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ANNALS

OF THE

ROYAL BOTANIC GARDEN, CALCUTTA

Vol. V.

Part I.

A

CENTURY OF INDIAN ORCHIDS

SELECTED FROM

DRAWINGS IN THE HERBARIUM OF THE BOTANIC
GARDEN, CALCUTTA,

By

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



WITH ONE HUNDRED AND ONE PLATES.



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1895.

A BRIEF MEMOIR OF WILLIAM ROXBURGH,

AUTHOR OF

THE FLOKA 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 Craigs 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 lectures as were then required for a licence to practise, he received (through the influence of Dr. Hope, 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 an 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 1759, 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 in 1735; went to the Danish Settlement in the Cambric as Physician and Naturalist in 1758; 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 Jagrenathporum on 25th 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 these two friends into the botanical sources of the indigenous economic products of the Darnatic 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 Biam and the Straits of Malacca, and in 1789 he was formally admitted into the Company's service. Koenig died of dysentery on the 23rd 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 gloriosoides*, 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. This observation from a worthy friend, a preceptor, and predecessor has made me more than usually minute in describing and drawing it."³⁷ Koenig was immediately succeeded in his appointment as Government Botanist by Dr. P. Ransel, 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 his time was spent at Samulcotta,* a small station about seven miles from the town of Canada, and about twenty-two from the mouth 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 SysUmatice Plantarum of the younger Linnaeus and in Retz's Observationes 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 Linnsean 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 1794, 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 Ooromandel*. 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 Eusebius in Knight's *UydyvpcBdia 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, amotto, and sapan wood as well as the bread-fruit tree, mulberry tree, and various kinds of pepper vines. He is also said to have interested himself in the improvement of 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^m 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 fils, Lamarck, Roth, Retz, Smith, Vahl, A. P. De Dandolls 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 Hyd, 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 Botany⁷. 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 (z.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 Grey friars Churchyard there in the tomb of the BOSWELLS of Auchinlech,

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

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

HBTB are deposited the remains of Doctor William Eoxburgh, Df the Honourable East India, Company's Civil Service, who died at Edinburgh on ths 18th February 1815, aged 54. AISD those uf Mary, his wife, daughter of thB late Robert Boswell, Estjuire, W.S., who died in London on the 18th January 1859 in hBr 85th year. Beneath this stonB are also deposited the remains Df Mary, the eldest daughter of Doctor William Roxburgh, and the wife of Henry Stone, EsquirB, who departed this life Dn the 30th January 1814, in the 3Dth 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^m W. Roxburgh.

Miss BontL
(Swiss or French; lather perhaps Governor of Penang. She was one of three sisters. The other two marriel Mr. Amos ani Baron Yon Streng.)

Miss Huttenmann.
(German.)

Miss Boswell
(of thD Auuhinlech family).

Child.

The above-namel Miss Bonté had one child, Mary, who married Henry Stone, B.D.S., and had four children—

1. Richard (?), who died aged about six.
2. Mary {Laçly Marjoribanks),
3. Amelia (Mrs. James Mac-Arthur).
4. Sibella (Mrs. Gk W. Norman).

Ohildren.

1. George, killed by lightning in Java.
2. Anne, married Eobert M. Tulloh, B.C.S.
3. Eobert, Indian Army.
4. Bruce, ditto.
5. Elizabeth, married F. Durwon-Smith, B.D.S., and died 1891, aged 92.
- B. Sophia, married John W.
7. James, Indian Army, married Miss DamegiB.
6. Henry (Royal Navy).

Children.

1. Sibella.
 2. Mary Anne, married H. D. Tucker, B.C.S.
 - *3. William, married Miss A. E. Boswell.
- [Mm JJosivell, the third Mrs. Roxburgh, was shter of Mrs. Egerton of Gresford.]*

Estimated by the amount of elaborate! botanical materials which he left behind him, Boxburgh's life at the Calcutta SardEn must havs been one of continued hard work. When he quitted India for the last time in 1813, he left, under the charge of I)r. Carey, not only the manuscripts of his *Hwtus Bengalensis* and of his *Fbrc 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 Dwn descriptions and those figures, there is, in most cases, no room f

... J^{TABP} is apparently SDHIB error as to thⁿ order of the birth of the son named William ; for, in a paper written in 19D1 (and in the Transitions of thⁿ Society of Arts, Vol. XXI, page 313), Will:am Koxburgh, junior, is credited with having discovered *Asclⁿin*, *prⁿima* [*Mursdemā tenacwmmn*, W. ami A.) In the jungles of the Rajmahal Hills,

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 *Flora Bengalensis* through the press, and thus secured for his absent and sick friend priority for many of his species. The *Flora Bengalensis* 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 Superintendency 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 *Uryptogamia*, which was not included in Carey's Serampore edition, but which (having been rescued from oblivion by Griffith) was published by him in 1814, 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 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 meagreness. 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 descriptions 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 Linnsean. Finally, I would claim for Roxburgh's book the merit that it does not contain a single ill-natured or unkind remark. Nature once does its

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 *Fhra* 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, 1804), 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, &c.

† 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 Lac-sha, or Lac-Insect [*Coccus lacca*]. Asiatic Researches, II., 1790, pp. 351—351; Tilloch, Phil. Mag. III, 1799, pp. 357-359.

2. A description of the plant *Butea*. Asiatic Researches, III, 1792, pp. 459—474.

3. A description of the *Jonesia*. Asiatic Researches, IV, 1795, pp. 355—359.

4. *Prosopis aculeata*, *Emulj*, Tshamio of the Hindus in the Northern Circars. Asiatic Researches, IV, 1795, pp. 405—403.

5. Botanical observations on the Spikenard of the ancients. Asiatic Researches, IV, 1795, pp. 433—435.

6. A botanical description of *Vrceola elastica*, or Caoutchouc Vine of Sumatra and Pulo Penang, with an account of the properties of its inspissated juice compared with those of the American Caoutchouc. Asiatic Researches, V., 1799, pp. 167—177; Nicholson, Journ. III, 1800, pp. 435-440; Tilloch, Phil. Mag. VI, 1800, pp. 154—156.

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

8. Account of the Tuaseh and Arrindy Silk-worms of Bengal. [LSD2] Linn. Soc. Trans. VII, 1804, pp. 33—48.

9. A botanical and economical account of *Bassia butyracea* or East India Butter Tree. Asiatic Researches, VIII, 1805, pp. 477—485; Nicholson, Journ. XIX, 1805, pp. 372—379; Gilbert, Annot. 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, 1805, 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, 1805, pp. 254—275.

12. A table of the growth of trees in the Botanic Garden at Calcutta. Nicholson, Journ. XVII, 1807, pp. 110—111.

13. Description of several of the monandrous plants of India, belonging to the natural order called *Scitamineæ* Linnæus, *Canna* by Jussieu and *Drimyrrhinum* by Ventenat. Asiatic Researches, XI, 1810, pp. 313—362; Sprengel,

14. Letter on various natural productions of the East Indies. Nicholson, Journ. XXVII, 1810, pp. 60—75.

15. Remarks on the Land Winds and their causes. London, Med. Soc. Trans. I, 1810, pp. 183—211; Tilloch, Phil. Mag. XXVI, 1810, pp. 243-253.

16. A complete account of the Teak tree of the East Indies. Nicholson, Journ. XXXIII, 1812, pp. 318—354.

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. [1851] Linn. Soc. Trans. XXI, 1855, pp. 123-125.

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 1834, 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 in a reduced scale in Wight's *Flora of the Indian Archipelago*.

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 reddas tuavitatem meam permulcet
Aut admonet ut peccata sentias de Deo
Habendus in honore tibi

Roxburghius
Hominum hortorum olim prefectus
Vir scientie botanice laude florens
Idemque amantissimum agrestium

Summus artifex
Conservat cinerem Patriae
Hic viget ingenium
Tu favore et prelo mere

B. M. P. D. Superstitibus 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 Waturhouse) of a picture published in thirty-third volume of the Transactions of the Society of Botanical Artists (London, 1815).

* A number of plants, collected at the Cape of Good Hope during his last voyage to England, were present in 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 Sreylriars Churchyard.

BOTANIC GARDEN, CALCUTTA, }
June 1895.)

G. KING.

ANNALS

OF THE

ROYAL BOTANIC GARDEN, CALCUTTA.

Yoi. y.

1. A CENTURY OF INDIAN ORCHIDS,

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

2. A CENTURY OF NEW AND RARE INDIAN PLANTS,

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

TO WHICH IS PREFIXED

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By Dr. E. KING.

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

1895.

TO THE MEMORY

OF

William Roxburgh,

M.D., F.R.S.E., F.L.S.,

A MEMBER OF THE HONOURABLE EAST INDIA COMPANY'S

MADRAS ESTABLISHMENT ;

SUPERINTENDENT OF THE BOTANIC GARDEN, CALCUTTA,

FROM 1793 TO 1814;

AUTHOR OF

THE PLANTS OF BORDOMANDEL,

THE HORTUS BENGALENSIS,

AND

THE FLORA INDICA.

THIS VOLUME IS DEDICATED

BY

THE PRESENT SUPERINTENDENT.

PRINTED BY THE SUPERINTENDENT OF THE BOTANIC GARDEN, CALCUTTA,

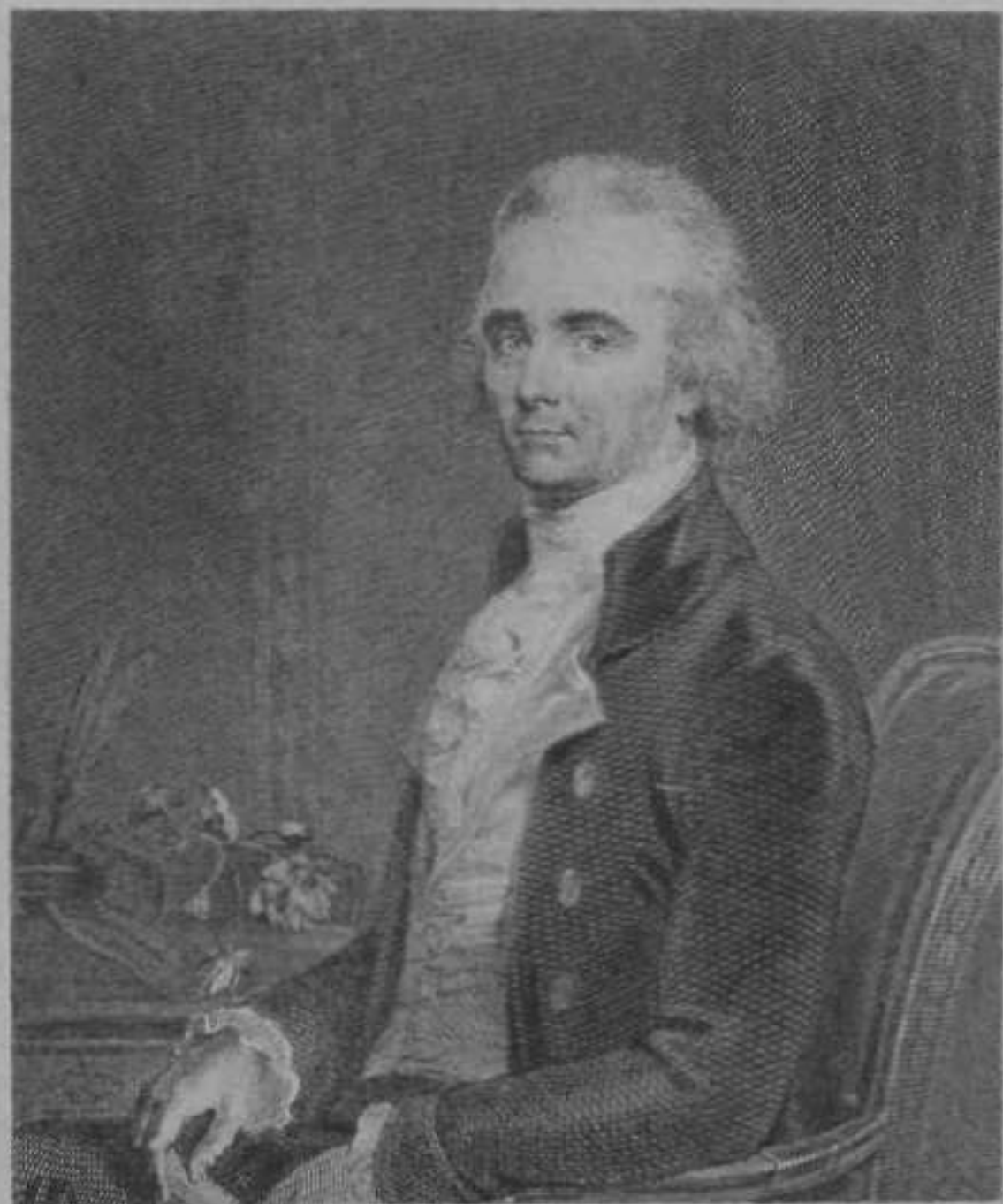
July 1805.

PREFACE.



THE present volume of the Annals of the Royal 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 Royal Garden, Kew, who generously agreed to their publication here. The second consists of descriptions of critical Indian species of *Ranuncuhcea* 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.

O. KING.



Engraving

Survey of Dacca & Benares, Calcutta, February 1813.

W^M ROXBURGH.

SUPERINTENDENT OF THE BOTANIC GARDEN CALCUTTA 1793 TO 1813

Engraving from an Engraving by C. Warren.

A

CENTURY OF INDIAN ORCHIDS,

SELECTED FROM THE

DRAWINGS OF PLANTS IN THE HERBARIUM OF THE ROYAL BOTANICAL
GARDEN, CALCUTTA,

WITH DESCRIPTIONS, *Sue.*

BY

J. D. HOOKEE, M.D., E.N., F.E.S., K.U.S.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 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 Orchidee" contained in vol. V, p. 17 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 should, should my suggestion meet with Dr. King'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. Eoxburgh; 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

Vamp, Sunningdak, October 1892.

A CENTURY OF INDIAN ORCHIDS

BY

Sir JOSEPH B. JILTON HOOKER,

PLATE 1.

OBERDNIA DRBIDULARIS, *Hovk. f.*

O. orlicuhris) foliis ensifurmibus sensim acuminatis, scapo crasso foliaceo vel folio confluentis, spica elongata cylindracea sensim longa attsnuata iensiflora, floribus sessilibus rachi crassa quasi applanatis aurautiacis, ovario brevissimo, bracteis late Dvatis orbiculatisve erosis, sepalis petalisque ovatis obtusis intBgerrimis, labello orbiculato concavo sepalis majore integerrimo vel crenulato apicem versus obscure 3-lobo v. emarginato. *Hook. l. FL Brit. Ind. v. 577.*

ITAB.—SIEKIM-HIMALAYA ; at Dikkeeling, alt. about 4, DGD ft., *Clarke.* KHASIA HILLS, *Gibson.*

SUMs very short, densely tufted, flat. *Leaves* 4—6 in. long by \—| in. broad towards the base, gradually narrowed from the basB to the tip, dark green. *Spike* sessile un the top Df a flat, truncate, leaf-like scape, or inserted at tha margin or top of a leaf, being in fact wholly or in part confluent with a leaf, 4—6 in. long by J in. diam., terete, veiy 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. paclnjrachis*, *Eeichb. f. Mss.* [*Fl. Brit. Ind. v. 681*], which has the same disposition of the leaves and spikB, and minute sessile flowers crowded on the thick terete rachis, and nearly the Bame sepals and lip; hut in that plant the hracts QIB shorter and broader and the petals are vsry narrow. As, however, both plants inhabit the Eastern Himalaya and Khasia Hills, thBy may provB forms of onB species.

The drawing of *O. urbicularis* was madB at tiiB Calcutta GradBn from spBcimBna sent by Mr. Gibson, a collector for the DukB of Devonshire, from the Khasia Hills, to Dr. Wallich in 1835. It bears the manuscript namB of *O. phylfostachys*, in Wallic-h's hand-writing, a significant name which I should have retained had I known of it when describing the genus *Obcronia* for tiiB 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; 5, ovary, column and anther; 7, pollinia,—all greatly enlarged.

PLATE 2.

MICRDSTYLIS WALLICHII, *Lindh*

M. Wallichii] foliis 2—4 sessilibus petiolatisve elHptiuo-vpl ovato-lancBolatis acuminatis m-arginibus ssepius undulatis, scapo acute angulato, racemo multifloro, bracteis ovario brevioribus patentibus vel reflexis, labelli lamina apice rotundata v. emarginata, auriculis

acutis v. *obtusis*. *Lindley in Wall. Uat. n. 193B et Gen. and Sp. Orchid. 20; Ridley in Journ. Linn. Soc. xxiv. 337; Hook. f. FL Brit. Ind. v. B85. Malaxis acuminata, Don Prodr. FL Nep, 29 (fid. obs. in Herb. Wallich).*

HAB.—TEMPERATE and SUBTROPICAL HIMALAYA, alt. 4—7,500 ft, from Simla to Sikkim. KHASIA HILLS, alt. 5—8,000 feet. ? Andaman Islands, *Kurz*. TRAVANDORE and the Anamallay Hills, *Boddy* (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 $\frac{1}{2}$ in., nearly $\frac{1}{2}$ 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 present represents a variable intermediate state of the species. *Malaxis 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 present 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 round at the apex; auricles long, parallel, acute.
- D. Lip and dorsal sepal from the type of *M. Wallichii*, Lin 11., in Herb. Hew (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 Hew, named *M. biloba*, Eichb. f. The leaves are 6—7 by 3—2 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 Mss.) 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), the lobes what 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.
- Q. Flower of var. *brachycheila*, from Moulmein, labelled *M. biloba* by Parish; the leaves are petioled, lanceolate.

The drawing which is reproduced in Plate 2 was inscribed "Sikkim, 4,009 feet, July 14, 1874, G. King" 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*] GRAMBLEI, Hook. f.

L. Gamblei pseudobulbis subglobosa, folio solitario subsessile vel petiolato elliptico vel oblongo plicato crenulato v. integerrimo, bracteis ovatis acutis, sepalia oblongo-lanceolata

obtusis 3-nerviis lateralibus labello suppositis, petalia linearibus 1-nerviis, labello deflexo elliptico acuto crenulato latribus distichis basi minute 2-callosis, columna tenui incurva. *Moth. l. in Rook. Ic. Plant t. 1812 et Fl. Brit. Ind. v. B93.*

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

Pseudobulbs 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 joint, slender. *Sepals* 1—1 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. 5,000 ft., Aug. 1875, G. King.¹¹ Figs. A1, flower and A2, lip, are from Gamble's specimen, also enlarged.

PLATE 4.

LIPAEIS (*Vorifolix*) PLANTAGINEA, *Lindl.*

L. plantaginea pseudobulbis magnis ovato-oblongis compressis, foliis 2 sessilibus suboppositis linearibus oblanceolatis acutis, scapo valido teretiusculo vel compresso, bracteis ovato-lanceolatis ovarium subsequantibus, sepalis obtusis 3-nerviis rectis lateribus revolutis, petalis linearibus 1-nerviis, labello sepalis sequali a basi deflexo orbiculare breviter unguiculato crenulato basi 2-tuberculato, columna incurva apice exalata. *Lindl. Gen. of Sp. Orchid.* 29; *Ridley in Journ. Linn. Soc.* xxii. 285; *Hook. f. Fl. Brit. Ind.* v. 702. *L. selligera*, *Reichb. f. in Linn. xli.* 42. *L. orbicularis*, *Lodd. ex Hemsl. in Gard. Chron.* 1851, ii- 592. *L. Griffithii*, *ex parte Ridley l.c.* 285.

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

Pseudobulbs 2—3 in. long by 1—1½ in. broad, smooth, green, much compressed; sheath membranous, acute. *Flowering scape* from the base of the old pseudobulb, 2—3 in. by ½—1 in. broad, flattened, clothed with compressed green imbricating acute sheaths. *Leaves* 5—10 in. 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 ½—1 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 taken from the Brahmakoond.

The drawing here reproduced is inscribed "Sikkim, 5-3-B3, fld. in H. B. C, 19-7-83, G. Hing." The following figures are of the specimen drawn:—1, bract and bud; 2, side and 3, front view of flower; 5, lip,—all of the natural size; 4, flower with the lateral sepals and lip removed; B, anther—both enlarged. The figures under A are from analyses of my own of a plant that flowered in the Enyal Garden, Kew, in June 1880 and is the type of *Eichenbachia selligera*; A, lip; A1, dorsal and A3, lateral sepals; A3, petal; A4, column—all enlarged.

PLATE 5.

DENDKDBIUM [*Bolbodium*] PUMILUM, *Roxb.*

B. pumilum dense caespitosum, pseudobulbis oblongis linearibusve dimorphis tetragonis y. 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 minoribus ovato, petalis linearibus oblongis, mento corniformibus sepalis longiore incurvo, labello oblongo v. obovato-oblongo apice 2-lobato lobis rotundatis crispatis, disco carina lata flava instructis. *Roxb. Hort. Beng.* 61 et *FL Ind.* iii. 479 in part; *Griff. Notul.* iii. 315; *Lindl. in Journ. Linn. Soc.* iii. 6; *Honk. f. FL Brit. Ind.* v. 713: vi. 184.

HAB.—DHITTAGONG, *Roxburgh.* PEGU, at Rangoon [*in Serb. Hort. Cakutt.*]. TENASERIM, *Griffith.* PERAK, *Swrchini.* SINGAPORE, *Ridley.* DISTRIB.—BornBD.

Pseudobulbs crowded, of ones usually many-grooved node, 1—1½ in. long, sessile or sub-stipitate. *Leaves* 1—1½ in., sessile, channeled along the centre above, strongly keeled beneath, dark green. *Flowers* 1 in. long, white or flushed with yellow; pedicels with ovary 1—fin. *Lateral sepals* 7-nerved. *Lip* with the median ridge obscurely carined, 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 tetragonal, 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, 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), *G. Matty*, July 1877, G. Hing." 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 meniscus 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 this plant and than in my specimen seen by me; 5, anther; 5, pollinia:—all enlarged.

PLATE B.

DENDRDBIDM [*Staihyobium*] DENQDANS, *Bon.*

B. denudans; caulibus caespitosis elongatis subbracteatis v. nutantibus, foliis distichis linearibus kneri-oblongis acutis obtusis vel emarginatis caducis, racemis axillaribus elongatis gracillimis cernuis, bracteis minutis, sepalis posticis lanceolatis attenuato-acuminatis falcatis, mento brevi incurvo obtuso vel rotundato, labello aepalis multo brevioribus, lobis lateralibus serrulatis incisive, terminali parvo ovato recurvo vel revoluta crispato, disco 2-lamellato. *Bon. Prodr. FL Nep.* 34; *Wall. Vat. n.* 2014 ex parte; *Lindl. Gen. ty Sp. Orchid.* 84 et in *Bot. Reg.* 1838 t. 15B et 1844 61 et in *Journ. Linn. Soc.* iii. 19; *nook. f. FL Brit. Ind.* v. 715.

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

Stems B—D 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—5 in., rachis flexuous; pedicel with ovary $\frac{1}{2}$ — $\frac{1}{4}$ in. *Flowers* $\frac{1}{2}$ 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 subsectional character which I have given in the Flora of British India, where *D. denudans*, *ericeflorum*, *Griffithii*, *alpevre*, *Boyle*, and *strongylanthum*, Beichb. 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; 5 & 6, pollinia:—all enlarged.

PLATE 7.

DENDEOBIUM [*Stachyolium*] ERLEFLDRUM, *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 seijuilongo, lobis lateralibus pBctinatim v. subfimbriatim serratis, terminali undulato, disco medio cristato, columna apice gbsse dentata. *D. ericeflorum*, *Griff Notul.* iii. 31B *et Ic. PI AsiaL* t. 3D7; *Lindl in Journ. Linn. Soc.* iii. 19; *Hook. f. FL Brit Ind.* v. 715.

HAB.—SIKHIM-HIMALAYA; alt. 6000 ft., *J. D. Hooker, fyc.* KHASIA HILLS, alt. 4—5,000 ft., *Griffith[^] Efz_m*

Stem 5—8 in., basal or all the internodes thickened, the upper few leafing. *Leaves* 2—3 in., distichous. *Scapes* with raceme 3—4 in.; pedicel with ovary $\frac{1}{2}$ 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 toothings 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 ^{cf}84, *D. denudans*, Don? Mr. J. Gibson, 1B3B. O. Mann showed me a drawing of this plant collected halfway between Punkabari and Eursong, 1BD7. T. Anders. *D. ericeflorum*. *Griff.*; SBB t. 3D7 Monocot. PL Notul. iii. 315, B. Eing."

Fig. 1, flower; 2J. the same with perianth segments detached; 3, column; 4, anther; 5, pollinia:—all enlarged.

PLATE 8.

DENDROBIUM [*Stachyobium*] PARCUM, *Reichb. l.*

D. parvum) caulibus densissime coespitosis gracilibus elongatis ramosis pendulis, racemis brevissimis axillaribus paucifloris, floribus parvis, sepalis viridibus lateralibus oblongia obtusis v- subacutis 3-nerviis, petalis lineari v- oblongo-spathulatis, inento late incurvo obtuso sepalis longiore, labello recto v. recurvo flavo basi rubro maculato, sepalis longiore angustis spathulato apice dilatato cuneiforme v. orbiculato truncato v. retuso. *Reichb. l. in Gard. Chron.* 18 BB, 1042 et *Xm. Orchid*, ii. t. 1B9.; *Hook. f. Fl Brit Ind.* v. 720.

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

Stems 15—18 in., narrows! at the base, aa thick as a goose-quill, green; internodes f—1[^] in., terete, lowest sheathed; nodes discoloured; branches elongate, with short brown sheaths at the very slender base. *Leavts* not seen, probably occurring only in a very young state of the plant. *Peduncle* \—\ in., slender, with very short imbricating sheaths at the basB, 2—4-fld.; pedicel with ovary \ in.; flowers \—\ in. long. *Sepah* 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 SBen, as well as in the drawing¹, though probably leaves are to be found in the young state of the plant; and are, as in its near ally *D. hrbacciim*, *ZindL* of the Deccan peninsula, very caducous. The lip, which is described as cunBiform and straight, and which appears to be so in dried specimen, is here represented as deflexBd beyond the, middls.

The drawing here reprDduced is inscribed " *D. linguseforme* Par. mss., Tenasserim Province, brought from Moulmein, 3rd February 1856. Drawn by Gopal, 15th February 1856. T. Anderson."

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

PLATE 9.

DENDROBIUM (*Formosce*) WILLIAMSDNI, *Day and Eichhb. f.*

If. Williamsoni) caulibus robustis flexuosis, vaginis foliisque hirtis-puberulis, foliis lineari-oblongis lanceolatisve obtusis v. 2-ctantatis, floribus 1—2 terminalibus breviter pBiunculatis amplis, sepalis albis lateralibus lanceolatis acuminatis, dorsali ovato acuto, mento infundibulari sepalo iorsali fsre Bequilongo, lab ell o aureo basi rubro-maculato lobis lateralibus brevibus rotundatis, terminali orbiculari plicato ciliato, disco obscure tricarinato. *Day et Rekhb. f. in Gard. Uchron.* 1859, 78; *Kovk_m f. FL Brit Ind.* v. 721.

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

SUms tufted, narrowed at the base, stout and fusiform or elongate (8—10 in.) and flexuous; naked below; internodes \—1[^] in., grooved. *Leaves* 2—4 in., pubescent on both surfaces, sessile, nearly flat, keeled, coriaceous. *Flowers* \—2 in. long from the tip of the dorsal sepal to that of the mentuin, yellowish without, white within except the yellow lip; peduncle £—£ in., sheathed 1—2-fld.7 hidden amongst the uppermost leaves. *Lateral sepals* subfiilcate; petals obovate, acuminate. *Column* with a toothed 2-lobed tip. *Anther* with ciliate margins, 2-lobed.

Of this fine spsoiBS I have seen no native specimens. It was first describe! in IB59 from a plant supposed to have beBn imported from Assam, which locality was at that period the putative birthplace of every orchid from N. E. India, the prBcisBr 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, ani on which is written "sent from the Khasia hills by Mr- Ballatly; fld. in Bot. Gardens, 3Dth January 1879. (? King."

Fig. 1j flower; 2, the flame with the perianth, segments detached; 3, lip spread open; 4 and 5, anther; 9, pollioia;—all but fig. 1, *enlarged*.

PLATE ID.

DENDRDBIUM [*Aporum*) LEDNIS, *Reichb.*, f.

D. Luonis robustum, foliis crasse coriacis late ovatis v. breviter cultriformibus obtusis, fluribus ternainalibua solitariis, bracteia numerosiasimia fibroaia, aepalia lateraU-bus rotundatia, petalia oblanceolata, mento rotundato, lab ell o lineari-oblongo inarginibus involutia apice rotundato v. retuao disco infra apicem carunculato. *Reichb. f. in Walp. Ann.* vi. 28 D; *Hook. f. FL Brit. Ind.* v. 723; vi. 1B4. *Aporum indivisum*, *LindL in Wall. Cat No. 2518 et Gen. and Sp_m Orchid 7D \non Bfame*). A* *Leonis, LindL in Bot. Reg.* 1840 *Misc.* 59 j *Griff, in Cub. Journ. Nat. Hist* v. 358.

HAB.—SINGAPORE, *Prints.* MALACCA, *Griffith*, PEJIAK, *Scvrtechini.* Wray.—JAVA.

Stem branching from the base; branches prostrate, 5—ID in. by 1—1| in. broal across the leaves, quite flat. *Leaves* f in. long and broad, not striated, margins thickened when dried, dark lurid green. *Fbwers* shortly and stoutly pedicelled, the pedicel about f 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. EidlBy, writing from Singapore, informs me that the flowers are exquisitely scented of vanilla. The specimen figured is inscribed "D. iniivisum, *Blame.* Singapore ID (1BB1). T. Anderson Fid. 2D-3-52." I have pointed out in thB Flora of British India that Blume's *D. indivisum*, of which thera is an authentically named specimen in Herb. LindL (now at HBW), has much longer not thickened lea7es, and a transverse lamfna on the lip, as in *D. mlophotum*.

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

PLATE 11.

DENDRDBIUM \Strvngyle) TERES, *LindL*

D. teres; caule gracile elongato parce folioso, foliia remotis teretibus obtusia v. oblique truncatis, floribus in apicem caulis elongatum aphyllum longe vaginatum paucis brevissine peliuellatia albis, bracteis spathaceis, sepalis ovato-lancBolatia acuminatia, petalia angustioribus lineari-lanceolatis, mento sepalis brevior conico recto, lab ell L> sepalis brevior cuneato oblique truncato acuminato v. cuspidato serrulato disco 3-cristato. *LindL in Bot Reg-* 1845 -Wiw. 51; *Hook. l. FL Brit. Ind.* v. 725.

HAB.—SINGAPORE *Sort* Liniley; {h. in *Herb. Hort. Uakutla*).

Stems tufted, 1½—2 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., 1½ in. broad, straight, subterete, 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, ½ 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. D. 8-S-83."

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

PLATE 12.

DENDROBIUM [*Viiyatce*] *PACHYGLISSUM*, *Reichb. f.*

D. pumilissimum caulibus gracilibus cespitosis, basi non incrassatis, foliis angustissima lineari elongatis patenti-recurvis acuminatis, vaginis superioribus hirtulis, floribus axillaribus solitariis v. 2-nis brevissime pedicellatis pendulis fusca-luteis striatis, sepalis 7-nerviis lateralibus oblongo- v. triangulari-ovatis, mento isepalis equilongo obtuso, petalis anguste oblongatis acuminatis, labello oblongo lobis lateralibus obscuris apicem versus labelli insertis, terminali minuto retuso, disco 2-carinato. *Parish et Reichenbach. f. in Trans. Linn. Soc. xxx. 149; Hook. f. FL Brit. Ind. v. 727.*

HAB.—TENASSEKIM; at Moulinein, *Parish*, SINGAPORE (10. in *Herb. Calcutta*).

Stem 1—2 in., rather flexuous, sheaths red-brown, lower internodes 1—1½ in. *Leaves* 3—4 by 1—1½ in., grass-like, bright-green, dorsally convex, channelled above. *Flowers* from the lower axils, nearly 1 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 drawing 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, 145-58. Fid. March 1859." Possibly this is an error due to transposition of 1 and 2, 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 *B. nutans* (see t. 11).

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

PLATE 13.

DENDRBIUM (*Vergaw*) TENUICAULE, *Hook. l.*

D. tenuicaule) caulis gracillimo elongato flexuoso internodio basilari minuto globose, 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, sepalo dorsali oblongo obtuso 7-nervi lateralibus late ovatis obtusis, mento sepalis duplo longiore corniforme fere recto, petalis oblongis, labello cuneato membranaceo 3-lobo, lobis lateralibus rotundatis, terminali parvo orbiculari, disco pubescentibus. *Hook. f. FL Brit. Ind. vi. 184.*

HAB.—ANDAMAN ISLANDS, (*? in Herb. Hort. Calcutta*).

Stems tufted, 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 cylindrical 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 "Aniamans, Reed. 8-2-84, fli. in Hort. Bot. Dale. 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 Batches of my own of the flowers accompanying the drawing.

PLATE 14.

DENDRBIUM [*Pedibum*] DRDCATUM, *Hook. m. l.*

D. crocatum ; caulibus teretibus elongatis foliosis, foliis lanceolatis acuminatis nervosis mollibus, racemis ad nudos rami apertis uniuersifloris, pedunculo pediculisque divaricatis gracillimis, bractea parvis ovatis, floribus majusculis laete croceis, sepalis lateralibus ovato-oblongis aGutis dorsali petalisque oblongis 7-nerviis, mento corniforme sepalis triplu longiore lente curvo, labello spatulato ungue angusto canaliculate basi sijnama recurva instructo lamina obovata crenulata. *Hook. l. FL Brit. Ind. vi. 185.*

HAB.—PERAK, at Larub [*lo. in. Herb. Hort., Calcutta*].

Stem 2—3 ft., narrowed at the base, green; internodes 1 in., ¼ in. diam. *Leaves* 4 by 1 in., bright green. *Racemes* pendulous, 2-fli, [in the drawing; peduncle 7—8 in. with a short annular basal sheath; bracts green; pedicels with ovary about as long; flowers 1 in. long from the tip of the dorsal sepal 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. Dal. Fl. 24-9-83."

Fig. 1, flower; 2, the same with the sepals and petals detached and lip removed; 3, lip from a drawing of my own:—all more or less enlarged.

PLATE 15.

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

D. panduriferum; caulibus elongatis cylindricis 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 Dakar elongatum sepalia multoties longius apicem versus subinflatum producto, petalis orbicularibus crenatis multinerviis, labello longissime anguste unguiculato limbo paniluriforme melio valde constricto lobis lateralibus auriculiformibus, terminali late obcordato, disco ad basin loborum lateralium lamella transversa aucto- *Hook. l. Flor. Brit. Ind. vi. 186.*

HAB.—PEGU; at Rangoon, *Gilbert [Iv. in Ezrb. Hort. Calcutta).*

Stem 2—3 ft., narrowed at the base, no doubt pendulous; internodea 1—1½ by 1 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. *Uvulum* 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*—are from drawings of my own of some flowers contained in a capsule attached to the drawing. The latter is inscribed "Kangoon, Dom. Gilbert misit; Fl. in H. B. D. 19-11-84." It must be nearly allied to the *D. ionopus*, Reichb. f. in *Bard. Dron. 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 recurved tooth. The latter is a common character of the section *Pedilonum*, but I found no trace of it in the solitary lip of *D. pamhiriforme* which I was able to examine.

PLATE 16.

DENDROBIUM (*Pedibnum*) SERPENS, *Hook. l.*

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

limbo basi squama transversa aucto. *D. panduriferum*, var. *serpens*, *Hort. f. FL Brit Ind.* vi. 185.

HAB.—PERAK; *Kunstler [Ic. in Herb. Calcutta]*.

Stem 2—3 ft., pendulous, green, internodes channelled and more or less twisted. *Leaves* not seen. *Racemes* $\frac{1}{2}$ in., about 5—8-fl.; peduncles short and rachis red-brown; pedicels with ovary about $\frac{1}{2}$ 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 *Z. 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 obcordate middle lobe and the claw is not even twice the length of the blade.

The drawing is inscribed "Kunstler misit ex Perak, FL in H. B. O. 7-5-B4."

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.

DENDROBILIUM (*Pedilonum*) TROPICOLIFLORUM, *Hook. f.*

D. tropicoliflorum; caule elongate 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 obovato-cylindrico obtuso aureo, labelli ungue elongato flavo sensim dilatato limbo multo longiore, disco inter lobos lateralea callo nigro semilunari instructo. *Hook. f. FL Brit Ind.* vi. 185.

HAB.—PERAK, *Kunstler [Ic. in Herb. Hort. Calcutta]*.

Stem 1 ft., incurved, slender below, tuberous at the base; roots fibrous; internodes $\frac{1}{2}$ —1 in., grooved. *Leaves* 2 by 1 in. *Raceme* 1—2 in., rachis slender, pink; bracts minute; pedicels with ovary $\frac{1}{2}$ in.; flowers 1 in. *Sepals* and *petals* $\frac{1}{2}$ 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 *Tropaeolum pentaphyllum*: I have seen no specimen, and have consequently described it from the drawing, which is inscribed "in H.B.D. FL 3D-B3, from Malaya, Perak, sent by Hen Kunstler," to which Mr. Brace (then keeper of the University Herbarium) has added in a note, "the sides of the claw of the lip adhere to the sides of the mentum," which they do in or less in other species of the section *Pedilonum*.

Fig. 1, flower; 2, the same with the sepals and petals detached and lip removed; 3, lip:—all of the natural size; 4, lip, enlarged.

PLATE IB.

DENDROBIUM [*Epidendrobium*] NUTANS, Lindl.

D. nutans \ caulibus coespitosis inferne attenuatis, superne crassiusculis foliosis, internodiis profunde sulcatis, foliis breviusculis lineari-oblongis lanceolatisve acutia obtusis v. sub-bilobis pubescentibus, racemis brevibus axillaribus paucifloris, pedunculo brevi basi taginis atque, floribus nutantibus flavis, sepalis petalisque lineari-lanceolatis, mento cuniceo sepalis dimidio brevioribus, labello sepalis sequilongo lineari-lanceolato lobis lateralibus parvis rotundatis, epichilio hypochilio sequilongum concavo acuta marginibus undulatis incurvis, disco 5-nervi, columna longiuscula. Lindl. *Gen. and Sp. Orchid.* 90 et in *Bot. Hey.* 1944, Misc. 52. *Thwaitts Enum. Pi. Zeyl.* 298 (BIDL. syn. *Jerdonianum*), *Hvok. l. Fl. Brit. Ind.* v. 734. *D. villosulum*, Lindl. *Gen. and Sp. Orchid.* 8B, in part.

HAB.—CEYLON; in the Central Province, alt. 4—6,000 ft., *JMacra?*, *Sfc.* NILGHIRI HILLS, at Dotacamund [*l.c.* in *Herb. Hvrt. Cakutta*].

Stems tufted, 6—10 in., sometimes rather swollen towards the middle, but hardly clavate. Leaves 2—2½ by 1—1½ in., spreading and recurved, rather coriaceous. Raceme 2—4 fld.; peduncle ½ in., half-opposed; pedicel with ovary ½ in.; bracts minute; flower ¾ in. long, narrow. Column rather long for the genus. Capsule sub-globose, ½ in. long.

Lindley describes the peduncles as subterminal, and the flowers as white tinged with green, probably from a cultivated specimen; but in an excellent drawing made by Mrs. Walker in Deylon, they are, as represented here, of a rather buff yellow. Thwaites has referred to this the Peninsular *D. Jeronianum*, Wight [*l.p.* t. 1514], 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, Dotacamund, ½ in., fld. in H. B. 0. Feb. 1363, 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. 5 and 7 enlarged.

PLATE 19.

DENDROBIUM [*Epidendrolium*] CANDIDUM, Wall

D. candidum \ caulibus uespitibus gracilibus erectis basi attenuatis, foliis lanceolate acutis, floribus in caulibus aphyllis breviter racemosis albis, pedunculo brevi vaginato, bracteis majusculis ovatis demum deciduis, sepalis petalisque lineari-oblongis obtusis, mento brevi rotundato, labello sepalis brevioribus ovato-lanceolato obtuso basi cuneato lobis lateralibus angustis rotundatis, disco barbato callo longato instructo. Wall, in Lindl. *Bot. Reg.* 1838, Misc. n. 54; *Paxt Fl. Uard.* i. 63, l. 41; *Hook. 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—1½ in., spreading and recurved. Racemes at the nodes; peduncle ½ in., rather stout; sheaths

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

A beautiful species and VBiy fragrant. I have seen no Khasian specimens; but ths drawing *hdTd* ^produced is inscribed "D. candidum, Wall., Mr. Gibson's collections; grows erect like D. nobile." Mr. Gibson was a collector in the Khasia, BBrt out by the Duke Df Devonshire about the year 1834, and who, according to Lindby [Bot. Eeg.), discovered D. candidum at Nungklow in the Khasia hills.

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

PLATE 2D.

DENDRDBIUM (*Eudendrobium*) STUPDSUM, *Lindh*

D. stuposum'y caulibus elongatis sulcatis, foliis lineari-oblongis lanceolatisve acutis, floribus paucis in caulibus aphyllia racemosis albis, pedunculo gTacili vaginato, sepalis nblongis acutia lateralibus carinata, petalis late oblongis acutis erosis, mento brevi rotundato, labello obovato-obloDgo v. sub-cuneato villosa et glanduloso-ciliato lobis lateralibus brevibus terminali rotundato. *Lindl Bot. Reg.* 1838, *Misc.* 52 et 1844, *Misc.* 52, *Hook. l. FL Brit Ind.* vi- IBB. D. sphegioglossum, *Rvichb. l. in Bonphndia* ii. 58; *Hook. l. I c.* v. 737.

JJABI—KHASIA HILLS, alt. 3—5,DDD ft. (*Ic. in Hurt. Calcutta.*). TENABSERIM, *Parish.*

Stems tufted, 5—12 in., internodea 1—\ in. *Leaves* 3—4 by | inch, rather thin. *Racemes* at the nodes. *Peduncle* slender, \ in., with short scattered green sheatha; bracts linear-oblong, obtuse, green; pedicel with ovary \—\ in.; flowers \ 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 inscribe! "introduced from the Hhasia Hills in 1857, fld. DU 1st June 1359," differs from the description in the Flora Df British India in the smallness of the lateral lobes of thB lip, DT rather in the greater breadth Df the terminal lobe, and in wanting the red veins and yellow band which arB represented in a drawing of the TenassBrim plant by Mr. Farish. That the drawing cannnt be altogether relied upon is evinced by the sepals and petals being rBpreSBnted as acuminate in the flowers of the natural size, and with rounded tips in thB enlarged figures 1 and 2; the latter being the more correct. By inadvertence I have in the Flora of British India (*V.* 737) adopted Reiohenbach's later name of *sphegidvghssum*, which is corrected at p. 18B of Vol. VI.

Fig. 1, flower; 2, the same with one sepal and petal remDveS; 3, lateral sepal; 4, lip:—all more Or less enlarged.

PLATE 21.

DENDRDBIUM (*Eudendrobium*) AURANTIACUM, *Reichb. l.*

D. aurantiacum) caulibus etEspitoeia elongatis Bulcalia, internoiia elongatisj foliia paucis lineari-oblongia apice emarginata, floribus in caulibua aphyllia amplia aurantiacia v. aureis solitariaia v. binid apicem versua peiunculi validi curvi vaginia coriaceis imbricatis tecti, bract BIS elongatia ppathaceis, sepalis lateralibus oblongis v. obloDgo-lanceolata acuminatis, petalis latioribus DTato-oblDEgis obtusis, minto brevi late conico apica rotundato, labello late unguiculato orbiculari marginibus BVBTISIS disco pubeiscente marginibus

CRYSIS v. *subfimbriata*. *Reichb.f. in Sard. Chron.* 1887 ii. 03; *Hook. f. FL Brit. InJ.*, v. 751, vi. 187. *D. aurantiacum*, *Ralfe in Gard. Chron.* 1888, i. 233. *Hook. f. L c.*, v. 748.

BHUTAN HIMALAYA [*C. in Herb. Hort. C*kutt.*]_m ASSAM [*Hort. m. VtiUh*]. SYLUUT, *Mckilloe* [*in Serb. Kew*].

Stems 1—2 ft., about ½ in. diam.; internodes 1—| in. *Leaves* 2—3 by ¾—1 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 1½ in. decurved; bracts ½—¾ in., obtuse, membranous, white; flowers 1½ 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 Reichenbach from specimens flowered by Vitch, and said to have been imported from Assam, probably the Khasia hills or Bhotun. The drawing is inscribed "Sylhet, April 1875. Mr. Melville, G. L. King." The same from Dewungiri, Bhutan, "3. S. Jennings, April 1876, J. AndBr." In the drawing the unnumbered figure of the lip is represented as having two small 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 rent; 2, ovary and column; 3, anther; 4 and 6, pollinia:—all enlarged. The two unnumbered figures are a bract and the lip:—both enlarged!

PLATE 22.

DENDROBIUM [*Eudmohium*], PALPEBRAE, Lindl.

D. palpebrae, pseudobulbia clavata sub-tetragona profundè canaliculatis, foliis terminalibus oblongo-lanceolatis acutis, racemibus breviter pedunculatis multifloris penicillatis v. nutantibus, bracteis parvis lanceolatis pelicello appressis, floribus amplis, sepalis oblongo-obtusis petalisque breviter unguiculatis orbiculatis ciliolatis candidis v. pallidis, mento parvo rotundato, labello amplo explanato breviter unguiculato late oblongo pubescente et villosa-ciliato albo plaga basali verua lata lutea. *Lindl. in Journ. Hort. Sue.* v. 33; *Pax. FL Gard.* i. 48; *Veitch Man. Dendrob.* 57; *Hook. f. FL Brit. Ind.*, v. 755.

HAB.—SIKKIM HIMALAYA; in the Teesta valley [*C. in Urb. Hort., Calcutta*]. BURMA; *Lobby Bzrkley**

Stems 8—9 in. long; internode about 1 in. diam., bluish green, deeply channelled, ribs rounded. *Leaves* 3—5, 4—0 in. long by 1—1½ broad, bright green, flat. *Raceme* inserted towards the base of the pseudobulb, nearly horizontal many-flowered; peduncle short, stout, decurved, with several short obtuse brown sheaths, rachis green; bracts ½—¾ in. long, white or pink; pedicel with ovary 1½ 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 neVBr havB been figured in any published work on orchids. The drawing here reproduced is inscribed ⁱ Harden of Mr. Lynam, March 1857, T. Anders. ThB same from Teesta valley on sál trees, March 18B7, T. A." It must be a VBry rarB plant, having hith&rto been found nowhere but one a in Sikkim, and by two collectors in Burma.

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

PLATE 23.

BULBDPHYLUM *(EubulbopJh0um)* PDLYRHIZDM, *Lindl.*

B. polyrhizum) pseudobulbois parvis dense ctESpitosis globoso-ovoieis florentibus aphyllis, scapo basi pseudobulbi gracili erecto, racemo laxifloro, bracteia minutis, floribus brevissime peicellatis parvis flavis, sepalis lateralibus oblongia subfalcata obtusia, petalia ovato-oblongia obtusis, labello sessili ovato obtuso, columnee dentibus brevibua. *Lindl. Gen. andSp. Orchid, 53; Hwk. l. FL Brit. Ind. v, 7B7.*

HAB.—NEPAL? *Wallich [Ic. in Herb., Kew). SIKKIM; Lister \C_m in Herb. Hort* Bot. dale).*

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 mDrB probably varieties. Both have densely clustered small psBudobulbs about the SZB of hazel nuts, apparently forming matted masses on the trunks of trBes, hafless at flowering timB, and Bearing very slender scapes with lax racemes of small yellow flowBrs. That figured as B is from a collection of drawings received at KBW from the India House, on the Indian Government heir? taken over by the State. It is inscribed "*Dendrvbium polyrhizum, Wall, jflrides?*" in Wallich's handwriting, and is no doubt the type of the species. It has smooth, striated pseudobulbs, and thB flowers are greenish. That marked A is from the Calcutta collection of orchid drawings, and is inscribed "Sent from Sikkim by Mr. Lister, fid. in H. B. C, 4th April 1877, G. King." It represents a plant with morB oblong-ovate pseudobulbs, twicB, rarely thrice, constricted transversely, as if formed of three internodes, and these internodes arB vertically traversed by many deep grooves with tumid interspaces, the whole pseudobulbs having (as drawn) somewhat the appearance of thrBB superpoSBd rows of green oblong beads. ThB psBudobulbs further emit surculi from their bases, which arB not shown in the other drawing. In both thB basB 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 arB old and shrivelled, allowing something also for the fancy of the native artist. With regard to ths difference in the size and colour of the flowers, here, again, too much reliance must not be placed on thB artist's work. The flowers of A are evidently giving place to fruit, and though its SBpals are represented as acuminate in the drawing of the natural size, and at figure 1 of the analyses, they are not so in thB enlarged figurB 2, the sepals of which accord sufficiently well with thosB of B2 and 3. The SBBSHB lip ig the samB in both, as BIB the short teeth at the top of the column. The proximity of Sikkim to Ne al is a further indication of the two figures representing different states of one species.

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

Fig. A, the Sikkim plant; Fig. 1, flower; 2, tha sums with the aepala Bui petals detached; 3 an I 4, anther- 5 polliDia:—*all enlarged.*

Fig. B, the Nepal plant [*B. polyrhismn, Wall.*]; B1 ml 2, flowers; E3, the SUDD witK thBJBpa]B anii FBta]i detached;—*all enlarged.*

PLATE 24-

BULBOPHYLLUM [*Eubulbophyllum*] EUBLEPHARUM, *Reivhb.*

B. eublepharum pseudobulbis elongato-ovoideis teretibus monophyllis, foliis breviter petiolatis linearibus acutis coriaceis, scapo ascendente elongato robusto, spica laxiflora bracteis ovario sequilongis aristata, aepalia ovato-lanceolata longe acuminate alba v. viridibus punctatis, petalis columnis sequilongis 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. *Spikes* with bracts 12 in. ascending, with a few long appressed sheaths toward the base and scattered empty green lanceolate bracts below the spike; spike 4—8 in. long, inclined; bracts lanceolate, green. *Sepals* 1 in. long, concave; *mentum* rounded; petals about 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. 1852. T. Anderson. Luchman Singh del." Griffith's specimens (brought by collectors in Sikkim) have leaves 6 by 1 in., and flowers larger than in the drawing.

Fig. 1, Base and 2, front view of flower; 3, the same with sepals and petals removed; 4, anther; 5, pollinia—*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 [*Rawmosx*] BLEPHARISTES, *Hwk. m. l.*

V. Blepharistes pseudobulbis in rhizoma elongatum robustum remotis teretibus ovatisve teretibus v. uno latera sulcatis 1—2 phyllia, folia oblongisve emarginatis crassissimis, scapula elongatis gracilibus recurva, rachi incrassato, floribus mammis breviter racemosis, aepalia viridibus rubro-striata, lateralibus in laminam ovato-lanceolatis acutis connatis, dorsali lanceolata breviter longiore, petalia lato oblongis obovato-coriatisve fimbriata 5—10 nervia aurea apicibus rubro-punctatis, labello recto oblongo apice rotunato basi dilatato cordato, columnis dentibus minutis. *Hook. f. Fl. Brit. Ind.* v. 779; vi. 190. *Bulbophyllum Blepharistea*, *Reichb. f. in Trans. Linn. Soc.* xxx. 138.

J. A. B. — KHASIA HILLS, *Badphy* (in *Herb. Hort. Calcutta*). TENASSEUM, *Parish*.

Rhizome as thick as a duck's quill, rooting at the base of the pseudobulbs, articulate. *Pseudobulbs* 1—3 in., smooth, green, with sometimes a superadded node. *Leaves* 2—3 in. sessile or shortly petioled. *Spikes* 6—12 in. with distant green appressed sheaths, often deflexed with the umbel erect; bracts minute, triangular, persistent, green; *petals* with ovary 1/2 in., slender. *Sepals* 7-nerved; lateral 1/2 in., base of combined pair embearded, dorsal variable in length; petals very small; lip 1/2 in. 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 Reichenbach. As I have stated in the Flora of British India (v. 772), the species of *Bulbophyllum* and *Cirrhopetalum* are in many cases so closely allied by cross affinities that the two genera might well be regarded as one. My keeping them apart is due to this consideration of convenience, and the fact that all my attempts to commingle the species of both has resulted in a chaotic aggregate with most unsatisfactory sectional characters; in fact a far less satisfactory result than the keeping them apart, which latter course avoids a greatly increased synonymy.

The drawing of the Ehasian specimen here figured is inscribed "Khas'a hills, Dept. Badgeley, fld. H. B. D., January 1878"; the flowers are much larger and the dorsal sepal far longer than in the Tenasserim specimens.

Fig. 1, flower; 2, dorsal and 3, lateral sepals; 4, petals; 5, column; 6, lip; 7, B. anther; 8, pollinia; 9, ovary and column.—all enlarged.

PLATE 25.

DIRRHDPETALUM (V. J. m. d. U. t. x) GAMDSEPALUM.

C. gamosepalum) pseudobulbia in rhizomate repens subrenatis ovoideis angulatis, foliis obovatis linearibus-oblongis emarginatis v. bilobis crasse cordatis, scapo gracili pendulo multifloro, bracteis lanceolatis pedicellis brevibus breviter viridibus, sepalo dorsali ovato in aristam ciliatam angustata aureo-rubro-striato producto, lateralibus dorsali subtriplo longioribus linearibus apice rotundatis in laminam lineari-oblongam planam rosam-purpuream coherentibus, petalis subobovatis dorsali breviter ciliatis et in aristam ciliatam productis rubro-punctatis, labello subsessile linearibus-oblongo obtuso recurvo purpureo, columnae angulatae rotundatis. *Griff. Nylul.* iii. 296; *Sool.* f. *Fl. Brit. Ind.* v. 774. *C. Andersonii*, *Kurz in Rep. Veg. Andam.* 51 [nomen]. *Bulbophyllum Griffithianum*, *Par. and Rehb. f. in Trans. Linn. Sw.* xxx. 153.

TENASSERIM—*Griffith, Parish.* ANDAMAN ISDS., *Kurz,* PERAK, *Swartz.* MALACCA, *Maingay.*

Rhizome ad thick as a crow-quill, closely articulated. *Pseudobulbs* 1 in. long, green, 4-angled. *Leaves* 2-4 in., subsessile, dark green. *Scape* 4-6 in., very slender, brown-purple, sheaths small appressed; bracts 1 in., green; pedicels with ovary about twice as long; flowers 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 *V. gamosepalum* as filiform, I feel sure that I was right in referring to it Kurz's *C. andamanicum*; and the drawing here given confirms this view. Except in colour, I find no other difference except in the lip, which Griffith describes as acuminate. The dorsal sepal and petal here described as blue-red; the former greenish at the base and the lateral ones closely dotted at the base with purple; and the column as white with black-purple spots. Reichenbach in his very imperfect 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 shrinking. I gather from an observation in his diagnosis that Parish had suggested its being *C. gamosepalum*. The latter says the flowers are white streaked with brown.

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

Flz. 1, flower, side view; 2, dij., front view; 3, flowers with the lateral sepals retained and the dorsal anther displaced; 4 and 5, lateral sepals; 6, lip; 7, anther; 8, pollinia.—all enlarged.

PLATE 27.

CYRHOPELALUM (*V. Jumbellata*) CECIDIOSUM, Wall.

V. cecidioides; pseudobulbia confertis ovoideis, folia petiolatis lanceolatis oblongifloris acutis, scapo foliolifloris, vaginis bracteis laxis, umbella confertiflora, floribus 3-9. virentibus, sepalis orbiculatis cymbiformibus orbicularibus galeatis 5-nerviatis, lateralibus liberis dorsali ter longioribus linearilanceolatis obtusis, petalis ovato-oblongis v. orbiculari-ovatis. Bulbophyllum sepalis dorsalis aquilongia 3-nerviis, labello breviter stipitato minuto ovato basi dilatato cordato obtuso aureo basi purpureo arcuato reflexo, columnis distichis acicularibus erectis. Wall, in *Bot. Beechey*. 1839, *Misc.* 35 et 1843 *sub. t.* 49; *Hook. f. Fl. Brit. Ind.* y. 775. *Bulbophyllum subulatum*, Reichb. *f. in Walp. Ann.* yi. 259.

HAB.—KHABIA HILLS, Griffith, Gibson.

Pseudobulbs 1 in., dark green, purple at the top, smooth. *Scapes* 2 in., slender, inclined, reddish-brown; bracts 1/2 in., lanceolate, shorter than the ovary, which with the pedicel is 1/2 in.; flowers 1/4 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 papillose texture of these organs. The different colour of the flowers of the specimen figured and the enlarged drawing 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 *V. vmpitum*, assuming that the flowers have not appeared in an umbellate form, as they should do.

The drawing here reproduced is inscribed "Dirrhopetalum cecidioides, 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 pectinately bent, also in the large bulb. 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.

CYRHOPELALUM (*V. Rawmna*) REFRACTUM, Zollner.

V. refractum; pseudobulbia diphyllia confertis ovoideis v. ovatis, junioribus globosis 3-9-nerviatis, folia breviter lanceolata acutis, scapo eubrecto paucifloro, floribus 2-3-pollicaribus, bracteis ovario brevi longioribus ovato-lanceolatis, sepalis lateralibus dorsali minuto lanceolato bistriatis ciliatis multotidis, bulbophyllum angustatum bracteis in lamina planam auxeam rubro-sanguineis ciliatis,

petalis rubria ovato-lanceolatis longe acuminatis ciliatis et pubescentibus sepalo dorsali minDribua, labello niinuto oblongo hispidulo v. glabrato, columns; calcaribus elongatw decurvis. *Zollinger in Flora* 1847, 457; *Walp. Ann.* i., 77B; *Hook. f. Fl. Brit. Ind.* v. 779. C. Wallichii, *Lindl. in Wall. Cat.* 19B0 *el in Bat. Reg.* 1839, Misc. 71 et 1343 sub. t. 49 \non *Wall. Pl. As. Ear.*). D. tripudiana, *Par. and Eichhb. f. in Gard. Chron.* 1876, 817. BulbDphyllum tripudians, *ejusd. in Trans. Linn. Soo.* xxx. 154. B. refractum, *Eichhb. f. in Wälp. Ann.* vi. 259.

HAB.—SUBTROPICAL HIMALAYA; from Kumaon alt. 3,700 ft., *Strachey and Winterboflom*, to Sikkim, alt. 4—5.D0D ft., J. D. H., &c. TENASSERIM, *Parish.* **DISTRIB.** JAVA.

Pseudohills very variable, f—1 in. diam., young often nearly globose, old deeply lobed at the sides. *Leaves* 2 on young pseudobulbs, 4—5 in. long, rather flaccid. *Scape* 4—g j n, fetuut or slender, often red-brown, sheatha few, appressed; spike usually inclined or nodding, with 3 - D spreading or drooping ibwers; bracts cymbiform, broadly ovate; ovary about | in. long. *Dorsal sepal* \ in., yellow streaked with Ted; lateral remote at their basea, margins glabrous or riliate; petals purplish red; lip sub-cylindric, streaked and speckled with red-purple, tip thickened incurved.

A VBTV singular species, quite unlike any other, rBmarkable also for its wide distributioD, being one of the BW epiphytic orchids that inhabit both the Himalayas and Java. The specimen and figures from nativB specimens, of which I have seen several, show a good deal of variation in the form and colouring of the bracts and perianth segments. The drawing here reproduced is of a Sikkim specimen inscribed "Bolb. above Kurseong, 5,590 ft., 4th October 1876, 3. King."

Fi.] flower ; 2, lit,rnl sepals ; S, dorsal sepal; 4 BU& 6, petab; 6, column iini lip; 7, lip; 8, fnmt view Bf çolumn 9, untlu'r; 10, polUnin:-*" enlarged.

PLATE 29.

PANISIA FARVIFLORA, *Lindl.*

P. parviflora; pseuiobulbis ovoideis reticulatis diphyllis, foliis subpétiolatia elliptico-lanceolatis acutis, scapo brevi gracile decurvo, racemo pendulo, floribus albia, sepalis later-alibus lanceolatia acutis 5-nBryiis, dorsali lineari-oblongo, petalis Dvato-lanceolatis 3-nerviis basi gibbia, labello lanceolato ungue elongata gracili geniculata apicB 2-tuberculata. *Liadl. Fol. Unhid.* 1; *Hook. f. Fl. Brit. Ind.* v. 783. *P. reflexa*, *Lindl. I.e. Doebgyne parviflora*, *Lindl. Sen. and Sp. Orchid.* 44. *Dendrobium demiESum Don Prodr.* 34.—*Androgyne*, *Griff-jW_M7.* iii. 379.

HAB.—SUBTROPICAL HIMALAYA; Nepal, *Wallich*; SIHKIM, alt. 4—10,D0D ft., *Ularke*. KHASIA HILLS, *Grijjih, Šfc*

Pseudobulbs broad or narrDW, |—f inch long, pale green, with slender, pubescent, L- ^a frnm the base. *Leaves* 2—3 in. *Scape* 1—2 in.; raceme laxly few or branching ioDt3 m«« J- ni i. +n i in lanceolate, snorter than the ovary, brown, membranous, many-fli.; bracts a > > i-. T deciduous; pedicel with ovary \ in. *Sepals* and *petals* pure white; lip very narrow, H t • claw variable in length, sometimes more than half as long as the blade' 'column' M l ^ g as tha sepals, slender below, gradually dilating upwards into

two entire or toothed wings, pale yellow brown. *Anther* notched at the tip; *pollinia* 4, connects! by a viscu. *Capsule* ½ in. long, turgidly obovDid.

Though known for upwards of 70 years—for Wallich sent specimens to England early in the OBntijry—this interesting litblB orchid has never yet been cultivated in England, nor has a figure of it bsBn published in EuropB. That here given is from a Sikkim specimen collected by Dr. King at 6000 feet elevation, 25th October 1876. The analyses A 1—5 are by myself from a specimen Bent by Dr. Wallioh to Sir James Smith about 1821, and given by the laLtBr to Sir W. Hooker.

Fig. 1, floWBr with the lateral sepala and lip turnel 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 A?, lateral sspal; A3, petal, A4, column and lip; IA5, *enlarged*:—all from Wallich's Nepal specimen.

B, lip of *Panisia apiculata*, Lindl., from Moolybet, Tenasaerim, *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 *P. parviflwa*.

PLATE 30.

ERIA [*Hymenma*] OBESA, Lindl

E. olesa pseudobulbis dense conjestis crassia fusiformlbus basi atkenuatia vaginis
 In V. tectis, fDliis laiiceolaria v. ovato-lanceolatis, racemis lateralibus sessilibus v.
 In iter peiunculis paucifloris pubescentibus, bracteis patulis ovatis h9rbac3ia, flDribus
 SBO-striatis, sepalis lateralibus falDato-decurvis lancaolatis acuninatis, mentu
 uetalis oblongD-lanceolatis, labelb lineari-oblongo lobis lateralibua parvia v.
 obsoletia iisco 3-carinato. Lindl in Wall Vat. n. 1975 et Gen. and Sp. Orchid 68 et Bot.
 Re. 1844 sub. t 29 et in Journ. Linn. Soc. iii. 53; Walp. Rep. vi. 277.; Evok. l. FL
 Brit. Ind. v. 791. E. Linileyana, Grif. Nvtul. iii. 3M.

^^MARTABAN, Wallich. TENASSERIM; at Mergui, Griffith^ Parish.

Pseudohulbs 2—3 in. by \-\ in diam., curved, spindle-shaped, narrowed at the base of 4—5 principal nodes and a few very short small basal ones, pale silvery green from the transparent hyaline reticulate sheaths. *Scapes* several from each pseudo-bulb, with the sub-corymbose raceme 2 in. long; bracts ½—½ in., green; pedicel with ovary \-\ in. > sleriier, ^pals \ in. long, lateral spreading and decurved, more or less pubescent, very acuminate, dorsal recurved; mBntum green, pubescent; petals l shorter than the sepals; lip nearly as long as the sepals. *Uapsule* 2 in., very slender, straight.

A singular species, remarkable for the pals sausagB-shaped crowded glistBning grBen pSBudobnlbs. There is no indication on thB drawing of the locality whence the specimen was proourel or of the collector, it being simply inscribed "*E. obeta*, Pale," implying that the drawing was made during Dr. Falconer's BuperintendBDce of the Dabutta garden.

Fig. 1, side ani 2, back views of flower with the lip removed; 4, (brsal sBPal; * > Mp⁵ 6 *** *' " ^ ^ 8, pollinia:— all enlarged.

Fig. A1, lip, enlarged. A3 fruit of the natural size, flDm Mr. Pariak'a sproimen ^ Herb^u Kew.

PLATE 31.

ERIA (*Hymenaria*) CLAVICAULIS, Wall

E. clavicaulis) caulis elongatus subclavatus sulcatus apices versus foliosus et floriferus, foliis 2—4 ellipticis oblongatis acuminatis, pedunculis brevibus 2-3-floris, bracteis magnis ellipticis oblongis patentibus, pedicellis elongatis, sepalis lateralibus triangulari-ovatis acutis recurvis, mento brevi lato 2-lobato, petalis lato oblongis obtusis 5-nerviis, labelli hypochilio late obcordato v. fere reniformi, lobis rotundatis, disco callo elongato tomentoso simpliciter v. basi 3-fido instructo, epichilio parvo orbiculari sinu hypochilii fere inclusio arsa centrali incrassata tomentosa. Wall, ex Lindl, Bot, Reg. 1840, Misc. 90 (non Journ. Linn. Soc.) Walp. Ann. vi. 278; Hook. f. Fl. Brit. Ind. v. 799. *E. khasiana*, Lindl. in Journ. Linn. Soc. m. iii. 59.

HAB.—KHASIA HILLS, Griffith.

Stems 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 in., with broad basal sheath; bracts 1 in., many-nerved, membranous, spreading; flowers glabrous, white, lip with purple margin, 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 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. D., 21st February 1840, T. Anderson."⁷⁷

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

Fig. A 1, lip and column; A 3, side view of column; A 4, anther viewed facing the cells, A 5, pollinia, all enlarged from Griffith's dried specimens. Fig. A 2, lip from a cultivated specimen in Herb. Kew, from Farley Hall.

PLATE 32.

ERIA (*Dendrocladia*) DISSEDLER, Lindl

E. discolor) rhizomate crasso elongato, caulis crassissimis pediculis clavatis profunde sulcatis, foliis oblongis linearibus apice marginatis coriaceis subplicate-nerviis, petiunculis basi foliorum insertis iisque brevioribus crassis strictis fusco-tomentosis Vaginis ovato-cordatis instructis apices versus floriferis, bracteis coriaceis ovato-cordatis floribus breviter pedicellatis extus fusco-tomentosis intus flavis labello brunneo sepalis oblongis obtusis, petalis angustioribus obovato-oblongis, labello basi columnae apod articulo orbiculari dense tomentoso basi callo magno globoso nitido instructo. Lindl in Journ. Linn. Soc. iii. 51. *E. pulchella* (partim), Hook. f. Fl. Brit. Ind. v. 802 (*plant. Sikkimensis*) et vi. 190.

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 1833 from living plants which were procured from KBW 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 flank of the outer Himalaya, at an elevation of about 5,000 feet.

The Indian species of *Achnanthe* 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 5 pollinia:—all enlarged.

PLATE 34.

NEPHELAPHYLLUM GRANDIFLORUM, Hook. & Thunb.

N. grandiflorum; foliis longe petiolatis ovato-cordatis acuminatis, scapo foliis bipartito-pubescentibus vaginis pallidis cylindricis elongatis, bracteis setaceis brevioribus, racemo laxifloro erecto, floribus 1 poll. diam. virgatis roseo ornatis, sepalis lateralibus lanceolatis acutis, petalis latioribus ellipticis acutis, mento late conico apice rotunato, labello parvo oblongo decurvo, disco 3-carinato, lobis lateralibus brevibus obtusis, terminali ovato obtuso. *Hort. Fl. Brit. Ind.* vi. 192.

JABONG PERAK (C. Scortechini), Kunth.

Stem short, terete, green, rooting. *Leaves* about 2, 4 by 2 in., cordate, with a narrow deep sinus at the base, 7—9-nerve, bright green; *petiole* 3—4 in., terete, green, without a sheathing base, but sheathed with a long membranous deciduous vagina. *Inflorescence* with raceme 10 in., green, finely pubescent, with two long membranous pale sheaths below the middle 1—1 in. long; raceme 2-7-fl.; bracts 1 in., slender; pedicel with ovary 1/2 in. flowers nodding, 1 in. diam, dull green, flushed with red, or the sepals with red margins. *Lateral sepals* ascending, subobovate; *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 specimen hitherto discovered. The drawing is inscribed "Malaya FL 28-4-82 H. B. C., Cull., red, from Kunth, Fl." A drawing by Scortechini represents the specimen as 2-fl.

Fig. 1, flower of the natural size; 2, do. with a lateral sepal removed, *Uth* of the natural size; 3, front view of lip; 4, side view of lip; 5, column; 6, anther; 7 pollinia:—all enlarged.

PLATE 35.

TAINIA LATIFOLIA, Benth.

T. latifolia caule procumbente radicante, foliis elliptico-lanceolatis acuminatis lamina petiolo longiore, scapo cum racemo laxifloro 2-3 pedale, bracteis linearilanceolatis ovatis brevioribus, sepalis 3-nerviis petalisque 5-nerviis linearilanceolatis obtusis flavis

faacn-pniporPD striatis, mento brevi rotundato, labello Dbovato-oblongo aureo, lobis hypo-
 hiliti latifolia antice acutis, disco 3-carinato carinis laterahbus medio incrassatis, epichilio
 C I U * K chiliti semihmerso orbiculari v. obcordato, disco tenuiter 5-nervi, anthera
 parvo sinu ypo
 2-umbonata latifolia f * «*» * mbr, Kew, HILL * FL Brit Ind, V, 82 D et Y I 193,
 Ania latifolia, Si ft. *»»• CFI n. 3741 et Gen. and Sp. Orchid 130. Eria Ania,
 Reichb. f. in Walp. Ann. vi. 270.-Dymbium, Griff. Notul iii. 343, et Ic. PI Asiatic.
 t. 319.

HAB—SIKKIM HIMALAYA, alt. 8,000 ft. [Ic. in Herb. Hort. Calcutta). SILHET, CADHAE,
 and thT KHASIA HILLS, Waiivh, p. UPPER BURMA, Griffith.

Stem prDstrate nr ascending, cylindric, not or hardly pseudobulbous, aa thick as
 osl-quill green, smooth. Leaves solitary, erect, B—12 by 1|—3£ in., 5-nerved,
 a goose-g. j p ^ ^ J g - ^ ^ enclosBd for half its length or more in an appressed
 dftl k green branous' brown sheath. Scape taller than the leaf, purplish, with two long, tubular,
 ^ I / t e l w n sheaths; raceme laxly many-fld.; bracts ±-£ in.; pedicel with ovary |
 aCU B h 2 in rliam • sepals and petals recurved. Anther with 2 dark bosses.
 in.; flowers 3 m-umm., r r

The leaves of Sikkim specimen here iepiDtel ar3 narrower than usual in *T. latifolia*, and
 h b'at recored on the drawing "Temperate oak woods on Sinchal, 8,010 feet above the BB&
 the -a 1 m. AndBrson!" is far above that at which the BpBica had previously been collected—much higher,
 31-8-32, I. — il th n the genus, which is essentially tropical, had been known to attain. As in all orchids
 T d e t mination of ths lamella, keels, crests, &c, of tha disk of the lip is exceedingly diffiult
 --8 -B er . ««» and that here given at figa. 1 and 2 from the Sikkim plant will not stand
 in d r i e i' specimen ^ ^ ih fi 3, which is from a drawing of my own or with Griffith's drawing
 . . l u j r o 1 1 with fig- 3, which is from a drawing of my own, or with Griffith's drawing
 of ths ^ ^ ^ 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: — all vnlargiti.

PLATE 36.

TAINIA CORDIFOLIA, Hwk. l.

T. cordifolia; caule foliifBTO violaceo pseudobulboso, folio ainplo late ovato-cordato
 peti d l D violaceo plureis longiore, scapo unacum racemo multifloro bipedali basi vaginato,
 bracteis ovario brevioribus lineari-lanceolata, sepalis petalisque linearibus acutia viridibus
 rubro-marginatia, mento brevi, labelli aurei lobis lateralibus acutia, epichilio suborbi-
 culari amplo, disco tricarinato, carinia hypochilio continua epichilio ultra mediam
 evanescentibua, anthera 2-umbonata. Hook. l. FL Brit. Ind. vi. 193.

JJ A B B — SIKKIM HIMALAYA (JF. in Herb. Hort. Calcutta). BHOTAN VC. 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 Bheath. Leaf about 12 by
 4^ in., 7-nerved, base obliquely cordate, sinus open; petiole 2\ in., very stout, violet-
 blue. Scape stout, base enclosed in long membranous brown sheaths, green; raceme
 8—10 in., very many-fld.; bracts and short pedicels reddish; floWBrS \ in. diuni.
 Sepals and petals spreading.

the trunks of trees. *Pseudobulbs* 3\ inches long by 1—1± i_{nc}hpa A\am 1
 many longitudinal furrows. *Scape* inserted on the rhizome near the base of a Pseud'ol lb
 6 inches long, striate, erecto-patent, clothed throughout with coriaceous sheaths, the T^wer
 of which are very short and closely imbricate, the upper laxer, an inch W, Lbu W
 with obtuse mouths. *Raceme* 4 inches long, ascending, B fld • r<<^A 1 J
 a I x • -J • -u i i xacni3 slender; sub-
 flexuous; bracts ngii, one inch long, Blongate-cymbiform, subacute, rather 1
 than the ovary; pedicel slender; flowers pure white except the five yello^ N r r T x
 ridges Dn the lip, which extend from the base to halfway down the termi ?*J, Ono
Sepals 1 inch long and petala pure white, lateral lanceolate acuminate, dorsal* ellfi?
 acute; petals as long, oblanceolate, acute. *Zip* with obtuse ahort side-lobta and an b
 cular apiculate midlube. *Column* truncate at the top. OT *

Though in most characters a member of a section of *Eucxlogyniv* which flr.™ s from
 developed pseudobulb, and of which the scapea are dothsd with imbricating shthl, if would "if ""
 drawing i. to be d.pended upon, differ W all thosB known to mB in th . . .
 directly from thB rhizomB, and neither from the base or apex of an otd 1 B " " A BprinK in?
 this a, it may, 0. *Kin9n* i, a v.ry different sPBdIBS from any Indian one L w T T, me. Be
 allies are 0. *Maingayi*, Hook f., and ths foUowiEg 0. *hngibracteata*. P S B U d . bulb . Be
 ^neat

The drawing here reproduced is inscribed "P_Brak, Kunstter, fld. in H. B. D. 21 <? <<> t.
 is drawn from a dried Up, by Miss Smith at Kew. Jim5. ^ Fig- 4

Fig. 1, flower; 2, the same with the sepals Bni petula dBtachBi, and H_p remov^ • q 1 J,
 anther; 7, p^llmia:-all of the natural site. P remoTel; 3» "lumn and l,p; 4, lip, 5 tmJ ^

PLATE 39.

DIELOGYNE LDNGIBRADTEATA, Hook. f.

0. *lonffibracteata*; rhizomate elongato erecto?, pseudobulbis ovoideis sulcatis, foliis
 petiolatis elongato-lanceolatis acuminatis 3-nerviis, scapo Bl^{ga} to . ^ to erecto-patente
 paucifloro fere ad apicem vaginato, yagina basi paucis brBvibus caeteris valde elongatis
 tubulosis, suprema racemum fohaue 2-emittente racpmr, H*^ *
 2 1/2 - 3 pollicaribus lineari-lanceolatis acuminatis s^ t H <tricto erecto, bmcteis longiflisma
 sepalis lanceolatis acuminatis, petalis linTri-oblanceolatis acutis, fionBUS A 2 X J r f l u a d u . ,
 bus brevibus rotundatis, terminali orbiculi,ri, disco cristis 5 aureis medio evanidis
 percurso.

HAB.—PEKAK, Kunstler.

Rhizome rather stout; probably erect or inclined against the trunks of trees. *Pseudo-*
bulbs pale-green,
 green sheaths, £ ^ J Z ^ T ^ t T t ^ ^ ^ ^ part with
 tubular; a pair of emt y o M K U a T e a ' r o n g e r , h r t t h e < < = < < t - T b r y l r a g a n d
 fr-M th_B upp_{eraiMt} sh.atl; TM [B T B 3 in * s t r i r a C o l n B , I m m , U d B ^ * t h B " < < -
 SWBT, rtriatB, concaTB, at hu^th defWrf- !! ^ - i p e ; - ^ 3 ~ s _ a d - ; bracts v o r y l o n g ,
 d f l B < d , w h i t , f r a g r a n t . f l j s l a r i a t ' " T * B f T M 7 ! >>> d o 0 U r n d i . • * >>> ^
 the base; lobes of the lip as ft. l i j l z l 1 ^ W i l e ; - < < J * >> P < < >> . ; - U p
 with the middle of the middle. K > 1 4 >> - e i t s | B d r i d g e s r u m m i f f r T M ,

PLATE 41.

CCELGDYNE (*Eucalogyne*) OVALIS, Lindl

C. ovalis V. rhizomate repente ramoso vaginato, pseudobulbis oblongis obtusis, foliis
 C. ovalis V. rhizomate repente ramoso vaginato, pseudobulbis oblongis obtusis, foliis
 f. fr. mag. a. spath. cada. sep. lateralibus ovato-lanceolatis acuti.
 1—c. J. lioro, petalis augustissime linearibus filiformibusve, labello
 pallide fimbriato et pseudo-laxe longe fimbriato et piloso, lobis hta-
 fl. subacutis, terminali late ovato, disco lamellis 2 nemque validis
 raliob. 1838 MOe. 91 ri ibL Or, 12; Wapf. Ann. vi. 232.
 percurso. 1838 MOe. 91 ri ibL Or, 12; Wapf. Ann. vi. 232.
 Fl. Hook. f. J. p. 291. L. i. ? C. pilosissima, P. awcft. Hvt. Donat. 104. Brouglitonia
 Unearis, Wall. mss.

TEMPERATE HIMALAYA; from Kumaon eastwards, alt. 4—7,100 ft. KHASIA
 HILLS, alt. 4,000 ft MUNNIPDRE (a large leaved var.), alt. 4,000 ft., Vhrhe.

as a goose-quill or less, closely annulate. Pseudobulbs 2—3 in., flattened,
 with a laxe ovate brown basal sheath. Leaves 3-4 in., hardly petioled. Scape 1—2 in.
 usually 1-fl.; bracts elongate, acuminate, coriaceous; pedicel with ovary,
 variable in size. Sepals 1 in., yellowish-brown, lateral ovate-
 acuminate, dorsal oblong; petals 1-nerved, extremely narrow, strongly recurvately
 usually backwards on each side of the dorsal sepal; lip with a yellow-brown
 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 BIZB, though I have seen no specimen approaching in this respect that
 figured, the drawing of which is inscribed "Sikkim, 4—6,000 ft. October 1876. J. K." But for
 size, this is hardly if at all distinguishable from *P. fimbriata*, Lindl.,—a Khasia species also
 found in China, of which the rhizome is no thicker than a duck's quill, and the pseudobulbs
 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. Jimbrinia*, Lindl., in
 U. Cat. n. 1957. Both species were established by Lindley and described contemporaneously in 1838,
P. fimbriata at Tab. 858 of the Botanical Register, and *C. ovata* in the Miscellanea 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; 9, petals; 4, lip; 5, column; B, anther; 7, pollinia:—all enlarged.

PLATE 42.

CCELLOGINE (*Eucvehjyne*) FLAVIDA, Wall mss.

C. flavida; rhizomate elongate squamis brevibus ovatis acutis atque imbricatis et
 appressis vaginatis, pseudobulbis ovoideis v. oblongo-ovoideis sulcatis, foliis longe petiolatis
 lineari-lanceolatis acuminatis multinerviis, scapo pseudobulbo terminuli gracili foliis

n. MBS' et Gen. and Sp. Orchid 42; Hook. Fl. Brit. Ind., v. 842. Paniaea uniflora, Lindl. Fol. Urckid. Panisea 2; Walp. Ann. vi. 24 D.—Epidendrum, Pf. j_siat. t. 313 f. 1.

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

Rhizome densely matted, clothed with imbricating distichous ovate scalea. Pseudobulbs 1-2 in., broadly or narrowly bottle-shaped, with dark brown large basal sheath. Leaves 3-8 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 1/4 in. from the tip of the dorsal sepal to that of the lip. Lateral sepal lanceolate, acute, deflexed and recurved; petals suberect; lip spreading from the base of the column, with two ear-shaped lobes toward the base and a large broadly obovate or subpanduriform middle lobe, disk with thickened wings; the wings rather dilated above the middle.

A very doubtful form, differing from its congeners in the column, for which reason it has been referred to Paniaea by Linde. The form of the flower is much more that of Ctenanthe than that of the three orange spots described by Wallich according to Lindl. In the drawing instead of the pseudobulbs are by misprint described as of the British India drawing is inscribed "D. falcata, T. Anders, mss. introd. from Darjeeling & in April 1875, G. King."

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

PLATE 44.

DALANTHE HEBBARDIA, Lindl.

C. hirsuta; elata, rhizomate repente, caule robusto. Racemata, scapo axillari robusto, racemo multifloro lanceolata lanceolata acutis, sepalia oblongis oblongis lanceolata supra medium aurantiacis, labello albo columnis adnatis terminaliter 2-partito linearis-oblonga bipartita duplo y. triplo longiore. Lindl. Fol. Ind. v. 852.

HAB.—SIKKIM- HIMALAYA, alt. 4-5,000 feet. J. n. W. jr.

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-nerved and strongly 6-ribbed on the back. Bracts sheathing, many-fid.; bracts sheathing, many-fid.; flow yellow for ft. upper; sepals yellow; lip broad; lip 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 lip close to the mouth of the spur.

A very handsome plant. The rhizomes are all green, except the lip in a drawing I made of it in Sikkim, and I did not observe this remarkable rhizome, which in plate 44 is represented as stout, horizontal, densely fibrous, and bearing a series of closely set conical 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, utters; 7 and 8, pollinia:—all enlarged.

PLATE 45.

CALANTHE CHLOROLEUCA, *Lindl.*

C. chloroleuca) rhizomate robusto repente, caule robusta foliis subsessilibus immaturis elongatis petiolatis elliptico-lanceolatis, scapo elongato, bracteis parvis persistens, sepalis ovatis lanceolatis petalisque lanceolatis viridi-flavidis, labello columnis adnato albo basi aureo, lobis lateralibus oblongis rotundatisve, terminali late obcordato v. orbiculari 2-lobato, calcaribus cylindraceo sepalis subaequilongis. *Lindl. Fol. Orchid. Calanthe, U Walp. Ann. vi. 920 j Mo/c. f. Fl. Bril. Ind. y. 862. C. galeata, Lindl. I c, Walp. I. c*

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

Rhizome stout, fleshy, creeping, as thick as the little finger, with tuberos 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 about 6 in. long, long-petioled, oblong-lanceolate, strongly nerved. *Stems* 6—1 in. or less, raceme lax-fl. bracts 1 in., ovate-lanceolate, green, not equalling the ovary; pedicels with ovary 1/2 - 1 in. *Sepals* 1 in. long, ovate-lanceolate, yellow-green, sometimes streaked with red; petals 3-nerved, usually more yellow than the sepals, lanceolate; Upper white, yellow towards the base, sidelobes sometimes incumbent on the midlobe; spur straight, green, hardly longer than lateral sepals, glabrous or puberulous. *Capsule* 1/2 in. long.

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

Fig. 1, side, and 2, front view of flower - *sulargii*.

PLATE 4B.

EULDPHIA EXPLANATA, Lindl.

E. explanata; scapo aphylo, bracteis subulatis ovario brevioribus, sepalis obovato-oblongis acutis basi labelli breviter adnatis, petalis latioribus ellipticis acutis 5-nerviis, labello oblongo v. subpanduriformi basi saccato apice truncato emarginato v. 2-lobato carinis 3 crassis carunculatis percursis. Lindl. Gen. and Sp. Orchid. 18D. H₇₀.k. f. wi Brit. Ind. vi. 3 et in Hook. Ic. Plant. t. 1882. Dipodium suariosum, Herb. Ham.

HAB.—NEPAL; at Maghela, in the Morung, Hamilton. N.-W. INDIA, Falconer *ilc* in Herb. Hvt. Calcutta).

Leaves not fully developed at flowering time, afterwards 4—5 in. long, ovate-acuminate, plicate. Scape 4-8 in., rather stout, 4-1 D-fl., sheathed at the base 1/2 in., appressed to the pedicel, which with the ovary is about 1/2 in. and several flowers nearly 1 in. diam. Sepals and petals widely spreading or removed to a purplish-brown with a broad pale central band and base; lip as long as the part or hypophyl with a conical obtuse sac and short widely spreading, golden yellow with the sides transversely barred with short recurved red serves. Column short, stout. Pylina globose, strap short, filaments orbicular.

A very interesting plant, only known for many years by a Himalayan name, *E. explanata*, here it is unknown to me. On examining the Dreher's of Buchanan-Hamilton's Herbarium, now at Edinburgh Botanic Garden, and kindly lent to me when preparing the Orchidæ for the Flora of British India, I found a specimen of a *Eubphia* so precisely the counterpart of that in Lindley's Herbarium, I doubt that (as in a good many other cases) Lindley's, habitat was figured in the "Icones Plantarum" (WB2) as a Nepal plant, and I subsequently reproduced of the same specimen in the Dahutta Herbarium collection, the habitat, and enables me to give the colour of the flowers as a subdistant, much confirmed Nepal *E. bracteosa*, Lindl. (including *E. p. r.*, Lindl.), a native, of the Himalayas, and to which Lindley has also assigned the erroneous habitat of Ceylon. The short bracts, the sepals not rounded at the tip, and in the petals and label. The Calcutta drawing here reproduced bears the inscription "Pania N. 1. it. i. obovato-oblongis, a much larger specimen than Hamilton's." (uncertain).

Fig. 1, flower with the sepals and petals detached; 2, anthers 3 and 4, pollinia—H₇₀.k. f. wi.

PLATES 47, 48, 49, 5D.

EULDPHIA (*Vrytypera*) KUDA, Zwerft

E. nuday elata, robusta, rhizomate tuberoso perianthii f. 1 tub. auciv. n. v. apicibus recurva, sepalia lineari-oblonga, ovata, brevioribus, obtusioribus, labello erecto conico incurvo obtuso v. subtruncato, lobis lateralibus dato v. latis spatulato retuso v. breviter bino dato nervis crenulatis plus minusve cristato, anthera 3-loba, pollinibus oblongis divaricatis caudicula S'andula transversa. Lindl. in

*Wall. Vat. n. 7371 et Gun. and Sp. Orchid 1BD; Hook. f. FL BriL Ind. vi. 6. E. fusca, Blume Orchid. Archip. 2nd. 182 in nota. E. tricolor, Dah. in Hook. Kew Journ. BoL iii. (1357) 343; Date, and Gibs. Bomb. FL 254. Dyrtopera fusca, Wight Ic. t. 1B9D; LindL in. Journ. Linn. *SW. iii- 31; Thwaites Mum. PL Zeyl. 429. C. plicata, LindL in. Wall Cat. n. 7362 et Sen. and Sp. Orchid, 29D. D. nuda, Beichb. / in Flora, 1872, 374. O. Grardoeri, Thwaites L c 31)2. C. mysorensia, LindL in Journ. Linn. Sou. iii. 32. C. laxiflora, Gardn. mss.. Dipodium Roniayte and plicatum, Herb. Ham.—? Hheede Hort MaL xii. t 2B.*

HAB.—TKOPICAL HIMALAYA, from Nepal eastwards. ASSAM, MUNNIPORE, PEGU, TENASBERIM, and UPPER BURMA; the DECCAN PENINSULA, from the Duncan southwards; CEYLON, in the Central Province.

Tuber large, often 3 in. diameter, marked with transversB ridges, which bear the red fibrous remains of old leaf-sheaths; roots large long, vermiform, from all parts of the tubers. *Lcafing-stem* 3—15 in. sheathed and ridged, bearing several lanceolate acuminate plicate leaves 4—B in. long or more, not fully developed till after flowering. *Flowering stem* or scape leafless, 2—3 ft. high, as thick as a goose's or swan's quill, sheathed towards the base. *Raceme* loosely B—ID-fld., erect; bracts variable in length, short in var. *macrantha*; pedicel with ovary ascending, f—1 in. long.* *Flowers* 1—1| in. long, curved; lateral sepala inserted on the sac of -tha lip, which is rather shorter than the sepals, and like them ascending Dr erect at the base with a broad esplanate recurved epichile.

When studying the DrchideEB from tho Flora of British India, I had Bxamijied a. great many specimens of this noble epeciBS under different names from various parts of India, without being abb 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 Drohidse). 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 Eubphias which not only uome under the definition of *E. mtda*, 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 havB therefore considered it best to reproduce the most divergent forms that arB represented in the aforesaid collection, and leave it tD more Bxtendei observation to discover whether any or all of them should rank as species. They are—

PLATE 47. This appears to me to agree most closely with Lindlsy's *R nuda* from NBpal; it is of msdium size, with green sBpals and petals suffused with dull purplB towards their bases, as is the sac of the lip, which jthe lip) is not longer than the SBpals. It is inscribed "Darjeeling, May 18B2, T. Anderson] Fid. in H. B. &, April 1875, U. King; introduced from Sikkim."

PLATE 48, var. *macrantha*, is a very tall stout plant, with much shortsr bracts, the pedicel and flowsrs not so erect, the sepals and petals broader, pab greBn; the lip is whitB and much larger than the sepals. It is inscribed "Phajus ? Darjeeling."

PLATE 49, var. *purpurea*, is also a tall plant, with the rnther spreading pedicels of var. *macrantha*, but it has the lngg bracts of the other vars.; the flowers are very largB, the sepals narrow and dull purple, the petals much broader, TDSB pink streaked with darker pink, and thB red-purple lip ia hardly longer'then ths sepals. It is inscribed "Sikkim No. 3, 1-10-B7 drawn, 18-5-70."

PLATE 5D, var. *Andenoni*, is apparently a smallsr form, but evidently in a young state; the btaets ar, largB, the pBdicBl and ovary upourved as in Plata 47, and flowers nearly erect, the sepals broad of a deep purpls and green, the petals narrow and pinkish purple as is the lip which is nofc longer than the sspals. It is inscribed "Dyrtopera purpursa, T. Anders., mss. var., drawing m_ad₉ f_rom wild specimen, Darjeeling-, May 1852.-fld. in H. B. D. May 1BB7 from Darjeeling-T, A." Pliably plub 50 represents the "fld. H. B. D. May 1867."

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

PLATE 47. Fig. 1, Ovary column; 2 and 3, anther; 4 and 6, pollinia.—all 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; 3, lateral sepal; 4, anther; 5, pollinia:—all enlarged.

PLATE 50. Fig. 1, ovary column and lip; 2, 3, and 4, anther; 6, B, pollinia:—all enlarged.

PLATE 51.

EULOPHIA [Uyrtopera] MADRDBULBON, Hook.

E. macrobulbon; robusta, rhizomate crasso tuberoso, scapo bracteia paucis vacnis instructo, racemose dense multiflora, bracteis filiformibus ovaria sub-erectis, perianthii segmentis erectis, sepalis lineari-oblonga acutis ricta luride purpurea, petalis brevioribus pallidioribus ellipticis obtusis v. subacutis multinerviis, labelli concoloris hypochilio Brecto oblongo in saccum conicum basi producto, lobis lateralibus brevibus, epichilio brevi ovato-rotundato recurvo, disc 3-nervi nervia basi increasata intermedia apicem versus crasato. *Book. f. Fl. Brit. Ind. vi. 7. Uyrtopera macrobulbon, Parish and Eichb. f. in Trans. Linn. Soc xxx. 144.*

HAB.—SIKKIM HIMALAYA VC in *Serb. Calcutta*. TENASSERIM; at Moulmein, *Parish*.

Tuber apparently about the size of a small potato. Leaf-stem as thick as the knidila finger, with basal sheath. Leaves 8-12 in. long, bipinnate, ovate, apiculate above with dull purple and strongly plaited, dull pale purple beneath green nerve. *Scape* 1 in. long, as thick as the leaf, more or less purple; basal sheath loose; raceme a span to a foot, joints erect; bracts 1 in. long and slender pedicel and sepals dull violet purple. *Sepals*—in long; tips not recurved. *Petals* paler, shorter. *Lip* shorter than the aepals' anther depressed, umbonate; pollinia gibbous, caudicle short; gW orbicular.

E. macrobulbon differs a good deal from most or all the hitherto described. The *Herb. TM* materials from which it would appear to present some differences from that described in the *Bot. Beechey* are probably three distinct thinned specimens, the first of which is inscribed "Eulophia W, Wall.," probably intended for *E. macrobulbon*, which is the original *Lindl.*

Fig. 1, flower; 2, side view; 3, tip of flower; 4, flower and bract, displayed; B, ovary column; B, anther; 7 pollinia:—all enlarged.

PLATE 52.

EULOPHIA [Uyrtopera] ANDAMANENSIS, Reichb. l.

E. andamanensis j caule robusto basi tuberoso, f. Hi_a maturis v. lanceolatis, bracteis paucis lanceolatis inshuoto, racemo laxo, brevioribus, floribus patentibus, perianthio explanato virescente, sepalis lineari-lanceolatis acutis v. acuminatis patentibus recurvis, lateralibus petalisque linearibus lanceolatis acutis v. acuminatis patentibus recurvis, dorsali erecto, labelli

hypochilio brevi 2-auriculato bass in cornu brsvem incurvum proiucto, epichilio late unguiculato orbiculari marginibus crispatis viriibua, disci albi nervis 3 in hypochilio incrassatis, nervulis Bpichilii divaricatis ramosis. *Eichb. f. in Flora*, 1872, 27 B; *Hook. f. Fl. Brit. Ind.* vi. 8.

HAB. TENASSEKIM ; 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 morB long, dark green, paler beneath. *Scape* 1—2 feet, rather slender, green. *Raceme* short; flowers spreading, 1—H in. ^{ii am} - 5 bracts, sepals petals and ovary green. *Sepals* $\frac{a}{3}$ m 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, caudicla quadrate.

Herbarium specimens rBsembb a good deal *E. virem*, from which this differs in the very distinct prolongation of the foot of the Bolumn, and which brings it into the group *Vyrtopera*.

ThB drawing is inscribe! "Eulophia sp., introduced from the Andamans by Mr. Kurz. in 1855; fld. 1857."

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

PLATE 53.

LUIBIA GRDVESII, *Hook. f.*

L. Grovesii, caula gracile ebngato ramoso lreve, foliis B—12 pollicaribus crassitie pennaee corvine teretibus obtusis, spicis brevibus paucifloris bracteis infundibularibus brunneis vaginatis, floribua 1 in. diam., sepalis subsiualibus ovato-oblongis subacutis (petalisiue) primulinis, dorsali erecto, lateralibus cymbifonnibus labello fere suppositis, petaUs anguste linearibus sepalis duplo v. triplo longioribus patenti-decurvis, labelli hypochilio quadrato piano atrD-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 thB saniB thickness (of a crow-quill), internodes 1 in. *Spikes* arising halfway between the interaodes, about \ in. long; bracts imbricating obliquely, truncate, dark brown. *Flowers* appearing onB at a time, flower-buds globose green. *Lip* rather longer than the sepals, probably variable in colour, the epichil being pa¹B purple with darker margins in one drawing and greenish yellow in another. *Uolumn* trianqular, fleshy; anther subquadrate, retuse at ths top, quite smooth; pollinia ovoid, seatBd on very short broad caudicle with a narrow gland.

I have SBBn only one specimen, without loDality, from thB Calcutta Herbarium, and two drawings, of which the one here reproduced is inscribed " *Vymhidium longipdalum*, 18th April IB61." The other beara the habitat and collector's name given above.

Fig. 1, flowBf; 3, mry. Up and column; 3, 4 ud 7, pollioi, --all enlargf.

PLATE 54.

TEIDHDGLDTTIS DAWSDNIANA, *Reichh. f.*

T. Dawsoniana; caulis robusto scandente superne foliis ovatis, foliis patulis loriformibus bilobis lobis rotundatis crassis coriaceis melius profunde canaliculatis, scapo axillari valido erecto laxo paniculato ramoso vaginis paucis brevibus truncatis instructo, paniculae ramis erectis patentibus basi bracteatis laxifloris, bracteis pedicellis multo brevioribus late ovatis appressis brunneis, floribus 1—\ pollinibus, diam., sepalis petalisque patentibus viridibus acuminatis fusco-rubro vitato-maculatis spatulato-oblongatis, petalis paulo latioribus, labello sepalis dimidio brevioribus aureo maculato basi saccate disco piloso, hypochilio utrinque bibrachiato brachiis consimilibus lineari-oblongis apice rotundatis, epichilio lineari apice dilatato 2-lobato, columna vertice 2-cornuta cornubus apice penicillatis. *Reichh. f. in Gard. Ohron.* 1872, 699; *Hook. f. Fl. Brit. Ind.* vi. 43. *Daleisotoma Dawsoniana*, *Reichh. f. L. c.* 1888, 815.

H.A.B.—TENASSEEIM; at Moulin en, *Parish.*

Stem as thick as thumb little finger, somewhat compressed, green, rooting below the leaves. *Leaves* 3—3 by 1—1 in., bright green, smooth, deeply channelled, sides convex. *Scapes* 1—1 in., as thick as a swan's quill, green; sheaths 1 in. long, white; panicle 18 in. long, stiff, branches distant, spreading, 1—1 ft. long; bracts at the bases of the branches 1 in., of the flower 1 in.; pedicels with ovary $\frac{1}{2}$ — $\frac{1}{3}$ in. *Lateral sepals* and *petals* widely spreading, subfalcate. *Horns of column* suberect, cylindrical, 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 *Triohoghtis*, I think that Bentham erred in suppressing this genus in the Genera Plantarum, and that taking Blume's *T. retusa* (Bijdr. 3BD, Tabelln 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. Zurz's *T. quadricornuta* from the Nicobar Isds., judging from his figure and description, generally well accorded with *T. retusa* and *T. Dawsoniana*, as does *T. fawiata*, of Manila, 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 in present Bd 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 presented in the drawing which is inscribed "Eenanthera from Moulmein, 12-5-7D," (the date no doubt of its flowering in the Botanical Garden).

Fig. 1, flower; Z, the KUDU with the sepals and petals displaced and lip removed. 3 in. diam. (all enlarged).

PLATE 55.

STAURDPSIB UNDULATDS, *Benth. mss.*

S. undulata caule flexuoso ecapoque creberrime verruculosis foliis loriformibus apice 2-lobis, lobis rotundatis sinu basi cuspidato, scapo bracteato vaginis paucis ovatis instructo, racemo terminali paucifloro, bracteis ovato-lanceolatis pedicellis brevioribus floribus albis v. roseo suffusis, aepalia petalisque sub-consimilibus oblongato-spathulatis acutis undulatis, labello sepalis multo brevioribus prae-nulino v. albo-roseo striato, hypochilio orbiculari basi saccato columna adnata, lobis 2 rotundatis incurvis penicillatis luvivis, capitulo angusto a

latere compresso linguiforme apice truncato v. retuso, disco 3-carinato. *Hook. f. Fl. Brit. Ind. vi. 27.* *Vanda undulata*, *Lindl. in Journ. Linn. Soc. iii. 42*; *Reichb. f. in Gard. Chron.*, ii, 212 et 1878, i. IBS.

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

Stem B—10 in. long, flexuous, as thick as a goose-quill, pale greenish, studded with small warts, as on the petioles and rachis of the raceme and bracts. *Leaves* 3—4 by 1—1½ in. recurved, dark green, terminal lobes unequal, sides convex. *Peduncle* B—8 in., striate, virid bright green, as thick as a crow-quill; sheaths ovate, obtuse; raceme B 4—8-fl.; bracts 1—1½ 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* VBry 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 *Stauroopsis*, though it bears little resemblance to its eizantic goliard flowered congener, *S. gigantea*. From *Vanda* it differs in the base of the lip being adnate to the sides of the column, but it resembles in habit *V. caruiscens*. From *Phaenopsis* it differs in the lip being adnate to the sides of the column, and in wanting a forked appendage on the disk of the lip. Lastly, should the lip prove to be jointed at the base and mobile, which I cannot determine on the dried specimens, it may better be placed in *Arachnanthe*. The wanted stems, SO, HXB character of this species amongst the allied *Vandete* known to me.

It will be observed that there is great discrepancy in the accompanying plates between the form of the lip 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 flowery parts, too, may admit of correction. The drawing is inscribed "Renanthera; *Vanda Jerdoni*, Darjeeling, 3rd June 1862, on trees 7,000 ft., T. Anders."

Fig. 1, flower; 2, column and lip; 3, pollinia:—a« enlarged.

PLATE 5B.

PHALENDOPSIS 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 flavidiis rufo-brunneo pallide maculatis, labello breviter unguiculato, hypochilii lobis lateralibus oblongis falcatis truncatis appendicula furcata interposita, epichilio panduriformi lobis terminalibus elongatis recurva carunculatis serrulatis. *Reichb. f. in Gard. Chron. 1871, 902 et 1873, 5D3*; *Eolfe I. c. 1886, ii. 27B*; *Hook. f. Fl. Brit. Ind. vi. 3D*.

ASSAM, *Mann*. SIKHIM HIMALAYA, Kungbes Valley [*Re. in Hort. Calc.*]

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 1—1½ in.; flowers few or many; 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 aubhemispheric; pollinia pyriform; strap large, spatulate; gland small, forked.

I have seen no Sikkim specimens, but I think there is no doubt that the drawing is intended for *P. Jtfannii*, 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. Ovrnu-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 hypochil 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 "Phalibnopsis, sp. *P. Mannii*, Reichb. f. Eungbee Valley, 1858, 18-3-7D."

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

PLATE 57.

PHALAENDPBIS TETRASPIS, Reichb. f.

P. tdraspis) subcaulis, foliis obovatis v. cuneato-obovatis striatis, scapo valiflo simplice v. ramoso ascendente v. erecto, vagina paucia brevibus, sepalia elliptico-ovatis petalis^ue angustioribus obtusis dilute virescentibus, labello albo breviter unguiculato, hypochilii lobis lateralibus oblongis falcatis truncatis appendicula 2 furcata interposita, epichilio carnoso oblongo lateraliter compresso apicem versus tumidum superne villosulo. *Reichb. f. Xen. Orchid*, ii. 14B et in *Sard. Uron.*, 1881, ii. 5B2, B55; *Rolf's I c.* 18BB, ii- 277; ffw*. *FL Brit. Ind.* vi. 3D, P. Barrii, King mss.

HAB.—CHITTAGONG, Lister (ID. in Herb. Calcutta). ANDAMAN ISDS., Berkeley. DISTRIBUTION.—SUMATRA.

Leaves 12 by 2—4 in., bright green, subcutis. Scape described as tall and branched, but simple in the plant here figured, terete, green, few-flowered. Bracts very short broad and acute, green; pedicel with ovary $1\frac{1}{2}$ in., slender; flower 2 in. diam. Lateral processes of the hypochil 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 Keichenbauh, and the accompanying drawing. As a species it is closely allied to *P. sperivsa*, Eeiohb. f. of the Andaman Isds., which has white or rosy flowers with darker blotches, toothed lateral lobes of the hypochil, and a dilated mallet-like tip of the epichil; its flowers vary much in colour, and *P. Mrwji** may prove to be a form of it.

The drawing is inscribed "77—119 *P. tetraspis*, B. f., from Andaman Isds., Ban.; from Dhittagong, Mr. Lister; fld. H. B. D. April 1875 and 1877, U. E. Dg.»

Fig. 1, flower with sepals and petals displaced; 2, lip; 3, front view, anther; 4 and 5, sides of column; 5, anther and pollinia; 7, strap and gland of pollinia; 8, pollinia:—all enlarged.

PLATE 58.

PHALENDPSIS KUNSTLEUI, Hook. f.

P. Kunstleri) subcaulis, foliis obovatis oblanceolatis elliptico-lanceolatis acutis, scapo foliato apice paucifloro, bracteis parvis, sepalia obovatis lateralibus apiculatis petalis^ue paulo minibus apice rotundatis soribus flavis infra medium sanguineo pictis,

labello parvo breviter unguiculato, hypochilii lobis late cuneatis falcatis truncatis rubro-striatis callo Z-lobo et appendicula furcata parva interposita, epichilio albo DbovatD apica rotundato carioia 7 crassis rubris percurso. *Soolc. l. FL Brit. Ind. vi. 30.*

HAB.—PERAK.—*Kunstler* (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 \wedge in., flower 1—1 $\frac{1}{4}$ in. diam. *Volumn* short; pollinia subglabrose; strap cuneately obovate; gland quadrate.

I have seen Only driBi flowers kindly sent me by Dr. King, and the drawing in thB Calcutta Herbarium here produced, which latter is inscribed "Perak. Kunstler; in H. B. Dab., Fid., ID-5-84^{ff}

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

PLATE 59.

DORITIS WIGHTII, *Benth.*

D. Wightii \ subacaulis, f oliia oblanceolata 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 instructis. *Benth. in Gen. Plant, iii. 574- Book l. Fl Brit Ind. vi. 32. PhaltenDpsis Wig-htii, Keichb f. in Bot ZeiL 18B2, 214[#] jEriies latifolium, Thwaites Enum. PL Zeyl 43D.*

HAB.—SIKKIM HIMALAYA (ib. in *Hort. OakuL*); BHOTAN, *Lister*; UHITTAGDNG, *Groves-BURMA*, at Mougong, *Griffith*; Moulmein, *Parish*] The Circars, *Hegne*; MALABAR, *Wight*; CEYLON, *Thwaites*.

Leaves few, 3—8 by 1 $\frac{1}{2}$ —2 $\frac{1}{2}$ 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 \ in. diam. *Mentum* short, conical.

This is one of thB very few Indian epiphytic orchids that has a wiiB range in disirih f from Sikkim and Burma to Ceylon; and it would bB interesting to know how far ^{of v. ri in} colour in different localities. The gBnus *Doritis* differs from *Phalwnopi* in the conical Dr ^{It spur-...e} mentum of the lip, but this vanBS a good danl in length, being shortest in *D. Wightii*, and ^{ma- % *} not prove to bB a reliable character.

The drawing of *D. Wightii* is inscribed ^{IC} Phalsenopsis from tha Dhittagong Hill Tracts, sent b Mr. Barton-Groves, April 1888, G. King. Fl. in H. B. D. June 1868. Fig. by B. Bas." *

Fig. 1, flower, with a, lateral sepal and petal displaced; 2, front and 3 aide view of flower; 4, fb_{wBr} w d h petals and sepals displaced and lip removed; 5 and B, lip; 7, sidelobe of lip; 8_f pollinium.—all but fig. g * $\frac{1}{2}$ the natural size.

PLATE 63.

DENDRITIS BRACEANA, Hook. /-

D. Bracetana subacaulis, foliis lineari-oblongis obtusis v. subacutis coriaceis, fl. erectis crassis viridibus rubro-punctatis 8—10 floris, bractea 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 spatulato-obovato apice rotundato, mentum elongatum calcitriforme. Hook. l. *FL Brit. Ind.* vi. 196.

HAB.—SIKKIM OR BHOTAN-HIMALAYA, Gamble.

Stems 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 ½ 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 1½ 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 lobes. *Column* large, stout, fleshy; pollinia 4 (2 bipartite?) subglobose.

A very singular species from its very stout habit, lurid green foliage, and in the raceme and its many-flowered raceme very unlike its congeners known to me, but with the flower quite that of *D. iaenialis* 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 were bred in the Calcutta Botanic Garden, and which were brought to Mr. Gamble at Darjeeling by a Bhootea 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 51.

SAKDOCHILUS [*Pteroseras*] MURIDULATUS, Hook. /.

S. muriculatus; acaulis v. caule brevi, folia latius oblongis v. briformibus 2-fidis flaccidis medio caaliculatis, scapo foliis brevioribus rachique viscidis, sepalia petalisque late ovatis subacutis primulinia v. albis vittis 2 transversis purpureis v. roseis notatis, sepalis lateralibus basi labelli v. pediculi columnae adnatis, labello saecato, sacco conico, lobis lateralibus bractea late ovatis v. quadricatis apicibus sinuato-lobulatis intermedio minuto truncato v. bifido pubescente, columna longiuscula, rostello brevi acuto. *Brichb. f. in Gard. Chron.* 1881, p. 198; *Hook. f. FL Brit. Ind.* yi. 34.

HAB.—ANDAMAN ISLANDS, Kurz, Berkeley.

Stem sometimes 8 in. long, rooting below. *Leaves* 6—9 by 1—1½ in., 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 1 in. diam., sweet-scented. *Lip* about as long as the sepals, variable

in the SIZB 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 Kura' and KeichBnbaeh's description and my analysis of Brans 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 this 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. Braoe's direction 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 sepal, » postJ, 1P «"* column; 2, lip limp erect (?) from a dried flower; 3, column; 4, anther; 5, pollinia:—all enlarged.

PLATE B2.

SAKCODHILUS [*Pterooeras*] BTENOGLDTTIS, *Book. f.*

S. stenoglottw; caule brevi robusto, foliis elongatis late loriformibus decurvia 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. *Hwk l. Fl. Brit. Ind. vi. 34.*

JJ_{ABJ}—PEKAK? *ScorUchini*. DISTKIB. Sumatra.

Stem 1—2 in., as thick as the thumb. *Leaves* many, apparently flaccid, 6—12 by 1—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-fid, raceme $\frac{1}{2}$ —1 in., rather thickened [or flattened?] subserrate from the persistent bracts (as in sect. *Fornimria*); pedicels with ovary $\frac{1}{2}$ in., slender. *Flowers* about $\frac{1}{2}$ in. diam., whitish 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 *Surcochili* 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 "Malays, Kunatler Fid. in H. B. D. 4-8-83. Sumatra Orchid." The analyses were made by myself from detached flowers in a pocket attached to the drawing.

Fig. 1, dorsal, and 2, lateral sepals; 3, petiole; 4, side view of column and lip; 5, front view of lip; 6, anther; 7, polliniam:—all enlarged.

PLATE 63.

SARDDCHILUS (*Uroceras*) BRACHY GLOTTIS, *Hook f.*

S. brachyglottis) caule brevi, foliis decurvis elongato-deolatis 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 truncate obtuso 2-lobo, lobo superioris apicem labelli efficiens inferioris in saccum v. calcar producto, columna brevi crassa, rostello erecto. *Hook f. FL Brit Ind. vi. 34.*

HAB.—PERAK, *King's Collector.*

Stem rather slender. *Leaves* not crowded, 4—8 by 1—1½ in., contracted at the base almost into a petiole. *Scapes* 1 in., rather stout, green; bracts minute, 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. It was made from a specimen sent by Xunstler to the Dalouita 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.

SAEDDDHILUS AUREUS, *Hook. f.*

S. aureus) caule brevi robusto superne folioso, foliis patentibus hneari-oblongis v. loriformibus crassis coriacea 2-fidis, pedunculis plurimis infra-foliaceis folia brevioribus robustis paucifloris, floribus magnis aureis, sepalia basi columnae insertis oblongo-lanceolatis acuminatis petalis angustioribus conniventibus, labello parvo a latere compresso unguiculato, ungue stipitifforme striata apicem versus carunculata, hypochilii crassiusculis lobis lateralibus erectis cuneato-falcatis obovatisve, disco carunculato 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 1-3 in., keeled, rigid, 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 in. *Sepals* 1 in., concave; petals nearly as long or

shorter, flat. Lip f as long as the sepals, with the claw nearly as long as the
and about as long as the side arms, margined with red, perforated as it were from
insertion of the claw to the globose sac or spur, above which is the short
midlobe or epichil. Column short, rostellum very short, acute; anther very
beaked; pollinia globose; strap subspathulate, gland narrow.

There are several drawings of this beautiful species in the Calcutta collection,
that had flowered in the Koyal Garden. But none are satisfactory as to the
especially. I have seen no specimens except some detached flowers in a pocket
here reproduced; as to which it is difficult to wholly reconcile their lips with,
I think the latter are in the main accurate. The fact is that the distortion of
great that I think it better to withhold any further attempt at comparing- it
further than to observe that in Fig. 2 the circular markings at the top of the
and the terminal globose body, the spur, over which rises the epichil. The
a plant that flowered in the Calcutta Garden in May 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.

SAECDCHILUS CLADDSTADHYS, Hook. f.

S. vladostachys) caule brevi subrobusta, foliis loriformibus bifidis
peiuunculis 2—3 infrafoliaceis foliis multoties brevioribus clavellatis paucifloris
majusculis albidis, labello purpureo picto, sepalis petalisque aequalibus
acuminatis, labello sepalis brevioribus anastomosis a latere compresso longo uno
stipitiforme, hypochilii lobis lateralibus oblongis obtusis, epichilio brevi
imposito lobis quadratis retusis cal care globoso, V. (si velis epichilio 3-lobis
quadratis intermediis globoso). Hook. f. *FL Brit. Lid.* vi. 35.

HAB.—PERAK (C. Swtechini). MALAYA, Kunsth.

Stem about an inch long, as thick as the little finger. Leaves 6—12 by 1—2
or pendulous pale green, flat, keeled. Peduncles 1—2 in., flexuous, nearly
thickened upward to the obtuse tip; bracts ovate, acute; pedicel with
flowers 1/2 inch diam., not quite white, rather cream-coloured, perianth spreading
widely, the segments narrow, very finely acuminate. Lip about 1/2 shorter than
slightly incurved; claws spotted with purple, as is the spur (or midlobe of the
lobes of the hypochil pale purple. Column rather short, rostellum hardly
acute in front; pollinia globos.

Described from the drawing, but I have seen no specimens. It is evidently a
but is a much more robust plant, with less rigid leaves, much shorter clavellate
nearly white sepals and petals, with very finely acuminate tips. The structure of the
in this the epichil is developed into two erect lobes. The drawing bears the inscription
H. H. Kunsth, Fl. Aug. 1887, flowers lasted only two days. Again May 1888,
days. & King.

Fig. J, flower; 2, the same, with sepals and petals removed; 3, Jip, 4 and 5, anther; 6, DoJlini —
natural size,

PLATE BB.

SAKCDCHILUS BERKLEYI, Reichb. l.

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 minoribus, 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 calcari impositis. *EDDJC. f. m. FU Brit. Irid. vi. 37.* *Thrixpermum Berkleyi, Reichb. l. in Gard. Uhrv. m. 1882, i. 557.*

HAB.—NICOBAR ISDS., Berkeley.

Stem 1—2 in., as thick as a goose-quill. *Leaves* 8—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 56 is a reproduction is inscribed "Sai to BB from the Aniamans fl. H. B. D., 14th Decbr 1885, & King." It is more probably from the Nicobars, whence Colonel Berkeley's sp 3 *Dinens* no doubt came, but it may inhabit both localities.

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

PLATE B7.

SARDDHILUS HIRBUTUA, Huk. f.

S. hirsutus] caule brevi, foliis bratis 2-lobis infra medium a basin an
vazinis brevissimis, pedunculis brevibus cum bracteis floribusque hirsutis fl. wu^{guat} JL[^] ^
I* i A FL. vior JJdn,ous rulis
v. aureis rubro-fasciatis? sepalis lateralibus ovato-oblongis obtusis basi lata colum
pediculis elongatis decurrentibus dorso infra apicem corniculatis petalis
obtusis, labello breviter unguiculato, epichilio in calcar elongato-columnae
producto et basin versus subtus gibbo, lobis lateralibus falcatis acutis apicibus ob-^{ICB}
truncatis et squarulatis, disco inter lobos squamis lanellatis 2 transversis instructo^{qu}
quarum portica lata truncata et dentata inter lobos hypochilii interposita anti-^{ca}
(epichilio?) multo minoribus ipostico antipositaj. *Book. l. Fl. Brit. Ind. vi., 33.*

HAB.—PEEAK, Eunsthr.

Stem short, about. *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
suberect, 4—8 fld; bracts rather large, broadly ovate, green; pedicel with ovary⁶⁸¹¹
flowers subglobose, 1 in. diam. if expanded. *Sepals* apiculated behind the rounded² apex,

and petals many-nervei. *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 point between the lobes of the hypochil is a shorter erect transverse plate, truncate, notched in the middle and toothed, and in front of that is a 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 an attached pocket. ThB analysis of the lip of the latter was most difficult with extreme care, I cannot vouch for its perfect accuracy. The fact is that as usually disposed in orchids, are so deformed and mixed up, as it preceding *Barcochili* that it is very difficult from dried specimens or pronounce on their nature and relations.

Fig. 1, flower with a sepal and a petal removed; 2, dorsal sepal; 3, petal; 4, front and side view of column and anther; 5, anther; 6, pollinia:—all enlarged.

PLATE 68.

VANDA [*Cristata*] PUMILA, Hook. Jm

V. pumila, caulibus brevibus, folia loriformibus recurvis concavis Jobo altero preemort) altero rotundato, pedunculo brevi paucifloro, v. albis, sepalis lateralibus ovatis v. lineari-oblongis acutis incurvis, petalis linearibus acutis, labelli purpurei v. rubro picti, lobis lateralibus rotundatis, terminali late ovato obtuso, calcare conico lobo terminali
V. cristata, var. *Lynchl* *FoL Orchid*, *Vanda pumila* Hook.

HAB.—SIKKIM AND BHPTAN HIMALAYA, alt. 2,050 ft.

Stems 1-2 in., tufted, stout. *Leaves* 3-4 in., pale, bright green. *Peduncle* from the base of the stem, 1-2 in., rather fibrous, with one or two ovate floral bracts similar, 1 in. long; pedicel with ovary 1/4 in. Petals rather shorter. *Lip* shorter than the sepals, rather fleshy; short; pollinia small, globose, strap short, gland large.

A distinct species belonging to the small group with *F. rrmata*. Lindl. and V. It is smaller than either, with the lip of the latter, but furnished with a long conical ones distinguishes it. As with those species, the flowBrse resemble in their incurved the genus *Luwá*, to which indeed Lindley referred *V. alpina*, but their habit is totally different. The form of the flowers is not well given in Plate 59, but is admirably well rendered of the same plant in the Dathcatt collection of Sikkim orchids at KBW, in which the flowers are represented as white and the lip as marked with purple, not the bright red.

The Calcutta drawing is inscribed "Vanda cristata, Lindl., var. *R* Darjeeling, brought from Bhutan, 1897; said to grow at 2,000 ft. Mungpo,

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

PLATE 59.

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

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

HAB.—ASSAM, *Jenkins M. in Herb. Calcutt.*

Stems 6—8 in., as thick as a duck's quill, terete, flexuosa, red-brown, striate, rooting at the base only, probably forming pendulous interrupted 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 $\frac{1}{3}$ — $\frac{1}{2}$ 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 Doolittle Herbarium, executed under Wallich's supervision, 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 *Calecolaria*, 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 *Saccolabium* and after reviewing the *Dymbidie*, I saw no possibility of referring it to any other genus.

The drawing is inscribed in Wallich's handwriting, «*Dymbidium inconspicuum* Wall. P. t. Jenkins, from Lower Assam.»

Fig. 1, flower; 2, the same with the sepals and petals displaced; 3 and 4, anther; fig. 5, pollinia—*all enlarged.*

PLATE 7D.

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

5. *gemmatum*; caule elongato flexuoso folioso, foliis linearibus decurvatis acutiusculis apicibus 2—3 dentatis, racemis elongatis gracilibus paniculatim ramosis multifloris floribus minutis amethystinis v. albis purpureo-pictis subcylindricis ramosae paniculae sessilibus aequantibus parallelis fere clavais, sepalis ovato-oblongis obtusis concavis papillosis, petalis obovatis labellum oblongo v. obovato-oblongo subcymbiforme carnosum crenulato, lobis lateralibus obscuris, calyce sepalis aequilongis cylindrico obtuso. *Lindl. in Bot. Eej.* 1838, *Mm* 50—*Walp. Ann.* vi. 885; *Hook. f. Fl. Brit. Ind.* vi. 55 [*errore gemmatum*].

HAB.—SIKKIM and BHOTAH HIMALAYA, alt. 35,000 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 cylindrical 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 sepals are of a very pale rose purple.

Fig. 1, side view of flower; 2, filix and lip; 3, lip; 4, top of ovary and column; 5 and 6, pollinia.—all enlarged.

PLATE 71.

SACDOLABIUM [*Micranthce*] PENANGIANUM, Hook. f.

S. penangianum; caulibus fasciculatis flexuosis, foliis linearibus v. anguste lineari-lanceolatis 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 comu incurvum compressum acutum longius ultra lobos producto, disco carnosio, 1 lobis lateralibus rotundatis, terminali minuto unguiforme lateralibus appositis. Hook. f. *Fl. Brit. 2nd.* vi. 57 et in Hook. *Icon. Pi. j. m.* 2129 B.

HAB.—PENANG, on the Sonkey river, Curtis. PEEAK, Kunstler (in *Herb. Cahutt*).

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 it were on one side, bright green. *Racemes* with the very short peduncle 1—li fruiting decurved; bracts subulate; flowers subsessile, $\frac{1}{2}$ in. from the dorsal to the tip of the lip, pale yellow or whitish with a few specks of red. *Sepals* very oblique, dorsal obovate-oblong rounded at the tip. *Petals* 1-nerved, 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 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 Kunth which "flowered in the El. Bat. Garden, Calcutta, 14-7-81."

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

PLATE 72.

SADDOLABIUM [*Micranthm*] LANATUM, Hook. f.

S. 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 DbovatD-oblongis, labello basi saccato sepalis paullo longiore lobis latBralibus triangulari-ovatis integris v. unidentatis terminali ovato 2-cuspidato, disco callo pubescente instructis *Huok. f. Fl. Brit. Ind. vi. BO. Dleisostoma lanatum, Lindl. in Juurn. Hort. Soc. iv. 264; Walp. Ann. vi. 8B9.*

HAB.—TENABSEEIM; at Moulmein, *Parish, Scott.*

Stem 1—2 in., as stout as a swan's quill. *Leaves* 3—4 by 1—1½ in., distichous, spreading, dark green, lobes equal rounded, sinus acute. *Peduncle* 3—8 in., flesuous, 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 ¼ 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 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, it appears to me, technically a *Saccolabium*. The woolly peduncle and the large deciduous bracts concealing the flowers are unlike any of its congeners or their allies. I find it in *okiso* to which genus it seems allied in the pubescent fin, encircling the month 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 angular. The drawing here reproduced is inscribed "Burma | Mr. Soott, June 1851."

Fig. 1, flower; 2, side view of the lip and column; 3, dorsal view of the lip and column; 4, petal; 5, anther; 6, pollinia; 7, rostellum; 8, gland; 9, pollinia; 10, pollinia.

PLATE 73.

SACCOLABIUM [*Distichophylla*] *DISTIDHUM*, Lindl.

S. distichum; caulibus elongatis gracilibus pendulis foliosis, foliis inter mediis distichis elliptico-lanceolatis 2—3-cuspidatis, pedunculis brevibus paucifloris foliis brevioribus, floribus flavis subsessilibus, sepalis petalisque subaequalibus obovatis obtusis, labello saccifloro, lobis lateralibus brevissimis rotundatis, terminali semicirculari carnosulo basi callo didymo instructo. Lindl. in Journ. Linn. Soc. Lond. 35; Beichb. f. *Ottia Hamburg* 43; Hook. f. *FL Brit Ind.* vi. 64.

HAB.—SIKKIM HIMALAYA, alt. 6—8,000 ft. KHASIA HILLS, alt. 5,000 ft. MUMBAI, alt. 6—8,000 ft., Watt.

Stems 4—8 in., soft, filiform when dry, rooting here and there, branched at the base and tufted. Leaves above 1 in., sessile, deeply channelled, keeled, bright green speckled with brown. Peduncles rarely as long or longer than the leaves, 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 base of sac rounded, surface perfectly smooth within, without calli or pubescence; bracts short; rostellum short; anther ovate-lanceolate; pollinia globose, at base of strap gland large, oblong. Capsules few in., fusiform.

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

Fig. 1, flower; 2, lip; 3, section of lip; 4, front, and 5, side view of column: from *Bull. Bot. Soc. Lond.* 1877, u. f. 111, u. a. d. enlarged.

PLATE 74.

SACCOLABIUM [*DisUrvhophyllu*] *TENUIDAULE*, Hook. f.

S. tenuicaule] caulibus elongatis gracilibus pendulis foliosis sulcatis foliis distichis linearibus v. elliptico-lanceolatis obtusis, floribus tuberculatis foliis brevioribus, floribus paucisve paucis Mavis, sepalis lateralibus oblique ovatis acutis brevioribus ovatis acutis, labello basi in calcar gibboso-clavatum subincurvum lobis lateralibus breviter ovatis acutis terminali paulo longiore oblongo incurvato truncato 2-cuspidato dente interjecto. Hook. f. *FL Brit. Ind.* vi. 64.

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

Stem 6—8 in., as thick as a crow-quill, simple or branched, rooting at the base green, deeply grooved. Leaves 3—4 in. by 1—2 in., channelled and keeled, bright green. Flowers 1 in. diam., yellow or yellow-green; bracts microscopic; ovary 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 a ring of hairs at the constriction within, but no callus. Column short; rostellum projecting styliform. Anther membranous, almost flat, acuminate; pollinia small, 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 DP 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. D., 16-7-84." The analyses 1—3 are on the drawing; those marked A1 to A4 are by Miss Smith at KBW under my name from Penang specimens.

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

PLATE 75.

SACCOLABIUM (*Speciosae*) TRIDRUM, *Beivhb. f.*

S. trichromum; caule elongate robusto, foliis elongatis lorifonnibus 2-bbis lobia rotundatis, racemia supra-axillaribus folia multoties longioribus breviter pedunculatis multi-SB cundi-floris, floribus alba TDSBO maculatis, sspalis lineari-Dbngis acutis, pstalis latioribus, labello cornuformiB sepalis duplo longiore cylindraco incurvo apice rotundato, lobis lateralibus brevibus rotundatis tBrminali parvo basi ore incluso callo uncinato instructo. *Jtichb. f. in Hamb. Gartemeit, 1859, 51 et Xen. Orchid 119, t. 139; Hook. f. FL Brit. Ind. vi. 65. S. pallsna, Lindl. (non Cathcart), w Journ. Linn. Soc. iii. 35.*

HAB.—SIKHEM HIMALAYA [*C. Cathcart*]. BHDTAN and ASSAM *W. in Herb. Calcutta*).

Stem 3 feet, as thick as a swan's quill, rooting at the base only, cylindrical and clothed with sheaths below, leafy (and flattened?) above; internodes 1 in. Leaves 7-10 by 1-1.5 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 1 in., usually sigmoid, all curving to one side; flowers 2 in. long. Sepals and petals 1/2 in. long, spreading, white or cream-coloured with pink midrib. Lip white or yellowish, spotted or blotched with pink. Column (rather rostratum) small. Anther flat, acute; pollinia globose, strap slender; gland small lanceolate.

A very distinct species of the section which I have called *Specie*, to which belong the well-known *S. ampullaceum* (*Aerides ampullaceum*, Koehne) and *S. murifolium*, Linl. [*S. rubrum*, Linl.], from both of which it is at once distinguished by the small lax-flowered one-sided raceme and curved

The plate is a reproduction of a portion of a full-sized drawing in the Dathcart collection at KBW. 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 *pallens* to Mr. Dathcart, who never attempted to name a plant.

Fig. 1, Bid. 1, 2, back view, and 3, front view of flower; 4, flower with dorsal sepal removed; 5, side view and 7, front view of lip; B. Kp. "«" "pB:—«« of the natural size of the anther, ID, pollinia:—all enlarged.

PLATE 7B.

SARCANTHUS APPENDICULATUS, *Hook. l.*

S. appendiculatus; caulibus elongatis teretibus, foliis elongatis teretibus obtusis, multi-lobis elongatis, racemi 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. *Jivk f. FL Brit. Ind. vi. 67. S. teretifolius. Reichb. f. in Trans. Linn. Sac. xxx. 13 f. [non Lindl.). Aerides appendiculatum, Wall. Vat n. 7215; Lindl. Gen. and Sp. Orchid, 242.*

HAB.—BURMAH; TAVDY, *Wallich*] MOULMEIN, *Griffith, Parish. KHASIA HILLS and ASSAM, Simons [lc. in Herb. Calcutta).*

Stems B—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, 5 — 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 \wedge in. long; flowers f in. diam. *Sepals* and *petals* widely spreading¹, 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 \wedge 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 Khasian 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 segments with section of lip; 4, 5, anther; 5, pollinia: all enlarged.

PLATE 77.

SARDANTHUS SECUNDUS, *Griff.*

S. secundus; caulibus elongatis gracilibus teretibus, foliis elongatis anguste linearibus ensiformibus-lanceolatisve longa acuminatis basin versus angustatis, racemis gracilibus laxifloris foliis multo brevioribus, floribus subsessilibus pallid rufo-flavis, aepalis obovato-oblongis petalisque obtusis, labello crasso caroso conico-infundibulari obtuso, lobis lateralibus identiformibus terminali parvo ovato acuto incurvo, *Griff. Noiul. 3D2 et lc. PL Asial. t. 33b¹; Hook. f. FL Brit Ind. vi. 57. Micropera pallida, Lindl in. Wall cat n. 7321, partim non Gen. and Sp. Orchid).*

HAB.—UPPER ASSAM, *Griffith*; DUPHLA HILLS, *Lister (lc. in Herb. Calcutta)* SYLHET, *Wallich.*

Stem 8—13 in., about as thick as a goose-quill, rooting towards the leafless sheathed base, leafy above. *Leaves* 4—7 by $\backslash\backslash$ in., distichous, spreading and recurved, deeply channelled, 5-nerved, bright green, obscurely retuse on one side at some distance \wedge in.) below the very slender subulate apex. *Racemes* shorter than the leaves, pendulous; bracts minute; pedicel with ovary \wedge in., nearly straight; flowers \backslash 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* —fin. ellipsoid or oblong, ribs not prominent.

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

The drawing here reproduced is inscribed "Sarcophyllum, Wall." in Wallich's handwriting; to which is added "Duple Hills, Mr. Lister, fld. June 1875."

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

PLATE 78,

SARDANTHUS INSEDTIFER, Reichb. f.

S. insctifer) caule robusto compresso elongato radicante folioso, foliis brevibus diatichis oblongis 2-lobis crassis dracenicis amplexicaulis, spicis subsessilibus brevibus paucifloris aequalibus late oblongis petalisque obovato-oblongis obtusis patentibus rubro striatis, labello calcaribus brevis conico-infundibulari, lobis lateralibus brevissimis rotundatis, ternis triangularibus ovatis camosis, columna brevissima apice 2-lobata recurvis. Meibh.f. in Hot. Zool. 1857, 159; Hook. f. FL Brit Ind. vi. 88.

HAB.—BEHAR, J. D. H. DACHAR, Mann. DITTASDINS [Ic in. Hort Calcutta). TENASSERIM, Parish.

Stem scandent, as thick as a swan's quill or leaf, green. *Leaves* — by — in, many and sometimes almost imbricating, deeply channelled, nerveless, terminal lobes unequal with sometimes an interposed mucro. *Spikes* — in., subsessile; bracts minute, deciduous; ovary short; flowers — in. diam. *Sepals* and *petals* greenish yellow, with red stripes. *Lip* rather longer than the aepala; 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 side 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 reproduced (for the original is a full-size folio) is inscribed "Sarcophyllum carinatum, Hot Springs near Hatgur and Seetakoond Hill"—the latter is one of the Ghattagur Hills.

Fig. 1, side and 2, front view of flower; 3, column; 4 and 6, anther; 5, pollinia.

PLATE 79.

SARCANTHUS PALLIDUS, Lindl

S_m pallidus] caule valds robusto, foliis elongatis latB IDriformibus insequalter 2-lobis, panícula ramosa effusa longe pedunculata, ramis patentibus multi-laxiflora, sepalis pctalisque obngis Dbtuis rubro-purpureo striatis, labelli carnosi albi calcare subcylindraceo incurvo subtruncato, lobis lateralibus brevissimis truncatis, terminali brevi ovato, incurve apice rostrate. Lindl in *Bot. Rey.*, 1840, *Misc.* 78 et in *Juurn. Linn. Soc.* iii 39. Hook. *l. Fl Brit hid.* vi. 68. *S. tricolor*, Reichb. *f. in Bonplandia* ii. 219. *Saccolabium racemifBrum*, Lindl *Gen. and Sp. Orchid.*, 224. *Aerides racemifBrum*, Wall, *mss*,

HAB.—EASTERN NEPAL, alt. 4,000 ft. J. D. H. BHOTAN and ths KHASIA HILLS, alt. 4—8, 000 ft., Wallich. BURMA, Berkeley.

Stem very short, aa thick as the thumb, leafy to the base; roots as thick as a goose-quill. *Leaves* ID—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. *Af* ^{am.}, 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 *fid.* caruncle below the column nearly closing the mouth. *Column* very short and stout, rostellum obscure; *anther* broadly ovate, acuminate, flat; pollinia large, oblong* globose, cleft; strap slender, dilated above, gland small. *Capsule* ^ in. ellipsoid or clavate.

Dns Df the largest species of the genus.

The drawing from which the plate is taken is inscribed "Mr. Gibson's Dhuxra collection. *Sarcanthus affinis*, Wall. (*Vania paniculata* Br.)" in Wallich's handwriting.

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

PLATE 8D.

DLEISDSTDMA ANDAMANICUM, Hovlc. f.

V. andamanim; caule crasso elongato, foliis loriformibus coriaceis 2-lobis, pedunculo elongato, floribus parvis racemosis, racemis spiciformibus ramoa paniculose laxis terminantibus viridi-flavescentibus brunneo suffusis, sepalis petalisque late obovato-oblongis obtusis, labello sacciforme cylindraceo basi lateralibus truncatis, terminali brevissimo erecto. *Rook. f. FL Brit Ind.* vi. 71.

HAB.—SOUTH ANDAMAN ISLAND, Kurs.

Stem as thick as a goose-quill, rooting, green; internode 1—1½ in. *Leaves* 4—8 by 1—1½ in., spreading and recurved, channelled; terminal lobes unequal, 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—1½ in., divoid, 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 *P. htifolium*, 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 midlobe of the lip.

The drawing of *C. andamanim* is inscribed "Sarcanthus of Andamans No. 1. Introd. Bot. Soc. Lond., April 1858."

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

PLATE 81.

DLEISDSTDMA EAMDSUM, Hook. l.

C. ramosum] caule breve, foliis angustis loriformibus obliquy 2-lobis, panicula gracili erecta breviter peiunculata, ramiis paucis paucifloris patentibus, floribus parvis breviter pedicellatis, sepalis petalisque obovatis obtusis rufo-fuscis albo viridibus marginatis, labelli lobis lateralibus parvis ovatis terminali triangulari-ovato v. rotundato et subtrilobo, disco basique columnis pubescentibus, calcare uncinato incurvo. *Hook. l. Fl. Brit. Ind.* vi. 72. *Saccolabium ramosum, Lindl. Gen. and Sp. Orchid.* 224. *S. flexuosum, Lindl. in Journ. Linn. Soc.* iii. 3B. *Deceocladia flexuosa, Lindl. in Wall. Cat. n. 7333 et Gen. and Sp. Orchid.* 23B. *Aerides ramosum, Wall. mss.*

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

Stem 1—3 in., hardly as thick as a goose-quill. *Leaves* few, 3—5 by $\frac{1}{2}$ — $\frac{1}{4}$ 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 banied with yellow; spur corniform, acute, mouth hairy, dorsal scale erect, 2-fid., pubescent; side lobes variable in length and middle lobe in form. *Column* very short, broad, angles rounded; rostellum very short. *Anther* short, broad; pollinia globose, 4 cleft, (2 very small, *Vlarkt*) strap dilated upwards, tip contracted; gland small. *Capsules* $\frac{1}{2}$ inch, fusiform.

An insignificant species, presenting a 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 show. The latter (flowers only) accompanied the drawing which was inscribed "Sarcanthus from UDL Perreau, in Calcutta, Fid. in H. B. D., 3rd May 1858."

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, the pollinia:—all enlarged.

PLATE 82.

DLEISDSTOMA BREVIPES, *Hook. l.*

C. brevipes; caule valido elongato folioso basi radicante, foliis distichis uniformibus Kneari-lanceolatis acutis crasse Boriaceis, spicis lateralibus brevibus breviter erap pedunculatis, rachi crassa cylindracea, bracteis parvis acutis, floribus aureis, petalis seioali ovato-oblongis obtusis vittis 2 rubris purpurBisve notatis, labelli lobis lateralibus brevibus falcatis acutis, terminali brevi triangulari-hastata apice meuibranacea bi-aristata disco incrassato, calcare brevi sacciforme.

HAB.—SIKKIM HIMALAYA (*IC. in Herb. Calcutta*) alt. 5000 feet, *Gamble*) ASSAM (*Hort.*)

Slomp tufted, 8—12 in., as thick as a gDose-quill, curved, leafless and sheathed below, rooting at the base, leafy above, internodBS \—1 in. *Leaves* similar all the way up the stem, 4—6 by f in., channelled above, stiff, hard, somewhat narrowed at the base, tip almost pungent. *Spike* 1—1| in., horizontal, green, \ in. diam.; basal sliBaths annular; bracts minute, red-brown; ovary \ in.; flowers |—§ in. diam. *Sypah* and *petals* widely spreading, subsimilar. *Lip* longer than the sepals, yellow with red markings, spur shining, with a thickened callus at the base of ths midlobe, which extends across th mouth Df the spur to meet the thick callus at the base of the column, thus closing th orifice. *Uolumn* short, stout, anglss rounded. *Pollinia* subquadrate; strap compressed gland large, 2-partite. *Capsuh* 1—1£ in., fusiform, terete, fleshy, striate.

A remarkable ep³ie³, of "which I have examined a fruiting specimen collected by Mr. *Gamble* in Sikkim, and a living flowering plant sent to KBW from a nursery in England. The latter differs somewhat from the figurB here given in the large fbwers with morB purple bands Dn the eepala and petals, and having two awns on ths membrauDUS tip of the midlobe of the lip; these may have fallen off in the specimen figured, which was inscribed "Sarcanthus from Sikkim, ND. 2, Botani Garden, July 1857."

Fi[^]. 1, fidWErj 2, front and 3, side view of column an I lip;—all enlarged.

PLATE 83.

CLEISDSTOMA BPCATUM, *LindL*

C. spicatitm; caule crasso elongato radicanie folioso, foliis latis Dblongia 2-l₂bi« pedunculo oppDsitifolio crasso decurvo, spica foliis longiore peniula multiflora, bracteis ovato-subulatis demum deflexis, sepalis petalisque nrioribus ovatis subacutis fusco-rubria vitta media marginibusque aureis, labelli lobis lateralibus rotundatis terminali par ovato carnosu, ralcare ma^no basi inflato 4-lobo. *LindL in Bvt. Reg_m sub. f_m 32 • Ho_ok. f. FL Brit. Jnd. vi. 72. Sarcanthus densiflorus, Par. et Reichb. f_u in Tram. Linn Soc. xxx. 135. SacDDLlabium densiflorum, LindL in Wall. Vat. n. 7311 et Gen. and Sp. Orchid, 220 et in Bot. ifay., 1838, Miw. 5B. Aeriies denaiflorum, Wall. mss.*

HAB.—BHOTAN [*IC. in Herb. Calcutta*]. TENASSERIM, Moulmein, *Parish*. PENANG, *Wallivh, Curtis*. PEBAK, *Kunstler*. DISTRIB. Borneo.

Sfym variable in thickness, as thick as the middle finger in the Penang and figured specimens, more slender in the Tenasserira and Perak unes, flexuous, apparently scanient •

roots very long and stout; internodes green, \wedge —1 in. long*. *Leaves* 4—8 by \backslash —2 in., spreading and waved, deeply channelled, dark green. *Peduncle* 1—2 in., stout, green, with broad ovate obtuse sheaths J 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 VBry stout spBciBs as figured herB, rsinarkabla for the bottle-shaped spur of thB lip, which resemblBB that of *Saccolabium buccosum*, KBichb. f. I have some doubts as to whBthsr thBrB may not be two spBciBS indudBd unler *O. spicatum*, and that the Sikkim plant |of which I have SBBn no specimen) figured hBre may bs diffrBnt from the TsnassBrim and l*Bnang ons, the flowers are so much larger; allowancB, hoWBVer, must be made for the habitual exaggeration DE nativB artists. On the other hand, the Sikkim habitat may not be a corroub DUB, the transposition of labBlS of garden plants is so frBijUBnt and not dBtBctabls. ThB drawing is inscribed "Saroanthus latifolius, T. Anders., from B. Gr, 25th April 1856, introd. by S. jBnning3, Eaij., from Bhotan. T. Anders." Another drawing of a plant with narrower leave3 is inscribed "From PBrak, Kunsthr misit, H. B. D. fld. 23-5-84."

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

PLATE 84.

DLEISDSTDMA UTERIFERUM, Hook. l.

C uteri/erum; acaule, foliis paucis late loriformibus flaccidis apice oblique rotunatis v. 2-fidis marginibus uniulatis, peiunculo rachijue spicse densiflorse striato crasso foliis brevioris, bracteis minutis, fluribua parvis, sepalia obovato-oblongis petalisque angustioribus lineari-obliDiigis flavis basin versus fuscD-rubris, marginibus uniulatis, labelli ore constricto lobis lateralibus brevibus truncatis, tsrminali minute Dvato carnosio, calcarB magno globoso inflato antics sulcato. *Hook. f. FL Brit Ind. vi. 74.*

HAB.—PERAK, *Kunsthr [in Serb. CalcutL]*.

Stem very short, with tufted roots. *Leaves* pendulous or iecurvei, flat, rather pale green, base hardly contracted, tip sometimes obliquely truncate. *Spike* with peduncle 3 \wedge in.; flowers about \backslash in. diam.; ovary about h in. *Sepal** 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 VBFV well marksd speDIBS, of which I have SBBH only dried flowers accompanying ths drawing, which is ILibBd "Kuril* • PBrak misit, FL in H. B. D. 14 - W

Fig. 1, sidB ani 2, front vi*w of flower; 3, aectim ui lip; 4, ^lumn *ni portion of uc pf lip with donil callus; 5, anther; 6, pollinia:—a^ enlarged.

PLATE 85.

DLEISDSTDMA WENDLANDDRUM, *Reichb. f. f*

U Wendlandvrum ; acaule, fdiis Bbngati3 late loriformibus oblique 2-lobis recurvis v. pandulis flaccidis, raceme brevi foliis multoties brevior simplicis v. paniculatis ramoso, pedunculo brevis ramisque validis, floribus minutis flavis, labello rubro suffuso, s_Gp_ah_s obovato-oblongis, petalia obovatis, labelli lobis lateralibus brevibus r_Dt_un_ia_tis, terminak orbiculari v latB ovato-rotundato, calcare sacciforme inflato basi rotundato. *Reuhb. f. in OtU * i** Algm. Gartenttit, 185_B 219; ^ . / . Fl . Brit. InJ . vi . 74. C callosum JfoWli. l. » Bonplmdia, (urn Ufami). PomatDcalpa spicatum, AiAf ««f JTa^tf, ca: A«Aft. / m Otto and Didr. Aljem. Gartenzeit. I c*

HAB.-DACHAR, *Keman. TENASSERIM, Parish. ANDAMAN ISDS., Berkeley.*

Stem _{DR} rather leaf-sheaths, sometimes 1-11 in., as broad as the middle finger, green with braUsh markings; roots basal, fasciculi. *Leaves* B-1D by 1-1¹/₂ in, coriaceous, briffht ffreen flat and faintly channelled above, with a slender keel beneath. *Raceme* oi *panicle* 4—B in ; peduncle and rachis green speckled with brown ; bracts obscure ; ovaries about 1 in. flowers about ^ in. diam., papillose. *Lip* about as long as the sepals ; mouth contracted ^B 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 ; pnUiiUB globose ; strap narrowly linear, gland small. *Vapsute* (in Dachar specimen) 1 in., linear-oblong.

If there bB not more than one species include under *U Wendlandorum*, this must be a common and variable species. Ther. ar_B fBranl drawings in th_a Kew and Dabutta H_Br_Bana 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, authentibdly named by KeiahenbaBh.

Fig. 1, flnw_{BR}-b>i; 2, flow_{BR}; 3, th_B s_Bm_B with th_B p_tals and sepals displaced; 4, anther; 5, polling A1, flow_{BR}, A2, lip laii open :— all enlarged.

PLATE 85.

CLEISDSTDMA MANNII, *Reichb. f.*

O Mannii • caule brevi, foliis breviusculis loratis v. lineari-oblongis apicem versus dinridiato-bilobis' crasse criaceis, pedunculo robusto simplici v. parce ramoso, spi_{ca} breviuscula multiflora, rachi crassa subclavata, bracteis minutis, flonbus parvis, sepalis petalis aue obovatis aureis, labelU lobis lateralibus truncatis abbreviatis tel-minali orbiculari ovato lilacino, calcara brevi sacciforme apice subinflato rotundato, callo infra columnam bifido. *Each*, f. in Flora, 1872, 273; ***. / . Fl. Brit Ind. vi. 74.*

HAB.-ASSAM, *Mann, SIKKIM ? [is. » Serb., Calcutta).*

St 1 _li in as thick as a swan's quill, rooting at the base. *Leaves* f_cw, 3 _{bv} i _T in' r striate, very coronas, rather narrowed towards th_B base, produced at one ^Ssid_e int_D a rounded point, the other sida shorter and very obliquely truncate, y_Bry coriaceDUS, dark-green ; sheaths very short. *Peduncle* about as long as the spike,

gTBn, 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 *V. Mannii*, and cannot hence speak confidently of their identity. As a species it approaches *O. Wendlandvrum* most closely, but is very much smaller, with shorter strict stiff apparently very cordate 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 *O. undulatum*, which has a bifid scale, but the leaves are very much shorter, not undulated, the spur is not glabrous, and the midlobe of the lip apparently not carinate.

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

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

PLATE 87.

DLEISDSTDMA BIDUSPIDATUM, Hook. f.

C. iicuspidatum; caulis brevis, foliis ascendentibus late loriformibus profundis acute bifidis lobis superioribus unidentatis, pedunculo gracile basi caulis ascendente foliis longioribus v. brevioribus simplicibus v. parce racemiferis, racemis apice deorsum laxe paucifloris, floribus majusculis, sepalis petalisque oblongis subacutis flavo-virescentibus nervo medio rosatis, labelli albi roseo picti lobis lateralibus majusculis rotundatis v. retusis terminali brevi crasso ovato incurvo, calcaribus sepalibus longioribus conis cylindricis obtusis, callis ad basin lobi terminalis et infra columnam bifidis pubescentibus. Hook. f. *FL Brit. Ind.* vi. 75.

HAB. SIKKIM HIMALAYA, near Darjeeling, Anderson [*in Herb. Calcutta*]. KHABIA HILLS, alt. 2200 ft., Mann. TENASSERIM, Parish.

Stem stout, 2—3 in., tooting at the base, clothed with the green gaping sheaths of the leaves. Leaves rather numerous, distichous, 3—5 by 1—1.5 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 1 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 broad, lanceolate, beak long or short; pollinia globose, cleft, sessile 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. Hew and DalDutta, 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, 8-5-5B, Fid. 20th July 1859." It has a short anther. Figures 1, 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 DarjBlinff, July iggo 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. 3] removed; 4, anther; 5, pollinia from the specimen figured:—*all enlarged*. A1, lip; A2, anther; A3, pollinia, nil from the Moulmein drawing; all enlarged. B1, column and B2, lip laid open; both enlarged from a Khasian specimen.

PLATE 88.

HERPYSMA LDNGICAULIS, *Lindl.*

H. Inngicimlisj 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 whit 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 1½ in., striate, pale green. Raceme spike terminal, sessile, many-fld.; bracts longer than the ovary, very broadly ovate, obtuse, membranous, pale brown, striate; pedicels short with the pubescent ovary ½—f in. long, suberect; flowers ½—¾ in. long, white or pale pink, or white tipped with red. Sepals puberulous, subequal, ovate-oblong, acute, free forming a hood with the shorter, broader, obtuse petals. Lip shorter than the adnate to the sides of the column, subpanduriform, inflexed from the middle, 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 pulvinate central stigma with 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 Vat n. 7389*; et in *BDL Reg. sub. t 1B18*; *Benland T' Orchid. 5D6* et in *Journ. Linn. Soc, i., 178, 198*; *Hook. f. Fl. Brit Ind. vi/ 98* "

HAB.—EASTERN SUBTROPICAL HIMALAYA; Nepal, *Wallich*; Sikkim, alt. 3—4000 ft J.D. H., &c. KHASIA HILLS, alt. 4,500 ft., *Vlarke*.

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

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

PLATE 89.

ODONTDCHILUS LANCEOLATUS, *Benth.*

O. lanwolatus; 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 utrinque ectinata dentibus 3—5, lobis terminalibus oblongo-quadratis, sacco globooso didymopolliniis globoso-ovoideis. *Benth. in Gen. Plant iii. 598*; *Book. f. FL Brit. Ind. iii. 101*.

D. flavua (errors pro *lutea*), *Benth. l.e.* *Anoctochilus lanceolata*, *Lindl. Gen. et sp. Orchid.* 499 et in *Journ. Linn. Soc.*, i., 179. *A. luteus*, *Lindl. in Journ. Linn. Soc.*, I. c.

HAB.—SIKKIM HIMALAYA and the KHASIA Hilla, alt. 5—BDDO ft., common; *Griffith, &c.* [*Kew distrib.*, n. 5,352, 5,354).

Stem with spike B—12 in., stout or slender, few or many-leaved, often extensively creeping, then ascending and flexuous. *Leaves* bright green, pale beneath; petiole $\frac{1}{2}$ in.; sheath short. *Spike* 2—3 in.; bracts $\frac{1}{2}$ —1 in., pale, nearly glabrous. *Lateral sepals* $\frac{1}{2}$ in., ovate, obtuse, green or purplish, 1-nerved, dorsal and petals cohering in an obtuse hood broader than long. *Zoophorum* many times longer than the sepals; claw not dilated at the base, limb $\frac{1}{2}$ 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* (*Anoctochilus*, *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 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 numerous divisions of the jaw 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 1822," in Dr. Anderson's hand-writing.

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

PLATE 90.

ZEUXINE [*Monochilus*] GDDYEEIOIDES, *Lindl.*

Z. aoduerioides; scapigera, foliis subsessilibus ovatis saturate viridibus costa media allida, spica glabra v. puberula, bracteis ovarium glabrum squantibus, labelli hypochilio hinc orbiculato, epichilio parvulo orbiculari v. oblongo concavo membranaceo. *Lindl. Gen. and Sp. Orchid.*, 486; *Book. f. Fl. Brit. Ind.* vi. 107.

HAB.—Temperate EASTERN HIMALAYA, from Sikkim to the Miahmi Hills, alt. 5—BDDO ft. *PEBU, Kurz; in Herbar. Calcutta.*

Stem 8 in. from a long creeping rooting base. *Leaves* 1—1 $\frac{1}{2}$ in., sessile or shortly petioled, obtuse or acute, acuminate, dark green, pale beneath; sheaths short, coloured, slender, broad. *Spike* 2—3, *Zoophorum* tips lanceolate. *Bractea* $\frac{1}{2}$ in. long, brown. *Sepals* $\frac{1}{2}$ in. lateral lanceolate, 1-nerved, green; dorsal ovate, acute, within. *Petals* falcate, very obtuse. *Lip* wholly included, hypochilaceous, 2-carate within. *Column* short, rostellar arms short; stigmatic lobes distant; *Pollen* pyriform, slender, & anisodiametric. *Uspuh* in fusiform.

The drawing is inscribed "Bikham, WTM &c., September 1875. Q. King."

Fig. 1 and 2, nowera mm
B, Up; B and 7, Bnth; 8, polHoia:—«« «! «!/*

PLATE 91.

GODDYERA FOLIOSA, Benth.

G. foliosa] caule basi longe decumbente radicante, dein ascendente folioso, foliis 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. Eew Hook. / Ft Brit, Ind.* vi. 113. *Georchis foliosa*, Lindl. *Gen. and Sp. Orchid.* 49Q. *G. secundiflora*, Griff. *Notul.* iii. 393 [excl. *Ic.*]_m—*Goodyera*, *sp. m.* Griff. *It. JYvtes* 3B No. 591, *JStotul* iii. 395, No. 11 et *Ic. Pl. Asiat.*, 34B l. i.

HAB.—Temperate SIKKIM HIMALAYA, alt. 5—7,000 ft. ASSAM, the KHASIA and NAOA HILLS, ascending to 5,000 ft. BUUMA, Griffith. PERAK., alt 7,000 ft., Wray.

Stem 5—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 $\frac{1}{2}$ — $\frac{3}{4}$ 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 base, 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 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, 7,300 ft., October 1862" in J. Anderson's handwriting. The lateral Sepals are represented as acuminate, which they are not in the examples I examined.

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

PLATE 92.

GOODYERA VITTATA, Benth.

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

HAB.—Temperate, SIKKIM HIMALAYA, alt. 8—9,000 ft., J. D. H., &c.

Stem 4—8 in., leafy nearly up to the spike. *Leaves* 1—3 in.; petiole very short or sheaths short, membranous, coloured. *Spike* 2—4 in.; peduncle short, clothed with imbricated lanceolate finely acuminate green and reddish bracts that pass into bracts $\frac{1}{2}$ — $\frac{3}{4}$ in. long, tips recurved. *Lip* rather longer than the sepals, gradually contracted beyond the sac 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 strap¹ seated on a narrowly linear gland.

The drawing from which the plate is produced is inscribed "Tonglo, near Darjeeling, 10000 ft. 1852, T. Anders."

Fig. 1. *Pogonia*; 2, the same, with the sepals and petals removed; 3, ovary and column; 4, anther; 5, pollinia;—*all enlarged.*

PLATE 93.

Pogonia scottii, *Reichb. f.*

P. Scottii; elata, glaberrima, folio longe petiolato amplo late reniformi apiculato multinervi, scapo valido sulcato, raceme* erecto multifloro, bracteis parvisaequilongis v. longioribus. linearibus lanceolatis reflexis, sepalis petalisque, linearibus lanceolatis acuminatis viridibus rubro-atriatis, labello sepalisaequilongis subunguiculato inaequali basi saccato obovato spatulato albo rubro striato ultra mediam 3-lobo, lobis lateralibus brevibus obtusis terminali suborbiculari velutino. *Reichb. f. in Flora*, 1872, 27 B.; *HQC. f. Fl. litl. Ind.* vi, 12D.—? *Pogonia* No. 2, *Grip. Notul.* iii. 377 *et Ic. PL Asiat.* t. 315.

HAB.—SIKKIM HIMALAYA; Darjeeling [*Reichb. f.*]. CHITTAOONG, at Sitakooni [*Reichb. f. in Herb. Calcutta*]. Burma? *Griffith*.

Leaf 8—10 in. long, dark green, with about 20 principal veins, and many interposed nerves, bright green above; petiole 13 in., acutely ribbed, green above, red-purple below the middle. *Stems* 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—1* in., cymbiform; raceme strict, 4—8 in. long, rachis angled; bracts 1—2 in., green, very slender; pedicels with ovary $\frac{1}{2}$ in., decurved; flowers 1 in. long, horizontal. *Sepals and petals connivent. Column dorsally hairy at the tip.*

A noble specimen, much the largest I have known, *discovered*, I believe, by Mr. Scott near Dhittagong when Curator of the Calcutta Botanic Garden, and after whom *Reichb. f.* named it. I do not know on what authority the latter author gives Sikkim as its native country, though it is a very likely *Dr. Lindley* transfers the Burmese plant of Griffith to *P. oarinata*, but the saccate base of the lip and flowers placed at an angle with the ovary rather indicate *P. Scottii*. Their characters are however, not shown in *Griffith's figures*.

"The drawing here reproduced is inscribed "*Pogonia nobilis*, *Scott. Pogonia* of Seetakooni, introduced. *IBBB*, figd. June 1858."

Fig. 1, *anther*; 2, the same with the *stamens* and *lip* [*&c.*]; 3, *ovary and column*; 4, *anther*; 5, *pollinia*;—*all enlarged.*

PLATE 94.

Pogonia darinata, *Andl.*

P. carinata, glaberrima, folio orbiculato-cordato acuto 7—12-nervi, acapo *flores* *Wier* teretiusculo, racemo erecto sparsifloro, bracteis linearibus ovariiis multo longioribus, pedicellis brevibus, *sepalis* petalisque patentibus anguste linearibus oblanceolatis, *inatis* viridibus, *sepalis* *aequilongis* basi non *stipitata* *intermedium* *gobbo*

cuneato-obovato vix unguiculato, lobis lateralibus parvis rotundata constrictis, terminali latifolia ovato acuto crenulato, disco pubescente. *Lindl. Gen. and Sp. Orchid.* 414 et in *Journ. Linn. Soc.* iii. 45 (excl. syn. *Griffith*); *Hook. l. FL Brit. Ind.* vi, 121. ? *Dah. and Gibs. Bomb. Fl.* 270. *Epipactis carinata, Roxb. Hvt. Beng.* 53 et *FL Ind.* iii, 452.

HAB. —Plains of INDIA, from Kohilcund to Lower Bengal and the Deccan Peninsula. PEGU, *Kurz.*

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-fl. ; *bracts* 1—2 in. long, spreading, green; *pedicels* about $\frac{1}{2}$ in.; *ovary* longer, turbinate; *sepals* $\frac{1}{2}$ 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 ⁸¹ *P. pKcah*, *Linl. fl. in. H. B. C. in pots, April 1831, T. Anders.*, which it certainly is not, that species being only 1—3-fl., and having hairy leaves and small bracts. The column is, however, similarly deeply 2-lobed at the tip, and the surculi proceeding from the downward prolongation from the base of the petiole are no doubt of the same nature as the tuberiferous ones of *P. plivata*. 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; Z, ovary and lips; 4, anther; 5, column; 6, style; 7, stigma; 8, pedicel:—all enlarged.

PLATE 95.

HABENARIA [*Ate*] DIGITATA, *Lindl.*

IT. diffitata; 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, calcaribus ovario foveoloso aequali v. apice clavato, antherarum loculis pendulis tubis brevibus incurvis, rostello triangulari erecto. Dah. and Gibs. Bomb. Fl. 267; Hook. l. FL Brit. Ind. vi. 134. H. trinerve, Wight. Ic. t. 1701. Bonatea punduana, Lindl. in Wall. Cat. n. 7153. B. benghalensis, Griff. in Calc. Journ. Nat. Hist. iv. 382. B. herbacea, Wall. mss.

HAB.—KASHMIR, *Falconer*, SIKKIM, alt. 7,000 ft., *King. [Ic. in Herb. Calcutta]*. ASSAM, *Simons*. SILHET, *Wullich*. BENGAL, *Griffith*. TENASSERIM, *Parish*. WESTERN GHATS, from the Concan Southwards.

Stem 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—6 in.; *bracts* large, often almost foliaceous, and exceeding the flowers; *pedicels* very short; *flowers* $\frac{1}{2}$ — $\frac{3}{4}$ 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, foliaceous habit and size of the flowers. Forms which I have included under var. *follow*, and which ascend to H. D. in the Nilghiris, are very leafy, but shorter, with denser flowers, shorter bracts and filiform segments of the lip: to it are referable *H. follow*, A. Rich., *H. lacinalata*, Dalz., *Platmthera marginata*, Wall, and *Orchis mysorensis*, Heyne.

The specimen here figured is noted on the drawing as from "near Darjeeling, October 1877. & King." It represents a flower 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 removed; B, side view of flower; C, pollinia.—Magnified.

PLATE 96.

HABENARIA (*Ate*) STENOPETALA, Lindl. *Var. polytricha*.

B. stenoptala, Lindl, *Gren. and Sp. Orchid.* 319 (not 324); Hooker f. *Fl. Brit. Ind.* vi. 134.

Var. polytricha; bracteis flores excedentibus, racemo brevi densifloro, sepalia in aristas capillaceas lamina multo longiore productis, petalorum cruribus patentibus $\frac{1}{2}$ longis bracteis, labelli lobis filiformibus incurvis.

HAB.—SIKKIM HIMALAYA, at Dhoongtam, alt. 8000 ft. J. D. H. NAGA HILLS, *Pram.*

Differs from the ordinary form of *Stenopetala* in the exaggerated length and curvature of the lobes 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, 1885," which was lent me by Dr. King from the Calcutta Herbarium. The same form or nearly approaching it is found in Sikkim.

PLATE 97.

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

H. arietina caule elato robusto folioso, foliis ovato-lanceolatis acuminatis amplexicaulis auctua valde costata, racemi elongato multifloro; bractea ovato-lanceolatis, inferioribus foliaceis ovaria longioribus, superioribus brevioribus cymbiformibus acuminatis; floribus amplis virescentibus, aepalis lateralibus ovato-lanceolatis acuminatis, dorsali cum plicata falcata basi gibbosa pubescentibus in gubam latam coherentibus, labelli 3-partiti segmenta lateralibus extima pectinata intermedio linearibus. *Hook. f. Fl. Brit. Ind.* vi. 138. *H. pectinata*, Lindl. *Gm. and Sp. Orchid.* 341 (non Dm.); Wall, *U. 7529 B* (in part), D.

HAB.—TEMPERATE HIMALAYA; from Simla, alt. 5 — 8,000 ft., eastward to Sikkim, ascending to 8,000 ft. KHASIA HILLS, alt. 5—8,000 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-nerved, tip usually curved. *Raceme* 8—10 in., laxly many-flowered; 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. *Lip* with the lateral lobes slender, falcate, pectinate with long cilia on the outer margin; spur ½—¾ 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 *H. pectinata*, Don., and taken for it by Lindley, who, as observed in the Flora of British India, gave the latter plant the name of *H. emifolia*. 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 *H. intermedia*, Don., also of the temperate Himalaya, differs in the glabrous petals and long stout spur.

The specimen figured was collected in Sikkim, "Darjeeling, 15th April 1875, G. King."

Fig. 1, flower; 2, ovary, column, and lip; 3, lateral anther and 4, lateral sepal; 5, petals; 6, pollinia.—all enlarged.

PLATE 9B.

HABENARIA (*Platyghssa*) GENICULATA, Don.

B. geniculata; caulo elato piloso superne vaginis foliaceis elongatis involuto, foliis sessilibus elliptic oblongo-lanceolatis v. acutis 5—7-nerviis, spica oblonga pauciflora, bracteis ovario fusiformi rostrato paulo brevioribus lanceolatis acuminatis, sepalis late ovatis acutis, petalis lineari-oblongis; labello orbiculari v. late orbiculato, lobis lateralibus latius semi-lobatis v. dimidiato-cuneatis crenatis v. fimbriatis, intermedio minuto, calcaribus gracilibus ovario multo brevioribus medio geniculato. Don *FL Nep. Prodr.* 25; Hook. *f. FL Brit Ind.* vi. 138. *Platanthera geniculata*, Lindl. in Wall. *Cat. n.* 7D42.—*Habenaria*, Griseb. *Nrful* iii. 4DB, *Bin. Notes*, 31, No. 494 et *Icon. Pi. Asiat.* t. m. 345.

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

Stem 1—3 ft., stout or slender. *Leaves* 2—5 in., sheaths long. *Spike* 1—2 in. long, 4—50 fld.; bracts ½—1 in., green, persistent; ovary narrowly fusiform, slightly incurved at the tip, thickly ribbed; flowers ½—1 in. broad. *Sepals* variable in breadth, greenish-white; petals much shorter and narrower, white. *Lip* white, very variable in breadth, often ½ 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 middle, which is hardly longer than the side-lobes; margins of side-lobes erose-crenate or shortly fimbriate; spur much longer than the ovary, knotted 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. *Uppers* 1 in., shortly pedicelled, beaked, deeply grooved and thickly ribbed.

Very fine specimen? common in the Himalayas at low elevations. The illustration here reproduced is inscribed "Mungpo, Sikkim, 3,590 ft., September-Dutobur 1874, G. King."

Figs. 1 and 2, flowers:—enlarged.

PLATE 99.

HABENARIA [*Platijhssa*] TRIFLORA, Don.?

H. triflora; caule dense folioso, foliis suberectis imbricatis ellipticis acutia in bracteas angustiores foliaceas ovaria superantea transeuntibus, spica brevi dense multiflora, floribus amplia albis, aepali3 orbicularibus, petali3 minutia linearibus, labello magno sepalia multo majore latB obcordato sinu elongato fere clauao, lobis lateralibus semi-orbicularibus v. dimidiato-obovatis integBrimia, terminali lineari lateralibus vix longiorB, calcaro ovario multo longiore, anthera latisaima.

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 lanceolata sheathing bracts an inch long and more, from amongst which the perianth with its spur alone protrudes. *Spike* densely fld., 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 nervulB 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 We W much BxemsBl in my mind. W thB drawing herc reproduced, which reprints B rBmarkably fins plant unfortunately with no nota of LocaUty or ^^ur, ^ prBstimaUy on9 that flowered in thB Oal^nt^a Botany Q.rd.n. At first I was disposed to consider it a nmnyflow^d gigantic Btata of thB Himalayan *S. inflora*, Don., which has similarly short, ofba indicating haves, long tracts, erect flower., small narrow petals, a large broad lip with two basal calli, very lon- spur and broad anther; but ID that species thB lateral sepals are narrow ond erect, the fbwers 1-3 only anJ 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 a-rees in the bracts' large flowers, small linear petals, the spur, approximately in the BhapB of the Up, 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; 5, pollinia:—all enlarged.

PLATE 100.

HABENARIA (*Hobgssa*) LATILABIUS, Hook. f.

M. hitalru-, caule mepiua elato, foliia seasilibus late obovato-v. BUiptico-oblongio acuminatis, spica multiflora, bracteis herbacea inferioribus floribus longioribus superioribus ovario 3-4 longioribus, flonbus flavo-viridibus, sepalo dorsali late ovato orbiculari v. oblongo, lateralibus reflexa ovatis v. oyato-l ancsolatia acutis, petalis polymorphis, labello sepalis longiore integro linean-lanceolato v. oblongo lateribus reflexis, calcaro ovario curvo rostra^ multo longiore incurvo. *Hook. f. Fl. Brit. Ind.* v. i. 153. *Platanthera acuminata*,

Midi, in *Wall Vat.* n. 704D; *Gen. and Sp. Orchid.* 233. *P. latilabris*, *Midi. Gen. and Sp. I c P. Orchidis*, *Wall, Cat.* 7D39, B.

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

Stem 6—18 in., stout. *Dr* 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 $\frac{1}{3}$ — $\frac{1}{2}$ in., often strongly curved to one side, shortly beaked; flowers very variable in size, $\frac{1}{2}$ — $\frac{1}{3}$ 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. *Capsules* $\frac{1}{2}$ 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 aetminata* 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 more 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; figs. 1 and 2 have lips (as in the whole spike figured) broader even than the common states of *Milabris*, 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-cylindrical horizontal tuber, which is annually renewed.

The plate is a reproduction of a drawing inscribed "Sikkim, Sinchal, 8,009 ft., Aug. 1876."

Pl. 1. flower and its parts; 2, flower with the dorsal sepal and a petal removed; 3, flower with the perianth-segments displaced; 4, dorsal sepal; 5, petal; 5, lip; 7, pollinia.—all enlarged.

PLATE 101.

HABENARIA [*Phyllostachya*] HELFERI, Hook. f.

H. Helferii; caule pubescentia 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 longioris integro cymbiforme marginibus recurvis purpureo v. roseo, calcaribus infundibulari v. inflato ovario brevior apice attenuato, antheris loculis approximatis parallelis. *Hook. f. Fl. Brit. Ind.* vi. 164. *Gymnadenia Helferii*, *Engelm. f. in Flora*, 1872, 27 B et in *Trans. Linn. Soc.* xxx. 139.

HAB.—KHASIA HILLS, *Simons*. TENASSEEIM, at Moulmein, *Heifer, Parish*.

Stem 8—10 in. from an oblong tuber, sheathed below, then leafy to the apex. *Leaves* 4—8 in., spreading and recurved. *Pedicel* with divaricate filaments, 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. *Vapuh* $\frac{1}{2}$ in. long, sessile, linear-oblong, ribs thick.

H. Hdferi belongs to a small section of the genus including *H. gahandra*, Benth, and *B. janiha*, Benth., from both of which it differs in the larger flower and very large, long, funnel-shaped spur. Keichenbach 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, 18-55.

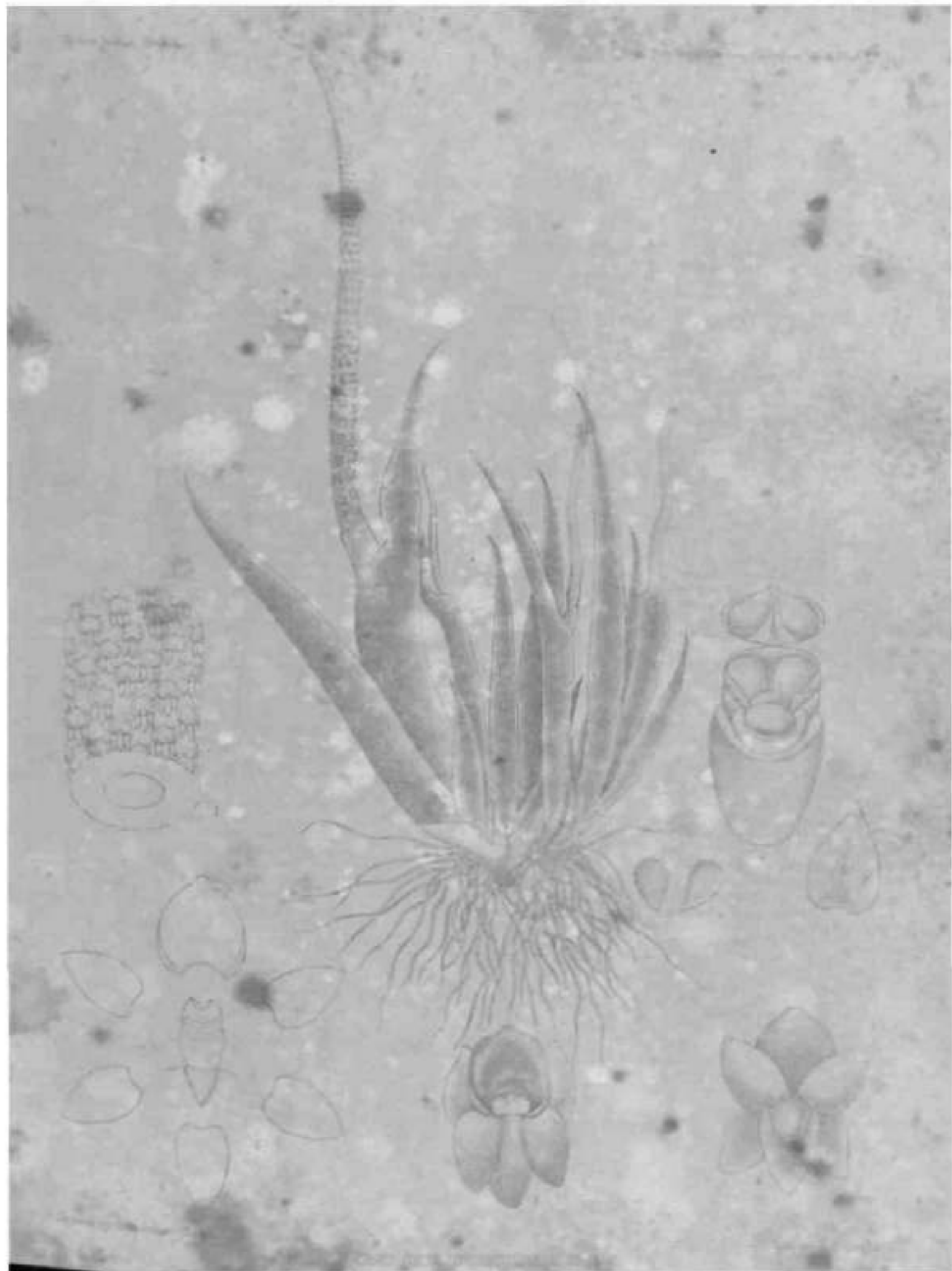
Fig. 1, flower; 2, ovary, column, and lip; 3, column and spur; 4, ovary and column; 5 and 5, pollinia:—*all enlarged.*

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| „ <i>Galeandra</i> , Benth | 58 | „ <i>tetraspia</i> , Beichb. fil. | 38 | „ <i>cladostachys</i> , Hook. <i>yii</i> | 43 |
| „ <i>geniculata</i> , Don | 55 | „ <i>Wightii</i> , <i>Eichb. fil.</i> | 39 | „ <i>hir^utus</i> , Hook. fil. | 44 |
| „ <i>Helferi</i> , Hook. fil. | 54 | <i>Tholidat a suave olens</i> , Lindl. | 21 | „ <i>muri culatus</i> , Hook. fil. | 40 |
| „ <i>intermedia</i> , Don. | 65 | <i>Phyllostachya</i> (Sect.) | 67 | „ <i>steriDglottis</i> , Hook. <i>fil</i> | 41 |
| „ <i>janthe</i> , Benth. | 58 | <i>Platanthera acuminata</i> , Lindl. | B5 | SpeciDsaе (Sect.) | 5H |
| „ <i>laciniata</i> , Dalz. | 54 | „ <i>geniculata</i> , Lindl. | 65 | <i>Stachyobium</i> (Sect.) | 4 |
| „ <i>latilabris</i> , Hook. fil. | 65 | „ <i>latilabris</i> , Lindl. | 67 | STAUBDPSIS <i>undulatas</i> , Benth. | 35 |
| „ <i>pevtinata</i> , Lin 11. | H4 | „ <i>marginata</i> , Wall. | 64 | „ <i>giganteus</i> , Benth. | 37 |
| „ <i>pectinata</i> , Bon. | J5 | „ <i>Orchidis</i> , Wall. | 67 | Strongyb (Sect.) | 7 |
| „ <i>stenantha</i> , Hook. fil. | 67 | Platzlo3Sa (Sect.) | 64 | TAINIA <i>crjrdifolia</i> , Hook. fil. | 24 |
| „ <i>stenDpetala</i> , Lindl. | 64 | PD&DNIA <i>Darinata</i> , Lindl. | G2 | i, <i>laLifo</i> , Benth. | 23 |
| „ „ <i>yap.polytricha</i> | 64 | „ <i>nobilis</i> , Scott MSS. | 62 | <i>Thrixspermum Berkeleyi</i> | 44 |
| „ <i>trifbra</i> , Don? | CB | „ <i>plicata</i> , Lindl. | AS | fil- | |
| „ <i>trinerve</i> , Wight | b^1 | „ <i>Scottii</i> , Beichb. fil. | 62 | TBICHD[JL0TTia <i>Dawsoniana</i> , Beichb. <i>yii</i> | 35 |
| HEHPTSMA <i>ngicaulis</i> , Lindl. | 59 | „ <i>No. 2</i> , Griff. | 62 | „ <i>fasciata</i> , Beichb. fil. | 36 |
| Hologbssa (Sect.) | B5 | <i>Pomatocalpa spicatum</i> , Huhl & Hasselt. | 57 | „ <i>guaricornuta</i> , Kurs | 35 |
| Hymeneria (Sect.) | 20 | <i>Pteroceras</i> (Sect.) | 4 0 | „ <i>retusa</i> , Blume | 35 |
| <i>Limatodes mishmensis</i> , Lindl. & Paxt. | 25 | BacemoSBB (Sect.) | 15, 18 | <i>Tropaolum pentaphyHum</i> , Lamk. | n |
| LIFABIS 'Grambbi, Hook. fil. | 2 | <i>Benanthera Jerdoni</i> , Herb. Cab. | 37 | <i>Tyltstylis discolor</i> , Hook. fil. | 22 |
| „ <i>Gvijfithii</i> , Bidby | 3 | SACCOLABIUM <i>ampullaceum</i> , Lindl. | 50 | „ <i>rigida</i> , Blume | 22 |
| „ <i>plantaginea</i> , Lindl. | 3 | „ <i>buccosum</i> , Beichb. fil. | 59 | Umbellate (Sect.) | 17 |
| „ <i>orbicularis</i> , Lodd. | 3 | „ <i>carinatum</i> , Griff. | 52 | <i>Vanda ulpina</i> , liindl. | 45 |
| „ <i>selligera</i> , <i>Eichb. fil.</i> | 3 | „ <i>curvifolium</i> , Lindl. | 50 | „ <i>CDBrulescens</i> , Griff. | 37 |
| LUISIA 'Grrovesii, Hook. fil. | 85 | „ <i>densiflorum</i> , Lindl. | 55 | „ <i>cristata</i> , Lindl. var. <i>puniila</i> | 45 |
| <i>Malaxis acuminata</i> , Don. | 2 | „ <i>distichum</i> , Lindl. | 49 | „ „ <i>var. B.</i> | 45 |
| <i>Micranths</i> (Sect.) | 45 | „ <i>flexuosum</i> , Lindl. | 54 | „ <i>Jerdvni</i> , Herb. Dale. | 37 |
| <i>Micropsra pallida</i> , Lindl. | 51 | „ <i>tfemmatum</i> , Lindl. | 45 | „ <i>paniculata</i> , B. Br. ? | 53 |
| MIDBDSTTLia <i>bilobi</i> , <i>Iteichb. fil.</i> | 2 | „ <i>gemminatum</i> , Hook. <i>yii</i> | 45 | „ <i>pumila</i> , Hook. fil. | 45 |
| „ <i>obllqua</i> , Tar. MSS. | 2 | „ <i>inDonspicuuin</i> , Hook, <i>fil.</i> | 48 | <i>Vanda undulata</i> , Lindl. | 37 |
| „ <i>Wallichii</i> , Lindl. | 2 | „ <i>lanatum</i> , Hook, <i>fit, m</i> | 48 | <i>Yirgatte</i> (Sect.) | 8 |
| „ „ <i>var. brachycheila</i> | 2 | „ <i>pattens</i> , Lindl. | 50 | ZEUXINE <i>goodyeroides</i> , Lindl. | 50 |
| „ „ <i>var. umphabides</i> | 2 | „ <i>penangianum</i> , Hook. <i>fil.</i> | 47 | | |
| Mollifoliffi (Sect.) | 2 | | | | |
| MonDchilus (Sect.) | 50 | | | | |
| NEPHELAPHTLLTJM <i>gran diflorum</i> , Hook, <i>fil.</i> | 23 | | | | |





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Drawn by G.C.D.

MICROSTYLIS WALLICHII LAM.

Coll. by J. G. Thunberg



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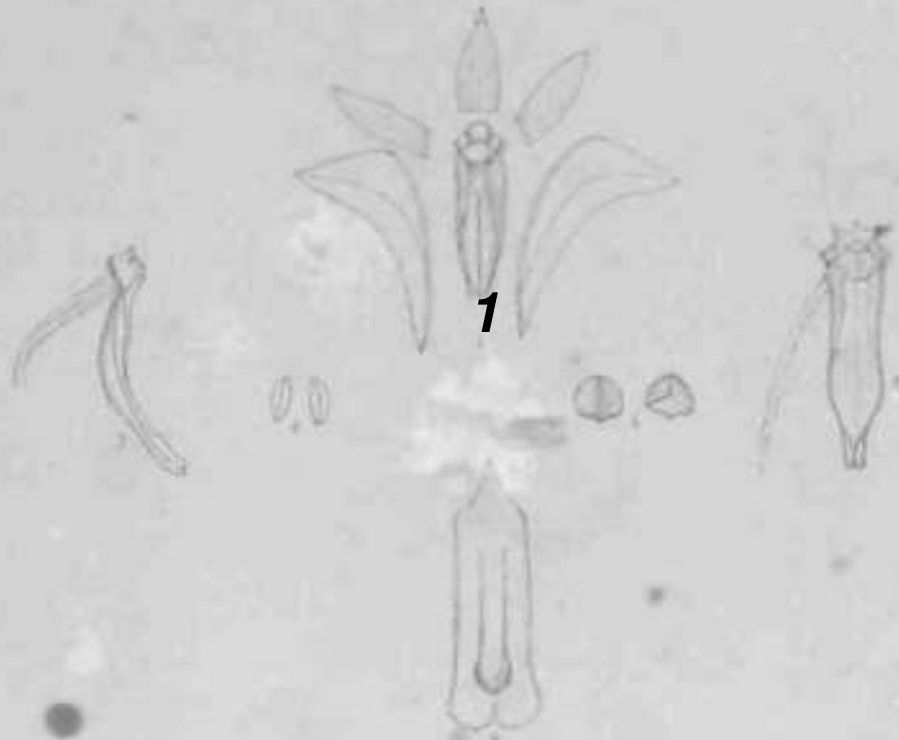


Drawn by G. Gilman

LILIPSIS PLANTAGINIFOLIA, LAM.

Lab. by G. Gilman

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Drawn by G. D. Sear

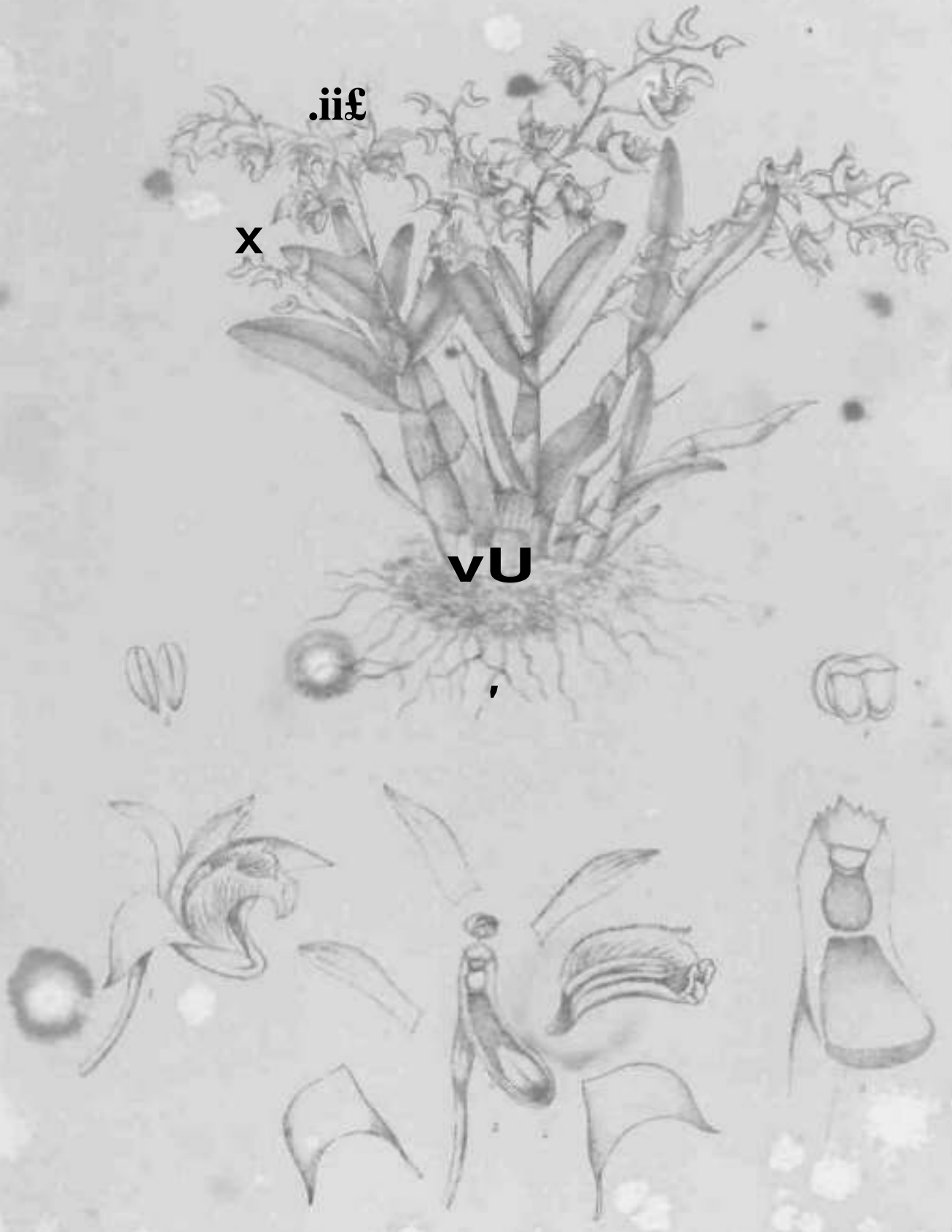
DETT. MOSSUM DEHIDANS Sear

W. C. Cresson Co.

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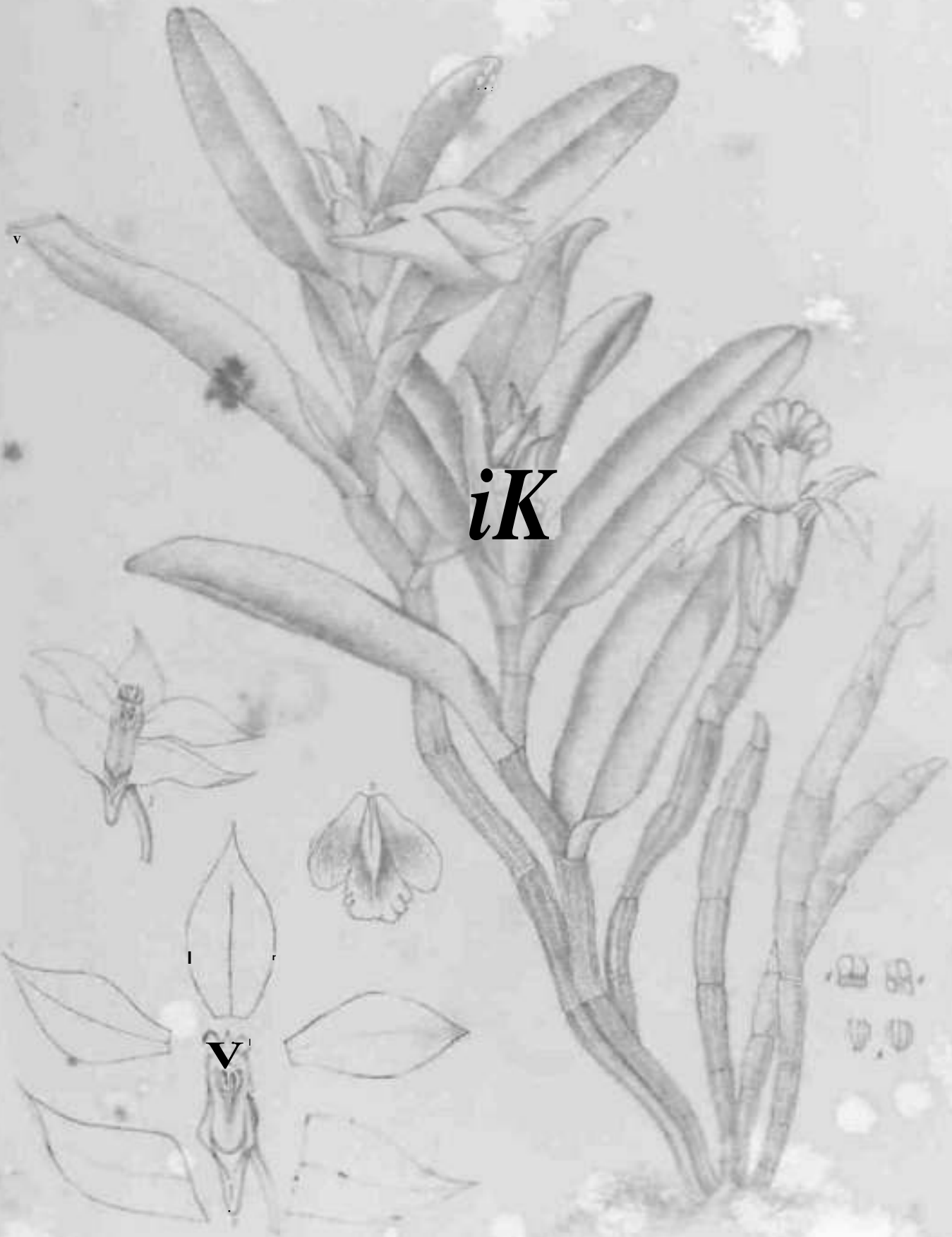
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See 11. Chap. 11. 11.



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DENINGERIUM PARVUM, R. & S. F.

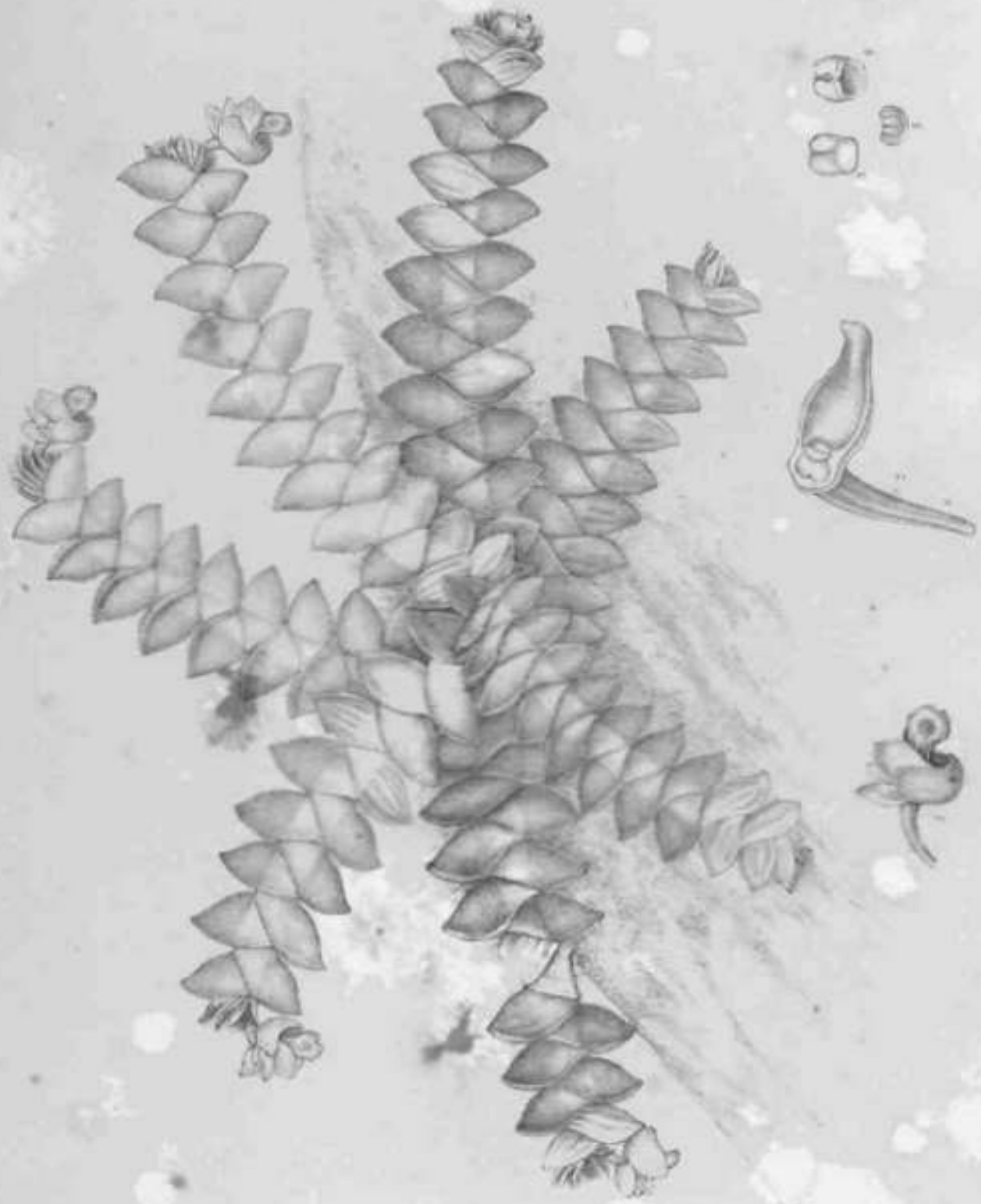


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With my changes 07



DESMODIUM LEMNIS, Hooker.

Drawn by L. R. Hough

v: **tf**



Drawn by G. C. Davis

SENECIOIUM TENAX, Linn.

Lab. by Clara Lily C.



Drawn by G. C. Davis

Psychotria paniculata, Par. and Iviclii.

Lith. by Oliver. Size 17

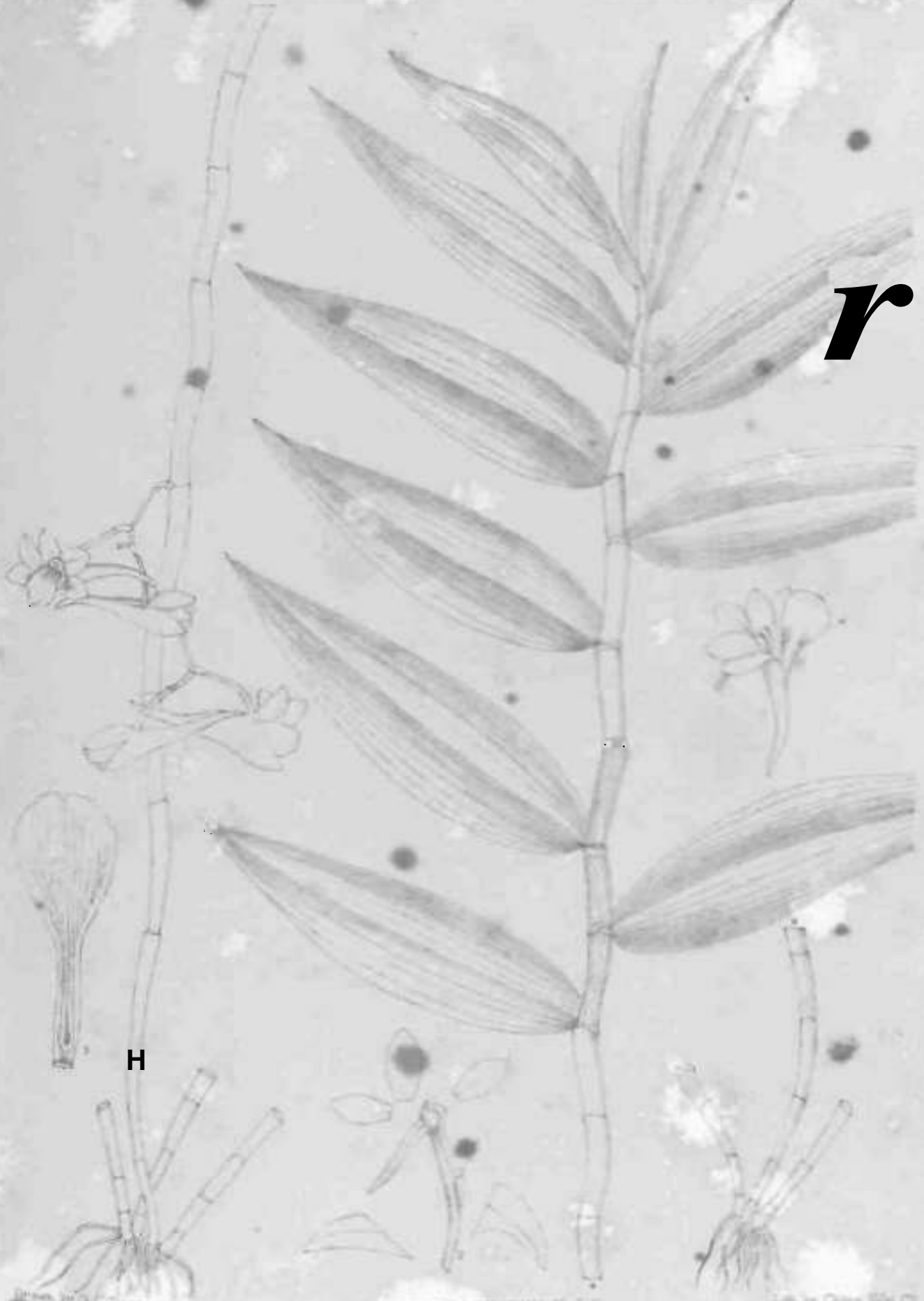


Drawn by G C Linn

DENTIROBIUM TENIICAULE, Hoot f.

Engr. by Clara Schott

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H



Drawn by G. C. Sain

Engr. by P. F. Sain

ISANDROSIUM PANDURIFERUM, Hook. f.

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Si'ib, li C DM*

DENDROBIUM TROPEOLIFLORUM, Hook f

Lib. by G. E. Hay



Drawn by E. Blyth.

DENDROBIUM NOTANS, Linn.

Lith. by B. K. VAJ.

^ *mmm*



Drawn by L. Singh.

Lit. by P. Kirby.

ANEMONE CANDIDA Willd.



Drawn by G. C. Dutt

STYPOBUM, Lindl.

Lib. by P. H. Datta



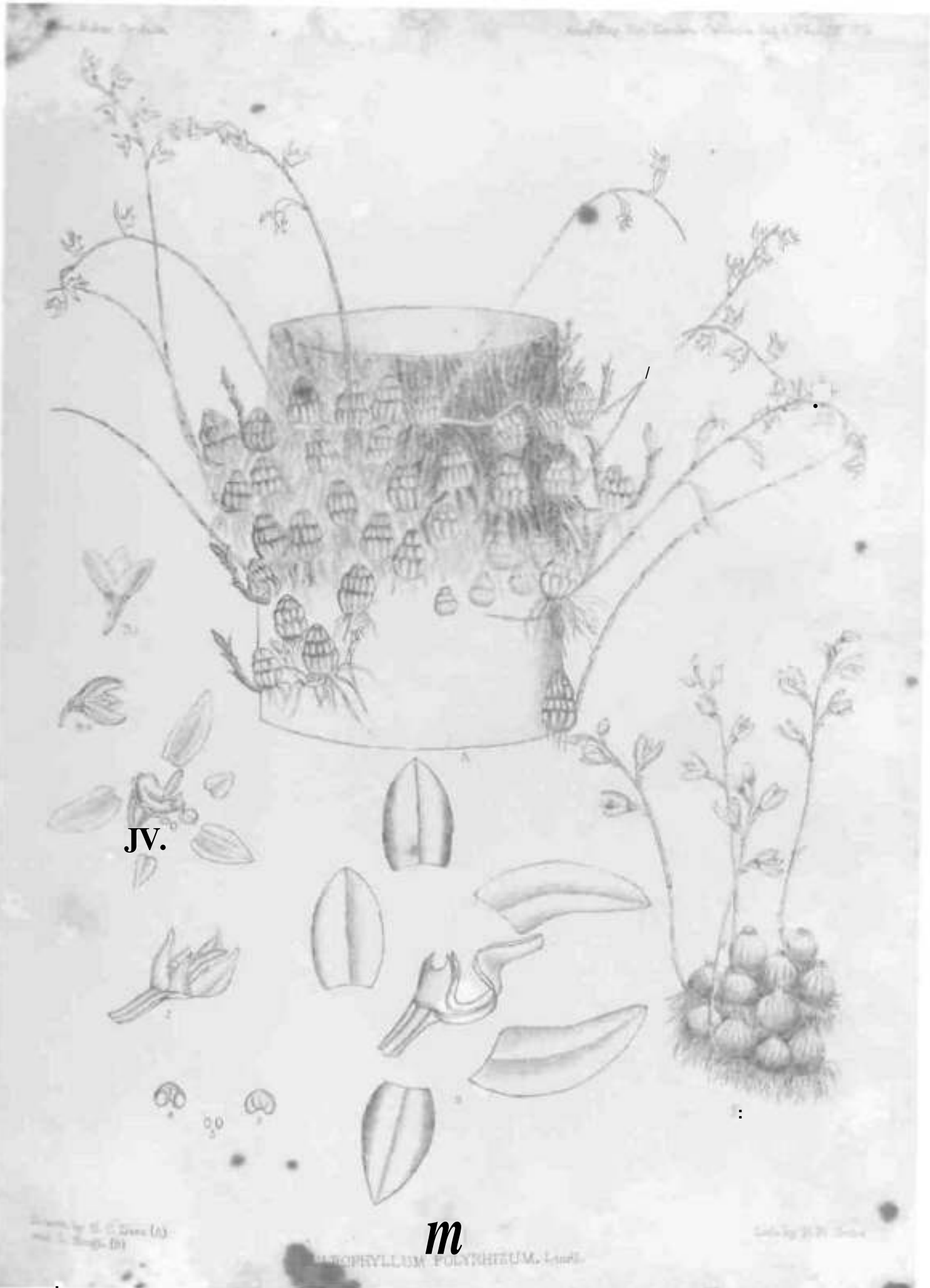
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A



Life by F. H. Fisher

ORCHIDUM PALPEBRA, Lindl.



JV.

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Drawn by H. C. Green (A)
and L. Sargent (B)

MACHRYLLUM POLYTRICHUM, Lamour.

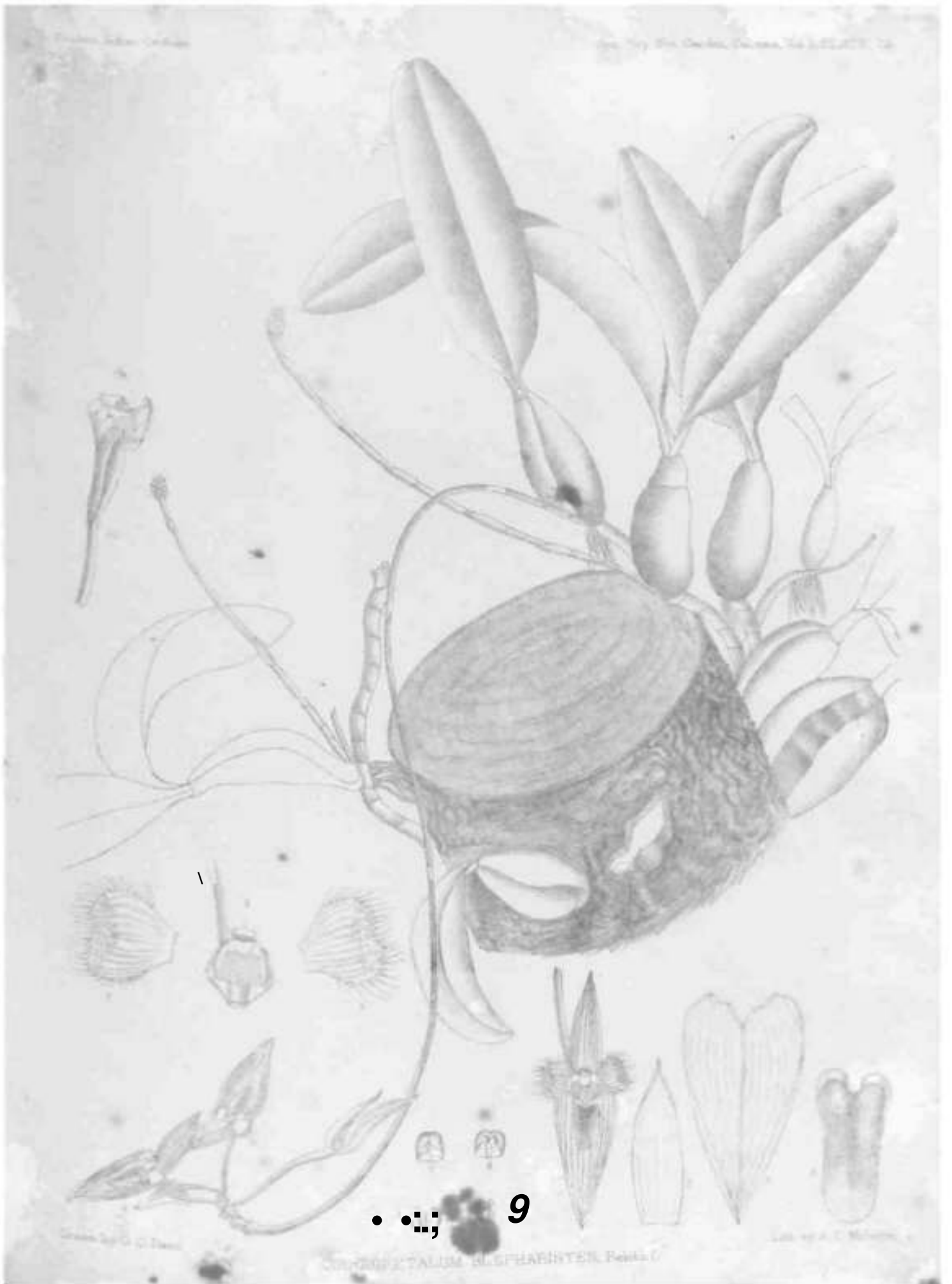
Col. by J. W. Green



Drawn by L. Burgh

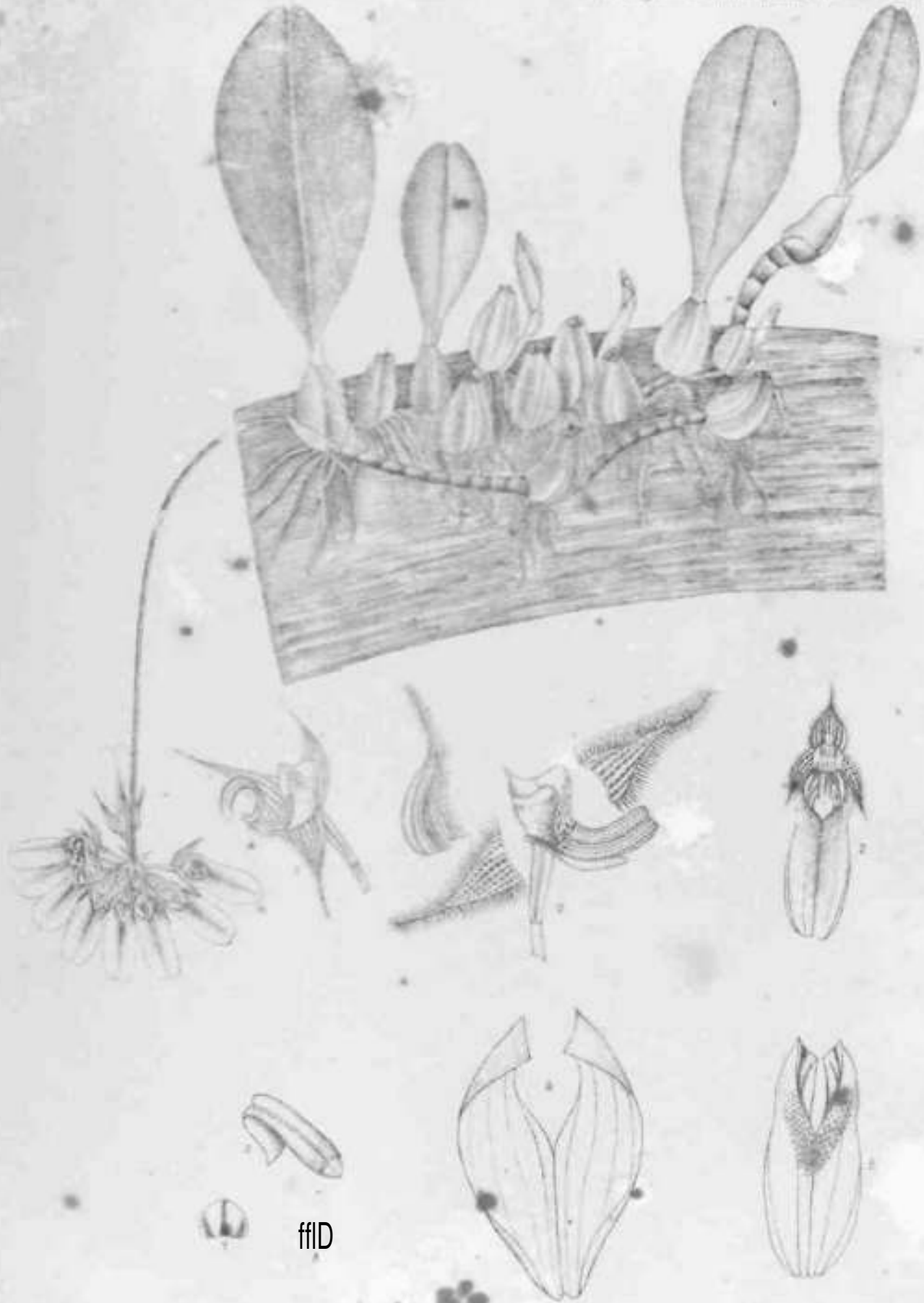
Litk b; P. H. Gilha

LBOPHYLLUM^TTBLEPHARUM, Reii



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CONVOLVULUM GLEPHABRYTES, PARR. G.



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Drawn by G. C. Deen

Lab. by A. C. H. H. H.

CITRUIPETAJUM GAMOSEPALUM, Griseb.

J

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Drawn by L. S. Engl.

CIRRHOPETALUM ASPITOSUM, Wal.

Lab. by A. C. Murray.



Drawn by G.C.D.M.

CIRRHOPETALUM REFRACTUM, Kuhn

Engr. by B.C. By

L



Drawn by G.C. Davis

Lab. by B.E. Sear

PASSERA PARVIFLORA, L.f.



Drawn by L. Duff

Lith. by n. (Ku v

EH.1A DBESA, LmJL



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Drawn by L. Singh

ERIA CLAVATA, Willd.

Engr. by P. N. Saha

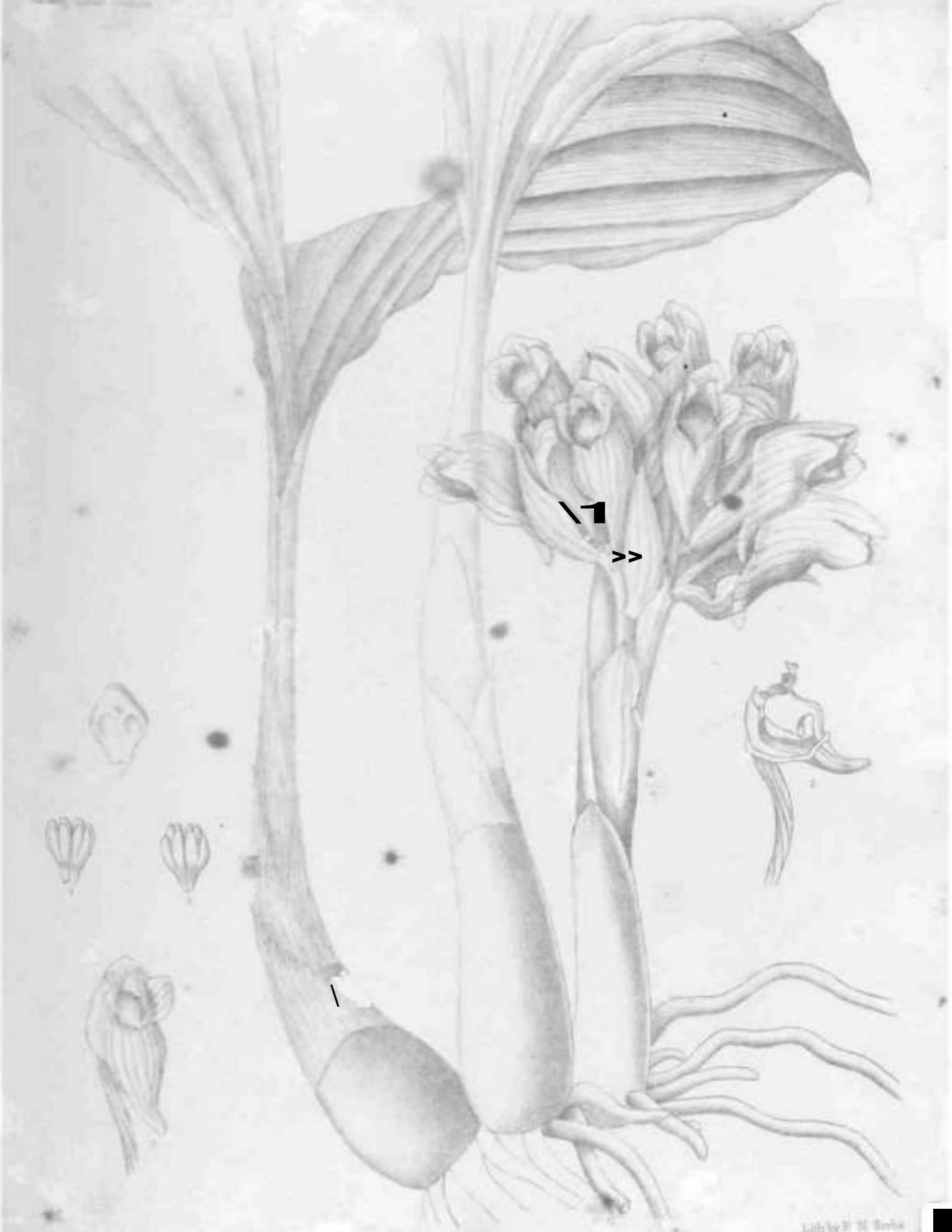
W



Wm. & A. Dyer

WESTINGHOUSE, LONDON

1854



ACANTHOPAPPUS SYLVATICUS, Less.

Wm. H. & Co. Lith.



Drawn by G. G. Don

Lit. W B r

NEPENTHES GRANDIFLORA, Hook. f.



Drawn by G.C. Davis

YUCCA LATIFOLIA, Hook

Lith by S. Chy



TAINIA CORDIFOLIA HERB.

Painted by G.C. Davis

Engraved by B.V. Day

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del. by C. J. Conner

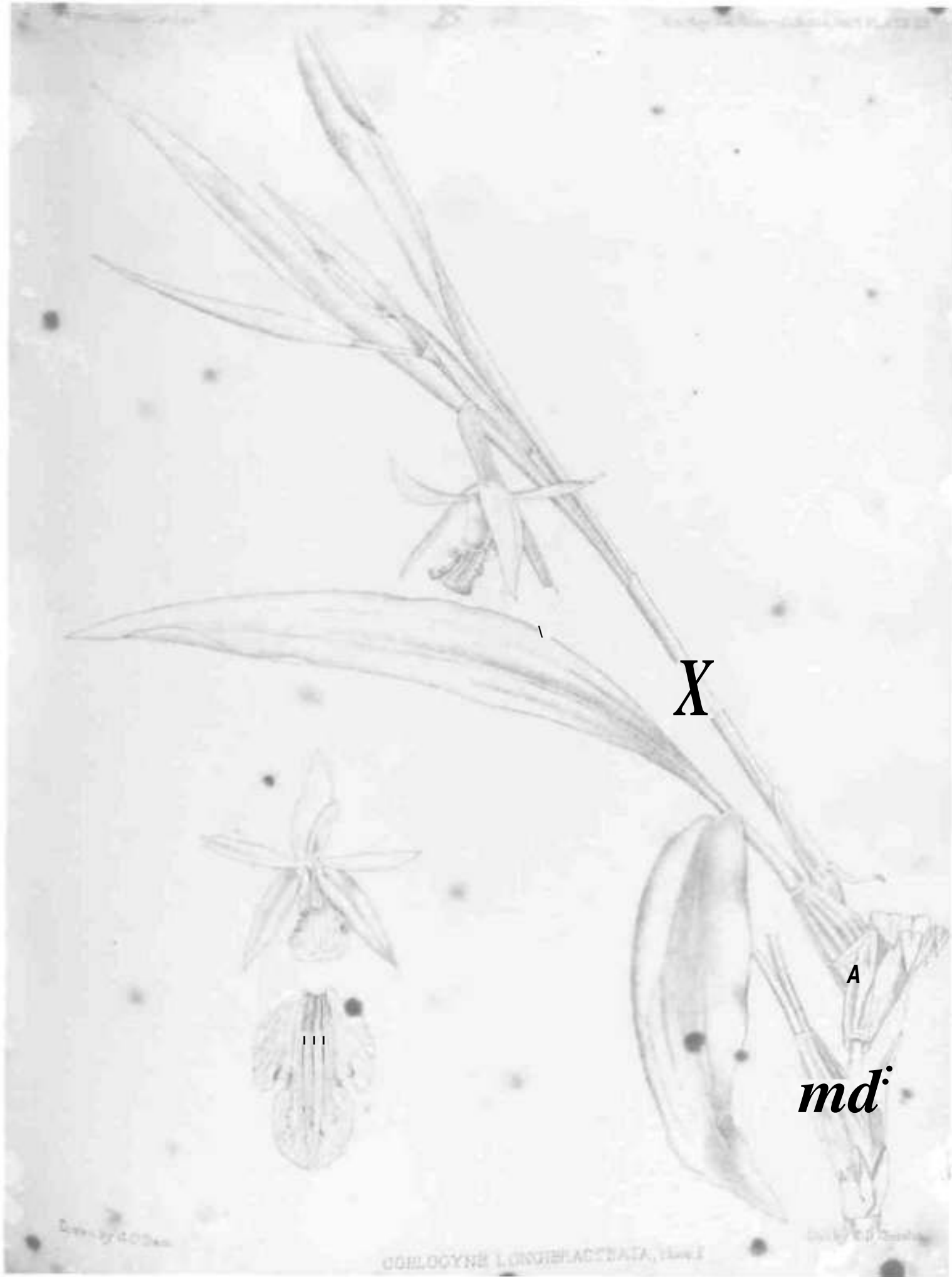
FRUIT OF MESSAGERIA No. 1



Drawn by G. C. Linn

Vanilla, Vanilla

Van. Sp. Pl. Hort. Calcutta, 1834, p. 10, t. 10, f. 10



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Drawn by G. O. S. & Co.

OPHOCLYPE LONGIBRACTEATA, 1841

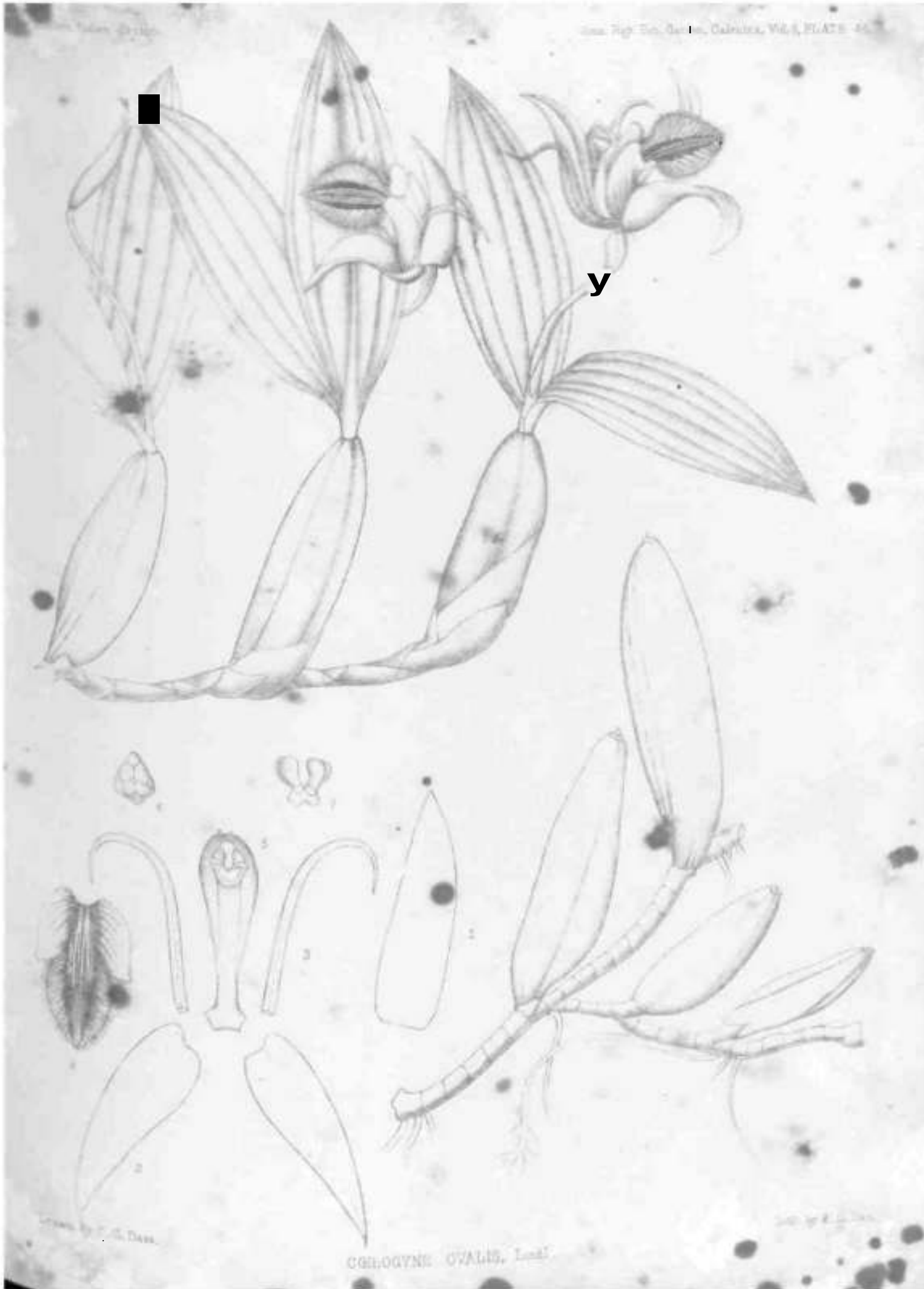
Printed by G. O. S. & Co.

Bot. Garden, Calcutta, India, 1872

Bot. Garden, Calcutta, India, 1872



BELOSYNE SUAVEOLENS Hook. f.



Drawn by P. G. Datta.

CEROPEGIA OVALIS, Lam.

Bot. Soc. Ind.



Wail

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Drawn by W. Wail

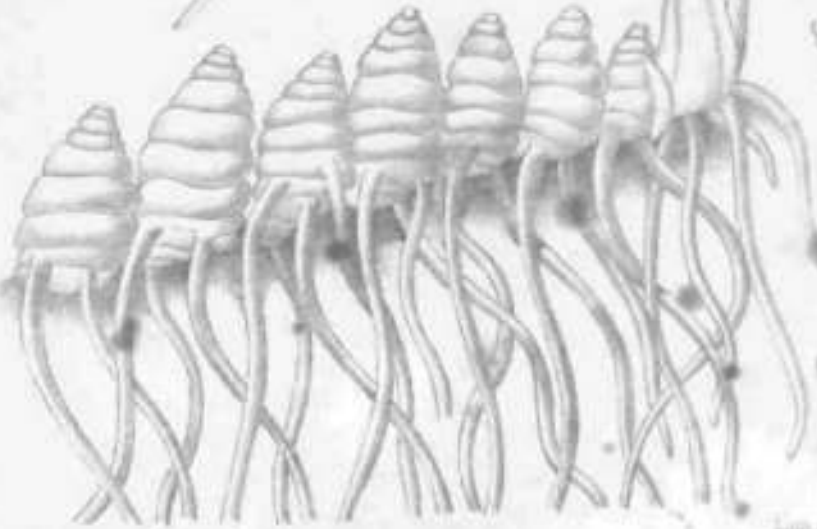
Wail

CYNCHONA FLAVIDA. Wail.



COLOGYNE ? UNIFLORA, Loeb

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Drawn by G. C. Dyer

Printed by I. A. [unclear]

CALANTHE HERCYNICA, Lindl.



Drawn by J.D.H.

Enl. by G. S. 1848

GALANTHE GLOROLEUCA, Lmdl

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Woods & Lough

EULOPHIA EXPLANATA Lindl.

1848



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EULOPHIA NUDA, L. MACBETHIA

W. & A. G. Scudder, Delin.

W. & A. G. Scudder, Delin.

W. & A. G. Scudder, Delin.

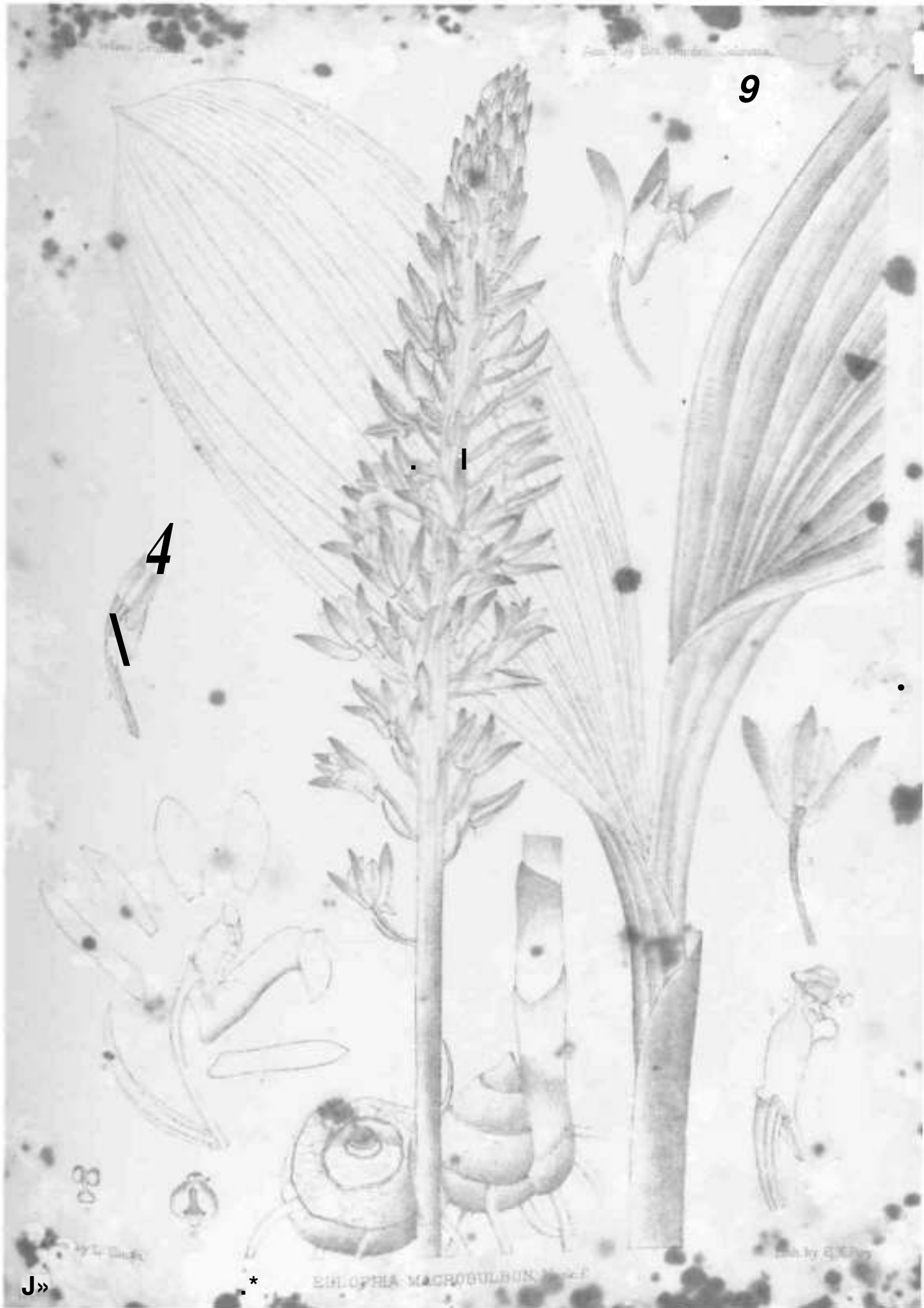


ETILOPRIA NUDA, Sm. & Gussone

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EULOPHIA NUTTIANA, LINDL. var. *AMERSONI*



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ERIOPHORA MACROBULBON

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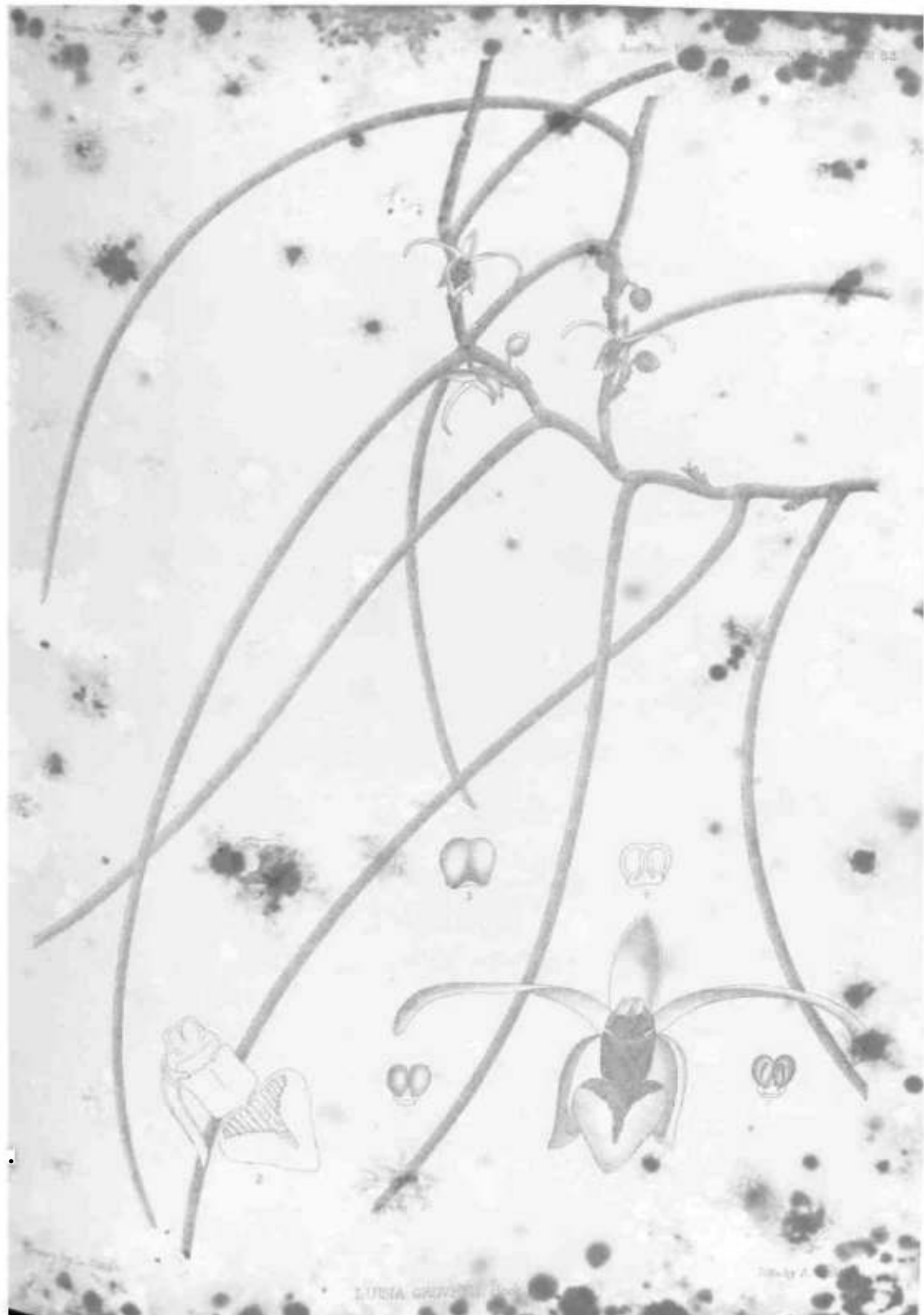
Dess. by G. X. 1890



Drawn by G. C. Dorr

EULOPHIA ANDAMANENSIS Hemsl. f.

Illustrated by H. K. Thuy



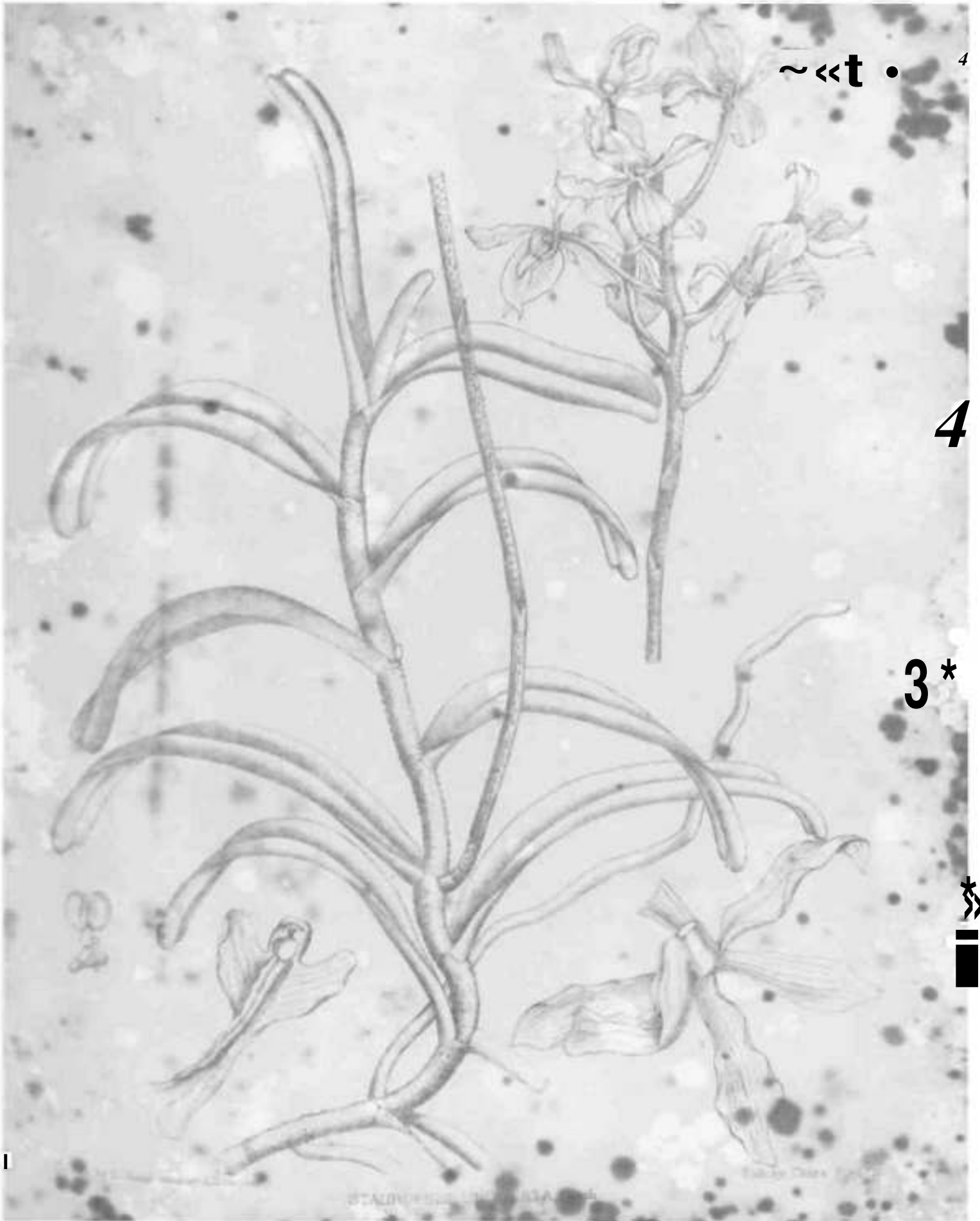
LYFIA GRAYI (Hook.)



Drawn by G. G. Don

TRICHOGLOTTIS DAWSONIANA

Look by Oliver & Boyd



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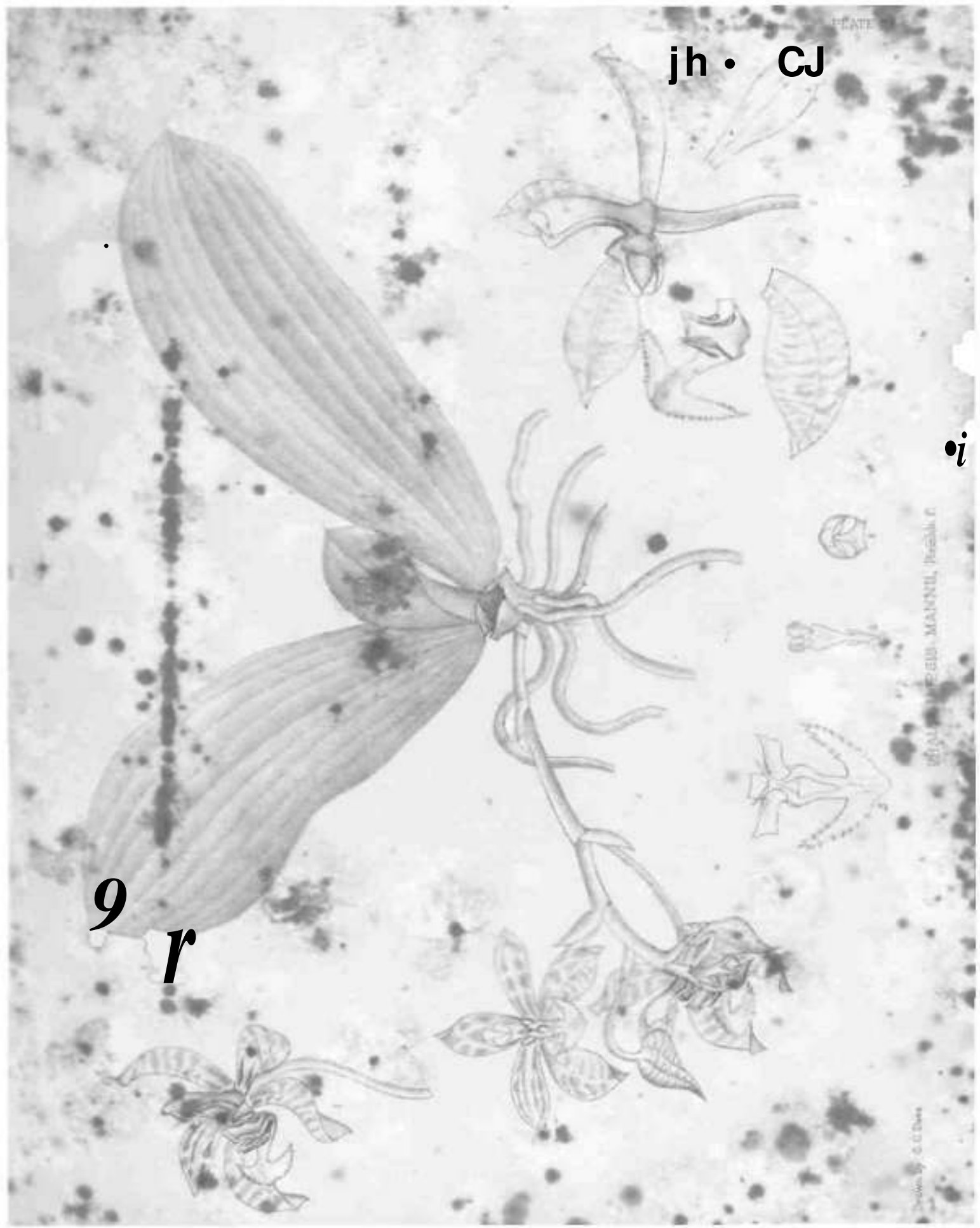
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W. MANNING, MANNING, KAROLIN C.

Drawn by G. C. Davis

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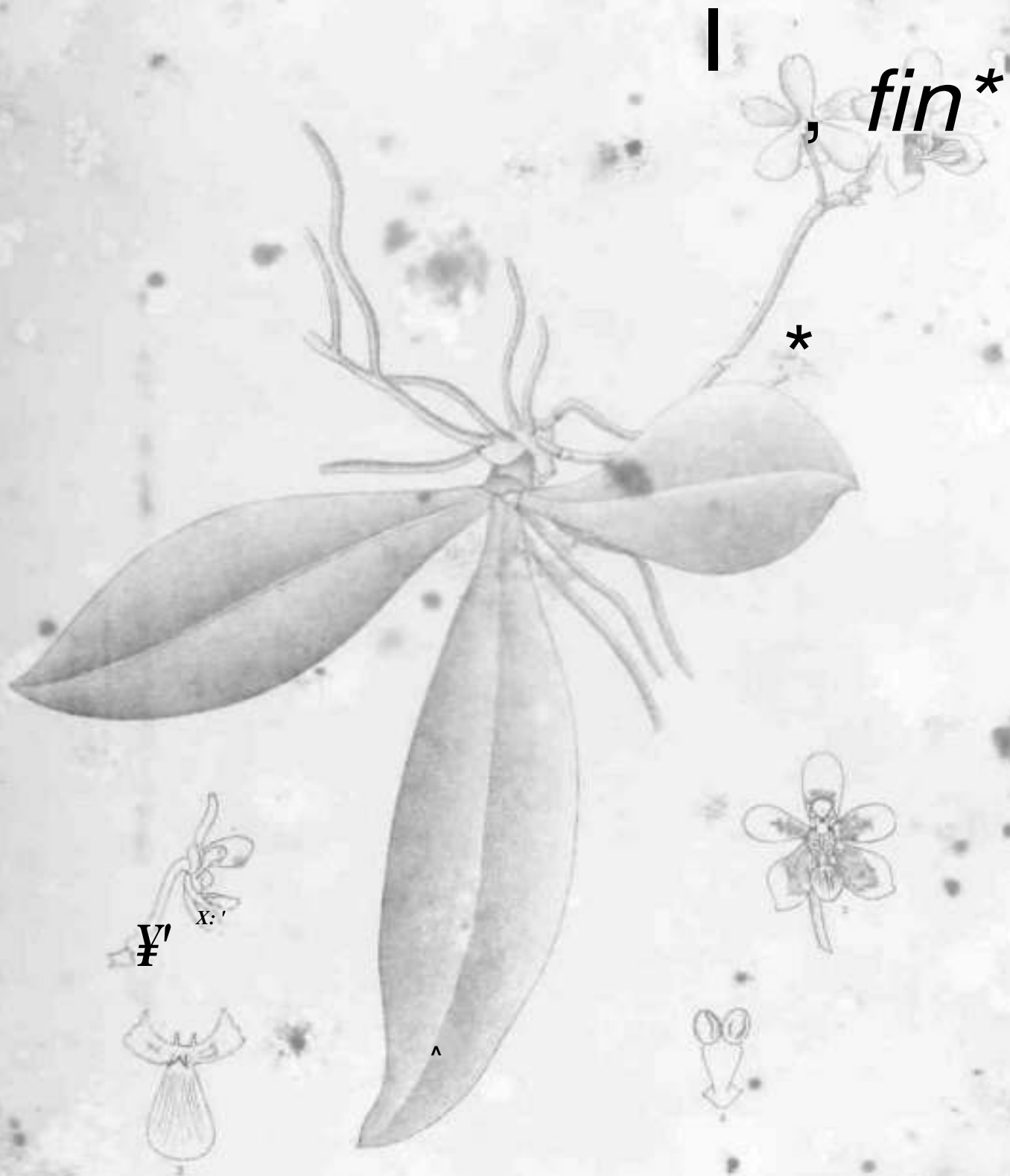
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L. S., Kkitr* Si

PLA. HOPEI. ERIC. 1872. 5



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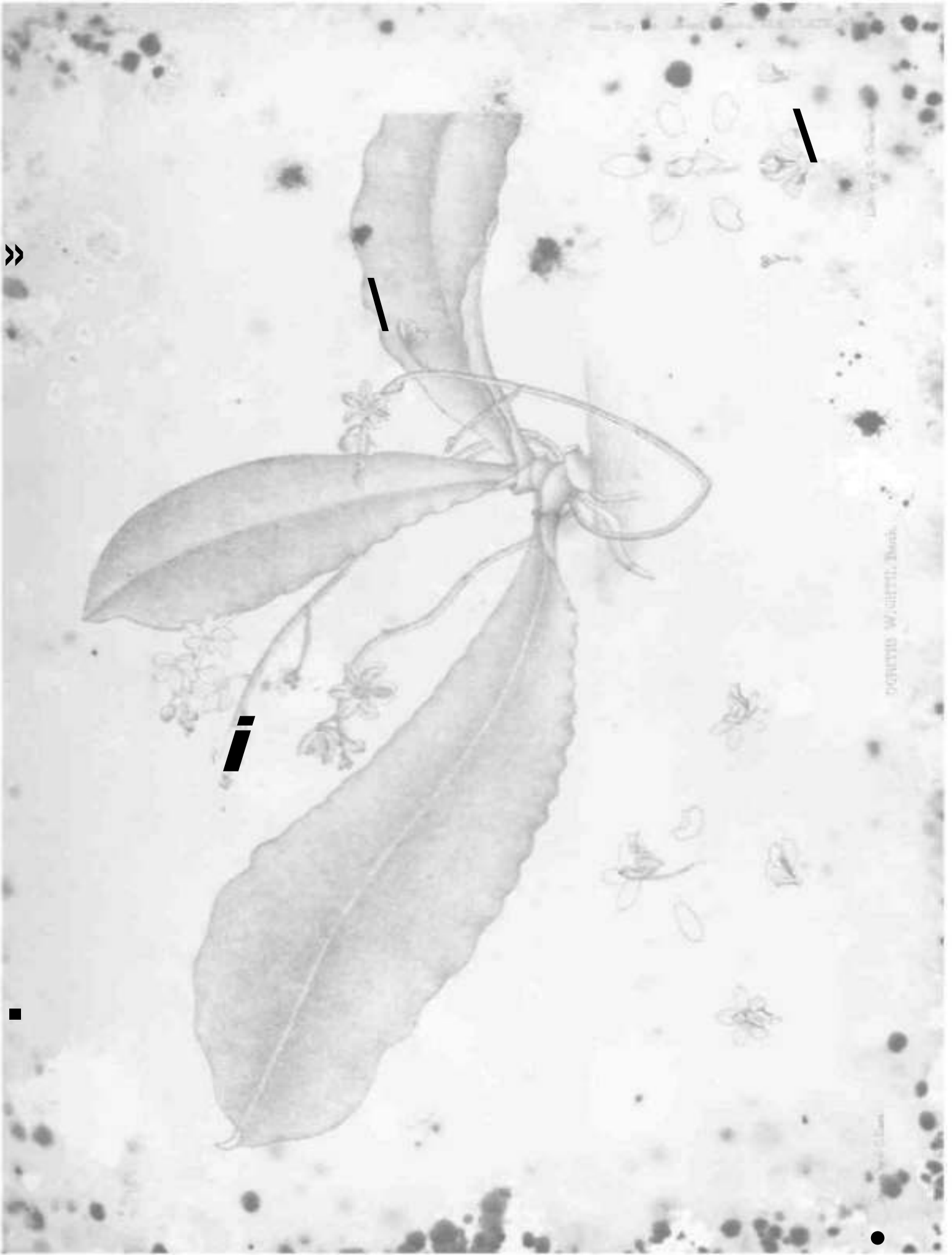
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Scaevola W. Gillett, Boeck.

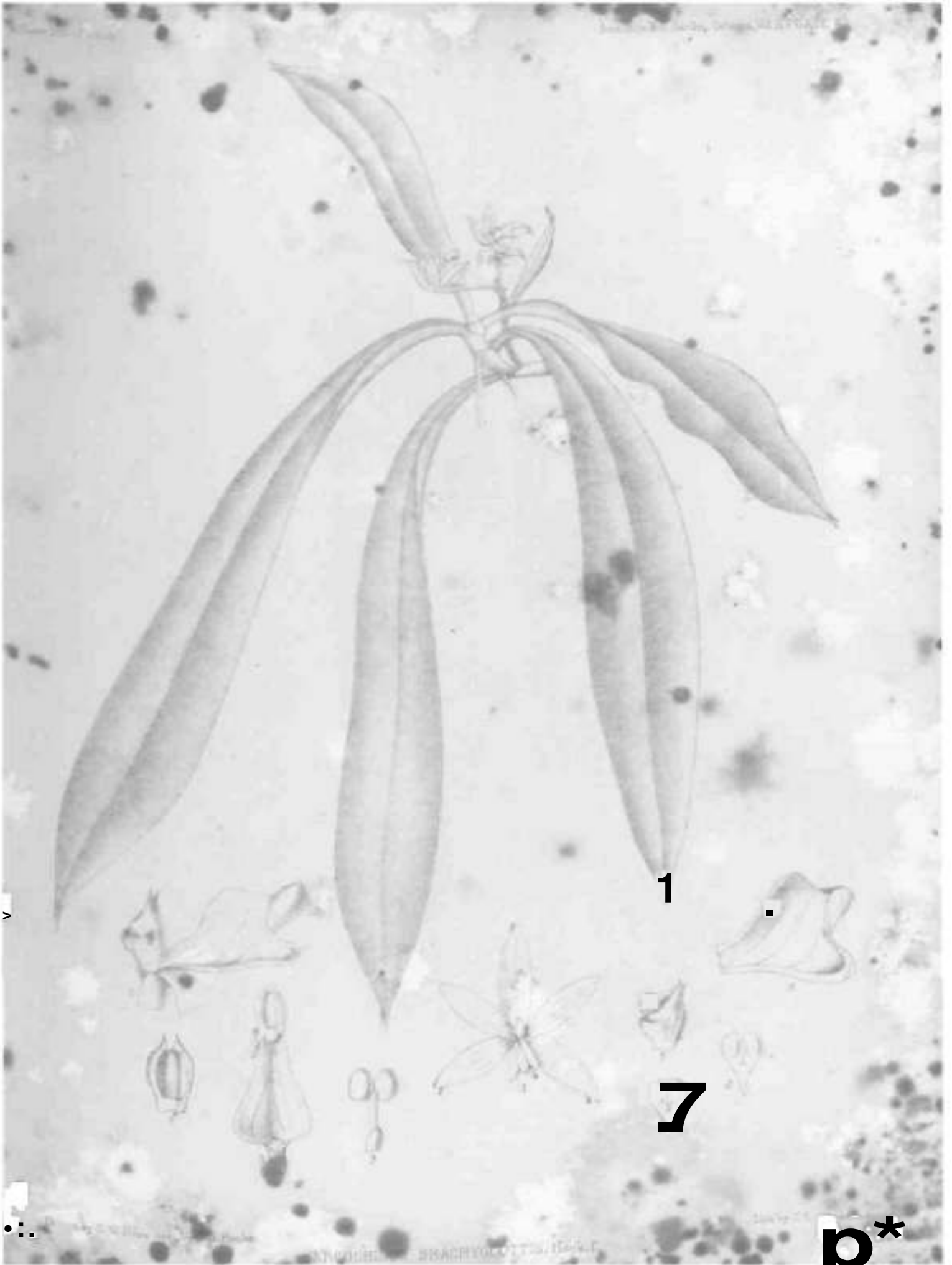


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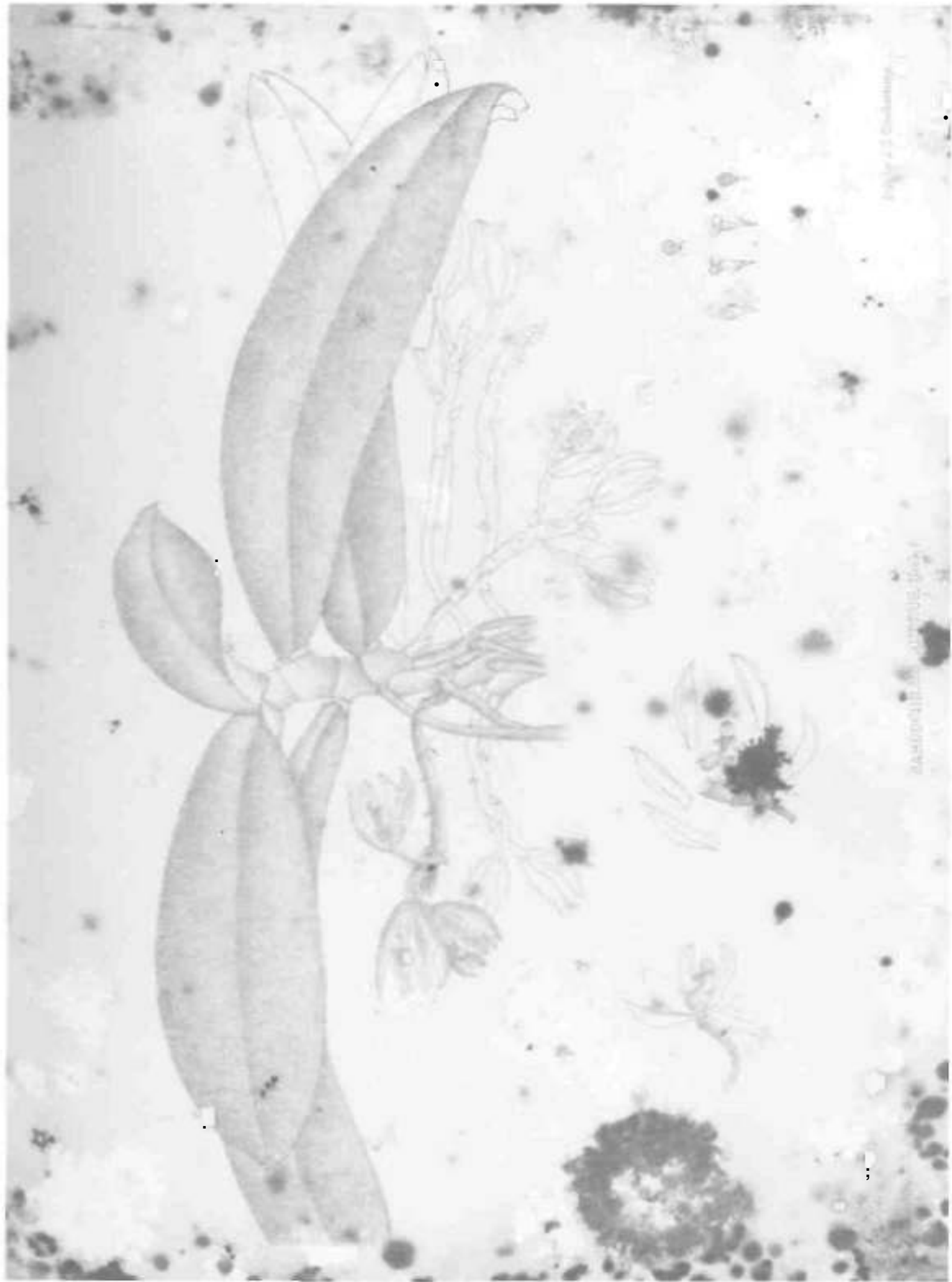
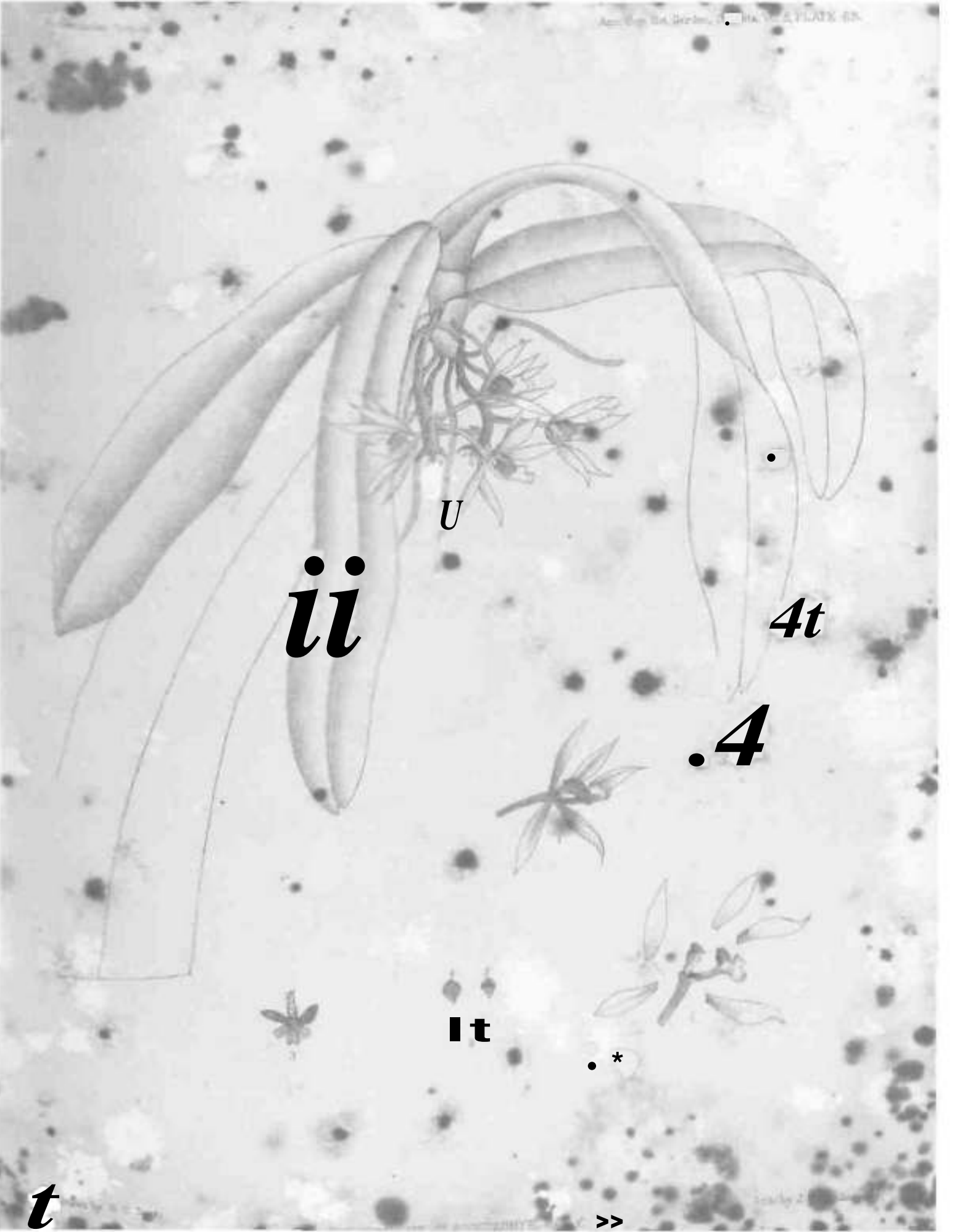


Fig. 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.

Botanical illustration of a plant with large, rounded leaves and a flowering branch.



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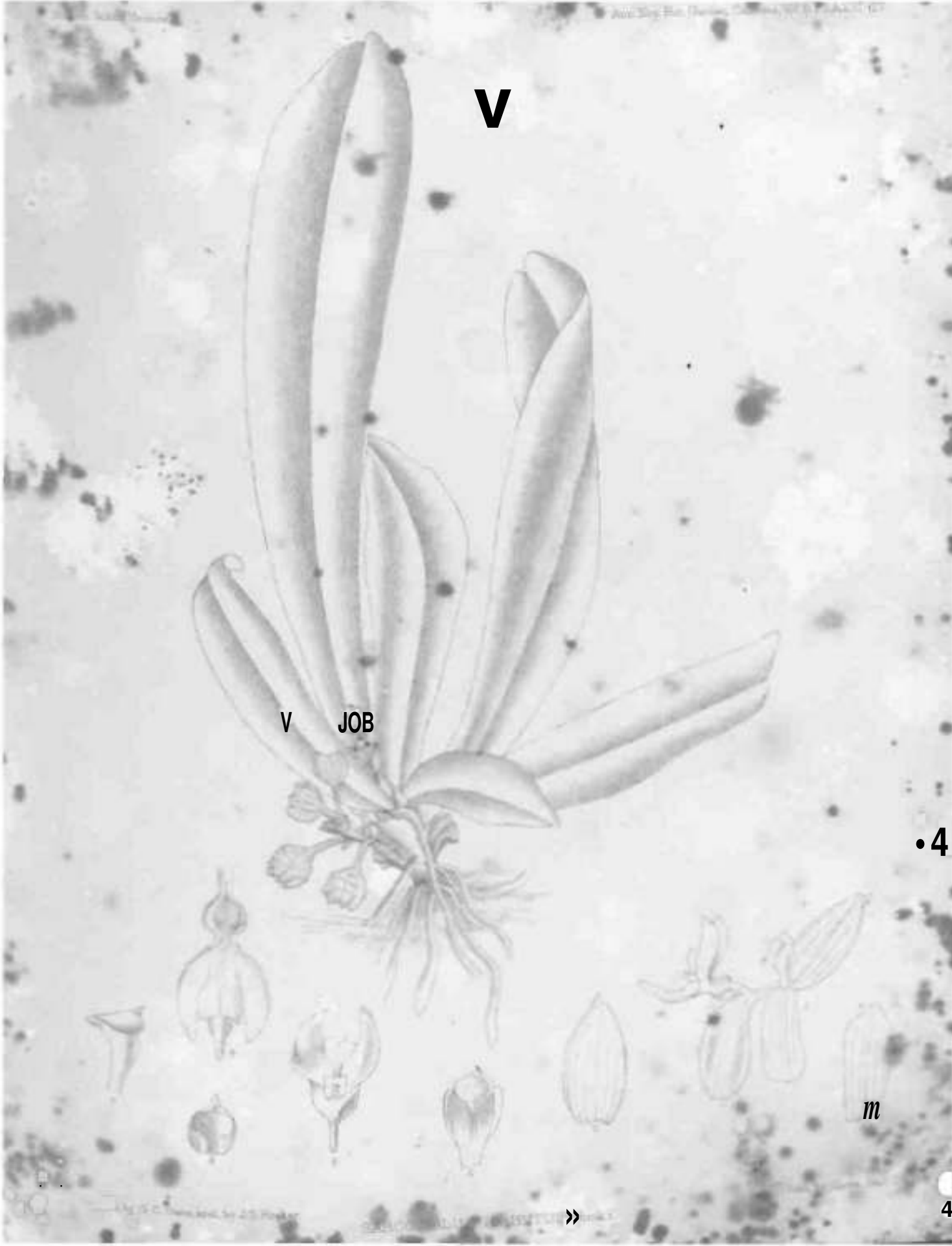
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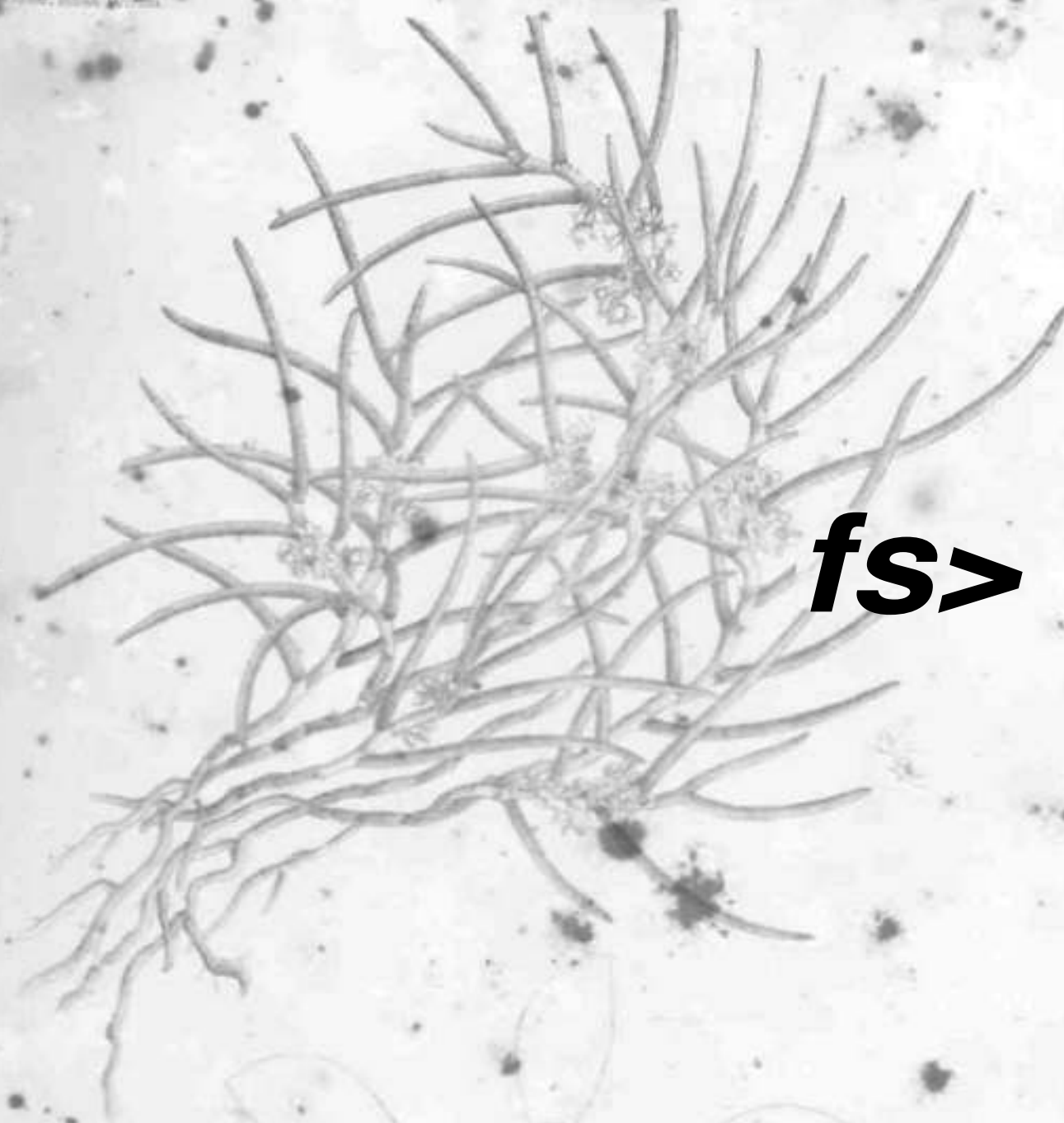
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1882, 1883, 1884



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ANNALS OF THE BOTANICAL SOCIETY OF LONDON

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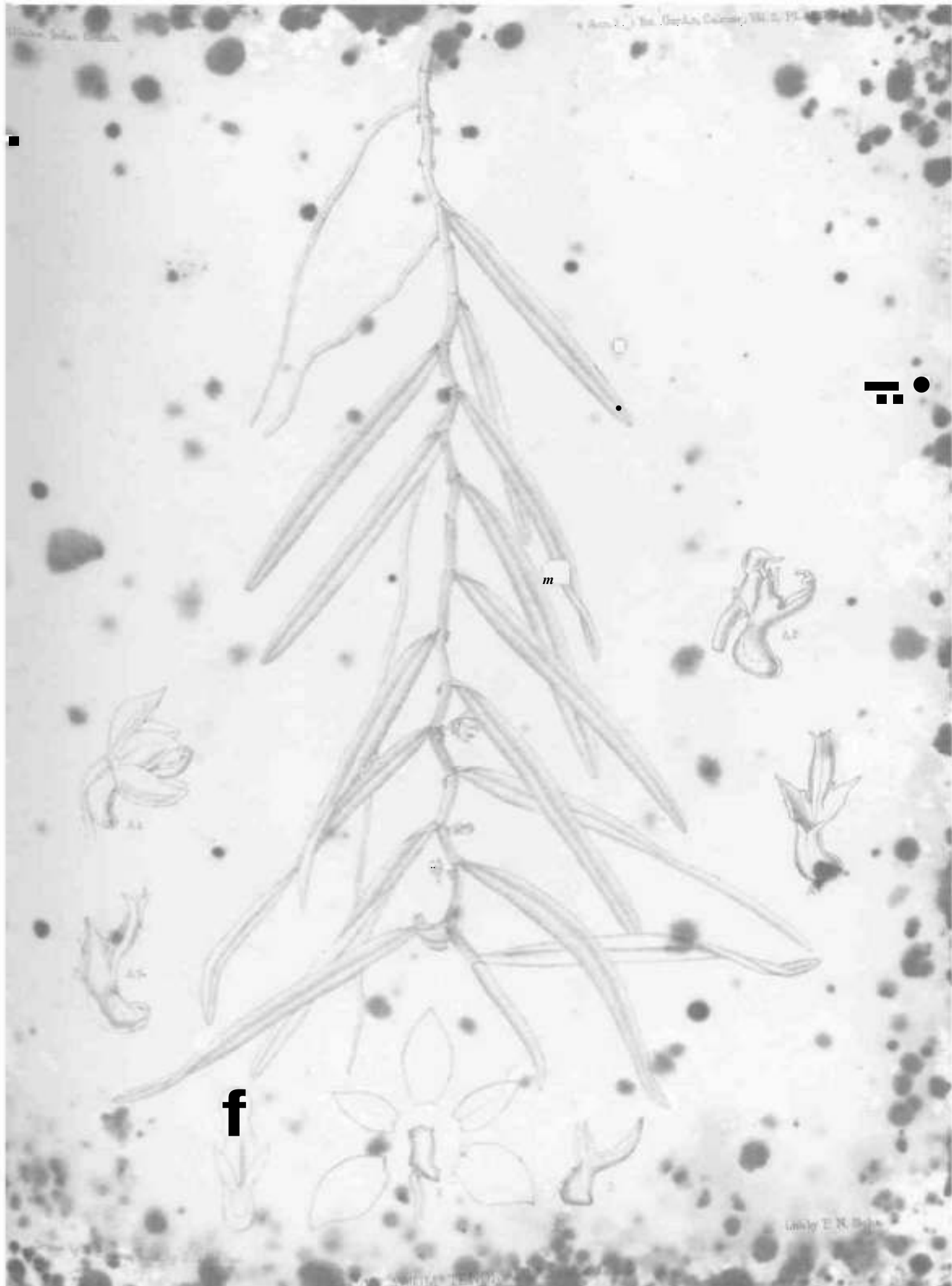




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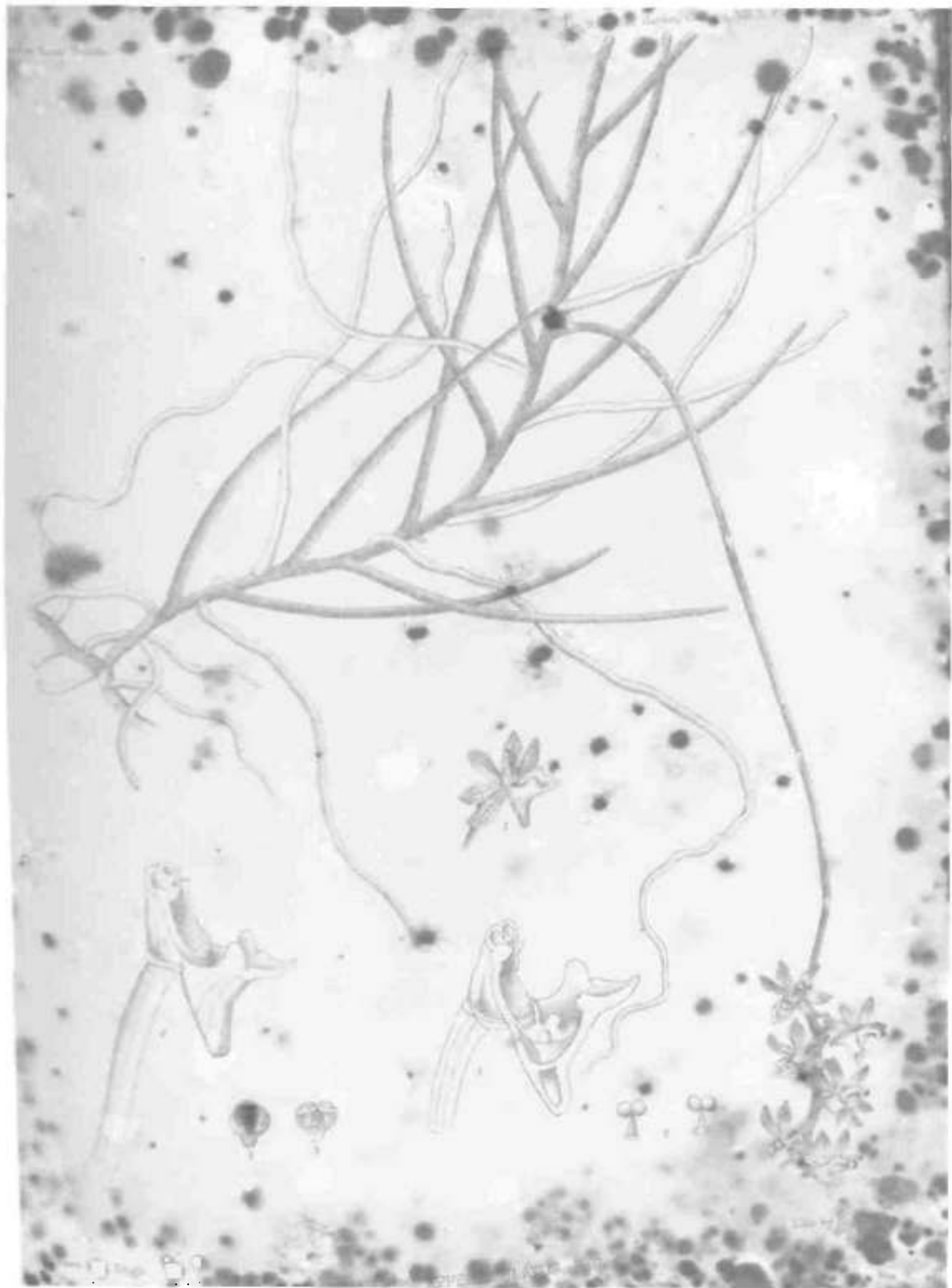
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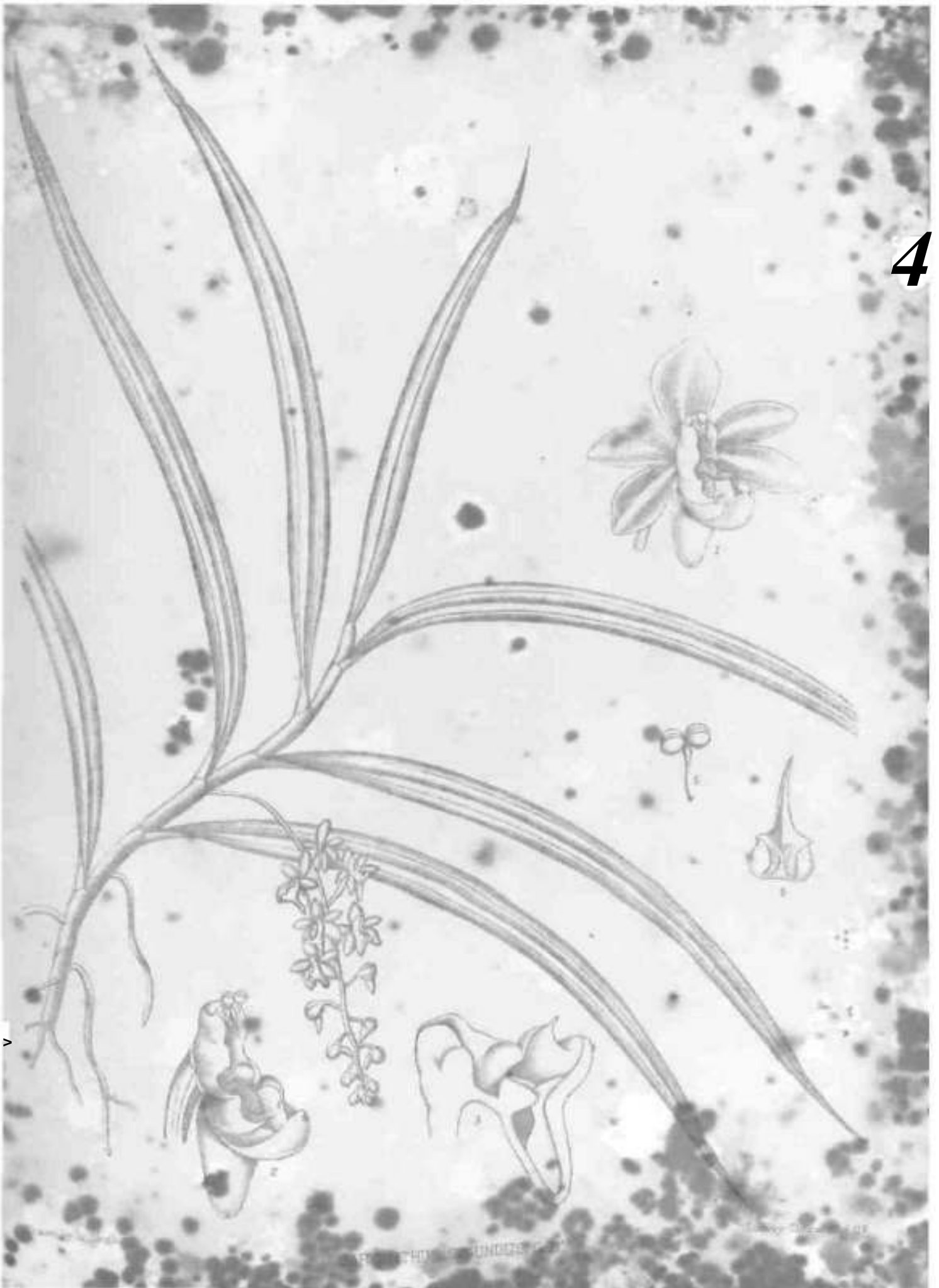


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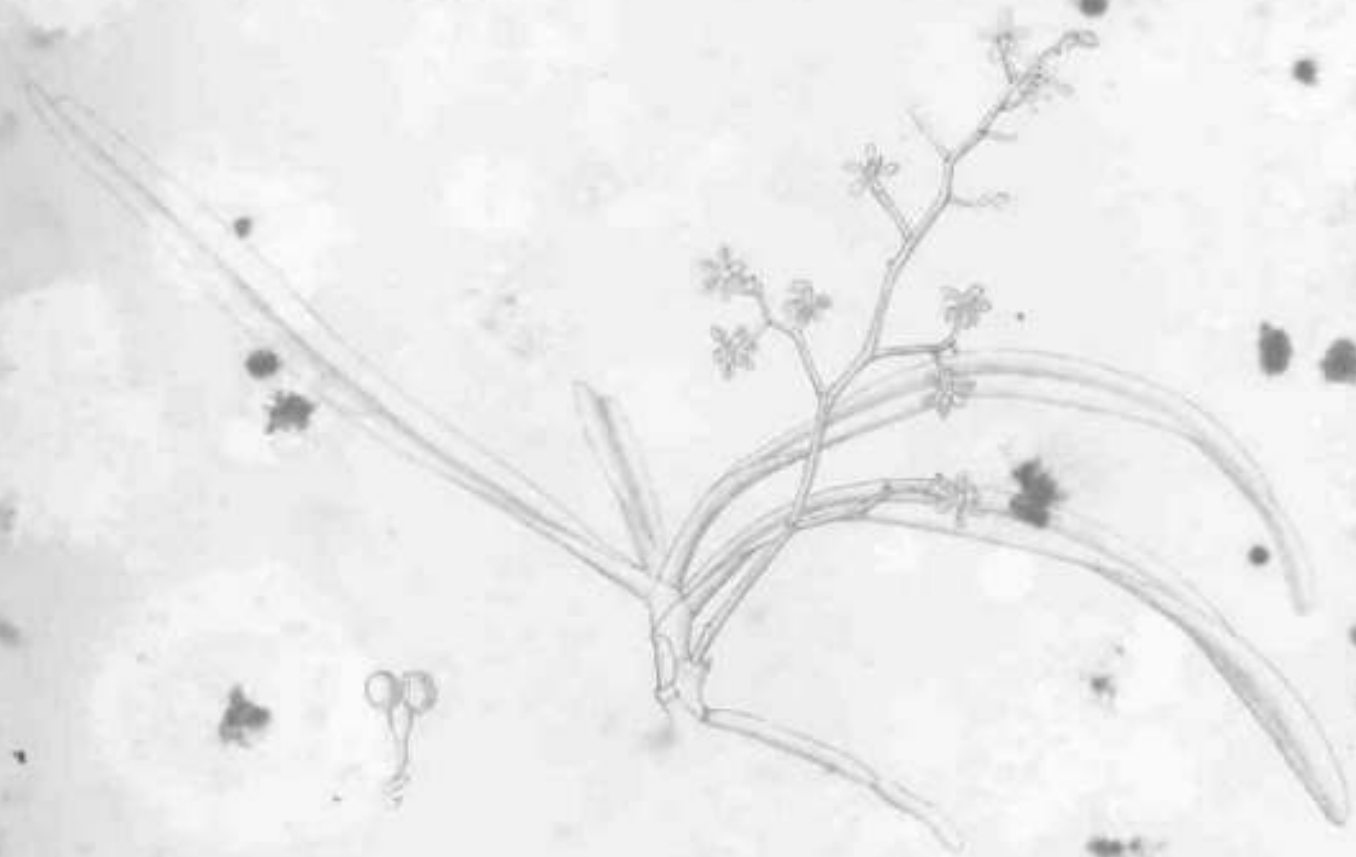




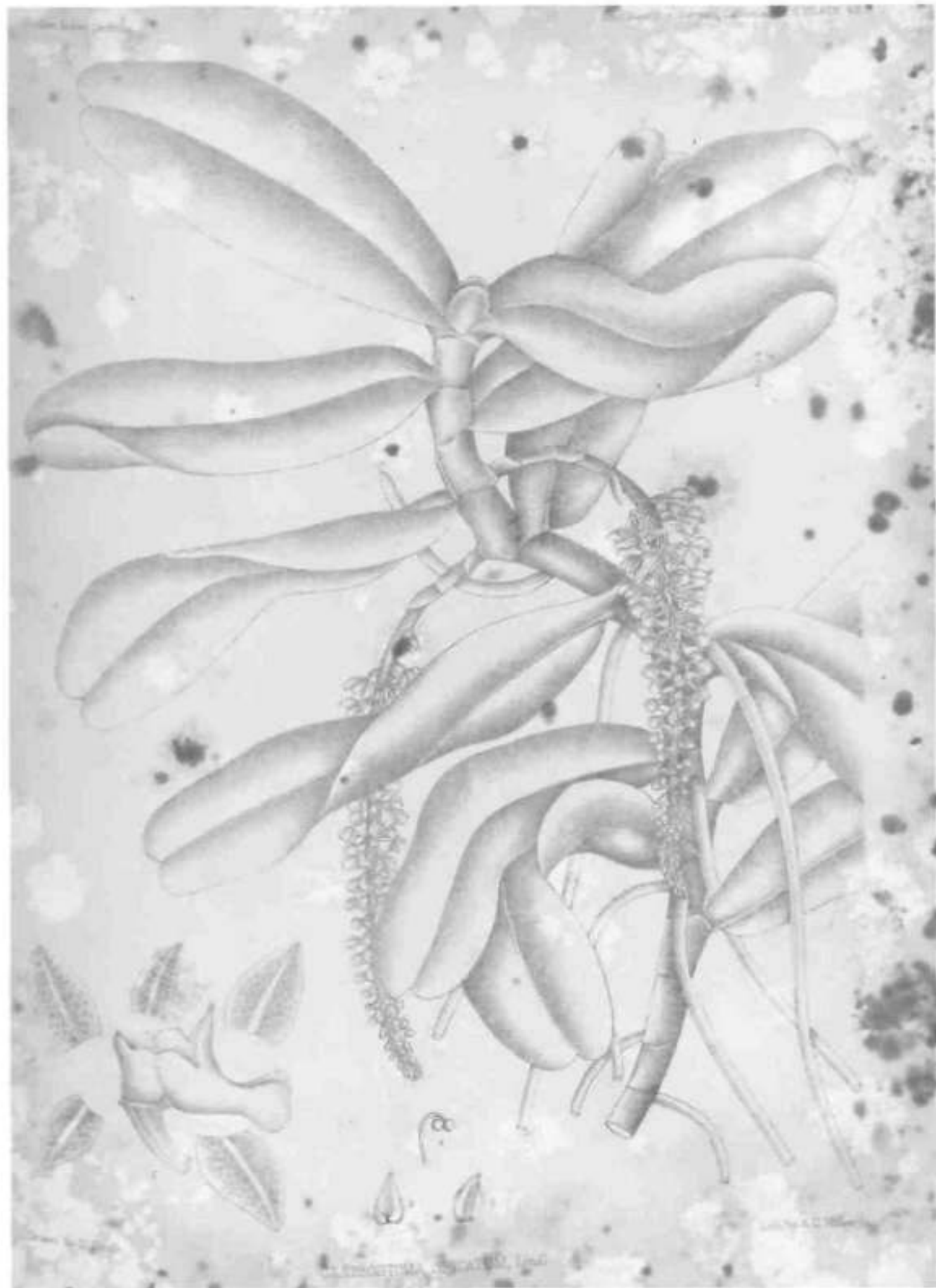




ASPLENIUM AIDAMANICUM Hook. & G.



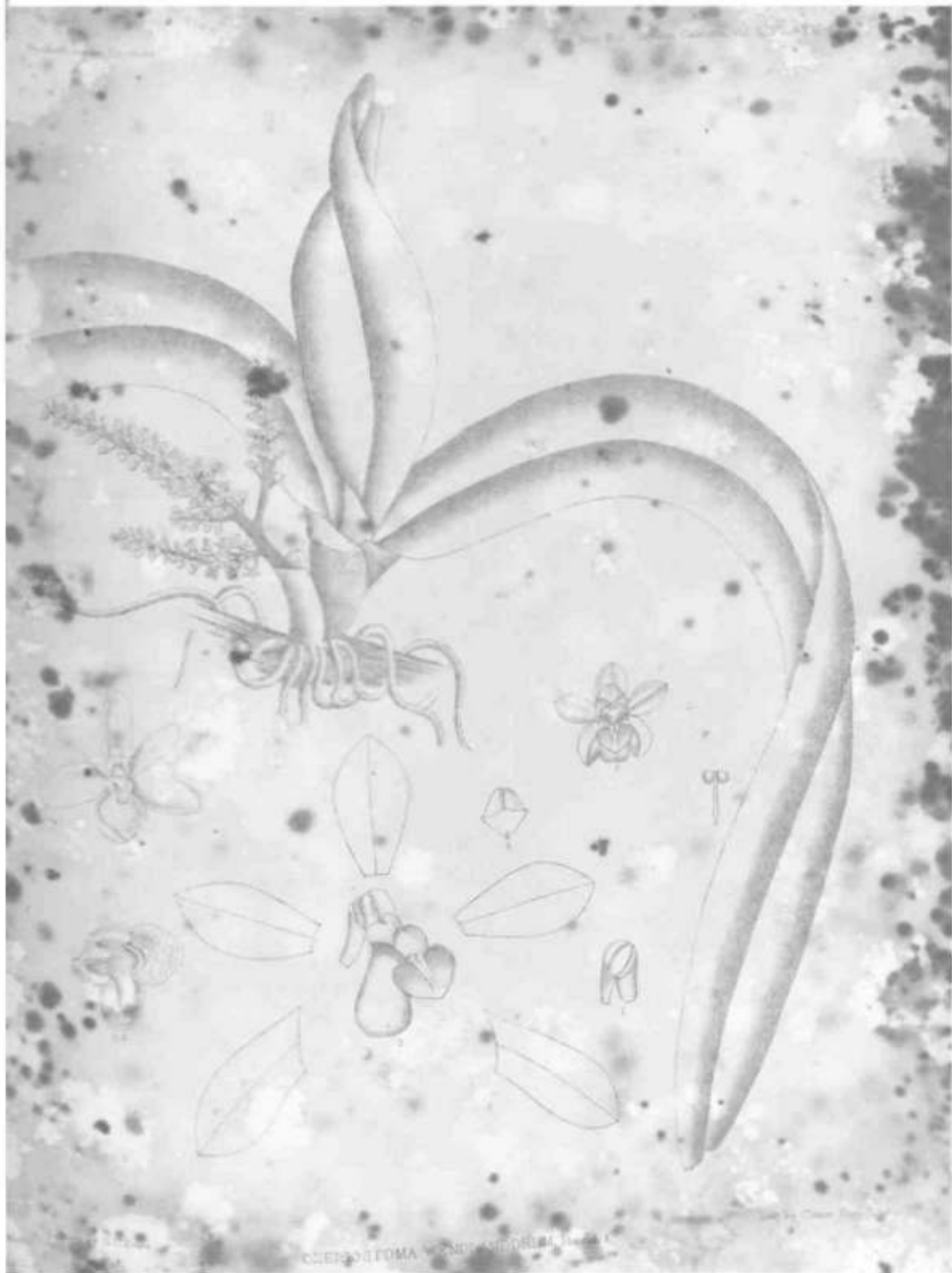






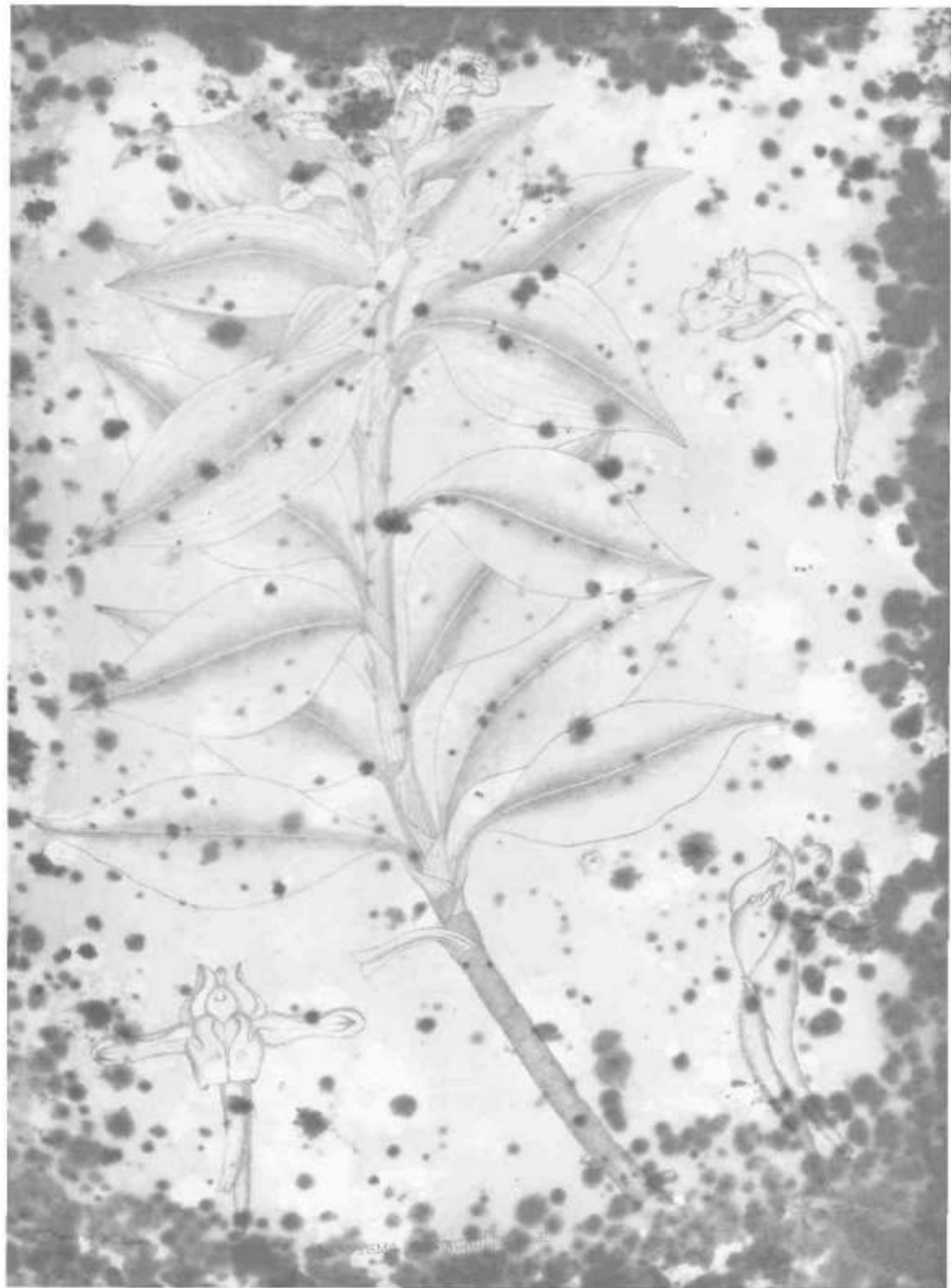
CLEISTOMA STRACHEYI

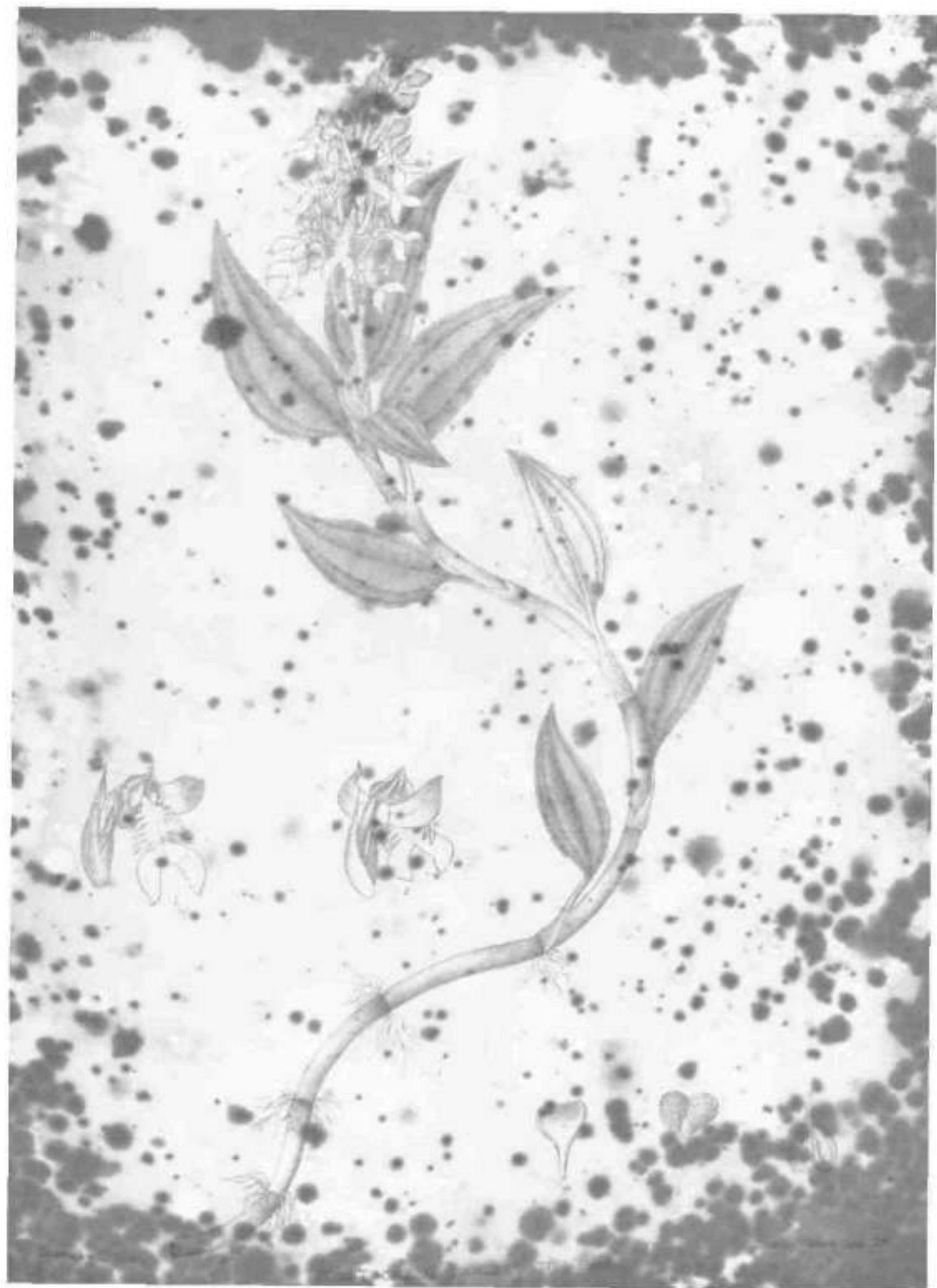
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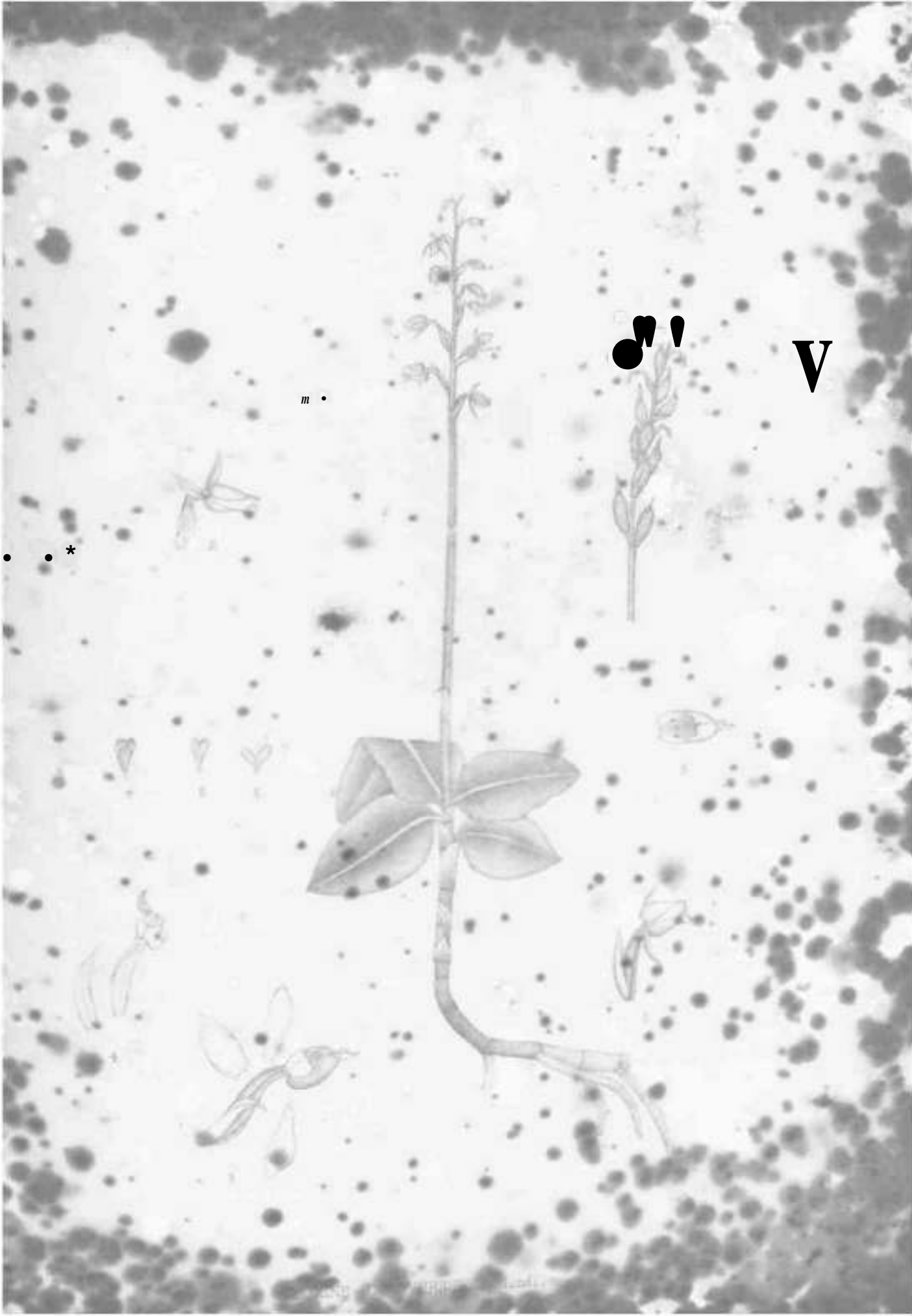












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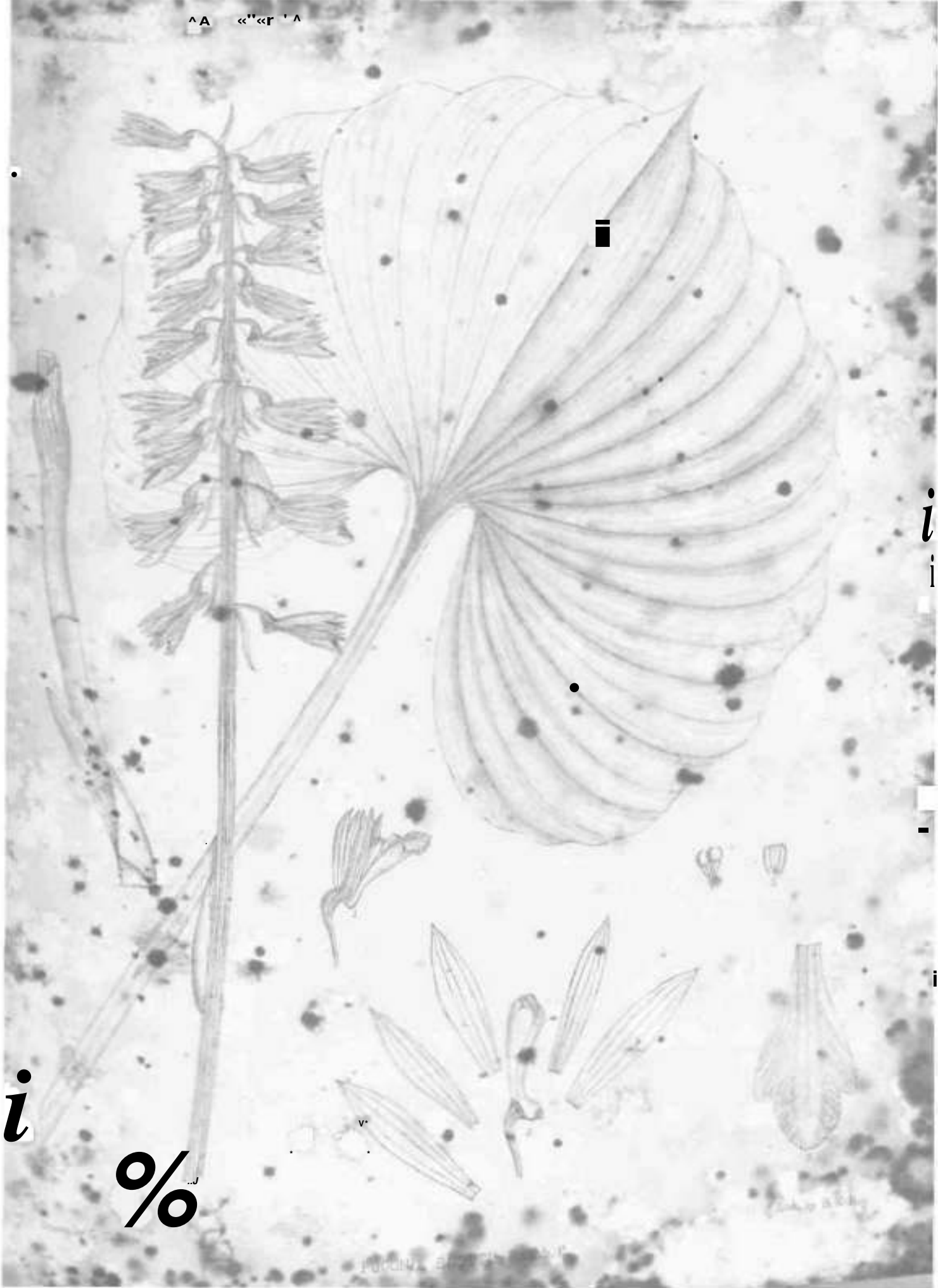
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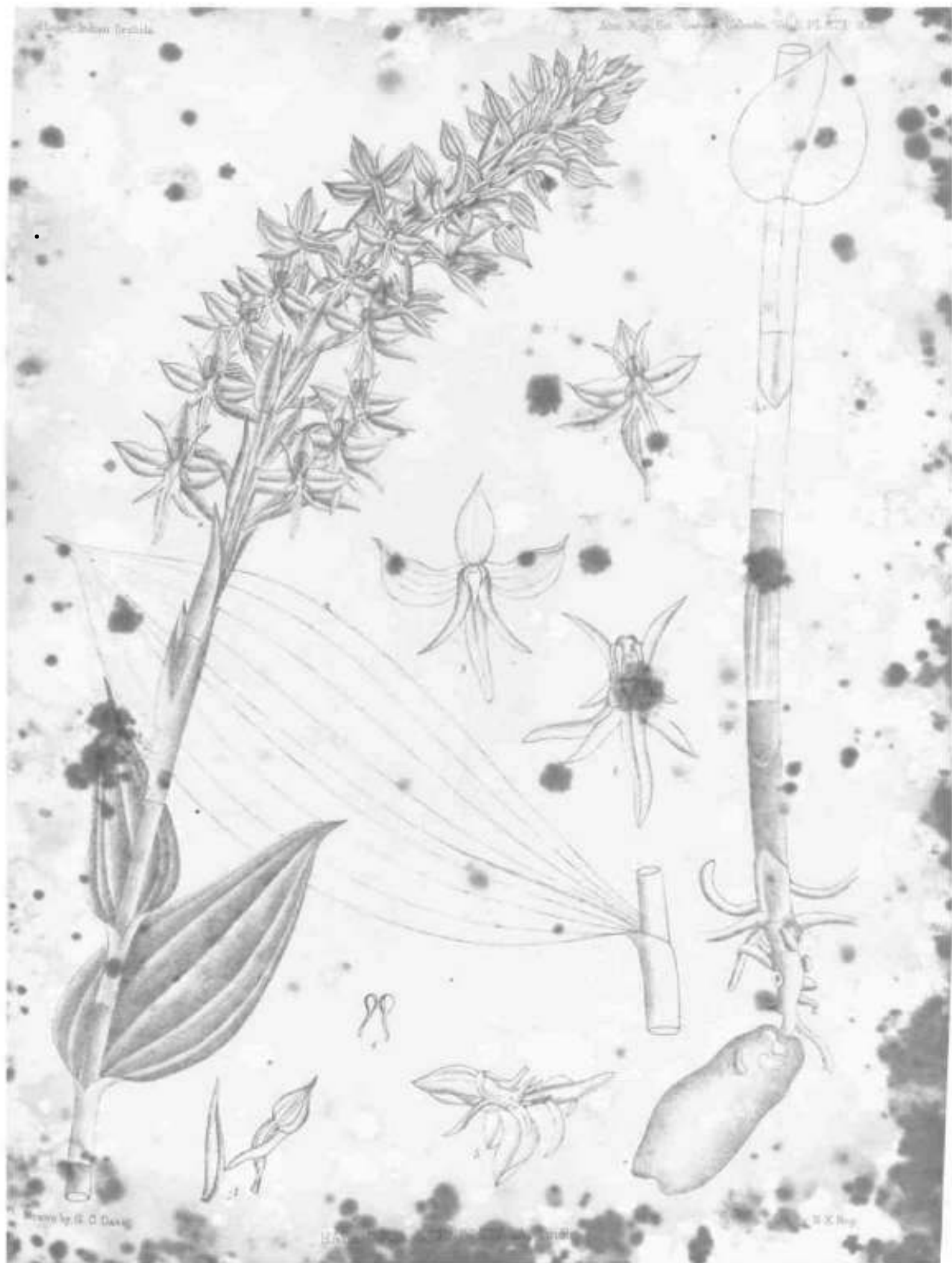
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HABIT AND ROOTS





W. C. C. East

Microstylis willdenowii Hook.

W. C. C. East



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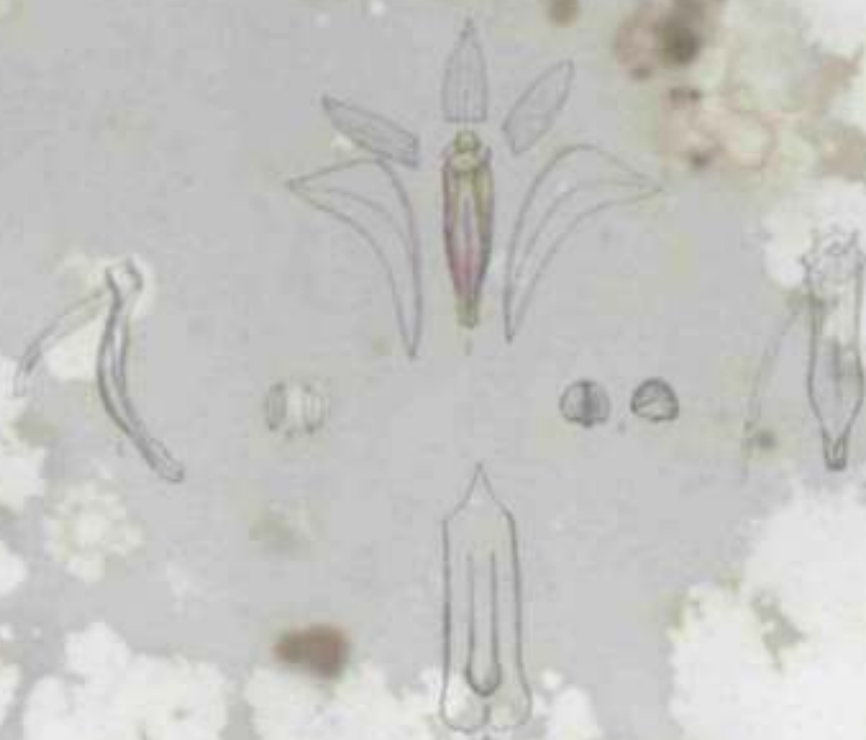
91



Drawn by G. O. Don

LEPIS PENTAGONA L.

Lab. by R. E. Roy





Drawn by C. C. Davis

LEPTORHIZUM DENDROIDEUM C.

Yunnan, China (S. Y. C.)



LEUCOPHYLLON FLORIDUM GENT.





Tab. 10. 1. 1. 1.



DENNARDIUM LEONIA, Hook. & G.

Painted by L. Burgh.





Drawn by G. C. Davis

Copyright 1904 by the University of California Press

Lab. by Davis, Nov. 17



Drawn by G. C. Davis

IRIS PUMILA (L.) SPRENG.

Life by George Engelmann

5



Vanilla planifolia

Vanilla planifolia

Vanilla planifolia









Drawn by L. B. S. P.

DENDROBIUM PULCHELLUM



GUNDOBOLUS CANALICULATUS

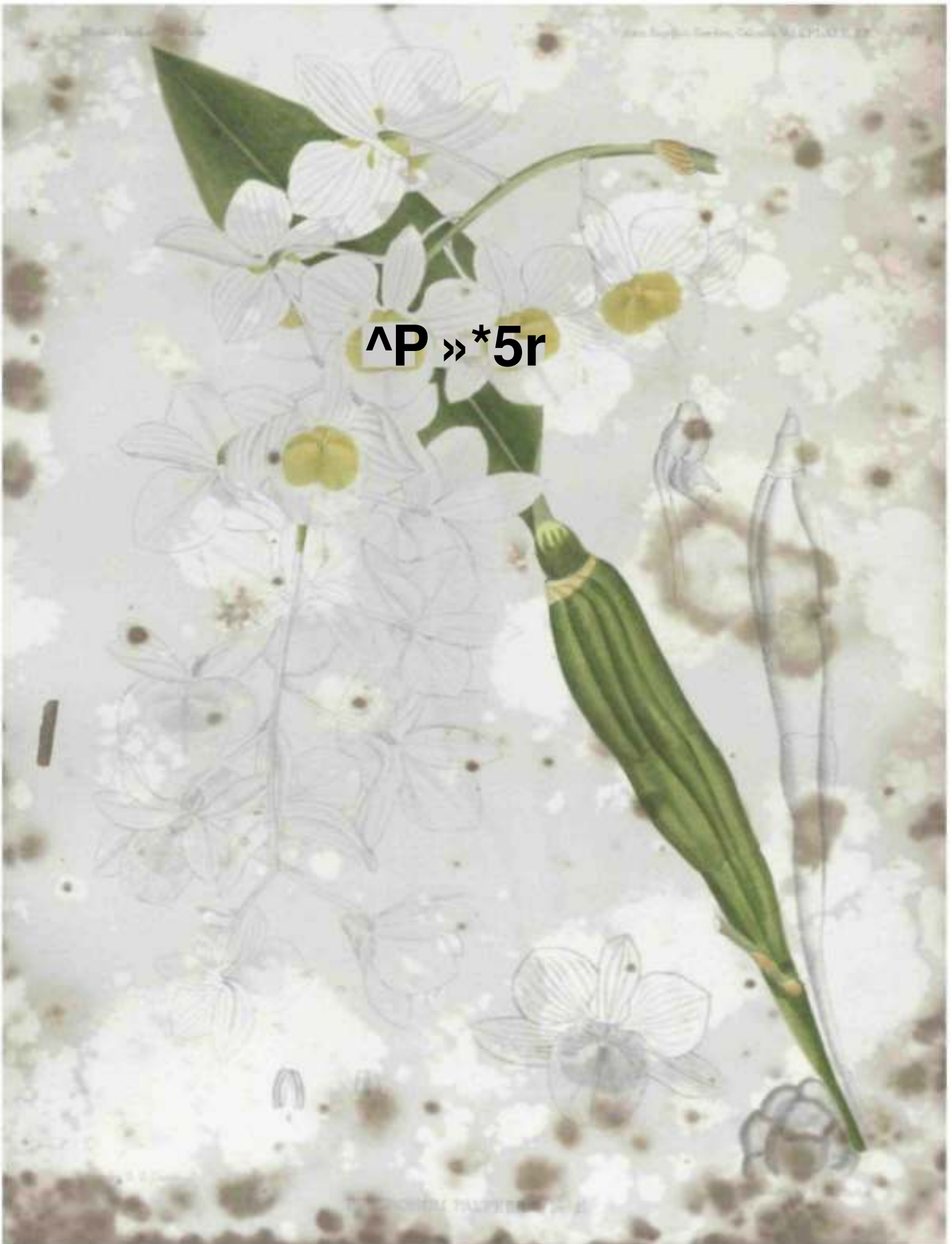


G. C. Dean

SPERMATOPHYTES



$\Delta P \gg *5r$







Drawn by L. Dyer

ORCHIS VITTELLINA VITTELLI, *FLORA VITTELLI*, No. 17

1843



Drawn by O. S. G. Jones

ASPLENIUM ELEPHANTINUM Swartz

Printed by J. S. G. Jones



COPIED FROM THE ORIGINAL DRAWING

PLATE 26



• f





Drawn by G. C. Chase

PANTHEA PARVIFLORA (L.) G. Don

Color by H. K. Fox



ORCHIDOPSIS

1902









Planta in fructu

San Ray. San. Theres. Calicut. 1822. 11



Drawn by G. S. Jones

1822

PLANTA SATIFOLIA

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Tab. 40 B E 5-1



Botany, British Columbia

For the Botanical Garden, B.C. 1917

Author's name

PLANT MUSEUM, B.C. 1917

Artist's name



Phacelia grandiflora

Phacelia grandiflora Hook.



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Texas High School

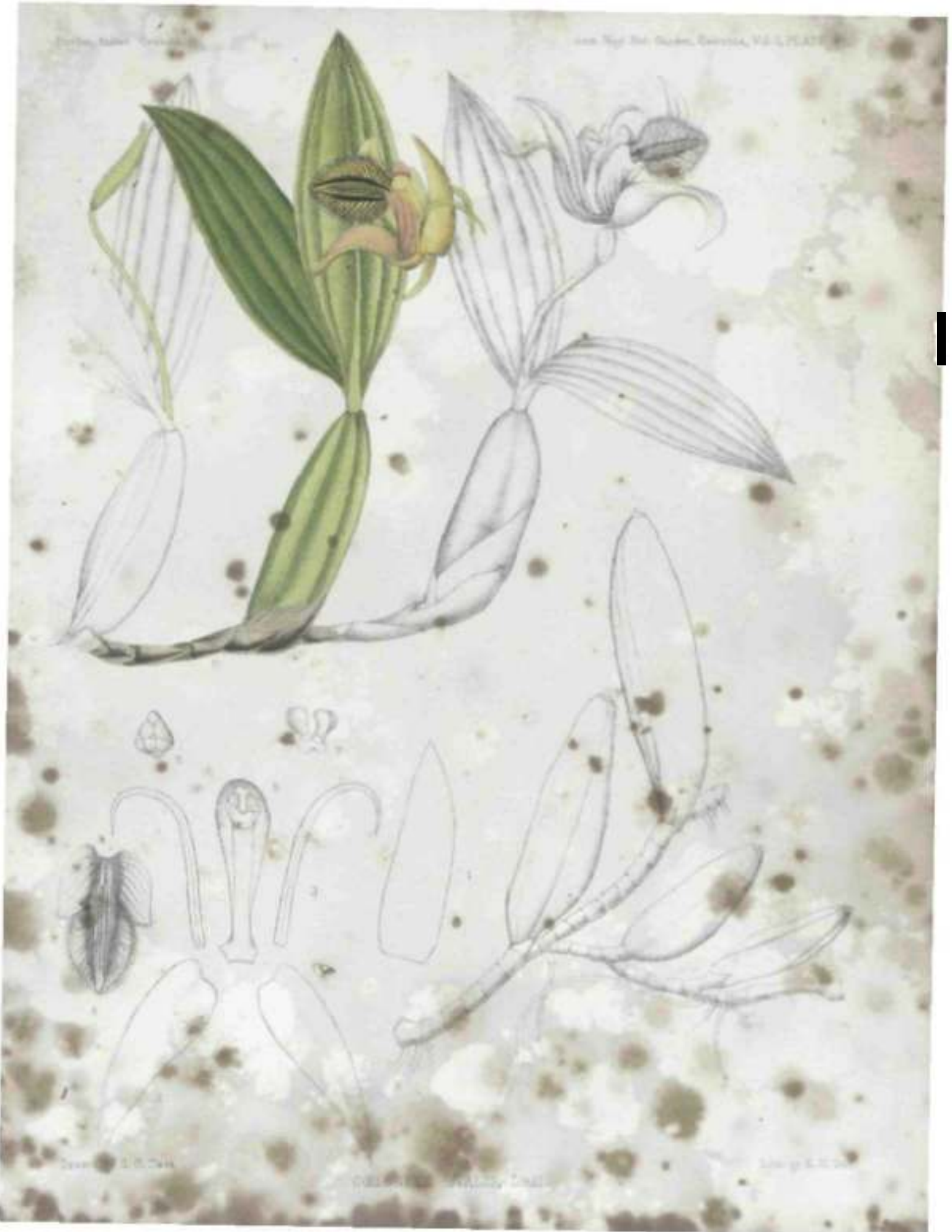
Am. Mus. Nat. Hist., Columbia, N.Y., 1911



Dr. J. S. Davis

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ORCHIS FURCATA Linn.

W. & A. D. 1817.





CALANTHE SIBIRICA LEUC. L. F.



ANTHRAXIS EXPLANATA Lindl.



Drawn by J. G. Davis

1872-1873



Drawn by G.C. Smith

ASPLENIUM ACIDUM, L. var. SERRANUM, L.





Drawn by D. C. Dorr

Printed by W. & A. G. S. & Co. Calcutta

See p. 11, 1842



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Drawn by J. Smith

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Collected by...



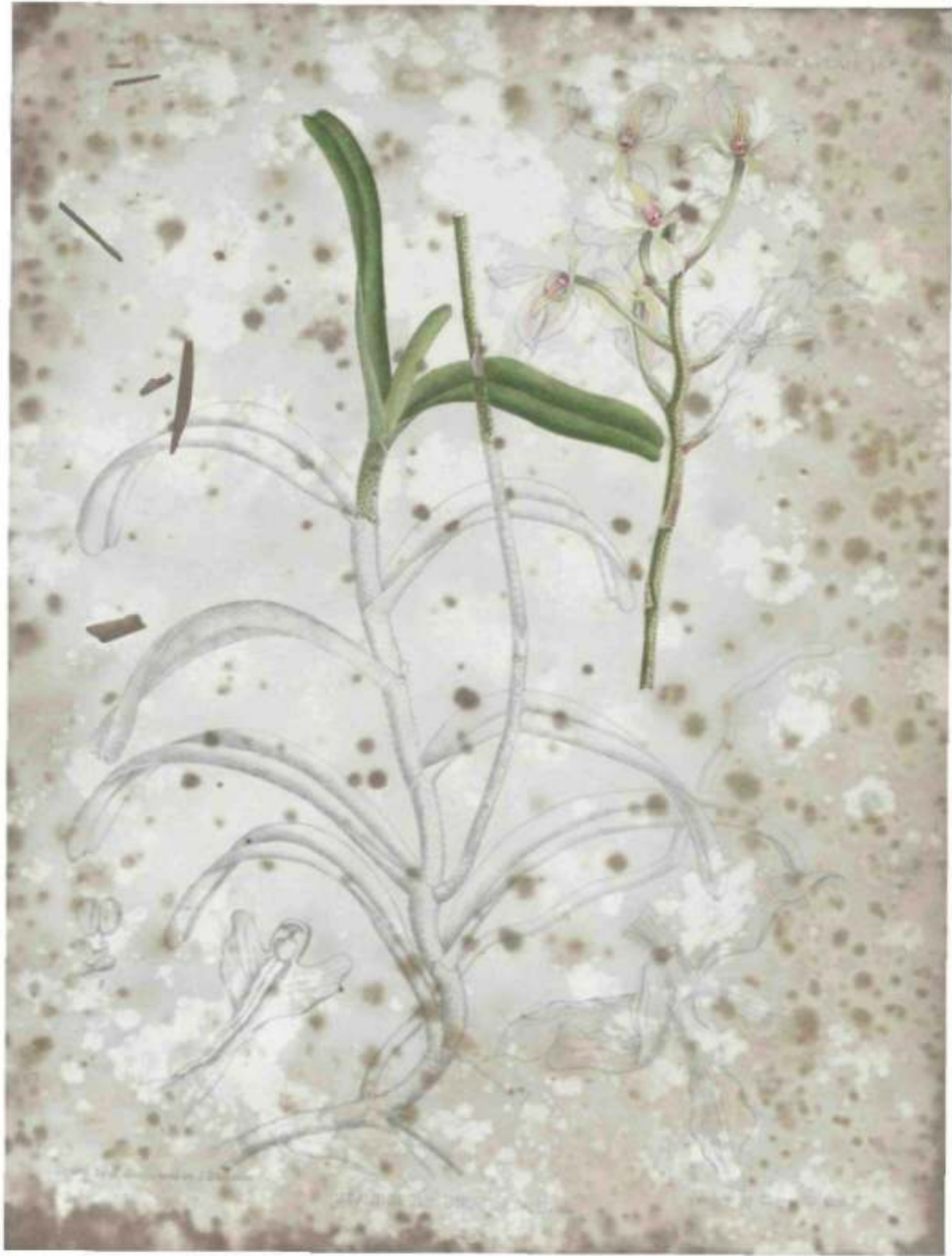


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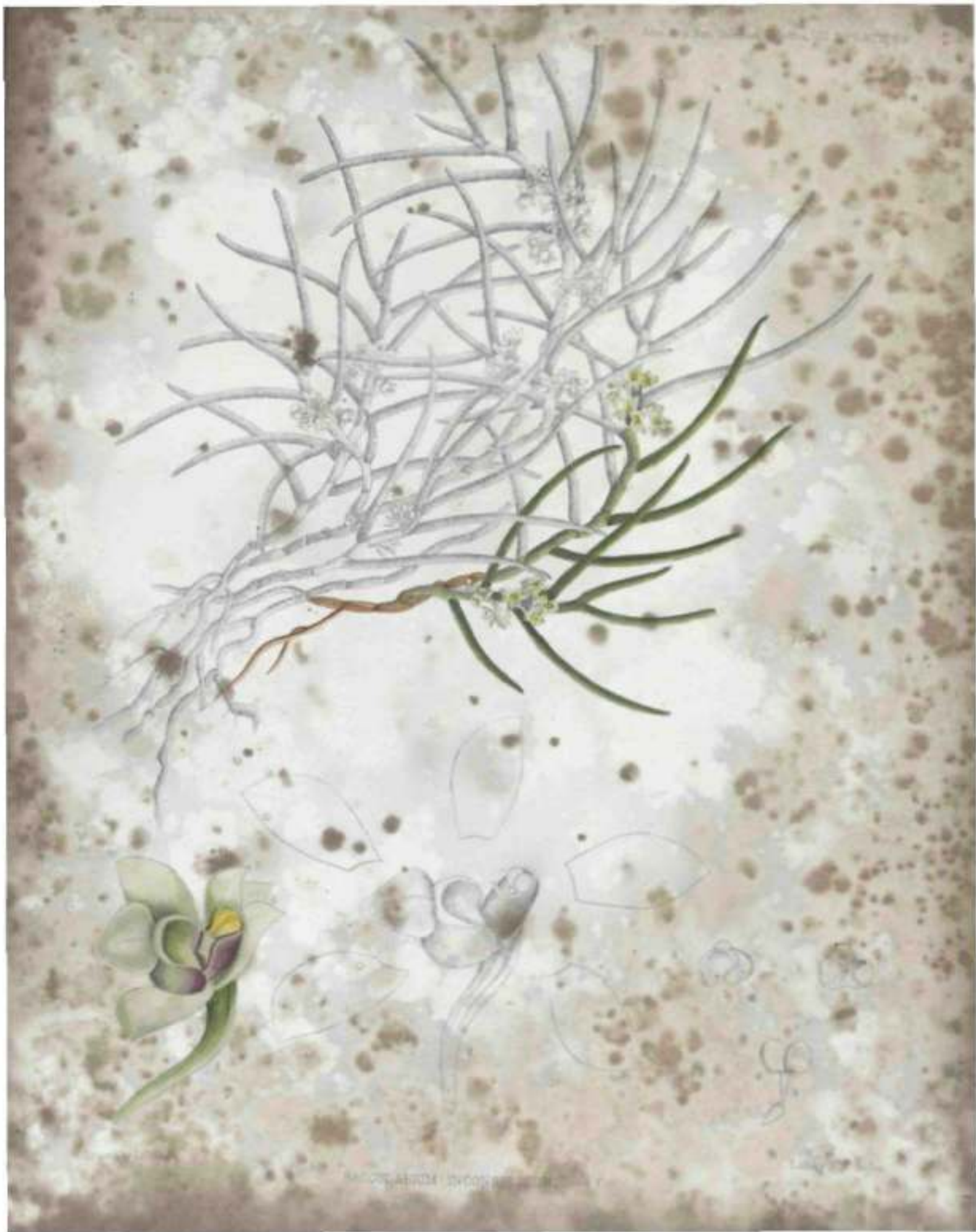














THE ARIZONA CACTUS, Lind.

Chas. P. Smith.



Drawn by G. C. Davis, colored by J. D. Moore

Yucca filamentosa (L.) Roth

See page 10 of volume



SYDNEUM LAMINUM (L.) S. P.





Drawn by J. J. Davis, and by J. J. Davis





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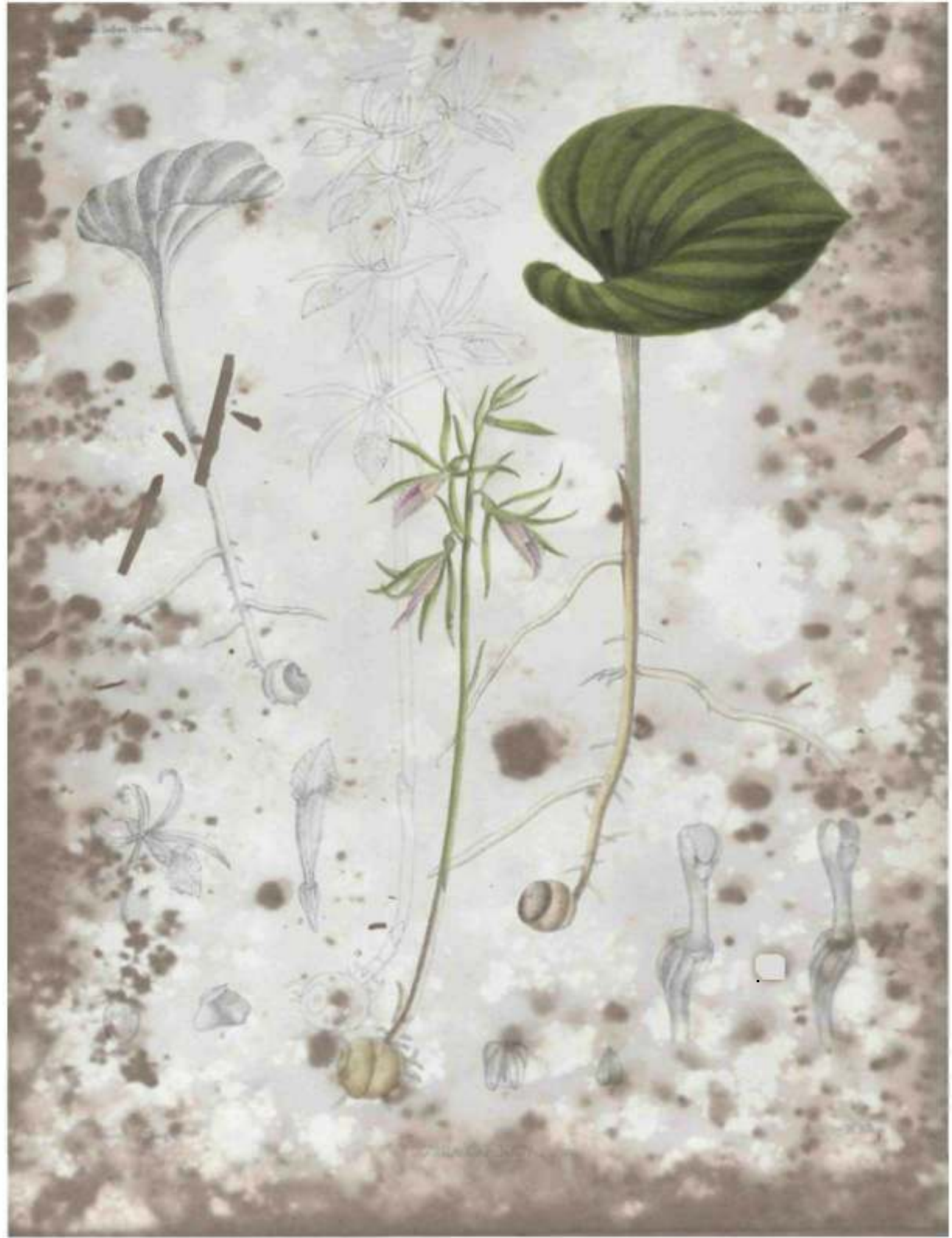




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MASDEVALLIA STENOPHYLLA

Fig. 1000





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