

ORCHIDS OF NAGALAND



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Ministry of Environment and Forests

ORCHIDS OF NAGALAND

**T. M. Hynniewta
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PREFACE

This study presents a detailed systematic account of the 'Orchidaceae of Nagaland' based on 63 genera, 241 species and 4 varieties, with a critical evaluation of the various taxonomic features provided for these taxa; keys for identification; up-to-date nomenclature; detailed descriptions with illustrations; geographical distribution; concise notes on ecology, morphology, importance and uses, conservation and cultivation.

It also presents an Introductory chapter on the history of previous works on the Orchidology of India, particularly Nagaland; an introduction to Nagaland as regards its location, physiography and climate; a suitable bibliographical account; Index of the scientific names; and some photographs.

Investigations over the last many years revealed 32 genera, 153 species and 4 varieties as new additions to the 'Orchidaceae of Nagaland', including 2 new taxa, 2 re-discoveries and 4 new records for India, 9 new records for North Eastern India, besides several rare and threatened taxa of immense floriculture and scientific value needing immediate attention for protection and conservation.

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T. M. Hynniewta
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INTRODUCTION

The family Orchidaceae is one of the largest families of flowering plants with a world distribution and biologically the most complex. It comprises of 785 genera and 17,500 species (Mabberly, 1987). Majority of the species are natives of the tropical countries and occur in their greatest diversity in humid tropical forests. This is the second largest family in India with 1,080 species in about 157 genera (A.N. Rao, 1995). Satishkumar and Manilal (1994) reported 1,141 species in 166 genera under this family.

India, with a total land area of about 329 million hectares, is a vast country with a diverse ecological habitats and spreads over a wide range of latitudes and altitudes. The varied geographical and climatic diversity is splendidly reflected in its diversity of floristic wealth. North-East India, located between 22°9'-29°6' N latitudes and 89°7'-97°5' E longitudes, covering over an area of about 2,55,210 sq.km., comprises of 7 states viz., Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura. It is one of the richest and most interesting floristic regions in India with orchids forming a very noticeable feature of the vegetation. Out of 1,080 species of orchids reported from India, 57% of the species, i.e. about 620 species are from this region alone (A.N. Rao, 1995).

GEOGRAPHY AND CLIMATE

The present state of Nagaland, earlier known as Naga Hills district of Assam and the Tuensang district of North-East Frontier Agency (NEFA), has a fascinating landscape and lies between 25°6'-27°4' N latitudes and 93°20'-95°15' E longitudes. It is bound on the north by the state of Arunachal Pradesh, on the south by Manipur state, on the east by Myanmar (Burma) and the west by the Assam state. It has a geographical area of 16,575 sq.km., out of which about 8,625 sq.km. is the forested area. It is further divided administratively into 8 districts viz., Kohima, Mokokchung, Mon, Tuensang, Wokha, Phek and Zunhebato, Dimapur, with Kohima town located at an altitude of 1,444 m. as its capital. The state presents a mountainous landscape, with rugged hills alternating with narrow intermontane valleys. The altitude varies between 300 m-3,840 m. above mean sea-level (MSL) and highest mountain is Mt. Saramati (3,840 m) in Tuensang district along Myanmar border. Geologically, the terrain is made of tertiary rocks belonging to the Barail, Disang and Tipan series. The Barail

are composed of sandstones and shales, whereas Disang series represent shales, slates and phylites. The soils on the hill slopes are mostly formed of shales and in the valleys from alluvial. They are loamy to clayey in texture and highly acidic in reaction with high organic carbon contents. The climate over the hills is warm subtropical and cool. It is temperate over the high hills, and moderate-submontane type in the lower ranges of western flank. The average annual rainfall is between 200 cm to 250 cm occurring mostly between May to November, though there is not a single completely dry month in the year. The rainy season is characterized by high humidity. The winter and summer temperature over the hills varies between 5°C to 25°C and over the foothills between 12°C to 32°C.

ORCHID VEGETATION

The altitudinal variations coupled with favourable climate and physiography are conducive in holding a very rich biodiversity of plant wealth. These elements have favoured the orchids to grow in all diversity and abundance in almost all the vegetation types. Depending upon their habitats, occurrence in different vegetation types, 3 orchid zones can be easily recognised in Nagaland state.

I. Tropical evergreen and semi-evergreen forest zone (150-900 m).

This zone is characterized by broad-leaved vegetation with high rainfall, high humidity and temperature. Several epiphytic orchids with beautiful flowers grow in abundance viz., *Aerides multiflora*, *Acampe rigida*, *Bulbophyllum reptans*, *Cleisostoma filiforme*, *C. subulatum*, *Coelogyne rigida*, *Cymbidium aloifolium*, *Dendrobium acinaciforme*, *D. aphyllum*, *D. moschatum*, *D. nobile*, *D. transparens*, *Eria stricta*, *E. pannea*, *Gastrochilus calceolaris*, *Liparis plantaginea*, *Malaxis latifolia*, *Papilionanthe teres*, *Rhynchostylis retusa* and *Zeuxine strateumatica* etc. These orchids normally flower between March and June every year. The species like *Aerides odorata*, *Dendrobium fimbriatum* var. *oculatum* and *Vanda coerulea* are found in partially exposed areas, while *Ornithochilus difformis* and *Pteroceras suaveolens* are found in densely shaded areas. The terrestrial orchids like *Arundina graminifolia*, *Goodyera procera*, *Spiranthes sinensis*, are invariably found in open areas.

II. Sub-tropical forest zone (900-1,800 m). This zone can be divided into 2 areas viz., mixed wet forest belt and mixed dry forest belt:

(a) *Mixed wet forest belt*

This belt mostly remains wet and cool, although it receives comparatively less rain. The trees and rocks are heavily moss-covered and form a congenial habitat for a number of orchids forming a richly inhabited orchid zone. The epiphytic species of *Bulbophyllum*, *Coelogyne*, *Cymbidium*, *Dendrobium*, *Eria* and *Liparis* are invariably found on tree trunks and moss-covered rocks in exposed areas. The species like *Bulbophyllum affine*, *B. guttulatum*, *Calanthe biloba*, *C. mannii*, *Cleisostoma racemiferum*, *Coelogyne corymbosa*, *C. flaccida*, *C. punctulata*, *C. nitida*, *Dendrobium chrysanthum*, *D. falconeri*, *D. densiflorum*, *D. wardianum*, *Epigeneium amplum*, *Eria amica* and *Kingidium taenialis* are found in exposed and semi-exposed areas. However, *Cleisostoma aspersum*, *Goodyera schlechtendaliana* and *Liparis bootanensis* are found in shady areas. On damp, humus rich forest floor, species like *Phaius flavus*, *Calanthe* sp. and *Malaxis* sp. are generally seen. In partially exposed areas, the ground orchid like *Malaxis khasiana* is found occurring in abundance. On the exposed, cleared areas *Anthogonium gracile* with beautiful flowers is found growing profusely in late summer. An interesting saprophytic orchid, *Cymbidium macrorhizon* is found on humus rich floor, though rarely.

(b) *Mixed dry forest belt*

This area is inhabited intermixingly by mostly *Pinus*, *Rhododendron* and *Quercus* trees and is characterised by less rain and dry winter. The common epiphytic orchids are *Coelogyne elata*, *C. ovalis*, *Dendrobium fimbriatum* var. *oculatum*, *D. hookerianum* and *Otochilus fusca*. The rare orchids like *Cleisostoma williamsonii*, *Cymbidium longifolium* also occur in this zone. The terrestrial species found here are those of *Habenaria* and *Satyrium nepalense*. On wet, shady, humus filled calcareous soil, *Phaius tancarvilleae* is often noticed.

III. **Temperate and subtemperate forest zone (1,800-3,500 m)**

The forests of this zone are characterized by *Quercus*, *Rhododendron*, conifers, *Magnolia* and *Michelia* trees, and experience moderate rainfall, and in winter there is frost in the form of heavy fog. The trees and rocks are covered with moss, providing a beautiful habitat for orchids. The common species found in this zone are *Coelogyne occultata*, *Cymbidium mastersii*, *Dendrobium eriaeflorum*, *Eria coronaria*, *E. paniculata*,

Herminium lanceum, *Otochilus* species, *Panisea tricallosa*, *Spiranthes sinensis* and *Vandopsis undulata*. These species are also seen growing on moss-covered rocks in exposed areas. The terrestrial orchids like *Calanthe mannii* and *Satyrium nepalense* are common sights.

HISTORY OF ORCHID COLLECTION IN INDIA

Earliest mention of the Indian Orchids are in Linnaeus "Species Plantarum (1753)" wherein he has listed about a dozen from Malabar under the comprehensive genus *Epidendrum*. The source of his description is the classical work "Hortus Malabaricus" by van Rheede (1678-1693). It is of historical importance that the genera *Cymbidium* and *Rhynchostylis* were established solely based on Rheede's plates. John Lindley (1830-1840) published "Genera and species of Orchidaceous Plants" and utilised vast collections of Indian orchids to shape his ideas, and eventually laid foundation of Orchidology, the Science of Orchids. Roxburgh (1832) included 57 species of orchids in his work "Flora Indica" mainly from Sylhet district of the then Assam state. J.D. Hooker (1785-1865), who had vast experience in the field, and spent 4 years in Meghalaya, Sikkim, Nepal and Bengal collecting plants had undoubtedly gained deep knowledge of Indian orchids. His collections and drawings/paintings made on the spot in the field helped him in Kew to compile "Flora of British India" with other contributors. Orchidaceae was among the many families treated by him (1888-1890). He also described and illustrated a hundred orchid species (in *Ann. Roy. Bot. Gard.*, Calcutta, 1895). His illustrations on Indian plants were published in *Himalayan Journal* (1854). After Hooker, accounts of orchids from some other regions of this country were published such as, Orchids of Sikkim (King & Pantling, 1898); Orchids of North-Western Himalaya (Duthie, 1906; Bruhl, 1926). In recent years, Santapau and Kapadia (1966) published Orchids of Bombay State; Hara (1966, 1971); Tuyama (1975), Orchids of Eastern Himalaya; Seidenfaden and Arora (1982) and Somdeva and Naithani, (1986), Orchids of North Western Himalaya; Abraham and Vatsala (1981) Orchids of Southern India; Joseph (1982), Orchids of Nilgiris Hills; Katakai (1986), Orchids of Meghalaya; Hedge (1983) Orchids of Arunachal Pradesh; Pradhan (1976, 1979). Bose and Bhattacharjee (1980), published illustrated account of orchids of India. Das and Jain (1980), published the revision of genus *Coelogyne* for India (1981). Jain and Mehrotra (1984) published Inventory of Orchidaceae in India and Satishkumar and Manilal (1994) brought out a catalogue of Indian orchids.

EXPLORATIONS AND ORCHID STUDIES IN NAGALAND

In spite of inadequate communication system, and the highly inaccessible dense forests of the state with many tribal habitations, the area was explored by many plant collectors. Until India achieved Independence, most of the plant collectors were British. W. Griffith (1837) marched from Sadiya in Upper Assam to Bhamo in Upper Burma (Myanmar) via Hookoom valley and made extensive collections from Assam valley, Mishmi Hill (Arunachal Pradesh), Khasi Hills (Meghalaya) and Naga Hills (Nagaland). In 1885, Dr. G. Watt marched along the same route in spring and C.B. Clarke in autumn. Clarke collected about 1,000 specimens and published an account in *Journ Linn. Soc. London* (Vol. 25, 1889) and for many years his collection remained the only source of information about the flora of Nagaland. Prior to his publication of 1889, he wrote a letter to J.D. Hooker (published in *Journ. Linn. Soc. London* 22:128, 1886), wherein he stated "I have not compared it thoroughly, but so far as I have seen it, I should infer that we, collecting along the same route, have collected mainly the same plants" He further remarked that he was struck by the differences which the flora of Naga Hills at comparable altitudes exhibited from that of Khasia Hills, which is only 100 miles away as a crow flies. He found that there was a greater resemblance to the flora of Sikkim and in particular to that of Darjeeling, which is 800 miles away to North-West with the whole width of Brahmaputra valley in between. Clarke (1889) reported 18 genera and 22 species only of orchid from Nagaland. Clarke (1889) remarked "As regards Kohima orchids, it must be recollected that I only paid a short visit in late autumn; the Kohima European who know Khasia Hills well, reckoned Kohima fully as rich in orchids as Khasia" Hooker (1888-90) recorded 24 genera and 49 species, based on the collections of Clarke, Collet, Griffith and Prain. Later in 1895, G. Watt, made more collections in Nagaland as a Reporter of the Economic Plants of East India Company, but his collections were not published. After that, D. Prain, botanised in different parts of Nagaland. Between 1820 to 1946, parts of Nagaland were also partially botanised by other plant explorers such as N.L. Bor, H. Collet, F. Kingdon-Ward, U.N. Kanjilal, S.R. Srinivasan, D.A. Atonor and G.K. Deka. After Independence, and ever since the reorganisation of the Botanical Survey India and establishment of Eastern circle, Shillong in 1956, several explorations were made in various parts of Nagaland by A.S. Rao, S.K. Kataki, C.L. Malhotra, and others, chiefly by the senior author of this work (T.M. Hynniewta) from 1979 onwards which have contributed towards the knowledge of the orchidaceae of Nagaland.

The study on these new collections as well as the old collections, available in ASSAM and CAL herbaria, and also the live material in cultivation in National Orchidarium, Shillong have resulted into the recording 240 species and 4 varieties under 63 genera. Out of these of *Coelogyne hitendrae* Das et Jain is endemic to Nagaland, whereas *Sunipia jainii* Hynniewta & Malhotra, though earlier endemic to Nagaland, has recently been reported from Arunachal Pradesh also. (A.N. Rao in Indian J. For. 10:196. 1987).

This detailed compilation is an outcome of the efforts put in by the senior author since 1979. The work include the taxonomic account of individual taxa involved with up to date nomenclature as far as possible. Sixteen coloured and 88 black and white illustrations have been included in this work. The specimens studied from Nagaland have been cited and their general distribution in India and in the world is indicated. The distribution in India is intended to indicate broad phytogeographical region rather than specific areas of distribution. The work is based on the material of taxa from the state of Nagaland studied by the authors.

NEW ORCHID REPORTS

Recently Deorani & Naithani (1995) have brought out the orchids of Nagaland dealing with 238 species. However the present work deals with 241 species, many of which are not recorded by Deorani & Naithani. These species are:

Acampe rigida (Buch. Ham. ex J.E. Sm.) Hunt; *Aerides uniflora* (Lindl.) Summerh.; *Agrostophyllum brevipes* King & Pantl., *Agrostophyllum khasianum* Griff.; *Arachnis labrosa* (Lindl. ex Paxt.) Reichb.f.; *Ascocentrum ampullaceum* (Roxb.) Schltr., *Ascocentrum micranthum* (Lindl.) Holtt. [= *Smitinandia micrantha* (Lindl.) Holtt.]; *Bulbophyllum caudatum* Lindl., *Bulbophyllum cauliflorum* Hook.f., *Bulbophyllum elatum* (Hook.f.) J.J. Sm., *Bulbophyllum khasianum* Griff., *Bulbophyllum penicillium* Par. & Reichb.f., *Bulbophyllum piluliferum* King & Pantl., *Bulbophyllum retusiusculum* Reichb.f., *Bulbophyllum roxburghii* (Lindl.) Reichb.f.; *Calanthe ceciliae* Reichb.f., *Calanthe chloroleuca* Lindl., *Calanthe herbacea* Lindl.; *Ceratostylis subulata* Bl.; *Cleisocentron trichromum* (Reichb.f.) Bruhl.; *Cleisostoma appendiculatum* (Lindl.) Benth. & Hook.f. ex Jackson, *Cleisostoma filiforme* (Lindl.) Garay, *Cleisostoma paniculatum* (Ker-Gawl.) Garay, *Cleisostoma striatum* (Reichb.f.) Garay,



Arachnis labrosa (Lindl. ex Paxt.) Reichb.f.



Bulbophyllum guttulatum (Hook.f.) Balak.



Cleisostoma racemiferum (Lindl.) Garay



Coelogyne corymbosa Lindl.



Cymbidium elegans Lindl.



Cymbidium tigrinum Par. ex. Hook.



Dendrobium fimbriatum var. *oculatum* Hook. f.



Dendrobium heterocarpum Lindl.



Dendrobium longicornu Lindl.



Dendrobium nobile Lindl.



Dendrobium ochreatum Lindl.



Dendrobium transparens Lindl.



Eria paniculata Lindl.



Paphiopedilum hirsutissimum (Lindl. ex Hook.) Stein.



Pleione maculata (Lindl.) Lindl.



Pleione praecox (Sm.) D. Don.

Cleisostoma williamsonii (Reichb.f.) Garay; *Cymbidium cochleare* Lindl. *Cymbidium elegans* Lindl.; *Dendrobium candidum* Lindl., *Dendrobium denudans* D. Don; *Epigeneium navicularis* (Balak. & Chow.) Hynniewta & Wadhwa; *Eria acervata* Lindl., *Eria alba* Lindl.; *Eria graminifolia* Lindl.; *Eria spicata* (D. Don) Hand.-Mazz.; *Gastrochilus inconspicuus* (Hook.f.) Ktze.; *Liparis assamica* King & Pantl., *Liparis bituberculata* (Hook.) Lindl., *Liparis distans* Clarke, *Liparis stricklandiana* Reichb.f.; *Luisia trichorrhiza* (Hook.) Bl.; *Oberonia obcordata* Lindl., *Oberonia orbicularis* Hook.f., *Otochilus lancilabius* Seidenf.; *Panisea apiculata* Lindl., *Pholidota protracta* Hook.f.; *Trichotosia dasyphylla* (Par. & Reichb.f.) Kraezl.; *Vanda bicolor* Griff., *Vanda testacea* (Lindl.) Reichb.f.; *Vandopsis undulata* (Lindl.) J.J. Sm.; *Zeuxine affinis* (Lindl.) Benth. ex Hook.f., *Zeuxine nervosa* (Wall. ex Lindl.) Benth. ex Clarke.

EXCLUDED SPECIES

The under mention species are reported by Deorani and Naithani (1995) but not included in this work as the authors have not seen the material.

Acanthophippium sylhetense Lindl.; *Acrochaene punctata* Lindl.; *Aphyllorchis montana* Reichb.f.; *Brachycorythis galeandra* (Reichb.f.) Summerh.; *Bulbophyllum griffithii* Reichb.f., *Bulbophyllum helenae* (Ktze) J.J. Smith, *Bulbophyllum hirtum* (J.E. Sm.) Lindl., *Bulbophyllum lobbii* Lindl., *Bulbophyllum repens* Griff., *Bulbophyllum polyrrhizum* Lindl., *Bulbophyllum rothschildianum* (O. Brien) J.J. Smith, *Bulbophyllum spathulatum* (Rolfe ex Cooper) Seidenf., *Bulbophyllum striatum* (Griff.) Reichb.f., *Bulbophyllum triste* Reichb.f., *Bulbophyllum umbellatum* Lindl.; *Calanthe densiflora* Lindl.; *Cephalanthera longifolia* (L.) Fritsch.; *Cephalantheropsis gracilis* (Lindl.) S.Y. Hu; *Chiloschista lunifera* (Reichb.f.) J.J. Smith; *Coelogyne fulginosa* Hook., *Coelogyne fuscescens* Lindl., *Coelogyne viscosa* Reichb.f.; *Corymborkis veratrifolia* (Reinw.) Bl.; *Cymbidium devonianum* Paxt., *Cymbidium lowianum* Reichb.f.; *Dendrobium bicameratum* Lindl., *Dendrobium formosum* Roxb. ex Lindl., *Dendrobium gibsonii* Lindl., *Dendrobium infundibulum* Lindl., *Dendrobium jenkinsii* Wall. ex Lindl., *Dendrobium lituiflorum* Lindl., *Dendrobium parishii* Reichb.f., *Dendrobium pendulum* Roxb., *Dendrobium pulchellum* Roxb. ex Lindl., *Dendrobium ramosum* Lindl. (= *D. ruckeri* Lindl.), *Dendrobium thyrsiflorum* Reichb.f.; *Eria muscicola* (Lindl.) Lindl., *Eria pubescens* (Hook.) Steud., *Eria pumila* Lindl.; *Gastrochilus intermedius* (Griff. ex Lindl.) Ktze.; *Geodorum densiflorum* (Lam.) Schltr.; *Eulophia*

graminea Lindl., *Eulophia sanguinea* Lindl. Hook.f.; *Goodyera recurva* (Lindl.) var. *prainii* (Hook.f.) Pradhan; *Herminium longilobatum* Hegde & A.N. Rao; *Herpysma longicaulis* Lindl.; *Hygrochilus parishii* (Veitch. & Reichb.f.) Pfitz.; *Luisia brachystachys* (Lindl.) Bl., *Luisia psyche* Reichb.f.; *Nephelaphyllum cordifolium* (Lindl.) Lindl., *Nephelaphyllum pulchrum* Bl. var. *sikkimensis* Hook.f.; *Nervilia juliana* (Roxb.) Schltr., *Nervilia scottii* (Reichb.f.) Schltr.; *Oberonia caulescens* Lindl., *Oberonia ensiformis* (J.E. Sm.) Lindl.; *Pachystoma pubesceus* Bl.; *Papilionanthe uniflora* (Lindl.) Garay; *Pecteilis gigantea* (J.E. Sm.) Rafin.; *Phaius mishmensis* (Lindl. & Paxt.) Reichb.f.; *Phalaenopsis parishii* Reichb.f.; *Pholidota bracteata* (D. Don) Seidenf.; *Sunipia racemosa* (J.E. Sm.) Tang & Wang; *Tainia minor* Hook.f.; *Thrixspermum centipeda* Lour.; *Trichotosia pulvinata* (Lindl.) Kraenzl.; *Vanda alpina* Lindl. and *Yoania prainii* King & Pantl.

STATISTICAL ANALYSIS OF ORCHIDS

A comparative statistical analysis of distribution of orchid species between the Nagaland state and the rest of N.E. India states has been given in Table I (adapted from A.N. Rao, 1995).

Table I : Distribution Pattern of Orchid Species in North-Eastern States

State	Total number of orchid species/ genera	New species reported since 1950	New record in India since 1950
Arunachal Pradesh	440/112	16	32
Assam	182/74	1	8
Manipur	207/67	1	20
Meghalaya	352/98	14	8
Mizoram	249/74	3	7
Nagaland	241/63*	2	5
Tripura	48/33		1

*represents species and genera in this work.

DISTRIBUTION PATTERN OF ORCHID SPECIES

In the Table II given below, a list of orchid genera with the number of taxa hitherto recorded from Nagaland alongwith their distribution in Sikkim, N.E. Region, other parts of India and Asia has been provided. From this table, it is easy to analyse the affinities of the orchid flora of Nagaland with its surrounding areas.

Table II : Distribution of Nagaland Orchid Genera and Species

Genera	Nagaland	Other States of N.E. India	Sikkim	Other Parts of India	Asia
	I	II	III	IV	V
<i>Acampe</i>	3	3	3	3	3
<i>Acanthophippium</i>	1	0	1	0	1
<i>Aerides</i>	3	3	3	2	3
<i>Agrostophyllum</i>	3	3	3	1	3
<i>Anoectochilus</i>	6	6	5	4	4
<i>Anthogonium</i>	1	1	1	0	1
<i>Arachnis</i>	1	1	1	0	1
<i>Arundina</i>	1	1	1	0	1
<i>Ascocentrum</i>	2	2	2	1	2
<i>Bulbophyllum</i>	19	15	17	9	16
<i>Calanthe</i>	13	11	11	5	10
<i>Ceratostylis</i>	2	2	2	1	2
<i>Cheirostylis</i>	1	1	1	0	1
<i>Cleisocentron</i>	1	2	2	0	1
<i>Cleisostoma</i>	8	8	7	0	7
<i>Coelogyne</i>	18	16	11	7	16
<i>Cryptochilus</i>	2	2	2	1	2
<i>Cymbidium</i>	11	10	9	5	11
<i>Dendrobium</i>	24	23	17	20	23
<i>Diphylax</i>	1	1	0	0	1
<i>Epigeneium</i>	4	2	3	0	4
<i>Eria</i>	13	11	13	4	12
<i>Eulophia</i>	2	2	2	1	2
<i>Flickingeria</i>	1	1	1	1	1
<i>Galeola</i>	1	1	1	0	1

Genera	I	II	III	IV	V
Gastrochilus	4	3	4	2	4
Goodyera	4	4	4	3	4
Habenaria	5	4	4	2	5
Herminium	1	1	1	1	1
Hetaeria	1	1	1	0	1
Kingidium	1	1	1	1	1
Liparis	12	12	11	7	11
Luisia	1	1	1	1	1
Malaxis	3	3	3	3	3
Neogyne	1	1	0	0	1
Oberonia	10	10	7	5	9
Ornithochilus	1	1	1	0	1
Otochilus	4	4	4	2	4
Panisea	2	1	1	0	2
Paphiopedilum	1	1	0	0	1
Papilionanthe	1	1	1	1	1
Pecteilis	1	1	1	1	1
Pelatantheria	1	1	0	0	1
Peristylus	5	5	3	3	5
Phaius	2	2	2	0	5
Pholidota	8	7	5	2	7
Pleione	3	3	3	2	3
Pteroceras	1	1	1	0	1
Renanthera	1	1	0	0	1
Rhynchostylis	1	1	1	1	1
Satyrium	1	1	1	1	1
Schoenorchis	1	1	1	0	1
Spathoglottis	1	1	0	0	1
Spiranthes	1	1	1	1	1
Sunipia	3	2	1	0	2
Tainia	2	2	1	0	2
Thelasis	1	1	1	0	1
Thunia	1	1	1	1	1
Trichotosia	1	1	1	0	1
Uncifera	2	2	2	0	2
Vanda	4	3	2	2	4
Vandopsis	1	1	1	0	1
Zeuxine	5	5	5	2	4
Total	241	219	196	109	211

Being in the botanical region-Assam, the great number of Orchid taxa found in Nagaland are common to the other states of North Eastern India, which represents 219 taxa, whereas only 109 taxa are common to other parts of India.

Clarke (1887) has remarked that the Flora of Nagaland closely resembles to that of Sikkim. An analysis of the data reveals that Sikkim represents about 82% of the Nagaland orchids.

Seven (7) taxa, viz. *Goodyera viridiflora*, *Liparis caespitosa*, *Luisia trichorrhiza*, *Malaxis latifolia*, *Oberonia pyrulifera*, *Peristylus goodyeroides* and *Spiranthes sinensis* are widely distributed, one (1) taxon is endemic to Nagaland, five (5) to N.E. India, and thirteen (13) taxa are found in India only.

BIOLOGY AND CONSERVATION OF ORCHIDS

The adaptation of the orchids to varied habitats, and their specialisation to aerial mode of life to grow as epiphytes or on rocks as epilithics or on ground as terrestrial is biologically the most complex. Amongst terrestrials, as few are saprophytes, i.e. they grow on decaying materials. The roots, stems, pseudobulbs, leaves and flowers are extremely varied. Roots are mostly terete or flat as in *Kingidium*. The roots of *Taeniophyllum* (not in Nagaland) are green photosynthetic in place of leaves, which are absent. Due to the range of variations in their floral structure and specialised mechanism for cross pollination, long lasting quality of flowers, colour combination and floral designs, the orchids have become the pride of florists and horticulturalists. Owing to their architectural expressions, they have become the source of very profitable and extensive floricultural industry in many countries. While the interest of professional botanist in orchid is natural, the continued interest of laymen for profitable purposes has led to condition of near depletion and extinction of many attractive orchids from their natural habitats, which need special conservation measures. Furthermore, after attaining statehood in 1963, systematic developmental activities and fruits of modernisation have made in roads into the erstwhile inaccessible areas of Nagaland state. Infra-structural facilities which were hitherto not thought of are now available. The most common reasons attributed to the calamity as elsewhere in similar conditions are population pressures and consequent habitat loss. The vast areas of natural forests have either been converted into farmlands or cleared for various

development operations. The slash and burn cultivation has also contributed to the erosion of plant genetic diversity.

With the popularization of orchids in horticulture, several hybrids were produced and the qualities of flowers improved. Indian orchids have played their historic roles in the international orchid markets. Today there are over 35,000 named orchid hybrids based on scientific procedures and techniques (Hegde, 1983). Hybrids of certain Indian orchids like *Vanda coerulea*, and species of *Cymbidium*, *Dendrobium* and *Paphiopedilum* are considered the monarchs in the orchid world. Some of them having long lasting flower qualities with exquisite beauty are cultivated in mass scale elsewhere in the world for cut-flower production. In countries like Thailand, Singapore, Hawaii, etc., orchid cut-flower industry flourishes very well having multi-million dollar earning business per annum.

ECONOMIC USES

Orchids are known to Indian as medicinal plants right from Vedic period. There are unmistakable references of orchids as medicinal in ancient Sanskrit Literature like 'Nighantus' and 'Amarakosha' by Sushruta and Vagbhata respectively (250-300 BC). Indian Vedic scriptures mentioned the orchids in Sanskrit as "Vanda" a name adopted for one of the most beautiful and common of monopodial group of orchids. In Nagaland, the natives called these plants "Ayikhow" from its primary meaning of "Skin" as the principal value of orchids to Nagas is in the use of skin of certain species of orchids for the manufacture of ornaments. The phytochemical significance is yet to be assessed in most of the orchids. The green fruits of *Vanilla* contain glycosides and related aromatic compound and yield vanilla of commercial importance, used as flavouring substance. The leaves of *Vanda roxburghii* (sans. Vandaka) prescribing for external application in rheumatism and allied disorders and diseases of nervous system have been reported in the above treatises. The famous 'Salamisri' (Sanm saleep misri) used presently as tonic, aphrodisiac and as blood purifier is extracted from the tubers of an orchid, *Eulophia nuda* Lindl. The pseudobulbs of *Bulbophyllum neilgherrense* Wight and *Flickingeria macraei* (Lindl.) Scidenf. *Ephemerantha macraei* (Lindl.) Hunt. & Summerh are sold in the market under the name 'Purusharathna' mostly used for restoration of adolescence and as tonic. The pseudobulbs of *Malaxis acuminata* form an ingredient of Ashtavarga used in the preparation of Chyavanprash which is regarded as nutritive tonic and enhances sperm formation and is also

known to cure tuberculosis. The powdery seeds of *Dendrobium nobile* are applied to the freshly cut wounds for quick healing.

Satyrium nepalense (known as Ban alu or Salep) are used as tonic and also reported to be useful in malaria and dysentery. *Vanda tasteacea* known as Banda, Rasna extract (Rasna) is useful in rheumatism, nervous disorders and scorpion stings. *Cleisostoma williamsonii* and *Pholidota* species are used for healing fractured bones. Several other orchids are used in medicine by native inhabitants in different parts of the world. In Arunachal Pradesh, the powdery seeds of *Dendrobium nobile* (vern. Bomzang momdang) are applied to the freshly cut wounds for quick healing. Similarly the leaves and stem of *Cleisostoma williamsonii* (vern. Nyakshing joraman) is used for treating bone fractures by the Minpa tribals. The pulp is applied on the fractured bone area and plastered, and the decoction is taken orally.

The beautiful inflorescence of *Rhynocostylis retusa* (fox-tail), popularly referred to as 'Kopou Phul' in Assam is invariably adorned by the ladies during 'Bihu' festival as ornamentation on their head. It symbolises youthfulness during springtime.

In Arunachal Pradesh, especially in Kameng district, orchids like *Dendrobium hookerianum*, *D. nobile*, *D. gibsonii*, symbolise purity and sanctity. In Tirap district, the Wanchoa tribal houses are generally decorated with *Vanda coerulea* for their beautiful flowers. Similarly, Monpas consider the flowers of *Cymbidium grandiflorum* important for holy worship (Hegde, 1983).

ORCHIDACEAE

ORCHIDACEAE A. L. de Jussieu, Gen. Pl. 64. 1789 (Orchideae).

Perennial herbs. Epiphytes and lithophytes with aerial roots or terrestrials, rarely saprophytes, with underground roots, with or without subterranean tubers. *Stems* with or without pseudobulb, 1 to-many-noded, simple, rarely branched, monopodial or sympodial, clustered or distant on slender or stout, creeping or scandent rhizomes, rarely absent, 1 to many-leaved, rarely leafless. *Leaves* sessile or subsessile, rarely long-petioled, simple, flat, rarely terete, persistent or deciduous, membranous to fleshy. *Inflorescence* 1 or 2-flowered or few-to-many-flowered raceme, spike, umbel or capitulum. *Flowers* small - large sized, glabrous or pubescent, rarely hirsute, with or without scent, bisexual, usually monandrous, rarely diandrous, spurred or not, bracteate; *bracts* short or long, sometimes lacking, membranous to coriaceous, usually persistent. *Sepals* 3, free, rarely all united or laterals united into a twin sepal. *Petals* 3; laterals similar, free, rarely connate to dorsal sepal forming a hood; Median (lip) greatly modified, sessile or stipitate, immobile, rarely mobile, attached to the base or foot, rarely the whole length of column, usually flat, rarely saccate or cymbiform, entire or lobed. *Pistils* and *stamens* united to form a gynostegium or column bearing stigmas and anthers; *column* short or long, winged or not, with or without foot; pollen grains combined into pollen masses (*pollinia*); *Pollinia* 2, 4 or 8, usually waxy, rarely powdery, stipitate or sessile, with or without viscous; *ovary* sessile or pedicellate, inferior, unilocular with parietal placentation; *stigmas* 3, 2 often fused and functional, third one often modified into a rostellum; *ovules* many. *Fruits* a capsule; *seeds* numerous, minute, exendospermous.

Key to the genera

(Several genera are keyed more than once)

- 1a. Lateral sepals firmly united forming a twin sepal; lip with a large pouch; fertile stamens 240. *Paphiopedilum*
- 1b. Lateral sepals free or seemingly united; lip not as above; fertile stamen 1.
 - 2a. Plants terrestrial:
 - 3a. Tubers or pseudobulbs present:
 - 4a. Plants with stems growing from underground tubers bearing terminal inflorescence:

- 5a. Lip base not protruding; spur absent29. *Herminium*
- 5b. Lip distinctly spurred; spur formed by a pouch-like protrusion of the basal part of the lip:
- 6a. Lip with one (1) spur:
- 7a. Stigma lobe arising from a stigmaphore:
- 8a. Flowers all-sided; lip 3-lobed28. *Habenaria*
- 8b. Flowers secund; lip entire 20. *Diphylax*
- 7b. Stigma lobe sessile; stigmaphore absent:
- 9a. Flowers large, showy, more than 5 cm across 42. *Pecteilis*
- 9b. Flowers small, not showy, less than 2 cm across 44. *Peristylus*
- 6b. Lip with 2 spurs51. *Satyrium*
- 4b. Plants without normal stems; leaves and inflorescence arise from tubers or pseudobulbs:
- 10a. Flowers tubular; sepals all connate, with or without sepaline tube:
- 11a. Pseudobulbs ovoid; flowers less than 2 cm long; pollinia 4 6. *Anthogonium*
- 11b. Pseudobulbs oblong-cylindric; flowers more than 3 cm long; pollinia 82. *Acanthophippium*
- 10b. Flowers not tubular; sepals all free or only the laterals connate at base to the foot of column forming a mentum:
- 12a. Leaves and flowers not appearing together:
- 13a. Pseudobulbs 1-leaved; lateral sepals forming a mentum; pollinia 8, without stipes56. *Tainia*
- 13b. Pseudobulbs 2 or more-leaved; lateral sepals not forming a mentum; pollinia 2, with stipes23. *Eulophia*
- 12b. Leaves and flowers appearing together:

- 14a. Pseudobulbs 1-leaved; lateral sepals forming a mentum ...56. *Tainia*
- 14b. Pseudobulbs 2 or more-leaves; lateral sepals free, without a mentum:
- 15a. Leaves petioled; bases not forming a pseudo-stem; petals broader than the sepals:
- 16a. Pseudobulbs directly rooting on host, rhizome absent; inflorescence many-flowered; flowers glabrous, spurred; column without foot; pollinia 2, with stipes ...23. *Eulophia*
- 16b. Pseudobulbs arise from the rhizome; inflorescence few-flowered; flowers pubescent, without spur; column with foot; pollinia 8, without stipes ...53. *Spathoglottis*
- 15b. Leaves sessile; bases sometimes forming a pseudo-stem; petals narrower than the sepals:
- 17a. Disc of lip with lamellae; pollinia 2 18. *Cymbidium*
- 17b. Disc of lip without lamellae; pollinia 4 or 8:
- 18a. Small herbs; flowers not spurred; pollinia 4:
- 19a. Leaves narrow, margins not undulate; sepals recurved; lip inferior without auricles ... 32. *Liparis*
- 19b. Leaves broad; margins undulate; sepals not recurved; lip superior, usually with auricles ...34. *Malaxis*
- 18b. Large herbs; flowers distinctly spurred; pollinia 8 :
- 20a. Lip connate with column along its whole length; margins spreading; pollinia sessile ...11. *Calanthe*
- 20b. Lip connate with column only at base; margins convolute; pollinia stipitate45. *Phaius*
- 3b. Tubers or pseudobulbs absent:
- 21a. Leaves absent:

- 22a. Small herb, less than 20 cm high; flowers few in simple raceme; pollinia waxy ...18. *Cymbidium*
- 22b. Large herb, more than 100 cm high; flowers in paniced raceme; pollinia powdery25. *Galeola*
- 21b. Leaves present:
- 23a. Stems tall, woody, bamboo like, many-leaved; inflorescence a paniced raceme, flowers large ...8. *Arundina*
- 23b. Stems short, herbaceous, few-leaved; inflorescence a simple raceme or spike; flowers small:
- 24a. Flowers tubular; lower parts of sepals united forming sepaline tube13. *Cheirostylis*
- 24b. Flowers not tubular; sepals free:
- 25a. Stems usually straight; inflorescence spirally twisted; disc of lip with lamellae54. *Spiranthes*
- 25b. Stems decumbent or atleast curved at its lower part; inflorescence not spirally twisted; disc of lip without lamellae:
- 26a. Flowers not resupinate; lip superior with much branched gland within each half of sac; pollinia 4 30. *Hetaeria*
- 26b. Flowers resupinate; lip inferior without gland within the sac; pollinia 2:
- 27a. Claw of the lip often with toothed flange on either side5. *Anoectochilus*
- 27b. Claw of the lip entire, without flange:
- 28a. Lip hairy within, entire; hypochile without papillae 27. *Goodyera*
- 28b. Lip glabrous within, lobed; hypochile with 2 to 4 papillae63. *Zeuxine*
- 2b. Plants epiphytic; usually branched, rarely lithophytic-growing:

29a. Plants with distinct pseudobulbs:

30a. Pseudobulbs arise from stems or rhizome :

31a. Stems present, arise from a rhizome,
branched; pseudobulbs at the tip
of the branchlet24. *Flickingeria*

31b. Stems absent; pseudobulbs arise directly
from a rhizome:

32a. Pseudobulbs 2 or more-noded;
pollinia 822. *Eria*

32b. Pseudobulbs 1-noded; pollinia 4:

33a. All sepals or the laterals keeled
or concave; lip cymbiform46. *Pholidota*

33b. Sepals not keeled;
lip not cymbiform:

34a. Sepals and petals
recurved or revolute32. *Liparis*

34b. Sepals and petals neither
recurved nor revolute:

35a. Sepals unequal in
length, dorsal
shorter; lip mobile10. *Bulbophyllum*

35b. Sepals equal in length;
lip not mobile:

36a. Pseudobulbs
1-leaved; lip entire;
pollinia without
stipes:55. *Sunipia*

36b. Pseudobulbs
2-leaved; lip
3-lobed; pollinia
without stipes:

37a. Inflorescence
few or many-
flowered; foot
of the column
absent; lip sessile16. *Coelogyne*

- 37b. Scape 1-flowered; foot of the column present; lip stipitate21. *Epigeneium*
- 30b. Pseudobulbs directly rooting on host; stems and rhizome absent:
- 38a. Pseudobulbs formed of leaf-bases; pollinia 218. *Cymbidium*
- 38b. Pseudobulbs distinct from the leaves; pollinia 4 or 8 :
- 39a. Petals membranous; pollinia with stipes:
- 40a. Scape few or many-flowered; sepals keeled or concave; pollinia 857. *Thelasis*
- 40b. Scape 1-flowered; sepals neither keeled nor concave; pollinia 439. *Panisea*
- 39b. Petals non-membranous; pollinia without stipes:
- 41a. Pseudobulbs 2-or more-noded; only the lateral sepals united at base to the foot of column forming a mentum;
- 42a. Petals equal to or broader than the sepals; pollinia 4 ...19. *Dendrobium*
- 42b. Petals narrower than the sepals; pollinia 822. *Eria*
- 41b. Pseudobulbs single noded; sepals all united into a tube, or all free:
- 43a. Flowers tubular; sepals united nearly to the tips forming a gibbous or urceolate tube; pollinia 817. *Cryptochilus*
- 43b. Flowers not tubular; sepals free; pollinia 4:
- 44a. Leaves and flowers not appearing together47. *Pleione*
- 44b. Leaves and flowers appearing together:

- 45a. Pseudobulbs articulated; branched:
- 46a. Lip short, broad, erect,
cymbiform; column with foot ...46. *Pholidota*
- 46b. Lip long, narrow, reflexed, not
cymbiform; column without foot 38. *Otochilus*
- 45b. Pseudobulbs neither articulated nor branched:
- 47a. Sepals all or only the laterals keeled;
lip cymbiform 46. *Pholidota*
- 47b. Sepals not keeled; lip not cymbiform:
- 48a. Disc of lip with lamellae; pollinia
cohering in pairs:
- 49a. Floral bracts persistent; column
with foot; base of lip 2-saccate35. *Neogyne*
- 49b. Floral bracts caducous; column
without foot; base of lip not
as above16. *Coelogyne*
- 48b. Disc of lip without lamellae;
pollinia not cohering:
- 50a. Sepals and petals recurved;
column without foot;
lip stipitate, mobile32. *Liparis*
- 50b. Sepals and petals not recurved;
column with foot; lip stipitate,
mobile10. *Bulbophyllum*
- 29b. Plants without pseudobulbs:
- 51a. Leaves and inflorescence arise directly
from rhizome10. *Bulbophyllum*
- 51b. Leaves and inflorescence arise from stem:
- 52a. Plants without a distinct stem:
- 53a. Inflorescence terminal; flowers
minute, less than 3 mm across;
pollinia without stipes36. *Oberonia*
- 53b. Inflorescence lateral; flowers
more than 3.5 cm across;
pollinia with stipes:

- 54a. Roots broad, flat; lobes of lip entire; pollinia 4 ... 31. *Kingidium*
- 54b. Roots thin, terete; lobes of lip comb-like;
pollinia 2 ...37. *Ornithochilus*
- 52b. Plants with a distinct stem :
- 55a. Flowers neither spurred nor saccate :
- 56a. Leaves and flowers not appearing together19. *Dendrobium*
- 56b. Leaves and flowers appearing together:
- 57a. Stems, leaves and sepals hirsute;
inflorescence 1-2-flowered59. *Trichotosia*
- 57b. Stems, leaves and sepals not hirsute;
inflorescence few to many-flowered,
spicate or racemose:
- 58a. Leaves terete:
- 59a. Stems arising from a rhizome;
flowers woolly or pubescent;
pollinia 822. *Eria*
- 59b. Stems directly rooting on host;
flowers glabrous; pollinia 233. *Luisia*
- 58b. Leaves flat:
- 60a. Sheaths and scape distinctly
warted; pollinia 262. *Vandopsis*
- 60b. Sheaths and scapes not
warted; pollinia 4 or 8:
- 61a. Stems with terminal
inflorescence; lateral
sepals not forming
a mentum:
- 62a. Stems thick,
stout; inflorescence
a head or capitulum;
pollinia 8, with
stipes ...4. *Agrostophyllum*

- 62b. Stems thin, slender; inflorescence a raceme or spike; pollinia 4, without stipes36. *Oberonia*
- 61b. Stems with terminal and lateral inflorescence; lateral sepals united at base to the foot of column forming a mentum:
- 63a. Petals narrower than the sepals; pollinia 822. *Eria*
- 63b. Petals as broad as or broader than the sepals; pollinia 419. *Dendrodium*
- 55b. Flowers spurred or saccate:
- 64a. Leaves terete or semi-terete:
- 65a. Stems rush-like, arising from a dense fibrous rhizome, 1-leaved; pollinia 8, without stipes 12. *Ceratostylis*
- 65b. Stems not rush-like, directly rooting, few to many-leaved; pollinia 2, with stipes:
- 66a. Leaves semi-terete, grooved on one-side; inflorescence a paniced raceme, many-flowered52. *Schoenorchis*
- 66b. Leaves terete throughout; inflorescence spicate with few flowers or only 1-3-flowered on a slender peduncle:
- 67a. Flowers few in spikes; lip expanded into a wide sac, without side lobes26. *Gastrochilus*
- 67b. Flowers 1-3 on a slender peduncle; lip distinctly spurred, with side lobes:
- 68a. Leaves thin, slender; flowers white; spur longer than the perianth; petals narrower than the sepals; column with claws3. *Aerides*
- 68b. Leaves thick, stout; flowers rose coloured, spur shorter than the perianth; petals broader than the sepals; column without claws41. *Papilionanthe*

64b. Leaves flat:

69a. Stem dichotomously branched; leaf solitary at the tip of a branchlet12. *Ceratostylis*

69b. Stems not dichotomously branched; leaves few or many, crowded or distant on the main stem:

70a. Inflorescence terminal; pollinia 8:

71a. Leaves deciduous; inflorescence a raceme; pollinia without stipes58. *Thunia*

71b. Leaves persistent; inflorescence a head; pollinia with stipes4. *Agrostophyllum*

70b. Inflorescence lateral; pollinia 2:

72a. Lip saccate; sac formed by a wide pouch - like protrusion of almost entire lip26. *Gastrochilus*

72b. Lip spurred usually at the base; spur usually formed by a narrow pouch-like protrusion of basal part of the lip:

73a. Lip stipitate, mobile; spur remote from the base of lip7. *Arachnis*

73b. Lip sessile, immobile; spur at the base of lip:

74a. Flowers in secund inflorescence14. *Cleisocentron*

74b. Flowers not in secund inflorescence:

75a. Spur with calli:

76a. Interior of spur with calli and a vertical septum divides it into 2 vertical chambers43. *Pelatantheria*

- 76b. Interior of spur occluded by calli on front or back wall or by a dorsal scale, but without any vertical septum15. *Cleisostoma*
- 75b. Spur without calli:
- 77a. Leaf apex praemorse, with a spine; spur laterally compressed, truncate at apex; lip entire, without side-lobes50. *Rhynchostylis*
- 77b. Leaf apex acute, obtuse or 2-lobed, without any spine; lip with large or small side-lobes; spur conical or cylindrical, obtuse at apex:
- 78a. Side lobes of lip united to the foot of column, forming a deep triangular pouch; lip spur-like48. *Pteroceras*
- 78b. Side lobes of lip free from the column, without any pouch; lip not as above:
- 79a. Lip and column with claws; lip united at foot and claws of column3. *Aerides*
- 79b. Lip and column without claws; lip united only at the base of the column:
- 80a. Inflorescence 1-2-flowered; apex of mid-lobes of lip with 2 spreading lobules and a horn-like fleshy beak pointing downward61. *Vanda*
- 80b. Inflorescence many-flowered; apex of mid-lobes of lip entire:
- 81a. Inflorescence a corymbose or subcorymbose raceme1. *Acampe*
- 81b. Inflorescence a simple or a panicled raceme:
- 82a. Inflorescence a simple raceme; ovary glabrous:
- 83a. Spur longer than the sepals60. *Uncifera*
- 83b. Spur shorter than the sepals:

- 84a. Stems short, pendulous; leaves crowded;
inflorescence drooping9. *Ascocentrum*
- 84b. Stems long, erect; leaves distant;
inflorescence erect:
- 85a. Flowers red; lateral sepals larger than
 dorsal sepal, and with claws49. *Renanthera*
- 85b. Flowers not so; lateral sepals similar
 to the dorsal sepal, without claws61. *Vanda*
- 82b. Inflorescence a paniced raceme; ovary
 sparsely pubescent1. *Acampe*

ENUMERATION OF ORCHID SPECIES

1. ACAMPE Lindl.

- 1a. Inflorescence a paniced raceme, longer than the leaves; ovary sparsely pubescent 1. *A. ochracea*
- 1b. Inflorescence a corymbose or sub-corymbose raceme, shorter than the leaves; ovary glabrous:
- 2a. Raceme corymbose; lip obscurely 3-lobed; spur cylindric, hairy within; pollinia bifid 2. *A. papillosa*
- 2b. Raceme sub-corymbose; lip distinctly 3-lobed; spur conical, glabrous within; pollinia entire 3. *A. rigida*

1. *Acampe ochracea* (Lindl.) Hochr. in Bull. New York Bot. Gard. 6 : 270. 1910; Sant. & Kapad, Orch. Bombay, 234. 1966. *Saccolabium ochraceum* Lindl. in Bot. Reg. Misc. 2. 1842; Hook. f., Fl. Brit. India 6 : 62. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 219. t. 219. 1898.

Stems 45-75 cm high. Leaves 10-20 x 1.5 - 3 cm, oblong; apex unequally and obtusely 2-lobed. Inflorescence 25-40 cm long, panicle many-branched. Flowers ca 1.0 cm across, pale lemon yellow with irregular red streaks; bracts ca 2 mm long, greenish brown, triangular, acute; pedicelled ovary 0.6-1.0 cm long, pale green, sparsely pubescent; sepals ca 5 mm long, obtuse; dorsal ca 2.5 mm broad, oblong; laterals ca 1.5 mm broad, linear-oblong, sub-falcate; petals ca 4 x 1.5 mm, linear-oblong, spatulate; apex obtuse or round; lip 4.5 - 5 mm long; side lobes lemon yellow, small, sub-triangular, erect; mid-lobe; side lobes lemon yellow, small, sub-triangular, erect; mid-lobe white, speckled with purple, large, ovate-oblong, obtuse, deflexed; spur 4- 6 mm long, yellow, cylindric, curved, hairy within; column ca 1.5 mm long, pale brown; pollinia ovoid.

Fl.: Jan. Feb.

Nagaland: Tisu, Hynniewta 80848; Tokye, Hynniewta 80915 (AS-SAM).

Distr.: INDIA (N. E. India, Sikkim, South India); BHUTAN, MYANMAR, CAMBODIA, SRI LANKA, LAOS, NEPAL, VIETNAM.

2. ***Acampe papillosa*** (Lindl.) Lindl. Fol. Orch. 2. 1853; *Saccolabium papillosum* Lindl. in Bot. Reg. t. 1552. 1841; Hook. f., Fl. Brit. India 6 : 63. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 219. t. 290. 1898.

Stems 15-20 cm high, sometimes branched. *Leaves* 8-15-2.0 cm, oblong; apex truncate or obliquely notched. *Inflorescence* 3-5 cm long; corymb few-branched. *Flowers* ca 1.2 cm across, pale lemon yellow with irregular brown streaks.; *bracts* ca 2 mm long, pale green triangular, acute; *pedicelled ovary* 0.7-0.8 cm long, pale green brown lined; *sepals* ca 6 mm long, obtuse; dorsal ca 2 mm broad, oblong; laterals ca 1.5 mm broad, linear-oblong, sub-falcate; *petals* ca 5 x 1.5 mm, linear-oblong, sub-falcate; apex obtuse or round; *lip* 0.7-0.8 cm long, white with irregular transverse purple streaks side lobes suppressed, narrowly rectangular; mid-lobe large, ovate-oblong, obtuse, deflexed; margin undulate, crenulate; spur 0.5-0.6 cm long, pale lemon yellow, cylindrical, obtuse, hairy within; *column* ca 2 mm long, brownish white; *pollinia* sub-ovoid, bifid.

Fl.: Nov. - Dec.

Nagaland: Mokokchung, Hynniewta 80399; Wokha, Hynniewta 80644 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim, West Bengal); BANGLA DESH, MYANMAR, CAMBODIA, LAOS, PAKISTAN, VIETNAM.

3. ***Acampe rigida*** (Buch. - Ham. ex J. E. Sm.) Hunt. in Kew Bull. 24 : 98. 1970. *Aerides rigida* Buch. - Ham. ex J. E. Sm. in Rees, Cyclop. 39, *Aerides* n. 12. 1819. *Acampe longifolia* (Lindl.) Lindl. Fol. Orch. *Acampe* 1. 1853. *Vanda longifolia* Lindl. Gen. & Sp. Orch. 215. 1835. *Saccolabium longifolium* (Lindl.) Hook. f., Fl. Brit. India 6 : 62. 1890 p.p.; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 220. t. 292. 1898.

Stems 50-100 cm high, very stout. *Leaves* 20-30 x 3.5-5 cm, oblong; apex unequally and obtusely 2-lobed. *Inflorescence* 10-15 cm long, sub-corymbose, few-branched. *Flowers* ca 1.5 cm across, pale lemon yellow with irregular crimson bands; *bracts* ca 3 mm long, pale green, ovate, acute; *pedicelled ovary* 1-1.2 cm long, yellowish green; *sepals* 7-8 mm long, obtuse; dorsal ca 4 mm broad, broadly oblong; laterals ca 3 mm broad, oblong-sub-falcate; *petals* ca 6 x 2.5 mm, linear-oblong, sub-

spathulate; *lip* 0.8 - 1.0 cm long, white with few crimson bands; side lobes narrowly oblong; mid-lobe ovate-oblong, obtuse; margins entire or crenulate; spur 0.3 - 0.4 cm long, greenish-yellow with few crimson bands, conical, obtuse; *column* ca 4 mm long, crimson yellow; *pollinia* ellipsoid.

Fl. Apr. - May.

Nagaland: Dimapur, *Hynniewta* 79977; Nyasia, *Hynniewta* 79948; Zunhebato, *Hynniewta* 80835 (ASSAM).

Distr. INDIA (N. E. India, Sikkim, West Bengal); BHUTAN, MYANMAR, CAMBODIA, CHINA, LAOS, NEPAL, VIETNAM.

2. ACANTHOPHIPPIUM Bl.

Acanthophippium striatum Lindl. in Bot. Reg. 45. 1838; Hook. f., Fl. Brit. India 5 : 816. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc 8 : 112. t. 133. 1898.

Stems 8-15 cm high, oblong-cylindric. *Leaves* 20-30 x 8-11 cm, elliptic, acute or acuminate. *Inflorescence* 10-15 cm long. *Flowers* ca 3.0 cm long, pale pink, red striped; *bracts* 1.5-2 cm long, pale brown, cymbiform, acute; *pedicelled ovary* 2.0 - 2.5 cm long, pale pink; *sepaline tube* pale pink, reddish striped; free parts pale pink, sub-equal, acute or obtuse, incurved; *mentum* conical, obtuse; *petals* ca 2 x 0.6 cm, pale pink, pale reddish striped, oblong, acute; *lip* ca 2 cm long, pale pink, yellow tinged; side lobes broad, entire; mid-lobe triangular, acute; edges undulate; disc nerved; ridge 1, fleshy, deep pink; *column* ca 1 cm long, pale pink, tinged with yellow; *pollinia* ovoid.

Fl. Jun. - Jul.

Nagaland: Jafu Hills, *Hynniewta* 56205 (ASSAM).

Distr. INDIA (Nagaland, Sikkim); BHUTAN, CAMBODIA, JAVA, LAOS, NEPAL, VIETNAM.

3. AERIDES Lour.

1a. Leaves terete; inflorescence 1-2-flowered

... 3. *A. uniflora*

1b. Leaves flat; inflorescence many-flowered, racemose:

- 2a. Flowers dense; side lobes small, rounded; mid-lobe large, ovate; spur *ca* 0.3 cm long, conical, straight ... 1. *A. multiflora*
- 2b. Flowers lax; side lobes large, strap-shaped; mid-lobe small, lanceolate; spur *ca* 1.2 cm long, narrowly indundibuliform, curved ... 2. *A. odorata*

1. *Aerides multiflora* Roxb. Corom. Pl. 3 : 63. t. 271. 1820; Fl. Ind. 3 : 475. 1832; Hook. f., Fl. Brit. India 6 : 44. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 212. t. 283. 1898. *A. affine* Lindl., Gen. & Sp. Orch. 239. 1833. *A. rosea* Lodd. ex Paxt. in Fl. Gard. 2 : 109. t. 60. 1852. *A. trigona* Klots. in Otto & Diet. Algem. Gartens. 177. 1855.

Stems 5-10 cm long, stout. Leaves 15-30 x 2-2.5 cm, linear-oblong, coriaceous; apex unequally and obtusely 2-lobed. Inflorescence many-flowered, dense, arched or drooping, 20-30 cm long. Flowers *ca* 1.4 cm across, white with pale pink shades or sometimes with dark pink spots; bracts *ca* 2 mm long, greenish; pedicelled ovary 0.5-1.0 cm long, pale pink; dorsal sepal *ca* 1.0 x 0.7 cm, elliptic, apiculate; laterals *ca* 0.8 x 0.7 cm, oblong-orbicular; margins slightly erose; petals *ca* 1.0 x 0.6 cm, obovate, obtuse; lip *ca* 1.5 cm long; side lobes smaller than the mid-lobe, rounded, recurved; mid-lobe ovate, acute; margins erose, crisped; spur *ca* 3 mm long, pale pink, conical, straight; column *ca* 3 mm long, pinkish white; pollinia globose.

Fl.: May - June.

Nagaland: Dimapur, Hynniewta 74544; Mon, Hynniewta 79932; Nyasia, Hynniewta 79947; Rangapahar, Hynniewta 80812 (ASSAM).

Distr.: INDIA (Andaman & Nicobar Islands, Arunachal Pradesh, Assam, West Bengal, Meghalaya, Nagaland, Tamil Nadu, Orissa, Sikkim); BHUTAN, MYANMAR, CAMBODIA, JAVA, LAOS, MALAYA, NEPAL, THAILAND, VIETNAM.

2. *Aerides odorata* Lour., Fl. Cochinch. 2: 525. 1790; Lindl. in Bot. Mag. t. 4139. 1845; Hook. f., Fl. Brit. India 6 : 47. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 212. t. 282. 1898. *A. cornutum* Roxb., Fl. Ind. 3 : 472. 1832.

Stems 15-20 cm long, stout. *Leaves* 20-30 x 2.5-3.0 cm, linear-oblong, fleshy, apex unequally and obtusely 2-lobed. *Inflorescence* many-flowered, lax, arched or drooping, 30-40 cm long. *Flowers* ca 2.0 cm across, white, pale pink flushed; *bracts* ca 4 mm long, greenish brown; *pedicelled ovary* ca 2 cm long, white; *sepals* and *petals* ca 1.0 cm long; apices rounded or apiculate; *sepals* 0.8 cm broad, broadly ovate; *petals* 0.8 cm broad, ovate; *lip* ca 1.5 cm long; side lobes larger than the mid-lobe, more or less strap-shaped; mid-lobe sub-quadrate; margins emarginate, erose; spur ca 1.2 cm long, white, pale flushed, infundibuliform, incurved; *column* ca 5 mm long, white; foot very short; *pollinia* sub-globose.

Fl.: May - Jun.

Nagaland: Khonoma, Hynniewta 74519; Mokokchung, Hynniewta 79972; Mon, Hynniewta 79914 (ASSAM).

Distr.: INDIA (Assam, Arunachal Pradesh, West Bengal, Bihar, Meghalaya, Mizoram, Nagaland, Orissa, Sikkim, Tamil Nadu, Uttar Pradesh); BANGLA DESH, BORNEO, MYANMAR, CELEBES, CHINA, JAVA, LAOS, MALAYA, NEPAL, PHILLIPINES, SUMATRA, THAILAND, VIETNAM.

3. ***Aerides uniflora*** (Lindl.) Summer. in Kew Bull. 588. 1955. *Mescolastes uniflora* Lindl., Gen. & Sp. Orch. 45. 1830. *Luisia uniflora* Bl. Mus. Bot. 1: 64. 1849; Seidenf. in Dansk Bot. Ark. 27 (4): 95. 1971. *Aerides longicornu* Hook. f., Fl. Brit. India 6: 40. 1890; Ic. Pl. t. 2127. 1893; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8: 211. t. 281. 1898.

Stems 30-45 cm long, slender, simple or branched. *Leaves* 15-25 x 0.2-0.3 cm, terete, fleshy, acute or obtuse, straight or slightly curved. *Inflorescence* 1-2-flowered, 3-5 cm long. *Flowers* ca 4.5 cm across, white; *bracts* 2-3 mm long, whitish brown; *pedicelled ovary* 1.5-3.0 cm long, white; dorsal sepal ca 2 x 0.7 cm, oblong, apiculate; laterals 2.2-2.3 x 0.4-0.5 cm, spreading, sub-falcate, acute, flexous; *petals* 1.6-1.7 x 0.6-0.7 cm, oblong; apex rounded; margins crisped; *lip* 1.4-1.5 cm long, white, sometimes flushed with pink; side lobes 2-partite, flexous; mid-lobe narrowly clawed; apex dilated, cuneiform; spur 2-2.5 cm long, white flushed with pink, slightly incurved, narrowly infundibuliform; *column* 5-6 mm

long, white; foot long; *pollinia* globose. *Capsule* 8-12 x 0.8 - 1.2 cm, elongate-clavate, ribbed.

Fl.: May - June.

Nagaland: Kohima, *Bor* 20265; *De* 17644, *Hynniewta* 80807; Pulebadze, *Hynniewta* 56190; Zunhebato, *Hynniewta* 80351 (ASSAM).

Distr.: INDIA (N.E. India, Sikkim); NEPAL.

4. AGROSTOPHYLLUM Bl.

- 1a. Stems clustered; rhizome absent; leaves elliptic-lanceolate, *ca* 1.5 cm or more broad; lip entire, spurred; column without foot ...3. *A. khasianum*
- 1b. Stems distant on the rhizome, more than 20 cm high; leaves linear-lanceolate, *ca* 1.0 cm or less broad; lip 3-lobed, not spurred; column with foot:
- 2a. Leaves few; head *ca* 2 cm or less across; flowers white; calli 4, minute, entire ...1. *A. brevipes*
- 2b. Leaves many; head *ca* 3 cm or more across; flowers pinkish or yellowish; lip with minute pink dots; callus 1, large, bilobed ...2. *A. callosum*

1. ***Agrostophyllum brevipes*** King & Pantl. in *Ann. Roy. Bot. Gard. Calc.* 8 : 156. t. 213. 1898. Fig. 1

Stems 20-30 cm high, distant, clavate, few-leaved. *Leaves* 7-15 x 0.5-0.8 cm, linear-lanceolate; apex notched, rarely acute. *Head* 1.8-2.0 cm across. *Flowers* *ca* 6 mm across, white; *bracts* much shorter than the pedicelled ovary; *sepals* *ca* 3 x 1.5 mm, ovate-oblong, obtuse; *petals* *ca* 2.5 x 1.3 mm, oblong-orbicular; *lip* *ca* 4 mm long, white, adnate to the foot of column; side lobes round; mid-lobe oblong; apex retuse, shortly bifid; calli 4, minute of unequal length; *column* *ca* 2 mm long; foot short; apex without wings; *pollinia* attached to a short stipes arising from a minute, cordate gland.

Fl.: Aug. - Sept.

Nagaland: Barak range, *Hynniewta* 74541; Josoma, *Hynniewta* 74574; Khonoma, *Hynniewta* 74518 (ASSAM).

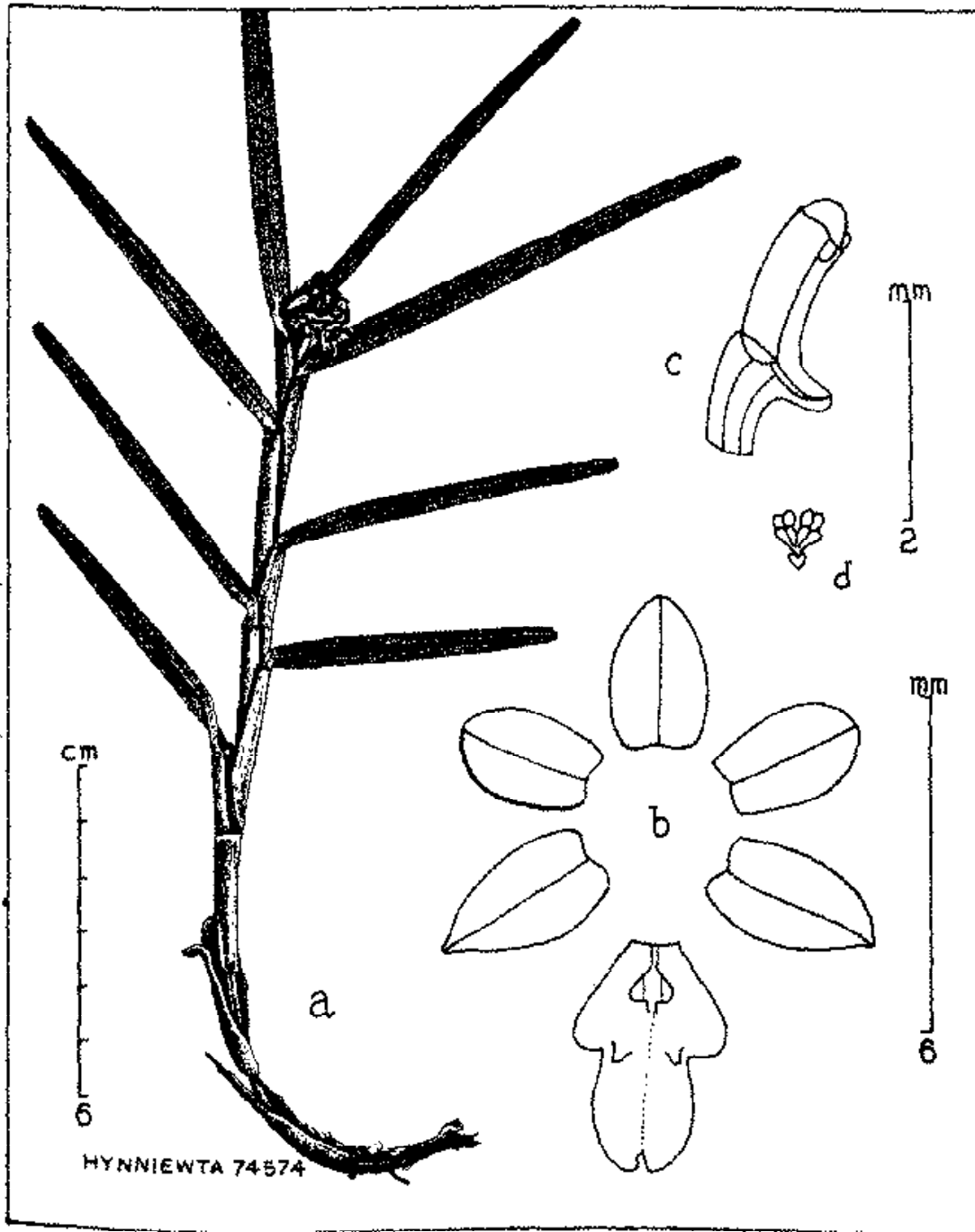


Fig.1. *Agrostophyllum brevipes* King & Pantl.:
a. habit; b. floral parts; c. column; d. pollinia.

Distr.: INDIA (N. E. India, Sikkim); BHUTAN, JAVA.

2. **Agrostophyllum callosum** Reichb. f. in Seem. Fl. Vit. 296. 1868; Hook. f., Fl. Brit. India 5 : 824. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 155. t. 212. 1898. **Fig. 2**

Stems 25-50 cm high, distant, sub-clavate, many-leaved. *Leaves* 7-17 x 0.8-1.0 cm, linear-lanceolate; apex notched. *Head* 3-3.5 cm across. *Flowers* ca 8 mm across, pinkish, sometimes yellowish; *bracts* as long as the pedicelled ovary; *sepals* ca 4 x 3 mm, oblong or elliptic, obtuse, concave; *petals* ca 3.5 x 2 mm, linear-oblong or orbicular-oblong; *lip* ca 5.5 mm long, adnate to the foot of column, yellowish with scattered, minute, pink dots; side lobes rounded; mid-lobe sub-orbicular; apex emarginate; callus 1, large, bi-lobed; *column* ca 2 mm long; foot very short; apex narrowly winged; *pollinia* attached to elastic threads arising from a viscid appendage.

Fl.: Jun. Jul.

Nagaland: Kohima, Prain 8 (CAL); Lumani, Hynniewta 56199, 80884; Pulebadze, Hynniewta 56144; Tuensang, Hynniewta 80952; Zunhebato, Hynniewta 80362, 80832 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN, MYANMAR.

3. **Agrostophyllum khasianum** Griff. in Calc. J. Nat. Hist. 4 : 378. t. 19. 1844; Hook. f., Fl. Brit. India 5 : 824. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 154. t. 211. 1898. *A. planicaule* Reichb. f. in Walp. Ann. 6 : 909. 1861. **Fig. 3**

Stems 12-15 cm high, clustered, clavate, few-leaved. *Leaves* 8-15 x 1.5-2.0 cm, elliptic-lanceolate; apex notched. *Head* 1.8-2.0 cm across. *Flowers* ca 6 mm across, pinkish; *bracts* shorter than the pedicelled ovary; *sepals* ca 3 x 2 mm, ovate-lanceolate, acute; *petals* ca 2.5 x 2 mm, linear-oblong, obtuse; *lip* ca 3.5 mm long, pinkish, with pale yellow patches on the middle, adnate at the base of column, reniform or transversely oblong; apex retuse, notched; base spurred; callus 1, minute in front of entrance to the spur; *column* ca 2 mm long; foot none; apex narrowly winged; *pollinia* attached to elastic threads arising from a viscid appendage.

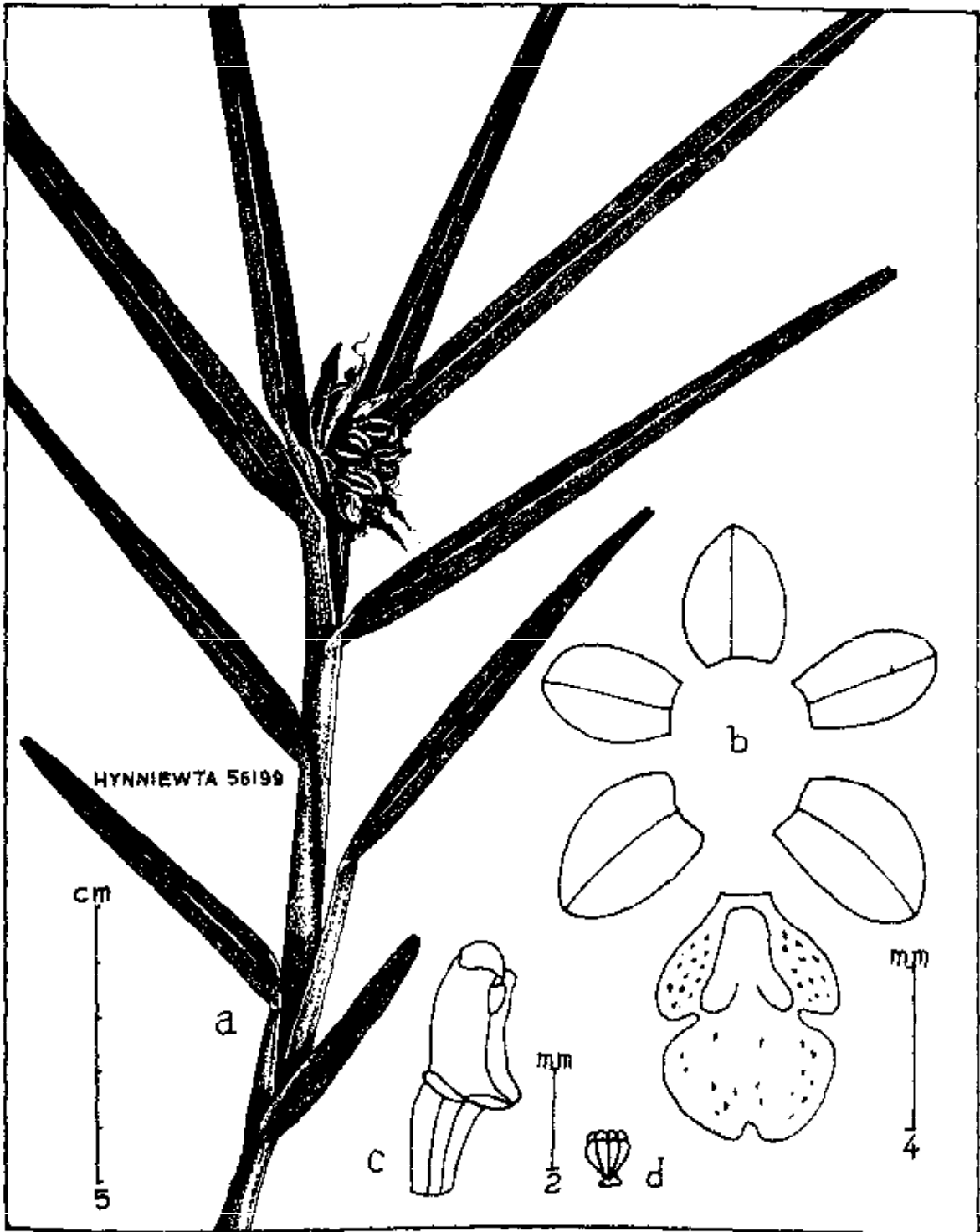


Fig. 2. *Agrostophyllum callosum* Reichb. f.:
 a. habit; b. floral parts; c. column; d. pollinia.

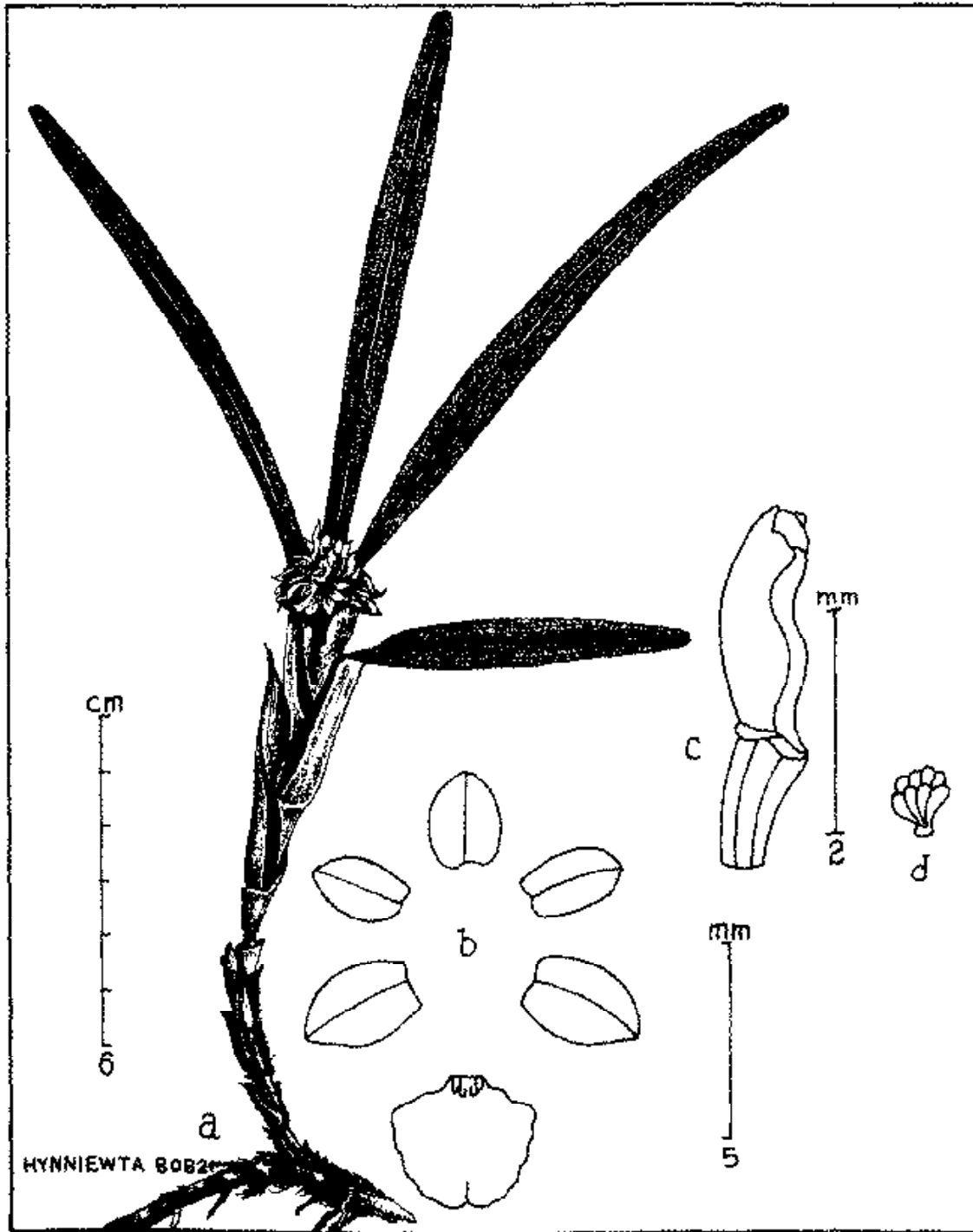


Fig. 3. *Agrostophyllum khasianum* Griff.:
a. habit; b. floral parts; c. column; d. pollinia.

Fl.: Aug. Sept.

Nagaland: Jafu Hills, *Hynniewta* 80821; Jhaluki, *Kataki s.n.* (ASSAM).

Distr.: INDIA (N. E. India, Andaman Islands, Sikkim); MYANMAR, CAMBODIA, LAOS, THAILAND, VIETNAM.

5. ANOECTOCHILUS BL.

- 1a. Claw of lip entire; tooth absent;
sac with two erose lamellae within calli absent 1. *A. crispus*
 - 1b. Claw of lip not entire; tooth present;
sac with two calli within; lamellae absent:
 - 2a. Claw of lip 8-toothed:
 - 3a. Leaves orbicular-ovate, apiculate, green throughout, without reticulations; claw of lip winged 4. *A. luteus*
 - 3b. Leaves elliptic-ovate, acute, upper surface reddish-golden yellow, lower surface uniformly dull red; claw of lip not winged 6. *A. sikkimensis*
 - 2b. Claw of lip 12-16 - toothed:
 - 4a. Leaves green throughout; flowers glabrous 3. *A. grandiflorus*
 - 4b. Leaves not green throughout; flowers pubescent:
 - 5a. Leaves olive green above, coppery beneath; petals wedge-shaped with long incurved beak-shaped apex; sac of lip not bifid; teeth 14-16; pollinia bifid 5. *A. roxburghii*
 - 5b. Leaves yellowish green golden yellow veined above, purplish red beneath; petals falcately oblong-ovate, acute; sac of lip bifid; teeth 12; pollinia entire 2. *A. elwesii*
1. **Anoectochilus crispus** Lindl. in *J. Linn. Soc.* 1 : 180. 1857; King & Pantl. in *Ann. Roy. Bot. Gard. Calc.* 8 : 297. t. 395. 1898. *Odontochilus crispus* (Lindl.) Hook. f., *Fl. Brit. India* 6 : 99. 1890.

Stems 8-14 cm high, slender. *Leaves* 1.2 - 2 x 0.8-1.2 cm, ovate, acute, entire or minutely crenulate, greenish. *Inflorescence* few-flowered, 3-5 cm long, pubescent. *Flowers* 1.6-1.8 cm long, greenish white; *bracts* 0.6-0.8 cm long, lanceolate, acute, pubescent, green; *pedicelled ovary* 1-1.1 cm long, green, glabrous, *sepals* green, pubescent, oblong, obtuse; dorsal 0.5-0.6 cm long, recurved; laterals 0.8-0.9 cm long; *petals* 0.6-0.7 cm long, white, triangular, falcate, acute, conniving under the dorsal sepal; *lip* 1.2-1.3 cm long, white, sac yellow, 2 sub-quadrate erose lamellae within; claw white; teeth none; lobules oblong, sub-falcate, obtuse, crenulate; *column* 3-4 mm long, white; *pollinia* sub-globose.

Fl.: Sept.

Nagaland: Kohima, Bor 15786 A (ASSAM).

Distr.: INDIA (Meghalaya, Nagaland, Sikkim, West Bengal); MYANMAR.

2. *Anoectochilus elwesii* (Clarke ex Hook. f.) King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 296. t. 394; 1898; Seidenf. in Dansk Bot. Ark. 32(2): 49. t. 24. 1978. *Odontochilus elwesii* Clarke ex Hook. f., Fl. Brit. India 6 : 100. 1890. Fig. 4

Stems 13-17 cm high, stout. *Leaves* 3.0-4.5 x 2-3 cm, ovate, acute, olive green on upper surface, coppery on the lower. *Inflorescence* few-flowered, 3-5 cm long, pubescent. *Flowers* 2.3-2.5 cm long, green, brown tipped; *bracts* 1.0-1.1 cm long, lanceolate, acuminate, green, glandular pubescent; *pedicelled ovary* 1.0-1.2 cm long, glandular pubescent, green; *sepals* pubescent; dorsal 0.8-0.9 cm long, ovate cordate; laterals 1.2-1.3 cm long, oblong, sub-falcate; *petals* 0.8-0.9 cm long, falcately oblong-ovate, acute, sparsely pubescent outside; *lip* 1.8-2.0 cm long yellowish white; sac bifid, 2 calli within; claw yellow with a red central line; teeth 12, greenish yellow; lobules white, sub-quadrate, undulate, crenulate; *column* 4-5 mm long, greenish yellow; *pollinia* clavate.

Fl.: Jul. - Aug.

Nagaland: Kohima, Bor 15786 C (ASSAM), Prain 17 (CAL).

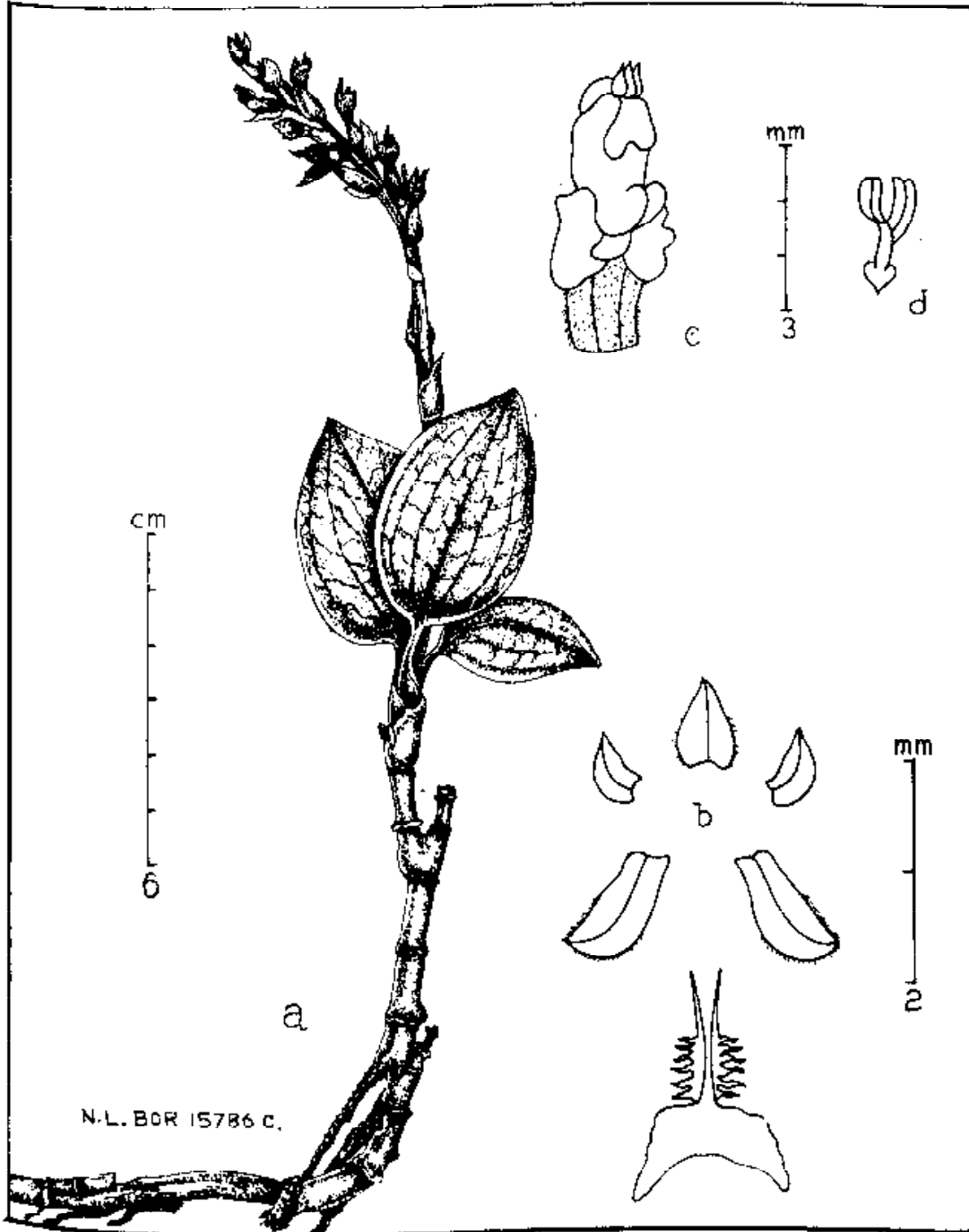


Fig. 4. *Anoectochilus elwesii* (Clarke ex Hook. f.) King & Pantl.:
 a. habit; b. floral parts; c. column; d. pollinia.

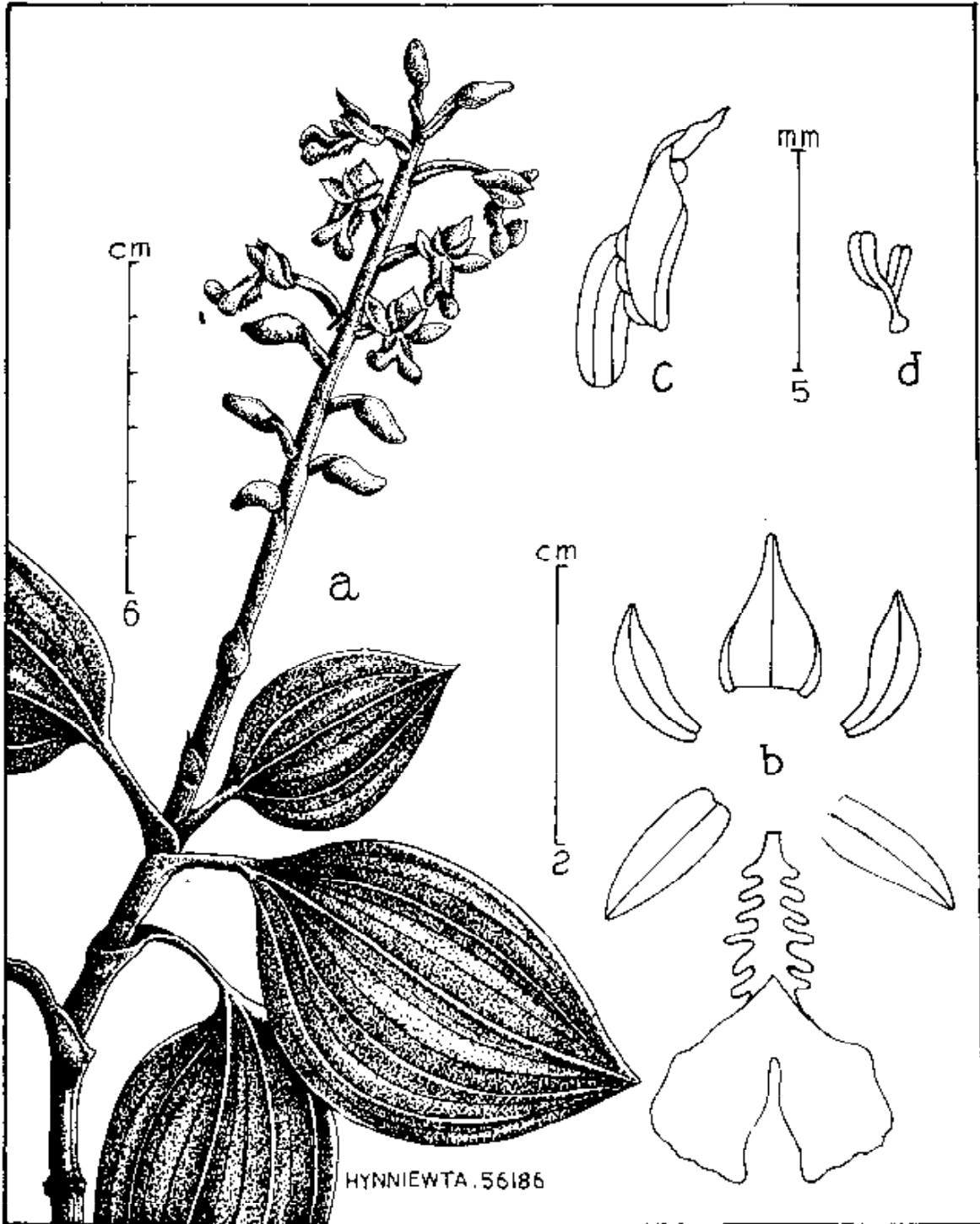


Fig. 5. *Anoectochilus grandiflorus* Lindl.:
a. habit; b. floral parts; c. column; d. pollinia.

Distr.: INDIA (Meghalaya, Nagaland, Sikkim, West Bengal); BHUTAN, MYANMAR, CHINA, THAILAND.

3. **Anoectochilus grandiflorus** Lindl. in Journ. Linn. Soc. 1 : 179. 1857; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 296. t. 393. 1898. *Odontochilus grandiflorus* (Lindl.) Benth. in Gen. Pl. 3 : 598. 1883; Hook. f., Fl. Brit. India, 6 : 100. 1890. **Fig. 5**

Stems 18-27 cm high, stout. *Leaves* 6-10 x 3.7-5 cm, obliquely elliptic, acute, green. *Inflorescence* many-flowered, 10-15 cm long, glabrescent. *Flowers* 2-2.2 cm across, pale green, purple tipped, mottled with white; *bracts* 1.0 - 1.1 cm long, ovate-lanceolate, acute, glabrescent, pale green; *pedicelled ovary* 1.1-1.2 cm long, glabrous, brownish green; *sepals* glabrous; dorsal 0.8-0.9 cm long, ovate, acute, concave; laterals 1-1.1 cm long, oblong, sub-falcate, obtuse, connate at their base; *petals* 0.8 - 0.9 cm long, falcately oblanceolate, acute; *lip* 1.4 - 1.5 cm long, white; sac yellow, 2 calli within; claw white; teeth 12, green; lobules white, sub-quadrate; apices truncate, erose; *column* 4-5 mm long, greenish purple; *pollinia* clavate.

Fl.: Jun. - Jul.

Nagaland: Pulebadze, Hynniewta 56186 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN, THAILAND.

4. **Anoectochilus luteus** Lindl. in J. Linn. Soc. 1 : 179. 1857; Balak., Fl. Jowai 1:469. 1983. *A. griffithii* Hook. f., Fl. Brit. India 6 : 96. 1890.

Stems 15-20 cm high, stout. *Leaves* 5-6 x 2.5 - 3.5 cm, orbicular-ovate, apiculate, green without reticulations. *Inflorescence* many-flowered, 6-10 cm long, glandular pubescent. *Flowers* 1.4-1.6 cm across, greenish brown; *bracts* 0.8-1.0 cm long, lanceolate, acute, pubescent, pale brown; *pedicelled ovary* 0.9-1.0 cm long, glandular pubescent, olive green; *sepals* greenish brown, oblong, glabrous, dorsal 0.5-0.6 cm long, obtuse, concave, laterals 0.7-0.8 cm long, acute; *petals* 0.5-0.6 cm long, greenish white, ovate-oblong, dimidiate; apex beaked; *lip* 1.2-1.3 cm long, white; sac bifid, green, 2 calli within; claw white; teeth 8, green; lobules white, hatchet-shaped, entire or crenulate; *column* 3-4 mm long, greenish brown; *pollinia* oblong.

Fl.: July - Aug.

Nagaland: Kohima, Prain 10 (CAL).

Distr.: INDIA (Nagaland, Mizoram).

5. *Anoectochilus roxburghii* (Wall.) Lindl. in Royle, *Illus. Bot. Himal.* 368. 1839; *Gen. & Sp. Orch.* 499. 1840; Hook. f., *Fl. Brit. India* 6 : 95. 1890; King & Pantl. in *Ann. Roy. Bot. Gard. Calc.* 8 : 293. t. 390. 1898. *Chrysobaphus roxburghii* Wall., *Tent. Fl. Nepal*, 37 t. 27. 1826. Fig. 6

Stems 11-15 cm high, slender. *Leaves* 1.5-3.5 x 1-2.5 cm, ovate or ovate-oblong, acute, yellowish green bordered purplish red and golden yellow veined on upper surface, uniformly purplish red on the lower. *Inflorescence* few-flowered, 3-5 cm long, pubescent. *Flowers* 1.8-2.0 cm across, pinkish white; *bracts* 0.6-0.7 cm long, ovate, acuminate, glandular pubescent, pinkish green; *sepals* glandular pubescent; dorsal 0.7-0.8 cm long, ovate, acuminate; apex slightly recurved; laterals 0.9-1.0 cm long, oblong, acute; *petals* 0.6 - 0.7 cm long, wedge-shaped with long, incurved, beak-shaped apex; *lip* 1.4-1.5 cm long, white; sac pale pink, 2 calli within; claw white; teeth 14-16, white; sac pale pink, 2 calli within; claw white; teeth 14-16, white; lobules white, linear-oblong, obtuse, recurved; *column* 3-4 mm long, pale pink; *pollinia* clavate, bifid.

Fl.: Sept. - Oct.

Nagaland: Jafu Hills, Hynniewta 56213; Khonoma, Katak, 65902 (ASSAM).

Distr.: INDIA (Himachal Pradesh, Manipur, Meghalaya, Nagaland, Sikkim, Uttar Pradesh, West Bengal); BHUTAN, CAMBODIA, CHINA, LAOS, NEPAL, THAILAND, VIETNAM.

6. *Anoectochilus sikkimensis* King & Pantl. in *J. Asiat. Soc. Beng.* 65: 124. t. 2. 1896; *Ann. Roy. Bot. Gard. Calc.* 8 : 294. t. 341. 1898.

Fig. 7

Stems 11-17 cm high, stout. *Leaves* 5-6.5 x 2.5-3.5 cm, elliptic-ovate, acute, reddish, golden yellow veined on upper surface, uniformly dull red on the lower. *Inflorescence* many-flowered, 6-10 cm long, pubescent.

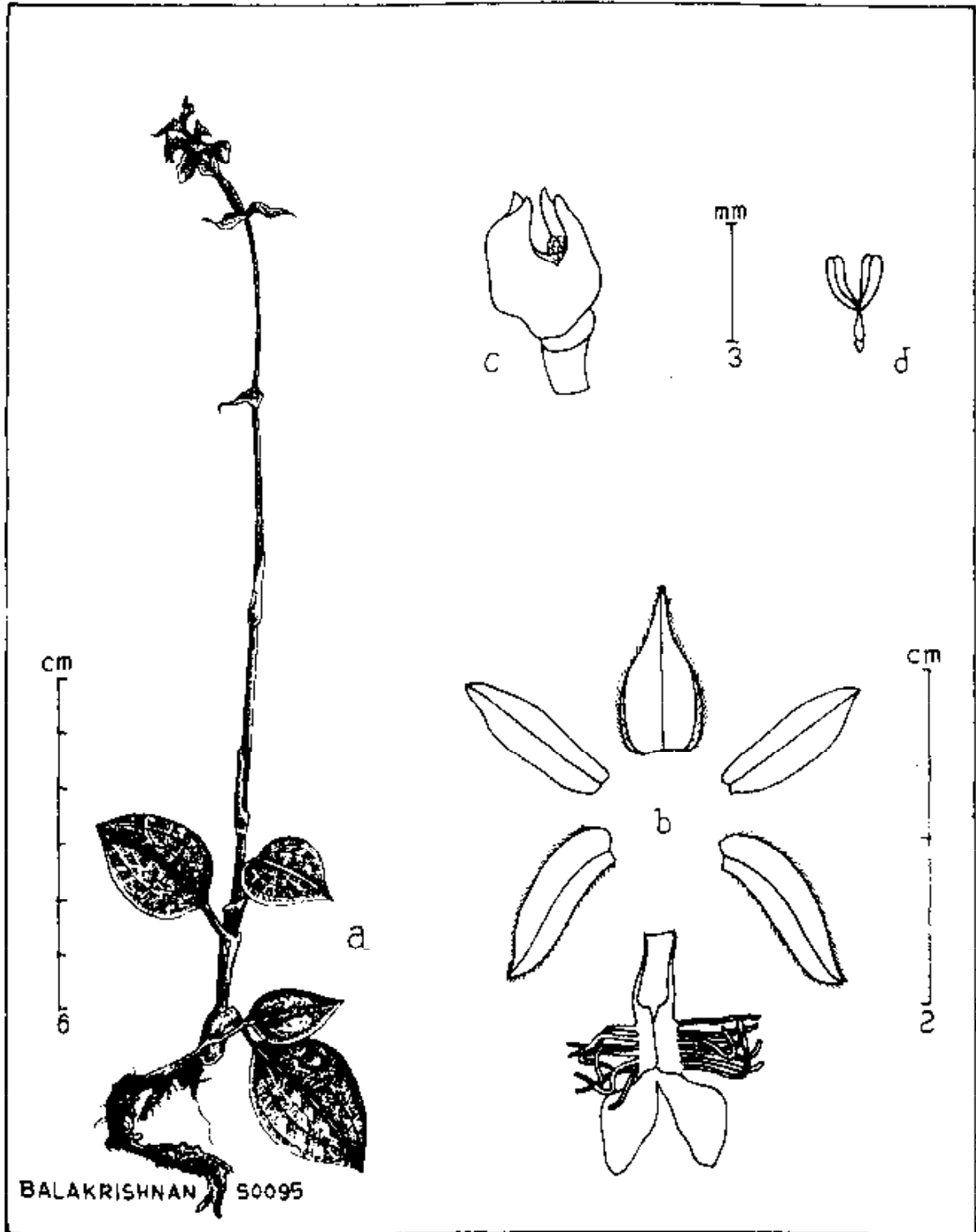


Fig. 6. *Anoectochilus roxburghii* (Wall.) Lindl.:
 a. habit; b. floral parts; c. column; d. pollinia.

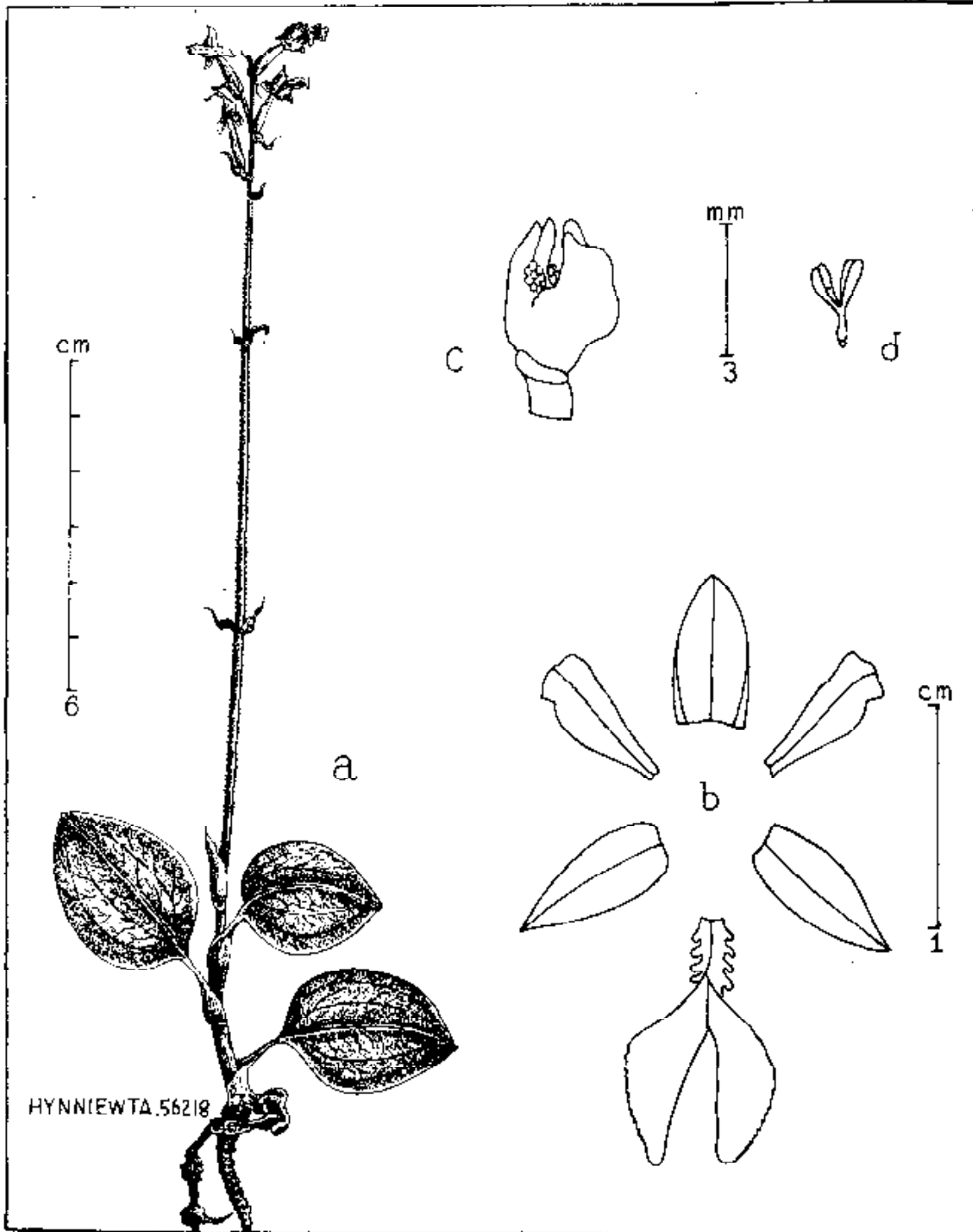


Fig. 7. *Anoectochilus sikkimensis* King & Pantl.:
a. habit; b. floral parts; c. column; d. pollinia.

Flowers 1.4-1.6 cm across, greenish brown; *bracts* 0.8-1.0 cm long, lanceolate, acute, pubescent, brownish green; *pedicelled ovary* 1-1.1 cm long; glandular, pubescent, olive green; *sepals* greenish brown, oblong, glabrous; dorsal 0.5-0.6 cm long, obtuse, concave; laterals 0.7-0.8 cm long, acute; *petals* 0.5-0.6 cm long, greenish white, ovate-oblong, dimidiate; apex beaked; *lip* 1.2-1.3 cm long, white; sac bifid, green, 2 calli within; claw white; teeth 8, green; lobules white, falcately oblong, crenulate; *column* 3-4 mm long, greenish brown; *pollinia* oblong.

Fl.: Sept. - Oct.

Nagaland: Jafu Hills, *Hynniewta* 56218; Kohima, *Bor* 15786 D (ASSAM).

Distr.: INDIA (N. E. India, Sikkim, West Bengal).

6. ANTHOGONIUM Lindl.

Anthogonium gracile Lindl., *Nat. Syst.* ed. 2 341. 1836; Hook. f., *Fl. Brit. India* 5 : 823. 1890; King & Pantl. in *Ann. Roy. Bot. Gard. Calc.* 8 : 96. t. 134. 1898. *A. griffithii* Reichb. f. in *Bonplandia*, 2 : 90. 1854.

Fig. 8

Pseudobulbs 2-3 cm high, ovoid. *Leaves* 5-30 x 0.7-1.5 cm, linear-lanceolate, acuminate. *Inflorescence* 25-45 cm long. *Flowers* ca 2 cm long, pale pink; *bracts* 4-5 mm long, pale brown, ovate, acuminate; *pedicelled ovary* 1.2-1.5 cm long, pale pink, curved; sepaline tube gibbous; free parts ca 0.9 cm long, sub-equal, acute or obtuse, erect or revolute; *petals* 1.7-1.8 cm long, linear, falcate, white at base, pink above; *lip* ca 1.5 cm long, flabelliform, pale pink; apical half broad with dark pink spots, cuneate; apex notched; *column* ca 1.5 cm long, curved, pale pink; *pollinia* ovoid.

Fl.: Jun. - Aug.

Nagaland: Chakabama, *Hynniewta* 51818, 74571; Fusema, *Hynniewta* 74567; Khonoma, *Malhotra* 75131; Kohima, *Bor* 21186, 21223; Phek, *Hynniewta* 80919; Saramati, *Hynniewta* 80962; Wokha, *Hynniewta* 80751; Ungma, *Hynniewta* 79991; Zunhebato, *Hynniewta* 80826 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN, MYANMAR, CAMBODIA, CHINA, LAOS, NEPAL, THAILAND, VIETNAM.

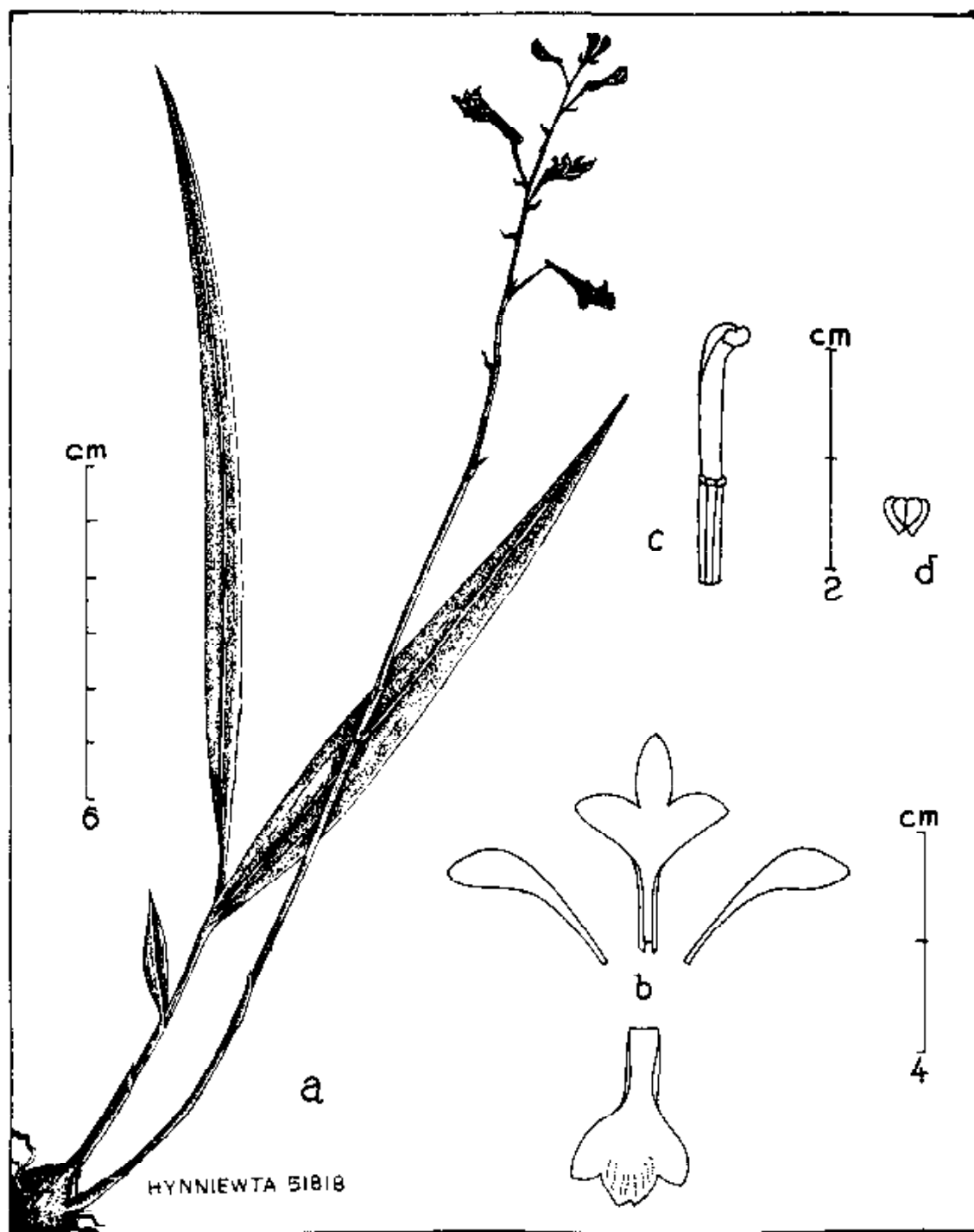


Fig. 8. *Anthogonium gracile* Lindl.:
 a. habit; b. floral parts; c. column; d. pollinia.

7. ARACHNIS BL.

Arachnis labrosa (Lindl. ex Paxt.) Reichb. f. in Bot. Centralbl. 28 : 343. 1886. *Arrhynchium labrosum* Lindl. ex Paxt., Fl. Gard. 1 : 142. 1850. *Armadorum labrosum* (Lindl. & Paxt.) Schltr., in Fedde Repert. 10 : 177. 1911. *Arachnanthe bilinguis* Benth. in Benth. & Hook. f., Gen. Pl. 3 : 573. 1883; Hook. f., Fl. Brit. India 6 : 28. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 210 t. 280. 1898.

Stems 25-30 cm long, erect or arched. *Leaves* 10-20 x 1.5-2 cm, oblong-linear; apex equally or unequally, obtusely 2-lobed. *Inflorescence* 15-25 cm long. *Flowers* ca 3.5 cm across, yellowish with irregular brown bands; *bracts* 4-5 mm long, triangular, obtuse, brownish; *pedicelled ovary* ca 2 cm long, pale pink; *sepals* 1.6-1.8 x 0.5 - 0.6 cm, subequal, oblong, obtuse, laterals sub-falcate; *petals* 1.2 - 1.3 x 0.3 - 0.4 cm, falcately lanceolate, obtuse; *lip* 1.2 - 1.3 cm long, yellowish white, sagittate in general outline; side lobes short, round, mid-lobe large, clawed; apex rounded; lamellae 6, faint, pink; spur 4-6 mm long, cylindric, obtuse, recurved; *column* 5-6 mm long, whitish pink; *pollinia* globose.

Fl.: Aug. Sept.

Nagaland: Kohima, *Hynniewta* 80816; Tiyie Hills, *Hynniewta* 80762; Tuensang, *Hynniewta* 80947; Wokha, *Hynniewta* 80745 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN.

8. ARUNDINA BL.

Arundina graminifolia (D. Don) Hochr. in Bull. New York Bot. Gard. 6: 270. 1910; Seidenf. & Smitnd. Orch. Thailand, 2(1) : 184. 1959. *Bletia graminifolia* D. Don, Prodr. Fl. Nepal. 29. 1825 *Arundina bambusifolia* Lindl. Gen. & Sp. Orch. 125. 1830; Hook. f., Fl. Brit. India 5 : 857. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 112. t. 156. 1898.

Stems 75-150 cm high, terete, sometimes viviparous. *Leaves* 20-30 x 1.8-2.5 cm, lanceolate or oblong-lanceolate, acuminate. *Inflorescence* 10-20 cm long; *panicle* few-branched; branchlets short, erect or sub-erect. *Flowers* 3.5-4.5 cm across, pale pinkish purple, at the tips of the branchlets;

bracts ca 1-1.5 cm long, pale brown, lanceolate, acute; *pedicelled ovary* 1.5-2 cm long, purplish white; *sepals* 3.2 - 3.3 x 0.9-1.0 cm, lanceolate or oblong-lanceolate, acute; *petals* 3.4-3.5 x 1.5-1.6 cm, orbicular-ovate, acute; *lip* ca 4.2 cm long, pink or rosy purple with dark pink spots, convolute; side lobes broad, round, crisped; mid-lobe deeply bifid; lamellae 3, unequal, yellow, undulate; outer two longer, fleshy, extending upto the sinus; *column* 3-3.5 cm long, whitish pink; *pollinia* oblong.

Fl.: Jun. - Aug.

Nagaland: Fusema, Prain 16 (CAL); Khonoma, Malhotra 75122; Satakha, Hynniewta 80874 Tiyie Hills, Hynniewta 80759; Tuensang, Hynniewta 80094 (ASSAM).

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9. ASCOCENTRUM Schltr. ex J. J. Sm.

- 1a. Leaves greyish green, invariably mottled with brown; apices acutely 2-lobed; flowers ca 1.8 cm across, pink; spur 0.9 cm or more long 1. *A. ampullaceum*
- 1b. Leaves green throughout; apices obtusely 2-lobed; flowers ca 0.7 cm across, whitish purple; spur 0.3 cm or less long 2. *A. micranthum*
1. **Ascocentrum ampullaceum** (Roxb.) Schltr. Fedde Repert. Boih. 1 : 975. 1913; Seidenf. & Smitnd. Orch. Thailand, 4(1) : 598. t. 449. 1963. *Aerides ampullaceum* Roxb. Fl. Ind. 3 : 476. 1832. *Saccolabium ampullaceum* (Roxb.) Lindl. in J. Linn. Soc. 3: 35. 1859; Hook. f., Fl. Brit. India 6: 64. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8: 220. t. 293. 1898.

Stems 6-10 cm high, stout, erect. *Leaves* 15-25 x 2-5 cm, greyish green, invariably mottled with brown, lanceolate-oblong; apex unequally, acutely 2-lobed, sometimes toothed in between. *Inflorescence* few- or many-flowered, 8-15 cm long, erect. *Flowers* ca 1.8 cm across, pink; *bracts* 2-3 mm long, greenish brown, ovate, acute; *pedicelled ovary* 0.9 - 1.1 cm long, light pink; *sepals* and *petals* sub-equal, ca 0.9 x 0.4 - 0.5 cm, broadly obovate, obtuse; *lip* 1.0 - 1.2 cm long, pink or pale rose, lanceolate, obtuse; spur 0.9 - 1.0 cm long, pink, cylindric, obtuse, flexuous; *column* 4-5 mm long, pale rose; *pollinia* ovoid.

Fl.: Mar. - Apr.

Nagaland: Mokokchung, Haridasan s. n.; Hynniewta 79963 (AS-SAM).

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2. ***Ascocentrum micranthum*** (Lindl.) Holtt. in Gard. Bull. Singapore, 11 : 275. 1947; Seidenf. & Smitnd. Orch. Thailand, 4 (1): 595. t. 446. 1963; Hook. f., Fl. Brit. India 6 : 59. 1890. *Saccolabium micranthum* Lindl., Gen sp, Orchid 2: 20. 1833. *Cleisostoma micranthum* (Lindl.) King & Pantl. in Ann. Bot. Gart. Calc. 8 : 234. t. 312. 1898. *Smitinandia micrantha* (Lindl.) Holtt. in Gard. Bull. Singapore 25: 106. 1969.

Fig. 9

Stems 10-20 cm high, stout, erect or arched. *Leaves* 8-15 x 1.5-2.5 cm, lanceolate-oblong, keeled; apex obliquely truncate and obtusely 2-lobed. *Inflorescence* many-flowered, 5-10 cm long, sub-erect. *Flowers* ca 7 mm across, whitish purple *bracts* ca 2 mm long, green, ovate, acute; *pedicelled ovary* 0.4-0.6 cm long, green, purple striped; *sepals* and *petals* white irregular purple bars, unequal; *sepals* ca 3.5 x 2 mm, elliptic, obtuse; *petals* ca 3 x 1.5 mm, oblong, obtuse or acute; *lip* ca 4 mm long, purple 3-lobed; side lobes small, ovate, obtuse; mid-lobe large, fleshy, oblong, obtuse; edges minutely erose; spur ca 3 mm long, purplish white, conical, obtuse; disc with 2 calli at base of mid-lobe in front of entrance to the spur; *column* ca 1.5 mm long, purplish white; foot none; *pollinia* oblong. *Capsules* 8-10 x 3-4 mm, oblong.

Note : Many authors consider this under *Smitinandia* Holtt.

Fl.: Jun. - Jul.

Nagaland: Akulato, Hynniewta 80892; Tokye, Hynniewta 80899 (AS-SAM).

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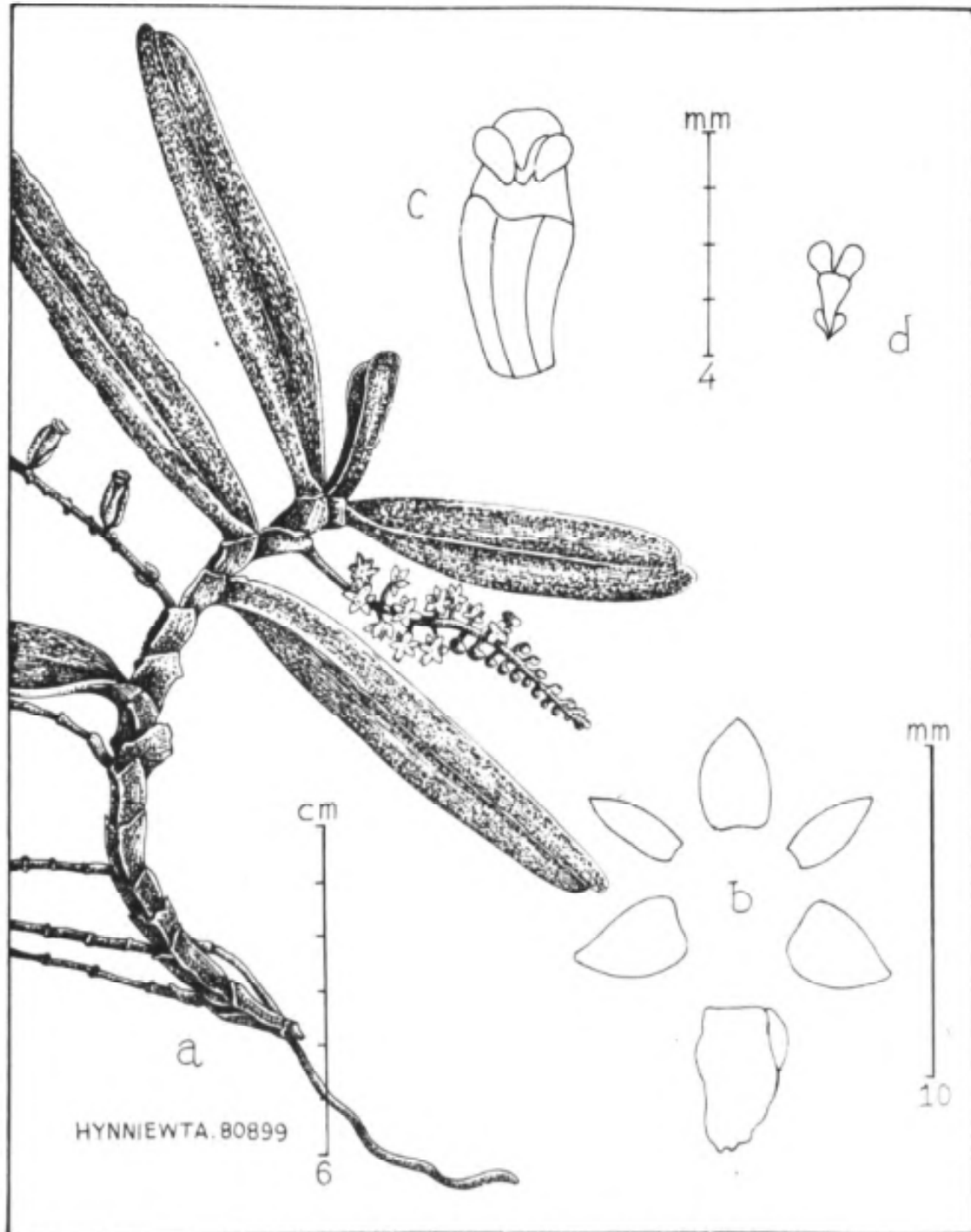


Fig. 9. *Ascocentrum micranthum* (Lindl.) Holtt.:
a. habit; b. floral parts; c. column; d. pollinia.

10. **BULBOPHYLLUM** Thouars *nom. cons.*

- 1a. Pseudobulbs absent; flowers sessile, many in spikes7. *B. khasianum*
- 1b. Pseudobulbs present; flowers pedicellate,
1-2 or few to many in umbels, racemes or capitula:
- 2a. Pseudobulbs 1-leaved:
- 3a. Inflorescence 1-2 flowered:
- 4a. Flowers yellow, purple striped; lip pinkish
brown, entire at base1. *B. affine*
- 4b. Flowers pale yellow, purple spotted; lip
brown, with small dentate auricles at base8. *B. leopardinum*
- 3b. Inflorescence few- to many-flowered:
- 5a. Flowers dense, capitate:
- 6a. Capitula umbellate; flowers white;
lateral sepals much longer than the
dorsal sepal, with caudate, elongate
fili-form tips; lip 3-lobed, glabrous2. *B. caudatum*
- 6b. Capitula sub-globose; flowers
whitish yellow or greenish brown;
lateral sepals slightly longer than the
dorsal sepal, with acute or obtuse tips;
lip entire, glandular hairy or papillose:
- 7a. Flowers whitish yellow; sepals
lanceolate, obtuse, apical half
with inrolled edges; lip oblong
lanceolate; glandular hairy, apex
narrow, obtuse9. *B. odoratissimum*
- 7b. Flowers greenish brown; sepals
ovate, acute, flat; lip elliptic,
papillose; apex broad, rounded12. *B. piluliferum*
- 5b. Flowers lax, sub-racemose to racemose
or sub-umbellate:
- 8a. Flowers sub-racemose to racemose:
- 9a. Flowers few, sub-racemose;
lateral sepals \pm twice the length
of dorsal sepal 15. *B. rolfei*
- 9b. Flowers many, racemose; lateral sepals
equalling to or slightly longer than the
dorsal sepal:

- 10a. Flowers white, lateral sepals slightly longer and widely separated from the dorsal sepal; petals erose, dentate6. *B. gymnopus*
- 10b. Flowers purplish or greenish yellow with purple nerves; lateral sepals as long as and touching dorsal sepal; petals ciliate or entire;
- 11a. Flowers purplish; petals ciliate; lip fimbriate or ciliolate:
- 12a. Sepals ovate-lanceolate, caudate-acuminate; lip lanceolate, broadly fimbriate11. *B. penicillium*
- 12b. Sepals broadly triangular, obtuse; lip oblong, ciliolate17. *B. secundum*
- 11b. Flowers greenish yellow with purple nerves; petals entire; lip neither fimbriate nor ciliolate13. *B. reptans*
- 8b. Flowers sub-umbellate:
- 13a. Peduncle as long as or shorter than the pseudobulbs; lateral sepals as long as the dorsal sepal, apices curved or hooked'3. *B. cauliflorum*
- 13b. Peduncle many times longer than the pseudobulbs; lateral sepals more than 2 times longer than the dorsal sepal; apices neither curved nor hooked:
- 14a. Lateral sepals more than 5 times the length of dorsal sepal, ending in long thin threads; petals with paleae; lip minutely serrate10. *B. ornatissimum*
- 14b. Lateral sepals nearly twice the length of dorsal sepal, not ending in long thin threads; petals without paleae; lip entire:
- 15a. Flowers yellow, red striped; dorsal sepal and petals ciliate16. *B. roxburghii*
- 15b. Flowers yellow with purple spots or brownish violet; dorsal sepal and petals entire:
- 16a. Flowers brownish violet; lateral sepals almost connate throughout; petals with obtuse; petals with obtuse apices 14. *B. retusiusculum*

- 16b. Flowers yellow with purple spots; lateral sepals connate at their base; petals with acute or apiculate apices:
- 17a. Dorsal sepal concave, acute; petals ovate, shortly apiculate5. *B. guttulatum*
- 17b. Dorsal sepal flat, acuminate; petals falcately triangular, acute4. *B. elatum*
- 2b. Pseudobulbs 2-leaved:
- 18a. Flowers large, puberulous and ciliate, lateral sepals 3.5-4.0 cm long, more than 3 times longer than the dorsal sepal; petals triangular, acute, aristate19. *B. wallichii*
- 18b. Flowers small, neither puberulous nor ciliate; lateral sepals 1.7-1.8 cm long, less than 2 times longer than the dorsal sepal; petals sub-orbicular or oblong, obtuse18. *B. viridiflorum*

1. **Bulbophyllum affine** Lindl. in Wall. Cat. 1822. 1820. Gen. & Sp. Orch. 48. 1830; Hook. f., Fl. Brit. India 5 : 756. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 67. t. 71. 1898. **Fig. 10**

Pseudobulbs 2-4 cm high, distant, cylindric. *Leaves* 7-17 x 1.5-3 cm, oblong, obtuse or notched. *Inflorescence* 1-flowered. *Flowers* ca 5 cm across, yellow, purple striped; *bracts* 3-4 mm long, pale brown, ovate, acute; *pedicelled ovary* 2.5-5 cm long, yellowish; *sepals* ca 2.5x0.8 cm, acute, sub-equal; dorsal lanceolate; laterals falcately lanceolate, sometimes reflexed; *petals* ca 2.0 x 0.6 cm, lanceolate, acute; *lip* ca 1.2 cm long, purplish brown, triangular, obtuse; *column* 4-5 mm long, yellowish-green; *pollinia* sub-globose.

Fl.: May - Jun.

Nagaland: Kohima, Prain 55 (CAL); Pulebadze, Hnniewta 56300; Zunhebato, Hynniewta 80374 (ASSAM).

Distr.: INDIA (Eastern & Western Himalayas); BHUTAN, CAMBODIA, CHINA, JAPAN, LAOS, NEPAL VIETNAM.

2. **Bulbophyllum caudatum** Lindl. Gen. & Sp. Orch. 56. 1830; Hook. f., Fl. Brit. India 5 : 759. 1890; Seidenf. in Dansk Bot. Ark. 29(1): 67.

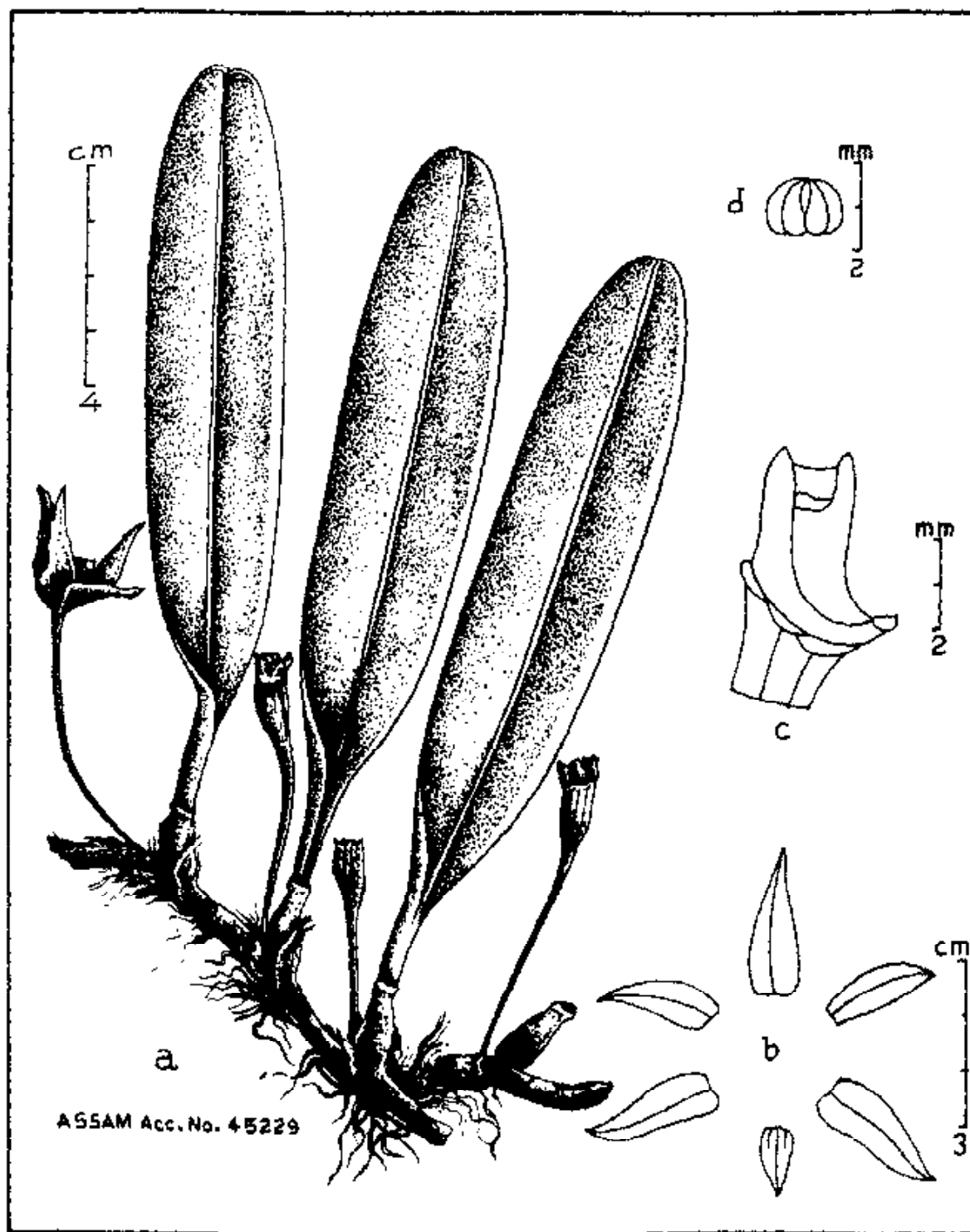


Fig. 10. *Bulbophyllum affine* Lindl.:
 a. habit; b. floral parts; c. column; d. pollinia.

t. 81. 1973. *Cirrhopetalum caudatum* (Lindl.) King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 93. t. 129. 1898.

Pseudobulbs 1.0-1.2 cm high, distant, ovoid. *Leaves* 1.8-2.5 x 0.7-1 cm, ovate-lanceolate, acute. *Inflorescence* a dense flowered, umbellate capitulum, 1.0-1.5 cm long. *Flowers* ca 2.0 cm long, white; *bracts* 2-3 mm long, pale brown, lanceolate, acute; *pedicelled ovary* 2-3 mm long, white; *sepals* unequal; dorsal ca 3 x 1.5 mm, oblong-ovate, acute or acuminate; laterals ca 2.0 cm long, linear, caudate, with elongated and slender filiform tips, divergent; *petals* ca 2 x 1 mm, oblong-obovate, obtuse; *lip* ca 3 mm long, oblong, 3-lobed; side lobes erect, rounded; mid-lobe oblong, obtuse, decurved; *column* ca 1 mm long, white; *pollinia* oblong.

Fl.: July.

Nagaland: Melori, *Hynniewta* 74538 (ASSAM).

Distr.: INDIA (Meghalaya, Nagaland, Sikkim), NEPAL.

3. ***Bulbophyllum cauliflorum*** Hook. f., Ic. Pl. t. 2036. 1890; Fl. Brit. India 5 : 758. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 80. t. 110. 1898. Fig. 11

Pseudobulbs 2-2.5 cm high, distant, sub-cylindric. *Leaves* 4-6 x 1-1.5 cm, oblong, obtuse or notched. *Inflorescence* few-flowered, sub-umbellate, 2.5-3 cm long. *Flowers* 0.9-1.0 cm long, greenish-brown; *bracts* 3-5 cm long, pale brown, lanceolate, acute; *pedicelled ovary* 4-6 mm long, greenish brown; *sepals* 0.9-1.0 x 0.3 cm, linear-lanceolate, caudate-acuminate; *petals* ca 0.5 x 0.2 cm, lanceolate, acute; *lip* 0.3-0.4 cm long, greenish-brown, triangular, obtuse; *column* ca 1.5 long, greenish-brown; *pollinia* sub-globose.

Fl.: May - Jun.

Nagaland: Kohima, *Hynniewta* 74501; Bor 21197; Melori, *Hynniewta* 74540; Pulebadze, *Hynniewta* 56279; Satakha, *Hynniewta* 80866; Zunhebato, *Hynniewta* 80852 (ASSAM).

Distr.: INDIA: (N. E. India, Sikkim); CAMBODIA, LAOS, VIETNAM.

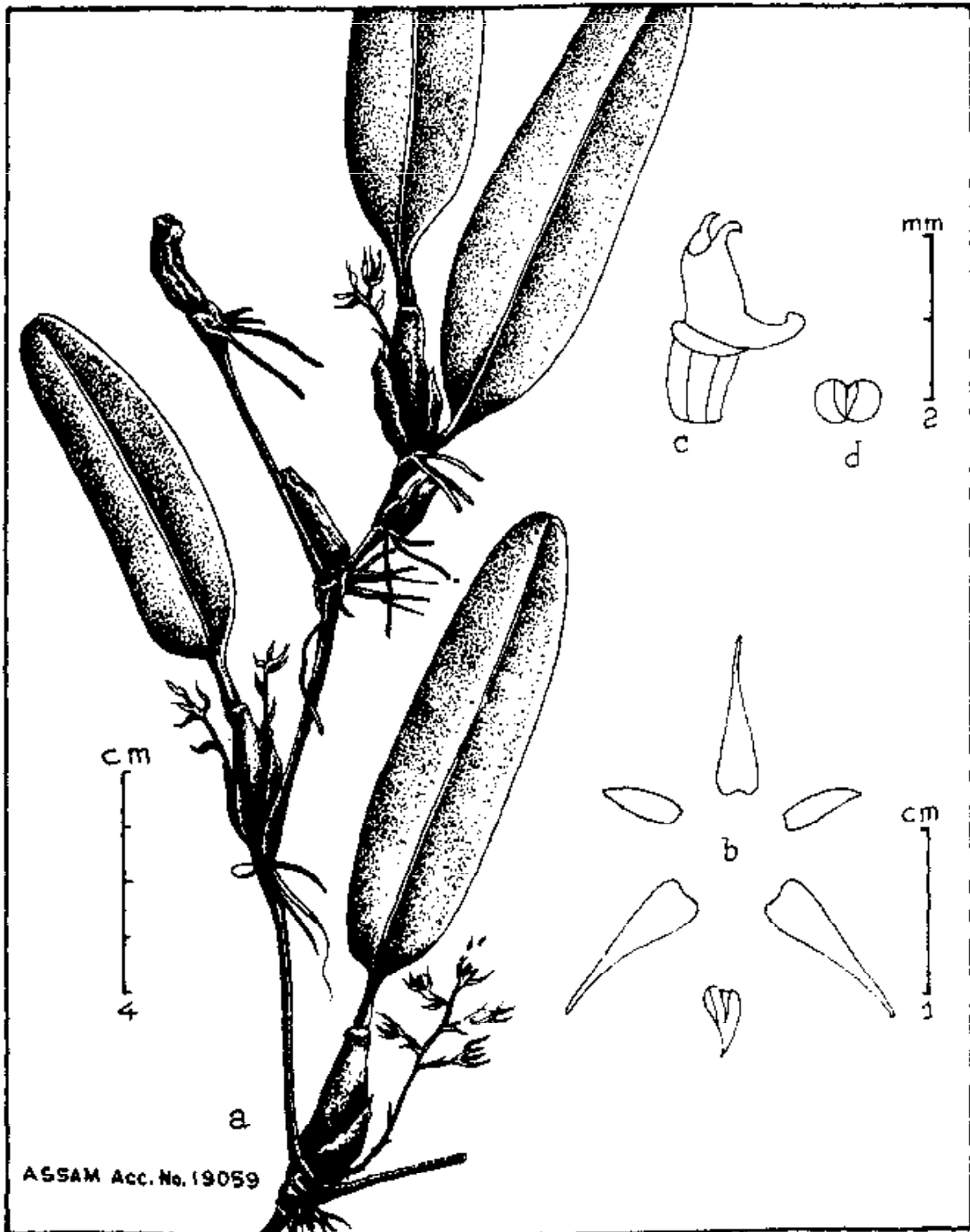


Fig.11. *Bulbophyllum cauliflorum* Hook. f.:
 a. habit; b. floral parts; c. column; d. pollinia.

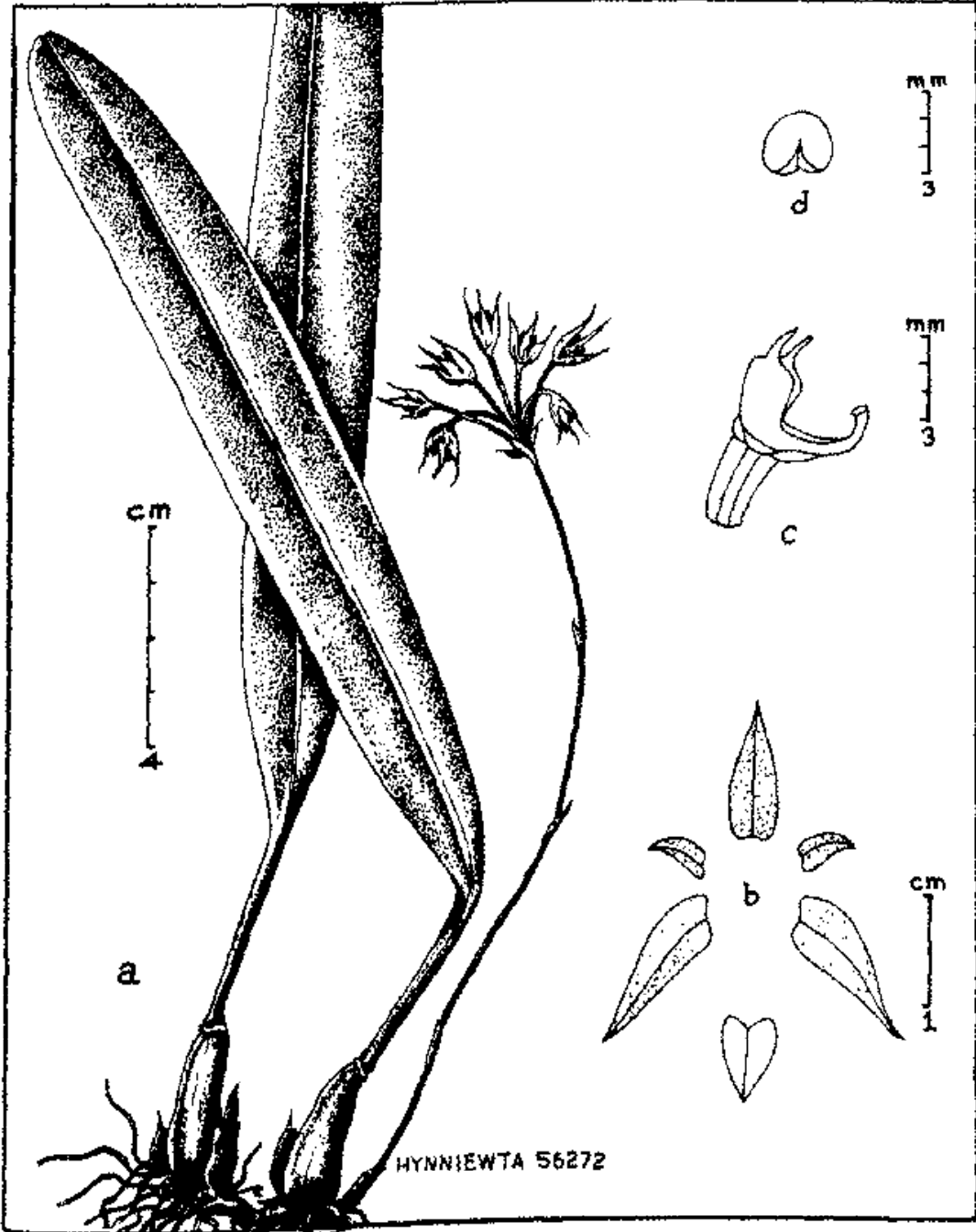


Fig. 12. *Bulbophyllum elatum* (Hook. f.) J.J. Sm.;
a. habit; b. floral parts; c. column; d. pollinia.

4. **Bulbophyllum elatum** (Hook. f.) J. J. Smith in Bull. Jard. Bot. Buitenz. ser. 2, 8 : 23. 1912; Seidenf. in Dansk Bot. Ark. 29(1) : 210 t. 114. 1973. *Cirrhopetalum elatum* Hook. f., Fl. Brit. India 5 : 775. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 93. t. 93. t. 130. 1898. Fig. 12

Pseudobulbs 4-8 cm high, clustered or distant, ovoid or ovoid-cylindric. *Leaves* 15-20 x 2-2.5 cm, oblong-lanceolate, obtuse or notched. *Inflorescence* few-flowered, sub-umbellate, 20-30 cm long. *Flowers* 1.6 - 1.7 cm long, dirty yellow, purple spotted; *bracts* 0.8 - 1.2 cm long, brownish purple, lanceolate, acute; *pedicelled ovary* 1.5-2.2 cm long, purple; dorsal *sepal* 1.0-1.1 x 0.5 cm, ovate-oblong, acute or acuminate; laterals 1.6-1.7 x 0.5 cm, lanceolate-oblong, falcate, acuminate, connate at base; *petals* 0.5 x 0.2 cm, falcate, triangular, acute; *lip* ca 6 mm long, ovate, obtuse, curved, entire; *column* ca 3 mm long, purplish; *pollinia* oblong.

Fl.: Aug.

Nagaland: Mokokchung, *Hynniewta* 79967; Naginamora, *Hynniewta* 79958; Pulebadze, *Hynniewta* 56272; Tuensang, *Hynniewta* 80936 (ASSAM).

Distr.: INDIA (Meghalaya, Nagaland, Sikkim, West Bengal); NEPAL.

5. **Bulbophyllum guttulatum** (Hook. f.) Balak. in J. Bombay Nat. Hist. Soc. 67 : 66. 1970. *Cirrhopetalum guttulatum* Hook. f., Fl. Brit. India 5 : 776. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 94. t. 131. 1898. Fig. 13

Pseudobulbs 3-4 cm high, clustered or distant, ovoid. *Leaves* 10-15 x 2-2.5 cm, oblong or oblong-lanceolate, obtuse. *Inflorescence* few-flowered, sub-umbellate, 15-20 cm long, greenish with purple dots. *Flowers* 1-1.2 cm long, pale yellow, purple spotted; *bracts* 0.8-0.9 cm long, yellowish purple, ovate, acuminate; *pedicelled ovary* 2-2.5 cm long, pale yellow, purple spotted; dorsal *sepal* 0.5-0.6 x 0.3 cm, ovate, obtuse, concave; laterals 1.0-1.2 x 0.4 cm, ovate-lanceolate, sub-falcate, connate at base; margin revolute; *petals* ca 0.3 x 0.2 cm, ovate, shortly apiculate; *lip* 4-5 mm long, purple, ovate-oblong, recurved; apex obtuse or minutely emarginate; *column* ca 2 mm long, pale purple; *pollinia* oblong.

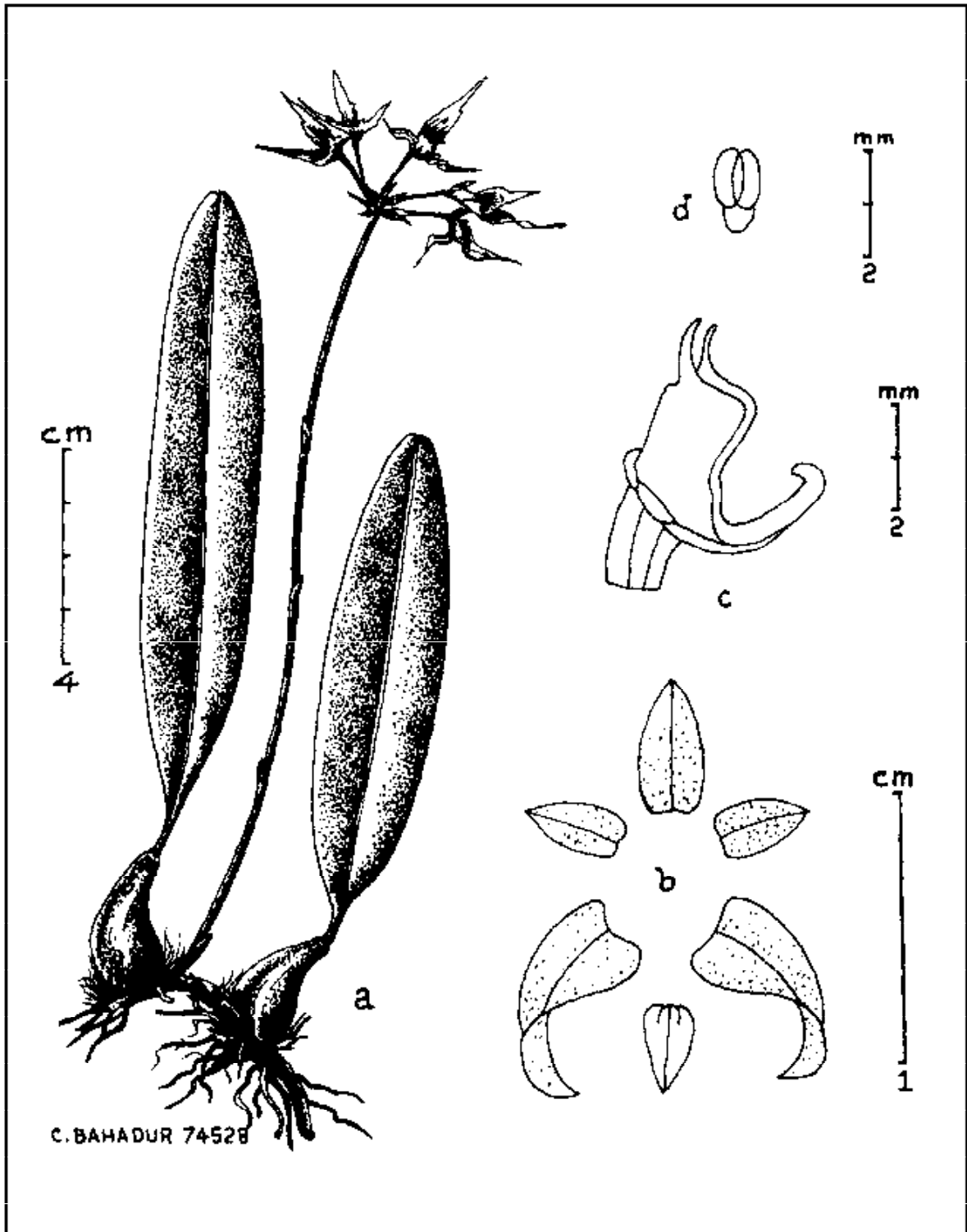


Fig. 13. *Bulbophyllum guttulatum* (Hook. f.) Balak.:
 a. habit; b. floral parts; c. column; d. pollinia.

Fl.: Apr. - May.

Nagaland: Phek, Bahadur 74528; Pulebadze, Hynniewta 56294; Tuli, Hynniewta 79928 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim, Uttar Pradesh, West Bengal); BHUTAN, NEPAL.

6. **Bulbophyllum gymnopus** Hook. f., Ic. Pl.t. 2040. 1890; Fl. Brit. India 5 : 764. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 68. t. 93. 1898; Seidenf. in Dansk. Bot. Ark. 33(3) : 100. t. 59. 1979.

Fig. 14

Pseudobulbs 2-4 cm high, distant, ovoid or oblong-ovoid. *Leaves* 10-18 x 1.5-2.5 cm, oblong-lanceolate, obtuse or notched. *Inflorescence* many-flowered, lax, racemose, 10-12 cm long. *Flowers* ca 1 cm across, white; *bracts* ca 0.2 cm long, yellowish brown, ovate, acute; *pedicelled ovary* 0.4-0.5 cm long, white; *sepals* acute; margins incurved; dorsal ca 5 x 2 mm, lanceolate; laterals ca 7 x 3 mm, falcate, widely separated from the dorsal with a narrow base attaching to the apex of the column foot; *petals* ca 3 x 1 mm, linear; margins erose, dentate; *lip* ca 3 mm long, yellow, lanceolate, acute; *column* ca 3 mm long, white; *pollinia* obovoid.

Fl.: Nov. - Dec.

Nagaland: Chakabama, Hynniewta 80991; Jhaluki, Hynniewta 74548 (ASSAM).

Distr.: INDIA (N.E. India, Sikkim); BHUTAN, THAILAND.

7. **Bulbophyllum khasianum** Griff., Not. Pl. 3: 284. 1851; Hook. f., Fl. Brit. India 5 : 765. 1890; Seidenf. in Dansk Bot. Ark. 33 (3) : 180. t. 128. 1979. *B. cylindraceum* var. *khasianum* Hook. f., Fl. Brit. India, 5: 768. 1890.

Fig. 15

Pseudobulbs absent. *Leaves* very long-petioled; *lamina* 12-30 x 3-4 cm, oblong-elliptic, acute. *Inflorescence* many flowered, densely packed, spicate, 20-30 cm long. *Flowers* ca 5 mm long, purple; *bracts* ca 2 mm long, pale purple, ovate, acuminate; *ovary* ca 2 mm long, purple; *sepals* sub-connivent, unequal; dorsal ca 3 x 1.5 mm, triangular, acuminate; laterals ca 5 x 2 mm, broadly oblong, acute, falcate; *petals* ca 2 x 1 mm,

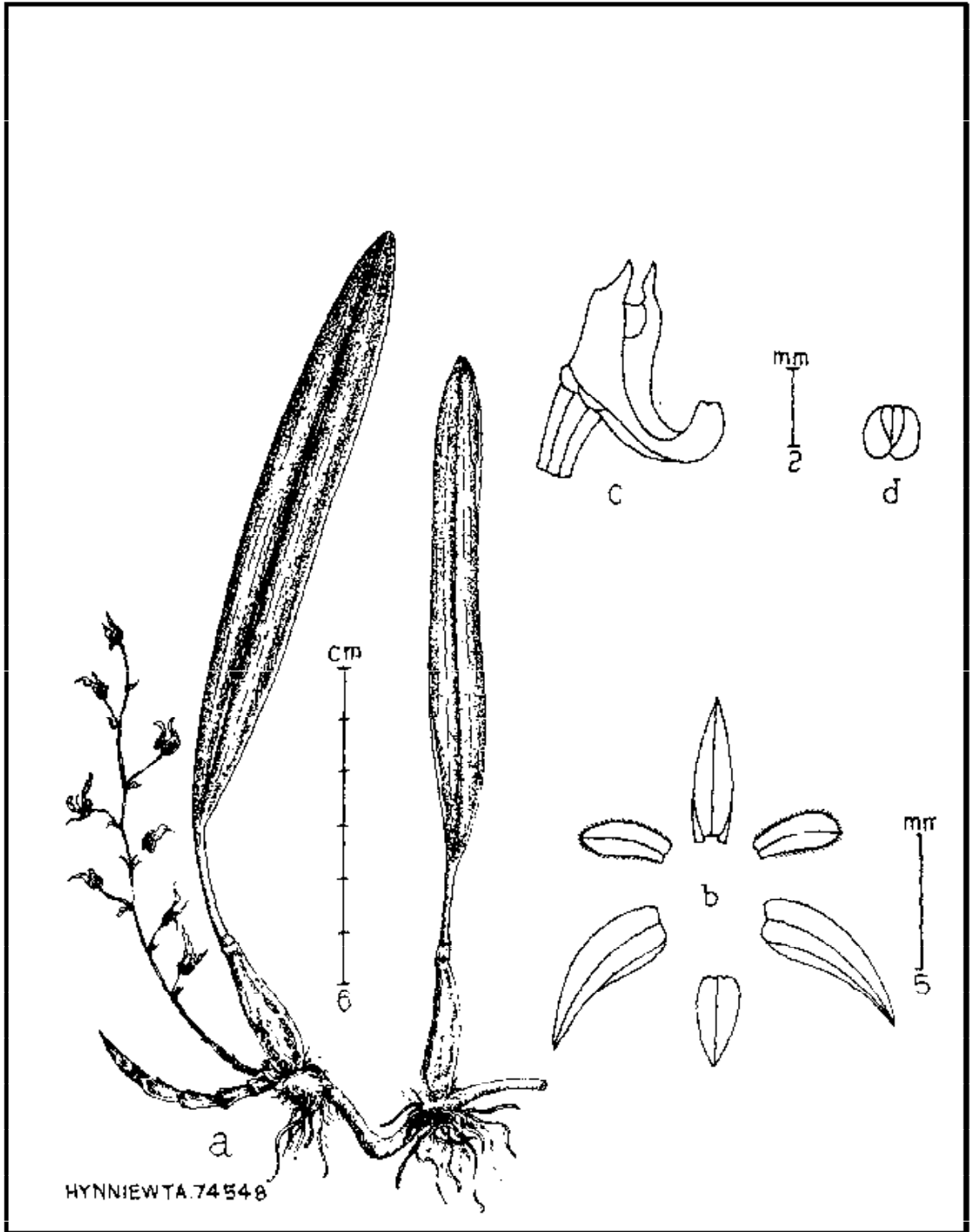


Fig. 14, *Bulbophyllum gymnopus* Hook. f.;
 a. habit; b. floral parts; c. column; d. pollinia.

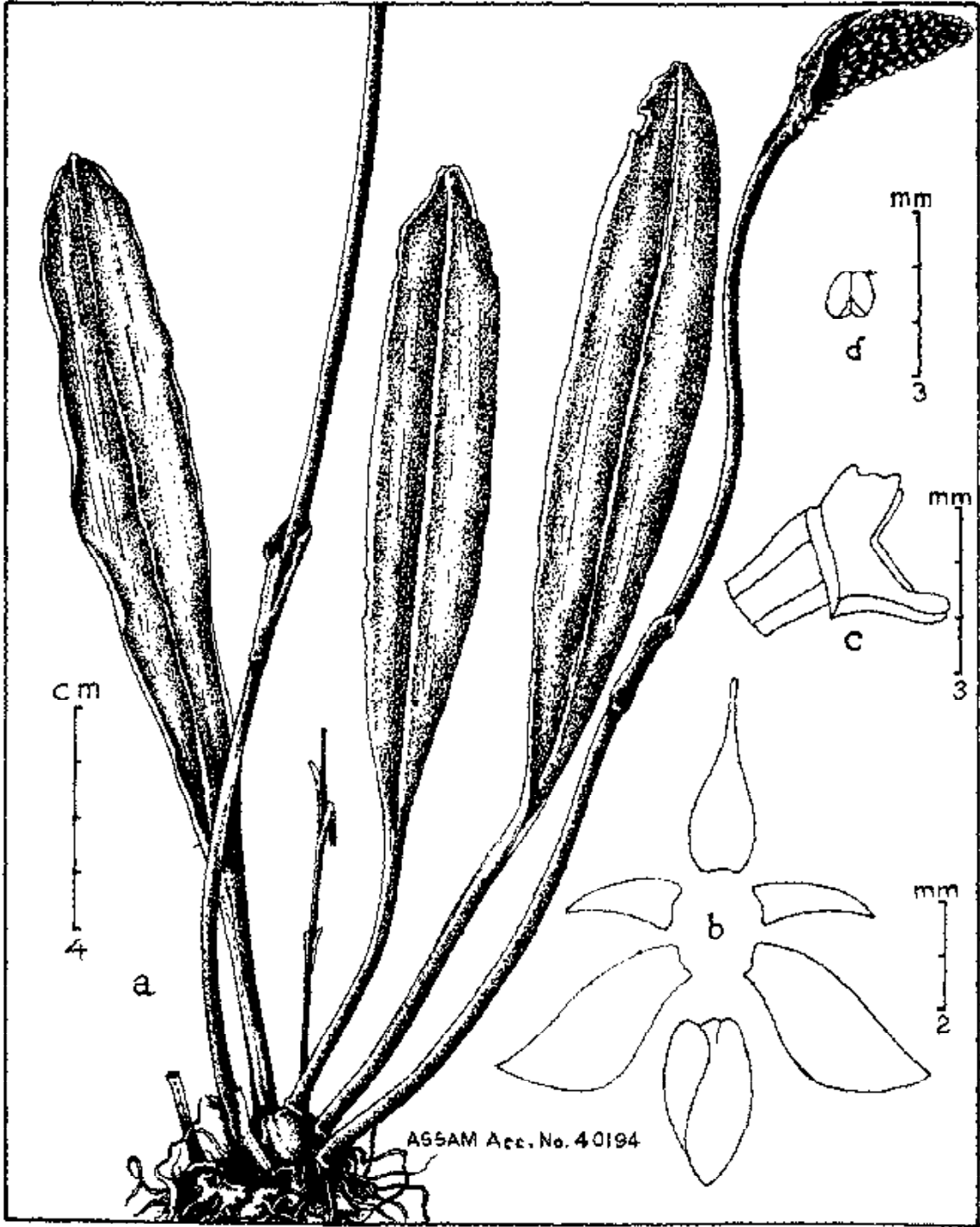


Fig. 15. *Bulbophyllum khasianum* Griff.:
a. habit; b. floral parts; c. column; d. pollinia.

falcate-lanceolate; apex acute, denticulate; *lip* ca 4 mm long, ovate-oblong, obtuse; *column* ca 1 mm long, pale purple; *pollinia* globose.

Fl.: Dec. Jan.

Nagaland: Kohima, *Hynniewta* 80817; Phek, *Hynniewta* 80922 (ASSAM).

Distr.: INDIA (N. E. India, Madhya Pradesh, Sikkim); BHUTAN, MYANMAR, NEPAL, THAILAND.

8. ***Bulbophyllum leopardinum*** (Wall.) Lindl., Gen. & Sp. Orch. Pl. 48. 1830; Hook. f., Fl. Brit. India 5 : 756. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 67. t. 92. 1898; Seidenf. in Dansk Bot. Ark. 33(3) : 28. t. 10. 1979. *Dendrobium leopardinum* Wall., Tent. Fl. Nepal. 1: 39. t. 28. 1826. Fig. 16

Pseudobulbs 2.5-2.7 cm high, clustered, obpyriform, *Leaves* 8-15 x 2.5-5 cm, elliptic-oblong, acute or obtuse. *Inflorescence* 1-2-flowered, 3-4 cm long. *Flowers* ca 4.5 cm across, pale yellow, purple spotted; *bracts* ca 3 mm long, brown indistinctly purple spotted; cymbiform, acute; *pedicelled ovary* 3-4 cm long, purplish yellow; *sepals* 2.2-2.3 x 1.2-1.3 cm, concave, obtuse; dorsal elliptic incurved; laterals falcately triangular; *petals* ca 1.5 x 0.9 cm, elliptic, acute or acuminate; *lip* ca 1.6 cm long, brown, indistinctly purple spotted, triangular, obtuse; base with rather small dentate auricles, ridges 2, from base terminating near the apex of lip; *column* 4-5 mm long, yellow, purple spotted; *pollinia* sub-globose.

Fl.: May - June.

Nagaland: Tseminyu, *Hynniewta* 56109 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN, MYANMAR, NEPAL, THAILAND.

9. ***Bulbophyllum odoratissimum*** (J. E. Sm.) Lindl., Gen. & Sp. Orch. 55. 1830; Hook. f., Fl. Brit. India, 5 : 758. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 79. t. 109. 1898; Seidenf. in Dansk Bot. Ark. 33(3): 76. t. 43. 1979. *Stelis odoratissima* J. E. Sm. in Rees, Cyclop. 34 : *Stelis* n. 12. 1816. Fig. 17

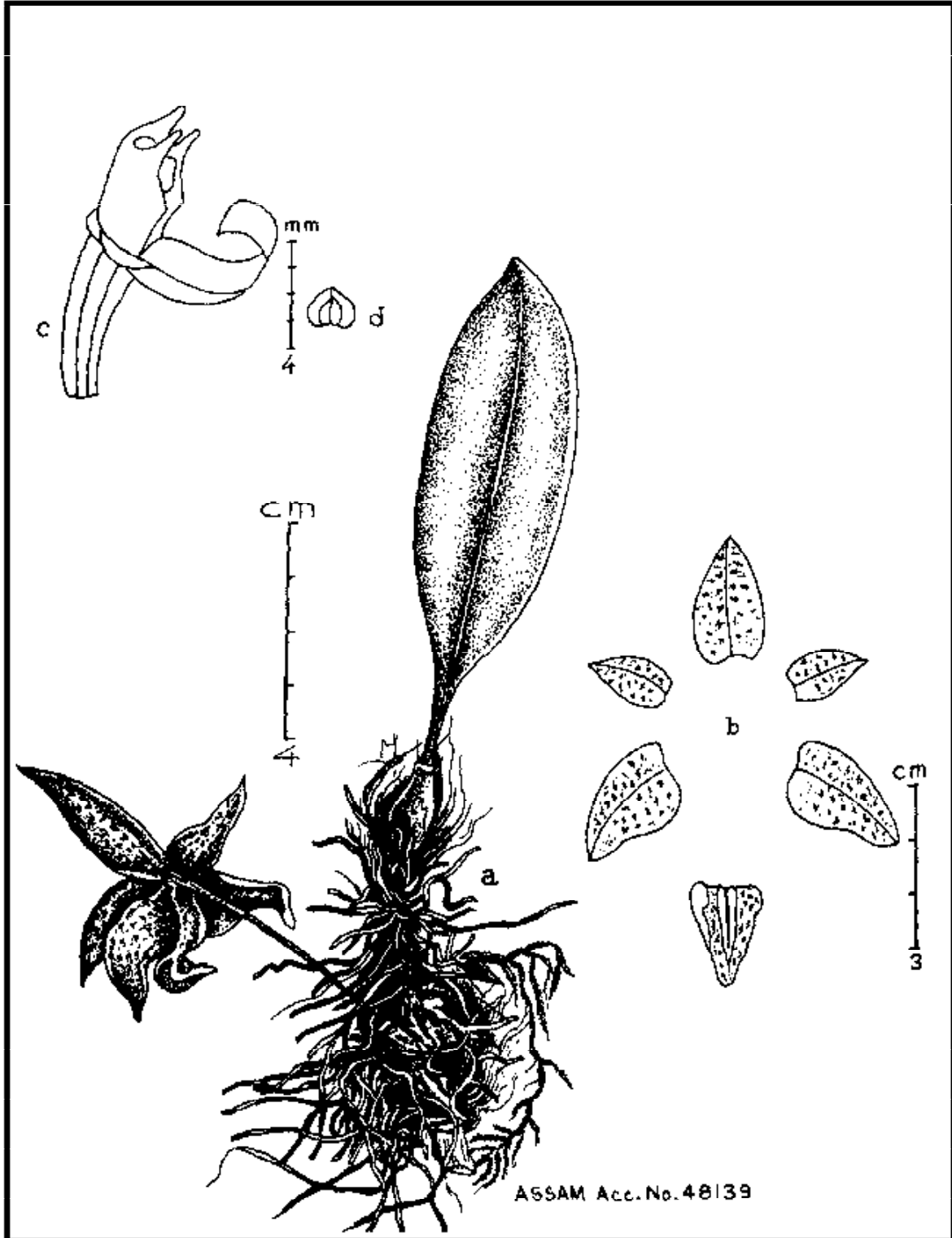


Fig. 16. *Bulbophyllum leopardinum* (Wall.) Lindl.:
a. habit; b. floral parts; c. column; d. pollinia.

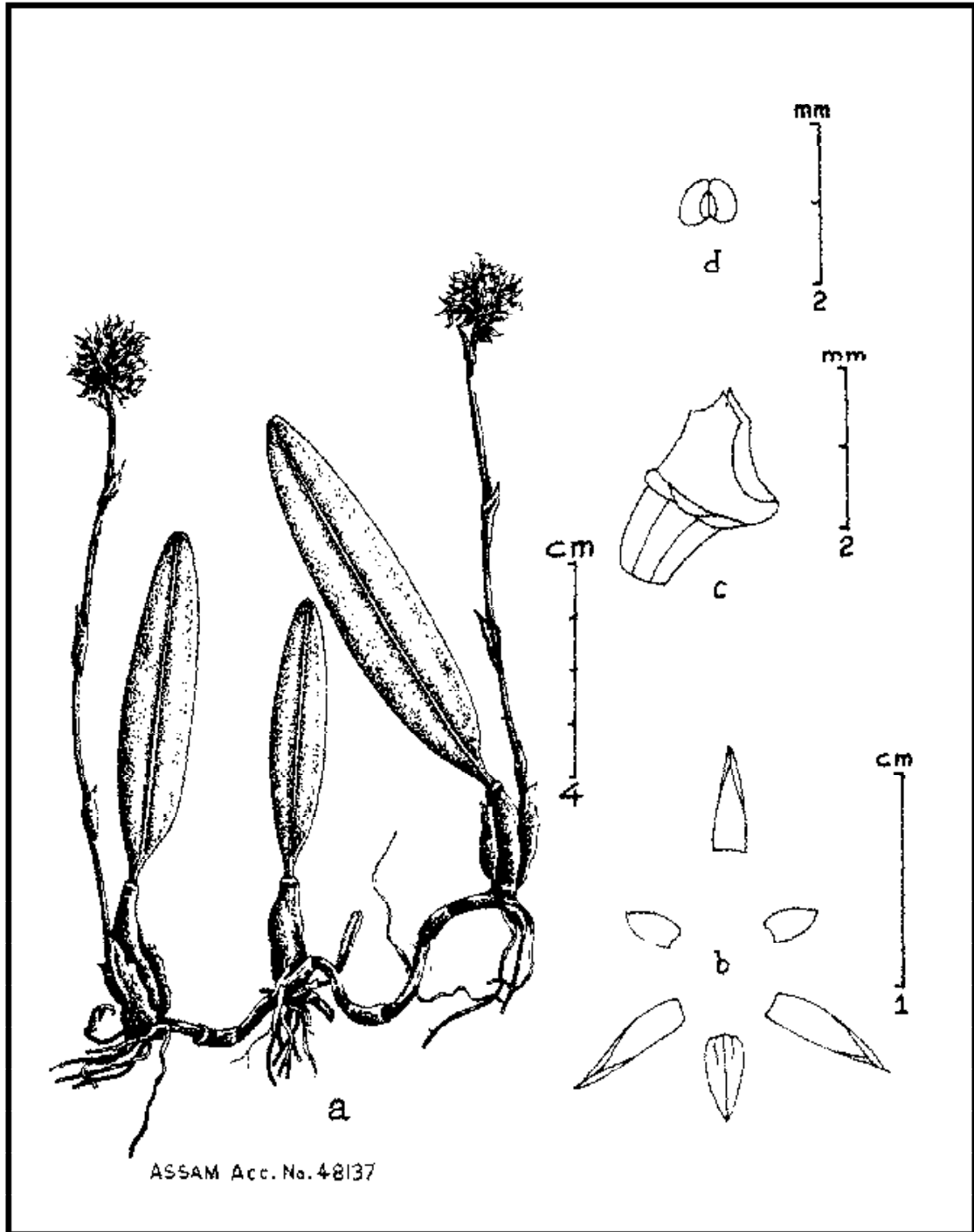


Fig. 17. *Bulbophyllum odoratissimum* (J.E. Sm.) Lindl.:
 a. habit; b. floral parts; c. column; d. pollinia.

Pseudobulbs 1.8-2.5 cm high, distant, ovoid or sub-cylindric. *Leaves* 2.5-7.5 x 0.6-1.5 cm, oblong-lanceolate, notched. *Inflorescence* a dense flowered, sub-globose, capitulum, 3-6 cm long. *Flowers* ca 1.6 cm across, whitish or yellow; *bracts* ca 1 cm long, pale brown, lanceolate, acuminate; pedicelled ovary 3-4 mm long, white; *sepals* ca 1.5 cm broad, whitish yellow, lanceolate, obtuse, falcate, apical half with inrolled edges; laterals ca 0.7 cm long; dorsal ca 0.5 cm long; *petals* ca 2 x 1 mm, white, ovate, acute; *lip* 3-4 mm long, orange, oblong-lanceolate, obtuse, glandular hairy; *column* ca 1.5 mm long, whitish yellow; *pollinia* oblong.
Fl.: May - Jun.

Nagaland: Akulato, *Hynniewta* 80891; Jhaluki, *Hynniewta* 74550 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN, MYANMAR, CAMBODIA, CHINA, LAOS, NEPAL, THAILAND, VIETNAM.

10. ***Bulbophyllum ornatissimum*** (Reichb. f.) J. J. Sm. in Bull. Jard. Bot. Buitenz. ser. 2, 8 : 26. 1912; Seidenf. in Dansk Bot. Ark. 29(1): 28. t. 2. 1973. *Cirrhopetalum ornatissimum* Reichb. f. in Gard. Chron. 2 : 424. 1882; Hook. f., Fl. Brit. India 5 : 773. 1890, *p.p.* **Fig. 18**

Pseudobulbs 3-5 cm high, distant, ellipsoid or conical. *Leaves* 10-15 x 1.5-2.5 cm, oblong-lanceolate, apex notched. *Inflorescence* few-flowered, sub-umbellate, 10-15 cm long. *flowers* 10-13 cm long, greenish yellow, purple spotted; *bracts* 8-9 mm long, brownish purple, lanceolate, acute; *pedicelled ovary* 1.0-1.2 cm long, purplish; dorsal sepal 1.8-2.0 x 0.9-1.0 cm, ovate, acute, ciliate in the upper half; laterals 10-13 cm long, lanceolate, acuminate, caudate, almost connate throughout; *petals* 1.5-1.6 x 0.3-0.4 cm, lanceolate, acuminate, caudate; *paleae* at apex greenish purple, fat, carrot-shaped; *lip* 0.8-1.0 cm long, lanceolate, obtuse, thick; margin minutely serrate; *column* ca 3 mm long, purplish; *pollinia* ovoid.

Fl.: Sept. - Oct.

Nagaland : Mokokchung, *Hynniewta* 80380; Tseminyu, *Hynniewta* 80699, Malhotra 74993; Wokha, *Hynniewta* 80598; Zumphu, Malhotra 75159 (ASSAM).

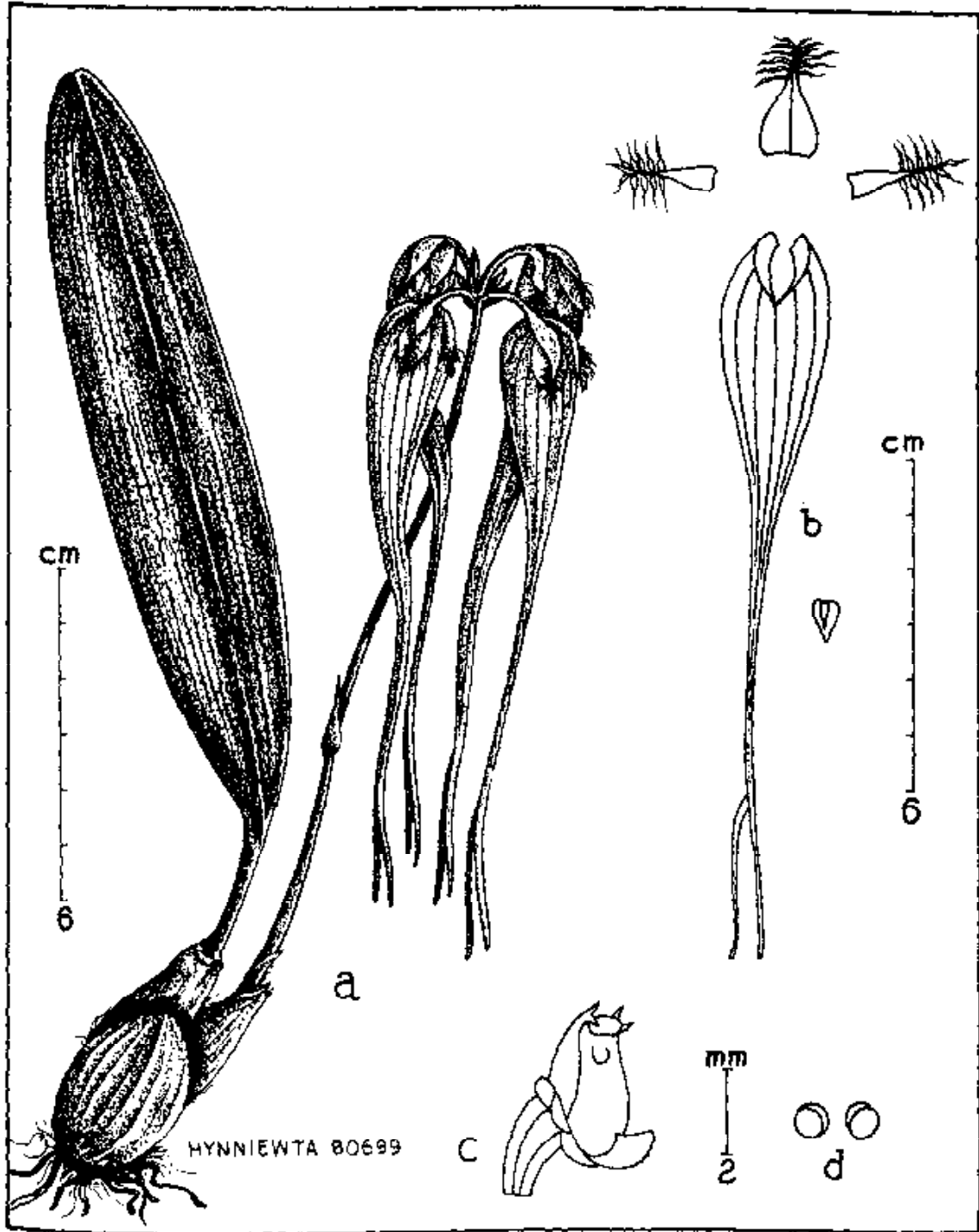


Fig. 18. *Bulbophyllum ornatissimum* (Reichb. f.) J.J. Sm.;
 a. habit; b. floral parts; c. column; d. pollinia.

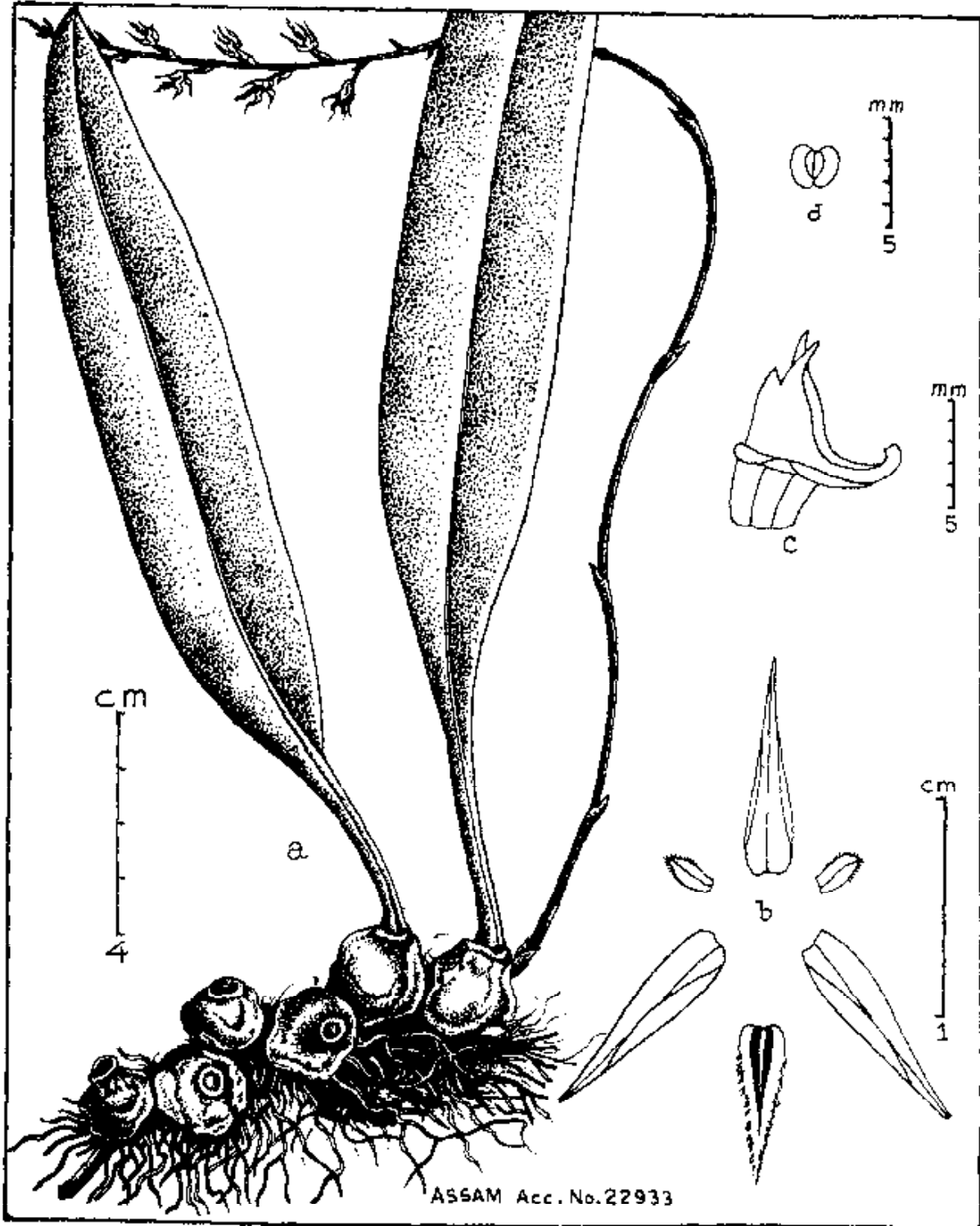


Fig. 19. *Bulbophyllum pentellium* Par. & Reichb. f.:
a. habit; b. floral parts; c. column; d. pollinia.

Distr.: INDIA: (Assam, Madhya Pradesh, Nagaland); CAMBODIA, LAOS, VIETNAM.

11. **Bulbophyllum pentellum** Par. & Reichb. f. in Trans. Linn. Soc. 30 : 151. 1874; Hook. f., Fl. Brit. India 5 : 764. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 79. t. 108. 1898. **Fig. 19**

Pseudobulbs 1.8-2.5 cm high, clustered or distant, ovoid. *Leaves* 7-16 x 1.5-3 cm, oblong-lanceolate, acute. *Inflorescence* ca 2.0 cm across, brownish purple; *bracts* 5-6 mm long, pale brown, ovate, acute; *pedicelled ovary* 5-6 mm long, brownish purple; *sepals* ca 1 x 0.4 cm, ovate-lanceolate, caudate-acuminate; margins incurved; *petals* ca 2 x 1 mm, oblong, upper half ciliate; *lip* ca 1.0 cm long, brownish, deep purple blotched, fringed with purple hairs, lanceolate, obtuse; *column* 4-5 mm long, brownish purple; *pollinia* sub-globose.

Fl.: Jul - Aug.

Nagaland: Chakabama, *Hynniewta* 74561; Kohima *Hynniewta* 74502; Zumphu, *Hynniewta* 74600 (ASSAM).

Distr.: INDIA (Meghalaya, Nagaland, Sikkim); MYANMAR.

12. **Bulbophyllum piluliferum** King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 76. t. 104. 1898. **Fig. 20**

Pseudobulbs 6-7 mm across, clustered, globose. *Leaves* 6-10 x 0.8-1 cm, linear-oblong, acute, obtuse. *Inflorescence* a dense flowered, sub-globose capitulum, 5-6 cm long. *Flowers* ca 6 mm long, brownish green, dark brown streaked; *bracts* ca 1 mm long, pale brown, lanceolate, acute; *pedicelled ovary* ca 2 mm long, greenish brown; *sepals* ca 2 mm broad, acute; dorsal ca 5 mm long, lanceolate; laterals ca 6 mm long, ovate; *petals* ca 3 x 1 mm, oblong, acute; *lip* ca 3 mm long, dark reddish brown, papillose, grooved and deflexed at base, elliptic with broad rounded apex; *column* ca 1.5 mm long, greenish brown; *pollinia* pyriform.

Fl.: May - Jun.

Nagaland: Saramati, *Hynniewta* 80955; Tokye, *Hynniewta* 80918 (ASSAM).

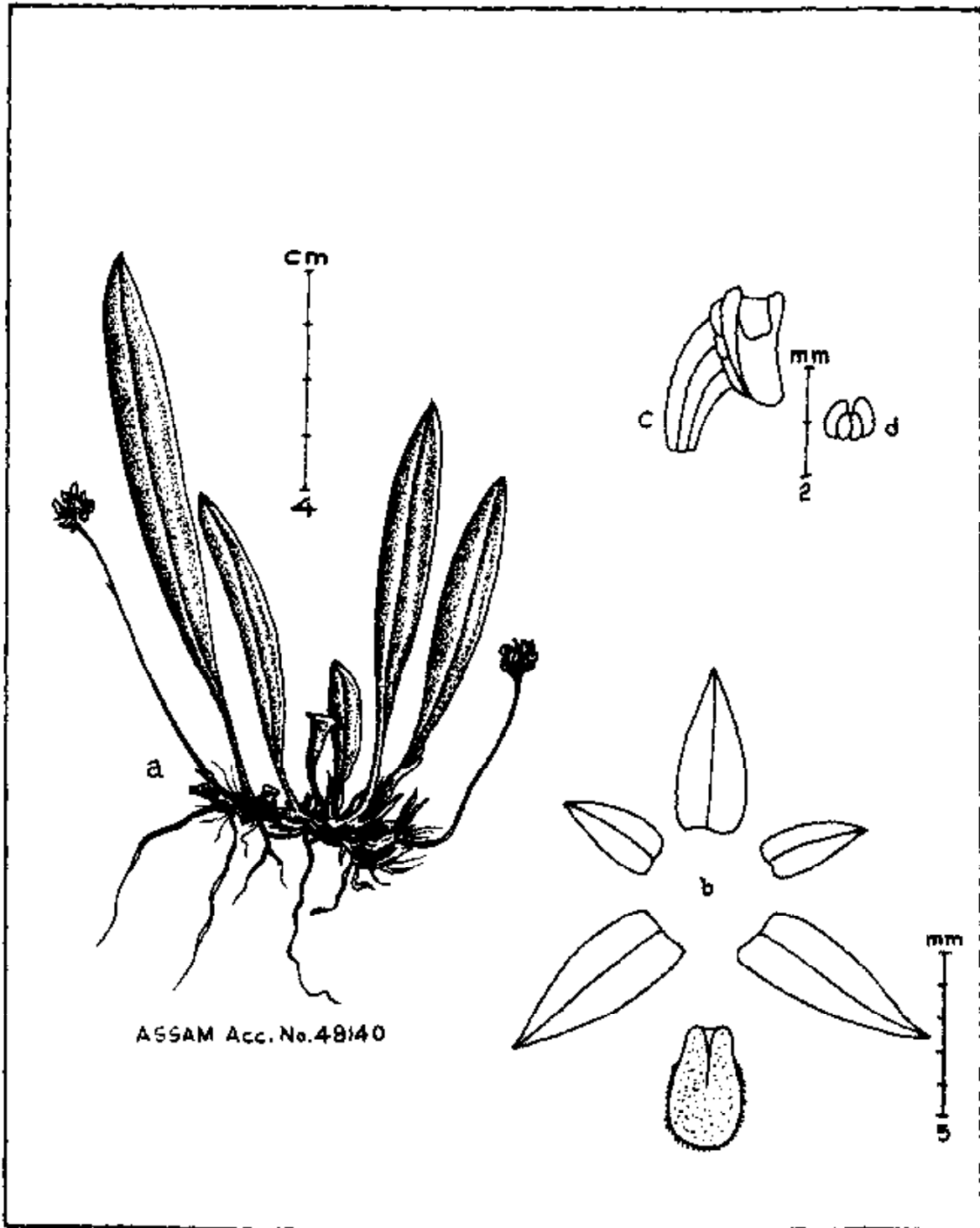


Fig. 20. *Bulbophyllum piluliferum* King & Pantl.:
a habit; b. floral parts; c. column; d. pollinia.

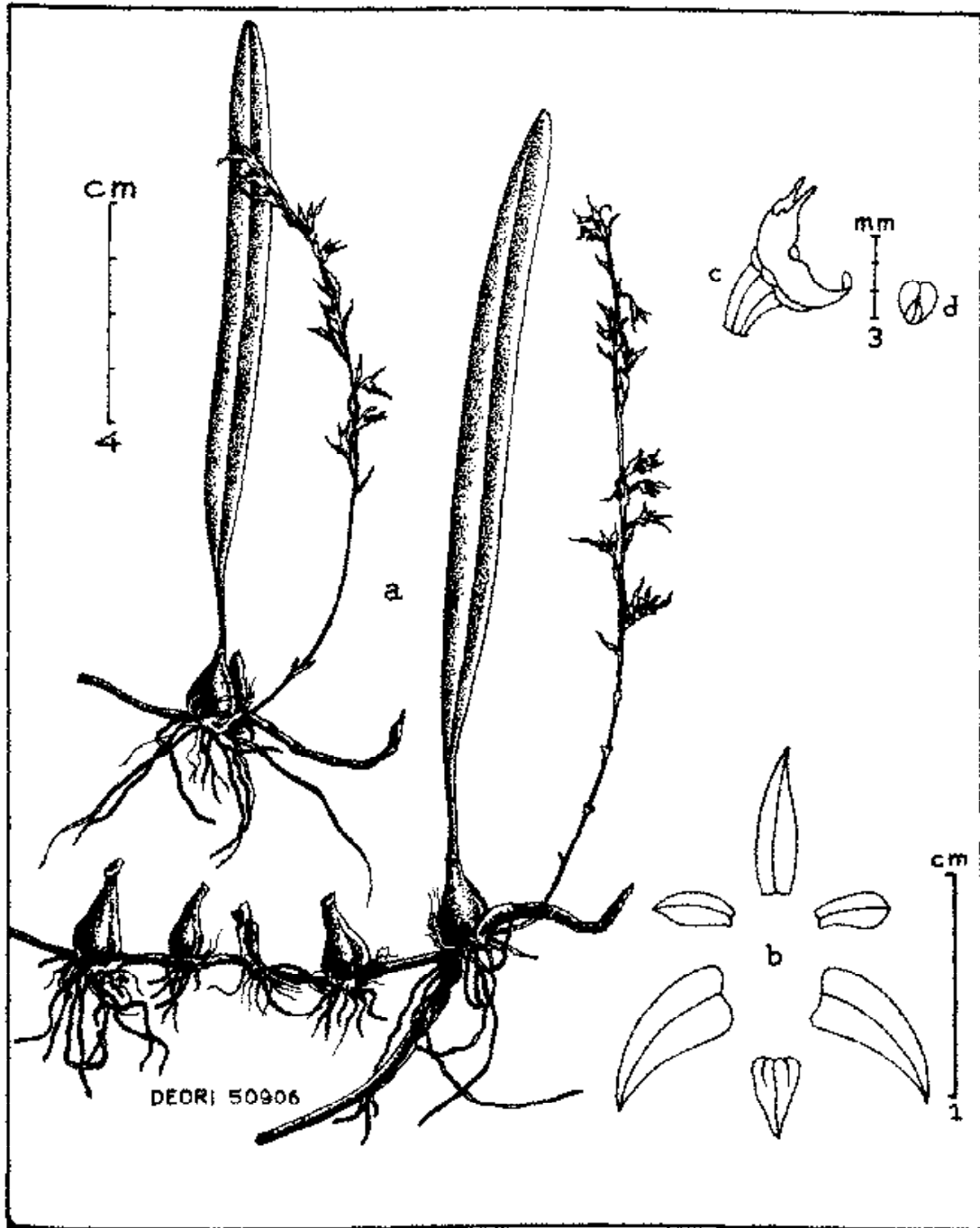


Fig. 21. *Bulbophyllum reptans* (Lindl.) Lindl.:
 a. habit; b. floral parts; c. column; d. pollinia.

Distr.: INDIA (Meghalaya, Nagaland, Sikkim).

13. **Bulbophyllum reptans** (Lindl.) Lindl., Gen. & Sp. Orch. 51. 1830; Hook. f., Fl. Brit. India 5 : 768. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 78. t. 106. 1898; Seidenf. in Dansk Bot. Ark. 33(3): 109. t. 70. 1979. *Tribachia reptans* Lindl. in Coll. Bot. t. 41a 1826. *Bulbophyllum grandiflorum* Griff., Itin. Not. 146. 1848.

Fig. 21

Pseudobulbs 1.5-1.8 cm high, distant, obpyriform. *Leaves* 8-15 x 0.6-1.2 cm, linear-oblong, acute or obliquely notched. *Inflorescence* few to many-flowered, lax, racemose, 5-6 cm long. *Flowers* ca 0.7 cm long, greenish yellow, purple, nerved; *bracts* 2-3 mm long, pale brown, oblong-lanceolate, acute; *pedicelled ovary* 5-6 mm long, yellowish; *sepals* ca 7 mm long, acute; dorsal ca 2 mm broad, lanceolate; laterals ca 3 mm broad, oblong-lanceolate, falcate; *petals* ca 3 x 2 mm, oblong; apex obtuse, sometimes orbicular; *lip* 0.3-0.4 cm long, brownish, triangular, obtuse; *column* ca 2 mm long, yellowish; *pollinia* sub-globose.

Fl.: Mar.

Nagaland: Kohima, Bor 21225; Mokokchung, Hynniewta 80384, 80398; Pulebadze, Hynniewta 56303; Tuensang, Hynniewta 80501, 80533 (ASSAM).

Distr.: INDIA (Eastern & Western Himalayas); BHUTUAN, MYANMAR, CHINA, NEPAL, THAILAND, VIETNAM.

14. **Bulbophyllum retusiusculum** Reichb. f. in Gard. Chron. 1182. 1869; Seidenf. in Dansk Bot. Ark. 29(1) : 195. tt. 106-108. 1973. *Cirrhopetalum wallichii* Lindl., Gen. & Sp. Orch. 59. 1830, p.p.; Hook. f., Fl. Brit. India 5 : 776. 1890, p.p.; King & Pantl. Ann. Roy. Bot. Gard. Calc. 8 : 88. t. 121. 1898 (non Lindl., 1839). *Bulbophyllum wallichii* auct. non Reichb. f.: Tuyama in Hara, Fl. E. Himal. 1:428. 1966.

Fig. 22

Pseudobulbs 1.5-2.0 cm high, distant, ovoid. *Leaves* 5-8 x 1.2-1.8 cm, oblong-lanceolate; apex notched. *Inflorescence* few-flowered, sub-umbellate, 5-8 cm long. *Flowers* 1.2-1.5 cm long, brownish violet; *bracts* 0.8-1.0 cm long, brownish, lanceolate, acuminate; *pedicelled ovary* 1-1.2

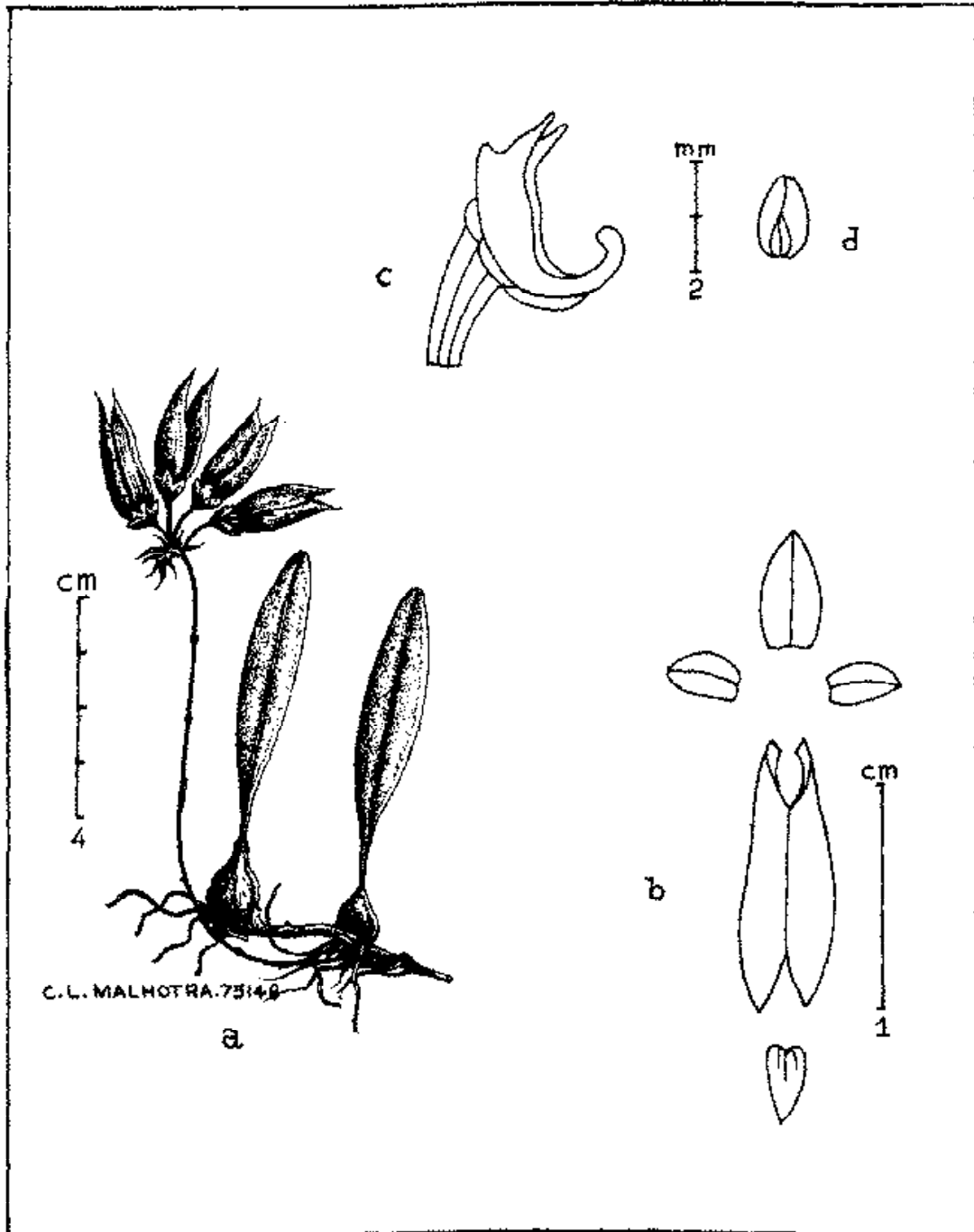


Fig. 22. *Bulbophyllum retustusculum* Reichb. f.:
a. habit; b. floral parts; c. column; d. pollinia.

cm long, brownish; dorsal sepal 0.4-0.5 x 0.2 cm, brownish violet, oblong-ovate, obtuse or slightly emarginate; laterals 1.2 - 1.5 x 0.3 cm, pale brown, linear-oblong, obtuse, connate in the middle; *petals* ca 0.4 x 0.3 cm, violet, broadly elliptic, obtuse; *lip* 0.3-0.4 cm long, brownish purple, oblong, obtuse, recurved; *column* ca 2 mm long, brownish purple; *pollinia* linear-oblong.

Fl.: July - Aug.

Nagaland: Dimapur, *Kataki* 65907; Kohima, *Deka* 15718; Pulebade, *Malhotra* 75148; Zunhebato, *Hynniewta* 80375 (ASSAM).

Distr.: INDIA (Meghalaya, Nagaland, Sikkim, West Bengal); BHUTAN, MYANMAR, CAMBODIA, CHINA, LAOS, MALAYA, NEPAL, TAIWAN, THAILAND, VIETNAM.

15. ***Bulbophyllum rolfei*** (Kuntze) Seidenf. in Dansk Bot. Ark. 33(3): 149. 1979. *Phyllorchis rolfei* Kuntze, Rev. Gen. Pl. 2 : 276. 1891. *Cirrhopetalum parvulum* Hook. f., Fl. Brit. India 5 : 778. 1890. *C. dyerianum* King & Pantl. in Journ. Roy. Asiat. Soc. Bengal, 64 (2) : 335. 1895. *Bulbophyllum dyerianum* (King & Pantl.) Seidenf. in Dansk Bot. Ark. 29(1): 175. t. 88. 1973.

Pseudobulbs 0.5-0.8 cm high, distant, oblong. *Leaves* 3-4 x 0.5 - 0.7 cm, elliptic-lanceolate, obtuse. *Inflorescence* few-flowered, sub-racemose, 5-6 cm long. *Flowers* ca 1.3 cm long, yellowish, purple streaked; *bracts* 6-8 mm long, pale brown, lanceolate, acuminate; *pedicelled ovary* 1.0-1.5 cm long, purplish yellow; *sepals* unequal; dorsal ca 7 x 2.5 mm, oblong-ovate, acute; laterals ca 1.3 x 0.3 cm, linear-oblong, sub-falcate, acuminate, divergent; *petals* ca 4 x 2 mm, ovate, obtuse; *lip* ca 3 mm long, oblong, obtuse; *column* ca 2 mm long yellowish-purple; *pollinia* elliptic.

Fl.: Aug.

Nagaland: Jafu Hills, *Bor* 6503 (CAL), *Hynniewta* 80785 (ASSAM).

Distr.: INDIA (Nagaland, Sikkim, West Bengal); BHUTAN, NEPAL.

16. ***Bulbophyllum roxburghii*** (Lindl.) Reichb. f. in Walp. Ann. 6 : 263. 1861; Seidenf. in Dansk Bot. Ark. 29(1) : 104. t. 51. 1973.

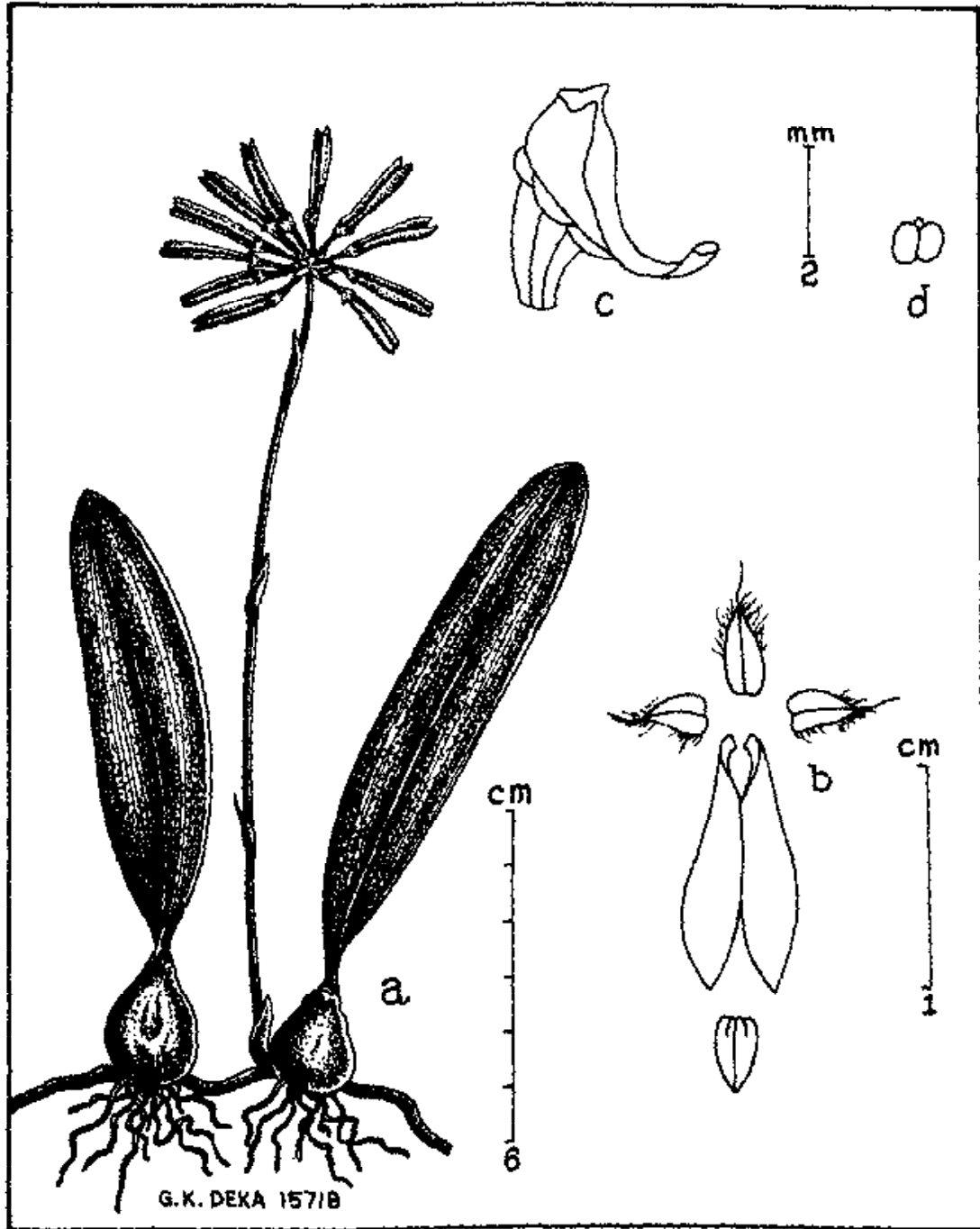


Fig. 23. *Bulbophyllum roxburghii* (Lindl.) Reichb. f.:
a. habit; b. floral parts; c. column; d. pollinia.

Cirrhopetalum roxburghii Lindl., Gen & Sp. Orch. 58. 1830. Hook. f., Fl. Brit. India 774. 1890. Fig. 23

Pseudobulbs 0.8-1.5 cm high, distant, oblong-orbicular. *Leaves* 4-6 x 0.6-1.5 cm high, oblong or oblong-lanceolate, obtuse or notched. *Inflorescence* few-flowered, sub-umbellate, 10-15 cm long. *Flowers* 0.9-1.0 cm long, yellow, red striped; *bracts* 0.5-0.6 cm long, pale brown, linear-lanceolate, acuminate; *pedicelled ovary* 0.8-0.9 cm long, purplish brown; dorsal sepal ca 4 x 2 mm, ovate-triangular, acuminate, aristate, ciliate; laterals 0.9-1.0 cm long, oblong-lanceolate, sub-falcate, obtuse, connate in the middle; *petals* ca 3x1 mm, broadly triangular, acuminate, aristate, ciliate; *lip* 0.3-0.4 cm long, reddish purple, ovate-oblong, obtuse, sometimes aristate; *column* ca 2 mm long, pale purple; *pollinia* oblong.

Fl.: Sept.

Nagaland: Kohima, Deka 15718; Medziphema, Hynniewta 80797 (ASSAM).

Distr.: INDIA (West Bengal, Nagaland).

17. ***Bulbophyllum secundum*** Hook. f., Fl. Brit. India 5 : 764. 1890; King & pantl. in Ann. Roy. Bot. Gard. Calc. 8: 75. t. 101. 1898; Seidenf. in Dansk Bot. Ark. 33(3) : 103. t. 63. 1979. Fig. 24

Pseudobulbs 6-8 mm high, clustered, turbinate. *Leaves* 4-7 x 0.5-1.0 cm, narrowly oblong, obtuse or notched. *Inflorescence* many-flowered, lax, racemose, 8-10 cm long. *Flowers* ca 6 mm across purple; *bracts* ca 1 mm long, yellowish brown, ovate, acute, *pedicelled ovary* ca 3 mm long, pale purple; *sepals* and *petals* pale purple with darker nerves; *sepals* ca 4 x 2 mm long, broadly triangular, acute; dorsal hooded; *petals* ca 2 x 1 mm, linear-spathulate, obtuse, concave, upper surface ciliolate; *column* ca 2 mm long, greenish purple; *pollinia* obovoid.

Fl.: Jun.

Nagaland: Kohima, Hynniewta 80818 (ASSAM) Prain 41 (CAL).

Distr.: INDIA (Nagaland, Sikkim); MYANMAR, CHINA, LAOS, NEPAL, THAILAND, VIETNAM.

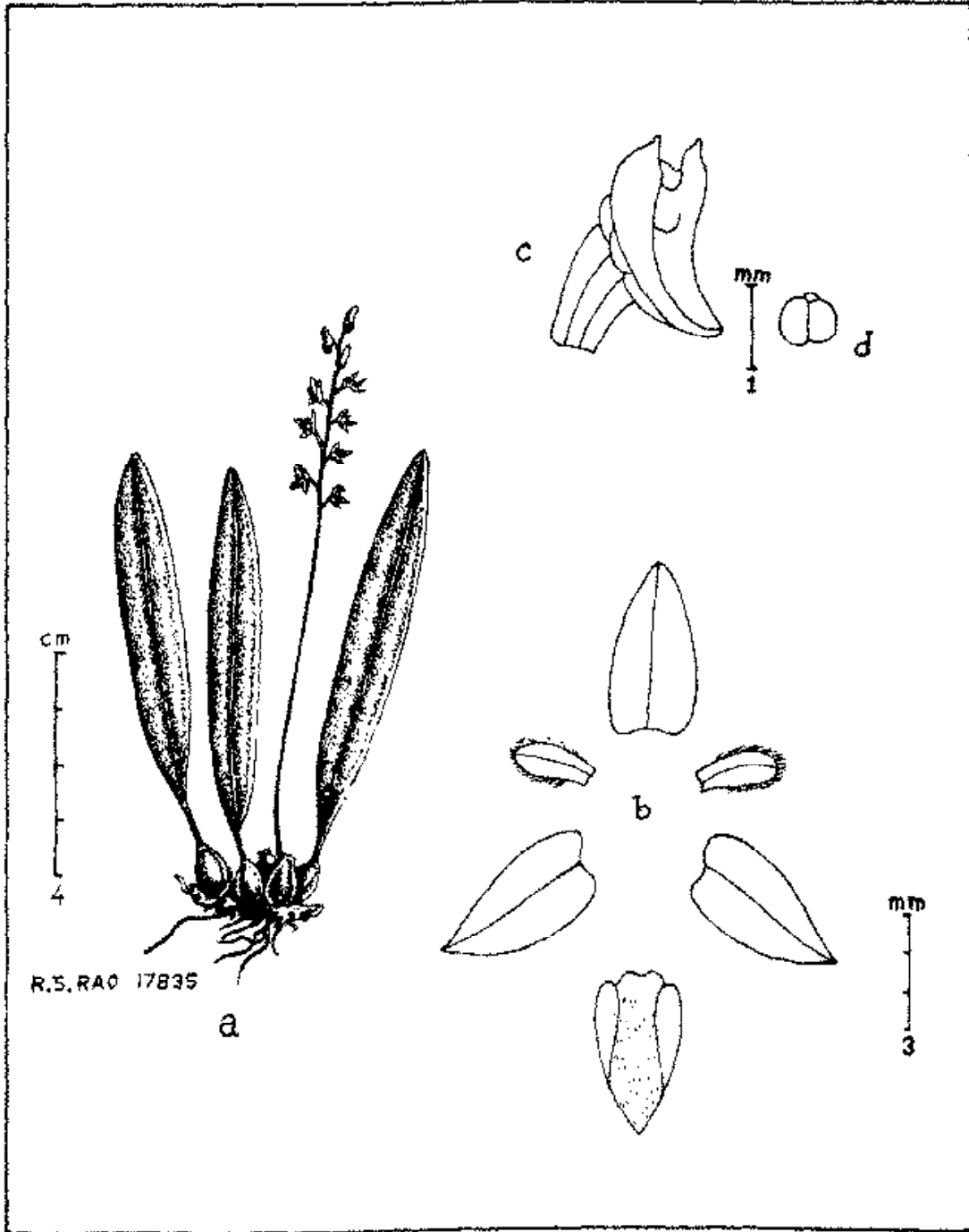


Fig. 24. *Bulbophyllum secundum* Hook. f.:
 a. habit; b. floral parts; c. column; d. pollinia.

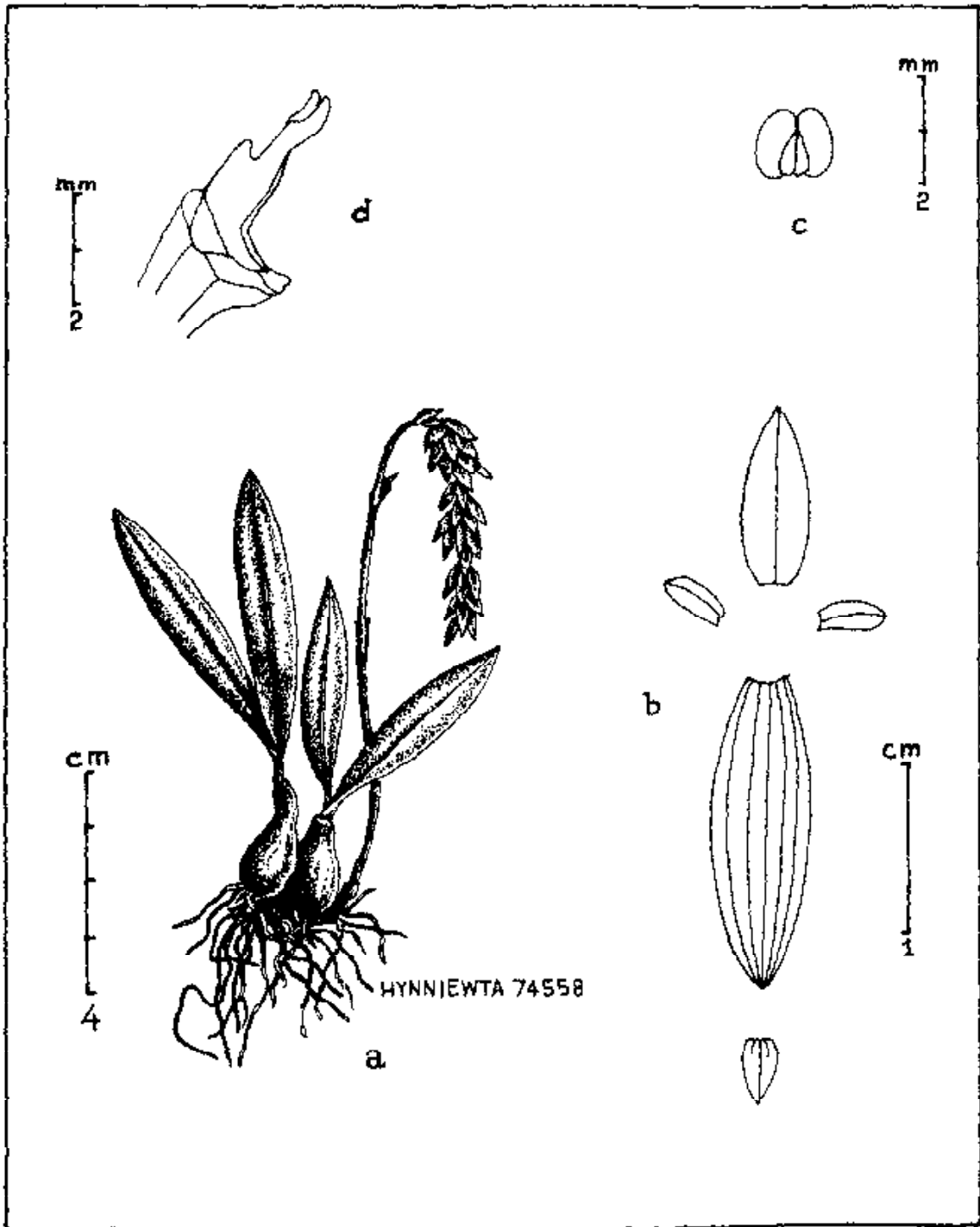


Fig. 25. *Bulbophyllum viridiflorum* (Hook. f.) Schitr.:
a. habit; b. floral parts; c. column; d. pollinia.

18. **Bulbophyllum viridiflorum** (Hook. f.) Schltr. in *Orchis* 4 : 108. 1910; Tuyama in Hara, *Fl. E. Himal* 1 : 428. 1966. Seidenf. in *Dansk Bot. Ark.* 29 (1): 237. t. 131. 1973. *Cirrhopetalum viridiflorum* Hook. f., *Fl. Brit. India* 5 : 779. 1890; King & Pantl. in *Ann. Roy. Bot. Gard. Calc.* 8: 86. 1. 118. 1898. **Fig. 25**

Pseudobulbs 2-3 cm high, clustered or slightly distant, ovoid or sub-ovoid. *Leaves* 8-12 x 1.5-2 cm, sometimes deciduous, lanceolate, acute. *Inflorescence* many-flowered, lax, racemose, 12-18 cm long. *Flowers* 1.7-1.8 cm long, brownish yellow; *bracts* 4-6 mm long, pale brown, lanceolate, acute; *pedicelled ovary* 3-4 mm long, pale brown; dorsal sepal 1.0-1.1 x 0.4 cm, ovate, acute; laterals 1.7-1.8 cm long, ovate-lanceolate, acute, connate throughout; *petals* ca 3 x 2 mm long, sub-orbicular or oblong, obtuse; *lip* ca 4 mm long, oblong, obtuse, recurved; *column* ca 2 mm long, brownish yellow; *pollinia* reniform.

Fl.: Sept.

Nagaland: Khonoma, Malhotra 75132; Kohima, Hynniewta 74558; Pulebadze, Hynniewta 56171; Tokye, Hynniewta 80906; Tuensang, Hynniewta 80932 (ASSAM).

Distr.: INDIA (Meghalaya, Nagaland, Sikkim).

19. **Bulbophyllum wallichii** Reichb. f. in *Walp. Ann.* 6 : 259. 1861; Seidenf. in *Dansk Bot. Ark.* 33(3) : 189. t. 136. 1979. *Cirrhopetalum refractum* acut., (non Zollinger, in Hassk. *Flora* 5: 28. t. 456. 1847): Hook. f., *Fl. Brit. India* 5 : 779. 1890, p.p.; King & Pantl. in *Ann. Roy. Bot. Gard. Calc.* 8: 87. t. 119. 1898, p.p. **Fig. 26**

Pseudobulbs 1.5 - 2.5 cm high, clustered or distant, sub-conical. *Leaves* 6-10 x 2-2.5 cm, sometimes deciduous, lanceolate or oblong, acute. *Inflorescence* many-flowered, lax, racemose, 18-25 cm long. *Flowers* 3.5-4.0 cm long, orange-yellow; *bracts* 7-8 mm long, pale brown, triangular, acuminate; *pedicelled ovary* 4-5 mm long, brownish; dorsal sepal 0.9-1.0 x 0.3 cm, oblong or oblong-triangular, acute or acuminate; inner surface puberulous; margins ciliate; laterals 3.5-4.0 cm long, linear, acute, sparingly ciliate, connate throughout or sometimes tip bifid; *petals* ca 0.4 x 0.2 cm, triangular, acute, aristate; inner surface puberulous; margins ciliate; *lip* ca 0.3 cm long, deep orange-yellow, oblong, obtuse, recurved, ciliolate; *column* ca 2 mm long, orange-yellow; *pollinia* oblong.

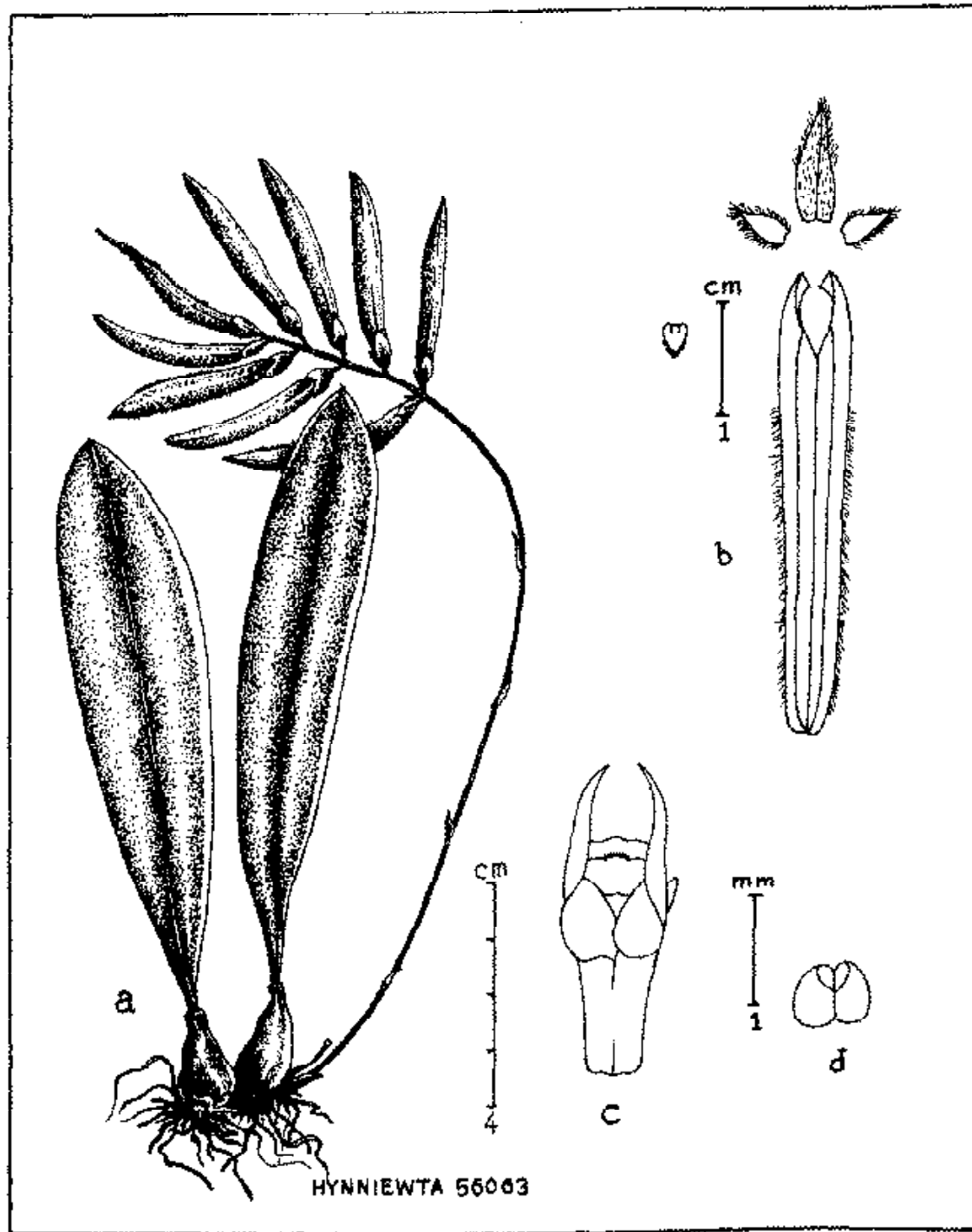


Fig. 26. *Bulbophyllum wallichii* Reichb. f.:
a. habit; b. floral parts; c. column; d. pollinia.

Fl.: Nov.

Nagaland: Tseminyu, *Hynniewta* 56063 (ASSAM).

Distr.: INDIA (Nagaland, Sikkim, Uttar Pradesh, W. Himalaya); BHUTAN, MYANMAR, CAMBODIA, LAOS, NEPAL, THAILAND, VIETNAM.

11. CALANTHE R. Br.

1a. Flowers spurred:

2a. Lip entire, deeply incised fimbriate 1. *C. alpina*

2b. Lip 2-4-lobed, not fimbriate:

3a. Spur short, not exceeding 5 mm in length:

4a. Lip 2-lobed; side lobes absent ... 3. *C. biloba*

4b. Lip 3-4-lobed; side-lobes present:

5a. Lip 3-lobed; mid-lobe entire;
lobules absent; lamellae 3:

6a. Side lobes oblong; mid-lobe
sub-obovate, erose or dentate; spur
glabrous outside, mouth hispidulous 4. *C. brevicornu*

6b. Side lobes sub-quadrate; mid-lobe
sub-reniform, entire; spur pubescent
outside, mouth not hispidulous 9. *C. mannii*

5b. Lip 4-lobed; mid-lobe cleft
into 2 oblong or sub-quadrate
crenulate lobules; lamella 1 7. *C. griffithii*

3b. Spur long, exceeding more than 10 mm in length:

7a. Lip 3-lobed; mid-lobe entire; lobules absent:

8a. Spur 4-5 cm long, glabrous; mid-lobe
of lip fan-shaped, emarginate; disc with
3 unequal, elongated calli 10. *C. masuca*

8b. Spur less than 2 cm long, puberulous;
mid-lobe neither fan-shaped nor
emarginate; disc without calli:

9a. Spur ca 2 cm long, bidentate;
mid-lobe of lip obovate, apiculate;
disc with 3 faint ridges 11. *C. plantaginea*

- 9b. Spur *ca* 1 cm long, not dentate; mid-lobe of lip flabellately cordate, not apiculate; disc without ridges 2. *C. angusta*
- 7b. Lip 4-lobed; mid-lobe cleft into 2 oblong, rounded or obovate, erose or crenulate lobules:
- 10a. Mid-lobe tip emarginate; lobules oblong, falcate, crenulate at apex; spur 3.0 cm or more long 8. *C. herbacea*
- 10b. Mid-lobe tip not emarginate; lobules obovate, not falcate, crenulate through-out; spur *ca* 1.5 cm or less long:
- 11a. Flowers *ca* 2.5 cm or less across, pale lilac or orange; side lobes crenulate 5. *C. ceciliae*
- 11b. Flowers *ca* 3 cm or more across, yellowish green; side lobes entire 6. *C. chloroleuca*
- 1b. Flowers not spurred:
- 12a. Mid-lobe of lip crisped, 2-fid; disc with 3 crenulate ridges 13. *C. tricarinata*
- 12b. Mid-lobe of lip rhombic, crenulate, dagger pointed; disc without ridges 12. *C. puberula*
1. ***Calanthe alpina*** Lindl., *Fol. Orch.* 4. 1854; Hook. f., *Fl. Brit. India* 5: 850. 1890; King & Pantl. in *Ann. Roy. Bot. Gard. Calc.* 8 : 170. t. 229. 1898.

Pseudobulbs 5-8 cm long, oblong or oblong-cylindric. *Leaves* 20-30 x 5-7.5 cm, oblanceolate, acute or acuminate. *Inflorescence* few-flowered, 30-45 cm long. *Flowers* *ca* 5.5 cm across, whitish, green tipped; *bracts* *ca* 1 cm long, greenish lanceolate, acuminate; *pedicelled ovary* 1.8- 2.0 cm long, green; *sepals* 2.7 - 2.8 cm long, acute; dorsal *ca* 1.4 cm broad, ovate-oblong; laterals *ca* 1.5 cm broad, oblong, sub-falcate; *petals* 2.2 - 2.3 x 0.8-0.9 cm, oblong-lanceolate, acuminate; *lip* 2.0 - 2.2 cm long; hypochile small, greenish yellow; epichile large dull red, semi-orbicular; margins deeply incised fimbriate; spur *ca* 1.5 cm long, whitish yellow, cylindric, decurved; *column* 5-6 mm long, whitish yellow; *pollinia* clavate.

Fl.: Jul.

Nagaland: Jafu Hills, *Bor* 2176 (ASSAM).

Distr.: INDIA (Nagaland, Sikkim).

2. **Calanthe angusta** Lindl., Fol. Orch. 7. 1854; Hook. f., Fl. Brit. India 5: 849. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 171. t. 232. 1898; Seidenf. in Dansk Bot. Ark. 29 (2): 12. t. 2. 1975. *Alismorchis angusta* (Lindl.) Kuntze, Rev. Gen. Pl. 2: 650. 1891.

Leaves 18-22 x 4-6 cm, lanceolate, acute or acuminate, *Inflorescence* many-flowered, 30-45 cm long, puberulous. *Flowers* ca 2.0 cm across, white; *bracts* 0.8 - 1.0 cm long, brownish green, lanceolate, acute, puberulous; *pedicelled ovary* ca 1.5 cm long, white; dorsal sepal ca 1.2 x 0.6 cm, broadly ovate, obtuse; laterals ca 1.0-0.5 cm, ovate, acute; *petals* ca 1.0-0.4 cm, narrowly oblong, obtuse; *lip* 1.2 - 1.3 cm long, white, 3-lobed; side lobes falcately oblong; mid-lobe flabellately cordate; lobes rounded; disc with many yellow *tubercles* at base; spur ca 1.0 cm long, white, cylindrical slightly curved; *column* ca 5 mm long, white; *pollinia* sub-clavate.

Fl.: Apr.

Nagaland: Jafu Hills, Hynniewta 74589 (ASSAM).

Distr.: INDIA (N.E. India, Sikkim); BANGLA DESH, BHUTAN, CAMBODIA, CHINA, LAOS, THAILAND, VIETNAM.

3. **Calanthe biloba** Lindl., Fol. Orch. 3. 1854; Hook. f., Fl. Brit. India 5 : 848. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8: 169. t. 228. 1898 incl. var. *diptera* Hook. f., *obtusata* Par. & Reichb. f. & *treutleri* Hook. f.); Seidenf. in Dansk Bot. Ark. 29 (2): 12. t. 1. 1975.

Pseudobulbs 25-40 cm long, cylindrical. *Leaves* 20-30 x 6-10 cm, oblanceolate or broadly elliptic, acute or acuminate. *Inflorescence* few or many-flowered, 30-40 cm long, glabrous. *Flowers* ca 3.5 cm across, golden yellow, mottled with dark brown; *bracts* 1.2 - 1.5 cm long, blackish brown, lanceolate, acuminate, very slender, reflexed or not; *pedicelled ovary* ca 2.3-2.5 cm long, pale violet; *sepals* 1.7-1.8 x 1.1 - 1.2 cm, broadly ovate-lanceolate, aristate; laterals sub-falcate; *petals* 1.3-1.4 x 0.7-0.8 cm, linear-oblong, acuminate; *lip* 1.3 - 1.5 cm long, pale violet with a whitish claw, deeply 2-lobed; apex emarginate; lobes broadly hatched-shaped, deflexed; spur ca 3 mm long, purplish violet, conical, obtuse; *column* ca 4 mm long, brownish; *pollinia* linear-oblong.

Fl.: Oct. - Nov.

Nagaland: Pulebadze, *Prain* 72 (CAL); Tseminyu, *Hynniewta* 56239 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN, MYANMAR, CHINA, NEPAL.

4. ***Calanthe brevicornu*** Lindl., *Gen. & Sp. Orch.* 251. 1833; Hook., f., *Fl. Brit. India* 5 : 848. 1890; King & Pantl. in *Ann. Roy. Bot. Gard. Calca.* 8 : 168. t. 227. 1898 (incl. var. *wattii* Hook. f.). **Fig. 27**

Pseudobulbs 3-6 cm long, ovoid or oblong. *Leaves* 20-30 x 6-9 cm, oblong-elliptic, shortly acuminate. *Inflorescence* many-flowered, 40-50 cm long, glabrous. *Flowers* ca 4 cm across, purplish white; *bracts* ca 1.2 cm long, pale green, linear-lanceolate, acute, caducous; *pedicelled ovary* ca 2 cm long, purplish green, puberulous; *sepals* and *petals* oblong-lanceolate, acute, spreading, purplish with white mid-ribs; *sepals* 2.0-2.1x0.5 cm, puberulous; *petals* 1.5-1.6x 6.3 cm; *lip* ca 2.5 cm long, purplish, white edged, 3-lobed; side lobes oblong, obtuse, divergent; mid-lobe sub-obovate, erose or dentate; apex emarginate, apiculate; disc with 2 purplish yellow streaks, unequal, tubercled and fleshy lamellae; *spur* ca 3 mm long, purplish, conical, obtuse; mouth hispidulous; *column* ca 5 mm long, dark purple; *pollinia* oblong-clavate.

Fl.: May - Jun.

Nagaland: Khonoma, *Watt* 11581 (CAL); Jhaluki, *Hynniewta* 74555; Peren, *Hynniewta* 74554 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim, Western Himalayas); BHUTAN, NEPAL.

5. ***Calanthe cecilliae*** Reichb. f., *Gard. Chron.* 1 : 432. 1883; Holtt., *Fl. Malaya*, 1 : 153. ed. 2. 1957; Seidenf. in *Dansk Bot. Ark.* 29(2) : 19. t. 5. 1975. *C. wrayi* Hook. f., *Fl. Brit. India* 5 : 850. 1890.

Leaves 25-35 x 5-7 cm, elliptic, acute or acuminate. *Inflorescence* few- or many-flowered, 25-40 cm long, puberulous. *Flowers* ca 2.5 cm across, pale lilac to orange; *bracts* ca 9 mm long, greenish brown, lanceolate, acute;

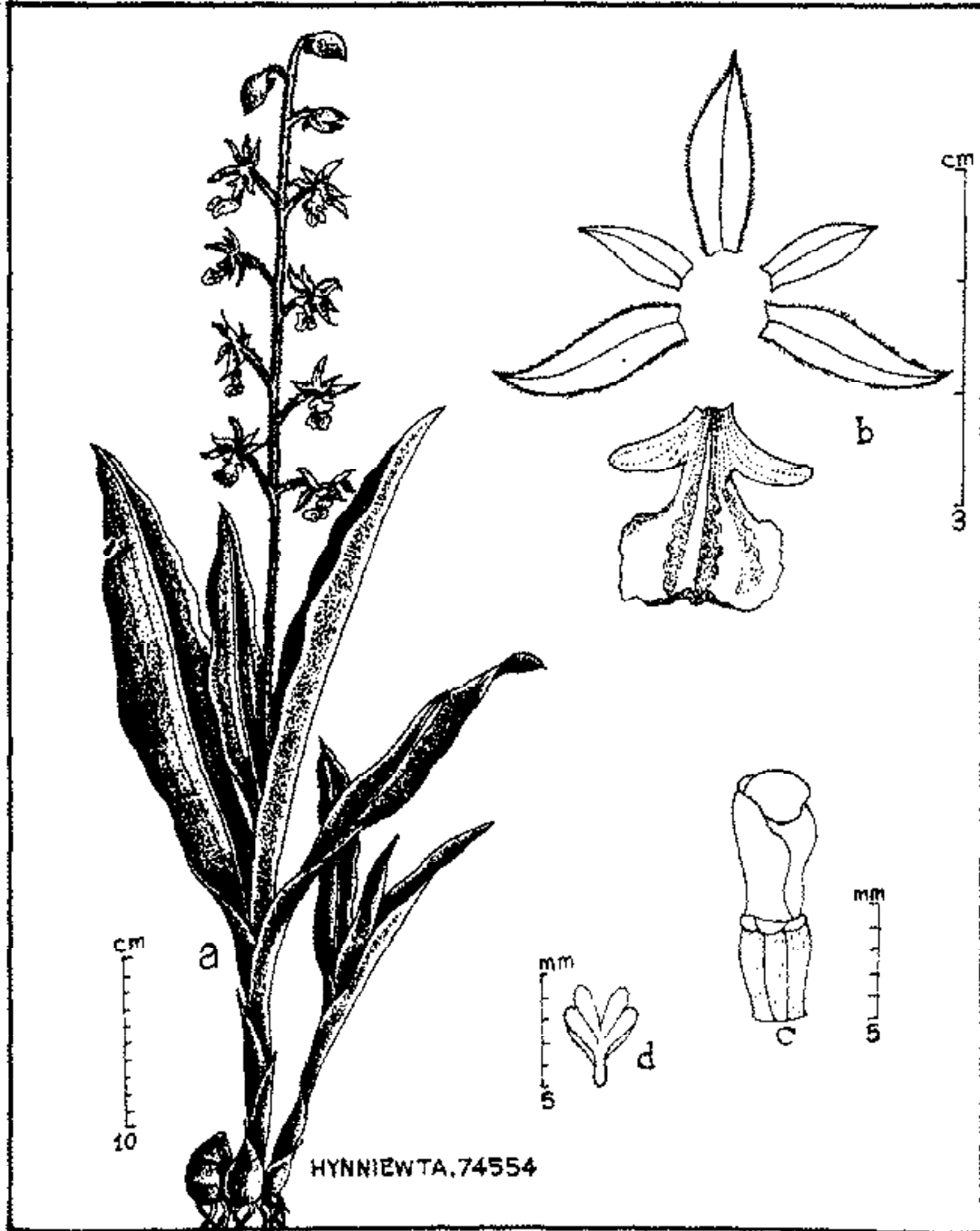


Fig. 27. *Calanthe brevicornu* Lindl. :
a. habit; b. floral parts; c. column; d. pollinia.

pedicelled ovary ca 2 cm long, whitish violet, puberulous; *sepals* 1.2-1.3 x 0.5 cm, oblong, acute; laterals slightly decurved; *petals* ca 1.0 x 0.2 cm, oblong-lanceolate, acute; *lip* ca 1.5 cm long, whitish yellow, with a warted callus, sub-equally 4-lobed side lobes oblong, spathulate, crenulate; mid-lobe cleft into 2 obovate or sub-quadrate, crenulate lobules; spur ca 1.5 cm long, pale violet, straight or slightly curved; *column* ca 5 mm long, white; *pollinia* linear-clavate.

Fl.: Sept.

Nagaland: Jafu Hills, *Deka* 20276 (ASSAM).

Distr.: INDIA (Nagaland); MYANMAR, JAVA, MALAYA, SUMATRA, THAILAND.

6. ***Calanthe chloroleuca*** Lindl., *Fol. Orch.* 10. 1854; Hook. f., *Fl. Brit. India* 5: 852. 1890; King & Pantl. in *Ann. Roy. Bot. Gard. Calc.* 8: 171. t. 231. 1898. *C. galeata* Lindl., *Fol. Orch.* 5. 1854.

Pseudobulbs 2-4 cm long, ovoid. *Leaves* 25-40 x 6-10 cm, elliptic-lanceolate, acute. *Inflorescence* many-flowered, 30-50 cm long, pubescent. *Flowers* ca 3 cm across, yellowish green; *bracts* ca 0.8 cm long, greenish, lanceolate, acuminate, pubescent; *pedicelled ovary* ca 3-3.5 cm long, green, pubescent; *sepals* ca 1.5 cm long, acuminate; dorsal ca 7 mm broad, ovate; laterals ca 5 mm broad, ovate-lanceolate; *petals* ca 1.4 x 0.4 cm, oblanceolate, acuminate; *lip* ca 1.8 cm long, white or yellowish green, with a bilobed callus, sub-equally 4-lobed; side lobes oblong; mid-lobe cleft into 2 obovate, crenulate lobules; spur ca 1.5 cm long, greenish yellow, straight; *column* ca 5 mm long, greenish yellow; *pollinia* linear-clavate.

Fl.: May - Jun.

Nagaland: Tuensang, *Hynniewta* 80704; Wokha, *Hynniewta* 80774 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim).

7. ***Calanthe griffithii*** Lindl. in *Paxt. Fl. Gard.* sub t. 37. 1853; Hook. f., *Fl. Brit. India* 5: 852. 1890.

Pseudobulbs 3-5 cm long, ovoid or ovoid-oblong. *Leaves* 30-45 x 8-12 cm, elliptic, acute. *Inflorescence* few-or many-flowered, 45-60 cm long, glabrous or puberulous. *Flowers* ca 3.5 cm across, dull greenish yellow or with creamy white streaks and white base; *bracts* ca 1.1 cm long, greenish, puberulous; *pedicelled ovary* 2-2.5 cm long, greenish, puberulous; *sepals* 1.7-1.8 x 0.5-0.6 cm, acute or acuminate, puberulous; laterals lanceolate; dorsal broadly-lanceolate; *petals* 1.5-1.6 x 0.2-0.3 cm, narrowly lanceolate, acuminate; *lip* ca 1.2 cm long, greenish yellow, white edged, with an erect, ridged triangular lamella at base, sub-equally 4-lobed; side lobes oblong; mid-lobe cleft into 2 oblong or sub-quadruate lobules; spur ca 5 mm long, yellowish, curved; *column* ca 5 mm long, yellowish; *pollinia* linear-clavate.

Fl.: May.

Nagaland: Tseminyu, *Hynniewta* 80723; Tuensang, *Hynniewta* 80703 (ASSAM).

Distr.: INDIA (N.E. India, Sikkim); BHUTAN.

8. ***Calanthe herbacea*** Lindl., *Fol. Orch.* 10. 1854; Hook. f., *Fl. Brit. India* 5 : 852. 1890; King & Pantl. in *Ann. Roy. Bot. Gard. Calc.* 8: 172. t. 233. 1898.

Pseudobulbs 2-4 cm long, ovoid-oblong. *Leaves* 20-30 x 5-10 cm, broadly or narrowly elliptic, acute or caudate-acuminate. *Inflorescence* many-flowered, 40-50 cm long, glabrous. *Flowers* ca 5 cm across, green; *bracts* ca 1 cm long, greenish; *pedicelled ovary* ca 3.5 cm long, pale green; *sepals* ca 2.5 cm long, acute; dorsal ca 1.2 cm broad, acute; laterals ca 1.0 cm broad, elliptic; *petals* ca 2.4 x 0.8 cm, oblong, sub-spathulate, acute; *lip* 2.7-2.8 cm long, white with a yellow warted triangular callus, sub-equally 4-lobed; side lobes narrowly oblong; mid-lobe emarginate at apex, cleft into two oblong, falcate, erose lobules' spur 3.0-3.5 cm long, white, curved; *column* ca 4 mm long, white; *pollinia* linear-clavate.

Fl.: May - Jun.

Nagaland: Tiyie Hills, *Hynniewta* 80764 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim).

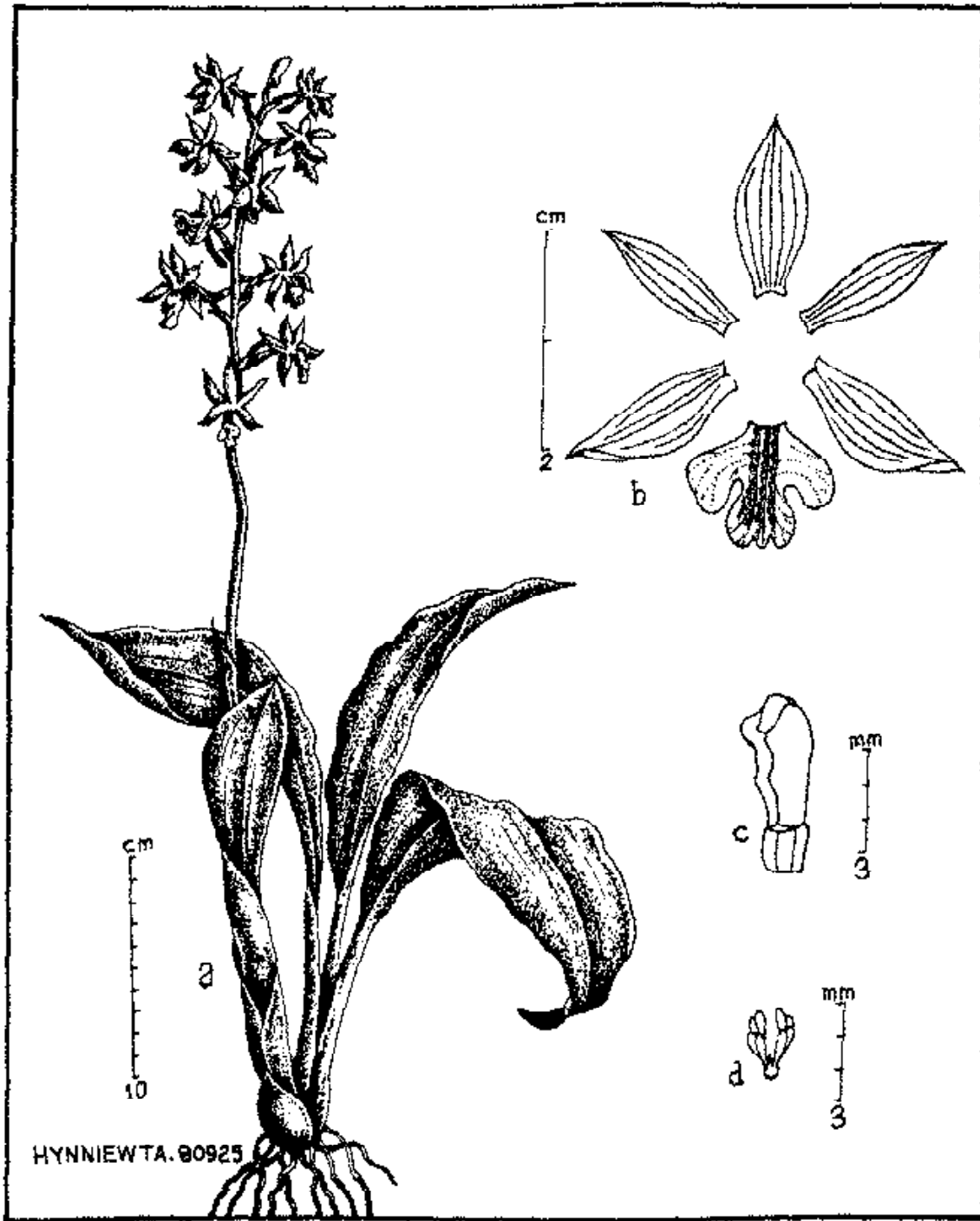


Fig. 28. *Calanthe masanli* Hook.f. :
 a. habit; b. floral parts; c. column; d. pollinia

9. **Calanthe mannii** Hook. f., Fl. Brit. India 5: 850. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8: 167. t. 225. 1898. **Fig. 28**

Pseudobulbs 6-8 cm long, cylindric. *Leaves* 25-35 x 3.5-5 cm, oblanceolate-oblong, acute, *Inflorescence* many-flowered, 30-40 cm long, pubescent. *Flowers* ca 2.0 cm across, dull brown; *bract* ca 5 mm long, pale green, lanceolate, acute; *pedicelled ovary* ca 1.5 cm long, pale green, pubescent; *sepals* ca 0.3 mm broad, pubescent, concave, connivent; dorsal ca 8 mm long, ovate-oblong, obtuse; laterals ca 1.0 cm long, spatulate, acute; *petals* ca 0.8 x 0.2 cm, linear-spathulate, acute; *lip* ca 0.8 cm long, yellowish brown tipped; side lobes sub-quadrangle; mid-lobe large, sub-reniform, obtuse, deflexed; disc with 3 unequal, brownish, fleshy and tubercled lamellae; spur ca 2 mm long, pale green, conical, obtuse, pubescent; *column* ca 4 mm long, green; *pollinia* clavate.

Fl.: Feb. - Mar.

Nagaland: Sangsangu, Hynniewta 80925 (ASSAM).

Distr.: INDIA (N.E. India, Sikkim, Western Himalayas); BHUTAN, NEPAL.

10. **Calanthe masuca** (D. Don) Lindl., Gen & Sp. Orch. 249. 1833; Bot. Mag. t. 4541. 1850; Hook. f., Fl. Brit. India 5 : 850. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 173. t. 234. 1898; Seidenf. in Dansk Bot. Ark. 29(2): 19. t. 6. 1975. *Bletia masuca* D. Don, Prodr. Fl. Nepal. 30. 1825. *Calanthe masuca* var. *fulgens* (Lindl.) Hook. f., 5: 850. 1890.

Pseudobulbs 8-12 cm long, oblong-conical. *Leaves* 25-40 x 6-10 cm, elliptic-ovate, acute. *Inflorescence* many-flowered, slightly dense, 30-50 cm long, pubescent. *Flowers* ca 5 cm across, purplish violet; *bracts* ca 1.5 cm long, greenish, ovate-lanceolate, acuminate, pubescent; *pedicelled ovary* ca 3.0 cm long, purplish violet, pubescent; *sepals* ca 2.5 x 1.0 cm, acute; dorsal elliptic; laterals elliptic-lanceolate, sub-falcate; *petals* ca 2.0 x 0.8 cm, oblanceolate, acute; *lip* ca 2.0 cm long, purplish violet, 3-lobed; side lobes small, oblong, obtuse, sub-falcate mid-lobe large, fan-shaped; apex emarginate; disc with 3 unequal, yellow calli; spur 4-5 cm long, purplish violet, narrowly cylindric, curved; *column* ca 5 mm long, whitish violet; *pollinia* linear-clavate.

Fl.: Aug. Sept.

Nagaland: Jafu Hills, *Hynniewta* 80823, *Malhotra* 75268; Mokokchung, *Hynniewta* 79982; Mon, *Hynniewta* 79912; Tiye Hills, *Hynniewta* 80769; Tuensang, *Hynniewta* 79960 (ASSAM).

Distr.: Throughout India: BHUTAN, JAVA, MALAYA, NEPAL, THAILAND.

11. ***Calanthe plantaginea*** Lindl., Gen & Sp. Orch. 250. 1833; Hook., f., Fl. Brit. India 5 : 853. 1890.

Leaves 30-45 x 8-10 cm, elliptic-lanceolate, acute or acuminate. *Inflorescence* many-flowered, 40-60 cm long, glabrous. *Flowers* ca 3.5 cm across, purplish pink; *bracts* ca 8 mm long, lanceolate, acuminate, pale green; *pedicelled ovary* ca 3.6 cm long, purplish pink; *sepals* acute; dorsal ca 1.6-0.7 cm, broadly oblong; laterals ca 1.8-0.6 cm, oblong, sub-falcate; *petals* ca 1.5 x 0.4 cm, oblong-lanceolate, acuminate; *lip* ca 1.1 cm long, dark purple, 3-lobed; side lobes obovate; mid-lobe sub-truncate, obovate, apiculate; disc with 3 unequal, faint lamellae; *column* ca 4 mm long, purplish pink; *pollinia* clavate.

Fl.: Feb. - Mar.

Nagaland: Kohima, *Hynniewta* 80801 (ASSAM), Kingdon Ward 11143 (CAL).

Distr.: INDIA (Arunachal Pradesh, Nagaland); BHUTAN, NEPAL.

12. ***Calanthe puberula*** Lindl., Gen. & Sp. Orch. 252. 1833; Hook. f., Fl. Brit. India 5 : 848. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 166. t. 224. 1898.

Pseudobulbs 2-4 cm long, ovoid. *Leaves* 15-20 x 4-5 cm, elliptic or elliptic-oblong, acute or acuminate. *Inflorescence* many-flowered, 30-50 cm long, puberulous. *Flowers* ca 3.5 cm across, purplish white; *bracts* 1.5 cm long, pale green, lanceolate, acuminate, pubescent; *pedicelled ovary* ca 2.2 cm long, pale green, pubescent; *sepals* ca 0.6 cm broad, pubescent outside; laterals 1.7-1.8 cm long, falcately oblong, aristate; dorsal ca 1.6 cm long, oblong, acute or acuminate; *petals* ca 1.2x0.2 cm, pubescent

outside, linear, falcate, acuminate; *lip* ca 1.5 cm long, purplish white 3-lobed; side lobes narrowly oblong, falcate; mid-lobe rhombic, crenate, acute or apiculate; disc with two narrow crenulate calli; *column* ca 3 mm long, purplish white, with yellow and purple markings in front; *pollinia* linear-clavate.

Fl.: Aug. Sept.

Nagaland: Jhaluki, *Kataki* 66458; Pulebadze, *Hynniewta* 56284 (AS-SAM), *Prain* 73 (CAL).

Distr.: INDIA (N. E. India, Sikkim, Western Himalayas); BHUTAN, CAMBODIA, LAOS, NEPAL, VIETNAM.

13. *Calanthe tricarinata* Lindl., Gen. & Sp. Orch. 252. 1833; Hook. f., Fl. Brit. India 5: 847. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 166. t. 223. 1898. *C. occidentalis* Lindl., Fol. Orch. 3. 1854. *C. pantlingii* Schltr. in Fedde Repert. Beih. 4 : 240. 1919.

Leaves 20-35 x 5-7 cm, oblong or oblanceolate, acute. *Inflorescence* few-flowered, 30-45 cm long, puberulous. *Flowers* ca 3.0 cm across, yellowish green, white edged; *bracts* 1.0-1.5 cm long, brownish green, lanceolate, acute; *pedicelled ovary* 1.8 - 2.0 cm long, greenish white, pubescent; *sepals* 1.5-1.6 x 0.6 cm, oblong-lanceolate, acuminate; *petals* ca 1.3 x 0.5 cm, ovate, acute; *lip* ca 1.3 cm long, yellowish green, 3-lobed; side lobes broadly oblong, slightly falcate; mid-lobe crisped 2-fid, base of lip with a didymous, purple pubescent callus; disc with 3 unequal, purple, fleshy lamellae; *column* ca 3 mm long, whitish; *pollinia* linear-oblong.

Fl.: May - Jun.

Nagaland: Kohima, *Clarke* 41027 (CAL).

Distr.: INDIA (N. E. India, Sikkim, Western Himalayas); JAPAN, NEPAL.

12. CERATOSTYLIS Bl.

- 1a. Stem erect, rush-like; leaves terete, caducous; inflorescence terminal to the main stem; flowers ca 6 mm cross, whitish ...2. *C. subulata*

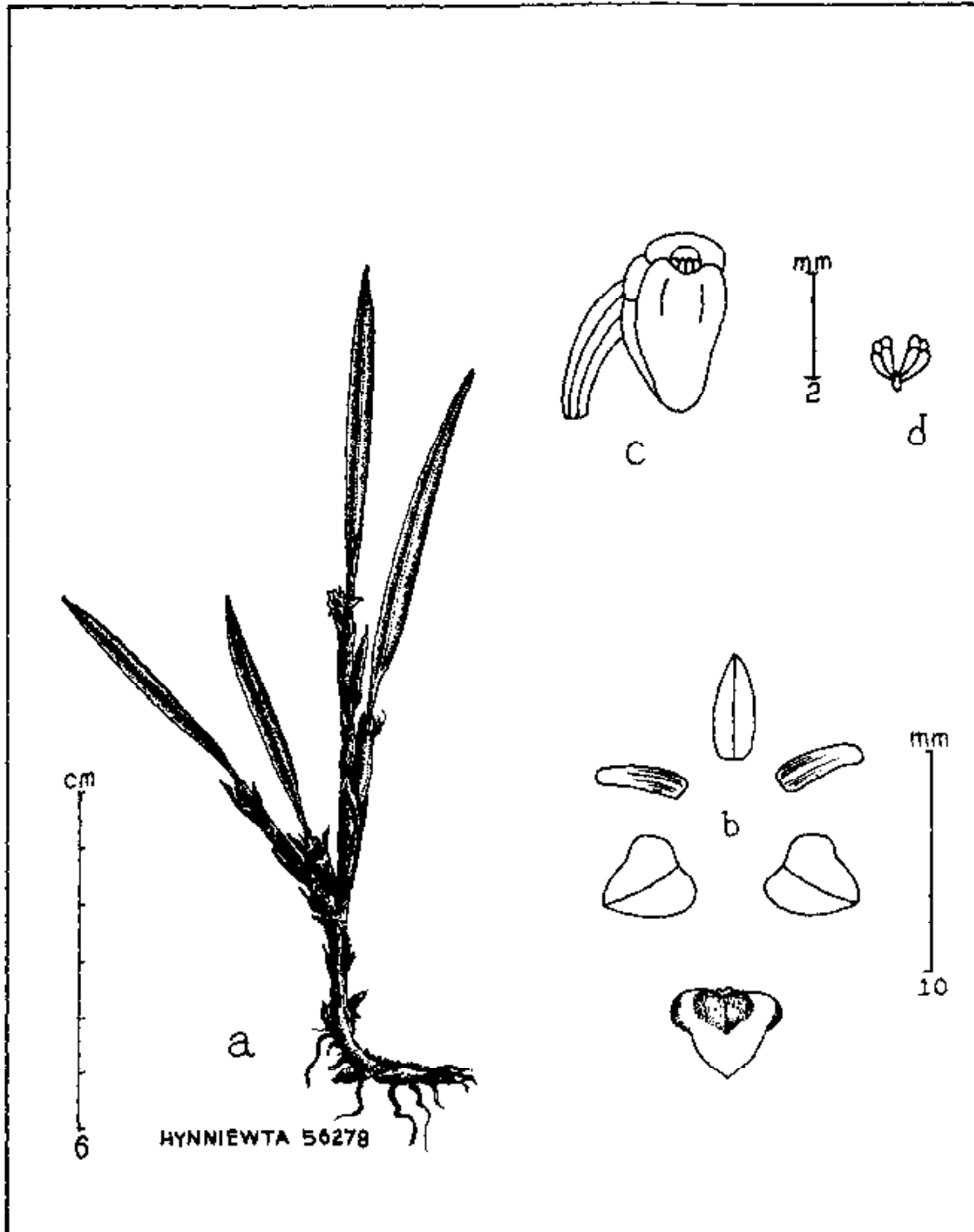


Fig. 29. *Ceratostylis himalaica* Hook. f.:
a. habit; b. floral parts; c. column; d. pollinia.

- 1b. Stem pendulous, dichotomously branched; leaves flat, persistent; inflorescence terminal to the branchlet; flowers ca 8 mm across, pinkish yellow

...1. *C. himalaica*

1. ***Ceratostylis himalaica*** Hook. f., Ic. Pl. t. 2101. 1889; Fl. Brit. India 5 : 826. 1890. *Ritaia himalaica* (Hook. f.) King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 159. t. 214. 1898. **Fig. 29**

Stems 8-15 cm long, slender, pendulous, covered by scarios brown sheaths, sub-dichotomously branched; branchlets short, slender. *Leaves* 6-10x0.7-0.8 cm, linear-oblong; apex acute or unequally 2-fid. *Inflorescence* terminal to the branchlets. *Flowers* ca 8 cm across, pinkish yellow; *bracts* ca 3 mm long, brown, ovate, acute, membranous; *ovary* ca 3 mm long, pinkish yellow, pubescent; *sepals* and *petals* ca 4 mm long; dorsal sepal ca 2 mm broad, oblong-lanceolate, obtuse, concave; laterals ca 3 mm broad, broadly ovate, gibbous, acute, connivent; *spur* ca 3 mm long, globose, septate, pubescent in front; *petals* ca 1 mm broad, linear, obtuse, obtuse; *lip* ca 4 mm long, ovate-oblong, obtuse; *column* ca 2 mm long, pinkish yellow; foot short; *pollinia* clavate.

Fl.: May - Jun.

Nagaland: Pulebadze, *Hynniewta* 56278; Tseminyu, *Hynniewta* 80727 (ASSAM).

Distr.: INDIA (Meghalaya, Nagaland, Sikkim); BHUTAN, NEPAL.

2. ***Ceratostylis subulata*** Bl. Bijdr. 206. 1825. *C. teres* Reichb. f. in Bonplandia, 2 : 89. 1854; Hook. f., Fl. Brit. India 825. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 247. t. 329. 1898.

Stems 10-20 cm long, rush-like, slender, erect or slightly curved, terete, covered by scarios sheaths at base. *Leaves* 2-3 x 0.3-0.4 cm, terete, awl-shaped, acute or obtuse, caducous. *Inflorescence* terminal to stems. *Flowers* ca 6 mm across, whitish; *bracts* ca 2 mm long, green, cymbiform, acute, scarios; *ovary* ca 2 mm long, green, sparsely pubescent; *sepals* and *petals* sub-equal, ca 3 mm long, acute; *sepals* ca 1.5 mm broad, ovate-lanceolate; *petals* ca 1 mm broad, lanceolate; *lip* ca 3 mm long, pale lemon yellow above, whitish beneath, clawed spatulate; apex thickened and fleshy; *spur* ca 3 mm long, globose; *column* ca 1 mm long, whitish, foot long; *pollinia* sub-clavate.

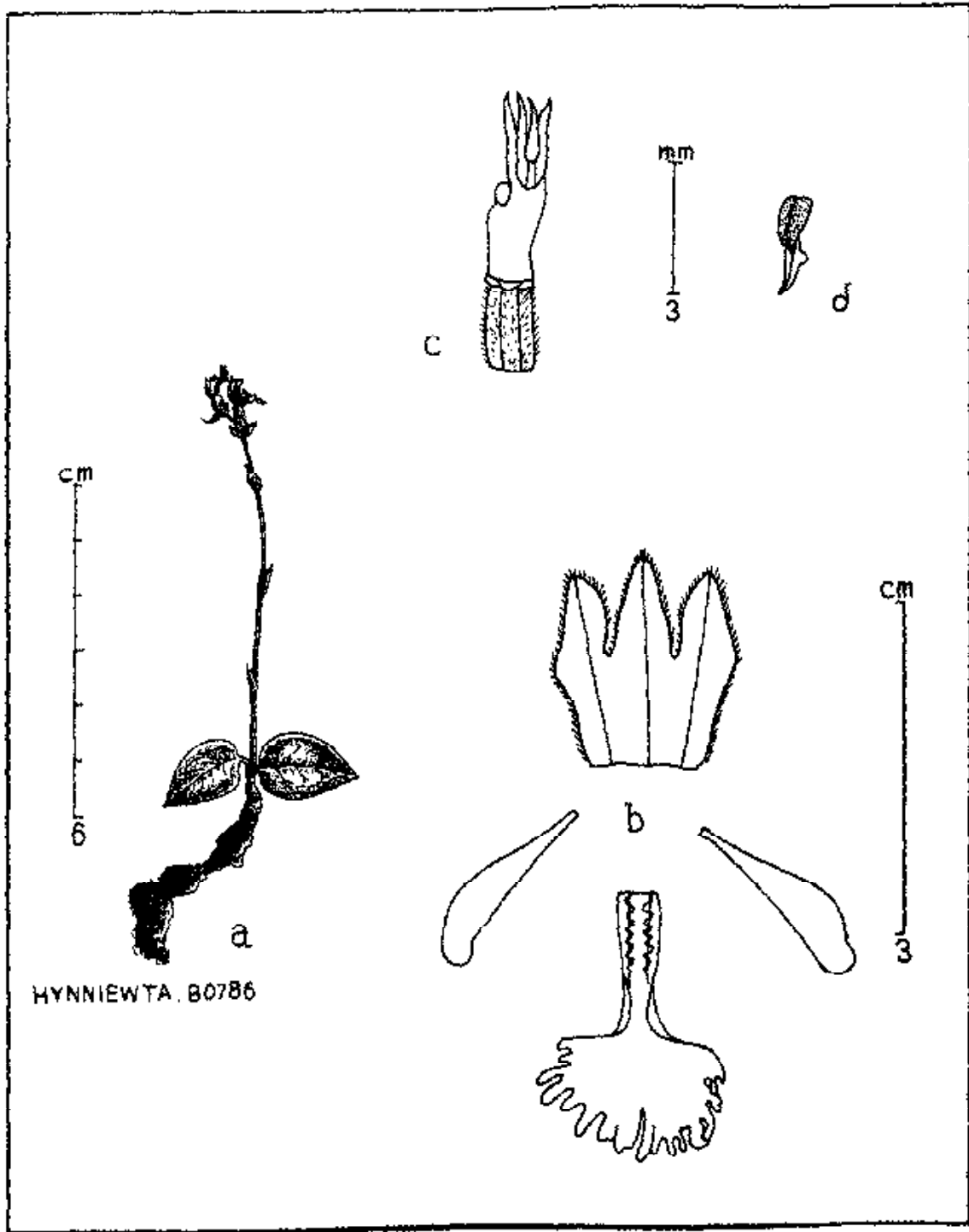


Fig. 30. *Cheirostylis griffithii* Lindl.:
a. habit; b. floral parts; c. column; d. pollinia.

Fl.: Jun.

Nagaland: Baghty, *Hynniewta* 80737, 80738; Tseminyu, *Hynniewta* 80721 (ASSAM).

Distr.: INDIA (N.E. India, Sikkim); CAMBODIA, LAOS, VIETNAM.

13. CHEIROSTYLIS Bl.

Cheirostylis griffithii Lindl. in J. Linn. Soc. 1 : 188. 1857; Hook. f., Fl. Brit. India, 6 : 105. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 299. t. 397. 1898. *C. micrantha* Schltr. Fede Repert. 2 : 83 1906.

Fig. 30

Stems 10-15 cm high, terete, fleshy. *Leaves* 1.8-2.5x0.5-1.5 cm, ovate, obtuse; base cuneate. *Inflorescence* 8-12 cm long, pubescent. *Flowers* 1.7-1.8 cm long, white; *bracts* 1.0-1.5 cm long, lanceolate, acuminate, brownish pink; *pedicelled ovary* 1.0-1.5 cm long, pubescent; *sepaline tube* pubescent outside; free apical parts 7-8 mm long, spreading, pale white, triangular, acute; *petals* 1.7-1.8 x 0.3-0.4 cm, linear, spatulate, sub-falcate, obtuse; *lip* 2.0-2.2 cm long; *hypochile* concave with 2 rows of glandular papillae within; *epichile* with 8-10 irregular fringes in each half; *column* 4-5 mm long, white; *pollinia* clavate.

Fl.: Nov. - Dec.

Nagaland: Barak range, *Bor* 2435 (CAL); Chumukedima, *Hynniewta* 80786 (ASSAM).

Distr.: INDIA (Meghalaya, Nagaland, Sikkim); BHUTAN, MYANMAR, PAKISTAN, THAILAND.

14. CLEISOCENTRON Bruhl

Cleisocentron trichromum (Reichb. f.) Bruhl, Guide Orch. Sikkim, 137. 1926. *Saccolabium trichromum* Reichb. f. in Hamb. Gartenzeit, 51. 1859; Hook. f., Fl. Brit. India 6 : 65. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 229. t. 306. 1898.

Stems 30-50 cm long, slender, pendulous. *Leaves* 15-25 x 1.5-2.5 cm, oblong, lanceolate; apex unequally and obtusely bilobed. *Inflorescence* 8-12 cm long, sub-erect. *Flowers* ca 2 cm across, pale yellowish pink; *bracts* ca 2 mm long, triangular, obtuse, pale brown; *pedicelled ovary* 2-2.5 cm long, pale yellowish pink; *sepals* ca 1 x 0.2 cm, sub-equal, linear-oblong, sub-acute; *petals* ca 0.8 x 0.3 cm, obovate-oblong, apiculate; *lip* ca 0.9 cm long, yellowish or rose colour, speckled with pink; side lobes erect, broadly triangular, obtuse; mid-lobe short, triangular, concave, acute; spur 1.8-2.2 cm long, rose-coloured, funnel-shaped, incurved; *column* ca 6 mm long, white, slightly curved; *pollinia* globose.

Fl.: Jul. - Aug.

Nagaland: Lumani, *Hynniewta* 80885; ; Tuli, *Hynniewta* 79922 (AS-SAM).

Distr.: INDIA (Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim); BHUTAN.

15. CLEISOSTOMA Bl.

1a. Leaves terete:

2a. Flowers few, large, ca 10 mm or more across, yellowish, reddish brown striped 1. *C. appendiculatum*

2b. Flowers many, small, ca 8 mm or less across, purplish:

3a. Lip apex acuminate, side lobes incurved, callus entire, glabrous 3. *C. filiforme*

3b. Lip apex acute or shortly subulate; side lobes erect; callus lobed, hispid 8. *C. williamsonii*

1b. Leaves flat:

4a. Leaf apex acute or acuminate:

5a. Flowers small, ca 8 mm across or less; lip whitish pink; side lobes white with subulate tip 7. *C. subulatum*

5b. Flowers large, ca 10 mm across or more; lip yellowish white; side lobes orange yellow with caudate tip 6. *C. striatum*

- 4b. Leaf apex acutely or obtusely 2-lobed:
- 6a. Leaf apex acutely 2-lobed; flowers few in simple raceme; callus entire 2. *C. aspersum*
- 6b. Leaf apex obtusely 2-lobed; flowers many in paniced raceme; callus 4-lobed:
- 7a. Flowers ca 8 mm across or less, purplish yellow; lip white, side lobes triangular 5. *C. racemiferum*
- 7b. Flowers ca 10 mm across or more, greenish; lip greenish yellow, side lobes oblong4. *C. paniculatum*

1. ***Cleisostoma appendiculatum*** (Lindl.) Benth. & Hook. f. ex Jackson, Index Kew. 1 : 555. 1895; Seidenf. in Dansk Bot. Ark. 29(3) : 58. 1975. *Aerides appendiculata* Lindl. Gen. & Sp. Orch. 242. 1833. *Sarcanthus appendiculatus* (Lindl.) Par. in Mason Bot. Burma, 2 : 181. 1883; Hook. f., Fl. Brit. India 6 : 67. 1890; Ic. Pl. t. 2136. 1893; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 290. t. 318. 1898 *p.p.*

Fig. 31

Stems 20-30 cm high, sometimes branched, many-leaved. *Leaves* 6-12 x 0.3 - 0.6 cm, terete, obtuse. *Inflorescence* few-flowered, lax, 3-5 cm long, sub-erect. *Flowers* ca 1 cm across, yellowish, reddish-brown striped; *bracts* ca 3 mm long, pale brown; *pedicelled ovary* 0.5-1.5 cm long, yellowish brown; dorsal sepal ca 7 x 4 mm, elliptic, obtuse; laterals ca 6 x 3 mm, ovate-oblong, acute; *petals* ca 6 x 2 mm, linear-oblong, acute; *lip* 0.7-0.8 cm long, yellowish, reddish brown striped outside, purplish yellow inside; side lobes triangular; mid-lobe triangular-ovate, acute; spur 3-4 mm long, yellowish, reddish brown striped; callus sub-quadrant, bilobed at base, hispid; *column* ca 3 mm long, yellowish; *pollinia* oblong-clavate.

Fl.: Jul. - Aug.

Nagaland: Pulebadze, *Hynniewta* 56273, 80858; Tiyie Hills, *Hynniewta* 80758 (ASSAM).

Distr.: INDIA (Nagaland, Sikkim); BANGLA DESH, BHUTAN, MYANMAR.

2. ***Cleisostoma aspersum*** (Reichb. f.) Garay in Bot. Mus. Leaflet. Harv. 23(4): 169. 1972; Seidenf. in Dansk Bot. Ark. 29 (3) : 12. t. 2. 1975.

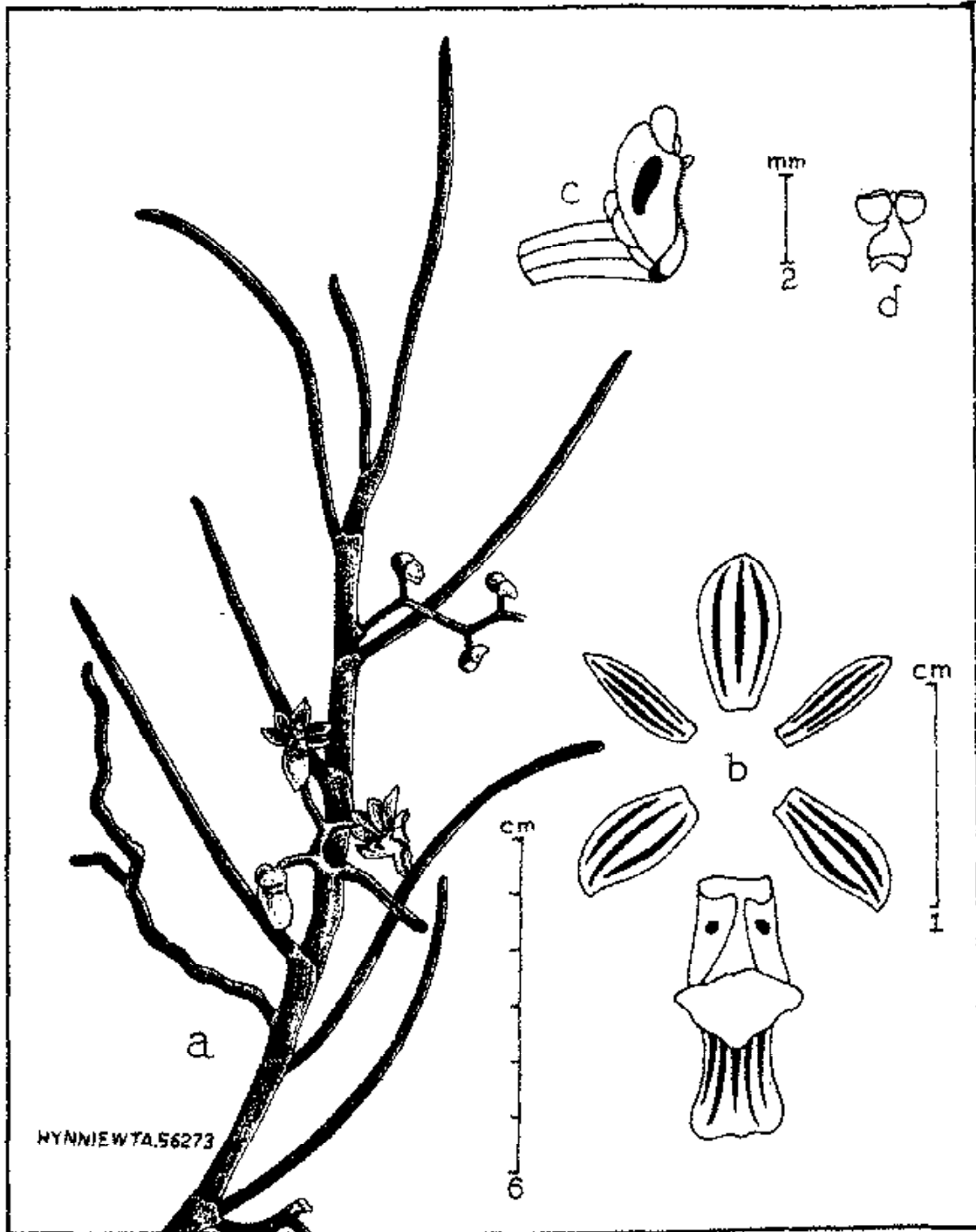


Fig. 31. *Cleisostoma appendiculatum* (Lindl.) Benth. & Hook.f. ex Jackson:
 a. habit; b. floral parts; c. column; d. pollinia.

Sarcanthus aspersum Reichb. f. in Hamb. Gartenz. 21 : 297. 1865; *Cleisostoma bicuspidatum* Hook. f., l.c. 6: 75. 1890; l.c. Pl. t. 2144. 1893. *Stereochilus bicuspidatus* (Hook. f.) King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 236. t. 314. 1898. *Sarcanthus khasiaensis* Tang & Wang in Acta. Phytolax. Sin. 1: 98. 1951.

Stems 3-5 cm high, few-leaved. *Leaves* 10-20 x 1.5-3 cm, linear-oblong; apex equally or unequally, acutely 2-lobed. *Inflorescence* few-flowered, 5-8 cm long, lax. *Flowers* ca 1.2 cm across, yellowish purple; *bracts* ca 3 mm long, pale brown; *pedicelled ovary* ca 6 mm long, yellowish green; *sepals* and *petals* ca 6 mm long, yellowish with purple mid-nerve; margins recurved; *sepals* ca 2.5 mm broad; dorsal oblong, obtuse; laterals obovate; *petals* ca 2 mm broad, oblong-obovate; *lip* 5-6 mm long, yellow pale purple flushed; side lobes broad, truncate; mid-lobe ovate, obtuse, incurved; spur 4-5 mm long, yellowish purple; callus sub-cordate; *column* ca 3 mm long, yellowish; *pollinia* oblong.

Fl.: Jul.

Nagaland: Dimapur, *Hynniewta* 80792; Tuli, *Hynniewta* 79924 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); MYANMAR, THAILAND.

3. ***Cleisostoma filiforme*** (Lindl.) Garay Bot. Mus. Leafl. Harv. 23 (4) : 171. 1972; Seidenf. in Dansk Bot. Ark. 29(3) : 55. t. 24. 1975. *Sarcanthus filiformis* Lindl. Bot. Reg. 28. Misc. 61. 1842; Hook. f., Fl. Brit. India 6 : 66. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 240. t. 319. 1898. Fig. 32

Stems 30-50 cm high, sometimes branched, slender, pendulous, many-leaved. *Leaves* 5-20 x 0.2-0.3 cm, terete, obtuse. *Inflorescence* many-flowered, lax, 15-20 cm long, sub-erect. *Flowers* ca 0.8 cm across, dark purple; *bracts* ca 2 mm long, purplish brown; *pedicelled ovary* 0.6-0.7 cm long, purplish; *sepals* and *petals* ca 3 mm long; *sepals* ca 4 x 1.5 mm, linear-oblong, obtuse; *petals* ca 3.5 x 1 mm, linear, acute; *lip* 5-6 mm long; side lobes whitish purple, triangular, obtuse, incurved; mid-lobe lilac, triangular, shortly acuminate; spur ca 3 mm long, white; callus sub-pentagonal, glabrous; *column* ca 2 mm long, purple; *pollinia* elliptic.

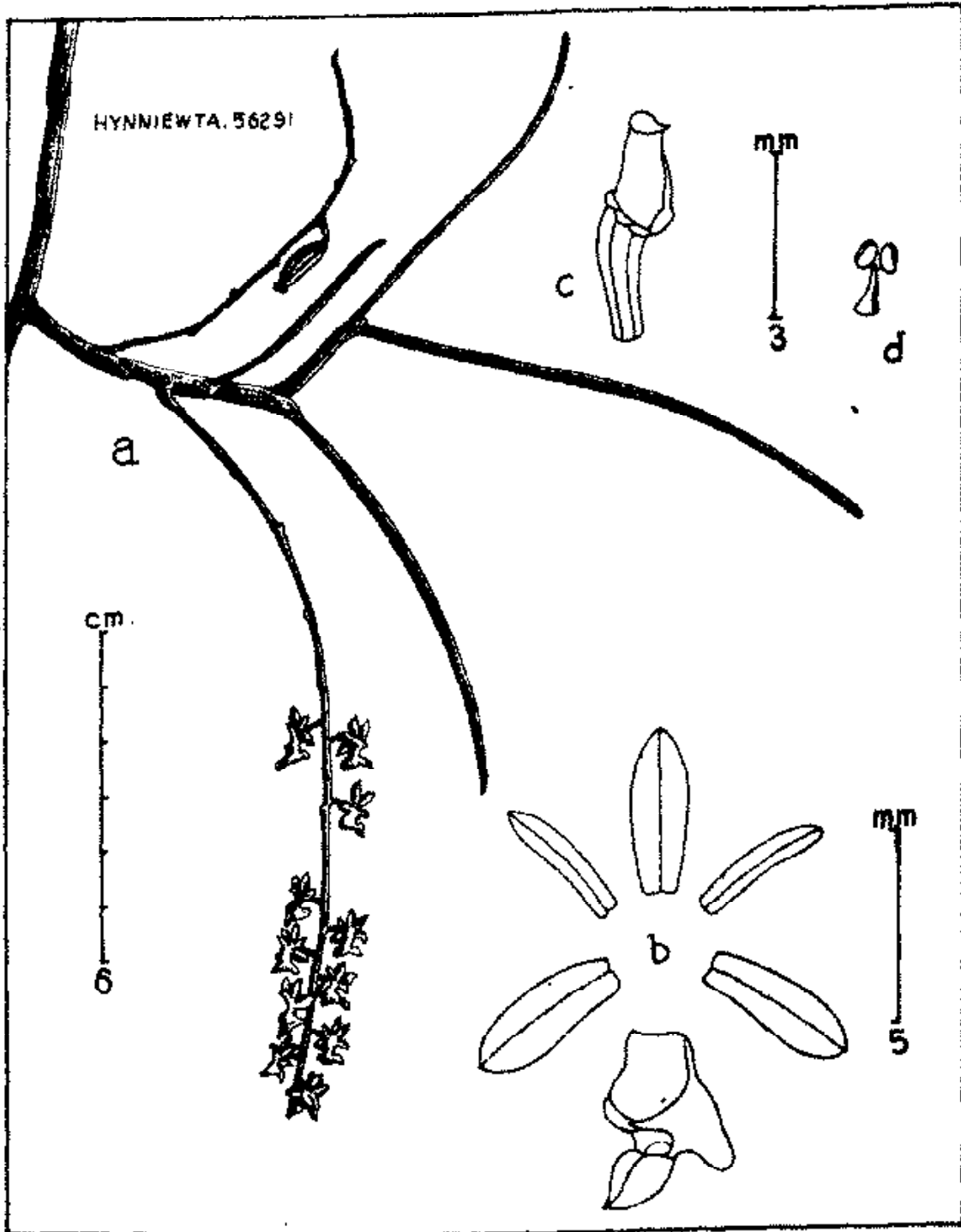


Fig. 32. *Cleisostoma filiforme* (Lindl.) Garay:
a. habit; b. floral parts; c. column; d. pollinia.

Fl.: Aug. - Sept.

Nagaland: Longkhim, *Hynniewta* 80953; Pulebadze, *Hynniewta* 56291, 80841; Tokye, *Hynniewta* 80907 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN, MYANMAR, CAMBODIA, LAOS, THAILAND, VIETNAM.

4. ***Cleisostoma paniculatum*** (Ker-Gawl.) Garay in Bot. Mus. Lefl. Harv. 23(4) : 173. 1972; Seidenf. in Dansk Bot. Ark. 29(3) : 37. t. 16. 1975. *Aerides paniculata* Ker-Gawl. in Bot. Reg. 3 : t. 220. 1817. *Vanda paniculata* (Ker - Gawl.) R. Br. in Bot. Reg. 6. sub. t. 516. 1820. *Sarcanthus paniculatus* (Ker - Gawl.) Lindl. in Bauer, Ill. Orch. Pl. t. 9. 1832.

Stems 30-50 cm high, with rugose internodes, many-leaved. *Leaves* 15-25 1.5 - 2.5 cm, lanceolate; apex unequally and obtusely 2-lobed. *In-florescence* many-flowered, 30-50 cm long, lax; panicle few-branched; branchlets long, erect or sub-erect. *Flowers* ca 1.0 cm across, greenish; *bracts* ca 2 mm long, greenish brown, ovate, acute; *pedicelled ovary* 0.6-0.7 cm long, green; *sepals* ca 5 cm long, greenish above, golden yellow with median purple blotches beneath; *dorsal* ca 2.5 mm broad, ovate, cuculate; apex crenate; *laterals* ca 2 mm broad, oblong; apex rounded; *petals* ca 4 x 1.5 mm, greenish, linear-oblong, acute or apiculate; *lip* 6-7 mm long, greenish yellow; side lobes oblong, obtuse, truncate; mid-lobe oblong, uncinata; apex triangular, acuminate; spur 3-4 mm long, green; *callus* sub-equally 4-lobed; *column* ca 2 mm long, purple; *pollinia* oblong.

Fl.: Jun. - Jul.

Nagaland: Tseminyu, *Hynniewta* 56254, 80724 (ASSAM).

Distr.: INDIA (Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland); CHINA, TAIWAN, THAILAND.

5. ***Cleisostoma racemiferum*** (Lindl.) Garay in Bot. Mus. Leafl. Harv. 23(4) : 173. 1972; Seidenf. in Dansk Bot. Ark. 29 (3) : 16. t. 4. 1975. *Saccolabium racemiferum* Lindl. Gen. & Sp. Orch. 224. 1833. *Sarcanthus racemifer* (Lindl.) Reichb. f. in Walp. Ann. 6 : 68. 1861. *S. pallidus* Lindl. in Edw. Bot. Reg. 27. Misc. 78. 1840; Hook. f., Fl.

Brit. India 6 : 68. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8: 241. t. 320. 1898. *S. lorifolius* par. ex Hook. f., *l.c.* 6 : 69. 1890.

Stems 10-15 cm high, stout, erect or arched, few-leaved. *Leaves* 10-20 x 2.0 - 3.5 cm, oblong; apex obtusely 2-lobed. *Inflorescence* many-flowered, lax, 25-40 cm long; panicle many-branched; branchlets long, sub-erect or drooping. *Flowers* ca 8 mm across, purplish yellow; *bracts* ca 1.5 mm long, pale brown; *pedicelled ovary* 0.9-1.0 cm long, pale green; *sepals* and *petals* yellow with 2 dark purple median bands, obtuse; *sepals* ca 4x2 mm, oblong; *petals* ca 3 x 1 mm, linear-oblong; *lip* ca 0.6 cm long, white; side lobes triangular, subulate, incurved; mid-lobe large, ovate, callus sub-equally 4-lobed, glabrous; *column* ca 2 mm long, white or pale yellow; *pollinia* ovoid.

Fl.: Jul. - Aug.

Nagaland: Melori, Hynniewta 80982 (ASSAM).

Distr.: INDIA (Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim); BHUTAN, BURMA, LAOS, NEPAL, THAILAND, MYANMAR, VIETNAM.

6. ***Cleisostoma striatum*** (Reichb. f.) Garay in Bot. Mus. Leaflet. Harv. 23(4) : 175. 1972; Seidenf. in Dansk Bot. Ark. 29 (3) : 42. t. 18. 1975; *Echioglossum striatum* Reichb. f. in Gard. Chron. n.s. 12 : 390. 1879; Hook. f., Fl. Brit. India 6 : 76. 1890. *Cleisostoma brevipes* Hook. f., *l.c.* 6 : 73. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 231. t. 307. 1898.

Stems 20-40 cm high, sometimes branched, with very rugose internodes, many-leaves. *Leaves* 10-25 x 1.5-3.0 cm, oblong-lanceolate, acute, often with a caudate or mucronate tip. *Inflorescence* many-flowered, 5-10 cm long, dense. *Flowers* ca 1.0 cm across, yellowish brown; *bracts* ca 2 mm long, greenish brown; *pedicelled ovary* 0.6-0.8 cm long, green; *sepals* and *petals* ca 5 mm long, orange yellow with 2 dark brown bands, obtuse; *sepals* ca 2 mm broad, broadly ovate-elliptic; dorsal concave; *petals* ca 1.5 mm broad, oblanceolate; *lip* ca 6 mm long, yellowish white; side lobes orange-yellow, triangular falcate with nearly caudate tips; mid-lobe white, triangular-hastate; apex decurved, with a bifurcate appendage; spur 3-4 mm long, orange-yellow; callus bi-lobed; *column* ca 2 mm long, orange yellow, red lined; *pollinia* sub-globose.

Fl.: Sept. - Oct.

Nagaland: Jafu Hills, *Hynniewta* 56217, 80839; Tiyie Hills, *Hynniewta* 80770 (ASSAM).

Distr.: INDIA (Assam, Nagaland, Sikkim); CAMBODIA, CHINA, LAOS, MALAYA, VIETNAM.

7. ***Cleisostoma subulatum*** Bl. Bijdr. 363. 1825; Seidenf. in Dansk Bot. Ark. 29(3) : 25. t. 9. 1975. *Sarcanthus secundus* Griff., Not. 3 : 362. 1848; *l.c.* Fl. 336. 1851; Hook. f., Fl. Brit. India 6 : 67. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 241. t. 321. 1898. *Sarcanthus subulatus* (Bl.) Reichb. f. in Bonplandia, 5 : 41. 1857. *S. oxyphyllus* Wall. ex Lindl. Hook. f., *l.c.* 6 : 70. 1890.

Stems 15-30 cm high, slender, pendulous, many-leaved. *Leaves* 3-15 x 0.5-1.2 cm, linear-lanceolate, acute or acuminate, constricted near the apex, often with a caudate or subulate tip. *Inflorescence* few-flowered, 3-5 cm long. *Flowers* ca 0.8 cm across, yellowish brown; *bracts* ca 1.5 mm long, green; *pedicelled ovary* 0.5-0.7 cm long, green; *sepals* and *petals* obtuse, pale lemon yellow with intra marginal dark brown bands; *sepals* ca 4 x 2 mm long, oblong; *petals* ca 3 x 1.5 mm, linear-oblong; *lip* 5-6 mm long, whitish pink; side lobes white, small, triangular, acute with forward and inward pointing nearly subulate tips; mid-lobe pale pink, keeled, broadly triangular, acute, sometimes with a small subulate tip; spur 5-6 mm long, pale lemon yellow; callus sub-rectangular, bilobed at base, glabrous; *column* ca 2 mm long, white; *pollinia* ovoid.

Fl.: Jul. - Aug.

Nagaland: Jafu Hills, *Bor* 1015, *Hynniewta* 80840; Tuensang, *Hynniewta* 80706 (ASSAM).

Distr.: INDIA (Assam Arunachal Pradesh, Meghalaya, Nagaland, Sikkim).

8. ***Cleisostoma williamsonii*** (Reichb. f.) Garay, Bot. Mus. Leafl. Harv. 23(4) : 176. 1972; Seidenf. in Dansk Bot. Ark. 29 (3) : 50. t. 21. 1975. *Sarcanthus williamsonii* Reichb. f. in Hamb. Gartenz. 21 : 333. 1865; Hook. f., Fl. Brit. India 6 : 67. 1890. **Fig. 33**

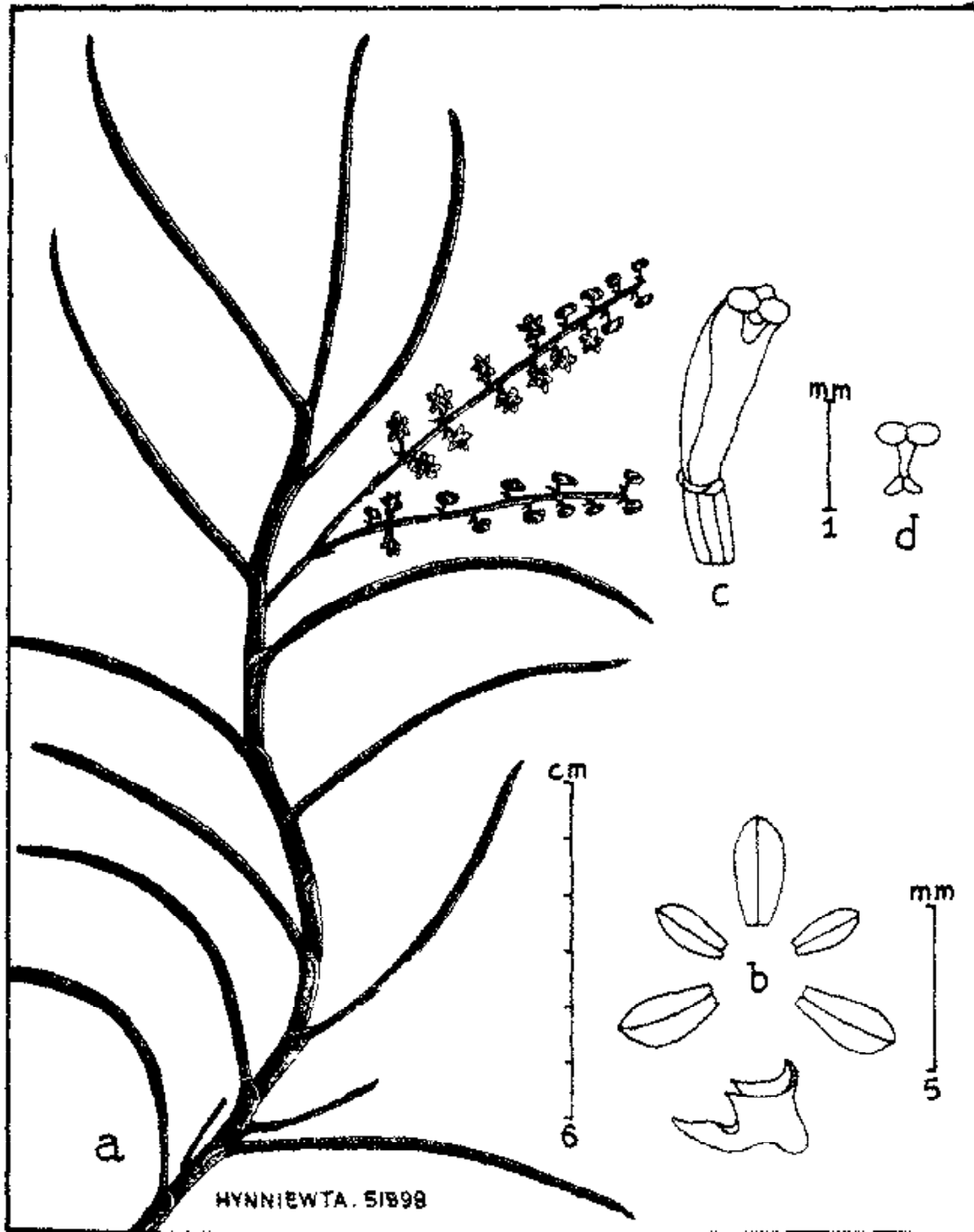


Fig. 33. *Cleisostoma williamsonii* (Reichb. f.) Garay:
 a. habit; b. floral parts; c. column; d. pollinia.

Stems 25-40 cm high, slender, sometimes branched, many-leaved. *Leaves* 6-15 x 0.2-0.3 cm, terete, acute or obtuse. *Inflorescence* many-flowered, lax, 15-20 cm long, sub-erect. *Flowers* ca 0.6 cm across, purplish pink; *bracts* ca 2 long, pale brown; *pedicelled ovary* 0.8-0.9 cm long, purplish brown; *sepals* ca 3 x 1.5 mm, ovate-oblong, obtuse; *petals* ca 2.5 x 1 mm, linear-oblong, acute; *lip* ca 0.6 cm long, purplish pink; side lobes triangular, acute, erect; mid-lobe triangular, ovate, acute or shortly subulate; spur ca 3 mm long, pale pink; callus sub-equally 4-lobed, hispid; *column* ca 1.5 mm long, dark purplish pink; *pollinia* elliptic.

Fl.: May - Jun.

Nagaland: Pulebadze, *Hynniewta* 56292; Tuensang, *Hynniewta* 51898, 80707 (ASSAM).

Distr.: INDIA (Andaman Islands, Assam, Nagaland); BHUTAN, BORNEO, MYANMAR, CAMBODIA, CHINA, JAVA, LAOS, MALAYA, SUMATRA, THAILAND, VIETNAM.

16. COELOGYNE Lindl.

- 1a. Inflorescence terminal, at the top of the pseudobulbs:
- 2a. Peduncle and rachis without enveloping sheaths ...14. *C. punctulata*
- 2b. Either the peduncle or rachis with enveloping sheaths:
- 3a. Peduncle with few loosely fitted enveloping sheaths at base:
- 4a. Inflorescence 1-2-flowered;
flowers more than 5.5 cm across;
margin of lip fimbriate, lamellae 3:
- 5a. Flowers ca 5.5 cm across; side lobes of lip fimbriate throughout, lamellae fimbriate ...4. *C. fimbriata*
- 5b. Flowers ca 6.0 cm across; side lobes of lip fimbriate at apex only; lamellae wavy or crenulate, not fimbriate ...12. *C. ovalis*
- 4b. Inflorescence few flowered;
flowers ca 1.7 cm or less across;
margin of lip entire; lamellae 5 ...9. *C. micrantha*

- 3b. Peduncle naked, rachis with many small tightly fitted enveloping sheaths:
- 6a. Inflorescence 1-racemed, not proliferating; rachis with sheaths at base of the raceme:
- 7a. Petals 4-5 mm broad, oblong-linear; margin of lip minutely or deeply fimbriate:
- 8a. Flowers ca 2.8 cm across, creamy; margin of lip minutely fimbriate; lamellae 2, crenulate18. *C. stricta*
- 8b. Flowers ca 7.5 cm across, white; margin of lip deeply fimbriate; lamellae 3, fimbriate1. *C. barbata*
- 7b. Petals 1-2 mm broad, linear or filiform; margin of lip entire, not fimbriate:
- 9a. Flowers ca 1.8 cm or less across, light brown; mid-lobe of lip oblong; side-lobes minutely serrulate; lamellae 5; column apex entire 6. *C. griffithii*
- 9b. Flowers ca 2.2 cm or more across, greenish yellow; mid-lobe of lip orbicular; side lobes entire; lamellae 3; column apex serrulate 16. *C. rigida*
- 6b. Inflorescence 2 or more racemed, proliferating; rachis with sheaths at base and at top of the raceme:
- 10a. Flowers brownish white or creamy; lamellae 315. *C. raizadai*
- 10b. Flowers brownish yellow or yellowish brown; lamellae 2:
- 11a. Column without wings; lamellae terminating at the apex of the mid-lobe ... 13. *C. prolifera*
- 11b. Column winged; lamellae terminating at the middle of the mid-lobe:
- 12a. Flowers ca 2.0 cm across; mid-lobe of lip broadly obovate; side lobes obovate, rounded 8. *C. longipes*
- 12b. Flowers ca 3.0 cm across; mid-lobe of lip orbicular or subquadrate; side-lobes oblong, obtuse 17. *C. schultesii*
- 1b. Inflorescence lateral, at the side of the pseudobulbs:

- 13a. Peduncle with many small, tightly fitted enveloping sheaths; inflorescence many-flowered, drooping; flowers creamy, 3.0 cm or less across 5. *C. flaccida*
- 13b. Peduncle with few large, loosely fitted enveloping sheaths; inflorescence few-flowered, erect or arched; flowers white, 5.0 cm or more across:
- 14a. Flowers 8.0 cm or more across; margin of sepals and petals crisped or undulate; lip without distinct coloured blotches; lamellae 5, fimbriate 3. *C. cristata*
- 14b. Flowers 7.0 cm or less across; margin of sepals and petals neither crisped nor undulate; lip with distinct coloured blotches; lamellae 3, not fimbriate:
- 15a. Lip with 1 golden yellow blotch bordered with reddish brown; margin of mid-lobe of lip crenulate; middle lamella longer than the outer 2 7. *C. hitendrae*
- 15b. Lip with 4 orange red blotches bordered with yellow; margin of mid-lobe of lip entire; middle lamella shorter than the outer 2:
- 16a. Inflorescence covered by new leafy shoots upto the top, erect 11. *C. occultata*
- 16b. Inflorescence not covered by new leafy shoots, arched:
- 17a. Flowers ca 5 cm across; lamellae entire 10. *C. nitida*
- 17b. Flowers ca 7 cm across; lamellae crenulate 2. *C. corymbosa*

1. ***Coelogyne barbata*** Griff., Itin. Not. Pl. 72. 1848; Hook. f., Fl. Brit. India 5 : 839. 1890.

Pseudobulbs 7-9 cm high, clustered or distant, ovoid. *Leaves* 20-40 x 4-6 cm, elliptic-lanceolate, acute. *Inflorescence* few-flowered, 25-50 cm long, erect. *Flowers* ca 7.5 cm across, white; *bracts* 3-3.5 cm long, cymbiform, acute, caducous; *pedicelled ovary* 2-3 cm long, white; *sepals* sub-equal, ca 3.8 x 1.0 cm, lanceolate, acute; *petals* ca 3.6 x 0.5 cm, oblong-linear, acute; *lip* ca 4.0 cm long, brown inside, white outside; side lobes round, fimbriate; mid-lobe ovate, acute, deeply fimbriate; lamellae 3, unequal, dark brown, fimbriate; outer 2 longer, terminating upto the apex of the mid-lobe; *column* ca 2.0 cm long, white; wings entire, sometimes erose; *pollinia* oblong.

Fl.: Oct. Nov.

Nagaland: Chakabama, *Hynniewta* 74563; Kohima, *Bor* 22364 (ASSAM), *Prain* 35 (CAL); Mokokchung, *Hynniewta* 79971, 80381; Merima, *Hynniewta* 80729; Mon, *Hynniewta* 79936; Pulebadze, *Kataki* 60244, *Malhotra* 75205 (ASSAM), *Prain* 36 (CAL); Tokye, *Hynniewta* 80911; Tuensang, *Hynniewta* 80949; Zunhebato, *Hynniewta* 80805 (ASSAM).

Distr.: INDIA (N. E. India); BHUTAN, MYANMAR.

2. ***Coelogyne corymbosa*** Lindl., *Fol. Orch.* 7. 1854; Hook. f., *Fl. Brit. India*, 5 : 831. 1890; King & Pantl. in *Ann. Roy. Bot. Gard. Calc.* 8 : 134. t. 185. 1898.

Pseudobulbs 3-4 cm high, clustered, elliptic or top-shaped, ridged. *Leaves* 12 - 18 x 3 - 4 cm, elliptic lanceolate, acute. *Inflorescence* few-flowered, 15-25 cm long, arched. *Flowers* ca 7 cm across, white; *bracts* 2-2.5 cm long, lanceolate, acute, caducous; *sepals* and *petals* ca 3.5 cm long, acute; *sepals* ca 1.0 cm broad, oblong-lanceolate; *petals* ca 0.5 cm broad, lanceolate; *lip* ca 3.6 cm long, white, brown streaked and 4 orange-red bordered yellow blotches; side lobes rounded; mid-lobe ovate, acute, entire; lamellae 3, unequal, white, crenulate; outer 2 longer, terminating upto the blotches of the mid-lobe; *column* ca 2.0 cm long, white; wings obscurely erose; *pollinia* oblong.

Fl.: Apr. - May.

Nagaland: Barak range, *Hynniewta* 80998; Pulebadze, *Malhotra* 75202 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim, West Bengal); BHUTAN, MYANMAR, CHINA, NEPAL.

3. ***Coelogyne cristata*** Lindl. in *Coll. Bot. Sub t.* 33. (Textus). 1821; Hook. f., *Fl. Brit. India* 5 : 829. 1890; King & Pantl. in *Ann. Roy. Bot. Gard. Calc.* 8 : 134. t. 185. 1898.

Pseudobulbs 5-8 cm high, clustered or distant, ovoid-oblong. *Leaves* 15-25 x 2-3 cm, lanceolate, acuminate. *Inflorescence* few-flowered, 15-25 cm long, arched. *Flowers* ca 8 cm across, white; *bracts* ca 2 cm long,

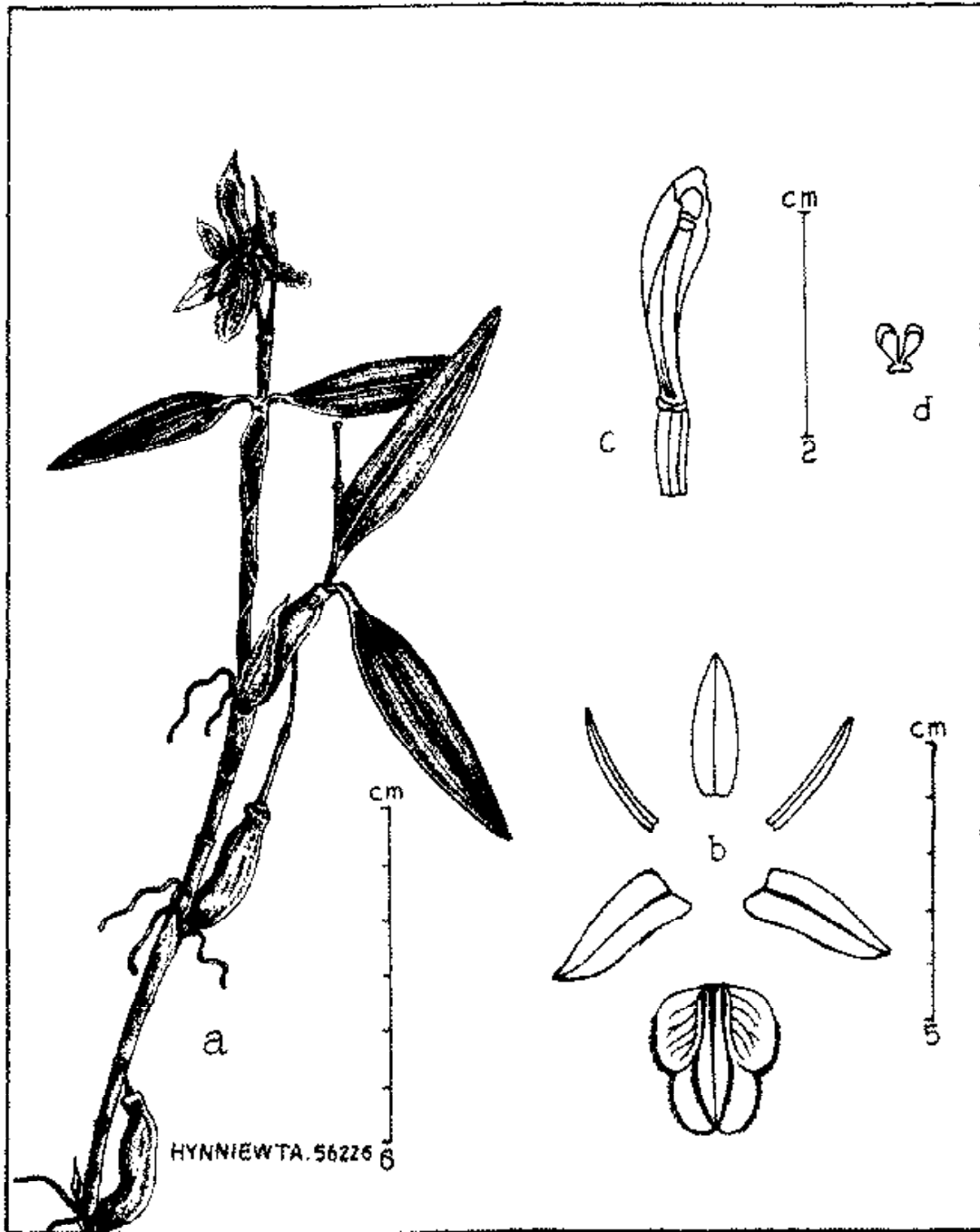


Fig. 34. *Coelogyne fimbriata* Lindl.:
 a. habit; b. floral parts; c. column; d. pollinia.

lanceolate, acute, persistent; *sepals* and *petals* ca 4 x 1 cm, lanceolate, acute; margins crisped or undulate; *lip* ca 4 cm long, white, tinged with yellow; side lobes broadly oblong, rounded; mid-lobe rhomboid, acute; lamellae 5, unequal, yellow, fimbriate; outer 2 longer, terminating upto the mid-lobe forming raised plates; *column* ca 3 cm long, white; wings entire; *pollinia* oblong.

Fl.: Feb. - Apr.

Nagaland: Jhaluki, *Kataki s.n.*; Peren, *Hynniewta* 80995 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim, Uttar Pradesh, West Bengal); BHUTAN, CAMBODIA, JAVA, LAOS, NEPAL, TIBET, VIETNAM.

4. ***Coelogyne fimbriata*** Lindl. in Bot. Reg. 11. t. 868. 1825; Hook. f., Fl. Brit. India 5 : 836. 1890; Seidenf. in Dansk Bot. Ark. 29 (4) : 15, fig. 4. 1975. Fig. 34

Pseudobulbs 3-6 cm high, distant, oblong, sub-rotund, cylindrical or fusiform. *Leaves* 10-15 x 1.0-2.5 cm, lanceolate or linear-oblong, acute. *Inflorescence* 1-2-flowered, 3-5 cm high, erect. *Flowers* ca 5.5 cm across, yellow; *bracts* 2.5 - 3 cm long, lanceolate, acute, caducous; *sepals* and *petals* ca 2.8 cm long, acute; *sepals* ca 0.6 cm broad, lanceolate; *petals* ca 0.2 cm broad, filiform; *lip* 2.7 - 2.8 cm long, yellow; side lobes yellow, dark brown streaked, fimbriate; mid-lobe rounded or oblong, fimbriate; apex acute or emarginate; lamellae 3, unequal, dark brown, fimbriate; outer 2 longer, terminating near the apex of the mid-lobe; *column* ca 2 cm long, pale brown; wings entire or erose; *pollinia* oblong.

Fl.: Sept. - Oct.

Nagaland: Kiphire, *Hynniewta* 80976; Koio, *Hynniewta* 80713; Satakha, *Hynniewta* 80862; Tseminyu, *Hynniewta* 56226 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim) BHUTAN, MYANMAR, CAMBODIA, CHINA, LAOS, MALAYSIA, NEPAL, THAILAND, VIETNAM.

5. ***Coelogyne flaccida*** Lindl., Gen. & Sp. Orch. 39. 1830; Hook. f., Fl. Brit. India 5 : 829. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 133. t. 183. 1898; Seidenf. in Dansk Bot. Ark. 29 (4) : 38. 1975.

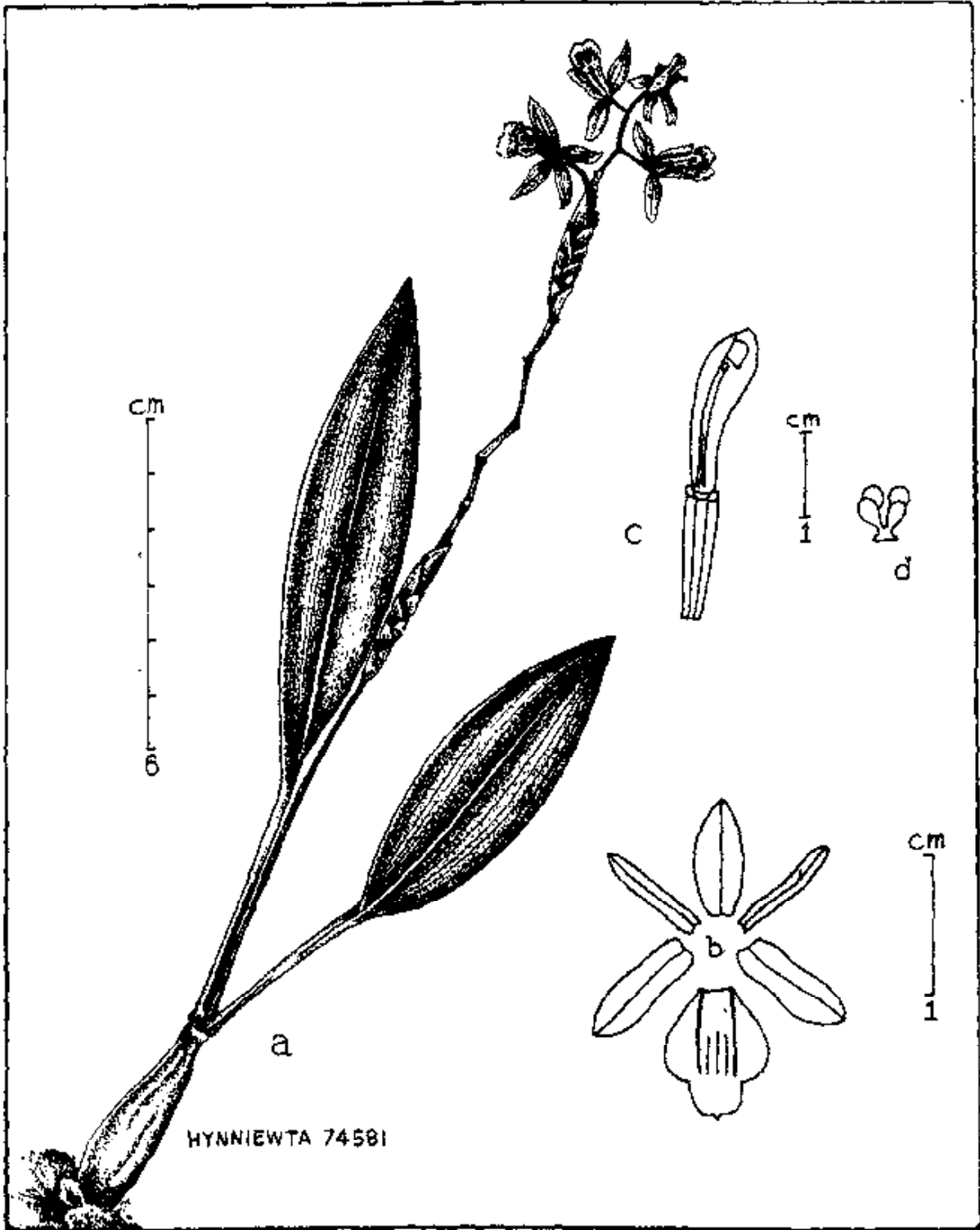


Fig. 35. *Coelogyne griffithii* Hook. f.:
 a. habit; b. floral parts; c. column; d. pollinia.

Pseudobulbs 5-8 cm high, clustered or distant, ovoid-cylindric, ridged. *Leaves* 15-20 x 3-4 cm, oblong-lanceolate, acute. *Inflorescence* many-flowered, 20-30 cm long, arched and drooping. *Flowers* ca 3.0 cm across, creamy; *bracts* ca 2 cm long, lanceolate, acute, caducous; *sepals* and *petals* ca 1.5 cm long; *sepals* ca 0.5 cm broad, linear-oblong, acute; *petals* ca 0.3 cm broad, linear-lanceolate, acute or acuminate; *lip* 1.5-1.6 cm long, creamy; side lobes oblong or rounded, reddish brown streaked; mid-lobe ovate, acute, entire or minutely erose; lamellae 3, unequal, reddish brown, wavy; outer 2 longer, terminating at the base of mid-lobe; *column* 1.0-1.1 cm long, creamy; wings erose; *pollinia* oblong.

Fl.: Mar. - Apr.

Nagaland: Jhaluki, Hynniewta 74547 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim & Western Himalayas); MYANMAR, LAOS, NEPAL, THAILAND.

6. *Coelogyne griffithii* Hook. f., Fl. Brit. India 5 : 838. 1890; Ic. Pl. t. 2108. 1894. Fig. 35

Pseudobulbs 4-7 cm high, distant, oblong, ridged, *Leaves* 15-30 x 3-4 cm, oblong-lanceolate, acute. *Inflorescence* few-flowered, 15-20 cm long, erect. *Flowers* ca 1.8 cm across, light brown; *bracts* ca 2 cm long, lanceolate, acute, caducous; *sepals* sub-equal, acute; dorsal ca 8 x 3.5 mm, linear-oblong; laterals ca 9 x 2.5 mm, linear-lanceolate; *petals* ca 8 x 1 mm, filiform; *lip* ca 0.8 cm long, pale brown; side lobes rounded, minutely serrulate, with a broad dark brown patch in the middle; mid-lobe oblong, truncate; lamellae 5, pale brown, unequal in the middle of the disc; outer 2 longer, terminating upto the base of lip; *column* ca 1.0 cm long, brownish; wings entire; *pollinia* obovate.

Fl.: Apr. - May.

Nagaland: Kohima, Bor 2761, Hynniewta 74581 (ASSAM).

Distr.: N. E. India.

7. *Coelogyne hitendrae* Das & Jain in Orch. Rev. 86 : 195. 1978.

Pseudobulbs 4-5 cm high, oblong-elliptic, ridged. *Leaves* 15-20 x 3-4 cm, elliptic-oblong, acute. *Inflorescence* 1-2-flowered, 8-10 cm long, erect. *Flowers* ca 5.0 cm across, white; *bracts* ca 1.8 cm long, lanceolate, acute, caducous; *sepals* and *petals* ca 2.5 cm long, acute; *sepals* 0.9-1.0 cm broad, oblong-lanceolate; *petals* ca 0.6 cm broad, lanceolate; *lip* 2.5-2.6 cm long, white with a continuous reddish-brown bordered golden yellow blotch; *side lobes* rounded; *mid-lobe* broadly ovate, acute, undulate, crenulate; *lamellae* 3, unequal, white, crenulate, middle longer, terminating beyond the blotch; *column* ca 2.0 cm long; *wings* crose or serrulate; *pollinia* oblong.

Fl.: Apr. - May.

Nagaland: Pulebadze, Katakí and Hynniewta 60202 (ASSAM).

Distr.: INDIA (Nagaland) - Endemic.

8. **Coelogyne longipes** Lindl., Fol. Orch. 10. 1854; Hook. f., Fl. Brit. India 5 : 839. 1890 (non King & Pantl., 1898); Seidenf. in Dansk Bot. Ark. 29 (4) : 80. t. 34. 1975.

Pseudobulbs 4-7 cm high, cylindric or narrowly ovoid. *Leaves* 25-30 x 2-3 cm, lanceolate, acuminate. *Inflorescence* few-flowered, 20-50 cm long, erect, proliferating. *Flowers* ca 2.0 cm across, yellowish brown or brown; *bracts* ca 1 cm long, lanceolate, acute, caducous; *sepals* ca 1.0 x 0.5 cm, ovate, acute; *petals* ca 0.9 x 0.1 cm, filiform, acuminate; *lip* ca 1.1 cm long, light brownish yellow; *side lobes* obovate, rounded; *mid-lobe* tinged with brown, broadly obcordate, retuse; *margin* undulate; *lamellae* 2, equal, brownish yellow, terminating in the middle of mid-lobe; *column* ca 0.8 cm long; *wings* entire; *pollinia* oblong.

Fl. : May - Jun.

Nagaland: Kohima, Meobold 6999, Prain 46 (CAL); Pulebadze, Hynniewta 56261, Katakí 60219; Zumpha, Malhotra 75162; Zunhebato, Hynniewta 80806, 80353 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN, MYANMAR, CAMBODIA, LAOS, THAILAND, VIETNAM.

9. *Coelogyne micrantha* Lindl. in Gard. Chron. 173. 1855; Hook. f., Fl. Brit. India 5 : 836. 1890 et 6: 184. 1890. *C. papagena* Reichb. f. in Bot. Zeit. 214. 1862.

Pseudobulbs 2.5-4 cm high, oblong to obovoid. *Leaves* 8-15 x 1.5-2.0 cm, lanceolate, acute or acuminate. *Inflorescence* few-flowered, 5-7 cm long, erect or arched. *Flowers* ca 1.7 cm across, pale brown; *bracts* ca 1 cm long, lanceolate, acute, caducous; *sepals* and *petals* ca 1.0 cm broad, filiform; *lip* ca 1.0 cm long, yellowish brown; side lobes narrowly oblong, yellowish brown inside, deep brown outside; mid-lobe broadly oblong, yellowish brown with dark brown spots; margin undulate; base cuneate; lamellae 5, unequal, fimbriate or tuberculate; outer 2 longer, terminating upto the sinus of the mid-lobe; *column* ca 0.7 cm long; wings obscure; *pollinia* oblong.

Fl.: Feb. - Mar.

Nagaland: Pulebadze, *Hynniewta* 56264; Tseminyu, *Hynniewta* 55475; Zunhebato, *Hynniewta* 80356 (ASSAM).

Distr.: INDIA (N. E. India); MYANMAR.

10. *Coelogyne nitida* (Wall. ex D. Don) Lindl., Gen. & Sp. Orch. 40. 1830; Seidenf. in Dansk Bot. Ark. 29(4) : 53. t. 20. 1975. *Cymbidium nitidum* Wall. ex D. Don Prodr. Fl. Nepal, 35 1825 (non *C. nitidum* Roxb., 1832). *Coelogyne ochracea* Lindl., Bot. Reg. 20. t. 69. 1846; Hook. f., Fl. Brit. India 5 : 831. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 132. t. 182. 1898. Fig. 36

Pseudobulbs 3-5 cm high, oblong-cylindric. *Leaves* 15-20 x 2.5-3.5 cm, oblong-lanceolate, acute. *Inflorescence* few-flowered, 20-25 cm long, arched. *Flowers* ca 5.0 cm across, white; *bracts* ca 2 cm long, lanceolate, acute, caducous; *sepals* and *petals* 2.5-2.6 cm long, acute; *sepals* ca 0.8 cm broad, oblong-lanceolate; *petals* ca 0.5 cm broad, linear-oblong; *lip* ca 2.5 cm long, white, with 4 orange-red bordered yellow blotches; side lobes rounded, entire or serrulate, white with brownish-orange streaks; mid-lobe broadly ovate, undulate, acute; lamellae 3, unequal, white; outer 2 longer, terminating at the blotches; *column* ca 1.0 cm long; wings entire; *pollinia* oblong.

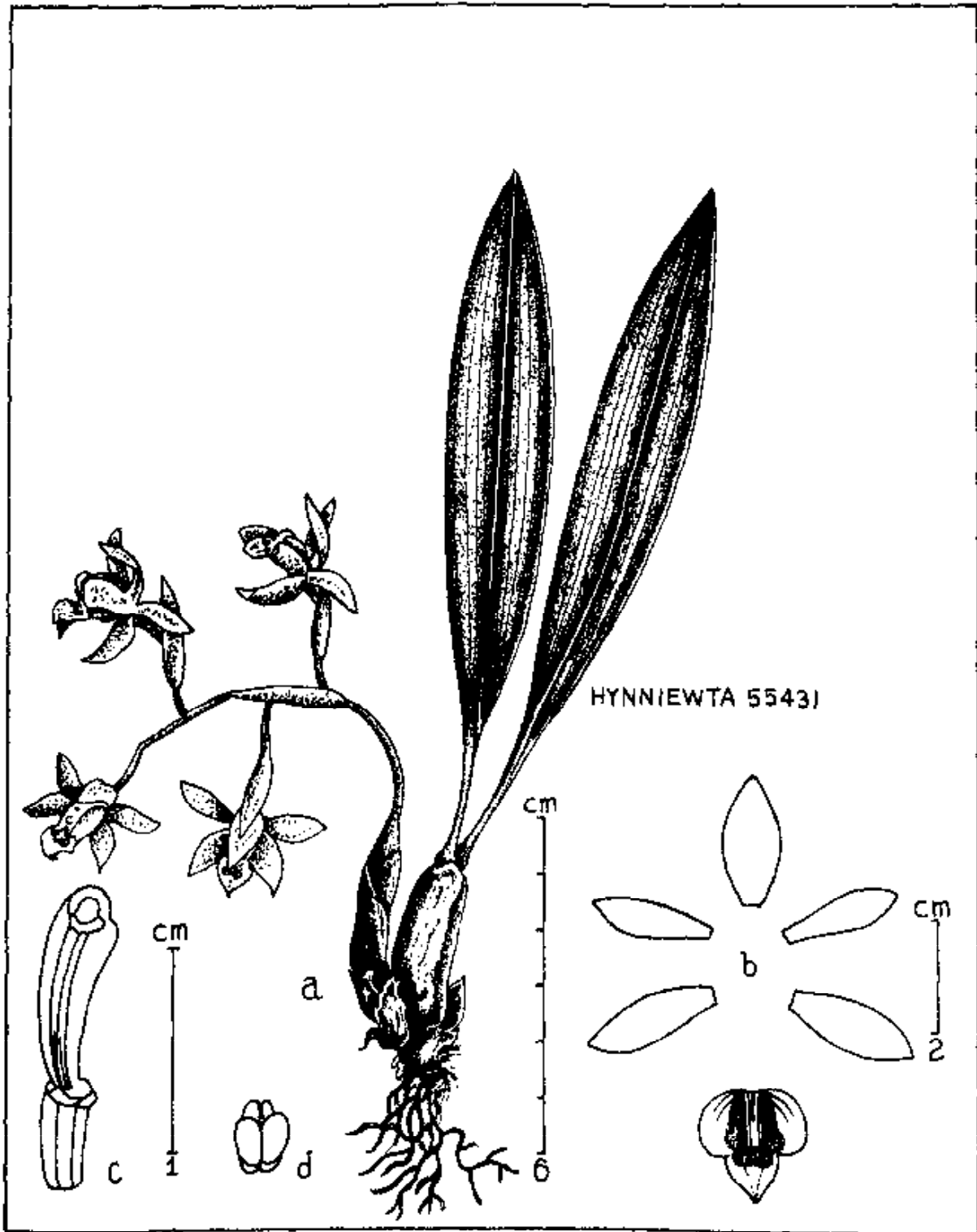


Fig. 36. *Coelogyne nitida* (Wall. ex D. Don) Lindl.:
 a. habit; b. floral parts; c. column; d. pollinia.

Fl.: Jun.

Nagaland: Khonoma, *Hynniewta* 55431, 80992 (ASSAM); Pulebadze, *Prain s.n.* (Acc. No. 454596 - CAL).

Distr.: INDIA (N. E. India, Sikkim, Uttar Pradesh, West Bengal); BANGLA DESH, BHUTAN, MYANMAR, CHINA, LAOS, NEPAL, THAILAND.

11. *Coelogyne occultata* Hook. f., Fl. Brit. India 5 : 832. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 135. t. 186. 1898.

Pseudobulbs 3-4 cm high, elliptic-turbinate. *Leaves* 4-8 x 1.1-1.8 cm, elliptic-oblong, acute. *Inflorescence* 1-2-flowered, 8-12 cm long. *Flowers* ca 6.0 cm across, white; *bracts* ca 2 cm long, lanceolate, acute, caducous; *sepals* and *petals* ca 3.0 cm long, acute; *sepals* ca 0.9 cm broad, linear-oblong; *petals* ca 0.6 cm broad, linear-lanceolate; *lip* ca 1.8 cm long, white, with orange-red bordered yellow blotches; side lobes broadly oblong, rounded, reddish brown streaked; mid-lobe ovate, acute, entire; lamellae 3, unequal, white, entire; outer 2 longer, terminating upto the blotches; *column* ca 1.2 cm long; wings entire or erose; *pollinia* oblong.

Fl.: Jun. - Jul.

Nagaland: Kohima, *Hynniewta* 74503; Jafu Hills, *Hynniewta* 74586 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim, West Bengal); BHUTAN.

12. *Coelogyne ovalis* Lindl. in Bot. Reg. 24 : 91. Misc. 191. 1838; Hook. f., Fl. Brit. India 5 : 836. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 135. t. 187. 1898; Seidenf. in Dansk Bot. Ark. 29(4) : 23. t. 6. 1975. *C. fimbriata* auct. non Lind. 1830.

Pseudobulbs 3.5 - 7.5 cm high, narrowly ovoid to fusiform. *Leaves* 9-16 x 2.5 - 3.5 cm, lanceolate, acute. *Inflorescence* 1-2-flowered, 3.5 - 7.5 cm long, erect. *Flowers* ca 3 cm long, ovate-lanceolate, acute, caducous; *sepals* ca 3.1 x 1.0 cm, lanceolate, acute; *petals* ca 3.1 x 0.1-0.2 cm, filiform or linear, acute; *lip* ca 3 cm long, yellowish brown; side lobes oblong,

obtuse; apex fimbriate; mid-lobe rounded or oblong; margins fringed with long black hairs; lamellae 3, blackish brown, wavy or crenulate; outer 2 longer, terminating near the apex of the mid-lobe; *column* ca 1.8 cm long; wings entire or minutely erose; *pollinia* obovate.

Fl.: Sept. - Oct.

Nagaland: Pulebadze, *Hynniewta* 56277; Tuensang, *Hynniewta* 80931 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim & Western Himalayas); MYANMAR, CAMBODIA, CHINA, LAOS, NEPAL, THAILAND, TIBET, VIETNAM.

13. ***Coelogyne prolifera*** Lindl., Gen. & Sp. Orch. 40. 1830 (excl. Hooker's Coll. Khasi Hills); Hook. f., Fl. Brit. India 5 : 828. 1890. *C. flavida* Wall. ex Lindl. Fol. Orch. 10. 1854; Hook. f., l. c. 5 : 839. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 138. t. 191. 1898; Seidenf. in Dansk Bot. Ark. 29(4): 82. t. 36. 1975. Fig. 37

Pseudobulbs 3-5 cm high, narrowly ovoid to ovoid. *Leaves* 10-16 x 1.5-2.8 cm, lanceolate, acuminate. *Inflorescence* a raceme, from 8 upto 35 cm long, terminal, proliferating; *peduncle* naked at base, rachis sheathed below and above the raceme; *raceme* 2 to many, arched, 4-9-flowered. *Flowers* ca 1.4 cm across, brownish yellow; *bracts* ca 1.0 cm long, lanceolate, acuminate, caducous; *sepals* ca 0.7 x 0.4 cm, ovate, acute; *petals* ca 0.6 x 0.1 cm, filiform, obtuse; *lip* ca 0.7 cm long, light purplish-yellow; side lobes oblong, obtuse; mid-lobe broadly obcordate, reflexed; margins undulate; lamellae 2, equal, purple terminating in the middle of mid-lobe; *column* ca 0.5 cm long, without wings; *pollinia* obovate.

Fl.: May - June.

Nagaland: Kohima, *Prain* 47 (CAL); Jhaluki, *Kataki* 60223; Pulebadze, *Hynniewta* 56235, *Kataki* 60225, 60226; Zunhebato, *Hynniewta* 80352 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN, MYANMAR, CAMBODIA, LAOS, NEPAL, THAILAND, VIETNAM.

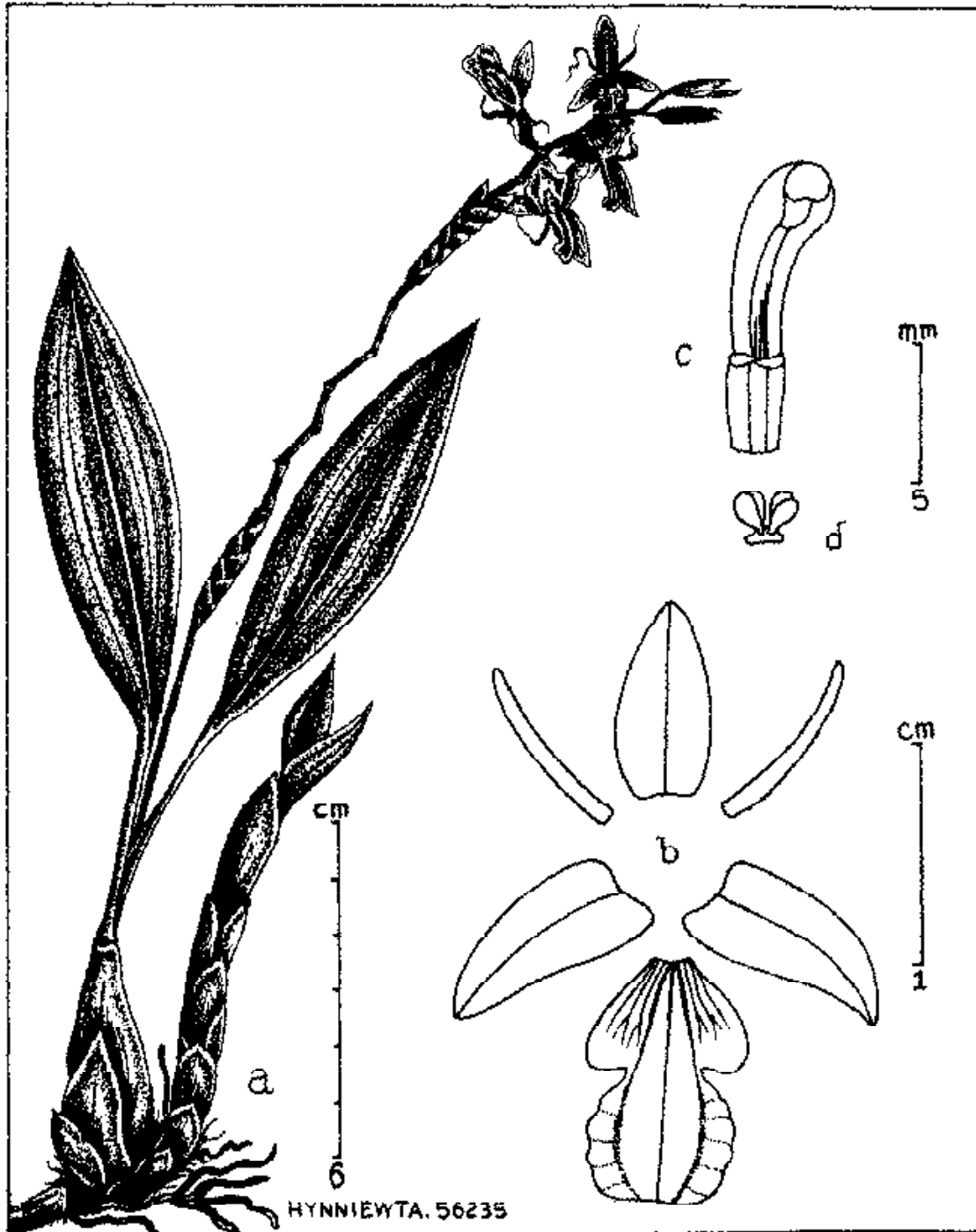


Fig. 37. *Coetogyne proliifera* Lindl.:
 a. habit; b. floral parts; c. column; d. pollinia.

14. **Coelogyne punctulata** Lindl. in Coll. Bot. Sub t. 33 (Textus) 1821. *C. ocellata* Lindl., Gen. & Sp. Orch. 40. 1830 Seidenf. in Dansk Bot. Ark. 29(4) : 57. t. 21. 1975. *C. goweri* Reichb. f. in Gard. Chron, 443. 1869. *C. nitida* (Roxb.) Hook. f., Fl. Brit. India 5 : 1890. *Cymbidium nitidum* Roxb. Fl. Ind. 3: 459. 1832, (non Wall. ex Don, 1825).

Fig. 38

Pseudobulbs 2.5-6 cm high, ovoid or sub-globose. *Leaves* 20-25 x 2-4 cm, lanceolate, acuminate. *Inflorescence* few-flowered, 12-20 cm long, erect or sub-erect. *Flowers* ca 6.0 cm across, white; *bracts* ca 3 cm long, lanceolate, acute, caducous; *sepals* ca 3.2 x 1.3 cm, oblong-lanceolate, acute; *petals* ca 3.1 x 0.7 cm, linear-lanceolate, acute; *lip* ca 3.0 cm long, white, with 4 orange-red bordered golden yellow blotches; side lobes oblong-ovate, rounded; mid-lobe broadly or narrowly ovate, acute, reflexed, undulate; lamellae 3, unequal, white, crenulate; outer 2 longer, terminating at the blotches; *column* ca 1.7 cm long; wings entire; *pollinia* obovate.

Fl.: Apr. - May.

Nagaland: Dimapur, *Hynniewta* 74505; Kohima, *Malhotra* 75156; Melori, *Hynniewta* 60149; Pulebadze, *Hynniewta* 56170, *Malhotra* 75197; Tseminyu, *Hynniewta* 60177; Tiye Hills, *Hynniewta* 80760; Tuensang, *Hynniewta* 80938 (ASSAM).

Distr.: INDIA (N. E. India); BHUTAN, MYANMAR, NEPAL, THAILAND.

15. **Coelogyne raizadae** Jain & Das in Proc. Ind. Acad. Sci. 87 B : 119. 1978. *C. longipes* auct. (non Lindl., 1854): King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 136. t. 189. 1898.

Pseudobulbs 5-8 cm long, narrowly ovoid or cylindric. *Leaves* 12-20 x 1.8-2.2 cm, lanceolate, acuminate. *Inflorescence* few-flowered, 25-30 cm long, erect or sub-erect, proliferating. *Flowers* ca 3.0 cm across, white; *bracts* ca 1.5 cm long, oblong-lanceolate, acute, caducous; *sepals* ca 1.5 x 0.6 cm, oblong-lanceolate, acute; *petals* ca 1.3 x 0.1 cm, filiform, acute; *lip* ca 1.5 cm long, white or creamy; side lobes narrowly oblong, pale orange brown at apex; mid-lobe oblong or obcordate, undulate; lamellae 3, unequal, whitish yellow; outer 2 longer, terminating near the apex of the mid-lobe; *column* ca 1.1 cm long; wings obscure; *pollinia* ovate.

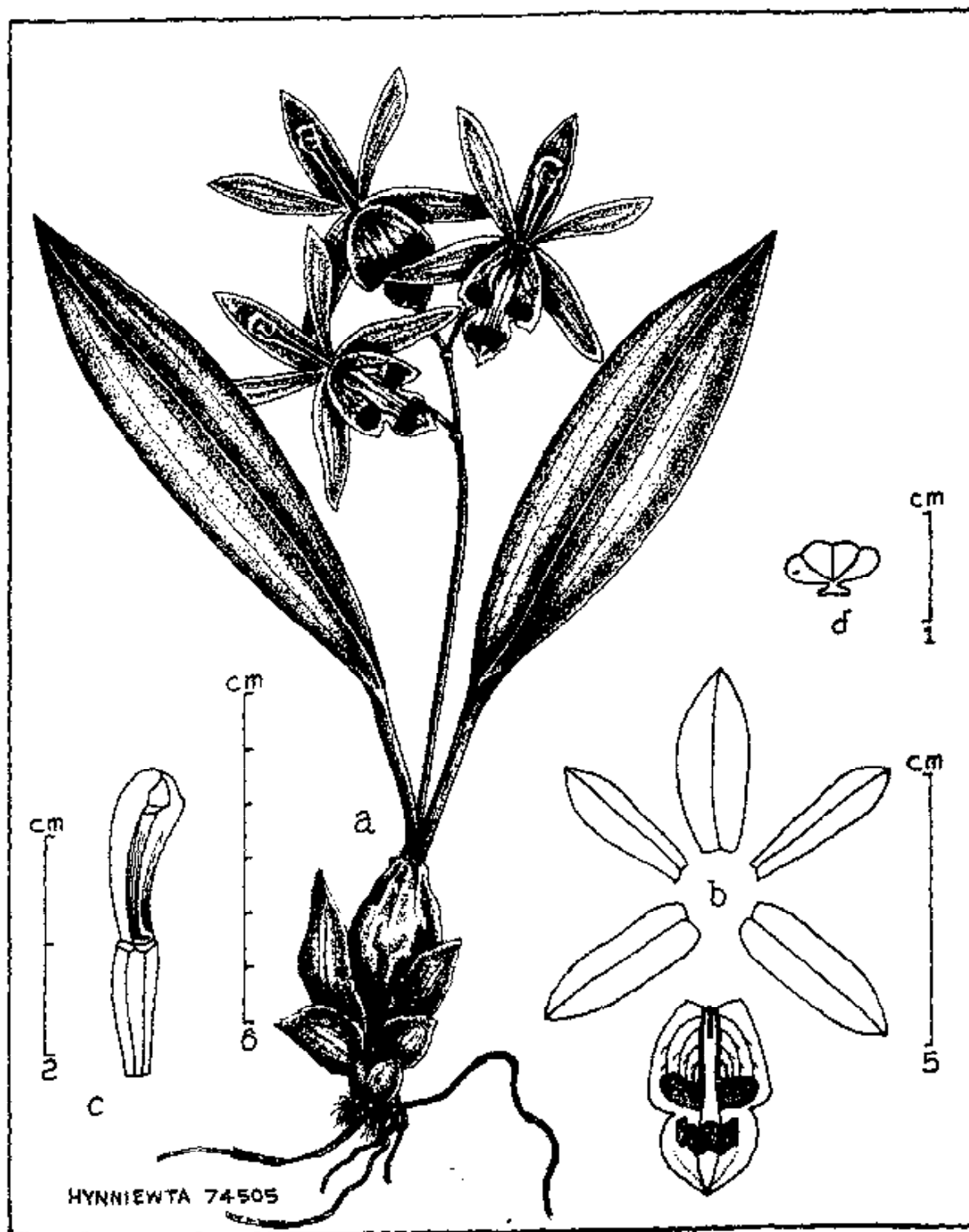


Fig. 38. *Coelogyne punctulata* Lindl.:
a. habit; b. floral parts; c. column; d. pollinia.

Fl.: May.

Nagaland: Pulebadze, *Kataki s.n.* (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN.

16. ***Coelogyne rigida*** Par. & Reichb. f. in Trans. Linn. Soc. 30 : 146. 1874; Hook. f., Fl. Brit. India 5 : 839. 1890 ; Seidenf. in Dansk Bot. Ark. 29 (4) : 73. t. 30. 1975.

Pseudobulbs 6-10 cm high, oblong elliptic, ridged. *Leaves* 15-25 x 2.5-4 cm, lanceolate or oblong-lanceolate, acute. *Inflorescence* many-flowered, 20-35 cm long, erect or sub-erect. *Flowers* ca 2.2 cm across, greenish yellow; *bracts* ca 2 cm long, elliptic, acute, caducous; *sepals* ca 1.1 x 0.6 cm, lanceolate-oblong, acute; *petals* ca 1.0 x 0.2 cm, linear, acute; *lip* ca 1.5 cm long, brownish green, 3-lobed; side lobes rounded, light brown ringed; mid-lobe sub-orbicular, retuse; lamellae 3, unequal, dark brown, undulate; outer 2 longer, terminating in the middle of the mid-lobe; *column* ca 1.0 cm long; wings entire or serrulate; *pollinia* oval.

Fl.: Jun. - Jul.

Nagaland: Kiphere, *Hynniewta* 80977; Kohima, *Hynniewta* 50881 (ASSAM).

Distr.: INDIA (Nagaland); MYANMAR, THAILAND.

17. ***Coelogyne schultesii*** Jain & Das in Proc. Ind. Acad. Sci. 87 B : 119. 1978. *C. prolifera* auct. (non Lindl., 1830); King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 137. t. 190. 1898.

Pseudobulbs 4-6 cm high, ovoid or ellipsoid. *Leaves* 15-20 x 1.5-3 cm, lanceolate, acuminate. *Inflorescence* few-flowered, 30-60 cm long, erect or sub-erect, proliferating. *Flowers* ca 3.0 cm across, brownish yellow to orange brown; *bracts* ca 1.5 cm long, elliptic, acute, caducous; *sepals* ca 1.5 x 0.7 cm, oblong-lanceolate, acute; *petals* ca 1.5 x 0.2 cm, filiform or linear, acute; *lip* ca 1.4 cm long, brownish yellow; side lobes triangular-oblong, obtuse, orange brown at the apex; mid-lobe orbicular or sub-quadrate, retuse; lamellae 2, brown, terminating in the middle of the mid-lobe; *column* ca 1.1 cm long; wings entire; *pollinia* oval.

Fl.: Mar. - May.

Nagaland: Medziphema, *Hynniewta* 74581A; Tseminyu, *Hynniewta* 56222, 56295 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN, MYANMAR, NEPAL, THAILAND.

18. *Coelogyne stricta* (Don) Schltr. in Fedde Repert. Beih. 6 : 184. 1919; *Cymbidium strictum* Don, Prodr. Fl. Nepal. 35. 1825. *Coelogyne elata* Lindl., Gen. & Sp. Orch. 40. 1830; Hook. f., Fl. Brit. India 5 : 838. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 136. t. 188. 1898.

Pseudodbulbs 3.5-6.5 cm long, distant, oblong. *Leaves* 20-30 x 3.5-4.5 cm, oblong-lanceolate, acute. *Inflorescence* many-flowered, 30-45 cm long, erect. *Flowers* ca 4.0 cm across, creamy; *bracts* ca 2 cm long, rhomboid, acute, caducous; *sepals* ca 2.0-0.7 cm, oblong-lanceolate, acute; *petals* ca 1.8x0.4 cm, oblong-linear, acute; *lip* ca 2.0 cm long, creamy white or yellowish white; side lobes ovate, acute, yellow tipped; apex minutely fimbriate; mid-lobe ovate-oblong or rounded, yellow tinged, minutely fimbriate; lamellae 2, equal, creamy white, crenulate, terminating upto two-third of the mid-lobe; *column* ca 1.3 cm long; wings erose; *pollinia* ovate.

Fl.: Mar. - Apr.

Nagaland: Jhaluki, *Hynniewta* 74547 (ASSAM).

Distr.: INDIA (N. E. India, Uttar Pradesh, Sikkim); BHUTAN, MYANMAR, NEPAL

17. CRYPTOCHILUS Wall.

- 1a. Flowers large, more than 1.8 cm long, secund, puberulous, scarlet red; bracts shorter than the flowers; column puberulous in front; pollinia green, cuneate2. *C. sanguinea*
- 1b. Flowers small, less than 0.6 cm long, not secund, glabrous, yellow; bracts longer than the flowers; column glabrous, yellow; bracts longer than the flowers; column glabrous; pollinia yellow, entire1. *C. lutea*

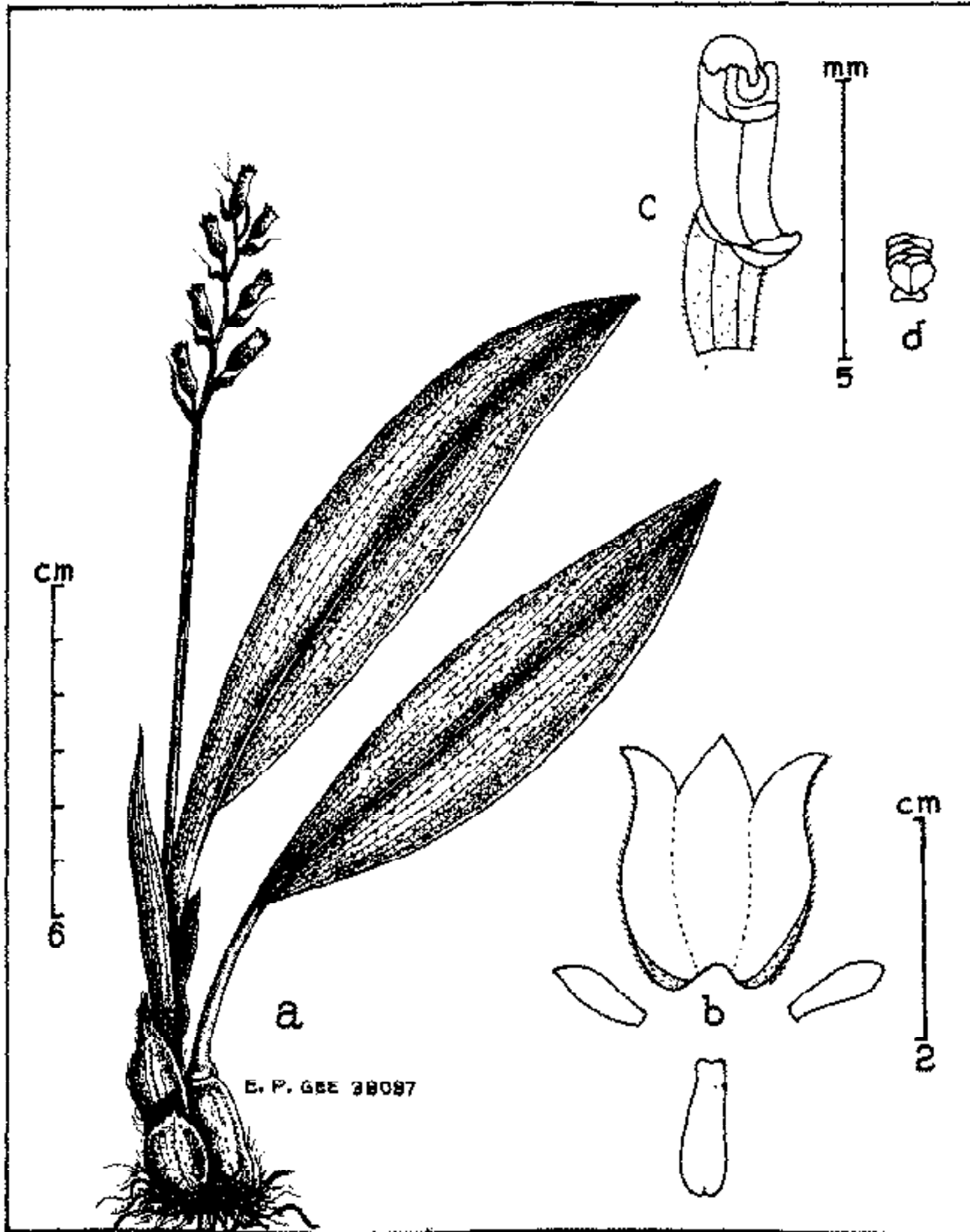


Fig. 39. *Cryptochilus sanguinea* Wail.:
 a. habit; b. floral parts; c. column; d. pollinia.

1. **Cryptochilus lutea** Lindl. in Journ. Linn. Soc. 3: 20. 1859; Hook. f., Fl. Brit. India 5: 827. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8: 163. t. 221. 1898.

Pseudobulbs 3.5 - 7 x 0.8 - 1 cm, narrowly oblong to cylindrical. *Leaves* 10-15 x 1.5-2.5 cm, lanceolate-elliptic, acute, fleshy. *Inflorescence* 15-20 cm long, not secund. *Flowers* 0.5-0.6 cm long, yellow, glabrous; *bracts* 0.8-1 cm long, greenish brown; *pedicelled ovary* 0.4-0.5 cm long, yellow, pubescent; *sepaline tube* urceolate, yellow, glabrous, free apical parts narrow, triangular, pale yellow; *petals* ca 4 mm long, yellow, oblanceolate, obtuse; *lip* ca 4 mm long, yellow, lanceolate-oblong; hypochile slightly curved; epichile broader at the apex, grooved; *column* ca 2 mm long, yellow, glabrous; *pollinia* oblong.

Fl.: May - June.

Nagaland: Melori, *Hynniewta* 74533; Mokokchung, *Hynniewta* 80388; Tuensang, *Hynniewta* 80531 (ASSAM).

Distr.: INDIA (Arunachal Pradesh, Manipur, Meghalaya, Nagaland, Sikkim, Uttar Pradesh); BHUTAN.

2. **Cryptochilus sanguinea** Wall., Tent. Fl. Nepal. 36. t. 26. 1826; Hook. f., Fl. Brit. India 5 : 827. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 163. t. 220. 1898. Fig. 39

Pseudobulbs 3-3.5 x 2.5 - 3 cm, ovoid to elliptic. *Leaves* 10-20 x 2-3.5 cm, linear-oblong, acute, coriaceous. *Inflorescence* 15-25 cm long, secund. *Flowers* 1.8 - 2 cm long, scarlet red, pubescent; *bracts* 1.6 - 1.7 cm long, dull brownish, puberulous; *pedicelled ovary* 0.6-0.7 cm long, dull brownish, puberulous; *pedicelled ovary* 0.6-0.7 cm long, scarlet red, pubescent; *sepaline tube* gibbous at base, scarlet red with scattered white hairs; free apical parts reddish white, broad, triangular; *petals* 0.8-0.9 cm long, yellow, oblanceolate, obtuse; *lip* 1-1.1 cm long, yellow, lanceolate-oblong; hypochile curved; epichile broader towards apex, smooth; tip sometimes retuse; *column* ca 3 mm long, yellow, puberulous in front; *pollinia* cuneately oblong.

Fl.: June - July.

Nagaland: Kiphere, *Hynniewta* 80978 (ASSAM): Kohima, *Prain* 9 (CAL); Pulebadze *Hynniewita* 56271 (ASSAM), *Prain s.n.* (Acc. No. 434240 - CAL.).

Distr.: INDIA (Arunachal Pradesh, Manipur, Meghalaya, Nagaland, Sikkim); BHUTAN, NEPAL.

18. CYMBIDIUM Sw.

- 1a. Pseudobulb absent, leafless herbs;
inflorescence arising from the root-stocks 9. *C. macrorhizon*
- 1b. Pseudobulb present, leafy herbs;
inflorescence arising from the pseudobulbs:
- 2a. Pseudobulbs few-leaved;
leaves petioled, oblong-lanceolate:
- 3a. Pseudobulbs ovoid, less than 4 cm high, 1-noded;
leaves recurved; flowers yellowish green,
purple spotted at base of sepals and
petals; lip lamellae straight 11. *C. tigrinum*
- 3b. Pseudobulbs fusiform, more than 6 cm high,
few-noded; leaves not recurved; flowers white,
with pink mid-nerve on the petals; lip
lamellae converging in the middle 7. *C. lancifolium*
- 2b. Pseudobulbs many-leaved; leaves sessile, linear:
- 4a. Inflorescence 1-2 flowered; lip with 1 lamella 4. *C. eburneum*
- 4b. Inflorescence few to many-flowered;
racemose; lip with 2 lamellae:
- 5a. Raceme lax; sepals and petals spreading;
lamellae parallel, not touching each other,
- 6a. Leaf apex acutely 2-fid;
sepals and petals white, pink tipped 10. *C. mastersii*
- 6b. Leaf apex obtusely 2-fid;
or acute to acuminate; sepals and
petals greenish, yellowish or brownish
with or without coloured stripes:
- 7a. Leaf apex obtusely 2-fid; peduncle
much shorter than the raceme, covered
with few sheaths at base; lamellae
notched in the middle 1. *C. aloifolium*

- 7b. Leaf apex acute or acuminate; peduncle as long as or longer than the raceme, covered with many sheaths, more than half of its length, lamellae continuous, not notched:
- 8a. Inflorescence erect; sepals and petals pure green; lamellae glabrous 3. *C. cyperifolium*
- 8b. Inflorescence arched; sepals and petals greenish or yellowish with distinct coloured stripes; lamellae pubescent.
- 9a. Leaves less than 20 cm broad; sepals and petals green, purplish brown striped; mid-lobe of lip white with brownish purple spots; lamellae short, terminating below the base of mid-lobe 8. *C. longifolium*
- 9b. Leaves more than 30 mm broad; sepals and petals yellowish, reddish brown striped; mid-lobe of lip yellowish with brown transverse blotches; lamellae long, terminating above the base of mid-lobe .. 6. *C. iridioides*
- 5b Raceme dense; sepals and petals connivent; lamellae not parallel, converging, touching each other at their apices:
- 10a. Sepals, petals and lip, all light ochraceous yellow; mid-lobe of lip glabrous; margin entire; base with 1 pubescent callus 5. *C. elegans*
- 10b. Sepals and petals greenish brown; lip speckled with red; mid-lobe of lip pubescent; margin crenulate; base without callus 2. *C. cochleare*
1. ***Cymbidium aloifolium*** (Linn.) Sw. in Nov. Act. Soc. Sci. Upsal. 6 : 73. 1799; Wight, Icon. 5(1): 11. t. 1687 & 1688. 1851; Hook. f., Fl. Brit. India 6 : 10. 1890. *p.p.*; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 189. t. 252. 1898. *Epidendrum aloifolium* Linn., Sp. pl. 853. 1753. *Cymbidium bicolor* Hook. f., l. c. 6 : 11. 1890. *C. pendulum* (Roxb.) Sw. : King & Pantl. in l. c. 8 : 188. t. 251. 1898.

Epiphytes. *Pseudobulbs* short, broad. *Leaves* 30-55 x 2-4 cm, linear; apex obtusely 2-fid. *Inflorescence* many-flowered, 25-50 cm long, arched, pendulous. *Flowers* ca 4.5 cm across, yellowish, with purple mid-nerve; *bracts* 2-3 mm long, pale brown ovate, acute; *pedicelled ovary* 1.8-2.0 cm, purplish yellow; *sepals* 2.2 - 2.3 x 0.5 - 0.6 cm, oblong-lanceolate

obtuse; *petals* 2.0-2.1 x 0.4- 0.5 cm, linear-oblong, obtuse; *lip* 2.0 - 2.2 cm long, yellowish with purple lines; side lobes erect, oblong, obtuse; mid-lobe ovate, acute, reflexed; lamellae 2, yellowish; *column* 1-1.1 cm long, purplish; *pollinia* pyramidal.

Fl.: May - Jun.

Nagaland : Jakhama, *Malhotra* 75287; Mokokchung, *Hynniewta* 79965; Rangapahar, *Hynniewta* 80789; Tseminyu, *Malhotra* 75287 A (ASSAM).

Distr.: Throughout India; BANGLA DESH, MYANMAR, CAMBODIA, SRI LANKA, CHINA, LAOS, SUMATRA, VIETNAM.

2. ***Cymbidium cochleare*** Lindl. in Journ. Linn. Soc. 3 : 28. 1859; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 194. t. 260. 1898. *Cyperorchis cochleare* (Lindl.) Benth. in Journ. Linn. Soc. 18 : 318. 1881; Hook. f., Fl. Brit. India 6 : 15. 1890.

Pseudobulbs long, narrow. *Leaves* 40-70 x 1-1.5 cm, linear; apex finely acuminate. *Inflorescence* many-flowered, 40-60 cm long, arched and drooping. *Flowers* ca 4.0 cm long, greenish brown; *bracts* ca 2 cm long, pale brown, triangular, acute; *pedicelled ovary* ca 2 cm long, brownish violet; *sepals* and *petals* ca 4.0 x 0.5 - 0.6 cm, oblong-lanceolate, obtuse; *lip* ca 4.0 cm long, yellow, speckled with red; side lobes triangular, acute; mid-lobe sub-orbicular, pubescent; margins undulate; lamellae 2, pale yellow; *column* ca 3.5 cm long, pubescent at base, pale green; *pollinia* pyriform.

Fl.: Sept. - Oct.

Nagaland: Tiye Hills, *Hynniewta* 80757; Tuensang, *Hynniewta* 80630; Zunhebato, *Hynniewta* 80368 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); MYANMAR.

3. ***Cymbidium cyperifolium*** Lindl., Gen. & Sp. Orch. 163. 1833; Hook. f., Fl. Brit. India 6 : 13. 1890 (excl. *C. haematodes* Lindl.); King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 186. t. 248. 1898. *C. viridiflorum* Griff., Itin. Notes 126. n. 454. 1851.

Terrestrials. *Pseudobulbs* short, very narrow. *Leaves* 30-60 x 0.6-1.0 cm, linear, finely acuminate. *Inflorescence* few-flowered, 30-60 cm long, erect. *Flowers* ca 6 cm across, green; *bracts* 2.5-3.0 cm long, purplish green; *sepals* and *petals* ca 3 x 0.6-0.7 cm, ovate-oblong or ovate-lanceolate, acute; *lip* 2.5-2.6 cm long, greenish-purple; side-lobes greenish, purple streaked, erect, round; mid-lobe greenish with few purple blotches, ovate or ovate-oblong, obtuse, reflexed; lamellae 2, greenish yellow; *column* 1.2-1.5 cm long, purplish green; *pollinia* ovoid.

Fl.: Oct. - Nov.

Nagaland: Khonoma, *Hynniewta* 74517; Kohima, *Hynniewta* 80817 (ASSAM), Prain 12 (CAL).

Distr.: INDIA (N. E. India, Sikkim & Western Himalayas); BHUTAN, JAVA, THAILAND.

4. *Cymbidium eburneum* Lindl. in Bot. Reg. 10: t. 67. 1847; Hook. f., Fl. Brit. India 6 : 11. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 196. t. 262. 1898.

Epiphytes. *Pseudobulbs* short, broad. *Leaves* 30-45 x 0.8 - 1.2 cm, linear; apex acutely 2-fid. *Inflorescence* 1-2-flowered, 15-20 cm long sub-erect. *Flowers* 10-11 cm across, pure white; *bracts* 1-1.2 cm long, pale green, ovate, acuminate; *pedicelled ovary* 3.7-4 cm long, pale green; *sepals* 5-5.5 x 1.8-2.0 cm, ovate-oblong; dorsal obtuse; laterals notched; *petals* 5.2 - 5.3 x 1.5-1.8 cm, oblong, acute; *lip* 5.5-6 cm long, white; side lobes white narrow, obtuse, incurved; mid-lobe white with a yellow blotch, ovate, acute, slightly deflexed; margin crisped, crenulate; lamella 1, ridged, pubescent; *column* 3.5 - 4 cm long, purplish white; *pollinia* oblong or ovoid.

Fl. : Mar. - Apr.

Nagaland: Tokye, *Hynniewta* 80897; Tseminyu, *Hynniewta* 56238 (ASSAM).

Distr.: INDIA (N.E. India, Sikkim); BHUTAN, MYANMAR, MALAYA, NEPAL.

5. **Cymbidium elegans** Lindl., Gen. & Sp. Orch. 163. 1832; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 194. t. 259. 1898. *Cyperorchis elegans* (Lindl.) Bl. Rumphia, 4 : 47. 1836; Hook. f., Fl. Brit. India 6 : 14. 1890.

Pseudobulbs short, broad. *Leaves* 40-60 x 1.6-1.8 cm, linear; apex acutely bifid. *Inflorescence* many-flowered, dense, 35-50 cm long, drooping. *Flowers* 3.6-3.8 cm long, light ochreous yellow; *bracts* ca 2 mm long, pale brown, acute; *pedicelled ovary* 1.5 - 2 cm long, greenish yellow; *sepals* and *petals* 3.6-3.8 x 0.4 - 0.6 cm, linear-oblong, or oblanceolate, acute; tips concave; *lip* ca 3.8 cm long, slightly recurved, light ochreous yellow; base with a pubescent callus; side lobes ovate-oblong, acute; mid-lobe sub-orbicular or obcordate; lamellae 2; *column* ca 3 cm long, slightly arched above, pubescent at base, light ochreous yellow; *pollinia* ovoid.

Fl.: Oct. - Nov.

Nagaland: Changtongia, *Hynniewta* 79999; Medziphema, *Hynniewta* 80799; Pulebadze, *Hynniewta* 56201; Satakha, *Hynniewta* 80872; Tuensang, *Hynniewta* 80942; Zunhebato, *Hynniewta* 80365 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN, NEPAL.

6. **Cymbidium iridioides** D. Don, Prodr. Fl. Nepal 36. 1825; Hook. f. Fl., Brit. India, 6 : 14. 1890; *C. giganteum* Lindl., Gen & Sp. Orch. 163. 1833 (non Sw., 1800); Hook. f., l. c. 6 : 12. 1890; King & Pantl. in Ann. Roy Bot. Gard. Calc. 8 : 191. t. 255, 1898.

Epiphytes. *Pseudobulbs* long, very broad. *Leaves* 30-50 x 3-4 cm, linear, acute or acuminate. *Inflorescence* many-flowered, 30-50 cm long, arched. *Flowers* ca 10 cm across, yellowish, reddish brown striped; *bracts* 2-3 mm long, yellowish-green, triangular, acute; *pedicelled ovary* 4-5 cm long, yellowish-green; *sepals* and *petals* ca 5 cm long, obtuse; *sepals* 1.5 - 1.8 cm broad, oblong; *petals* 1.0 - 1.2 cm broad, linear oblong; *lip* 4.5-5.0 cm long, greenish-brown, puberulous; side lobes yellowish green, reddish brown striped, ovate, acute; mid-lobe yellowish green with large reddish brown transverse blotches, ovate-oblong, acute, reflexed; margin undulate, ciliolate; lamellae 2, greenish yellow, pubescent, terminating above the base of mid-lobe; *column* 2-2.2 cm long, greenish brown; *pollinia* ovoid.

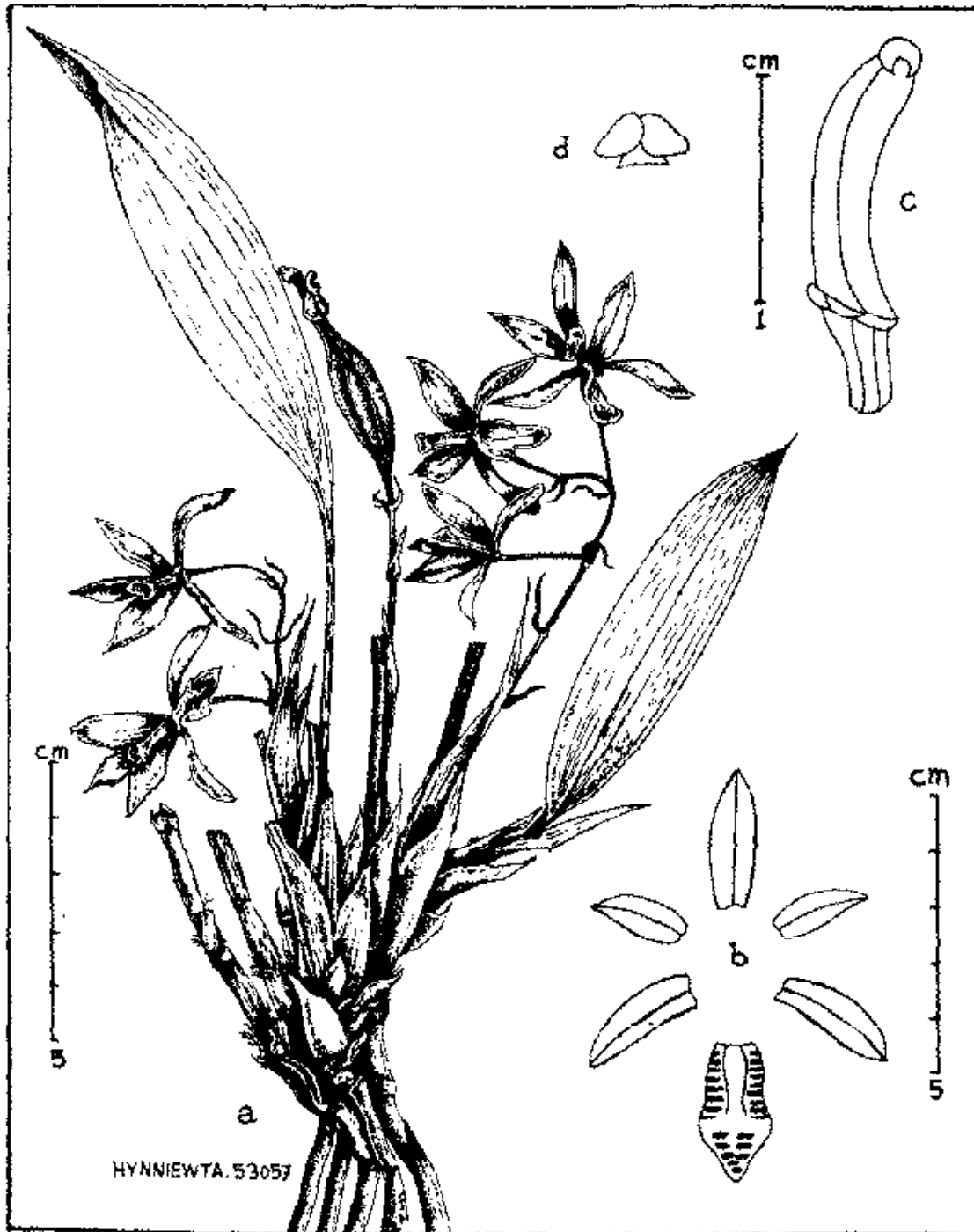


Fig. 40. *Cymbidium lancifolium* Hook. f. :
a. habit; b. floral parts; c. column; d. pollinia.

Fl.: Oct. - Nov.

Nagaland: Kohima, *Hynniewta* 80814; Pulebadze, *Hynniewta* 56180; Saramati, *Hynniewta* 80963; Tseminyu, *Hynniewta* 56059. Zunhebato, *Hynniewta* 80567 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim & Western Himalayas); BHUTAN, MYANMAR, CAMBODIA, LAOS, MALAYA, NEPAL VIETNAM.

7. ***Cymbidium lancifolium*** Hook., Exot. Fl. 1: t. 81. 1823; Hook. f., Fl. Brit. India 6 : 9. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8: 185. t. 247. 1898. Fig. 40

Terrestrial. *Pseudobulbs* 6-8 cm long, fusiform. *Leaves* 15-20 x 2-3 cm, oblong-lanceolate, acute. *Inflorescence* few-flowered, 10-15 cm long, erect or sub-erect. *Flowers* ca 4.5 cm across, white with pink mid-nerve on the petals; *bracts* 1-1.2 cm long, lanceolate, acute, purplish-green; *pedicelled ovary* 2.2 - 2.5 cm long, purplish-green; *sepals* 2.2 - 2.3 x 0.5 - 0.6 cm, oblong, acute; *petals* 1.5 - 1.6 x 0.4-0.5 cm, elliptic-oblong, acute; *lip* 1.8-1.9 cm long, grooved; side lobes with transverse purple streaks, suppressed, round; mid-lobe with scattered purple spots, ovate, acute or obtuse; lamellae 2, purplish white, convergent in the middle; *column* 1.4-1.5 cm long, white with purple stripes in front; *pollinia* sub-globose.

Fl.: May - Jun.

Nagaland: Jafu Hills, *Hynniewta* 53057, 56216 (ASSAM); Kohima, Prain 24 (CAL); Koio, *Hynniewta* 80712; Mon, *Hynniewta* 79917; Zunhebato, *Hynniewta* 80851 (ASSAM).

Distr.: INDIA (N.E. India, Sikkim); BHUTAN, CAMBODIA, CHINA, JAPAN, JAVA, LAOS, MALAYA, NEPAL, THAILAND, VIETNAM.

8. ***Cymbidium longifolium*** D. Don. Prodr. Fl. Nepal. 36 1825; Hook. f., Fl. Brit. India 6 : 13. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 191. t. 254. 1898. *C. erythraeum* Lindl. in Journ. Linn. Soc. 3 : 30. 1859.

Epiphytes. *Pseudobulbs* long, narrow. *Leaves* 45-75 x 1.5 - 2.0 cm, linear, acuminate. *Inflorescence* many-flowered, 40-60 cm long, arched.

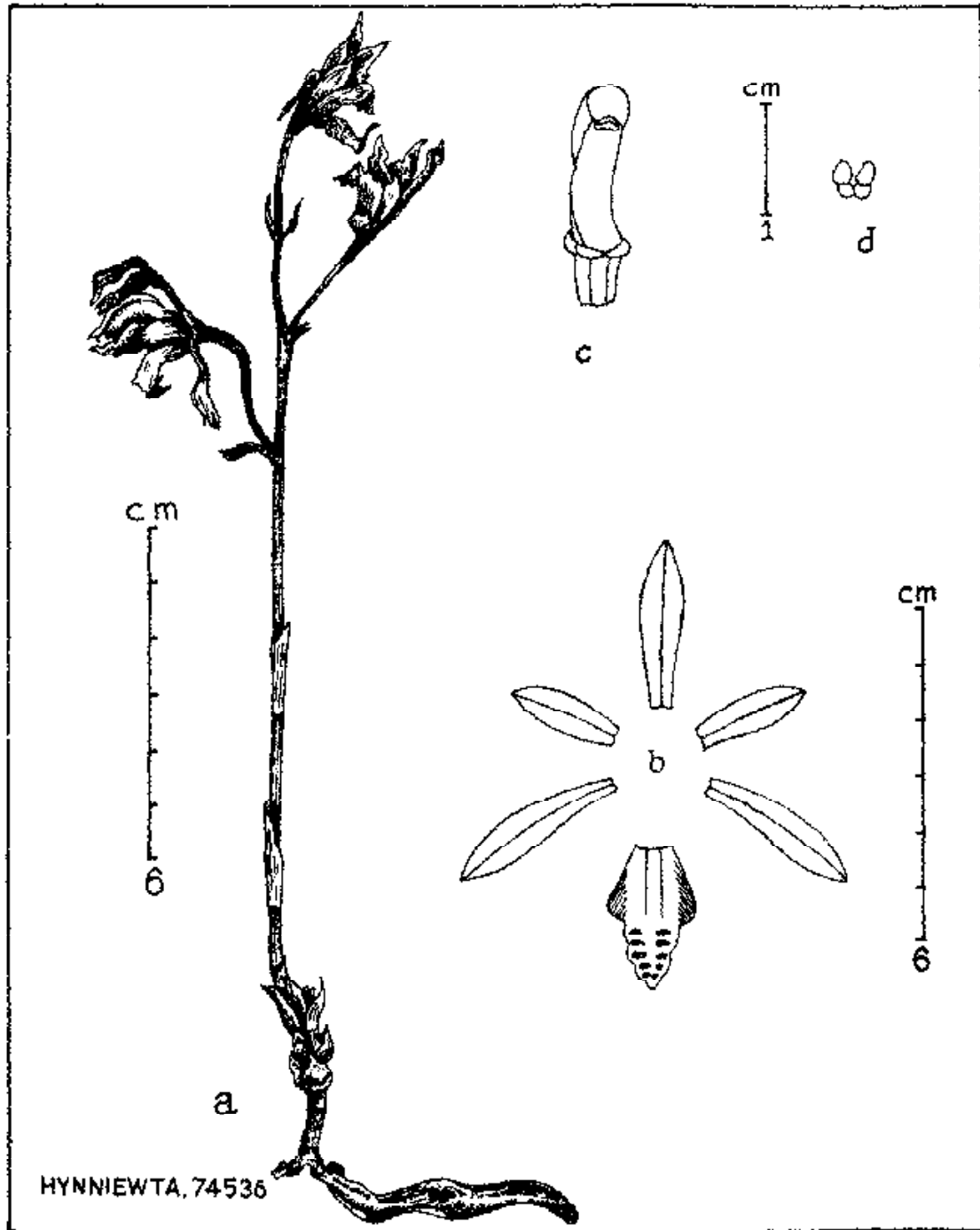


Fig. 41. *Cymbidium macrorhizon* Lindl.:
a. habit; b. floral parts; c. column; d. pollinia.

Flowers ca 8 cm across, greenish, purplish brown striped; *bracts* 2-3 mm long, greenish, triangular, acute; *pedicelled ovary* 2.5-3.0 cm long, greenish purple; *sepals* and *petals* ca 4 x 1-1.2 cm, lanceolate, acute, sub-falcate; *lip* 4-4.2 cm long, purplish yellow; side lobes purplish brown striped, ovate, acute; mid-lobe white, with few brownish purple spots, thinly pubescent, broadly ovate, acute, reflexed; lamellae 2, brownish purple, pubescent; *column* 2.0 - 2.5 cm long, yellowish-green, brownish purple streaked in front; *pollinia* pyramidal.

Fl.: Oct. - Nov.

Nagaland: Pulebadze, *Hynniewta* 56194; Tuli, *Hynniewta* 79923; Ungma, *Hynniewta* 79990; Zunhebato, (*Hynniewta* 80361, 80804 (ASSAM)).

Distr.: INDIA (N. E. India, Sikkim, Uttar Pradesh); BHUTAN.

9. *Cymbidium macrorhizon* Lindl., Gen. & Sp. Orch. 162. 1833; Hook. f., Fl. Brit. India. 6 : 9. 1890. Fig. 41

Terrestrials. *Root-stocks* 10-20 cm long, greenish brown, warted, elongated, creeping, branched, fleshy, jointed. *Inflorescence* 15-25 cm long, erect. *Flowers* ca 6 cm across, purplish white; *bracts* 1-1.2 cm long, purplish, oblong-lanceolate, acute, incurved; *pedicelled ovary* 2-2.5 cm long, purplish green; *sepals* ca 3 x 0.7 cm, white, linear-lanceolate, acute or obtuse; *petals* ca 2.2 x 0.5 cm, white, purple streaked, lanceolate, acute; *lip* 2.5-2.6 cm long, purple streaked; base concave; side lobes white, purple streaked, round, erect; mid-lobe white, purple spotted, broadly ovate, acute; lamellae 2, pinkish white; *column* 1.2-1.3 cm long, white, purple streaked in front; *pollinia* sub-globoe.

Fl.: May - Jun.

Nagaland: Chumukedima, *Hynniewta* 80787 (ASSAM); Kohima, Prain 24 A (CAL); Melori, *Hynniewta* 74536 (ASSAM).

Distr.: INDIA (N. E. India & Western Himalayas); CHINA, THAILAND.

10. *Cymbidium mastersii* Griff. ex Lindl. in Bot. Reg. 8. n.s. t. 50 1845; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 195. t. 261. 1898.

Cyperorchis mastersii (Griff. ex Lindl.) Benth. in Journ. Linn. Soc. 18 : 318. 1881; Hook. f., Fl. Brit. India 6 : 15. 1890.

Pseudobulbs very long, narrow. *Leaves* 40-80 x 1.5 - 1.8 cm, linear, apex minutely and acutely bifid. *Inflorescence* few-flowered, 25-30 cm long, arched. *Flowers* ca 5 cm long, white, pink tipped; *bracts* ca 2 mm long, greenish, triangular, acute; *pedicelled ovary* ca 1.3 cm long, pale green, slightly curved; *Sepals* and *petals* ca 5 cm long, acute or obtuse; *sepals* 0.6 - 0.7 cm broad, oblong-lanceolate; *petals* 0.4-0.5 cm broad, lanceolate; *lip* ca 4.5 cm long, white, yellowish flushed outside; side lobes ovate-oblong; acute; mid-lobe orbicular, pubescent; margin undulate and irregularly crenate; *lamellae* 2; *column* ca 3.5 cm long, pale green; *pollinia* sub-clavate.

Fl.: Oct - Nov.

Nagaland: Tiye Hills, *Hynniewta* 80772; Tuensang, *Hynniewta* 80503; Wokha, *Hynniewta* 80629 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN, MYANMAR.

11. *Cymbidium tigrinum* Par. ex Hook. in Bot. Mag. t. 5457. 1849; Hook. f., Fl. Brit. India 6 : 9. 1890.

Epiphytes or lithophytes. *Pseudobulbs* 2.5-1.5 - 2.5 cm, ovoid. *Leaves* 7.5 - 15 x 1.5 - 2.5 cm, oblong-lanceolate, acute. *Inflorescence* few-flowered, lax, 25-35 cm long, erect or sub-erect. *Flowers* ca 7 cm across, yellowish green purple spotted at base of sepals and petals; *bracts* 0.8-1.0 cm long, brownish green, lanceolate, acute; *pedicelled ovary* 3.5 - 4 cm long, brownish green; *sepals* ca 3.5 x 0.6 - 0.7 cm, yellowish green, lanceolate, acute; *petals* 2.9 - 3.0 x 0.5 - 0.6 cm, linear-oblong, acute; *lip* 3.3 - 3.4 cm long; side lobes white, reddish brown striped, round, erect; mid-lobe white with purple transverse blotched, oblong or sub-quadrate, obtuse, reflexed *lamellae* 2, pinkish white; *column* 2.5-2.6 cm long, greenish yellow with reddish-brown spots; *pollinia* globose.

Fl.: Apr. - May.

Nagaland: Khonoma, *Kataki* 65909 (ASSAM); *Watt* 11610 (CAL); Tseminyu, *Hynniewta* 56234; Saramati, *Hynniewta* 80958 (ASSAM).

19. DENDROBIUM Sw.

- 1a. Leaves ensiform, equitant, fleshy;
inflores-cence adnate to the uppermost leaf ...1. *D. acinaciforme*
- 1b. Leaves neither ensiform nor equitant, membranous
or coriaceous; inflores-cence free from the leaves:
- 2a. Stems with pseudobulb,
oblong or fusiform, creeping, 1-leaved ... 15. *D. lindleyi*
- 2b. Stems with or without pseudobulb, neither
oblong nor fusiform, erect or pendulous,
2 to many-leaved:
- 3a. Stems with pseudobulbs sepals and
petals not spreading, narrow, with
acuminate to finely acuminate apices:
- 4a. Pseudobulbs upto
4 cm long, 2-3-
leaved; margin
of lip entire ...20. *D. porphyrochilum*
- 4b. Pseudobulbs 7 cm
or more long, many-leaved;
margins of lip serrulate to deeply serrate:
- 5a. Flowers greenish, upto 1.3 cm
long, side lobes of lip serrulate;
mid-lobe serrate ...10. *D. eriaeflorum*
- 5b. Flowers purplish,
1.7 cm or more long, side
lobes of lip deeply serrate;
mid-lobe entire ...8. *D. denudans*
- 3b. Stems without pseudobulb; sepals and petals
moderately or widely spreading, broad, with
obtuse to round, sometimes shortly acute apices:
- 6a. Stems & leaves hirsute; flowers funnel-shaped;
mentum 15 mm or more long; sepals & petals
moderately spreading:
- 7a. Leaf apex obtusely 2-fid; mentum
ca 15 mm long; lip entire ...24. *D. williamsonii*
- 7b. Leaf apex acutely 2-fid; mentum
ca 22 mm long; lip fimbriate ...16. *D. longicornu*

- 6b. Stems and leaves glabrous; flowers not funnel-shaped; mentum less than 6 mm long; sepals & petals wide spreading:
- 8a. Stems beaded, with contracted internodes and much thick and swollen nodes:
- 9a. Stems thin, slender, branched; leaves upto 5 mm broad, linear lanceolate; lip broadly ovate, obscurely 3-lobed11. *D. falconeri*
- 9b. Stems thick, stout, simple; leaves 12 mm or more broad, oblong-lanceolate; lip sub-orbicular, not lobed23. *D. wardianum*
- 8b. Stems never beaded, with nodes and internodes more or less equally thick:
- 10a. Flowers small, ca upto 2.5 cm across; margin of lip with long gland tipped hairs; pedicel capillary21. *D. stuposum*
- 10b. Flowers medium-sized or large, more than 4.0 cm across; margin of lip entire, ciliate or fimbriate; pedicel solid:
- 11a. Sepals and petals reticulate; lip cup-shaped17. *D. maschatum*
- 11b. Sepals and petals not reticulate; lip flat or slightly saccate at base:
- 12a. Stems quadrate; inflorescence dense, unexpanded, cone-like7. *D. densiflorum*
- 12b. Stems terete or sub-terete; inflorescence lax, expanded, not cone-like:
- 13a. Inflorescence few-to many-flowered raceme; flowers borne on the rachis; lip fimbriate:
- 14a. Raceme arched and drooping; flowers white, purple tipped; margin of lip abortly fimbriate9. *D. devonianum*
- 14b. Raceme erect or sub-erect; flowers yellow; margin of lip deeply fimbriate:

- 15a. Stems clavate, few-leaved; leaf apex 2-fid;
lip reddish nerved at base with 1 deep yellow blotch5. *D. chrysotoxum*
- 15b. Stems more or less uniformly thick or narrowing
towards both ends, many-leaved; leaf apex acute or
acuminate; lip uniformly yellow, except with 1 or 2
deep purple blotches:
- 16a. Stems erect; leaves coriaceous; lip with
1 large blotch12. *D. fimbriatum*
- 16b. Stems pendulous; leaves membranous;
lip with 2 small blotches14. *D. hookerianum*
- 13b. Inflorescence 1-flowered 2-4-flowered cluster;
flowers borne on the peduncle; margin of lip not fimbriate:
- 17a. Petals narrower than the sepals;
margin of lip smooth, entire3. *D. candidum*
- 17b. Petals broader than the sepals;
margin of lip crisped, erose or ciliate:
- 18a. Stems clavate; flowers pale ochraceous,
often tinged with green; lip papillose
hairy; margin crisped13. *D. heterocarpum*
- 18b. Stems more or less uniformly thick or
narrowing towards both ends; flowers
creamy white or pale orange to purplish
white; lip glabrous to sparsely pubescent;
margin erose to ciliate:
- 19a. Flowers creamy white or pale rose;
lip without blotch2. *D. aphyllum*
- 19b. Flowers purplish white or yellow;
lip with distinct blotches:
- 20a. Stems erect or sub-erect; flowers purplish white:
- 21a. Stems sheath striated green and white;
lip not convolute, with 1 greenish yellow
blotch; margin of lip ciliate6. *D. crepidatum*
- 21b. Stems sheath not striated; lip posterior
part convolute into a tube, with 1 or
2 deep purple blotches; margin of lip
erose or undulate:

- 22a. Sepals oblong, obtuse; lip with 2 large blotches, broadly ovate-oblong, acute; upper surface pubescent ...18. *D. nobile*
- 22b. Sepals lanceolate, acute; lip with 2 small blotches, ovate-lanceolate, obtuse; upper surface glabrous ...22. *D. transparens*
- 20b. Stems pendulous; flowers yellow:
- 23a. Stems decumbent, sheath inflated; lip posterior part convolute into a tube with 1 large red blotch; margin erose ...19. *D. ochreatum*
- 23b. Stems not decumbent, sheath scarious; lip not convolute and with 2 small purplish brown blotches; margin ciliate ...4. *D. chrysanthum*

1. ***Dendrobium acinaciforme* Roxb.** (Hort. Bengal, 63. 1814. *nom. nud.*) Fl. Ind. 3: 487. 1832; Hook. f., Fl. Brit. India 5 : 723. 1890. *Aporum acinaciforme* Griff. in Calc. Journ. Nat. Hist. 5 : 370. 1845.

Stems 20-35 cm long, compressed, slender, erect, many-leaved. *Leaves* 3-6 x 0.5-1.0 cm, ensiform, acute. *Inflorescence* many-flowered, lax, 20-30 cm long, terminal, erect. *Flowers* ca 1.0 cm across, white or pale yellow; *bracts* ca 2 mm long, ovate, acute, pale brown; *pedicelled ovary* ca 4 mm long, white or pale yellow; *sepals* unequal, acute; laterals 0.5-0.6 x ca cm, falcately triangular, acute; dorsal 0.4-0.5 x ca 0.2 cm, ovate; *mentum* 3-4 mm long, white; *petals* ca 0.5 x 0.1 cm, filiform, obtuse; *lip* ca 0.7 cm long, white with minute pink dots, conical, crisped or crenulate, obscurely 3-lobed; side lobes broad, triangular; mid-lobe short, sub-quadrate; *column* ca 2 mm long, white; *pollinia* linear - oblong.

Fl.: June - July.

Nagaland : Mokokchung, *Hynniewta* 79981; Mon, *Hynniewta* 79904; Pulebadze, *Hynniewta* 56183; Tiye Hills, *Hynniewta* 80767; Tuensang, *Hynniewta* 80930; Wakching, *Hynniewta* 79942; Wokha, *Hynniewta* 80747 (ASSAM).

Distr. : INDIA (N. E. India); CAMBODIA, LAOS, THAILAND, VIETNAM.

2. ***Dendrobium aphyllum* (Roxb.) Fischer**, in Gamble Fl. Madras 3 : 1416. 1928. *Limodorum aphyllum* Roxb. Cor. Pl. 1 : 34. t. 41 1795.

Dendrobium cucullatum R. Br. in Bot. Reg. 7. t. 548. 1821. *D. pierardii* Roxb. Fl. Ind. 3: 482. 1832 Hook. f., Fl. Brit. India 5 : 738. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 51. t. 72. 1898.

Stems 20-50 cm high, slender, pendulous, many-leaved. *Leaves* 5-10 x 2-3.5 cm, lanceolate to ovate-lanceolate, acute. *Inflorescence* 1- or 2-flowered, 3-5 cm long, lateral, arched or drooping. *Flowers* ca 6.0 cm across, creamy white or pale rose; *bracts* ca 2 mm long, ovate, acute, brown; *pedicelled ovary* ca 2.5 - 3.5 cm long; *sepals* sub-equal, ca 2.0 x 1.0 cm, oblong-lanceolate, acute; *mentum* ca 5 mm long; *petals* ca 3.0 x 1.5 cm, elliptic, obtuse; *lip* ca 3.2 cm long, pale orange with a patch of radiating purple nerves at the base, orbicular; tip acute; upper surface pubescent; margins erose or ciliolate; *column* ca 5 mm long, white; *pollinia* oblong.

Fl.: Apr. - May.

Nagaland: Changtonia, *Hynniewta* 80088; Ongpangkong, *Hynniewta* 80098; Tseminyu, *Hynniewta* 56249, 80720 (ASSAM).

Distr.: Throughout India: BANGLA DESH, BHUTAN, CAMBODIA, JAVA, LAOS, MALAYA, THAILAND, VIETNAM.

3. ***Dendrobium candidum*** Lindl. in Bot. Reg. Misc. 54. 1838; Hook. f., Fl. Brit. India 5 : 735. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 49. t. 68. 1898.

Stems 20-35 cm long, stout, cylindric, erect, many-leaved. *Leaves* 6-10 x 1-2 cm, linear-oblong; apex unequally, obtusely 2-fid. *Inflorescence* 2- or 3-flowered, 3-5 cm long, lateral, erect or sub-erect. *Flowers* ca 6.0 cm across, pure white; *bracts* ca 5 mm long, lanceolate, acute, pale brown; *pedicelled ovary* 2-3 cm long, white; *sepals* sub-equal, ca 3.0 x 1.1 cm, oblong-lanceolate, acute; laterals slightly falcate; *mentum* ca 5 mm long; *petals* ca 2.8 x 1.0 cm, elliptic-lanceolate, acute; *lip* ca 3.0 cm long, pure white | yellow blotch, 3-lobed; side lobes round; mid-lobe oblong lanceolate, acute, upper surface puberulous; *column* ca 4 mm long, white; *pollinia* linear-oblong.

Fl.: May - Jun.

Nagaland: Khonoma, *Hynniewta* 81000, *Kataki* 65911 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim & Western Himalayas); BHUTAN, NEPAL.

4. **Dendrobium chrysanthum** Lindl. Gen. & Sp. Orch. 80. 1830; Hook. f., Fl. Brit. India 5 : 747. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 55. t. 77. 1898; Seidenf. & Smitnd. 2(2) : 198. t. 155 a' - c'. 1960. *D. paxtoni* Lindl. in Bot. Reg. Misc. 56. 1839.

Stems 50-80 cm high, stout, pendulous, cylindric, many-leaved. *Leaves* 10-20 x 2.5-4.0 cm, elongate, lanceolate, acuminate. *Inflorescence* 2 or 4-flowered, 3-5 cm long, lateral, arched or drooping. *Flowers* ca 4.0 cm across, yellow; *bracts* ca 2 mm long, ovate, acute, brown; *pedicelled ovary* 3 - 4.5 cm long, greenish white; *sepals* sub-equal, ca 2 x 1.0 cm, concave, elliptic-lanceolate, acute; *mentum* ca 5 mm long; *petals* ca 2 x 1.8 cm, ovate-orbicular; margins entire or minutely erose; *lip* ca 2 cm long, yellow with 2 purplish brown blotches, concave, transversely orbicular-oblong, obtuse; upper surface pubescent; margin ciliate; *column* ca 6 mm long; *pollinia* linear-oblong.

Fl. : Aug. - Oct.

Nagaland: Dimapur, *Hynniewta* 80791; Kohima, *Deka* 20271; Mon, *Hynniewta* 79905; Pulebadze, *Malhotra* 75224; Tseminyu, *Hynniewta* 80359; Tuli, *Hynniewta* 79921; Zunhebato, *Hynniewta* 80359A (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN, MYANMAR, CAMBODIA, LAOS, MALAYA, THAILAND, VIETNAM.

5. **Dendrobium chrysotoxum** Lindl. in Bot. Reg. subt. 19 & t. 36. 1847; Hook. f., Fl. Brit. India 5 : 750. 1890. *D. suavissimum* Reichb. f. in Gard. Chron. 406. 1874. Fig. 42

Stems 12-25 cm long, clavate, erect, few-leaved. *Leaves* 8-15 x 2-3.5 cm, sub-terminal, oblong or oblong-lanceolate, apex unequally and obtusely 2-fid. *Inflorescence* many-flowered, lax, racemose, 15-25 cm long, erect or sub-erect. *Flowers* ca 4.0 cm across, golden yellow; *bracts* ca 2 mm long, ovate, acute, pale brown; *pedicelled ovary* 2.5 - 4.0 cm long, yellow; *sepals* ca 2.0 x 0.9 cm, oblong, obtuse; dorsal broader, concave; *petals* ca 2.5 x 1.5 cm, broadly oblong; apex truncate; *mentum* ca 3 mm long; *lip* ca 2.8 cm long, yellow with 1 deep yellow blotch and a patch of reddish nerves

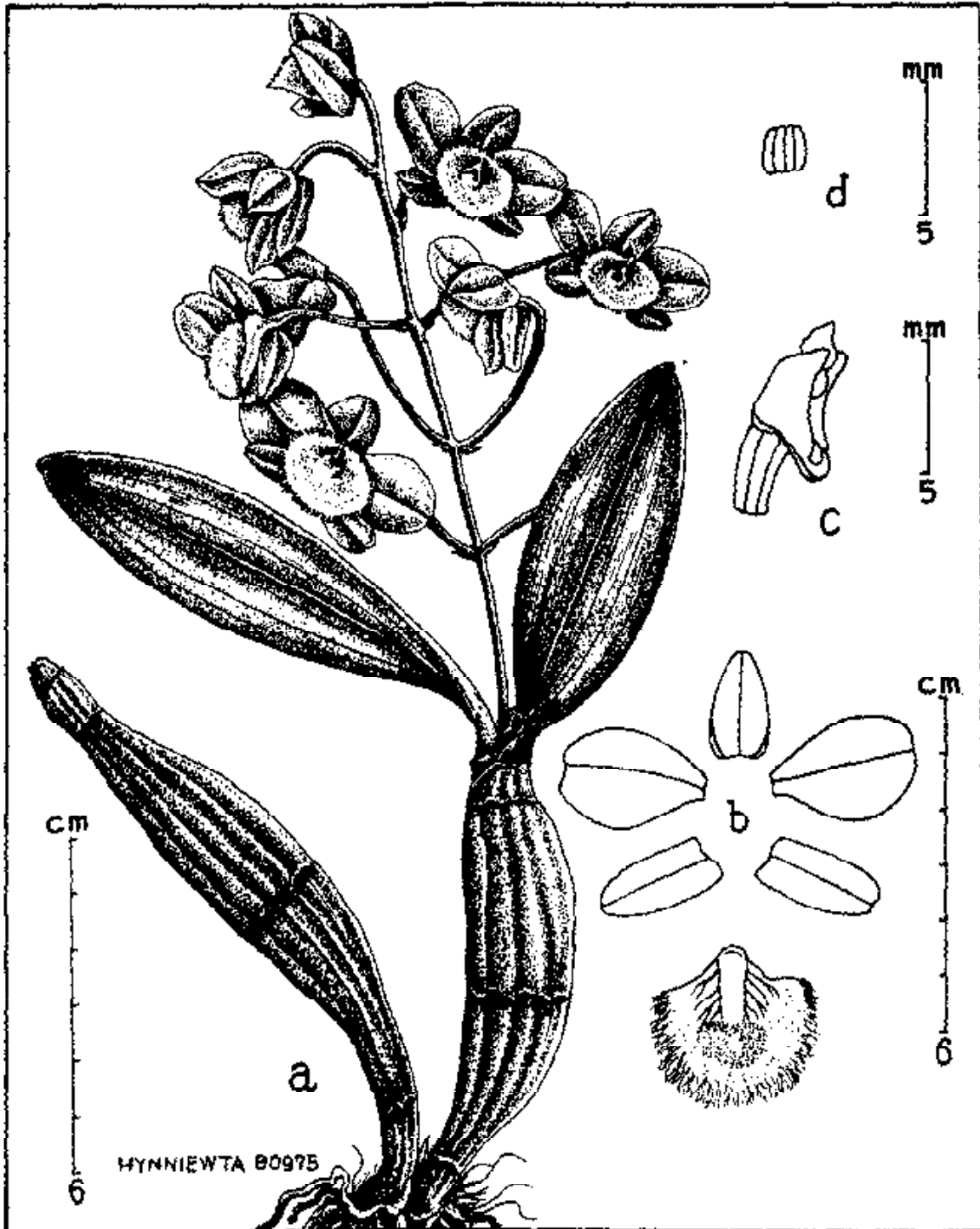


Fig. 42. *Dendrobium chrysotoxum* Lindl.:
 a. habit; b. floral parts; c. column; d. pollinia.

at base, orbicular, upper surface pubescent; margin deeply fimbriate; *column* ca 5 mm long, yellow; *pollinia* oblong.

Fl.: May - Jun.

Nagaland: Heliphong, *Hynniewta* 80966; Kiphere, *Hynniewta* 80975; Pulebadze, *Hynniewta* 56268; Tuensang, *Hynniewta* 80951 (ASSAM).

Distr.: INDIA (Manipur, Mizoram, Nagaland); MYANMAR, CAMBODIA, JAVA, LAOS, VIETNAM.

6. ***Dendrobium crepidatum*** Lindl. & Paxt. in Fl. Gard. 1 : 63. f. 45. 1850-51; Bot. Mag. t. 4993. 1857; Hook. f., Fl. Brit. India 740. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 48. t. 66. 1898; *D. roseum* Dalz. in Hook. Kew Journ. 291. 1852. *D. lawanum* Lindl. in Journ. Linn. Soc. 3 : 10. 1859.

Stems 20-35 cm high, stout, erect or sub-erect, sub-clavate, few-leaved. *Leaves* 8-15 x 1-1.5 cm, linear-lanceolate, acute or acuminate. *Inflorescence* 1 - or 2-flowered, 4-6 cm long, lateral, erect or sub-erect. *Flowers* ca 6 cm across, pinkish white, dark pink tipped; *bracts* ca 4 mm long, lanceolate, acute, green; *pedicelled ovary* 3.5 - 4.0 cm long, bright magenta pink; *sepals* sub-equal, ca 3 x 1.5 cm, obovate, acute; *lip* ca 3.2 cm long, white, pink tipped, with 1 greenish yellow blotch, broadly obovate; upper surface pubescent; margins undulate, ciliate; *column* ca 5 mm long, white; *pollinia* linear-oblong.

Fl.: Apr. - May.

Nagaland: Mokokchung, *Hynniewta* 79970; Tseminyu, *Hynniewta* 56247; Zunhebato, *Hynniewta* 80844 (ASSAM).

Distr.: Throughout India: MYANMAR, CAMBODIA, LAOS, VIETNAM.

7. ***Dendrobium densiflorum*** Lindl. in Wall. Pl. As. Rar. 1 : 34. t. 40. 1830; Hook. f., Fl. Brit. India 5: 748. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 56. t. 79. 1898. *D. clavatum* Roxb. Fl. Ind. 3: 481. 1832. Fig. 43

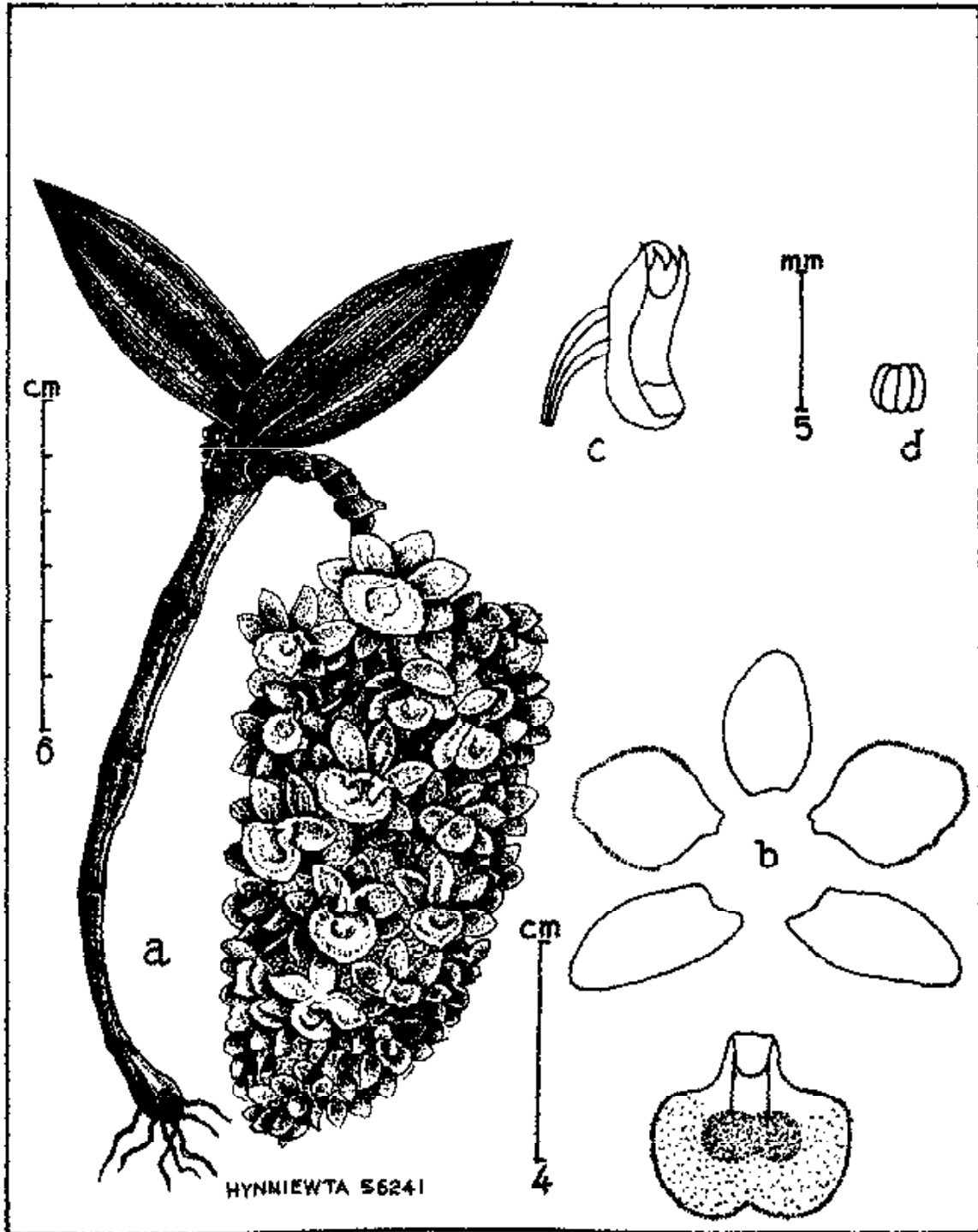


Fig. 43. *Dendrobium densiflorum* Lindl.:
 a. habit; b. floral parts; c. column; d. pollinia.

Stems 25-35 cm high, quadrate, erect, few-leaved. *Leaves* 10-15 x 3.5-4.5 cm, oblong-lanceolate to ovate-lanceolate, acute. *Inflorescence* many-flowered, very densely packed, racemose, sub-terminal, drooping. *Flowers* ca 6 cm across, pale yellow; *bracts* 2.5 - 3.0 x 1.0 -2.5 cm, broadly oblong, cymbiform, acute, twisted, revolute; *pedicelled ovary* 2.0 - 2.5 cm long, greenish white; *sepals* ca 1.5 cm broad, obtuse; *laterals* ca 3.0 cm long; dorsal shorter; *mentum* ca 5 mm long; *petals* ca 2.5 x 2.2 cm, sub-orbicular; margin erose, ciliolate; *lip* ca 3.0 cm long, orange-yellow, sub-orbicular; apex retuse; upper surface pubescent; margin ciliolate; *column* 6-7 mm long, pale yellow; *pollinia* oblong.

Fl.: Mar. - Apr.

Nagaland: Satakha, *Hynniewta* 80871; Tiye Hills, *Hynniewta* 80756; Tseminyu, *Hynniewta* 56241 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN, MYANMAR, CAMBODIA, JAVA, LAOS, NEPAL, VIETNAM.

8. ***Dendrobium denudans*** D. Don, Prodr. Fl. Nepal. 34. 1825; Hook. f., Fl. Brit. India 5 : 715. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8: 45. t. 62. 1898. Fig. 44

Stems 15-30 cm high, terete, erect, many-leaved. *Leaves* sessile, 3-10 x 0.8-1.5 cm, linear-oblong; apex obliquely notched. *Inflorescence* many-flowered, lax, racemose, 10-15 cm long, arched or drooping. *Flowers* 1.8-1.9 cm long, purplish; *bracts* 4-5 mm long, lanceolate, acute, purplish brown; *pedicelled ovary* 5-6 mm long, purplish; lateral sepals 1.7 - 1.8 cm long, lanceolate, falcate, finely acuminate; *mentum* ca 4 mm long, purplish; dorsal sepal and petals 1.5-1.6 cm long, linear-lanceolate, acuminate; *lip* ca 1 cm long, deep purple, 3-lobed; side lobes narrow, laciniate; mid-lobe oblong, acute, crisped and serrate; disc obscurely 3-ridged; *column* ca 3 mm long, deep purple; *pollinia* oblong.

Fl.: Oct. - Nov.

Nagaland: Baghty, *Hynniewta* 80736; Tseminyu, *Hynniewta* 56064; Tuensang, *Hynniewta* 80378, 80938; Wokha, *Hynniewta* 80742 (ASSAM).

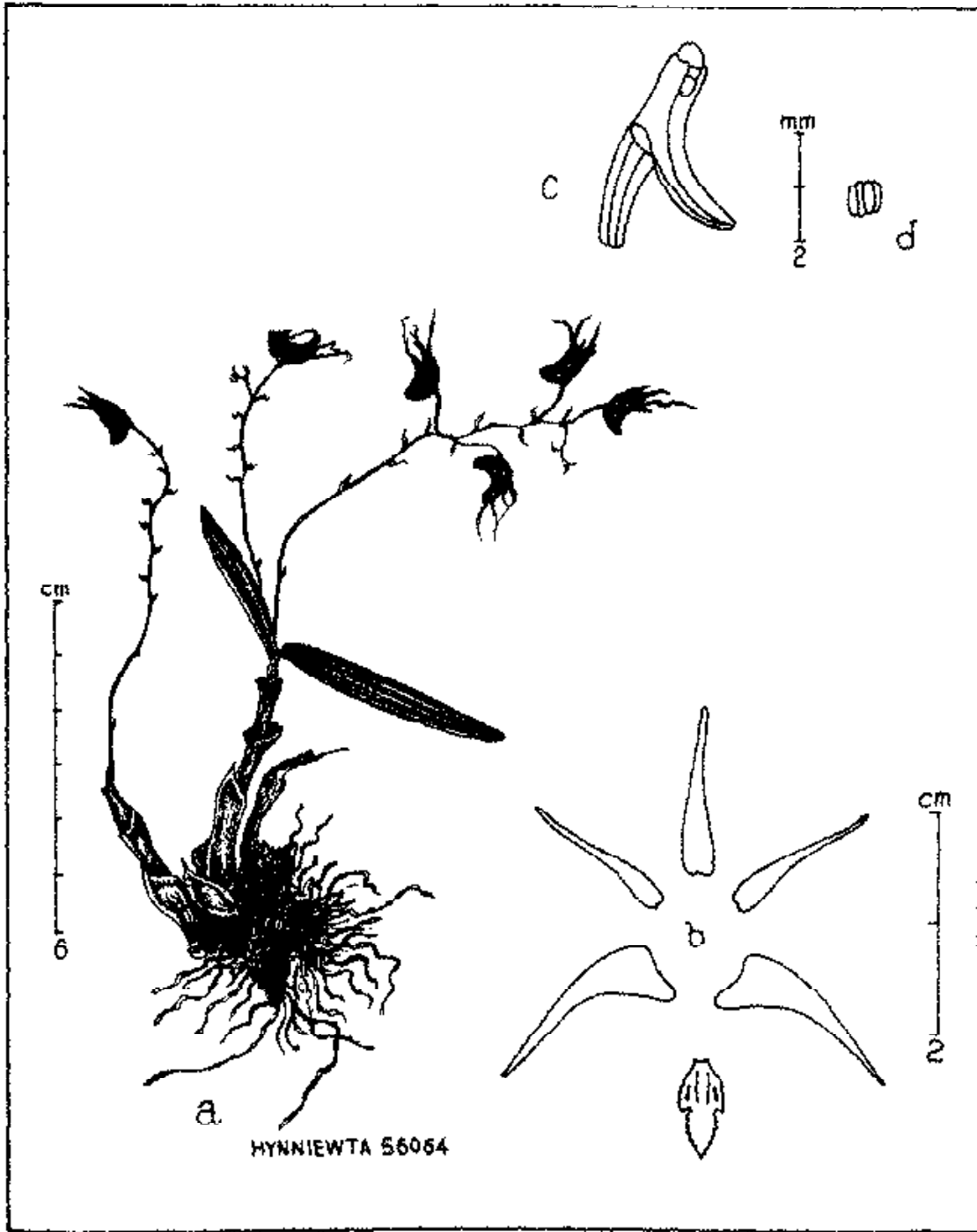


Fig. 44. *Dendrobium denudans* D. Don :
 a. habit; b. floral parts; c. column; d. pollinia.

Distr.: INDIA (Nagaland, Sikkim, Western Himalayas); BHUTAN, NEPAL.

9. **Dendrobium devonianum** Paxt. in Bot. Mag. 7 : t. 169. 1840; Hook. f., Fl. Brit. India 5 : 743. 1890; Seidenf. & Smitnd. Orch. Thailand, 2(2) : 37. 1960. *D. pictum* Griff. ex Lindl. in Journ. Linn. Soc. 3 : 12. 1859.

Stems 30-50 cm high, terete, slender, erect, many-leaved. *Leaves* 5-10 x 0.5 - 1.0 cm, lanceolate or linear-lanceolate, acuminate. *Inflorescence* many-flowered, lax, racemose, 30-50 cm long, lateral, arched and drooping. *Flowers* ca 5.0 cm across, white, purple tipped; *bracts* ca 2 mm long, ovate, acute, brown; *pedicelled ovary* ca 2.5 - 3.0 cm long, purplish white; *sepals* sub-equal, ca 2.5 x 0.8 cm, lanceolate, acuminate; *mentum* ca 5 mm long; *petals* ca 2.6 x 1.1 cm, broadly ovate, acute, ciliate; *lip* ca 3.0 cm long, white, purple tipped, with 2 orange blotches, sub-orbicular; margin shortly fimbriate; *column* ca mm long; *pollinia* oblong.

Fl.: May - Jun.

Nagaland: Longkhim, *Hynniewta* 80954; Pulebadaze, *Hynniewta* 56286; Tuensang, *Hynniewta* 80986 (ASSAM).

Distr.: INDIA (N.E. India); BHUTAN, MYANMAR, CAMBODIA, CHINA, LAOS, MALAYA, THAILAND, VIETNAM.

10. **Dendrobium eriaeflorum** Griff., Notul. 3 : 316. 1848; Ic. Pl. Asiat. t. 307. 1851; Hook. f., Fl. Brit. India 5 : 715. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 44. t. 61. 1898.

Stems 7.5-15 cm high, often tapering towards both ends, few-leaved. *Leaves* 2-5 x 0.5-0.7 cm, linear-lanceolate or linear-oblong, notched. *Inflorescence* few - or many-flowered, lax, racemose, 3-6 cm long, lateral or sub-terminal, sub-erect. *Flowers* ca 1.2 - 1.3 cm long, greenish; *bracts* ca 5 mm long, lanceolate, acuminate, greenish; *pedicelled ovary* ca 5 mm long, greenish; *sepals* and *petals* 1.2 - 1.3 cm long, lanceolate, acuminate, connivent; laterals slightly broader, sub-falcate; *mentum* ca 4 mm long, green; *lip* ca 8 mm long, green with few purple spots, oblong-ovate, 3-lobed; side lobes narrowly oblong, deeply serrate; mid-lobe small, ovate, acute, undulate; disc 1-ridged; *column* ca 3 mm long, purple spotted; *pollinia* linear-oblong.

Fl.: Sept. - Oct.

Nagaland: Wokha, *Hynniewta* 80688 (ASSAM)

Distr.: INDIA (N. E. India, Sikkim); MALAYA, THAILAND.

11. **Dendrobium falconeri** Hook. in Bot. Mag. t. 4944, 1856; Hook. f., Fl. Brit. India 5: 742. 1890.

Stems 40-75 cm high, beaded; slender, pendulous, branched, branchlets many; apex 1-3 leaved. *Leaves* 2.5-7 x 0.4-0.5 cm, linear-lanceolate, acute or acuminate. *Inflorescence* 1-2 - flowered, many, lateral, drooping. *Flowers* ca 7.5 cm across, white with purple tips; *bracts* 5-8 mm long, lanceolate, acute; *pedicelled ovary* 2.5 - 3 mm long, white; *sepals* sub-equal, 3.2 - 3.3 x 0.9-1.0 cm, oblong-lanceolate, acute; *mentum* ca 4 mm long, *petals* 3.1 x 3.2 x 1.4-1.5 cm, ovate, acuminate; *lip* ca 3.6 cm long, white, purple tipped, obscurely 3-lobed; side lobes round; mid-lobe broadly triangular, acute, upper surface pubescent; margins ciliolate; disc orange with 2 dark purple blotches; *column* ca 5 mm long; *pollinia* oblong.

Fl.: Apr. - May.

Nagaland: Jhaluki, *Hynniewta* 74553; Pulebadze, *Hynniewta* 56289 (ASSAM).

Distr.: N. E. India; BHUTAN, MYANMAR.

12. **Dendrobium fimbriatum** Hook. var. **oculatum** Hook. f., Bot. Mag. t. 4160. 1845; Hook. f., Fl. Brit. India 5 : 745. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 58. t. 82. 1898.

Stems 30-100 cm high, cylindric, erect, many-leaved. *Leaves* 6-10 x 1.5-2 cm, lanceolate or oblong-lanceolate, acute. *Inflorescence* many-flowered, lax, 15-30 cm long, lateral, arched. *Flowers* ca 5.0 cm across, yellow; *bracts* ca 3 mm long, ovate, acute, pale brown; *pedicelled ovary* ca 3 cm long, greenish-yellow; *sepals* ca 2.5 cm long; *laterals* ca 1 cm broad, oblong-lanceolate, acute; dorsal broader, oblong; apex obtuse or notched; *mentum* ca 5 mm long; *petals* ca 3.2 x 2.5 cm, obovate or sub-orbicular; margin erose or ciliolate; apex slightly emarginate; *lip* ca 3.5 cm long,

yellow with 1 deep purple blotch, orbicular; margin deeply and irregularly fimbriate; *column* ca 5 mm long, yellow; *pollinia* oblong, compressed.

Fl.: Apr. - May.

Nagaland: Mokokchung, *Hynniewta* 79969; Tseminyu, *Hynniewta* 56251 (ASSAM).

Distr.: INDIA (N.E. India, Sikkim); BHUTAN, CAMBODIA, JAVA, LAOS, MALAYA, VIETNAM.

13. ***Dendrobium heterocarpum*** Lindl. Gen. & Sp. Orch. 78. 1830; Bot. Mag. t. 4708. 1853; Hook. f., Fl. Brit. India 5 : 737. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 53. t. 74. 1898. *D. aureum* Lindl., Gen. & Sp. Orch. 72. 1830.

Stems 15-25 cm high, terete, clavate, erect, few-leaved. *Leaves* 7-12 x 1.5-2.0 cm, oblong-lanceolate; apex acute or emarginate. *Inflorescence* 1- to 2-flowered, 3-5 cm long, lateral. *Flowers* ca 6.0 cm across, pale ochreous, often tinged with green; *bracts* ca 4 mm long, ovate, acute, pale brown; *pedicelled ovary* 2-2.5 cm long. *sepals* sub-equal, ca 3.0 x 1 m; dorsal linear-oblong, obtuse; laterals oblong, falcate, acute; *mentum* ca 5 mm long; *petals* ca 2.8 x 1.2 cm, ovate-lanceolate, acute; *lip* ca 3.0 cm long, trowel-shaped, acute; disc golden yellow streaked and veined with radiating crimson lines; upper surface papillose-pubescent; margin crisped or undulate; *column* ca 4 mm long; *pollinia* oblong.

Fl. : Mar. - Apr.

Nagaland: Mon, *Hynniewta* 79913; Tiyie Hills, *Hynniewta* 80761; Tseminyu, *Malhotra* 75288 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN, MYANMAR, CAMBODIA, SRI LANKA, JAVA, LAOS, NEPAL, PHILIPPINES, VIETNAM.

14. ***Dendrobium hookerianum*** Lindl. in J. Linn. Soc. 3 : 8. 1859; in Bot. Mag. t. 6013. 1873; Hook. f., Fl. Brit. India 5: 745. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 59. t. 83. 1890. *D. chrysotis* Reichb. f. in Gard. Chron. 1 : 1311. 1870.

Stems 40-60 cm high, slender, pendulous, cylindric, many-leaved. *Leaves* 7-10 x 2.5-3 cm, oblong lanceolate, cuneately acuminate. *Inflorescence* 2-flowered or few-flowered, sub-racemose, lax, 8-15 cm long, lateral, arched or drooping. *Flowers* ca 8.0 cm across, golden yellow; *bracts* ca 3 mm long, triangular, acute; *pedicelled ovary* ca 2.5 cm long, slender, terete; *sepals* sub-equal, ca 4 x 1.5 cm, ovate-oblong, acute, entire, 7-nerved; *mentum* ca 5 mm long; *petals* ca 3.8 x 1.8 cm, elliptic-obtuse; margin denticulate or erose; *lip* ca 4 cm long, golden yellow with 2 deep purple blotches, sub-orbicular; margin deeply and irregularly fimbriate; *column* ca 5 mm long; *pollinia* broadly oblong.

Fl.: Apr. May.

Nagaland: Akulato, *Hynniewta* 80876; Heliphong, *Hynniewta* 80969; Pulebadze, *Hynniewta* 56287 (ASSAM).

Distr.: INDIA(N. E. India, Sikkim); BHUTAN, MALAYA, NEPAL.

15. ***Dendrobium lindleyi*** Steud., *Nomencl.* 490. 1840; Hunt & Summer. in *Kew Bull.* 20(1) : 55. 1966. *D. aggregatum* Roxb. *Fl. Indica*, 3 : 477. 1832 (non Kunth, 1815) ; Lindl., *Bot. Mag.* t. 3643. 1838; Hook. f., *Fl. Brit. India* 5 : 749. 1890; King & Pantl. in *Ann. Roy. Bot. Gard. Calc.* 8 : 60. t. 85. 1898.

Pseudobulbs 2.5-3.5 x 1-1.2 cm, oblong, compressed, angled, with long filiform sheaths, erect, 1-leaved. *Leaves* 3-5 x 1.5-2.0 cm, oblong; apex notched. *Inflorescence* few-flowered, lax, racemose, 5-8 cm long, lateral, arched or drooping. *Flowers* ca 3.0 cm across, yellow; *bracts* ca 2 mm long, triangular, acute, pale brown; *pedicelled ovary* 4-6 cm long, pale yellow; *sepals* ca 1x0.4 cm, lanceolate, acute; laterals slightly falcate; *petals* ca 1.5 x 0.8 cm, elliptic, cute; margins ciliate; *lip* ca 2.2 cm long, yellow with a single orange patch in the centre, sub-orbicular; apex retuse; upper surface pubescent; margins ciliate; *column* ca 3 mm long, pale yellow; *pollinia* linear-oblong.

Fl.: July - Aug.

Nagaland: Wokha, *Hynniewta* 80753 (ASSAM).

Distr.: INDIA (N.E. India, Sikkim); MYANMAR, CHINA, MALAYA, THAILAND.

16. **Dendrobium longicornu** Lindl. in Bot. Reg. 16. t. 1315. 1830 et Gen. & Sp. Orch. 80. 1830. Hook. f., Fl. Brit. India 5 : 720. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 46. t. 64. 1898; *D. flexuosum* Griff., Notul. 3 : 317. 1848. Fig. 45

Stems 25-35 cm high, fusiform, erect, covered with hirsute sheaths, few- or many-leaved. *Leaves* 6-10 x 0.8-1 cm, linear-lanceolate, sparsely hirsute; apex unequally and acutely bifid. *Inflorescence* 1 to 3 flowered, 3-5 cm long, terminal or lateral, sub-erect. *Flowers* 2.2 - 2.3 cm long, white; *bracts* 0.4-0.5 cm long, hirsute; *pedicelled ovary* 2-2.2 cm long, white; *sepals* and *petals* 2.2 - 2.3 cm long, acute, moderately spreading; orsal sepal and petals ca 0.8 cm broad, ovate-oblong; lateral sepals broader, broadly triangular, falcate; *mentum* ca 2.2 cm long, white; *lip* 3.4 - 3.5 cm long, white with a brown patch on the middle veined with orange, 3-lobed; side lobes oblong; apex fimbriate; mid-lobe small, triangular or ob-triangular, acute, fringed or fimbriate; disc 3-ridged; ridges crenate; *column* ca 1.2 cm long, white; *pollinia* linear - oblong.

Fl.: Sept. - Oct.

Nagaland: Chakabarna, *Hynniewta* 74535; Dimapur, *Hynniewta* 74596; Pulebadze, *Hynniewta* 56288, Malhotra 75199; Tuli, *Hynniewta* 79920; Ungma, *Hynniewta* 79987; Zunhebato, *Hynniewta* 80836 (Assam).

Distr.: INDIA (N. E. India, Sikkim), BHUTAN, NEPAL.

17. **Dendrobium moschatum** (Buch. - Ham.) Sw. in Schtr. Neim. J. Bot. 1 : 943. 1905; Lindl. Gen. & Sp. Orch. 82. 1830; in Wall. Pl. Asiat. Rar. 2 : 83. t. 195. 1831; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 60. t. 84. 1898. *D. calceolaria* Carey ex Hook. f., Fl. Brit. India 5 : 744. 1890.

Stems 60-180 cm high, stout, erect or sub-erect, many-leaved. *Leaves* 8-20 x 1-4 cm, lanceolate or oblong-lanceolate; apex acute or minutely and obliquely notched. *Inflorescence* few - or many-flowered, lax, racemose, 15-25 cm long, lateral, arched or drooping. *Flowers* ca 8.0 cm across, orange yellow; *bracts* 1-1.5 cm long, lanceolate, acute, greenish

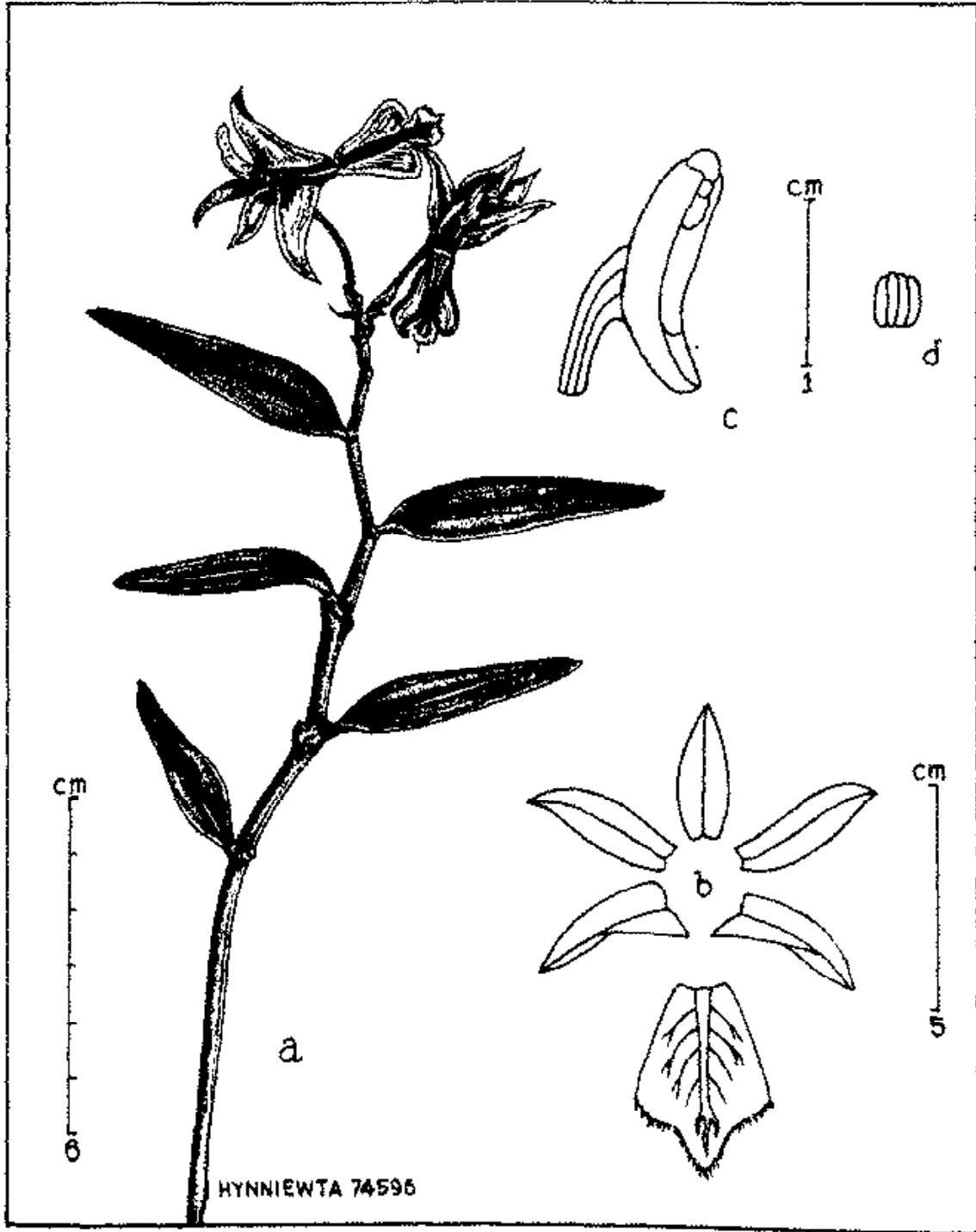


Fig. 45. *Dendrobium longicornu* Lindl.:
 a. habit; b. floral parts; c. column; d. pollinia.

brown; *pedicelled ovary* 3-4 cm long, pale yellow; *sepals* sub-equal, ca 4 x 1.5 cm, elliptic - oblong, acute; *mentum* ca 5 mm long; *petals* ca 3.6 x 2 cm, sub-orbicular; *lip* ca 3 cm long, cup-shaped, orange, yellow with 2 large brownish purple spots inside; upper surface pubescent; margin ciliate; *column* 3-4 mm long, orange; *pollinia* oblong.

Fl.: Jun. - July.

Nagaland: Kohima, *Hynniewta* 80780; Mokokchung, *Hynniewta* 79985 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim, Western Himalayas); MYANMAR, CAMBODIA, JAVA, LAOS, MALAYA, NEPAL, THAILAND, VIETNAM.

18. ***Dendrobium nobile*** Lindl., Gen. & Sp. Orch. 79. 1830; Hook. f., Fl. Brit. India 5 : 740. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 51. t. 71. 1898. *D. lindleyanum* Griff., Notul. 3 : 309. 1848.

Stems 30-40 cm high, stout, erect, cylindric or ribbed, many-leaved. *Leaves* 10-15 x 1.5-3.0 cm, linear-oblong; apex unequally and obtusely 2-fid. *Inflorescence* 2- 3-flowered, 2-4 cm long, lateral, erect or sub-erect. *Flowers* ca 7.5 cm across, white, purple flushed; *bracts* ca 2 mm long, ovate, acute, brownish purple; *pedicelled ovary* 3-4 cm long, purplish white; *sepals* sub-equal, 3.7 - 3.8 x 1.1-1.2 cm, oblong, obtuse; *mentum* ca 5 mm long; *petals* ca 3.5 x 2.0 cm, elliptic, obtuse; *lip* ca 3.5 cm, white, pale purple blotch, broadly ovate-oblong, acute, upper surface pubescent; margins erose; *column* ca 5 mm long, green with vertical purple lines in front; *pollinia* oblong.

Fl.: Apr. - May.

Nagaland: Wokha, *Hynniewta* 80749 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN, MYANMAR, CHINA, MALAYA, NEPAL, THAILAND.

19. ***Dendrobium ochreatum*** Lindl. in Bot. Reg. t. 1756. 1835; Hook. f., Fl. Brit. India 5 : 748. 1890; Seidenf. & Smitnd. Orch. Thailand, 2(2): 198. 1960. *D. cambridgeanum* Paxt., Bot. Mag. 6 : t. 265. 1839.

Stems 20-30 cm high, stout, cylindric, pendulous, many-leaved. *Leaves* 5-10 x 1.5-3 cm, oblong or oblong-lanceolate, acuminate or acutely bifid. *Inflorescence* 1 or 2-3 flowered, 3-5 cm long, lateral, arched or drooping. *Flowers* ca 7.0 cm across, golden yellow; *bracts* ca 2 mm long, ovate, acute, green; *pedicelled ovary* 3-3.5 cm long, green; *sepals* sub-equal, ca 3.5 x 1.5 cm, oblong-lanceolate, acute; *mentum* ca 5 mm long; *petals* ca 3.4 x 1.8 cm, elliptic-lanceolate; apex obtuse or notched; *lip* ca 3.2 cm long, yellow with 1 red blotch in the middle and a patch of reddish nerves at the base, sub-orbicular; upper surface pubescent; margin erose; *column* ca 3 mm long, white; *pollinia* oblong.

Fl.: Apr. - May.

Nagaland: Tseminyu, *Hynniewta* 56244 (ASSAM).

Distr.: INDIA (N. E. India); THAILAND.

20. ***Dendrobium porphyrochilum*** Lindl. in Journ. Proc. Linn. Soc. Bot. 3 : 18. 1859; Hook. f., Fl. Brit. India 5 : 716. 1898; Tuyama in Hara, Fl. E. Himal. 1 : 433. 1966; in Ohashi, Fl. E. Himal. 3: 141. 1975. *D. caespitosum* King & Pantl. in Journ. Asiat. Soc. Bengal. 64 : 44. t. 59. 1895.

Stems 2.5-4 cm high, cylindrical to conical, 2-3-leaved. *Leaves* 2.5-5 x 0.5-0.7 cm, linear-oblong; apex notched. *Inflorescence* few-flowered, lax racemose, 3-4 cm long, terminal, sub-erect. *Flowers* ca 1.2 cm across, pale yellow; *bracts* 4-5 mm long, linear-lanceolate, acuminate; *pedicelled ovary* 6-7 mm long, stout; *sepals* sub-equal, ca 6 x 2 mm, acuminate; dorsal lanceolate; laterals falcately-lanceolate; *mentum* ca 2 mm long, yellowish; *petals* ca 5 x 2 mm, oblong, acute; *lip* ca 5 mm long, dull brownish purple, 3-lobed; side lobes short, round; mid-lobe elongate, oblong, acute; disc obscurely 3-ridged; *column* ca 1 mm long, foot dilated, concave; *pollinia* linear-oblong.

Fl.: June - July.

Nagaland: Kiphere, *Hynniewta* 80974; Tokye, *Hynniewta* 80896 (ASSAM).

Distr.: INDIA (Meghalaya, Nagaland, Sikkim); MYNAMAR, NEPAL.

21. **Dendrobium stuposum** Lindl. in Bot. Reg. Misc. 52. 1838; Hook. f., Fl. Brit. India 5 : 737. 1890; King Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 54. t. 75. 1898. *D. sphegidoglossum* Reichb. f. in Bonplandia, 2 : 58. 1854; Hook. f., Fl. Brit. India 5 : 737. 1890.

Stems 20-35 cm high, cylindric, erect, many-leaved. *Leaves* 6-10 x 1.0-1.2 cm, linear-lanceolate or linear-oblong, thinly coriaceous; apex obtuse or notched. *Inflorescence* few flowered, lax, racemose, 5-10 cm long, arched. *Flowers* ca 2.5 cm across, white; *bracts* ca 4 mm long, lanceolate, obtuse; *pedicelled ovary* ca 2 cm long, capillary; *sepals* unequal; dorsal sepal and petals ca 1 x 0.6 cm, ovate-oblong, acute; laterals 1.2 - 1.3 x 0.5 cm, oblong, keeled, aristate; *mentum* ca 4 mm long, green flushed; *lip* ca 1.2 cm long, cuneately obovate, white with red veins and a yellow band, 3-lobed; side lobes short, round, apex ciliolate; mid-lobe ovate-orbicular, ventrally smooth, dorsally villous with long gland-tipped hairs; *column* ca 3 mm long; *pollinia* oblong.

Fl. : Jun. - July.

Nagaland: Pulebadze, Hynniewta 56285 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim, West Bengal); BHUTAN, MYANMAR, THAILAND.

22. **Dendrobium transparens** Wall. ex Lindl. Gen. & Sp. Orch. 79. 1830; Bot. Mag. t. 4663. 1852; Hook. f., Fl. Brit. India 5 : 738. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 50. t. 70. 1890. *D. henshalli* Reichb. f. in Bonplandia, 3 : 226. 1855. Fig. 46

Stems 20-45 cm high, cylindric, stout, erect, many-leaves. *Leaves* 7-10 x 0.9-1.2 cm, linear-lanceolate to lanceolate; apex unequally and acutely or obtusely 2-fid. *Inflorescence* 1- or 2-flowered, 2-3 cm long, lateral, sub erect. *Flowers* ca 5.5 cm across, white, light-purple tipped; *bracts* ca 5 mm long, broadly lanceolate, acute, greenish brown; *pedicelled ovary* 2-2.5 cm long, light purple; *sepals* sub-euqal, 2.7 2.8 x 0.8 x 0.6 0.7 cm, lanceolate, acute; *mentum* ca 5 mm long; *petals* 2.4-2.6 x 0.9-1.0 cm, ovate-lanceolate obtuse; *lip* ca 3.0 cm long, white, purple tipped with 2 deep purple blotches, elliptic-oblong, acute; margins erose or purple blotches, elliptic-oblong, acute; margins erose or undulate; *column* ca 6 mm long, white; *pollinia* liner-oblong.

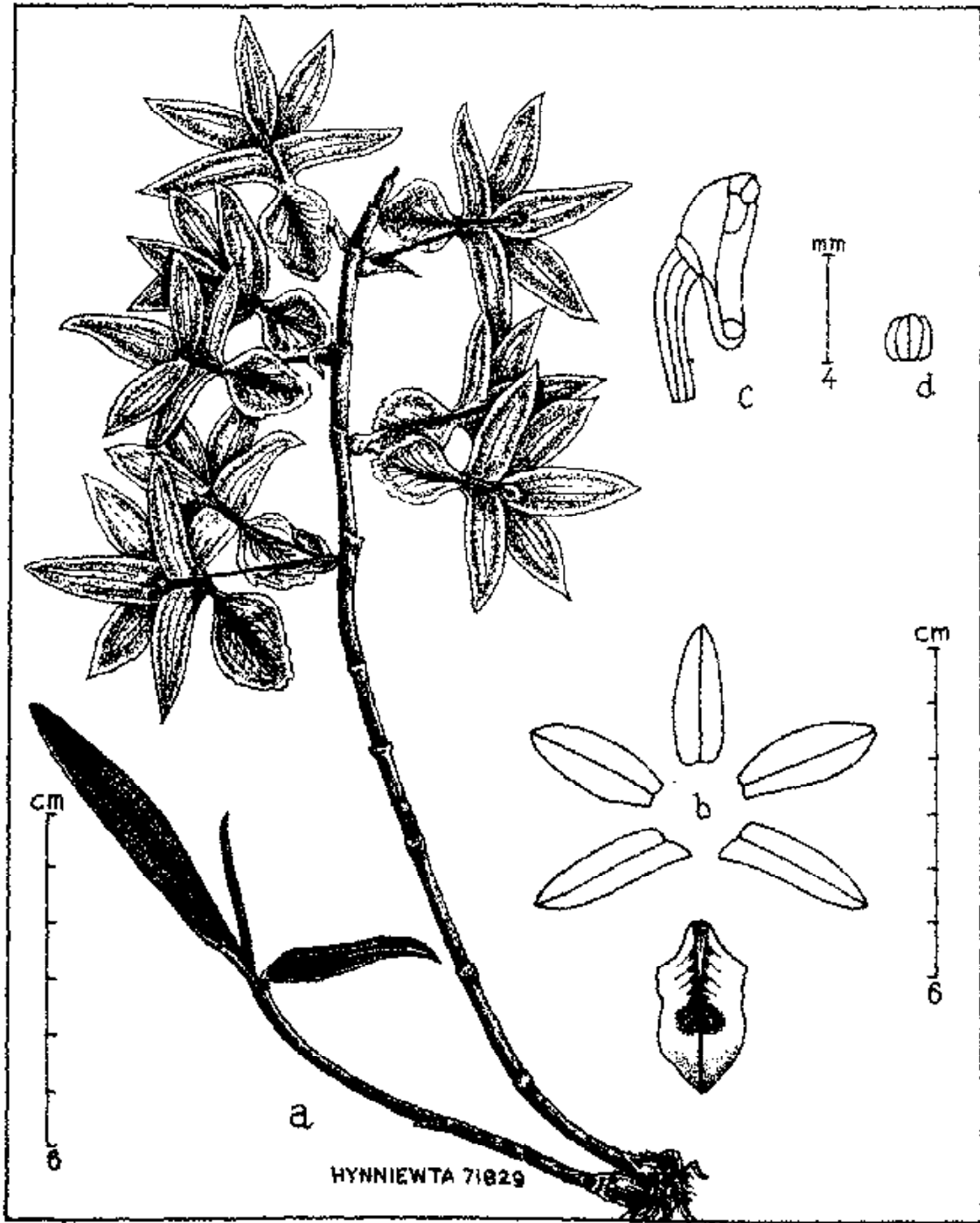


Fig. 46. *Dendrobium transparens* Wall. ex Lindl.:
 a. habit; b. floral parts; c. column; d. pollinia.

Fl.: May - June.

Nagaland: Pulebadze *Hynniewta* 71829; Satakha, *Hynniewta* 80861; Wokha, *Hynniewta* 80748 (ASSAM).

Distr.: INDIA (N. E. India, Bihar, Orissa, Sikkim, Uttar Pradesh); MYANMAR.

23. ***Dendrobium wardianum*** Warner, Sel. Orch. 1. t. 19. 1862; Hook. f., Fl. Brit. India 5: 742. 1890.

Stems 45-100 cm high, beaded, stout, sub-scandent, many-leaved. *Leaves* 8-12 x 1.2-1.8 cm, oblong-lanceolate, acute. *Inflorescence* 1- or 2-flowered, few, 3-5 cm long, lateral, sub-erect. *Flowers* ca 8 cm across, white, purple tipped; *bracts* ca 5 mm long, ovate, acute, pale green; *pedicelled ovary* 3.5-4 cm long, white; *sepals* sub-equal, ca 4.2 x 2.5 cm, broadly oblong, acute or obtuse; *lip* ca 3.8 cm long, white, purple tipped, with 2 maroon blotches, sub-orbicular, acute; upper surface pubescent; margins erose or ciliolate; *column* ca 6 mm long, white; *pollinia* oblong.

Fl.: Apr. - May.

Nagaland: Kiphere, *Hynniewta* 80990; Khonoma, *Kataki* 65908; Tseminyu, *Hynniewta* 56245, 80719 (ASSAM).

Distr.: INDIA (N. E. India); MYANMAR.

24. ***Dendrobium williamsonii*** Day & Reichb. f. in Gard. Chron. 78. 1869; Hook. f., Fl. Brit. India 5 : 721. 1890; Seidenf. & Smitnd. Orch. Thailand, 2(2) : 222. 1960. **Fig. 47**

Stem 12-25 cm high, fusiform, erect, covered with hirsute sheaths, few- or many-leaved. *Leaves* 4-7 x 1.5-2.0 cm, oblong or oblanceolate, hirsute at base; apex unequally and obtusely bifid. *Inflorescence* 1- to 3-flowered, 3-5 cm long, terminal or sub-terminal, sub-erect. *Flowers* 2.2-2.3 cm long, white; *bracts* ca 5 mm long, lanceolate, acute, greenish brown; *pedicelled ovary* 2.2-2.5 cm long, white; *sepals* and *petals* 2.2-2.3 cm long, acuminate, moderately spreading; dorsal sepal and petals ca 1.0 cm broad, oblanceolate; lateral sepals broader, broadly triangular, falcate; *mentum* 1.5 cm long, white; *lip* 3-3.2 cm long, 3-lobed; side lobes round, reddish

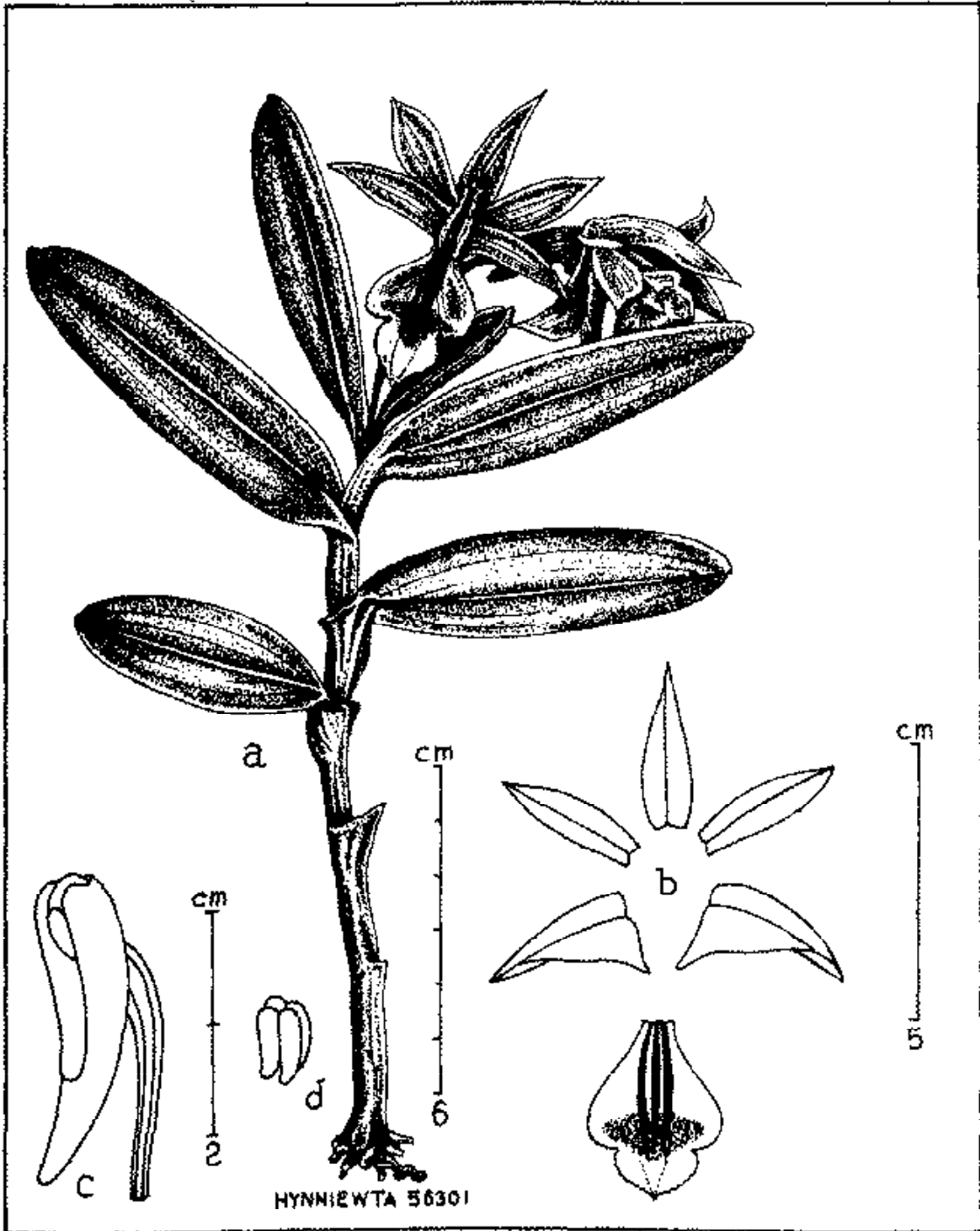


Fig. 47. *Dendrobium williamsonii* Day & Reichb. f.:
 a. habit; b. floral parts; c. column; d. pollinia.

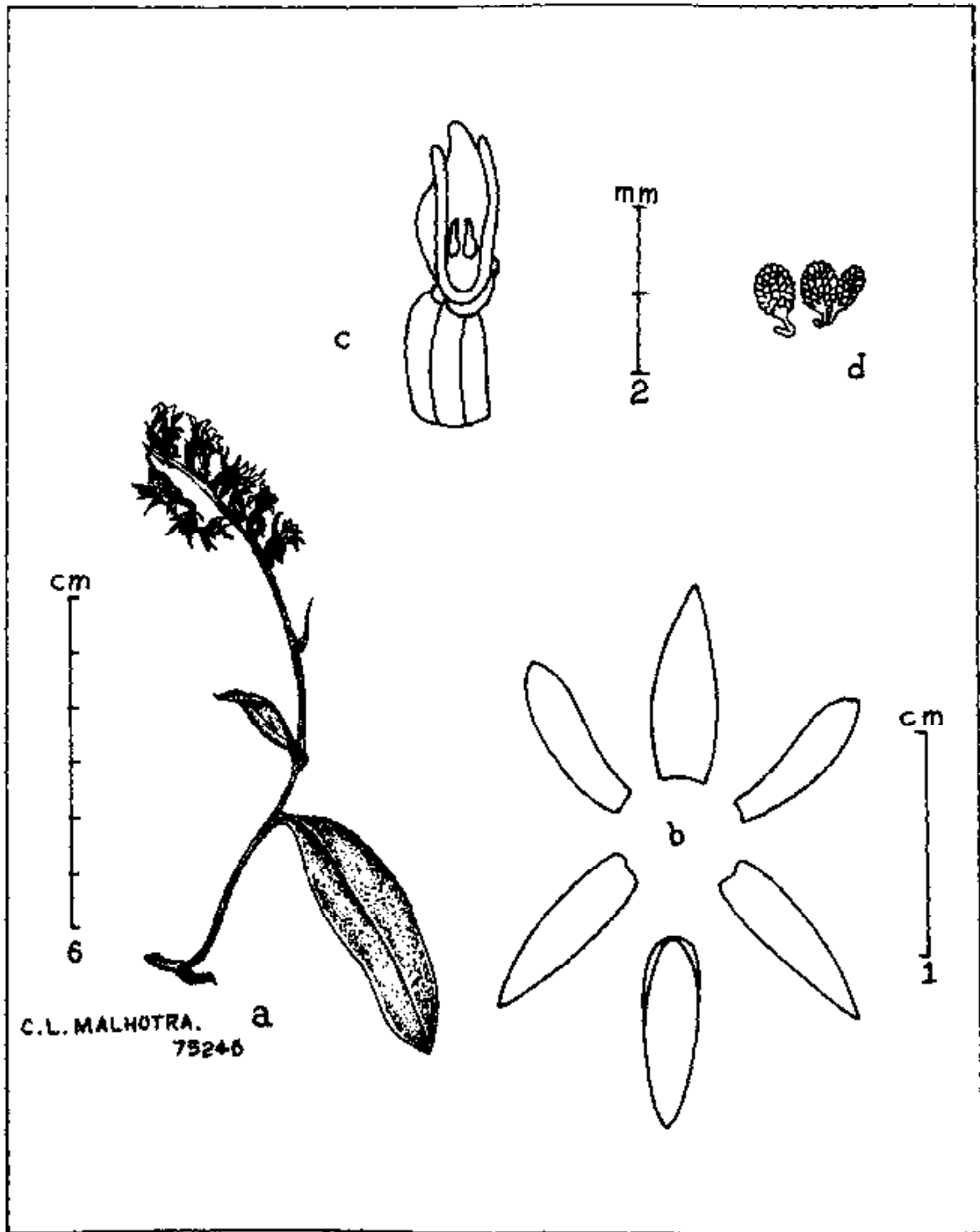


Fig. 48. *Diphyllax urceolata* (Clarke) Hook. f.:
a. habit; b. floral parts; c. column; d. pollinia.

striped; mid-lobe small, oblong or sub-orbicular, acute, crisped or undulate; disc hairy in the middle, 3-ridged; *column* ca 1 cm long, white; *pollinia* linear-oblong.

Fl.: Apr. - May.

Nagaland: Palebadze, *Hynniewta* 56288, 56301 (ASSAM).

Distr.: INDIA (N. E. India); CAMBODIA, LAOS, THAILAND, VIETNAM.

20. DIPHYLAX Hook. f.

***Diphylax urceolata* (Clarke) Hook. f.**, in Hook., *lc.* Pl. 19 : t. 1865. 1889.
Habenaria urceolata Clarke in J. Linn. Soc. 25 : 73. t. 30. 1889; Hook. f., *Fl. Brit. India* 6 : 165. 1890; King & Pantl. in *Ann. Roy. Bot. Gard. Calc.* 8 : 316. t. 415. 1898. Fig. 48

Stems 5-15 cm high, slender, erect or curved, 1-leaved. *Leaves* 6-10 x 1.0-2.0 cm, oblong-lanceolate or elliptic-lanceolate, obtuse. *Inflorescence* few-flowered, 8-10 cm long, decurved, secund. *Flowers* ca 1.5 cm across, white; *bracts* 0.6-0.8 cm long, linear-lanceolate, acute, green; *pedicelled ovary* 0.5-0.6 cm long, green; *sepals* 0.7-0.8 cm long, white, sub-equal, dorsal ca 4 mm broad, oblong, obtuse, laterals ca 3 mm broad, oblong-lanceolate, acute; *petals* 0.6-0.7 x 0.2 cm, linear-oblong, obtuse; *lip* 0.7-0.8 cm long, green, lanceolate, obtuse; *hypochile* slightly concave, hispidulous at base; *epichile* thick, decurved; *spur* ca 0.5 cm long, greenish white, narrowly ellipsoid; *column* ca 2 mm long, white; *pollinia* ellipsoid.

Fl.: Aug. - Sept.

Nagaland: Chakabama, *Hynniewta* 74576; Jafu Hills, *Hynniewta* 74587, *Malhotra* 75246; Kohima, *Hynniewta* 79974, 79975 (ASSAM).

Distr.: INDIA (Nagaland, Sikkim); BHUTAN, NEPAL.

21. EPIGENEIUM Gagnep.

1a. *Leaves* elliptic-oblong, ca 3 cm or more broad; *flowers* ca 8.5 cm or more across, purple spotted, margin of lip crisped

...1. *E. amplum*

BOTANICAL SURVEY OF INDIA

leaves elliptic-lanceolate or lanceolate,
less than 2.5 cm broad; flowers less than 5.5 cm
across, without purple spots; margin of lip entire:

- Mid-lobe of lip ovate; lamellae of equal length ...3. *E. navicularis*
2. Mid-lobe of lip orbicular-ovate or sub-reniform,
not acute; lamellae of unequal length:
- 3a. Leaf apex notched; mid-lobe of lip orbicular-ovate,
larger than the hypochile ...2. *E. fuscescens*
- 3b. Leaf apex acute; mid-lobe of lip
sub-reniform, smaller than the hypochile ...4. *E. rotundatum*

Epigeneium amplum (Lindl.) Summer. in Kew Bull. 260. 1957.
Dendrobium amplum Lindl., Gen. & Sp. Orch. 74. 1830; Hook. f., Fl.
Brit. India 5 : 711. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc.
: 63. t. 89. 1898. *Bulbophyllum amplum* (Lindl.) Reichb. f. in Walp.
Ann. 6 : 224. 1861. *Katherinea ampla* (Lindl.) Hawkes in Lloydia,
9(2): 95. 1956; Balak. & Chowd. in Bull. Bot. Surv. India 8(3 & 4):
14. 1966. Fig. 49

Pseudobulbs 3.5 - 5 cm high, oblong-ellipsoid. *Leaves* 10-14 x 3.0 -
4.0 cm, elliptic-oblong, apex notched; *scape* 2.5-3.5 cm long. *Flowers* ca
1.5 cm across, greenish-brown, purple spotted; *bracts* ca 1.6 cm long, ovate-
oblong, acute, pale brown; *pedicelled ovary* 3-4 cm long; *sepals* 4.2-4.3 x
1.4 cm, ovate-lanceolate, acute; margins recurved; *petals* 4.0 - 4.1 x
1.6 cm, linear-lanceolate, acuminate; margins recurved at the upper
lip 3-3.1 cm long, greenish yellow with purple spots, side lobes
obovate, mid-lobe rhomboid-ovate, acute, longitudinally sulcate, margins
recurved and revolute; lamellae unequal; *column* 1-1.2 cm long, white with
purple spots, broadly winged; *pollinia* ovoid-ellipsoid.

Fl.: Oct.

Agaland: Tiyie, *Hynniewta* 80768; Tokye, *Hynniewta* 80917;
Jinyu, *Hynniewta* 56061, 80725 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN, NEPAL.

Epigeneium fuscescens (Griff.) Summer. in Kew Bull. 262. 1957.
Dendrobium fuscescens Griff., Notul. 3 : 30. 1848; Hook. f., Fl. Brit.

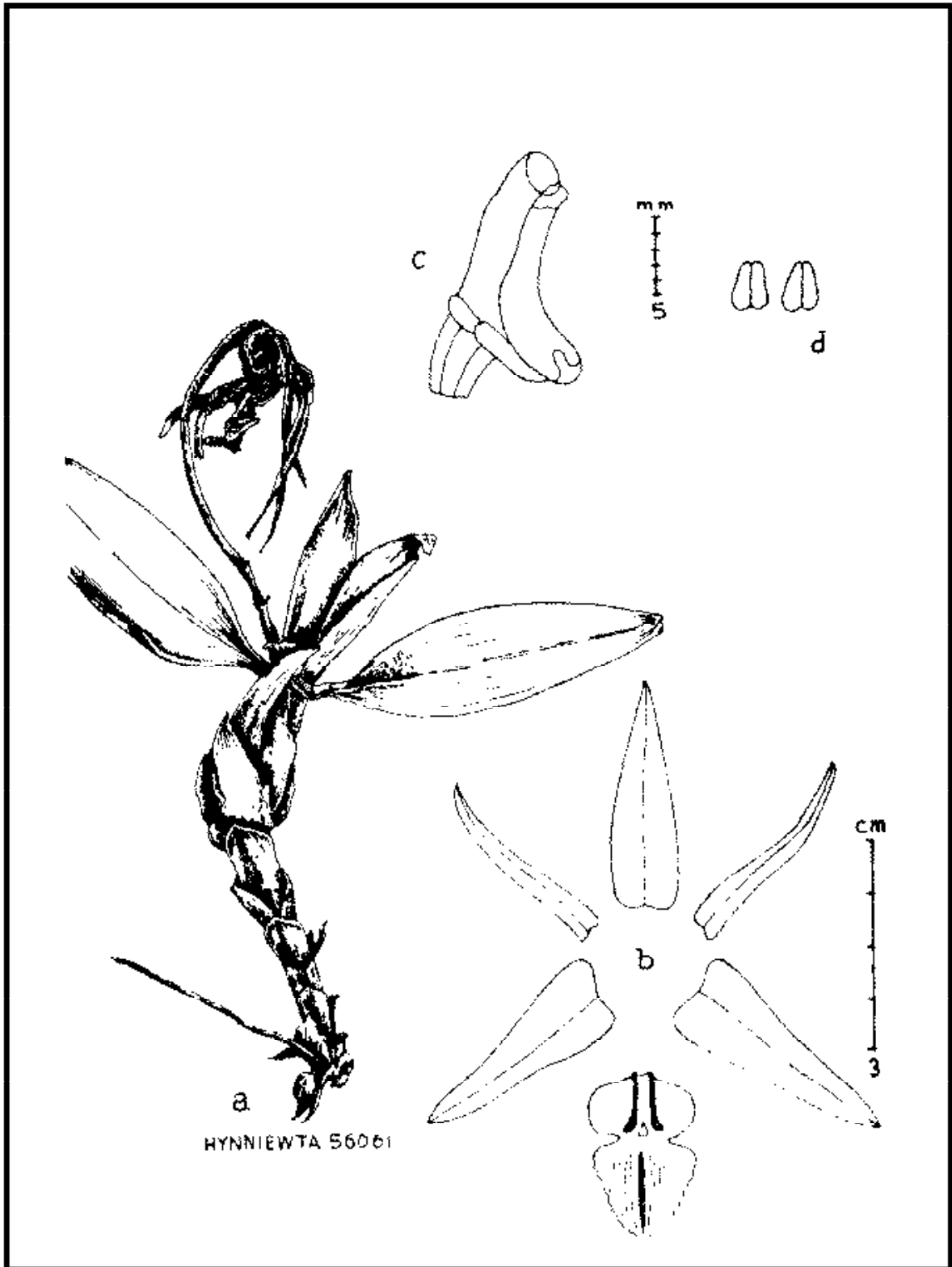


Fig. 49. *Epigeneium amplum* (Lindl.) Summer.
 a. habit; b. floral parts; c. column; d. pollinia

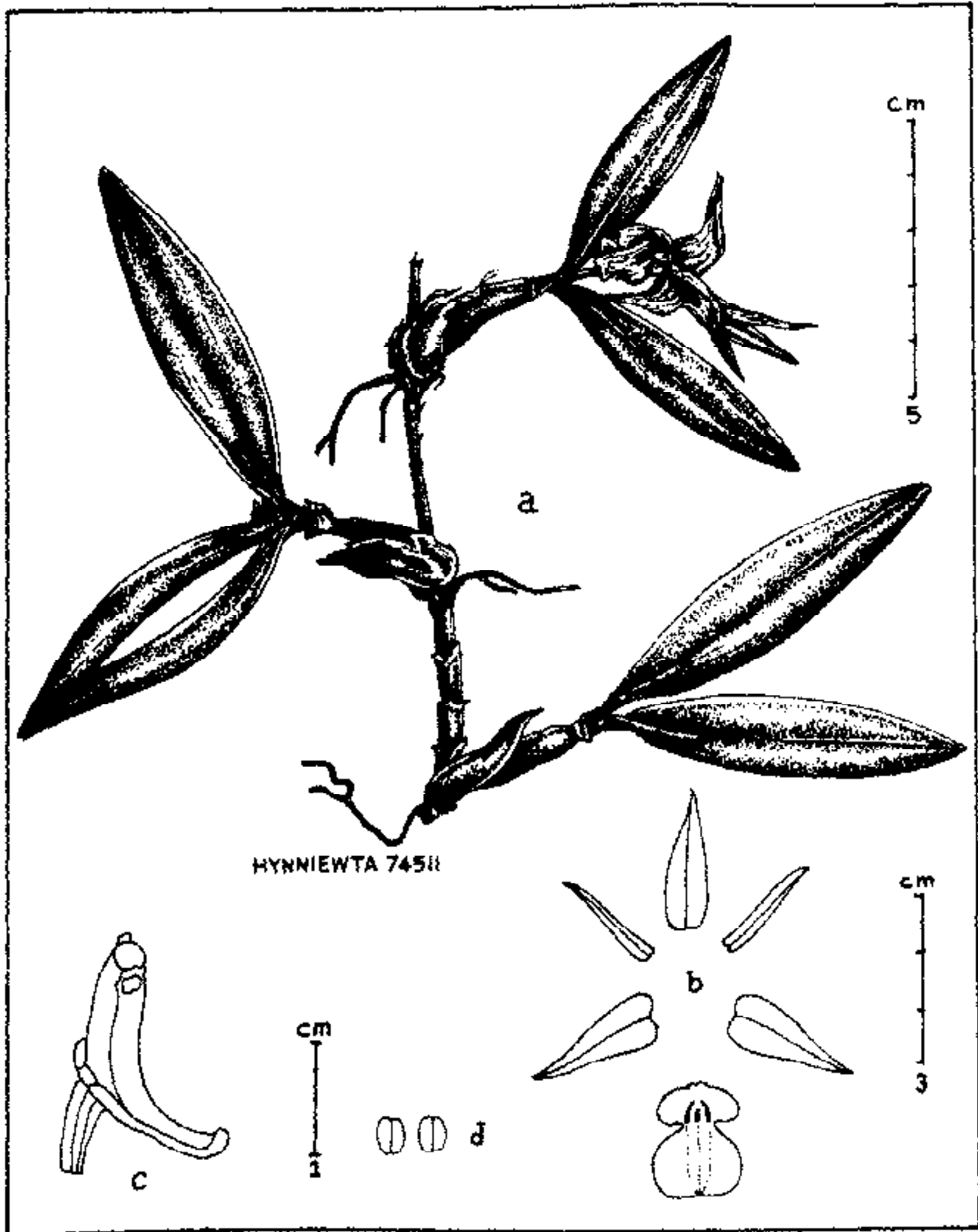


Fig. 56. *Epigeneium fuscescens* (Griff.) Summer.:
 a. habit; b. floral parts; c. column; d. pollinia.

India 5: 712. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8: 62. t. 88. 1898. *Katherinea fuscescens* (Griff.) Hawkes in Llyoydia, 19(2): 96. 1956; Balak. & Chowd. in Bull. Bot. Surv. India, 8(3 & 4): 315. 1966. **Fig. 50**

Pseudobulbs 2.2-4.0 cm high, narrowly oblong-ovoid. *Leaves* 6-8.5 x 1.2-2.0 cm, lanceolate, apex notched. *Scape* 0.3-0.6 cm long. *Flowers* ca 4.5 cm across, pale brownish-purple; *bracts* ca 0.8 cm long, ovate-lanceolate, acute, pale brown; *pedicelled ovary* 1.5-1.8 cm long; *sepals* 2.2 - 2.3 x 0.6-0.8 cm, ovate-lanceolate, acute; *petals* ca 2 x 0.3 cm, linear-lanceolate, acute; *lip* ca 2 cm long, dull brownish red; side lobes narrowly oblong, obtuse; mid-lobe orbicular-ovate; margins undulate; lamellae unequal; *column* ca 1 cm long, pale brown, obscurely winged; *pollinia* oblong-ellipsoid.

Fl.: Oct.

Nagaland: Phek, *Hynniewta* 80921; Rangapahar, *Hynniewta* 74511; Tseminyu, *Hynniewta* 56231 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BANGLA DESH, BHUTAN, NEPAL.

3. *Epigeneium navicularis* (Balak. & Chowd.) Hynniewta et Wadhwa. *comb. nov.* *Katherinea navicularis* Balak. & Chowd. in Bull. Bot. Surv. India, 8(3 & 4) : 316. 1967. **Fig. 51**

Pseudobulbs 3.5-4.0 cm high, narrowly ellipsoid-oblong. *Leaves* 5.5-8.5 x 1.5-2.0 cm, lanceolate; apex emarginate; *scape* ca 1 cm long. *Flowers* ca 5.5 cm across, dull purplish-brown; *bracts* ca 0.8 cm long, linear-lanceolate, acuminate, greenish brown; *pedicelled ovary* 2.5-2.7 cm long; *sepals* 2.7-2.8 x ca 1 cm, ovate-lanceolate, acute; *petals* ca 2.6 x 0.3 cm, linear-lanceolate, acuminate; *lip* ca 1.8 cm long, dull purplish brown, side lobes broadly oblong, obtuse; apex crenulate, mid-lobe ovate, acuminate; lamellae equal; *column* ca 1.6 cm long, white with few yellow spots, broadly winged; *pollinia* oblong-pyriform.

Fl.: Sept.

Nagaland: Pulebadze, *Malhotra* 75196; Saramati, *Hynniewta* 80961 (ASSAM).

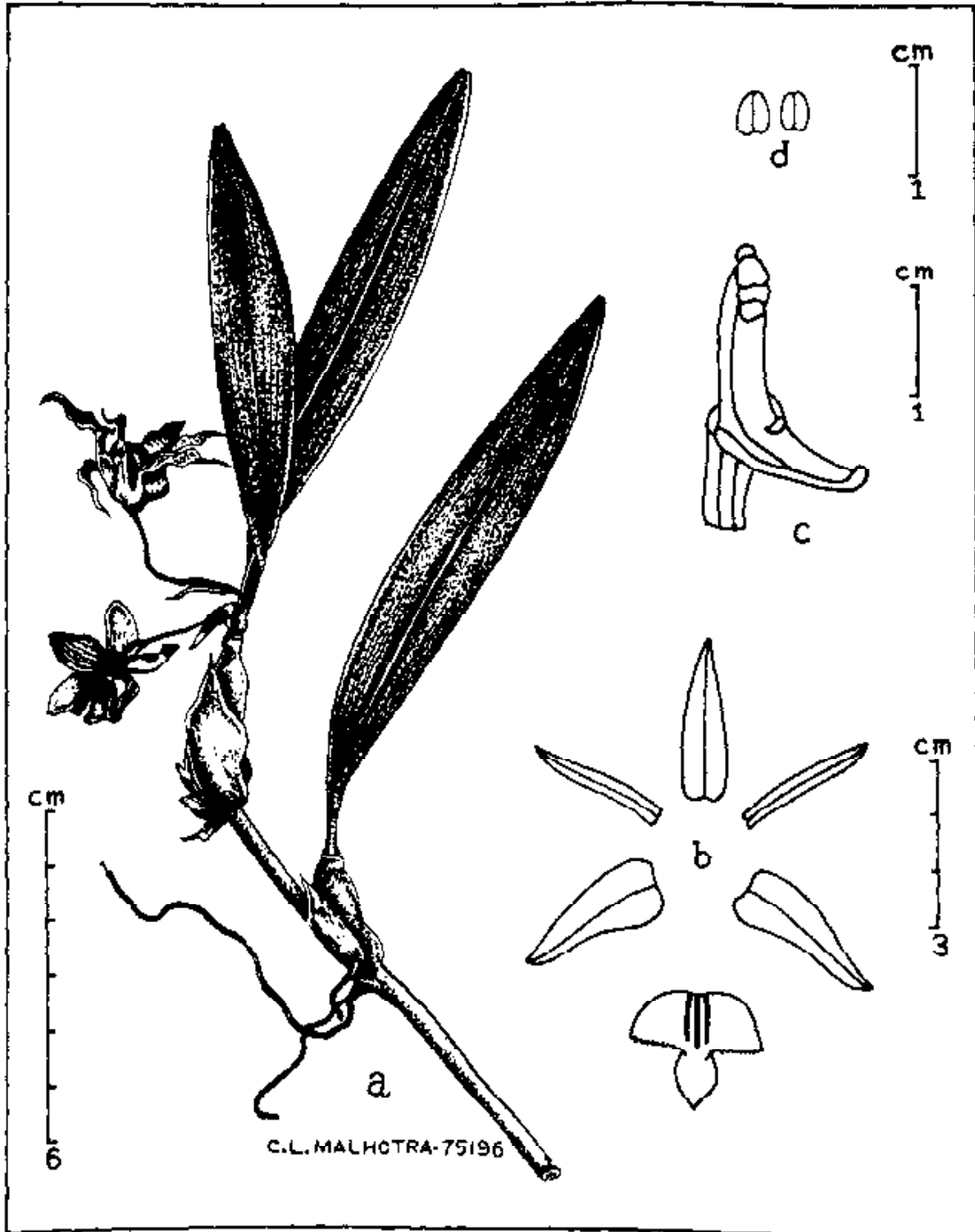


Fig. 51. *Epigeneium navicularis* (Balak. & Chowd.) Hynniewta et Wadhwa:
a. habit; b. floral parts; c. column; d. pollinia.

Distr.: INDIA (Nagaland); BHUTAN.

Notes : A.N. Rao (in J. Econ. Tax. Bot. Addl. ser. 11:59.1995 has made the new combination, but it is not legitimate, as basionym has not been cited properly as required under International Rules of Nomenclature, hence the new combination is provided here.

4. **Epigeneium rotundatum** (Lindl.) Summer. in Kew Bull. 264. 1957. *Sarcopodium rotundatum* Lindl., Fol. Orch. Sarcop. 2. 1853. *Katherinea rotundata* (Lindl.) Hawkes in Llyoydia, 19 (2): 97. 1956. *Bulbophyllum rotundatum* (Lindl.) Reichb. f. in Walp. Ann. 6 : 224. 1861. *Dendrobium rotundatum* (Lindl.) Benth. & Hook. f., Gen. Pl. 3(2) : 499. 1883; Hook. f., Fl. Brit. India 5 : 712. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 62. t. 87. 1898: **Fig. 52**

Pseudobulbs 3.0 - 4.0 cm high, narrowly oblong-ovoid. *Leaves* 6.5-8.5 x 2.2-2.5 cm, elliptic-lanceolate, acute; *scape* 2.2-2.5 cm long. *Flowers* ca 5.5 cm across, pale chestnut brown; *bracts* 1-1.2 cm long, ovate, lanceolate, acute, pale brown; *pedicelled ovary* 1.2-1.5 cm long; *sepals* 2.7-2.8 x 0.9-1.0 cm; dorsal ovate-lanceolate, acute; laterals falcate; *petals* ca 2.5 - 2.6 x 0.6 x 0.4 cm, lanceolate, acute; *lip* 2.2-2.3 cm long, chestnut brown, side lobes rounded, mid-lobe sub-reniform; lamellae 3, unequal; *column* ca 1.2 cm long, pale yellow, broadly winged; *pollinia* oblong ellipsoid.

Fl.: Oct.

Nagaland: Jakhoma, Bahadur 61683; Pulebadze, Hynniewta 56302 (ASSAM).

Distr.: INDIA (Nagaland, Sikkim); CHINA.

22. **ERIA** Lindl.

- 1a. Leaves terete; sepals and petals woolly10. *E. pannea*
- 1b. Leaves flat; sepals and petals glabrous
or only sepals woolly, hirsute or pubescent:
- 2a. Stems with pseudobulb, 1 to few-noded;
leaves few, crowded, terminal or sub-terminal:

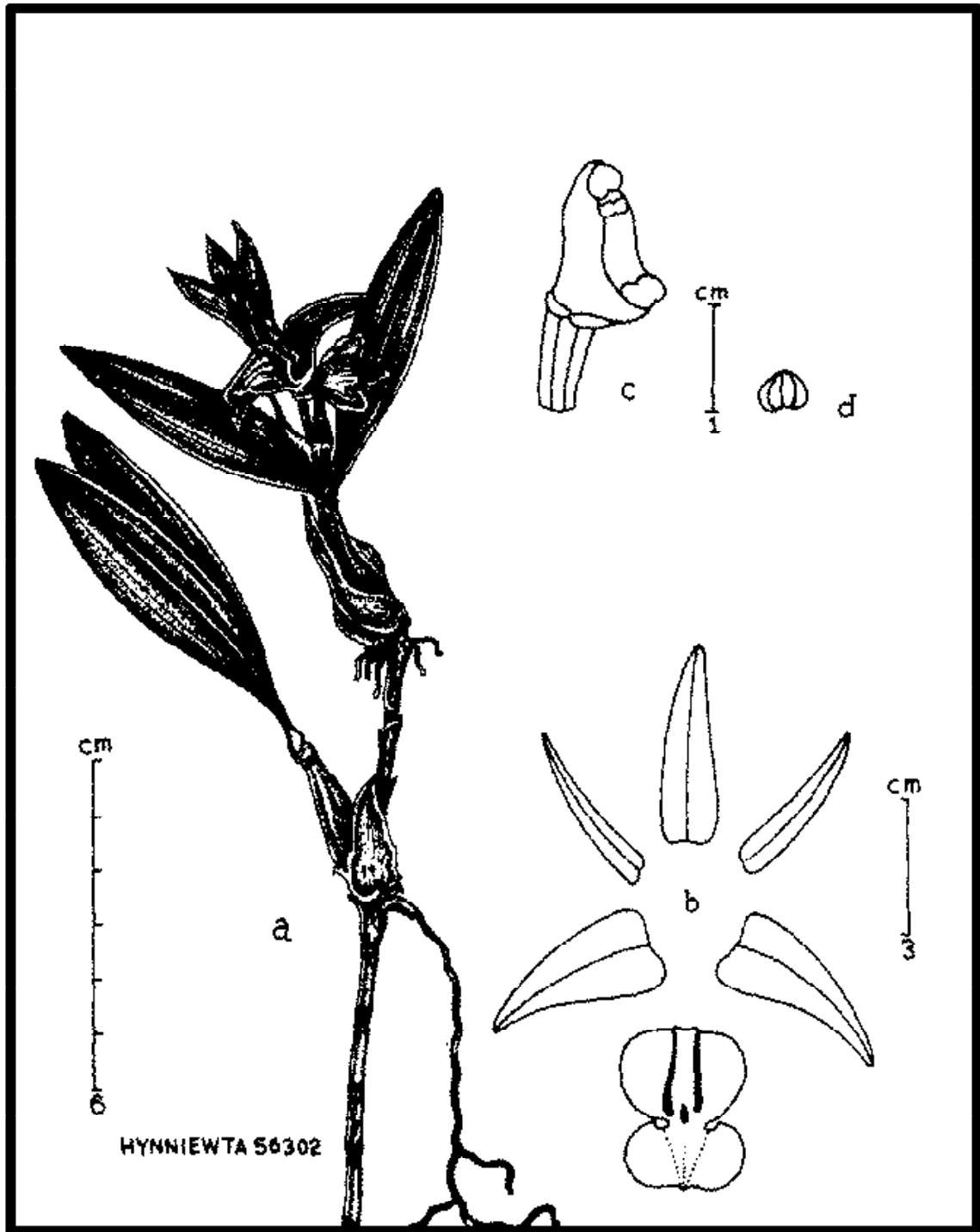


Fig. 52. *Epigeneium rotundatum* (Lindl.) Summer.:
a. habit; b. floral parts; c. column; d. pollinia.

- 3a. Inflorescence, ovary and sepals woolly or pubescent:
- 4a. Pseudobulbs terete, 1-noded; inflorescence terminal, spicate, woolly, secund; ovary and sepals woolly; lip without lamellae12. *E. stricta*
- 4b. Pseudobulbs oblong-cylindric or clavate, few-noded; inflorescence lateral, racemose, pubescent, not secund; ovary and sepals pubescent; lip with 3 lamellae:
- 5a. Pseudobulbs oblongcylindric; flowers dirty white; bracts lanceolate; lip with 2 calli; mentum obscure or absent; lamellae of equal length7. *E. excavata*
- 5b. Pseudobulbs clavate; flowers dull yellow, reddish brown nerved; bracts ovate; lip without calli; mentum distinct; lamellae of unequal length3. *E. amica*
- 3b. Inflorescence and ovary pubescent or 2 glabrous; sepals glabrous:
- 6a. Inflorescence and ovary pubescent:
- 7a. Pseudobulbs terete, 1-noded; lip with 3 calli8. *E. graminifolia*
- 7b. Pseudobulbs oblong-cylindric, few-noded; lip without calli 2. *E. alba*
- 6b. Inflorescence and ovary glabrous:
- 8a. Pseudobulbs few-noded; inflorescence spicate, dense, unexpanded, oblong or sub-globose; lip smooth, without calli or lamellae11. *E. spicata*
- 8b. Pseudobulbs 1-noded; inflorescence racemose, lax, expanded, neither oblong nor sub-glabose; lip with lamellae:
- 9a. Pseudobulbs ovoid or oblong-cylindric, inflorescence lateral; bracts ovate, reflexed; flowers ca 2.2 cm or less across; lip with 3 smooth lamellae:
- 10a. Pseudobulbs ovoid, sometimes flask-shaped; flowers white, lamellae of equal length1. *E. acervata*

- 10b. Pseudobulbs oblong-cylindric; flowers pale purplish yellow; lamellae of unequal length5. *E. bractescens*
- 9b. Pseudobulbs terete; inflorescence terminal; bracts lanceolate or ring-like, not reflexed; flowers ca 2.5 cm or more across; lip with 5 or 7 crenulate or crenate lamellae:
- 11a. Flowers ca 2.5 cm across, pale green, purplish brown striped; bracts minute, ring-like; lip entire; lamellae 5, equal in length13. *E. vittata*
- 11b. Flowers ca 4.5 cm across, white; bracts large, lanceolate, acute; lip 3-lobed; lamellae 7, unequal in length6. *E. coronaria*
- 2b. Stems without pseudobulb, many-noded; leaves many, distant, distichous:
- 12a. Inflorescence, ovary, sepals all woolly; flowers ca 1.2 cm or less across; sepals yellowish green; petals purple spotted; lip 3-lobed, with 1 callus, without lamellae9. *E. paniculata*
- 12b. Inflorescence, ovary, sepals all rusty pubescent; flowers ca 2.2 cm or more across; sepals and petals pale brown, dark brown streaked; lip entire with 5 lamellae, without calli4. *E. bambusifolia*
1. ***Eria acervata*** Lindl. in J. Hort. Soc. 6 : 57. 1851; Hook. f., Fl. Brit. India 5 : 796. 1890 (non King & Pantl., 1898). **Fig. 53**

Pseudobulbs 3-6 cm high, erect, narrowly ellipsoid, 3-5-leaved. *Leaves* 8-15 x 1-2 cm, lanceolate or linear-oblong; apex notched. *Inflorescence* few-flowered, 4-8 cm long. *Flowers* 2.0-2.2 cm across, white; *bracts* 0.8-1.0 cm long, brownish green, ovate, acute, reflexed; *pedicelled ovary* 2.5-3 cm long, pale green; *sepals* 1.0-1.1 x 0.5 cm, sub-equal; dorsal ovate-lanceolate; laterals ovate, falcate; *mentum* conical, obtuse, glabrous; *petals* 0.9-1.0 x 0.3 cm, lanceolate, acute; *lip* 0.8-0.9 cm long, white with yellow apex, 3-lobed; side lobes oblong, obtuse; mid-lobe sub-orbicular, apiculate; lamellae 3, equal, white, terminating near the apex of mid-lobe; *column* 4-5 mm long, white slightly curved; foot long; *pollinia* obovoid.

Fl.: Jun. - Jul.

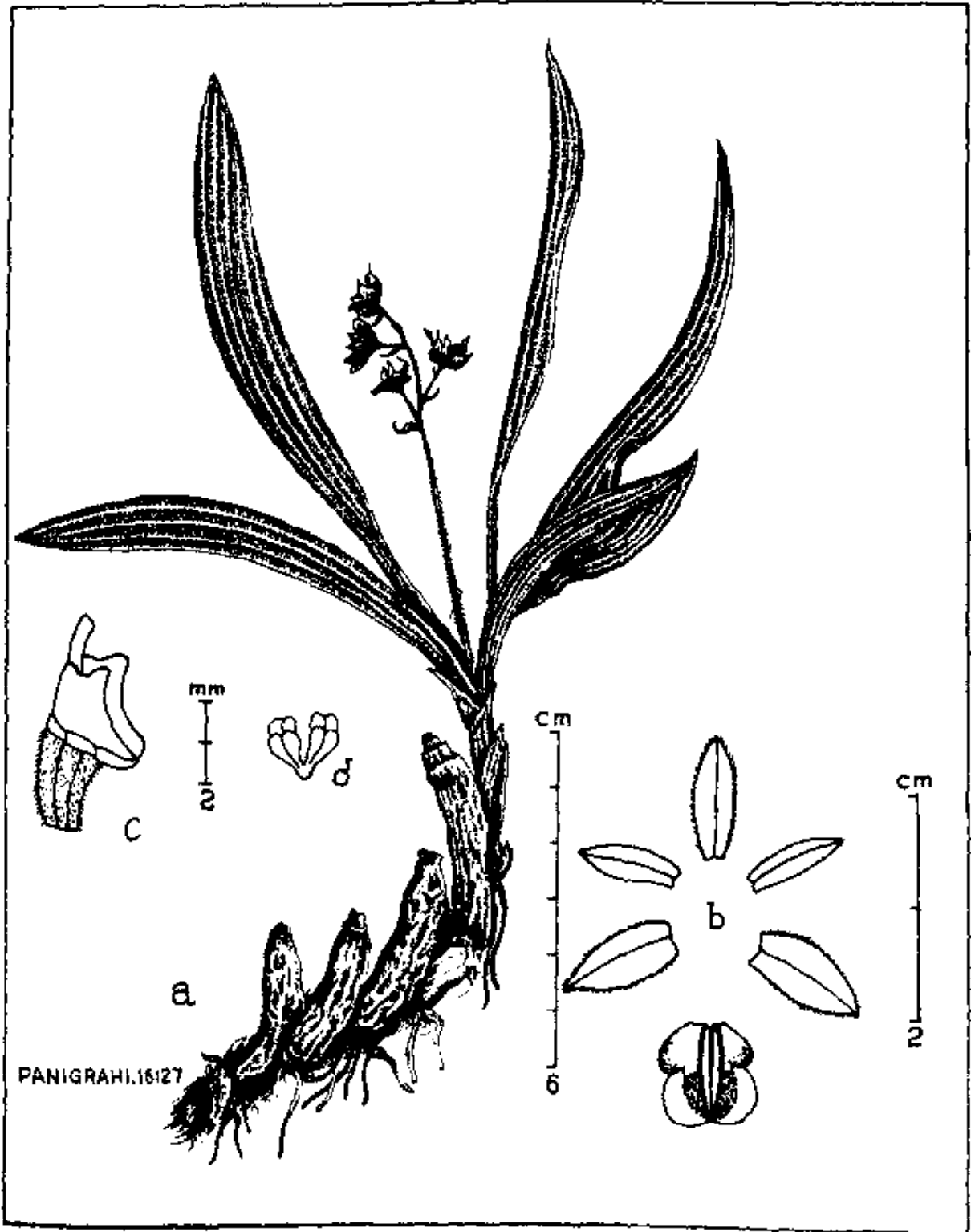


Fig. 53. *Eria acervata* Lindl.:
 a. habit; b. floral parts; c. column; d. pollinia.

Nagaland: Khonoma, Hynniewta 64526 (ASSAM).

Distr.: INDIA (Arunachal Pradesh, Meghalaya, Nagaland, Sikkim); MYANMAR, CAMBODIA, LAOS, VIETNAM.

2. *Eria alba* Lindl., Gen. & Sp. Orch. 67. 1830; Hook. f., Ic. Pl. t. 1845. 1889; Fl. Brit. India 5: 795. 1890. Fig. 54

Pseudobulbs 1.5–2.5 cm high, 2-5-leaved. *Leaves* 5-8 x 1–1.5 cm, oblong-lanceolate; apex 2-fid. *Inflorescence* few-flowered, lax, 5-8 cm long, sparsely pubescent, terminal. *Flowers* ca 2.0 cm across; white; *bracts* 0.5–0.6 cm long, elliptic-ovate, acute, reflexed, green; *pedicelled ovary* 2.0–2.5 cm long, white, sparsely pubescent; *sepals* ca 1.0 x 0.4 cm, acute, sub-equal; dorsal oblong; laterals oblong, sub-falcate; *mentum* broad, obtuse; *petals* ca 0.9 x 0.3 cm, linear-oblong, acute; *lip* ca 0.9 cm long, white, yellow tinged, 3-lobed; side lobes oblong, obtuse; mid-lobe orbicular, acute; *lamellae* 3, white, faint, equal, from base to the apex of lip; *column* ca 4 mm long, white; *pollinia* oblong.

Fl.: Jun. - Jul.

Nagaland: Melori, Hynniewta 80982; Noklak, Hynniewta 51813, 80939 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim, Western Himalayas).

3. *Eria amica* Reichb. f. in Gen. Orch. 3 : 168. t. 3. f. 6-9. 1870; Hook. f., Fl. Brit. India 5 : 800. 1890. *E. confusa* Hook. f., Ic. Pl. t. 1850. 1889; Fl. Brit. India 5 : 796. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 120. t. 169. 1898. *E. andersoni* Hook. f., Fl. Brit. India 5 : 795. 1890.

Pseudobulbs 10-15 cm high, 3-5-leaved. *Leaves* 10-12 x 2-3 cm, oblong-lanceolate, acute. *Inflorescence* many-flowered, lax, 5-8 cm long. *Flowers* ca 2.4 cm across, dull yellow with reddish brown nerves; *bracts* 1.0-1.5 cm long, brownish yellow, ovate, acute, puberulous; *pedicelled ovary* 2.0-2.5 cm long, reddish brown, pubescent; *sepals* ca 1.2 x 0.5 cm, pubescent outside, sub-equal; dorsal elliptic, obtuse, incurved; laterals ovate, acute; *mentum* conical, obtuse, pubescent; *petals* ca 1.0 x 0.3 cm, elliptic-lanceolate, obtuse; *lip* ca 1.0 cm long, 3-lobed; side lobes; reddish

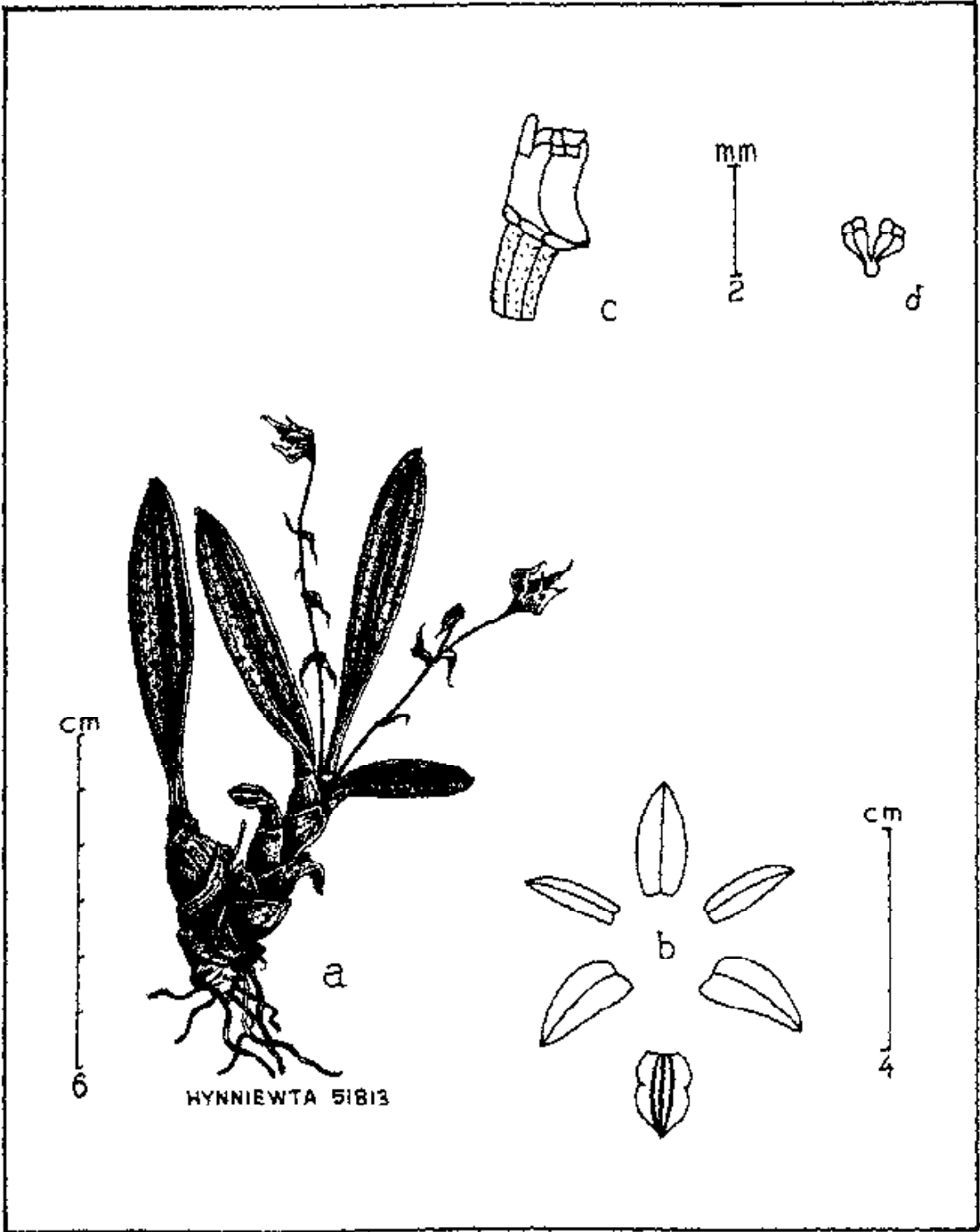


Fig. 54. *Eria alba* Lindl.:
a. habit; b. floral parts; c. column; d. pollinia.

brown, round, incurved; mid-lobe greenish yellow with brown margin, reniform, reflexed; lamellae 3, brownish yellow, unequal, middle longer terminating at the apex of the mid-lobe; *column* ca 0.8 cm long, brownish yellow; foot long; *pollinia* obovoid.

Fl.: Apr.

Nagaland: Ongpangkong, *Hynniewta* 80701; Tiye Hills, *Hynniewta* 80763; Tseminyu, *Hynniewta* 56229 (ASSAM).

Distr.: INDIA (Arunachal Pradesh, Assam, Nagaland, Sikkim); BHUTAN, CAMBODIA, LAOS, VIETNAM.

4. ***Eria bambusifolia*** Lindl. in J. Linn. Soc. 3 : 61. 1859; Hook. f., Fl. Brit. India 5 : 895. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 119. t. 163. 1898.

Stems 60 cm to 1 m high, terete, many-leaved. *Leaves* 10-20 x 2.5-4.0 cm, oblong-lanceolate, acuminate. *Inflorescence* many-flowered, 10-25 cm long, racemose, terminal and lateral. *Flowers* ca 2.2 cm across, pale brown, dark brown streaked; *bracts* 0.6-0.7 cm long, blackish brown, sub-orbicular, apiculate, pubescent, reflexed; *pedicelled ovary* 1.5-1.7 cm long, blackish brown, rusty pubescent; *sepals* ca 0.5 cm broad, rusty pubescent outside; dorsal ca 1.0 cm long, oblong, obtuse; laterals ca 1.1 cm long, falcately oblong, acute, recurved; *mentum* conical, obtuse, rusty pubescent, incurved; *petals* 0.9-1.0 x 0.3 cm, linear-oblong, obtuse; *lip* 1.0-1.1 cm long, pale brown, dark brown streaked, oblong, obtuse; lamellae 5, green, pubescent, unequal; middle 3 longer, from base of lip terminating at the apex of mid-lobe; *column* 0.9-1.0 cm, pinkish yellow, curved; foot long; *pollinia* obovoid-elliptic.

Fl.: Sept. - Oct.

Nagaland: Kohima, *Hynniewta* 74514; Pulebadze, *Hynniewta* 56203; Tuensang, *Hynniewta* 80948 (ASSAM).

Distr.: INDIA (Meghalaya, Mizoram, Nagaland, Orissa, Sikkim); CHINA, THAILAND.

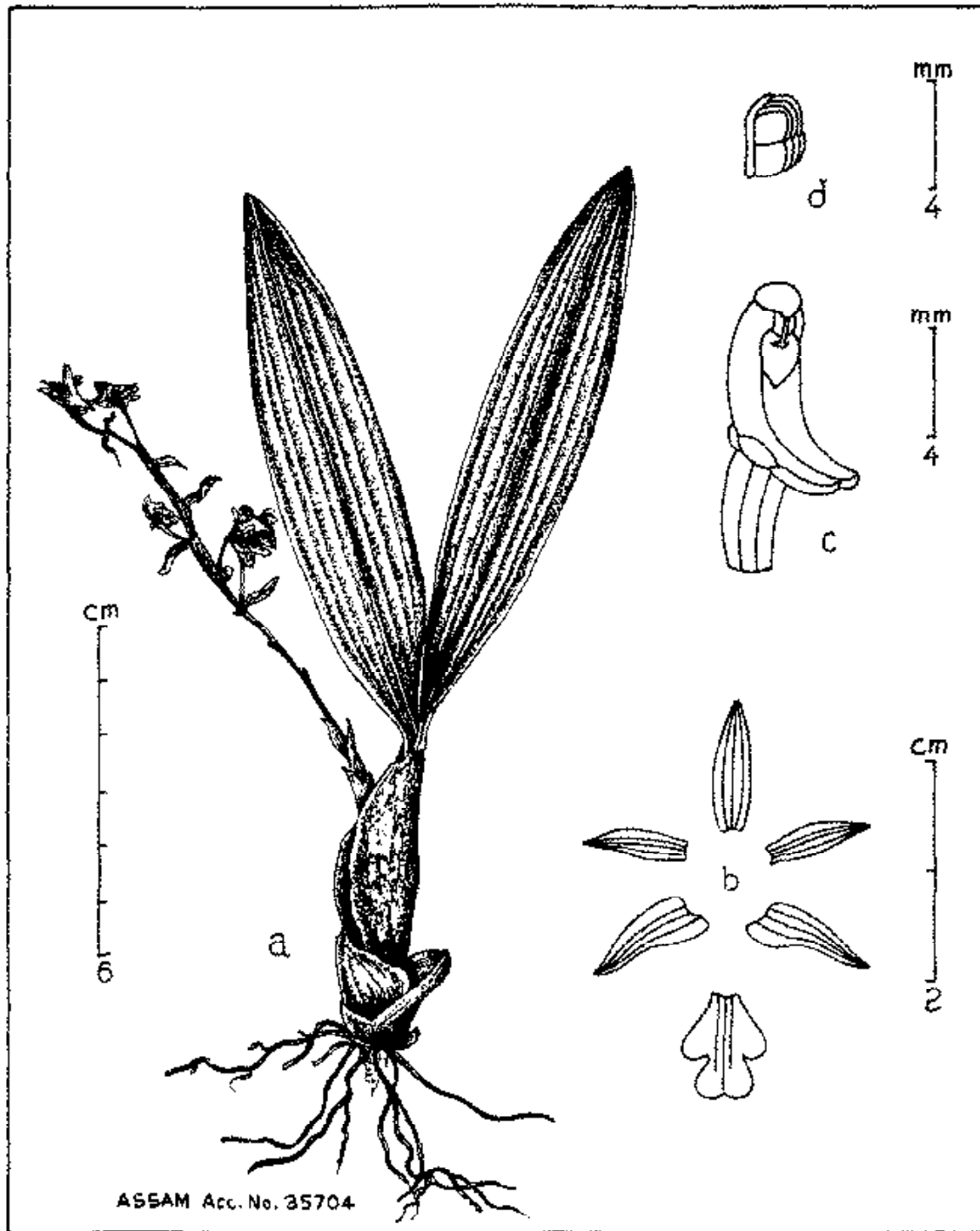


Fig. 55. *Eria bractescens* Lindl.:
a. habit; b. floral parts; c. column; d. pollinia.

5. *Eria bractescens* Lindl. in Bot. Reg. 18. Misc. 201. 1841; Hook. f., Fl. Brit. India 5 : 796. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 120. t. 166. 1898; Seidenf. & Smitnd. Orch. Thailand, 2 (2) : 305. t. 228. 1960. Fig. 55

Pseudobulbs 4-8 cm high, 2-3-leaved. *Leaves* 10-15 x 2-3.5 cm, elliptic-oblong, acute. *Inflorescence* many-flowered, 10-15 cm long. *Flowers* ca 2.0 cm across, pale pinkish yellow; *bracts* 0.4-0.5 cm long, pale yellow, elliptic-ovate, acute, reflexed, brownish; *pedicelled ovary* 1.2 - 1.3 cm long, greenish yellow, glabrous; *sepals* 1.0-1.1 x 0.4-0.5 cm, glabrous, sub-equal; dorsal lanceolate-oblong; apex acute, curved backwards; laterals ovate, falcate, acute; *mentum* conical, obtuse, glabrous; *petals* 0.9-1.0 cm long, 3-lobed; side lobes deep pink, round erect; mid-lobe creamy, quadrate, reflexed; lamellae 3, red, unequal; middle one longer terminating at the apex of mid-lobe; *column* 5-6 mm long, pinkish yellow, slightly winged at apex; *pollinia* obovoid, compressed.

Fl.: Apr.

Nagaland: Pulebadze, Hynniewta 56298 (ASSAM).

Distr.: INDIA (Andaman Islands, Nagaland, Sikkim); BANGLA DESH, MYANMAR, CAMBODIA, JAVA, LAOS, MALAYA, PHILIPPINES, SUMATRA, THAILAND.

6. *Eria coronaria* (Lindl.) Reichb. f. in Walp. Ann. 6 : 272. 1861; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 125. t. 172. 1898. *Coelogyne coronaria* Lindl. in Bot. Reg. Misc. 83. 1841. *Eria cylindropoda* Griff., Notul. 3 : 299. 1851. *E. suavis* Lindl. in J. Linn. Soc. 3 : 52. 1859. *Trichosma suavis* Lindl. in Bot. Reg. Misc. 83. 1841; Hook. f. Fl. Brit. India 5 : 828. 1890 et 6 : 193. 1890. Fig. 56

Pseudobulbs 8-15 cm high, 2-leaved. *Leaves* 8-15 x 2.5-3.5 cm, narrowly elliptic to ovate-lanceolate, acute. *Inflorescence* few-flowered, 5-12 cm long. *Flowers* ca 4.5 cm across, white; *bracts* 0.3-0.5 cm long, greenish brown, linear-lanceolate, acute; *pedicelled ovary* 2.0-3.0 cm long, brownish green; *sepals* sub-equal; dorsal 2.0-2.1 x 0.5-0.6 cm, oblong lanceolate, obtuse; laterals 2.2-2.3 x 0.6-0.7 cm, oblong-falcate; *mentum* short, conical, obtuse; *petals* 2.0 - 2.1 x 0.4-0.5 cm, lanceolate, obtuse; *lip* 2.2-2.3 cm long, purple flushed externally; side lobes large, rounded, purple

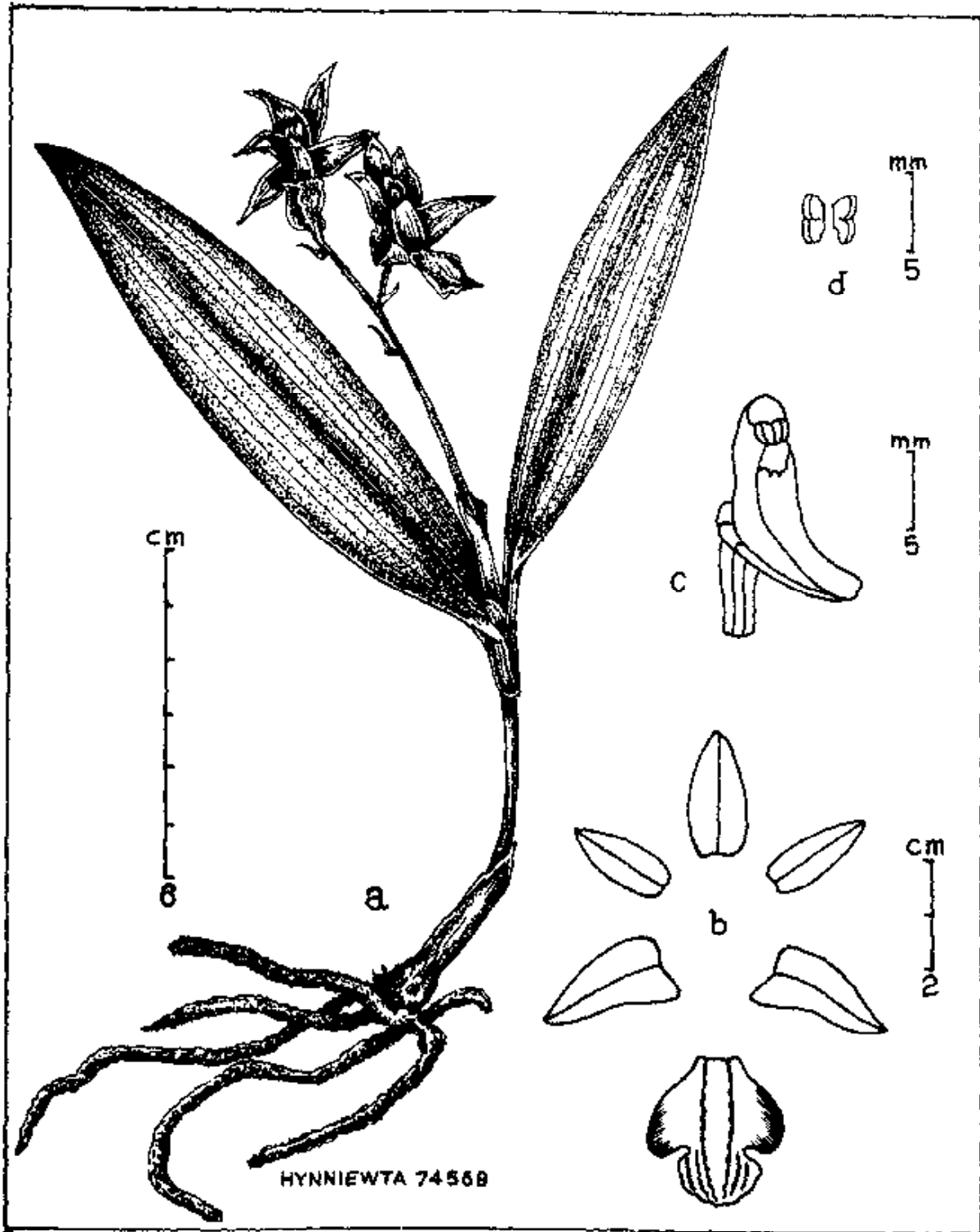


Fig.56. *Eria coronaria* (Lindl.) Reichb. f.;
a. habit; b. floral parts; c. column; d. pollinia.

streaked; mid-lobe sub-orbicular, acute, yellow, revolute; margins undulate; lamellae 7, crenate, unequal; 2 longer, from base to apex of mid-lobe; *column* ca 8 mm long, white, purple flushed in front; foot long; *pollinia* ovate.

Fl. : Oct. - Nov.

Nagaland: Dimapur, *Hynniewta* 74543; Kohima Bahadur 55749, *Hynniewta* 74568; Pulebadze, *Hynniewta* 56141 (ASSAM), *Prain* 33 (CAL).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN:

7. *Eria excavata* Lindl., Gen. & Sp. Orch. 67. 1830 p.p.; Hook. f., Fl. Brit. India 5 : 795. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 124. t. 171. 1898. *Eria sphaerochila* Lindl. in Journ. Linn. Soc. 3 : 54. 1859. Fig. 57

Pseudobulbs 4-5 cm long, 2-5-leaved. *Leaves* 5-15 x 1.0-2.2 cm, elliptic-lanceolate or elliptic-oblongate, acute. *Inflorescence* few-flowered, lax, 8-12 cm long. *Flowers* ca 2 cm across, dirty white; *bracts* 7-8 mm long, pale green, lanceolate, acute; pubescent; *pedicelled ovary* 2-2.5 cm long, pale green, pubescent; *sepals* ca 1 x 0.4 cm, ovate or ovate-lanceolate, acute, pubescent outside; *petals* 0.8-0.9 x 0.2-0.3 cm, lanceolate, acute or obtuse; *lip* 0.8-0.9 cm long, pale yellow, saccate and with 2 elongate calli at base, 3-lobed; side lobes erect, rounded; mid-lobe sub-orbicular, yellow with red markings about its base; apex deflexed, emarginate; disc rugulose; lamellae 3, equal, from base to apex of lip; *column* ca 3 mm long, greenish yellow; foot very short, deeply excavate; *pollinia* sub-clavate.

Fl.: Jun. - Jul.

Nagaland: Pulebadze, *Hynniewta* 56270 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); NEPAL.

8. *Eria graminifolia* Lindl. in J. Linn. Soc. 3 : 54. 1859; Hook. f., Fl. Brit. India 5 : 794. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 120. t. 164. 1898. Fig. 58

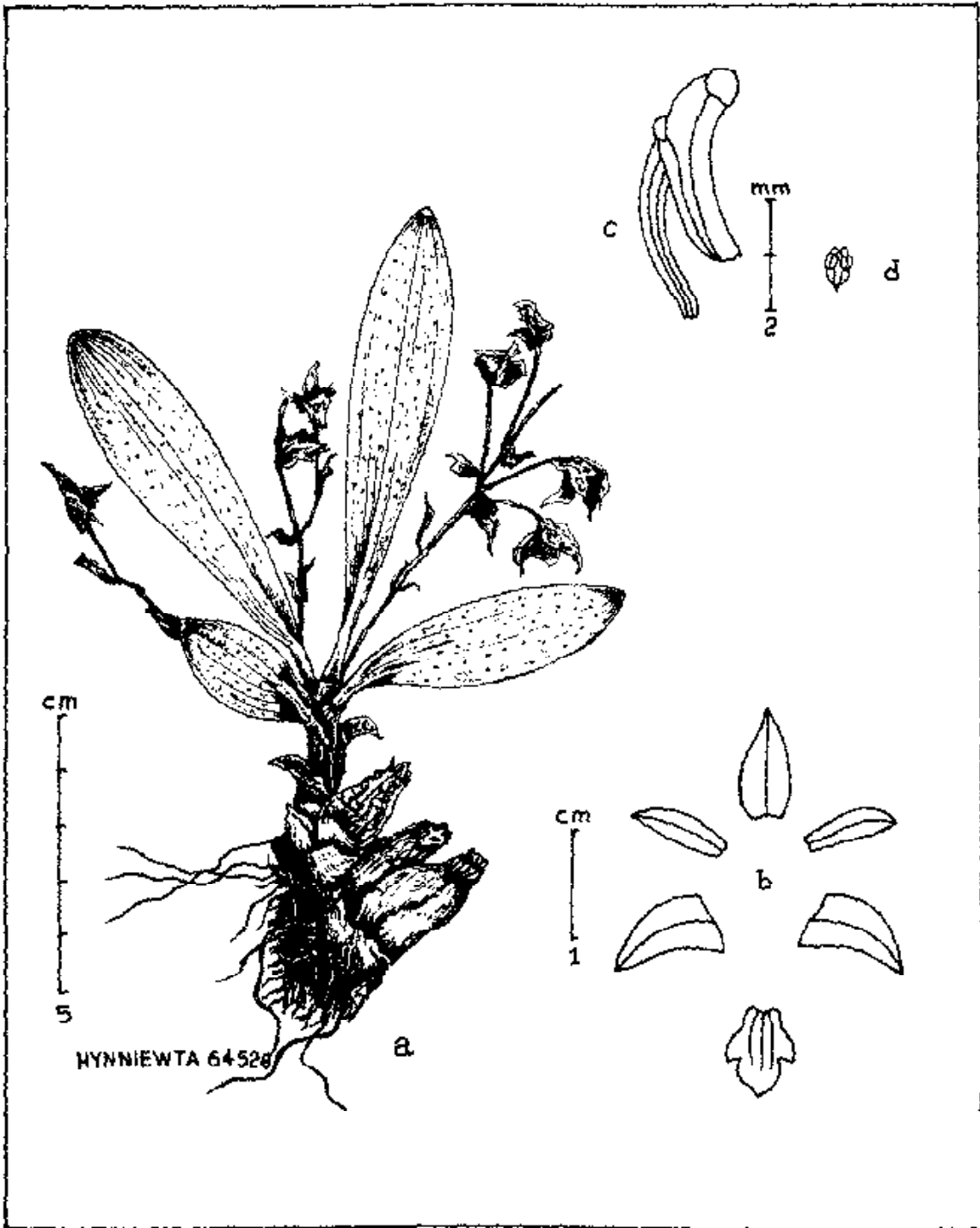


Fig. 57. *Eria excavata* Lindl.:
 a. habit; b. floral parts; c. column; d. pollinia.

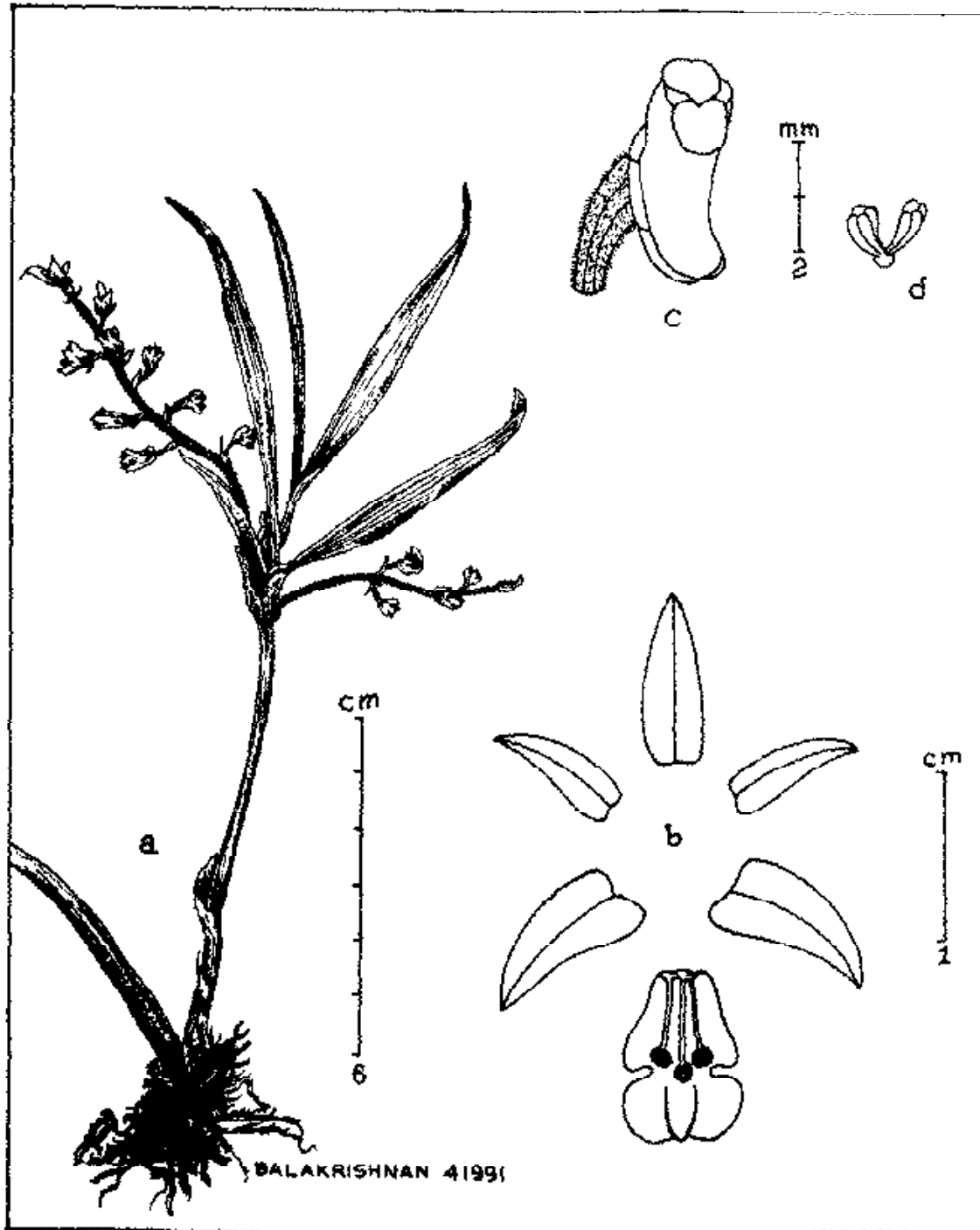


Fig. 58. *Eria graminifolia* Lindl.:
a. habit; b. floral parts; c. column; d. pollinia.

Pseudohulbs 12-20 cm high, 3-5-leaved. *Leaves* 10-15 x 1.5-2.0 cm, lanceolate, acuminate. *Inflorescence* many-flowered, lax, 8-15 cm long, terminal or sub-terminal. *Flowers* ca 2.0 cm across, white; *bracts* 0.6 - 0.7 cm long, brownish green, ovate, acuminate; *pedicelled ovary* 1.0-1.1 x 0.5-0.6 cm, elliptic lanceolate, obtuse; *laterals* sub-falcate; *mentum* short, rounded; *petals* 0.9 - 1.0 x 0.4 cm, oblong, obtuse; *lip* 1.0-1.1 cm long with 3 unequal oblong calli in the middle, 3-lobed; *side lobes* pink, oblong, obtuse incurved; *mid-lobe* pale yellow, transversely oblong; *apex* emarginate; *lamellae* 3, yellow, unequal, middle longer, terminating above the base of mid-lobe; *column* 3-4 mm long, white, purple flushed in front; *foot* short, puberulous; *pollinia* linear-clavate.

Fl.: Jul. - Aug.

Nagaland: Medziphema, *Hynniewta* 74582; Pulebadze, *Hynniewta* 56259; Satakha, *Hynniewta* 80863 (ASSAM).

Distr.: INDIA (Nagaland, Sikkim); BHUTAN.

9. ***Eria paniculata*** Lindl. in Wall. Fl. As. Rar. 1 : 32. t. 36. 1830; Hook. f., Fl. Brit. India 5 : 789. 1890; King & Pantl. in. Ann. Roy. Bot. Gard. Calc. 8 : 126. t. 174. 1898. **Fig. 59**

Stems 30-45 cm high, caespitose, terete, many-leaved. *Leaves* 15-20 x 1.5-2.0 cm, linear; apex acuminate, sometimes unequally and acutely 2-fid. *Inflorescence* many-flowered, terminal, a fascicle of 2 or 3 racemes, simple, sometimes branched. *Flowers* ca 1.2 cm across, greenish purple; *bracts* 0.4-0.5 cm long, green, ovate-lanceolate, acuminate, reflexed; *pedicelled ovary* 0.9-1.0 cm long, green, woolly; *sepals* yellowish green, woolly outside; *dorsal* ca 5 x 2.5 mm, ovate, obtuse; *laterals* ca 6 x 3 mm, triangular, sub-falcate, acute; *mentum* short, rounded; *petals* ca 4x2 mm, green, purple spotted, oblong-lanceolate, obtuse; *margins* entire or crenulate; *lip* ca 5 mm long, white, purple spotted, 3-lobed; *side lobes* oblong, obtuse; *mid-lobe* reniform, apex truncate; *margins* crenulate; *callus* 1, large, white, fleshy; *column* ca 3 mm long, white with purple blotches; *pollinia* clavate.

Fl.: Jun. - Jul.

Nagaland: Pulebadze, *Hynniewta* 56275 Sangsangu, *Hynniewta* 80924 (ASSAM).

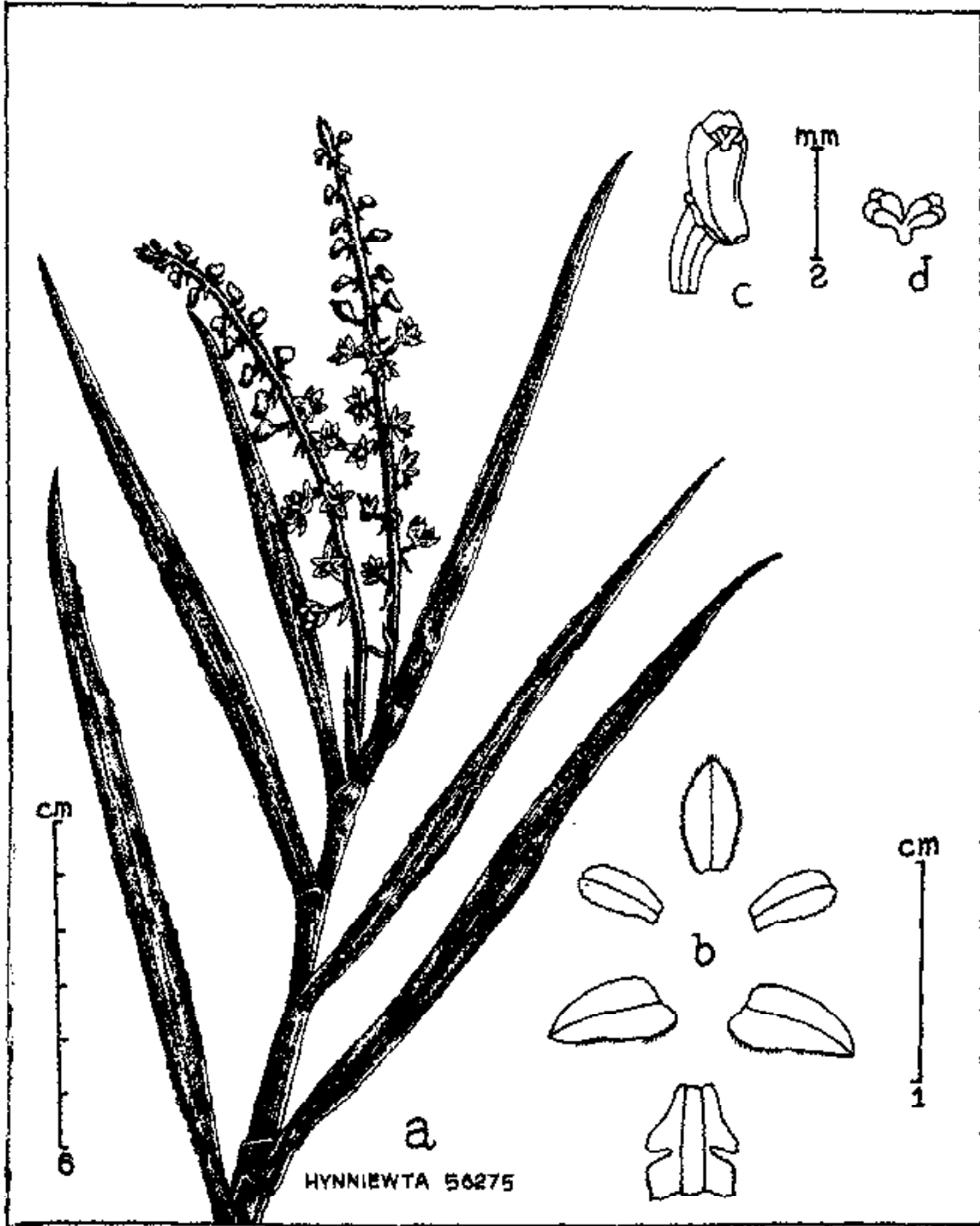


Fig. 59. *Eria paniculata* Lindl.:
a. habit; b. floral parts; c. column; d. pollinia.

Distr.: INDIA (N. E. India, Sikkim); CAMBODIA, LAOS VIETNAM.

10. **Eria pannea** Lindl. in Bot. Reg. 64. Misc. 79. 1842; Hook. f., Fl. Brit. India 5 : 804. 1890; King & Pantl. in. Ann. Roy. Bot. Gard. Calc. 8 : 127. t. 176. 1898. *E. teretifolia* Griff., Notul. 3 : 298. 1851.

Stems 2-4 cm high, terete, 3-4-leaved. *Leaves* 3-15 x 0.3-0.5 cm, terete, straight or arched, obtuse. *Inflorescence* 2-3-flowered, spicate, 3-6 cm long, terminal. *Flowers* ca 1.5 cm across, whitish above, golden brown beneath; *bracts* 0.5-0.6 cm long, ovate, acute, woolly; *ovary* 0.3-0.4 cm long, sessile, woolly; *sepals* obtuse, densely woolly outside; dorsal ca 6 x 4 mm broad, broadly elliptic; laterals 7-8 x 5 mm, ovate-triangular, sub-falcate; *petals* ca 5 x 2 mm, elliptic, obtuse, sparsely woolly outside; *mentum* broadly conical, obtuse; *lip* ca 7 mm long, dark brown, oblong, obtuse; disc with an oblong granulate lamella; *column* ca 2 mm long, woolly, green; *pollinia* clavate.

Fl.: Jul. - Aug.

Nagaland: Tokye, Hynniewta 80898 (ASSAM).

Dist.: INDIA (N. E. India, Sikkim); BHUTAN, MYANMAR, BORNEO, MALAYA.

11. **Eria spicata** (D. Don) Hand. Mazz in Symb. Sin. 7 : 1353. 1936; Seidenf. & Smitnd. Orch. Thailand, 2(2): 306. t. 229. 1960. *Octomeria spicata* D. Don, Prodr. Fl. Nepal. 31. 1825. *Eria convallarioides* Lindl., Gen. & Sp. Orch. 70. 1830; Hook. f., Fl. Brit. India 5 : 791. 1890.

Fig. 60

Pseudobulbs 5-10 cm high, 3-5-leaved. *Leaves* 10-17 x 2.5-4 cm, elliptic-lanceolate, acute. *Inflorescence* many-flowered, dense, 6-12 cm long, lateral or sub-terminal. *Flowers* ca 1.2 cm across, white or pale straw colour; *bracts* 0.4-0.6 cm long, green, oblong, acute, concave; *pedicelled ovary* 0.8-0.9 cm long, green; *sepals* 0.6-0.7 cm long, sub-equal; dorsal ca 0.4 cm broad, broadly oblong, obtuse; laterals oblong, concave; *mentum* short, round; *petals* 0.5-0.6 x 0.3 cm, oblong-lanceolate, acute; *lip* 0.8-0.9 cm long, white or pale straw colour tinged with yellow, 3-lobed; side lobes shallow, round; mid-lobe sub-orbicular, obtuse; disc smooth; lamellae none; *column* ca 3 mm long, white, tinged with red; foot short, curved; *pollinia* linear-clavate.

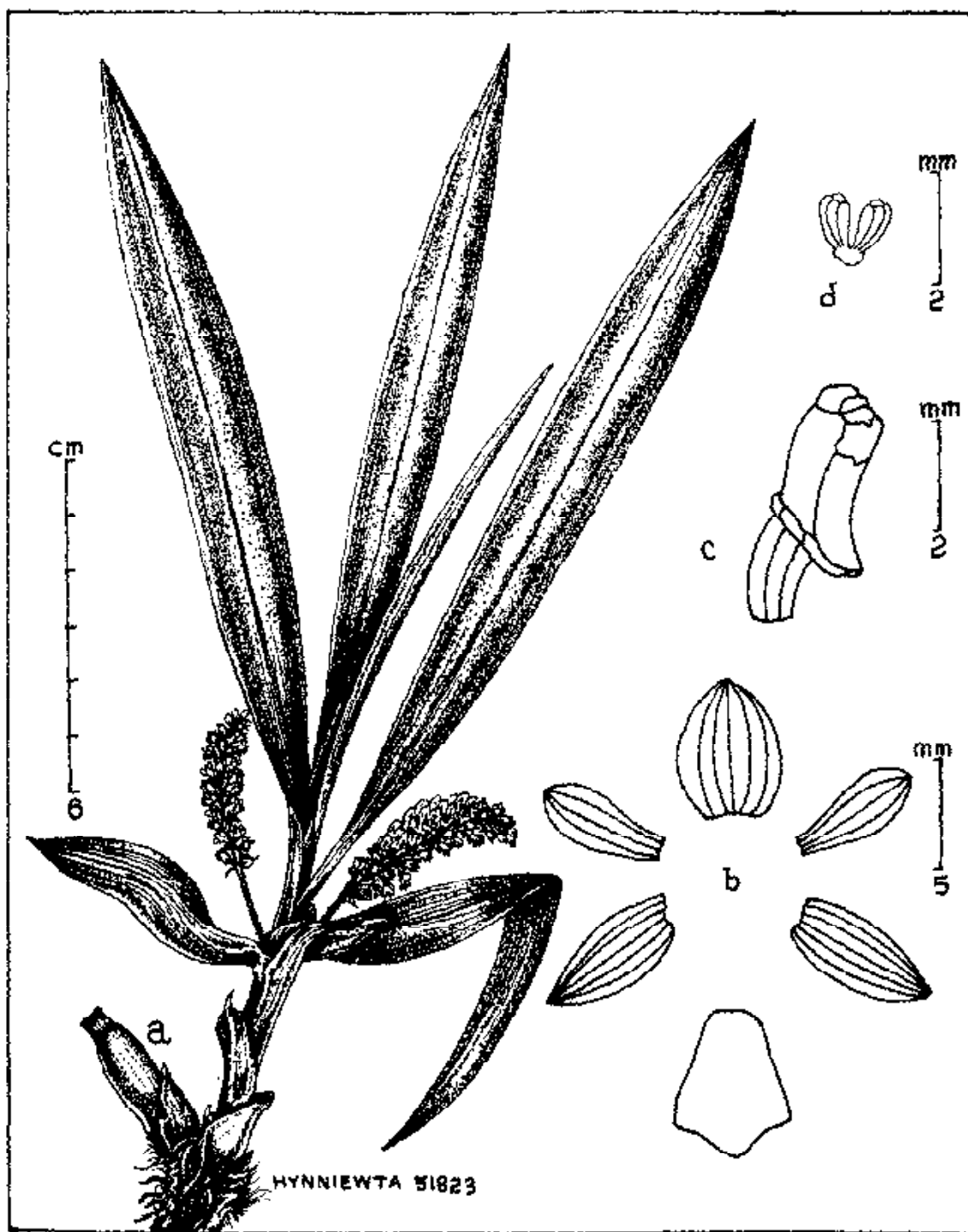


Fig. 60. *Eria spicata* (D. Don) Hand.-Mazz.:
a. habit; b. floral parts; c. column; d. pollinia.

Fl. : Aug. Sept.

Nagaland: Dimapur, *Hynniewta* 51823, 74515; Pfutzero, *Bahadur* 55809, 55810; Tseminyu, *Hynniewta* 56270 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim, Western Himalayas); BHUTAN, MYANMAR, CAMBODIA, LAOS, THAILAND, VIETNAM.

12. *Eria stricta* Lindl. in Coll. Bot. t. 41 B. 1826; Hook. f., Fl. Brit. India 5 : 791. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 125. t. 173. 1898. *E. secundiflora* Griff., Ic. Pl. Asiat. t. 30. 1847. *Mycaranthes stricta* Lindl., Gen. & Sp. Orch. 63. 1830; Wight, Ic. Pl. t. 1737. 1856.

Fig. 61

Pseudobulbs 10-15 cm high, clustered, 2-leaved. *Leaves* 10-15 x 2.5-3.5 cm, oblong-elliptic; apex acutely bifid. *Inflorescence* many-flowered, lax, 12-15 cm long. *Flowers* ca 1.0 cm across, white, pink flushed; *bracts* ca 0.3 cm long, dark brown, ovate, acute; *ovary* sessile, 0.5-0.6 cm long, white or pale green, pink flushed, woolly; *sepals* ca 0.5 x 0.3 cm, ovate, obtuse, woolly outside; *mentum* short, obtuse; *petals* ca 0.4 x 0.2 cm, linear-oblong, obtuse; *lip* ca 0.5 cm long, sub-orbicular, concave, 3-lobed; side lobes pink streaked, shallow, rounded; mid-lobe round, acute or apiculate; disc with 2 basal oblong and 1 sub-apical globose calli; *column* ca 2 mm long, yellow; foot short; *pollinia* sub-globose.

Fl.: Dec. - Jan.

Nagaland: Tseminyu, *Hynniewta* 51878, 56214 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); CAMBODIA, LAOS, VIETNAM.

13. *Eria vittata* Lindl. in J. Linn. Soc. 3 : 51. 1859; Hook. f., Fl. Brit. India 5 : 794. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 120. t. 165. 1898.

Pseudobulbs 5-10 cm high, 2-leaved. *Leaves* 15-20 x 4-5 cm, elliptic-oblong, acute. *Inflorescence* many-flowered, 15-20 cm long. *Flowers* ca 2.5 cm across, pale green, purplish brown striped; *bracts* absent; *pedicelled ovary* 1.0-1.5 cm long, green; *sepals* 1.2-1.3 cm long, sub-equal; dorsal ca 0.3 cm broad, oblong obtuse; laterals ca 0.4 cm broad, triangular, oblong,

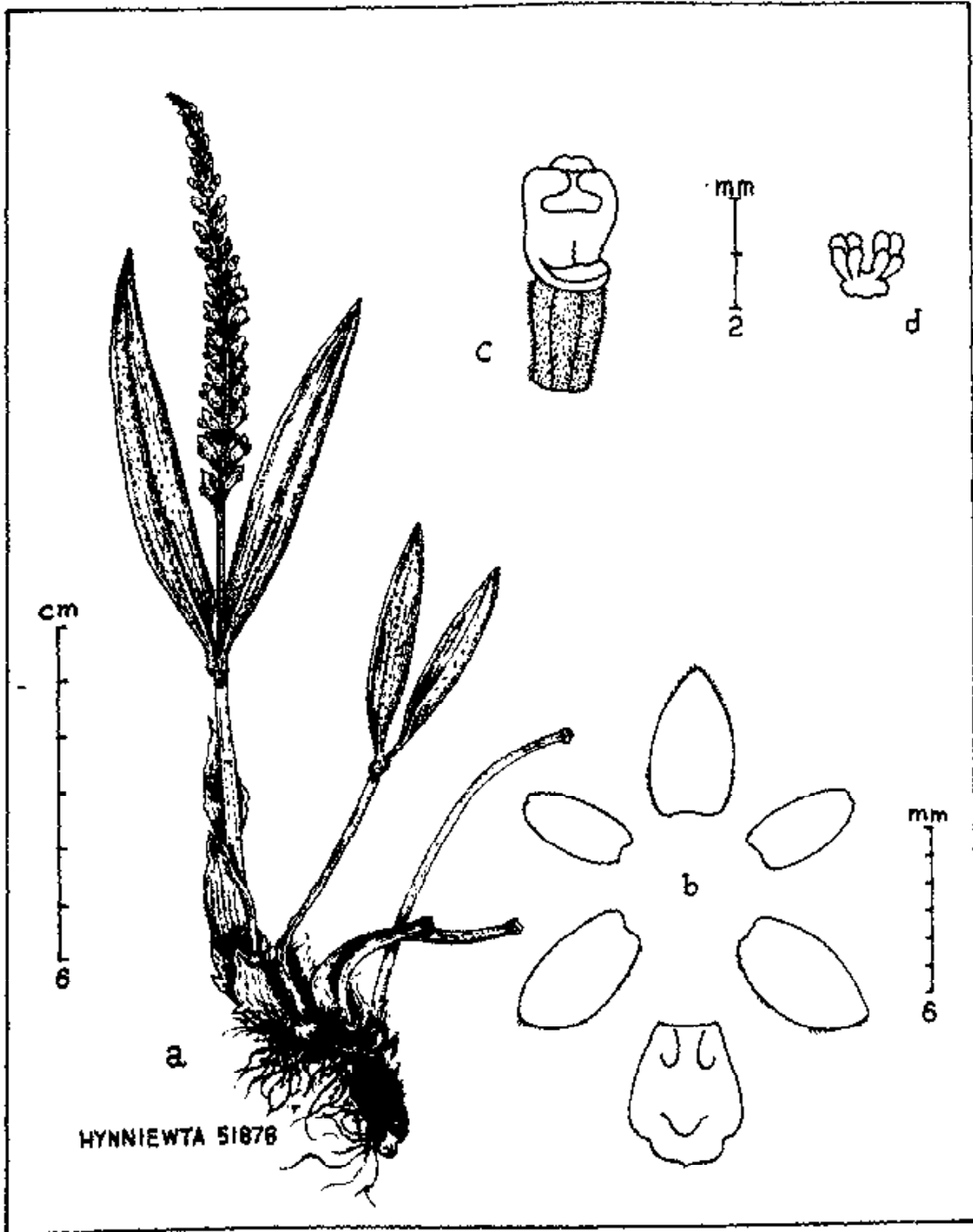


Fig. 61. *Eria stricta* Lindl.:
 a. habit; b. floral parts; c. column; d. pollinia.

falcate; *mentum* broadly conical, obtuse; *petals* 1.1-1.2 x 0.2 cm, linear-oblong, obtuse, slightly falcate; *lip* 1-1.1 cm long, green, purplish brown striped and spotted, oblong; apex crenulate; lamellae 5, greenish purple, crenulate, equal, from base to the apex; *column* ca 0.6 cm long, green, purple striped in front; foot; *pollinia* ovoid.

Fl.: Oct. - Nov.

Nagaland: Khonoma, *Kataki* 66353; Pulebadze, *Hynniewta* 56267 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); THAILAND.

23. EULOPHIA R. Br.

- 1a. Leaves linear, acuminate, less than 1.8 cm broad, absent during flowering; flowers dense; lip distinctly 3-lobed; lamellae 5, thick, carunculate 1. *E. bicallosa*
- 1b. Leaves elliptic-lanceolate, acute, more than 4 cm broad, present during flowering; flowers lax; lip obscurely 3-lobed; lamellae 9-11, thin, tubercled 2. *E. nuda*

1. ***Eulophia bicallosa*** (D. Don) Hunt & Summer. in Kew Bull. 20 (1): 60. 1969. *Bletia bicallosa* D. Don, Prodr. Fl. Nepal. 30. 1825; Hook. f., Fl. Brit. India, 6 : 196. 1890. *Cyrtopara bicarinata* Lindl. Gen. & Sp. Orch. 190. 1833. *Eulophia bicarinata* (Lindl.) Hook. f., l. c. 6 : 6. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 180. t. 244 1898.

Tubers ca 6 cm long, oblong, lobed. *Leaves* long-petioled, 30-50 x 1.5-1.8 cm, linear, acuminate. *Inflorescence* 40-60 cm long, dense. *Flowers* ca 3.5 cm across, greenish yellow; *bracts* 1-1.2 cm long, pale brown; *pedicelled ovary* 2-2.5 cm long, yellowish; *sepals* 1.7 - 1.8 cm long, keeled; dorsal ca 5 mm broad, oblong, acute; laterals ca 4 mm broad, linear-oblong, spatulate; *petals* 1.5 - 1.6 x 0.6 cm, narrowly elliptic, spatulate, obtuse; *lip* 1.7 - 1.8 cm long, yellowish, purple edged; side lobes broad, obtuse; mid-lobe transversely oblong; margins slightly crisped; apex notched; lamellae 5, fat, carunculate; spur conical, obtuse; *column* ca 1 cm long, yellowish; *pollinia* ovoid-oblong.

Fl.: Jun.

Nagaland: Jafu Hills, Bor 21078 (ASSAM).

Distr.: INDIA (N.E. India, Sikkim); MYANMAR, JAVA, MALAYA.

2. ***Eulophia nuda*** Lindl., Gen. & Sp. Orch. 180. 1833; Hook. f., Fl. Brit. India 6 : 5. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 180. t. 243. 1898.

Tubers 3-5 cm across, spherical. *Leaves* shortly petioled, 25-35 x 4-6 cm, elliptic-lanceolate, acute, *Inflorescence* 40-75 cm long, lax. *Flowers* ca 4.5 cm across, greenish brown; *bracts* 1.5 - 1.6 cm long, purplish green; *pedicelled ovary* 2-2.2 cm long, brownish; *sepals* 2.2 - 2.3 x 0.7 - 0.8 cm, lanceolate, acute; laterals sub-falcate; *petals* 2.0 - 2.1 x 0.8 - 0.9 cm, elliptic-oblong, obtuse; *lip* ca 2.5 cm long, greenish purple side lobes suppressed; mid-lobe large, sub-orbicular; margins undulate, crenulate; apex obtuse or emarginate; lamellae 9-11, thin, tubercled; spur obconical, retuse; *column* ca 1.2 cm long, purplish; *pollinia* ovoid-oblong.

Fl.: May.

Nagaland: Jhaluki, Hynniewta 74556 (ASSAM).

Distr.: Throughout India; BANGLA DESH, MYANMAR, CAMBODIA, SRI LANKA, CHINA, JAVA, LAOS, NEPAL, PHILIPPINES, THAILAND, VIETNAM.

24. FLICKINGERIA Hawkes

- Flickingeria macraei*** (Lindl.) Seidenf. in Dansk Bot. Ark. 34(1): 39. 1984. *Dendrobium macraei* Lindl., Gen. & Sp. Orch. 75. 1830; Hook. f., Fl. Brit. India 5: 714. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 61. t. 86. 1898. *Ephemerantha macraei* (Lindl.) Hunt & Summer. in Taxon 10 : 105 1961.

Pseudobulbs 5-8 cm long, narrowly fusiform. *Leaves* 15-22 x 2-3.5 cm, linear-oblong or oblong-lanceolate, acute or notched; *peduncle* 6-7 mm long, slender. *Flowers* ca 3 cm across, white; *bracts* ca 3 mm long, ovate, acute, brown; *pedicelled ovary* ca 4 mm long, white; *sepals* ca 1.5 x 0.4 cm, elliptic-oblong, acute; laterals sub-falcate; *petals* ca 1.4 x 0.3 cm, linear-oblong, acute; *lip* ca 1.3 cm long, white, red-spotted; side lobes

linear-oblong, obtuse; mid-lobe 2-lobulate; lobules oblong-elliptic or broadly triangular, obtuse; margin crisped and crenulate at base; ridges 2, reddish, fleshy, wavy, terminating at the base of mid lobe; *column* ca 3 mm long, white; *pollinia* linear-oblong.

Fl.: July - Oct.

Nagaland: Melori, *Hynniewta* 74535; Tseminyu, *Hynniewta* 56227 (ASSAM).

Distr.: INDIA (N.E. India, Sikkim, South India); BHUTAN, MYANMAR, CAMBODIA, SRI LANKA, JAVA, LAOS, VIETNAM.

25. GALEOLA Lour.

Galeola lindleyana (Reichb. f.) Reichb. f., *Xen. Orch.* 2 : 78. 1874; Hook. f., *Fl. Brit. India* 6 : 88. 1890; King & Pantl. in *Ann. Roy. Bot. Gard. Calc.* 8 : 264. t. 352. 1898. *Erythrorchis lindleyana* Reichb. f. in *Bonplandia* 5 : 37. 1857.

Roots ca 2.5 cm thick, reddish, stout. *Stems* 1-1.5 m high, brown or brownish purple, sub-terete. *Inflorescence* 15-30 cm long; panicle few-branched; branchlets short, drooping. *Flowers* ca 3.5 cm across, yellow somewhat spongy in texture, sub-globose, tomentose; *bracts* ca 1 cm long, brownish, ovate-lanceolate, acute, deciduous; *pedicelled ovary* 1.5-3 cm long, cylindrical, yellowish, furfuraceous; *sepals* 1.7 - 1.8 x 1.1-1.2 cm ovate obtuse; *petals* 1.4-1.5 x 0.7-0.8 cm, oblong, obtuse, margin ciliate; *lip* 1.4-1.5 cm long, cup-shaped, glabrous without, papillose within, margins ciliolate; side lobes small, yellowish, red blotched, rounded, mid-lobe large, ovate, obtuse; disc lamellate; *column* 5-6 mm long, yellow clavate, slightly arched; base with 2 erect, granular teeth; *pollinia* cleft at base.

Fl.: Jul. - Aug.

Nagaland: Pulebadze, *Prain s.n.* (Acc. No. 458633) and 36 (CAL).

Distr.: INDIA (N.E. India, Sikkim); JAVA.

26. GASTROCHILUS D. Don

1a. Leaves terete; flowers pale yellowish green

....3. *G. inconspicuus*

1b. Leaves flat; flowers greenish, brown spotted:

- 2a. Leaves more than 8 x 1.5 cm; flowers *ca* 2.0 cm or more across; epichile of lip papillose hairy, erose, echinate 1. *G. calceolaris*
- 2b. Leaves less than 2.5 x 0.6 cm; flowers *ca* 1.0 cm or less across; epichile of lip glabrous, entire:
- 3a. Leaf apex acuminate or 2-3 cuspidate; epichile of lip semi-circular, pale yellow with deflexed edges 2. *G. distichus*
- 3b. Leaf apex acutely and minutely bifid; epichile of lip broadly cordate, orange with flat edges 4. *G. pseudodistichus*

1. ***Gastrochilus calceolaris*** (Buch. Ham. ex Sm.) D. Don, Prodr. Fl. Nepal. 32. 1825. *Saccolabium calceolare* (J. E. Sm.) Lindl. Gen. & Sp. Orch. 223. 1833; Ic. Pl. Asiat. 1. 334. 1851; Hook. f., Fl. Brit. India 6 : 60. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 225. t. 300. 1898. *S. nilagiricum* Hook. f., l. c. 6 : 60. 1890. *Aerides calceolare* Buch.-Ham. ex J. E. Sm. in Rees Cycl. 39 : 11. 1818.

Stems 5-8 cm high, pendulous, few-leaved. *Leaves* 8-20 x 1.5-2.0 cm, oblong, apex unequally and obtusely 2-lobed. *Inflorescence* many-flowered, rather dense, in corymbose raceme; *peduncle* 3-4 cm long, stout. *Flowers* *ca* 2.0 cm across, green with scattered brown spots; *bracts* 2-3 mm long, greenish, ovate, obtuse; *pedicelled ovary* 1-1.2 cm long, green; *sepals and petals* *ca* 1 cm long, obtuse, spreading; *sepals* *ca* 4 mm broad, sub-equal; dorsal sepal ovate-oblong; laterals oblong, sub-falcate; *petals* *ca* 3 mm broad, oblanceolate; *lip* *ca* 1 cm long; hypochile hemispherically saccate, brownish yellow with brownish red markings; epichile semi-circular, white, papillose hairy; edges erose, echinate; *column* *ca* 3 mm long, reddish; *pollinia* sub-globose.

Fl.: May - Jun.

Nagaland: Merima, Hynniewta 80732; Pulebadze, Hynniewta 56303, Katakai 66379; Tiyie, Hynniewta 80772; Tseminyu, Bahadur 61705 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim, Uttar Pradesh); BHUTAN, MYANMAR, CAMBODIA, LAOS, THAILAND, VIETNAM.

2. ***Gastrochilus distichus*** (Lindl.) Kuntze, Rev. Gen. 2 : 661. 1891. *Saccolabium distichum* Lindl. in J. Linn. Soc. 3 : 64. 1859; Hook. f.,

Fl. Brit. India 6 : 64. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 227. t. 303. 1898.

Fig. 62

Stems 18-25 cm long, slender, pendulous, many-leaved. *Leaves* 1.8-2.5 x 0.5-0.6 cm, lanceolate; apex acuminate or 2-3 cuspidate. *Inflorescence* few-flowered, lax, racemose; *peduncle* 1.5 - 2.0 cm long, slender. *Flowers* ca 1 mm long, oblong, obtuse, greenish brown; *pedicelled ovary* ca 1.0 - 1.5 cm long, pale green; *sepals* and *petals* ca 5 mm long, obtuse; *sepals* ca 3 mm broad, oblong; laterals sub-falcate; *petals* ca 2 mm broad, linear-oblong; *lip* 5-6 mm long; hypochile conically saccate, greenish with irregular brownish spots, 2 calli within; epichile semi-circular, pale yellow; edges deflexed; *column* ca 2 mm long, green; *pollinia* elliptic.

Fl.: Mar. - Apr.

Nagaland: Jafu Hills, Hynniewta 56214; Kohima, Hynniewta 74507; Zunhebato, Hynniewta 80854 (ASSAM).

Distr.: INDIA (Manipur, Meghalaya, Nagaland, Sikkim); BHUTAN.

3. **Gastrochilus inconspicuus** (Wall. ex Hook. f.) Kuntze, Rev. Gen. Pl. 2 : 661. 1891; Seidenf. in Dansk Bot. Ark. 27(4) : 94. 1971. *Saccolabium inconspicuum* Hook. f., Fl. Brit. India 6 : 56. 1890. *Luisia inconspicua* (Wall. ex Hook. f.) King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 203. t. 272. 1898.

Stems 10-25 cm long, erect, slender, few-leaved. *Leaves* 4-8 x 0.2-0.3 cm, terete, acute or obtuse. *Inflorescence* few- or many-flowered, dense spicate; *peduncle* 0.5-0.8 cm long, slender. *Flowers* ca 8 mm across, pale yellowish green; *bracts* ca 2 mm long, triangular, acuminate, membranous; *sepals* ca 4 x 3 mm, ovate or ovate-lanceolate, acute or obtuse, keeled, spreading; *petals* ca 3 x 2 mm, oblong, obtuse; *lip* 5-6 mm long, pale yellowish green, purple spotted at its lower half; hypochile infolded, hemispherically saccate; epichile sub-reniform, deflexed; apex notched; *column* ca 2 mm long, pale purple; *pollinia* globose.

Fl.: Jun. - Jul.

Nagaland: Koio, Hynniewta 80717; Wakching, Hynniewta 79943 (ASSAM).

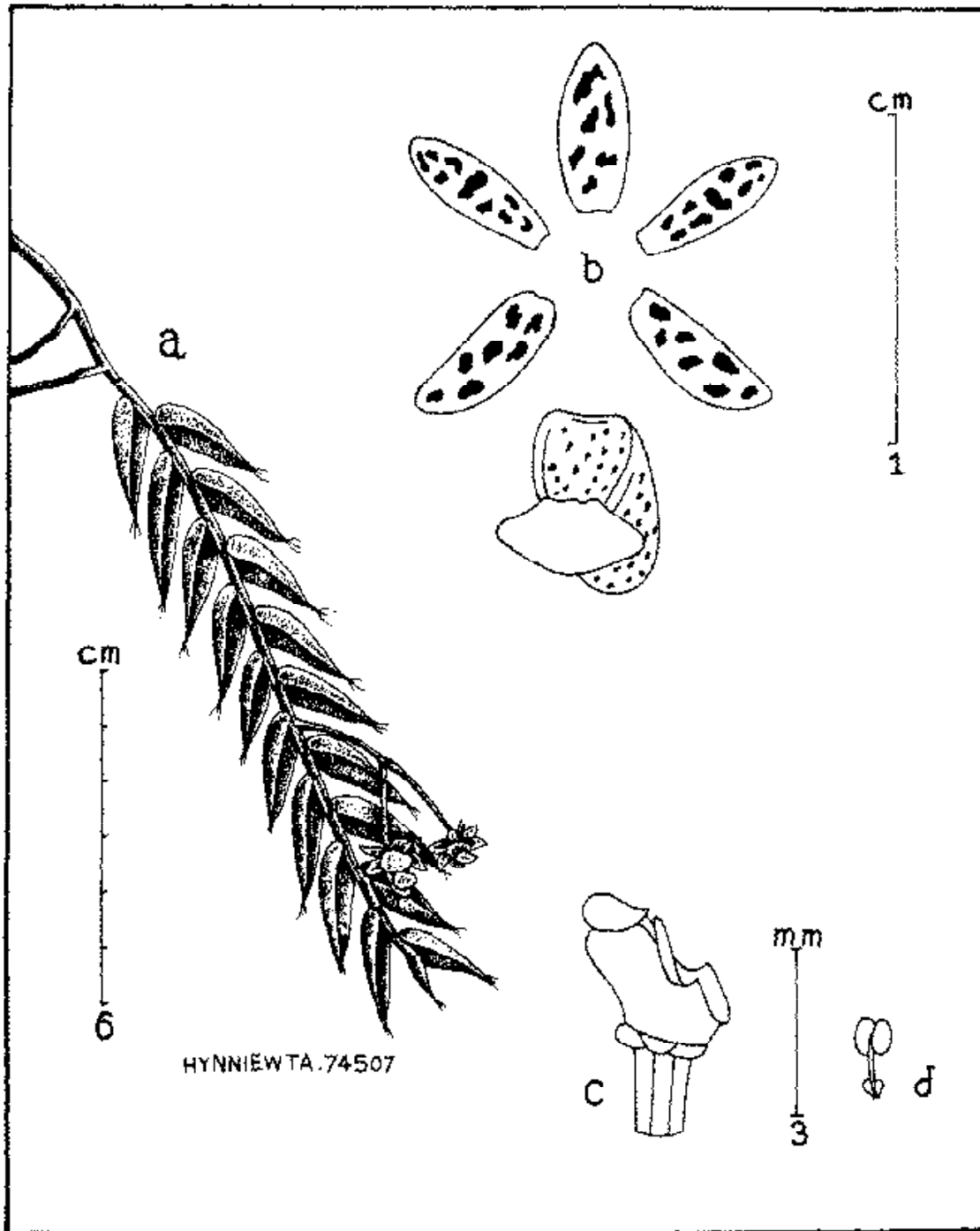


Fig. 62. *Gastrochilus distichus* (Lindl.) Kuntze :
a. habit; b. floral parts; c. column; d. pollinia.

Distr.: INDIA (N. E. India, Sikkim; Western Himalayas); BHUTAN, NEPAL.

4. **Gastrochilus pseudodistichus** (King & Pantl.) Seidenf. Orch. Fl. Camb., Laos & Viet 1 : 65. 1975. *Saccolabium pseudodistichum* King & Pantl. in J. Asiat. Soc. Beng. 64 (3) : 341. 1895; in Ann. Roy. Bot. Gard. Calc. 8 : 229. t. 305. 1898. **Fig. 63'**

Stems 15-22 cm long, simple or branched, slender, pendulous. *Leaves* 1.2 - 1.8 x 0.5-0.6 cm, lanceolate; apex minutely bifid. *Inflorescence* few-flowered, sub-umbellate; *peduncle* 0.8 - 1.0 cm long. *Flowers* ca 1.0 cm across, greenish with scattered brownish spots; *bracts* ca 2 mm long, oblong, obtuse, pale green; *pedicelled ovary* 0.8 - 1.0 cm long, pale green; *sepals* and *petals* ca 5 x 2 mm long, oblanceolate-oblong, obtuse, spreading; *lip* ca 5 mm long, oblanceolate-oblong, obtuse, spreading; *lip* ca 5 mm long; *hypochile* sub-hemispherically saccate, yellow; *epichile* broadly cordate, obtuse, orange; *column* ca 1 mm long, greenish purple; *pollinia* ovoid or elliptic.

Fl.: Sept. - Oct.

Nagaland: Mokokchung, *Hynniewta* 80390; Satakha, *Hynniewta* 80873; Tokye, *Hynniewta* 80901; Tuensang, *Hynniewta* 80537 (ASSAM).

Distr.: INDIA (Nagaland, Sikkim); CAMBODIA, LAOS, VIETNAM.

27. GOODYERA R. Br.

- 1a. Stems glabrous, many-leaved;
inflorescence many-flowered, dense raceme;
floral bracts about as long or longer than the flowers:
- 2a. Leaves green, variegated with few pure
white lines; inflorescence pubescent; flowers
orange yellow, pubescent; lip without calli 1. *G. foliosa*
- 2b. Leaves green throughout; inflorescence
puberulous; flowers white faintly tinged
with green, glabrous; lip with 2 calli 2. *G. procera*
- 1b. Stems pubescent, few-leaves; inflorescence few-flowered,
lax spikes; floral bracts much shorter than the flowers:

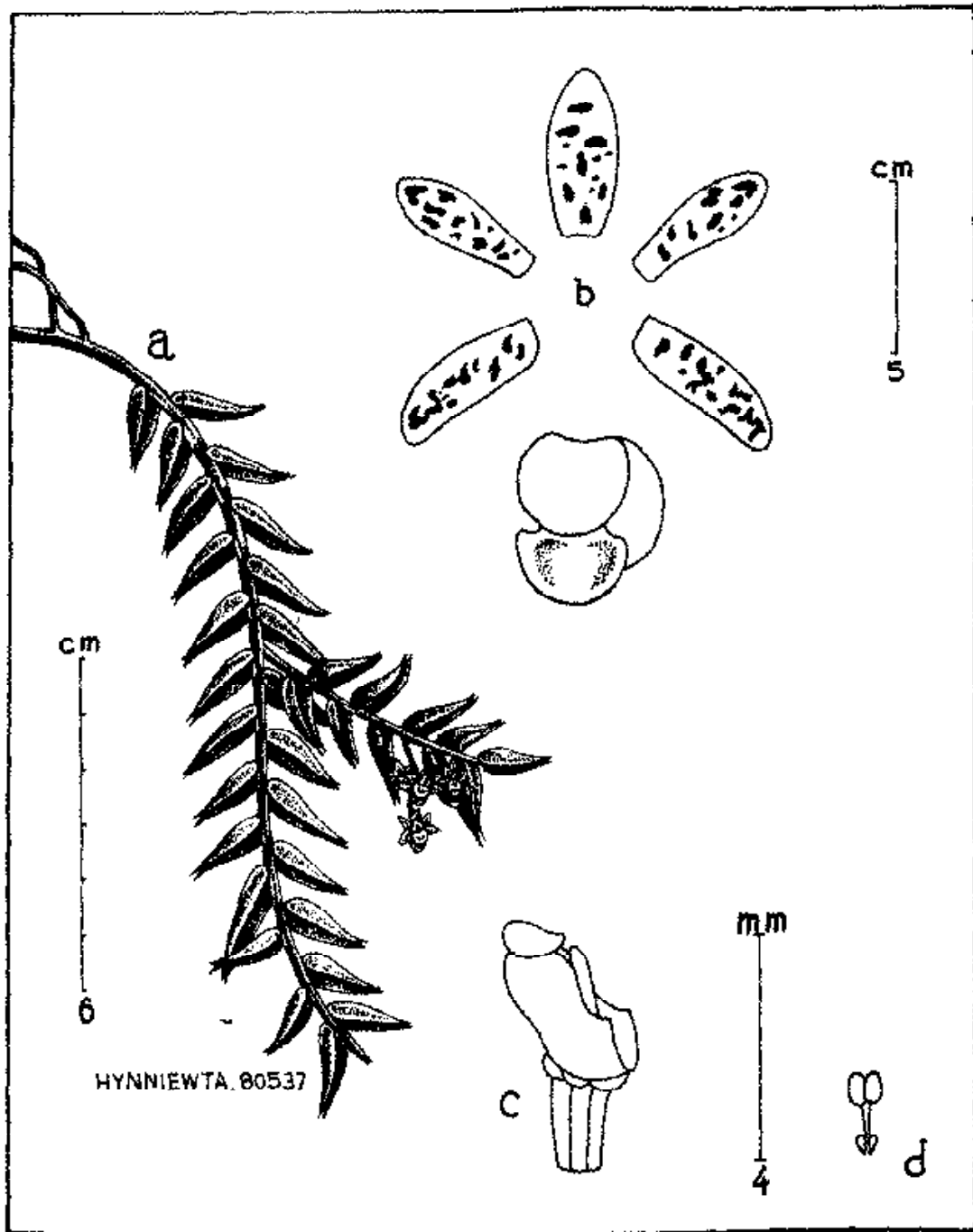


Fig. 63. *Gastrochilus pseudodistichus* (King & Pantl.) Seidenf.:
 a. habit; b. floral parts; c. column; d. pollinia.

- 3a. Leaves green, variegated with white blotches; inflorescence pubescent; flowers pinkish brown; sepals connivent, connate at base; epichile of lip with 2 parallel lamellae 3. *G. schlechtendaliana*
- 3b. Leaves green throughout; inflorescence glabrous; flowers green, tinged with brownish yellow; sepals spreading, free; epichile of lip without lamellae 4. *G. viridiflora*

1. **Goodyera foliosa** (Lindl.) Benth. ex Clarke in J. Linn. Soc. 25 : 73. 1889; Hook. f., Fl. Brit. India 6 : 113. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 281. t. 374. 1898; Seidenf. in Dansk Bot. Ark. 32(2) : 29. t. 12. 1978. *Georchis foliosa* Lindl., Gen. & Sp. Orch. 496. 1840.

Stems 20-30 cm high, glabrous. *Leaves* 10-15 x 2.5-4 cm, green, variegated with few pure white lines, lanceolate, acute. *Inflorescence* many-flowered, dense, 8-12 cm long, glandular pubescent. *Flowers* ca 2.5 cm across, orange yellow; *bracts* 1.4-1.5 cm long, green, lanceolate, acuminate, glandular pubescent; *pedicelled ovary* ca 0.5 cm long, glandular pubescent; *sepals* 1.2-1.3 x 0.4-0.5 cm, ovate-oblong, obtuse, connivent, glandular pubescent outside, connate at base; *laterals* sub-falcate; *petals* 1.1-1.2 x 0.5-0.6 cm, obliquely rhomboid, obtuse; *lip* 0.7-0.8 cm, white, yellow at base; *epichile* oblong, obtuse, slightly recurved; *column* ca 5 mm long, white; *pollinia* linear-clavate.

Fl.: Oct. -Nov.

Nagaland: Josoma, Prain 3 (CAL); Tuensang, Hynniewta 80934 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim, Western Himalayas); BHUTAN, MYANMAR, CAMBODIA, CHINA, JAPAN, KOREA, LAOS, MALAYA, NEPAL, TAIWAN, THAILAND, VIETNAM.

2. **Goodyera procera** (Wall. ex Ker-Gawl) Hook. f., Exot. Fl. 1 (3): t. 39. 1823; Hook. f., Fl. Brit. India 6 : 111. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 282. t. 378. 1898; Seidenf. in Dansk Bot. Ark. 32(2): 22. t. 8. 1978. *Neottia procera* Wall ex Ker-Gawl in Dew. Bot. Reg. 8 : t. 639. 1822.

Stems 20-30 cm high, glabrous. *Leaves* 7-15 x 1.8-3.5 cm, green, lanceolate or elliptic-lanceolate, acute or acuminate. *Inflorescence* many-flowered, dense, 15-30 cm long, puberulous. *Flowers* ca 4 mm long, white, faintly tinged with green, glabrous; *bracts* ca 6 mm long, green, lanceolate, acute, pubescent; *pedicelled ovary* ca 2 mm long, glabrous; *sepals* ca 4 mm long; dorsal ca 2 mm broad, ovate, acute; laterals ca 3 mm broad, broadly ovate, obtuse, sub-connivent; *petals* ca 4 x 3 mm, oblong, spatulate, obtuse; *lip* ca 4.5 mm long, white; epichile triangular, acute, slightly recurved; *column* ca 1 mm long, white; *pollinia* clavate-cylindric.

Fl.: Apr. - May.

Nagaland: Akulato, *Hynniewta* 80889, 80890; Chakabama, *Hynniewta* 80988, *Kataki* 66386; Heliphong Hills, *Hynniewta* 80965; Jhaluki, *Hynniewta* 74554; Kohima, *Bor* 21221, *Hynniewta* 80779; Mokokchung, *Hynniewta* 79980, 80383; Mon, *Hynniewta* 79903; Tokye, *Hynniewta* 80905; Tuli, *Hynniewta* 79927; Tuensang, *Hynniewta* 80928; Wokha, *Hynniewta* 80745, 80750; Zunhebato, *Hynniewta* 80831 (ASSAM).

Distr.: Throughout India; BANGLA DESH, BHUTAN, MYANMAR, CAMBODIA, SRI LANKA, CHINA, JAPAN, JAVA, LAOS, NEPAL, PHILIPPINES, SUMATRA, TAIWAN, THAILAND, VIETNAM.

3. ***Goodyera schlechtendaliana*** Reichb. f. in *Linnaea* 22 : 861. 1849; Seidenf. in *Dansk Bot. Ark.* 32(2) : 26. t. 11. 1978. *G. secundiflora* auct. (non Griff.) Hook. f., *Fl. Brit. India* 6 : 113. 1890; King & Pantl. in *Ann. Roy. Bot. Grd. Calc.* 8 : 283. t. 376. 1898. Fig. 64

Stems 8-15 cm high, pubescent. *Leaves* 3-7 x 1-2.5 cm, green, variegated with white blotches, ovate or elliptic, acute. *Inflorescence* few-flowered, lax, sometimes secund, 8-15 cm long, pubescent. *Flowers* 0.9-1.0 cm long, white; *bracts* 0.7-0.8 cm, pinkish brown, lanceolate, acute, pubescent; *ovary* 0.8-0.9 cm, pubescent; *sepals* 0.9-1.0 x 0.4 cm, ovate-oblong, obtuse, connivent, pubescent outside, connate at base; *petals* 0.8-0.9 x 0.3 cm, falcately oblanceolate; apex acute, sometimes beaked; *lip* 0.7 - 0.8 cm long, white; epichile brown tipped, ovate-oblong, acute, with 2 parallel lamellae from base terminating near its apex; *column* ca 4 mm long, white; *pollinia* linear-clavate.

Fl.: Apr. - May.

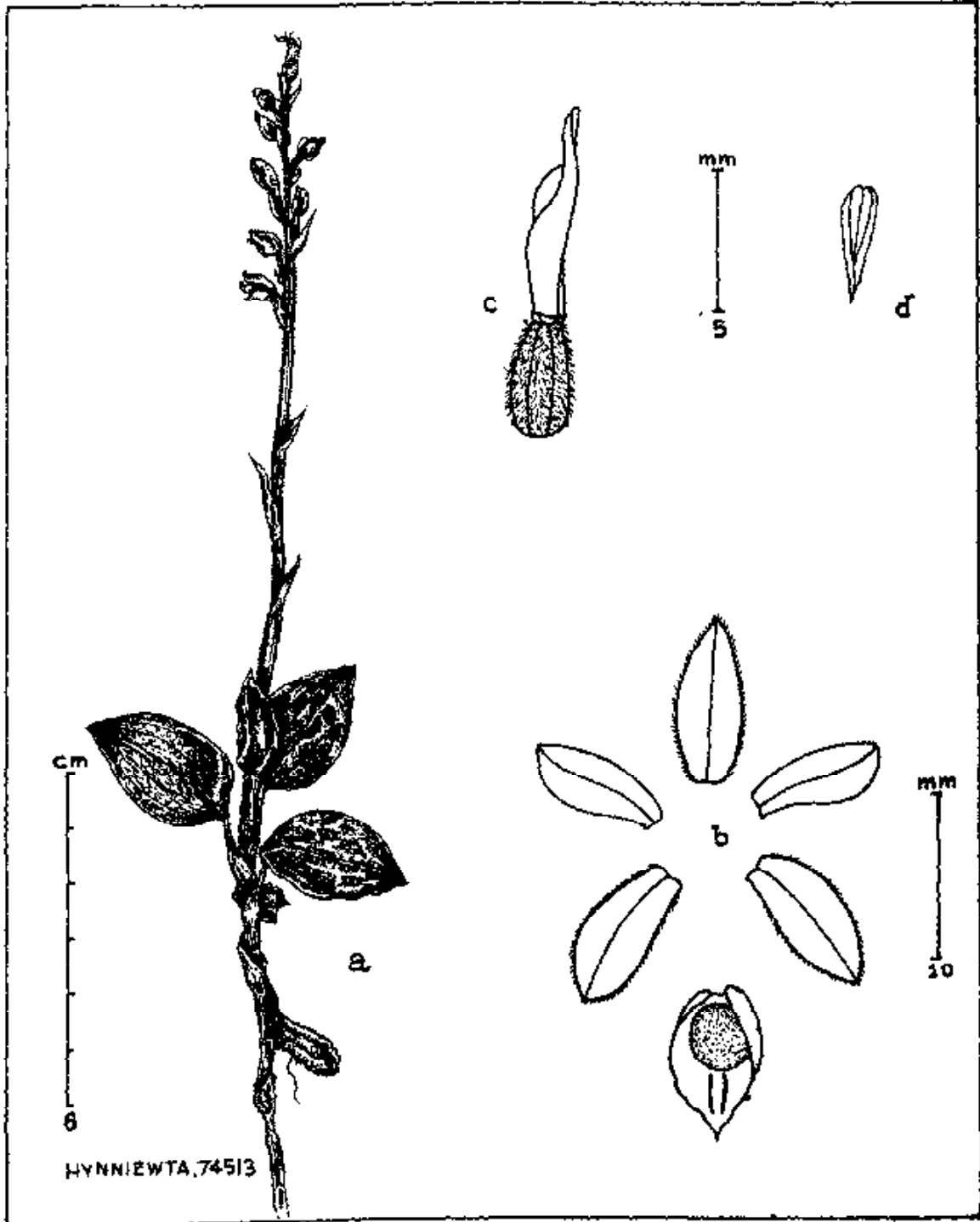


Fig. 64. *Goodyera schlechtendalliana* Reichb. f.:
 a. habit; b. floral parts; c. column; d. pollinia.

Nagaland: Kohima, *Hynniewta* 74513 (ASSAM), *Prain* 5 (CAL); Jafu Hills, *Bor* 6410 (CAL), *Malhotra* 75262 (ASSAM).

Distr.: INDIA (N.E. India, Sikkim); BHUTAN, CAMBODIA, CHINA, JAPAN, KOREA, LAOS, NEPAL, SUMATRA, TAIWAN, THAILAND, TIBET, VIETNAM.

4. ***Goodyera viridiflora*** (Bl.) Bl., Coll. Orch. Arch. Ind. 41. t. 9. 1858; Seidenf. in Dansk Bot. Ark. 32(2): 20. t. 6. 1978. *Neottia viridiflora* Bl., Bijdr. 415. 1825; *Goodyera cordata* (Lindl.) Nichols., Dict. Gard. 2 : 81. 1885; Hook. f., Fl. Brit. India 6 : 114. 1890.

Stems 10-12 cm high, pubescent, *Leaves* 3-8 x 2-4 cm, green, obliquely ovate-cordate, acute. *Inflorescence* few-flowered, lax, 10-15 cm long, racemose, glabrous. *Flowers* 1.2 - 1.3 cm long, green, tinged with brownish yellow; *bracts* 0.8-0.9 cm, green, lanceolate, acuminate, pubescent; *ovary* 0.8-0.9 cm long, pubescent; *sepals* 1.2 - 1.3 x 0.4-0.5 cm, sub-equal, ovate-lanceolate, acute, pubescent outside; dorsal erect, incurved; *petals* 1.2-1.3 x 0.3-0.4 cm, linear-obovate, acute; *lip* 1.3 - 1.4 cm long, greenish yellow; epichile triangular, acute, recurved; *column* ca 1 cm long, greenish yellow; *pollinia* narrowly cylindric.

Fl.: Sept.

Nagaland: Fusema, *Prain* 19 (CAL); Kohima, *Hynniewta* 80778 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim, Western Himalayas); AUSTRALIA, BHUTAN, BORNEO, CELEBES, CHINA, JAPAN, JAVA, MALAYA, NEPAL, PHILLIPINES, SUMATRA, TAIWAN, THAILAND.

28. HABENARIA Willd.

1a. Lip 3-lobed, spur distinct:

2a. Sepals with cristate tips; petals bi-partite5. *H. stenopetala*

2b. Sepals with acute or obtuse tips; petals not bi-partite:

3a. Leaves few, linear-lanceolate;
flowers golden yellow; side lobes
of lip smaller than the mid-lobe 1. *H. acuífera*

- 3b. Leaves many-ovate-lanceolate
or elliptic-lanceolate; flowers white
or green; side lobes of lip larger than the mid-lobe.
- 4a. Flowers white, side lobes of lip entire 3. *H. dentata*
- 4b. Flowers green, side lobes of lip laciniate 2. *H. arietina*
- 1b. Lip entire, spur not distinct 4. *H. malintana*
1. **Habenaria acufera** Wall. ex Lindl. Gen. & Sp. Orch. 325. 1835;
Hook. f., Fl. Brit. India 6 : 146. 1890 (excl. syn. *H. linguella* Lindl.);
Seidenf. Dansk Bot. Ark. 31(3): 106. f. 64. 1977. **Fig. 65**

Stems 15-35 cm high, slender, few-leaved. *Leaves* 8-15 x 0.8-1.5 cm, linear-lanceolate, acute or acuminate. *Inflorescence* few-flowered, 7-20 cm long, erect. *Flowers* 1.6-1.8 cm across, golden yellow; *bracts* 1.0 - 1.2 cm long, lanceolate, acuminate, greenish brown; *pedicelled ovary* 1.2-1.4 cm long, green; *sepals* concave, obtuse; dorsal 0.6-0.7 x 0.3 cm, oblong; laterals 0.8-0.9 x 0.4 cm, broadly oblong, recurved; *petals* 0.5-0.6 x 0.2 cm, linear-oblong, obtuse; *lip* 0.9 - 1.0 cm long, golden yellow; side lobes short, filiform, subulate; mid-lobe long, linear; *spur* 0.8-1.0 cm long; tip clavate; *column* ca 3 mm long, yellow; *pollinia* ovate.

Fl.: Jun. - Jul.

Nagaland: Kohima, Bor 21224, Hynniewta 80810; Khonoma, Hynniewta 74530 (ASSAM).

Distr.: INDIA (N. E. India); MYANMAR, CAMBODIA, CHINA, LAOS, VIETNAM.

2. **Habenaria arietina** Hook. f., Fl. Brit. India 6 : 138. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 311. t. 407. 1898. *H. pectinata* Lindl., Gen. & Sp. Orch. 341. 1835 (non D. Don).

Stems 30-60 cm high, stout, erect many-leaved. *Leaves* 5-17 x 1.5-2.5 cm, elliptic-lanceolate, acute or shortly acuminate. *Inflorescence* many-flowered, 20-30 cm long, erect. *Flowers* ca 4.5 cm across, green; *bracts* 2-2.5 cm long, lanceolate, acute, green; *pedicelled ovary* 1.8-2 cm long, green; *sepals* 2.2-2.3 cm long, obtuse or acute, sub-equal; dorsal 7-8 mm broad, oblong-elliptic; laterals 5-6 mm broad, oblong, sub-falcate; margin

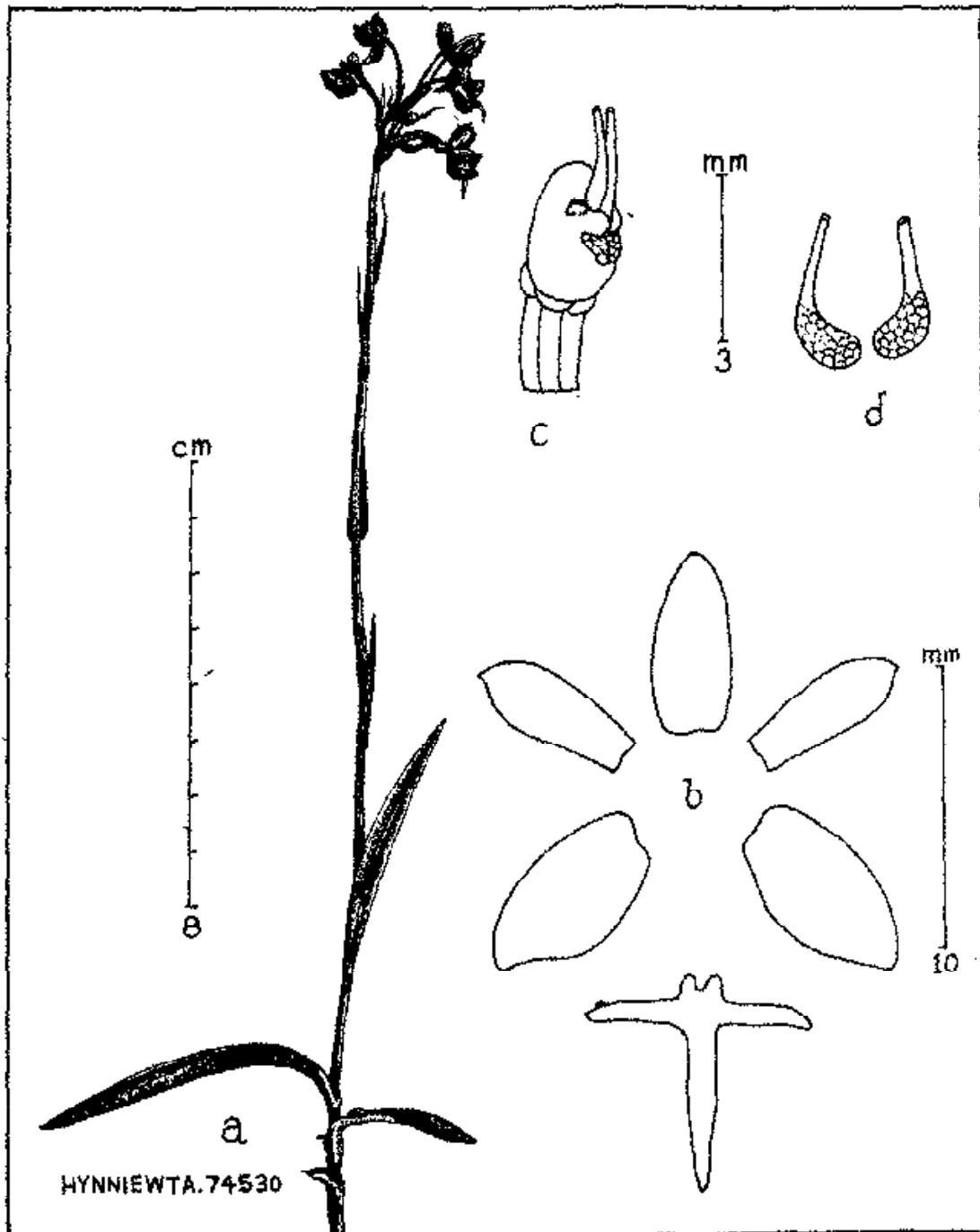


Fig. 65. *Habenaria acuffera* Wail. ex Lindl.:
a. habit; b. floral parts; c. column; d. pollinia.

ciliolate; *petals* 2.0 - 2.1 x 0.7-0.9 cm, elliptic, oblong, sub-falcate, bluntly acuminate; margin ciliolate, inner surface puberulous; *lip* 2.3 - 2.4 cm long; side-lobes deeply lacinate, nearly to base; mid-lobe linear; spur 3.8 - 4.0 cm long, infundibuliform, laterally compressed; *column* ca 4 mm long, green; infundibuliform, laterally compressed; *column* ca 4 mm long, green; *pollinia* oblong, grooved.

Fl.: Sept. - Oct.

Nagaland: Jafu Hills, *Deka* 20264 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); CAMBODIA, LAOS, VIETNAM.

3. ***Habenaria dentata*** (Sw.) Schltr. in Fedde Repert. Beih. 4 : 125. 1919; Seidenf. Dansk Bot. Ark. 31(3): 98. f. 60. 1977. *Orchis dentata* Sw. in Kongl. Vet. Akad. Nya Handl. 21 : 207. 1800. *Habenaria geniculata* D. Don, Prodr. Fl. Nepal. 25. 1825; Hook. f., Fl. Brit. India 6 : 138. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 309 t. 405. 1898. *Platanthera geniculata* (D. Don) Lindl. Wall. Cat. 7042. 1832. *nom. nud.* *P. dentata* (Sw.) Lindl., Gen. & Sp. Orch. 296. 1835.

Stems 30-45 cm high, stout, erect, many-leaved. *Leaves* 7-13 x 2-3 cm, ovate-lanceolate, acute. *Inflorescence* few - or many-flowered, 10-20 cm long, erect. *Flowers* 2-2.4 cm across, white; *bracts* 1.8-2.0 cm long, lanceolate, acuminate, green; *pedicelled ovary* 1.8-2.2 cm long, green; *sepals* 1.1 - 1.2 x 0.8- 0.9 cm, ovate acute; *petals* 0.8 - 0.9 x 0.3-0.4 cm, linear-oblong, obtuse, curved inward, not bi-partite; *lip* 1.2-1.3 cm long; side lobes narrowly or broadly fan-shaped; margin erose or dentate; mid-lobes narrowly or broadly fan-shaped; margin erose or dentate; mid-lobe short, linear, subulate; *spur* 2.0-3.5 cm, sub-clavate, sometimes swollen at base; *column* ca 3 mm long, white; *pollinia* ovate, compressed.

Fl.: Sept. - Oct.

Nagaland: Jafu Hills, *Hynniewta* 80167; Kohima, *Bor* 21704, *Hynniewta* 80808, *Malhotra* 75058; Tiye Hills, *Hynniewta* 80771; Tseminyu, *Hynniewta* 80726, *Malhotra* 75088; Tuensang, *Hynniewta* 79962; Ungma, *Hynniewta* 80297; Zunhebato, *Hynniewta* 80364; Viswema, *Malhotra* 74881 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim, Western Himalayas); MYANMAR, CAMBODIA, CHINA, JAPAN, LAOS, NEPAL, TAIWAN, THAILAND, VIETNAM.

4. **Habenaria malintana** (Blanco) Merril, Bur. Sci. Publ. Manilla. 12 : 112. 1918; Seidenf. Dansk Bot. Ark. 31(3) : 126. f. 79. 1977. *Thelymitra malintana* Blanco, Fl. Filip. 642. 1837. *Habenaria pelorioides* Par. & Reichb. f., Trans. Linn. Soc. 30 : 135 & 139. t. 27. fig. A, 1-3. 1874; Hook. f., Fl. Brit. India 6 : 166. 1890.

Stems 15-35 cm high, slender, erect, few-leaved. *Leaves* 5-10 x 0.8-1.2 cm, ovate-lanceolate or oblong-lanceolate, acute. *Inflorescence* few-flowered, 6-10 cm long, erect. *Flowers* 2.0-2.2 cm across, white; *bracts* 0.8-0.9 cm long, linear-lanceolate, acuminate, pale green, ciliolate; *pedicelled ovary* 0.7-0.8 cm long, white; *sepals* 1.0 - 1.1 cm long, ciliolate, sub-equal, dorsal *ca* 6 mm broad, elliptic-oblong, acute, laterals *ca* 5 mm broad, elliptic-lanceolate, obtuse; *petals* 0.8-0.9 x 0.3 cm, lanceolate, acute, ciliolate; *lip* 1.0-1.1 cm, lanceolate, obtuse, ciliolate; *column ca* 3 mm long, whitish; *pollinia* oblong.

Fl.: Sept.

Nagaland: Kohima, Prain 3 (CAL).

Distr.: INDIA (Manipur, Nagaland, West Bengal); MYANMAR, CAMBODIA, HAINAN, LAOS, PHILIPPINES, THAILAND, VIETNAM.

5. **Habenaria stenopetala** Lindl., Gen. & Sp. Orch. 319. 1835; Hook. f., Fl. Brit. India 6 : 134. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 308. t. 404. 1898; Seidenf. Dansk Bot. Ark. 31(3) : 70. f. 37. 1977.

Stems 30-45 cm high, stout, erect, many-leaved. *Leaves* 5-10 x 1-1.2 cm, oblong-lanceolate or ovate-lanceolate, acute; margin sometimes undulate. *Inflorescence* many-flowered, dense, 10-20 cm long, erect. *Flowers* 2.4-2.6 cm across, greenish white; *bracts* 0.7-0.8 cm long, lanceolate, acuminate, green; *pedicelled ovary* 0.6-0.7 cm long, green; *sepals* 0.7-0.8 x 0.3 cm, sub-equal, greenish white, oblong-lanceolate with aristate tips, sometimes drawn out in a thread; *petals* 0.6 - 0.7 cm long,

greenish white, bi-partite nearly to the base; segments 1-2 mm broad, filiform; lower segment 2-3 mm long; *lip* 1.0-1.1 cm long, greenish brown, lobes filiform, arched, unequal; side lobes shorter than the mid-lobe; *spur* 0.6-0.7 cm long, green slender; tip clavate; *column* ca 2 mm long, pale green; *pollinia* linear-oblong, grooved.

Fl.: Aug. Sept.

Nagaland: Kohima, *Prain s.n.* (CAL), *Hynniewta* 79973 (ASSAM).

Distr.: Throughout India: BANGLA DESH, MYANMAR, CAMBODIA, JAPAN, LAOS, NEPAL, PHILIPPINES, TAIWAN, THAILAND, VIETNAM.

29. HERMINIUM Linn.

Herminium lanceum (Thunb. ex Sw.) Vuijk. in *Blumea* 11(1) : 228. 1961; Seidenf. in *Dansk Bot. Ark.* 31(3): 20. f. 7. 1977. *Ophrys lancea* Thunb. ex Sw. in *Kongl. Vet. Akad. Nya Handl. Stockh.* 21. 223. 1800; in *Edw. Bot. Reg.* 18: sub t. 1525. 1832; Wight *lc.* 5 : t. 1961. 1852. *Herminium angustifolium* (Lindl.) Benth. ex Hook. f. *Gen. Pl.* 3 : 622. 1880; Hook. f., *Fl. Brit. India* 6 : 129 1890; King & Pantl. in *Ann. Roy. Bot. Gard. Calc.* 8 : 332. t. 434. 1898.

Stems 15-30 cm high, slender, erect. *Leaves* 10-25 x 0.8-1.0 cm, linear, acuminate. *Inflorescence* 10-35 cm long; *peduncle* 5-15 cm, erect, terete or slightly compressed; spike cylindrical. *Flowers* ca 6 mm across, pale green; *bracts* 6-7 mm long, green, linear-lanceolate, acuminate *ovary* 6-7 mm, pale green; *sepals* ca 3 x 2 mm, broadly oblong, obtuse; *petals* ca 3 x 1 mm, linear, obtuse; *lip* 4-5 mm long, green hypochile linear, concave epichile unequally 3-lobulate; lateral lobules long, filiform, curved; middle short, ovate, acute; *column* ca 1 mm, long, green; *pollinia* clavate.

Fl.: Jul. Aug.

Nagaland: Kohima, *Deka* 20224, *Bor* 20249, 20250 (ASSAM); *Prain* 41 (CAL); Tseminyu, *Hynniewta* 56230 (ASSAM).

Distr.: Throughout India; S. E. ASIA.

30. HETAERIA Bl.

Hetaeria rubens (Lindl.) Benth. in Benth & Hook. f., Gen. Pl. 3 : 164, 1880; Hook.f., Fl. Brit. India 6 : 115, 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 300 t. 399, 1898; Seidenf. in Dansk Bot. Ark. 32(2): 100. t. 62, 1978. *Cerochilus rubens* Lindl. in Gard Chron. 87, 1854.

Stems 20-35 cm high, glabrous, terete. *Leaves* 7-12 x 4-5 cm, ovate to elliptic, acute or obtuse. *Inflorescence* 15-20 cm long, puberulous. *Flowers* ca 4 mm long, greenish, purple tipped; *bracts* 3-4 mm long, purplish brown, lanceolate, acuminate, pubescent; *pedicelled ovary* 4-6 mm long, pubescent, purple; *sepals* and *petals* ca 4 mm long; *sepals* ovate, acute, pubescent outside; *petals* oblique, hammer-shaped; *lip* ca 5 mm long, green, white tipped; hypochile large, saccate, with a much branched gland in each half of sac; epichile small, cordate; *column* ca 2 mm long, pale purple; *pollinia* pyriform.

Fl.: Jan. Feb.

Nagaland: Kohima, *Bor* 15786 B (ASSAM).

Distr.: INDIA (N.E.India,Sikkim); BANGLADESH, MYANMAR, THAILAND.

31. KINGIDIUM P. F. Hunt

Kingidium taenialis (Lindl.) P. F. Hunt in Kew Bull. 24(1) : 98, 1970. *Aerides taeniale* Lindl., Gen. & Sp. Orch. 239, 1833. *Doritis taenialis* (Lindl.) Hook. f., Fl. Brit. India 6 : 31, 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 199, t. 266, 1898. *Kingiella taenialis* (Lindl.) Rolfe in Orch. Rev. 25 : 197, 1917.

Stems ca 1 cm long, terete. *Inflorescence* 5-8 cm long, arched. *Flowers* ca 3.0 cm across, light purple, sometimes deep purple spotted; *bracts* 2-3 mm long, ovate, acute, greenish purple; *pedicelled ovary* 1.5-1.8 cm long, light purple; *sepals* ca 1.5 cm, obtuse; dorsal ca 5 mm broad, lanceolate; laterals ca 7 mm broad, concave, elliptic;

mentum 0.4 - 0.5 cm long, light purple, straight or slightly curved, conical, obtuse; *petals* ca 1.3 x 0.9 cm, obovate; *lip* ca 1.0 cm long; side lobes small, linear, falcate, pointing backwards; mid-lobe large, lance-shaped, curved; disc with a forked lamella; *column* 5-6 mm long, light purple; *pollinia* obovate.

Fl.: May.

Nagaland: Khonoma, *Hynniewta* 74529; Jhaluki, *Hynniewta* 74559; Tijit, *Hynniewta* 79937; Tiye Hills, *Hynniewta* 80765 (AS-SAM).

Distr.: INDIA (Arunachal Pradesh, Nagaland, Sikkim, Uttar Pradesh); BHUTAN, MYANMAR, MALAYA, NEPAL, THAILAND.

32. LIPARIS L. C. Rich.

1a. Pseudobulbs 1-leaved:

2a. Flowers ca 1.5 cm or more, across,
pale brown; sepals 3-nerved; lip with 2 calli4. *L. bootanensis*

2b. Flowers ca 0.6 cm or less across, pale green;
sepals 1-nerved; lip without callus5. *L. caespitosa*

1b. Pseudobulbs 2-4-leaved:

3a. Pseudobulbs distant; leaves long petiolate 8. *L. petiolata*

3b. Pseudobulbs clustered; leaves sessile
or sub-sessile:

4a. Pseudobulbs short, less than 4 cm high,
ovoid or oblong or conical:

5a. Pseudobulbs 3-4-leaved; lateral
sepals shorter than the dorsal
sepal; petals 3-nerved7. *L. paradoxa*

5b. Pseudobulbs 2-leaved; lateral
sepals as long as the dorsal sepal;
petals 1-nerved:

6a. Flowers brownish; sepals 3-5-nerved;
lip base auricled and with 2 calli;
column with wings:

- 7a. Lateral sepals 3-nerved; lip oblong-orbicular, apex rounded or obtuse; column not keeled; wing triangular toothed ...10. *L. resupinata*
- 7b. Lateral sepals 5-nerved; lip broadly oblong, apex apiculate; column keeled at side; wing semi-circular, entire ...1. *L. assamica*
- 6b. Flowers greenish; sepals 1-nerved; lip base entire and with 1 or without callus; column without wings:
- 8a. Lip oblong; apex narrow, entire, acute; base without callus; margin with ear-like folds ...12. *L. viridiflora*
- 8b. Lip ob-deltoid; apex broad, erose, apiculate; base with 1 callus; margin not folded ...11. *L. stricklandiana*
- 4b. Pseudobulbs long, more than 7 cm high, oblong-cylindric or terete:
- 9a. Pseudobulbs 3-4-leaved; lateral sepals shorter than the dorsal sepal ...3. *L. bituberculata*
- 9b. Pseudobulbs 2-leaved; lateral sepals as long as the dorsal sepal:
- 10a. Pseudobulbs oblong-cylindric; inflorescence lateral; flowers 2 cm across or more; lip about as broad as long, orbicular; margin erose or dentate:
- 11a. Flowers green; bracts triangular, acuminate; margin of lip dentate; column wing, triangular, obtuse ...9. *L. plantaginea*
- 11b. Flowers yellowish brown; bracts linear-lanceolate, acute; margin of lip erose; column wing semi-circular ...6. *L. distans*
- 10b. Pseudobulbs terete; inflorescence terminal; flowers 1.2 cm across or less; lip longer than broad, oblong or quadrately oblong; margin entire ... 2. *L. bistrata*

1. ***Liparis assamica*** King & Pantl. in Ann. Roy. Bot. Gard. Calcutta, 8 : 36. t. 50. 1898; Seidenf. in Dansk Bot. Ark. 31 (1): 86. t. 58. 1976.

Epiphytes. *Pseudobulbs* 2-3 cm high, ovoid-oblong. *Leaves* 6-10 x 0.2-1.2 cm, lanceolate or linear-lanceolate, acute or acuminate, membranous. *Inflorescence* many-flowered, lax, terminal, 12-15 cm long. *Flowers* ca 1.5 cm across, yellowish brown; *bracts* 0.8-0.9 cm long, greenish brown, ovate, lanceolate, acute; *pedicelled ovary* 1.1-1.2 cm long, brownish; *sepals* 7-8 mm long; dorsal ca 2 mm broad, oblong-lanceolate, acute, 3-nerved; laterals ca 2.5 mm broad, obtuse, reflexed, 5-nerved; *petals* ca 5 x 1.5 mm, linear, obtuse, 1-nerved; *lip* ca 5 mm long, broadly-oblong; base 2-auricled with 2 calli in between; apex truncate or retuse, with apiculate tip; *column* ca 4 mm long, brownish, erect with 2 side keels; wings semi-circular; *pollinia* linear-oblong.

Fl. : Oct. - Nov.

Nagaland: Lumani, *Hynniewta* 80883; Tokye, *Hynniewta* 80909 (ASSAM).

Distr.: INDIA. (N.E. India, Sikkim).

2. *Liparis bistriata* Par. & Reichb. f. in Trans. Linn. Soc. 30: 155. 1874; Hook. f., Fl. Brit. India 5 : 702. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 30. t. 39. 1898; Seidenf. in Dansk Bot. Ark. 31(1) : 73. t. 47. 1976. *L. saltucola* Kerr in Kew Bull. 216. 1927.

Epiphytes. *Pseudobulbs* 7-10 cm high, terete. *Leaves* 7-10 x 2.0-2.5 cm, elliptic-oblong or oblong-lanceolate, acute, sub-coriaceous. *Inflorescence* many-flowered, lax, terminal, 15-25 cm long. *Flowers* ca 1.2 cm across, yellowish; *bracts* 4-5 mm long, lanceolate, acute; *pedicelled ovary* 0.8-1.0 cm long, green; *sepals* and *petals* ca 6 mm long, obtuse, revolute; *sepals* ca 2 mm broad, linear-oblong, 3-nerved, laterals sub-falcate; *petals* ca 1 mm broad, filiform, 1-nerved; *lip* ca 6 mm long, yellowish green, quadrately oblong, deflexed; base with a 2-lobed callus; apex broad, truncate, emarginate; *column* ca 3 mm long, yellowish green, straight or slightly curved; wings semi-circular; *pollinia* oblong.

Fl.: Jul. - Aug.

Nagaland: Josoma, *Malhotra* 75141; Kohima, *Deka*, s.n. (ASSAM), *Koels* 25287 (CAL); Mokokchung, *Hynniewta* 79979; Pulebadze,

Hynniewta 56266; Satakha, *Hynniewta* 80868; Tuensang, *Hynniewta* 80941 (ASSAM).

Distr.: INDIA (N.E. India, Sikkim); MYANMAR, CHINA, THAILAND.

3. *Liparis bituberculata* (Hook.) Lindl. in Bot. Reg. 11. subt. 882. 1825; Hook. f., Fl. Brit. India 5 : 696. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : t. 35. 1898. *Cymbidium bituberculatum* Hook., Exot. Pl. t. 116. 1824.

Terrestrials. *Pseudobulbs* 20-25 cm high, cylindrical. *Leaves* 10-20 x 3-5 cm, ovate to elliptic-lanceolate, acuminate, membranous. *Inflorescence* few-flowered, lax, 15-25 cm long. *Flowers* ca 1.5 cm across, dull brownish purple; *bracts* 3-4 mm long, green, broadly cordate, acute, deflexed; *pedicelled ovary* 1.5-1.6 cm long, brownish purple; *sepals* obtuse, revolute, 3-nerved; dorsal ca 8 x 2 mm, linear-oblong; laterals ca 7 x 3 mm, oblong, slightly falcate; *petals* ca 8 x 1 mm, filiform, obtuse, revolute, 1-nerved; *lip* ca 0.6 cm long, oblong-conical, concave, slightly revolute, deflexed; base with 2 calli; apex broad, minutely erose, apiculate; *column* ca 4 mm long, green, slightly curved; wings semi-circular; *pollinia* obovoid.

Fl.: June - July

Nagaland: Chakabama, *Hynniewta* 74564 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim, Western Himalayas), BHUTAN, CAMBODIA, LAOS, VIETNAM.

4. *Liparis bootanensis* Griff., Itin. Not. 98. 1848 (descr.) & Not. Pl. 3 : 278. 1851; Hook. f., Fl. Brit. India 5 : 700. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 30. t. 40. 1898. Seidenf. in Dansk Bot. Ark. 31(1) : 50. t. 28. 1976. *L. lancifolia* Hook. f., Icon. Pl. t. 1855. 1889.

Epiphytes. *Pseudobulbs* 2-4 cm high, narrowly oblong. *Leaves* 10-20 x 1.5-2.5 cm, lanceolate to oblong-lanceolate, acute, coriaceous. *Inflorescence* many-flowered, lax, lateral, 15-25 cm long. *Flowers* ca 1.5 cm across, pale brown; *bracts* 5-6 mm long, green, linear-lanceolate, acuminate; *pedicelled ovary* 8-9 mm long, filiform, green; *sepals* 7-8 x ca

2 mm, lanceolate, obtuse, 3-nerved, revolute; *petals* 8-9 x ca 1 mm, filiform, obtuse, 1-nerved; *lip* 9-10 long, olive brown, cuneately oblong, deflexed; base narrow with 2 calli; apex broad, erose, nearly truncate or emarginate; *column* ca 3 mm long, greenish white, erect; wings triangular, uncinnate; *Pollinia* oblong.

Fh: Aug. - Sept.

Nagaland: Chakabarna, *Hynniewta* 74573; Pulebadze, *Hynniewta* 75200; Tseminyu, *Hynniewta* 56224; Tuensang, *Hynniewta* 80933; Tuli, *Hynniewta* 79934; Wokha, *Hynniewta* 80741; Zunhebato, *Hynniewta* 80825.

Distr.: INDIA (N.E. India, Sikkim), BHUTAN, MYANMAR, CAMBODIA, CHINA, JAPAN, JAVA, LAOS, MALAYA, PHILIPPINES, THAILAND, VIETNAM.

5. *Liparis caespitosa* (Thou.) Lindl. in Bot. Reg. 11. subt. 882. 1825; Gen & Sp. Orch. 32. 1830; Seidenf. in Dansk Bot. Ark. 31(1) : 61 t. 38 1976. *Malaxis caespitosa* Thou. Orch. Ill. Afr. t. 89. 1822. *Liparis minima* (Bl.) Lindl. Gen. & Sp. Orch. 32. 1830. *L. pusilla* Ridl. in Journ. Linn. Soc. 22 : 294. 1886; *L. prainii* Hook. f., Ic. Pl. t. 1857 A. 1889; Fl. Brit. India, 5 : 700. 1890. *L. duthiei* Hook. f., Ic. Pl. t. 1857 B. 1889; Fl. Brit. India, 5 : 701. 1890. *L. obscura* Hook. f., Ic. Pl. t. 1886. 1889; Fl. Brit. India, 5 : 701. 1890.

Epiphytes. *Pseudobulbs* 1.0-1.5 cm high, ovoid to ellipsoid. *Leaves* 5-10 x 0.6-1.2 cm, linear - lanceolate to linear-oblancoate, acute, coriaceous. *Inflorescence* many-flowered, lax, lateral, 8-15 cm long. *Flowers* ca 0.6 cm across, pale green; *bracts* 2-3 mm long, green or pale brown, lanceolate, acuminate; *pedicelled ovary* 3-5 mm long, green; *sepals* ca 3 mm long, reflexed, 1-nerved, acute; dorsal ca 1.5 mm broad, revolute, oblong; laterals broader, flat, ovate; *petals* ca 3 x 1 mm, reflexed, filiform, obtuse or acute, 1-nerved; *lip* ca 3 mm long, green, broadly oblong, with a medium groove from base to apex, deflexed; edges entire or minutely erose; apex broad, truncate, emarginate or with a minutely apiculate tip; *column* ca 1.5 mm long, green, erect; wings rectangular, uncinnate; *pollinia* oblong.

Fl.: Aug. - Oct.

Nagaland: Changtongia, *Hynniewta* 74998; Chumukedima, *Hynniewta* 80786; Khonoma, *Hynniewta* 74524; Kohima, *Hynniewta* 74510; Tseminyu, *Hynniewta* 56256; Tuensang, *Hynniewta* 80945

Distr.: INDIA (Eastern & Western Himalayas), Wide spread from Africa to the Pacific.

6. *Liparis distans* Clarke in Journ. Linn. Soc. 25 : 71. t. 29. 1889; Hook. f., Fl. Brit. India 5: 704. 1890; Seidenf. in Dansk Bot. Ark. 31(1): 76. t. 50. 1976. *L. macrantha* Hook. f., Ic. Pl. t. 1854. 1889. *L. yunnanensis* Rofle, in Journ. Linn. Soc. 36: 8. 1903.

Epiphytes. *Pseudobulbs* 8-10 cm long, oblong-cylindric. *Leaves* 25-35 x 2-2.5 cm, lanceolate, acute or acuminate, coriaceous. *Inflorescence* many-flowered, very lax, lateral, 35-40 cm long. *Flowers* ca 2.5 cm across, yellowish brown; *bracts* 0.8-1.0 cm long, green, linear-lanceolate, acute; *pedicelled ovary* 3.0-4.0 cm long, brownish green; *sepals* and *petals* obtuse, revolute; *sepals* 1.2-1.3 cm long, 3-nerved; dorsal ca 2 mm broad, linear-lanceolate; laterals ca 2.5 mm broad, lanceolate, sub-falcate; *petals* ca 1.4 x 1 mm, filiform; *lip* ca 1.2 cm long, brownish, orbicular-ovate; margins erose; base with a 2-lobed callus; *column* ca 6 mm long, brownish green, curved; wings 2, semi-circular; *pollinia* oblong.

Fl.: Sept. - Oct.

Nagaland: Kohima, Clarke 41071 (CAL), *Hynniewta* 80782, 80783, Malhotra 75101 (ASSAM), Prain 44 (CAL); Medziphema, *Hynniewta* 80798; Tuensang, *Hynniewta* 80926; Wokha, *Hynniewta* 80746 (ASSAM).

Distr.: INDIA (Manipur, Nagaland); CAMBODIA, CHINA, LAOS, VIETNAM.

7. *Liparis paradoxa* (Lindl.) Reichb. f. in Walp. Ann. 6 : 218. 1861; Hook. f., Fl. Brit. India, 5 : 697. 1890; Seidenf. in Dansk Bot. Ark. 31 (1): 38. t. 22. 1976. *Empusa paradoxa* Lindl. in Bot. Reg 10, subt. 825. 1824; Gen. & Sp. Orch. 17. 1830. *Liparis parishii* (Hook. f.) Hook. f., Fl. Brit. India 6 : 182. 1890.

Terrestrials. *Pseudobulbs* 2-4 cm high, ovoid. *Leaves* 8-12 x 2-3 cm, ovate-lanceolate to elliptic-lanceolate, acute, membranous. *Inflorescence*

few-flowered, lax, 15-20 cm long. *Flowers* ca 1.0 cm across, green; *bracts* 6-8 mm long, green, lanceolate, acute; *pedicelled ovary* 1-1.1 cm long, green, twisted; *sepals* unequal, obtuse; dorsal ca 7 x 1.5 mm, revolute, linear, 3-nerved, lateral nerves forking in two; laterals ca 5 x 3 mm, ovate, sub-falcate, acute, 5-nerved, recurved; *petals* ca 7 x 1.5 mm, revolute, linear, spathulate, 3-nerved, nerves often branching; *lip* ca 6 mm long, purplish red, sub-orbicular or orbicular, deflexed; margin entire or crenulate; base narrow, concave, with 2 calli; apex erose, emarginate; *column* ca 4 mm long, green, slightly curved; wings semi-circular; *pollinia* oblong.

Fl.: Jul. - Aug.

Nagaland: Kohima, Prain 41 (CAL); Pulebadze, Hynniewta 56202 (ASSAM), Prain 39 (CAL).

Distr.: Throughout India, BANGLA DESH, MYANMAR, CAMBODIA, SRI LANKA, CHINA, JAPAN, JAVA, LAOS, NEPAL, TAIWAN, THAILAND, VIETNAM.

8. *Liparis petiolata* (D. Don) Hunt & Summer. in Kew Bull. 20 : 52. 1966; Seidenf. in Dansk Bot. Ark. 31 (1): 12. t. 3. 1976. *Acianthus petiolatus* D. Don, Prodr. Fl. Nepal. 29. 1825. *Liparis nepalensis* Lindl. in Bot. Reg. 11. subt. 882. 1825; Hook. f., Fl. Brit. India 5 : 693. 1890. *L. pulchella* Hook. f., Ic. Pl. t. 1810. 1889 ; Fl. Brit. India, 5: 693. 1890.

Terrestrials. *Pseudobulbs* at short intervals on a stout, elongate, creeping rhizome, 3-5 cm high, sub-globose. *Leaf-flamina* 8-13 x 6-10 cm, ovate or elliptic, acute, membranous. *Inflorescence* many-flowered, lax, terminal, 15-25 cm long. *Flowers* ca 2.0 cm across, greenish purple; *bracts* 0.8 - 1.8 cm long, greenish purple, lanceolate, acuminate; *pedicelled ovary* 1.5 - 2.0 cm long, green; *sepals* ca 1.0 cm long, revolute, 3-nerved; dorsal ca 2 mm broad, alanceolate, acuminate; laterals ca 2.5 mm broad, oblong-lanceolate, sub-falcate, obtuse; *petals* ca 9 x 1.0 mm, linear, acute, 1-nerved; *lip* ca 9 mm long, purple veined, elliptic, 2 purple calli at base; apex triangular, acute; *column* ca 4 mm long, purple, arched, grooved; wings rectangular; *pollinia* obovoid.

Fl.: Apr. - May.

Nagaland: Akulato, Hynniewta 80875; Kohima, Bor 21701, Hynniewta 80777 (ASSAM), Prain 58 (CAL); Pfitdero, Hynniewta 80985 (ASSAM).

Distr.: INDIA (Meghalaya, Nagaland, Sikkim, West Bengal), BHUTAN, CAMBODIA, LAOS, THAILAND, VIETNAM.

9. **Liparis plantaginea** Lindl., Gen. & Sp. Orch. 29. 1830; Hook. f., Fl. Brit. India 5 : 702. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 29. t.36. 1898; Seidenf. in Dansk Bot. Ark. 31(1) : 75. t. 48. 1976.

Epiphytes. *Pseudobulbs* 8-10 cm high, oblong- cylindrical. *Leaves* 18-30 x 2.5-5 cm, channelled towards the base, oblanceolate to linear-oblong, acute, coriaceous. *Inflorescence* many-flowered, lax, lateral, 25-35 cm long. *Flowers* ca 2.0 cm across, green *bracts* 1.4-1.6 cm long, green; triangular, acuminate; pedicelled ovary 2.0 - 2.5 cm long, green; *sepals* and *petals* ca 1.0 cm long, obtuse, revolute; *sepals* 2.5-3 mm broad, oblong- lanceolate, 3-nerved; *petals* ca 1.5 mm broad, linear, 1-nerved; *lip* ca 1.2 cm long, orbicular, reflexed; base narrow, concave, with a 2-lobed callus; margin erose, dentate; *column* ca 5 mm long, green, slightly curved; wings broadly triangular, obtuse; *pollinia* linear-oblong.

Fl.: June - July

Nagaland: Baghty, Hynniewta 80235; Dimapur, Hynniewta 80790; Jafu Hills, Hynniewta 74585; Jhaluki, Hynniewta 74557; Kohima, Hynniewta 74525; Tokye, Hynniewta 80916; Tuli, Hynniewta 79926; Zunhebato, Hynniewta 80859 (ASSAM).

Distr.: INDIA (N.E. India, Sikkim), BHUTAN, CAMBODIA, LAOS, THAILAND, VIETNAM.

10. **Liparis resupinata** Ridl. in Journ. Linn. Soc. 22: 290. 1886; Hook. f., Ic. Pl. t. 1888. 1889; Fl. Brit. India 5 : 705. 1890; Seidenf. in Dansk Bot. Ark. 31 (1) : 8. t. 60. 1976. *L. ridleii* Hook. f., Ic. Pl. t. 1887. 1889; Fl. Brit. India 5 : 705. 1890. **Fig. 66**

Epiphytes. *Pseudobulbs* 2-3.5 cm high, ovoid-oblong, compressed. *Leaves* 8-12 x 0.9-1.8 cm, lanceolate or linear-lanceolate, acute or acuminate, membranous. *Inflorescence* many-flowered, lax, terminal, 12-20 cm long. *Flowers* ca 6 mm across, golden-brownish; *bracts* 0.9-1.1 cm long,

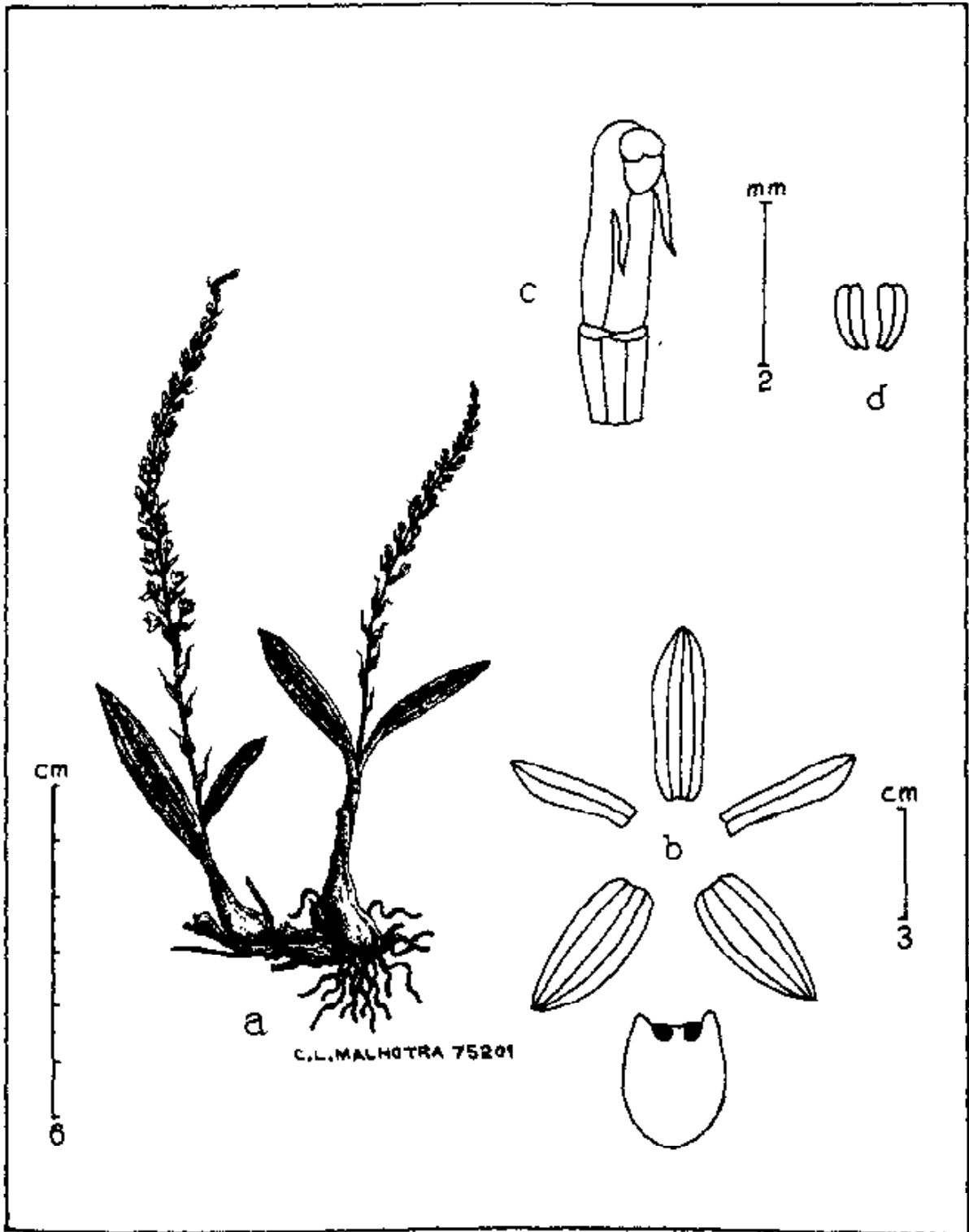


Fig. 66. *Liparis resupinata* Ridl.:
a. habit; b. floral parts; c. column; d. pollinia.

greenish brown, linear-lanceolate, acuminate; *pedicelled ovary* 1.5-2.0 cm long, yellowish brown; *sepals* and *petals* ca 4 mm long, obtuse, convolute; *sepals* ca 1.5 mm broad, linear-oblong, 3-nerved; *petals* ca 1 mm broad, filiform, 1-nerved; *lip* ca 3 mm long, golden-brownish, oblong-ovate, reflexed; base 2-auricled with 2 calli in between; apex rounded or obtuse; *column* ca 2 mm long, yellowish, erect; wings triangular, each ending in a pendent subulate tooth; *pollinia* linear-clavate.

Fl.: Oct. - Nov.

Nagaland: Mon, Hynniewta 79902, 79916; Naginimora, Hynniewta 79954; Pulebadze, Hynniewta 75201; Zunhebato, Hynniewta 80803 (ASSAM).

Distr.: Throughout India: BHUTAN, NEPAL, THAILAND.

11. *Liparis stricklandiana* Reichb. f. in Gard. Chron. 1: 232. 1880; Hook. f., Fl. Brit. India 5: 707. 1890; Seidenf. in Dansk Bot. Ark. 31(1): 69. t. 43. 1976. *L. chloroxantha* Hance in Journ. Bot. 21: 231. 1883; *L. griffithii* Ridl. in Journ. Linn. Soc. 22: 286. 1886; Hook. f., Fl. Brit. India 5: 700. 1890. *L. dolabella* Hook. f., Fl. Brit. India 6: 183. 1890.

Epiphytes. *Pseudobulbs* 1.5-3 cm high, ovoid or oblong. *Leaves* 12-22 x 1.5-2.5 cm, lanceolate to oblong-lanceolate, acute or acuminate, coriaceous. *Inflorescence* many-flowered, lax, lateral, 10-20 cm long. *Flowers* ca 1.2 cm across, yellowish green; *bracts* 5-6 mm long, green, linear, acuminate; *pedicelled ovary* 8-10 mm long, green; *sepals* ca 6x2.5 mm long, revolute, 1-nerved, obtuse, oblong to linear-oblong, reflexed; *petals* ca 7 x 1 mm, filiform, obtuse, 1-nerved; *lip* ca 6 mm long, obdeltoid, deflexed; base narrow with a single large callus; apex broad, truncate, erose, with a small triangular apiculate tip; *column* ca 3 mm long, green, slightly curved, without wings; *pollinia* ovate.

Fl.: Oct. Nov.

Nagaland: Kohima, Hynniewta 80781, Malhotra 74979; Pulebadze, Hynniewta 56274; Tiye Hills, Hynniewta 80766; Tuensang, Hynniewta 80950 (ASSAM).

Distr.: INDIA (Arunachal Pradesh, Meghalaya, Nagaland, Sikkim), BHUTAN, CAMBODIA, CHINA, LAOS, VIETNAM.

12. **Liparis viridiflora** (Bl.) Lindl., Gen. & Sp. Orch. 31. 1830; Hook. f., Fl. Brit. India 5 : 704. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 35. t. 47. 1898; Seidenf. in Dansk Bot. Ark. 31(1): 82. 1976. *Malaxis viridiflora* Bl., Bijdr. 392. t. 54. 1825. *Liparis longipes* Lindl. in Wall. Pl. As. Rar. 1: 31. t. 35. 1830; Hook. f., Fl. Brit. India 5: 703. 1890.

Epiphytes. *Pseudobulbs* 2.5-4 cm high, ovoid to conical. *Leaves* 8-15 x 1.8-2.5 cm, channelled towards the base, oblong-lanceolate, acute, sub-coriaceous. *Inflorescence* many-flowered, terminal, 10-15 cm long. *Flowers* ca 1.0 cm across, light green; *bracts* 5-6 mm long, green, linear-lanceolate, acute; *pedicelled ovary* 4-5 mm long, greenish white, slightly decurved; *sepals & petals* ca 5 mm long, obtuse, 1-nerved; dorsal ca 1.5 mm broad, linear-oblong; laterals ca 2 mm broad, oblong; *petals* ca 1 mm broad, filiform, sub-falcate, acute; *lip* ca 3 mm long, conical, deflexed; base concave; apex shortly triangular, acute, contracted at sides, forming 2 ear-like marginal folds; *column* ca 2 mm long, green, slightly curved, without wings; *pollinia* oblong.

Fl.: Nov. Dec.

Nagaland: Barak Range, *Hynniewta* 80997; Kiphere, *Hynniewta* 80980; Eakching, *Hynniewta* 79941; Zunhebato, *Hynniewta* 80830 (ASSAM).

Distr.: Throughout India: BANGLA DESH, CAMBODIA, SRI LANKA, CHINA, LAOS, MALAYA, TAIWAN, THAILAND, VIETNAM.

33. LUISIA Gaud.

- Luisia trichorhiza** (Hook.) Bl., Mus. Bot. Lugd. Bot. 1: 63. 1849; Lindl., Fol. Orch. 2. 1853; Hook. f., Fl. Brit. India 6 : 21. 1890; Seidenf. in Dansk Bot. Ark. 27 (4) : 66. t. 35. 1971. *Vanda trichorhiza* Hook., Exot. Fl. 1: t. 72. 1823 Fig. 67

Stems 8-20 cm long, erect, stout. *Leaves* 5-15 x 0.2-0.4 cm, straight or arched, spreading, acute or obtuse; *peduncle* 3-7 mm long, stout.

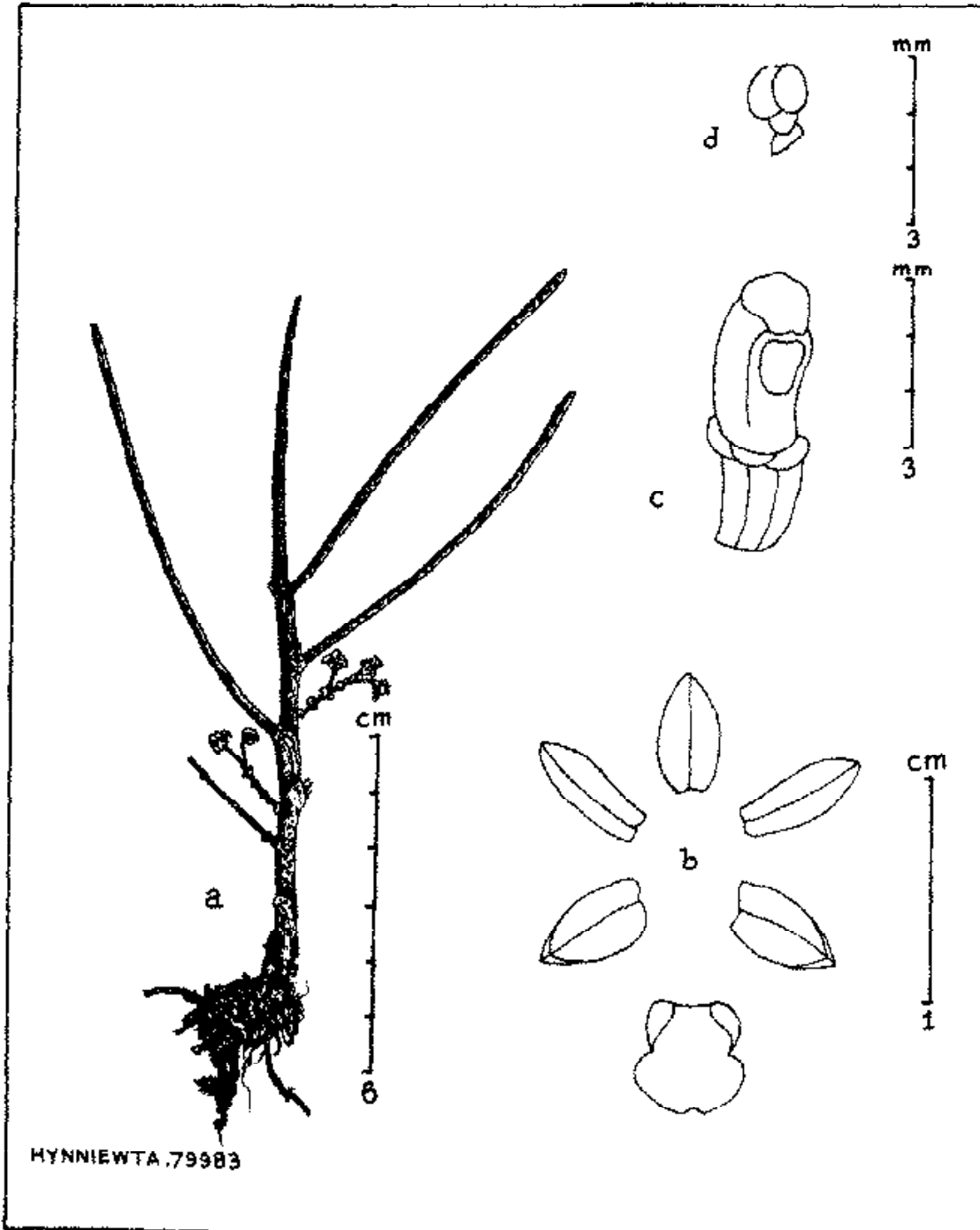


Fig. 67. *Luisia trichorhiza* (Hook.) Bl.:
a. habit; b. floral parts; c. column; d. pollinia.

Flowers ca 1.0 cm across, greenish purple; *bracts* ca 2 mm long, pale brown, cymbiform, acute; *sepals* ca 5 x 3 mm, broadly oblong, obtuse, laterals keeled; *petals* ca 6 x 2 mm, linear-oblong, spathulate; *lip* ca 5 mm long, deep purple; hypochile sub-quadrate, concave; epichile reniform; apex sub-truncate; upper surface glabrous with 5-6 vertical lines; *column* ca 3 mm long, purplish; *pollinia* sub-globose.

Fl.: May June.

Nagaland: Baghty, *Hynniewta* 80740; Mokokchung, *Hynniewta* 79983 (ASSAM)

Distr.: INDIA (East & West Himalaya, Sikkim); MYANMAR, THAILAND.

34. MALAXIS Soland. ex Sw.

- 1a. Peduncle thick, stout, distinctly ribbed; flowers ca 5 mm or less across, densely crowded; bracts much longer than the pedicelled ovary; lip 3-lobed; apex entire, disc with 1 callus ...3. *M. latifolia*
- 1b. Peduncle thin, slender, smooth or obscurely ribbed; flowers 10 mm or more across, lax; bracts shorter than the pedicelled ovary; lip entire, not lobed; apex 2-fid; disc without callus:
- 2a. Peduncle without sheath; flowers ca 10 mm across; lip concave; auricles broad, falcate; apex deeply 2-fid ...2. *M. khasiana*
- 2b. Peduncle with 1 or 2 tubular, acute sheath; flowers ca 12 mm across; lip flat; auricles narrow, not falcate; apex obscurely 2-fid ...1. *M. acuminata*

1. **Malaxis acuminata** D. Don, Prodr. Fl. Nepal. 29. 1825; Seidenf. in Dansk Bot. Ark. 33 (1): 55. t. 44. 1975. *Microstylis wallichii* Lindl., Gen. & Sp. Orch. 20. 1830; Hook. f., Fl. Brit. India 5: 686. 1888; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 16. t. 18. 1898. **Fig. 68**

Stems 7-10 cm high. *Leaves* 5-15 x 3-4.5 cm, greenish purple, ovate-lanceolate to ovate-elliptic, acute. *Inflorescence* lax, many-flowered, 20-30 cm long. *Flowers* ca 12 mm across, greenish yellow or purplish; *bracts*

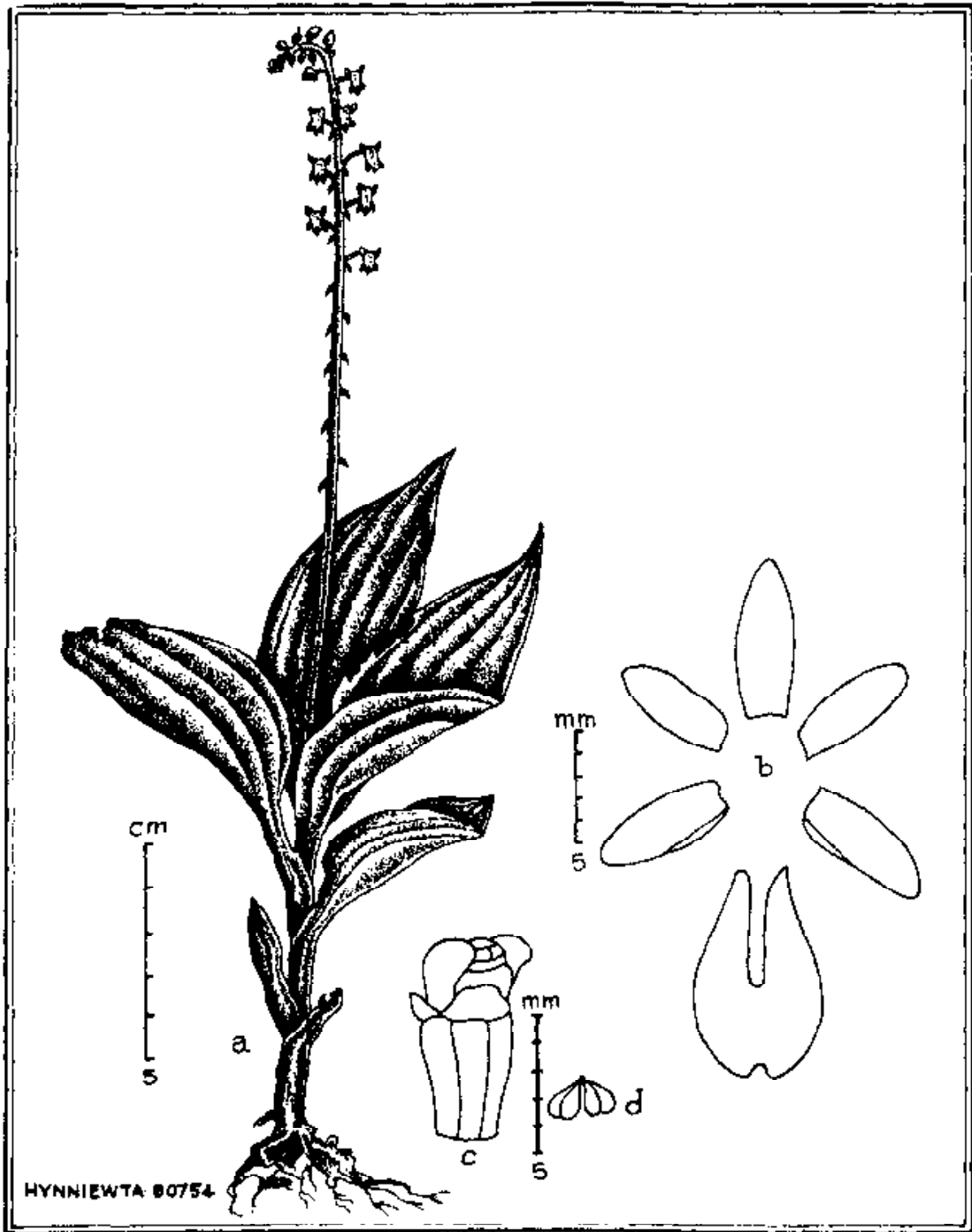


Fig. 68. *Malaxis acuminata* D. Don:
a. habit; b. floral parts; c. column; d. pollinia.

3-4 mm long, lanceolate, acuminate, purplish yellow; *sepals* and *petals* ca 6 mm long, *sepals* ca 2.5 mm broad, linear-oblong; *petals* ca 1.5 mm broad, linear; *lip* ca 10 mm long, not lobed; *column* ca 2 mm long, yellowish; *pollinia* ellipsoid.

Fl.: Jun. - Jul.

Nagaland: Kohima, Bor 21189; Tiyie Hills, Hynniewta 80754

Distr.: Throughout India; BANGLA DESH, MYANMAR, CAMBODIA, JAVA, LAOS, NEPAL, PHILIPPINES, SUMATRA, THAILAND, VIETNAM.

2. **Malaxis khasiana** (Hook. f.) O. Ktze., Rev. Gen. Pl. 673. 1891. *Microstylis khasiana* Hook. f., Fl. Brit. India 5 : 686. 1888; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8: 15. t. 17. 1898. **Fig. 69.**

Stems 6-10 cm high. *Leaves* 5-15 x 2.5-4.0 cm, ovate or ovate-lanceolate, acute. *Inflorescence* laxly many-flowered, 15-25 cm long, erect or sub-erect. *Flowers* ca 10 mm across, dull purple or chestnut red; *bracts* 2-3 mm long, ovate, acuminate, purplish; *pedicelled ovary* 6-10 mm long; *sepals* and *petals* ca 5 mm long, obtuse; *sepals* ca 2.5 mm broad, oblong; *petals* ca 1.5 mm broad, linear; *lip* ca 7 mm long, concave, entire; *column* ca 2 mm long, purplish red; *pollinia* ellipsoid.

Fl.: Aug. - Oct.

Nagaland: Chakabama, Hynniewta 74564 Khonoma, Hynniewta 74522; Kohima, Kataki 66362; Ungma, Hynniewta 79986

Distr.: INDIA (Meghalaya, Nagaland, Sikkim, Uttar Pradesh); CHINA, NEPAL, THAILAND.

3. **Malaxis latifolia** J. E. Sm. in Rees, Cyclop. 22 : Malaxis n. 3. 1812; Kataki, Orch. Megh. 30. 1986. *Microstylis congesta* (Lindl.) Reichb. f. in Walp. Ann. Bot. Syst. 6 : 206. 1861; Hook. f., Fl. Brit. India 5 : 689. 1890; op. cit. 6: 181. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8: 19. t. 23. 1898. *Dienia congesta* Lindl., Bot. Reg. 10. sub. t. 825. 1827.

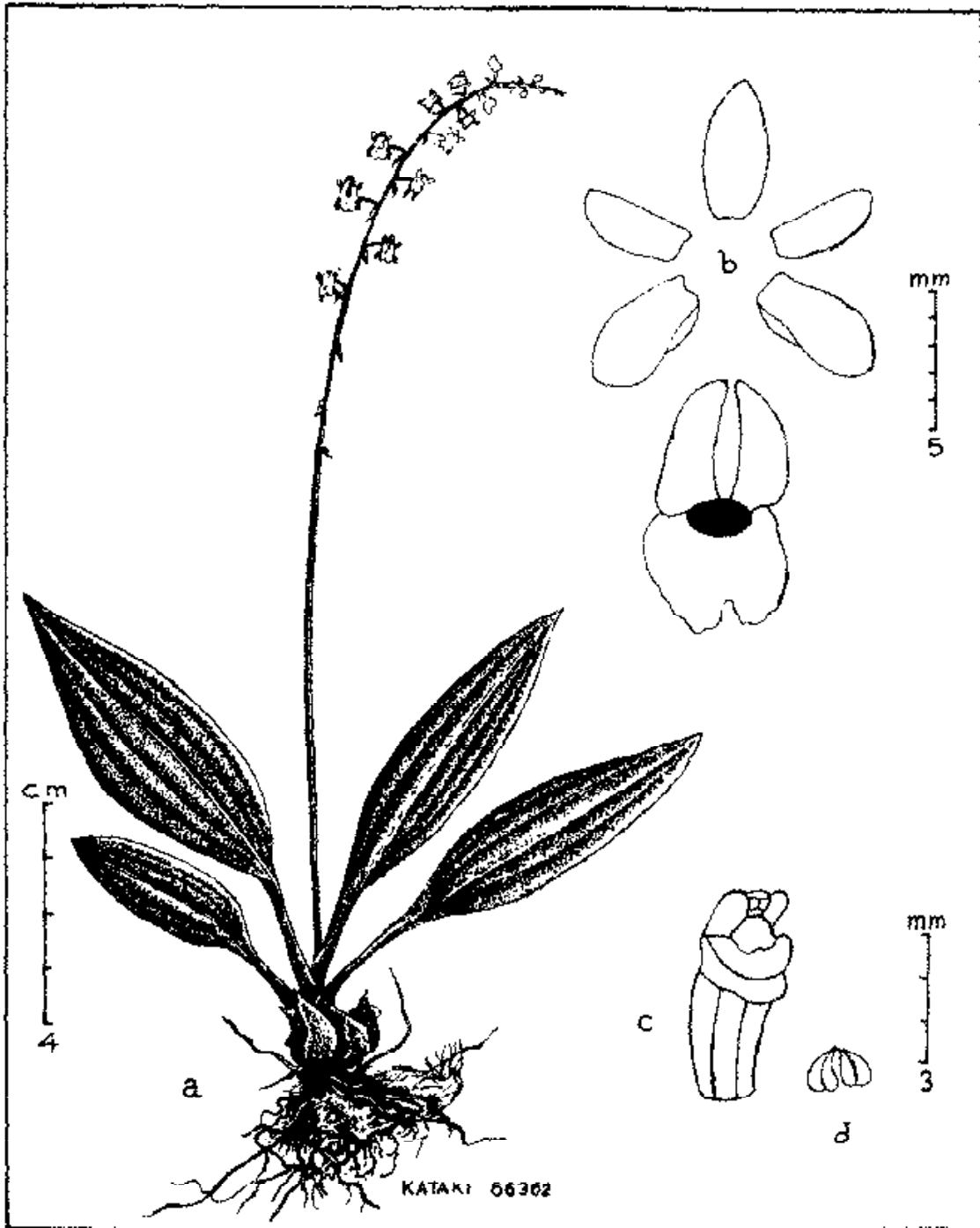


Fig. 69. *Malaxis khasiana* (Hook. f.) O. Ktze.:
 a. habit; b. floral parts; c. column; d. pollinia

Stems 8-12 cm high, 4-6-leaved. *Leaves* 8-20 x 1-3 cm, elliptic-lanceolate, acute or acuminate. *Inflorescence* many-flowered, 12-25 cm long, erect. *Flowers* ca 5 mm across, yellowish-green; *bracts* ca 4 mm long, purplish green, acuminate; *pedicelled ovary* ca 2 mm long, *sepals* and *petals* ca 2.5 mm long, obtuse; *sepals* ca 1.5 mm broad, oblong; *petals* ca 1 mm broad, filiform; *lip* ca 2 mm long, 3-lobed, side lobes round, mid lobe ovate-triangular, obtuse; disc with a minute transversal callus in front of the column; *column* ca 1 mm long, purplish; *pollinia* obovate.

Fl.: Jul. - Aug.

Nagaland : Heliphong Hills, *Hynniewta* 80968; Lumani, *Hynniewta* 80882; Peren, *Hynniewta* 80994; Pfitzero, *Hynniewta* 80894; Tuensang, *Hynniewta* 80926 (ASSAM).

Distr.: Throughout India; AUSTRALIA, MYANMAR, CAMBODIA, CEYLON, CHINA, LAOS, MALAYA, NEW GUINEA, NEPAL, PHILLIPINES, RYUKU, SUMATRA, THAILAND, VIETNAM.

35. NEOGYNE Reichb. f.

Neogyne gardneriana (Lindl.) Reichb. f. ex Pfitz. in Engl. Pflanzenfam. 2, 6 : 126. f. 127a. 1888; Seidenf. & Smitnd. Orch. Thailand, 2(1) : 134. 1959. *Coelogyne gardneriana* Lindl. in Wall. Pl. As. Rar. 1: 33. t. 38. 1830; Gen. & Sp. Orch. 41. 1830; Hook. f., Fl. Brit. India 5 : 828. 1890.

Pseudobulbs 10-20 cm high, oblong-cylindric. *Leaf-lamina* 35-50 x 4-8 cm, elliptic-lanceolate, acute. *Inflorescence* 25-30 cm long, drooping. *Flowers* 3.8 - 4.0 cm long, white; *bracts* 2.5 - 3.0 cm long, cymbiform, obtuse, pale brown; *pedicelled ovary* 1.0-1.5 cm long, white; *sepals* ca 4.0 - 0.8 cm, sub-equal, lanceolate, acute; *petals* ca 3.9 x 0.5 cm, linear-lanceolate, acute; *lip* ca 4 cm long, white; side lobes narrow, round; mid-lobe 2-cleft; lamellae 3, unequal, white or pale yellow; outer 2 longer, fleshy towards apex, terminating near the sinus of the mid-lobe; *column* ca 3 cm long, white; wings entire or undulate; *pollinia* obovate.

Fl.: Oct. - Nov.

Nagaland: Tiyie Hills, *Hynniewta* 80773; Tseminyu, *Hynniewta* 56065 (ASSAM).

Distr.: INDIA (N. E. India); BHUTAN, CAMBODIA, LAOS, THAILAND, VIETNAM.

36. **OBERONIA** Lindl. *nom. cons.*

- 1a. Inflorescence adnate to a leaf:
- 2a. Peduncle and rachis thick, stout, fleshy; flowers sessile, spicate; bracts elliptic; lip 3-lobed; mid-lobe entire ...9. *O. pachyrachis*
- 2b. Peduncle and rachis filiform, slender, not fleshy; flowers pedicellate, racemose; bracts lanceolate; lip 4-lobed; mid-lobe 2-lobulate ...7. *O. obcordata*
- 1b. Inflorescence not adnate to a leaf:
- 3a. Peduncle and rachis thick, stout, fleshy; flowers sessile, spicate; bracts elliptic; lip entire, not lobed:
- 4a. Petals entire; margin of lip entire or crenulate; apex entire ...6. *O. maxima*
- 4b. Petals erose; margin of lip erose; apex minutely or deeply notched:
- 5a. Peduncle winged; petals as broad as the sepals; lip apex minutely notched8. *O. orbicularis*
- 5b. Peduncle not winged; petals narrower than the sepals; lip apex deeply notched ...3. *O. denticulata*
- 3b. Peduncle and rachis filiform, slender, not fleshy; flowers pedicellate, racemose; bracts lanceolate or ovate-lanceolate; lip 2-4-lobed:
- 6a. Floral bracts entire; lip 3-lobed; apex entire or notched:
- 7a. Petals about as broad as sepals, ovate, acuminate; side lobes of lip small, entire; mid-lobe large, serrulate; apex notched ...4. *O. emarginata*
- 7b. Petals much narrower than the sepals, linear, obtuse; side lobes of lip large, deeply serrate; mid-lobe small, entire; apex not notched2. *O. clarkei*
- 6b. Floral bracts serrate or serrulate; lip 2- or 4-lobed; apex deeply 2-lobulate:

- 8a. Lip 4-lobed; side lobes present; lobules linear, acuminate or quadrately oblong:
- 9a. Petals serrulate; side lobes triangular, acute; lobules linear, acuminate5. *O. mannii*
- 9b. Petals entire; side lobes oblong, obtuse; lobules quadrately oblong 1. *O. acaulis*
- 8b. Lip 2-lobed; side lobes absent; lobules oblong, sub-falcate10. *O. pyrulifera*

1. ***Oberonia acaulis*** Griff., Itin. Not. 76. 1848; Icon. t. 286. f. 1. 1851; Seidenf. Dansk Bot. Ark. 33 (1) : 20. 1978. p.p.; Ansari et Balak., Orch. Monogr. Rijksherb. Leiden 4 : 26. f. 21. 1990.

Stems short, stout, few-leaved. *Leaves* 10-20 x 1-2 cm, ensiform, straight or falcate, acute or obtuse. *Inflorescence* racemose, more or less whorled, lax, 20-30 cm long, erect or arched. *Flowers* ca 2 mm across, brownish; *bracts* ca 2 mm long, lanceolate, acute, pale brown, irregularly and deeply serrate; *Pedicelled ovary* short, brownish; *sepals* and *petals* ca 1 mm long, acute; *sepals* oblong; *petals* linear-oblong; *lip* ca 1.5 mm long, 4-lobed; side lobes oblong, obtuse, erose; mid-lobe 2-lobulate lobules quadrately oblong; *column* ca 1 mm long, brownish; *pollinia* broadly oblong.

Fl. : July - Sept.

Nagaland: Kohima, Hynniewta 74541; Dimapur, Hynniewta

Distr.: INDIA (Arunachal Pradesh, Nagaland, Assam, Sikkim, Uttar Pradesh); BANGLA DESH, MYANMAR, CAMBODIA, CHINA, LAOS, NEPAL, THAILAND, VIETNAM.

2. ***Oberonia clarkei*** Hook. f., Ic. Pl. t. 1779. 1888; Fl. Brit. India 5: 676. 1888; Seidenf., Dansk Bot. Ark. 25 (3): 107. 1968; Pradhan, Ind. Orch. 2 : 204. 1979; Katak, Orch. Megh. 24. 1986.

Stems very short, stout, many - to few-leaved. *Leaves* 1.5-3 x 0.2-0.4 cm, linear-oblong, straight or falcate, acute or obtuse. *Inflorescence* racemose, rather dense, 5-10 cm long, erect or arched. *Flowers* ca 2 mm across, reddish brown; *bracts* ca .1 mm long, lanceolate, acute, brown; *pedicelled ovary* short, reddish brown; *sepals* and *petals* ca 1 mm long,

acute; dorsal sepal elliptic; laterals oblong, sub-falcate; *petals* linear; *lip* ca 1.5 mm long, 3-lobed; side lobes deeply serrate; mid-lobe sub-quadrate; apex truncate, minutely erose; *column* ca 1 mm long, reddish brown; *pollinia* linear-oblong.

Fl. : Sept. Oct.

Nagaland: Jhaluki, *Hynniewta* 74546; Zumphu, *Hynniewta* 74594 (ASSAM).

Distr.: INDIA (Meghalaya, Nagaland); CHINA.

3. ***Oberonia denticulata*** Wight, *Icon.* 5(1): 3. t. 1625. 1851; Ansari et Balak., *Orch. Monogr. Rijksherb. Leiden* 4 : 20. f. 15. 1990. *O. iridifolia* (Roxb.) Lindl., *Gen. & Sp. Orch.* 15. 1830; (*nom. superfl. et illig.*) Hook. f., *Fl. Brit. India* 5 : 675. 1888 (excl. var. *denticulata* Hook. f., *angustifolia* Hook. f., *brevifolia* (Hook. f.); King & Pantl. in *Ann. Roy. Bot. Gard. Calc.* 8 : 8. t. 8. 1898.

Stems short, very stout, few-leaved. *Leaves* 5-20 x 1-2.5 cm, ensiform, acute or obtuse. *Inflorescence* spicate, dense, 20-30 cm long, erect, arched. *Flowers* ca 3 mm across, yellowish or greenish; *bracts* ca 3 mm long, elliptic, greenish, irregularly and deeply serrate; *ovary* sessile, greenish, sink in the fleshy rachis; *sepals* and *petals* ca 1.5 mm long; *sepals* oblong or ovate, obtuse; laterals sub-falcate; *petals* linear-oblong, acute, erose; *lip* ca 1.5 mm long, semi-circular, irregularly erose; apex deeply notched; *column* ca 1 mm long, yellowish; *pollinia* oblong.

Fl. Oct. - Nov.

Nagaland: Kohima, *Hynniewta* 74970 Josoma, *Hynniewta* 75142 (ASSAM).

Distr. : Throughout India: AUSTRALIA, BANGLADESH, BORNEO, MYANMAR, CAMBODIA, JAVA, LAOS, MALAYA, NEPAL, PHILIPPINES, SUMATRA, THAILAND, VIETNAM.

4. ***Oberonia emarginata*** King & Pantl. in *Ann. Roy. Bot. Gard. Calc.* 8: 6. t. 2A. 1898; Ansari et Balak., *Orch. Monogr. Rijksherb Leiden*

4: 35.f. 31. 1990. *O. micrantha* King & Pantl. l.c. 8: 6. t. 5. 1898 (nom A. Rich., 1834).

Stem short, slender, few-leaved. *Leaves* 2-8 x 0.2-0.6 cm, linear, straight or falcate, acute or obtuse. *Inflorescence* racemose, rather dense, 10-20 cm long, arched. *Flowers* ca 2 mm across, orange yellow; *bracts* ca 1.5 mm long, lanceolate, acute, green; *pedicelled ovary* short, yellow; *Sepals* and *Petals* ca 1mm long; *Sepals* oblong or ovate, obtuse; *petals* linear-ovate, acuminate; *lip* ca 1.5 mm long, 3-lobed; side lobes round; mid-lobe broadly triangular, minutely and irregularly serrate; apex notched; *column* ca 1 mm long, orange yellow; *pollinia* broadly oblong.

Fl.: Aug. - Sept.

Nagaland: Khonoma, Hynniewta 74521; Melori, Hynniewta 74539 (Assam).

Distr.: INDIA (Arunachal Pradesh, Nagaland, Sikkim, West Bengal); THAILAND.

5. *Oberonia mannii* Hook. f., Ic. Pl. t. 2003. 1890; Fl. Brit. India 6: 180. 1890; Ansari et Balak. Orch. Monogr. Rijksherb. Leiden 4 : 42. t. 41. 1990.

Stems upto 11 cm long, slender, many-leaved. *Leaves* 2-4 x 0.2-0.4 cm, linear, straight or falcate, acute or acuminate. *Inflorescence* racemose, rather dense, 5-10 cm long, erect. *Flowers* ca 2 mm across, yellowish; *bracts* ca 1 mm, ovate-lanceolate, acute, pale brown; upper half serrulate; *pedicelled ovary* short, yellowish; *sepals* and *petals* ca 1 mm long; *sepals* ovate, acute; *petals* linear-ovate, acuminate, serrulate; *lip* ca 1.5 mm long, 4-lobed; side lobes triangular, acute; mid-lobe deeply 2-lobulate; lobules linear, acuminate; *column* ca 1 mm long, yellow; *pollinia* oblong.

Fl. : May - Jun.

Nagaland: Pulebadze,, Hynniewta 56304 (ASSAM).

Distr.: INDIA (Meghalaya, Nagaland, Sikkim); BANGLA DESH, THAILAND.

6. **Oberonia maxima** Hook. f., Fl. Brit. India 5 : 677. 1888; Jain & Mehrotra, Prel. Inv. Orch. India 97. 1984; Ansari et Balak. Orch. Monogr. Rijksherb. Leiden 4 : 22. f. 16. 1990.

Stems short, very stout, few-leaved. *Leaves* 10-30 x 2-4 cm, ensiform, straight or falcate, acute. *Inflorescence* spicate, dense, 25-35 cm long, erect or arched. *Flowers* ca 3 mm across, yellowish green; *bracts* ca 2.5 mm long, elliptic, greenish, minutely serrate; *ovary* sessile, yellowish green, sink in the fleshy rachis; *sepals* ca 1.5 mm long, broadly ovate, obtuse; *petals* ca 1 mm long, ovate, acute; *lip* ca 1.5 mm long, semi-circular, concave, apex emarginate; *column* ca 1 mm long, pale yellow; *pollinia* linear-oblong.

Fl. : Jun. Sept.

Nagaland: Khonoma, Hynniewta 74523 (ASSAM).

Distr.: INDIA (Arunachal Pradesh, Meghalaya, Nagaland); MYANMAR, THAILAND.

7. **Oberonia obcordata** Lindl., Fol. Orch. Oberonia 7. 1859; Hook. f., Fl. Brit. India 5: 684. 1888; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 9. t. 11. 1898; Ansari et Balak. Orch. Monogr. Rijksherb. Leiden 4 : 40. f. 38. 1990. *O. treutleri* Hook. f., l.c. 6 : 683. 1888; Icon t. 1786 A, 1888.

Stems upto 8 cm high, slender, many-leaved. *Leaves* 2-5 x 0.4-0.6 cm, linear, falcate or not, acute. *Inflorescence* racemose, scattered or in whorls, rather lax, 6-10 cm long, erect. *Flowers* ca 2 mm across, reddish brown; *bracts* ca 3 mm long, lanceolate, acute, deep brown; upper half minutely and triangularly serrate; *pedicelled ovary* short, reddish brown; *sepals* and *petals* ca 1 mm long, obtuse; *sepals* ovate; *petals* linear, sub-falcate; *lip* ca 1.5 mm long, 4-lobed; side lobes linear-oblong, obtuse; mid-lobe 2-lobulate; lobules broadly triangular, obtuse; *column* ca 1 mm long, deep brown; *pollinia* oblong.

Fl. : Aug. Sept.

Nagaland: Chakabama, Hynniewta 74572; Jafu Hills, Hynniewta 56204 (ASSAM).

Distr.: INDIA (Meghalaya, Nagaland, Sikkim, West Bengal); BHUTAN, THAILAND.

8. **Oberonia orbicularis** Hook. f., Fl. Brit. India 5: 677. 1888; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8: 5. 1898; Kataki, Orch. Megh. 25. 1986; Ansari et Balak., Orch. Monogr. Rijksherb. Leiden 4 : 43. 1990.

Stems short, stout, few-leaved. *Leaves* 5-12 x 0.7-1.5 cm, laterally compressed, ensiform, straight or falcate, acute or obtuse. *Inflorescence* spicate, dense, 12-20 cm long, erect or arched. *Flowers* ca 2 mm across, pale yellow; *bracts* ca 2 mm long, elliptic, greenish, irregularly and deeply serrate; *ovary* sessile, yellowish, sink in the fleshy rachis; *sepals* and *petals* sub-equal, ca 1 mm long, oblong or ovate, acute; *petals* erose; *lip* ca 1 mm long, semi-circular, erose, apex notched; *column* ca 1 mm long, pale yellow; *pollinia* oblong.

Fl.: Aug. Sept.

Nagaland: Zumphu, Hynniewta 74590 (ASSAM).

Distr.: INDIA (Nagaland, Sikkim).

9. **Oberonia pachyrachis** Reichb. f. ex Hook. f., Fl. Brit. India 5: 681. 1888; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 4. t. 3. 1898; Ansari et Balak., Orch. Monogr. Rijksherb. Leiden 4 : 11. f. 3. 1990.

Stems short, stout, few-leaved. *Leaves* 15-30 x 1.0-1.5 cm, laterally compressed, ensiform, slightly falcate, acute. *Inflorescence* spicate, dense, 10-15 cm long, erect or arched. *Flowers* ca 2 mm across, yellow to light brown; *bracts* ca 1.5 mm long, elliptic, pale brown, irregularly and deeply serrate; *ovary* sessile, yellowish, sink in the fleshy rachis; *sepals* and *petals* ca 1 mm long, acute; *sepals* ovate; *petals* linear; *lip* ca 1.5 mm long, saccate, 3-lobed; side lobes oblong, insignificant upwards curved, auricular; mid-lobe triangular-ovate, obtuse; *column* ca 1 mm long, yellow; *pollinia* linear-oblong.

Fl.: Sept. - Oct.

Nagaland: Kohima, Hynniewta 75140 Tseminyu, Hynniewta 56062 (ASSAM)

Distr.: INDIA (N.E. India, Sikkim, Uttar Pradesh; BHUTAN, MYANMAR, CHINA, NEPAL, THAILAND.

10. **Oberonia pyrulifera** Lindl., *Fol. Orch. Oberonia* 3. 1859; Hook. f., *Fl. Brit. India* 5 : 678. 1888; King & Pantl. in *Ann. Roy. Bot. Gard. Calc.* 8: 14. t. 16 B. 1898; Seidenf. in *Dansk Bot. Ark.* 25(3) : 38. 1968; *ibid* 33(1): 23. 1978; Ansari et Balak., *Orch. Monogr. Rijksherb. Leiden* 4 : 30.f. 26. 1990.

Stems short, slender, few-leaved. *Leaves* 3-10 x 0.5-0.8 cm, narrowly ensiform, straight or falcate, acute. *Inflorescence* racemose, lax, 15-25 cm long, erect. *Flowers* ca 2 mm across, yellowish green; *bracts* ca 1.5 mm long, lanceolate, acute, green irregularly and deeply serrate; *pedicelled ovary* long, yellowish green; *sepals* and *petals* ca 1 mm long; *sepals* ovate, acute; *petals* linear-oblong, obtuse; *lip* ca 2 mm long, 2-lobed; side lobes absent; mid-lobe 2-lobulate; lobules oblong, sub-falcate, obtuse; *column* ca 1 mm long, yellowish; *pollinia* broadly oblong.

Fl.: Oct. - Nov.

Nagaland: Baghty, *Hynniewta* 80734; Jafu Hills, *Malhotra* 75276; Kiphire, *Hynniewta* 80981; Pfitzero, *Bahadur* 53747, 61619 (ASSAM).

Distr.: INDIA (Assam, Manipur, Meghalaya, Nagaland, Sikkim); BHUTAN, CHINA, THAILAND.

37. **ORNITHOCHILUS** Wall. ex Benth.

Ornithochilus difformis (Wall. ex Lindl.) Schltr., in *Fedde Repert. Beih.* 4 : 277. 1919. *Aerrides difformis* Wall. ex Lindl., *Gen. & Sp. Orch.* 242. 1833. *Ornithochilus fuscus* Wall. ex Hook.f., *Fl. Brit. India* 6 : 76. 1890. *nom. illegit.* **Fig. 70**

Stems ca 1 cm long, slender, pendulous. *Leaves* 5-15 x 2-7 cm, crowded, oblong or elliptic, obtuse. *Inflorescence* 25-35 cm long, drooping. *Flowers* 1.6-1.8 cm across, yellowish, brown streaked; *bracts* ca 2 mm long, ovate, acute, pale brown; *pedicelled ovary* 1.0-1.5 cm long, greenish yellow; *sepals* 8-9 mm long, obtuse; apices incurved; dorsal ca 4 mm broad, elliptic; laterals ca 5 mm broad, broadly obovate; *petals* 7-8 x 2 mm, oblong, obtuse; *lip* 0.9-1.0 cm long, yellow, red streaked; side

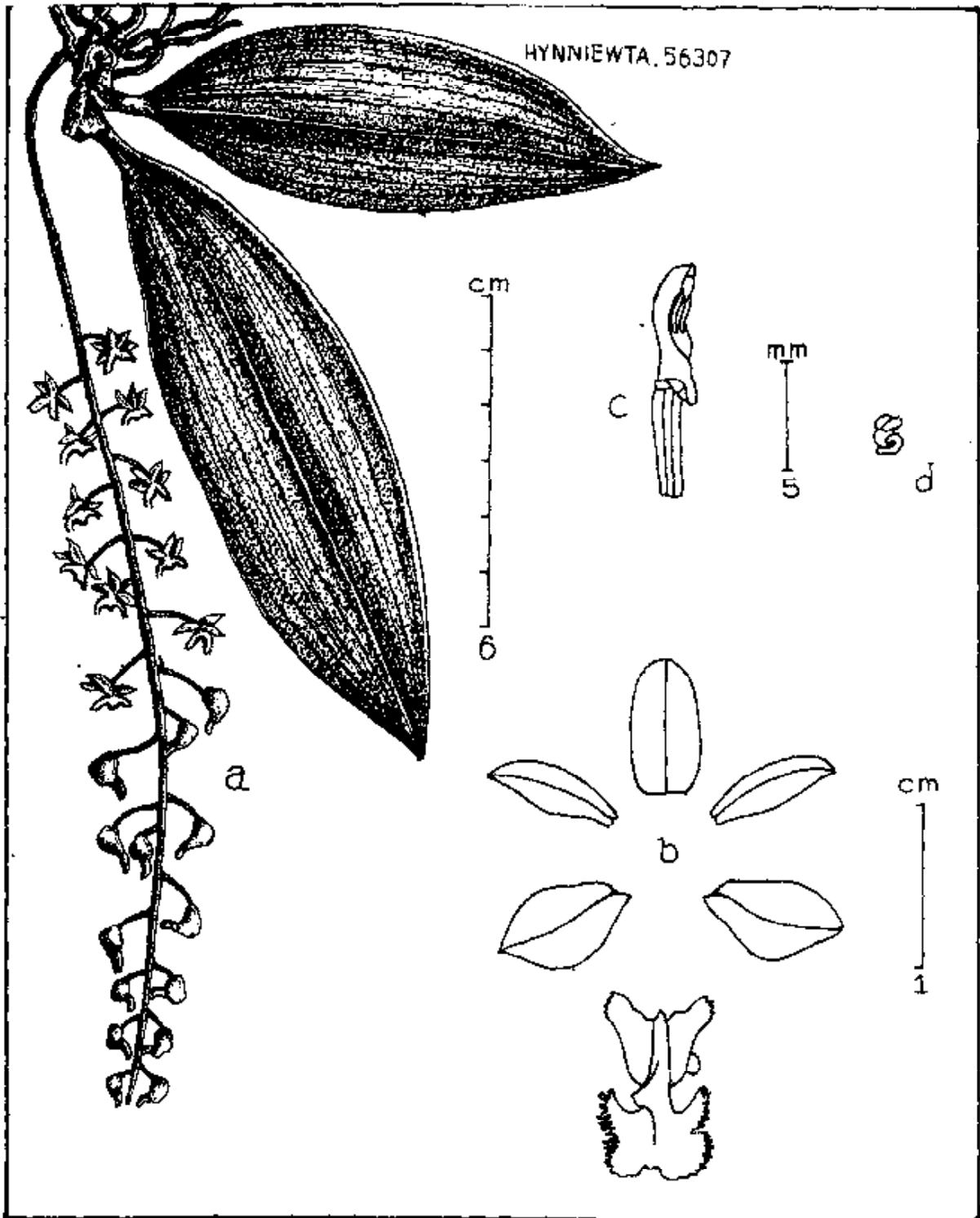


Fig. 70: *Ornithochilus difformis* (Wall. ex. Lindl.) Schltr.:
 a. habit; b. floral parts; c. column; d. pollinia.

lobes spreading; apices pectinate; mid-lobe infolded, quadrangular; margin irregularly and deeply pectinate; apex acute, notched; disc clawed; spur 3-4 mm long, sub-cylindric, incurved, pale yellow; column 5-6 mm long, pale yellow; *pollinia* sub-globose.

Fl.: Jul. - Aug.

Nagaland: Pulebadze, *Hynniewta* 56307 (ASSAM).

Distr.: INDIA (N.E. India, Sikkim); BHUTAN, CAMBODIA, LAOS, THAILAND, VIETNAM.

38. *OTOCHILUS* Lindl.

- 1a. Flowers large, ca 2.5 cm or more across; bracts ovate-lanceolate with narrow triangular apices; lip 3-5-ridged:
- 2a. Side lobes of lip sub-quadrate, acute or obliquely truncate, erose; mid-lobe ovate-lanceolate, apiculate; ridges 5, unequal, lacinate, at the base of mid-lobe, shorter 2 not extending to the base of lip 4. *O. porrecta*
- 2b. Side lobes of lip round, obtuse, entire; mid-lobe lanceolate, acuminate; ridges 3, equal, smooth, at base of lip not extending to the base of mid-lobe 3. *O. lancilabius*
- 1b. Flowers small, less than 1.5 cm across; bracts obovate with broad, round apices; lip 1-ridged:
- 3a. Leaves 1.0-1.2 cm broad, linear-lanceolate, acuminate; side lobes of lip smooth; mid-lobe lanceolate, acuminate; ridge transverse, rectangular, terminating above the base of mid-lobe; column cylindric 2. *O. fusca*
- 3b. Leaves 2-4 cm broad, ovate-lanceolate, acute; side lobes of lip papillose; mid-lobe ovate-lanceolate, apiculate; ridge longi-tudinal, round, terminating below the base of mid-lobe; column sub-quadrate 1. *O. alba*
1. ***Otochilus alba*** Lindl., Gen. & Sp. Orch. 35. 1830; Hook. f., Fl. Brit. India 5 : 843. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 143. t. 200. 1898; Seidenf. in Bot. Tidskr. 71 : 10. t. 9. 1976.

Pseudobulbs 5-7 cm long, sub-cylindric. *Leaves* 10-20 x 2.5-4 cm, ovate-lanceolate, acute. *Inflorescence* 8-12 cm long. *Flowers* ca 1.5 cm across, white; *bracts* 1.3-1.4 cm long, pale brown, obovate; margins incurved; apex broad, round; *pedicelled ovary* 0.8-0.9 cm long, pale brown; *sepals* 0.7-0.8 x 0.3 cm, lanceolate, obtuse, sub-equal; laterals concave; *petals* 0.7-0.8 x 0.1 cm, filiform, acute; *lip* 1.0-1.1 cm white; side lobes small, rectangular, papillous outside; mid-lobe large, ovate-lanceolate, apiculate; ridge 1, longitudinal, rounded; *column* 0.8-0.9 cm long, white, quadrate; *pollinia* sub-globose.

Fl.: Nov. - Dec.

Nagaland: Kohima, Prain 29 (CAL); Pfitzner, Bahadur 55746; Pulebadze, Hynniewta 56263, Malhotra 75103; Tuli, Hynniewta 79919; Zunhebato, Hynniewta 80358, 80827, 80850 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); MYANMAR, CAMBODIA, CHINA, LAOS, NEPAL, THAILAND, VIETNAM.

2. *Otochilus fusca* Lindl., Gen. & Sp. Orch. 35. 1830; Hook. f., Fl. Brit. India 5 : 844. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 143. t. 199. 1898; Seidenf. in Bot. Tidsskr. 71: 8. t. 8. 1976. *O. lancifolia* Griff., Itin. Not. 69. 1848.

Pseudobulbs 3-6 cm long, cylindric or fusiform. *Leaves* 10-15 x 1.0-1.2 cm, linear-lanceolate, acuminate. *Inflorescence* 10-15 cm long. *Flowers* ca 1.5 cm across, white; *bracts* 1.2-1.3 cm long, pale brown, obovate; margins incurved; apex broad, round; *pedicelled ovary* 0.7-0.8 cm long, brownish; *sepals* 0.7-0.8 x 0.2 cm, lanceolate, acute or obtuse; *petals* 0.7-0.8 x 0.1 cm, filiform, acute or obtuse; *lip* 0.8-0.9 cm long, white, brownish pink at base; side lobes very small, sub-quadrate; apex erose; mid-lobe large, lanceolate, acuminate; ridge 1, rectangular; *column* 0.7-0.8 cm long, cylindric, brownish; *pollinia* cuneately oblong.

Fl.: Nov. - Dec.

Nagaland: Dimpapur, Hynniewta 74504; Medziphema, Hynniewta 74583; Pulebadze, Hynniewta 56260; Shamator, Hynniewta 80971; Tuli, Hynniewta 79929; Ungma, Hynniewta 79992; Zunhebato, Hynniewta 80371, 80834 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim, West Bengal); BHUTAN, MYANMAR, CAMBODIA, CHINA, LAOS, NEPAL, THAILAND, VIETNAM.

3. **Otochilus lancilabius** Seidenf. in Bot. Tidsskr. 71 : 13. t. 11. 1976.
O. porrecta auct. (non Lindl.): Hook. f., Fl. Brit. India 5 : 844. 1890, p.p.

Pseudobulbs 5-10 cm long, cylindric. *Leaves* 15-25 x 3-5 cm, ovate-lanceolate, acute. *Inflorescence* 10-16 cm long. *Flowers* ca 2.5 cm across, white; *bracts* 1.2-1.3 cm long, pale brown, ovate-lanceolate; margins incurved; apex narrow, triangular; *pedicelled ovary* 1.1-1.2 cm long, brown; *sepals* 1.2-1.3 x 0.3 cm, lanceolate, acute, sub-equal; laterals sub-falcate; *petals* 1.1-1.2 x 0.2 cm, linear, obtuse; *lip* 1.2-1.3 cm long, white, brownish pink; side lobes round, obtuse, entire; mid-lobe lanceolate, acuminate, ridges 3, equal *column* 1.1-1.2 cm long, brownish, sub-quadrate; *pollinia* globose.

Fl.: Sept. - Oct.

Nagaland: Kohima, Prain 57 (CAL); Tseminyu, Malhotra 75286 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim, Western Himalayas); BHUTAN, LAOS, NEPAL.

4. **Otochilus porrecta** Lindl., Gen. & Sp. Orch. 36. 1830; Hook. f., Fl. Brit. India 5 : 844. 1890; Seidenf. in Bot. Tidsskr. 71 : 10. t. 10. 1976 (non King & Pantl., 1898). *Tetrapeltis fragrans* Wall. ex Lindl. Bot. Reg. 18, sub t. 1522. 1822; *Otochilus latifolia* Griff., Notul. 3 : 279. 1848; *Coelogyne porrecta* (Lindl.) Reichb. f. in Walp. Ann. 6 : 236. 1861. *Otochilus fragrans* (Wall. ex Lindl.) Nichols, Dict. Gard. 2 : 534. 1886.

Pseudobulbs 5-10 cm long, cylindric. *Leaves* 15-25 x 3.5 - 5 cm, ovate-lanceolate, acute. *Inflorescence* 8-12 cm long. *Flowers* ca 2.5 cm across, white; *bracts* 1.9-2.0 cm long, pale brown, ovate-lanceolate; margins incurved; apex narrow triangular; *pedicelled ovary* 1.2-1.5 cm long, brown; *sepals* 1.2-1.3 x 0.3 cm, lanceolate, dorsal acute; laterals sub-falcate, obtuse; *petals* 1.0-1.1 x 0.2 cm, linear, acute or obtuse; *lip* 1.3 - 1.4 cm long,

white, brownish pink; side lobes sub-quadrate, obliquely truncate, erose; mid-lobe ovate-lanceolate apiculate; ridges 5, unequal, laciniate; *column* 1.1-1.2 cm long, brownish, sub-quadrate; *pollinia* globose.

Fl.: Oct. - Nov.

Nagaland: Jafu Hills, *Hynniewta* 56206; Kohima, *Hynniewta* 75103 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); MYANMAR, CAMBODIA, CHINA, LAOS, VIETNAM.

39. PANISEA (Lindl.) Steudel.

1a. Labellum obscurely trilobed, with two calli on hypochile ... 1. *P. apiculata*

1b. Labellum unlobed, with three calli on epichile ... 2. *P. tricallosa*

1. **Panisea apiculata** Lindl. *Fol. Orch. Panisea* 2. 1854; Hook.f. *Fl. Brit. India* 5: 703.1890; Seidenf. in *Bot. Tidsskr.* 70: 1975. *Coelogyne apiculata* (Lindl.) Reichb.f., in *Walp. Ann.* 6:225.1861.

Rhizomes slender. *Pseudobulbs* 1.0-2.5x1.7-1.4 cm, ovoid, oblique, caespitose, 1-2 rarely 3-leaved. *Leaves* petioled, 2-6x0.7-1.2 cm, ovate-lanceolate to oblong-lanceolate, acute, entire, midnerve prominent. *Inflorescence* proternathous, sheathed at base, short, 2-4-flowered; *bracts* ovate, acute 0.9x0.6 cm; *pedicelled ovary* 0.7-0.9 cm long, slender. *Flower* 0.8-1.1 cm across, white or greenish brown; *sepals* 1.1-1.3x0.4-0.6 cm, ovate-lanceolate, acute; *petals* 1.0-1.1x0.4-0.5 cm, ovate-lanceolate, acute; *lip* 0.9-1.0x0.4-0.5 cm, sigmoid at base, obscurely trilobed, oblong, retuse, apiculate, with two entire calli at hypochile, 5-nerved; *column* 3x2 mm, curved, concave, slightly winged towards apex, trilobed at apex; *pollinia* 0.5 mm, in two pairs, oblong.

Fl.: Oct-Nov.

Nagaland: Tuensang, *Hynniewta* 80535 (ASSAM)

Dist.: INDIA (Nagaland); MYANMAR, THAILAND.

2. **Panisea tricallosa** Rolfe in Kew Bull. 148. 1901; Seidenf. & Smitnd. Orch. Thailand, 2(1) : 135. t. 103. 1959. **Fig. 71**

Pseudobulbs 5-7 mm across, sub orbicular. Leaves 5-7 x 1-1.5 cm lanceolate to ovate lanceolate, acute. *Inflorescence* 2-3.5 cm long, sub-erect. *Flowers* ca 3.0 cm across, greenish yellow; *bracts* 5-6 mm long, ovate, acute, pale brown; *pedicelled ovary* 1.5-2.0 cm long, greenish yellow; *sepals* ca 1.5x0.8 cm, oblong, acute; laterals sub-falcate; *petals* ca 1.1 - x 0.4 cm, linear-oblong, acute; *lip* 1.8-2.0 cm long, greenish yellow, lanceolate-oblong; hypochile narrow, sub-saccate, 2 calli at base; epichile broad, 3 calli in the middle; apex obcordate, acute, mucronulate; *column* ca 1 cm long, light yellow; *pollinia* quadrately oblong.

Fl. : Feb. - Mar.

Nagaland: Jafu Hills, *Hynniewta* 79504; Sangsangu, *Hynniewta* 80923 (ASSAM).

Distr.: INDIA (Nagaland, Sikkim); BHUTAN, CAMBODIA, LAOS, THAILAND, VIETNAM.

40. PAPHIOPEDILUM Pfitz.

Paphiopedilum hirsutissimum (Lindl. ex Hook.) Stein, Orchid. 470. 1892; Seidenf. in Bot. Tidsskr. 70 : 64. t. 1. 1975. *Cypripedium hirsutissimum* Lindl. ex Hook., Bot. Mag. t. 4990. 1857; Hook. f., Fl. Brit. India 6 : 171. 1890.

Stems short, hidden by leaf bases. *Leaves* 25-40 x 2-3 cm, green, linear-oblong, acute. *Scapes* 12-20 cm long, angled, hairy. *Flowers* 7-8 cm across, very showy, greenish-purplish; *bracts* 2-2.5 cm long, greenish-brown, ovate, acute, hairy; *ovary* ca 8 cm long, cylindrical; *sepals* unequal; dorsal large, 4.5 - 5 x 3 - 3.5 cm, greenish-purple, purple spotted at base, orbicular-ovate, obtuse; laterals ovate, obtuse, hairy, firmly connate; *petals* 6-7 x 2-2.5 cm, greenish purple, purple spotted at base, spathulate, hairy, recurved, obtuse; margin undulate; *lip* 4-5 cm long, greenish purple, deep purple spotted; side lobes small, truncate; mid-lobe oblong; apex conical; *column* ca 5 mm long, greenish-purple; *staminode* quadrate, greenish purple; apex undulate, greenish white; *anther* sub-globose.

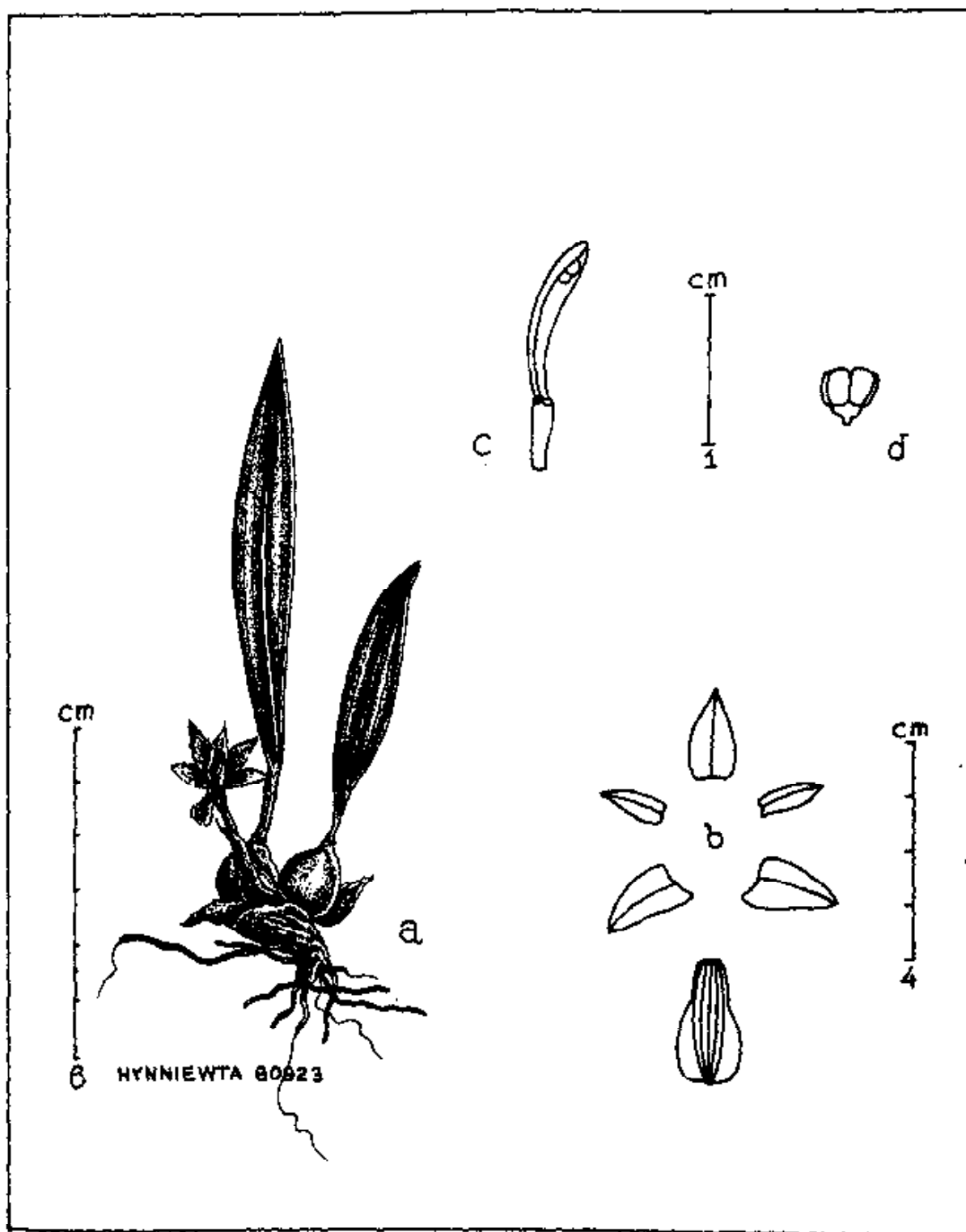


Fig. 71. *Panisea tricallosa* Rolfe :
 a. habit; b. floral parts; c. column; d. pollinia.

Fl.: Apr.

Nagaland: Tisu Valley, C.A. Atonor s.n. Acc. Nos. 36358, 36359; Tuensang, Hynniewta 80999 (ASSAM).

Distr.: INDIA (N. E. India); MYANMAR, JAVA, THAILAND, VIETNAM

41. PAPHILIONANTHE Schltr.

Paphilionanthe teres (Roxb.) Schltr. *Orchis*, 9 : 78. 1915 *Dendrobium teres* Hook., *Fl. Ind.* 3 : 621. 1832. *Vanda teres* (Roxb.) Lindl., *Gen. & Sp. Orch.* 217. 1833; *Bot. Mag.* t. 4114. 1845; Hook. f., *Fl. Brit. India* 6 : 49. 1890; King & Pantl. in *Ann. Roy. Bot. Gard. Calc.* 8 : 214. t. 285. 1898.

Stems 45-100 cm high, slender, sub-scandent. *Leaves* 8-15 x 0.4-0.6 cm, straight or arched, obtuse. *Inflorescence* few flowered, lax, racemose, 10-15 cm long, arched. *Flowers* 7-8 cm across, pink; *bracts* 3-4 mm long, brownish green; *pedicelled ovary* 2.2 - 2.5 cm long, pinkish white; *sepals* 3.3 - 3.5 x 1.8-2.0 cm, oblong or obovate, obtuse, laterals sub-falcate, moderately spreading, margins slightly undulate; *petals* ca 4.0 x 3.5 cm, sub-orbicular; *lip* 4.5 - 5 cm long, pale pink with crimson spotted lines, side lobes round, mid-lobe obovate; lobules large, deep pink, sub-clavate; disc smooth; *column* 1-1.2 cm long, pinkish white, pubescent in front; foot short; *pollinia* broadly ovoid.

Fl.: Feb. - Mar.

Nagaland: Dimapur, Hynniewta 79501; Mon, Hynniewta 79915; Rangapahar, Srinivasan 22003 (ASSAM).

Distr.: INDIA (N. E. India, Andaman & Nicobar Islands, Sikkim, West Bengal); BANGLADESH, BHUTAN, MYANMAR, CAMBODIA, JAVA, LAOS, MALAYA, THAILAND, VIETNAM.

42. PECTEILIS Rafin.

Pecteilis susannae (Linn.) Rafin. *Fl. Tellur.* 2 : 38. 1836 ('Susanna'); Seidenf. in *Dansk Bot. Ark.* 31(3) : 22. f. 8. 1977. *Orchis susannae*

Linn., Sp. Pl. 939. 1753. *Platanthera susannae* (Linn.) Lindl., Gen. & Sp. Orch. 295. 1835. *Habenaria susannae* (Linn.) R. Br., Prodr. 312. 1810; Hook. f., Fl. Brit. India 6 : 137. 1890 p.p.

Stems 1-1.5 m high, erect, many-leaved. *Leaves* 5-15 x 2-3.5 cm, imbricating, ovate-oblong, acute. *Inflorescence* few-flowered, 5-10 cm long. *Flowers* 8-10 cm across, white; *bracts* 3-5 cm long, foliaceous, pale brown, cymbiform, acute; *pedicelled ovary* 4-5 cm long, twisted, white; *sepals* 4-5 cm long, sub-equal; laterals broadly ovate or sub-quadrate, acute, slightly deflexed; dorsal orbicular; *petals* 1-1.2 cm long, lanceolate, acuminate; *lip* ca 5 cm long, deflexed 3-lobed, side lobes large, truncate, laciniate, mid-lobe small, linear, obtuse; *spur* 10-12 cm long, white, narrower towards the tips; *pollinia* linear.

Fl.: Sept. - Oct.

Nagaland: Chakabama, Hynniewta 80205 (ASSAM)

Distr.: INDIA (Arunachal Pradesh, Meghalaya, Nagaland, S. India) AMBON, BORNEO, MYANMAR, CAMBODIA, CELEBES, CERAM, JAVA, LAOS, MALAYA, THAILAND, TIMOR, VIETNAM.

43. PELATANThERIA Ridl.

Pelatantheria insectifer (Reichb. f.) Ridl. in J. Linn. Soc. 32 : 373. 1896. *Sarcanthus insectifer* Reichb. f. in Bot. Zeit. 159. 1857; Hook. f., Fl. Brit. India, 6 : 68. 1890; Ic. Pl. t. 22. 1893. Fig. 72

Stems 20-35 cm high, stout, scandent, many-leaved. *Leaves* 3-8 x 1.2-2.0 cm, oblong; apex equally or unequally obtusely 2-lobed, sometimes with a caudate or mucronate tip in between. *Inflorescence* few-flowered, dense, 2-3 cm long, sub-erect. *Flowers* ca 0.8 cm across, yellow pale red striped; *bracts* ca 2 mm long, pale brown; *pedicelled ovary* 0.4-0.5 cm long, greenish yellow; *sepals* ca 3.5 x 1.5 mm, oblong; laterals obtuse; dorsal slightly concave, shortly acute; *petals* ca 2.5 x 1.0 mm, linear-oblong, acute; *lip* 5-6 mm long, purplish white; side lobes small, rounded, greenish yellow with intra marginal white band; mid-lobe large, purplish, triangular, acute; *spur* ca 4 mm long, greenish-yellow; callus sub-rectangular, bilobed at base, glabrous; *column* ca 2 mm long, greenish yellow; *pollinia* globose.

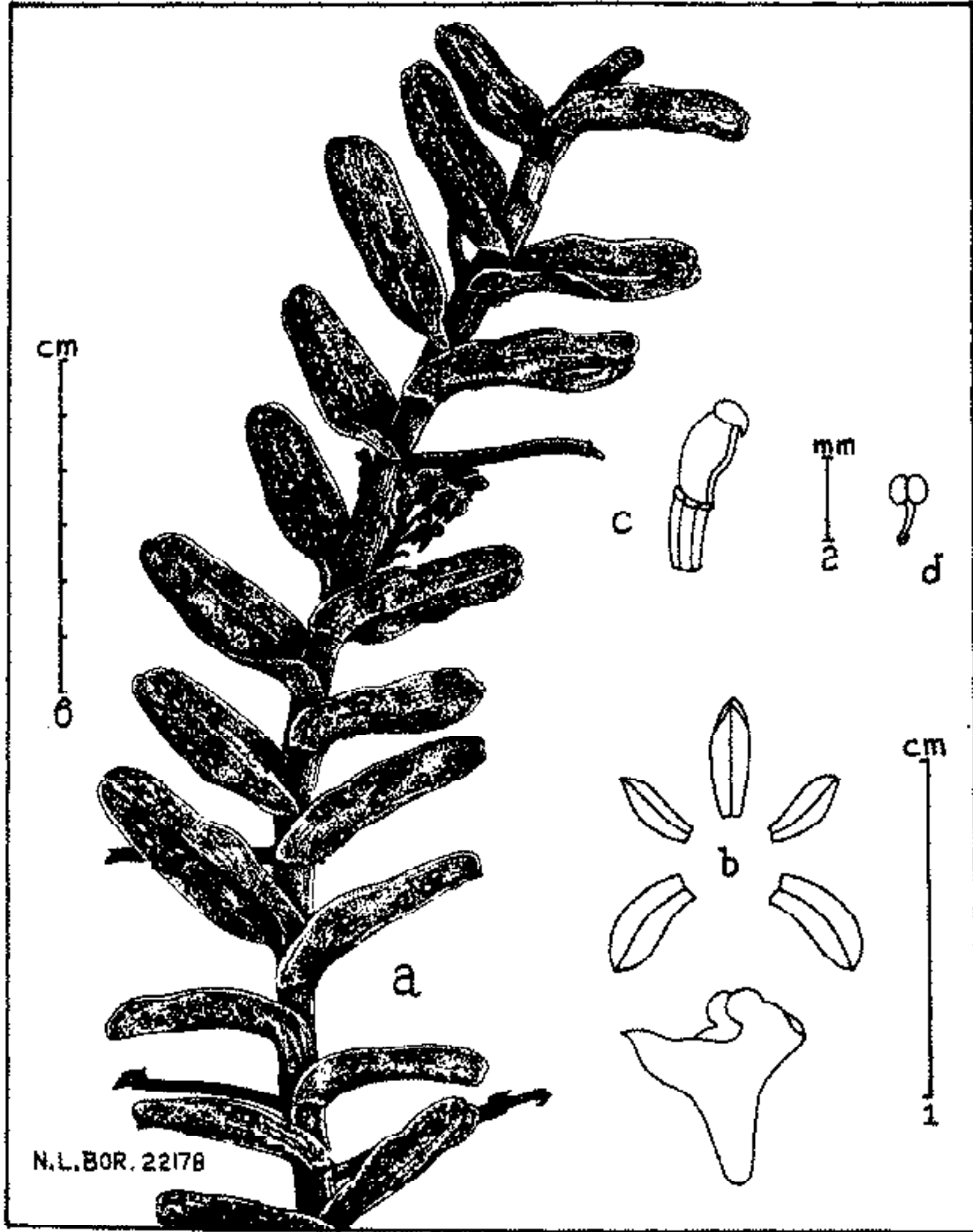


Fig. 72. *Pelatantheria insectifer* (Reichb. f.) Ridl.:
a. habit; b. floralparts; c. column; d. pollinia.

Fl.: July - Aug.

Nagaland: Kohima, *Hynniewta* 80813; Jafu Hills, *Bor* 22178, *Hynniewta* 80824 (ASSAM).

Distr.: INDIA (Assam, Meghalaya, Nagaland); MYANMAR.

44. PERISTYLUS Bl.

- 1a. Stems filiform; leaves linear acuminate4. *P. manni*
- 1b. Stems thick; leaves lanceolate to ovate-elliptic, acute or obtuse;
 - 2a. Lip with a longitudinal round callus; mid-lobe shorter than the side lobes 3. *P. lacertiferus*
 - 2b. Lip without any callus; mid-lobe as long as or longer than the side lobes:
 - 3a. Flowers creamy white; lip with a longitudinal narrow triangular protuberance touching the mouth of spur; mid-lobe of lip as long as the side lobes 2. *P. goodyeroides*
 - 3b. Flowers greenish; lip without any protuberance; mid-lobe of lip longer than the side-lobes.
 - 4a. Sepals with incurved margins; lip papillous at base 1. *P. affinis*
 - 4b. Sepals with flat margins; lip glabrous at base 5. *P. prainii*

1. ***Peristylus affinis*** (D. Don) Seidenf. Dansk Bot. Ark. 31(3) : 48. f. 23. 1977. *Habenaria affinis* D. Don, Prodr. Fl. Nepal. 25. 1825. *H. goodyeroides auct.* (non D. Don, 1825): Royle, IH. Him. Bot. t. 87. f. 2. 1839. *H. goodyeroides* D. Don var. *affinis* King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 327. t. 430. 1898.

Stems 10-18 cm high slender, erect, few-leaved. *Leaves* 3-7 x 1-1.5 cm, oblong-lanceolate, acute. *Inflorescence* many-flowered, dense, 10-15 cm long, erect or slightly curved. *Flowered* ca 6 mm across, pale creamish green; *bracts* 0.6-0.7 cm long, linear-lanceolate, acuminate, green; *ovary* sessile, 0.7-0.8 cm long, greenish white; *sepals* ca 3 mm long, obtuse,

concave; dorsal *ca* 2 mm broad, ovate; laterals *ca* 1.5 mm broad, ovate-lanceolate; margins infolded; *petals ca* 3 x 2 mm, oblique, sub-trapeziform, obtuse; *lip ca* 4 mm long; side lobes linear-oblong, acute or obtuse; mid-lobe broader, oblong, obtuse; disc gibbous at base, papillous in front of entrance to spur; *spur ca* 1.5 mm long, pale green, scroliform; *column ca* 1 mm long, pale green; *pollinia* pyriform.

Fl.: Jun.

Nagaland: Kohima, *Hynniewta* 80809 (ASSAM,) *Prain* 66 (CAL).

Distr.: INDIA (N.E. India, Sikkim, Western Himalayas); CHINA, LAOS, NEPAL, THAILAND.

2. *Peristylus goodyeroides* (D. Don) Lindl., *Gen. & Sp. Orch.* 299. 1835; Sant. & Kapad. *Orch. Bombay*, 52. 1966; Seidenf. *Dansk Bot. Ark.* 31 (3) : 53. f. 25. 1977. *Habenaria goodyeroides* D. Don, *Prodr. Fl. Nepal.* 25. 1825; Hook. f., *Fl. Brit. India* 6 : 161. 1890 (*excl. syn. P. grandis* Bl.); King & Pantl. in *Ann. Roy. Bot. Gard. Calc.* 8 : 326. t. 430. 1898.

Stems 20-35 cm high, stout, erect or slightly curved, few-leaved. *Leaves* 5-12 x 2-5 cm, ovate or ovate-elliptic., acute. *Inflorescence* many-flowered, dense, 15-30 cm long, erect or slightly curved. *Flowers ca* 1.5 mm across, creamy white; *bracts* 0.8-0.9 cm long, linear-lanceolate, acuminate, green; *ovary* sessile, 0.9-1.0 cm long, creamy white; *sepals* 0.7-0.8 cm long, sub-equal; dorsal *ca* 4 mm broad, oblong, concave, obtuse, laterals *ca* 3 mm broad, ovate-lanceolate, acute, margins inrolled; *petals* 0.6-0.7 x 0.5 cm, trapeziform, obtuse; *lip* 5-6 mm long,; side lobes triangular, falcate, acute, mid-lobe triangular, obtuse; disc with a longitudinal narrow triangular protuberance touching the mouth of spur; *spur ca* 3 mm long, creamy, scrotiform; *column ca* 3 mm long, white; *pollinia* broadly pyriform.

Fl.: Jun.

Nagaland: Khonoma, *Kataki* 65910; Kiphore, *Hynniewta* 80979; Wokha, *Hynniewta* 80775 (ASSAM).

Distr.: Throught India; MYANMAR, NEPAL, widespread and common from North Western Himalayas to CHINA and the PHILIPPINES and through MALAYA & INDONESIA to NEW GUINEA.

3. **Peristylus lacertiferus** (Lindl.) J. J. Sm. in Bull. Buitenz. ser. 3, 9 : 23. 1927; Seidenf. Dansk Bot. Ark. 31 (3) : 58. f. 29. 1977. *Coeloglossum lacertiferum* Lindl., Gen. & Sp. Orch. 302. 1835. *Habenaria lacertifera* (Lindl.) Benth., Fl. Hongk. 362. 1861; Hook. f., Fl. Brit. India 6 : 163. 1890 (incl. var. *robusta*). **Fig. 73**

Stems 18-35 cm high, erect, slender, few-leaved. *Leaves* 5-10 x 2-4 cm, ovate or oblong, acute or obtuse. *Inflorescence* many-flowered, lax, 15-20 cm long, erect. *Flowers* ca 5 mm across, greenish white; *bracts* 0.5-0.6 cm long, pale green, lanceolate, acuminate; *ovary* sessile, 0.6-0.7 cm long, green, white; *sepals* ca 2.5 x 1.5 mm, oblong, obtuse; *laterals* sub-falcate; *petals* ca 2.5 x 1 mm, linear-oblong, obtuse, connate with the dorsal sepal to form a hood; *lip* ca 3.5 mm long; side lobes narrowly triangular, acuminate; mid-lobe shorter and broader, broadly triangular, obtuse, disc with a longitudinal, round callus; *spur* ca 2 mm long, pale green, dauciform, apiculate; *column* ca 1 mm long, pale green; *pollinia* pyriform.

Fl.: Jun.

Nagaland: Kohima, Prain 43, 64 (CAL).

Distr.: INDIA (N.E. India, Sikkim); MYANMAR, CHINA, JAPAN, JAVA, MALAYA, SUMATRA, TAIWAN, THAILAND.

4. **Peristylus mannii** (Reichb. f.) Mukherjee in Notes Bot. Gard. Edinburgh, 21(3) : 153. 1953; Seidenf. in Dansk Bot. Ark. 31(3) : 45. f. 19. 1977. *Coeloglossum mannii* Reichb. f., Linnaea 41 : 54. 1877. *Habenaria gracillima* Hook. f., Fl. Brit. India 6 : 163. 1890. *Platanthera mannii* (Reichb. f.) Schltr. Fedde Repert. Beih. 4 : 114. 1919. **Fig. 74**

Stems 15-35 cm high, slender, filiform, erect, few-leaved. *Leaves* 2.5-7.5 x 0.3-0.5 cm, grass-like, linear, acute or acuminate. *Inflorescence* many-flowered, lax, 10-20 cm long, erect. *Flowers* ca 4 mm across, green; *bracts* 0.2-0.3 cm long, ovate, acute, green; *ovary* sessile, 0.5-0.7 cm long, pale green; *sepals* ca 2 mm long, obtuse, sub-equal, dorsal ca 1.5 mm

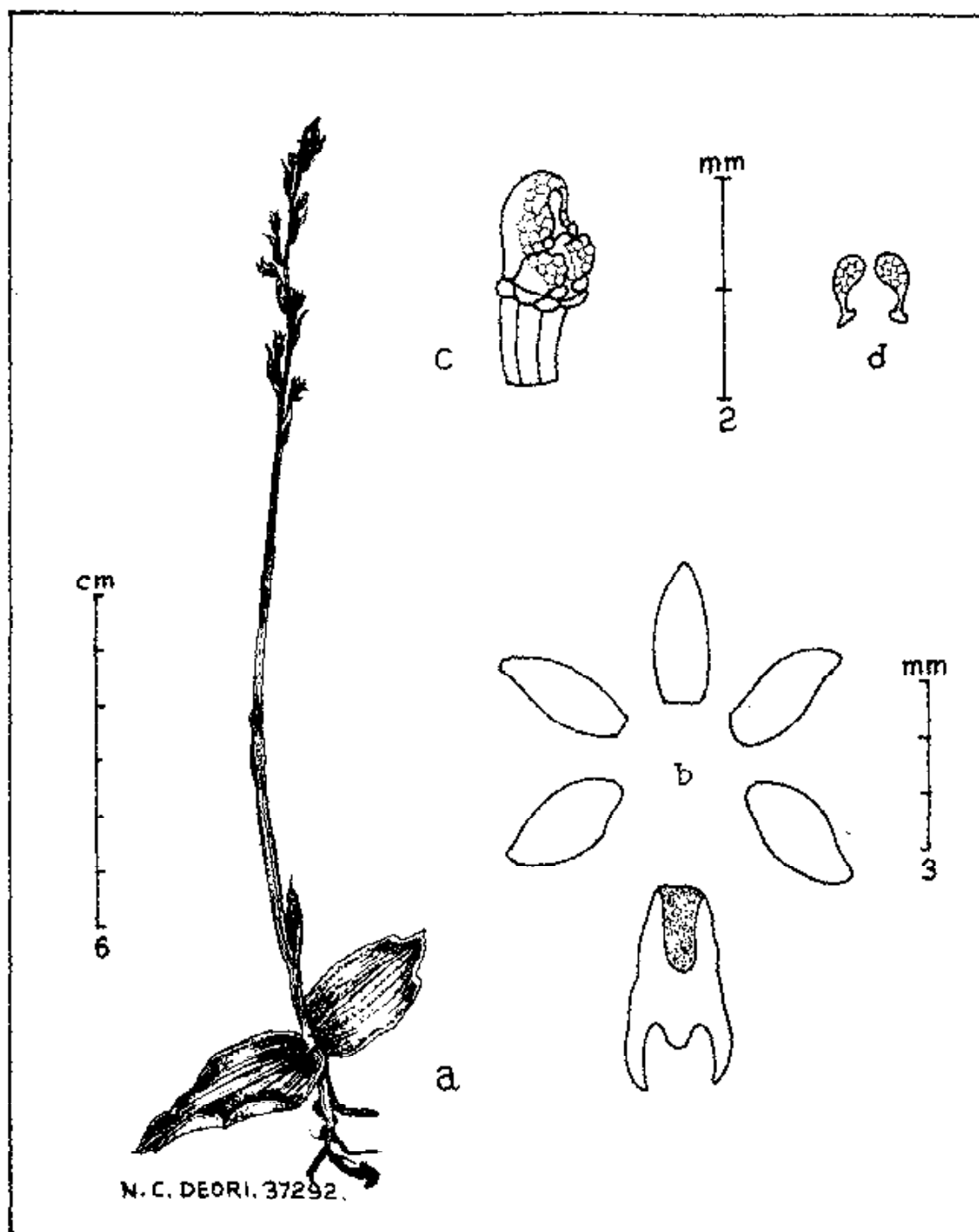


Fig.73. *Peristylus lacertiferus* (Lindl.) J.J. Sm.:
a. habit; b. floral parts; c. column; d. pollinia.

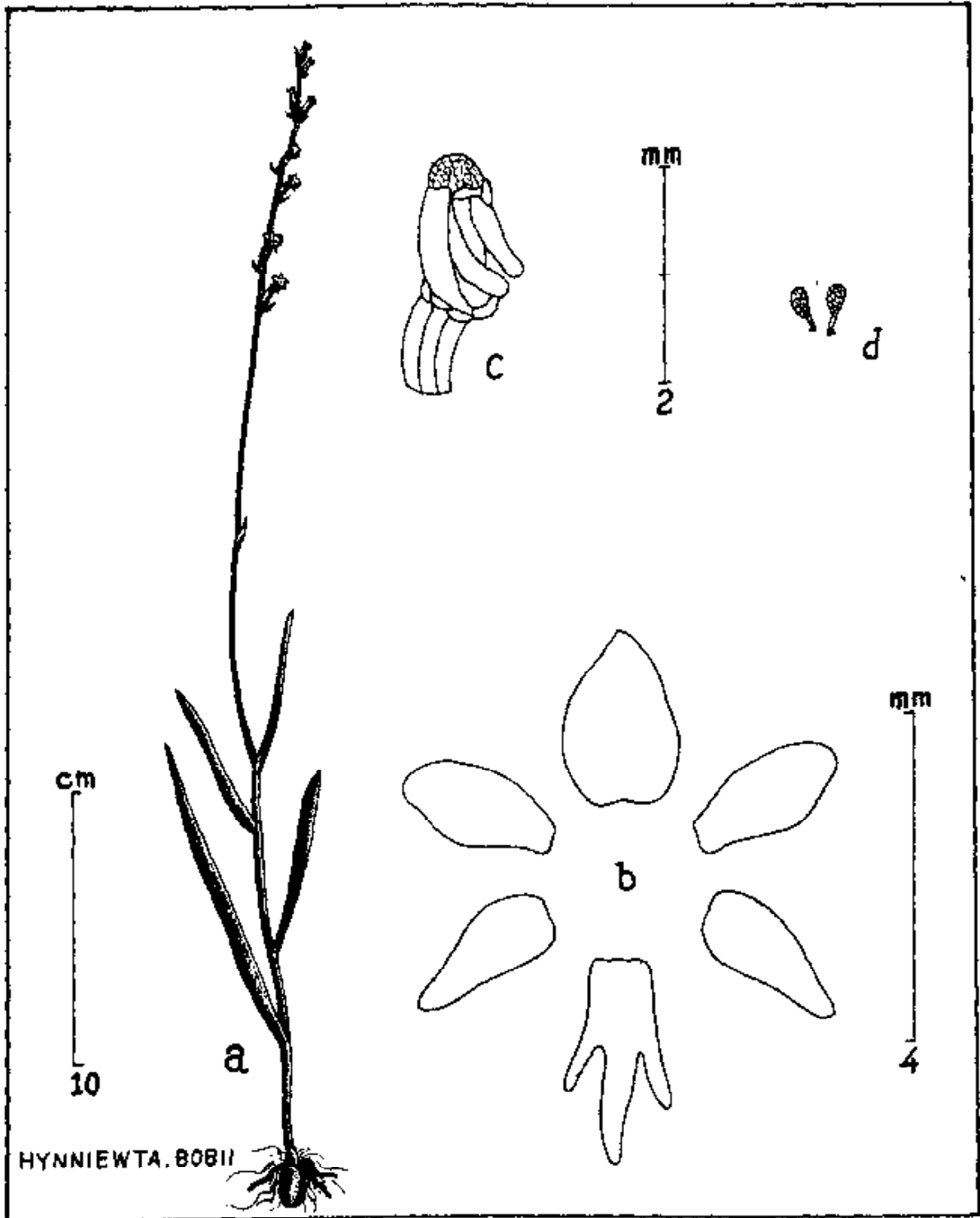


Fig. 74. *Peristylus mannii* (Reichb. f.) Mukherjee:
 a. habit; b. floral parts; c. column; d. pollinia.

broad, oblong-elliptic, concave, laterals *ca* 1 mm broad, lanceolate-oblong, sub-falcate, obtuse; *petals ca* 2 x 1 mm, connate with the dorsal sepal to form a hood, ovate, obtuse; *lip ca* 2.5 mm long, side lobes linear-oblong, obtuse, mid-lobe broader and longer, oblong, obtuse; *spur ca* 1 mm long, green, scrotiform; *column ca* 1 mm long, green; *pollinia* subglobose.

Fl.: Jul. - Aug.

Nagaland: Jafu Hills, *Hynniewta* 56210 (ASSAM); Kohima, *Prain* 63 (CAL); Peren, *Hynniewta* 80811 (ASSAM).

Distr.: INDIA (N. E. India); CHINA.

5. ***Peristylus prainii*** (Hook. f.) Krzl. *Orch. Gen. & Sp.* 514. 1901; Seidenf, *Dansk Bot. Ark.* 31 (3) : 48. f. 22. 1977. *Habenaria prainii* Hook. f., *Fl. Brit. India* 6 : 159. 1890; King & Pantl. in *Ann. Roy. Bot. Gard. Calc.* 8 : 329. t. 431. 1898.

Stems 10-15 cm high, slender, erect, few-leaved. *Leaves* 3-7 x 1.0-2.0 cm, ovate-oblong, acute or obtuse. *Inflorescence* many-flowered, lax, 8-15 cm long, erect. *Flowers ca* 6 mm across, greenish brown; *bracts* 0.5-0.6 cm long, lanceolate, acuminate, green; *ovary* sessile, 0.5 - 0.6 cm long, greenish brown; *sepals ca* 3 mm long, obtuse, sub-equal; dorsal *ca* 2 x 1.5 mm broad, elliptic; laterals *ca* 1.5 mm broad, oblong; *petals ca* 2 x 1.5 mm, broadly ovate-elliptic, gibbous in the middle, obtuse; *lip ca* 3.5 mm long; side lobes oblong, obtuse; mid-lobe broadly oblong, obtuse; *spur ca* 2 mm long, green; *column ca* 1 mm long, brownish; *pollinia* obovoid.

Fl.: Aug.

Nagaland: Kohima, *Prain* 42 (CAL).

Distr.: INDIA (Assam, Nagaland, Sikkim, West Bengal); MYANMAR, CAMBODIA, LAOS, THAILAND, VIETNAM.

45. PHAIUS Lour.

- 1a. Inflorescence dense; flowers *ca* 6 cm or less across; sepals and petals yellowish, green tipped, erecto-patent; lip apex retuse

....1. *P. flavus*

- 1b. Inflorescence lax; flowers ca 12 cm or more across; sepals and petals whitish above, brownish beneath, spreading; lip apex acute or acuminate2. *P. tancarvilleae*

1. ***Phaius flavus*** (Bl.) Lindl., Gen. & Sp. Orch. 128. 1831; Seidenf. Smitnd. Orch. Thailand, 3 : 328. 1961. *Limodorum flavum* Bl., Bijdr. 375. 1825. *P. maculatus* Lindl., Gen. & Sp. Orch. 127. 1831; Hook. f., Fl. Brit. India 5 : 817. 1890 et 6: 192. 1890. *Bletia woodfordii* Hook., Bot. Mag. 54. t. 2719 1827; Hook. f., l.c. 5 : 817. 1890.

Pseudobulbs 8-13 x 5-9 cm, ovoid-cylindric. *Stems* 28-50 cm high. *Leaves* 20-40 x 7-10 cm, elliptic-lanceolate, acuminate. *Inflorescence* 25-30 cm long, dense. *Flowers* ca 6 cm across, yellow, green tipped; *bracts* 3-3.5 cm long, pale green; *pedicelled ovary* 2-4.0 cm long, greenish yellow; *sepals* ca 3 x 1.2 cm, oblong-spathulate, obtuse; *petals* ca 2.8 x 1.0 cm, linear-oblong, spathulate, obtuse or apiculate; *lip* ca 3.0 cm long, yellow, reddish blotched, with orange brown apex; side lobes round; mid-lobe conchiform, retuse; margin corrugated; *spur* ca 1.5 cm long, yellow infundibuliform, obtuse; *column* ca 2 m long, without foot yellow, pubescent in front; *pollinia* obovate.

Fl.: Mar. - Apr.

Nagaland: Akulato, Hynniewta 80877; Kohima, Hynniewta 74909 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); CAMBODIA, CHINA, JAPAN, LAOS, MALAYA, NEPAL, THAILAND, VIETNAM.

2. ***Phaius tancarvilleae*** (Banks ex L. 'Herit) Bl. in Mus. Bot. Lygd. 2 : 177. 1856 (*tankervillii*) *Limodorum tancarvilleae* Banks ex L. Herit., Sert. Angl. 28 1789. *Phaius wallichii* Lindl. in Wall. Pl. As. Rar. 2: 46. t. 158. 1831; Hook. f., Fl. Brit. India 5 : 816. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 108. t. 150. 1898.

Pseudobulbs 8-12 x 4-6 cm, conical or oblong. *Stems* 30-50 cm high. *Leaves* 25-40 x 10-15 cm, elliptic-lanceolate, acuminate. *Inflorescence* 50-75 cm long, lax. *Flowers* ca 12 cm across, whitish brown; *bracts* 5-6 cm long, dirty white or bluish white; *pedicelled ovary* 4.5 - 5.5 cm long, bluish green; *sepals* and *petals* whitish above, brownish beneath, lanceolate,

acuminate; *sepals* ca 6 x 1.2-1.5 cm; *petals* ca 5.5 x 0.8-1.0 cm; *lip* ca 5 cm long, light brown, white edged; side lobes round; mid-lobe conchiform, more or less ovate, acute or acuminate; margins erose, undulate; mouth white, tube yellowish brown upper surface corrugated; spur ca 1.5 cm long, light brown, infundibuliform, curved; apex retuse; *column* ca 2.5 cm long with short foot, light brown, glabrous; foot very short; *pollinia* dimediate ovate.

Fl.: Apr. - May.

Nagaland: Koio, *Hynniewta* 80714 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); MYANMAR, SRI LANKA, MALAYA, THAILAND.

46. PHOLIDOTA Lindl.

- 1a. Stems 50 cm or more long, articulate; inflorescence terminal to pseudobulb:
- 2a. Flowers ca 1.8 cm across; floral bracts rhomboid-ovate, acute equap to or longer than the flower; dorsal sepal elliptic, obtuse1. *P. articulata*
- 2b. Flowers ca 1.0 cm across; floral bracts sub-orbicular, shorter than the flower; dorsal sepal sub-orbicular4. *P. griffithii*
- 1b. Stems 10 cm or less long, not articulate; inflorescence from the rhizome or lateral to pseudobulb:
- 3a. Inflorescence few-flowered from the rhizome, much shorter than the leaves; lip apex trilobulate7. *P. protracta*
- 3b. Inflorescence many-flowered, lateral to pseudobulbs; as long as or longer than the leaves; lip apex entire or bilobulate:
- 4a. Pseudobulbs clustered, 1-leaved; lip apex bilobulate:
- 5a. Inflorescence distichous; bracts sub-orbicular, persistent; flowers light brown:
- 6a. Inflorescence long5. *P. imbricata* var. *imbricata*
- 6b. Inflorescence sessile or very short-peduncled6. *P. imbricata* var. *sessilis*

- 5b. Inflorescence not distichous; bracts ovate, acute, deciduous; flowers whitish 2. *P. calceata*
- 4b. Pseudobulbs distant on the rhizome, 2-leaved; lip apex entire:
- 7a. Inflorescence distichous; bracts ovate, persistent; flowers brownish green; lip 3-lobed 8. *P. undulata*
- 7b. Inflorescence not distichous; bracts linear, deciduous; flowers white; lip entire, not lobed 3. *P. convallariae*
1. ***Pholidota articulata*** Lindl., Gen. & Sp. Orch. 38. 1830; Hook. f., Fl. Brit. India 5 : 844. 1890; King & Pantl. in Ann. Roy. Bot Gard. Calc. 8 : 146. t. 205. 1898. *P. khasiana* Reichb. f. in Bonplandia, 4 : 329. 1856.

Stems 50-100 cm long, creeping, branched, pendulous, articulate. *Pseudobulbs* 6-10 cm high, terete, 2-leaved. *Leaves* 7-12 x 2.3-4 cm, oblong-lanceolate or elliptic - lanceolate, acute. *Inflorescence* many-flowered lax, 10-15 cm long, drooping. *Flowers* ca 1.8 cm across, white, orange tinged; *bracts* 1.2-1.5 cm long, light brown, rhombid-ovate, acute, convolute, deciduous; *pedicelled ovary* 3-4 mm long, pale green; *sepals* ca 0.9 cm long, sub-equal; dorsal ca 0.6 cm broad, ovate, obtuse; laterals ca 0.5 cm broad, ovate, acute, keeled; *petals* ca 0.7 x 0.3 cm, linear-oblong, obtuse; *lip* 0.8-0.9 cm long, white, cymbiform, 3-lobed; side lobes round; mid-lobe transversely oblong; base infolded; apex 2-lobulate; disc white, orange spotted; lamellae 5; *column* ca 4 mm long, with very short foot, whitish; *pollinia* cub-globose.

Fl.: May - Jun

Nagaland: Khonoma, Katakai 65906; Kohima, Hynniewta 81800, Katakai 65906 (ASSAM), Prain 52 (CAL); Tseminyu, Hynniewta 56220, 80722; Tuensang, Hynniewta 80702; Wokha, Hynniewta 80744; Zunhebato, Hynniewta 80357, 80828 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN, MYANMAR, CAMBODIA, JAVA, LAOS, MALAYA, THAILAND, VIETNAM.

2. ***Pholidota calceata*** Reichb. f. in Walp. Ann. 6: 238. 1861.; Hook. f. Ic. Pl. t. 1876. 1889; Fl. Brit. India 5: 846. 1890. Fig. 75

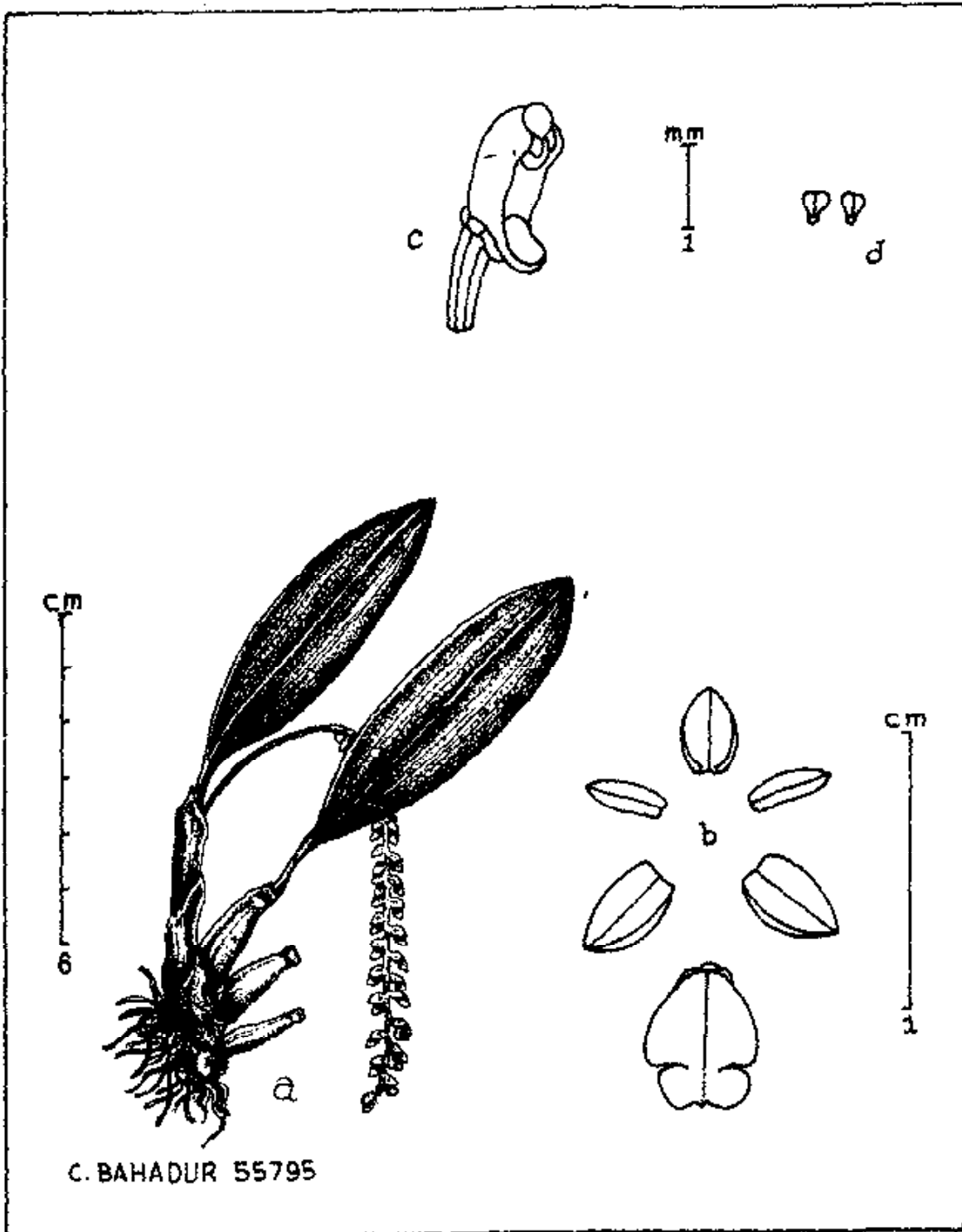


Fig. 75. *Pholidota calceata* Reichb. f. :
 a. habit; b. floral parts; c. column; d. pollinia.

Pseudobulbs 2.5-3.0 cm high, narrowly ovoid to fusiform, 1-leaved. *Leaves* 6-10 x 1-1.5 cm, linear-lanceolate, acute. *Inflorescence* many-flowered, dense, 10-15 cm long, drooping. *Flowers* ca 0.8 cm across, whitish; *bracts* 3-4 mm long, dirty green, ovate, acute, deciduous; *pedicelled ovary* ca 2 mm long, whitish; *sepals* ca 4 x 2.5 mm, ovate-oblong, obtuse, concave; *petals* ca 4 x 2 mm, linear-oblong, acute, sometimes falcate; *lip* 0.4- 0.5 cm long, cymbiform in its lower half, 3-lobed; side lobes rounded; mid-lobe broadly obovate, reflexed; apex emarginate, 2-lobulate; *column* ca 2 mm long, whitish; *pollinia* sub-globose.

Fl.: Jul.- Aug.

Nagaland: Pfitzner, *Bahadur* 55795; Phek, *Hynniewta* 80920; Tseminyu, *Hynniewta* 56078 (ASSAM).

Distr.: N. E. India.

3. ***Pholidota convallariae*** (Reichb. f.) Hook. f. Ic. Pl. t. 1880. 1889; Fl. Brit. India 5 : 846. 1890. *Coelogyne convallariae* Reichb. f. in Flora, 277. 1872. **Fig. 76**

Pseudobulbs 2.5 - 4 cm high, ovoid or narrowly ovoid, 2-leaved. *Leaves* 20-25 x 1.2 - 1.5 cm, linear to linear-lanceolate, acute. *Inflorescence* many-flowered, dense, 10-15 cm long, erect. *Flowers* 1.0 cm across, white; *bracts* 0.5-0.6 cm long, pale brown, linear, acute, deciduous; *pedicelled ovary* 0.5-0.8 cm long, white; *sepals* and *petals* ca 0.5 cm long, acute; *sepals* ca 2.5 mm broad; dorsal oblong-lanceolate; laterals oblong; *petals* ca 3 mm broad, elliptic; *lip* ca 0.4 mm long, white, cymbiform, sub-orbicular; apex retuse; *column* ca 4 mm long, white; *pollinia* sub-globose.

Fl.: Apr, - May.

Nagaland: Peren, *Hynniewta* 80996; Pulebadze, *Hynniewta* 56299 (ASSAM).

Distr.: INDIA (N. E. India); MYANMAR, CAMBODIA, JAVA, LAOS, VIETNAM.

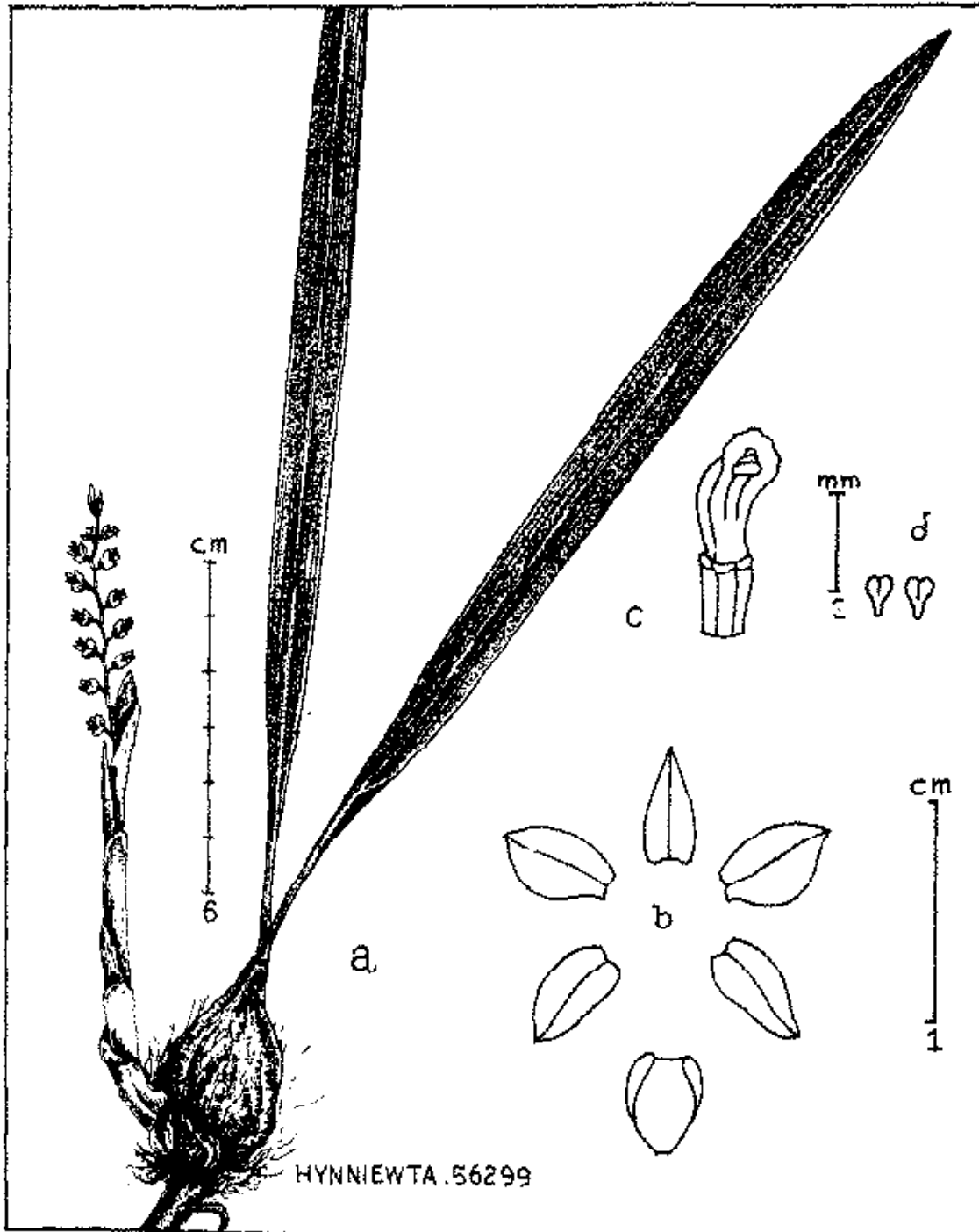


Fig. 76. *Pholidota convallariae* (Reichb. f.) Hook. f. :
a. habit; b. floral parts; c. column; d. pollinia.

4. **Pholidota griffithii** Hook. f., Ic. Pl. t. 1881 1889; Fl. Brit. India 5: 845. 1890; Seidenf. & Smitnd. Orch. Thailand, 2(1) : 140. 1959. *P. articulata* var. *griffithii* (Hook. f.) King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 147. 1898. **Fig. 77**

This can be easily distinguished from *P. articulata* Lindl. by its smaller flowers, ca 1.0 cm across or less, sub-orbicular floral bracts about half as long as the flowers; dorsal sepal sub-orbicular.

Fl.: May Jun.

Nagaland: Dimapur, *Hynniewta* 74599; Tseminyu, *Hynniewta* 56211 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN, CAMBODIA, LAOS, THAILAND, VIETNAM.

5. **Pholidota imbricata** (Roxb.) Lindl. in Hook., Exot. Fl. 2. t. 138. 1825; Hook. f., Fl. Brit. India 5 : 845. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 144. t. 201. 1898. *Cymbidium imbricatum* Roxb., Fl. Ind. 3 : 40. 1832. *Pholidota pallida* Lindl. in Bot. Reg. t. 1777. 1836. **Fig. 78**

Pseudobulbs 3-6 cm high, narrowly ovoid to cylindric, 1-leaved. *Leaves* 15-20 x 3 - 5 cm, elliptic-oblongate, obtuse. *Inflorescence* long or short peduncled or completely sessile; many-flowered, dense, 12-15 cm long, distichous, drooping. *Flowers* ca 1.0 cm across, light brown; *bracts* 5-6 cm long, brown, sub-orbicular, persistent; *pedicelled ovary* 3-4 mm long, light brown; *sepals* ca 5 mm long; dorsal ca 4 mm broad, sub-orbicular, obtuse; laterals ca 5 mm broad, elliptic, acute, keeled at base; *petals* ca 4.5 x 2 mm, linear-oblong, obtuse; *lip* 5-6 mm long, 3-lobed; side lobes rounded; mid-lobe oblong, reflexed; apex 2-lobulate; *column* ca 3 mm long, light brown, winged; *pollinia* clavate.

var. **imbricata**

Inflorescence long peduncled.

Fl.: June. - July.

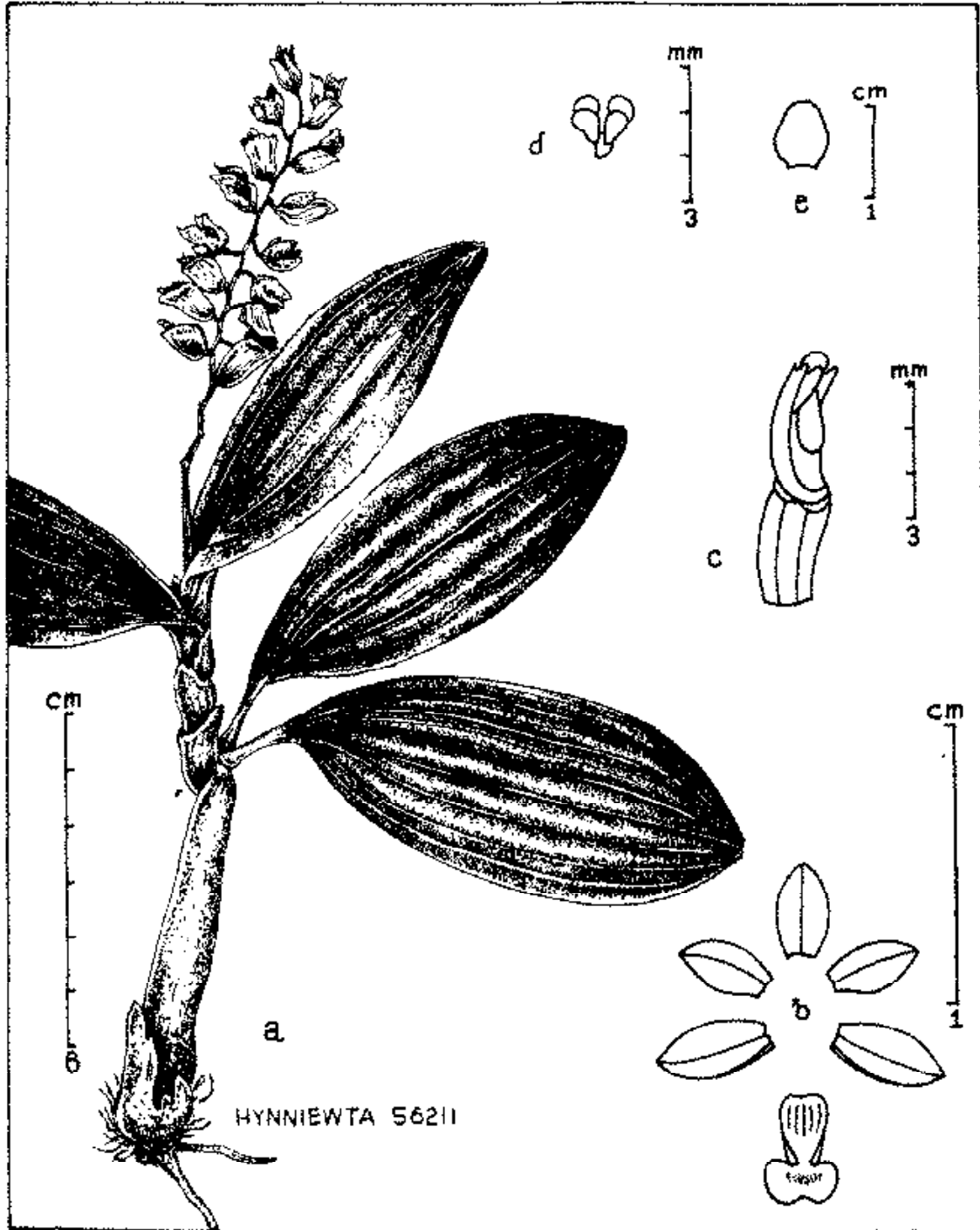


Fig. 77. *Pholldota griffithii* Hook. f.:
 a. habit; b. floral parts; c. column; d. pollinia.

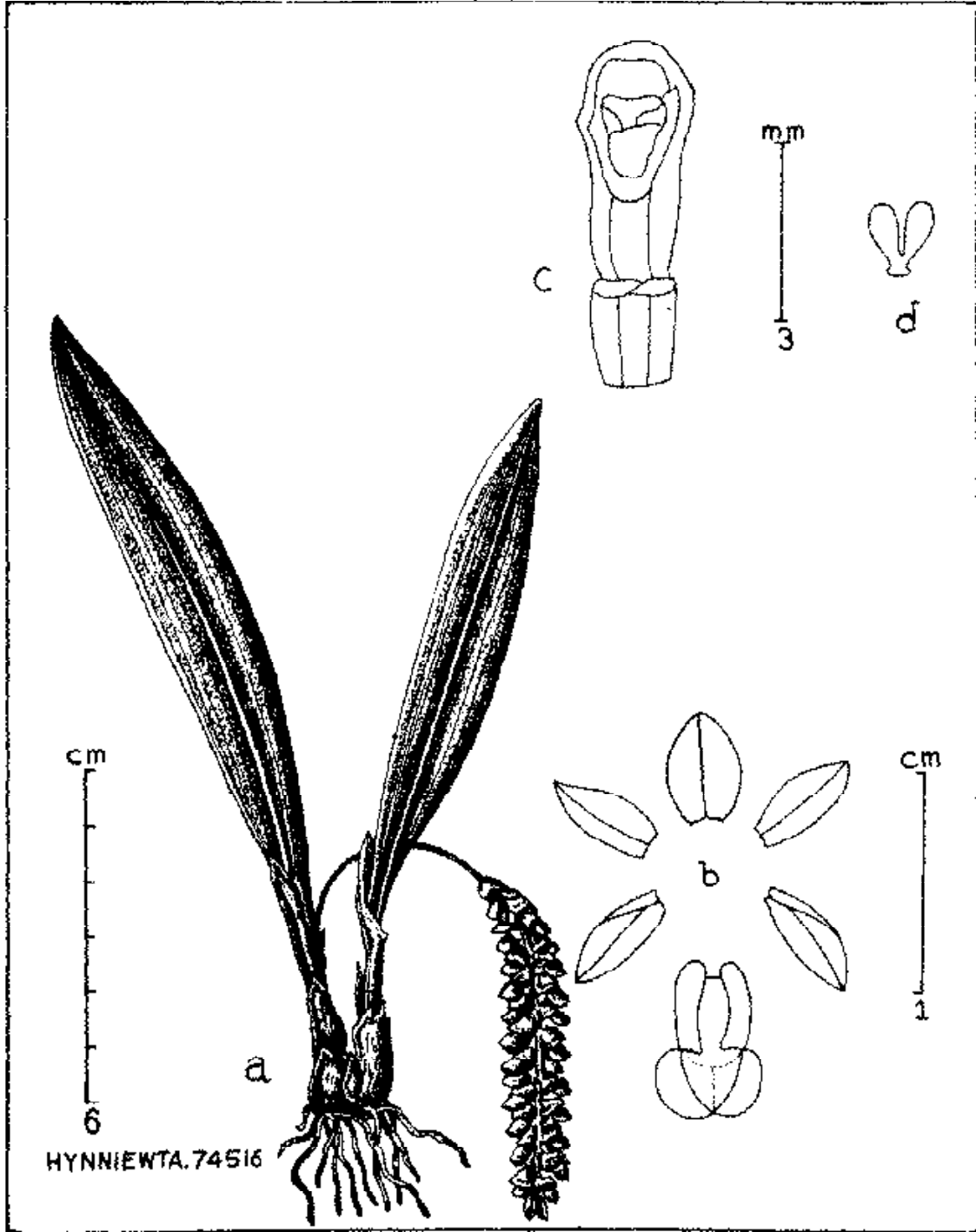


Fig. 78. *Pholidota imbricata* (Roxb.) Lindl. var. *imbricata* :
 a. habit; b. floral parts; c. column; d. pollinia.

Nagaland : Dimapur, *Hynniewta* 74516; Kohima, *Malhotra* 75092 (ASSAM), *Prain* 25 (CAL); Mokokchung, *Hynniewta* 79968; Pulebadze, *Hynniewta* 56265; Satakha, *Hynniewta* 80869; Zunhebato, *Hynniewta* 80370 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim, South India); BHUTAN, MYANMAR, CAMBODIA, SRI LANKA, JAVA, LAOS, MALAYA, THAILAND, VIETNAM.

6. ***Pholidota imbricata*** (Roxb.) Lindl. var. ***sessilis*** Hook. f., *Fl. Brit. India* 5 : 846. 1890. **Fig. 79**

This can be distinguished from type with its inflorescence very short-peduncled or sessile.

Fl.: Aug. Sept.

Nagaland: Satakha, *Hynniewta* 80870; Tseminyu, *Hynniewta* 56223 (ASSAM).

Distr.: INDIA (N. E. India); BHUTAN.

7. ***Pholidota protracta*** Hook. f., *lc. Pl. t.* 1877. 1889; *Fl. Brit. India* 5 : 845. 1890; King & Pantl. in *Ann. Roy. Bot. Gard. Calc.* 8 : 146. t. 203. 1898. **Fig. 80**

Pseudobulbs 3.5 - 5 cm high, fusiform or cylindrical, 1-2-leaved. *Leaves* petioled, 8 - 13 x 1.8 - 2.5 m, elliptic to elliptic-lanceolate, acute. *Inflorescence* few-flowered, lax, 2.5-5 cm long, drooping. *Flowers* ca 0.8 cm across, greenish-yellow; *bracts* 2-3 mm long, pale brown, ovate, acute, minutely crenate, deciduous; *pedicelled ovary* 4-5 mm long, greenish; *sepals* ca 0.4 x 0.3 cm, ovate, obtuse; laterals keeled; *petals* ca 0.3 x 0.2 cm, linear-oblong, obtuse; *lip* ca 0.5 cm long, cymbiform, obscurely 3-lobed; side lobes suppressed, round; mid-lobe oblong-lanceolate; apex trilobulate; disc gibbous in its lower half, with 2 or 4 minute yellow blotches; *column* ca 2 mm long, green; *pollinia* cuneately oblong.

Fl.: Oct. - Nov.

Nagaland : Pfutzer, *Bahadur* 55803; Pulebadze, *Hynniewta* 56269, *Malhotra* 74958 (ASSAM), *Prain* 27 (CAL).

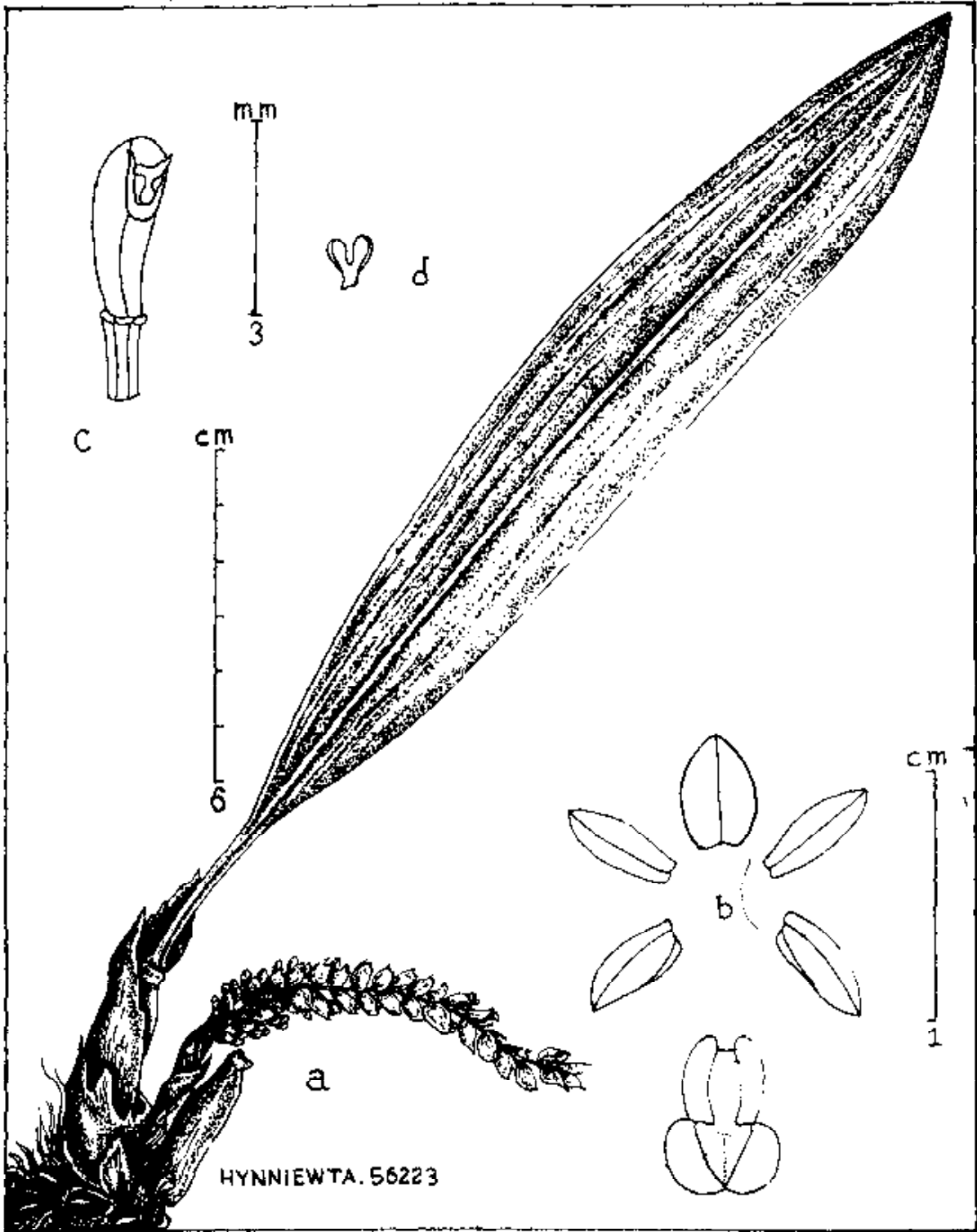


Fig. 79. *Pholidota imbricata* (Roxb.) Lind. var. *sessilis* Hook. f. :
 a. habit; b. floral parts; c. column; d. pollinia.

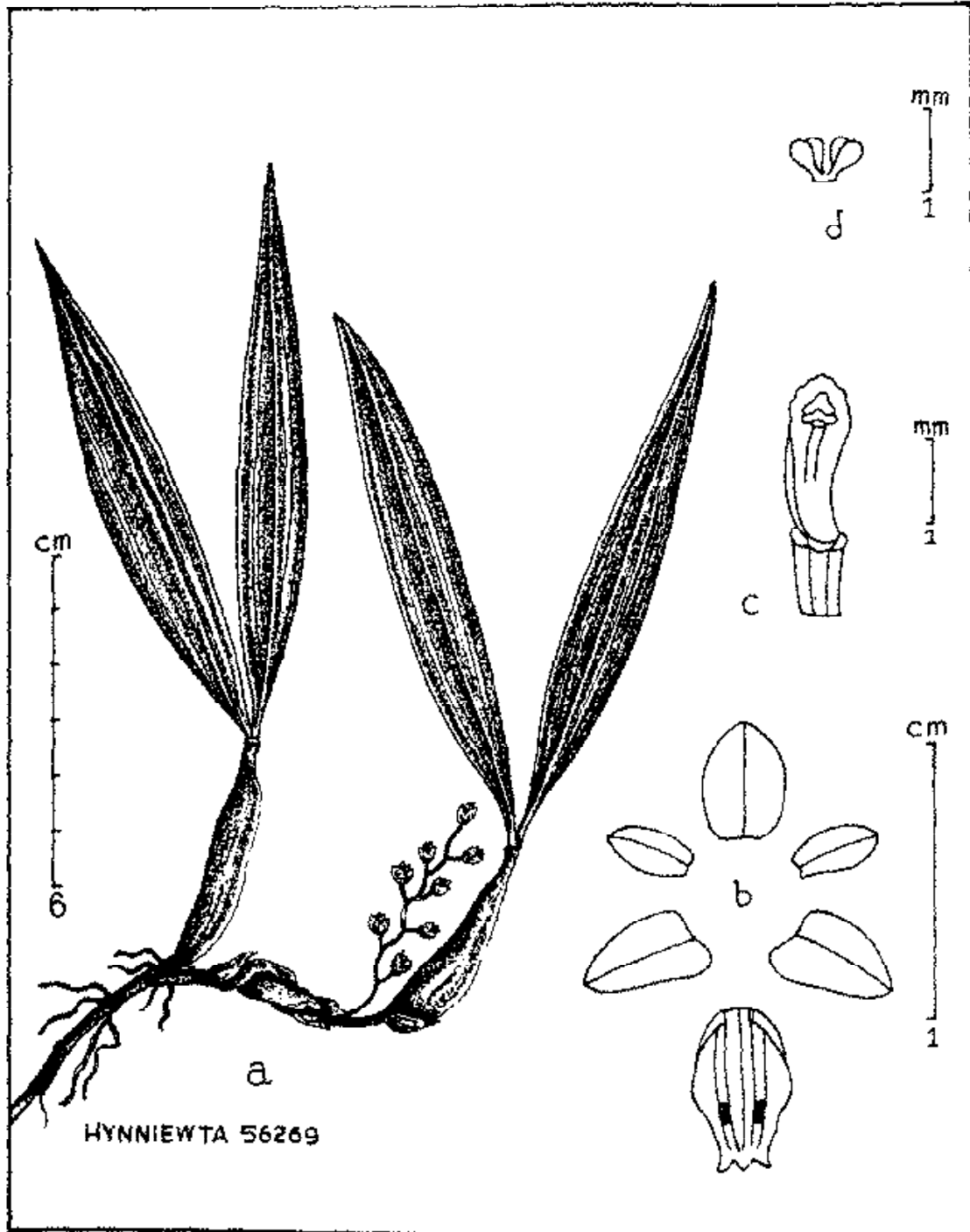


Fig. 80. *Pholidota protracta* Hook. f. :
 a. habit; b. floral parts; c. column; d. pollinia.

Distr.: INDIA (Nagaland, Sikkim); BHUTAN.

8. **Pholidota undulata** Lindl. in Bot. Reg. 14. sub. t. 1213. 1829. *P. rubra* Lindl., Gen. & Sp. Orch. 37. 1830; Hook. f., Ic. Pl. t. 1879. 1889; Fl. Brit. India 5 : 847. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8: 145. t. 202. 1898.

Pseudobulbs 4-6 cm high, fusiform, 2-leaved. *Leaves* 12-20 x 2-3.5 cm, elliptic-lanceolate, acuminate. *Inflorescence* many-flowered, lax, 12-20 cm long, arched or drooping, distichous. *Flowers* ca 1.0 cm across, brownish green; *bracts* 4-5 mm long, pale brown, ovate, acute, cymbiform, persistent; *pedicelled ovary* 4-5 mm long, green; *sepals* and *petals* ca 0.5 cm long; *sepals* ca 3 mm broad, triangular-ovate, acute; *petals* ca 2 mm broad, linear, obtuse *lip* ca 0.5 cm long, purplish brown, cymbiform in its lower half, 3-lobed; side lobes rounded; mid-lobe ovate, acute, reflexed; lamellae faint, 3 or 5; *column* 3 mm long, purplish brown; *pollinia* clavate.

Fl. : Oct. Nov.

Nagaland : Jhaluki, Hynniewta 74552 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN, MYANMAR, CAMBODIA, LAOS, VIETNAM.

47. PLEIONE D. Don

- 1a. Pseudobulbs elongated, ovoid, pale green, 1-leave 1. *P. humilis*
- 1b. Pseudobulbs more or less turbinate, umbonate, greenish, pale mottled brownish purple, 2-leaved:
- 2a. Sheaths at base of leaves with nodular inflations; lip broadly elliptic, anterior half with entire or obscurely dentate margins 2. *P. maculata*
- 2b. Sheaths at base of leaves without nodular inflations; lip ovate-orbicular, anterior half with deeply and irregularly dentate margins 3. *P. praecox*
1. **Pleione humilis** (J. E. Sm.) D. Don, Prodr. Fl. Nepal. 37. 1825. *Epidendrum humile* J. E. Sm., Ext. Bot. 2 : 75. t. 98. 1804, *p.p.* *Coelogyne humilis* (J. E. Sm.) Lindl. Coll. Bot. sub t. 37. 1825; Hook. f., Fl. Brit. India 5 : 840. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 139. t. 194. 1898.

Pseudobulbs 3.1-4.3 cm high, elongated, ovoid, 1-leaved. *Leaves* 7.5-10 x 2.8-3.5 cm, elliptic or elliptic-lanceolate, acute; *scape* ca 2.5 cm long, sheathed at base; sheath pale brown with pink striae. *Flowers* ca 8.0 cm across, dirty white; *bracts* 2.5-3.5 cm long, purplish brown, obovoid-elliptic, acute or obtuse; *pedicelled ovary* 3-3.5 cm long; *sepals* ca 4 x 0.8 cm, oblong-lanceolate, acute; *petals* ca 3.8 x 0.5 cm, lanceolate, obtuse; *lip* ca 3.5 cm long, sub-orbicular, purplish white, with purple spots towards the margins; margins deeply and irregularly dentate in the anterior half; apex emarginate; lamellae fimbriate; *column* ca 1.8 cm long, white with few purple spots in front; *pollinia* elliptic.

Fl.: Mar. - Apr.

Nagaland: Jafu Hills, *Hynniewta* 80822, *Sharma* 17477 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN, NEPAL.

2. ***Pleione maculata*** (Lindl.) Lindl. & Paxt. in *Flow. Gard.* 2 : 5. t. 39. l. 1851; Seidenf. & Smitnd. *Orch. Thailand*, 2(1) : 133. t. 100. 1959. *Coelogyne maculata* Lindl., *Gen. & Sp. Orch.* 43. 1830; Hook. f., *Fl. Brit. India* 5 : 841. 1890; King & Pantl. in *Ann. Roy. Bot. Gard. Calc.* 8 : 140. t. 195. 1898.

Pseudobulbs 2.5-3 cm high, more or less turbinate or umbonate, 2-leaved. *Leaves* 10-15 x 2.5-4.0 cm, elliptic-lanceolate, acute; *scape* 2.0-2.2 cm long, sheath greenish brown, purple mottled. *Flowers* ca 6 cm across, white; *bracts* 2.0-2.2 cm long, obovoid-elliptic, greenish brown; apex broad, emarginate; *pedicelled ovary* 1.5-1.8 cm long; *sepals* ca 3 x 0.8 cm, sub-equal, oblong-lanceolate, acute; *petals* ca 2.8 x 0.5 cm, oblong-lanceolate, obtuse; *lip* ca 3.2 cm long, broadly-elliptic, white with purple streaks at base and yellow patches at the anterior half, obscurely 3-lobed; apex broad and emarginate; margins entire or obscurely dentate; lamellae lacinate; *column* ca 1.8 cm long, green; *pollinia* narrowly elliptic.

Fl.: Sept. - Oct.

Nagaland: Tseminyu, *Hynniewta* 56232 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim, Western Himalayas); BHUTAN, NEPAL, THAILAND.

3. **Pleione praecox** (Sm.) D. Don, Prodr. Fl. Nepal. 37. 1825; Seidenf. & Smitnd. Orch. Thailand, 2(1) : 132. 1959. *Epidendrum praecox* Sm., Exot. Bot. t. 97. 1804. *Coelogyne praecox* Lindl., Coll. Bot. 37. 1825; Hook. f., Fl. Brit. India, 5 : 840. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 141. t. 196. 1898. *C. wallichiana* Lindl., Gen. & Sp. Orch. 43. 1830; *Pleione wallichiana* Lindl., Paxt. Flow. Gard. 2. t. 39. 1851.

Pseudobulbs 3.5 - 4.0 cm high, more or less turbinate or umbonate, 2-leaved. *Leaves* 15-20 x 3.0 - 4.5 cm, elliptic-lanceolate, acute; *scape* 3-3.5 cm long, sheathed at base; sheaths few, tubular, greenish brown, purple mottled. *Flowers* ca 1.2 cm across, rose purple; *bracts* 3.5 - 3.8 cm long; *sepals* ca 6 x 1.2 cm, sub-equal, oblong-lanceolate, acute; *petals* ca 5.8 x 0.6 cm, lanceolate, acute; *lip* ca 5 cm long, ovate-orbicular, with purple spots; margins deeply and irregularly dentate in the anterior half bifid; lamellae laciniate; *column* ca 4.0 cm long, pinkish green; *pollinia* elliptic.

Fl.: Sept. - Oct.

Nagaland: Heliphong Hills, *Hynniewta* 80967; Pulebadze, *Malhotra* 75204, *Hynniewta* 56297 (ASSAM), *Prain* 32 (CAL); Tokye, *Hynniewta* 80912; Zunhebato, *Hynniewta* 80833 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim, Western Himalayas); BHUTAN, MYANMAR, THAILAND.

48. **PTEROCERAS** Hassk.

- Pteroceras suaveolens** (Roxb.) Holtt. in Kew Bull. 14(1) : 270. 1960. *Aerides suaveolens* Roxb. Pl. Ind. 3 : 473. 1832 (non Bl.). *Sarcochilus suaveolens* (Roxb.) Hook. f., Fl. Brit. India 6 : 33. 1890.

Stems 10-23 cm long, slender, pendulous. *Leaves* 15-25 x 2-4 cm, narrowly oblong; apex equally or unequally obtusely 2-lobed. *Inflorescence* 25-40 cm long, erect when budding, arched and pendulous when flowering. *Flowers* ca 2.5 cm across, yellow with brown spots; *bracts* 1-2 mm long, ovate, acute, pale yellowish; *sepals* 1.2 - 1.3 x 0.5-0.6 cm, sub-equal, oblong-spathulate, obtuse; laterals slightly cymbiform; *petals* ca 1.0 x 0.3 cm, linear-oblong, obtuse; *lip* ca 1.0 cm long, white above, yellow beneath,

purple tipped, entirely made up into narrowly funnel-shaped spur; side lobes oblong, their blunt apices pointing backwards; mid-lobe very short, truncate; *column* ca 5 mm long, yellowish; *pollinia* ovoid.

Fl.: May - Jun.

Nagaland: Dimapur, *Hynniewta* 74598; Mokokchung, *Hynniewta* 79966; Mon, *Hynniewta* 79907; Saramati, *Hynniewta* 80958; Zunhebato, *Hynniewta* 80837 (ASSAM).

Distr.: INDIA (N.E.India, Sikkim); BANGLA DESH, MYANMAR.

49. RENANTHERA Lour.

Renanthera imschootiana Rolfe in Kew Bull. 200. 1891; Backer *et al.*, Fl. Java, 3 : 434, 1968.

Stems upto 1 m long, cylindric, stout, erect. *Leaves* 8-12 x 2-3 cm, oblong-lanceolate; apex unequally, obtusely 2-lobed. *Inflorescence* 50-75 cm long, erect. *Flowers* ca 4.5 cm across, brownish red; *bracts* 1-2 mm long, purplish green, ovate, brownish red; *bracts* 1-2 mm long, purplish green, ovate, acute; dorsal sepal 1.6 - 1.7 x 0.4-0.5 cm, brownish red, linear-lanceolate, spathulate, obtuse, slightly keeled; laterals 2.2 - 2.3 x 1-1.2 cm, bright red above, brownish yellow beneath, orbicular-oblong, lower half slightly keeled; *petals* 1.2-1.3 x 0.2-0.3 cm, brownish yellow, red spotted, linear-spathulate; apex broad, sub-rotund, reddish flushed; *lip* 0.6 - 0.7 cm long, bright red; side lobes triangular, acute; mid-lobe oblong-orbicular, with 2 minute projections, one on each side at the junction with the side lobes and with 3 yellow contiguous knobs in between them; lamellae 2, yellow, ellipsoid; ridges 2, yellow, semi-orbicular, obtuse; *column* 4-5 mm long, brownish red, terete; *pollinia* reniform, deeply bifid.

Fl.: May - Jun.

Nagaland: Jafu Hills, *Hynniewta* 80820; Kohima, *Atonor* s.n. (Acc. No. 37695); Saramati, *Hynniewta* 80960; Tuensang, *Hynniewta* 80944 (ASSAM).

Distr.: INDIA (Manipur, Mizoram, Nagaland); MYANMAR, CAMBODIA, JAVA, LAOS, VIETNAM.

50. **RHYNCHOSTYLIS** Bl.

Rhynchostylis retusa (Linn.) Bl. Bijdr. 7 : 266. t. 49. 1825; Hook. f., Fl. Brit. India 6 : 32. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 213. t. 284. 1898. *Epidendrum retusum* Linn., Sp. Pl. 953. 1753. *Gastrochilus retusus* (Linn.) Ktze., Rev. Gen. Pl. 2 : 661. 1891.

Stems 10-15 cm long, terete. *Leaves* 15-30 x 3-4 cm, linear-oblong; apex praemorse with a curved spine. *Inflorescence* 15-25 cm long, rather dense, drooping. *Flowers* ca 1.2 cm across, white with scattered pink blotches; *bracts* 3-4 mm long, obovate, acute, brown; margins dentate; *pedicelled ovary* 1-1.5 cm long, pinkish white; dorsal sepals ca 5 x 3 mm, oblong, acute; laterals ca 6 x 4 mm, gibbously orbicular-ovate, obtuse; *petal* ca 5 x 2 mm, linear-oblong, spatulate, obtuse; *lip* 1.1-1.2 cm long, purple, oblong-lanceolate, acute or emarginate; spur ca 4-5 mm long, pinkish conical, obtuse, puberulous inside; *column* 3-4 mm long, white; *pollinia* globose.

Fl.: Apr. - May.

Nagaland: Chumukidima, *Hynniewta* 74532; Dimapur, *Hynniewta* 80794; Mon, *Hynniewta* 79910; Naginimora, *Hynniewta* 79955; Tisu, *Hynniewta* 80846; Tseminyu, *Hynniewta* 56253; Zunhebato, *Hynniewta* 80363 (ASSAM).

Distr.: Throughout India; BHUTAN, MYANMAR, CAMBODIA, SRI LANKA, JAVA, LAOS, MALAYA, NEPAL, PHILIPPINES, THAILAND, VIETNAM.

51. **SATYRIUM** Sw.

Satyrium nepalense D. Don, Prodr. Fl. Nepal. 26. 1825; Wight, Ic. Pl. t. 929. 1845; Hook. f., Fl. Brit. India 6 : 168. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 338. t. 444. 1898.

Roots long, fleshy. *Tubers* oval, glabrous. *Stems* 30-40 cm high, erect, terete, stout, sheathed above, 2-3-leaved. *Leaves* sessile, 10-25 x 3.5-8 cm, elliptic-lanceolate, acute. *Inflorescence* a spike, 20-35 cm long, terminal; *peduncle* 10-20 cm long bearing several tubular, brownish, lanceolate or oblong, acute or acuminate sheaths from base to below the

spike; spike erect, stout, densely many-flowered. *Flowers* ca 0.7 cm across, white or pink, fragrant; *bracts* 1-1.2 cm long, brown, oblong-lanceolate, acuminate, deflexed; *ovary* 0.3-0.4 cm, white or pink; *sepals* 0.5-0.6 x 0.2 cm, linear-oblong, obtuse entire, spreading or deflexed; *petals* 0.4-0.5 x 0.2 cm, linear, obtuse, entire; *lip* 0.3-0.4 cm long, sub-orbicular, hooded, concave in front, keeled on back; *spur* 2.0-0.8 cm long, pink or white, stout or slender; *column* 3-4 mm long, sub-clavate, white or pink; *pollinia* pyriform, bi-partite.

Fl.: Sept. - Oct.

Nagaland: Chakabama, *Hynniewta* 74562; Jafu Hills, *Malhotra* 75263, *G. K. Deka* 22458 (ASSAM).

Distr.: Throughout India; BHUTAN, MYANMAR, SRI LANKA.

52. *SCHOENORCHIS* Bl.

Schoenorchis gemmata (Lindl.) J. J. Sm. in *Nat. Tijd. Ned. Ind.* 72 : 100. 1912. *Saccolabium gemmatum* Lindl. in *Bot. Reg.* 24. Misc. 50. 1838; Hook. f., *Fl. Brit. India* 6 : 56. 1890. *Cleisostoma gemmatum* (Lindl.) King & Pantl. in *Ann. Roy. Bot. Gard. Calc.* 8 : 234. t. 313. 1898. Fig. 81

Stems 20-30 cm high, slender, curved, pendulous. *Leaves* 7-12 x 0.3-0.5 cm, curved, semi-terete, with one side grooved; apex minutely 3-toothed. *Inflorescence* 15-25 cm long; *panicle* few-branched; branches long, drooping, *Flowers* ca 6 mm across, purple; bracts ca 1 mm long, ovate, acute, brownish purple; *pedicelled ovary* ca 3 mm long, purple; *sepals* ca 3x1.5 mm, purple, elliptic-oblong, obtuse; *lip* ca 4 mm long; side lobes very small, purple, ovate, acute; mid-lobe large, white, ovate-rotund, obtuse, concave; *spur* ca 2 mm long, purple, conical, obtuse with 2 small calli within; *column* ca 1 mm long, purple; *pollinia* ovoid.

Fl.: May.

Nagaland: Barak range, *Hynniewta* 80999; Pulebadze, *Hynniewta* 50857, 56293 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN, CAMBODIA, LAOS, THAILAND, VIETNAM.

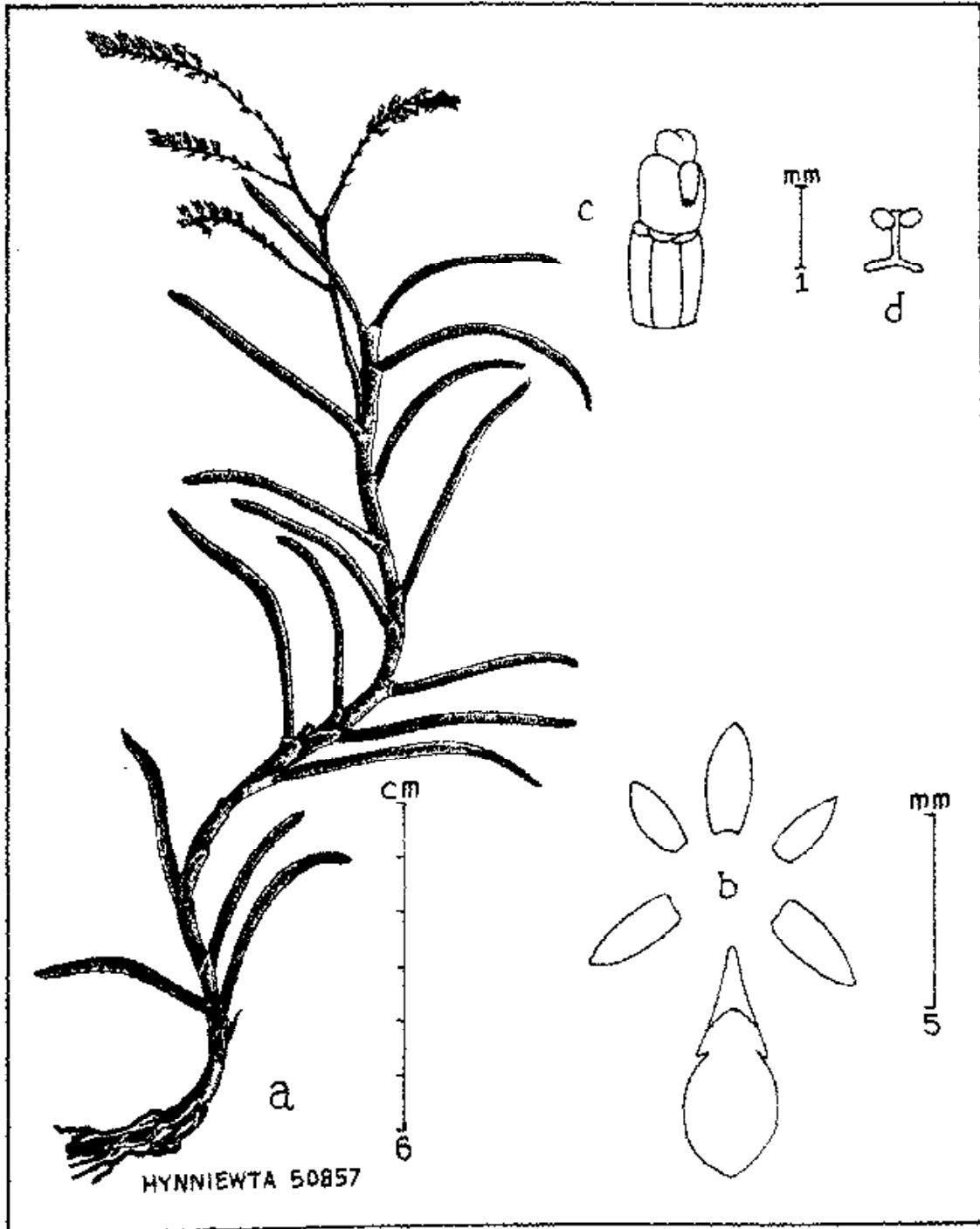


Fig. 81. *Schoenorchis gemmata* (Lindl.) J.J. Sm.:
 a. habit; b. floral parts; c. column; d. pollinia.

53. SPATHOGLOTTIS Bl.

Spathoglottis pubescens Lindl. Gen. & Sp. Orch. 120. 1831; Hook. f., Fl. Brit. Ind. 5 : 814. 1890; Seidenf. & Smitnd. Orch. Thailand, 3 : 343. t. 262 B. 1961. *Epipactis graminifolia* Roxb., Fl. Ind. 3 : 456. 1832. *Spathoglottis parvifolia* Lindl. in Bot. Reg. t. 19. 1845. *S. khasiana* Griff., Notul. 3 : 323. 1848. *S. pubescens* Lindl. var. *parvifolia* Hook. f., Fl. Brit. India 5 : 814. 1890.

Pseudobulbs 2-3 cm high, ovoid or broadly conical, 2-3 leaved. *Leaves* 30-45 x 2.0-3.0 cm, lanceolate, acuminate; lower surface puberulous. *Inflorescence* 30-40 cm long, erect. *Flowers* ca 2.5 cm across, golden yellow; *bracts* 6-7 mm long, greenish brown, lanceolate, acute, pubescent; *pedicelled ovary* 1.2-1.5 cm long, pale yellow, pubescent; *sepals* 1.2-1.3 x 0.7 cm, oblong, acute, pubescent outside; *petals* 1.3 - 1.4 x 0.9 cm, elliptic, obtuse; *lip* 1.4 - 1.5 cm long, golden yellow; side lobes quadrately-oblong, streaked with red lines; mid-lobe quadrately-obcordate, with 2 side teeth; lamellae 3, unequal; middle longer, terminating at the middle of the mid-lobe; *column* 1-1.1 cm long, yellow; wing entire; *pollinia* linear-oblong.

Fl.: Aug. - Sept.

Nagaland: Heliphong, *Hynniewta* 80970; Kohima *Bor* 19772, *Malhotra* 74953; Merima, *Hynniewta* 80728; Mon, *Hynniewta* 79906 (AS-SAM)

Distr.: INDIA (N.E. India); MYANMAR; CAMBODIA, CHINA, INDOCHINA, LAOS, THAILAND, VIETNAM.

54. SPIRANTHES L.C. Rich.

Spiranthes sinensis (Pers.) Ames, Orch. 2 : 53. 1908; Seidenf. in Dansk Bot. Ark. 32(2) : 105. t. 65. 1978. *Neottia sinensis* Pers., Syn. 2 : 511. 1807. *Spiranthes australis* (R. Br.) Lindl. in Bot. Reg. 10. sub. t. 823. 1824; Hook. f., Fl. Brit. India 6 : 102. 1890. *Neottia australis* R. Br., Prodr. 319. 1810. Fig. 82

Tubers oblong or ellipsoid. *Stems* 5-10 cm long, slender. *Leaves* 3-5 x 0.5-0.8 cm, linear-lanceolate or linear-oblong, acute or acuminate. *Inflo-*

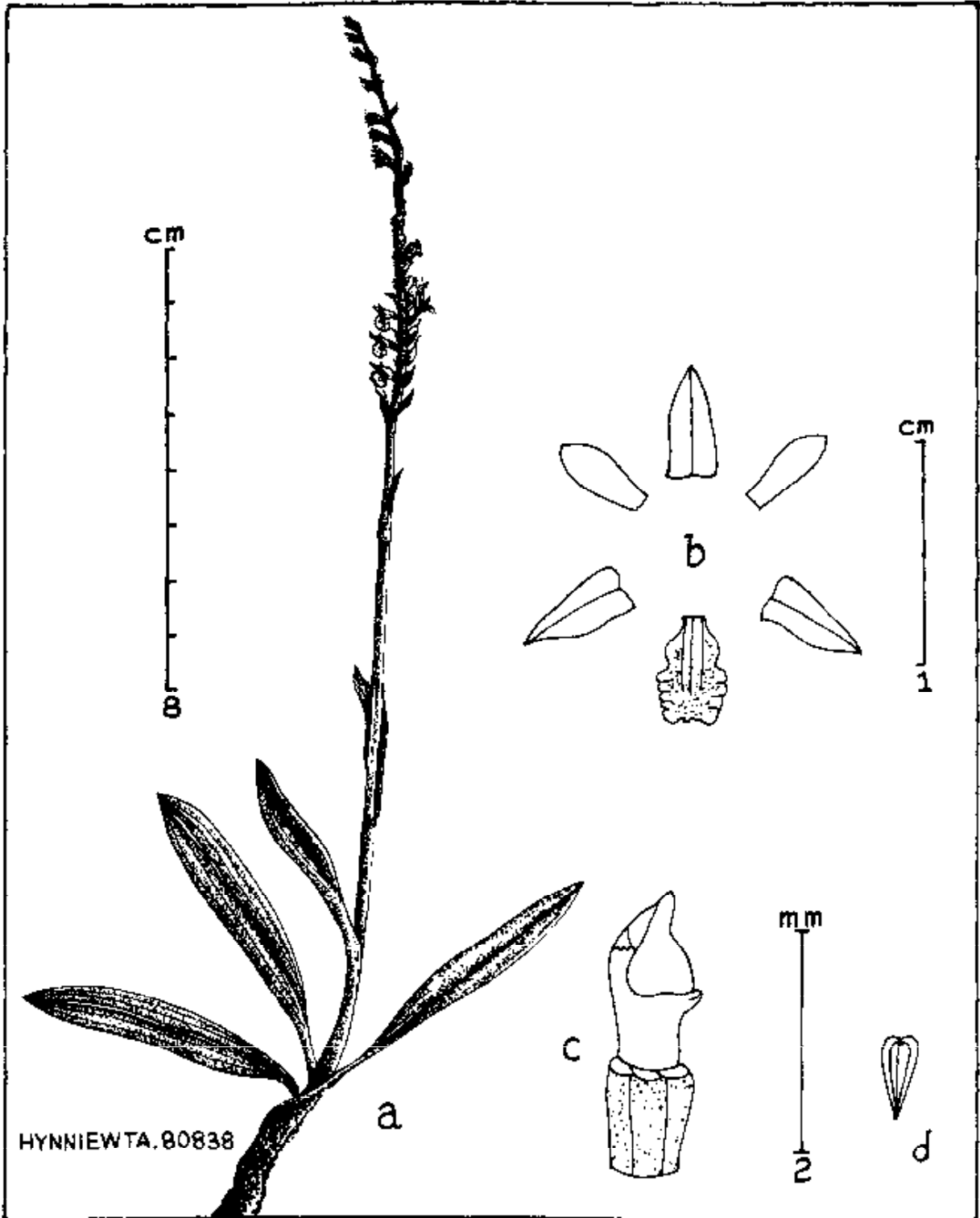


Fig. 82. *Spiranthes sinensis* (Pers.) Ames:
 a. habit; b. floral parts; c. column; d. pollinia.

rescence 10-20 cm long, puberulous. *Flowers* ca 5 mm long, white, pink tipped; *bracts* 5-8 mm long, green, ovate-lanceolate, acute, concave, puberulous; *ovary* sessile, 3-5 mm long, green, puberulous; *sepals* sub-equal, ca 5 x 2 mm, ovate-oblong, acute, reflexed; *petals* ca 4 x 1.5 mm, linear-oblong, spatulate, obtuse, membranous; *lip* ca 5 mm long; *hypochile* white, sub-orbicular; *epichile* pinkish, sub-quadrate, truncate; *margins* erose, crisped; *apex* retuse; *lamellae* 3, thin, puberulous; *column* ca 1.5 mm long, pale green; *pollinia* linear, clavate.

Fl.: May - Jun.

Nagaland: Jafu Hills, *Hynniewta* 80838 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim, South India); AFGHANISTAN, AUSTRALIA, CAMBODIA, SRI LANKA, CHINA, JAVA, LAOS, MALAYA, PHILIPPINES, THAILAND, TIBET, VIETNAM.

55. *SUNIPIA* Buch. - Ham. ex Lindl.

- 1a. Bracts narrow, not concealing the flowers;
Inflorescence few-flowered, racemose:
- 2a. Leaf apex entire, obtuse; flowers pale green
with pink nerves, lateral sepals connate;
petals entire; lip ridged1. *S. bicolor*
- 2b. Leaf apex 2-fid; flowers whitish yellow;
lateral sepals free; petals serrate; lip smooth2. *S. candida*
- 1b. Bracts broad, concealing the flowers;
Inflorescence 1-flowered3. *S. jainii*

1. *Sunipia bicolor* Lindl. Gen. & Sp. Orch. 179. 1833; Seidenf. in Oper, Bot. 89 : 176. 1986. *Ione bicolor* (Lindl.) Lindl., Fol. Orch. Ione 6. 1853; Seidenf. in Bot. Tidsskr. 64 : 216. 1969. *Dipodium khasianum* Griff., Not. Pl. Asiat. 3 : 354. 1851. *Bulbophyllum bicolor* (Lindl.) Hook. f., Fl. Brit. India 5: 770. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 158. t. 216. 1898. Fig. 83

Pseudobulbs 1-2 cm high, obpyriform. *Leaves* 6-10 x 0.5-1.0 cm, linear, obtuse. *Inflorescence* 4-6 cm long, arched or drooping. *Flowers* ca 8 mm long; *bracts* 3-4 mm long, linear, acuminate, pale green; *pedicelled ovary* 3-4 mm long, greenish; *dorsal sepal* ca 7 x 2 mm long, linear-

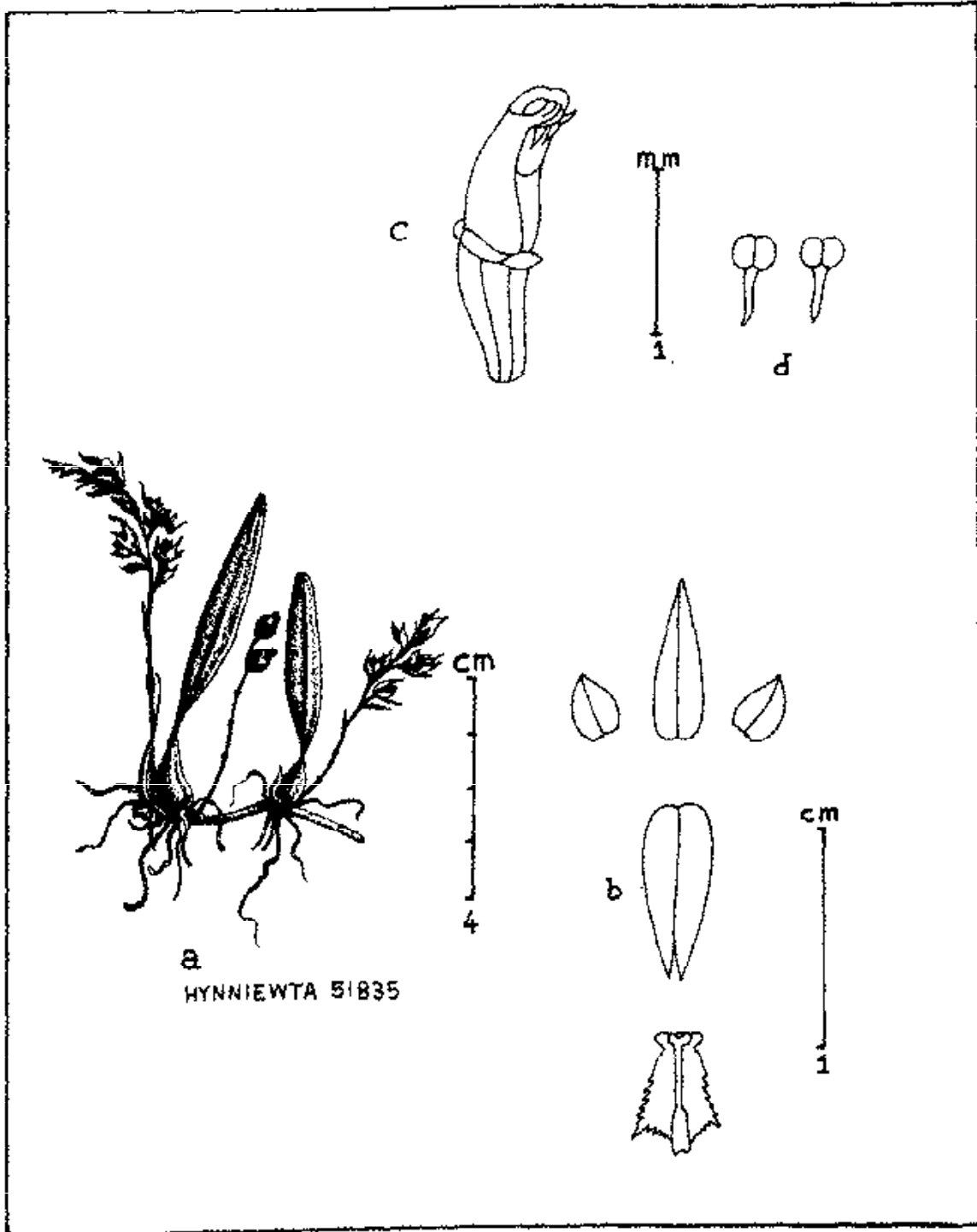


Fig. 83. *Suipla bicolor* Lindl.:
 a. habit; b. floral parts; c. column; d. pollinia.

lanceolate, acute; laterals *ca* 8 mm long, free tips *ca* 2 mm long, acute; petals *ca* 3 x 2 mm, ovate or elliptic, obtuse; lip *ca* 6 mm long, dark pink, narrower towards the base; upper half fimbriate; apex emarginate with a fleshy ridge; column *ca* 1 mm long, pale green; pollinia ovoid.

Fl. Sept. - Oct.

Nagaland: Melori, Bahadur 55748; Tuensang, Hynniewta 51835, 80929 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN, MYANMAR, CHINA, NEPAL.

2. ***Sunipla candida*** (Lindl.) Hunt. in Kew Bull. 26 : 183. 1971. *Ione candida* Lindl. Fol. Orch. Ione. 3. 1853; Seidenf. in Bot. Tidsskr. 64 : 222. t. 9. 1969. *Bulbophyllum candidum* (Lindl.) Hook. f., Fl. Brit. India 5: 770. 1890; Ic. Pl. t. 2050. 1892. Fig. 84

Pseudobulbs distant, 1-1.5 cm high, ovoid or oblong. *Leaves* 4-6 x 0.5-0.8 cm; apex 2-fid. *Inflorescence* 3-5 cm long, erect. *Flowers* *ca* 6 mm long; *bracts* 2-3 mm long, linear, acuminate, greenish brown; *pedicelled ovary* 3-4 mm long, whitish yellow; dorsal sepal *ca* 5 x 2 mm, lanceolate, acute; laterals *ca* 6 x 1.5 mm, linear-lanceolate, shortly acuminate; petals *ca* 4 x 2 mm, ovate-oblong, acute, serrate; lip *ca* 5 mm long, yellowish, narrower towards the apex, acute; lower half serrate; column *ca* 1 mm long, greenish yellow; pollinia ovoid.

Fl.: June - July.

Nagaland: Peren, Hynniewta 74549; Phek, Bahadur 74527; Pulebadze, Hynniewta 56283 (ASSAM).

Distr.: INDIA (N. E. India); BHUTAN.

3. ***Sunipla jainii*** Hynniewta et Malhotra in J. Indian Bot. Soc. 57: 31. 1978.

Rhizomes 1-1.5 mm thick, creeping. *Pseudobulbs* 4-12 mm in diameter, ovoid or conical-ovoid, depressed at base, crowded or distant at 5-15 mm, yellowish-green, 1-leaved. *Leaves* 15-50 x 3-10 mm, petiolate, sub-erect,

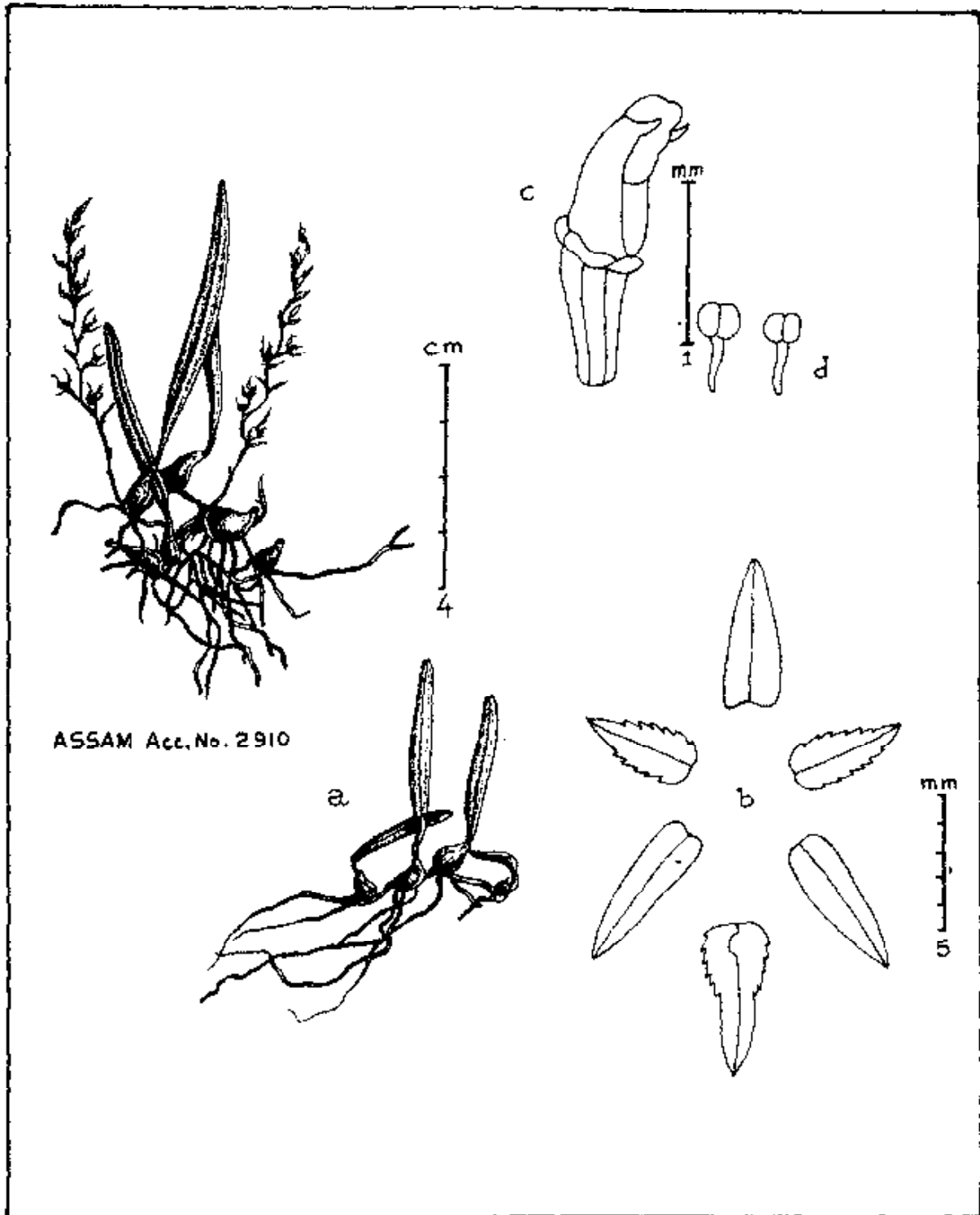


Fig. 84. *Sunipia candida* (Lindl.) Hunt :
 a. habit; b. floral parts; c. column; d. pollinia.

lanceolate, thick, sub-coriaceous, many-nerved; mid-nerve prominent along lower side, depressed above; base attenuate, apex notched; petioles 1-3 mm long, winged. *Scapes* 5-8 mm, 1-flowered, arising from base of pseudobulb, 2-3 sheathed; sheath dark brown. Flowers yellow; *sepals* and *petals* blotched with densely arranged purple gland dots without; *bracts* 10-14 x 8-10 mm, concave; apex acute, membranous, with many dark brown nerves; *sepals* 3; laterals 20-23 x 6-8 mm, falcate; base broad; apex acute, slightly keeled, 7-nerved, nerves dark brown; mentum attached to the broad foot of the column; dorsal sepals 19-22 x 6-8 mm, lanceolate, concave; apex acute, keeled; base broad, 7-nerved; *petals* 14-16 x 4-5 mm, lanceolate; apex acute, margins ciliate, 3-nerved; *lip* 16-18 x 10-12 mm, sessile, somewhat triangular in outline, 4-nerved; margin involute, ciliate; disc pubescent, with a fleshy dagger-shaped, thick, hairy lamella extending from base to apex of lip, with a triangular, keeled sinus at base; *column* 3-4.5 x 1-2 mm; foot 4 x 3 mm; apex toothed; rostellum bifid; anthers 2-celled; *pollinia* 4, two each pair stipate, linear-oblong, 1-1.5 mm long; ovary including pedicel 7-19 mm, slightly grooved. *Capsules* 10-12 x 1-10 mm, oblong, stalked, 6-ridged; ridges extending from middle portion but not reaching apex.

Fl. & Frt.: Nov.

Nagaland: Tseminyu, *Hynniewta* 56060 A (CAL), *Hynniewta* 56060 B-D (ASSAM).

56. TAINIA Bl.

- 1a. Pseudobulbs ovoid, clustered, flowers spurred; lip with 5 lamellae2. *T. viridi-fusca*
- 1b. Pseudobulbs narrowly ensiform, distant; flowers not spurred; lip with 3 lamellae1. *T. latifolia*
1. ***Tainia latifolia*** Benth. ex Hook. f., Fl. Brit. India 5 : 820. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 103. t. 142. 1898. *Eria ania* Reichb. f. in Walp. Ann. 6 : 270. 1861.

Pseudobulbs 8-12 cm high, narrowly ensiform. *Leaf lamina* 25-30 x 8-10 cm, broadly elliptic, acute. *Inflorescence* 50-75 cm long, terete, erect, arched. *Flowers* ca 3.5 cm across, dark brown; *bracts* 0.6-0.8 cm long, pale brown, lanceolate, acuminate; *pedicelled ovary* 1.0-1.5 cm long, dark brown;

sepals and petals 1.7-1.8 x 0.3-0.4 cm, subequal, linear-lanceolate, acute; margins of lateral sepals infolded in the lower half; *lip* ca 1.7 cm long, yellowish; side lobes oblong, acute; mid-lobe quadrately oblong, retuse; lamellae 3, unequal; outer 2 fleshy, longer, from the base of lip terminating in the middle of the mid-lobe; *column* ca 1.3 cm long, yellowish; *pollinia* oblong-clavate.

Fl.: Mar. - Apr.

Nagaland: Tuensang, *Hynniewta* 80502 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); MYANMAR.

2. ***Tainia viridi-fusca*** Benth. in Gen. Pl. 3 : 515. 1883; Hook. f., Fl. Brit. India 5 : 820. 1890.

Pseudobulbs 5-6 cm high, ovoid. *Leaf-lamina* 18-25 x 2-3 cm, lanceolate to elliptic-lanceolate, acute or acuminate. *Inflorescence* 40-50 cm long, terete, erect. *Flowers* ca 3.0 cm across, greenish brown; *bracts* 0.5 - 0.8 cm long, pale brown, lanceolate, acuminate; *pedicelled ovary* 1.3-1.5 cm long, pale brown; *sepals and petals* ca 1.5-0.3 cm, sub-equal, linear-lanceolate, acute; lateral sepals and petals sub-falcate; *lip* 1.0-1.1 cm long; side lobes round; mid-lobe ovate, acute; lamellae 5, unequal; middle 3 fleshy, longer, from base of lip terminating at the base of mid-lobe; *spur* 3-4 mm long, greenish brown, conical, obtuse; *column* ca 1.1 cm long, greenish brown; *pollinia* oblong-clavate.

Fl.: Apr. - May.

Nagaland: Tseminyu, *Hynniewta* 56232 (ASSAM).

Distr.: INDIA (N. E. India); MYANMAR, CAMBODIA, LAOS, THAILAND, VIETNAM.

57. THELASIS Bl.

Thelasis longifolia Hook. f., Fl. Brit. India 6: 87. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8: 250. t. 332. 1898.

Pseudobulbs 2-3 cm high, clustered, sub-globose, depressed, devoid of sheaths. *Leaves* 10-15 x 1.8-2 cm, oblong-lanceolate; apices acute or notched. *Inflorescence* 15-20 cm long, erect. *Flowers*: ca 1.0 cm across, yellowish; *bracts* 2-3 mm long, ovate or ovate-lanceolate, acute; *pedicelled ovary* 3-4 mm long yellowish; *sepals* ca 5 x 2 mm, ovate-oblong, acute; *petals* ca 4 x 1.5 mm long, ovate-oblong, acute; *lip* ca 5 mm long, yellowish, elliptic-ovate, acute or emarginate; *column* ca 3 mm long, yellowish; *pollinia* sub-globose.

Fl.: Jun. - Jul.

Nagaland: Melori, *Hynniewta* 74534 (ASSAM).

Distr.: INDIA (N.E. India, Sikkim) BHUTAN.

58. THUNIA Reichb. f.

Thunia alba (Lindl.) Reichb. f. in Bot. Zeit. 10 : 764. 1852; Seidenf. & Smitnd. Orch. Thailand, 2(2) : 185. 1960. *Phaius albus* Lindl., Gen. & Sp. Orch. 128. 1830; Hook. f., Fl. Brit. India 5 : 818. 1890 *p.p.*; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 110. t. 153. 1898.

Stems 30-45 cm high, terete. *Leaves* 5-20 x 1-3 cm, linear-lanceolate or elliptic-lanceolate, acute or acuminate, glaucous beneath. *Inflorescence* 10-16 cm long, arched or drooping. *Flowers* ca 4.5 cm long, white; *bracts* 3-3.5 cm long, greenish white, cymbiform, acute; *pedicelled ovary* 2.8-3.2 cm long, greenish white; *sepals* ca 4.5 x 1.2 cm, oblong-lanceolate, acute; *petals* ca 4.3 x 0.9 cm, lanceolate, acute; *lip* 4.3-4.5 cm long, white with a purple patch in the middle hypochile convolute into a tube; epichile cuculate, forming a rounded shell-like mouth; margin undulate, unequally dentate; ridges 7 or 9, dentate; orange or white from base to the apex of lip; *column* ca 2.0 cm long, white; *pollinia* elongate clavate.

Fl.: Jun. - Aug.

Nagaland: Kohima, *Deka* 20301, *Hynniewta* 80819; Mon, *Hynniewta* 79908; Noklak, *Hynniewta* 80940; Tseminyu, *Hynniewta* 56255; Zunhebato, *Hynniewta* 80829 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim, Western Himalayas); BHUTAN, MYANMAR, CAMBODIA, JAVA, LAOS, MALAYA, THAILAND, VIETNAM.

59. TRICHOTOSIA Bl.

Trichotosia dasyphylla (Par. & Reichb. f.) Krzl., *Planzenreich* 50: 138. 1911; Seidenf. in *Oper. Bot.* 62 : 12. 1982. *Eria dasyphylla* Par. & Reichb. f. in *Trans. Linn. Soc.* 30 : 147. 1874; Hook. f., *Fl. Brit. India* 5 : 808. 1890; King & Pantl. in *Ann. Roy. Bot. Gard. Calc.* 8 : 128. t. 177. 1898.

Stems 15-30 cm long, hirsute, procumbent, much branched, many-leaved. *Leaves* 1-1.8 x 0.7-0.9 cm, elliptic- or oblong - ovate, obtuse, fleshy, hirsute. *Inflorescence* 1-2-flowered, 1.8-2.2 cm long, lateral or terminal, hirsute. *Flowers* ca 1 cm across, green, slightly yellow flushed; *bracts* 0.3-0.4 cm long, green, cupular, hirsute; *pedicelled ovary* 0.6-0.7 cm long, green, hirsute; *sepals* hirsute outside, acute, dorsal ca 0.5 x 0.3 cm, erect, elliptic, laterals ca 0.7 x 0.5 cm, broadly triangular, concave, *mentum* broadly obtuse, hirsute; *petals* ca 0.5-0.2 cm, linear-oblong, obtuse; *lip* ca 0.7 cm long, fleshy, greenish yellow with brownish purple blotch at base, oblong, sub-quadrate; apex minutely erose, slightly emarginate; base with a minute callus; *column* ca 3 mm long, greenish yellow, slightly curved; foot very long; *pollinia* obovate.

Fl.: May - June.

Nagaland.: Mankolemba, *Hynniewta* 80091 (ASSAM).

Distr.: INDIA (Meghalaya, Nagaland, Sikkim); MYANMAR, CAMBODIA, LAOS, VIETNAM.

60. UNCIFERA Lindl.

- 1a. Leaf apex 2-lobed; flowers 1.2 cm or more across, pale lemon yellow ...2. *U. obtusifolia*
- 1b. Leaf apex acute or acuminate; flowers 1.0 cm or less across, yellowish green ... 1. *U. acuminata*

1. **Uncifera acuminata** Lindl. in J. Linn. Soc. 3 : 40. 1859. *Saccolabium acuminatum* (Lindl.) Hook. f., Fl. Brit. India, 6 : 65. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 223. t. 296. 1898. **Fig. 85**

Stems 15-25 cm high, slender, pendulous. *Leaves* 4-6 x 0.7-1.0 cm, oblong-lanceolate, acute or acuminate. *Inflorescence* few- or many-flowered, dense, 3-5 cm long. *Flowers* 1.0 cm across, yellowish green; *bracts* ca 2 mm long, green, ovate, acute; *pedicelled ovary* 5-6 mm long, green; *sepals* ca 5 x 4 mm, yellowish green, sub-equal; dorsal ovate, obtuse, concave; laterals ovate-rotund; *petals* ca 5 x 2.5 mm, yellowish, white tipped, elliptic, obtuse; *lip* 7-8 mm long, yellowish, white tipped; side lobes large, orbicular, erose; mid-lobe broadly triangular, acute, concave; spur 8-9 mm long, yellowish green, infundibuliform, acute; *column* ca 2 mm long, pale green; *pollinia* globose.

Fl.: Aug. Sept.

Nagaland: Jhaluki, *Hynniewta* 74560; Kohima, *Bor* 21219, *Hynniewta* 74508, 79976; Pfitzner, *Bahadur* 55811 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim).

2. **Uncifera obtusifolia** Lindl. in J. Linn. Soc. 3 : 40. 1859. *Saccolabium obtusifolium* (Lindl.) Hook. f., Fl. Brit. India 6 : 65. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 222. t. 295. 1898.

Stems 10-15 cm high, slender, pendulous. *Leaves* sessile, sheathing, 10-20 x 1.5-2.5 cm, linear-oblong; apex equally or unequally obtusely 2-lobed. *Inflorescence* many-flowered, dense, 10-15 cm long. *Flowers* ca 1.2 cm across, pale lemon yellow; *bracts* ca 3 mm long, green, oblong, obtuse; *pedicelled ovary* 5-6 mm long, green; *sepals* and *petals* pale lemon yellow, unequal; *sepals* ca 6 x 4 mm, obovate, obtuse, sub-connivent; dorsal concave; *petals* ca 5 x 3.5 mm, elliptic, obtuse; *lip* 6-7 mm long, pale lemon yellow; side lobes small, triangular, acute; mid-lobe large, laterally compressed, cymbiform; spur 0.8-1.0 cm long, pale lemon yellow, funnel-shaped, much curved; apex bulbous; *column* ca 3 mm long, whitish; foot short; *pollinia* ovoid.

Fl.: Aug. Sept.

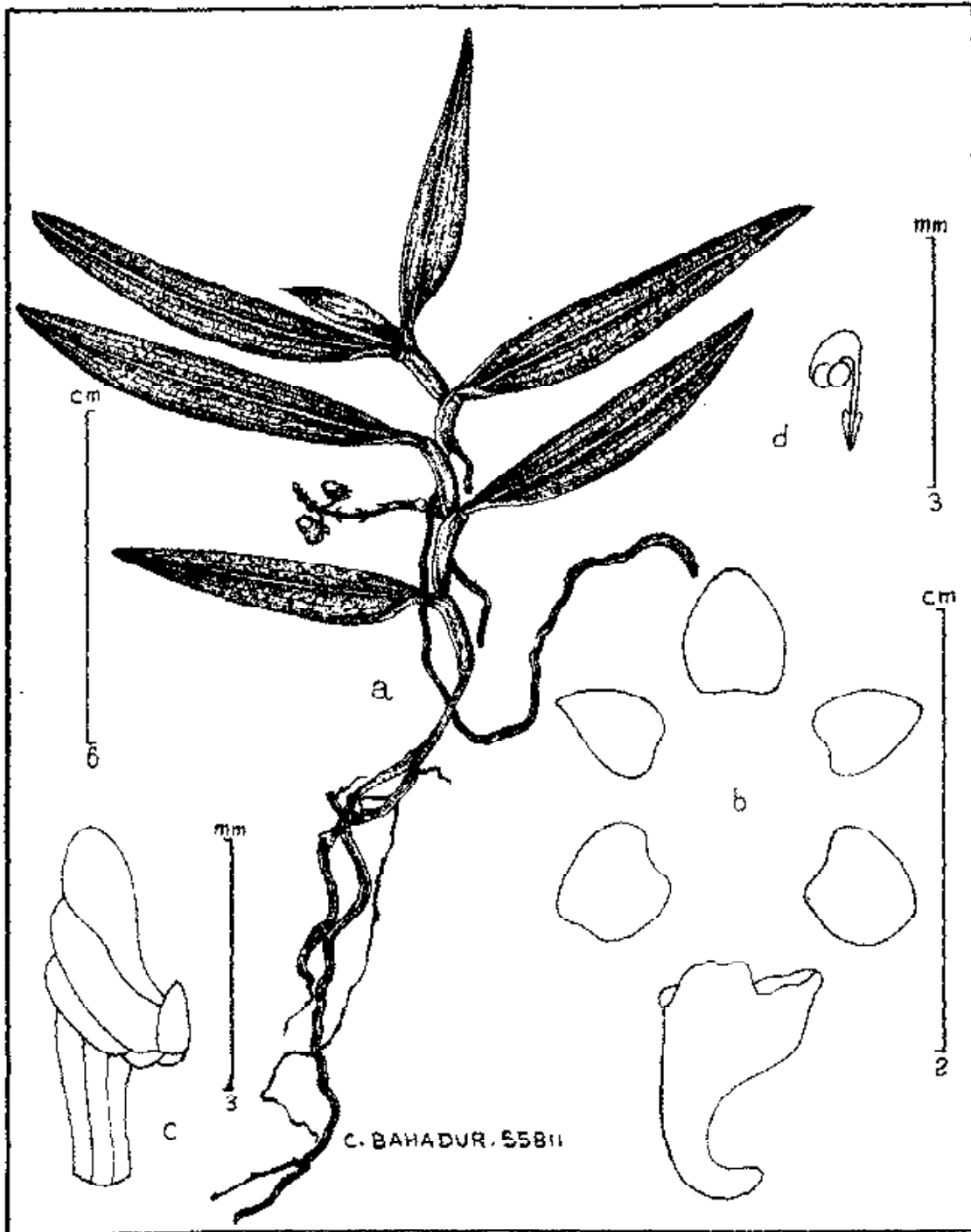


Fig. 85. *Uncifera acuminata* Lindl.:
a. habit; b. floral parts; c. column; d. pollinia.

Nagaland: Tizu, *Hynniewta* 80849; Mokokchung, *Hynniewta* 79984; Mon, *Hynniewta* 79931 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN.

61. VANDA R. Br.

- 1a. Stems almost leafy throughout; inflorescence
1 or 2-flowered sepals much broader than the
petals disc of lip 5-7 ridged ... 3. *V. cristata*
- 1b. Stems leafy towards apex; inflorescence few-or many-
flowered, racemose; sepals and petals more or
less equally broad; lip 2-ridged or not :
- 2a. Flowers small, *ca* 1.5 cm or less across; lip
with a deep central groove. ... 4. *V. testacea*
- 2b. Flowers large 5 or more cm across;
lip smooth or ridged:
- 3a. Inflorescence shorter than the leaves;
flowers *ca* 5 cm across, distinctly tessellate,
white, pale purple mottled above, violet flushed
beneath; lip tinged; disc smooth ... 1. *V. bicolor*
- 3b. Inflorescence longer than the leaves;
flowers *ca* 6 cm across, obscurely tessellate,
blue; lip deep blue; disc 2-ridged. ... 2. *V. coerulea*
1. **Vanda bicolor** Griff., Notul. Pl. 3 : 354. 1851; Ic. Pl. Asiat. 3. t. 330.
1851; Hook. f., Fl. Brit. India 6 : 52. 1890.

Stems 20-40 cm high, very stout, erect. *Leaves* 15-25 x 2-3 cm, narrowly oblong; apex obliquely truncate, toothed or unequally and obtusely 2-lobed. *Inflorescence* few-flowered, racemose, lax, 10-15 cm long, erect or sub-erect. *Flowers* *ca* 5 cm across, white, pale purple mottled above, violet flushed beneath; *bracts* 3-4 mm long, pale brown; *pedicelled ovary* 4-5 cm long, pure white; *sepals* and *petals* obovate, spatulate, obtuse, tessellate; margin undulate; *sepals* *ca* 2.5 x 1.0 cm; *petals* *ca* 2.2 x 0.8 cm; *lip* *ca* 2.0 cm long, white, violet tinged; side lobes oblong or sub-orbicular; mid-lobe panduriform; lobules short; disc smooth; *column* *ca* 6 mm long, whitish violet; foot none; *pollinia* ovoid.

Fl.: May - Jun.

Nagaland: Kohima, *Hynniewta* 64506 (ASSAM)

Distr.: INDIA (Nagaland); BHUTAN.

2. **Vanda coerulea** Griff. ex Lindl. in Bot. Reg. t. 30. 1847; Hook. f., Fl. Brit. India 6 : 51. 1890.

Stems 30-50 cm high, very stout, erect. *Leaves* 10-20x1.9-3 cm, narrowly oblong; apex obliquely truncate, toothed or unequally and obtusely 2-lobed. *Inflorescence* few- or many-flowered, 25-40 cm long, erect, *Flowers* ca 6.0 cm across, blue; *bracts* 3-4 mm long, greenish *pedicelled ovary* 4-5 cm long, pale blue; *sepals* and *petals* sub-equal, ca 3 x 1.2-1.4 cm, obovate, spatulate, obtuse, obscurely tessellate; margins undulate; *lip* 2.0-2.2 cm long, deep blue; side lobes oblong, obtuse or rounded; mid-lobe oblong; apex emarginate; disc with 2 thick ridges; *column* 1-1.2 cm long, light blue; foot long; *pollinia* ovoid.

Fl.: Sept. - Oct.

Nagaland: Josoma, *Malhotra* 75154; Kohima, *Hynniewta* 74506; Pulebadze, *Hynniewta* 56296; Tseminyu, *Malhotra* 75161; Tuensang, *Hynniewta* 79961; Wokha, *Hynniewta* 80752; Zunhebato, *Hynniewta* 80354 (ASSAM).

Distr.: INDIA (N. E. India); MYANMAR, SRI LANKA, INDONESIA, JAVA, MALAYA, NEPAL, THAILAND.

3. **Vanda cristata** Lindl., Gen. & Sp. Orch. 216. 1833; Bot. Mag. t. 4304. 1847; Hook. f., Fl. Brit. India 6 : 53. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 2 16. t. 287. 1898.

Stems 15-30 cm high, very stout, erect, polynodal. *Leaves* 7.5-10 x 1.5-1.7 cm, narrowly oblong; apex obliquely truncate, toothed. *Inflorescence* 1- or 2-flowered, 3-5 cm long, arched. *Flowers* ca 5.5 cm across, greenish yellow; *bracts* 2-3 mm long, greenish brown; *pedicelled ovary* 2-2.5 cm long, green; *sepals* and *petals* 2.7-2.8 cm long, obtuse; *sepals* ca 1.0 cm broad, oblong; *petals* ca 0.5 cm broad, linear-oblong, lip 2.8-3 cm long, pale olivaceous green, purple barred, side lobes triangular, acute,

mid-lobe oblong; lobules spindle-shaped, divergent, with an erect, fleshy recurved spine in between; ridges 5 or 7, carunculate; *column* 5-6 mm long, greenish yellow; foot none; *pollinia* ovoid.

Fl.: Apr. - May.

Nagaland: Tokye, *Hynniewta* 80913 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim, Western Himalayas); BHUTAN, NEPAL.

4. ***Vanda testacea*** (Lindl.) Reichb. f. in Gard. Chron. 2 : 166. 1877; Sant. & Kapad. Orch. Bombay, 219. 1966. *Aerides testaceum* Lindl., Gen. & Sp. Orch. 238. 1833. *Vanda parviflora* Lindl. in Bot. Reg. 30 Misc. 45. 1835; Hook. f., Fl. Brit. India 6 : 50. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 215 t. 286. 1898.

Stems 15-30 cm high, stout, erect, *Leaves* 7.5 - 10 x 0.8 - 1.2 cm, linear-oblong; apex obliquely truncate, toothed or unequally and obtusely bilobed. *Inflorescence* few- or many-flowered, lax, racemose, 5-8 cm long, erect or sub-erect. *Flowers* ca 1.5 cm across, creamy; *bracts* 2-3 mm long, brown; *pedicelled ovary* 1-1.2 cm long, creamy; *sepals* and *petals* 0.7-0.8 x 0.3 - 0.4 cm, oblong, spatulate, obtuse; laterals *sepals* sub-falcate; lip 0.9 - 1.0 cm long, creamish blue; side lobes oblong, obtuse or rounded, sometimes purple spotted towards the apex; mid-lobe oblong-lanceolate; apex erose or minutely emarginate; disc with a deep central groove; *column* 2-3 mm long, creamy; foot short; *pollinia* sub-globose.

Fl.: Apr. - May.

Nagaland: Tseminyu, *Hynniewta* 56236 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim, Western Himalayas, South India); BHUTAN, MYANMAR, SRI LANKA, NEPAL, THAILAND.

62. VANDOPSIS Pfitz.

- Vandopsis undulata*** (Lindl.) J. J. Sm. in Nat. Tijd. Ned. Ind. 72 : 77. 1912. *Stauroopsis undulatus* Benth. ex Hook. f., Fl. Brit. India 6 : 27. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 205. t. 275. 1898. *Vanda undulata* Lindl. in Journ. Linn. Soc. 3 : 42. 1859.

Stems 30-45 cm high; sheaths warted, green, purplish brown spotted. *Leaves* 5-10 x 1.6-2.0 cm, linear-oblong; apex unequally and obtusely 2-lobed. *Inflorescence* 10-15 cm long, erect. *Flowers* ca 4.5 cm across, whitish pink; *bracts* 0.8 - 1.0 cm long, lanceolate, obtuse, greenish brown; *pedicelled ovary* 2- 2.2 cm long, whitish green; *sepals* and *petals* 2.2-2.3 cm long, white, pink flushed, sometimes green tipped, shortly acute or obtuse; margins undulate; laterals sepals 1.1 - 1.2 cm broad, obovate; dorsal sepal and petals narrower, 0.9 - 1.0 cm broad, lanceolate, spatulate; *lip* 1.7 - 1.8 cm long, yellowish green; *hypochile* auricled; *auricles* 2, yellowish green, pink striped, large, rounded, erect; *epichile* laterally compressed with a thickened projection near the apex; *disc* channelled; *ridges* 2, puberulous, from base terminating near the apex of lip; *column* 5-6 mm long, whitish pink; *pollinia* ovoid or sub-ovoid; 2-cleft.

Fl.: Apr. - May.

Nagaland: Dimapur, *Hynniewta* 80793; Tijit, *Hynniewta* 80845; Tuensang, *Hynniewta* 80705 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BHUTAN.

63. ZEUXINE Lindl.

- 1a. Leaves sessile, less than 5 mm broad, linear, grass-like 5. *Z. strateumatica*
- 1b. Leaves petioled, more than 8 mm broad, lanceolate to elliptic, not grass-like:
 - 2a. Epichile of lip with edges intro flexed, entire, without lobules 3. *Z. goodyeroides*
 - 2b. Epichile of lip not with intro-flexed edges, lobed, divided into 2 lobules:
 - 3a. Hypochile of lip with 4 papillae; pollinia bifid connected to a stipe 4. *Z. nervosa*
 - 3b. Hypochile of lip with 2 papillae; pollinia entire, sessile, stipe absent:
 - 4a. Epichile of lip with lobules very divergent, spreading into T-shaped; column winged 2. *Z. flava*
 - 4b. Epichile of lip with lobules slightly divergent, spreading into V-shaped; column not winged 1. *Z. affinis*

1. ***Zeuxine affinis*** (Lindl.) Benth. ex Hook. f., Fl. Brit. India 6: 108. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8: 290. t. 387. 1898; Seidenf. in Dansk Bot. Ark. 32(2): 88. t. 55. 1978. *Monochilus affinis* Lindl. Gen. & Sp. Orch. 487. 1840. **Fig. 86**

Stems 10-15 cm high, few-leaved. *Leaves* 2.5-5 x 0.8-1.5 cm, ovate-lanceolate, acute, green. *Inflorescence* many-flowered, 15-20 cm long, pubescent. *Flowers* ca 0.5 cm long, pale green; *bracts* 5-7 mm long, ovate-lanceolate, acute, green, pubescent; *ovary* 6-8 mm long, pubescent, pale green; *sepals* ca 5 mm long, obtuse, pubescent outside; dorsal ca 3 mm broad, broadly elliptic, concave; laterals ca 2.5 mm broad, ovate; *petals* ca 4.5 x 2 mm long, elliptic, obtuse; *lip* ca 6 mm long, yellowish, simple; *papillae* 2, one on each side of the sac; *epichile* bilobulate; *lobules* oblong; *column* ca 2 mm long, white, without wing; *pollinia* without stipe, clavate.

Fl.: May.

Nagaland: Jafu Hills, *Hynniewta* 56015; Phek, *Bahadur* 55680; Tisu, *Hynniewta* 80847 (ASSAM).

Distr.: INDIA (Meghalaya, Nagaland, Sikkim); BANGLA DESH, BHUTAN, MYANMAR, LAOS, MALAYA, THAILAND.

2. ***Zeuxine flava*** (Wall. ex Lindl.) Trimen in J. Ceylon Br. Roy. Asiat. Soc. 9: 90. 1885; Hook. f., Fl. Brit. India 6: 108. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8: 289. t. 386. 1898. *Monochilus flavum* Wall. ex Lindl., Gen. & Sp. Orch. 487. 1840.

Stems 5-10 cm high, few-leaved. *Leaves* 0.5-4.0 x 0.8-1.5 cm, ovate-lanceolate, acute, greenish brown. *Inflorescence* many-flowered, 10-15 cm long, pubescent. *Flowers* ca 4 mm long, greyish-white; *bracts* 6-7 mm long, lanceolate, acuminate, greyish-brown, laxly pubescent; *ovary* 6-7 mm long, pubescent, greyish-white; *sepals* laxly pubescent outside, obtuse, greyish; dorsal ca 4 x 3 mm, elliptic, concave; laterals ca 3 x 2 mm, ovate, oblong; *petals* ca 4 x 2 mm, white, oblong-elliptic, obtuse; *lip* ca 5 mm long, orange-yellow; *papillae* 2, one on each side of the sac; *epichile* bilobulate, *lobules* sub-quadrate; *column* ca 1.5 mm long, white, winged; *pollinia* without stipe, bifid, clavate.

Fl.: May - Jun.

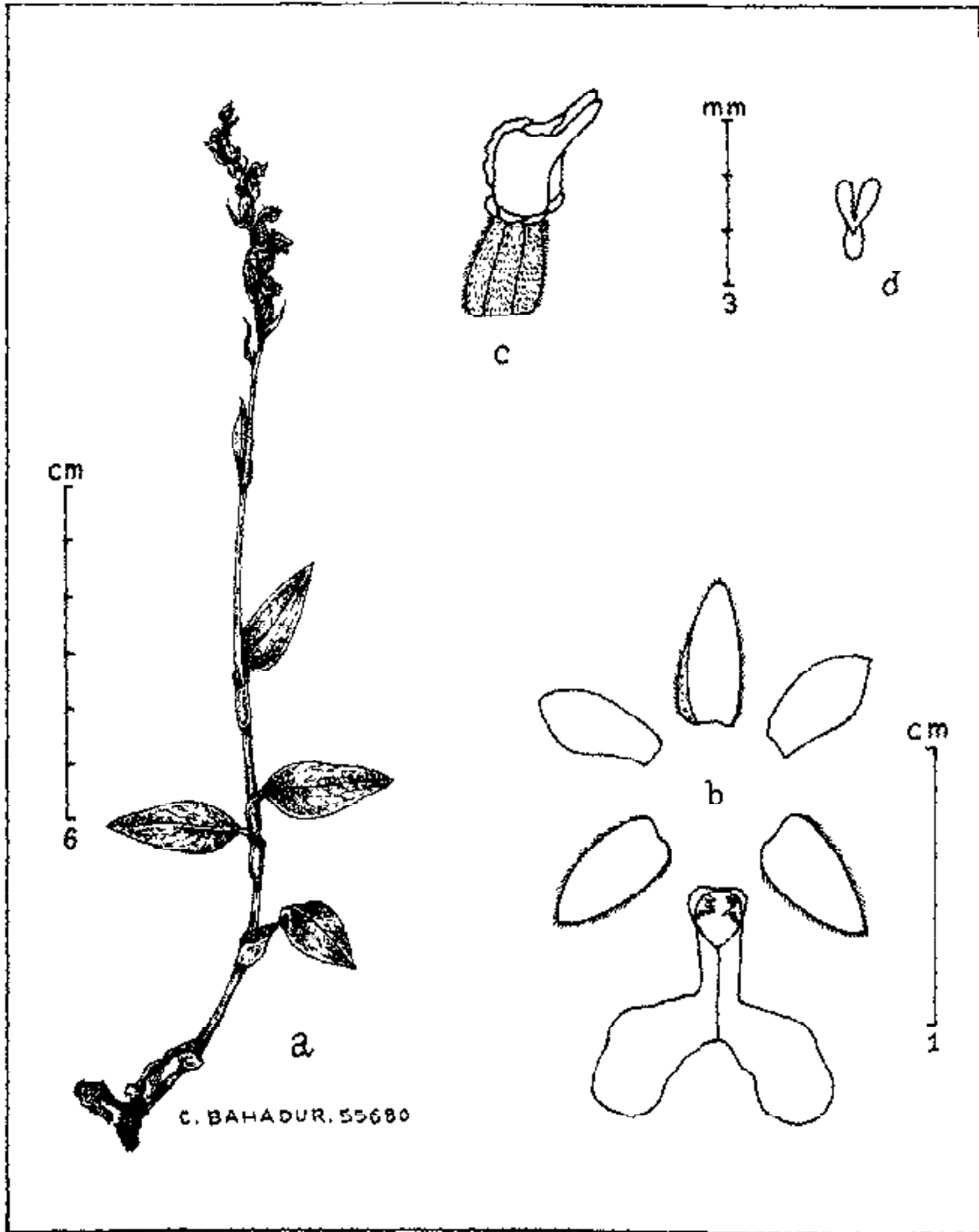


Fig. 86. *Zeuxine affinis* (Lindl.) Benth. ex Hook. f.:
 a. habit; b. floral parts; c. column; d. pollinia.

Nagaland: Kohima, Hynniewta 80856 (ASSAM), Prain 11 (CAL); Phek, Bahadur 55680 A (ASSAM).

Distr.: INDIA (N. E. India, Sikkim & Western Himalayas); BHUTAN, MYANMAR, NEPAL, THAILAND.

3. ***Zeuxine goodyeroides*** Lindl., Gen. & Sp. Orch. 486. 1840; Hook. f., Fl. Brit. India 6 : 107. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 287. t. 382. 1898. *Monochilus goodyeroides* (Lindl.) Lindl. in Journ. Proc. Linn. Soc. Bot. 1 : 187. 1857. **Fig. 87**

Stems 8-15 cm high, few-leaves. *Leaved* 2.5-4 x 0.8-2 cm, oblong-ovate or elliptic, acute, velvety green with a pure white stripe along the mid-rib. *Inflorescence* few-flowered, 10-15 cm long, pubescent. *Flowers* ca 5 mm long, pale pinkish green; *bracts* 5-6 mm long, ovate, acuminate, brownish pink; *ovary* 7-8 mm long, dull greenish-olive; *sepals* ca 5 mm long, acute, sub-equal; dorsal ca 3 mm broad, oblong, concave; laterals ca 2 mm broad, falcately lanceolate; *petals* ca 4 mm long, ca 1.5 mm broad in the middle, falcately oblong, obtuse; *lip* ca 5 mm long, pale pink; margin intro-flexed; papillae 2, one on each side of the sac; *column* ca 2 mm long, greenish white, winged; *pollinia* with stipe, clavate.

Fl.: Jun.

Nagaland: Kohima, Bor 21011, Hynniewta 80855 (ASSAM).

Distr. : INDIA (N. E. India, Sikkim).

4. ***Zeuxine nervosa*** (Wall. ex Lindl.) Benth. ex C.B. Clarke in J. Linn-Soc. 25: 73. 1889; Hook. f., Fl. Brit. India 6 : 108. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 289. t. 385. 1898. *Monochilus nervosum* Wall. ex Lindl., Gen. & Sp. Orch. 487. 1840. **Fig. 88**

Stems 10-15 cm high, few-leaved. *Leaves* 4-7 x 1.5-2 cm, ovate-lanceolate, acute or acuminate, pale green, sometimes suffused with grey or with a broad grey median stripe. *Inflorescence* few-flowered, 12-18 cm long, pubescent. *Flowers* ca 6 mm long, whitish green; *bracts* 8-9 mm long, ovate, acuminate, greenish yellow, pubescent; *ovary* 7-8 mm long, whitish green, pubescent; *sepals* ca 6 mm long, obtuse, sparsely pubescent outside; dorsal ca 4 mm broadly ovate, concave; laterals ca 2.5 mm

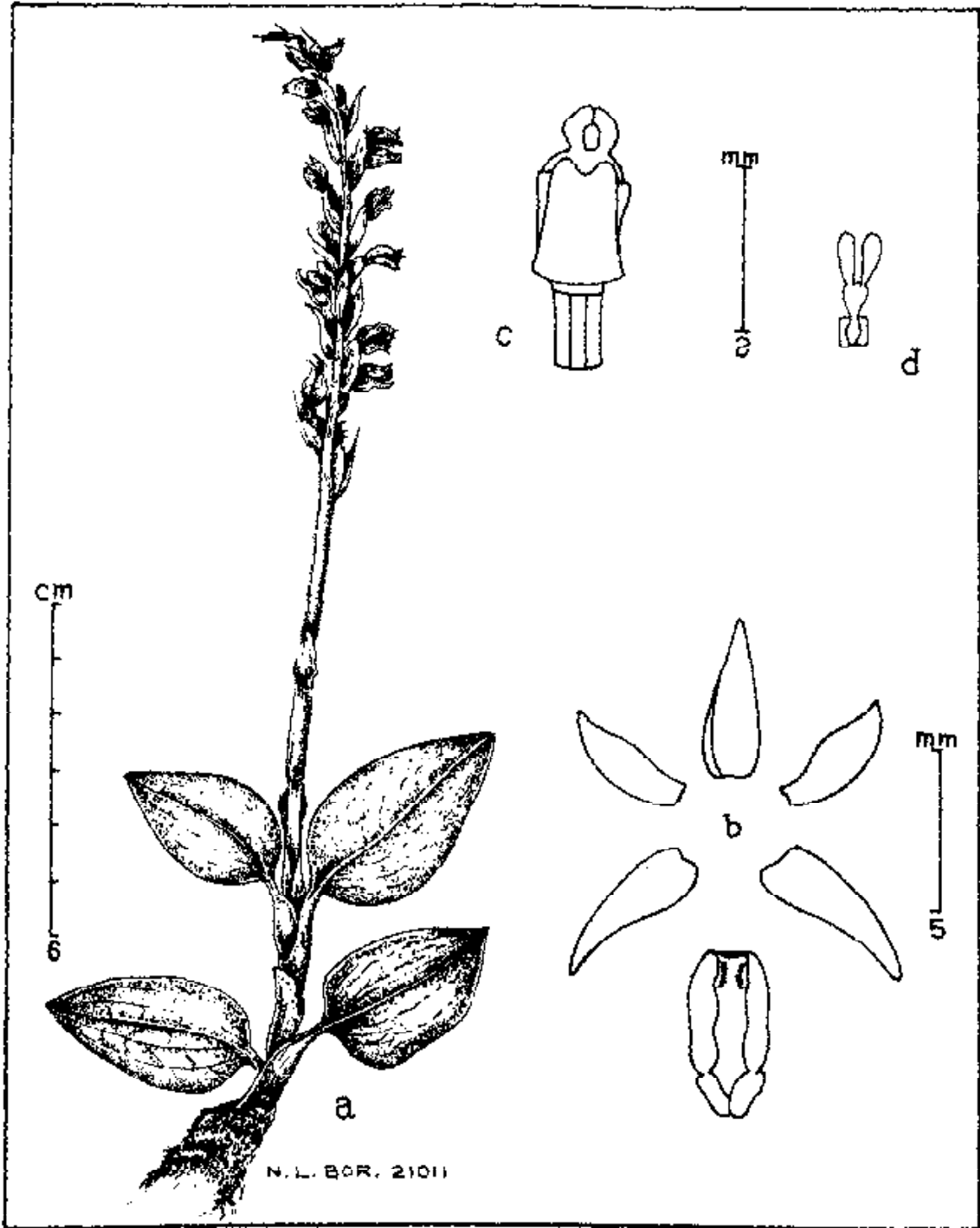


Fig. 87. *Zeuxine goodyeroides* Lindl.:
 a. habit; b. floral parts; c. column; d. pollinia.

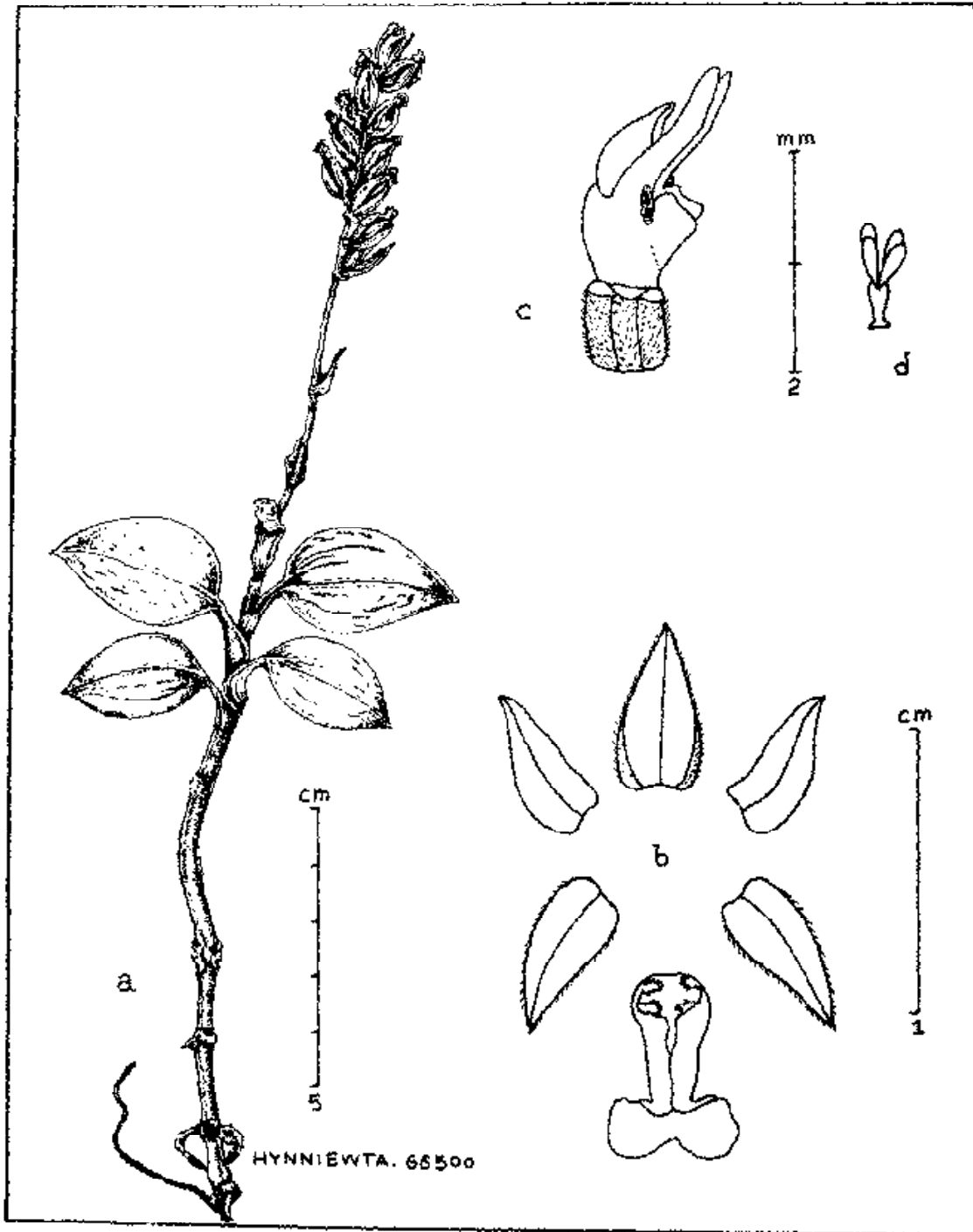


Fig. 88. *Zeuxine nervosa* (Wall. ex Lindl.) Benth. ex Clarke
 a. habit; b. floral parts; c. column; d. pollinia.

broad, ovate; *petals* ca 5 x 2 mm, falcately oblong, obtuse; *lip* 5-6 mm long; papillae 4, 2 on each side of the sac; epichile bilobulate; lobules sub-quadrate; *column* ca 1.5 mm long, white, winged; *pollinia* with stipe, bifid, oblong.

Fl.: Apr.

Nagaland: Khonoma, Hynniewta 66500 (ASSAM).

Distr.: INDIA (N. E. India, Sikkim); BANGLA DESH, BHUTAN, CHINA, JAPAN, NEPAL, PHILIPPINES, TAIWAN, THAILAND, VIETNAM.

5. *Zeuxine strateumatica* (Linn.) Schltr. in Engl. Bot. Jahrb. 45 : 394. 1911; Sant. & Kapad. Orch. Bombay, 167. 1966; Seidenf. in Dansk Bot. Ark. 32(2) : 79. t. 48. 1978. *Orchis strateumatica* Linn., Sp. Pl. 943. 1753. *Zeuxine sulcata* (Roxb.) Lindl. in Royle, Illus. Bot. Himal. 368. 1839; Hook. f., Fl. Brit. India, 6 : 106. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8 : 286. t. 381. 1898. *Pterygodium sulcatum* Roxb., Fl. Ind. ed. 2, 3 : 452. 1832.

Stems 8-15 cm high, few- or many-leaved. *Leaves* 2.5-5.0 x 0.2-0.5 cm, linear, acute or acuminate, green. *Inflorescence* many-flowered, dense, 8-12 cm long, pubescent. *Flowers* ca 6 mm long, white; bracts 1.0 - 1.5 cm long, lanceolate, acuminate, pale green; *ovary* 0.5 - 0.8 cm long, white, pubescent; *sepals* ca 6 mm long, obtuse; dorsal ca 4 mm broad, ovate-oblong, concave; laterals ca 2 mm broad, lanceolate; *petals* ca 5 x 2 mm, oblong, sub-falcate, obtuse; *lip* ca 6 mm long, white; papillae 2, one on each side of the sac; epichile bilobulate; lobules sub-quadrate; *column* ca 2 mm long, white; winged; *pollinia* with stipe, oblong-clavate.

Fl.: Jan.

Nagaland: Jafu Hills, Hynniewta 56015; Jhaluki, Katakai 66500; Saramati, Hynniewta 80956; Tuensang, Hynniewta 80972 (ASSAM).

Distr.: Throughout India: AFGHANISTAN, CAMBODIA, SRI LANKA, CHINA, JAPAN, JAVA, LAOS, MALAYA, PHILIPPINES, THAILAND, VIETNAM.

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INDEX BOTANICAL NAMES

- ACAMPE** Lindl. 9,25,27
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