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ANNALS
OF THE
ROYAL BOTANIC GARDEN, CALCUTTA

Vol. V.

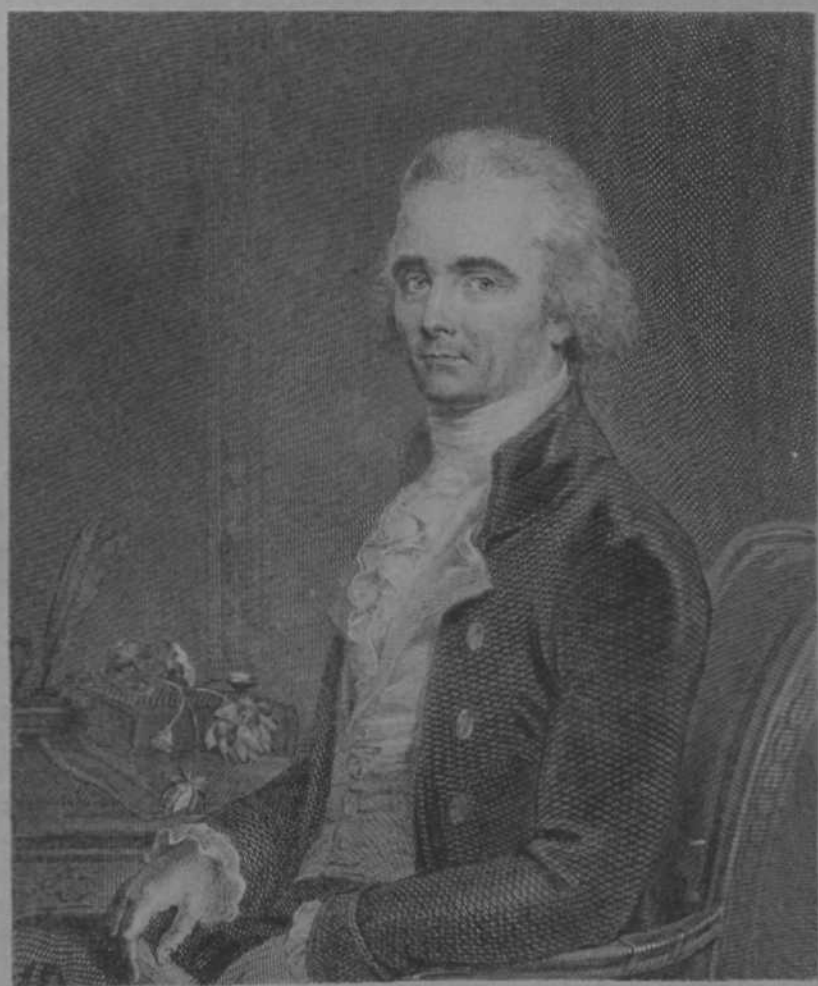


Photo-etching

Survey of India Office, Calcutta, February 1855.

W^M ROXBURGH.

SUPERINTENDENT OF THE BOTANIC GARDEN CALCUTTA 1783 TO 1813.

Enlarged from an Engraving by C. Warren.

TO THE MEMORY
OF
William Roxburgh,
M.D., F.R.S.E., F.L.S.,
OF THE HONOURABLE EAST INDIA CO!
MADRAS ESTABLISHMENT ;
ATTENDANT OF THE BOTANIC GARDEN, CALCUT
FROM 1793 TO 1814 ;
AUTHOR OF
THE PLANTS OF COROHANDEL,
THE HORTUS BENGALENSIS,
AND
THE FLORA INDICA.
THIS VOLUME IS DEDICATED
BY
THE PRESENT

PREFACE.

THE present volume of the Annals of the Eoyal Botanic Garden, Calcutta, consists of two parts. The first part contains descriptions of one hundred and one species of Indian Orchids by Sir J. D. Hooker, late Director of the Eoyal Garden, Kew, who generously agreed to their publication here. The second consists of descriptions of critical Indian species of *Ranunculacea* by Mr. Paul Briihl, of the Bengal Educational Service, and of an account by myself of eighty-three species of new and little-known Indo-Malayan plants—mostly Thalamifloral. A figure is given of each species described in both parts.

G. KING.



A BRIEF MEMOIR OF WILLIAM ROXBURGH,

AUTHOR OF

THE FLORA INDICA.

Prefixed to the last volume of these Annals, I gave a short account of Colonel Robert Kyd, the Founder and first Superintendent of the Calcutta Botanic Garden. It seems fitting therefore that some account should, in the present volume, be given of the Botanist to whom this Garden owes the establishment of its reputation as a centre of botanical work.

William Roxburgh was born at Underwood in the parish of Craigue in Ayrshire on the 3rd June 1751.* His family, although not rich people, managed to give him the kind of liberal education which during the two centuries that preceded the introduction of school-boards, "standards" and capitation grants, used to be obtainable at almost every parochial school in Scotland. From the parish school Roxburgh went to the University of Edinburgh and, having attended as many of the medical classes there as were then required for a license to practice as a Surgeon's mate, he received (through the influence of Dr. Hope, then Professor of Botany at Edinburgh) an appointment in that capacity on one of the Honourable East India Company's ships. He accomplished several voyages to India on East Indiamen, and having, during the intervals spent at home, completed his medical studies at the University of Edinburgh, Roxburgh was offered, and accepted, an appointment on the same Company's Madras Establishment. Roxburgh arrived at Madras during 1776, and he there made the acquaintance of Dr. Koenig,† who happened at the time to be making one of his frequent visits to Madras. Koenig had come out to India about eight years previously, and had been working at Natural History (chiefly on its botanical side) ever since. Koenig had been a pupil of Linnaeus, and was still an active correspondent of that great master. Coming originally to India at the instance of the King of Denmark, Dr. Koenig was attached to the Danish Settlement at Tranquebar. The inadequate income which he received there, however, induced him to accept service under the Nawab of Arcot, and it was while in the Nawab's service that he first met Roxburgh. From the special interest taken in him by Dr. Hope, there is every probability that Roxburgh had, as a student at Edinburgh, shown enthusiasm for Botanical Science. Koenig had already given practical proof of his

* In Chambers' Biographies of Eminent Scotchmen, the date is given as 29th June 1769, but that does not agree with Roxburgh's age at death as given on his tombstone.

† John Gerard Koenig, a native of Courland, pupil and correspondent of Linnaeus, travelled in Iceland during 1765; went to the Danish Settlement in the Carnatic as Physician and Naturalist in 1768; entered the service of the Nawab of Arcot about 1774; was employed by the Madras Board in 1778, and entered the service of the Honourable East India Company in 1780; died of dysentery at Jsgrenathporum on 26th June 1785.

devotion to it; and there can be little doubt that the daily intercourse of two such men in an unfamiliar country, where every plant was comparatively new to them), must have afforded the greatest mutual satisfaction, as well as the strongest mutual stimulus to work. The researches of the two friends into the botanical sources of the indigenous economic products of the Carnatic impressed the Madras Government so favourably that, from 1778, the Madras Board made a monthly allowance to Dr. Koenig to enable him to extend his enquiries to Siam and the Straits of Malacca, and in 1780 he was formally admitted into the Company's service. Koenig died of dysentery on the 26th of June 1785; he was attended during his last illness by Roxburgh, who makes a touching allusion to him in the following note appended to his description of *Roxburghia gbriosoides*, Dryand. (Fl. Ind. II, 236). "This," writes Roxburgh, "was one of the last plants Dr. Koenig saw. It was brought in when he was on his death-bed. He did attempt to examine it, but was unable; for the cold hand of death hung over him. He desired that I would describe it particularly, for he thought it was new, and uncommonly curious and beautiful. His observation from a worthy friend, a preceptor, and predecessor has made me more than usually minute in describing and drawing it." Koenig was immediately succeeded in his appointment as Government Botanist by Dr. P. Russel, who, however, held the office for but a short time, and he in turn was succeeded by Dr. Roxburgh. Roxburgh, who was presumably attached to a regiment (I can, however, find no definite information on the point) was moved about from place to place; but, from his first arrival in the Madras Presidency until his transfer to the Calcutta Botanic Garden in 1793, his service was confined to the Northern Circars, and a great deal of it was at Samulcotta,* a small station about seven miles from the town of Coconada, and about twenty-two from one of the mouths of the Godavery river.

Samulcotta stands on the edge of a hilly region possessing a very interesting *Flora*. For years it had been the practice, both of Koenig and of Roxburgh, to describe and make drawings of every plant they met. During his life-time Koenig had transmitted many specimens of plants to Europe, some of which had been published in the *Supplementum Systematis Plantarum* of the younger Linnaeus and in Retz's *Observations Botanice*; while others had been described by Schrader and by Vahl. Papers written by Koenig himself had also been published in the Transactions of the learned Societies of Berlin, Copenhagen, and Lund; and one in the first volume of the Transactions of the Linnaean Society of London. By Koenig's will, all his letters, papers, and unpublished manuscripts, as well as his dried specimens of plants, were bequeathed to Sir Joseph Banks, President of the Royal Society of London. Up to the time of Koenig's death Roxburgh had, so far as can be learnt, sent no plants to Europe, and had himself published nothing. Between the years 1791 and 1791, however, he transmitted, to the Court of Directors in London, descriptions and figures of no fewer than five hundred species. The Court placed these in the hands of Sir Joseph Banks, who selected three hundred of them which were published, at the Company's expense, in three large folio volumes under the title *The Plants of the Coast of Coromandel*. This was Roxburgh's earliest book; the first part of it appeared in 1795, the last not until 1819. Contemporary with

* In the article on Roxburgh in Knight's *Cyclopædia of biography*, it is stated that he was stationed at Samulcotta from 1781 until his transfer to Calcutta; and also that at Samulcotta he established a garden where he introduced the plants yielding coffee, cinnamon, nutmeg, arnotto, and sappan wood as well as the bread-fruit tree, the mulberry tree, and various kinds of pepper vines. He is also said to have interested himself in the improvement of the cultivation of sugar, in the rearing of silkworms and in the manufacture of silk.

Roxburgh in India there were, in the end of the last and the early part of the present century, many keen Botanists, chief among whom may be mentioned Anderson, Berry, Campbell, Carey, Colebrooke, Fleming, Hardwicke, Kyd, Heyne, Hunter, Buchanan-Hamilton, John, Sir W. Jones, Klein, Leschenault, Rottler, Russell, Shuter, and Sonnerat. All these men probably received some stimulus from the ardour of Koenig, who appears to have been in India a sort of *avatar* of Linnaeus. The majority of them contented themselves, however, with collecting and distributing unnamed specimens of Indian plants. Many of their plants sent to Europe were published by Linnaeus filius, Lamarck, Roth, Retz, Smith, Vahl, A. P. De Candolle and others; while not a few were published in India by Roxburgh himself. Rottler did indeed issue some species bearing manuscript names, some of which have been kept up. But Roxburgh was the only one of the group who attempted to give an account of any considerable number of Indian plants in the form of a *Flora*, and for this reason he has been called the "Father of Indian Botany" and "the Linnaeus of India."

Colonel Robert Kyd, the Founder and first Superintendent of the Botanic Garden at Calcutta, having died in May 1793, Roxburgh was appointed to succeed him, and he took charge of the Calcutta Garden on 29th November of the same year. Colonel Kyd had never lived in the garden; in fact there was no house fit for occupation by a European within its precincts. Roxburgh, however, determined to live in it, and one of the first matters which occupied his attention was the building of a house for himself. The spot selected by Roxburgh for his house (the present Superintendent's quarters) was on a bold promontory where the river Hooghly makes a bend. This site is marked in the old charts and maps as "thanna," and had at one time been occupied by a old fort. On the left bank of the Hooghly, just opposite this promontory and on the site of the village still known as Mattiabruj (mud-bastion), there stood in former days a similar fort; and the two formed a protection against enemies and pirates coming up the river. Roxburgh does not appear to have been so expert at building as he was at Botany. For the cost of the house erected by him exceeded the sum allotted by the Honourable Company by a considerable sum, and the Accountant-General of the period, with the obduracy hereditary to his office, refused to pay the excess.

Roxburgh appears to have arrived at Calcutta with a constitution impaired by hard botanical work in the feverish jungles of the Carnatic; for, within four years of his transfer to the Botanic Garden (*i.e.*, in 1797), he was obliged to make a voyage home for the re-establishment of his health.* In October 1799 he returned to Calcutta. But so soon as 1805 he had again to visit England on account of illness, and during this second visit he lived at Chelsea. He returned to Calcutta for the last time apparently about 1808; but during the hot season of 1813 his health completely broke down, and he was compelled to undertake a sea-voyage, which he at first intended should have been only to the Cape of Good Hope. His health, however, did not improve sufficiently at the Cape to warrant his return to Calcutta, and he therefore extended his voyage to St. Helena, and finally to England. Shortly after his arrival at home, he proceeded to Edinburgh, where he died at Park Place on the 18th February 1815. He was buried in the Greyfriars Churchyard there in the tomb of the Boswells of Auchinlech,

* According to one account, it was during this visit to Scotland that Roxburgh proceeded to the degree of Doctor of Medicine at the University of Edinburgh.

his third wife having been a daughter of that house. The part of the inscription on the tombstone which refers to Roxburgh is as follows:—

Here are deposited the remains of Doctor William Roxburgh, of the Honourable East India Company's Civil Service, who died at Edinburgh on the 18th February 1815, aged 64. Also those of Mary, his wife, daughter of the late Robert Boswell, Esquire, W.S., who died in London on the 18th January 1859 in her 85th year. Beneath this stone are also deposited the remains of Mary, the eldest daughter of Doctor William Roxburgh, and the wife of Henry Stone, Esquire, who departed this life on the 30th January 1811, in the 30th year of his age.

Dr. Roxburgh was three times married. Through the kindness of Mr. N. Bonham-Carter, of the Bengal Civil Service, who is a lineal descendant of the Mrs. Stone mentioned on the tombstone, I am enabled to give the under-noted family table which, however, is unfortunately for the most part without dates:—

Marriages and Families of Dr. W. Roxburgh.

<i>Miss Bonti.</i>	<i>Mth Huttenmann.</i>	<i>Miss Bosicell</i>
(Swiss or French; father perhaps Governor of Penang. She was one of three sisters. The other two married Mr. Amos and Baron Yon Streng.)	(German.)	(of the Auchinlech family).
<i>Child.</i>	<i>Children.</i>	<i>Children.</i>
The above-named Miss Bonté had one child, Mary, who married Henry Stone, B.C.S., and had four children—	1. George, killed by lightning in Java.	1. Sibella.
1. Richard (?), who died aged about six.	2. Anne, married Robert M. Tulloh, B.C.S.	2. Mary Anne, married H. C. Tucker, B.C.S.
2. Mary (Lady Marjoribanks).	3. Robert, Indian Army.	*3. William, married Miss A. E. Boswell.
3. Amelia (Mrs. James Mac-Arthur).	4. Bruce, ditto.	(It/to Boswell, the third Mrs. Roxburgh, teas shter of Mrs. Egrton of Oresford.)
4. Sibella (Mrs. G. W. Norman).	5. Elizabeth, married F. Gurwen-Smith, B.C.S., and died 1891, aged 92.	
	6. Sophia, married John W.	
	7. James, Indian Army, married Miss Carnegie.	
	8. Henry (Royal Navy).	

Estimated by the amount of elaborated botanical materials which he left behind him, Roxburgh's life at the Calcutta Garden must have been one of continued hard work. When he quitted India for the last time in 1813, he left, under the charge of Dr. Carey, not only the manuscripts of his *Hortus Bengalensis* and of his *Flora Indica*, but also no fewer than 2,533 life-sized coloured drawings of Indian plants, with figures of excellent analyses of their flowers which had doubtless been made by himself. The majority of these drawings are of plants described in his *Flora*, so that, between his own descriptions and those figures, there is, in most cases, no room for

any doubt as to what Roxburgh's species are. With the characteristic caution of his nationality, Roxburgh had several copies made of the manuscript of the *Flora Indica*. One of these he took home with him, intending to occupy the remainder of his life in amending and passing it through the press. Another copy he left with his friend, the Revd Dr. Carey, the celebrated Christian Missionary, who was himself an ardent Botanist, and who had brought together, in the Garden of the Mission House at Serampore, a collection of living plants second only to that under Roxburgh's charge at Sibpur. So competent a Botanist was Dr. Carey acknowledged to be, that he was put by the Local Government in charge of the Botanic Garden when Roxburgh was obliged to leave it; and he continued to hold charge of it until relieved by Dr. Buchanan-Hamilton, who was nominated its Superintendent by the Court of Directors in England. Dr. Roxburgh had not long left India before Dr. Carey passed the *Ilortus Bengahnin* through the press, and thus secured for his absent and sick friend priority for many of his species. The *Ilortus Bengahnin* consists of two parts, the first being a list of the plants growing in the Garden when Roxburgh left it, the second a catalogue of plants described by Dr. Roxburgh in his manuscript *Flora Indica*, but not yet introduced into the Botanic Garden. The former list contains about three thousand* five hundred species, of which no fewer than fifteen hundred and ten (including many new genera) had been first described and named by himself; the second list contains four hundred and fifty-three species, mostly Roxburghian. As has already been stated, Roxburgh took a copy of his manuscript *Flora Indica* home to Scotland with him, with the intention, in the light of the most recent views of systematic Botanists in Europe, of improving and amending it prior to publication; and (as he wrote to Dr. Carey) he hoped to have secured the assistance of Robert Brown in this matter. His ill-health, and death so soon after his return home, prevented, however, his doing anything towards this object; and the *Flora* remained in manuscript and untouched for six years. In the year 1820, however, Doctors Carey and Wallich undertook its publication. Dr. Wallich, then Surgeon to the Danish Settlement at Serampore and a young Botanist of much promise, had been appointed Superintendent of the Calcutta Garden at the end of Dr. Buchanan-Hamilton's short tenure of office; and he had employed the early years of his Superintendship in making extensive collections in Nepal, and subsequently in the Straits of Malacca and in other parts of India which had never come within the scope of Roxburgh's efforts. It was decided that descriptions of these collections of Wallich should be incorporated with Roxburgh's manuscript, and that the whole should be published under the joint supervision of Carey and Wallich. The first volume of this work, covering the Roxburghian manuscript to the end of *Tetrandria*, appeared in 1820, and that volume contained but few of Wallich's interpolations. The second volume, which did not appear until four years later, contained, however, a great many of them, and it did not quite finish the *Pentandria* of the Roxburghian manuscripts. In fact, the decision to include Wallich's novelties was the cause of the failure of the whole project. For Wallich's capacities for collecting were so far in excess of his leisure for description and classification that he had to abandon the idea of carrying on his share of the work. The publication of the Carey and Wallich edition of Roxburgh's *Flora* therefore ended prematurely with the second volume. Eight years having elapsed without anything having been done towards the completion of its publication, its author's two sons, Captains Bruce and James Roxburgh, neither of whom

Of this number, three hundred were growing in the garden when Roxburgh assumed charge of it.

was a Botanist, determined to print, at their own expense, their father's manuscript exactly as he had left it. This was done under the editorship of the venerable Carey, and the book was published, in three octavo volumes, at Serampore in 1832. This edition having been for many years out of print and difficult of purchase, a verbatim reprint of it, in a single volume (paged, however, according to the original), was undertaken in Calcutta in 1874, at the expense of Mr. C. B. Clarke, F.R.S., the present distinguished President of the Linnsean Society. Mr. Clarke's reprint also includes Roxburgh's account of Indian *Cryptogamia*, which was not included in Carey's Serampore edition, but which (having been rescued from oblivion by Griffith) was published by him in 1844, in the fourth volume of the Calcutta Journal of Natural History. Mr. Clarke's objects in re-publishing Roxburgh's *Flora* are stated at length in his excellent preface to his edition of it. The main one was to put the book within the reach of the poorest Indian student, and that object was most effectually fulfilled by his issuing the volume at a price (five rupees) which could not have covered one-half of the cost of publication, even had every copy of the edition been sold within a year. Roxburgh's *Flora* is still a most useful book to persons, who, without being really Botanists, desire to make themselves acquainted with the plants of the plains and of the lower slopes of the hills of Northern India and of the Madras Presidency. It contains also an account of the majority of the exotic plants which are cultivated, even at the present day, in gardens in the plains of India, and also descriptions of some plants which Roxburgh had introduced from various parts of the Malayan Peninsula and Archipelago (which he named in a general way "The Moluccas"). The descriptions of these "Molucca" plants are often meagre in the extreme, and are now practically of no value. Many of the common garden plants also are described in an imperfect way. And of the plants of the Himalaya and of the higher ranges of Southern India above levels of 500 feet or thereby, the *Flora* gives no account whatever. With reference to the imperfections of Roxburgh's *Flora* as a guide to the Botany of the Indian mountain ranges, it should, however, be borne in mind that the bulk of the indigenous population lives in the plains; and that it is only a small percentage even of the European population who actually reside in the hills.

The excellence of Roxburgh's *Flora* as a botanical work has so long been acknowledged that it is unnecessary here to enter upon any estimate of it. I would simply remark that Roxburgh's descriptions of Indian plants are, for the most part, so accurate and graphic that, while identifying a plant by his *Flora*, one can feel quite certain when he has got the very species that its author meant: one does not finish one's attempt with a headache and with the uneasy feeling that his plant may be one of half a dozen. I regard Roxburgh's accuracy as something marvellous. When an organ is not too minute for proper observation by means of the comparatively rude lenses obtainable in Roxburgh's time, one may trust to his account of it being absolutely correct. Authors since Roxburgh—and especially young authors—working chiefly with Herbarium specimens have, as it seems to me, reduced some of his species with rather too much levity. I have worked a good deal with Roxburgh's *Flora* and among Indian plants, and it takes a good deal to convince me of a Roxburghian blunder! Roxburgh's ideas of affinity are in the highest degree sagacious; and, had he lived a few decades later, his *Flora* would have doubtless been as successfully fashioned on the natural system as it was on the Linnaean. Finally, I would claim for Roxburgh's book the merit that it does not contain a single ill-natured or unkind remark. Never onco does its author

insinuate that some other botanist is either an egregious blunderer, a vile filcher of another man's species, or a person of supreme incompetence.

As regards economic botany, Roxburgh's *Flora* is a perfect mine of wealth; and it is only since the publication of Dr. Watt's Economic Dictionary that it has been superseded as the standard book on Indian vegetable economics. Much of Roxburgh's time and a great deal of his attention were given to enquiries into indigenous vegetable products; and so greatly were his researches into the sources of fibres* and other useful substances esteemed in England, that on no fewer than three occasions were gold medals awarded to him by the Society of Arts. To him also much credit was due for the organization of the arrangements successfully carried out by one of his sons, for the introduction into the Honourable Company's Malayan possessions of the cultivation of the trees yielding cloves, cinnamon and nutmeg.

Roxburgh was not, as has been stated in some notices of him, one of the founders of the Asiatic Society of Bengal. As a fact he was stationed at Samulcotta when it was founded (1784); but after his settlement in Calcutta he took an active interest in its management and contributed several papers to its *Researches*.[^] Besides being a member of the Asiatic Society, Roxburgh was a Fellow of the Linnæan Society of London, of the Society of Arts, and of the Royal Society of Edinburgh. He was not, however, a Fellow of the Royal Society of London.

* In Vol. XXII of the Transactions of the Society of Arts (London, 1E04), there are printed many letters of Roxburgh's giving an account of his experiments into the mode of cultivation and properties of the fibres of hemp jute, bowstring-flax, sun, agave, Abiscus, Ac.

^t A list of all Roxburgh's contributions to Scientific Journals (taken from the Royal Society's Catalogue of papers) is given below :—

Roxburgh, William. On the Lacshfi, or Lac-Insect (*Coccus laced*). Asiatic Researches, II., UO, pp. £61—861; Tilloch, Phil. Mag. III, 1799, pp. 367-369.

2. A description of the plant *Butea*. Asiatic Researches, III, 1792, pp. 469—474.

3. A description of the *Jonesia*. Asiatic Researches, IV, 1795, pp. 365—368.

4. *Prosopis aculeata*, *Loenig*, Tshamio of the Hindus in the Northern Circars. Asiatic Researches, IV, 1795, pp. 406—409.

6. Botanical observations on the Spikenard of the ancients. Asiatic Researches, IV, 1795, pp. 433—436.

6. A botanical description of *Vrceola elastica*, or Caoutchouc Vine of Sumatra and Pulo Fenang, with an account of the properties of its inspissated juice compared with those of the American Caoutchouc. Asiatic Researches, V, 1798, pp. 167—177; Nicholson, Journ. III, 1800, pp. 436—440; Tilloch, Phil. Mag. VI, 1800, pp. 164—161.

7. An account of a new species of *Delphinus*, an inhabitant of the Ganges. Asiatic Researches, VII, 1801, pp. 170-174.

8. Account of the Tusseh and Arrindy Silk-worms of Bengal. [1802] Linn. Soc. Trans. VII, 1804, pp. 33—48.

9. A botanical and economical account of *Basda butyrarea* or East India Butter Tree. Asiatic Researches, VIII, 1806, pp. 477-486; Nicholson, Journ. SIX, 1808, pp. 372—379; Gilbert, Annal. XL, 1812, pp. 334-340.

10. On the culture, properties, and comparative strength of Hemp and other vegetable fibres, the growth of the East Indies. Nicholson, Journ. XI, 1806, pp. 32—47; Gill, Tech. Rep. VI, 1824, pp. 184—194, 240-244.

11. An account of the Hindu method of cultivating the Sugarcane and manufacturing the sugar and jagary in the Rajamundry district. Tilloch, Phil. Mag. XXI, 1806, pp. 264—475.

12. A table of the growth, of trees in the Botanic Garden at Calcutta. Nicholson, Journ. XVII, 1807, pp. 110—11.

13. Description of several of the monandrous plants of India, belonging to the natural order called *Scitamineæ* by Linneus, *Can*** by Jussieu and *Drimyrrhinm* by Ventenat. Asiatic Researches, XI, 1810, pp. 318—362; Sprengel, Jahrb. I, 1820, pp. 64—110.

14. Letter on various natural productions of the East Indies. Nicholson, Journ. XXVII, 1810, pp. 69—76.

16. Remarks on the Land Winds and their causes. London, Med. Soc. Trans. I, 1810, pp. 189—211; Tilloch, Phil. Mag. XXXVI, 1810, pp. 243-263.

16. Some account of the Teak tree of the East Indies. Nicholson, Journ. XXXIII, 1812, pp. 318—351.

17. *Flora Indica*, Part 4, Cryptogamous Plants. Calcutta, Journ. Nat. Hist. IV, 1841, pp. 463—520.

18. On the genus *Aquilaria*, with remarks by the late H. T. Colebrooke [185J] Linn. Soc. Trans. XXI, 1866 199—206 i Lin J. 800. Proc. II, 1865, pp. 123-125. PT%

There can be little doubt that Roxburgh must have made large collections of plants during his long Indian career of thirty-eight years. Comparatively few of these can, however, now be traced in collections. It is known that his earlier collections in the Carnatic were destroyed by an inundation. He, however, made later collections in that province prior to his removal to Calcutta; and, during the twenty years of his life in the Calcutta Garden, when collecting was more or less his business, such an ardent botanist must have accumulated large quantities of dried plants. No Indian plants of his, however, now exist in the Calcutta Herbarium.* It is indeed asserted by Griffith, in his report on the Calcutta Garden written while he acted for Dr. Wallich in 183-4, that the latter had carried off all Roxburgh's collections from Calcutta, and that they had (without being distinguished by any identifying mark) formed part of the great Herbarium of Indian plants distributed to the chief scientific institutions in Europe, at the expense of the East India Company, under Dr. Wallich's direction. A few of Roxburgh's Indian plants are to be found in the Edinburgh Herbarium; there are a few also at Kew and the British Museum, and doubtless there are others in some of the great Herbaria on the Continent of Europe; but the mass of them cannot be now traced. The want of complete suites of Roxburgh's plants is, however, greatly compensated for by the drawings which he left in Calcutta of the majority of the species named by him. Copies of all of these drawings were made at the expense of the late Sir W. J. Hooker, and were deposited by him at Kew where they can be now consulted; while many of them were printed on a reduced scale in Wight's *Icones Plantarum Indice Orientate*.

A few years after Roxburgh's death some of his friends erected a monument to his memory on a little mound near the great banyan tree. The inscription on this monument, which was composed by Bishop Heber, is as follows:—

Quisquis ades
Si locus suavitate mentem permulcet
Aut admonet ut pie sentias de Deo
Habendus in honore tibi
Roxburghius
Horum hortorum olim præfector
Vir scientiæ botanices laude florens
Idemque omoenitatum agrestium
Summus artifex
Conservat cinerem Patria
Hic viget ingenium
Tu fave et perfrue
B. M. P. C. Superstites Amici A. D. 1822.

The portrait which forms the frontispiece to the present volume is a reproduction (by the process of photographic etching by my friend Colonel James Waterhouse) of the picture published in thirty-third volume of the Transactions of the Society of Aits (London, 1815).

* A number of plants, collected at the Cape of Good Hope during his last voyage to England, were presented to the Herbarium about twenty years ago by a surviving daughter.

In preparing this brief memoir, I have received much kind help from my friend Mr. Henry Beveridge, late of the Bengal Civil Service. Mr. Beveridge had the records of the parish of Craigie, as well as the Register House in Edinburgh, searched (unfortunately in vain) for the entry of Roxburgh's birth; and it was he who kindly copied for me the inscription on the tombstone in Greyfriars Churchyard.

BOTANIC GAEDEN, CALCUTTA,

G. KING.

June 1895.

ANISTALS

OF THE

ROYAL BOTANIC GARDEN, CALCUTTA

Vol. T.

1. A CENTURY OF INDIAN ORCHIDS,

By SIR J. D. HOOKER, M.D., R.N., F.R.S., K.C.S.I., C.B., &c, &c.

2. A CENTURY OF NEW AND RARE INDIAN PLANTS,

By G. KING, M.B., LL.D., F.R.S., C.I.E., AND P. BRUHL

TO WHICH IS PREFIXED

A BRIEF MEMOIR OF WILLIAM ROXBURGH,

By Dr. G. KING.



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E. A. Arnold, 37, Bedford Street, Strand.

1896.

A

CENTURY OF INDIAN OECHIDS

SELECTED FROM

DRAWINGS IN THE HERBARIUM OF THE BOTANIC
GARDEN, CALCUTTA,

By

J. D. HOOKER, M.D., B.N., F.B.S., K.C.S.I., C.B., &c, &c.



WJTM ONE HUNDRED AND ONE PLATES.



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A
CENTURY OF INDIAN ORCHIDS,
SELECTED FROM THE
DRAWINGS OF PLANTS IN THE HERBARIUM OF THE ROYAL BOTANIC
GARDEN, CALCUTTA,
WITH DESCRIPTIONS, &c.

BT

J. D. HOOKER, M.D., S.N., F.R.8., K.C.8.I., C.B., &c, &c.

THE drawings here reproduced in lithography consist of a small selection from the magnificent series of Indian plant-portraits by native artists, that have been accumulating in the Calcutta Botanic Garden for nearly a century. The collection was commenced by Dr. Roxburgh, then Superintendent of the garden, before the end of the last century, and has been steadily added to by his successors, Drs. Wallich, Falconer, Thomson, Anderson, Clarke and King down to the present day, when it numbers from six to seven thousand drawings. Of these the most important botanically and most instructive scientifically are those of the orchids, of which there are about one thousand.

It was not until I had almost completed the descriptions of the Indian orchids for the "Flora of British India" that I ventured to ask Dr. King whether permission could be obtained from the Bengal Government for the transmission and temporary deposit in the Royal Gardens, Kew, of the drawings of this Order, so as to enable me to make such use of them as was still possible for my Flora. My request met with a prompt and generous acquiescence from Dr. King, who lost no time in obtaining the requisite permission and in forwarding the drawings to Kew.

As stated in the remarks preliminary to the "Supplement to the Orchidea" contained in vol. v, p. 176 of my Flora, the inspection of these drawings, together with the study of a multitude of specimens received through Dr. King from the Calcutta Herbarium, some on loan and some as gifts to Kew, necessitated a revision of the characters of the greater proportion of the species already described (often from very imperfect materials), and consequently entailed many emendations in the latter, together with the addition of not a few new species.

The great assistance afforded me by the drawings, and their manifest superiority to descriptions, however exact and complete, for the identification of plants belonging to this most difficult Order, suggested the desirability of having a selection of them published for the use of scientific botanists and cultivators of orchids. To this end I offered, should my suggestion meet with Dr. Söng's approval, my services in selecting a century of them for publication in the "Annals of the Calcutta Garden," adding fuller (and often amended) descriptions and observations on the species figured than could be given in the limited space devoted to the orchids in "The Flora of British India." Dr. King's cordial approval gratified me much, and this Part of the Annals is the result.

I should call attention to the fact that, excellent as the drawings are in many respects, as representatives of the plants portrayed, they err in manifesting that tendency to enlarge, which is a besetting sin of Indian botanical artists; and that the analyses leave much to be desired in the matter of proportion and accuracy. Of these defects the first is irremediable; the others I have in many instances endeavoured to certify or to check, by adding analyses of my own. In no case do these defects appear to me to detract materially from the value of the illustrations as a means of identifying the plants represented.

It remains to add that the drawings here reproduced were the work of many native artists of various skill and attainments, subsequent to the series commenced by Dr. Roxburgh; that they date from the period of Dr. Wallich's superintendency of the Royal Gardens; and that the artists' name being rarely recorded, the inscription at the left hand lower corner of each plate should read "Lithographed by " and that on the corresponding right hand corner "Printed by." Exact copies of the whole Calcutta collection of drawings of Indian orchids have been, with Dr. King's permission, made under my supervision for Kew, and are deposited in the Herbarium of that establishment, the cost having been defrayed by the Trustees of the Bentham Fund.

J. D. HOOKER.

Camp, Sunningdalt, October 1892.

A CENTURY OF INDIAN ORCHIDS

BT

Sir JOSEPH DJZLTOLF HOOKER.

PLATE 1.

OBEBONIA OEBICULAEIS, *Hook. f.*

O. orbicularis; foliis ensiformibus sensim acuminatis, scapo crasso foliaceo vel folio confluyente, spica elongata cylindracea sensim longe attenuata densiflora, floribus subsessilibus rachi crassa quasi appplanatis aurautiacis, ovario brevissimo, bracteis late ovatis orbiculatisve erosis, sepalis petalisque ovatis obtusis integerrimis, labello orbiculato concavo sepalis majore integerrimo vel crenulato apicem versus obscure 3-loba v. emarginato. *Book f. Fl. Brit. Ind. v. 677.*

HAB.—SIKKIM-HIMALAYA ; at Dikkeeling, alt. about 4,000 ft., *Clarke.* KHASIA HILLS, *Gibson.*

Stems very short, densely tufted, flat. *Leaves* 4—6 in. long by £—§ in. broad towards the base, gradually narrowed from the base to the tip, dark green. *Spike* sessile on the top of a flat, truncate, leaf-like scape, or inserted at the margin or top of a leaf, being in fact wholly or in part confluent with a leaf, 4—6 in. long by £ in. diam., terete, very gradually narrowed from the base to the filiform tip. *Flowers* minute, pressed down on the broad membranous erose bracts, dull orange yellow, with the lip darker and deeper coloured.

Very closely allied to *O. pachyrachis*, Keichb. f. Mss. (Fl. Brit. Ind. v. 681), which has the same disposition of the leaves and spike, and minute sessile flowers crowded on the thick terete rachis, and nearly the same sepals and lip; but in that plant the bracts are shorter and broader and the petals are very narrow. As, however, both plants inhabit the Eastern Himalaya and Khasia Hills, they may prove forms of one species.

The drawing of *O. orbicularis* was made at the Calcutta Garden from specimens sent by Mr. Gibson, a collector for the Duke of Devonshire, from the Khasia Hills, to Dr. Wallich in 1836. It bears the manuscript name of *O. phytostachys*, in Wallich's hand-writing, a significant name which I should have retained had I known of it when describing the genus *Oberonia* for the Flora of British India.

Fig. 1, portion of spike; 2, bract; 3, front and 4, back view of flower; 5, flower with perianth-segments displaced; 6, ovary, column and anther; 7, pollinia,—all greatly enlarged.

PLATE 2.

MICROBTYUS WALLICHII, *Lindl.*

M. Wallichii; foliis 3—4 sessilibus petiolatisve elliptico-vel ovato-lanceolatis acuminatis marginibus saepius undulatis, scapo acute angulato, racemo multifloro, bracteis ovario brevioribus patentibus vel reflexis, labelli lamina apice rotundata v. emarginata, auricula

acutis v. obtusis. *Lindley in Wall. Cat. n. 1938 et Gen. and Sp. Orchid.* 20; *Ridley in Journ. Linn. Soc.* xxiv. S37; *Hook. f. FL Brit. Ind.* v. 686. *Malaxis acuminata*, *Don Prodr. Fl. Nep.* 29 (fid. obs. in *Herb. Wallich*).

HAB.—TEMPERATE and SUBTROPICAL HIMALAYA, alt. 4—7,000 ft, from Simla to Sikkim. KHASIA HILLS, alt. 5—6,000 feet. ? Andaman Islands, *Kurz.* TRAVANCOR and the Anamallay Hills, *Beidome* {fid. *Ridley*), DISTRIB.—Cambodia.

Rhizome creeping, fleshy. *Stem* 2—3 in., sheathed. *Leaves* 3—5 in. long, many-nerved, bright green above, strongly ribbed, and often discoloured wholly or on the nerves only beneath. *Scape* 3-8 in. high, slender. *Raceme* 2-4 in. long, narrow; bracts ovate, acute, green; flowers 1 in., nearly 1 inch from the tip of the lip to that of the dorsal sepal, greenish, purplish or yellowish. *Sepals* oblong, dorsal 1-3-nerved, lateral 3-5-nerved. *Petals* 3-nerved. *Lip* very variable as to the comparative and absolute length and breadth of the lamina and auricles.

The plate represents a very small-flowered state of the species. *Microstylis Wallichii* is a very common and variable Himalayan and Khasian plant; and probably, as hitherto defined, includes more than one species. To illustrate the great differences in form of lip that occur in plants of *M. Wallichii* or closely allied species not hitherto distinguished from it, I have added to the plate enlarged figures of the following:—

- A. Flower of a Khasian specimen, with sessile leaves cordate at the base; A1, dorsal, A2, lateral sepal; A3, petal,—all spread out
- B. Flower of another Khasian specimen with narrower, longer-petioled leaves; the lip nearly rounded at the apex; auricles long, parallel, acute.
- C. Lip and dorsal sepal from the type of *M. Wallichii*, Lindl., in *Herb. Kew (Wall. Cat. n. 1938-1)*. The sepals are very broad and the lip contracted opposite the column and 3-lobulate at the apex; the auricles divergent.
- D. Flower from a large form cultivated at Kew, named *M. biloba*, Beichb. f. The leaves are 6—7 by 2-2½ in.; scape with raceme 12—14 in.; bracts 1 in. long, reflexed; lip 2-lobulate at the apex; auricles parallel.
- E. Flower of specimen from the Andaman Islands (*Kurz*) with the apex of the lip acute and auricles crossing. Leaves all broadly ovate, 3—4 by 2—2½ in. The lip appears not to be concave in front of the column. It is probably a distinct species.
- F. Flower of var. *omphaloides* (*M. obliqua*, *Parish Mts.*) from Moulmein. Lip 2-lobulate at the apex; auricles short, rounded, overlapping. Mr. Parish observes of this, "very near indeed to *M. omphaloides*, but the flowers are fewer (8—10), somewhat longer, lip nearly a perfect oval, with the lobes overlapping and tip notched; the column 2-dentate (not 4-dentate as in *omphaloides*)." F1, front view of column with anther; F2, back view of column with anther removed; F3, anther—all from a drawing by Mr. Parish.
- G. Flower of *Tar. brachycheila*, from Moulmein, labelled *M. biloba* by Parish; the leaves are petioled, lanceolate.

The drawing which is reproduced in Plate 2 was inscribed "Sikkim, 4,003 feet, July 14, 1874, G. King.¹" The figures 1 and 2 at the left-hand upper corner and the analyses at the left-hand lower corner are those of the specimen represented; 1, front and 2, back view of flower; 3, lip; 4, dorsal sepal; 5 and 6, lateral sepals; 7 and 8, petals; 9, column—all enlarged.

PLATE 3.

LIPARIS (Mollifolice) Q-AMBLBI, Hook. /.

L. Gamblei pseudobulbis subglobosis, folio solitario sessile vel petiolato ellipticovel oblongo plicato crenulato v. integerrimo, bracteis ovatis acutis, sepalis oblongo-lanceolatis

obtusis 3-nerviis lateralibus labello suppositis, petalis linearibus 1-nerviis, labello deflexo elliptico acuto crenulato lateribus deflexis basi minute 2-callosa, columna tenui iTM,TM,
Hook. f. in Rook. Ic. Plant, i. 1812 et Fl. Brit. Ind. v. 693.

HAB.-SIKKIM-HIMALAYA, at Rungbee, alt. about 5,000 feet, *Clarke*-, on Sinchul alt. 6,500 feet, *Gamble*.

Pseudobulbus clustered, the size of a small hazelnut, green, smooth. Stem 0. Leaf 4-6 in., obtuse, acute or suddenly narrowed into an obtuse tip, with about 12 plaits pale green, narrowed at the base; petiole 0-2 in. Scape enfolded by the base of the leaf rather stout, shorter than the leaf, many- and lax-flowered; rachis of raceme (in the drawing rather thickened, reddish, ribbed; bracts erect, spreading, green; pedicel with ovary in slender. Sepals $\frac{1}{2}$ - $\frac{3}{4}$ in., pale pink, margins recurved. Lip rather longer than the sepals greenish-yellow, with three strong, red median nerves, margins, and branching lateral nerves. Column strongly incurved above the middle, terminal wings entire or more or less notched.

In the specimens of this species described in the Flora of British India, the leaves were sessile, whereas in this they have rather long petioles.

Fig. 1, bract; 2, flower; 3, lip; 4, anther; 5, pollinia—all enlarged from the specimen figured, collected in "Sikkim, alt. 6,000 ft. Aug. 1876, G. King." Figs. A1, flower and A2, lip, are from Gamble's specimen, also enlarged.

PLATE 4.

LIPARIS {*Coriifolia*} PLANTAGINEA, *Lindl.*

L. plantaginea-, pseudobulbis magnis ovato-oblongis compressis, foliis 2 sessilibus suboppositis lineari-oblongis oblanceolatisve acutis, scapo valido teretiusculo vel compresso bracteis ovato-lanceolatis ovarium subaequantibus, sepalis obtusis 3-nerviis rectis lateribus revolutis, petalis linearibus 1-nerviis, labello sepalis aequalongis a basi deflexo orbiculato breviter unguiculato crenulato basi 2-tuberculato, columna incurva apice exalata. *Id. dl. C. # Sp. Orchid. 29; Bidley in Journ. Linn. Soc. xxii. 286; Hook. f. Fl. Brit. Ind. 702. L. selligera, Beichb. f. in Linnaea xli. 42. L. orbicularis, Lodd. ex Hmsl. in Griseb. Chron. 1881, ii. 592. L. Griffithii, ex parte Bidley l. 285.*

HAB.—SIKKIM-HIMALAYA, alt. 1—2,000 feet, *Clarke*. UPPER ASSAM, at the Brahma-koond, *Griffith*.

Pseudobulbus 2—3 in. long by 1—1½ in. broad, smooth, green, much compressed; sheaths membranous, acute. Flowering scape from the base of the old pseudobulb, 2—3 in. by 1—1½ in. broad, flattened, clothed with compressed green imbricating: acute sheaths by 1—2 in., keeled, sessile or narrowed into a petiole, 5—7-nerved. Scape with the raceme about as long as the leaves, strict or flexuous; bracts $\frac{1}{2}$ — $\frac{3}{4}$ in., concave; flowers 1 in. broad, green. Lip with 3 median nerves and branching lateral ones.

Lindley gives Bhutan as the habitat for this species, and in all probability it is a native of that country; but the specimen he described, and which is preserved in his Herbarium now at Kew, is ticketed from the Brahma-koond.

The drawing here reproduced is inscribed "Sikkim, 5-3-83, fld. in H. B. C., 19-7-83, G. King." The following figures are of the specimen drawn:—1, bract and bud; 2, side and 3, front view of flower; 6, lip, natural size; 4, flower with the lateral sepals and lip removed; 6, anther-cWA enlarged. The figures under A are from analyses of my own of a plant that flowered in the Koyal Garden, Kew, in June 1866, and is the type of Keichenbach's X, *telfyera*; A, lip; A1, dorsal and A2, lateral sepals; A3, petal; A4, column—all enlarged.

PLATE 5.

DENDROBIUM (*Bolbodontium*) PUMILUM, Rozb.

D. pumilum dense coespitosum, pseudobulbis oblongis linearibusve cylindraceis demum tetragonis v. multisulcatis 1—2-foliatis, foliis parvis brevibus ellipticis v. rotundatis crasse coriaceis obtusis, floribus ad apicem pseudobulbi solitariis breviter pedicellatis, sepalis albis lateralibus late triangularibus acutis, dorsali multo minore ovato, petalis lineari-oblongis, mento corniforme sepalis longiore incurvo, labello oblongo v. obovato-oblongo apice 2-lobato lobis rotundatis crispatis, disco carina lata flava instructo. *Roxb. Hort. Beng.* 61 et *Fl. Ind.* iii. 479 in part; *Griff. Notul.* iii. 315; *Lindl. in Journ. Linn. Soc.* iii. 6; *Hook. f. Fl. Brit. Ind.* v. 713: vi. 184.

HAB.—CHITTAGONG, *Roxburgh*. PEGU, at Rangoon (in *Herb. Sort. Calcutt.*). TEXAS* BERIM, *Griffith*. PERAK, *Scortechini*. SINGAPORE, *Ridley*. DISTRIB.—Borneo.

Pseudobulbs crowded, of one usually many-grooved node, 1—1 ½ in. long, sessile or sub-stipitate. *Leaves* f—1 in., sessile, channelled along the centre above, strongly keeled beneath, dark green. *Flowers* 1 in. long, white or flushed with yellow; pedicel with ovary ½—f in. *Lateral sepals* 7-nerved. *Lip* with the median ridge obscurely caruncled, ending in a horse-shoe-shaped or notched caruncle in front of the terminal lobes.

The description of this given in *Roxburgh's Flora* is mixed up with that of an *Eria*, no doubt through an error of the transcriber or printer; his drawing of it is excellent. According to the plate here given, the pseudobulbs are sometimes tetraquetrous, which suggests the suspicion that *D. quadrangulare*, Parish (*Fl. Brit. Ind.* v. 714), may not be (as Parish supposed it was) really distinct. The flowers are identical in the two, but *D. quadrangulare* otherwise differs in the clavate pseudobulbs, linear-oblong leaves and fascicled flowers. Mr. *Ridley*, writing to me from Singapore, says that "*D. pumilum* is common at Singapore, with flowers yellow or cream-coloured; lip with a dark spot at the tip, or veined with red. I never saw many flowers in a head as in *D. quadrangulare*."

The drawing here reproduced is inscribed "Moolyet (a mountain in Tenasserim), Gallatly, July 1877, G. King." Fig. 1, flower with the sepals and petals detached and lip removed, and the foot of the column down to the notched base of the mentum coloured pink and yellow; 2, pedicel and column with its foot, the anther removed; 3, side view of the same; 4, lip, represented as much narrower than in the drawing of the plant and than in any specimen seen by me; 5, anther; 6, pollinia:—all enlarged.

PLATE 6.

DENDROBIUM (*Stashyobium*) DENUDANS, Don.

D. denudans caulibus coespitosus elongatis suberectis v. nutantibus, foliis distichis linearibus linear i-oblongisve acutis obtusis vel emarginatis caducis, racemis axillaribus elongatis, gracillimis cernuis, bracteis minutis, sepalis petalisque lanceolatis attenuato-acuminatis faicatis, mento brevi incurvo obtuso vel rotundato, labello sepalis multo brevior, lobis lateralibus serrulatis incisive, terminali parvo ovato recurvo vel revoluto crispato, disco 2-lamellato. *Don Prodr. Fl. Nep.* 34; *Wall. Cat. n.* 2014 ex parte; *Lindl. Gen. & Sp. Orchid.* 84 et in *Bot. Reg.* 1838 Misc. 156 et 1844 61 et in *Journ. Linn. Soc.* iii, 19; *Hook. f. Fl. Brit. Ind.* v. 715.

HAB.—TEMPERATE and SUBTROPICAL HIMALAYA, alt. 4—7,000 ft., from Kumaon eastward to Sikkim.

Stems 6—10 in. long, leafy throughout, or (through the early fall of the lower leaves) naked below, except for their sheaths. *Scapes* axillary, very slender, with the raceme 4—6 in., rachis flexuous; pedicel with ovary $\wedge$ —\ in. *Flowers* $\frac{5}{8}$ in. long, white or greenish with red mentum and red veins on the lip, or yellowish with a greenish lip. *Dorsal sepal* 3-nerved, lateral 5-nerved; petals 1-nerved, all drawn out into very slender points. *Column* very short. *Anther* with an erose margin.

The drawing reproduced here represents a greatly more robust state of the species than I have seen, and the side lobes of the lip are toothed only, not deeply cut, as in the specimens I have examined; which invalidates the subseotional character which I have given in the Flora of British India, where *D. denudans*, *ericeflorum*, Griff., *alpe*tre*, Royle, and *strongylanthum*, Reiohb. f., are distinguished from *D. microbulbon* and others by the deeper cutting of the lip.

The drawing here reproduced is inscribed "near Darjeeling, 1862, T. Anders." Fig. 1, flower; 2, column; 3 & 4, anther; 6 & 6, pollinia:—all enlarged.

PLATE 7.

DENDROBIUM (*Stachyobium*) ERICEFLORUM, Griff.

D. ericeflorum) caulibus brevibus pseudobulbosis, foliis linearibus vel lineari-oblongis vel lanceolatis acutis vel emarginatis, scapis gracilibus foliis longioribus nutantibus multifloris, bracteis parvis, sepalis lanceolatis acuminatis falcatis, mento breve incurvo obtuso vel rotundato, labello sepalis fere seguilongo, lobis lateralibus pectinatim v. subfimbriatim serratis, terminali undulato, disco medio cristate, columna apice grosse dentata. *D. ericeflorum*, Griff. Notul. iii. 316 et Ic. Pl. Asiat. t. 307; Zindl. in Journ. Linn. Soc. iii. 19; Hook. f. Fl. Brit. Ind. v. 715.

HAB.—SIKKIM-HIMALAYA; alt. 6,000 ft., /. D. Hooker, Sfc. KHASIA HILLS, alt. 4—5,000 ft., Griffith, Sc.

Stem 6—8 in., basal or all the internodes thickened, the upper few leafing. *Leaves* 2—3 in., distichous. *Scape* with raceme 3—4 in.; pedicel with ovary \ in.; flowers green, $\frac{1}{2}$ in. long. *Sepals* and *petals* simply acuminate, not drawn out into long points; petals oblanceolate, acute. *Lip* green, with red veins. *Anther* not erose on the margin (as it is in *D. denudans*).

In the Flora of British India I have described; the flowers from various sources as being as variable in colour as those of *D. denudans*, to which this species is closely allied. I had not, however, any knowledge of these being green as here represented, and I had not observed the toothing of the top of the column; or that the margin of the anther was erose in *D. denudans* and entire in *D. ericeflorum*. The stems also of this are longer and more slender in the specimens I have examined than in the figure here reproduced, which is inscribed "84, *D. denudans*, DonP Mr. J. Gibson, 1836. G. Mann showed me a drawing of this plant collected halfway between Punkabari and Kurseong, 1867. T. Anders. *D. ericeflorum*, Griff.; see t. 307 Monocot. PL Notul. iii. 316, G. King."

Fig. 1, flower; 2, the same with perianth segments detached; 3, column; 4, anther; 6, pollinia:—«« enlarged.

PLATE 8.

DENDROBIUM (*Stachyobium*) PARCUM, *Reichb. f.*

D. parcum) caulibus densissime coespitosis gracilibus elongatis ramosis pendulis, racemis brevissimis axillaribus paucifloris, floribus parvis, sepalis viridibus lateralibus oblongis obtusis v. subacutis 3-nerviis, petalis lineari v. oblongo-spathulatis, ruento late incurvo obtuso sepalis longiore, labello recto v. recurvo flavo basi rubro maculato, sepalis longiore anguste spathulato apice dilatato cuneiforme v. orbiculato truncato v. retuso. *Reichb. f. in Gard. Chron.* 1866, 1042 et *Xen. Orchid*, ii. t. 169.; *Book. f. Fl. Brit. Ind.* v. 720.

HAB.—TENASSERIM ; near Moulmein, *Parish.*

Stems 10—18 in., narrowed at the base, as thick as a goose-quill, green ; internodes 1—1½ in., terete, lowest sheathed; nodes discoloured; branches elongate, with short brown sheaths at the very slender base. *Leaves* not seen, probably occurring only in a very young state of the plant. *Peduncle* J—J in., slender, with very short imbricating sheaths at the base, 2—4-fld.; pedicel with ovary ½ in.; flowers ½—¾ in. long. *Sepals* subfalcate; petals 3-nerved, as long as the sepals, green; lip nearly twice as long as the sepals. *Anther* conical.

A singular species, leafless in all the specimens I have seen, as well as in the drawings though probably leaves are to be found in the young state of the plant; and ore, as in its near ally *D. hcrbnceum*, *Lindl.* of the Deccan peninsula, very caducous. The lip, which is described as cuneiform and straight, and which appears to be so in dried specimen, is here represented as deflexed beyond the middle.

The drawing here reproduced is inscribed "D. linguiforme Par. mss., Tenasserim Province, brought from Moulmein, 3rd February 1866: Drawn by Gopal, 16th February 1866. T. Anderson."

Fig. 1, flower with the perianth segments detached; 2 and 3, anther; 4, pollinia—all enlarged.

PLATE 9.

DENDROBIUM (*Formosa?*) WILLIAMBONI, *Day and Reichb. f.*

D. Williamsoni) caulibus robustis flexuosis, vagiuis foliisque Rirto-puberulis, foliis lineari-oblongis lanceolatisve obtusis v. 2-dentatis, floribus 1—2 terminalibus breviter pedunculatis amplis, sepalis albis lateralibus lanceolatis acuminatis, dorsali ovato acuto, mento infundibulari sepalo dorsali fere sequilongo, labello aureo basi rubro-maculato lobis lateralibus brevibus rotandatis, terminali orbiculari plicato ciliato, disco obscure tricarinato. *Day et Reichb. f. in Gard. Chron.* 1869, 78; *Hook. f. Fl. Brit. Ind.* v. 721.

HAB.—ASSAM, *Williamson.* KHASIA HILLS, *Gallatly.*

Stems tufted, narrowed at the base, stout and fusiform or elongate (8—10 in.) and flexuous; naked below; internodes 1—1½ in., grooved. *Leaves* 2—4 in., pubescent on both surfaces, sessile, nearly flat, keeled, coriaceous. *Flowers* 1½—2 in. long from the tip of the dorsal sepal to that of the mentum, yellowish without, white within except the yellow lip; peduncle ½—¾ in., sheathed 1—2-fld., hidden amongst the uppermost leaves. *Lateral sepals* subfalcate; petals obovate, acuminate* *Column* with a toothed 2-lobed tip. *Anther* with ciliate margins, 2-lobed,

Of this fine species I have seen no native specimens. It was first described in 1869 from a plant supposed to have been imported from Assam, which locality was at that period the putative birthplace of every orchid from N. E. India, the precise habitats of which were not indicated. Nothing further was known of it until the publication of the Flora of British India, wherein the drawing here reproduced is mentioned, and on which is written "sent from the Khasia hills by Mr. Galtay; fid. in Bot. Gardens, 30th January 1879. Q. King."⁹

Fig. 1, flower; 2, the same with the perianth segments detached; 3, lip spread open; 4 and 6, anther; 6, pollinia:— all but fig. 1, enlarged.

PLATE 10.

DENDROBIUM (*Aporum*) LEONIS, Reichb., f.

D. Leonis robustum, foliis crasse coriaceis late ovatis v. breviter cultriforribus obtusis, floribus terminalibus solitariis, bracteis numerosissimis fibrosis, sepalis lateralibus rotundatis, petalis oblanceolatis, mento rotundato, labello lineari-oblongo inarginibus involutis apice rotundato v. retuso disco infra apicem carunculato. Reichb. f. in Walp. Ann. vi. 280; Hook. f. FL Brit. Ind. v. 723; vi. 184. *Aporum indivisum*, Lindl in Wall Cat. No. 2018 et Gen. and Sp. Orchid 70 (non Blume). A. Leonis, Lindl. in But. Reg. 1840 Misc. 59; Griff, in Culc. Journ. Nat. Hist. v. S68.

HAB.—SINGAPORE, Prince. MALACCA, Griffith. PEKAK, Scortechini. Wray.—JAVA.

Stem branching from the base; branches prostrate, 6—10 in. by 1—1½ in. broad across the leaves, quite flat. Leaves 6 in. long and broad, not striated, margins thickened when dried, dark lurid green. Flowers shortly and stoutly pedicelled, the pedicel about ½ in. long and broad, sunk in the brush-like tuft of filiform bracts, dirty purplish and yellow green (pale citron tinged with claret, Wray); mentum forming a rounded base to the flower; lip recurved, rather longer than the lateral sepals. Anther 2-lobed on the crown.

Mr. Ridley, writing from Singapore, informs me that the flowers are exquisitely scented of vanilla. The specimen figured is inscribed "*D. indivisum*, Blume. Singapore 10 (1861). T. Anderson, Flid. 20-3-62." I have pointed out in the Flora of British India that Blume's *D. indivisum*, of which there is an authentically named specimen in Herb. Lindl. (now at Kew), has much longer not thickened leaf and a transverse anther as in *eulophotum*.

Fig. 1. flower; 2, column; 3 & 4, anther; 5, pollinia.—all enlarged.

PLATE 11.

DENDEOBIUM (*Strongylo*) TERES, Lindl.

caule gracile elongate parce folioso, foliis remotis teretibus obtusis v. truncatis floribus in apicem caulis elongatum aphyllum longe vaginatum panicis oblique, bracteis spatheis, sepalis ovato-lanceolatis acuminatis, petalis brevissime plicatis Uneari-lanceolatis, mento sepalis brevior conico recto, labello sepalis petalis angustis Jdiane truncato acuminate v. cuspidate serrulate disco 3-cristato.

HAB.—SINGAPORE Ort. Lindleyi (Lindl. « Serb. E. Cak » tt«).

Stems tufted, 6—18 in. long, as thick as a crow-quill, green, narrowed towards the base, clothed below with long brown sheaths; internodes about 1 in. *leaves* 2—3 in., 1 in. broad, straight, suberect, bright green, obtuse, or very obliquely truncate at the flattened apex, with a rather acute triangular point. *Flowers* few, fragrant, produced in the very long leafless apex of the stem, which is closely invested by two or more long appressed pale sheaths an inch long; pedicel very short, issuing from a short annular sheath (? bract); perianth rather narrow, 1 in. long from the tip of the dorsal sepal to that of the mentum, which is yellow; lip white with pink veins

In the Flora of British India I described this species from Lindley's diagnosis and a very imperfect leafless specimen. The fine drawing here reproduced enables me to amend the description; it is inscribed "Singapore; Fl. in H. B. 0. 8-8-83."

Fig. 1, base, and 2, apex of leaf; 3, portion of stem and flower; 4, flower; 5, the same with the petals and sepals detached; 6 & 7, column and leaf:—all slightly enlarged.

PLATE 12.

DENDBOBIUM (*Vbyato*) PACHYGLOSSUM, *Reichb. f.*

D. pachyglossum) caulibus gracilibus coespitosis, basi non incrassatis, foliis angustissime lineari elongatis patenti-recurvis acuminatis, vaginis superioribus hirtulis, floribus axillaribus solitariis y. 2-nis brevissime pedicellatis pendulis fusco-luteis striatis, sepalis 7-nerviis lateralibus oblongo- v. triangulari-ovatis, mento sepalis aequilongo obtuso, petalis anguste oblanceolatis acuminatis, labello oblongo lobis lateralibus obscuris apicem versus labelli insertis, terminali minuto retuso, disco 2-carinato. *Parish et Reichb. f. in Trans. Linn. Soc. xxx. 149; Hook.f. Fl. Brit. Ind. v. 727.*

HAB.—TENASSERIM; at Moulmein, *Parish*. SINGAPORE (*IC. in. Herb. Calcutta*).

Stem 6—10 in., rather flexuous, sheaths red-brown, lower internodes 1—1½ in. *Leaves* 3—1½ by 1½—1 in., grass-like, bright-green, dorsally convex, channelled above. *Flowers* from the lower axils, nearly ½ in. long; pedicel hardly any, with the ovary decurved, reddish. *Sepals* and 3-nerved *petals* dull yellow with brown streaks along the nerves, which are continued to the base of the mentum; lip as long as the sepals, thickish in texture, nearly straight, concave, dull pale yellow with a green tip, nerves faint. *Column* very large for the genus, stout, 3-toothed at the top.

The drawing¹ here reproduced enables me to give a more complete description of this species than that contained in the Flora of British India. It is inscribed "Singapore, 14-5-68. Fid. March 1869." Possibly this is an error due to transposition of labels, a very common occurrence in gardens; for the only other known habitat of the species is Moulmein, whence I have seen specimens collected by Parish and accompanied by a drawing, which leaves no doubt of the identity of the supposed Singapore plant with his. The great length of the column is remarkable, and shows an affinity with *D. nutans* (see t. 18).

Kg. 1, flowers 2, the same with a sepal, petal, and lip detached; 3, column:—all more or less enlarged.

PLATE 13.

DENDROBIUM (*Virgate*) TENUICAULE, Hook. f.

D. tenuicaule) caule gracillimo elongate flexuoso internodio basilari minuto globoso, secundo et tertio gracilibus, quarto supra medium clavato, quinto incrassato tereti, sexto obverse clavato, reliquis 1—2-pollicaribus filiformibus, foliis apicem versus caulis paucis anguste lineari-elongatis, floribus apicem aphyllum versus caulis paucis solitariis albis v. pallide fulvis, sepalis dorsali oblongo obtuso 7-nervi lateralibus late ovatis obtusis, quinto sepalis duplo longiore corniforme fere recto, petalis oblongis, labello cuneato membranaceo 3-lobato, lobis lateralibus rotundatis, terminali parvo orbiculari, disco pubescente. Hook. f. *Fl. Brit. Ind.* vi. 184.

HAB.—ANDAMAN ISLANDS, {*lc. in Herb. Hort. Calcutta*).

Stems tufted, 10—12 in., very slender above, base swollen into a globose tuber emitting fibrous roots, two following internodes very slender, the next clavate ribbed, followed by a cylindric ribbed one an inch long, and this by an obversely clavate one, the rest all 1—1½ in. long, very slender, with appressed sheaths. *Leaves* on the young stems only, 3—5 in. long, slender and recurved, ½ in. broad, acute. *Flowers* about 1 in. long from the tip of the dorsal sepal to that of the mentum, very membranous; petals as long as the dorsal sepal, nerve solitary with branching nervules. *Lip* delicately 5-nerved in the centre, the outer pair of nerves branching towards the margins. *Column* very short, 3-toothed; anther hemispheric.

As stated in the *Flora of British India*, this species is there described from the drawing here reproduced (which is inscribed "Andaiidins, Eecd. 8-2-84, fld. in Hort. Bot. Calc. 30th April 1884"), and some detached flowers placed in a packet with the drawing. It seems to be quite distinct from any previously described, but it belongs to a very troublesome group with swollen lower internodes the characters afforded by which latter organs are not likely to be constant.

Fig. 1. flower with the lip removed, and 2, lip* both enlarged, are from sketches of my own of the flowers accompanying the drawing.

PLATE 14.

DENDROBIUM (*Pedibnum*) CROCATUM, Hook. f.

D. crocatum; caulibus teretibus elongatis foliosis, foliis lanceolatis acuminatis nervosis mollibus, racemis ad nodos rami aphylli paucifloris, pedunculo pediculisque divaricatis gracillimis, bracteis paucis ovatis, floribus majusculis laete croceis, sepalis lateralibus ovato-oblongis acutis dorsali petalisque oblongis 7-nerviis, mento corniforme sepalis triplo longiore lente curvo, labello spathulato ungue angusto canaliculato busi squama recurva instructo lamina obovata crenulata. Hook. f. *Fl. Brit. Ind.* vi. 185.

HAB.—PEBAK, at Larut (*lc. in Herb. Hort., Calcutta*).

Stem 2—3 ft., narrowed at the base, green; internodes 1 in., ½ in. diam. *Leaves* 4 by 1 in., bright green. *Raceme** pendulous, 2-fld. (in the drawing); *peduncle* ½—1 in., with a short annular basal sheath; *bracts* green; *pedicels* with ovary about as long; *flowers* 1* 1½ in. long from the tip of the dorsal *** to that of the long

spur-like mentum. *Lip* hardly recurved, as long as the sepals spotted with dark-red on each side towards the base of the blade, flabellately many-nerved; claw with a narrow median canal leading down to the short oblong recurved callus or scale.

A beautiful species, of which I have seen only the dried flowers accompanying the drawing. The latter is inscribed "Larut, Perak, Ic. Hort. Bot. Calo. Fl. 24-9-83."

Fig. 1, flower; \ the same with the sepals and petals detached and lip removed; 3, lip from a drawing of my own i—all more or less enlarged.

PLATE 15.

DENDROBIUM (*Pedilonum*) PANDURIFERUM, Hook. f.

D. panduriferum) caulibus elongatis cylindraceis sulcatis, foliis in caulibus junioribus lanceolatis acuminatis, racemis in caulibus aphyllis axillaribus brevibus paucifloris, bracteis parvis, pedicellis divaricatis, floribus flavis rubro-punctatis, sepalis lateralibus late ovatis subacutis, mento in calcar elongatum sepalis multoties longius apicem versus subinflatum producto, petalis orbicularibus crenatis multinerviis, labello longissime anguste unguiculato limbo panduriforme medio valde constricto lobis lateralibus auriculaefornibus, terminali late obcordato, disco ad basin loborum lateralium lamella transversa aucto. Hook. f. *Fhr. Brit. Jnd.* vi. 186.

HAB.—PEGU ; at Rangoon, Gilbert (Ic. in *Herb. Hort. Calcutta*).

Stem 2—3 ft., narrowed at the base, no doubt pendulous; internodes 1—1½ by ½ in., green, nodes often rooting; sheaths white, young green and speckled, membranous. Racemes 1—2 in.; bracts small; pedicel with ovary ½ in. and peduncle purplish; flower 1 in. long. *Sepals* and *petals* yellow or greenish, with red dots along the numerous nerves; mentum straight or slightly curved, streaked with red. *Lip* with the claw 3—4 times as long as the dull yellow limb, margins of claw incurved above, below connate with the sides of the mentum. *Column* very short; anther stipitate.

A remarkable species. The analyses fig. 1, flower, with the lip displaced; 2, petal; 3, lip; 4, column and anther; 5, anther—all enlarged—axe from drawings of my own of some flowers contained in a capsule attached to the drawing. The latter is inscribed "Rangoon, Dom. Gilbert mait; El. in H. B. C. 19-11-84." It must be very nearly allied to the *D. ionopus*, Reichb. f. in Gard. Ghron. 1882 ii. 508, from Burma, which has yellow flowers with red blotches and an elongate falcate mentum; but that species is described as having a thick keeled claw of the lip with a flat retroe tooth. The latter is a common character of the section *Pedilonum*, but I found no trace of it in the solitary lip of *D. panduriferum* which I was able to examine.

PLATE 16.

DENDROBIUM (*Pedilonum*) SERPENS, Hook. f.

D. serpens; caulibus longissimis gracilibus flexuosis basi tuberosis, internodiis 1—1½ pollicaribus medio sulcatis, racemis caulibus aphyllis ad nodos lateralibus brevibus plurifloris, floribus breviter pedicellatis, sepalis late ovatis obtusis petalisque late obovatis aureis rubro-striatis, mento viridi sepalis lateralibus duplo longiore tereti pbtuso fere recto, labelli aurei ungue lineari limbo panduriforme medio modice constricto vix duplo longiore,

limbo basi squama transversa aucto. *D. pandurifonne*, var. *serpens*, *Hoik. f. Fl. Brit. Ind.* vi. 186.

HAB.—PERAK; *Kunstler (Ic. in Herb. Calcutta)*.

Stem 2—3 ft., pendulous, green, internodes channelled and more or less twisted. *Leaves* not seen. *Racemes* 1½ in., about 6—8-fl.; peduncles short and rachis red-brown; pedicels with ovary about ½ in.; bracts very small, ovate, acute. *Sepals* and *petals* spreading, sub-acute, 5-nerved; mentum nearly straight, obtuse. *Lip* with the blade oblong, cordate above and below, slightly constricted in the middle.

In the Flora of British India, I have recorded this plant as a variety of *D. panduriferum*, adding that it may be Reichenbach's *D. ionopus*. A further examination of the drawing convinces me that it cannot be either the one or the other. From *D. panduriferum* it differs in the short pedicels, broadly obovate 5-nerved petals, much shorter mentum, and above all in the form of the lip, the blade of which is more oblong (not deeply constricted with auricle-like side-lobes), and the obconlate midlobe and the claw is not even twice the length of the blade.

The drawing is inscribed "Kunstler misit ex Perak, EL in H. B. O. 7-5-84."

Fig. 1, front, 2, back view, and 3, side view of flower; 4, flower with the sepals and petals detached and lip removed; 5, lip:—all enlarged.

PLATE 17.

DENDROBIUM (*Pedilium*) TROPCEOLIPLOEUM, *Hook. f.*

D. tropceoliflorum; caule elongato flexuoso superne incrassato apicem versus paucifoliato, foliis lineari-oblongis acutis, racemo subterminali plurifloro breviter pedunculato sepalis triangulari-ovatis acutis, petalisque obovato-rotundatis acutis atro-purpureis, mento sepalis planis longiore cylindraceo obtuso aureo, labelli ungue elongato flavo sensim dilatato limbo multo longiore, disco inter lobos laterales callo magno semilunari instructo. *Hook. f. FL Brit. Ind.* vi. 186.

HAB.—PERAK, *Kunstler (Ic. in Herb. Hort. Calcutta)*.

Stem 1 ft., incurved, slender below, tuberous at the base; roots fibrous; internodes f—I in., grooved. *Leaves* 2½ by fin. *Raceme* 1—2 in., rachis slender, pink; bracts minute; pedicels with ovary ½ in.; flowers 1 in. *Sepals* and *petals* ½—¾ in. long, dark red-purple; mentum four times as long as the sepals, nearly straight, broad, slightly undulate, obtuse. *Lip* small, narrow, about as long* as the sepals, claw gradually dilated into the short lateral lobes, between which is the large semilunar callus, suddenly contracted into the obovate-oblong apiculate limb.

A very peculiar species, with flowers a good deal like those of *Tropceofom pentaphyllum*. I have seen no specimen, and have consequently described it from the drawing, which is inscribed "in H.B.O. FL 30-8-82, from Malaya, Perak, sent by Herr Kunstler," to which Mr. Brace (then keeper of the Herbarium) has added in a note, "the sides of the claw of the lip adhere to the sides of the mentum," which they do more or less in other species of the section *Pedilonum*.

Fig. 1, flower; *, the same with the sepals and petals detached and lip removed; 3, Up *—all of the natural the, 4» lip, wUrged.

PLATE 18.

DENDROBIUM (*Eudendrobium*) NUTANS, Lindl.

D. nutans | caulibus coespitosis inferne attenuatis, superne crassiusculis foliosis, inter* nodis profunde sulcatis, foliis breviusculis lineari-oblongis lanceolatisve acutis obtusis v. sub-bilobis pubescentibus, racemis brevibus axillaribus paucifloris, pedunculo brevi basi vaginato, floribus nutantibus flavis, sepalis petalisque lineari-lanceolatis, mento conico sepalis dimidio brevioribus, labello sepalis sequilongo lineari-lanceolato lobis lateralibus parvis rotundatis, epichilio hypochilio sequilongo concavo acuto marginibus undulatis incurvis, disco 5-nervi, columna longiuscula. Lindl. *Gen. and Sp. Orchid.* 90 et in *Bot. Beg.* 1844, Misc. 52. Thwaites *Enum. PL Zeyl.* 298 (excl. syn. *Jerdonianum*), Hook, f. *Fl. Brit. Ind.* v. 734. *D. villosulum*, Lindl. *Gen. and Sp. Orchid.* 86, in part.

HAB.—CEYLON; in the Central Province, alt. 4—6,000 ft., Macrae, &c. NILGHIKI HILLS, at Ootacainund (l. in *Herb. Hort. Calcutta*).

Stems tufted, 6—10 in., sometimes rather swollen towards the middle, but hardly clavate. Leaves 2—2½ by ½—¾ in., spreading and recurved, rather coriaceous. Raceme 2—4 fld.; peduncle 1 in., leaf-opposed; pedicel with ovary ½ in.; bracts minute; flower ¾ in. long, narrow. Column rather long for the genus. Capsule sub-clavate, ½ in. long.

Lindley describes the peduncles as eubterminal, and the flowers as white tinged with green, probably from a cultivated specimen; but in an excellent drawing made by Mrs. Walker in Ceylon, they are, as represented here, of a pale rather buff yellow. Thwaites has referred to this the *Peninsular D. Jerdonianum*, Wight (*Io. t.* 1614), and no doubt the species are nearly allied, if not varieties of one; but in that the stems are much more robust, the leaves deeply acutely cleft at the broad apex, and the flowers larger. The drawing here reproduced is inscribed "*D. Jerdonianum*, Wight, Ootacainund, 1 in., fid. in H. B. O. Feb. 1863, T. A." The length of the column is remarkable, as noticed under *D. pachyglossum* (Plate XII).

Fig. 1, flower; 2, the same with the sepals and petals removed; 3, lip; 4, anther; 5, pollinia; 6, capsule; 7, the same cut transversely:—all but Figs. 6 and 7 enlarged.

PLATE 19,

DENDROBIUM (*Eudendrobium*) CANDIDUM, Wall.

D. candidum; caulibus coespitosis gracilibus erectis basi attenuatis, foliis lanceolatis acutis, floribus in caulibus aphyllis breviter racemosis albis, pedunculo brevi vaginato, bracteis majusculis ovatis concavis, sepalis petalisque lineari-oblongis obtusis, mento brevi rotundato, labello sepalis brevioribus ovato-lanceolato obtuso basi cuneato lobis lateralibus angustis rotundatis, disco barbato callo elongato instructo. Wall, in Lindl. *Bot. Reg.* 1838, Misc. n. 54; Paxt. *Fl. Gard.* i. 63, t. 41; Boott. f. *Fl. Brit. Ind.* v. 735.

HAB.—TROPICAL and SUB-TROPICAL HIMALAYA, from Kumaon, alt. 3,000 ft., to Sikkim, ascending to alt. 7,000 ft., and Bhutan. KHASIA HILLS, Gibson.

Stems tufted on a short stout creeping rhizome; internodes 1—1½ in., striate; leafless stems with long fibrous remains of the leaf-sheaths at the nodes. Leaves 3—5 by 1 in., spreading and recurved. Racemes at the nodes; peduncle ½—1 in., rather stout; sheaths

short; bracts 1 in.; pedicels with ovary 1/2 in.; flower 1—1 1/2 in. across the spreading subfalcate lateral sepals, very fragrant, pure white. *Lip* yellowish towards the base.

A beautiful species and very fragrant. I have seen no Khasian specimens; but the drawing here reproduced is inscribed "D. candidum, Wall., Mr. Gibson's collections; grows erect like D. nobile." Mr. Gibson was a collector in the Khasia, sent out by the Duke of Devonshire about the year 1834, and who, according to Lindley (Bot. Beg.), discovered D. candidum at Nunglow in the Khasia **M18**.

Fig. 1, flower with the perianth segments detached; 2, lip; 8, anther; 4, pollinia:—aW enlarged.

PLATE 20.

DENDROBIUM (*Eudendrobium*) STUPOSUM, Lindl.

D. stuposum; caulis elongatis sulcatis, foliis lineari-oblongis lanceolatisve acutis, floribus paucis in caulis aphyllis racemosis albis, pedunculo gracili vaginato, sepalis oblongis acutis lateralibus carinatis, petalis late oblongis acutis erosius, mento brevi rotundato, labello obovato-oblongo v. sub-cuneato villosulo et glanduloso-ciliato lobis lateralibus brevibus terminali rotundato. Lindl. Bot. Reg. 1838, Misc. 52 et 1844, Misc. 52, Book. f. FL Brit. Ind. vi. 186. D. sphegidoglossum, Reickb. f. in Bonplandia ii. 58; Book. f. I e. v. 737.

HAB.—KHASIA HILLS, alt. 3—5,000 ft. (Ic. in Eort. Calcutta.). TENASSEM, Parish.

Stems tufted, 6—12 in., internodes 1—1 1/2 in. Leaves 3—4 by 1/2 inch, rather thin. Racemes at the nodes. Peduncle slender, 1 1/2 in., with short scattered green sheaths; bract linear-oblong, obtuse, green; pedicel with ovary 1/2 in.; flowers 1 in. long. Lip nearly as long as the sepals, concave, not recurved, white with red veins and a yellow transverse band.

The specimen figured, which is inscribed "introduced from the Khasia Hills in 1867, fld. on 1st June 1868," differs from the description in the Flora of British India in the smallness of the lateral lobes of the lip, or rather in the greater breadth of the terminal lobe, and in wanting the red veins and yellow band which are represented in a drawing of the Tenasserim plant by Mr. Parish. That the drawing cannot be altogether relied upon is evinced by the sepals and petals being represented as acuminate in the flowers of the natural size, and with rounded tips in the enlarged figures 1 and 2; the latter being the more correct. By inadvertence I have in the Flora of British India (V. 737) adopted Beichenbach's later name of *sphegidoglossum*, which is corrected at p. 186 of Vol. VI.

Figs. 1, flower; 2, the same with one sepal and petal removed; 8, lateral sepals; 4, Ullrich's all more or less enlarged.

PLATE 21.

DENDROBIUM (*Eudendrobium*) AURANTIACUM, Reichb. f.

D. aurantiacum; caulis cespitosus elongatus sulcatus, internodiis elongatis, folia paucis lineari-oblongis apice emarginatis, floribus in caulis aphyllis amplis aurantiaca v. aureis solitariis •• binis 8 pedicem versus pinnatis validi curvis •• coriaceis imbricatis tecti, bracteis elongatis spathaceis, sepalis lateralibus oblongis v. oblongo-obovatis acuminatis, petalis latioribus ovato-oblongis ciliatis, mento brevi late conico apice rotundato, labello late unguiculato orbiculari marginibus eversis disco pubescente marginibus

erosis v. subfimbriatis.. *Reichb/f. in Gard. Chron.* 1887 ii. 98; *Book f. Fl. Brit. Ind.*, v. 751, vi. 187. *D. aurantiacum*, *Rolfe in Gard. Chron.* 1888, i. 233. *Book. /.* I e., v. 748.

BHUTAN HIMALAYA (*IC. in Eerb. Sort. CMcutl*). ASSAM (*Sort. Vtitch*). SYLHET, *Melville {in Serb. Kew}*.

Stems 1—2 ft., about $\frac{1}{2}$ in. diam.; internodes 1— $\frac{1}{2}$ in. *Leaves* 2—3 by $\frac{1}{2}$ — $\frac{1}{4}$ in., spreading and recurved. *Racemes* solitary from the upper and lower nodes; peduncle 1—2 in., curved to one side; sheaths tubular, obliquely truncate, green and brown spotted, pedicel with ovary $\frac{1}{2}$ in. decurved; bracts $\frac{1}{2}$ — $\frac{1}{4}$ in., obtuse, membranous, white; flowers $\frac{1}{2}$ in. diam. *Petals* broader than the sepals; lip with sometimes faint crimson streaks at the base. *Column* very short; anther taller than broad, tip 2-lobed.

A very fine species, first described by Beichenbach from specimens flowered by Veitch, and said to have been imported from Assam, probably the Khasia hills or Bhotan. The drawing is inscribed "Sylhet, April 1875. Mr. Melville, G. King." The same from Dewangiri, Bhotan, "Q. S. Jennings, April 1866, J. Anders." In the drawing the unnumbered enlarged figure of the lip is represented as having two small inflexed lobes above the claw, which I did not detect, and I suspect that they are due to laceration.

Fig. 1, flower with the sepals and petals detached and lip removed; 2, ovary and column; 3, anther; 4 and 6, pollinia:—all enlarged. The two unnumbered figured are a bract and the lip:—both enlarged.

PLATE 22.

DENDROBIUM (*Eudendrobium*) PALPEBRAE, *Lindl.*

D. palpebrae; pseudobulbis clavatis sub-tetragonis profunde canaliculatis, foliis terminalibus oblongo-lanceolatis acutis, racemis breviter pedunculatis multifloris pendulis v. nutantibus, bracteis parvis lanceolatis pedicello appressis, floribus amplis, sepalis oblongis obtusis petalisque breviter unguiculatis orbiculatis ciliolatis candidis y. pallido roseis, mento parvo rotundato, labello amplo explanato breviter unguiculato late oblongo pubescente et villosa-ciliato albo plaga basin versus lata lutea. *Lindl. in Journ. Sort. Sac.* v. 33; *Paxt. FL Gard.* i. 48; *Veitch Man. Dendrob.* 67; *Hook. f. Fl. Brit. Ind.*, v. 750.

HAB.—SIKKIM HIMALAYA; in the Teesta valley (*IC. in Herb. Sort., Calcutta*). BURMA; *Zobbe, Berkeley*.

Stems 6—9 in. long; internodes about 6, the upper 1 in. diam., bright green, deeply channelled, ribs rounded. *Leaves* 3—5, 4—6 in. long by $\frac{1}{2}$ — $\frac{1}{4}$ in. broad, bright green, coriaceous, flat. *Raceme* inserted towards the base of the pseudobulb, nearly a foot long, many-flowered; peduncle short; stout, decurved, with several short obtuse brown striate sheaths, rachis green; bracts $\frac{1}{2}$ — $\frac{1}{4}$ in. long, white or pink; pedicel with ovary $\frac{1}{2}$ in., slender, pink; flowers 2 in. diam. *Sepals* and *petals* pure white, or flushed with pink, faintly many-nerved, the petals twice as broad and rather shorter than the lateral sepals; lip oblong when spread out, the basal part convolute, the rest forming an orbicular softly pubescent and sub-fimbriately margined limb 1 in. diam., white with a broad golden area in the centre and base. *Column* very short.

It is singular that this beautiful plant, though introduced into England by Messrs. Veitch from Moulmein previous to 1849, should never have been figured in any published work on orchids. The drawing here reproduced is inscribed "Garden of Mr. Lynam, March 1867, T. Anders. Th. from Teesta valley on sal trees, March 1867, T. A." It must be a very rare plant hitherto been found nowhere but once in Sikkim, and by two collectors in Burma.

Fig. 1, flower; 2, column with anther; 3, anther; 4, pollinia:—all enlarged,

PLATE 23.

BULBOPHYLLUM (*Etibulbophyllum*) POLYRHIZOM, Lindl.

B. polyrhisum-, pseudobulbis parvis dense coespitosis globoso-ovoideis florentibus aphyllis, scapo basi pseudobulbi gracili erecto, racemo laxifloro, bracteis minutis, floribus brevissime pedicellatis parvia flavis, sepalis lateralibus oblongis subfalcatis obtusis, petalis ovato-oblongis obtusis, labello sessili ovato obtuso, columnæ dentibus brevibus. *Lindl. Gen. and Sp. Orchid*, 53; *Hook. f. JV. Brit. Ind.* v. 767.

HAB.—NEPAL? *WalUeh* (1c. in *Serb., Kew*). SIKKIM; *Lister* (Je, in *Herb. Sort. Bot. Cale.*).

On Plate 23 are represented two plants, which may be different, but which agree so closely in the structure of their flowers that they are more probably varieties. Both have densely clustered small pseudobulbs about the size of hazel nuts, apparently forming matted masses on the trunks of trees, leafless at flowering time, and bearing very slender scapes with lax racemes of small yellow flowers. That figured as B is from a collection of drawings received at Kew from the India House, on the Indian Government being taken over by the State. It is inscribed "*Dendrobium polymzum*, Wall. *jEridea?*" in Wallich's handwriting, and is no doubt the type of the species. It has smooth, striated pseudobulbs, and the flowers are greenish. That marked A is from the Calcutta collection of orchid drawings, and is inscribed "Sent from Sikkim by Mr. Lister, fld. in H. B. O., 4th April 1877, G. King." It represents a plant with more oblong-ovate pseudobulbs, twice, rarely thrice, constricted transversely, as if formed of three internodes, and these internodes are vertically traversed by many deep grooves with tumid interspaces, the whole pseudobulbs having (as drawn) somewhat the appearance of three superposed rows of green oblong beads. The pseudobulbs further emit surculi from their bases, which are not shown in the other drawing. In both the base of the pseudobulb is copiously supplied with fibrous roots. To identify specifically figure A with B it is necessary to suppose that the pseudobulbs of the former are old and shrivelled, allowing something also for the fancy of the native artist. With regard to the difference in the size and colour of the flowers, here, again, too much reliance must not be placed on the artist's work. The flowers of A are evidently giving place to fruit, and though its sepals are represented as anonninate in the drawing of the natural size, and at figure 1 of the analyses, they are not so in the enlarged figure 2, the sepals of which accord sufficiently well with those of B2 and 3. The sessile lip is the same in both, as are the short teeth at the top of the column. The position of Sikkim to Nepal is a farther indication of the two figures representing different states of one species.

I have only further to observe that the figures in the plate represent but very small portions of great masses depicted in the original drawings of both, and that it must be left to future observers to clear up any remaining doubts as to whether A is a distinct species or variety, which in either case if the drawing be faithful, might bear the name of *wnole*.

Fig. A, the Sikkim plant; Fig. 1, flower; 2, the same with the sepals and petals detached; 3 and 4, anther; 6, pollinia:—all enlarged.

Fig. B, the Nepal plant (*B. polyrhisian*, Wall.)* B1 and 2, flowers; B3, the same with the sepal and petal, detached:—all enlarged.

PLATE 24.

BULBOPHYLLUM (*Eubulbophyllum*) EUBLEPHABUM, *Reichb.*

B. eublepharum \ pseudobulbis elongato-ovoideis teretibus monophyllis, foliis breviter petiolatis lineari-oblongis acutis coriaceis, scapo ascendente elongato robusto, spica laxiflora, bracteis ovario aequilongis aristatis, sepalis ovato-lanceolatis longe acuminatis albis v. viridibus punctatis, petalis columnar aequilongis oblongis eroso-fimbriatis albis punctatis, labello stipitato late ovato recurvo purpureo, columnis dentibus elongatis erectis. *Reichb. f. in Walp. Ann.* vi. 252; *Hook f. Fl. Brit. Ind.* v. 764.

HAB.—SIKKIM HIMALAYA, alt. 7—10,000 ft.

Pseudobulbs 2—3 in. *Leaves* 4—8 in., sometimes loriform. *Scape* with spike 12—18 in., ascending, with a few long appressed sheaths toward the base and scattered empty green lanceolate bracts below the spike; spike 4—6 in. long, inclined; bracts 1 in., green. *Sepals* 1—1½ in. long, concave; mentum rounded; petals about 1½ as long as the sepals. *Lip* cordate at the base, strongly recurved, obtuse.

This is perhaps the only species of *Bulbophyllum* that attains to 10,000 ft. elevation. The drawing reproduced here is from a Sikkim specimen, and is inscribed "From Tonglo, alt. 10,000 ft, Aug. 1862. T. Anderson. Luchman Singh del." Griffith's specimens (brought by collectors in Sikkim) have leaves 6 by 1½ in., and flowers larger than in the drawing.

Fig. 1. side and 2, front view of flower; 3, the same with sepals and petals removed; 4, anther; 5, pollinia—*atf enlarged from the specimen drawn.* Fig. 6 > enlarged flower with a lateral sepal and a petal removed, from a drawing of my own of a flower taken from Griffith's specimen.

PLATE 25.

CIRRHOPETALUM (*Racemose?*) BLEPHARISTES, *Hook. f.*

C. Blepharistes; pseudobulbis in rhizoma elongatum robustum remotis oblongis ovoideisve teretibus v. uno latere sulcatis 1—2 phyllis, foliis oblongis lineari-oblongisve emarginatis crassissimis, scapis elongatis gracilibus decurvis, rachi incrassato, floribus magnis breviter racemosis, sepalis viridibus rubro-striatis, lateralibus in laminam ovato-lanceolatam acutam connatis, dorsali lanceolato bis terve longiore, petalis late oblongis obovato-cordatisve fimbriatis 5—10 nerviis aureis apicibus rubro-punctatis, labello sessile recto oblongo apice rotundato basi dilatato cordato, columnae dentibus minutis. *Hook f. It Brit. Ind.* v. 779; yi. 190. *Bulbophyllum Blepharistes*, *Reichb. f. m. Trans. Linn. Soc.* xxx. 138.

HAB.—KHASIA HILLS, *Badgeley (Ic. in Herb. Hwt. Calcutta).* TENASSERIM, *Parish.*

Rhizome as thick as a duck's quill, rooting at the bases of* the pseudobulbs, articulate. *Pseudobulbs* 1½—3 in., smooth, green, with sometimes a superadded node. *Leaves* 2—3 in., sessile or shortly petioled. *Scape* 6—12 in., with distant green appressed sheaths, often deflexed with the umbel erect; bracts minute, triangular, persistent, green; pedicels with ovary ½ in., slender. *Sepals* 7-nerved; lateral 1 in., base of combined pair subcordate, dorsal variable in length; petals very small; lip yellowish, mottled with red, not recurved. *Column* very short, apex dorsally toothed.

This is one of the few species of *Cirrhopetalum* that may be referred to that genus or to *Bulbophyllum*, according to whether the dorsal sepal is considered to be long or short. In the case of the specimen figured it would, but for its habit, be referred to the latter genus, as it was by Eichenbaoh. As I have stated in the Flora of British India (v. 772), the species of *Bulbophyllum* and *Cirrhopetalum* are in many cases so dosely allied by cross affinities that the two genera might well be regarded as one. My keeping them apart is due to the consideration of convenience, and the faot that all my attempts to commingle the species of both has resulted in a ohaotio aggregate with most unsatisfactoiy sectional characters; in fact a for less satisfactory result than the keeping them apart, which latter course avoids a greatly increased synonymy.

The drawing of the Khasian specimen here figured is inscribed "Khasia hills, Oapt. Badgeley, fid. H. B. O., January 1878"; the flowers are muoh larger and the dorsal sepal far longer than in the Tenasserim specimens.

Kg. 1, flower; 2, dorsal and 8, lateral sepals; 4, petals; 6, column; 6, lip; 7, 8, anther; 0, pollinia; 6, ovary and column :—all enlarged.

PLATE 26.

CIRRHOPETALUM (*Umbettata*) GAMOSEPALUM.

C. gamosepalum) pseudobulbis in rhizomate repente subremotis ovoideis angulatis, foliis obovatis lineari-obovatis-oblongisve emarginatis v. bilobis crasse coriaceis,* scapo gracili pendulo multifloro, bracteis lanceolatis pedicillis brevibus brevioribus viridibus, sepalo dorsali ovato in aristam ciliatam angustato aureo-rubro-striato producto, lateralibus dorsali subtriplo longioribus linearibus apice rotundatis in laminam lineari-oblongam planam roseo-purpuream cohserentibus, petalis sepalo dorsali fere aquilongia ciliatis et in aristam ciliatam pro^uctis rubro-punctatis, labello subsessile lineari-oblongo obtuso recurvo purpureo, columnar angulis rotundatis. *Griff. Notul.* iii. 296; *Hook. f. Fl. Brit. Ind.* v. 774. *C. Andersonii*, *Kurz in Rep. Veg. Andam.* 51 (*nomen*). *Bulbophyllum* Griffithianum, *Par. and Eeichb. f. in Trans. Linn. Soc.* xxx. 153.

TENASSERIM— *Griffith, Parish.* ANDAMAN ISDS., *Kurz.* PERAK, *Scortechinl* MALACCA, *Mangay.*

Rhizome as thick as a crow-quill, closely articulate. *Pseudolulbs* f—1 in. long, green, 4-angled. *Leaves* 2£-4 in., subpetiolate, dark green. *Scape* 4—6 in., very slender, brown-purple, sheaths small appressed; bracts £ in., green; pedicels with ovary about twice as long; flowers f—1 in. long. *Dorsal sepal* suberect, lateral cohering as a flat rose-purple blade with a rounded entire or crenate tip, each 5-nerved.

Notwithstanding Griffith's description of the rhizome of his *O. gamosepalum* as filiform, I feel sure that I was right in referring to it Kurz's *O. andamanicum*; and the drawing here given confirms this view. Except in colour, I find no other difference except in the lip, whioh Griffith describes as acuminate. The dorsal sepal and petal he describes as blood-red; the former greenish at the base and the lateral as closely dotted at the base with purple; and the oolumn as white with black-purple spots. Reichenbach in his very imperfeot diagnosis of *Bulb. Griffithianum* describes the leaves and lateral sepals as acute, and omits the ciliate awned apices of the dorsal sepal and petals. Following him I described the lateral sepals as acute (*Fl. Brit. Ind.*), but I feel sure that they are only so through shrivelling. I gather from an observation in his diagnosis that Pariah had suggested its being *O. gamosepalum*. The latter says the flowers are white streaked with brown.

I think it probable that *C. gamosepalm* is a littoral species, as it extends from Tenasserim to Malacca and the Andamans. The drawing here reproduced was from an Andaman specimen which flowered in the Calcutta Garden. There are specimens in Herb. Kew from all the given localities* except from Griffith's of Mergui (in Tenasserim).

Fig. 1, flower, side view; 2, do., front view; 3, flowers with the lateral sepals removed and the dorsal and petals displaced; 4 and 5, lateral sepals; 6, lip; 7, anther; 8, pollinia:—*all enlarged*.

PLATE 27-

CIRRHOPETALUM (Umbellate) CCBSPITOSUM, Wall.

C. ccespitosum; pseudobulbis confertis ovoideis, foliis petiolatis lanceolatis oblongo-lanceolatisve acutis, scapo foliis brevior, vaginis brevibus laxis, umbella confertiflora, foliis flavis v. virescentibus, sepalis dorsali cymbiforme v. orbiculare galeato 5-nervi petalisque erosis, lateralibus liberis dorsali ter longioribus lineari-lanceolatis obtusis, petalis ovato-oblongis v. orbiculari-ovatis subacutis sepalis dorsali aequilongis 3-nerviis, labello breviter stipitato minuto ovato basi dilatato cordato obtuso aureo basi purpureo arete reflexo, columnae dentibus acicularibus erectis. *Wall in Boi. Reg.* 1838, *Misc.* 35 et 1843 *sub. t.* 49; *Hook. f. Fl. Brit. Ind.* v. 775. *Bulbophyllum scabratum, Rekhb. f. in Walp. Ann.* vi. 259.

HAB.—KHASIA HILLS, *Griffith, Gibson*.

Pseudobulbs —1 in., dark green, purplish at the top, smooth. *Scape* 2 in., slender, inclined, red-brown; bracts 1 in., lanceolate, shorter than the ovary, which with the pedicel is 1 in.; flowers —1 in. long, papillose. *Dorsal sepal* apiculate, lateral with involute margins, nerves of petals flexuous.

The hairs on the dorsal sepal and petals of the drawing are intended to represent the cellular or papillose erose texture of these organs. The different colour of the flowers of the specimen figured and the enlarged one is not easily accounted for, and the enormous column represented at fig. 3 is quite unlike that of any species of the genus known to me. On the other hand, the habit of the plant is entirely that of *O. empitomm*, assuming that the flowers have not spread in an umbellate form, as they should do.

The drawing here reproduced is inscribed "*Cirrhopetalum ccespitosum*, Mr. J. Gibson, 1836" in Wallich's writing. The figure differs from Lindley's description in the dorsal sepal being ciliate and not scabrid, and in the petals not being profusely serrate, also in the large size of the lip. In the *Flora of British India* the lateral sepals are described as obtuse.

Fig. 1, flower; 2, petal; 3, column and lip; 4, pollinia:—*all enlarged*.

PLATE 28.

CIRRHOPETALUM (Racemosae) BEFRACTUM, Zollinger.

C. refractum; pseudobulbis diphyllis confertis ovoideis v. conicis, junioribus globosis senioribus saepe lobatis, foliis sessilibus lanceolatis acutis, scapo suberecto paucifloro, floribus sub-spicatis remotis 2-pollicaribus, bracteis ovario brevi longioribus ovato-lanceolatis, sepalis lateralibus dorsali minuto lanceolato aristato ciliato multoties longioribus anguste loriformibus in laminam planam auream rubro-striatam coherentibus,

petaJis rubris ovato-lanceolatis longe acuminatis ciliatia et pubescentibus ^{8eMirt} A V minoribus, labello minuto oblongo hispidulo v. glabrato, column® calcaribuT^{Lr.3} decurvis. *ZoMnger in Flora* 1847, 457; *Walp. Ann. i.* 776; *Hook. T T Z i T* 779. C. Wallichii, *Lindl. in Wall. Cat.* 1980 et in *Bot. Beg.* 1839, *Miso* 71 ^ 1843 *sub.*

1876, 817. *Bulbophyllum tnpudians*, *ejrnd. %n Tram. Linn. Soc. m'154*. *B. refractum*, *BeicKb. f. in Walp. Am. vi.* 259.

^.-SUBTROPICAL HIMALAYA; from Kumaon alt. 3,700 ft., *Strachey and Winterbottom*, to Sikkim, alt. 4-5,000 ft., J. D. H., &c. TENASSERIM, *Parish.* DISTBIB. TM JAVA.

*Pseudobull** very variable, f-1 in. diam., young often nearly eloboeae «M A I lobed at the sides. *Leaves* 2 on young pseudobulbs, 4-5 in. long, rather flaccid ^{esp. y} 4-6 in., stout or slender, often red-brown, sheaths few, appressed; spike usuall ^ clined or nodding, with 3-10 spreading or drooping flowers; bracts cymbiform brLdT ovate; ovary about £ in. long. *Dorsal sepal* J in., yellow streaked with --- /o lateral remote at their bases, margins glabrous or ciliate; petals purplish red*** re-! cylindric, streaked and speckled with red-purple, tip thickened incurved. ^ su-*

A very singular species, quite unlike any other, remarkable also for its wide di trih r one of the few epiphytio orchids that inhabit both the Himalayas and Java. The specimen ^{on, w l *} from native specimens, of which I have seen several, show a good deal of variation in th ^{and a gWeti} colouring of the bracts and perianth segments. The drawing here reproduced is of a Siktⁿ⁶ ^ inscribed "Bolb. above Kureeong, 5,500 ft., 4th October 1876, G. King." ** ^eamu

Fig. 1, flower; 3, lateral sepals; 3, dorsal sepal; 4 and 6, petals; 6, column and lip; 7, TJD. o *... P. . P», front new of column

PLATE 29.

PANISIA PABVIFLOBA, *Lindl.*

P. paniHora; pseudobulbis ovoideis reticulatis diphyUis, foliis subpetiolatis elliptico lanceolatis acutis, scapo brevi gracile decurvo, racemo pendulo, floribus albis, sepalis kter- alibus lanceolatis acutis 5-nerviis, dorsali lineari-oblongo, petalis ovato-lanceolatis 3-nerviis basi gibbis, labello lanceolato ungue elongata gracili geniculata apice 2-tuberculata" *Itou Fol. Orchid.* 1; *Hook. f. Fl. Brit. Ind. v.* 783. *P. reflexa*, *Lindl. U. Coelogyne parviflora*, *Lindl. Gen. and Sp. Orchid.* 44. *Dendrobium demissum* *Don Prodr.* 34.—*Androgyne*, *Griffr Mtul.* iii. 279.

HAB.—SUBTROPICAL HIMALAYA; Nepal, *Wallich*; SIKKIM, alt. 4-10,000 ft., *Clarke*. KHASIA HILLS, *Griflih, Spc*

Pseudobulbs broad or narrow, |—f inch long, pale green, with slender, pubescent, branching roots from the base. *Leaves* 2-3 in. *Scape* 1-2 in.; raceme laxly few or many-fld.; bracts | in., lanceolate, shorter than the ovary, brown, membranous, deciduous; pedicel with ovary £ in. *Sepals* and *petals* pure white; lip very narrow, 3-nerved, acute; claw variable in length, sometimes more than half as long as the blade. *Column* as long as the sepals, slender below, gradually dilating upwards into

two entire or toothed wings, pale yellow brown. *Anther* notched at the tip; pollinia 4, connected by a viscus. *Capsule* $\frac{1}{2}$ in. long, turgidly obovoid.

Though known for upwards of 70 years—for Wallich sent specimens to England early in the century—this interesting little orchid has never yet been cultivated in England, nor has a figure of it been published in Europe. That here given is from a Sikkim specimen collected by Dr. King at 6,000 feet elevation, 25th October 1876. The analyses A 1—5 are by myself from a specimen sent by Dr. Wallich to Sir James Smith about 1821, and given by the latter to Sir W. Hooker.

Fig. 1, flower with the lateral sepals and lip turned down; 2, flower with the sepals and petals detached; 3, ovary and column; 4, lip; 5 and 6, anther; 7, pollinia, *enlarged*:—all from the Sikkim drawing.

A1, dorsal and A2, lateral sepal; A3, petal, A4, column and lip; A5, *enlarged*:—all from Wallich's Nepal specimen.

B, lip of *Panisia apiculata*, Lindl., from Moolyett, Tenasserim, Parish, from a drawing of my own. It is the only other species of the genus, and differs remarkably in the form of the lip from *E. parviflora*.

PLATE 30.

ERIA (Hymeneria) OBESA, Lindl.

E. obesa; pseudobulbis dense congestis crassis fusiformibus basi attenuatis vaginis hyalinis tectis, foliis lanceolatis v. ovato-lanceolatis, racemis lateralibus sessilibus v. breviter pedunculatis paucifloris pubescentibus, bracteis patulis ovatis herbaceis, floribus albis roseo-striatis, sepalis lateralibus falcato-decurvis lanceolatis acuminatis, mento breve, petalis oblongo-lanceolatis, labello lineari-oblongo lobis lateralibus parvis y. obsoletis, disco 3-carinato. Lindl. in Wall. Cat. n. 1976 et Gen. and Sp. Orchid 68 et Bot Reg. 1844 sub. t. 29 et in Journ. Linn. Soc. iii. 53; Walp. Rep. vi. 277.; Hook. f. Fl. Brit. Ind. v. 794. *E. Lindleyana*, Grif. Notul. iii. 300.

HAB.—MARTABAN, Wallich. TENASSEEIM; at Mergui, Griffith, Parish.

Pseudobulbs 2—3 in. by $\frac{1}{2}$ — $\frac{1}{4}$ in. diam., curved, spindle-shaped, narrowed at the base of 4–6 principal nodes and a few very short small basal ones, pale silvery green from the transparent hyaline reticulate sheaths. *Scapes* several from each pseudobulb, with the sub-corymbose raceme 2 in. long; bracts $\frac{1}{2}$ — $\frac{1}{4}$ in., green; pedicel with ovary $\frac{1}{2}$ — $\frac{1}{4}$ in., slender. *Bepah* $\frac{1}{2}$ in. long, lateral spreading and decurved, more or less pubescent, very acuminate, dorsal recurved; mentum green, pubescent; petals shorter than the sepals; lip nearly as long as the sepals. *Capsule* 2 in., very slender, straight.

A singular species, remarkable for the pale sausage-shaped crowded glistening green pseudobulbs. There is no indication on the drawing of the locality whence the specimen was procured or of the collector, it being simply inscribed "*B. obesa*. Pale," implying that the drawing was made during Dr. Falconer's superintendence of the Calcutta garden.

Fig. 1, side and 2, back views of flower with the lip removed; 4, dorsal sepal; 5, lip; 6 and 7, anther; 8, pollinia:—all *enlarged*.

Fig. A1, lip, *enlarged*. AS fruit of the natural size, from Mr. Parish's specimen in Herb. Kew.

PLATE 31.

EBIA (*Symmria*) CLAVICAULIS, Wall.

E. clavicaulis; caulibus elongatis subclavatis sulcatis apices versus foliosis et floriferis, foliis 2—4 elliptico-lanceolatis acuminatis, pedunculis brevibus 2-3-floris, bracteis magnis ellipticis oblongisve patentibus, pedicellis elongatis, sepalis lateralibus triangulari-ovatis acutis recurvis, mento brevi lato 2-lobato, petalis late oblongis obtusis 5-nerviis, labelli hypochilii late obcordato v. fere reniforme, lobis rotundatis, disco callo elongato tomentoso simplici v. basi 3-fido instructo, epichilio parvo orbiculari sinu hypochilii fere incluso area centrali incrassata tomentosa. Wall, ex Lindl. Bot. Beg. 1840, Misc. 90 (non. Journ. Linn. Soc.); Walp. Ann. vi. 278; Book. f. Fl. Brit. Ind. v. 799. *E. khasiana*, Lindl. in Journ. Linn. Soc. iii. 59.

HAB.—KHASIA Hills, Griffith.

Stem 6—10 in., very narrow at the base, gradually thickening upwards to 1 in. diam., many grooved; internodes 3—5, 2 in. long, each with a short appressed brown ovate* sheath that does not embrace the stem, pale-green and speckled with darker. Leaves 3—4 in., spreading and reflexed. Peduncle 1—1 in., with broad basal sheaths; bracts 1—1 in., many-nerved, membranous, spreading; flowers glabrous, white, lip with purple margins, and yellow disk. Sepals 1 in. long; petals nearly as large as the sepals; lip variable in the breadth of the hypochil and size of the epichil. Column—rather long and slender.

No habitat is given for the original *E. clavicaulis*, which was sent by Wallich with the mss. name, to the Royal Horticultural Society previous to 1840, where it flowered and was described by Lindley in the latter year. There are, however, specimens amongst Griffith's collections from the Khasia Hills. The drawing reproduced here has no indication of its native country, bearing only "Flowered in H. B. O., 21st February 1866, T. Anderson."

Eg. 1, side and front view of flower; 2, ovary ** «olimm» * " " ^; 3, ** & * - « «*arged.

Fig. A 1. lip «d columns A 3, side view of column; A 4. anther viewed facing the odds, A 5, pollinia/I from Griffith's dried specimens. Kg. A *, lip from a cultivated specimen in H. B. O., from Barley Hall.

enlarged

PLATE 32.

EBIA (*Dendrolirion*) DISCOLOB, Lindl.

JE. discolor?, rhizomate crasso elongato, caulibus crassissimis pedicellis clavatis f. n. de sulcatis, foliis oblongis lineari-oblongisve apice emarginatis coriaceis subplicato-
pro u n « « n p d n n c i J i s d o r s o f o l i o r u m i n s e r t i s i i s q u e b r e v o r i b u s c r a s s i s s t r i c t i s f u s c o - t o m e n t o s i s v a g i n i s o v a t o - c o r d a t i s i n s t r u c t i s a p i c e s v e r s u s f l o r i f e r i s , b r a c t e i s c o n a c e i s o v a t o - c o r d a t i s , f l o r i b u s b r e v i t e r p e d i c e l l a t i s e x t u s f u s c o - t o m e n t o s i s i n t u s f l a v i s l a b e l l o b r u n n e o , s e p a l i s o b l o n g i s o b t u s i s , p e t a l i s a n g u s t i o r i b u s o b o v a t o - o b l o n g i s , l a b e l l o b a s i c o l u m n a p o d a e a r t i c u l a t e o r b i c u l a r i d e n s e t o m e n t o s o b a s i c a l l o m a g n o g l o b o s o n i t i d o i n s t r u c t o . L i n d l . i n J o u r n . L i n n . S o c . i i i . 5 1 . *E. pulchella* (partim), Hook. f. Fl. Brit. Ind. v. 802 (phnta Sikkimensis) et vi. 190.

HAB.—SIKKIM HIMALAYA ; alt. 3—4,000 ft., J. D. H.

Rhizome thicker than a swan's quill, woody, terete, naked. *Sterns* distant on the rhizome, a foot high, of a few very large naked internodes 2—3 in. long by 1 in. diam., the basal narrowed, and a few short terminal ones, all dark-green, shining and deeply grooved, somewhat contracted at the nodes. *Leaves* 5—8 in. by 1—1½ in., suberect, with about 7—10 longitudinal grooves on the upper surface. *Peduncles* inserted at the backs of the leaves at their bases 3—4 in. long, as thick as a crow-quill, stiff, erect or spreading with several bract-like cordate brown sheaths ½ in. long, and many imbricating ones at its base; flowers ½ in. diam., crowded at the ends of the peduncle. *Sepals* and *petals* coriaceous. *Lip* inserted by a very short narrow claw, above which is a bead-like shining black callus. *Column* stout, incurved. *Anther* broadly conical.

This fine drawing shows me that I erred when describing the *Erias* for the Flora of British India, in uniting Lindley's *E. discolor* with the Malayan *E. pulchella* a much smaller plant, to which, however, it is very closely allied. Both are referable to Blume's genus *Callostylis* (*C. rigida*, Blume, Bijdragen, 340, Fig. 74), afterwards altered to *Tylostylis* (Blume Fl. Jav. Praef. vi), that of *Callostylis* having been preoccupied. This genus *Tylostylis* is, though reduced to *Eria* by Lindley and others, I suspect a distinct one, remarkable for the spreading perianth, the total absence of a mentum, the lip articulate with the base of the column and mobile, and presenting a singular polished knob at its base. According to Griffith, *E. barbata*, Reihb. f. has a mobile lip, but of a very different form from that of *E. pulchella* and *E. discolor*, and its flowers are otherwise those of a true *Eria*. This character of a mobile lip can be satisfactorily ascertained only on living specimens. If the genus *Tylostylis* is to be retained, the Malayan *E. pulchella* should take the name of *T. rigida*, BL., and the species here figured of *T. discolor*. The drawing gives no indication of locality, or other information than "Orchid sent by Mr. Jaffray, drawn 1880, G. King." According to the drawing the pollinia are very peculiar. I have not the means of verifying it.

Fig. 1, flower; 2, anther; 3, pollinia:—enlarged.

PLATE 33.

ACANTHEPHIPIUM STBIATUM, Lindl.

A. striatum; pseudobulbis cylindræis v. elongato-obpyriformibus, foliis obovato-oblongis acutis, floribus capitatis congestis, bracteis magnis lanceolatis acuminatis flores subsequantibus viridibus rubro-striatis deciduis, floribus albis roseo-striatis, sepalis lateralibus oblongis apice rotundatis, mento calcariforme incurvo obtuso, petalis sepalis aequilongis, labelli lobis lateralibus subquadratis antice rotundatis, postice falcato incurvis, terminali parvo coccineo, disco crista media nervisque 2 incrassatis instructo. Lindl. in Bot. Reg. 1838, Misc. 45; Walp. Ann. vi. 460; Hook. f. Fl. Brit Ind. v. 816.

HAB.—SIKKIM HIMALAYA, Griffith* collector; at Pachem (Ic. Herh. Hort. Bot. Calc). NEPAL (Lindley in Bot. Reg.).

Pseudobulbs 2—3 in. by 1—1½ diam., green, quite smooth and terete, clothed above with long brown lacerate sheaths which embrace the leaf-bases; flowering stems 4—5 ft., very stout, sometimes two together, green, clothed with green sheaths 2—2½ in. long, with reddish tips, or sometimes with pale tips striated with red; bracts 1½ in., elongate-cymbiform; pedicel very short and stout, with the ovary about 1 in., green, streaked with red; flowers 1½ in. from the tip of the dorsal sepal to that of the mentum.

Lateral sepals very broad; petals and lip concealed within the sepals; lip hardly longer than the column.

Described from the drawing, which probably exaggerates the dimensions of the specimen it portrays. The species was first described by Lindley in 1838 from living plants which were procured from Kew and said to have been received from Nepal (no doubt from Dr. Wallich). Lindley's description accords very well with the figure here reproduced, which is that of a Sikkim plant, which was collected at Pacheem, on the southward flanks of the outer Himalaya, at an elevation of about 5,000 feet.

The Indian species of *Acaethihippium* all want careful analyses and figures taken from living specimens; the texture of their flowers is such that in a dried state they cannot be satisfactorily studied.

Fig. 1. flower of the *natural* size; 2, ovary lip and column; 3, anther; 4 and 6 pollinia:—all enlarged.

PLATE 34.

NEPHELAPHYLLUM GRANDIFLORUM, *Hook f.*

N. grandiflorum; foliis longe petiolatis ovato-cordatis acuminatis, scapo foliis longiore pubescente vaginis pallidis cylindraceis elongatis, bracteis setaceis pedicello brevioribus, racemo laxifloro erecto, floribus 1 poll. diam. virescentibus roseo ornatis, sepalis lateralibus lanceolatis acutis, petalis latioribus ellipticis acutis, mento late conico apice rotundato, labello parvo oblongo decurvo, disco 8-carinato, lobis lateralibus brevibus obtusis, terminali ovato obtuso. *Hook, f. FL Brit. Ind. vi. 192.*

HAB.—PERAK (*IC. Scortechini*), Kwutfar.

Stem short, terete, green, rooting. *Leaves* about 2, 4 by 2½ in., cordate, with a narrow deep sinus at the base, 7—9-nerved, bright green; petiole 3—4 in., terete, green, without a sheathing base, but sheathed with a long membranous deciduous vagina. *Scape* with raceme 10 in., green, finely pubescent, with two long membranous pale sheaths below the middle 1—1½ in. long; raceme 2-7-fl.; bracts ½ in., slender; pedicel with ovary 1—½ in. flowers nodding, 1 in. diam, dull green, flushed with red, or the sepals with red margins. *Lateral sepals* ascending, subfalcate; mentum broad; petals as long, but rather broader. *Lip* with 3 keels on the disk from base to apex, white or pink with a dark red midlobe.

Much the largest species hitherto discovered. The drawing is inscribed "Malaya FL 28-4-82, H B. O., Cult., recd, from Kunster, Perak." A drawing by Scortechini represents the scape as 2½ in.

Fig. 1, flower with the lip removed; 2, do. with a lateral sepal removed, both of the natural size; 3, front and 4, side view of the column; 6, anther; 7 pollinia:—all enlarged.

PLATE 35.

TAINIA LAHFOLIA, *Benth.*

T. latifolia; caule procumbente radicante, foliis elliptico-lanceolatis acuminatis lamina petiolo longiore, scapo cum racemo laxifloro 2-3 pedale, bracteis lineari-lanceolatis ovario brevioribus, sepalis 3-nerviis petalisque 5-nerviis lineari-oblongis obtusis flavidis

fusco-purpureo striatis, mento brevi rotundato, labello obovato-oblongo aureo, lobis hypochilii lati antice acutis, disco 3-carinato carinis lateralibus medio incrassatis, epichilio parvo sinu hypochilii semi-immerso orbiculari v. obcordato, disco tenuiter 5-nervi, anthera 2-umbonata, latifolia. *T. Benth. in Serb. Kew.*; *Hook. f. Fl. Brit. Ind. v. 820 et vi. 192.* *Ania latifolia, Lindl. in Wall. Oat. n. 3741 et Gen. and Sp. Orchid 130.* *Eria Ania, Reichb. f. in Walp. Ann. vi. 270.*—*Cymbidium, Griff. Notul. iii. 343, et Ic. Pl. Asiat. t. 319.*

HAB.—SIKKIM HIMALAYA, alt. 8,000 ft. (*Ic. in Herb. Hort. Calcutta*). SILHET, CACHAK, and the KHASIA HILLS, *Wattich, fyc.* UPPER BURMA, *Griffith.*

Stem prostrate or ascending, cylindric, not or hardly pseudobulbous, as thick as a goose-quill, green, smooth. *Leaves* solitary, erect, 6—12 by 1½—3 in., 5-nerved, dark green; *petiole* 3—4 in., enclosed for half its length or more in an appressed membranous brown sheath. *Scape* taller than the leaf, purplish, with two long, tubular, acute, brown sheaths; *raceme* laxly many-fl.; *bracts* ½—1 in.; *pedicel* with ovary 1 in.; *flowers* ½ in. diam.; *sepals* and *petals* recurved. *Anther* with 2 dark bosses.

The leaves of the Sikkim specimen here depicted are narrower than usual in *T. latifolia*, and the habitat recorded on the drawing "Temperate oak woods on Sinohal, 8,000 feet above the sea, 31-8-62, T. Anderson," is far above that at which the species had previously been collected—much higher, indeed, than the genus, which is essentially tropical, had been known to attain. As in all orchids the determination of the lamella, keels, crests, &c, of the disk of the lip is exceedingly difficult in dried specimens, and that here given at figs. 1 and 2 from the Sikkim plant will not stand critical comparison with fig. 3, which is from a drawing of my own, or with Griffith's drawing of the Burmese plant on t. 319 of his "Icones." I am, however, satisfied that all belong to the same species.

Figs. 1 and 2, ovary, lip and column; 3, lip; 4, anther; 5, pollinia i—all enlarged.

PLATE 36.

TAINIA COBDEFOLIA, *Hook. f.*

T. cordifolia; caule foliifero violaceo pseudobulboso, folio amplo late ovato-cordato petiolo violaceo plureis longiore, scapo unacum racemo multifloro bipedali bad vaginato, bracteis ovario brevioribus lineari-lanceolatis, sepalis petalisque linearibus acutis viridibus rubro-marginatis, mento brevi, labelli aurei lobis lateralibus acutis, epichilio suborbiculari amplo, disco tricarinato, carinis hypochilio continuis epichilio ultra mediam evanescentibus, anthera 2-umbonata. *Hook. f. Fl. Brit. Ind. vi. 193.*

HAB.—SIKKIM HIMALAYA (*Ic. in Herb. Hort. Calcutta*). BHOTAN (*Ic. Simons in Herb. Sort., Calcutta*).

Stem as stout as the middle finger; pseudobulb of leaf 2 in., bottle-shaped, smooth, dark violet-blue, enclosed in a deciduous brown sheath. *Leaf* about 12 by 4½ in., 7-nerved, base obliquely cordate, sinus open; *petiole* 2½ in., very stout, violet-blue. *Scape* stout, base enclosed in long membranous brown sheaths, green; *raceme* 8—10 in., very many-fl.; *bracts* and short *pedicels* reddish; *flowers* 1½ in. diam. *Sepals* and *petals* spreading.

Much the largest species of the genus, but of which I have seen no specimen, and have therefore to trust to the drawings for the entire description. Of these, that of Simons is a very rude outline in pen and ink, and without analyses; that here reproduced is inscribed "Introduct. from Sikkim, Feb. 1867, fide Feb. 1867, T. Anderson; fide again March 1875, GK King."

Fig. 1, flower; 2 front view of do; 3 lip foreshortened; 4, anther; 5 pollinia:—all enlarged.

PLATE 37.

PHAJUS MISHMENSIS, *Beichb. f.*

P. mishmensis; caule robusto elato folioso basi vix pseudobulboso, foliis al ternis elliptico-lanceolatis acutis, scapo axillari elongato plurifloro, bracteis lanceolatis caducis ovario brevioribus, , floribus suberectis rostratis, sepalis petalisque hinc oblongis subacutis concavis, labello sepalis aequilongo, lobis lateralibus brevibus rotundatis recurvis, terminali parvo orbiculato 2-lobulato reticulato, disco cristate, calcaro angusto sepalis dimidio brevioribus. *Beichb. f. in Bonplandia* v. 43 et in *Walp. Ann.* vi. 922, 928. *Hook. f. Fl. Brit. Ind.* v. 817. *Limnites mishmensis*, *Lindl. and Paxt. Fl. Gard.* iii. 36.

HAB.—SIKKIM HIMALAYA, in hot valleys, *Clarke*. MISHMI HILLS, *Griffith*.

Stem 3—4 ft., as thick as the middle finger, somewhat tuberous at the very base; naked below, with the fibrous remains of old leaf-sheaths on the nodes, leafy above! *Leaves* 6—12 by 4—5 inches, 5-nerved. *Scapes* 1—2, rather slender, much exceeding the leaves, green; sheaths few, narrowly-lanceolate; racemes few and lax-flowered; bracts narrowly-lanceolate, much shorter than the ovary; pedicel with ovary slender, 1—1½ in., suberect. *Lateral sepals* 1± inches long, bright rose-coloured; petals narrower, paler; lip narrow with short everted lobes; spur green.

The drawing here reproduced is from the collection formed by the late J. F. Cathcart, Esq., B. O. S., when residing in Darjeeling in 1849, and now at Kew.

Fig. 1, side view of flower; 2, front view of flower with sepals and petals removed and the lip spread out; 3, lip and column:—all of the natural size; 4, anther; 5, 6, pollinia:—all enlarged; 7, young fruit of the natural size; 8, transverse section of the same, enlarged.

PLATE 38.

CYCLOPSYNE KINGII, *Hook. f.*

C. Kingii, rhizomate robusto ascendente crebre articulate fibroso, pseudobulbis diphyllis magnis anguste ovoideis sulcatis diphyllis, foliis magnis lanceolatis acuminatis, scapo aphylo rhizomate inserto stricto elongato toto vaginato, vaginis inferioribus brevibus arete imbricatis superioribus elongatis laxioribus, racemo ascendente laxifloro, bracteis pollicaribus ovario excedentibus lineari-cymbiformibus, floribus albis 1 | 2 pollinatis, sepalis lateralibus lanceolatis acuminatis dorsali elliptico-lanceolato, petalis oblanceolatis acutis, labelli lobis lateralibus brevibus rotundatis, terminali orbiculato, disco cristis 5 medio lobi terminate evanidis percurso.

HAB.—PEBAK, *Kunstler*.

Rhizome as thick as a swan's quill, with many internodes 1 in. long, fringed with fibres at the nodes, and emitting short rootlets, probably erect and inclined against

the trunks of trees. *Pseudobulbs* 3½ inches long by 1—1½ inches diam., pale green, with many longitudinal furrows. *Scape* inserted on the rhizome near the base of a pseudobulb, 6 inches long, striate, erecto-patent, clothed throughout with coriaceous sheaths, the lower of which are very short and closely imbricate, the upper laxer, an inch long, tubular with obtuse mouths. *Raceme* 4 inches long, ascending, 6-fld.; rachis slender, subflexuous; bracts rigid, one inch long, elongate-cymbiform, subacute, rather longer than the ovary; pedicel slender; flowers pure white except the five yellow crested ridges on the lip, which extend from the base to halfway down the terminal lobe. *Sepals* 1 inch long and petals pure white, lateral lanceolate acuminate, dorsal elliptic acute; petals as long, oblanceolate, acute. *Lip* with obtuse short side-lobes and an orbicular apiculate midlobe. *Column* truncate at the top.

Though in most characters a member of a section of *Euccelogynia* which flower from an undeveloped pseudobulb, and of which the scapes are clothed with imbricating sheaths, it would, if the drawing is to be depended upon, differ from all those known to me in the scape springing directly from the rhizome, and neither from the base or apex of an old or nascent pseudobulb. Be this as it may, *C. Kingii* is a very different species from any Indian one known to me. Its nearest allies are *C. Maingayi*, Hook 1, and the following (*C. bngibracteata*).

The drawing here reproduced is inscribed "Perak, Kunstler, fld. in H. B. O., 21*5-86." Fig. 4 is drawn from a dried lip, by Miss Smith at Kew.

Fig. 1, flower; 2, the same with the sepals and petals detached, and lip removed; 3, column and lip; 4, lip; 5 and 6, anther; 7, pollinia:—all of the natural size.

PLATE 39.

CCELOGYNE LONGIBRACTEATA, Hook. f.

C. bngibracteata; rhizomate elongate erecto?, pseudobulbis ovoideis sulcatis, foliis petiolatis elongatolauceolatis acuminatis 3-nerviis, scapo elongate striato erecto-patente paucifloro fere ad apicem vaginato, vaginis basi paucia brevibus caeteris valde elongatis tubulosis, suprema racemum foliaque 2-emittente, racemo stricto erecto, bracteis longissimis 2½—3 pollicaribus lineari-lanceolatis acuminatis strictis deciduis, floribus albis 2½ poll. diam.,* sepalis lanceolatis acuminatis, petalis lineari-oblanceolatis acutis, labelli albi lobis lateralibus brevibus rotundatis, terminali orbiculari, disco cristis 5 aureis medio evanidis percurso.

HAB.—PEKAK, Kunstler.

Rhizome rather stout, probably erect or inclined against the trunks of trees. *Pseudobulbs* ovoid, green, many-furrowed, 1½—2 in. long. *Leaves* 6—7 by 1—1½ in., pale-green, 3-nerved; petiole 1 in. *Scape* 6 in., striate, suberect, clothed for the greater part with green sheaths, of which the lower few are short and looser, the rest very long and tubular; a pair of erect young leaves, longer than the raceme, protrude with the latter from the uppermost sheath; raceme 3 in., erect, strict, 3—5-fld.; bracts very long, slender, striate, concave, at length deflexed; pedicel with ovary 1 in., decurved; flowers deflexed, white, fragrant. *Sepals* lanceolate, acuminate; petals oblanceolate, acute; lip with the midlobe as long as the hypochil, nearly orbicular, its margins crisped towards the base; lobes of hypochil rounded; disk with five golden-crested ridges running from the base to the middle of the midlobe.

A species remarkable for the great length of the bracts, which far exceed those of any other Indian species known to me. It belongs to the same section as *C. Maingayi* and *C. Kingii*, but differs from both in the two long leaves the petioles of which are embraced in the same sheaths as the scape. In the Flora of British India the pseudobulbs are by error described as obovoid instead of ovoid.

The drawing is inscribed "Kunstler, Perak, in H.B.O., introd. 4-5-83, fid. 1-9-83, G. Sing."

Fig. 1, flower of natural size; 2, lip enlarged by Miss Smith from a flower which accompanied the drawing.

PLATE 40.

CCELOGYNE (*Euecehgyne*) SUAVEOLENS, Hook. f.

C. suaveolens; rhizomate robuste repente squamis ovatis acutis arete imbricatis tecto, pseudobulbis magnis remotis elongato-obfusiformibus ovoideisve, foliis magnis sessilibus v. petiolatis elliptico-lanceolatis acuminatis 5-nerviis marginibus undulatis, scapo ascendente toto vaginato, vaginis viridibus coriaceis inferioribus distichis ovatis acuminatis arete imbricatis superioribus longioribus, supremo foliaceo, racemo multifloro nutante rachi sub-articulato, bracteis spathaceis caducis, floribus distichis albis, sepalis erectis oblongo-lanceolatis acutis, petalis obovato-oblongis, labelli hypochilio angusto lobis rotundatis, epichilio dilatato late ovato v. orbiculare, disco cristis 4 v. 6 aureis percurso. Hook, f. *Fl. Brit. Ind.* v. 832. *C. undulata*, Wall. mss. *Pholidota suaveolens*, Lindl. in *Gard. Chron.* 1836, 372.

HAB.—KHASIA HILLS. Sikkim, at Mungpo, alt. 1,500 ft., Clarke. ASSAM (/?). *Serb. Hort., Calcutta*).

Rhizome as stout as a goose-quill, creeping, clothed with closely imbricating appressed ovate acute distichous brown scales | in. long. *Pseudobulbs* 2—3 in. long, usually narrowly ovoid, with a few very slender ribs. *Scape* ascending, densely clothed with distichous sheaths, the lower of which resemble those of the rhizome, but are green, the upper gradually longer and more lax, the uppermost foliaceous closely embracing the young emerging leaves; raceme 4—6 in., inclined or drooping, many-fld.; bracts distichous, coriaceous, striate, cymbiform, as long as the rachis, articulate; pedicel with ovary $\frac{1}{2}$ in., curved sigmoidly; flowers white, $\frac{1}{2}$ — $\frac{1}{4}$ in. long, very fragrant. *Sepals* and *petals* erect, concave, subequal, pure white. *Lip* as long as the sepals, white with golden ridges on the disk. *Column* short for the genus.

An interesting species, as showing a strong affinity with *Pholidota* in habit, in the closed distichous flowers and sub-articulate rachis of the raceme, and in the column being shorter than in the typical *Coelogynes*; but the large flowers, and form of the lip, which is not saccate, and the far longer column than that of any *Pholidota*, and which is neither hooded nor winded, effectually exclude it from the latter genus.

The drawing is marked "Assam, 20-4-80, G. King."

Fig. 1, bract; flower with sepals and petals detached; 2, U_p; 3, a side view of ovary and column; 4, the same view from behind; 5, anther; 6, column; 7, anther; 8, anther; 9, pedicel; 10, anther.

PLATE 41.

CCELOGYNE (*Euccelogyne*) OVALIS, *Lindl.*

C. ovalis; rhizomate repente ramoso vaginato, pseudobulbis oblongis obtusis, foliis elliptico-lanceolatis acutis 5-nerviis, scapo ex apice pseudobulbi foliis brevioris basi vaginato 1—3-floro, bractea magna spathacea caduca, sepalis lateralibus ovato-lanceolatis acutis pallide brunneis, dorsali oblongo, petalis augustissime linearibus filiformibusve, labello flavo v. albo atro-purpureo vittato et venoso laxo longe fimbriato et piloso, lobis lateralibus rotundatis v. subacutis, terminali late ovato, disco lamellis 2 nervisque validis percurso. *Lindl. in Bot. Reg.* 1838 *Misc.* 91 et *Fol. Orchid.* 12; *Walp. Ann.* vi. 232, *Hook. f. Fl. Brit. Ind.* v. 836. *C. fimbriata*, *Lindl. in Wal. Cat. n.* 1957; *Griff. Notul.* iii. 281, et *lc. Pl. Asiat.* 291. f. i. ? *C. pilosissima*, *Planch. Hort. Donat* 104. *Broughtonia linearis*, *Wall. mss.*

HAB.—TEMPERATE HIMALAYA; from Kumaon eastwards, alt. 4—7,000 ft. KHASIA HILLS, alt. 4,000 ft.. MUNNIPORE (a large leaved var.), alt. 4,000 ft., *Clarke.*

Rhizome as thick as a goose-quill or less, closely annulate. *Pseudobulbs* 2—3 in., flattened, with a large ovate brown basal sheath. *Leaves* 3—4 in., hardly petioled. *Scape* 1—2 in. flexuous, usually 1-fl.; bracts elongate, acuminate, coriaceous; pedicel with ovary, $\frac{1}{2}$ in.; flowers very variable in size. *Sepals* 1—1 in., yellowish-brown, lateral ovate-lanceolate, acuminate, dorsal oblong; petals 1-nerved, extremely narrow, strongly falcately recurved usually backwards on each side of the dorsal sepal; lip with a yellow-brown hypochil and large orbicular-ovate epichil, copiously fringed and covered on the surface with flexuous purple hairs, disk of epichil with a slender median and two broad dark purple stripes that meet at the apex, and two ridges or lamellae, one on each side of the median stripe; very many purple nerves run from the broad outer stripes to the margin. *Column* long, tip rounded. *Capsule* 1 in., turgidly pyriform.

A very variable plant in size, though I have seen no specimen approaching in this respect that here figured, the drawing of which is inscribed "Sikkim, 4—6,000 ft. October 1876. G. K." But for the greater size, this is hardly if at all distinguishable from *C. fimbriata*, *Lindl.*—a Khasia species also found in China, of which the rhizome is no thicker than a duck's quill, and the pseudobulbs 1—1½ in. long and ovoid-oblong. Indeed unless better characters are found on a comparison of living specimens to distinguish these two plants, I think they must be united under the name of *C. fimbriata*, *Lindl.* in *Wal. Cat. n.* 1957. Both species were established by Lindley and described contemporaneously in 1838, *O. fimbriata* at Tab. 868 of the Botanical Register, and *C. ovalis* in the *Misoellanea* of the same year and volume. *C. fuliginosa*, *Lindl.*, of Tenasserim (*Bot. Mag.* 4440), is another far too closely allied plant.

Fig. 1, Dorsal sepal; 2, lateral sepal; 3, petals; 4, lip; 5, column; 6, anther; 7, pollinia:—all enlarged.

PLATE 42.

COELOGYNE (*Euccelogyne*) FLAVIDA, *Wall. mss.*

C. flavida; rhizomate elongate squamula brevibus ovatis acutis arete imbricatis et appressis vaginato, pseudobulbis ovoideis v. oblongo ovoideis sulcatis, foliis longe petiolatis lineari-lanceolatis acuminatis multinerviis, scapo pseudobulbo terminali gracili foliis

breviore apicem versus vaginis parvis oblongis distichis coriaceis brunneis arete imbricatis tecto, racemo brevi erecto, bracteis spathaceis ovario longioribus deciduis floribus parvis stramineis, sepalis oblongis acutis, petalis anguste linearibus obtusis, labelli lobis lateralibus rotundatis terminali majusculo recurvo cuneatim obcordato, disco tenuiter 2-carinato. *C. flavida*, Wall. nus.; Hook. f. *Fl. Brit. Ind.* v. 839; Lindl. *Fol. Orchid.*, *Ccelog.* 10 {excl. "Auct. Book. /."}; Walp. *Ann.ri.* 223.

HAB.—NEPAL, *Hamilton*. SIKKIM, alt. 1—4,000 ft. KHASIA HILLS, alt. 4—5,000 ft. *Lobb.*, *Sfc.* MUNNIPOEE, on Kobima, *Prain*.

Rhizome as thick as a goose-quill or less, as it were zigzagged superficially by the imbricating triangular brown scales. *Pseudobulba* 1—2½ in., distant on the rhizome. *Leaves* 3—6 in., bright green; petiole slender, 1—1½ in. *Scape* 6—10 in., slender, green, naked up to about one inch below the raceme, where it is clothed with small distichous closely imbricating convex glumaceous light-brown scale-like sheaths about ½ in. long; raceme 1—1½ in., ^{erect} rather close-fld; bracts sub-distichous, narrowly oblong, concave, about ½ in. long or less, deciduous; pedicel with ovary ½ in.; flowers ½ in. diam., uniformly pale yellow. *Sepals* oblong, acute; petals narrowly linear; lip with small side lobes and a large obcordate midlobe, disk with 2 faint ridges. *Capsule* ¾ in. long, ellipsoid.

C. flavida belongs to a group of nine Indian species of the genus, with terminal scapes that bear distichous imbricating scales immediately below the raceme, which is otherwise naked. It would be interesting to discover the object of this singular arrangement. The said scales may be regarded as greatly reduced empty floral bracts like the small flowerless glumes beneath the principal flowerless ones in some grasses, but this is no explanation. A very curious modification of the scape is represented at fig. B., which is taken from a specimen in the Walliohian Herbarium, marked in "Wallich's handwriting as received from Mr. Hamilton in Nepal. It presents a scape terminated by an elongate rachis which bears three superposed series of distichous persistent imbricating flowerless bracts, separated by flowering intervals when the rachis is zigzag, and naked from the flowering bracts having fallen away. The third or uppermost series of flowerless bracts is succeeded by a continuation of the rachis with its flowering bracts and flowers. Of the three naked intervals, the lowest has neither flower nor fruit, the second bears fruit, the third or terminal is flowering. This arrangement indicates three successive superposed inflorescences on the same scape, probably occupying as many years for their development. I know of no parallel to this in the genus, though such may very well occur. The drawing here reproduced is of a Khasia specimen and is inscribed "*C. flavida*, Wall. Mr. Gibson, Cherra."

Fig. 1, bract and flower; 2 ovary and column; 3, dorsal and 4, lateral sepals; 5, petals; 6, lip; 7, anther; 8 pollinia.—*W* enlarged.

PLATE 43.

CHELOGYNE? UNIELOBA, Lindl.

C. ? unijlora, pseudobulbis rhizomate squamoso confertis parvis lageniformibus diphyllis squamis distichis membranaceis vaginatis, foliis lineari-lanceolatis acuminatis, e caudice basi pseudobulbi brevissimo 1—2 floro, bracteis parvulis pedicello decurvo brevioribus, floribus flavis sepalis laterajibus oblongo-lanceolatis acuminatis recurvis, dorsali erecto, petalis angustioribus elliptico-lanceolatis acuminatis, labelli a basi subsaccato patente, lobis lateralibus fere basilaribus auriculiformibus patentibus (columnam non amplexantibus) terminali obovato-orbiculari v. subpanduriforme, disco carinato. Lindl. in Wall. *Oat.*

it. 1966 *et Gen. and Sp. Orchid* 42; Hook. *f. Fl. Brit. Ind.*, v. 842. *Fanisea uniflora*, Lindl. *Fol. Orchid*. *Panisea* 2; Walp. *Ann.* vi. 240.—*Epidendrum*, Grif. *Ic. PL An 'at*. t. 313 f. 1.

HAB.—TROPICAL HIMALAYA; Nepal, Wallich; Sikkim, alt. 3,500 ft., J. D. H. KHASIA HILLS? Griffith. TENASSERIM; at Moulmein, Parish.

Rhizome densely matted, clothed with imbricating distichous ovate scales. *Pseudobulbs* |—| in., broadly or narrowly bottle-shaped, with dark brown large basal sheaths. *Leaves* 3—6 by 1 in. or less, dark green. *Scape* shorter than the pseudobulb; ovary with pedicel 1/2 inch, decurved; flower pale yellow with orange spots on the lip, about 1 in. from the tip of the dorsal sepal to that of the lip. *Lateral sepals* oblong-lanceolate, acute, deflexed and recurved; petals suberect; lip spreading from the base of the column, with two ear-shaped sidelobes towards the saccate? base, and a large broadly obovate or subpanduriform midlobe, disk with thickened ridges. *Column* winged; the wings rather dilated above the middle.

A very doubtful *Calogyne*, differing from its congeners apparently in the lip not embracing the column, for which reason it has been referred to *Panisea* by Lindley;*but the lip wants the claw of that genus, and the form of the flower is much more that of a *Cwlogyne*. The drawing does not represent the three orange spots described by Wallich (according to Lindley). There are indications in figs. 1 and 3 of two small tubercles at the base of the lip. In the flora of British India the scapes instead of the pseudobulbs are by misprint described as clothed with membranous sheaths. The * drawing, is inscribed "O. tolcata, T. Anders, mss., introd. from Darjeeling; again in April 1876, G. King."

Fig. 1* flower with perianth segments detached; 2, lip; 3 and 4, anther; 5 and 6, pollinia—all enlarged.

PLATE 44.

GALANTHE HEBBACEA, Lindl.

& *hebbacea*; efflta, rhizomato repente, caule robusto, foliis elliptico-ovatis v. lanceolatis acuminatis, scapo axillari robusto, racenio multifloro, bracteis 1/2 poll, longis oblongo-lanceolatis acutis, sepalis oblongis oblanceolatisre petalisque angustioribus virescentibus v. supra medium aurantiacis, labello albo columnæ adnato, lobis lateralibus angustis falcatis terminali fere 2-partito segmentis lineari-oblongis falcatis divaricatis, calcare gracili sepalis duplo v. triplo longiore. Lindl. *Fol. Orchid*, *Calanthe*, 10; *Book. f. Fl. Brit. Ind.* v. 852.

HAB.—SIKKIM HIMALAYA, alt. 4—6,000 feet, J. D. JET, King.

Stem with the strongly ribbed leaf-sheaths, as thick as the middle finger. *Leaves* 3—4, 8—10 by 2—3 in., elliptic or ovate-lanceolate, acuminate, 5-nerred and strongly 6-ribbed on the back. *Scape* from among the lower leaves, at the side of the stem, a foot and more high, stout, green, with one or two green sheaths; raceme 6—10 in., laxly many-fld.; bracts sheathing, more or less persistent, green; pedicel with ovary 1 in.; flowers 1—1 1/2 in. broad across the sepals. *Sepals* and *petals* all green or ochreous yellow for the upper half; sepals variable in width, sometimes obovate and apiculate; petals about half as broad; lip adnate by the spur to the large long column,

broader than long, pure white, subequally 4-partite, the divaricating recurved obtuse segments of the midlobe being very little broader than the similarly divaricating recurved sidelobes; spur very long and slender; a minute carunculate 2-lobed callus is placed at the very base of the b'p close to the mouth of the spur.

A very handsome plant. The flowers are all green, except the lip in a drawing I made of it in Sikkim, and I did not observe the remarkable rhizome, which in plate 44 is represented as (tout, horizontal, densely fibrous, and bearing a series of closely set conical green pseudobulbs, each with six or seven horizontal constrictions, and a small terminal tubercle, and emitting thick vermiform roots from the joints. If these are short stems of previous year's growth denuded of sheaths and leaves, they must increase very greatly after their denudation, for they diminish in size as they approach the flowering and leafing stem which terminates the rhizome.

FIG. 1, flower; 2, ditto, with the sepals and petals detached and lip removed; 3, lip with the spur removed; 4, top of column; 5 and 6, anther; 7 and 8, pollinia: - a « enlarged.

PLATE 45.

CALANTHE CHLOROLEUCA, Lindl.

C. chloroleuca; rhizomate robusto repente, caule robusto foliis (sub-anthesin immaturo) elongatis petiolatis elliptico-lanceolatis, scapo elongato, bracteis parvis persistentibus, sepalis ovato-lanceolatis acuminatis petalisque lanceolatis viridi-flavidis, labello columnie adnato albo basi aureo, lobis lateralibus oblongis rotundatisve, terminali late obcordato v. orbiculari 2-lobo, calcar cylindraceo sepalis subaequilongis. *Lindl. Fol. Orchid. Calanthe*, 10; *Walp. Am.* vi. 920; *Hook. f. Fl. Brii. Ind.* y. 852. *C. galeata*, *Lindl. I c.*, *Walp. I. c.*

HAB.—SIKKIM HIMALAYA; alt. 6-8,000 ft., J. D. H., Treutler.

Rhizome stout, fleshy, creeping, as thick as the little finger, with tuberous pseudobulbs on the upper surface and stout vermiform roots from the lower, stem as stout as the little finger. *Leaves** few, very young at flowering time, when mature a foot long, long-petioled, iblong-lanceolate, strongly nerved. *Scape* 6-10 in. high or less, raceme lax-fl'd. *bracts* i «», ovate-lanceolate, green, not equalling the ovary; *pedicels* with ovary $\frac{1}{2}$ - $\frac{3}{4}$ in. *Sepals* $\frac{1}{2}$ in. long, ovate-lanceolate, yellow-green, sometimes streaked with red; *petals* 3-nerved, usually more yellow than the sepals, lanceolate; *Lip* white, yellow towards the base, sidelobes sometimes incumbent on the midlobe; spur straight, green, hardly longer than lateral sepals, glabrous or puberulous. *Capsule* 1 $\frac{1}{2}$ in. long.

Tindley founded *C. chloroleuca* on specimens of my own collected in Sikkim in 1848, aided by the figure which I here reproduce. It differs from *C. herbaea* (Tab. 44, also founded on Sikkim [^] *Lindl.* of mine) in the form of the lip, much shorter spur, colour of the flowers, and in the leaves of this not being My developed at the flowering time. Lindley further described, also from a drawing of mine, as *C. yakata*, what I believe to be a faded specimen of *C. chloroleuca* with sepals connivent, thus giving a hooded appearance to the flower. The Himalaya species of *Calanthe* are, however, very little known, and much more numerous specimens of *O. chloroleuca* and *O. herbaea* are wanted, together with better drawings than those here given of the nature of the rhizome, which in both species especially wants elucidation.

FIG. 1, side, and 2, front view of flower -enlarged.

PLATE 46.

EULOPHIA EXPLANATA, Lindl.

E. explanata; scapo aphylo, bracteis subulatis ovario brevioribus, sepalis ovato oblongis acutis basi labelli breviter adnatis, petalis latioribus ellipticis acutis 5-nerviis, labello oblongo Y. subpanduriformi basi saccato apico truncato emarginato v. 2-lobo carinis 3 crassis carunculatis percurso. Lindl. *Gen. and Sp. Orchid.* 180; Hook. f. *Fl. Brit. Ind.* vi. 3 et in Hook. *Ic. Plant.* t. 1882. *Dipodium scariosum*, Herb. Ham.

HAB.— NEPAL; at Maghsela, in the Morung, Hamilton. N.-W. INDIA, Falconer (*Ic. in Herb. Hort. Calcutta*).

Leaves not fully developed at flowering time, afterwards 4—6 in. long, oblong-ovate, acuminate, plicate. Scape 4—8 in., rather stout, 4—10-fld., sheathed at the base; bracts 1—1½ in., appressed to the pedicel, which with the ovary is about ½ in. and spreading; flowers nearly 1 in. diam. Sepals and petals widely spreading or recurved, pale purplish-brown with a broad pale central band and base; lip as long as the sepals, basal part or hypochil with a broad conical obtuse sac and short broad auricles; epichil spreading, golden yellow with the sides transversely barred with short recurved red nerves. Column short, stout. Pollinia globose, strap short, gland small orbicular.

A very interesting plant, only known for many years by a solitary specimen in Lindley's Herbarium, labelled as a native of Ceylon, where it was unknown to all Cingalese botanists and collectors. On examining the Orchidea of Buchanan-Hamilton's Herbarium, now at the Edinburgh Botanic Garden, and kindly lent to me when preparing the Orchideæ for the Flora of British India, I found a specimen of a *Eulophia* so precisely the counterpart of that in Lindley's Herbarium of *E. explanata* as to leave no doubt that (as in a good many other cases) Lindley's habitat was an error; and I consequently figured it in the "Icones Plantarum" (1882) as a Nepal plant. I now find the excellent figure here reproduced of the same species in the Calcutta Herbarium collection of drawings, which confirms the Nepal habitat, and enables me to give the colour of the flowers. As a species *E. explanata* is perhaps nearest to *E. bracteosa*, Lindl. (including *E. grandiflora*, Lindl.), a native of the Khasia Hills, Chittagong, etc, and to which Lindley has also assigned the erroneous habitat of Ceylon; it differs from that plant in the short bracts, the sepals not rounded at the tip, and in the petals and lip being by no means obovate. The Calcutta drawing here reproduced bears the inscription "PANIA, Nepal (date and origin uncertain)." It represents a much larger specimen than Hamilton's.

Fig. 1, flower with the sepals and petals detached; 2, anther; 3 and 4, pollinia:—all enlarged.

PLATES 47, 48, 49, 50.

EULOPHIA (*Cyrtopera*) NUDA, Lindl.

E. nuda; elata, robusta, rhizomate tuberoso crasso, scapo aphylo pauciyaginato, racemo laxifloro, floribus magnis suberectis, perianthii foliolis conniventibus falcatis v. apicibus recurvis, sepalis lineari-oblongis lanceolatisve acutis v. acuminatis, petalis brevioribus oblongo-ovatis obtusioribus, labello erecto hypobilio basi saccato, sacco conico incurvo obtuso v. subrotundato, lobis lateralibus rotundatis, epichilio rotundato y. late spathulato retuso y. breviter bilobato marginibus cypato-crenatis, disco nervis crenulatis plus minusve cristato, anthera late conica latiore quam longu apice 3-loba, polliniis oblongis divaricatis caudicula brevi lata, glandula transversa. Lindl. in

HAB.—THOPICAL HIMALAYA, from Nepal eastwards. ASSAM, JUUNNIPORE, PEGU, TENASSERTM, and UPPER BUBMA; the DECCAN PENINSULA, from the Cuncan southwards, CEYLON, in the Central Province.

When studying the Orobanchaceae from the Flora of British India, I had examined a great many specimens of this noble species under different names from various parts of India, without being able to separate any one as a distinct species, or to group them all under well-defined varieties (the latter a very dangerous process with dried specimens of Orobanchaceae). This was previous to my receiving the loan of the Calcutta collection of orchid drawings, wherein I find a splendid series of coloured portraits of Eulophias which not only come under the definition of *E. nuda*, but which differ so much in habit and colour of flowers that I cannot help suspecting that they may include more than one species. I have therefore considered it best to reproduce the most divergent forms that are represented in the aforesaid collection, and leave it to more extended observation to discover whether any or all of them should rank as species. They are—

PLATE 48, var. *macrantha*, is a very tall stout plant, with much shorter bracts, the pedicel and flowers not so erect, the sepals and petals broader, pale green; the lip is white and much larger than the sepals. It is inscribed "Phajus ? Darjeeling." *

PLATE 50, var. *Anderson**, is apparently a smaller form, but evidently in a young state; the bracts are large, the pedicel and ovary upcurved as in Plate 47, and flowers nearly erect, the sepals broad of a deep purple and green, the petals narrow and pinkish purple as is the lip whufe j / ^ longer than the sepals. It is inscribed "Cyrtopera purpurea, T. Anders., mss. var., drawing made from wild specimen, Darjeeling, May 1862.—fld. in H. B. C. May 1867 from Darjeeling-T. A." P₁₀baM: imen, Darjeeling, May 1862.—fld. in H. B. C. May 1867." «0DaWy

It will be observed that *E. nuda* differs much from the typical Indian *Eulophias*, whether of the section *Eulophia* proper, or *Cyrtopera*, in the erect segments of the perianth—a character it shares with *E. macrobulbon**

PLATE 47. Fig. 1, Ovary lip and column; 2 and 3, anther; 4 and 6, pollinia:—aZ/ enlarged.

PLATE 48. Fig. 1, anther; 2, pollinia:—both enlarged.

PLATE 49. Fig. 1, flower with one lateral sepal and petal removed; 2, dorsal sepal; 8, lateral sepal; 4, anther; 6, pollinia:—all enlarged.

PLATE 60. Fig. 1, ovary column and lip; 2, 3, and 4, anther; 5, 6, pollinia:—all enlarged.

PLATE 51.

EULOPHIA (*Cyrtopera*) MACROBULBON, Hook.

E. macrobulbon; robusta, rhizomate crasso tuberoso, scapo bracteis paucis vacuis instructo, racemo dense multifloro, bracteis filiformibus ovaria sub-sequentibus, floribus sub-erectis, perianthii segmentis erectis, sepalis lineari-oblongis acutis rectis luride purpureis, petalis brevioribus pallidioribus ellipticis obtusis v. subacutis multinerviis, labelli concoloris hypochilio erecto oblongo in saccum conicum basi producto, lobis lateralibus brevibus, epichilio brevi ovato-rotundato recurvo, disco 3-nervi nervis basi incrassatis intermedio apicem versus crenato. Hook. f. *FL Brit. Ind.* vi. 7. *Cyrtopera macrobulbon*, Parish and Reichb. f. in *Trans. Linn. Soc.* xxx. 144.

HAB.—SIKKIM HIMALAYA (*IC. in Herb. Calcutta*). TENASSERIM; at Moulmein, Parish.

Tuber apparently about the size of a small potato. Leafing stem as thick as the middle finger, with loose basal sheaths. *Leaves* 8—12 in. long, elliptic-obovate, apiculate, yellow-green above with dull purplish margins and strongly plaited, dull pale purplish red beneath with green nerves. *Scape* 18 in. long, as thick as the little finger or less, more or less purple; basal sheaths loose; raceme a span to a foot and a half long, erect; bracts $\frac{1}{2}$ in. long and slender pedicels and sepals dull violet purple. *Sepals* $\frac{3}{4}$ —1 in. long; tips not recurved. *Petals* paler, shorter. *Zip* shorter than the sepals. *Column* short, anther depressed, umbonate; pollinia globose, caudicle short; gland small, orbicular.

E. macrobulbon differs a good deal from most or all the hitherto described species in the erect sepals not recurved at the tips. The Herbarium materials from which it was first described (from Moulmein) would appear to present some differences from that represented in the plate, especially in the lip, which in a dried state presents three very distinct thickened nerves, that are not here represented. The original drawing is inscribed "*Eulophia fusca*, Wall.," probably intended for *E. fusca*, Blume, which is 22. *nuda*, JilndL

Fig. 1, flower-bud; 2, side, and 8, back view of flower; 4, flower pedicel and bract, with the sepals and petals displayed; 6, ovary and column; 6, anther; 7 pollinia:—aW enlarged.

PLATE 52.

EULOPHIA (*Cyrtopera*) ANDAMANENSIS, Reichb. f.

E. andamanensis; caule robusto basi tuberoso, foliis maturis lineari-lanceolatis, scapo bracteis paucis lanceolatis instructo, racemo laxo paucifloro, bracteis ovario multo brevioribus, floribus patentibus, perianthio explanato virescente, sepalis lateralibus petalisque lineari-lanceolatis acutis v. acuminatis patenti-recurvis falcatisque, dorsali erecto, labelli

hypochilio brevi 2-auriculato base in cornu brevem incurvum producto, epichilio late unguiculato orbiculari marginibus crispatis viridibus, disci albi nervis 3 in hypochilio incrassatis, nervulis epichilii divaricatis ramosis. Reichb. f. in Flora, 1872, 276; Hook. f. FU Brit. Ind. vi. 8.

HAB.—TENASSERIM ; at Moulmein, Parish. ANDAMAN ISDS., Kurz.

Tuber not seen. *Leafing* stem very short, with the broad sheathing bases of the leaves 2 in. diam. *Leaves* very small at flowering time, when mature a foot or more long, dark green, paler beneath. *Scape* 1—2 feet, rather slender, green. *Raceme* short; flowers spreading, 1—1½ in. diam.; bracts, sepals petals and ovary green. *Sepals* ½ in. long, 3—5 nerved; petals rather shorter and broader, 3-nerved. *Lip* recurved, shorter than the petals, very conspicuous from the white disk, broad green crisped margins, and transverse red veins of the epichil. *Anther-tip* bifid; pollinia globose, very broad, caudicle quadrate.

Herbarium specimens resemble a good deal *E. virens*, from which this differs in the very distinct prolongation of the foot of the column, and which brings it into the group *Cyrtopera*.

The drawing is inscribed "Eulophia sp., introduced from the Andamans by Mr. Kurz in 1866- fled 1867."

Fig. 1, flower; 2, lip; 3, column; 4, pollinia :—all enlarged.

PLATE 53.

LUISIA GROVESII, Hook. f.

L. Grovesii, caule gracile elongato ramoso laeve, folia 6—12 pollicaribus crassitie pennae corvinæ teretibus obtusis, spicis brevibus paucifloris bracteis infundibularibus brunneis vaginatis, floribus 1 in. diam., sepalia subaequalibus ovato-oblongis subacutis (petalisque) primulinis, dorsali erecto, lateralibus cymbiformibus labello fere suppositis, petalis anguste linearibus sepalia duplo v. triplo longioribus patenti-decurvis, labelli hypochilio quadrato piano atro-purpureo, epichilio duplo latiore late cordato albo plaga basilari late triangulari atro-purpurea, columna brevissima lata. Hook. f. Fl. Brit. Ind. vi. 25.

HAB.—EASTERN BENGAL; in the Lushai Hills, G. B; Barton Groves,

Stem flexuose, probably several feet long and much branched, dark green as are the leaves, which are of the same thickness (of a crow-quill), internodes 1 in. ^{Spikes} arising halfway between the internodes, about ½ in. long; bracts imbricating obliquely truncate, dark brown. *Flowers* appearing one at a time, flower-buds globose green. *Lip* rather longer than the sepals, probably variable in colour, the epichil being pale purple with darker margins in one drawing and greenish yellow in another. *Column* triangular, fleshy; anther subquadrate, retuse at the top, quite smooth; pollinia ovoid, seated on very short broad caudicle with a narrow gland.

I have seen only one specimen, without locality, from the Calcutta Herbarium, and two drawings of which the one here reproduced is inscribed "Cymidium hngipctalum, 18th April 1861." The other bears the habitat and collector's name given above.

Fig. 1, flower; 2, ovary, lip and column; 3, 4 and 7, pollinia:—all enlarged.

PLATE 54.

TRICHOGLOTTIS DAWSONIANA, *Reichb. f.*

T. Dawsoniana; caule robusto scandente superne folioso, foliis patulis loriformibus bilobis lobis rotundatis crasse coriaceis medio profunde canaliculatis, scapo axillari Yalido erecto laxo. paniculato ramoso vaginis paucis brevibus truncatis instructo, paniculse ramis erecto-patentibus basi bracteatis laxifloris, bracteis pedicellis multo brevioribus late ovatis appressis brunneis, floribus 1—1½ poll. diam., sepalis petalisque patentibus viridibus acuminatis fusco-rubro vitato-maculatis spathulato-oblongeolatis, petalis paulo latioribus, labello sepalis dimidio brevior aureo rubro-maculato basi saccato disco piloso, hypochilio utrinque bibrachiato brachiis consimilibus lineari-oblongis apice rotundatis, epichilio lineari apice dilatato 2-lobato, columna vertice 2-cornuta cornubus apice penicillatis. *Reichb. f. in Gard. Chron.* 1872, 699; *Hook. f. Fl Brit. Ind.* vi. 43. *Cleisostoma Dawsonianum*, *Reichb. f. I. c.* 1868, 815.

HAB.—TENASBEEIM; at Moulmein, *Parish.*

Stem as thick as the little finger, somewhat compressed, green, rooting below the leaves. *Leaves* 3—6 by 1—1½ in., bright green, smooth, deeply channelled, sides convex. *Scape* 6—10 in., as thick as a swan's quill, green; sheaths ½ in. long, white; panicle 18 in. long, stiff, branches distant, spreading, 6—10 ft. long; bracts at the bases of the branches ½ in., of the flower ½ in.; pedicels with ovary ½—¾ in. *Lateral sepals* and *petals* widely spreading, subfalcate. *Horns of column* suberect, cylindric, slightly decurved. *Anther* subquadrate, retuse, crested with hair, contracted at the sides.

As I have stated in the Flora of British India in the notes under *Trichoglottis*, I think that Bentham erred in suppressing this genus in the Genera Plantarum, and that taking Blume's *T. return* (Bijdr. 360, Tabellen fig. viii) as the type, it is well distinguished by the long narrow processes at the base of the lip and its hairiness, which suggested the generic name. Kurz's *T. quadricornuta* from the Nicobar Isds., judging from his figure and description, generically well accords with *T. return* and *T. Damoniana*, as does *T. fasciata*, of Manilla, of which there is a fine drawing in the Calcutta Herbarium. The pollinia of *T. Dawsoniana* are large, globose, with short slender straps; not as represented at fig. 5, which is probably imperfect or undeveloped. I also find the sepals and petals in the dried specimens to have each a cusp beneath the apex, a feature not represented in the drawing, which is inscribed "Benanthera from Moulmein, 12-5-70," (the date no doubt of its flowering in the Calcutta Botanical Garden).

Fig. 1, flower; 2, the same with the sepals and petals displaced and lip removed; 3 lip; 4, anther; 6, pollinia (undeveloped?);—all enlarged.

PLATE 55.

STAUROPSIB UNDULATUS, *Benth. mss.*

S. undulatus; caule flexuoso scapoque creberrime verruculosus, foliis loriformibus apice 2-lobis, lobis rotundatis sinu basi cuspidato, scapo erecto vaginis paucis ovatis instructo, racemo terminali paucifloro, bracteis ovato-lanceolatis pedicellis brevioribus, floribus albis v. roseo suffusis, sepalis petalisque sub-consimilibus oblanceolato-spathulatis acutis undulatis, labello sepalis multo brevior primulino v. albo-roseo striato, hypochilio orbiculari basi saccato columnis adnato, lobis 2 rotundatis incurvis, epichilio angusto a

latere compresso linguiforme apice truncato v. retuso, disco 3-carinato. *Hook. f. Ft. Brit. Ind.* vi. 27. *Vanda undulata*, *Lindl. m. Journ. Linn. Soc.* iii. 42; *Reichb. l. ML Gard. Chrm.* 1875, ii, 212 et 1878, i. 168.

EASTERN SUBTROPICAL HIMALAYA; Sikkim and Bhotan, ascending to 7,000 ft. The KHASIA HILLS, alt. 5—6,000 ft.

Stem 6—10 in. long, flexuous, as thick as a goose-quill, pale greenish, studded with small warts, as on the peduncle and rachis of the raceme and bracts, *leaves* 3—4 by $\frac{A}{2} - \frac{E}{4}$ in., recurved, dark green, terminal lobes unequal, sides convex. *Peduncle* 6—8 in., striate, rigid, bright green, as thick as a crow-quill; sheaths ovate, obtuse; raceme 4—8-fl.; bracts J—E in., green; pedicels with ovary 1—1½ in., ascending, nearly white. *Flowers* 1½ in. diam.; sepals and petals spreading and more or less recurved, lateral sepals with their tips often crossing under the lip, which is only half their length and nearly straight. *Column* very short; anther depressed, 2-lobed, red; pollinia nearly globose or ellipsoid, strap moderate inflexed; gland large, transverse.

I have followed Bentham in placing this in *Stauroptis*, though it bears little resemblance to its gigantic, golden flowered congener, *S. gigantetu*. From *Fonda* it differs in the base of the lip being adnate to the sides of the column, but it resembles, in habit *V. catrukaoens*. From *Phaenoptu* it differs in the Up being adnate to the sides of the column, and in wanting a forked appendage on the disk of the Up. Lastly, should the Up prove to be jointed at the base and mobile, which I cannot determine on the dried specimens, it may better be placed in *Arackmnhf*. The waited stems scapes, &c., are characteristic of this species alone amongst the allied *Vandea* known to me.

It will be observed that there is great discrepancy in the accompanying plate between the form of the Up as represented of the natural size and the enlarged figures 1 and 2; the latter are more like what I find in the dried specimens. The colouring of the flowers, too, may admit of correction. The drawing is inscribed "Eenanthia; Vanda Jerdoni, DarjeeUng, 3rd June 1862, on trees 7000 ft., T. Anders."

Eg. 1, flower; 2, column and lip; 8, pollinia:—all enlarged.

PLATE 56.

PHALENOPSIS MANNII, *Reichb. f.*

P. Mannii) subcaulis, foliis sessilibus obovato-oblongis v. oblanceolatis subacutis striatis, pedunculo subradicali valido, bracteis majusculis ovatis acutis viridibus sepalisque oblanceolatis acuminatis flavidis rufo-brunneo pallide maculatis, labello breviter unguiculato, hypochilii lobis lateralibus oblongis falcatis truncatis appendicula furcata interposita, epichilio panduriformi lobis terminalibus elongatis recurvis carunculatis serrulatis. *Reichb. f. in Gard. Chron.* 1871, 902 et 1876, 503; *Rollé 1. e.* 1886, ii. 276; *Hook. f. Ft. Brit. Ind.* vi. 30.

ASSAM, *Mam.* SIKKIM HIMALAYA, Rungboe Valley (*l.c. in Hort. Cak.*).

Leaves few, rather flaccid, 6-10 by 2-2½ in., pale green. *Peduncle* 3-12 in., simple or branched and stout, rachis green decurved or pendulous; bracts E-E in.; flowers few or many, 1* in. diam.; sepals broader than the petals. *Lip* white with red markings at the base of the epichil and on the processes of the hypochil; disk with a flattened sword-shaped appendage in front of the forked one. *Column* long, with a short foot, yellow; anther subhemispheric; pollinia pyriform; strap large, spatulate; gland small] forked.

I have seen no Sikkim specimen, but I think there is no doubt that the drawing is intended for *P. jWannii*, though the terminal lobes of the lip are not serrate, either in the descriptions or herbarium specimens of that species. The species is very near *P. Cornu-cervi* of Tenasserim, of which the rachis of the raceme is much flattened and the bracts rounded at the tip; in both the disk of the hypophyll presents the usual forked appendage of the genus, with a sword-shaped one in front of it. The rachis of the raceme is probably somewhat flattened in *P. Mannii*, but this is not shown in the drawing. The drawing is inscribed "*Phalamopsis*, sp! *P. Mannii*, *Reichb.* f. Eungbee Valley, 1868, 18-8-70."

Fig. 1, flower; 2, the same with the lip and sepal and petal displaced; 3, lip; 4, anther; 5, pollinia:—all enlarged.

PLATE 57.

PHALAENOPSIS TETRASPIS, *Reichb. f.*

P. tetraspis) subcaulis, foliis obovatis v. cuneato-obovatis striatis, scapo valido simplice v. ramoso ascendente v. erecto, vaginis paucis brevibus, sepalis elliptico-ovatis petalisque angustioribus obtusis dilute virescentibus, labello albo breviter unguiculato, hypophylli lobis lateralibus oblongis falcatis truncatis appendicula 2 furcata interposita, epichilio carnosio oblongo lateraliter compresso apicem versus tumidum superne villosio. *Reichb. f. Xen. Orchid*, ii. 146 et in *Gard. Chron.*, 1881, ii. 562, 656; *Bolfe I. c.* 1886, ii. 277; *Hook. f. Fl. Brit. Ind.* vi. 30, *P. Barrii*, *King mss.*

HAB.—CHITTAGONG, *Lister* (Ic. in *Herb. Calcutta*). ANDAMAN ISDS., *Berkeley*. DISTRIB. SUMATRA.

Leaves 6—12 by 2—4 in., bright green, subacute. Scape described as tall and branched, but simple in the plant here figured, terete, green, few-fl'd. Bracts very short broad and acute, green; pedicel with ovary 1½ in., slender; flower 2 in. diam. Lateral processes of the hypophyll yellow; epichil waxy white, convex, obtuse. Column rather short, white; tip dorsally toothed; pollinia ovoid; strap large, spatulate, gland small, broad.

I have seen DO flowers of this species, which I have described from Eichenbaoh, and the accompanying drawing. As a species it is closely allied to *P. speciosa*, *Reichb. f.* of the Andaman Isds., which has white or rosy flowers with darker blotches, toothed lateral lobes of the hypophyll, and a dilated mallet-like tip of the epichil; its flowers vary much in colour, and *P. tetraspis* may prove to be a form of it.

The drawing is inscribed "77—119 *F. tetraspis*, 22./., from Andaman Isds., Ban.; from Chittagong, Mr. *Lister*; fld. H. B.C. April 1876 and 1877, Gk King."

Fig. 1, flower with sepals and petals displaced; 2, lip; 3, front view, and 4 and 6, side views of column; 6, anther and pollinia; 7, strap and gland of pollinia? 8, pollinia:—all enlarged.

PLATE 58.

PHALANOPSIS KUNSTLERI, *Hook. f.*

P. Kunstleri; subcaulis, foliis obovatis oblanceolatis elliptico-lanceolatisve acutis, scapo folia sequante apice paucifloro, bracteis parvis, sepalis obovatis lateralibus apiculatis petalisque paullo minoribus apice rotundatis sordide flavis infra medium sanguineo pictis,

labello parvo breviter unguicalato, hypochilii lobis late cuneatis falcatis truncatis rubro-striatis callo, 2-lobo et appendicula furcata parva interposita, epichilio albo obovato apice rotundato carinis 7 crassis rubris percurso. *Hook. f. Fl. Brit. Ind.* vi. 30.

HAB.—PEEAK.—*EunstUr* (in Herb. Calcutta).

leaves 4—6 in., pale green, very variable in length and breadth. *Scape* rather slender, flexuous; bracts very small, broad green; pedicel with ovary $\frac{1}{2}$ in.; flower 1—1½ in. diam. *Column* short; pollinia subglobose; strap cuneately obovate; gland quadrate.

I have seen only dried flowers kindly sent me by Dr. King, and the drawing in the Calcutta Herbarium here produced, which latter is inscribed "Perak. Kunstler; in H. B. Calc. Eld., 10-6-84."

Fig. 1, side and 2, front view of flowers, of the natural size; 3, lip, enlarged; 4, pollinia, greatly enlarged,

PLATE 59.

DOBIS WIGHTII, Benth.

D. Wightii; subacaulis, foliis oblanceolatis subacutis marginibus undulatis v. subcrispatis, scapis plurimis gracilibus simplicibus v. ramosis, sepalis petalisque obovatis apicibus rotundatis aureis, sepalis lateralibus latioribus oblique retusis, labello albo-rubro picto, hypochilii lobis late cuneato-obovatis truncatis, epichilio parvo cordato sinu rotundato disco basi appendicula furcata instructo. *Benth. in Gen. Plant.* iii. 674; *Book, f. Fl. Brit. Ind.* vi. 32. *Phalsonopsis Wightii*, *Reichl f. in Bot. Zeit.* 1862, 214. *brides latifolium*, *Thwaites Enum. Pl. Zeyl.* 430.

HAB.—SIKKIM HIMALAYA (*le. in Hort. Cahutt.*); BHOTAN, *Lister*; CHITTAGONG, *Groves*; BURMA, at Mougong, *Griffith*; Moulmein, *Parish*; The Circars, *Segne*; MALABAR, *Wight*; CEYLON, *Thwaites*.

Leaves few, 3—8 by 1—2½ in., flaccid, nerveless, costa indistinct. *Scape* as long as the leaves or shorter, inclined or nodding; sheaths few, very short, green; bracts very small, much shorter than the pedicels, which are (with the ovary) $\frac{1}{2}$ in.; flowers $\frac{1}{2}$ in. diam. *Mentum* short, conical.

This is one of the very few Indian epiphytic orchids that has a wide range in distribution, from Sikkim and Burma to Ceylon; and it would be interesting to know how far it varied in colour in different localities. The genus *Doritis* differs from *Phalsonopsis* in the conical or spur-like mentum of the lip, but this varies a good deal in length, being shortest in *J.D. WigWi*, and may not prove to be a reliable character.

The drawing of *J.D. WigMM** inscribed "Phalsonopsis from the Chitting Hill Traoto, sent by Mr. Barton-Groves, April 1888, G. King. Fl. in H. B. O. June 1888. Kg. by G. Das."

Fig. 1, flower, with a lateral sepal and petal displaced; 2, front and side view of flower; 3, flower with petals and sepals displaced and lip removed; 4 and 5, lip; 6, side-lobe of lip; 7, pollinium; 8, detail of the natural size.

PLATE 60.

DORITIS BRACEANA, Hook. f.

D. Braceana; subacaulis, foliis lineari-oblongis obtusis v. subacutis coriaceis, scapis erectis crassis viridibus rubro-punctatis 8—10 floris, bracteis minutis, floribus nutantibus pedicellis crassiusculis decurvis, sepalis petalisque obovato-oblongis obtusis flavis costa rufescente, labelli violacei lobis lateralibus ovato-lanceolatis subacutis appendicula parva furcata interposita, terminali spathulato-obovato apice rotundato, mento elongato calcitriforme. Hook. f. *Fl. Brit.* 2nd. yi. 196.

HAB.—SIKKIM OR BHOTAN-HIMALAYA, Gamble.

Roots very numerous, long, flat, apparently pubescent. *Stem* about 1 in. long, clothed with the brown short sheaths of old leaves. *Leaves* in the drawing, two, one 2½ by nearly 1 in., straight, rounded at both ends, very dark green and grooved down the middle, apparently thickly coriaceous; the other about 2 by 1 in., acute. *Scapes* 2, nearly as thick as a crow-quill from the base to the top of the raceme, with one or two flowerless bracts, dark green, speckled with red-brown; bracts ovate, green, about ½ in. long; pedicels with ovary ½ in. long; flowers nearly 1 in. diam. *Lip* membranous, midlobe narrowed to the base; mentum as long as the erect sidelobes. *Column* large, stout, fleshy; pollinia 4 (2 bipartite ?) subglobose.

A very singular species from its very stout habit, lurid green foliage, and in these respects and its many-fid, erect raceme very unlike its congeners known to me, but with the flower quite that of *D. taenialis* in general character and in the colour of the lip. I have seen no specimens, and have described it from the drawing in Herb. Calcutta, and from notes made by Mr. Brace from the living plants which flowered in the Calcutta Botanic Garden, and which were brought to Mr. Gamble at Darjeeling by a Bhotea collector in 1882. I dedicated it to Mr. Brace, sometime employed in the Herbarium of the Royal Garden, Calcutta.

Fig. 1, flower; 2, the same with the lip removed; 3 lip:—all enlarged.

PLATE 61.

SARCOCHILUS (*Pteroceras*) MURICULATUS, Hook. f.

S. muriculatus; acaulis v. caule brevi, foliis late oblongis v. loriformibus 2-fidis flaccidis medio canaliculatis, scapo foliis brevioris rachique viscidis, sepalis petalisque late ovatis subacutis primulinis v. albis vittis 2 transversis purpureis v. roseis notatis, sepalis lateralibus basi labelli v. pediculi columnar adnatis, labello saccato, sacco conico, lobis lateralibus erectis late ovatis v. quadratis apicibus sinuato-lobulatis intermedio minuto truncate v. bifido pubescente, columna longiuscula, rostello brevi acuto. *Beichb. f. in Gard. Chron.* 1881, ii. 198; Hook. f. *Fl. Brit. Ind.* vi. 34,

HAB.—ANDAMAN ISDS., Kurz & Berkeley.

Stem sometimes 6—8 in. long, rooting below. *Leaves* 6—9 by 1—HTM pale green, unequally bifid, the lobes and sinus acute or rounded. *Scape* rather slender, with the raceme 2—3 in., green speckled with red; bracts broad, minute; pedicels with ovary ½ in.; flowers ½ in. diam., sweet-scented. *Lip* about as long as the sepals, variable

in the size of the lateral lobes. *Column* incurved; anther broadly ovate, acute; pollinia globose or ovoid; strap short, flat; gland small.

There is considerable discrepancy in the analyses made from the original dried specimen collected by Kxanz' and Beiohenbach's description and my analysis of some detached flowers which accompanied the drawing here reproduced. In the latter the length of the foot of the column, and the insertion along it of the lateral sepals (fig. 1), would indicate that the species should be referred to section VI, according to the arrangement of the species given in the Flora of British India. Much better specimens are required to arrive at a satisfactory knowledge of the lip, which in one flower when spread out took the form of figure 2, being simply cuneiform. The drawing was made under Mr. Brace's directions from a plant that was brought from the Andaman Isds. by a native collector (Abdulla), and which flowered in the Calcutta Botanic Garden, 5-5-84.

Fig. 1, portion of lateral tepal, a petal, lip and column; 2, lip (imperfect?) from a dried flower; 3, column; 4, anther; 5, pollinia:—*a* *Unlarged*.

PLATE 62.

SAECOCHILUS (*Pteroceras*) BTENOGLOTTIS, *Rook*, /.

S.stenoglottis; caule brevi robusto, foliis elongatis late loriformibus decurvis sub-bilobis v. emarginatis, scapis deflexis v. pendulis foliis multo brevioribus apices versus plurifloris, bracteis ovatis rufis, floribus stramineis v. fere albis, sepalis oblongis obtusis, petalis angustioribus lineari-oblongis acutis, labello breviter unguiculato a latere valde compresso subcymbiforme marginibus undulatis basi breviter 2-auriculato, in appendicem v. calcar claviforme rectum obtusum productum, columna basi constricta anguste alata, rostello decurvo. *Hook f. Fl. Brit. Ind.* vi. 34.

HAB.—PEBAK? *Scortechini*. DISTKIB. Sumatra.

Stem 1—2 in., as thick as the thumb. *Leaves* many, apparently flaccid, 6—12 by 1½—2 in., pale green, nearly flat; sheaths very short and broad. *Scapes* 3—4 in., dark purple or red-brown, sheathed with a few small acute bracts; rachis of many-fld. raceme ½—1 in., rather thickened (or flattened?) subserrate from the persistent bracts (as in sect. *Fornicaria*); pedicels with ovary ½ in., slender. *Flowers* about ½—f in. diam., white with a faint yellow tinge and a few red markings towards the base of the perianth. *Sepals* and *petals* many-nerved. *Lip* very singular, longer than the sepals, white, strongly laterally compressed, curved like a boat, forming a long fleshy narrow cup with undulate lips running half way along the upper margin, and then contracting into a club-shaped terminal appendage, which I take to be a modified spur or sac, and which, instead of being inserted beneath the body of the lip, is in a straight line with the latter. *Anther* shortly beaked, membranous; pollinia oblong; strap spatulate; gland small.

It is not possible to describe the lips of *Sarcochilus* so as to convey any tolerable idea of their form and structure, and to draw them with accuracy is very difficult from living specimens, and impracticable from dried ones. The drawing of the plant here reproduced was inscribed «Malaya Künstler Fld. in H. B. C. 4-8-83. Sumatra Orchid." The analyses were made by myself from detached flowers in a pocket attached to the drawing.

Ffo. 1, dorsal, and S, lateral sepals; 3. petal; 4, side view of column and lip; «, front view of lip; «, *nthm*, 7 pollinums—*ott enlarged*,

PLATE 63.

SAECOCHILUS (*Pteroceras*) BRACHYGLOTTIS, Hook f.

8. *brachyglottis*; caule brevi, foliis decurvis elongato-oblongatis apice acuminatis integris v. bicuspidatis, scapo brevi paucifloro, floribus albis, sepalis lanceolatis acutis dorso infra apicem corniculato, petalis oblongo-obovatis obtusis, labello parvo sessili a latere valde compresso subcuneato truncato obtuso 2-lobo, lobo superiore apicem labelli efficiente inferiore in saccum v. calcar producto, columna brevi crassa, rostello erecto. Hook. f. *Fl. Brit. Ind.* vi. 34.

HAB.—PERAK, *Kintfs Collector*.

Stem rather slender. *Leaves* not crowded, 4—8 by 1—1½ in. pale green, keeled beneath, contracted at the base almost into a petiole. *Scape* 1 in., rather stout, green; bracts minute, broad, persistent; pedicels with ovary ½ in.; flowers ½ in. diam. *Sepals* and *petals* faintly tinged with pink. *Lip* not half the length of the sepals, inserted by a narrow base to the base of the column, very much compressed laterally, nearly as deep as long, hollow, with a narrow slit along the top, produced into a rounded boss or spur below the solid obtuse tip. *Column* with the clinandrium almost dorsal, and the rostellum (at length 2-fid.) hence suberect. *Anther* depressed, beaked; pollinia globose, strap narrow, gland not large.

A very well marked species both in habit, leaf, and flowers. Described from the drawing and detached flowers accompanying it. It was made from a specimen sent by Kunstler to the Calcutta Botanic Garden, which flowered there, 7th October 1884.

Fig. 1, flower; 2, column and lip; 3, column and lip seen from above; 4, vertical section of lip; 5, side view of column and anther; 6, front view of column; 7 and 8, anther; 9, pollinia :—all enlarged.

PLATE 64.

SARCOCHILUS AUREUS, Hook. f.

8. *aureus*; caule brevi robusto superne folioso, foliis patentibus lineari-oblongis v. lorifonnibus crasse coriaceis 2-fidis, pedunculis plurimis infra-foliaceis foliis brevioribus robustis paucifloris; floribus magnis aureis, sepalis basi columnis insertis oblongo-lanceolatis acuminatis petalisque angustioribus conniventibus, labello parvo a latere compresso longe unguiculato, ungue stipitifforme striata apicem versus carunculata, hypochilii crassiusculi lobis lateralibus erectis cuneato-falcatis obovatisve, disco carunculato sacco subdidymo instructo, epichilio parvo erecto 2-lobo, sacco hypochilo quasi imposito. Hook. f. *Fl. Brit. Ind.* vi. 35.

HAB.—PERAK, *King's Collector*.

Stem 3—5 in., as thick as the little finger, clothed with the short, compressed pale green fleshy leaf-sheaths, and rooting. *Leaves* 4—10 by 1—2 in., keeled, rigid, pale green, broadly sessile on the sheaths, narrowed to the acute terminal lobes. *Scapes* from the lower part of the stem below the leaves, from the old but still green lower sheaths. 2—7 in. long, rather thickened in the rachis, green with scattered short, green, ovate-acute bracts; pedicel with ovary ½—f in. *Sepals* 1 in., concave; petals nearly as long or

shorter, flat. *Lip* $\frac{1}{2}$ as long as the sepals, with the claw nearly as long as the body, and about as long as the side arms, margined with red, perforated as it were from the insertion of the claw to the globose sac or spur, above which is the short caruncled midlobe or epichil. *Column* short, rostellum very short, acute; anther very shortly beaked; pollinia globose; strap subspathulate, gland narrow.

There are several drawings of this beautiful species in the Calcutta collection, made from specimens that had flowered in the Royal Garden. But none are satisfactory as to the analysis of the lip especially. I have seen no specimens except some detached flowers in a pocket attached to the drawing here reproduced; as to which it is difficult to wholly reconcile their lips with those in the drawing, though I think the latter are in the main accurate. The fact is that the distortion of the lip when dried is so great that I think it better to withhold any further attempt at comparing it with that of the drawing further than to observe that in Fig. 2 the circular markings at the top of the claw represent caruncles, and the terminal globose body, the spur, over which rises the epichil. The drawing is made from a plant that flowered in the Calcutta Garden in July 1888.

Fig. 1, side view of flower; 2, ditto with sepals and petals displaced; 3, 4 and 5, anther; 6, pollinia:—all enlarged

PLATE 65.

SAECOCHEILUS CLADOSTACHYS, Hook. f.

8. *cladostachys*) caule brevi subrobusto, foliis loriformibus bifidis recurvis, pedunculis 2—3 infrafoliaceis foliis multoties brevioribus clavellatis paucifloris, floribus majusculis albidis, labello purpureo picto, sepalis petalisque angustioribus elliptico-lanceolatis acuminatis, labello 6-petalis brevior angusto a latere compresso longo unguiculato ungue stipitifforme, hypochilii lobis lateralibus oblongis obtusis, epichilio brevi 2-fido hypochilio imposito lobis quadratis retusis calcare globoso, v. (si velis epichilio 3-lobo lobis lateralibus quadratis intermedio globoso). Hook. f. *Ft. Brit. Ind.* vi. 35.

HAB.—PEEAK (*IC Scortechini*). MALAYA, *Kunstler*.

Stem about an inch long, as thick as the little finger. *Leaves* 6—12 by 1½—2 in., recurved or pendulous, pale green, flat, keeled. *Peduncle* 1—2 in., flexuous, nearly naked, gradually thickened upward to the obtuse tip; bracts ovate, acute; pedicel with ovary $\frac{1}{2}$ inch; flowers 1½ inch diam., not quite white, rather cream-coloured, perianth spreading, but not widely, the segments narrow, very finely acuminate. *Lip* about $\frac{1}{2}$ shorter than the sepals, slightly incurved; claws spotted with purple, as is the spur (or midlobe of the epichil); lobes of the hypochil pale purple. *Column* rather short, rostellum hardly beaked; anther acute in front; pollinia globose.

Described from the drawing, for I have seen no specimens. It is evidently closely allied to *S. aureum*, but is a much less robust plant, with less rigid leaves, much shorter clavellate peduncles, narrower nearly white sepals and petals, with very finely acuminate tips. The structure of the lip is the same, but in this the epichil is developed into two erect lobes. The drawing bears the inscription "Malaya H. H. Kunstler, Eld. Aug. 1887, flowers lasted only two days. Again May 1888, fig., again only two days. G. King."

Kg. 1, flower; 2, the same, with sepals and petals removed; 3, lip; 4 and 5, anther; 6, pollinia:—all of the natural size.

PLATE 66.

SARCOCHILUS BERKLEYI, *Reichb. f.*

S. Berkleyi) caule brevi, foliis loriformibus 2-lobis pendulis, pedunculo brevi, racemo elongato multifloro pendulo v. decurvo, bracteis minutis, floribus albis, sepalis lateralibus ovato-rotundatis basi lata columnae pedis decurrentibus, dorsali minore, petalis late obovatis, labello sepalis longiore breviter unguiculato a latere compresso, hypochilio in calcar compressum clavellatum antice producto, basi 2-brachiato brachiis erectis falcatis obtusis, epichilii lobulis 2 dentiformibus calcaribus impositis. *Book. f. Fl. Brit. Ind.* vi. 37. *Thrixspermum Berkleyi, Reichb. f. in Gard. Ohron.* 1882, i. 557.

HAB.—NIOOBAB ISDS., *Berkeley**

Stem 1—2 in., as thick as a goose-quill. *Leaves* 6—9 by 1—1½ in., narrowed from above the middle to the base, rather flaccid, narrowed also at the obtusely unequally 2-lobed point. *Peduncle* short, compressed; *raceme* 4—6 in.; *bracts* minute, broad, membranous; *pedicel* with ovary 1—1½ in., sigmoidly ascending; *flowers* horizontal, about 1 in. from the tip of the lip to that of the dorsal sepal, all white or cream-coloured, or with purple markings on the lip; *sepals* and *petals* hardly spreading, concave. *Column* rather long, *rostellum* at length bicuspidate; *anther* broad, depressed; *pollinia* 2, globose, *strap* short broad; *gland* orbicular. *Capsule* 5 in. long, narrow, curved.

The drawing of which Plate 66 is a reproduction is inscribed "Said to be from the Andamans, fid. H. B. C., 14th October 1886, G. "King." It is more probably from the Nicobars, whence Colonel Berkeley's specimens no doubt came, but it may inhabit both localities.

Figs. 1 and 2, flowers; 3, column and lip:—all of the natural size.

PLATE 67.

SARCOCHILUS HIBBUTUB, *Hook. f.*

S. hirsutus; caule brevi, foliis loratis 2-lobis infra medium ad basin angustatis, vaginis brevissimis, pedunculis brevibus cum bracteis floribusque hirsutis, foliis fulvis v. aureis rubro-fasciatis, sepalis lateralibus ovato-oblongis obtusis basi lata columnae pedis elongati decurrentibus, dorso infra apicem corniculatis, petalis oblongo-obovatis obtusis, labello breviter unguiculato, epichilio in calcar elongato-conicum antice producto et basin versus subtus gibbo, lobis lateralibus falcatis acutis apicibus oblique truncatis et serrulatis, disco inter lobos squamis lamellisve 2 transversis instructo, quarum portica lata truncata et dentata inter lobos hypochilii interposita, antica (epichilio?) multo minore (postico antipositaj. *Hook. f. Fl. Brit. Ind.* vi., 38,

HAB.—PERAK, *Kunstler.*

Stem short, stout. *Leaves* 4—8 by 1—1½ in., flat, keeled, pale green, apparently flaccid and probably drooping. *Peduncles* from the old sheaths, 1—1½ in. long, stout, green, suberect, 4—8 fld; *bracts* rather large, broadly ovate, green; *pedicel* with ovary 1 in.; *flowers* subglobose, ½ in. diam. if expanded. *Sepals* apiculate behind the rounded apex*

and petals many-nerved. *lip* about as long as the sepals; claw dilating into a cup-shaped spur, in front of which are the erect, wing-like lobes or arms of the hypochil, which is produced beyond them into a broad projecting spur with a subulate point; between the lobes of the hypochil is a shorter erect transverse membranous plate, truncate, notched in the middle and toothed, and in front of that again is a much smaller one which I have assumed to be a very rudimentary epichil, but this is little better than a guess.

Described from the drawing, and a very few detached flowers in a very bad state contained in an attached pocket. The analysis of the Up of the latter was most difficult, and, though conducted with extreme care, I cannot vouch for its perfect accuracy. The fact is that the parts of the lip, as usually disposed in orchids, are so deformed and mixed up, as it were, in this and the preceding *Sarcochilus* that it is very difficult from dried specimens or the analyses of native artists to pronounce on their nature and relations.

Fig. 1. flower with a sepal and a petal — ^ ' J ^ " \$ ± ^ ! t ^ " * * * * TM * Up; 6, front, and 7, side view of column and anther; 8, anther, 9, pollinia.

PLATE 68.

VAKDA (*Cristata*) FUMILA, Hook. /.

V. pumila, caulibus brevibus, foliis loriformibus recurvis concavis apice 2-lobis lobo altero praeaniso altero rotundato, pedunculo brevi paucifloro, floribus primulinis albis sepalis lateralibus ovatis v. linearibus oblongis acutis incurvis, dorsali angustiore lateralit. linearibus acutis, labelli purpurei v. rubro picti, lobis lateralibus oblongis v. f. *terminali* late ovato obtuso, calcar conico lobo terminali tequilongo. Hook. *Fl. Ind. vi.* 53. *V. cristata*, var. *Lindl Fol. Orchid. Vanda p.* 10.

HAB.-SIKKIM AND BHOTAN HIMALAYA, alt. 2,000 ft.

Stem 1—2 k> tufted, stout; *Leaves* 3—5 in., pale, bright green. *Peduncle* from near base of the stem, 1—2 in., rather flexuous, with one or two ovate acute bracts; the bracts similar, J in. long; pedicel with ovary 1-1½ in. *Sepals* f in. long; petals rather shorter. *Lip* 1 shorter than the sepals, rather fleshy. *Column* very short; pollinia small, globose, strap short, gland large.

A very distinct species belonging to the small group with *V. cristata*. Lindl. and F. *Alpina*, Lindl. *U* than either, with the lip of the latter, but furnished with a long conical spur which it is smaller. The flowers resemble in their incurved sepals and petals once distinguished by which the genus *V.* is not well given in plate 68, but is admirably well rendered in a drawing form of the plant in *Cathart* emotion of Sikkim orchids at Kew, in which the flowers are tented white and the lip as marked with purple, not the bright red here depicted.

The Calcutta drawing is inscribed "Vanda cristata, Lindl., Tar. f., grown at Mungpo, J. X. Brought from Bhotan, 1887; said to grow at 2,000 ft."

Fig. 1, flower with the lateral sepals removed; 2, flower with the sepals and petals displaced and lip removed; 3, side and 4 front view of lip; 5 and 6, anther; 7 and 8, pollinia:—all except figs. 3 and 4 enlarged.

PLATE 69.

SACCOLABIUM (*Micranthoe*) INCONSPICUUM, *Hook. f.*

8. *ineonsipeum*; caulibus intricatim cespitosis teretibus ramosis, foliis 2—3-pollicaribus funiformibus teretibus obtusis, floribus parvis pallidis breviter pedicellatis pedunculo perbrevis fasciculatis, sepalis petalisque late ovatis v. ovato-oblongis apicibus recurvis subacutis, labelli hypochilio hemispherico marginibus integerrimis, epichilio inargine hypochilii sessili triangulari-ovato retuso v. emarginato ? inconspicuo. *Hook. f. Fl. Brit. Ind.* vi. 56. *Gymbidium inconspicuum*, *Wall, mss.*

HAB.—ASSAM, *Jenkins {Ic. in Herb. Calcutt.}*

Stems 6—8 in., as thick as a duck's quill, terete, flexuous, red-brown, striate, rooting at the base only, probably forming pendulous interlaced tufts; internodes about $\frac{1}{2}$ in. Leaves about as thick as the stems, straight or slightly curved, dark green. Flowers $\frac{1}{2}$ in. diam., in almost sessile supra-axillary tufts of 6—8; pedicel with ovary $\frac{1}{2}$ — $\frac{1}{4}$ in., curved. Sepals and petals greenish white. Lip large for the size of the flower, with a cup-shaped truly hemispheric hypochil, apparently fleshy, with no indication of lateral lobes, green, purplish at the base, margins slightly everted; epichil greenish white, as broad as the hypochil, flat, without ridges, warts, or nerves. Column very stout indeed, purple, clinandrium quite entire; anther broad, flattish, 2-celled, golden yellow; pollinia globose; strap short, rather slender, gland ovate.

A remarkable species, quite unlike any other, of which there is an excellent drawing (reproduced here) in the Calcutta Herbarium, executed under Wallich's superintendence, but of which I can find no specimen in his Herbarium, nor have I seen it in any other. The specimen figured is only a portion of that in the original. In the shape of the lip, and especially the hemispheric hypochil, it precisely accords with that of the section *Calecolavia* but it resembles in habit no species of that group in foliage and inflorescence, and further differs in the perfectly smooth epichil. The same characters remove it from the section *Acampe*. In the Flora of British India I doubtfully referred it to *Baccolabium*; and after reviewing the *Cymbidieae*, I see no possibility of referring it to any other genus.

The drawing is inscribed in Wallich's handwriting, "90 *Cymbidium inconspicuum*, Wall., Oapt. Jenkins, from Lower Assam."

Fig. 1, flower; 2, the same with the sepals and petals displaced; 3 and 4, anther; 6 pollinium:—all enlarged.

PLATE 70.

SACCOLABIUM (*Micranthoe*) GEMMATUM, *Lindl.*

8. *gemmatum*; caule elongate flexuoso folioso, foliis linearibus decurvatis semiteretibus apicibus 2—3 dentatis, racemis elongatis gracillimis paniculatim ramosis multifloris, floribus minutis amethystinis v. albis purpureo pictis secus ramos paniculae sessilibus iisque parallelis fere clausis, sepalis ovato-oblongis obtusis concavis papillois, petalis obovatis, labello oblongo v. obovato-oblongo subcymbiforme carnosio crenulato, lobis lateralibus obscuris, calcare sepalis sequilongo cylindrico obtuso. *Lindl. in Bot. Reg.* 1838, Misc. 50; *Walp. Ann.* vi. 885; *Hook. f. Fl. Brit. Ind.* vi. 55 (*errore gemminatum*).

HAB.—SIKKIM and BHOTAN HIMALAYA, alt. 3—5,000 feet. KHASIA and JYNTIA HILLS, alt. 2—4,000 feet, common.

Stems 6—12 in. or more, rooting at the base, strongly decurved. *Leaves* 2—4 in., fleshy, very variable in breadth, from terete and deeply channelled to linear and concave, always recurved. *Peduncle* slender, 2—4 in., terete, green; branches of panicle spreading, filiform, flexuous, green with ovate acute bracts at the forks; flowers $\frac{1}{2}$ in. long, rather remote, quite sessile and parallel to the rachis; bracts broadly ovate, much shorter than the short deeply grooved ovary with alternate green and red ribs. *Sepals* all amethystine purple or tipped with white; petals purple. *Lip* white, rather longer than the sepals, very variable in shape, sometimes linguiform, nearly flat, at others laterally compressed, blade white; spur variable in length, purple, sometimes cylindric and nearly as long as the ovary, at others shorter and conic. *Column* very short indeed, with two terminal subulate processes. *Anther* broadly ovate; pollinia globose; strap broad; tongue-shaped, gland large. *Capsule* sub-sessile, $\frac{1}{2}$ - * in. long, oblong, curved.

The drawing was made by myself in Sikkim, 2nd August 1848. In another, from the Calcutta collection of drawings, the aepals are of a very pale rose purple.

Kg. 1, Side view of flower; 3, ovary and lip; 8, lip; 4, top of ovary and column; 5 and 6, pollinia:—a« enlarged.

PLATE 71.

SACCOLABIUM (*Micranthoe*) PENANGIANUM, Hook. f.

8. penangianum, caulibus fasciculatis flexuosis, foliis linearibus v. anguste linearilanceolatis canaliculatis oblique bidentatis, floribus minutis in racemum parvum puberulum breviter pedunculatum confertis, sepalis lateralibus late ovato-oblongis subacutis 1-nerviis, dorsali multo minore obtuso obovato, petalis lanceolatis acutis, labello supero sepalis multoties longiore in cornu incurvum compressum acutum longe ultra lobos producto, disco carnosio, lobis lateralibus rotundatis, terminali minuto unguiforme lateralibus apposito. Hook, f. *Fl. Brit.* 2nd. vi. 57 et in Hook. *Icon. Pl.* *. 2129B.

HAB.—PENANG, on the Sonkey river, Curtis. PEKAK, Kunsth (in *Herb. Calcutt*).

Stems 4-5 in., apparently tufted, as thick as a crow-quill, internodes $\frac{1}{2}$ in. *Leaves* 2—4 by $\frac{1}{2}$ in., spreading, curved, keeled, tip usually acutely notched as if were on one side, bright green. *Eaemes* with the very short peduncle 1—1 $\frac{1}{2}$ in., fruiting decurved; bracts subulate; flowers subsessile, $\frac{1}{2}$ in. from the dorsal sepal to the tip of the lip, pale yellow or whitish with a few specks of red. *Lateral sepals* very oblique, dorsal, obovate-oblong rounded at the tip. *Petals* 1-nerved, much smaller than the sepals. *Lip* erect, much larger than the rest of the flower, forming a compressed or angled more or less inflated incurved acute horn with the orifice and 3 small lobes close under the column, base contracted. *Column* very short; rostellum inconspicuous; anther hemispheric; pollinia globose; strap rather long[^] dilated upwards, gland minute. *Capsules* $\frac{1}{2}$ in. long, sessile, oblong, crowded, reflexed!

A very peculiar little species, from the minute reversed erect flowers, and minute lobes of the lip. The analyses were made by me from dried Penang specimens, and they are, I hope, fairly accurate.

The drawing of the whole plant is from Perak specimens sent by Kunstler which "flowered in the Rl. Bot. Garden, Calcutta, 14-7-8*,"

Fig. 1, flower; 2, dorsal and 3, lateral sepals; 4, petal; 5, ovary, lip and column; 6, column and upper, part of lip; 7, column; 8, anther including pollinia; 9, rostellum; 10 pollinia:—all greatly enlarged.

PLATE 72.

SACCOLABIUM {*Micranthm*} LANATUM, Hook /.

8. *lanatum*; caule brevi robusto, foliis lineari-oblongis v. breviter loriformibus obtuse 2-lobis profunde canaliculatis crasse coriaceis, pedunculo foliis longiore et spica elongata densiflora pendula tomentosis v. lanatis, bracteis magnis imbricatis ovatis acuminatis flores velantibus caducis, sepalis lateralibus late ovatis, dorsali elliptico-oblongo, petalis obovato-oblongis, labello basi saccato sepalis paullo longiore lobis lateralibus triangulari-ovatis integris T. unidentatis terminali ovato 2-cuspidato, disco callo pubescente instructo. Hook. f. *Fl. Brit. Ind.* vi. GO. *Cleisostoma lanatum*, Lindl. in *Journ. Sort Soc.* iv. 264; Walp. *Ann.* vi. 889.

HAB.—TENABSERIM; at Moulmein, Parish, Scott.

Stem 1—2 in., as stout as a swan's quill. *Leaves* 3—i by 1—1½ in., distichous, spreading, dark green, lobes equal rounded, sinus acute. *Peduncle* 3—6 in., flexuous, pale green, simple or branched; sheaths tubular, appressed; spike 4—7 in. long, young, clothed with densely imbricating long-pointed pale green tomentose bracts that completely conceal the flowers, and are very caducous; flowers ½ in. diam., pale green, striped with dull purple. *Sepals* pubescent, tips of lateral compressed and almost winged at the back; petals ciliate. *Lip* with the side-lobes ciliate and usually notched on the lower margin; tips of mid-lobe divaricate and recurved; sac hemispheric with a pubescent ridge encircling the mouth within; the pubescent callus of the disc descending into the sac for a short way. *Column* not long, compressed upwards laterally; rostellum not prominent. *Anther* nearly flat, membranous, lanceolate from a broad 2-lobed base; pollinia small, globose, seated one in the terminal sinus of each arm of the long forked strap, which is dilated upward from a very slender base, and then forks, each arm being flat and broader than its pollinium; gland small, oblong or ovate-lanceolate.

A very remarkable plant, not satisfactorily referable to any genus, though, as it appears to me, technically a *Saccolabium*. The woolly peduncle and spike and the large deciduous bracts concealing the flowers are unlike any of its congeners or their allies. Lindley placed it in *Cleimnoma*, to which genus it seems allied in the pubescent ring encircling the mouth of the sac of the lip, but I find no trace of the callus or sac underneath the column which is characteristic of *Cleisostoma*. The forked strap of the pollinia is very singular. The drawing here reproduced is inscribed "Burma, Mr. Soott, June 1861."

Fig. 1, flower; 2, side view of column and lip; 3, section of lip; 4 and 5, anther; 6 pollinia:—all enlarged.

PLATE 73.

SACCOLABIUM (*Distichophylla*) DISTICHUM, *Lindl.*

8. *distichum*) caulibus elongatis gracilibus pendulis foliosis, foliis inter minoribus distichis elliptico-lanceolatis 2—3-cuspidatis, pedunculis brevibus paucifloris foliis multo brevioribus, floribus flavis subsessilibus, sepalis petalisque subaequalibus obovato-oblongis obtusis, labello saociforme, lobis lateralibus brevissimis rotundatis, terminali parvo semicirculari oarinosulo basi callo didymo instructo. *Lindl. in Journ. Linn. Soc. iii. 36; Bekhb. f. Ottia Hamburg 43; Hook. f. Fl. Brit. Ind. vi. 64.*

HAB.—SIKKIM HIMALAYA, alt. 6—8,000 ft. KHASIA HILLS, alt. 5—6,000 ft. MUNNIPOBE, alt. 6—9,000 ft., *Watt.*

Stem 4—8 in., soft, filiform -when dry, rooting here and there, branched at the base and tufted. *Leave** above 1 in., sessile, deeply channelled, keeled, bright green, speckled with brown. *Peduncles* rarely as long or longer than the leaves, slender; bracts minute; flowers about 1 in. diam., greenish yellow, obscurely speckled with purple. *Sepals* and *petals* spreading, tips rounded. *Lip* about as long as the sepals, base of sac rounded, surface perfectly smooth within, without calli or pubescence. *Column* very short; rostellum short; anther ovate-lanceolate; pollinia globose, strap linear; gland large, oblong. *Capsules* f in., fusiform.

The drawing reproduced here is inscribed "Sikkim, 6,000 ft., Sept. 1876, G. King." The analyses are my own from dried specimens.

Kg. 1, flower; 8, lip; 8, section of lip; 4, front, and 6, side view of column; 6, pollinia,—all enlarged.

PLATE 74.

SACCOLABIUM (*Distichophyllu*) TENUICADLE, *Hook. /,*

S. tenuicaule; caulibus elongatis gracilibus pendulis foliosis sulcatis flexuosis, foliis distichis linearibus v. lineari-lanceolatis obtusis, floribus tuberculis folio oppositis sessilibus solitariis paucisve parvis flavis, sepalis lateralibus oblique ovatis acutis, petalis brevioribus ovatis acutis, labello basi in calcar gibboso-davatum subincurvum producto, lobis lateralibus erectis ovatis acutis terminali paullo longiore oblongo incurvo apice truncato 2-cuspidato dente interjecto. *Hook. f. Fl. Brit. Ind. vi. 64.*

HAB.—PENANG; on West Hill, *Curtis.* PEBAK, *Scortechini, Wray.*

g stem 6—8 in., as thick as a crow-quill, simple or branched, rooting at the base only, green, deeply grooved. *Leaves* 3—4 in. by 1—2 in., channelled and keeled, spreading, bright green. *Flowers* 1 in. diam., yellow or yellow-green; bracts microscopic; ovary very short; sepals 3-nerved, dorsal as large as the lateral; petals 1-nerved. *Lip* as long as the sepals, side-lobes sparingly irregularly obtusely toothed, mid-lobe rather longer; spur with a ring of hair* at the constriction within, but no callus. *Column* short; rostellum projecting styliform. *Anther* membranous, almost flat, acuminate; pollinia small, reniform, strap broad with a dilated subreniform top, gland small.

Except in habit of growth, which approaches that of *S. distichum*, this is not nearly allied to any other species of the genus. The solitary or fascicled flower, sessile on leaf-opposed brown tubercles of the stem, which are covered with microscopic bracts, is very peculiar.

The drawing is inscribed "no label sent, H. B. 0., 16-7-81." The analyses 1—3 are on the drawing; those marked A1 to A4 are by Miss Smith at Kew under my eye from Fenaug specimens.

Fig. 1, flower, with the sepals and petals displaced and lip removed; 2, lip seen from above, and 3, from the side. A1, flower; A2, column, and lip; A3, section of lip; A4, lip seen from above:—all greatly enlarged.

PLATE 75.

SACCOLABIUM (*Speciosae*) TRICHKOMUM, *Beichb.* /.

8. *irichromum*; caule. elongato robusto, foliis elongatis loriformibus 2-lobis lobis rotundatis, racemis supra-axillaribus foliis multoties longioribus breviter pedunculatis multi-secundi-floris, floribus albis roseo maculatis, sepalis lineari-oblongis acutis, petalis latioribus, labello cornuforme sepalis duplo longiore cylindraceo incurvo apice rotundato, lobis lateralibus brevibus rotundatis terininali parvo basi ore incluso callo uncinato instructo. *Iieichb. f. in JBamb. Gartenzeit*, 1859, 51 *et Xen. Orchid* 119, t. 139; *Hook. f. II. Brit. Ind.* vi. 65. *S. pallens*, *Lindl* (non *Cathcart*)[^] in *Journ. Linn. Soc.* iii. 35.

HAB.—SIKKIM HIMALAYA (/<?. *Cathcart*). BHOTAN and ASSAM (*IC. in Herb. Calcutta*).

Stem 1—3 feet, as thick as a swan's quill, rooting at the base only, cylindric and clothed with sheaths below, leafy (and flattened?) above; internodes 1 in. *Leaves* 7—10 by f—1 in., spreading, flat, deeply channelled, bright green. *Racemes* with the rather stout ascending terete green peduncle 3—5 in.; bracts very small, ovate, brown; pedicels slender, with the ovary f in., usually sigmoid, all curving to one side; flowers | in. long. *Sepals* and *petah* £ in. long, spreading, white or cream-coloured with pink midrib. *Lip* white or yellowish, spotted or blotched with pink. *Column* (rather rostellum) small. *Anther* flat, acute; pollinia globose, strap slender; • gland small lanceolate.

A very distinct species of the section which I have called *Speciosce*, to which belong the well-known 8. *ampullaceum* (*Aeridea ampullaceum*, Boxb.) and 8. *curviolum*, Lindl. (*S. rubrum*, Lindl.), from both of which it is at once distinguished by the small lax-fid, one-sided raceme and ourved spur.

The plate is a reproduction of a portion of a full-sized drawing in the Cathcart collection at Kew. Of the figures, that of the section of the lip represents the gland as misplaced; it should be within the mouth of the lip below the base of the midlobe, as badly represented at figure 8. Lindley by an oversight attributed the specific name of *palkm* to Mr. Cathoart, who never attempted to name a plant.

Figure 1, side view; 2, back view, and 3, front view of flower; 4, flower with the dorsal sepal removed; 6, side and 7, front view of lip; 6, lip cut open:—all of the natural size: 8, mouth of lip; 9, anther; 10, pollinia.—all enlarged.

PLATE 76.

SARCANTHUS APPENDICULATUS, *Rook. f.*

& *appendiculahis*; caulibus elongatis teretibus, foliis elongatis teretibus obtusis, pedunculo elongato, racemo terminale brevi paucifloro pendulo, sepalis oblongo-obovatis

petalisque paullo augustioribus, labelli calcare infundibulari conico sub-incurvo 2-loculari lobis parvis, lateralibus rotundatis v. acutis, terminali brevi incurvo. *Hook f. Fl. Brit. Ind.* vi. 67. *S. teretifolius. Reichb. f. in Trans. Linn. Soc.* xxx. 136 (non *Lindl.*). *Aerides appendiculatum, Wall. Cat. n.* 7315; *Lindl. Gen. and Sp. Orchid*, 242.

HAB.—BURMAH; TAVOT, *Wallieh*; MOULMEIN, *Griffith, Parish.* KHASIA HILLS and ASSAM, *Simons (Ic. in Herb. Calcutta).*

Stems 6—12 in., from a branching pubescent rooting rhizome, as thick as a duck's quill, curved or flexuous, dark green spotted with red, throwing out here and there very long, stout roots. *Leaves* 3—5 in., as thick as the stem, curved, dark green, speckled towards the base. *Peduncle* supra-axillary, 6—10 in., slender, decurved, dark green with a few short brown sheaths; raceme 2 in., rachis rather thickened; bracts small; pedicel very short, with the ovary $\frac{1}{2}$ in. long; flowers $\frac{3}{8}$ in. diam. *Sepals* and *petals* widely spreading, subacute, yellowish, with three broad red nerves, the outer pair branching outwards. *Lip* rather shorter than the sepals; spur yellow, streaked and tipped with red; lobes pink, nearly triangular in outline, as broad from the base of the column to the midlobe as from the latter to the base of the spur; midlobe with a callus at its base; spur with "a transverse septum towards the base"?

In the Flora of British India I have described *S. appendiculatus* from Moulmein specimens as having flowers $\frac{1}{2}$ in. diam., with yellow green sepals and petals, the side lobes of the lip acuminate, the spur with a longitudinal septum, and the pollinia as very large. The above suggests that the Khasia plant here figured may be specifically different from the Moulmein one, which is the type of the species. The latter will be figured in the "Icones Plantarum."

Figure 1, flower; 2, ovary, column and lip; 3, the same with section of lip; 4, 5, anther; 6, pollinia—all enlarged*

PLATE 77.

SAKCANTHUS SECUNDUS, *Griff.*

S. secundus; caulibus elongatis gracilibus teretibus, foliis elongatis anguste lineari ensiformibus-lanceolatisve longe acuminatis basin versus angustatis, racemis gracilibus laxifloris foliis multo brevioribus, floribus subsecundis pallido rufo-flavis, sepalis obovato-oblongis petalisque obtusis, labello crasse carnosio conico-infundibulari obtuso, lobis lateralibus dentiformibus terminali parvo ovato acuto incurvo. *Griff. Notul.* iii, 302 et 1c. *PL Asiat.* t. 336; *Hook. f. Fl. Brit. Ind.* vi. 67. *Micropera pallida, Lindl. in Wall, cat. n.* 7321, partim {non *Gen. and Sp. Orchid*).

HAB.—UPPER ASSAM, *Griffith*) DUPLHA HILLS, *Lister (Ic. in Herb. Calcutta)*; SYLHET, *Wallieh*.

Stem 8—18 in., about as thick as a goose-quill, rooting towards the leafless sheathed base, leafy above. *Leaves* 4—7 by $\frac{1}{2}$ —1 in., distichous, spreading and recurved, deeply channelled, 5-nerved, bright green, obscurely retuse on one side at some distance ($\frac{1}{2}$ in.) below the very slender subulate apex. *Racemes* shorter than the leaves, pendulous; bracts minute; pedicel with ovary $\frac{1}{2}$ in., nearly straight; flowers $\frac{1}{2}$ in. diam. *Sepals* and *petals* subequal, widely spreading, dull reddish with a broad central pale yellow diffused band, and sometimes margined. *Lip* with spur about as long as the sepals;

spur slightly incurved, with a very large 2-lobed compressed caruncle under the column within, and a vertical plate descending from the base of the midlobe to below the middle of the spur, dividing the base of the latter into two parallel cells; the upper part of this plate fits into the cleft of the 2-lobed caruncle. *Column* very stout, rostellum subulate. *Anther* broad, flat, suddenly contracted in front into a long subulate beak; pollinia large, globose, cleft; strap slender, gland minute. *Capsule* $\frac{1}{2}$ — $\frac{3}{4}$ in. ellipsoid or oblong, ribs not prominent.

A little known plant, referred to by Lindley in his paper on Indian orchids in the Journal of the Linnaean Society (iii, 39) under *8. peninsulari** as possibly that plant; to which it is indeed closely allied, but *8. pumilus* differs in the ribbed stem and much smaller flowers.

The drawing here reproduced is inscribed "Sarcanthus oxypetallus, Wall." in Wallich's handwriting; to which is added "Diphla Hills, Mr. Lister, fid. June 1875."

Fig. 1, flower; 2, column and lip; 3, section of lip; 4, anther; 6, pollinia:—all enlarged.

PLATE 78,

SARCANTHUS INSECTIFER, *Rehnb. f.*

8. insectifer] caule robusto compresso elongate radicante folioso, foliis brevibus distichis oblongis 2-lobis crasse coriaceis amplexicaulis, spicis subsessilibus brevibus paucifloris sepalis late oblongis petalisque obovato-oblongis obtusis patentibus rubro striatis, labelli calcar brevis conico-infundibulari, lobis lateralibus brevissimis rotundatis, terminali triangulari-ovato carnosio roseo, columna brevissima apice 2-aristata aristis recurvis. *Reichb.f. in bot. Zeits. 1857, 159; Hook. f. Fl. Brit. Ind. vi. 68.*

HAB.—BEHAR, J. D. H. CACHAR, *Mann.* CHITTAGONG (*IC. in. Sort. Calcutta*). TENASSERIM, *Parish.*

Stem scandent, as thick as a swan's quill or less, green. *Leaves* $\frac{1}{2}$ — $1\frac{1}{2}$ by $\frac{1}{2}$ — $\frac{3}{4}$ in., many and sometimes almost imbricating, deeply channelled, nerveless, terminal lobes unequal with sometimes an interposed mucro. *Spikes* $\frac{1}{2}$ in., subsessile; bracts minute, deciduous; ovary short; flowers $\frac{1}{2}$ in. diam. *Sepals* and *petals* greenish yellow, with red stripes. *Lip* rather longer than the sepals; terminal lobe as long and as broad as the spur, bright rose-coloured or purplish, sometimes margined with white; spur with a large 2-fid callus below the column within, semiseptate by a plate descending from the base of the midlobe. *Column* very stout, clinandrium horizontal or reclinate, with the two awns from the sides of the column in front arched over it; rostellum obscure. *Anther* flat, subquadrate, truncate or broadly retuse in front; pollinia large, globose; strap very short and broad; gland transverse.

A remarkable and exceptionally bright-flowered species, of which I have seen several drawings displaying a good deal of variation in the colour of the flowers. That here reproduced (for the original is a full-sized folio) is inscribed "Saccob. carinatum, Hot Springs near Hatgur and Seetakoond Hill"—the latter is one of the Chittagong Hills.

Fig. 1, side and 2, front view of flower; 3, column; 4 and 6, anther; 6, pollinia.

PLATE 79.

SARCANTHUS PALLIDUS, *Lindl.*

S. pallidus; caule valde robusto, foliis elongatis late loriformibus inaequaliter 2-lobis, panícula rainosa effusa longe pedunculata, ramis patentibus multi-laxifloris, sepalia petalisque oblongis obtusis rubro-purpureo striatis, labelli carnosí albi calcar subcylindraceo incurvo subtruncato, lobis lateralibus brevissimis truncatis, terminali brevi ovato incurvo apice rostrato. *Lindl. in Bot. Reg.*[^] 1840, Misc. 78 et in *Journ. Linn. Soc.* iii. 39; *Hook. f. Fl. Brit. Ind.* vi. 68. *S. tricolor*, *Reichb. f. in Bonplandia* ii. 219. *Saccolabium racemiferum*, *Lindl. Gen. and Sp. Orchid.*[^] 224. *Aerides racemiferum*, *Wall. mss.*

HAB.—EASTERN NEPAL, alt. 4,000 ft. J. D. H. BHOTAN and the KHASIA HILLS, alt. 4_6,000 ft., *Wallich.* BURMA, *Berkeley.*

Stem YQTI short, as thick as the thumb, leafy to the base; roots as thick as a goose-quill. *Leaves* 10—14 by 1|—2 in., spreading and recurved, thickly coriaceous, deeply channelled, dark green, terminal lobes rounded; sheaths short, open. *Panicle* with *peduncle* 2—3 ft., nodding; branches spreading, 2—3 in. long, slender, laxly many-fld.; bracts at the forks and floral very small, ovate-lanceolate or subulate, persistent; pedicels with ovary spreading, | in.; flowers about | in. diam., fleshy, dark or pale reddish-purple with a median broad pale band. *Spur* with very thick walls, septate and 2-celled longitudinally below the middle, and with a large 2-fid. caruncle below the column nearly closing the mouth. *Column* very short and stout, rostellum obscure; *anther* broadly ovate, acuminate, flat; pollinia large, oblong or globose, cleft; strap slender, dilated above, gland small. *Capsule* § in. ellipsoid or clavate.

One of the largest species of the genus.

The drawing from which the plate is taken is inscribed "Mr. Gibson's Churra collection. *Sarcanthus affinis*, *Wall.* (*Yanda paniculata* Br.P)" in *Wallioh's* handwriting.

Fig. 1, flower; 2, section through flower; 3 and 4, anther; 4, pollinia:—aW enlarged.

PLATE 80.

CLBISOSTOMA ANDAMANICUM, *Hook. f.*

C. andamanicum; caule crasso elongato, foliis loriformibus coriaceis 2-lobis, pedunculo elongate, floribus parvis racemosis, racemis spiciformibus ramos paniculae lax® terminantibus viridi-flavescentibus brunneo suffusis, sepalis petalisque late obovato-oblongis, obtusis, labello sacciforme cylindraceo lobis lateralibus truncatis, terminali brevissimo erecto. *Hook. f. Fl. Brit. Ind.* vi. 71.

HAB.—SOUTH ANDAMAN ISLD., *Kurz.*

Stem as thick as a goose-quill, rooting, green; internodes 1—1| in. *Leaves* 4—6 by |—I in., spreading and recurved, channelled; terminal lobes unequfcl, rounded. *Peduncle* infra-foliar, 5—7 in., rather rigid, green, speckled with red; sheaths short annular; branches about 1 in. long; racemes (or spikes) 1—1| in., ovoid, many-fld.; bracts small, ovate,

pedicels with ovary $\frac{1}{2}$ in., flower $\frac{1}{2}$ in. diam. *Sepals* and *petals* widely spreading, thick, greenish yellow, with a broad streaked red purple band within the border, or the streaks may be replaced by spots. *Lip* about as long as the sepals, yellow spotted from the middle to the base of the spur; dorsal callus retuse. *Column* very short, stout; clinandrium horizontal, angles obtuse; rostellum short; anther flat, ovate, acuminate; pollinia globose, strap slender, gland medium-sized.

Closely allied to *C. latifolium*, Lindl., a common species in the Malayan Peninsula, which differs in the much broader leaves, stouter stem and peduncles, smaller flower, and in having a reniform rounded midlobe of the lip.

The drawing of *C. andamanicum* is inscribed "Sarcanthus of Andamans No. 1. Introd. 1807, fid. in H. B. 0., April 1868."

Fig. 1, flower; 2, the same with the perianth segments displaced; 3, column and lip, the latter bisected; 4, anther; 5, pollinia:—all enlarged.

PLATE 81.

CLEISOSTOMA RAMOSUM, Hook, f.

C. ramosum; caule breve, foliis anguste loriformibus oblique 2-lobis, panícula gracili erecta breviter pedunculata, ramis paucis paucifloris patentibus, floribus parvis breviter pedicellatis, sepalis petalisque obovatis obtusis rufo-fuscis alba viridive marginatis, labelli lobis lateralibus parvis ovatis terminali triangulari-ovato v. rotundato et subtrilobo, disco basique columnae pubescentibus, calcaribus uncinato incurvo. Hook. f. *Fl. Brit. Ind.* vi. 72. *Saccolabium ramosum*, Lindl. *Gen. and Sp. Orchid.* 224. *S. flexuosum*, Lindl. in *Journ. Linn. Soc.* iii. 36. *Oeceoclades flexuosa*, Lindh. in *Wall. Cat. n. 7333 et Gen. and Sp. Orchid.* 236. *Aerides ramosum*, Wall. mss.

HAB.—SIKKIM HIMALAYA, in hot valleys, J. D. H. LOWER BENGAL, in the Sunderbuns, Wallich, Clarke. BUKMA, on the Attran river, Wallich. MOULMEIN, Parish.

Stem 1—3 in., hardly as thick as a goose-quill. *Leaves* few, 3—5 by $\frac{1}{2}$ —1 in., spreading and recurved, terminal lobes rounded. *Peduncle* 1—2 in., green; panicle 4—5 in., branches rather distant, spreading; bracts minute; pedicels with ovary $\frac{1}{2}$ in.; flowers about $\frac{1}{2}$ in. diam. *Sepals* and *petals* widely spreading. *Lip* about as long as the sepals, white, flushed with pink or banded with yellow; spur coriiform, acute, mouth hairy, dorsal scale erect, 2-fid., pubescent; side lobes variable in length and midlobe in form. *Column* very short, broad, angles rounded; rostellum very short. *Anther* short, broad; pollinia globose, 4 cleft, (2 very small, Clarke) strap dilated upwards, tip contracted; gland small. *Capsule* $\frac{1}{2}$ inch, fusiform.

An insignificant species, presenting a good deal of variation in the length and breadth of the leaves, colour of the flowers, and form of the lobes of the lip, in so far as the analyses of Herbarium specimens shows. The latter (flowers only) accompanied the drawing which was inscribed "Sarcanthus from Col Perreau, in Calcutta, fid. in H. B. 0., 3rd May 1886.

Fig. 1, front, and 2, dorsal view of flower; 3, front view of column and lip; 4, lip; 5, side view of column and lip; 6, the same with the lip bisected; 7, pollinia:—all enlarged.

PLATE 82.

CLEISOSTOMA BREVIPES, *Hook. f.*

C. brevipes; caule valido elongate folioso basi radicante, foliis distichis uniformibus lineari-lanceolatis acutis crasse coriaceis, spicis lateralibus brevibus breviter crasse pedunculatis, rachi crassa cylindracea, bracteis parvis acutis, floribus aureis, petalis sepalisque ovato-oblongis obtusis vittis 2 rubris purpureisque notatis, labelli lobis lateralibus brevibus falcatis acutis, terminali brevi triangulari-hastata apice membranacea bi-aristata disco incrassato, calcare brevi sacciformo.

HAB.—SIKKIM HIMALAYA (*IC. in Herb. Calcutta*); alt. 5,000 feet, *Gamble*; ASSAM (*Hort.*).

Stems tufted, 8—12 in., as thick as a goose-quill, curved, leafless and sheathed below, rooting at the base, leafy above, internodes ½—1 in. *Leaves* similar all the way up the stem, 4—6 by 1 in., channelled above, stiff, hard, somewhat narrowed at the base, tip almost pungent. *Spike* 1—1½ in., horizontal, green, ½ in. diam.; basal bracts annular; bracts minute, red-brown; ovary ½ in.; flowers ½—1 in. diam. *Sepals* and *petals* widely spreading, subsimilar. *Lip* longer than the sepals, yellow with red markings; spur shining, with a thickened callus at the base of the midlobe, which extends across the mouth of the spur to meet the thick callus at the base of the column, thus closing the orifice. *Column* short, stout, angles rounded. *Pollinia* subquadrate; strap compressed, gland large, 2-partite. *Capsule* 1—1½ in., fusiform, terete, fleshy, striate.

A remarkable epiphyte, of which I have examined a fruiting specimen collected by Mr. Gamble in Sikkim, and a living flowering plant sent to Kew from a nursery in England. The latter differs somewhat from the figure here given in the large flowers with more purple bands on the sepals and petals, and in having two awns on the membranous tip of the midlobe of the lip; these may have fallen off in the specimen figured, which was inscribed "Sarcanthus from Sikkim, No. 2, Botanic Garden, July 1867."

Fig. 1. flower; 2, front and 3, side view of column and lip:—all enlarged.

PLATE 83.

CLEISOSTOMA SPICATUM, *Lindl.*

C. spicatum; caule crasso elongato radicante folioso, foliis latis oblongis 2-lobis, pedunculo oppositifolio crasso decurvo, spica foliis longiore pendula multiflora, bracteis ovato-subulatis demum deflexis, sepalis petalisque minoribus ovatis subacutis fusco-rubris vitta media marginibusque aureis, labelli lobis lateralibus rotundatis terminali parvo ovato carnosio, calcare magno basi inflato 4-lobato. *Lindl. in Bot. Reg. sub. t. 32; Hook, f. Fl. Brit. Ind. vi. 72. Sarcanthus densiflorus, Par. et Reichb. f. in Trans. Linn. Soc. xxx. 136. Saccolabium densiflorum, Lindl. in Wall. Cat. n. 7311 et Gen. and Sp. Orchid, 220 et in Bot. Reg., 1838, Misc. 56. Aerides densiflorum, Wall. mss.*

HAB.—BHOTAN (*IC. in Herb. Calcutta*). TENASSERIM, Moulmein, *Parish*. PENANG, *Wallich, Curtis*. PEBAK, *Kunstler*. DISTRIB. Borneo.

Stem variable in thickness, as thick as the middle finger in the Penang and figured specimens, more slender in the Tenasserim and Perak ones, flexuous, apparently scandent;

roots very long and stout; internodes green, £—1 in. long. *Leaves* 4—8 by £—2 in., spreading and waved, deeply channelled, dark green. *Peduncle* 1—2 in., stout, green, with broad ovate obtuse sheaths £- in. long, the lowest of which are annular; spike 4—5 in., dense-fl., glabrous or faintly furfuraceous; bracts nearly as long as the short ovary; flowers £ in. broad in Penang specimen, £ in. in the Bhotan drawing. *Sepals* and *petals* widely spreading. *Lip* about as long as the sepals, yellowish, flushed with red, dorsal callus erect forked; spur almost bottle-shaped, the inflated truncate end 2-lobed and each lobe again faintly lobulate, sometimes transversely septate near the base within. *Column* very short and stout, rostellum obscure. *Anther* flat, ovate, acuminate; pollinia globose; strap very slender, dilated above; gland small.

A very stout species as figured here, remarkable for the bottle-shaped spur of the lip, which resembles that of *Saccolabium buccosum*, Reichb. f. I have some doubts as to whether there may not be two species included under *C. spicatum*, and that the Sikkim plant (of which I have seen no specimen) figured here may be different from the Tenasserim and Penang one, the flowers are so much larger; allowance, however, must be made for the habitual exaggeration of native artists. On the other hand, the Sikkim habitat may not be a correct one, the transposition of labels of garden plants is so frequent and not detectable. The drawing is inscribed "Saroanthus latifolius, T. Anders., from B. Gk, 26th April 1863, introd. by S. Jennings, Esq., from Bhotan. T. Anders." Another drawing of a plant with narrower leaves is inscribed "From Perak, Kunstler misit, H. B. C. fld.' 23-5-84."

Fig. 1, flower with the sepals and petals displaced; 2 and 3, anther; 4, pollinia:—aW enlarged.

PLATE 84.

CLEISOSTOMA UTERIFERUM, Hook. f.

*C. uteriferum**) acaule, foliis paucis late loriformibus flaccidis apice oblique rotundatis v. 2-fidis marginibus undulatis, pedunculo rachique spicse densiflora striato crasso foliis brevior, bracteis minutis, floribus parvis, sepalis obovato-oblongis petalisque angustioribus lineari-oblongis flayis basin versus fusco-rubris, marginibus undulatis, labelli ore constricto lobis lateralibus brevibus truncatis, terminali niinuto ovato carnosio, calcare magno globoso inflato antice sulcato. Hook. /. Fl. Brit. Ind. vi. 74.

HAB.—PERAK, Kunstler {in Herb. Calcutt.).

Stem very short, with tufted roots. *Leaves* pendulous or decurved, flat, rather pale green, base hardly contracted, tip sometimes obliquely truncate. *Spike* with peduncle 3£ in.; flowers about J in. diam.; ovary about ^ in. *Sepals* and *petals* fleshy. *Lip* almost wholly consisting of the globose bottle-like spur with thin walls; it bears a small callus under the minute caruncled midlobe, and a large erect tongue-like one below the column. *Column* very short and stout, rostellum short, protruded. *Anther* broad, truncate, crown 2-lobed, 1-celled; pollinia globose, strap elliptic-lanceolate, narrowed at both ends, gland oblong.

A very well marked species, of which I have seen only dried flowers accompanying the drawing, which is inscribed "Kunstler e Perak misit., Fl. in H. B. O., 14-6-84."

Fig. 1, side and 2, front view of flower; 3, section of lip; 4, column and portion of sac of lip with dorsal callus; 5, anther; 6, pollinia:—aW enlarged.

PLATE 85.

CLEISOSTOMA WENDLANDORUM, *Reichb. f. ?*

C. Wendlandorum; acaule, foliis elongatis late loriformibus oblique 2-lobis recurvis y. pendulis flaccidis, racemo brevi foliis multoties brevioris simplici v. paniculatim ramoso, pedunculo brevi ramisque validis, floribus minutis flavis, labello rubro suffuso, sepalis obovato-oblongis, petalis obovatis, labelli lobis lateralibus brevibus rotundatis, terminali orbiculari v. late ovato-rotundato, calcare sacciforme inflato basi rotundato. *Reichb. f. in Otto & Dietr. Algem. Gartemeit*, 1856, 219; *Hook. f. Fl. Brit. Ind.* vi. 74. *C. callosum*, *Reichb. f. in Bonplandia (non Blume)*. *Pomatocalpa spicatum*, *Kuhl and Hasselt, ex Reichb. / in Otto and Dietr. Algem. Gartmeit. I. c.*

HAB.—CACHAR, *Keenan*. TENASSERIM, *Parish*. ANDAMAN ISDS., *Berkeley*.

Stem, or rather leaf-sheaths, sometimes 1—1½ in., as broad as the middle finger, green with brownish markings; roots basal, fascicled. *Leaves* 6—10 by 1—1½ in., coriaceous, bright green, flat and faintly channelled above, with a slender keel beneath. *Raceme* or *panicle* 4—6 in.; peduncle and rachis green speckled with brown; bracts obscure; ovaries about 1 in.; flowers about ½ in. diam., papillose. *Lip* about as long as the sepals; mouth contracted; spur short, broad, almost truncate, dorsal callus a semicircular erose scale, that under the midlobe of the lip 2-lobed; midlobe rough. *Column* very short, rostellum beaked. *Anther* broad; pollinia globose; strap narrowly linear, gland small. *Capsule* (in Cachar specimen) 1 in., linear-oblong.

If there be not more than one species included under (*C. Wendlandorum*), this must be a common and variable species. There are several drawings in the Kew and Calcutta Herbaria of what I take to be the same.

The figures 1A and 1B of the flower and lip are taken from Tenasserim specimens collected by *Parish*, authentically named by *Eichlenbach*.

Fig. 1, flower-bud; 2, flower; 3, the same with the petals and sepals displaced; 4, anther; 5, pollinia. A1, flower, A2, lip laid open:—all enlarged.

PLATE 86.

CLEISOSTOMA MANNII, *Reichb. f.*

C. Mannii; caule brevi, foliis breviusculis loratis v. lineari-oblongis apicem versus dimidiato-bilobis crasse coriaceis, pedunculo robusto simplici v. parce ramoso, spica breviuscula multiflora, rachi crassa subclavata, bracteis minutis, floribus parvis, sepalis petalisque obovatis aureis, labelli lobis lateralibus truncatis abbreviatis terminali orbiculari-ovato lilacino, calcare brevi sacciforme apice subinflato rotundato, callo infra columnam bifido. *Reichb. f. in Flora*, 1872, 273; *Hook. f. Fl. Brit. Ind.* vi. 74.

HAB.—ASSAM, *Mann*. SIKKIM ? (*Tc in Herb., Calcutta*).

Stem 1—1½ in. as thick as a swan's quill, rooting at the base. *Leaves* few, 3 by 1½ in., inf. striate, very coriaceous, rather narrowed towards the base, produced at one side into a rounded point, the other side shorter and very obliquely truncate, very coriaceous, dark-green; sheaths very short. *Peduncle* about as long as the spike,

green, striate; bracts minute, ovate, brown; ovaries about $\frac{1}{2}$ in.; flowers $\frac{1}{2}$ — $\frac{1}{4}$ in. diam*
Sepals flushed with purplish red. *Lip* about as long as the sepals, yellow except the midlobe. *Column* very short and stout. *Anther* broad, obtuse; strap rather long, slender, dilated upwards, gland small.

I have seen no specimens of the plant here figured, or of Reichenbach's *C. Mannii*, and cannot hence speak confidently of their identity. As a species it approaches *C. Wendlandorum* most closely, but is very much smaller, with shorter strict stiff apparently very coriaceous leaves, narrowed towards the one-sided obtuse tip. The lip is identical with that of the above-mentioned species, except that the scale or callus below the column is bifid or acutely 2-toothed. It is also closely allied to *C. undulatum*, which has a bifid scale, but the leaves are very much shorter, not undulated, the spur is not globose, and the midlobe of the lip apparently not caruncled.

The drawing here reproduced is inscribed " ? Sikkim fid. Bot. Garden, Calo. March 1875."

Fig. 1, flower; 2, column and lip; 3, lip seen from above; 4, anther; 5, pollinia:—all enlarged.

PLATE 87.

CLEISTOSTOMA BICUSPIDATUM, Hook. f.

C. bicuspidatum; caule brevi, foliis ascendentibus late loriformibus profunde acute bifidis lobis sapius intus unidentatis, pedunculo gracile e basi caulis ascendente foliis longiore v. brevior simpliciter v. parce racemifero, racemis apice decurvis laxe pauci-v. multi-floris, floribus majusculis, sepalis petalisque oblongis subacutis flavo-virescentibus nervo medio roseo, labelli albi roseo picti lobis lateralibus majusculis rotundatis y. retusis terminali brevi crasso ovato incurvo, calcare sepalis longioro conico-cylindraco obtuso, callis ad basin lobi terminalis et infra columnam 2-fidis pubescentibus. Hook. f. *Fl. Brit. Ind.* vi. 75.

HAB.—SIKKIM HIMALAYA, near Darjeeling, Anderson (*in Herb. Calcutta*). KHASIA HILLS, alt. 2,000 ft., Mann. TENASSERIM, Parish.

Stem stout, 2—3 in., rooting at the base, clothed with the green gaping sheaths of the leaves. *Leaves* rather numerous, distichous, 3—6 by $\frac{1}{2}$ —1 in., flat, striate, midrib slender, bright green, not keeled. *Peduncle* sometimes 8 in. long, and exceeding the leaves, green, speckled with red; sheaths short, amplexicaul, brown; bracts minute; racemes sometimes 6 in. long; pedicel with ovary $\frac{1}{2}$ in.; flowers $\frac{1}{2}$ — $\frac{1}{4}$ in. broad. *Sepals* and *petals* spreading or reflexed, 1-nerved, rather membranous. *Column* short, stout, rostellum long beaked. *Anther* flat, lanceolate, beak long or short; pollinia globose, cleft, seated below the rounded apex of the strap, which is rather long and dilated upwards.

I have vainly endeavoured to identify this apparently rather widely distributed and very distinct species with any described by Reichenbach. There are several drawings of it in Herbs. Kew and Calcutta, presenting a good deal of variety in the flowers, but very uniform in habit and in the remarkable broadly acutely bifid flat leaves. Of those in the Calcutta Herb., that here reproduced is inscribed "Parish Orchid, 8-6-66, Eld. 20th July 1869." It has a short anther. Figures A1, 2, 3 are from another drawing, marked "Aerides of Moulmein." It has a very long anther. A third drawing, representing a specimen with narrower leaves and smaller flowers, has a shorter stem with broader sepals

and petals and a hemispheric midlobe of the lip: it is* inscribed "near Darjeeling, July 1862} T. Anders." The anther of this is intermediate in length between those of the two former.

The figs. B1 and B2 are from Mann's Khasian specimens.

Fig. 1. flower; 2, the same with the sepals and petals displaced and lip (fig. 8) removed; 4, anther; 5, pollinia from the specimen figured:—*all enlarged*. A1, lip; A2, anther; AS. pollinia, all from the Moulmein drawing and *all enlarged*. B1, column and B2, lip laid open; both *enlarged* from a Khasian specimen.

PLATE 88.

HERPTSMA LONGICAUB, *Lindl.*

H. longicaulis, *Lindl.* Stem 6—12 in., robust, elongate and creeping and rooting below/ then ascending, as thick as a swan's quill or less, clothed below with white membranous truncate pubescent sheaths, leafy above. Leaves 2—3 in., ovate-lanceolate or elliptic, acuminate, narrowed into a short petiole, membranous, bright green, paler beneath; sheaths appressed to the stem, lower £, upper 1£ in., striate, pale green. Raceme or spike terminal, sessile, many-fld.; bracts longer than the ovary, very large, broadly ovate, obtuse, membranous, pale brown, striate; pedicels short, with the pubescent ovary ½ in. long, suberect; flowers ½—¾ in. long, white or pale pink, or white tipped with red. Sepals puberulous, subequal, ovate-oblong, acute, free, dorsal, forming a hood with the shorter, broader, obtuse petals. Lip shorter than the petals, adnate to the sides of the column, subpanduriform, reflexed from the middle, strongly 5-nerved, disk with two flattish calli about the middle and a thick lamella extending to the rounded tip; spur longer than the blade, straight, inflated above, slender below, striate, longitudinally grooved and infolded at the back, tip rounded and notched. Column short, white, contracted below the broad pulvinate central stigma, without appendages in front; rostellum short, erect at length bifid. Anther sessile, erect, linear-oblong, 2-celled; pollinia narrow, tipped with hard lanceolate appendages, pollen-grains flattened. In *Wall. Cat.* n. 7389; *et in Bot. Beg. sub. t.* 1618; *Gen. and Sp. Orchid.* 506 *et in Journ. Linn. Soc.* i., 178, 190; *Hook. f. Fl. Brit. Ind.* vi. 98.

HAB.—EASTERN SUBTROPICAL HIMALAYA; Nepal, *Wallich*; Sikkim, alt. 3-4,000 ft., J.D.H., &c. KHASIA HILLS, alt. 4500 ft., *Clarke*.

* There is no inscription on the drawing, which is no doubt from a plant that flowered in the Eoyal Garden, Calcutta.

Fig. 1, Bide, and 2, front view of flower; 3, flower with one lateral sepal and petal removed :—*all enlarged*.

PLATE 89.

ODONTOCIBILUS LANCEOLATUS, *Benth.*

O. lanceolatus; caule pedali flexuoso, foliis 2—3-pollicaribus ovato-lanceolatis acutis v. acuminatis, spica breviter pedunculata multiflora pubescente, bracteis lanceolatis ovarium glabrum aequantibus v. excedentibus, floribus glabris, labelli aurei ungue lata utrinquo ectinata dentibus 3—6, lobis terminalibus oblongo-quadratis, sacco globoso didymo, polliniis globoso-ovoideis. *Benth. in Gen. Plant.* iii. 598; *Hook. f. Fl. Brit. Ind.* iii. 101.

O. flavus (*erroré pro luteus*), *Benth. I.e.* • *Anectochilus lanceolatus*, *Lindl. Gen. et sp. Orchid.* 199 *et in Journ. Linn. Soc. i.*, 179, *A. luteus*, *Lindl. in Journ. Linn. Soc. I e.*

HAB.—SIKKIM HIMALAYA and the KHASIA Hills, alt. 5—6,000 ft., common; *Griffith, &c.* (*Kew distrib.*, n. 5,352, 5,354).

Stem with spike 6—12 in., stout or slender, few or many-leaved, often extensively creeping, then ascending and flexuous. *Leaves* bright green, paler beneath; petiole ½—1 in.; sheath short. *Spike* 2—3 in.; bracts ½—1 in., pale, nearly glabrous. *Lateral sepals* ½ in., ovate, obtuse, green or purplish/ 1-nerved, *dorsal* and *petals* cohering in an obtuse hood broader than long. *Lip* < many times longer than the sepals; claw not dilated at the base, limb ½ in. diam.; sac with a pair of curved spurs within. *Column* very short indeed, frontal appendages obscure; rostellum broad, bicuspidate. *Anther* shortly ovate, beaked; pollen grains cuneiform.

After an examination of numerous specimens for the Flora of British India, I concluded that *Odontochilus lanceolatus* and *O. luteus* (*Anectochilus*, *Lindl.*) were one and the same species, and the figure here given tends to confirm this opinion, for it agrees with the characters given to both. It is, however, very much larger than the usual form of the plant, no doubt due to the habit of enlargement to which native artists are prone; and it differs from the description in the Flora of British India, in the violet-purple colour of the sepals and petals and in the more numerous divisions of the claw of the lip and rather narrower terminal segments,—all variable characters. The size of the flower appears also to be extremely variable.

The drawing is inscribed "Tonglo, near Darjeeling, August 1862," in Dr. Anderson's hand-writing.

Fig. 1, front, and 8 back view of flower; 3 and 4, anther; 5, pollinia:—all enlarged.

PLATE 90.

ZEUXINE (*Monochilus*) GOODYERIOIDES, *Lindl.*

Z. goodyerioides. *scapigera*, foliis subsessilibus ovatis saturate viridibus costa media pallida, spica glabra v. puberula, bracteis ovarium giabrum requantibus, labelli hypochilio cymbiforae, epichilio parvulo orbiculari v. oblongo concavo membranaceo. *Lindl. Gen. and Sp. Orchid.*, 486; *Hook. f. Fl. Brit. Ind.* vi. 107.

HAB.—Temperate EASTERN HIMALAYA, from Sikkim to the Mishmi Hills, alt. 6—8,000 ft. *PEGU, Kurz (in Herb. Calcutta).*

Stem 6—8 in., from a long creeping rooting base. *Leaves* 1—11 in., sessile or shortly petioled, obtuse acute or acuminate, dark green, paler beneath; sheaths short, coloured. *Scape* 3—6 in., slender, glabrous or pubescent with reversed hairs; sheaths 2—3, with coloured tips lanceolate. *Spike* 1—2 in., few and lax-fl.; bracts ½ in. long, lanceolate, brown. *Sepals* ½ in. long, lateral lanceolate, 1-nerved, green; dorsal ovate, acute, brownish red; petals falcate, very obtuse. *Lip* wholly included, hypochil coriaceous, 2-calcarate within. *Column* short, rostellar arms short; stigmatic lobes distant; pollinia pyriform, caudicle slender, gland oblong. *Capsule* ½ in., fusiform.

The drawing is inscribed "Siurfxn, 6,000 ft., September 1876. G. King."

Figs. 1 and 2, flower* and bract \$ 3, flower with three perianth segments displaced; 4, bract, ovary and column; 5» Up; 6 and 7, anther; 8, pollinia:—all enlarged.

PLATE 91.

GOODYEBA FOLIOSA, *Benth.*

G. foliosa, caule basi longe decumbente radicante, dein ascendente folioso, foliis¹ petiolatis ovato-lanceolatis acuminatis, spica breviter pedunculata glanduloso-pubescente, bracteis lineari-lanceolatis flores secundos roseos longe superantibus, sepalis 3-nerviis ovatis v. ovato-lanceolatis, petalis dimidiato-oblongis 1-nerviis labello oblongo saccato intus crebre setoso, rostellis ramis elongatis, anthera lanceolata. *G. foliosa*, *Benth. in Herb. Kew Hook. f. Fl. Brit. Ind.* vi. 113. *Georchis foliosa*, *Lindl. Gen. and jgp. Orchid.*, 496. *G. secundiflora*, *Griff. Notul.*, iii. 393 (excl. ii?).—*Goodyerae*, sp. *Griff. It. Notes* 36, No. 591, *Notul.* iii, 396, No. 11 et *IC PI. Asiat.*, 346 / i.

HAB.—Temperate SIKKIM HIMALAYA, alt. 5—7,000 ft. ASSAM, the KHASIA and NAGA HILLS, ascending to 5,000 ft. BUBMA, *Griffith*. PEKAK, alt 7,000 ft., *Wray*.

Stem 6—12 in., rather slender. *Leaves* 1\$—2£ inches, oblique, dark green, 3—5-nerved, not reticulately veined; *petiole* £ - f in.; *sheath* short. *Spike* 2 - 3 in.; *bracts* £ - f in., erect, glabrous or puberulous; *flowers* pale pink. *Lip* included, with a rather dilated recurved rounded tip beyond the sac. *Column* very short; *rostellum* longer than its body; *stigma* broad. *Anther* ovate-lanceolate, long-beaked; *pollinia* clavate, bipartite, united at the base and produced into a slender strap.

A very distinct species, resembling, in the leafy stem *G. vittata*, also a native of Sikkim, which has fleshy dark green leaves with white nerves, a glabrous spike, much shorter bracts, and a long-pointed lip.

The drawing here reproduced is inscribed "Below Buchim, Sikkim, 7,000 ft., October 1862," in Dr. Anderson's handwriting. The lateral sepals are represented as acuminate, which they are not in the examples I examined.

Figs 1, bract and flower; 2, flower with the sepals and petals displaced; 3, ovary, column, and lip; 4, lip; 5, column; 6, anther; 7, pollinia *—all enlarged.

PLATE 92.

GOODYEBA VITTATA, *Benth.*

G. vittata; glaberrima, robusta, caule folioso, foliis ovatis acutis crassiusculis saturate viridibus nervis nervisque albis, subtus purpurascens, bracteis lanceolatis flores secundos roseos aequantibus, sepalis ovatis acuminatis, petalis oblanceolatis falcatis 3-nerviis, labello basi saccato 7-nervi apice longe producto apicem versus 2-lamellato, sacco intus setoso, rostellis ramis elongatis. *G. vittata*, *Benth. in Herb. Kew Book. f. Fl. Brit. Ind.* vi. 113. *Georchis vittata*, *Lindl. in Journ. Linn. Soc.* i. 184.

HAB.—Temperate, SIKKIM HIMALAYA, alt. 6—9,000 ft., J. D. H., &c.

Stem 4—6 in., leafy nearly up to the spike. *Leaves* 1£—3 in.; *petiole* very short or o.; *sheaths* short, membranous, coloured. *Spike* 2—4 in.; *peduncle* short, clothed with imbricating lanceolate finely acuminate green and reddish sheaths that pass into bracts. *Sepals* 4 in. long, tips recurved. *Lip* rather longer than the sepals, gradually contracted beyond the flac into the subrecurved oblong-lanceolate acute blade. *Column*, very short. *Anther*

ovate-lanceolate; pollinia narrowly pyriform* united at the base into a very short slender stipe or strap seated on a narrowly linear gland.

The drawing from which the plate is produced is inscribed "Tonglo, near Darjeeling, 10,000 ft. above the sea, 2nd August 1862, T. Anders."

Fig. 1, flower; 2, the same, with the sepals and petals removed; 3, ovary and column; 4, anther; 6, pollinia;—all enlarged*

PLATE 93.

POGONIA SCOTTII, Reichb. f.

P. Scottii elata, glaberrima, folio longe petiolato amplo late reniforme apiculato multinervi, scapo valido sulcato, racemo erecto multifloro, bracteis ovario aequilongis v. longioribus. linearilanceolatis deflexis, sepalis petalisque linearilanceolatis acuminatis viridibus rubro-striatis, labello sepalis aequilongo subunguiculato ima basi saccato oborato spatulato albo rubro striato ultra mediam 3-lobo, lobis lateralibus brevibus obtusis terminali suborbiculari velutino. Reichb. f. in *Flora*, 1872, 276; Hook. f. *Fl. Brit. Ind.* vi, 120.—? *Pogonia* No. 2, *Griff. Notul.* iiiL 377 et *Icon. Pt. Asiat.* t. 315.

Hb.—SIMIM, HIMALAYA; Darjeeling {fide Reichb. /•}. CHITTAGOK, at Sitakoond (*Icon. in. Herb. Calcutta*). Burma? Griffith.

Leaf 8—10 in. diam., dark green, with about 20 principal folds, and many interposed nerves, bright green above; petiole 12 in., acutely ribbed, green above, red-purple below the middle. Scape about as long as the petiole, dark-brown below and as thick as a goose-quill, more slender, green, and acutely ribbed above; sheaths few, 1—H in., cymbiform; raceme strict, 4—6 in. long, rachis angled; bracts 1—2 in., green, very slender; pedicels with ovary 1 in., decurved; flowers 1 in. long, horizontal. Sepals and petals connivent. Column dorsally hairy at the tip.

A noble species, much the largest hitherto known, discovered, I believe, by Mr. Scott near Chittagong when Curator of the Calcutta Botanical Garden, and after whom Reichenbach named it. I do not know on what authority the latter author gives Sikkim as its native country, though it is a very likely one. Lindley refers the Burmese plant of Griffith to *P. carinata*, but the saccate base of the lip and flowers placed at an angle with the ovary rather indicate *P. Shottii*. Their characters are, however, not shown in Griffith's figure.

The drawing here reproduced is inscribed "*Pogonia nobilis*, Scott. *Pogonia* of Seetakoond hill, introduced 1866, figd. June 1868."

Fig. 1, flower; 2, the same with the sepals and petals displaced and the lip (fig. 3) removed; A, anther; f., pollinia—all enlarged.

PLATE 94.

POGONIA CARINATA, Lindl.

P. carinata, glaberrima, folio orbiculato cordato acuto 7—12-nervi, scapo foliis longiore teretiusculo, racemo erecto sparsifloro, bracteis linearibus ovario multo longioribus, pedicellis brevibus, sepalis petalisque patentibus anguste linearibus oblanceolatisve acuminatis viridibus, labello sepalis aequilongo basi non saccato ad medium 3-lobato

cuneato-obovato vix unguiculato, lobis lateralibus parvis rotundatis constrictis, terminali latiore late ovato acuto crenulato, disco pubescente. *Lindl. Gen. and Sp. Orchid.* 414 et in *Journ. Linn. Soc.* iii. 45 (excl. syn. Griffith), *Hook. f. Ft. Brit. Ind.* vi, 121. ? *Dalz. and Oik. Bomb. Fl.* 270. *Epipactis carinata, Roxb. Sort. Beng.* 53 et *Fl. Ind.* iii, 452.

BAB.—Plains of INDIA, from Rohilcund to Lower Bengal and the Deccan Peninsula. PEGU, KWZ.

Tuber globose, the size of a marble, annulate. *leaf* 1\$—2£ in, diam., dark green, not waved, but plicate; *petiole* 2—4 in., striate, passing below into a long, erect rhizome, with horizontal roots and suckers; at the junction of the petiole and rhizome is a lanceolate sheath. *Scape* 8—12 in., slender, terete, with appressed tubular basal sheaths; *raceme* many or few-fld.; *bracts* 1—f in. long, spreading, green; *pedicels* about £ in.; *ovary* longer, turbinate; *sepals* f in. long, and rather narrowed; *petals* greenish; *lip* pink.

I am pretty certain that this is Lindley's *P. carinata*. On the drawing it is named «*P. pUeata* Lindl. fld. in. H. B. 0. in pots, April 1861, T. Anders.," which it certainly is not, that species being only 1-3-fld., and having hairy leaves and small bracts. The column is, however, similarly deeply f-lobed at the tip, and the long sureuli proceeding from the downward prolongation from the base of the petiole are no doubt of the same nature as the tuberiferous ones of *P. plicata*. The Indian Pogonias are very imperfectly known, and being of an extremely delicate consistence, it is only from very carefully preserved specimens or drawings that characters of any value can be drawn.

Fig. 1, flower; 2, ovary and Up; 3 and 4, ovary and column; 5, 6, and 7, anther; 8, pollinia enlarged.

PLATE 95.

HABENAKU (*Ate*) DIGITATA, *Lindl.*

H. digitata; foliis ovatis v. ovato-oblongis, racemo multifloro, floribus viridibus, bracteis elongatis inferioribus foliaceis. ovario longioribus, sepalis patentibus, lateralibus ovatis acutis, dorsali suborbiculari, petalis bipartitis segmentis linearibus falcatis, labelli tripartiti segmentis linearibus acutis lateralibus terminali longioribus v. brevioribus, calcare ovario æquilongo aequali v. apice clavato, antherarum loculis pendulis tubis brevibus incurvis, rostello triangulari erecto. *Dabs, and Gibe. Bomb. Fl.* 267; *Hook, f. Fl. Brit. Ind.* vi. 134. *H. trinerve, Wight. Ic. t.* 1701. *Bonatea punduana, Lindl. in Wall. Cat. n.* 7063. *B. benghalensis, Griff, in Cole. Journ. Nat. Hist. iy.* 382." *B. herbacea, Watt, mss.*

HAB:—KASHMIR, *Falconer*. SIKJOM, alt. 7,000 ft., *King. {Ic. in Herb. Calcutta}*. ASSAM, *Simons*. SILHET, *Wallich*. BENGAL, *Griffith*. TKNASSEBDJ, *Parish*. WESTER* GHATS, from the Concan Southwards.

Stem 1—2 ft. from an oblong tuber, leafy chiefly* towards the middle, *leaves* 2—5 in. long, very variable in breadth, from orbicular to almost oblong-lanceolate, acute or acuminate, rarely narrowed into a petiole. *Raceme* 3—5 in.; *bracts* large, often almost foliaceous, and exceeding the flowers; *pedicels* very short; *flowers* \$—f in. diam. *Segments of petals* very variable, in length, sinus between them narrowed or rounded. *Spur* with

an erect ligule at the mouth; *Stigmatic processes* clavate. *Pollinia* with minute glands. *Capsule* shortly pedicelled, $\frac{1}{2}$ -in. long, fusiform, ribs thick.

A very common, widely diffused Indian species, and consequently very variable in stature, foliaeous habit and size of the flowers. Forms which I have included under var. *foliosa*, and which ascend to »fiQ0 feet in the NUghiris, are very leafy, but shorter, with denser flowers, shorter bracts and filiform segments, of the lip: to it are referable *H. foliosa*, A. BioL, *H. laciniata*, Dalz., *Platnthera marginata*, Wall., and *Orchis mysoremis*, Heyne.

The specimen here figured is noted on the drawing as from "near Darjeeling, October 1877. G. King/" It represents a plant nearly twice as large as any of the specimens of the species that I have seen.

Fig. 1, bract and flower-bud; 2, flower; 3, flower with petals removed; 4, flower with sepals and petals restored; 5, side view of flower; 6, pollinia:—all enlarged.

PLATE 96.

HABENAKIA {Ate) STENOPETALA, Lindl. Var. *polytricha*.

B. stempeiala, lindl. Gen. and sp. Orchid. 319 (not 324); Hook. f. Fl. Brit. Ind. vi. 134.

Var. *polytricha*; bracteis flores excedentibus, racemo brevi densifloro, sepalis in aristas caillaceas lamina multo longiores produces, petalorum cruribus patentibus sequilongis setaceis, labelli lobis filiformibus incurvis.

HAB. SIKKIM HIMALAYA, at Choongtam, alt. 6,000 ft., J. D. H. NAGA HILLS* JPrain.

Differs from the ordinary form of *E. stenopetala* in the exaggerated length and capillary blunders of the apices of the sepals, and segments of the lip and of the petals.

The drawing is made from a dried specimen ticketed "Naga Hills, No. 79, Jotsuma. Dr. D. Prain, 1886," which was lent me by Dr. King from the Calcutta Herbarium. The same form or nearly approaching it is found in Sikkim.

PLATE 97.

HABENAKIA (*Platyghssa*) ARIETINA, Hook. f.

H. arietina; caule elato robusto folioso, foliis ovato-lanceolatis acuminatis amplexicanlibus subtus valide costatis, racemo elongate multifloro; bracteis ovato-lanceolatis, inferioribus foliaceis ovaribus longioribus; superioribus brevioribus cymbiformibus acuminatis; floribus amplis virescentibus, sepalis lateralibus ovato-lanceolatis acuminatis, dorsali cum petalis falcatis bad gibbosis pubescentibus in galeam latam coherentibus, labelli 3-partiti segmentis lateralibus extus pectinatis intermedio lineari. Hook. f. Fl. Brit. Ind. vi. 138. *H. pectinata*, Lindl. Gen. and Sp. Orchid. 341 (non. Don.); Wall, Cat. 7029 B (in part), C.

HAB.—TEMPERATE. HIMALAYA; from Simla, alt. 5—8,000 ft., eastward to Sikkim, ascending to 10,000 ft. KHABIA HILLS, alt. 5—6,000 ft.

Tuber oblong. *Stem* 1—2. ft. and upwards; often as thick as a swan's quill below, grooved, stiff. *Leaves* 4—6 in., 5-nerred, tip usually curved. *Raceme* 6—10 in., laxly many-fld.; lower bracts 2 in., much longer than the ovary, upper half not longer than

the pedicel, which with the ovary is 1—2 in. long; flowers 2 in. diam. or less. *Sepals* and *petals* variable in breadth, widely spreading. *Zip* with the lateral lobes slender, falcate, pectinate with long cilia on the outer margin; spur |—§ in., slender. *Anther* short, broad, cells rather incurved, their short tubes upcurved towards the face of the anther-cells or outwards; pollinia linear, about as long as their caudicles or shorter*, rostellum confluent with the face of the column, stigmatic processes elongate falcate.

Closely allied to *S. pertinata*, Don., and taken for it by Lindley, who, as observed in the Flora of British India, gave the latter plant the name of *H. ensi/oKa*. It differs from *H. pectinata* in the much broader and very gibbous pubescent petals, and in the longer lip. They may prove to be varieties, for they inhabit the same mountains and at about the same elevation, but, as hitherto observed, apparently keeping their characters. The closely allied *E. intermedia*, Don., also of the temperate Himalaya, differs in the glabrous petals and long stout spur.

The specimen figured was collected in Sikkim, ^c Darjeeling, 16th April 1876, G. King."

Fig. 1. flower; S, oraty, column, and lip; 8, doml and 4, lateral sepals; 6, petals; 6, palliia:-«« enlarged.

PLATE 98.

HABENAEIA {*Platyglossa*} GENICULATA, Don.

H. geniculata; caule elato folioso superne vaginis foliaceis elongatis involuto, foliis sessilibus ellipticis oblongo-lanceolatisve acutis 5—7-nerviis, spica oblonga pauci-v. multi-flora, bracteis ovario fusiformi rostrato paullo brevioribus lanceolatis acuminatis,* eepalis late ovatis acutis, petalis lineari-oblongis; labello orbicular! v. late obcordato, lobis lateralibus latis semi-orbiculatis v. dimidiato-cuneatis crenatis v. fimbriatis, intermedio minuto, calcare gracili ovario multo longiore medio geniculato. Don *Fl. Nep. Prodr.* 25; Hook. f. *Fl. Brit. Ind.* vi. 138. *Platanthera geniculata*, Lindl in Wall. *Cat. n.* 7042.—*Habenaria*, Griff. *Notul.* iii. 406, *Itin. Notes*, 31, No. 494 et *Ie. Pi. Asial.* t. 340.

HAB.—SUBTROPICAL HIMALAYA, from Nepal eastwards. KHASIA and NAGA HILLS, alt. 2—5,000 ft. BURMA, Wallieh.

Stem 1—3 ft., stout or slender. *Leaves* 2—6 in., sheaths long. *Spike* 6—10 in. long, 4—50 fld.; bracts f—1J in., green, peristent; ovary narrowly fusiform, slightly decurved at the tip, thickly ribbed; flowers f—1 in. broad. *Sepals* variable in breadth, greenish-white; petals much shorter and narrower, white. *Zip* white, very variable in breadth, often f in. broad, sometimes orbicular with the very small entire yellow ovate mid-segment in a terminal notch, at others much broader than long, with wing-like side-lobes and a tongue-shaped midlobe, which is hardly longer than the side-lobes; margins of side-lobes erose-crenate or shortly fimbriate; spur much longer than the ovary, kneed above the middle, the lower portion more or less clavate towards the tip. *Anther* broad, cells divaricate, their tubes upcurved; glands of pollinia small; stigmatic processes elongate, clavate, margining the mouth of the spur; rostellum low, broad. *Capsule* 1 in., shortly pedicelled, beaked, deeply grooved and thickly ribbed.

A very fine species, common in the Himalayas at low elevations. The drawing here reproduced is inscribed "Mungpo, Sikkim, 3,500 ft., September-October 1874, G. King."

Figs. 1 and 2, flowers t—enlarged.

PLATE 99.

HABENARIA (*Platyglossa*) TBIFLORA, *Don.?*

H. triflora; caule dense f. olioso, foliis suberectis imbricatis ellipticis acutis in bracteis angustiores foliaceas ovaria superantes transeuntibus, spica brevi dense multiflora, floribus amplis albis, sepalis orbicularibus, petalis minutis linearibus, labello magno sepalis multo majore late obcordato sinu elongato fere clauso, lobis lateralibus semi-orbicularibus v. dimidiato-obovatis integerrimis, terminali lineari lateralibus vix longiore, calcare ovario multo longiore, anthera latissima.

HAB.—unrecorded.

Stem stout, closely invested by the imbricating suberect leaves, probably more than a foot high, the upper part (above figured) 8 in., with the inflorescence. *Leaves* 1½—2 inches, smaller and narrower upwards, and passing into long green lanceolate sheathing bracts an inch long and more, from amongst which the perianth with its spur alone protrudes. *Spike* densely-fl'd., probably elongating to several inches; ovaries 1 in., not beaked; flowers 1 in. broad, pure white. *Sepals* incurved, 5-nerved, the outer pair with branching nervules towards the margin; petals 1-nerved. *Lip* as broad as the rest of the flower, cleft nearly to the base into two very broad lobes, with a slender intermediate lobe and 2 calli at the base; spur slender, green, much longer than the ovary, slightly curved. *Anther* very large and broad, cells marginal incurved; rostellum apparently a minute tooth on the broad face of the column.

I have been much exercised in my mind about the drawing here reproduced, which represents a remarkably fine plant, unfortunately with DO note of locality or collector, but presumably one that flowered in the Calcutta Botanic Garden. At first I was disposed to consider it a many-flowered gigantic state of the Himalayan *H. triflora*, Don., which has similarly short, often imbricating leaves, long bracts, erect flowers, small narrow petals, a large broad lip with two basal calli, very long spur, and broad anther; but in that species the lateral sepals are narrow and erect, the flowers 1—3 only, and the side lobes of the lip crenulate. There is no other species to which this is at all nearly allied; and, considering the danger of constituting new species on drawings, especially on those of native artists', it appears to me the best course to refer it doubtfully to *H. triflora*, with which it agrees in the bracts, large flowers, small linear petals, the spur, approximately in the shape of the lip, and especially in the broad anther.

Fig. 1, front and 2, back views of flower; 3, the same with the perianth-segments (displaced; 4, lip; 6, pollinia:—all enlarged.

PLATE 100.

HABENARIA (*Holoplossa*) LATILABRIS, *Hook. f.*

H. latilabris; caule saepius elato, foliis sessilibus late obovato-v. elliptico-oblongis acuminatis, spica multiflora, bracteis herbaceis inferioribus floribus longioribus superioribus ovario sequilongis, floribus flavo-rufidibus, sepalo dorsali late ovato orbiculari v. oblongo, lateralibus reflexis ovatis y. ovato-lanceolatis acutis, petalis polymorphic, labello sepalis longiore Integra lineari-lanceolato v. oblongo lateralibus reflexis, calcare ovario multo rostrato multo longiore incurvo. *Hook. f. FL Brit. Ind.* vL 153. *Flatanthera acuminata*,

Lindl. in Wall. Cat. n. 7040; Gen. and 8p. Orchid. 289. P. latilabris, Lindl. Gen. and Sp. I. c. P. Orchidis, Wall. Cat. 7039, B.

HAB.—TEMPERATE HIMALAYA, from Kashmir, alt. 5—10,000 ft., to Sikkim[^] alt. 7—12,000 ft.. CENTRAL INDIA, *Hope (Herb. Clarke).*

Stem 6—18 in., stout or slender, from an elongate horizontal rather fusiform tuber. *Leaves*, lower 3—5 in. about 7-nerved, upper gradually smaller. *Spike* 3—10 in., lax-fl.; bracts lanceolate or the upper ovate-lanceolate (the latter foliaceous); ovary } - i in., often strongly curved to one side, shortly beaked; flowers very Variable in size, ½—½ in. broad. *Sepals* 3—5-nerved, green; petals yellow-green, erect, fleshy, from linear and gibbous on one side to dimidiate-ovate or broadly ovate with the outer base gibbous. *Lip* yellow-green, thick, linear or lanceolate or almost ovate, sides reflexed; spur stout or slender, often upcurved involute or flexuous. *Anther* rather small, broad, cells contiguous without tubes; pollinia pyriform, caudicles short, glands small; stigmatic processes large, subglobose; rostellum short, triangular, obtuse. *Capsule* ½ in., sessile, fusiform, shortly beaked, more or less curved or twisted.

A very common Himalayan species, and most variable. The trivial name is very inappropriate but that of *acuminata* having been preoccupied for the *Ate acuminata* of Ceylon, the adoption of *latilabris*[^] was imperative according to the current rules of nomenclature. In its narrow lip and petals the form of *latilabris* here figured approaches the *H. stenantha*, Hook. f. of the Sikkim Himalaya, which is a much[^] slender plant with the lateral sepals linear, and so strongly reflexed as to give the flower the appearance of being laterally compressed. The two may probably prove to be varieties of one. The analyses in the accompanying plate are made from different plants; fig. 1 and 2 have lips (as in the whole spike figured) broader even than the common states of *latilabris* and with reflected sides, whilst that of fig. 3 is extremely narrow, linear and flat, as it is in *H. stenantha*; fig. 6 represents an intermediate form[^].

In this and allied species the stem springs from the side or top of a long simple or branched sub-cylindric horizontal tuber, which is annually renewed.

The plate is a reproduction of a drawing inscribed[^] "Sikkim, Sinchai, 8,000 ft., Aug. 1876."

Fig. 1, flower and bracts; 2, flower with the dorsal sepal and a petal removed; 3, flower with the B. ' th segments displaced; 4, dorsal sepal; 5, petal; 6, lip; 7, pollinia:—all enlarged. P[^]nanWl[^]

PLATE 101.

HABENARIA (*Phyllostachya*) HELFERI, *Hook. f.*

H. Helferi caule pubescente ad apicem folioso, foliis sessilibus oblongo-lanceolatis acutis v. acuminatis 3-nerviis, floribus paucis solitariis axillaribus cernuis, sepalis falcato-lanceolatis herbaceis, petalis ovato-lanceolatis, labello magno porrecto sepalis duplo longior integro cyathiforme marginibus recurvis purpureo v. roseo, calcare infundibulari v. inflato ovario breviori apice attenuato, anther[®] loculis approximatis parallelis. *Hook. f. Fl. B[^] Ind. vi. 164. Gymnadenia Helferi, Reichb. f. in Flora, 1872, 276 et in Trans. " Linn. Soc. xxx. 139.*

HAB.—KHASIA HILLS, *Simons. TENASSERIM, at Moulmein, Helfer, Parish.*

Stem 8—16 in. from an oblong tuber, sheathed below, then leafy to the apex. *Leaves* 4—8 in., spreading and recurved. *Pedicel* with ovary ½ in., pubescent, erect then decurved. *Sepals* 1 in. long or less, lateral recurved or with recurved acuminate tips[^];

petals nearly as large, rose-purple. *Lip* rose-purple, neither clawed nor lobed, quite entire, boat-shaped with recurved margins, orbicular when spread out. *Anther* small, obtusely apiculate, cells narrow, tubes very short, straight, close together; pollinia clavate, as long as their winged caudicles; glands rather large, contiguous; stigmatic processes obscure; rostellum small, erect, 3-lobed, fleshy. *Capsule* $\frac{1}{2}$ in. long, sessile, linear-oblong, ribs thick.

H. Helferi belongs to a small section of the genus including *E. galeandra*, Benth., and *H. jantha*, Benth., from both of which it differs in the larger flower and very large, long, funnel-shaped spur. Beichenbach describes the lip as broad or narrow, but it is broad in all the specimens that I have examined.

No native country was given on the drawing here reproduced, only the date, 1855.

Fig. 1, flower; 2, ovary, column, and lip; 3, column and spur; 4, ovary and column; 5 and 6, pollinia:—all enlarged.

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„ Wallichii, Lindl. • 19	„ crocatum, Hook. fil. . 9	JUsq, Wall. . . . 3 4
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„ bicuspidatum, Hook. fil. . . . 68	„ denudans, Don. . 4	„ macrobulbon, Hook. fil.. 34
„ brevipeg, Hook. fil. . 65	„ erieeflorm, ^rjff. . 6	„ nuda, Lindl. . . . 32,34
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	„ herbaceum, Lindl. . 6	„ var. macrantha . 33
	„ indivisum, Blume . 7	„ var. purpurea. . S3

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„ barbata, Beichb. fil. 22	„ pachyrachis, Hook. fil. 1	„ ramosum, Lindl. 64
„ clavicantlis, Wall. 21	„ phyllostachys, Wall.	„ r«5n«i», Lindl. 50
9, discolor, Lindl. 21	MS3. 1	„ temiicaule, Hook. fil. 49
9, khasiana, Lindl. 21	ODOKTOCHILUS flaus, Jfrjtta. 60	„ trichromm, Beichb. fil. 50
» Lindleyana, Griff. 20	„ lanceolatus, Benth. 59	SAECAVTHUS affinis, Wall. 53
„ obesa, Lindl. 20	„ hteus, Benth. 60	„ appendiculatus, Hook. fil. 50
„ pulchella, Hook. fil. 21,22	Oeceocladusfiexusus, Lindl. 64	9, densiflorus, Par. ft Beichb. fil. 55
Formosa (Sect.) 6	OreAfa mysorensis, Heyne 64	„ insectieT, Beichb. fil. 52
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99 secundiflora, Griff. 61	99 pamflora, Zuuft. 19	„ oxyphyllus, Wall. 52
9, vittata, Lindl. 61	„ r^w-a, Lindl. 1 9	„ pallidus, Lindl. 53
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„ vittata, 2fenEA. 61	Pedilonnm (&c*). 9	„ secundus, Griff. 61
Gymnadeni* Eelferi, Beichb. fii. 67	FHAJUS mishmensis, Beiclib. fil. 25	„ teretifolius, Beichb. fil. 61
HABENABIA arietina, Hook. fil. 64	PHALJBNOPSIS £ a m i, King. MSS. 38	„ tricolor, Reichb. til 63
„ digitata, Lindl. 63	99 cornu-cervi, Beichb. fil. 38	SABCOCHILUS aureus, Hook. fil. 42
„ ensifolia, Lindl. 65	9t Kunstleri, Hook. fil. 38	„ Berkeleyi, Beichb. fil. 44
99 foliosa, A. Bich. 64	99 Magnii, Beichb. fil. 37	„ brachyglottis, Hook. fil. 42
„ Galeandra, Benth 68	99 epectosa, Beichb. fil. 38	„ cladostachys, Hook. fil. 4
„ genicnata, Don 65	„ tetraspis, Beichb. fil.. . . . 38	„ hirsutus, Hook. fil. 44
„ Helferi, Hook.fil. 67	„ Wighüi, Beichb. fil. 39	„ muricolata^JBboifc.^ 40
„ intermedia, Don. 65	Pholidota suaveolens, Lindl. 27	99 stenoglottis, Hook. fil 41
„ janthe, Benth. 68	Phyllostachya (Sect.) 6 7	Speciosa (Sect.) 50
„ laciniata, Dalz. 64	Platanthera acuminata, Mndl. 66	Stachyobiom (Sect.) 4
9, latilabris, Book. fil. 63	99 geniculata, Lindl. 65	STAUBOFSIS undulatas, Benth. 36
„ pectinata, LinJl. 64	99 latilabris, Lindl. 67	„ giganteus, Benth. 37
„ pectinata, Don. 65	„ marginata, Wall. 64	Strongyle (Sect.) 7
„ stenantha, Hook. fil. 67	99 Orchidis, Wall. 67	TAWIA cordifolia, Hook.fil. 24
„ stenopetala, Lindl. 64	Platyglossa (Sect) 6 4	„ latifolia, BMIA. 23
„ „, yar. polytricha 64	POGONIA carinata, Lindl. 62	Thrixspermum Berkeleyi, Beichb. fil. 4 4
9, triflora, Don ? 06	„ nobilis, Scott MSS. 62	TBICHOGIOTTIS Dawsoniana, Reichb. fil. 36
„ trinerve, Wight 63	„ plicata, Lindl. 63	„ fatciata, Beichb. fil. 36
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Hologlos&a (Sect.) 6 6	„ No. 2, Griff. 62	„ retusa, Blame 36
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Limatodes mishmensis, Lindl. & Paxt. 25	Pteroceras (^ O 4 0	TyUstylis discolor, Hook. fil. 22
LIPABIS Gamble), Hook. fit. 2	Bacemosa (^ O ^ 16,18	„ rigida, Blume 22
„ GriffithAi*, Bidley 3	Benanthera Jerdoni, Herb. Calc. 37	Umbellate (&c*). 1 7
„ plantaginea, Lindl. 3	SACCOLABIUIC ampullaceum, Lindl. 60	Yanda alpina, Lindl. 4 5
„ orbicularis, Lodd. 3	99 buccosum, Beichb. fil. 66	„ cceralescens, Gny. 37
„ selligera, Beichb. fil. 3	„ carinatum, Griff. 52	„ cristata, Lindl. var. pumila. 45
LUISIA Groyesii, Hook. fil. 36	„ curvifolium, Lindl. 50	„ „ var.B. 45
Malaxis acuminata, Don. 2	„ densiflorum, LiaH. 55	„ Jerdoni, Herb. Calc. 37
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„ obliqua, Vai. M88. 2	„ gemminatum, Hook. fil. 46	Virgate (Sect.) 8
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„ „ 99 var. brachychcila 2	„ inconspicuum, Hook. fil. 4Q	
„ „ 99 var. omphaloides 2	„ l&n&tum, Hook. fil. 49	
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Monochilus (Sect.) 60	„ penangianum, Hook. fil. 47	
NEPHBIAPHTILUM grandiflorum, 23		



Drawn by Lutchman Singh

OPHRYS ORBICULARIS, Hook. f.

Int. by A.L. Singh



Drawn by G. A. Dux.

MICROSTYLIS WALLICHII Lindl.

Engr. by J. A. Chanderbali.









r



s



Drawn by G. C. Dasm.

TENEROIDIUM PASCUM, Reichb. f.

India by Chitra Singh C.









Drawn by G.C. Banks

DENDROBIUM TENUICAULE, Hook. &

Lab. by Chas. Sledge



Drawn by G. C. Dore.

DENDROBIUM CROCATUM Hook. f.

Lab. by Chitra Saha



Drawn by G. C. Dyer.



Drawn by C. C. Bass.

Lith. by P. N. Sinha.

DENDROBIUM PANDURIFERUM, Hook. f. var. *SERPENS*, Hook. f.







Drawn by L. Singh

DENDROBIUM HARKERI

by B. K. Roy









Drawn by G. C. Daza. (A)
and E. Singh. (B)

Lith. by P. N. Bhatia

BULBOPHYLLUM POLYRHIZUM, Lindl.



Drawn by L. Singh.

BULBOPHYLLUM EUBLEPHARUM, Reichb. f.

Painted by P. N. Sinha

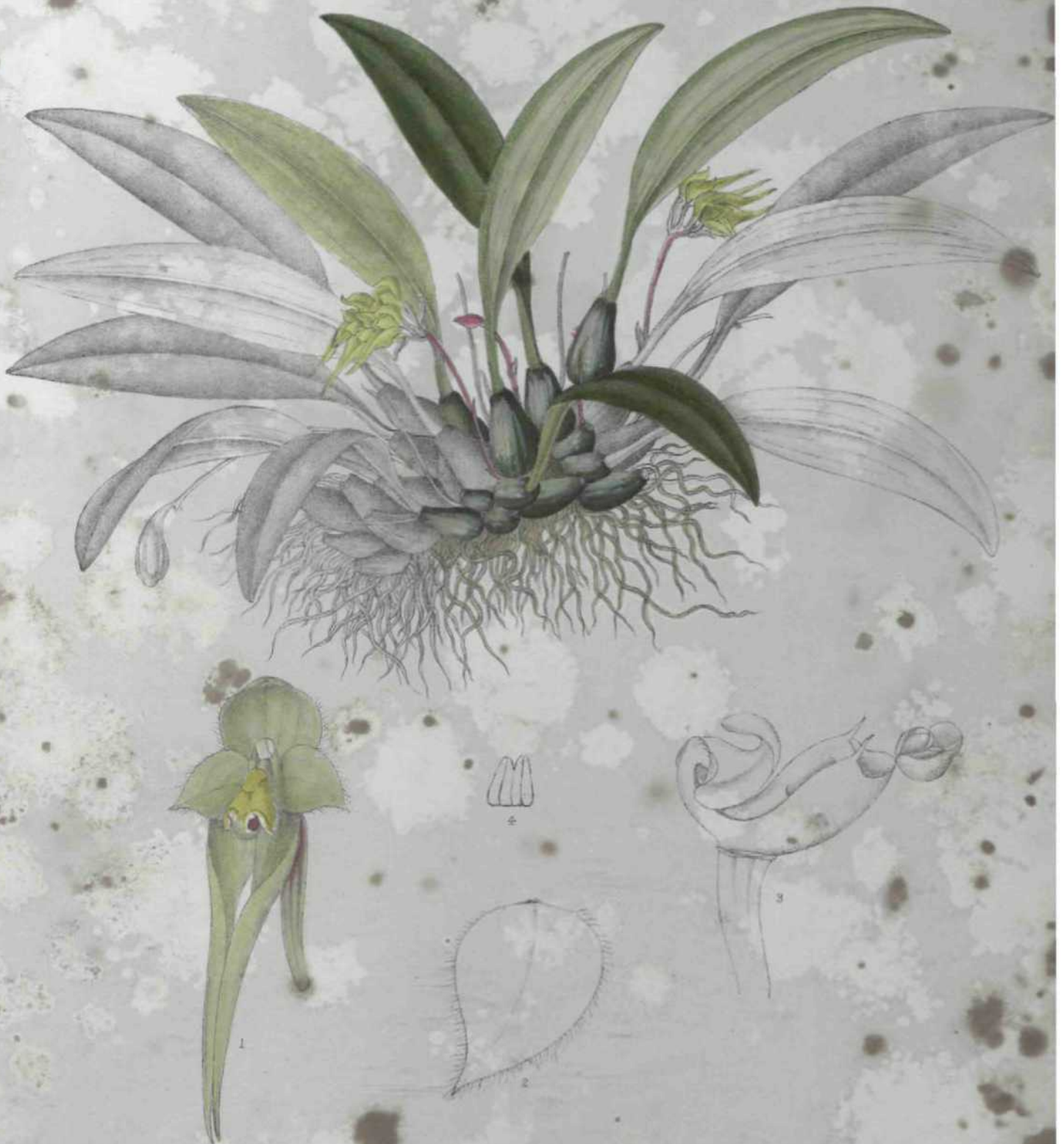


Drawn by G. C. Datta

CIRRHOPE TALUM BLEPHARISTAE, Reichenb.

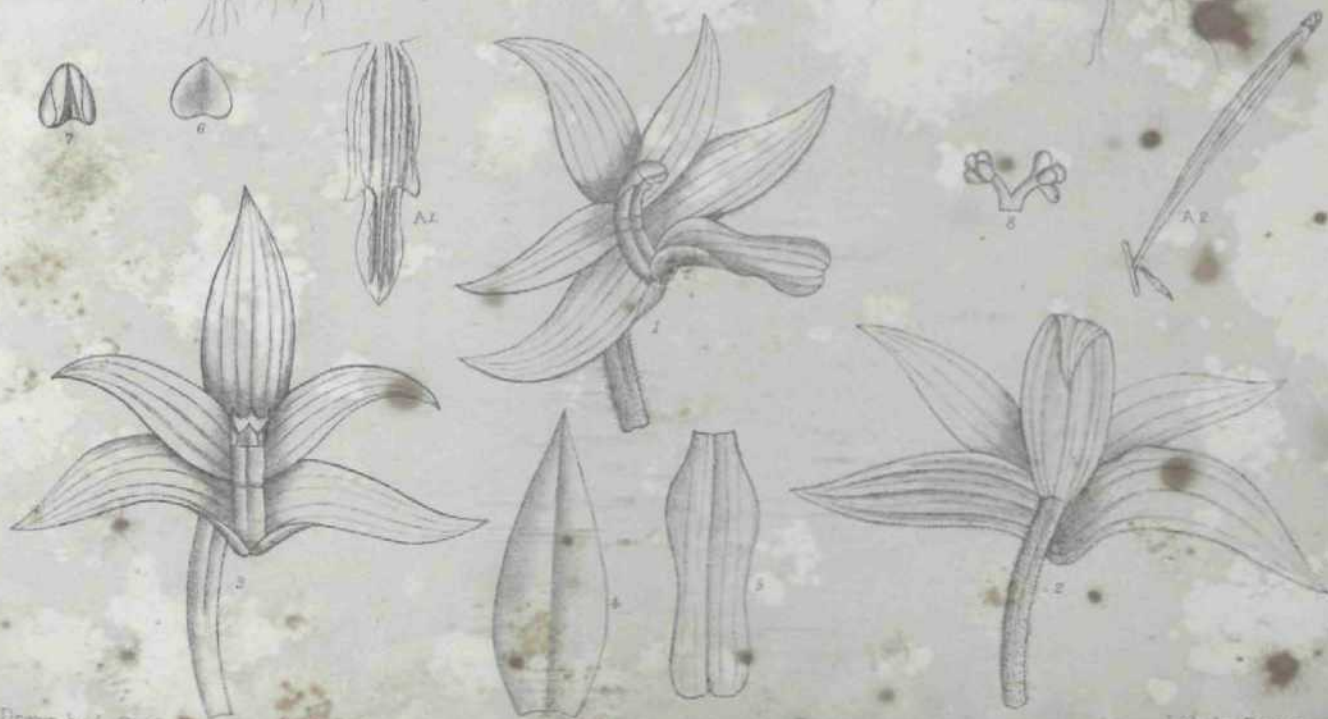
Painted by A. C. M.











Drawn by L. Singh.

ERIA OBESA L.

Lith. by B. K. Roy.



Drawn by L. Sing

ERIA CLAVICAULIS, Walp.

Lith. by F. N. Lubbock







Drawn by G. C. Dore.

NEPHELAPHYLLUM GRANDIFLORUM, Hook. f.

Lab. by Dr. K. P. Roy.











Drawn by G.C. Dorr

CYMBOCYNE LONGIBRACTEATA, Hook. f.

Lab. by K.D. Chandra



Drawn by G.C. Deas.

CELOELYNE SUAVEOLENS, Hook. f.

Lith. by Chitra Supt. Govt.



Drawn by G. C. Das.

COELOGYNE OVALIS, Lindl.

Lith. by A. H. Das.



Drawn by L. Singh

CELOGYNE FLAVA, Walp.

Lab. by K. H. B.



Drawn by Le Saff.

OPHRYNE PUMILA, Lindl.

Lith. by Chas. G. & Co.





Drawn by J.D.R.

CALANTHE CHLOROLEUCA, Lindl.

Label by Charles S. G. Smith



Drawn by L. Smgh.

EULOPHIA EXIMIANATA, L. H.

1845, H. B. K.



Drawn by G. C. Dorr

EULOPHIA INDICA (L.) Lindl.

Lab. by G. C. Dorr



Drawn by G. C. Dore

EULOPHIA NUDA (L.) B. & M. (MADAGASCAR)

Painted by J. C. Dore







Drawn by L. B. R. & P.

EULOPHIA MACROBULBOSA L. B. R. & P.

L. B. R. & P.



Drawn by G. C. Daan.

EULOPHIA ANDAMANENSIS, Hooker f.

Lith. by B. K. Nay.





TRICHOGLOTTIS DAWSONIANA, R. & M.

Line by G. S. S. S.







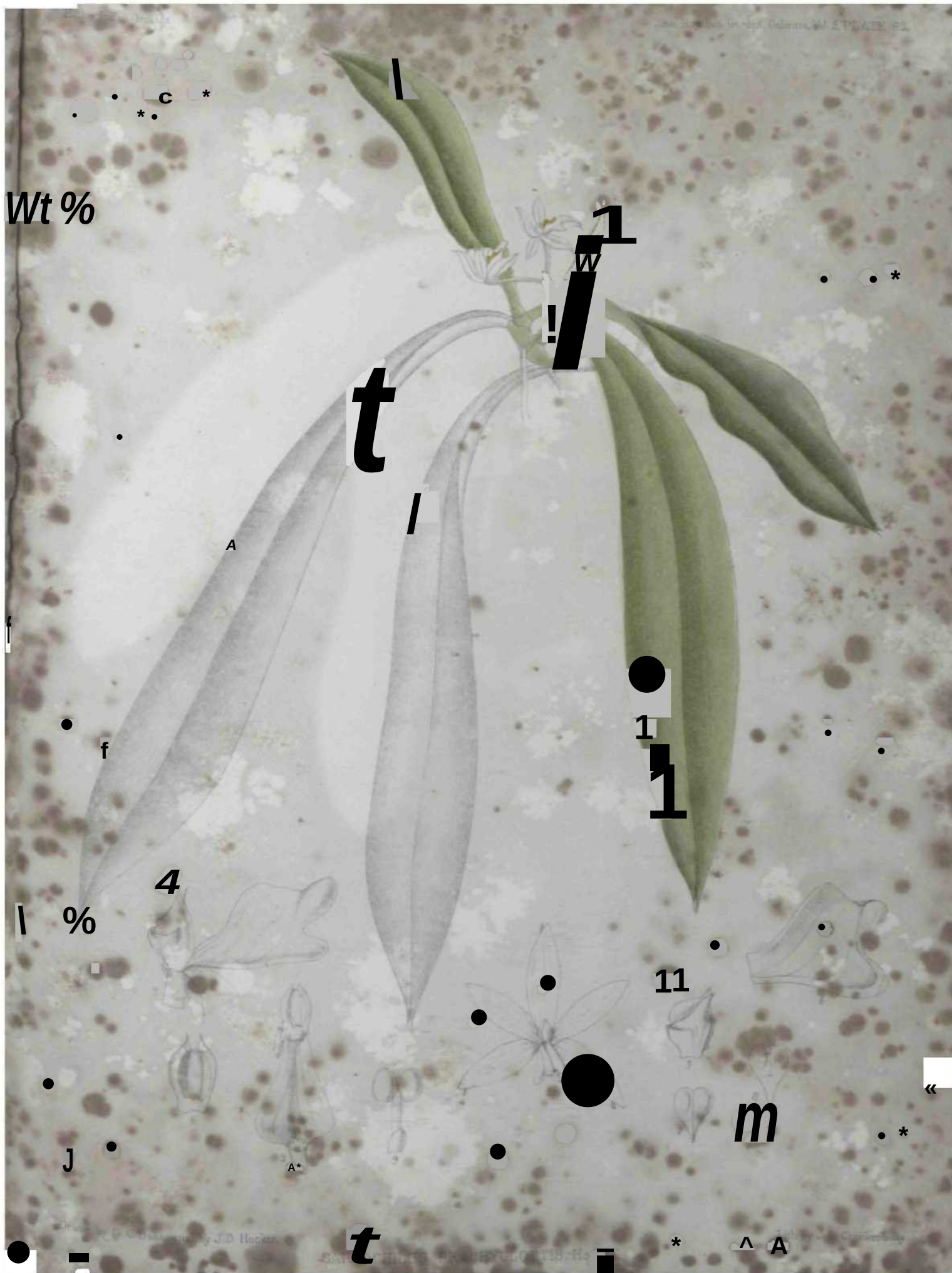




















Drawn by J. C. Cullen and by J. D. Hooker

SARCOCAULIS HIRSUTUS (Jackf.)

Label by J. C. Cullen, Sept. 1887











































Drawn by G.C.

HERPYZIA LONGICAULIS, Lindl.

Lab. by Chas. Edg. C.



Drawn by L. Smith

ODONTOCHILUS LANCEOLATUS, Benth.

Lith. by Thos. Sulp. Co.





Painted by G. S. G. and by G. S. G.

GECYERA FOLIOSA, Benth.

Bot. Soc. G. S. G.





Drawn by G. D. Don

POGONIA SCOTTII, Reichenb.

Life from the Bog





Drawn by G. C. Dunn.



Drawn by Grace E. Hodges

HABENARIA STENOPETALA (LEWIS & CLARK) TRICHA, H. & A.

PLATE I







Habenaria, Indiana, Lachida.

Prof. Dr. Garton, Indiana, 1871, 1872, 1873.



Drawn by G. O. Chase.

HABENARIA LATILABRIS Hook.

Lab. by Chas. J. R. C.

