailand, Cambodia, Malaysia, Indonesia, Java and Borneo.

Specimens examined: Arunachal Pradesh, Kameng, Tipi, *A.N.Rao* 62384; Tirap, *D.B.Deb* 26292, 26691; *G.Panigrahi* 17059; Pava Sanctuary, *P.K.Hajra* 52492. Assam, NC Hills, Umrangsho, *S.Phukan* 102864; Golaghat, Nameri, *S.S.Begum* 103958; North Lakhimpur, Dulong RF, *G.Panigrahi* 11338, 27743. Meghalaya, Garo Hill, Nangalbibara, *M.K.V.Rao* 64609.

***Cleisostoma tenuifolium* (L.) Garay** in Bot. Mus. Leaflet. 23: 175. 1972; Seidenf. in Dansk Bot. Ark. 29 (3): 30, t.11. 1975; Pradhan, Indian Orch. 2: 514. 1979. *Epidendrum tenuifolium* L., Sp. Pl. 2: 952. 1753. *Cymbidium tenuifolium* (L.) Willd., Sp. Pl. 4, 1: 103, no. 39. 1805. *Sarcanthus peninsularis* Dalzell in Hooker's J. Bot. Kew Gard. Misc. 3: 343. 1851; Hook.f., Fl. Brit. India 6: 67. 1890; Santapau & Kapadia, Orch. Bombay: 230, t. 53. 1963. *Sarcanthus pauciflorus* Wight, Icon. Pl. Ind. Orient. 5: t. 1747. 1851. *Saccolabium acuminatum* Thwaites, Enum. Pl. Zeyl. 304. 1861. *Sarcanthus tenuifolius* (L.) Seidenf. in Dansk Bot. Ark. 27 (4): 37. 1971.

Type: Malabar, *Rheede* s.n.

Epiphytes. Stem pendulous, up to 30 cm long, dirty green, internodes 1 cm long, 3 - 5 mm thick, ribbed. Leaves alternate, 6 - 14 × 0.7 - 1 cm, narrowly linear-oblong, acuminate, thickly coriaceous, 3 - 5-nerved. Inflorescence in leaf-opposed, pendulous, simple lax raceme, 2 - 8 cm long, few-flowered. Flowers c. 7 mm across, yellow with red margins, bracteate; pedicel with ovary c. 2 - 3 mm long, pale yellowish. Bract c. 1.5 × 1 mm, minute, scarious, persistent, oblong, acuminate. Sepals c. 4 × 2.5 mm, spreading, obovate-oblong obtuse. Petals slightly smaller than sepals, oblong, acute; sepals and petals yellow with 2 broad brown-red bands along the margins. Lip c. 2.5 × 2 mm, 3-lobed, spurred; lateral lobes erect, triangular, acute, minute, pale violet; mid lobe small, incurved, acute, arrow-head-shaped; with two rounded calli between the lateral lobes. Spur c. 2.5 × 1.5 mm, conical, obtuse, yellow with a longitudinal septum from the mouth of the spur. Column short, stout, pale yellowish. Anthers beaked; pollinia 4 in pairs, globular with a narrow caudicle and a small gland. Capsules 17 - 19 × 6 - 8 mm, narrowly oblong, subsessile, strongly ribbed.

Fl. & Fr.: June - November.

Distribution: India: Karnataka, Kerala, Maharashtra; Sri Lanka, and Thailand.

Note: No specimen of this species are found in Indian herbaria; however the species is mentioned here vide Seidenfaden (l.c.) and Pradhan (l.c.)

***Cleisostoma tricallosum* S.N.Hegde & A.N.Rao** in Orchid Rev. 81: 54. 1983; Phukan & Bhaumik in Oas the J. 4: 9. 2009. (Fig. 1)

Type: India, Arunachal Pradesh, West Kameng dist., Sessa, *Hegde* 4127 (holo. Orch. Herb. Tipi; is ASSAM).

Plants small, epiphyte, up to 7 cm high. Roots many, spreading on the host, slender, branched, a few up to 30 cm long. Leaves distichous with a sheathing base, 3.5 - 6.5 × 1.2 - 1.7 cm, oblong, bilobed at apex. Inflorescence arising from base, 3-cm long, 6-16-flowered. Flowers white, 5 - 6 mm across. Bracts persistent broadly ovate, 1.5 - 2 mm long, acute. Sepals spreading, 4 - 5 × 1.5 - 2 mm, obtuse, entire, 3-nerved; the dorsal ones oblanceolate, while the laterals lanceolate. Petals 2 - 3 × 1 mm, oblong-lanceolate, obtuse, entire, 1-nerved. Lip c. 3 × 2 mm long, outer white, obscurely 3-lobed; lateral lobes small, with a violet blotch on inner side of each lobe; mid lobe small, up-curved, acute; spur c. 5 × 2 mm, slender, without any septa/lamellae; the callus clavate, pubescent; the lateral calli slightly thickened at the mouth region, with longer pubescent hairs.

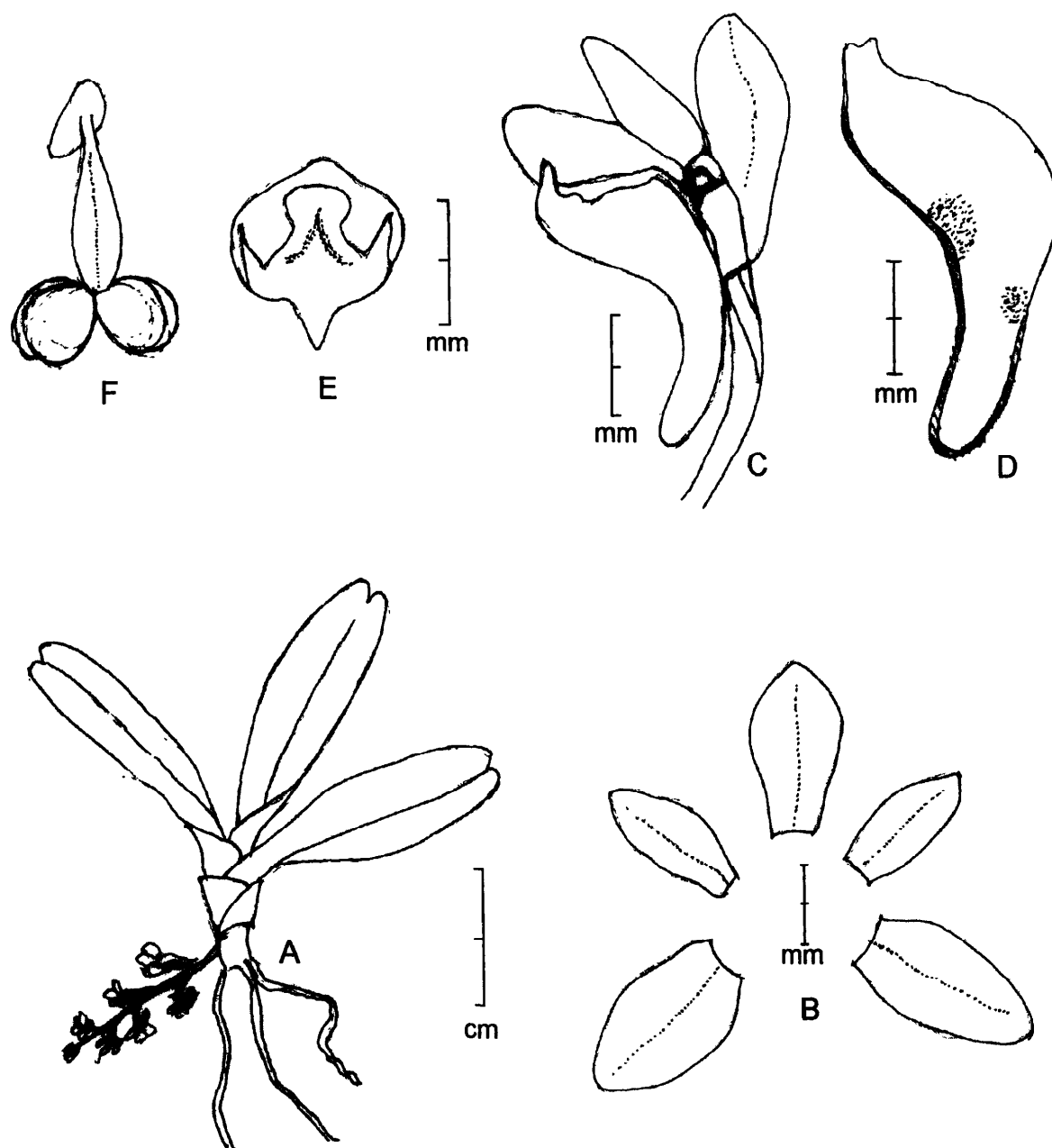


Fig.11. *Cleisostoma tricallosum* S.N.Hegde & A.N.Rao: A. plant; B. sepals & petals; C. lip & column; D. l.s. of lip; E. anther; F. pollinia.

running down two-thirds of the spur. Column c.2 mm long, broader towards apex; rostellum beaked forward and bent upwards at tip; stigma orbicular; anthers white, 2-chambered, apex beaked; pollinia attached to a stipe, 4 in number, arranged in two pairs, globular; pedicel and ovary 4 - 5 mm long.

Fl.: July.

Distribution: India: Arunachal Pradesh.

Specimens examined: West Kameng, Sessa, *Hegde* 4127 (ASSAM) and a live plant collected from Dibang Valley in Arunachal Pradesh, grown in B.S.I. Garden at Shillong.

Cleisostoma uraiense (Hayata) Garay & H.R. Sweet, *Orchids S.Ryukyu Isl.* 156. 1974; D.K.Hore & N.P.Balakr. in *J. Bombay Nat. Hist. Soc.* 81: 628. 1984. *Sarcanthus uraiensis* Hayata, *Icon. Pl. Formosan* 8: 130, t. 58. 1919. (Fig.12)

Epiphytic pendulous herbs, rooting and branching at base. Stem 35 - 70 cm long, 3 - 6 mm thick, covered with leaf sheaths; sheaths 2 - 4 cm long, persistent, striated. Leaves alternate, 12 - 20 × 1 - 2 cm, linear-lanceolate, obtuse, bilobed at apex, coriaceous, only midnerve is prominent. Inflorescence from upper leaf

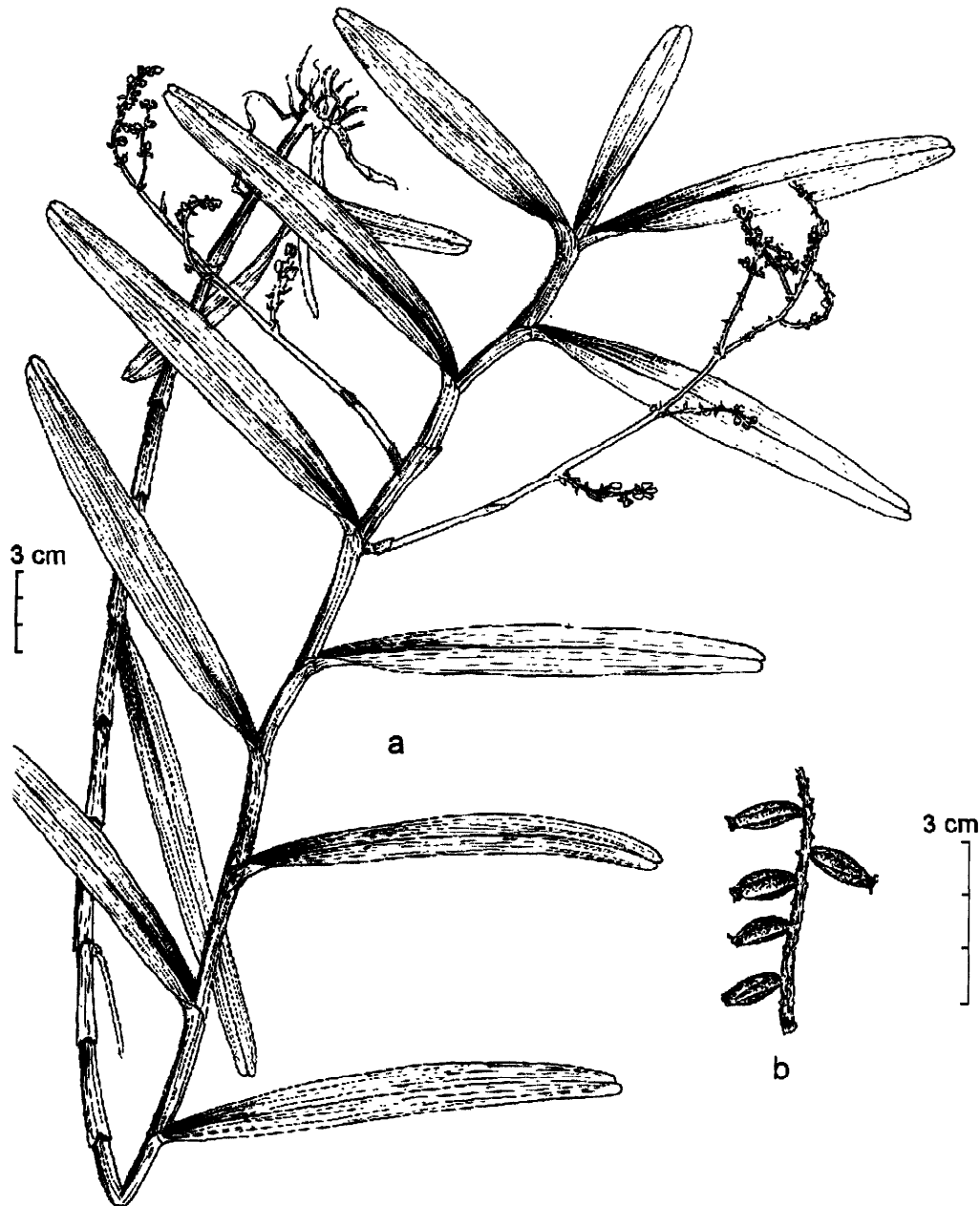


Fig.12. *Cleisostoma uraiense* (Hayata) Garay & H.R. Sweet: A. plant; B. capsules. (drawn from Balakrishnan 3869).

axils, extra- axillary; panicles 15 - 23 cm long, with a few small sheaths at base; peduncle with a sterile bract in the middle and at each branching point. Flowers 2 - 3 mm across, greenish-white, dense; pedicellate ovary c.2 mm long. Bracts persistent, minute. Sepals and petals greenish, minute. Lip white. Fruits 11 - 14 × 3 - 5 mm, ellipsoid.

Fl.: July - August; *Fr.*: September - October.

Distribution: India: Andaman and Nicobar Islands; Formosa, Philippines and Taiwan.

Specimens examined: Andaman & Nicobar Islands, Great Nicobar, Campbell Bay, N.P.Balakrishnan 2937; Galathea river to coastal forests, N.P.Balakrishnan 3869; Chenga Bay, D.K.Hore 7721, 8287 (PBL).

Cleisostoma williamsonii (Rchb. f.) Garay in Bot. Mus. Leafl. 23: 176. 1972; Seidenf. in Dansk Bot. Ark. 29 (3): 50. 1975. *Sarcanthus williamsonii* Rchb.f., Hamburger-Blumenzeitung Garten. 21: 353. 1865; Hook.f., Fl. Brit. India 6: 67. 1890; N.P.Balakr. & Sud. Chowdhury in Bull. Bot. Surv. India 9: 93, t. 57 - 68. 1968 (1967). (Fig.13)

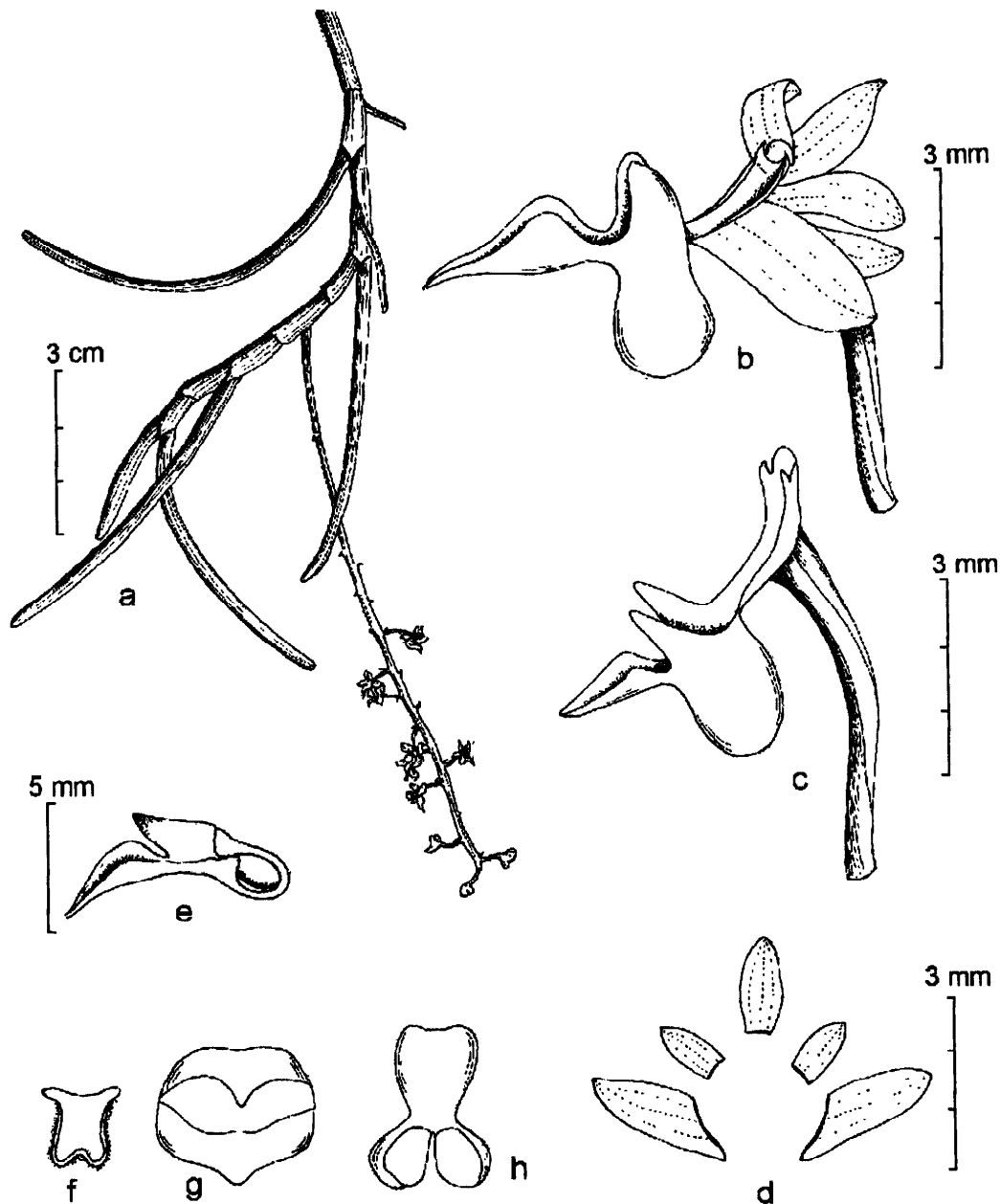


Fig.13. *Cleisostoma williamsonii* (Rchb. f.) Garay: A. plant; B. flower; C. lip with column; D. sepals & petals; E. l.s. of lip; F. dorsal callus; G. anther; H. pollinia (drawn from *Deka* 8035).

Type: Assam, *Williamson* s.n. Herb. Rchb.f. 53525 (holo. W).

Pendulous epiphytes. Stem elongate, slender, terete, 8–35 cm long, 3–4 mm thick; internodes 1–2.2 cm long. Leaves terete, slender, distichous, curved, 6–12 × 0.1–0.2 cm, subacute, longitudinally striate; leaf base sheathing, completely covering the internodes, striate. Inflorescence in supra axillary, simple or branched, laxly many-flowered racemes, 7–14 cm long. Flower opening from base upwards; peduncle terete, purplish. Bracts ovate, obtuse, scarious, minute, persistent. Flowers 5–8 mm across, purplish-pink, mildly fragrant, pedicellate ovary 4–8 mm long, purplish-brown. Sepals subequal, pale pinkish-purple, ovate-oblong, sub-obtuse; dorsal sepal 2–3 × 1–2 mm; laterals 3–4 × 2 mm, falcate. Petals linear-oblong, obtuse 2–3 × 1 mm. Lip 3-lobed, adnate to the foot of column; lateral lobes triangular, subacute, erect, dark purplish-pink, c. 1 mm long; mid lobe ovate, pink at apex, dark purplish at base, fleshy, longitudinally grooved at middle; spur pale pink, obtuse; back wall callus bilobed, minutely pubescent. Column short, operculum depressed, pale yellowish-pink with dark purple margins. Pollinia 4, in pairs, united in two globose bodies; caudicle spatulate, narrow, hyaline, narrowed towards apex, attached to a obcordate basal gland. Capsules 0.8–1.2 × 0.3–0.5 cm, obovoid, ridged.

Fl.: April - June.

Distribution: India: Andaman Islands, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland; Bhutan, China, Myanmar and Thailand.

Specimens examined: Arunachal Pradesh, Kameng, Dirang-Dzong, *R.S. Rao* 8035, 53976; Sabri Camp Rahung, *R.S. Rao* 7522, 1439. Manipur, near Ukhrul, *A.K. Baisya* 72200. Mizoram, Thiak road, *G.K. Deka* s.n. (ASSAM 41046). Meghalaya, Grown in National Orchidarium Shillong, *H.J. Basu* 50865. Nagaland, Pulebadje, *T.M. Hynniewta* 56292. Eastern Bhutan, Nyoth, *N.P. Balakrishnan* 43044, 44159.

Note: The pink colour of lip in fresh flowers becomes reddish in older flowers.

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भारत में क्लिसोस्टोमा ब्लूम (आर्किडेसी) वंश

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सार संक्षेप

आर्किडेसी कुल के क्लिसोस्टोमा वंश में विश्व में लगभग 100 जातियां हैं। भारत में मात्र 18 जातियां हैं। प्रस्तुत शोधपत्र में समानार्थकता, आकारिकी, व्याप्ति एवं आधार शब्दों के साथ टैक्सोनॉमिक विवरण दिया गया है।