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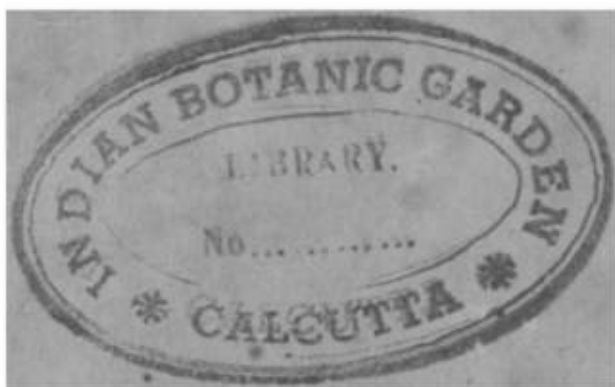




TABLE OF THE  
 S. TRIBES, AND GENERA OF FERNS  
 S FOLLOWED IN THIS WORK.

ORDER FILICES.

ORDER I.—GLEICHENIACEÆ.

Long vertically; surrounded by a broad complete ring

Gen.	Page
1. GLEICHENIA	2

ORDER II.—POLYPODIACEÆ.

Surrounded by a jointed, vertical and elastic ring.

NOTE. Sori with an indusium, except in *Alsophila*.

TRIBE I.—CYATHIÆ.

capsules sessile or stalked, often on a stalk. Indusium (wanting in *Alsophila*) lining the sorus, lateral and resembling a hood-shaped, often when young enveloping the sori, internally opening at the summit, or with a more or less regular margin, and often arborescent.

Indusium elevated, inferior, quite covering the sorus when young

2. CYATHA	3
-----------	---

Indusium like scale below the sorus, but never covering it, veins free

3. AFRYCANIA	8
--------------	---

Indusium elevated, inferior, quite covering the sorus when young

4. ALSOPHILA	11
--------------	----

Indusium elevated, inferior, globose, covering the sorus when young, umbella-shaped, six-lobed

5. DIACALIX	18
6. MATUNIA	19

GENUS.

## TRIBE I.—DICKSONIEÆ.

- Sori globose, indusium inferior, subglobose, free, sometimes covering the whole sorus, closed, at length bursting irregularly, more frequently cup-shaped entire or with two lips.
- Fertile fronds binate with revolute margins, indusium hemispherical, very fugacious or wanting, veins free . . . . . 7 STRUTHIO
- Indusium thin, subglobose, open at the top and lacinate . . . . . S Woodsia
- Indusium medial on a vein, thick globose pedicellate, bursting into two lips . . . . . 9 PERANEM
- Indusium apical on I vein, two-valved . . . . . 10 CIBOTIUM
- Indusium apical on B vein, cup-shaped . . . . . 11 DENNST.

## TRIBE III. LIIVMENOPHYLLIÆ.

- Filmy ferns, indusium inferior, apical on a vein, two-lipped or tubular.
- Indusium more or less two-lipped . . . . . 12 HYMENOP
- Indusium tubular, the mouth truncate or slightly two-lipped . . . . . 13 TRICHIOM

## TRIBE IV.—DAVALLIÆ.

- Indusium squamiform, suborbicular or tubular, open at the apex, fastened broadly at the base, and sometimes at the sides.
- Indusium apical on I vein, suborbicular coriaceous, attached by a broad base, the sides free . . . . . 14 IIUMAI
- Indusium as in IIaata, but thin and smaller and narrower . . . . . 15 LEUCOSP
- Indusium a suborbicular cyst formed of the substance of the frond, apical on the veins . . . . . 16 PROSA.
- Indusium apical, tubular, attached by the base and sides . . . . . 17 DAVALI.
- Indusium apical, half cup-shaped, attached by the base and sides . . . . . 18 MICROL



## PREFACE.

This handbook is a digest of the information on Indian ferns contained in Sir W. Hooker's "Species Filicum," "Synopsis Filicum," Mr. J. Smith's "Historia Filicum," Mr. Clarke's "Ferns of Northern India," and of the works, "The Ferns of Southern India" and "The Ferns of British India."

The author's former works were compiled in India, without access to libraries or to any herbarium with typical specimens. He has now had the advantage of going through the Wallichian ferns at the Linnean Herbarium, the collections at Kew and in the British Museum, comparing his own collections with typical forms. He is indebted for much assistance to Messrs. J. D. Hooker and Clarke, especially in the determination of all doubtful specimens, so that he has been able, he believes, to remove many doubts and to correct many errors.

PREFACE.

The generic nomenclature is, with few exceptions of the "Synopsis Filicum," but the sub-genera are raised to the rank of genera; this avoids the inconvenience of double generic names, and may be admitted on even by those who do not consider the wide distribution of such genera as Phegopteris, Polypodium, and Dryopteris. If any value generically, and who distinguish the sori alone, without reference to form, or venation.

The geographical limits of the work comprise of British India, Ceylon and the Malay Peninsula.

WEST HILL, PUTNEY,

May, 1833.



TABLE OF THE GENERA OF FERNS.

oval, long, anti-sutricular, only open at	19	STEKONOMA	65
oval on a vein, membranaceous, broad-	20	CYSTOPTERIS	70

TRIBE V. LINDSAYEAE.

(nervical in the veins, in a continuous or  
veins, the outer valve being the margin of  
vein, inner membranaceous.

	21	LINDSAYA	75
	22	SPITZLODIA	77

TRIBE VI. PTERIDEAE.

oblong or linear, formed of the base or  
and reflexed margin of the frond, open

one to linear usually many and distinct, apiculate and continuous, bearing the capsules under side, veins free	23	ADANTUM	82
--	----	---------	----

oblong and distinct, or more or less con- tinuous, capsules on the frond.	24	CHEILANTHUS	85
--	----	-------------	----

oblong, the pinnate segments of fronds very narrow	25	ONYCHOS	95
---	----	---------	----

oblong fronds dimorphic	26	CYRTIOGRAMMA	98
-------------------------	----	--------------	----

oblong, continuous, not at first setate, but into a line	27	PELLIA	103
---	----	--------	-----

oblong continuous, on linear venous side, a slender filiform receptacle in the axis of pin, veins free	28	PTERIS	104
--	----	--------	-----

oblong lowest vein meeting and forming	29	CAMPTELOPS	110
--	----	------------	-----

oblong veins all anastomosing without free veinlets	30	DORIS	112
--	----	-------	-----

oblong veins all anastomosing without free veinlets	31	LITOPHLEBA	117
--	----	------------	-----

TABLE OF THE GENERA OF FERNS.

	GENUS-
Anomalous . . . . .	32 CERATOP
Indusium continuous, sori linear, continuous, covering all or nearly all the space between the midrib and margin, fronds Is dimorphous, capsule ring vertical . . . . .	33 LOMAR "
As in Lomaria, but capsule ring oblique . . . . .	34 PLAGIOGI

TRIBE VII.—BLECHNEIE.

Indusium linear or oblong parallel with the midrib and opening towards it, not near the margin.

Indusium membranaceous, distinct from the margin of the frond, parallel with and usually contiguous with the midrib, veins free . . . . .	35 BLECHNU
As in Blechnum, only veins anastomosing . . . . .	36 BLECHNII
Indusium linear-oblong, thick, in single rows parallel with and near the midrib, sori sunk in cavities . . . . .	37 WOOBWAT
Indusium lamate, bin, in one or more rows, parallel with and near the midrib, sori not sunk . . . . .	38 DOODIA

TRIBE VIII.—ASPLENIE.K.

Indusium linear or oblong or horseshoe-shaped, opening towards the midrib, sometimes double, and attached to the veins.

Indusium linear, single, veins free, their apices connected by a transverse marginal vein . . . . .	39 THAMNO
Indusium linear or oblong single, veins free . . . . .	40 ASPLEN
As in Asplen. [in, but indusium more or less curved . . . . .	41 ATHYRI
As in Asplenium, but indusium double . . . . .	42 DIPLAZI
As in Diplazium, but veins anastomosing . . . . .	43 ANISOGE
As in Asplenium, but veins anastomosing obliquely only towards margin of frond . . . . .	44 HEMIDIC
Indusium fan-shaped, veins anastomosing and forming elongated areoles . . . . .	45 ALLANTO
Indusium linear elongated, submarginal, fronds fan-like . . . . .	46 ACTINIO



XII. CLASS OF THE GENERA OF FISHES

62 NITR  
63 DITR  
64 DITR  
65 DITR

TRIBE XI — RAMMIDAE.

66 NITR  
67 MONO  
68 LEFT  
69 SEVEN  
70 SIX  
71 SEVEN  
72 SEVEN  
73 FOUR  
74 SEVEN  
75 SEVEN  
76 SEVEN  
77 SEVEN

	GENUS.	PAGE.
nous linear, or interrupted central or ine, veins reticulated, fronds pinnate .	78 TVENTIS .	. 410
'lit fronds simple and dimorphous .	79 DRYMOGLOSSUM.	410
reticulated and completely soriferous.	80 HEMIONITIS .	413

**I**

\* XII.—ACROSTICHE.I-:.

ried to tie veins, but spread entirely  
leneth.

Tainsfree . . . . . Si ET.APHOGLOSSUM. 416

Loinaria-like, veins all simple or  
juate at the base ; scandent ferns . . . . . 82 STENOCHL.-KNA . 421

not Lomaria-like, veins all simple ;  
. . . . . *fk* . . . . . S 3 POLYBOTRYA . 424

loglossum, but with a connecting  
und the margin . . . . . \$£ ACONTOPTERIS . 42;

, anastomosing with free included  
. . . . . 85 GYMNOPTERIS . 4~o

anastomosing without free included  
coast fern . . . . . S6 ACROSTICHUM . 440

n Is, pinnre articulated, hut stipe  
lex . . . . . S7 PHOTIXOPTERIS . 442

g's-horn-like divisions, veneration  
}n large patches only on the fertile  
. . . . . S8 PLATYCERIUM . 444

;R III.—OSMUNDACEiE.

lived, opening across the ap<x,  
>ort horizontal ring . . . . . S9 OSMUKDA . . 447

;R IV.—SCHIZÆACEÆ.

jylved, opening down the side,  
ilete operculiform ring.

• n 2-4 rows on one side of close  
. . . . . 90 SCHIZ^EA . . 452

- Capsules smooth, very abundant in a branched panicle . . . . . 91 ANEMONE  
 Capsules solitary in the axils of large imbricated clasping involucre; scandent . . . . . 92 LYCOP

## SUB-ORDER V.—MARATTIACEÆ.

- Capsule opening by a slit down one side or a pore at the apex, without a ring . . . . .  
 Capsules sessile, very close together, but not concrete . . . . . 93 ANDRO  
 Capsules concrete, in boat-shaped spore-cases . . . . . 94 MARA  
 Capsules concrete in raised circular masses which are hollow in the centre . . . . . 95 KAUL

## SUB-ORDER VI.—OPHIOGLOSSACEÆ.

- Capsules deeply two-valved, opening down the side nearly to the base, without a ring . . . . .  
 Capsules sessile in two rows on a narrow close spike . . . . . 96 OPHIO  
 Capsules in small crested clusters forming a loose spike . . . . . 97 HEBE  
 Capsules in two rows on the face of spikes which form a compound panicle . . . . . 98 POTR



## GENUS I.—GLEICHENIA. (Sw.)

(In honour of Gleichen, a German botanist.)

Sori of few sessile capsules, situated on a lower caudex generally creeping; frond rarely unbranched, dichotomously divided, often proliferous from the axils; pinnae deeply pinnatifid, with the segments small and orbicular, or pectinate with elongated lobes.

§ Sori solitary at the apex of a veinlet.

1. *GLEICHENIA CIRCINATA*. (Sw.) Fronds dichotomous, lobes of the pinnae head-like, ovate, or margins slightly recurved; capsules 1-4; frond glabrous, or more or less scaly. *Bald. F. H. I. c. 1. Tabul. Hook. Sp. Pl. 1. 11.*

Malacca.

(Also in Australia, Tasmania, New Zealand, and

§ Sori near the middle, or at the forking, of the

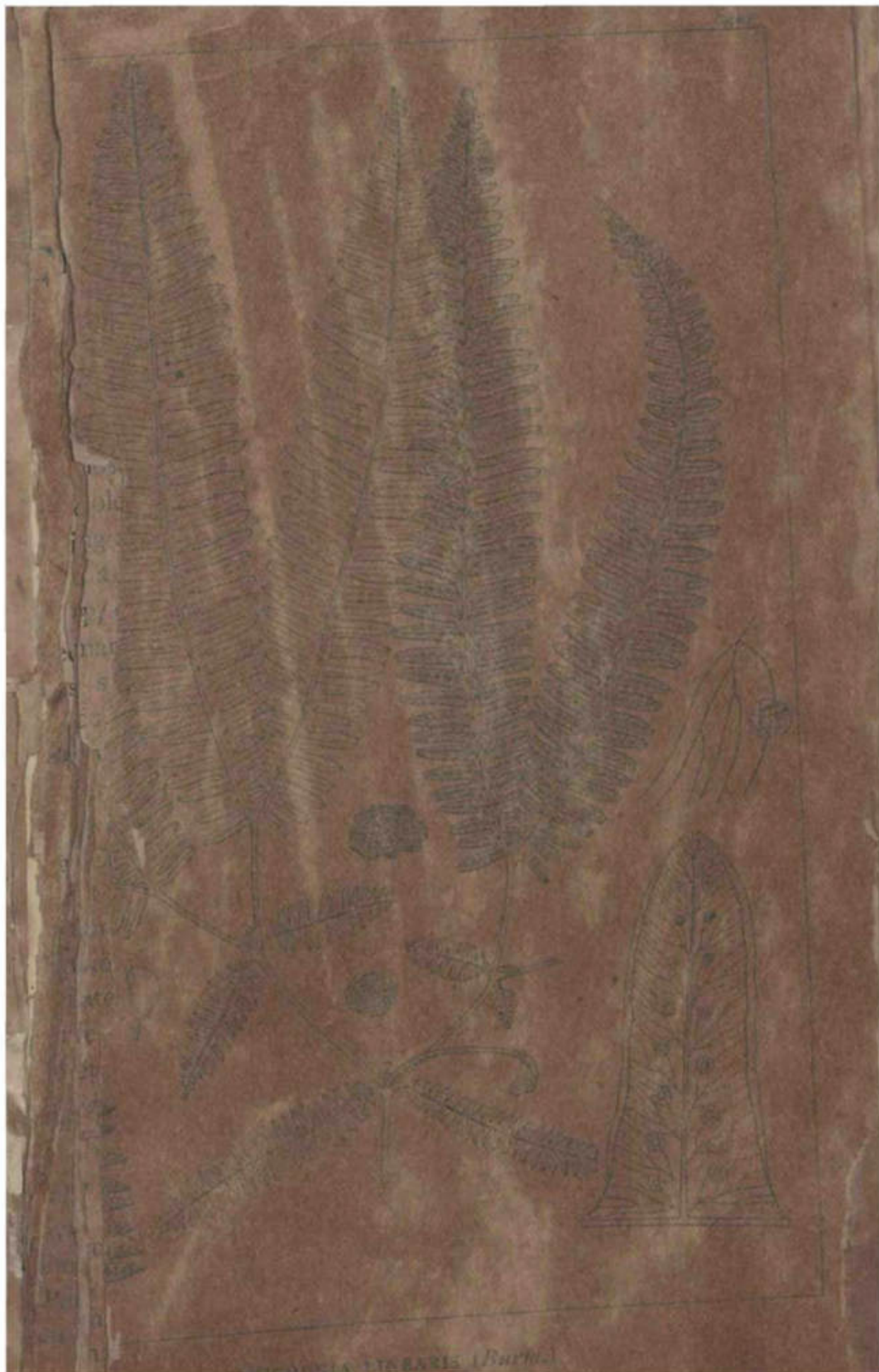
2. *GLEICHENIA GLAUCA*. (Hook.) A large straggling plant; stipes stout forked; primary pinnae opposite, alternate, close, 6-8 inches long by 1-2 inches wide, acuminate, pinnatifid nearly to the rachis, the segments oblong-lanceolate, but obtuse, more or less glabrous or tomentose, and paleaceous on the sides; capsules 3-5, often mixed with hairs. *Bald. F. H. I. c. 1. Tabul. Hook. Sp. Pl. 1. 11. gigantea Wallich. G. longissima, M. Hook. Sp. Pl. 1. 11. gigantea, Wall. Cat. Polypodium glaucum Thunb. which is the oldest specific name.*

Bhotan and Sikkim 2000-4500-7500 feet. Very common in Darjeeling, Khasya, 3500-5000. Common in Nepal, Manass.

(Also in China, Japan, the Malay Islands, and Tropical Australia, Polynesia, West Indies, and Tropics.)

3. *GLEICHENIA NORRISHI*. (Mitt.) Branches of fronds jugate, oblong-lanceolate, 2-3 feet long, pinnae lanceolate, distinctly stalked, spreading, 6-9 inches long, can do





LIBRARY (Burns)

into close entire ligulate blunt segments, up]
T, reflexed ; texture subcoriaceous, both surfaces l
green or glaucous; veinlets once forked ; sori n-
;gment. Bedd. F B. I. t. 346, Hook. Sp. Fil. p
talacca.

GLEICHENIA LINEARIS (Burm. under Polypodium).

[edly di- or trichotpmous, the ultimate branches 1
of forced pinnae ; a distinct pair of pinncc also arises f;
of the I forked branches, pinnules usually glaucous ben
entire with recuned margins, texture hard, veink
brancl led from the base, the centre one being
pinnate. Bedd. F. S. I. t. 74, as dichotoma. Cl. d
Hook. Sfr. Fil p. 15. Polypodium lineare, Burnt. Fil
ing. 2. I oldest specific name. This fern has long bee'
the name of dichotoma, which, however, must be d
is an older specific nani e.

Mciumtains of southern India and Ceylon, up
"fi, Bhotan, Nepal, Kumaon, Khasya, &c, up
Malay Peninsula.

•Also in japan, Tropical Australia, America, Pol)

SUB-ORDER II. -POLYPODIACB

pri dorsal or marginal, subglobose, of many cap%
without an indusium, usually pedicellate, more or W-
ided trith a jointed vertical and elastic ring,
transvrsely (except in Hymenophylleai).

i—INVOLUCRAT/I.—Sori furnished with an indiu
in A >phila), Tribes Cyatheae to Aspidie; e.

TRIBE I.—CYATHEÆ.

m dorsal, globose, often at or near the forkinj
capsules numerous, often very compact sessile or stalk
on an elevated receptacle, often mixed with hairs, obtfj
with Abroad, vertical, or sub-oblique elastic rim ; indusi

inferior, including the sorus, internal and resembling a scale  
 side of the sorus, or cup-shaped, often when young an-  
 orous, eventually opening at the summit, or breaking down  
 or less regular margin: caudex very often arborescent.

GENUS II.—CYATHEA (Smith)

*Cyathia*, a cup—the form of indusium.

vein, or in the axil of the forkings of a vein, receptacle  
 rose, or elongated;

base inferior, cov-

ole sorus, after-

ing at the summit,

is more or less

even or irregu-

margin; generally

stripes often ac-

simple, pinnate,

or pinnate.

unmarked.

STRUCTURE (Hook.)

Caudex erect, 2-

1/2 inch in diam-

eter, 2-3 ft. long;

leaves elongate-lan-

ceolate, acuminate, to

the base; veins (in-

ter) surfaceous near

the base.

in the Singhe-Rajah Forest.

*Fronds pinnate.*

—*CYATHA BRUGONII* (Wall.)

Stipes 12 feet long; fronds

pinnate glossy; pinnae 6-14 inches long, alternate,

membranous and cartilaginous, oblong-lanceolate, acuminate,

narrow point obliquely truncated at the base and the



*CYATHA SINGHIA* (Hook.)

petiolate, sinuato-crenate; veins three-branched or veinlets occasionally anastomosing amongst themselves next group; sori medial on the veinlets; indusium ve  
*Bedd. F. S. I. 1. 17. Hook. Syn. Fil. p. 16.*

Tenang and Malacca.

(Also in the Malay Islands.)

3. *CYATHEA HOOKERI*. (*Thunb.*) Small, but with pedunc 1½ inch thick; stipes short black, auriculate and sub-pilaceous; fronds coriaco-membranaceous, 2-3 inches wide, elongate-lanceolate, acuminate, pinnate pinnae 1-2 inch long, from a broad base, which is more or lanceolate-ovate, sessile or sub-sessile, coarsely dentate more or less entire towards the apex and base, and the gradually diminishing in size and obtuse at their apex; sori medial on the veinlets; indusium soon breaking up a cup-like. *Bedd. F. S. I. 1. 260. Thunb. Ent. Pl. L. p. 14. p. 16.*

Ceylon in the Singhe-Rajah Forest.

\*\*\* Fronds decompositely pinnate.

4. *CYATHEA SPINULOSA* (*Hall.*) A tall tree fern with main rachis beneath, strongly aculeate, dark purple; fronds bipinnatifid; main rachis and rachis of pinnae ferruginous; rachis of pinnae and main vein of segments scaly beneath; glabrous above; segments falcate-oblong acute, margin more or less recurved; veinlets once-branched, or three-branched; sori copious near the costules or main rachis completely covering the sori when young, so irregularly. *Bedd. F. S. I. 1. 57. Hook. Syn. Fil. p. 23.*

The Wund at 3000 feet elevation, North and South Coorg, Jeypore Hills (Vizag), Nepal, Jaintia Hills. The specimens are in every way identical with those from India collected by Wallich, and Mr. Clarke is in error that the South-Indian plant is a *Hemitelia*, as on comparing the specimens he had examined at Kew I found them "*Alsophila latibrasa*," and that this *Cyathea* was not



MARTHA T. STONOR (1824)

from India in the Cymodoctonoides at K. although a specimen of it from D. Zell's, which I labelled pinoides, and a specimen from Ceylon, mixed with I find no 3-branched veinlets in my specimens. Saccan pinnae in which only they occur. Except more acute, over the examples are with difficulty from Alsophila lutea; it is however perfectly glabrous beneath, whereas in the Alsophila there is pubescence on the rachis, and minute hairs on it. I have never found this fern much above 7000 feet. The Alsophila is common at the highest altitudes of Pattee and Annamayas.

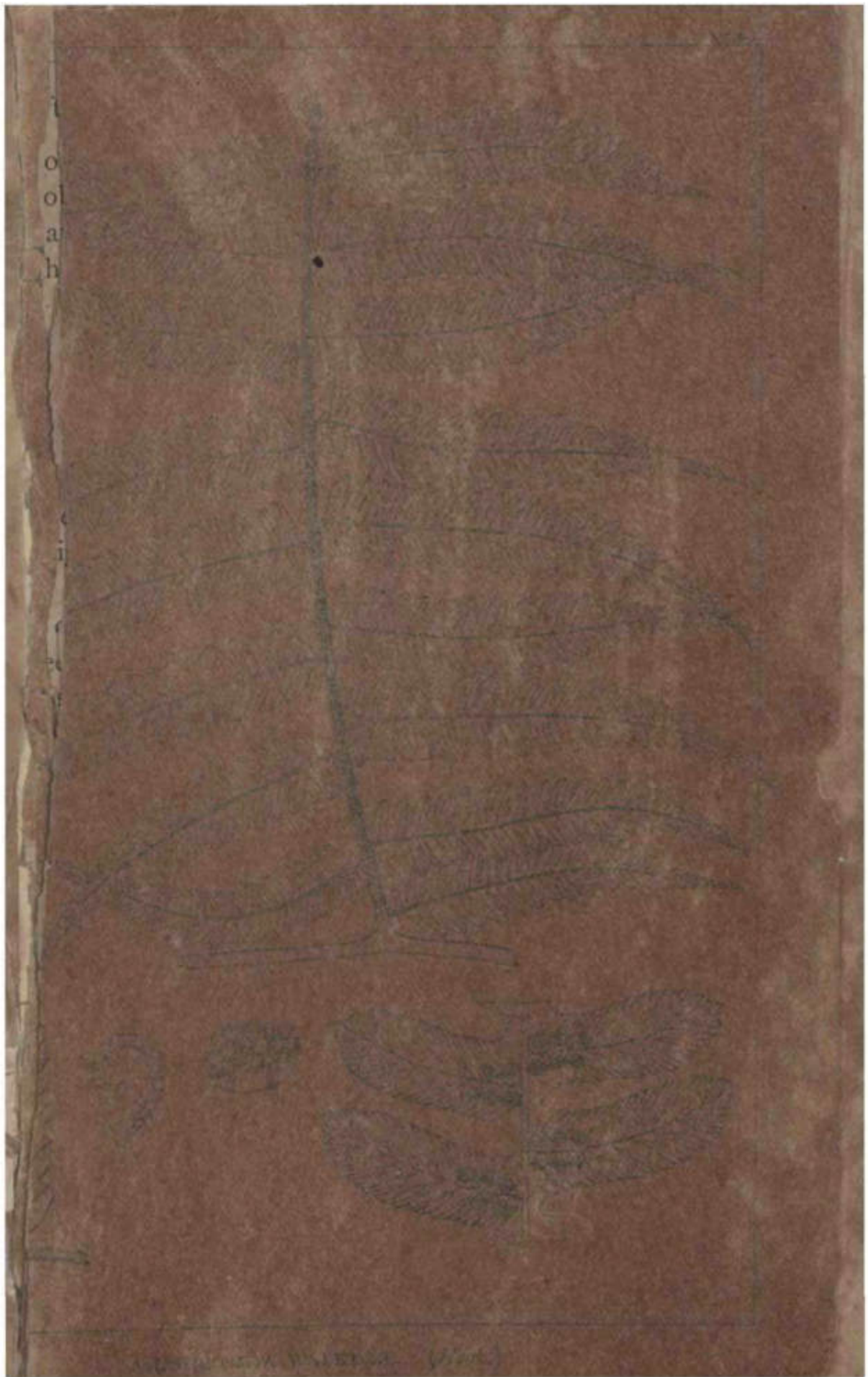
GENUS III.—AMPHICOSMIA. (B.)

*Amphi*, around; *kosmos*, world; in allusion to its wide

four-lobed, dorsal, on a veinlet, receptacle elevating a scale-like scale below the corus, but never covering the capules as in *Cyathea*. Arboresecent fern, intermediate link between last genus and *Alsophila*, to describe except with unripe sori; veins all free; decurrent. (*Hemitelea* only differs in having the anastomosing. None are found in India.)

1. *AMPHICOSMIA WALKERII* (Horn.) Stipes unarticulate; fronds ample bipinnate, thick, firm, soft primary pinnae 2 foot long, secondary pinnae rather inches long, deeply, nearly to the costa pinnatifid, or at all times narrow-crenate; the costa, as is the rachis, mostly below; pinnales or lobes oblong, very obtuse, entire, veinlets once-forked, three-branched or even pinnate. The venation: *Indusium* cup-shaped under the sori. *Bot. Beech. A. S. 1. 1851.*

Common on the island at the higher elevations. *pinnales* has the ultimate pinnales, but here are



1. *AMPHICOMA THOMASII*, *J. Scott*, under *Healthy*  
 leafy tree fern, very thickly on the main and secondary  
 primary rachis (that of the pinnae) bullate-sulcate. Leaf w-  
 filamentous glabrous, or dense so, segments sometimes linear,  
 when fertile; venation forked, or when three-branched, or  
 branched in the sterile portions; soon in two rows, directly  
 from vein or costa of the segment; involucre a form of  
*J. Scott*, in *Ann. Trans. Ind. Mus.*, vol. 3, p. 103, *Plate I. P. 1. 1.* is of  
 the vein and bullate sulcate correctly, but not the venation of  
 Sikkim and Bhotan, 2,000-4,000 feet. Kashmir 8 feet  
 long. Distinct from the next in being much more rigid, the  
 segments being generally longer and narrower,  
 more distinct from *Cyathea spinulosa*, as I have  
 mentioned in very young state.

2. *AMPHICOMA BURKOVIANA*, *Wall.*, under *Aspid.*  
 leafy tree fern, main rachis somewhat thickly, with  
 slight indication of secondary rachis of the pinnae, seg-  
 ments minutely hairy on the veins (under like 1,  
 contracted in fruit; venation forked, or three-branched,  
 and involucre as in the last, *Cham.*, p. 432, *fig. 1.*  
 Bhotan, *Wall.*, *Alpine latifolia*, var. *pendulifolia*,  
 p. 14.

Sikkim and Bhotan, 4,000-7,500 feet; East Nep.,  
 1,000-5,000 feet, very common.

The specimen for which Mr. Clarke gives the locality  
 is a specimen of *Cyathea spinulosa*, collected at Mendocino  
 by Dr. Kichler.

If Clarke's variety *β Scottii*, "segments of the fern  
 usually large, deeply cretated, with many these being be-  
 come divided on a single pinna in the Kew Herbarium of  
 Scott in Sikkim and labelled by him *latifolia*, var. *β* of  
 new species.

3. *AMPHICOMA APPROXIMATA*, *Hook.*, under *Aspid.*  
 glabrous, smooth, turning brown; fronds glaucous, gl.



...very shining when ... very ... 12-14 ...  
...wing, oblong ... finely ...  
...segments ... inch long, oblong ...  
...horizontal, ... extremely ...  
...stipules ... the ...  
...forked ... of the ...  
...considerably above ... involucre ...  
...surrounding the base of the ...  
...*Hook. Syn. Fl. N. Z.*  
...specimen, distinctly show the indusium.

PLANT IV.—ALSOPHIDA (*Brongn.*)

(*Alve. gen. p. 101. t. 101.*)

...dorsal, on a vein or at the ...  
...veined, often ... involucre ...  
...segments may often be ...  
...trunks ... compoundly ...  
...of pinnate.

...(*Hook.*) ...  
...dark ...  
...long ...  
...pinnate ...  
...oblong ...  
...of pinnules ...  
...hairy ...  
...scales along the ...  
...of the ...  
...of the segment. *Brongn. Fl. N. Z. t. 101. p. 101.*

...the western mountains in the ...  
...to ...  
...and ...  
...and ...  
...The south Indian ...

ery from quite or nearly quite glabrous to its pubescent Sikkim, and the Penang specimens are quite glabrous.

12. *ALSOCELLA GLABRA*. (L. Kuhn.) A tall, erect, herbaceous fern; fronds subterrestrial, glabrous, glaucous, 2-3 feet long, simple, 4-5 inches long, 1 to 1 inch broad, to the costa mucronate, segments linear-oblong, sterile when contracted; sori or distally crenulate, and often three branched; receptacle naked or hairy. *Hort. Juss. Cult. Ind. 419.* *Bull. B. B. I. J. 86* (as *A.*) Also *alia* continuous, *Hort. Syn. Fil. p. 41.* *Camp. Bot. Lib. Ind. Ind. 443.*

Sikkim, Bhotan, Assam, Khasia, Cachar, Sylhet, Barmah and Malay Peninsula, up to 4,000 feet. (Also in the Malay Islands.)

13. *ALSOCELLA ORNATA*. (L. Sw.) A lofty fern, pubescent at the base, slightly mucronate, and/or twines, glossy purplish-brown; fronds herbaceous, primary pinnae oblong lanceolate, rather abruptly short, deeply pinnatifid apex; pinnales nearly all pinnatifid acuminate, deeply, nearly to the costa pinnatifid in the sterile; narrow oblong in the fertile serrated; costa of the pinnales somewhat hairy below; venulets forked or a few three branched. *Ann. Sci. Nat. 36, t. 16.* *Bull. B. B. I. J. 342.*

Sikkim, on the banks of the Rangtee, below Cinchon. plantations, at 2,500 feet elevation, called the Lapcha.

14. *ALSOCELLA ASPERISORA*. (L. Sw.) A tall, branched and rough, clothed more or less with deciduous scales; rachises tawny villous below, so above; fronds ovate-lanceolate, herbaceous, membranous, primary pinnae oblong lanceolate, acuminate, pinnatifid, nearly to the rachis with an attenuated serrated broad wing, slightly crenate, sharply serrated.

12 pair to each segment, all except the upper  
angle stem a little below the middle; the costae  
beneath all furnished with long, crax, white  
is also present in a less degree on the upper side.  
*Hort. Lin. Soc. xxx. t. 17. Bedd. F. B. J. t. 10.*  
in the tropical valleys below the Government Camp  
E. 1,000-2,400 feet. Khasia. Collet, Polaito.

*ALSOPIA OLIBIAMI*

6-10  
e principal  
ig. ac. 10-15  
n. 10-15  
of 10-15  
et many pinnae  
st. 8-9  
e. 10-15  
st. 4-5  
e. 10-15  
M. 10-15  
an. 10-15  
n. 10-15  
ne. 10-15  
e. 10-15



FF  
uple, or  
e. 10-15  
s. 10-15  
ir. 10-15  
c. 10-15

No. 10  
*ALSOPIA OLIBIAMI* *Blindl.*  
in the middle of the venule. *Bedd. F. B. J. t. 10.*  
*Sikkim, in the forest between Darjeeling,*  
2,100 feet; Moulmein.

*ALSOPIA COMOSA*. (*Horn.*) A tree fern, unarmed;  
long linear-subulate scales, pale brown, as well as  
such very rufous villous on the upper side; the

12  
herbaceous, glabrous, 1-2 feet long,  
long 2-3 inches wide; pinnules oblong, acuminate,  
broad and truncated, sessile or shortly petioled, be-  
tween the way to the costule, pinnatifid with very  
lobes close-placed, oblong, serrated; veins simple or  
soon about half-way between the margin and the costule  
small, very slightly elevated. *Hook. Syn. Fl. Bor.* 4. 5.  
7. 8.

Singapore.  
(Also in the Malay Islands.)

7. *ALLOPHILA COMPOSITATA* (Willd.) A. DC.  
paleaceous, at the base tuberculate-asperous; rachis  
partial rachis slightly sinuate; pinnules all petioled,  
oblong-lanceolate, fertile portions often contractile  
glaucescent as if varnished, ending in an acuminate  
pinnule scarcely half-way down to the rachis,  
obuse, serrate, the margins denticled or very shallowly  
simple or often forked; soon frequently confluent with  
the pinnule, and a little distant from the costule.  
*Hook. Syn. Fl. Bor.* 4. 5. *Bald.* 6. *Bald.* 23. (as 5)  
Malacca on Mount Ophir.

8. *ALLOPHILA GRABRA* (Hook.) A. DC.  
paleaceous at the base, the rachis large and  
glabrous or with a few scales, or with minute  
fronds subcinnaceous-membranaceous; pinnules  
long, deeply pinnatifid at the apex, pinnules  
lower ones petioled at a truncated base, oblong  
inches long, 5-9 inches wide, pinnatifid, 1-2 inches  
sometimes more in diameter, ovate, rounded,  
rounded, rarely ovate serrated; pinnules all simple  
the shape of a V, the vein not extending to the apex.  
*Hook. Syn. Fl. Bor.* 4. 5. *Bald.* 6. *Bald.* 23. (as 5)  
In the western hills of the Malay Peninsula.



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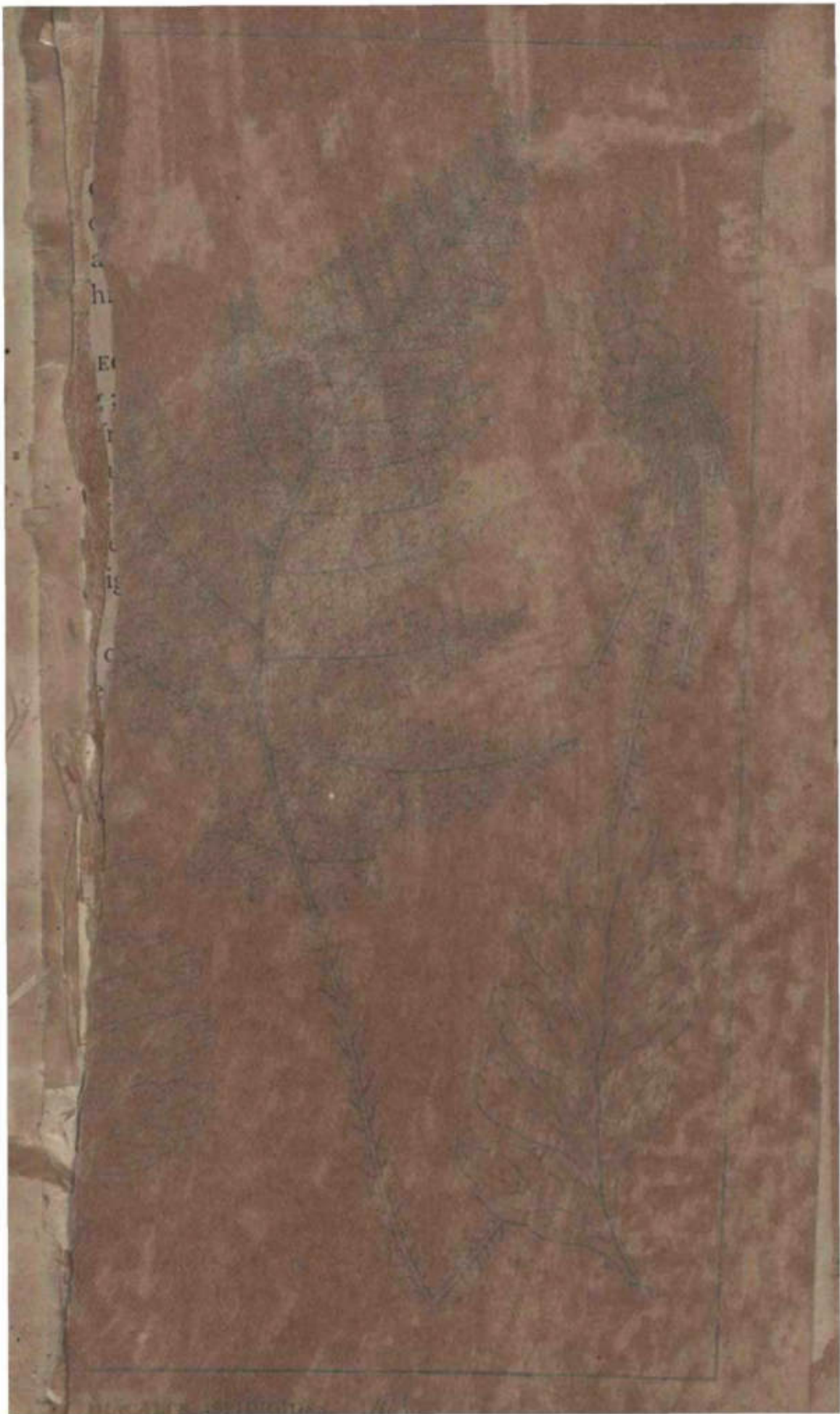
North-west and Southern Hill. ... through the Northern ...  
Ceylon.

(Also in the ... and S. China) ...  
The ... of the ... exaggerated ...

9. *ALOPHIS GINIVA* (Hock). A ...  
and ...  
strongly ...  
with ...  
densely ...  
generally ...  
with ...  
scales: ...  
increased ...  
covering the whole ...  
Hock, ...  
of ...  
Ceylon ...  
By ...

10. *ALOPHIS ...* (Fisher).  
minutely ...  
radius ...  
segments ...  
falcate ...  
branches ...  
beneath ...  
a less ...  
termined ...  
hair ...

Natchat ... (Kurtz)



GENUS V.—UIACALPE. (*BL*)

(*Dia* and *kalpe*, a vessel, in allusion to the cup-shape)

Sori globose, the receptacles small, scarcely exserted (inferior {i.e., below the sorus), globose, hard-membranous, at length bursting very irregularly at the summit; pedicel nearly sessile, ring broad, veinlets simple, free.

1. DIACALPE ASPIDIOIDES. (*BL*) A large coarctate fern, scaly, particularly near the base; fronds tripinnate, the rachis of pinnae pubescent with adpressed scales, the rachis or sub opposite, segments of pinnules oblong-ovate, decurrent, glabrous, or furnished with long web-like veins, not reaching the margin; sori medial on the pinnules, involucre bursting irregularly, or sometimes in two lips. *BL En. PL Jav. Fil* 241. *Hook, Syn. F. S. I. t* 257.

Nepal to Bhotan, Khasya, 4,000-6,000 feet elevation, in the parts of central provinces. Tenasserim on Malacca, 1,000 feet. Tavoy.

(Also in the Malay Islands.)

2. DIACALPE FICULACEA. (*Book, u*) A large fern, Rhizome creeping; stipes tufted, 6-12 inches high, clothed below with lanceolate reddish-brown scales, the lower pinnule 6-8 inches long, 3-4 inches broad, deltoid-lanceolate, secondary pinnules cut deeply into their lower divisions often again pinnatifid; segment ovate, subcoriaceous and very glossy, with a few scale-like hairs beneath; indusium leathery, dark brown, attached by the point under its centre, not stalked, arising from above. *Clarke, p.* 434. *Hook. Syn. I. K B. I. tab.* 36, under *Lastrea* (indusium incorrectly).

Sikkim, 7,000-10,000 feet elevation, abundant; Upper Ratong, 8,000-9,000 feet.



GENUS VI.—MATONIA. (*Br.*)

(after Dr. Maton, a London physician.)

of the sori expanded into a firm membranaceous, obscurely six-lobed stipitate involucre, which covers large sessile capsules; veins forked free, except those which are closely reticulated.

PECTINATA. (*Br.*)

; stipe slender, fronds fan-like, pinnately-flabellate, attached on the angle of the diverging rachis (rigid-coriaceous, nearly to the base [often glaucous] pet long; sori at the anterior base of the pinnules. *in Wall. PL. t. 1. Hook. Syn. F.B.IJ. 186.* Mount Ophir: the most handsome



MATONIA PECTINATA A. f. *Br.*)

(neo.)

GENUS II.—DICKSONIA.

(on the back or apex of a vein; **indusium** inferior, sometimes covering the whole sori, closed, or at irregularly; more frequently cup-shaped, entire, or **caudex** arborescent in Cibotium; veins free, or

GENUS VII.—STRUTHIOPTERIS.

(*Struthios* ostrich, the fronds like feathers o<sup>37)</sup>

Sori dorsal on **the** veins of the changed and<sup>ha</sup> of the fertile frond, and quite concealed by the n] **indusium** very thin hemispherical, very fugacious, 01 erect or creeping; fronds stipitate, dimorphous, fer **pinnae** torulose or flattish j veins all free **pinnae** Onoclea in having free veins.)

I. STRUTHIOPTERIS ORIENTALIS. [*Hook.*] Fr not attenuated at the base; fertile ones oblong, cj linear-oblong, flattened, two-edged, the broad covering the whole back, dark brown, glossy, atj and torn at the margin. *Hook. Syn. Fil. f. 46. l. 171.*

Sikkim, elevation 900-1,200 feet, Khasya, As (Also in Japan and **Western** China.)

GENUS VIII.—WOODSIA. (*B*

(In honour of Joseph Wood, a British b

Son globose; indusium inferior, soft, membran or more or less globose, and sometimes enclosing t opening at the top, the margin laciniate or fringed ; or forked. Small herbaceous ferns, the stipes **tuft**

1. WOODSIA HYPEKBOREA. (*Br.*) GlabftO.U>, rachis and costa beneath slightly hairy and scalyj, long by \ inch broad, linear-lanceolate, pinnate . ovate, pinnatifid, with few broadly obovate entire ones distinct; indusium smaller than the sorus, but, hairs which extend beyond it. *Hook. Syn. Fil. A 434-*

Kashmir, Sind Valley, elevation 5,000 feet; t Mr. Levinge.

(Also in Alpine and Arctic Europe and North

HANDBOOK

NO. XXII.

FERNS OF BRITISH INDIA,

CEYLON AND THE MALAY PENINSULA.

BY

COL. R. H. BEDDOME, F.R.S.,

*Late Conservator of Forests, Madras.*

*Author of "The Ferns of British India," "The Ferns of Southern India,"  
"The Ferns of the Malay Peninsula," &c., &c.*

WITH THREE HUNDRED ILLUSTRATIONS.

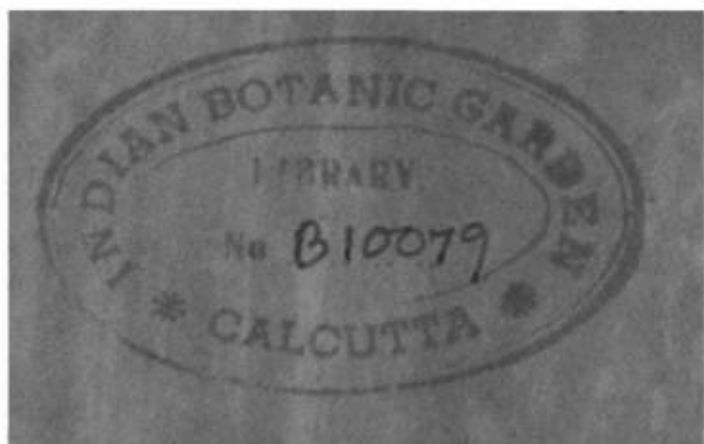
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FERNS OF BRITISH INDIA.



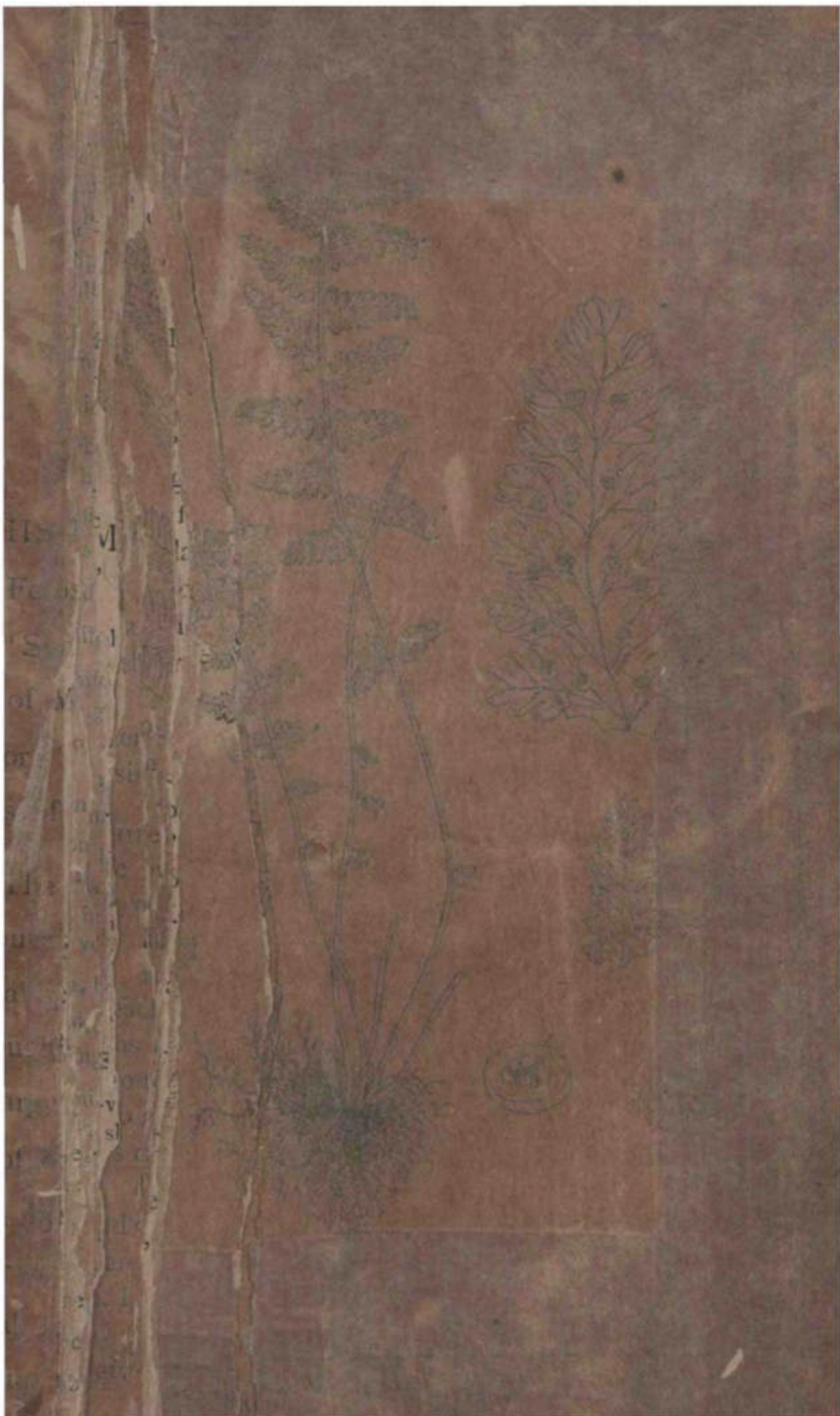
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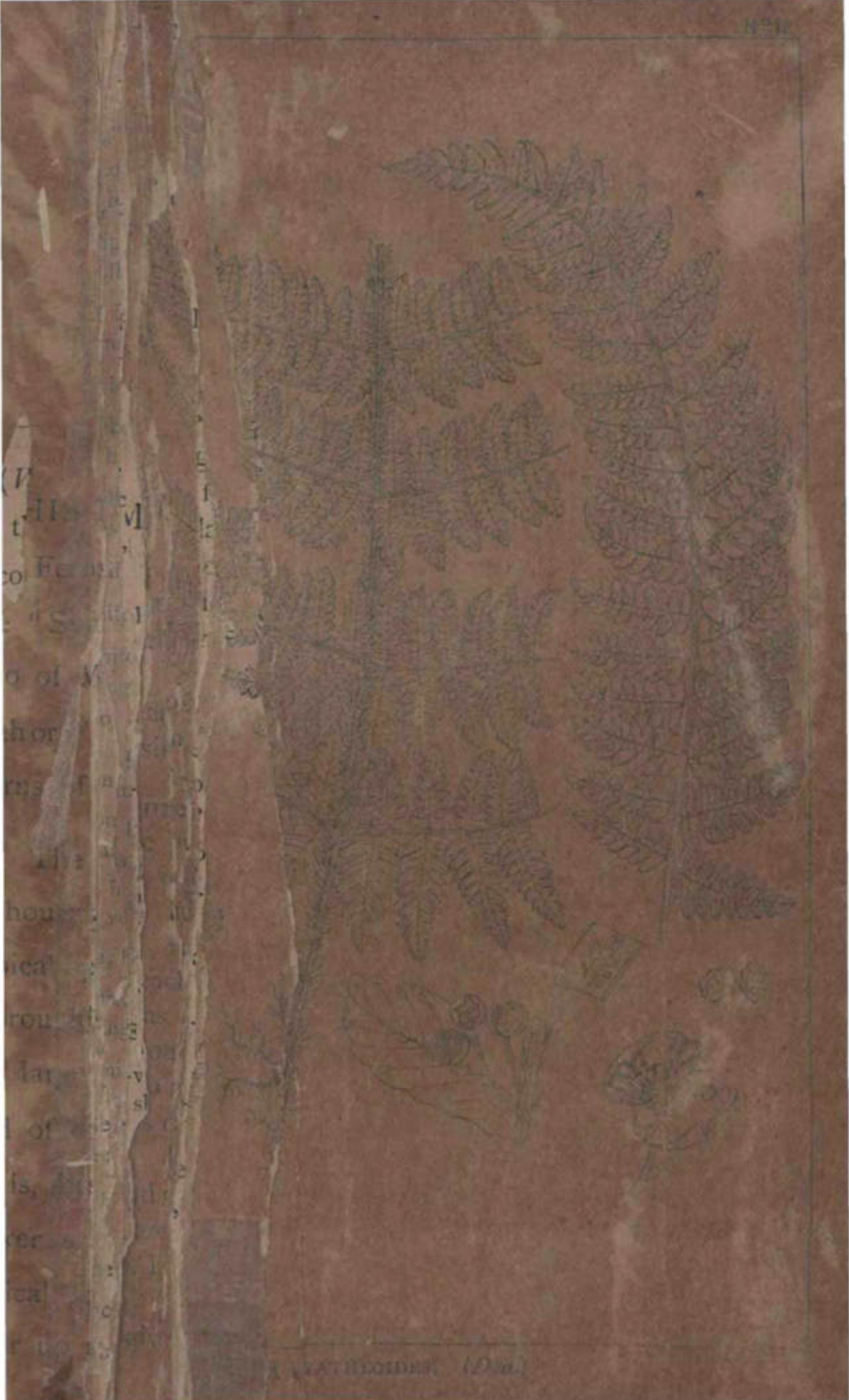












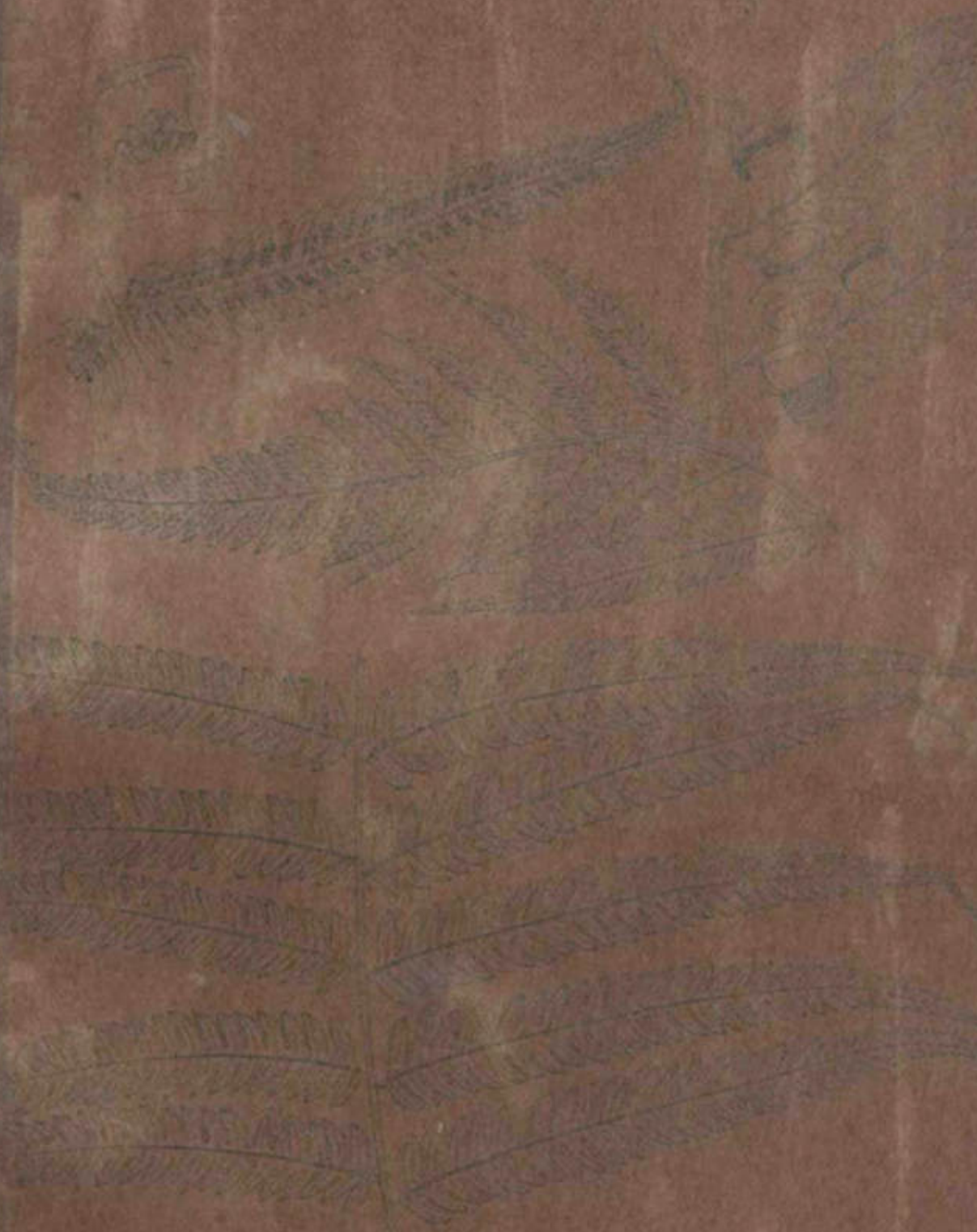
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YATHROIDES (Dra.)

The thorns also are broad, imbricated, obtuse, cartilaginous segments; some 2-6 to 10 times as long as the lower segments; indurated, cup-shaped, subglobular, or subglobose. *Wall. Cat. Bot. Beech. Syn. Yil. p. 54.* *Dendroica deltoidea, Bull. F. S. I. 1. 27.* *Himalayas, common to Bhutan, 1,000-3,000 feet; Birma and the Malay Peninsula generally, very common.*

3. *Dendroica* (*Arctostaphylos*) *deltoidea* (Hook.) *Arb. (Hook. and Parlat.)* Fronds lanceolate, long, which is acuminate or nearly sessile, 2-3 inches long, rachis flattened, pinnules sessile, increase at the base, pinnatifid; segments 1-2, lowest in the upper part, often 1/2 inch long, solitary in the center, the latter apex of the segment. *Hook. Syn. Yil. p. 54.* *Burma, 8,000 feet; Cheongtam, 1,000 feet.*

*Dendroica* (*Arctostaphylos*) *deltoidea* (Hook.) *Arb. (Hook. and Parlat.)* Fronds lanceolate, long, which is acuminate or nearly sessile, 2-3 inches long, rachis flattened, pinnules sessile, increase at the base, pinnatifid; segments 1-2, lowest in the upper part, often 1/2 inch long, solitary in the center, the latter apex of the segment. *Hook. Syn. Yil. p. 54.* *Burma, 8,000 feet; Cheongtam, 1,000 feet.*



## TRIBE III.—HYMENOPHYLLEIÆ.

Sori terminal or marginal from the apex of a vein; receptacle elongated, often filiform and long, and exserted more or less, clothed especially below with sessile orbicular imbricated subpeltate compressed capsules, surrounded by a complete transverse ring, opening vertically; indusium inferior, various in shape, generally of the same texture as the frond. Small, often epiphytal ferns, herbaceous-membranaceous, more or less laxly cellular, variously costate and veined. Caudex frequently long, creeping, and filiform.

## GENUS XII.—HYMENOPHYLLUM. (Z.)

{*Hymen*, membrane ; *phyllon*, leaf.)

Sori marginal, more or less sunk in the frond or exserted, terminating in the costa or vein; indusium inferior, more or less deeply incised, two-valved, toothed, fringed, or entire; receptacle elongated, columnar, exserted, or included; capsule mostly orbicular depressed, attached by the centre, furnished with a broad transverse ring, opening irregularly at the apex. Small, often minute ferns, generally on the mountains; fronds delicately membranaceous, simple or compound, costate, or with simple or branched, never anastomosing, veins.

\* Margin of the frond entire.



N?14.

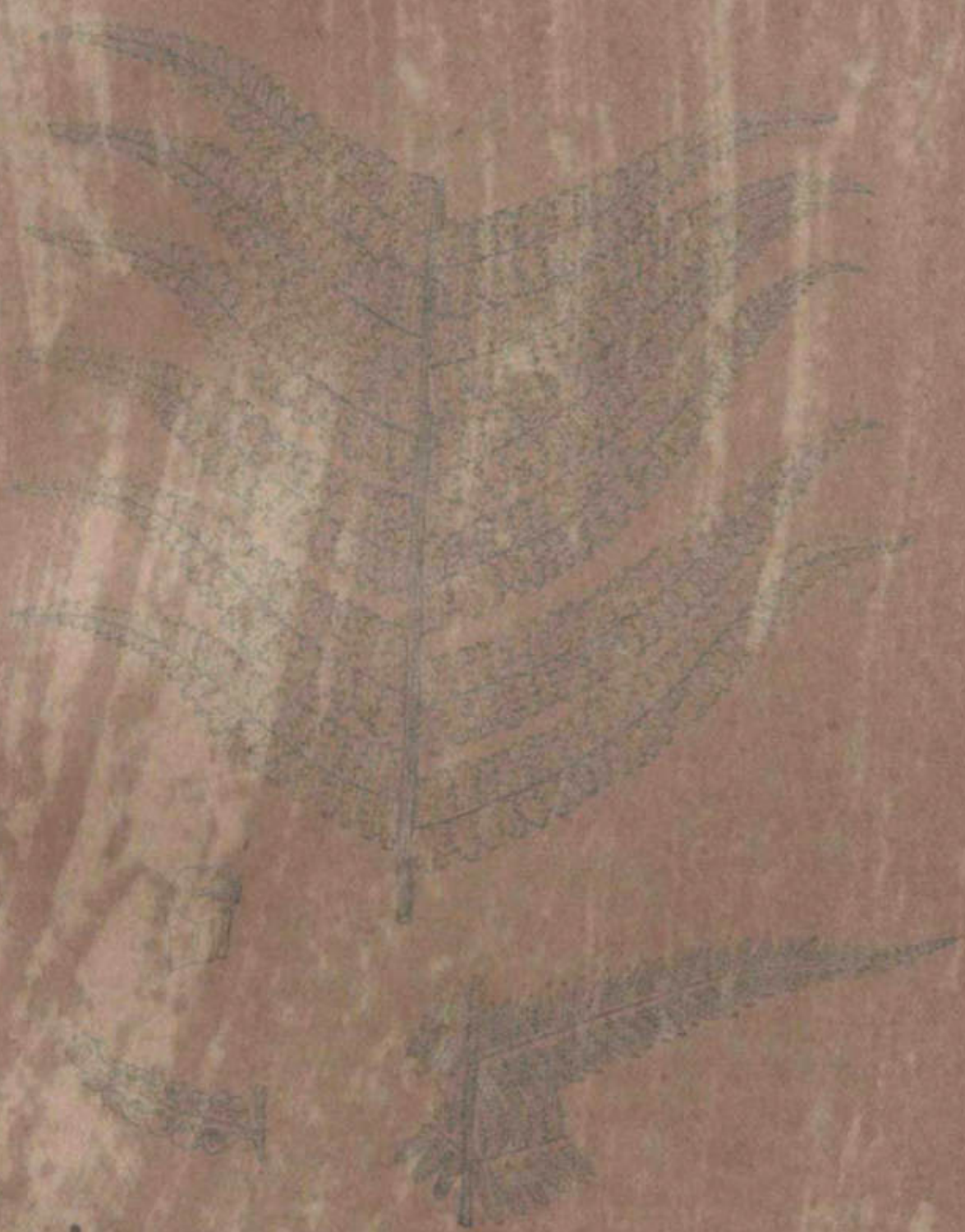
HYMENOPHYLLUM  
PARVIFOLIUM, (Baker.)

• HYMENOPHYLLUM PARVIFOLIUM. {*Baker.*}

A very tiny species, rhizome slender, creeping, tomentose; stipes about a line long; frond very minute, 2-3 lines long, 1 line broad, linear-oblong, margin entire; simple or 2-3-cleft at the apex, sometimes half-way down, furnished only with a central costa and a few faint, irregular, free spurious venules, the margin not thickened; sori solitary, terminal, sunk in the frond divided

'unk in the frond divided





DESI. FELIXIA ADENOCICATA. (Wall.)

about **half** way down ; valves rounded entire. *Bo her, Syn. Fil. f. 56. Bedd. F. B. I. t 225.*

Moulmein.

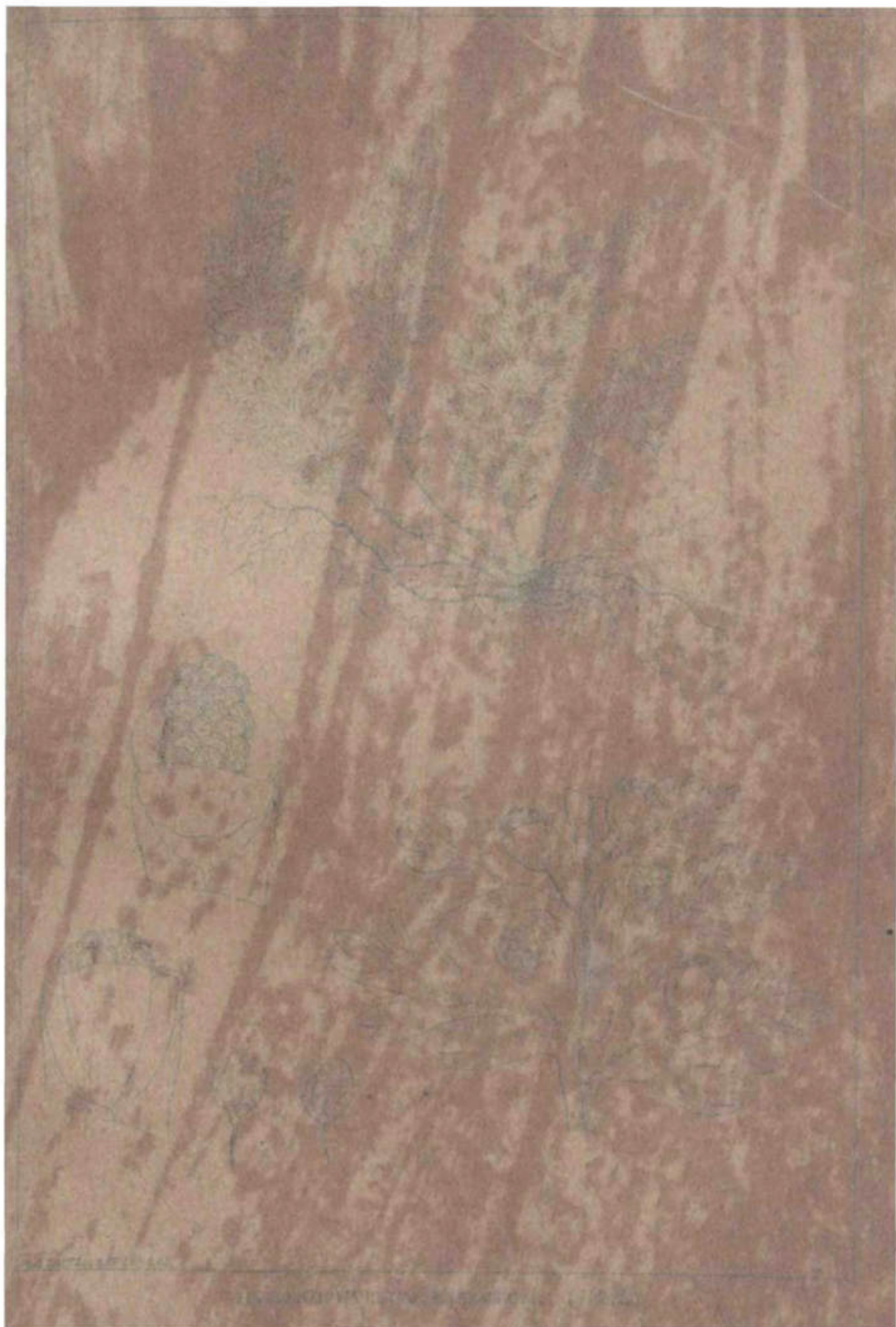
2. *HYMENOPHYLLUM TENELLUM.* (*Kuhn.*) Rhizome wide-creeping hairy or with fine hair-like scales; stipes  $\frac{1}{2}$  inch <sup>1°</sup> slender, somewhat hairy, fronds 1-2 inches long,  $\frac{1}{2}$  inch broad oblong to deltoid, tripinnatifid, margin entire, main rachis winged more or less furnished beneath with ferruginous hair-like scales; pinnae 4-6 jugate, deltoid, cuneate-truncate at the base on the lower side, lower pinnules 1-2, cleft at tip with ligulate blunt lobes,  $\frac{1}{2}$  line broad, partial rachises and veins more or less hairy beneath, glabrous above; sori 2-6 to a pinna, terminal in the lobes; involucre with hemispherical lobes, and a cuneate entire immersed base. *Baker, Syn. Fil. p. 57. H. polyanthos, Bedd. F. B. I. t. 267. H. eraersum, Baker, Syn. Fil. Isted. p. 457.*

Ceylon. (C. F. 3,560.) Differs from any form of *polyanthos* in having the rachises and veins hairy beneath.

3. *HYMENOPHYLLUM EXSERTUM.* (*Wall.*) Stipe 1-2 inches long, slender; fronds 2-6 inches long, 1-2 inches broad, lanceolate-oblong, ovate or short triangular bipinnatifid; main rachis winged above or throughout, more or less densely clothed with deciduous ferruginous hairs; lower pinnules rhomboidal, lanceolate-acuminate, divided more than half way down to the rachis into simple or forked linear pinnules, slightly hairy on the principal veins; sori 2-8 to a pinna, terminal or axillary in the segments on both sides, involucre divided down nearly to the base; valves oblong, bluntly denticulate at the apex. *Hook. Syn. Fil. p. 58. Bedd. F. B. I. t. 9.*

**K** Himalayas and Khasya Hills, 2,000 to 9,000 feet; Birma; all Western Ghats of the Madras Presidency; Ceylon, central provinces. Very common.

4. *HYMENOPHYLLUM POLYANTHOS.* (*Sw.*) Stipes  $\frac{1}{2}$  to  $\frac{3}{4}$  inches long; wingless or narrowly winged towards the apex; fronds glabrous, or nearly so, 2-8 inches long by 1-3 inches broad. not crisped, ovate-



oblong tripinnatifid ; main rachis\* *Jhh* .. 7  
 triangularly divided <sup>acms</sup> <sup>Wltn</sup> a narrow wing; lower pinnae  
**S t f T l f** cent e into sever  
 deep **Z m** <sup>Si?e></sup> the **10W6St** Of which **!TM** **cuneate** or rhomboid,  
**i a l b2** ' <sup>mate SfgmentsS</sup> linear > **>>-X\*** "ne long, less th:  
 segments on hJj, <sup>pmna, terTM</sup> **Small**, divide <sup>d</sup> **TM** **nearly to tr**  
 or rounded entire or slightly denticulate. *Swartz*

**£\*?£%. ft %: \p H -** *microglossum, V.D.B. Bedd. F. B. I. 66.*

Western Ghats of the <sup>^</sup> **feet elevatio** <sup>n.</sup>  
 Madras Presidency; Ceylon; Birma.  
 (Also widely distributed in all tropical and subtropical regions  
 throughout the world)

The typical form is only from Northern India, and is a very large fern.

**VAR.**  
 India. *Be* **OSSUM** is from the western ghats of South India. *t. 306.* **A S form With the Stipe more**  
 less winged; but Mr **me a fern under this name fr**  
**Uh I** *Clarke* sends me a fern under this name fr  
 diate between this and the type with some of  
 close to *Blumeanum*.

**BLUMEANUM.** Fronds very narrow and elongate, and pinnae sometimes simply pinnatifid only. *Bedd. F. S. I. t. 266.*  
 Ceylon. Tinnevelly and Travancore mountains. This has  
 generally been considered quite distinct species «V botanists  
**N** **Ceylon Ld Sou h I** India, but Mr. *Clarke* says it runs into the  
 and cannot be separated. With only a few  
 specimens in view, it is difficult to consider it as a distinct  
 species, but after seeing the Himalayan forms, I quite  
 agree with Mr. *Clarke* that they cannot be separated as species.

5- **HVMENOPHYLLUM JAVANICOM** (*Spreng.*) **Glabrous or 4earl**  
 stipe **a** 4 inches long, **J** margined above with a broad,  
 wing; fronds **4 T** inches long, 3-4 inches broad, triangular

tripinnatifid; main rachis with a broad crisped wing; lower **pinna**: 11-2 inches long, triangular-rhomboidal, erect-patent, divided down to a narrow crisped centre into several plane or slightly crisped **pinnules** on both sides, the lower of which are several times deeply pinnatifid; sori 6-20 to a pinna, terminal and axillary on the segments on both sides; involucre about as broad as the segments, divided down nearly to the base; valves orbicular, entire, or **denticulate**. *Spreng. Syst.* iv. 132. *Hook. Syn. Flip.* 60. *H. crispatum* (Wall.), *Bedd. K S I. t.* 207.

Himalayas, Nepal, and Bhotan, 5,000-8,000 feet; Khasya, 3,500-5000 feet; Western Ghats of the Madras Presidency; Ceylon, central provinces; Birma and Malay Peninsula.

(Also in Australia, New Zealand, Mauritius, Bourbon, and the Philippines.)

**VAR. P BADIUM.** (*Hook, and Grev.*) Frond hardly or not at all crisped. *H. badium*, *Hook. Syn. Fil. p.* 60. *Bedd. F. B. L t.* 282.

Sikkim, Malay Peninsula, **Tenasserim** on the Mooleyit Mountain.

6. **HVMKXOPHVLLUM CILIATUM.** (*Sw.*) Stipe 1-2 inches long, **furnished with** tufts of stellate hairs, **decurrently** winged above; wing ciliate; frond oblong, acuminate, tripinnatifid, 2-6 inches long, 1-2 inches broad at the centre; main rachis broadly winged throughout ciliated and **hairy** like the stipe; lower **pinna**; oblong or **rhomboidal**, **with** a broad central undivided portion, and numerous erect-patent simple or forked ciliated linear segments 2-3 lines long; sori 2-12 on a pinna, placed at the end of the lateral segments on **both** sides, involucre immersed suborbicular; valves divided about **half-way** down, and conspicuously ciliated. *Hook. Syn: Fil p* 6? *Bedd F. B. I. t.* 305.

Sikkim.

(Also in tropical America from Cuba and Mexico to **Chili** and South Brazil; Tropical Africa, Mauritius, Madagascar, Bourbon. **Seychelles** and Johanna Island; New Zealand.)

Mr. Clarke seems to doubt the Sikkim locality, but my specimens received from Dr. Jerdon quite agree with the type.

\*\* Margin of the frond serrulate.

7. *HYMENOPHYLLUM SIMONSLANUM*. (Hook.) Stipe slender, wiry or winged, naked or with a few ferruginous hairs, 1-2 inches long; fronds linear-oblong, 2-6 inches long, up to 1½ inch broad, pinnatifid to the winged rachis; the primary segments fan-shaped, 1-6 lobate, ultimate segments broadly oblong, serrulate; sori 1-4 terminal on the divisions of the upper pinnae, involucre broadly oblong, divided nearly to the base; valves serrulate. *Hook. Syn. Fil. p. 66. Bedd. F. B. I. t. 281.*

Sikkim, 4,000-10,000; common. Khasya Hills.

8. *HYMENOPHYLLUM SMITHII*. (Hook.) Stipe 1-2 inches long, wiry naked or slightly tomentose; fronds oblong-acuminate, 3-8 inches long, 2-3 inches broad, bipinnatifid; rachis winged above, ciliated below; pinnae oblong-triangular, with a winged rachis and simple or 1-4 times forked linear-serrulate segments; sori 1-4 terminal on the segments of the pinnae on both sides; involucre oblong, small, divided half down; valves entire. *Hook. Syn. Fil. p. 69. Bedd. F. B. I. t. 277.*

Malacca and Penang.

(Also in Philippines and Java.)

9. *HYMENOPHYLLUM DENTICULATUM*. (Sw.) Stipe 1-2 inches long, erect, ferruginously hairy or naked, often winged towards the apex; rachis winged throughout; fronds 2-3 inches long by 1 or more broad at the base, ovate to narrowly oblong, glabrous, or with scattered hairs, slightly crisped, pinnatifid to the rachis; primary segments pinnatifid, secondary ones oblong, sometimes again divided, serrulate on the margin, involucre ovate, glabrous or scabrous, or rarely slightly hairy; valves serrulate, or pectinate. *Swarth. Syn. Fil. t. 148 and 375. Hook. Syn. Fil. p. 70. Bedd. F. B. I. t. 278. Clarke, Ferns of North India, t. 438.*

Khasya hills, about Cherra Poonjee, 4,000-5,000 feet: British  
 Birma, Moulmein mountains, 7,000 feet.

(Also in Java.)

VAR.  $\beta$  FLACCIDUM. Main rachis, often with much ferru-  
 ginous hair beneath; fronds flaccid, hardly at all crisped, ultimate  
 segments slightly serrulate in their upper portion only, the main  
 rachis quite entire, valves of the involucre slightly serrulate at the  
 summit. H. Khasianum, *Hoo*, *Syn. Fil.* p. 464. *Bedd. F. B. I.*  
*t.* 276. *Clarke, l. c.*, p. 138.

Khasya Hills, growing with the type. Mr. Clarke, who has seen  
 it growing, considers it only a variety of *denticulatum*.

16. HYMENOPHYLLUM

NEESII. (*Hook.*) Stipe

2-1 inches long, naked,

or slightly winged, with

a crispate margin on both

sides, frond ovate, about

2 inches long,  $\frac{1}{2}$ -1 inch

broad, tripinnatifid; ra-

chis winged throughout,

the wing and pinnae

much crisped; pinnae

with distant, narrow, sim-

ple or 1-3 times deeply

forked, deeply toothed

segments; sori small,

usually single, supra-

axillary on the upper

pinnae; involucre subcylindrical below, divided more than halfway

down, with two acute spinulose-dentate valves. *Hook. Syn. Fil.*

p. 71. *Bedd. F. S. I. t.* 279. *Hymenophyllum Tunbridgense.*

*Bedd. F. S. I. t.* 265.



1917

HYMENOPHYLLUM NEESII.

(*Hook.*)

Ceylon, central provinces; Tamaveiru on the Chel, upland hills, 5,000 feet; Penang.

(Also in Java, Borneo, Fiji, and Philippines.)

11. *TRICHOMANES LEVINII*. (Clarke.) Very delicate in texture; stipe 1 inch, with moniliform hairs; frond 7-2 inches long, more or less covered with moniliform hairs, narrowly oblong, not creped, pinnatifid to the winged rachis; primary segments 1-4 lobes; ultimate segments oblong, remotely serrate, their midrib with many hairs and lanceolate scales of the same texture as the frond, involucre usually 1-2 at the end of the segment, small, glabrous sub-gradate; valves separating nearly to the base entire or slightly toothed at the apex. *Clarke, F. of North India, p. 439. t. xxix. fig. 3.*

Sikkim; Yaksun and Neebay, 7,000 feet elevation.

### GENUS XIII.—TRICHOMANES. (Smith.)

(*Thria*, a hair; *manos*, soft.)

Soft marginal, always terminating a vein, more or less sunk to the frond; involucre monophyllous, tubular, closely corresponding with the frond in texture, the mouth truncated or winged, or slightly notched; receptacle fibrous, elongated, often considerably exerted beyond the mouth of the involucre, capsuliferous principally at the base; capsule sessile, depressed, surrounded by an entire broad nearly transverse ring, bursting vertically. Like the last genus in habit of growth and delicacy of texture.

1. *TRICHOMANES MATEYKI*. (V. D. B.) Rhizome creeping, more or less tomentose; fronds very small, sessile, or shortly stalked, about 1 inch broad, cordate-ovate, sometimes somewhat lobed, sterile ones nearly entire, fertile ones with a deep apical sinus; veins in the sterile fronds radiating from the base without any distinct central vein, but a distinct costa is present in the fertile fronds; primary veins indistinct, a distinct marginal line; involucre



swaged, proceeding into the base of the stipe, the apical space long and much dilated. *Hook. Syn. Fil. 2: 73. L. Henzaiense, Bot. Beechey, P. L. 1: 2, 183.*

Tenasserim, Andamans, Ceylon.  
(Also in Borneo and New Caledonia.)

2. *TRICHOMANES TACTUM*. (Bedd.) under *Hymenophyllum*. Rhizome wide-creeping; stipe very short; frond  $\frac{1}{4}$  to  $\frac{1}{2}$  inch linear-oblong, narrowed at the base, blunt repand, rarely somewhat parallel; veins pinnate from a central costa, simple or forked, spinous; venules few but nearly 15, prominent as the veins, not reaching the costa, and often not touching the margin; involucre solitary, terminal, the base sunk in the frond; valves chart. laxo and spreading; receptacle exserted or included. *Bedd. F. S. I. 1: 275. Bot. Syn. Fil. 4: 464.*

Wynnad and Coony, 3,000-4,000 feet, Ceylon.

3. *TRICHOMANES NEIGHERRIENSE*. (Bedd.) Rhizome creeping more or less tomentose; stipe 3-6 lines long, glabrous or tomentose; fronds glabrous, very small up to 1 inch long, ovate to elliptic, orbiculate or linear, entire or somewhat lobed; veins from a more or less distinct central costa, spinous; venules numerous, a marginal band generally present; involucre terminal, 1-2 sunk in the frond, the mouth exserted, more or less two-lobed; receptacles exserted. *Bedd. F. S. I. 1: 6. Hook. Syn. Fil. 2: 74.*

Neigiris, abundant about Walaghat, 3,000-4,000 feet; Anamalai hills, Innevelly and Thevira hills; Ceylon, central provinces.

4. *TRICHOMANES HENZAIENSE*. (Hook.) Rhizome creeping, tomentose; stipe from obsolete up to  $\frac{1}{2}$  inch long; frond  $\frac{1}{4}$ -1 inch each way, very thin, orbiculate to obovate-unequal, more or less long, central costa present or often obsolete, steep towards the base, above which it branches off into veins; veins prominent and spinous; venules copious, marginal band absent or inconspicuous; involucre 1-2 sunk in the frond; mouth rather sessile.

*Parv. in Hook. 2 Cent. Ferns, t. 1. Figk. Syn. Tab. p. 75. Bedd. F. B. I. t. 393.*

Moulmein and Pegue, on trees.

5. TRICHOMANES MUSCOIDES. (Sw.) Frond stalked, 1-3 inches long, by 1-1/2 inch broad, linear-oblong to suborbicular, entire or

variously lobed, spurious venules copious; sori 1-3, terminal on the lobes, the tube sunk in the frond, the mouth free, dilated, but usually scarcely two-fifths of

Northern India (received from Dyas); Khasya.

(Also in tropical America and Africa, Polynesia, &c.)

Mr. Clarke states that the typical form is not found in Northern India, but only the variety sublimbatum, distinguished by having no trace of a marginal band, but in Griffith's specimen collected on the Khasya hills, this marginal band is more or less present in some fronds, and I do not think it can be separated as a variety. This species, as I understand it, is not



FIG. 5.  
TRICHOMANES PARVOLUM.  
(Poir.)

not found in Northern India, but only the variety sublimbatum, distinguished by having no trace of a marginal band, but in Griffith's specimen collected on the Khasya hills, this marginal band is more or less present in some fronds, and I do not think it can be separated as a variety. This species, as I understand it, is not

present in Ceylon or S. India, the Ceylon plant being identical with the Nilgiri *T. neilgherrense*.

6. *TRICHOMANES PARVOTUSULA* (Presl.) Rhizome wide-creeping, interlaced; stipe 1 inch long, wiry, slender, tomentose below; frond  $\frac{1}{4}$  to  $\frac{1}{2}$  inch each way, orbicular in general outline, cuneate or truncate at the base, flabellately cut about half-way down from the outer edge in the direction of the base into narrow irregular segments; veins close, prominent, so that the frond, when dry, appears channelled; dichotomous at a very small angle; spongy venules numerous; sori 4-6, terminal on the central segments, the tube quite sunk in the frond, the mouth dilated at the sides. *Hook. Syn. Fil. p. 75. Bald. K. S. I. t. 179.*

Nilgiris.

(Also in Japan, China, Java, Polynesian Islands, Madagascar, Johanna Island, and the Moluccas.)

7. *TRICHOMANES PROLIF. RUM.* (Blume.) Rhizome wide-creeping, interlaced; stipe 1-2 inches long, slender, bearing 1-3 deeply divided fronds about 1 inch broad each way, ovate-lanceolate to roundish; segments narrow dichotomously branched, divided down nearly to the central rachis; veins numerous, irregular; sori 4-12, terminal, the tube quite sunk, the mouth obscurely two-lipped; receptacles exserted. *Hook. Syn. Fil. p. 76. Bald. K. S. I. t. 262.*

Nilgiris, west slopes, 3,000 feet; Travancore Hills, Ceylon.

(Also in Java and the Philippine Islands.)



Nº 19.

*TRICHOMANES DIGITATUM.*

(Sw.)

8. *TRICHOMANES DIGITATUM* (Swartz.) Stipe very slender, naked,  $\frac{1}{2}$  inch long; frond 1-2 inches long,  $\frac{1}{2}$ -1 inch broad, irregular in general outline, divided down nearly to the base, or a little

winged rachis into long broadly-linear dichotomous segments, sometimes ciliate, with only a central costa in each ; sori 2-6, terminal on the segments ; involucre cup-shaped, quite sunk, the mouth broadly dilated, slightly two-lipped. *Hook. Syn. Fil p. 76. T. corticola, Bedd. F. S. I. 1. 264.*

Ceylon, Ambagamwa district; also collected by Griffith either in North India or the Malay peninsula.

(Also in Mauritius, Bourbon, Java, and the Polynesian Islands.)

9. **TRICHOMANES KURZII.** (*Bedd.*) Rhizome slender, wide creeping; stipe very short; frond not 1 inch long, cuneate below, deeply **pinnatifid**, primary segments L • 3 lobate, ultimate segments linear, texture thick, surface somewhat undulated,



**TRICHOMANES KURZII.** (*Bedd.*) margin bounded by a thickened line, a central vein only in each segment; sori 1-2 to a frond, subterminal, the involucre turbinate, sunk in the frond, the mouth dilated but without lips. *Bedd. F. B. I. t. 286. Trich. nanum, Hook. Syn. Fil. p. 77, Crepidomanes nanum, D. B. Hymen. Sitpl. p. 122. Clarke, F. N. I. p. 440. ,*

Assam, Andaman Islands; Malabar, at Poodoopady, foot of the Tambacherry Ghat.

10. **TRICHOMAXES VIRIDAXS.** (*Mett.*) Rhizome creeping, tomentose : fronds with a broadly winged stipe 1/2 inch long, very irregular in outline, more or less deeply pinnatifid nearly down to the midrib; segments again more or less deeply divided, obtuse and rounded at the apex of the lobes; veins erect-patent from a central costa one to each lobe of the segments; spurious venules lineolate, numerous, very short and detached ; sori numerous, terminal

at the apex of the lobes, the mouth entirely excluded, only the base being sunk in the margin of the frond, the root dilated. *K. in.* 276. 35. *t.* 389. *T. pallidum, Bodd. F. S. L. 308.* (*Sp. pl. Ind. 1753.*)

*Stomochium* 27.

31. *TROCHOMAYERIA MARGINALIS* (Hook. and Grev.) Rhizome slender, creeping, tomentose; stem slight; frond 1-2 inches long, 1/2 inch broad, tapering below, erect, pinnatifid, central portion 1 line broad, segments few, either simple, forked or pinnate, subcoriaceous, opaque, the apices acute; a central vein only in each segment, but the margin thickened; involucre 1-4 to a frond, subcylindrical, tapering at the base, sunk entirely in the apex of the segments; sori pinnate, pointing. *Hook. Sp. Ind. 5. v. Bodd. F. S. L. 308.*

Sivagui Hills (Tinnevely district); Marthar plains, base of the Bhagamandal Ghat, which descends into Coorg; Ceylon, in the Ambagawwa district.

32. *TROCHOMAYERIA MULTIPLEX* (Blume.) Rhizome creeping, slender, tomentose; stem 1-2 inches long, wiry, slender; fronds 2-5 inches long, 1/2-1 1/2 inch broad, ovate to lanceolate bipinnatifid, divided down to a narrow, jagged margin, glaucous when dry, primary divisions broad-lanceolate; the segments all more linear, simple or forked; veins broad and few; sori 1-4 to a pinna, subcylindrical, on short segments, partially sunk, slightly cylindrical, attenuated at the base, the mouth broad, pinnatifid, but scarcely two-lined. *Blume Hook. Sp. Ind. 5. v. 14. Glauco-insensit. Hort. Sp. Ind. 5. v. 23. Bodd. F. S. L. 326.*

Ceylon, Ambagawwa district; Penang.

Also in the Pacific Islands, and the Philippines.

33. *TROCHOMAYERIA MARGINALIS* (Hook.) Rhizome slender, creeping, tomentose, rather slender; stem 1-2 inches long, and slightly winged above; involucre 4 inches long, 1/2 inch broad,

ovate, tripinnatifid, main rachis with a very narrow wing or <sup>ir</sup> below; pinnae ovate-rhomboidal, pinnatifid down to a narrowly-winged rachis; the lower pinnule again deeply pinnatifid; ultimate segment linear; texture firm, membranaceous.; a central costa in each segment, spurious venules none or indistinct; sori 1-4 <sup>to</sup> a pinna, axillary, or terminal on the segments; tube sunk or somewhat exserted; the mouth very distinctly two-lipped, the lips subtriangular with a rounded apex. *Poiret in Encyc. M'eh. Bot.* viii. 69. *Trich. Filicula, Bory. Hook. Syn. Fil. p. Si. Bedd. F. B. L. t. 283.*

Himalayas and Khasya hills, up to 6,000 feet; all the western crests of the Madras and Bombay Presidencies, up to 8,000 feet; Ceylon; Birma.

(V. throughout the tropics of the whole world.)

VAR. <sup>13</sup> ~~NSIGN~~ FE. (V. D. B.) A narrower more slender form. *Bedd. F. B. I. t. 284.*

N. W. Himalaya.

VAR. <sup>y</sup> PLICATUM. (V. D. B.) Ultimate segments of the pinnules very narrow and acute; wing of the rachis somewhat crisped. *Bedd. F. B. L. t. 285.*

Birma.

14. TRICHOMANES PYXIDIFERUM. (Z.) Rhizome wide-creeping, tomentose, rather slender; stipe 1-2 inches long, naked, winged above; frond 1-6 inches long, <sup>i</sup> inch broad, ovate-oblong, tripinnatifid, main rachis with a very narrow wing; pinnae ovate-rhomboidal, pinnatifid down to a narrowly-winged rachis, with the lower pinnule again deeply pinnatifid; ultimate segment linear, often emarginate at the apex; texture membranaceous; a central costa in each segment; spurious venules none or indistinct; sori 1-4 to a pinna, axillary, tube more or less winged, mouth broadly dilated but scarcely two-lipped; receptacle filiform, exserted. *Hook. Syn. Fil. p. Si. Bedd. F. B. L. t. 7. F. B. I. t. 301.* A

<sup>1</sup> small variety.

Scarcely distinguishable from No. 13, except by the involucre.

South Indian forests, Ceylon, Birma, Eastern Bengal.  
(Also in the tropics throughout the world.)

VAR.  $\beta$  LILIPUTUM. Fronds up to 8-10 inches long, by 1½-3 inches broad, flaccid, and larger and less cut than the type. *Bedd. F. B. I. 2.* 348.

Khasia Hills, 6,000 feet.

15. TRICHOMANES BIRMANICUM. (*Bedd.*) Rhizome thick, very wide-creeping, tomentose; stipe 1-3 inches long, winged throughout; frond 2-7 inches long up to 2½ inches broad, ovate, rachis winged; pinnae very compound, very minutely furfuraceous (under the lens), the ultimate segments very narrow, ¼ line broad, a single costa to each ultimate segment; sori copious, supra-axillary, much exserted, the mouth truncated. *Bedd. F. B. I. Suppl. 1.* 349.

Birma, common on the Mooleytic mountain, 5,000-6,000 feet.

16. TRICHOMANES RADICANS. (*Sw.*) Rhizome wiry, wide-creeping, tomentose; stipe strong, up to 6 inches long, naked or nearly so; fronds up to 12 inches long and 6 inches broad, 3-4-pinnatifid, nath rachis naked or winged sometimes to the base of the stipe, lower pinnae 1-4 inches long, ovate-rhomboidal, ultimate segments oblong, one-nerved, texture firm, membranaceous, sori lateral, 6-4 to a pinnule, the tube small, subcoriaceous, more or less exserted, the mouth slightly lipped or altogether truncated, receptacle slender, elongated. *Stewart, Fl. Ind. Or.* 1736. *Hook. Syn. Fl.* p. 31. *Bedd. F. B. I. 1.* 181. *T. umbrosum*, *Wallch.*

Himalayas from Nepal to Bhotan, 2,000-7,000 feet; common in Khasya, 2,000-3,500 feet; Mergui.

(Also scattered throughout warm, temperate regions of both hemispheres, and known as the Irish fern.)

Mr. Clarke says it often climbs to the height of 12 feet, and is 1-2 pinnate with finely divided fronds, in which state it is very distinct; but it also varies so as to be with difficulty distinguished from *Lyidiferum* on one hand and *articulatum* on the other.

19. *Trichomanes (Bl.)*. Rhizome slender; stipe often winged  
to the base, primary segments pinnatifid or somewhat 2-pinnatifid.  
The whole involucre slightly broader than the tube. *Cavan. Bot.*

Sikkim and Khasya, rare.

20. *TRICHOMANES AURICULATUM (Bl.)*. Rhizome strong,  
wide creeping, tomentose; frond nearly sessile, 1-2 scarcely 3-jun-  
cund, 4-16 inches long, 1-2 inches broad, rachis more or less  
winged, pinnae shortly stalked, ovate-rhomboidal, obliquely cuneate  
at the base, 3-7 regularly pinnatifid half down or more, ultimate seg-  
ments ovate entire with 8-10 bell-shaped, or narrowly oblong, one-  
nerved, entire, subparallel veins; sori 3-12 to a pinna, the tube nearly  
or quite exserted, the mouth truncate. *Planch. Fl. Jav. III. p. 225.*  
*Hort. Syn. Fl. p. 87. Gard. Bot. Soc. L. 182.*

Sikkim, Bhotan, 2,000-7,000 feet, frequent; Khasya, 2,000-  
5,500 feet, common; Ceylon.

(Also in Japan, Formosa, Philippines, Java, and Guinea.)

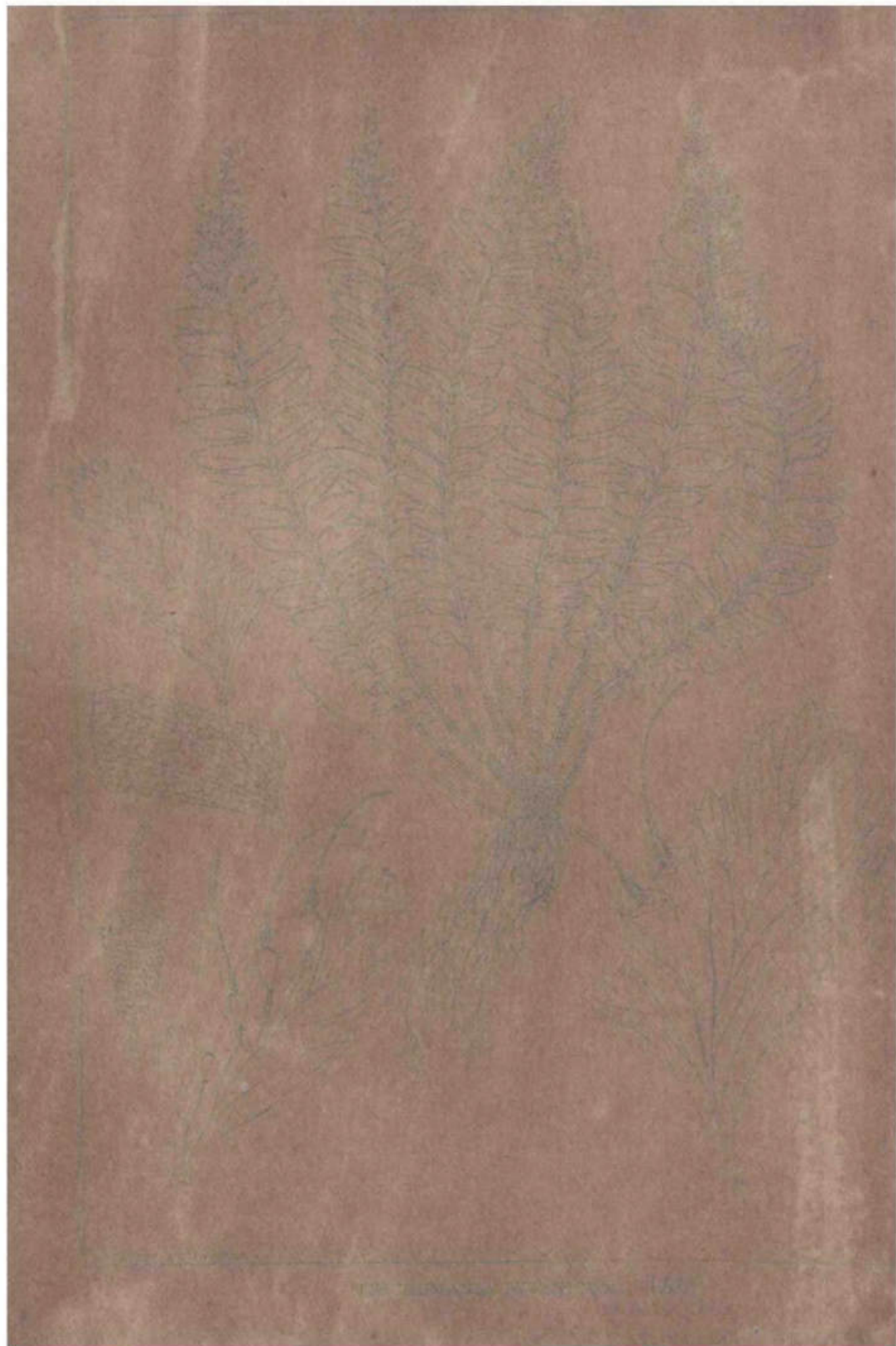
21. *TRICHOMANES JAVANICUM (Bl.)*. Caudex tufted with  
strong very roots; stipe 1-4 inches long, wing, erect, naked, or  
scarcely so; fronds 2-3 inches long, 1-2 inches broad, ovate-lanceolate,  
acuminat, simply bipinnate, pinnae oblong serrate, or linear imbricate-  
serrate-subspicuous; veins numerous, close, central costa not  
strongly marked or continuous to the apex; sori 1-4 placed in the  
axils of the linear segments on the upper side of the pinnae; tube  
fracture monandrous, dilated, but not two-imped, receptacle immu-  
table. *Pl. Em. Fl. Jav. III. 227. Hook. Syn. III. p. 83. Seid-  
litz. Bot. p. 180.*

Stipe long, up to 1,000 feet; Ceylon, Malay peninsula.

(Also in Borneo, Java, Polynesian Islands, and Madagascar.)

22. *Trichomanes (Bl.)*. Rhizome slender; stipe erect,  
winged, 2-3 inches long, naked or very slightly winged above; fronds  
2-3 inches long, 1-2 inches broad, deltoid or ovate, acuminate,  
pinnatifid, the main rachis usually only slightly winged towards





the top; lower pinnae 2-3 inches long, erect-patent, ovate or lanceolate-rhomboid, cut down the rachis; pinnules deeply pinnatifid with deeply toothed or pinnatifid linear lobes, texture sub-mateous, colour dark green, nearly black when dry, nearly naked, often slightly crisped; sori 2-16 to a pinnule, small axillary, the tube more or less exerted, the mouth slightly dilated. *Hook. Syn. Ed. p. 86. Bedd. F. S. I. 18.*

Common in the moist forests on the western mountains of the Madras Presidency, 2,000-4,000 feet elevation, and in Ceylon and the Malay Peninsula.

(Also in tropical America and the West Indies, Polynesian Islands, New Zealand, Japan, South China, South Africa, Angola, Fernando Po, and the Mascareen Islands.)

#### TRIBE IV.—DAVALLIÆ.

Sori marginal or submarginal, roundish, covered by a reniform or suborbicular, squamiform indusium, which is open at the apex, fastened broadly at the base, open or free at the sides.

#### GENUS XIV.—HUMATA. (*Car.*)

(*Humatus*, humid, in opposition to *Adiantum*.)

Sori intra- or sub-marginal, globose, indusium coriaceous suborbicular or reniform, attached by a broad base, the apex and sides free; fronds articulated upon the rhizome, coriaceous, small usually deltoid, more or less dimorphous, the barren ones less cut; veins always free, rhizome creeping, growing on trees or rocks.

1. *HUMATA HETEROPHYLLA*. (*Smith.*) Rhizome wide-creeping, scaly; frond shortly stalked, 3-6 inches long, 1 inch broad, glabrous; the sterile ones ovate-lanceolate entire or slightly lobed at the base, the fertile ones narrower, deeply sinuate-pinnatifid; sori 2-16 to a lobe. *Hook. Syn. Fl. 88. Bedd. F. B. I. 100.*

Singapore, Penang, and the Malay Peninsula.

(Also in the Polynesian Islands.)

2. *HUMATA ANGUSTATA*. (Wall.) Rhizome wide, creeping, scaly; fronds subsessile, or shortly stalked, 3-8 inches long, 1- $\frac{1}{2}$  inch broad, linear, slightly and irregularly crenate at the margin, rarely once forked; both surfaces naked; veins parallel, simple or forked thickened; sori in a row along the edges, indistinct small, transversely oval. *Hook. Syn. Fil.* p. 86. *Bedd. F. B. I. t.* 237.

The Malay Peninsula, Malacca, &c.  
(Also in the Malay Islands.)

3. *HUMATA PARALLELA*. (Wall.) Caulis creeping, paleaceous; fronds, 4-8 inches long, 1 $\frac{1}{2}$ -2 inches broad, stipitate, coriaceous, ovate-lanceolate, acuminate, deeply pinnatifid nearly to the rachis; segments close, parallel, horizontally patent, linear or linear-oblong subobovate entire, the lowermost pair sometimes with a solitary obtuse lobe at the base beneath, rarely more; involucres semiorbicular, copious marginal, but all pointing towards the apex of the segments in two close parallel lines (not pointing towards the margins); veins thickened sunk. *Hook. Syn. Fil.* 89. *Bedd. F. B. I.* t. 99.



*HUMATA PARALLELA*. (Wall.)

Birma and the Malay Peninsula.  
(Also in the Polynesian Islands.)

1. *HUMATA PEDATA*. (*Smith*.) Rhizome creeping, scaly; stipe 2-4 inches long; fronds 2-8 long by  $1\frac{1}{2}$ -4 inches broad, deltoid in outline, cut down nearly or quite to the rachis, the lower pair of segments or pinnae larger than the others, and more compound, deeply pinnatifid, with the segments crenated, or more or less pinnatifid; sori in rows on the teeth on both sides of the lobes. *Smith, Tentam. Gen. Fil.* 55. *Hook. Syn. Fil.* p. 89. *Bedd. F. S. I. t.* 12. *H. alpina*, *Blume*, is a smaller, more finely cut variety; which is found in the Himalayas as well as Mergui. *H. vestita* (*Bl.*), *Bedd. F. S. I. t.* 6, 253, has a longer stipe, is more lanceolate in shape, and more finely cut, but is said to run into typical "pedata."

The typical form is found on the western slopes of the Nilgiris, and on the Travancore Ghats, at 3,000-4,000 feet elevation; Sikkiat, Bhotan, Khasya, Jaintea, 4,000 feet; Ceylon; and the Malay Peninsula.

(Also in the Malay Islands, North Australia, South China, in Japan, and the Mascareen Islands.)

The variety *alpina* has been received from the north west Himalayas (Dyas) and Mergui, and also inhabits Java, Azores, and the Polynesian Islands.

The variety *vestita* is from Ceylon, and also occurs in Java.

#### GENUS XV.—LEUCOSTEGIA (*Presl*)

(From *leucus*, white; *steges*, a cover.)

Sori intra- or sub-marginal, indusium as in *Humata*, but smaller, narrower and thinner; fronds articulated upon the rhizome (except in *nodosa*), generally membranaceous and flaccid, generally 3-4-pinnatifid or pinnate, rarely only bipinnatifid; veins forked, venules free; rhizome long, creeping, growing generally on trees and rocks.

1. *LEUCOSTEGIA HYMENOPHALTA* (*Parish MS.*) Caudex creeping furnished with numerous long waxy roots, stipe slender, 3-4 inches long; fronds subglabrous, membranaceous, very flaccid and transparent, ovate, or deltoid-ovate pinnate; lower pinnae deeply pinnatifid with the lower basal segments much the largest, and again



PL. F. AMER. ACUTIPEDAL.

ADANTUM PEDATUM. (Sw.)

innatifid with the segments entire or crenated, the remaining pinnæ pinnatifid with the segments crenately serrate at the apex of the superior veins of each segment, indusium as in the genus, veins terminating within the margin. *Hook. Syn. Fil. p. 90. Bald. F. B. T. t. 96.*

This very delicate species was discovered near Moulmein, on limestone rocks, by the Rev. C. S. Parish.  
Moulmein.

2. *LEUCOSTEGIA MEMBRANULOSA* (Wall.) Caudex hispid, with very long, slender, subulate, rigid, membranaceous scales; fronds 9-15 inches long, thin and membranaceous, ovate-lanceolate and as well as the slender stipe and rachis pubescent-hirsute, bipinnatifid; pinnae lanceolate, their rachis winged; pinnules lanceolate pinnatifid, the segments ovate-lanceolate subulate, very acute entire or rarely toothed; involucre small, ovate-subround acute, very thin and membranaceous fixed by the broad base, the rest free. *Hook. Syn. Fil. p. 91. Bald. F. B. T. t. 98.*

Very like *multidentata*, but differs in the scales of the rhizome, and in the fronds being much less compound, in this they are pinnate, with the pinnae deeply pinnatifid, in *multidentata* bipinnate, with the pinnae deeply pinnatifid.

Neral, Kumaon, Mcharguri Pass, 6,500 feet.  
(Also in Yunnan.)

3. *LEUCOSTEGIA MULTIDENTATA* (Wall. under *Aspidium*.) Rhizome stout-creeping; scales ovate-acute; fronds with the stipe up to 2 feet long and 1 foot broad, deltoid, bipinnate, with the pinnules deeply pinnatifid, down to a winged rachis, texture herbaceous; rachis pubescent above, often furnished with a few distant large ovate scales, rachis and segments beneath, generally glandularly pubescent; sori 2-12 to a segment, placed at the base of its teeth, on the upper side of the central vein. *Wall. Cat. 346. Microlepia pectoris. Bald. F. B. T. t. 313. Hook. Syn. Fil. p. 91.*

Himalayas, Nepal and Bhotan, 5,000-8,000 feet. Khamsa, 1800-5,000 feet, common.

4. *LAUCOSTEGIA ASSAMICA*. (*Burm. f. et Acrostichum*) Rhizome creeping, covered with numerous imbricated chaffy scales, ovate in the series; fronds glabrous, shining, 3-14 inches long (including the stipe, which is 2-3 inches), 2-3 inches broad, subcordate or lanceolate, acuminate with the primary pinnae alternate or opposite, parallel almost to the rachis, lower ones petiolate, upper ones decurrent, so as to form a regular wing to the rachis, pinnae imbricated, segments toothed, each leafing one setus, setus terminating within the margin.

Involucres as in the genus, as

fronds as deep. *Burm. f. et Acrostichum*

*Bot. Beech. p. 467.*

Bhotan, Mishmee, and by the Bihong.

5. *LAUCOSTEGIA IMMERSA*.

(*Wall.*) Rhizome creeping stout

fibriflose; stipe 4-8 inches long,

strong, erect; fronds 11-18

inches long, 6-9 inches broad,

deltoid, tripinnate, glabrous;

lowest pinnae lanceolate and

deltoid, 2-3 inches long, 1 inch

broad, with broad segments,

which are obliquely lanceolate

at the base below and roundly

lobed with the lobes acute or obtuse above; texture herbaceous,

sori large, impressed, clearly visible from the upper side, 4-6 to

segment, oblique; involucre broader than long. *Horn. Syn. Fil. p. 67.*

*Bot. Beech. p. 467.*

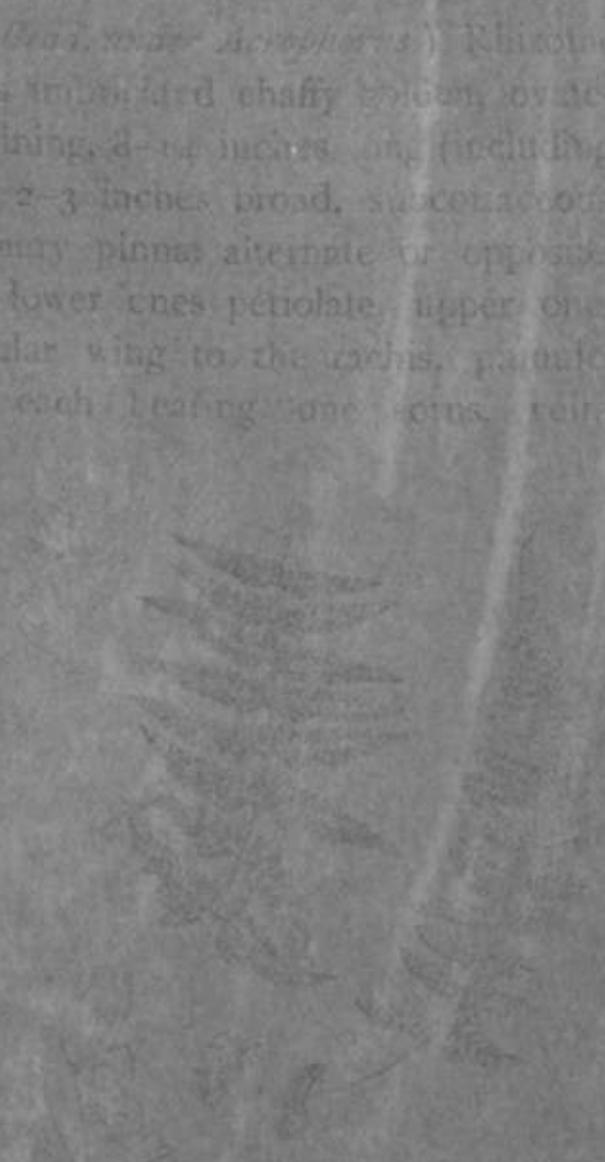
Madras Presidency on the western mountains; very abundant

in Coorg, growing on rocks; from Mysore, from Malabar at least about

3,000-6,000 feet. Sikkim, Khasya, Patna, and the Malay

Peninsula

(Also in Java.)



N° 26  
*LAUCOSTEGIA ASSAMICA*. (*Burm. f. et Acrostichum*)

6. *LEUCOSTEGIA HOOKERI*. (*Moore, under Acrophorus.*) Rhizome stout; scales dense, lanceolate, golden; stipe up to 6 inches long slender often scaly at the base; fronds deltoid up to 10 inches long, 3-4 pinnatifid; lower pinnae opposite or alternate, lanceolate or deltoid, 1-2 inches broad; pinnales deltoid, ultimate segments ligulate, acute, 1-veined,  $\frac{1}{2}$ -1 line broad texture; membranaceous; sori at the base of the ultimate lobes; involucre persistent, membranaceous, broader than long. *Davallia Clarkii, Baker. Syn. Fil. p. 91.*

Himalayas, Lachen, and Simur, 8,000-12,000 feet elevation. Sundukphoo, near Darjeeling, 11,000 feet.

Very like *Polypodium dareforme*, Hook., but with acute segments, and differing somewhat in the scales of the rhizome. Indian Botanists, not having seen this plant, have quoted *Hookeri* of Moore (*Clarkii* of Baker) as a synonym of *dareforme*, and united the two under the name of *Leucostegia dareformis*. Mr. Levinge has lately gathered this species at Sundukphoo, but the Kew specimens from Lachen and Simur were gathered by Thomson in 1849. I have examined a great many specimens of *dareforme* in the Kew Herbarium, and can find no trace of an indusium, so I retain it in *Polypodium*; but it is very likely that there is a fugacious indusium, and that it is a *Leucostegia* nearly allied to this species.

7. *LEUCOSTEGIA PULCHRA*. (*Don, under Davallia.*) Rhizome wide-creeping, clothed with broad-obtuse, often petiolately attached scales; stipe 4-6 inches long, naked; fronds 9-15 inches long, 4-8 inches broad, lanceolate-deltoid, 3-4 pinnatifid, lowest pinnae 1-2 inches long, 1 inch broad, cut down to a narrowly-winged rachis into deeply pinnatifid segments, ultimate lobes narrow lanceolate, not distant, not very acute; texture thin, rather flaccid; sori copious, usually as broad as the segment at the base of the teeth of which it is placed; involucre prominent. *Don, Prod. Fl. Nep. vi. Bedd. F. S. I. I. 10 (under Acrophorus).*

Madras Presidency, Western mountains, very common on rocks and trees; Ceylon, central provinces, 3,000-5,000 feet; Himalayas, Nepal, and Bhotan, 2,000-9,000 feet; Khasya; Moumein.





SPONGIOPOLIA PULCERRIMA (Lam.)

8. LEUCOSTEGIA PSEUDO-CYSTOPTERIS. (*Kunze.*) Very similar to pulchra, but the ultimate segments very acute, and the scales of the rhizome more spreading. *Kunze in Bot Zeit* 1850, l. 68. *Bedd. F. B. L t* 92.

Himalayas, Dalhousie to Nepal, **4,000-8,600 feet**

Mr. Clarke considers it is a variety only of pulchra.

9. LEUCOSTEGIA HYMENOPHYLLOIDES. (*Blume, under Dawllia.*)

**I** frond! fronds ample, tall, 12-24 inches long; **S** narrow subulate scales; involucre membranaceous; primary pinna, petiolate, 2-2.5 inches long; secondary pinnae **oblong-ovate; pinnate** or **pinnatifid**; segments ovate acute, subfalcate, generally (the fertile ones) with a tooth on the inner margin; small hemispherical or subreniform, placed near the centre of a segment below the sinus of the tooth; veins slender, black. Uavalha affinis. *Hook. Syn. Fil.* p. 92. *Bedd. F. S. I. t* 252.

Travancore Mountains, Ceylon, 3,000-4,000 feet.

(Also in Java and Polynesia.)

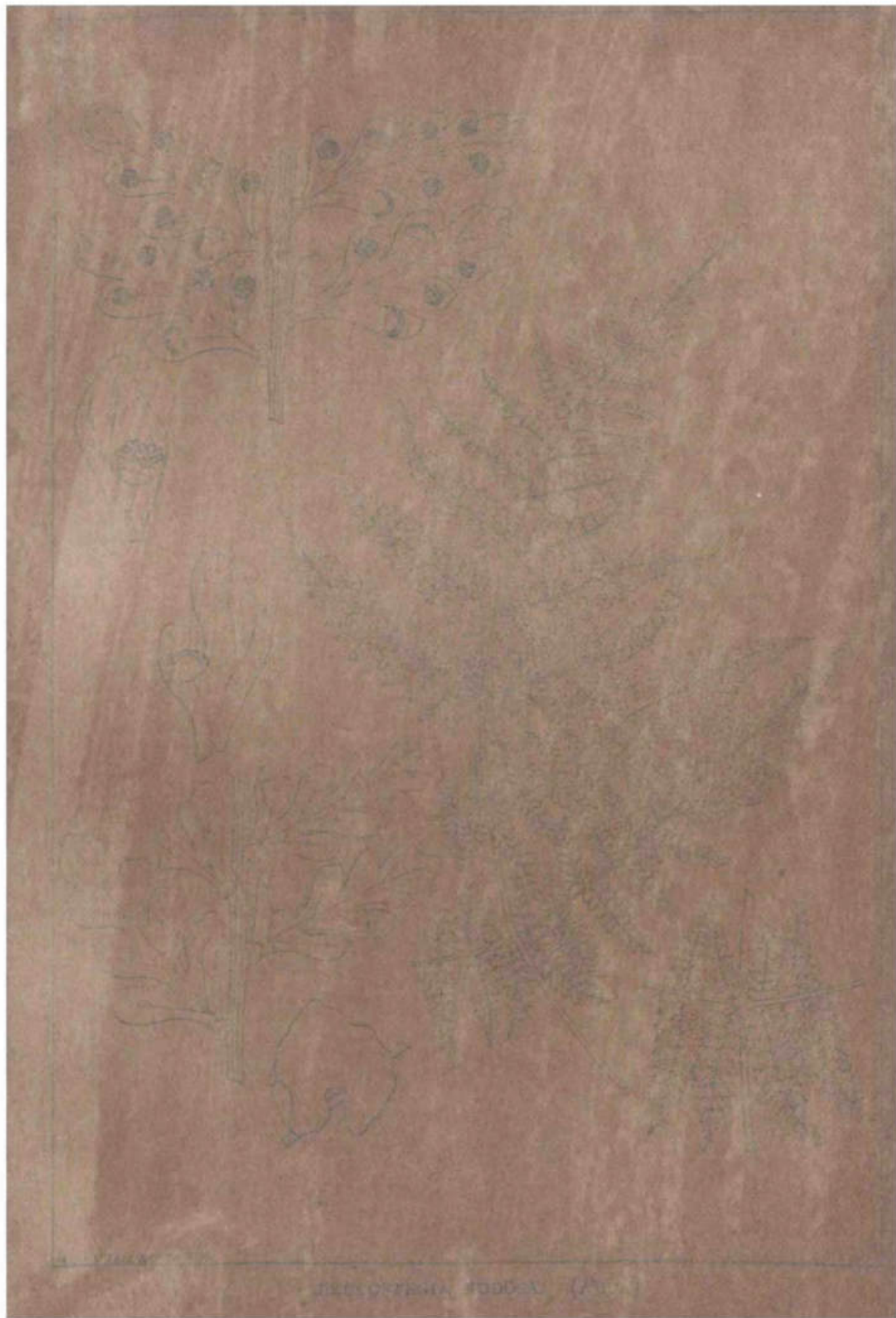
10. LEUCOSTEGIA PARVULA. (*Wallich*) Caudex long, creeping, clothed with lax subulate scales; frond very small deltoid-tripinnate, glabrous, rigid (from the stout costa), segments linear throughly grooved above, when dry, unequally forked and acute at the apices; sori at the sinus of the forks; involucre suborbicular, broader than the segments. *Davallia parvula*, *Hook. Syn. Fil.* p. 92, *Bedd. F. S. I. t* 97 (under *Acrophorus*).

placed by Mettenius in *Humata*.

Singapore.

(Also in Borneo and Java.)

11. LEUCOSTEGIA NODOSA (*Presl. under Acrophorus.*) Fronds tripinnate, membranaceous furfuraceous on both sides of the veins; pinnules sessile (chaffy beneath at their insertions), oblong-lanceolate, secondary ones sessile, oblong obtuse, pinnatifid; segments cuneiform obtuse, lowest ones inciso-serrate or at the base again subauriculate



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Stipe submarginate, not indurated above, at the insertion of the sori. *Filix* (genus) *lomentosa*; stipe not articulate, slightly rough above, pilaceous below; rhizome short creeping. *Presl. Tent. Bot. Voy. Hook. Syn. Fil. p. 92. Bedd. Fl. B. I. t. 17.*

Malaya, from Nepal to Thotian, 3,000-7,000 feet, abundant at Sukum. Khasya, 3,000-6,000 feet; Malacca.  
(Also in Java.)

This differs from the other *Leucostegias* in habit, and in the stipe not being articulate, and should be kept distinct as a genus under its original name of *Acrophorus*; it is very like *Diacalpe aspidioides* except in the indusium.

#### GENUS XVI.—PROSAPTIA. (*Sw. et Gr.*)

(Sori imbricated in the margin of the frond.)

Fronde contiguæ, linear-lanceolæ, pectinatè-pinnatifidæ, venis simplicibus; involucre a marginali cystâ formæ of the substance of the frond subcylindric.

1. *PROSAPTIA EMERSONI*. (*Presl.*) Fronde tufted, sessile, 6-12 inches long, 1 inch broad, linear-lanceolate, cut more than half-way down to the rachis into many linear-oblong, or at the lower part triangular lobes; texture coriaceous; sori 4-6 round the edge of the lobes. *Hook. Syn. Fil. p. 94. Bedd. Fl. S. I. t. 20.*

Agamallay Mountains, South India, 3,000-4,000 feet; Ceylon, Penang.

(Also in Java, Borneo, and the Philippine Islands.)

2. *PROSAPTIA CONTIGUA*. (*Sw. et Gr.*) Fronde tufted, sessile, or nearly so, 12-18 inches long, 1-1½ inch broad, linear-lanceolate, cut



1927

*PROSAPTIA EMERSONI* (1927)

*PROSAPTIA CONTIGUA* (1927)



down nearly or quite to the rachis into numerous linear-acuminate or bluntly slightly-toothed lobes; texture coriaceous; sori 2-8 to a lobe placed in the teeth on their upper part. *Sw. Syn. Fil. p. 130.*

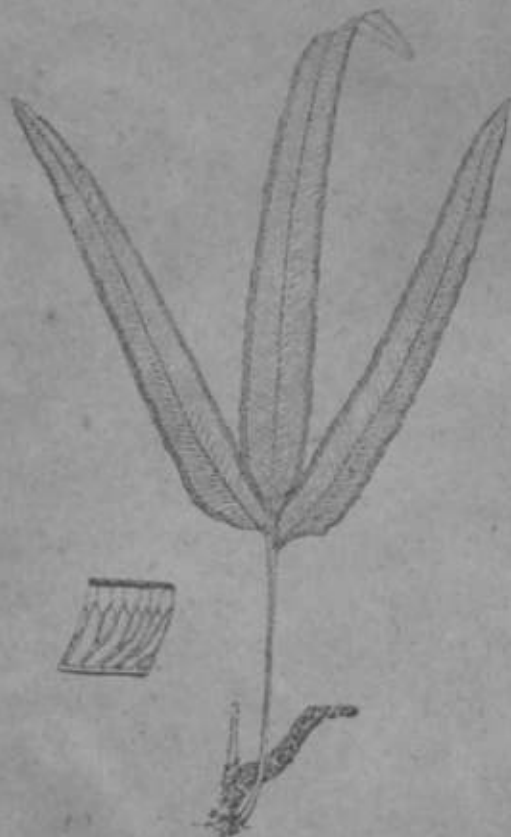
Anamallay Mountains and Travancore Hills; on the west side of the Madras Presidency, not common. Ceylon, central provinces, common, Ceylon, central provinces,

(Also in Java and the Philippines.)

GENUS XVII<sup>A</sup> DAVALLIA. (JMac;)

(In honour of Davall, a Swiss botanist.)

Fronde pinnate, bipinnate, or deltoid-multifid, firm and veins forked, venules free; sori intra- or submarginal; involu-



N<sup>o</sup> 29.

DAVALLIA TRIPHYLLA. [Hook.]

creeping or suberect; stipe articulated upon the rhizome. sori marginal on the veins, attached by the base and sides, and forming an urceolate tabular cyst impressed in the substance of the frond; rhizome creeping or suberect; stipe articulated upon the rhizome.

1. DAVALLIA TRIPHYLLA. {Hook}

Caudex stout, creeping, covered with chaffy scales; fronds coriaceous small ternate, pinnae oblong-lanceolate, obtuse cuneate at the base, in fertile plants more elongated, all of them entire, intermediate ones petiolate, lateral ones shorter, sessile, oblique at the base, veins horizontally patent, copious, crowded, parallel, forked, thickened > flat (not prominent); involu-

Singapore.

2. *LTAVALLIA SOLIDA*. (Swartz.) Tall, caudex stout, creeping, clothed with densely imbricated scales, fronds coriaceous trisubquadripinnate, pinnrc acuminate; pinnules **trapeziform** acuminate, pinnatind, many-veined, terminal ones crenate-serrate coadunate into an acuminate point; involucre linear-oblong, sunk in a tooth or segment having a narrow wing on each side or e'ntire. *Hook. Sp. Fil.* i. 163. *Sw. Syn. Fil.* pp. 132 and 34\$. *Hook. Syn. Fil.* p. 95. *Bedd. F. B. I. t.* 104. The width of the pinnules and the amount of cutting differ considerably.

*Davallia ornata* (Wall.) is a variety with the pinnules very wide.

**Birma;** Penang ; and Singapore.

(Also in Java and the Polynesian Islands'.)

3. *DAVALLIA ELEGANS*. (Sw.) Rhizome stout, creeping, clothed with woolly fibres ; stipe firm, erect, 4-8 inches long; fronds 1-2 feet long, 9-15 inches broad, deltoid-tripinnatifid; main racliis slightly winged towards the apex; pinnules of the lower pinnre 2-3 inches long, 1 inch

wide, deltoid-lanceolate, cut down quite to the rachis in the lower part, with oblong-deltoid segments, which are slightly toothed and obliquely truncate at the base on the lower side; texture coriaceous; venation dose, prominent, irregular, many spurious venules between the veins proper; sori several to a segment, marginal, but the sharp teeth projecting beyond them at the edges; involucre half cup-shaped. *Hoik. Syn. Fil.* p. 95. *Bedd. F. S. I. t.* 18.

Western mountains of Madras; Ceylon, 2,000-3,000 feet elevation ; Malay Peninsula.



H°30.

*DAVALLIA SOLIDA.* (Sw.)

(Also in China, Java, Borneo, Tropical Australia, Polynesian Islands, Madagascar, Ango'a, Fernando Po, and Johanna Island.)

4. *DAVALLIA TRIPHYLLA*. (*Blume*.) Rhizome thick, fibulose; stipe 4-6 inches long, erect, firm; fronds 12-15 inches long, 6-9 inches broad, deltoid-lanceolate, tripinnatifid; main rachis hardly at all winged; pinnules of the lower pinnae lanceolate,  $1\frac{1}{2}$  inch long,  $\frac{1}{2}$  inch broad; segments narrow, mucronate, sharply toothed; texture coriaceous; veins not immersed, one or two carried into each tooth; sori small, submarginal, half cup shaped, with the sharp mucro of the tooth extending beyond them. *Hook. Syn. Fil.* p. 96. *Bedd. Suppl. to Ferns*, p. 350.

Malay Peninsula.

(Also in Java.)

5. *DAVALLIA BIVARIATA*. (*Blume*.) Rhizome creeping, clothed with long lanceolate-caudate chestnut scales; stipe firm, erect, 6-12 inches long; fronds 2-3 feet long, tripinnatifid; lower pinnae often 12 inches long by 6 inches broad; segments deltoid, cut down to the rachis in the lower part, with linear-oblong, sharply-toothed lobes; texture coriaceous; veins uniform, not conspicuous; sori half cup shaped, placed obliquely as regards the central veins in the teeth at some distance from the edge; involucre as long as broad. *Hook. Syn. Fil.* p. 96. *D. polyantha* (*Hook.*), *Bedd. F. B. I.* t. 107.

Sikkim, Mishmee, Khasya; Malay Peninsula.

(Also in South China and Java.)

6. *DAVALLIA GRIFFITHIANA*. (*Hook.*) Rhizome creeping, stout, clothed with long lanceolate-caudate white or yellowish scales; stipe erect, wiry, 4-6 inches long; fronds 9-12 inches long, 4-8 inches broad, deltoid 3-4-pinnatifid; pinnules of the lower pinnae lanceolate-deltoid, 2-3 inches long, 1 inch or more broad; lower segments toothed on the barren fronds, cut down nearly to the rachis in the fertile; texture coriaceous; sori large, submarginal or marginal; involucre cup-shaped, very shortly attached on the side. *Hook. Syn. Fil.* p. 96.



*Bedd. F. B. I.* 106. The texture and habit of *Davallia* but the indusium is nearer that of *Leucostegia*.

Bhotan and Mishmee, Khasya and Jemtea, 3,000-5,000 feet.  
(Also in South China.)

7. *DAVALLIA LORRAINII* (*Hance*). Rhizome thick as a quill; scales linear-subulate, nearly black, densely grey ciliate; stipe 3-4 inches long, naked brownish; fronds  $\frac{1}{2}$ -1 foot long, deltoid, bipinnatifid; pinnae stalked deltoid, lowest largest produced on the lower side, their rachises winged to base; pinnules and segments subsessile, crowded deltoid much reduced on lower side; final lobes ligulate,  $\frac{1}{4}$ - $\frac{1}{3}$  lines broad, with sorus at base of inner side; texture subcoriaceous; surfaces naked; barren lobes 1-veined; involucre subcylindrical,  $\frac{1}{2}$  line long. *Hance. Ann. Sc. Nat. Ser. 1.* vol. 7. p. 254. *Hook. Syn. Fl. p. 469. Bedd. F. B. I. Suppl. p. 4. t. 353.*

(Malay Peninsula.)

8. *DAVALLIA PULATA* (*Walk*). Rhizome creeping stout, densely clothed with hair-pointed chestnut scales; stipe strong, erect, 3-4 inches long; fronds 8-12 inches long, 4-8 inches broad, deltoid, 4-pinnatifid; pinnules of the lower pinnae lanceolate, 2-3 inches long, 1 inch broad, with deeply incise-pinnatifid oblong triangular segments; texture coriaceous; sori deeply half cup-shaped, occupying the greater part of the tooth in which they are placed, marginal, with usually a horn on the outside. *Hook. Syn. Fl.* 97. *Bedd. F. B. I.* t. 17.

All the Western Ghats of Madras and Bombay Presidencies; Himalaya, Nepal to Bhotan, 2,000-6,000 feet; Khasya; Ceylon; Birma; and Malay Peninsula.

(Also in Japan, South China, and the Malay Islands.)

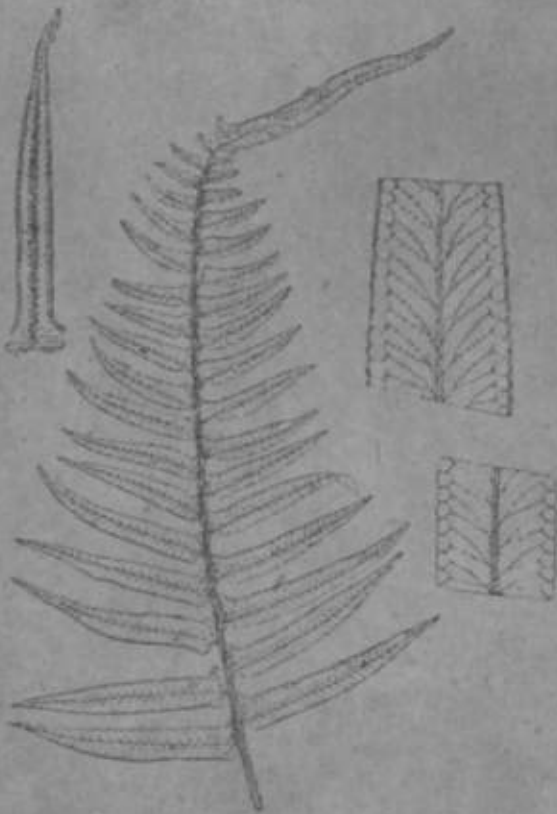
9. *DAVALLIA DEPRESSA* (*Mitt*). Rhizome wide-creeping, 3 lines thick; scales ferruginous dense linear-subulate; stipe 3-5 inches, naked brown, striate; frond deltoid, 4-pinnatifid, 1-1 $\frac{1}{2}$  foot long; rachis winged in upper half; pinnae truncate-deltoid, long-veined, lowest largest, 3-4 inches broad; pinnules and segments

deltoid, with rachises winged to base, **Micro-trunca** on lower side final  
 Z<sub>r</sub> . . . lanceolate-falcate under, line broad, with sorus on  
 cunthf<sup>B</sup>, I j t<sup>f</sup>XtUre Subcoriac<sup>^</sup>s j surfaces naked; involucre  
 deep, 1/2 line broad, oblique, close to final  
 Syn. Fil. 469. Bedd. F. B. I. Suppl. t. 352.  
 Moulmein.

### GENUS XVIII.-MICROLEP.JA. (Prat.)

(*Micros*, small; / ^ , a scale, the small **indusium**.)

Fronds pinnate or variously compound; texture various; veins  
 simple or pinnately forked : venules free; sori intra- or sub-marginal;  
 involucre membranaceous, half cup-shaped, attached at the sides  
 as well as the base; rhizome creeping; stipe continuous with  
 the caudex,



N°32

**MICROLEPIA HOOKERIANA** {Wall.) **approximate**, forming a continued  
 line at the base of the crenatures  
 of the margin; involucre half cup-shaped; stipes and rachis  
 pubescent-hirsute. Hook. Syn. Fil. 1. 97. Bedd. J. Bot. t. IOT.  
 Sylhet, Upper Assam, Khasya and Mikir Hills.  
 (Also in Hong Kong.)



DAVALLIA BULBATA

DAVALLIA BULBATA. (Horned Fern)

2. *MICROLITIA BINNATA*. (Crisp.) Rhizome creeping, furnished with fibrillose scales; stipe strong, erect, 6-12 inches long, glossy; fronds 9-15 inches long, 4-8 inches broad, lanceolate-pinnate, glabrous; pinnae slightly toothed, 6 inches long, 1 inch broad, coriaceous, linear-lanceolate, gradually acuminate, obliquely acuminate at the base; sori one to each tooth, small, submarginal; veins sunk, inconspicuous, generally forked; involucre small, half-cup-shaped. *Leak. Syn. Fil. p. 98. Bedd. F. S. I. t. 14.*

Anamallay Mountains, Malay Peninsula.  
(Also in Java and Polynesian Islands.)

3. *MICROLITIA MARGINALIS*. (Thunb. under *Polypodium*.) Fronds broadly ovate-lanceolate, firm, membranaceous; pinnae elongate-lanceolate, subfidate, acuminate, pinnatifid-lobate, the acuminate apices serrated, pubescent-villous beneath, most so on the costa and prominent veins, unequally cuneate at the base, and subpetiolate, lobes acute crenate-dentate; veins pinnated; sori solitary in the axils of the smaller and upper lobes or serratures, and distant from the margin, marginal on the small teeth of the larger lobes; involucre broad half-cup-shaped, densely villous; rachis and stipe downy, the latter at length glabrous; rhizome creeping, villous; stipe 1-2 feet long, erect, strong; fronds 18-24 inches long, 9-15 inches broad, once pinnate. *Polyp. marginale, Thunb. Fl. Japan, p. 337. Microlitia scabra, Don. Bedd. F. B. I. t. 102.*

Nepal and Kanton, Khasya, Mikir Hills.  
(Also in Japan and Formosa.)

VAR. 3 *CALVESCENS*. (Hook.) Pinnae narrower and more deeply pinnatifid, nearly glabrous beneath, except the strigose midrib. *Davallia calvescens, Hook. Sp. Fil. t. p. 172, t. 8 B. D. anophylla (Wallich), Bedd. F. B. I. t. 103.*

Kanton.

4. *MICROMITIA UROPHYLLA*. (Hook.) Rhizome creeping; stipe strong, erect, 2-3 feet long; fronds bipinnate, tripinnatifid, coriaceous, shining above and beneath, but pubescent on the rachises below.



MICROCLERIA PLATYNEURA

secondary pinnae lanceolate-linear, very finely serrate, cut down nearly to the rachis into ovate acuminate, undulal sided toothed lobes, sori submarginate, one to each of the lower sinuses of the lobes. *Hook. Syn. Fil. 5, gen. 1 of Wallich or E. Ind. Clarke, P. N. I. 1, 50.*

Bhotan (allied to *M. platyphylla*).

5. *MICROLEPIA PLATYPHYLLA* (Don.) Rhizome creeping, woody scaly; stipes 2-3 feet long, firm erect; frond 2-4 feet long, tripinnatifid; lower pinnae 12-15 inches long, 6-9 inches broad, lanceolate with distant linear-lanceolate pinnules, which are cut nearly to the wavy rachis below into broad, bluntish toothed, oblong-deltoid lobes; texture coriaceous when adult, glabrous and shining on both surfaces, but when young more or less membranaceous and hairy; sori 2-12 to a segment, placed one in each tooth, a small distance from the edge about a line across. *Linn. Fil. Prod. Nep. 10. Hook. Syn. Fil. p. 99. Bull. P. S. I. 1, 13.*

Madras Presidency, throughout the Western mountains, up to nearly 6,000 feet; Ceylon, Himalayas, Nepal, Sikkim, Bhotan 3,000-3,500 feet elevation; Khasya.

6. *MICROLEPIA KENZEL* (Clarke) Fronds large tripinnatifid; pinnae as in *platyphylla* with linear-lanceolate pinnules, which are cut down to its rachis (which is not wavy, or only slightly so towards the apex) below into triangular subobtusate or lanceolate-ovate lobes which are bluntly serrate; texture not so coriaceous as in *platyphylla*, uniformly pubescent beneath, even when adult; venation much less prominent than in *platyphylla*; involucre finely ciliate round the margin. *Clarke P. N. I. p. 446.*

Birma.

This is very like *platyphylla*, and may turn out to be only a variety of it. I have only seen one specimen.

learly or quite to the rachis into blunt slightly crenated oblong lobes; rachis and both surfaces slightly hairy, the upper bright green, shining texture subcoriaceous; sori small submarginal, 2-12 to a segment.  
*Hook. Syn. Ml p- 99- Microlepia proxima (Thw.), Bedd. F.S.Z.t.2; Ceylon, Rangbodj, 3,500 feet elevation.*

**S. MICROLEPIA STRIGOSA.** (*Swartz.*) Fronds tall, lanceolate, pinnate; stipes elongated; rachis and veins pubescent-hispid, primary pinnae petiolate, lanceolate-acuminate, secondary (or pinnules) mostly petiolate, submidvein-ovate, obtuse pinnatifid, chiefly on the upper edge, lower lobes obtusely serrate deep, the rest entire, all of them finely dentate, veins pinnate furnished with a long scattered hairs above and beneath (the remaining surface of the frond beneath sometimes furnished with numerous small hairs). or sometimes brous as is the upper surface; involucre hairy, smooth, half cup-shaped.  
*Hook\* Syn. Fil. p. <). Bedd. F. S. I. t. 2*

Tinnevely and Travancore Mountains; South India; Ceylon Himalayas; and Malay Peninsula.

(Also in Japan, South China, Sandwich and Fiji Islands.)

Mr. Clarke considers this a variety of *speluncae*, as he states it develops into this more complex form; as far as the South Indian and Ceylon forms are concerned this is never more than bipinnate, whereas *speluncae* is 3-4 pinnate; it has been for years in cultivation in the gardens of the Horticultural Society in London, and is quite constant.

**9. MICROLEPIA SPELUNCA.** (*Link.*) Rhizome creeping; stipes strong, 1-1.5 feet long; fronds up to 6 feet broad, ovate to deltoid, 3-5-4-pinnatifid, more or less hairy, strigose villous, or with few or many long glistening setae; texture membranaceous; primary pinnae from oblong or ovate to linear-lanceolate, ultimately lobed, or irregularly imbricate, or irregularly imbricate to the entire segments, involucre half cup-shaped, hispid prominent beneath. Polypod; *Lin. Sp. Pl. 1555.*

The Himalayas (Nepal, Sikkim, Darjeeling, Khasya; Chitagon, Ladras, Western mountains, Ceylon, Malaya Peninsula.

(Also in China, Java, India, Malacca, Polynesia, and Tropical America.)

Frond. Ultimate segments bipinnate, subentire, or slightly crenate. *Davallia thomii* Met. *Wald. Cat.* 257.

VAR.  $\beta$  HIRTA. Ultimate segments more or less deeply cut.

Rhomboides (*Microloma polydioris*, *Hedd. F. S. I. 1*), is so easily be picked out with the greenish leaf, very uniform in character, and does not run into the other species; it is very common throughout India and in Ceylon.

The variety *hirta* (*Hedd. F. S. I. 1*), is a much more variable form, and I refer to this *Hirta* (*Hedd. F. S. I. 1*; 265 *pilosula*; 267 *densa*; 278 Roxburghii; and *Hirta pubescens*). These are all closely allied that it is impossible to refer them up as separate varieties, and they blend into one another. There are two varieties in Southern India and Ceylon, one very hairy and the other nearly quite glabrous, but blending in no way with the pubescent. The supposed species *Hirta* (*Hedd. F. S. I. 1*; 253) I now consider only a form of *hirta*, as I cannot distinguish it in the herbarium. It is said to be very fringed and to grow ten and twelve feet long. I have seen no forms so long as those in Southern India and Ceylon, yet some Ceylon and South Indian specimens are referred to *Hirta* (*Hedd. F. S. I. 1*; 253); but if these are put together and more elongated than any of the other forms, it will be quite like *Hirta*.

GENUS *DAVALLIA* (NODI) (L.) Kuhn

(*Sagittaria* L. *Polypodium* L.)

Fronds bitripinnate, bipinnate, or palmate, growing gradually wider from the base, the ultimate segments dichotomously forked, venies forked, the ultimate segments, forming a pressed and obtuse, or rounded, or slightly lobed, or deeply lobed, or some creeping, sub-entire, or slightly crenate, or slightly





SPHYRARIA CHRYSTAL. (50.)

*DAVALLIA CHINENSIS*. (*Swariz*.) Rhizome stout, densely  
 covered with scales, stipes strong, erect, polished, naked, dark brown, 6-12  
 inches long; fronds 12-18 inches long, 6-9 inches broad, ovate,  
 tripinnatifid; lower pinnae ovate lanceolate, 4-6 inches long, 1-2  
 inches broad; pinnules lanceolate, their segments cut down to the  
 middle below, with toothed cuneate lobes, 1-1½ lines across at the  
 apex; texture subcoriaceous, both surfaces naked, the upper  
 shining; sori terminal, usually solitary, often rather broader than  
 the pinnae; **ep.** *Swariz Syn. Fil. 133 (under Davallia) Davallia tenuifolia,*  
*Took. Syn. Fil p. 102. Bedd. F. S. I. i. 16.*

Madras Presidency, Western mountains, 3,000-6,000 feet:  
**Himalayas**, Kumaon to Bhotan, up to 1,000-4,000 feet; Khasya;  
 Ceylon; Malay Peninsula.

(Also in China, Japan, Polynesia, and the East African Islands.)

## GENUS XX.—CYSTOPTERIS." (*Bernh.*)

(*Cystos*, a cyst, in allusion to the inflated infusium.)

Fronds more or less compound, membranaceous; sori globose,  
 seated on the back of the veins; indusium membranaceous, subor-  
 bicular inserted by its broad base, under the sorus, which, at the  
**beginning** it covers or partially covers like a hood; veins free.

1. CYSTOPTERIS FRAGILIS. (*Bernh.*) Stipes 2-12 inches long;  
 fronds glabrous, weak, up to 1 foot, ovate-lanceolate, tripinnatifid;  
 the rachis slightly winged above; pinnae lanceolate-deltoid; pin-  
 nules oblong-rhomboidal, cut down to a broad central space into  
 bluntly or sharply-toothed segments; sori 2-12 to a pinnule. *Hook,*  
*Syn. Fil. 103. Bedd. F. B. I. L 91.*

North West Himalayas, from Kashmir to Kumaon, 10,000-  
 5,000 feet elevation; Sikkim.

(Also in most parts of the world, in cold regions.)

2. CYSTOPTERIS SETOSA. (*Bedd.*) Caudex erect; stipes 1 foot long,  
 sparsely covered with small flaccid subulate light-brown scales; fronds  
 tufted 3-3½ feet long, tripinnate, pinnae 8-10 inches long, lowest



CYSTOPTERIS SETOSA. (<del>add.</del>)

ATTENACONERAS

FRONDS OF BLATTIS (INDIA AND CEYLON).

Very heavy as long as the central midrib, gradually decreasing in size towards the apex, pinnales pinnatifid to nearly the rachis, but always more or less connected by a decurrent wing, very membranaceous and hairless, and furnished on both sides sparsely (as is the rachis and costa) with long weak pellucid, oval or sub-oval segments of the pinnae, generally as broad at the apex as at the base, more or less pinnatifid with the lobes of a cuneately rounded or variously toothed; veins forked and simple reaching the margin, one to each segment, medial of the lower vein, involucre very membranaceous, small scale-like, oval or undish ovate, or oblong, from a broad base, crenate, not nearly reaching the sori, imbricate or entire, fugacious. *Beard, F. D. I. 1872; also in 1881, under Eusirene.*

Mochnam Mountains, Sikkim 5,500-8,000 feet.

TRIBE V.—LINDSAYEÆ.

Sori placed in a line, or a row, near the edge of the frond, covered with an involucre, the inner valve of which is membranaceous, the outer formed of the margin of the frond.

GENUS XXI.—LINDSAYA (*Dryopteris*).

(In honour of Dr. Lindsay, a writer on Ferns.)

Sori marginal or submarginal, placed to the apex of, and usually having more veins; involucre double, opening outwardly, the inner valve membranaceous, the outer formed of the more or less changing margin of the frond; veins fixed pinnate unilateral or emarginate.

1. *Pinnæ unilateralis.*

1. LINDSAYÆ CHATRATA (*Swartz*).—Rhizome very creeping, clothed with linear scales, stipes with deciduous, 3-6 inches long, blade 6-12 inches long, lower inch broad, simple pinnate, pinnae broadly-ovate, lower edge beak-like, might contain the main nerve (upper one) slightly lobed or nearly entire, upper pinna stalked, texture rather coriaceous. *Journal of the Asiatic Society of Bengal, 1851, p. 100.* *Journal of the Asiatic Society of Bengal, 1852, p. 100.* *Journal of the Asiatic Society of Bengal, 1853, p. 100.* *Journal of the Asiatic Society of Bengal, 1854, p. 100.* *Journal of the Asiatic Society of Bengal, 1855, p. 100.*



A. J. CATTELL SCIENTIFIC

LINDSAY A COI-TB VIA. (Sw.)

PLANTS OF BURMA AND ANNEBORNE

Very common on the western side of the Andes. Frequency, up to 50 feet, called the "lowland" form, but less so in the high drying region, higher altitudes in the centre, 20 inches. In the Andes, Nepal, Malacca and Chingong, up to 4,000 feet. Burma and the Malay Peninsula.

Also in North Australia, Formosa, Japan, Malay Islands, and East African Islands.

*LINDSAYA HEDDENS*. (Thun.) Causes creeping, scaly, scabrous. Fronds rigid, membranaceous, linear-lanceolate, 10-18 inches long, 2 inch broad, pinnate, acuminate at the base; pinnae very numerous, 10 or more per half, deltoid to acute obtuse or subacute, base nearly parallel with the rachis, and with the lower margin quite entire; upper margin toothed-crenate, costa parallel with and close to the margin; veins simple or forked, free, some short, oblong, one near the margin of each lobule.



N° 37  
LINDSAYA HEDDENS

*Indo-Ha. Pl. 38. Bull. R. S. I. 1. 203. Odontoloma, Hook. Syn. Fil. p. 95. Lindsaya rectifera (Blume), Hook. Syn. Fil. p. 106.*

Ceylon, Saigne-Rajah Forest; Mishinang, Khasya; Sikkim-Tani, Dulkajhar 1,000 feet; Malay Peninsula.

Also in the Malay Islands, Polynesia and Mauritius.

*Variety minor*. A smaller form, more membranaceous, and more finely pinnatifid, some much shorter. *Thun. L. Indo-Ha. 314.*

*LINDSAYA SCANDENS*. (Hook.) (Chizotaxont, with creeping habit). Paleaceous, fronds 9-12 inches long, 1 1/2-1 1/4 inch broad, very pinnate; pinnae 7/8 inch long, 2/3 inch broad, the lower leaf slightly decurved, the upper rounded, entire, the point broadly rounded, placed in a long row close together, but not imbricated. Membranaceous, venia marginate, venia in a continuous parallel line. *Thun. L. Indo-Ha. 314. Bull. R. S. I. 1. 203.*

Malay Peninsula

4. *LINDSAYA ORICULATA*. (*Less. under Adiantum*.) Rhizome creeping; stipes tufted, generally elongated, pinnae linear-lanceolate and pinnate or deltoid and bipinnate; pinnae approximate, shortly petiolate, rather rigid, flabellate, and approaching to lunate or subrhomboid, with the sides unequal, the base obliquely cuneate, sometimes the upper ones are confluent, the superior margin crenulate or serriferous; no distinct midrib; sori continuous or interrupted; involucres toothed. *Hook. Syn. Fil.* i. 211. *J. subulata*, *Hook. Syn. Fil.* p. 107. *Beid. F. B. T.* i. 216.

*Davallia nichomanoides*, *Beid. F. B. T.* i. 178 (not Blume) an abnormally cut variety. *D. schizophylla*, *Hook. Syn. Fil.* p. 468.

VAR.  $\beta$  VENERA. Pinnules of thinner texture, and obtusely rounded in outline. *Beid. F. S. J.* i. 24. This is the only form found in the Madras Presidency.

Western Forests of Madras; Ceylon; Khasya, Assam, Jaintia, Malay Peninsula.

(Also in South China and Australia.)

5. *LINDSAYA LANCEA*. (*L. under Adiantum*.) Rhizome creeping; stipes strong, up to 12 inches long; frond up to 15 inches long, bipinnate; pinnae several pairs erect-patent; pinnules about 1 inch long, by  $\frac{1}{2}$  inch deep, the lower line nearly straight, the upper rounded entire; texture pellucid-herbaceous; sori in a continuous line, round the upper margin. *Adiantum lanceum*, *L. Lindsaya lanceiformis* (Dry.), *Hook. Syn. Fil.* 107, *L. caudata* (Hook.), *Beid. F. S. J.* i. 217. Mr. Wall sends from Ceylon a form with numerous pinnae, which taper away into a long caudate apex, the lower pinnules being obovate from a longish stalk, and much smaller than in the type; the upper pinnules very small and tongue-shaped.

Ceylon; Malay Peninsula.

(Also in Tropical America, the West Indies, and the Malay Islands.)

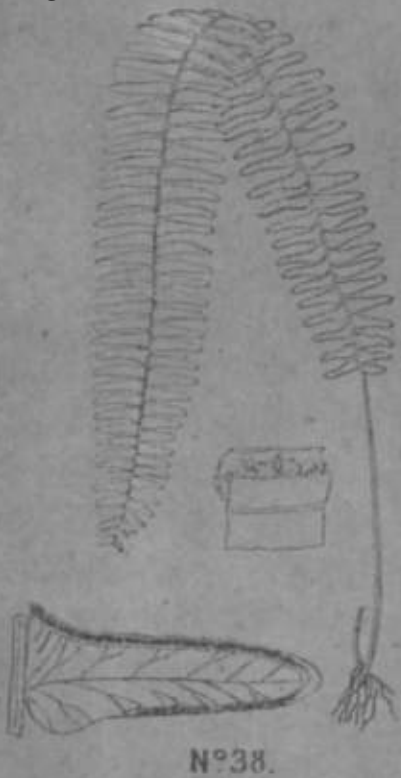
6. *LINDSAYA GIBBA*. (*J. Sm.*) Rhizome wide-creeping; stipes 6 inches long, rigid, erect, pinnately towards the base; fronds with a long unbranched central pinna, and a pair of flexuose lateral

tranches, < -S inches long; pinnules 3-4 lines broad, 2 lines deep, the lower edge often falcate, the upper 3-4 times bluntly, not deeply lobed, close together, but not imbricate j texture very thick, coriaceous; veins prominent; sori in a marginal line on the lobes. *Hook. Syn. Fil. p. 108. Bedd. F. B. I. f. 166.*

Malacca, on Mount Ophir.

§§ *Pinnæ equilateral.*

7. **LINOSAYA WALKERS.** (*Hook.*) Rhizome creeping, thicker than a crow's **quill**, ferruginous with scale-like hairs. Stipes very long, often 1 foot, and as well as the rachis dark purple, glossy; fronds lanceolate, pinnate, 6 inches to 1 long, pinna? 6-9 pairs, with a terminal one, which is sometimes confluent with one or both of the upper pair, coriaceous, subopposite, remote, lanceolate or linear-lanceolate, equal, costa central, veins copious, almost parallel with the costa; sorus marginal, continuous on both sides. *Hook. Sp. Fil. i. 209. Syn. Fil. 109. Bedd. F. S. lit 215.*



LINDSAYA DIVERGES.  
{*Wall.*}

8. **LINDSAYA DIVERGENS.** (*Wall*) Rhizome creeping; stipes and rachis ebony-black, glossy; fronds lanceolate-pinnate; **pinna\*** approximate, crowded, horizontal-lanceolate, obtuse, subsemihastate at the base, glaucous beneath, the sides equal; costa central; veins oblique, once forked, distant, internal, obscure; sorus marginal and continuous on both edges and at the apex. *Hook. Sp. Fil. i. 210; Hook, et Grev. Ic. Fil. f. 226. Bedd. R. B. I. t. 250. Vittaria divergens, Herb. JRoxb. Wall Cat. iu 2191.*

-Malacca.

(Also in Borneo.)

Ceylon, Hinidoon Corlc in swamps.

(Also the island of **Banco**, east of Sumatra.)

8. **LINDSAYA DIVERGENS.** (*Wall*) Rhizome creeping; stipes and rachis ebony-black, glossy; fronds lanceolate-pinnate; **pinna\*** approximate, crowded, horizontal-



9. *LINDSAYA LANGUNOSA* (Wall.) Rhizome creeping, stout, clothed with thin loose scales; stipules stout, erect, 4-6 inches long; fronds 12-24 inches long, 3-4 inches broad, simply pinnate; pinnae 12-15 inches long, 1-1 1/2 inch broad, linear entire or very slightly toothed towards the point, which is acute in the fertile, bluntly rounded in the barren frond; texture coriaceous; rachis pubescent; sori in a continuous line along both edges. *Flora Sin. Pl. p. 110. Bedd. R. B. B. t. 140.*

Birma and the Malay Peninsula.

(Also in Tropical Australia, Mauritius, and Tropical Africa.)

10. *LINDSAYA HETEROPHYLLA* (Bedd.) Glabrous, fronds 12-20 inches high; deltoid-bipinnate, in the lower portion, sometimes tripinnate, simply pinnate at the apex; lower pinnae 4-6 inches long, upper ones gradually smaller, and less compound, pinnae numerous, as many as 20, very variable in form, subround, rhomboidal or lanceolate, margin entire; veins simple or forked, all free; sori continuous round the whole margin except at the base, the larger pinnae have a distinct midrib. *Bedd. R. B. t. 206.*

This is more compound than any of the Indian forms of *Schizoloma heterophylla*; but there is a form of that plant from Hong-kong in the Kew Herbarium very like this in outline, but with the veins anastomosing. I have examined many fronds of this plant, and the veins never anastomose, and if it be lumped with *Schizoloma heterophylla*, it at once does away with that genus or subgenus. I am, however, inclined to consider it a distinct species more allied to *L. orbiculata* var. *tenera* than to *Schizoloma heterophylla*.

Shevaroy Hills (on the Green hills), Tinnevely Mountains.

GENUS XXII — SCHIZOLOMA. (Gaud.)

(*Schima*, Lecty. *Loma*, margin.)

A. in *Lindsaya*, but veins more or less anastomosing.

1. *SCHIZOLOMA TOBIANA* (Poir.) Rhizome short-creeping, stipules 6-8 inches long, firm, erect, fronds pinnate, pinnae 7-8 pairs, erective, 1 1/2-2 inches long, pinnales about 1/2 inch long, 1/2 inch



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SCHIZOLAoba LOBATA. (L. f.) VAR. MALABARICA.

base), recurved, rounded, the upper margin with broad shallow lobes, texture thin pellucid herbaceous; veins anastomosing in the upper portion of the pinnales; sori marginal in the lobes, the intervalle of the sori very narrow and membranous, the edge of the frond produced beyond  $\frac{1}{2}$  and scarcely altered. *Hook. Sic. Bot. p. 111.*  
*S. recurvata* (Willd.) *Bedd. F. B. L. t. 27.* *S. nitens*, *Bedd.*

Malabar and Travancore Mountains, Ceylon.

(Also in Queensland and the Polynesian Islands.)

VAR.  $\beta$  MALABARICA. (*Bedd.*) Fronds always simply pinnate, rachis tetragonous, pinnales erect, not recurved, upper margin more deeply lobed, veins less anastomosing. *Bedd. F. B. L. t. 27.*

Perhaps a distinct species.

Malabar and South Canara.

2. SCHIZOLOMIA DATATIFOLIOSA. (*Bl.*)

Rhizome short-creeping; stem 20-25 inches long, firm, erect; fronds pinnate, pinnae 2-3 pairs, erect-patent, 4-8 inches long, pinnales 4-6 lines long, 2-3 lines broad, the lower margin straight or slightly curved, the upper with 4-6 regular rounded but not deep lobes, texture pellucid herbaceous; veins anastomosing at the base of the lobes; sori marginal in the lobes. *Hook. Syn. Fil. p. 111.* *Bedd. F. B. L. t. 141.*  
 (Closely allied to *lanceata*.)

Malacca.

(Also in the Malay Islands.)

3. SCHIZOLOMIA COPDATA. (*Gard.*) Rhizome short-creeping; stem 3-6 inches long, slender, erect, wiry; barren frond 2-3 inches long, 1-1½ inch broad, concave-oblong, quite entire, fertile one 3-6 inches long, linear-entire or lobed; texture coriaceous; sori in a continuous marginal line; veins anastomosing. *Hook. Sp. L. p. 219, t. 116.*  
*Syn. Fil. p. 111.* *Bedd. F. B. L. t. 219.*

Malay Peninsula.



Nº 20.  
 SCHIZOLOMIA COPDATA.  
 (Gard.)

4. *SCHIZOLOMA CINERIANA* (Curtis) Rhizome creeping, paleaceous; stipes 4-6 inches long, articulate with the rachis; fronds 6-9 inches long, oblong-lanceolate, simply pinnate, pinnae  $\frac{1}{2}$ - $\frac{3}{4}$  inch long, ovate or oblong, nearly entire, horizontal or falcate, slightly auricled at the base on the upper edge; texture subcoriaceous; sori in a continuous line along both margins. *Syn. Fil. p. 111; Hook. Sp. Fil. v. 231. Bedd. F. F. I. t. 340.*

Malacca.

(Also in the Malay Islands.)

5. *SCHIZOLOMA ENSIFIDA* (Swartz) Rhizome creeping, stout, paleaceous; stipes 6-9 inches long, wiry, flexuose; fronds 6-12 inches long, 3-4 inches broad, with a linear-lanceolate simple or pinnatifid apex, simply pinnate below, pinnae herbaceous, usually in many pairs, rarely reduced to one, all stalked,  $1\frac{1}{2}$ -6 inches long,  $\frac{1}{2}$ -1 inch broad, varying from linear-acuminate to lanceolate, sterile ones only a little toothed; veins conspicuously anastomosing; sori in a continuous marginal line. *Hook. Sw. Fil. p. 112. Bedd. F. S. I. t. 24. (Griffithiana (Hook.), Bedd. F. B. I. t. 29 is a simple form.)*

Western mountains of Madras; Ceylon; Himalayas, Sikim, to Almepore and Chittagong up to 4,000 feet; Birma.

(Also in North Australia, Tropical Africa and its eastern islands, Polynesia.)

6. *SCHIZOLOMA HETEROPHYLLA* (Dry.) Rhizome creeping; stipes 4-5 inches long, firm, naked, erect; frond 6-12 inches long, 3-6 inches broad, lanceolate or oblong, deltoid, varying from simply pinnate with large uncap-lanceolate entire pinnae, to bipinnate with erect pinnules 3-4 inches long, with oblong-lanceolate bipinnules  $\frac{1}{2}$ -1 inch long  $\frac{1}{2}$  inch broad, texture herbaceous; sori in continuous marginal lines. *Hook. Sw. Fil. p. 112. Bedd. F. S. I. t. 25.*

Malabar Mountains, Travancore; Ceylon; Malay Peninsula.

(Also in Malacca, Hong-kong, and Malay Islands.)



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SCHIZOLOMA ENSIFOLIA. (Sw.)

## TRIBE VI.—PTERIDÆ.

Sori marginal, oblong, or linear; indusium of the same shape as the sori, formed of a more or less changed and reflexed portion of the frond, opening inwardly.

## GENUS XXIII.—ADIANTUM.

(*Adiantos*, dry; water will not lie on the fronds.)

Sori marginal, varying in shape from globose to linear, usually numerous and distinct, sometimes confluent and continuous; indusium of the same shape as the sori, formed of the reflexed margin of the fronds, bearing the capsules on its under side; veins free.

1. *ADIANTUM PARISHII*. (*Hook.*) Small, caespitose; no distinct



*ADIANTUM PARISHII*. (*Zett.*)

caudex; roots few, fibrous, tomentose; fronds about 1 foot each way, orbicular, flabellate, membranous, pellucid, sterile ones crenate-dentate, fertile ones few (3-5) lobate; sinuses deepsericeous; veins originating from the base, flabellate, di-

vergent, repeatedly dichotomous; stipes slender, uniform, ebeneous, black, shining, articulated at the summit. *Hook. Sp. Fil.* ii. 257, and *Bot. Beech.* i. pl. 51; *Syn. Fl.* i. 114. *Bedd. F. B. I.* i. 10.

Moisture, on limestone rocks.

2. *ADIANTUM ENERGETUM*. (*Burm.*) Stipes 4-6 inches long, angled, very naked, polished dark chestnut-brown; fronds 6-12

inches long and 3 inches broad, simply pinnate, often elongated and rooting at the apex; pinnae subinnervate, the lower edge nearly in a line or oblique with the petiole, the upper edge rounded and like the bluntly-rounded sides usually more or less lobed; petioles of the lower ones spreading 1-1/2 inch long, texture herbaceous; the rachis and both surfaces naked; sori in continuous lines along the edge. *Burm. F. Ind. p. 235. Hook. Syn. Fil. p. 114. Bedd. P. S. I. t. 1.*

Throughout Northern India in moist places; South India, very general on the western side in the plains and lower slopes of the hills; Ceylon; Birma.

(Also in the tropics of nearly the whole world.)

VARIETY. METTEND. (*Kuhli*)  
 Stipes and rachis winged, not polished, petioles winged, very short, otherwise as in *lunulatum* (type).  
*Kuhli, Fil. Af. p. 65. Bedd. Ferns Suppl. 2. 354. Apteris, R. Br.*  
 Travancore Mountains, in dense evergreen forests between Coor Talion and Oulon, 1,000-2,000 feet. Perhaps a distinct species.

(Also in Tropical Africa.)

3. *ADIANTHUM CAUDATUM*. (L.)  
 Stipes 2-3 inches long, tufted, wiry, spreading, dark chestnut brown, tomentose; fronds 6-12 inches long, simply pinnate, often elongated and rooting at the extremity, pinnae 1/2-1 1/2 inch long, 1/2 inch deep, midrib nearly sessile, the lower line straight and horizontal, the upper rounded, more or less cut, often deeply and repeatedly, the point usually blunt, the lower ones slightly stalked; texture cartilagineous, the veins prominent; the rachis and both surfaces of the frond villose; sori roundish or transversely oblong, on the edge of the frond. *Hook. Syn. Fil. p. 115. Bedd. P. S. I. t. 1.*



No. 43.  
*ADIANTHUM TENSILE*.  
 VARIETAS METTEND. (*Kuhli*)

Throughout India, Ceylon, and the Malay Peninsula, in the plains and on lower slopes of the hills.

(Also in South China, Tropical Africa, the Malay Islands, Java, Mauritius, and Cape Verde Islands.)

VAR.  $\beta$ . EDGEWORTHII. Pinnae and rachis glabrous; pinnae less cut on the upper margin. *Adiantum Edgeworthii*. *Hook. Sp. Fil.* ii. 14. *Bedd. F. B. I. t.* 17.

Nepal, Mooltan, Gurwhal. Perhaps a distinct species.

Clarke refers this to *rhizophorum* Walk. Cat. 32, but that plant has the rachis scabrous above, and is one of the forms of typical *caudatum*.

VAR.  $\gamma$ . SCHOLIFERUM. Stipes petioles and rachis winged. *Hook. Sp. Fil.* ii. 13. *Bedd. F. B. I. t.* 19.

Birma.

4. *ADIANTUM CAPILLUS VENERIS*. (L.) Stipe suberect, rather slender, 4-9 inches long, polished, blackish, naked; fronds bipinnate, with a short terminal pinna and numerous erect-patent lateral ones on each side, the lowest slightly branched again; segments  $\frac{1}{2}$ -1 inch broad, the base cuneate, the outer edge rounded, deeply lobed from the circumference in the direction of the centre, and the lobes again bluntly crenated, lowest petioles  $\frac{3}{4}$  inch long, texture pellucid-herbaceous, thin; rachis and both surfaces naked; sori roundish or obreniform, placed in the roundish sinuses of the crenations. *Hook. Syn. Fil.* p. 123. *Bedd. F. B. I. t.* 4.

Madras Presidency, west side, common on banks of rivers in the plains, and up to 5,000 feet on the mountains; Ceylon; North India, in many localities.

(Also in Europe, Africa, America, and Australia.)

5. *ADIANTUM ETHIOPICUM*. (L.) Stipe 6-9 inches long, rather slender, erect, dark chestnut-brown, polished, naked; fronds up to 8 inches long, 6-9 inches broad, deltoid in outline, 3-4-pinnate; lower pinnules 3-4 inches long, 2-3 inches broad, deltoid; ultimate segments  $\frac{1}{2}$ -1 inch across, suborbicular, straight or subcuneate or rounded at the base, the upper part broadly not deeply lobed; texture thinly pellucid-herbaceous; rachis and surfaces naked; sori in several roundish or transversely oblong patches in rounded hollows





ATLANTIC CAPSULE

of the outer edge. *Hort. Syst. Fl.* 7, 17. *Bald. F. B. I.* 1. 3. *W. exarbatum*, *Bald. F. B. I.* 1. 18.

Nigeri and Palmyr Mountains at the higher elevations. Ceylon (Also in Australia, New Zealand, America, Africa and the East African Islands.)

6. *ADIANTUM VENUSTUM*. (Desf.) Fronds 3-4-pinnate; pinnales 5mm, membranaceous-chartaceous, glabrous and slightly glaucous beneath, shortly petioledate obovate-cuneate, rarely subrhomboid-cuneate, striated, the superior margin rounded, scarcely ever or but slightly 2 or 3 lobed, finely dentate-seriate, fertile lobes with 2, rarely 3 notches, each notch bearing a rather large sorus at the bottom. involucre reniform-cordate, subacaulisquamaceous; stipes and slender rachis everywhere ebeneous-glossy, glabrous. *Hort. Syst. Fl.* 11. 40. *A. venustum*, *Don Flor. Fl. Nep.* 16. *Bald. F. B. I.* 1. 20.

N. E. Himalayas, very common, 3,000-10,000 feet elevation. (Also in Cahul.)

7. *ADIANTUM PEDATUM*. (L.) Stipes 6-12 inches long, polished, dark chestnut-brown, glabrous; fronds dichotomous, with the main divisions flabellately branched; central pinna 6-9 inches long, 1-1½ inch broad; pinnales ¼-¾ inch long, ¼ inch deep, dimidiate, broadest on the side nearest the stem, the upper and outer margin lobed, sometimes one-third down, the lowest on short slender stalks; texture pellucid-herbaceous; rachises and surfaces naked, and roundish or transversely oblong, 1-2 lines broad. *Linn. Sp. Pl.* 153. *Hort. Syst. Fl.* 1. 125. *Bald. F. B. I.* 1. 167.

N. W. Himalayas, from Curwah to Sikkim, 6,000-9,000 feet elevation.

(Also in Japan and North America.)

8. *ADIANTUM RISPIDULUM*. (Swartz.) Stipes up to 15 inches long, strong, erect, polished, dark chestnut-brown, scabrous; fronds dichotomous, with the main divisions flabellately branched; central pinna 6-9 inches long, ½-1 inch broad, dimidiate, sub-rhomboid, rather broader on the side nearest the stem, broad on both sides, the outer edge bluntly rounded or oblique, upper and outer margin



finely toothed, lower ones slightly stalked; texture subcoriaceous; sori roundish, numerous, contiguous round the upper and outer edge\* *Hook. Syn. Flip.* 126. *Bedd. F. S. I. t.* 3.

Common in the Western Hills of the Madras Presidency, 3,000-5,000 feet; Ceylon up to 4,000 feet.

(Also in Australia, New Zealand, Fiji, Africa and its Eastern Islands.)

9. ADIANTUM FLABELLUM LATTIUM, (L.) Scales on the rhizome long, linear, lax, chestnut coloured; fronds flabellate, bipartite pedately divided, tripinnate; secondary pinnae lanceolate-acuminate; pinnules glabrous, subcoriaceous-chartaceous, obliquely cuneate or semi-orbicular-cuneate, superior base truncate, superior margin 2-lobed and serrate-dentate in the sterile one; lobes soriferous; involucres large, the breadth of the lobe, oblong, straight, rarely a little curved, hard coriaceous; stipes elongated ebeneous-scabrous below the rest, as well as the slender rachis, glossy and glabrous. *Hook. Sp. Fil.* ii. 30. *Linn. Sp. Fil.* p. 1558. *Hook. Syn. Fil.* p. 126. *Bedd. F. S. I. t.* 218.

Nepal, Assam, Khasya, Sylhet; Ceylon, in the Ouwah district; the Malay Peninsula.

(Also in the Malay Islands, South China and Japan.)

#### GENUS XXIV.—CHEILANTHES. (Swartz.)

(*Chet'os*, lip or margin; *ant*] 10\$, flower; the fructification on the margin)

Sori terminal, or nearly so, on the veins, at first small subglobose afterwards more or less confluent; indusium formed of the changed reflexed margin, roundish and distinct, or more or less confluent, but not quite continuous; fronds subcoriaceous in texture, mostly\* under 12 inches, often under 6 inches long, 3-4-pinnatifid; veins free.

1. CHEILANTHES FRAGILIS. (Swartz.) Stipes caespitose, wiry 1-3 inches long, densely clothed with reddish-brown linear scales; fronds 2-3 inches long, about 1 inch broad, ovate-acuminate, bipinnatifid; pinnule opposite, 1/2-1 inch long, 1/4-1/2 inch broad, deltoid cut down to the rachis below into several sinuate-pinnatifid linear

oblong lobes; texture subcoriaceous; rachis polished but slightly scaly, both surfaces green and naked; sori small, copious; involucre light brown, membranaceous, toothed., *Hook. Syn. Fil. p. 134* *Sp. Fil. ii. 81.* *Polypodium fragrans* (Linn.), *Bedd. F. B. I. t. 338.*

Muree, 4,000-5,000 feet; Mountains of Kashmir; Kishtwar, 3,500-5,000 feet.

(Also in Cabul, and all round the Mediterranean, Canaries, Madeira.)

2. **CHEILANTHES SZOVITZII.** (*Fisch and Meyer.*) Stipes densely tufted, erect, wiry, polished, brown, thinly coated, as is the rachis, with spreading woolly hairs and linear scales; fronds 3-6 inches long, 1-1½ inch broad, ovate-lanceolate, bipinnate to tripinnate; pinnae in opposite pairs, the lower ones deltoid; pinnules linear-oblong, contiguous, cut down to the rachis below into small round bead-like segments, ¼ inch in diameter, subcoriaceous, above green slightly tomentose, below covered with white woolly hairs, which arise from the sori, the margins much incurved; sori copious, marginal *Fisch and Meyer in Bull. Soc. Mosc. 1838, l. 241.* *Hook. Syn. Fil. p. 139.* *Bedd. F. B. J. t. 145.*

Kashmir and Baltistone, 5,000-7,000 feet, common; Kulu.

(Also in Cabul, Asia Minor, Persia, and South Europe.)

3. **CHEILANTHES MYSORENSIS.** (*Wallich.*) Roots densely caespitose, the fibres' very woolly, stipes slightly scaly below, short, 1-2 inches, and as well as the main rachises, deep glossy-ebeneous rigid; fronds a span or more long, in outline narrow oblong, acute, tapering below by the diminishing of the pinnae, glabrous, membranaceous but firm, bipinnate; lower pinnae very small, all of them oblong-ovate, sessile, frequently opposite pinnate below, the upper half pinnatifid; pinnules or segments linear-oblong, plane (much incurved if dried without pressure), toothed or lobed-pinnatifid, each tooth or lobe bearing one or two subcontinent, small, whitish, suborbicular sori. *Hook. Sp. Fil. ii. p. 94; Syn. Fil. p. 135.* *Bedd. F. S. I. t. 190.*

South India, common in dry, rocky places in the plains and lower slopes of the hills; Ceylon, at low elevations.

(Also in China and Japan.)



Dr. J. G. S. S. S. S.

CHEILANTHES MYSORENSIS (Wall.)

2. *CHRISTANTHUS VARIANS* (Willd.) C. Lindl. none except the  
 top of the stem very fibrous. From which the stipules arise in this form a  
 rather long and slightly scaly stipule (2-3 inches long) clothed with a  
 greenish glandular tomentum; fronds of an opaque brownish-green  
 colour, submembranaceous, 1-2 inches long, erect rather stiff but  
 fragile, oblong-lanceolate, pinnate with the pinnae pinnatifid; pinnae  
 alternate distant, horizontal up to 2 inches long, pinnatifid nearly to  
 the rachis (which is furnished with subulate scales); segments  
 serrated; lobes obtuse and partially  
 ciliated at the margin; veins pinnate,  
 simple or forked; sori approximate  
 roundish; involucre ciliated, formed  
 of the slightly enlarged lobes of the  
 margin. *Hort. Pet. Exot. t. 96;*  
*Syn. Ill. p. 335; Bedd. P. L. t. 1.*  
*p. 233.*

Perhaps only a form of No. 3.

Longham, on limestone rocks.

3. *CHRISTANTHUS VARIANS* (Willd.)

*C. Lindl. none* Root tufted; stipules 4-5

inches long slender, chamois glossy,

smooth and margined on the upper

side, obscurely setose paleaceous

fronds sub-membranaceous, glabrous

about a span long, long-lanceolate,

the pinnatifid apex acuminate,

pinnated above bipinnate below; primary pinnae distant spreading

or a little curved upwards; basal, superior ones

obovate sinuate-pinnatifid at their base and somewhat angled

at the upper base, lower ones obovate acuminate pinnate at their

base, pinnatifid acuminate (rarely) in the upper half; pinnae

all acute acuminate or acute pinnatifid below, the lowest

inferior, usually the longest. *Hort. Sp. Ill. t. p. 80; Syn. Ill.*  
*t. 1. p. 233; Bedd. P. L. t. 1.*



*CHRISTANTHUS VARIANS* (Willd.) C. Lindl.

East Bengal plains, from Assam to Chittagong; Khasya Hills, 2,000 feet; South India (Annamallay Hills); Birma.

(Also in South China and Luzon.)

6. *CHEILANTHES LAXA*. (Moore.) Stipes densely tufted, chestnut coloured, shining up to 8 inches long, sparsely clothed towards the base with lanceolate scales; fronds narrow-lanceolate up to 20 inches long by 3 inches broad, bipinnate or tripinnatifid; rachis naked, or nearly so; pinnae distant, sessile, deltoid, lower ones reduced; pinnules blunt, upper adnate entire, lower free lanceolate, bluntly lobed, texture very thin; surfaces naked; dull green, slightly furrowed beneath on the young fronds; involucre narrow. *Moore Ind. Fil.* p. 215. *Cheilanthes Thwaitesii*, *Mett. Hook. Syn. Fil.* p. 457.

Ceylon, Kurunegalla and Kallupahane.

7. *CHEILANTHES TENUIFOLIA*. (Sw.) Annual, caudex short-creeping, scaly; stipes elongated, rarely scaly; frond submembranaceous, glabrous, 3-4 inches to a span and more long, ovate acuminate, or more or less deltoid, subtripinnate, ultimate lobes of the primary and secondary divisions the largest, more or less pinnatifid; pinnules elliptic, oblong or oblong-lanceolate subpinnatifid or crenate, with broad blunt teeth; involucre mostly elongated, more or less confluent, more or less crenated or denticulate, sometimes transversely wrinkled; stipes and rachis purple-black, main rachis winged above, secondary and tertiary rachises all with a narrow wing. *Hook. Sp. Fil.* ii, p. 82, t. 87c. *Syn. Fil.* p. 138. *Bedd. F. S. I. A.* 188.

Madras Presidency, common in the plains and on low hills up to 2,000 feet; Bengal, plains in Assam, Chittagong, Dacca, Choum Nigpore; Khasya, up to 3,500 feet; Sikkim; Malay Peninsula.

(Also in China, Australia, New Zealand, Polynesia, Uruguay, and the Malay Islands.)

8. *CHEILANTHES FARINOSA*. (Kaulf.) Roots tufted; stipes more or less elongated, ebenaceous-glossy, deciduously scaly; fronds submembranaceous, from a span to 2 feet long, deltoidly lanceolate or lanceolate glabrous, white and powdery beneath, pinnate, the apex



in the middle, acuminate, pinnae tips by lanceolate rounded, the one or two lowermost pair more or less half orboid bipinnate below; involucre brown, striate, rounded, sometimes confluent and then wrinkled or lobed, the margin white or toothed and jagged. *Hook. Sp. Bot. Beech. p. 77; Syn. Fl. p. 142; Bedd. F. S. I. t. 191 and 192 (Hollows).*

Throughout North India, in the hills up to 5,000 feet; Madras Presidency, in the plains and up to 3,000 feet on the hills; Ceylon; Burma.

(Also in Tropical America, Java, Philippines, East Java and its Islands, and Arabia.)

**VARIETY DALHOUSII.** (*Hook.*) Pinnae (even when young) without hairs, scales or powder underneath; involucre deeply serrate to be toothed or lacinate on the margin. *Clarke, F. B. I. p. 149, and t. 51. F. Dalhousie, Hook. Sp. Bot. Beech. p. 107; Syn. Fl. p. 167.*

West Himalaya, from Kashmir to Kumaon, 6,000–9,000 feet; Sikkim, Lachin, 12,000 feet.

**VARIETY PLEURONDA.** Ultimate pinnae very lacrid, and generally broader than in the type, the white powder scarce on young fronds; altogether absent on mature ones; stipes and rachis weak and often wavy. *Cheranthus Dalhousie, Bedd. F. S. I. t. 192.*

Nilgiris, in woods near Makoor Peak, 7,000 feet, Anamalais, open grassy places on Ponnoby Hill, 6,000 feet.

**VARIETY CHRYSOMELLA.** Powder beneath of a bright golden colour; fronds with quite the outline of typical *farinosus*, but smaller. *Hook. Fl. Eschsch. p. 95, t. 51. Cheril. argentea, var. chrysomella Hook. Sp. Bot. p. 142.*

Khasya, 5,000 feet; *Cheranthus argentea, var. subarvensis Clarke, F. B. I. p. 145* is only the young, undeveloped frond of this.

9. **CHERANTHUS SUBARVENSIS.** (*Hook.*) Stipes densely clothed 2–3 inches long, polished, naked, bright chestnut coloured, finely scabrous, clothed with prostrate 3-nerved scales below stem rachis; rachis beneath the distal rachis with striped woolly substance of red hairs beneath; fronds 6–8 inches long, 2–3 inches broad,

elongate-lanceolate tripinnatifid; [pinnae] pairs, the lower ones distant, 1/2 inch long, more than 1 inch broad, deltoid; pinnules on the lower side the largest, sometimes 1 inch long oblong-lanceolate, cut down to the rachis below into oblong lobes; texture herbaceous, upper surface naked, lower villous, especially on the costa; involucre continuous, slightly crenulate, not fimbriate on the margin. *Hook. Syn. Fil. p. 137; Sp. Fil. ii. p. 87, l. 98 B. Bald. F. Ind. l. t. 1-1-Clarke, F. N. I. p. 456.*

Mr. Clarke says that the involucre is that of *Pelloea*, to which genus this might be referred.

N. W. Himalayas, Palur Valley, and Kitghur, near Simla.

10. CHEILANTHUS ALBO-MARGINATA. (*Clarke.*) Rhizome with tufts of hair-pointed scales, stipes up to 10 inches, shorter or longer than the frond; glabrous, reddish-brown, shining, furnished, particularly below and when young, with lanceolate white-margined scales; fronds deltoid to deltoid-lanceolate, when very young completely covered beneath with lanceolate brown scales, and with yellowish or whitish powder, in age glabrous except the partial rachises and costa, which are scaly; lowest pair of pinnae half deltoid, and with their lower pinnules much more developed than in the others (as in *farinosa*); involucre lacerate on the margins. *Clarke, F. N. I. p. 456, t. 52.* Perhaps only a form of *farinosa*.

N. W. Himalayas, Kashmir, Basaoli, 5,000 feet; Dulhousie, 6,000 feet; Simla, 7,000 feet; Gurwhal, 2,000-9,000 feet.

11. CHEILANTHUS RUFA. (*Don.*) Stipes tufted, up to 6 inches long, densely clothed with rusty brown, woolly tomentum; fronds 6-10 inches long, bipinnatifid, from deltoid with the lower pinnae much developed (like *farinosa*) to lanceolate with the lower pinnae dwindling down; whole frond woolly beneath, with crisped hairs; texture herbaceous, white powder present below on the young fronds; involucre ciliated. *Don. Prod. Fl. Nep. 16. Hook. Syn. Fil. 141. Pindl. F. B. L. t. 144.*

Very near the last species, only tomentose. I have some specimens from Gurwhal, I hardly know which to refer to, the tomentum

ig present, but very sparse ; the difference between the two is only a question of the tomentum, and both may well be varieties of *farinosa*.

Khasya, 4,000 feet, plentiful on limestone; Sikkim, 5,000 feet j Gurwhal, 2,000-4,000 feet; Dalhousie.

12. CHEILANTHES ARGENTEA. (*Kunze.*) Stipes densely tufted, 3-6 inches long, thick, dark brown, polished, clothed at the very base with linear scales ; fronds 3-4 inches long by 2 inches broad, triangular or deltoid, tripinnatifid, lowest pinnre much the largest but not cut down to the rachis, tripinnatifid; rachis and costa polished like the stipe, upper surface naked, green, lower covered with white powder; involucre crenate or fimbriate. *Kunze. Linna>a*, 1850, / . 242. *Hook. Syn. Fit.* p. 142. *Bedd. F. B. I. t* 143. (The low rest pair of pinnae is rarely almost quite free, the decurrent wing on the rachis from the next pair being very narrow; the pinnae are generally broadly decurrent, so that ihe frond is not cut down nearly to the rachis\*)



CHEILANTHES ARGENTEA

Birma ; Khasya, 3,000-5,000 feet.  
(Also in Siberia, Japan, and China.)

GENUS XXV.—ONYCHIUM. (*JSatif*)

(*Onychion*, a little nail; resemblance to the fertile segments of the frond.)

Son placed upon a continuous linear receptacle, which connects the apices of several veins ; indusium parallel with the margin of the segments, linear, opposite, pressed down over the sori, the edge

nearly or quite reaching the nerve. Closely allied to *Pteris* and referred to that genus by Mettenius.

1. *ONYCHIUM ALIKATUM* (Kaulf.) Stipes 6-12 inches long, stout, erect, straw-coloured or pale brown; fronds 12-18 inches long, about 6 inches broad, ovate, 4-pinnatifid; lower pinnae subdeltoïd, erect-patent; pinnules and segments numerous, usually deltoid; ultimate divisions of the sterile frond often obovate-cuneate, broad at the apex, about 1 line long,  $\frac{3}{4}$ -1 line broad when entire, coriaceous in texture, fertile segments pod-like,  $\frac{1}{4}$ -1 inch long,  $\frac{1}{2}$  inch broad; rachis and both surfaces naked, the membranous involucre and copious sori a rich golden yellow. *Kaulf. Bot. Fidei*, p. 117. *Hook. Syn. Fil.*, p. 143. *Pedd. F. B. I.*, t. 30.

Plains of East Bengal, from Nepal to Assam, up to 4,000 feet; Burma; (once received from the Painghat Hills in Southern India, but as it has not been detected since, it was probably from a cultivated specimen).

(Also in New Guinea and the Malay Islands.)

2. *ONYCHIUM JAPONICUM* (Kunze) Stipes tufted, 6-12 inches long, stout, erect, straw-coloured or pale brown, scaly at the base; fronds subcoriaceous when mature, shining on both surfaces, 12-18 inches long, ovate, 4-pinnate, lower pinnae lanceolate-deltoid; pinnules and segments numerous, usually deltoid, the copious linear-terete narrow ultimate divisions 1-2 lines long, nearly uniform in the barren and fertile segments; rachis and both surfaces naked; indusium pale, membranaceous, ripe capsules deep brown. *Kunze in Sch. Bot. Suppl.*, p. 11. *Hook. Syn. Fil.*, p. 147. *Pedd. F. B. I.*, t. 31.

Himalayas, Garwhal to Mishmee and Khasya, 3,000-5,000 feet; Birma.

(Also in Japan and China.)

Mr. Clarke makes two varieties besides the type: 1st, *multicaulis*, fertile frond, very finely cut, herbaceous, hardly shining, often 5-pinnate, ripe capsules straw-coloured, not numerous; involucre remaining closed over the ripe capsules. 2nd, *straminea*, fronds more coarsely cut, indusium often 1 inch; in this and variety 1st



refers, *Bedd. Bot. B. I. t. 21*, but it was taken from *muitisecta*; the two varieties, however, differ very slightly, if at all.

GENUS XXVI.—CRYPTOGRAMME, (*R. Br.*)

(*KryMos*, hidden; *gramme*, a line.)

Sterile and fertile fronds usually different from the same root; sori terminal on the veins, at first separate, subglobose, afterwards confluent, the continuous indusium formed of the changed margin of the frond, rolled over them till full maturity. (Differs from *Pdlicea* rather in the dimorphic fronds than in anything else.)

1. CRYPTOGRAMME, *C. CRISPATA*. (*N. L.*) Glabrous, tufted, scales at base of stipe, lanceolate, acute, pale-brown; fronds 2-4 inches long, 1-2 inches broad, oblong, 3-4-pinnatifid; ultimate segments of the barren frond obovate-cuneate, deeply pinnatifid, those of the fertile frond pod-shaped, 1-1/2 inch long; texture thickly herbaceous, both surfaces naked. *It Br. in Richardson's Appcn. to Franklin's 1st Journal, p. 54. Hook. Syn. Fil. p. 144. C. Brunoniana (Wall.) Bedd. F. B. I. I. 164. Allosorus crispus, Bernk.*

Himalayas, Kumaon to Kashmir, 10,000-15,000 feet; Sikkim, 10,000-14,000 feet, head of Lachen Valley.

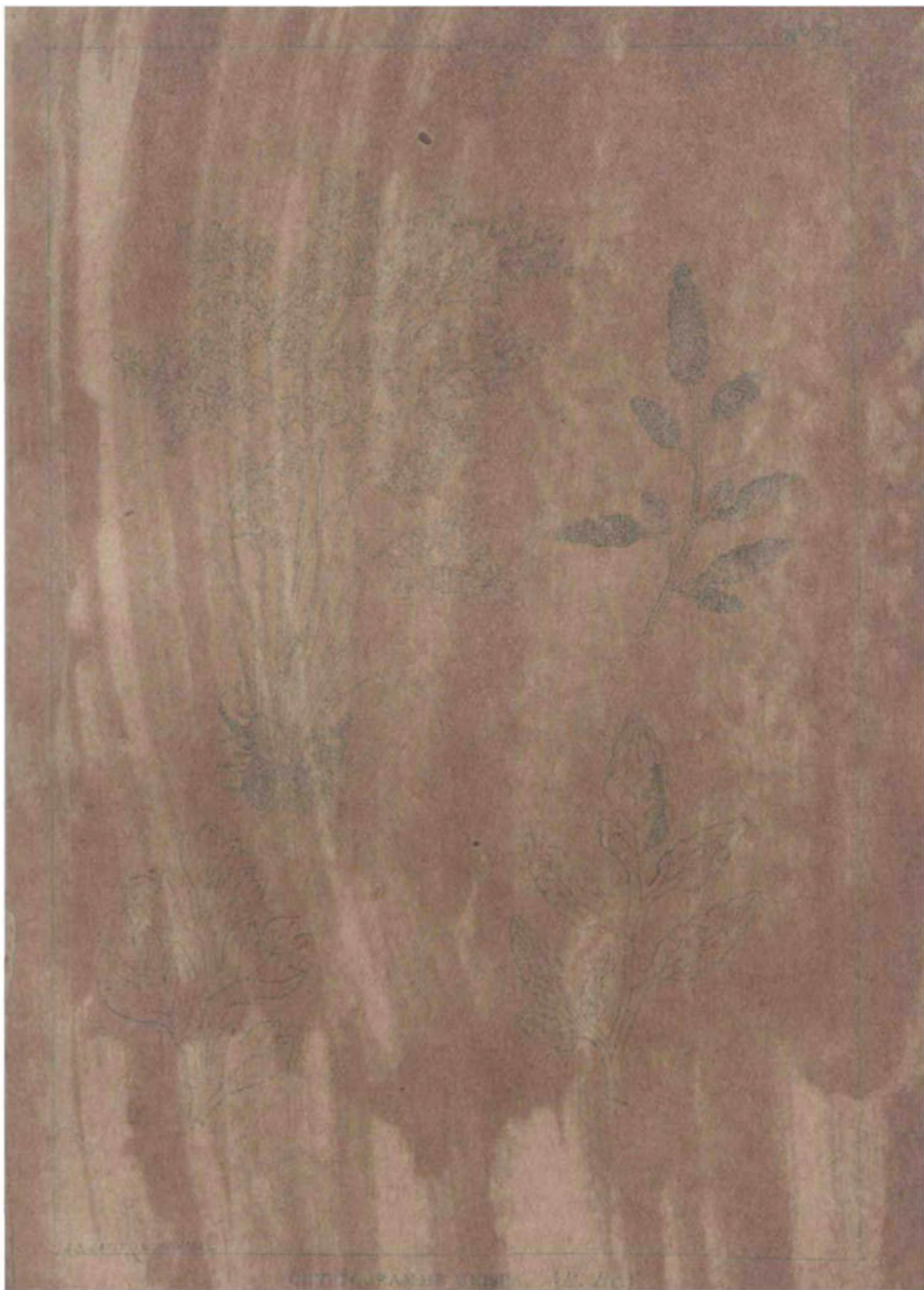
(Also in Arctic and Alpine Europe, Asia, and North America.)

GENUS XXVII.—PELL.EA. (*Link.*)

(*Pellios*; dark coloured, the colour of the fronds.)

Sori intramarginal, terminal on the veins, at first dot-like or dicurrent on the veins, but soon running into a line; involucre or indusium formed of the more or less changed edge of the frond, quite continuous, sometimes very narrow; veins free. (Differs from *Cheilanthes* in the continuous indusium.)

§ *Veins clearly visible; indusium broad.*



1. PELL. I. - I. A STELLERI. (*Gmetin under Pteris.*) Rhizome wiry,



N°51  
PELL. EA STELLERI.  
(*Gmel.*)

creeping j stipes scattered, slender, 2-3 inches long, naked, straw-coloured or pale-brown, polished, furnished about the base with few linear pale brown scales; fronds 2-4 inches long, 1-2 inches broad, ovate bi-tripinnatifid, often with the lowest pinna: barren, the upper fertile; pinna; lanceolat e- deltoid, 1-2 inches long, cut down to the rachis ; lower pinnule again sometime? slightly divided; texture thinly herbaceous^ or flaccid ; rachis and both surfaces naked veins visible ; young sori subterminal on tin veins, clustered, not forming a marginal line till old; indusium broad, continuous, mem" bra nous. Pell sea gracilis, *Hook. Syn. Fit \* p. 145. *Clarke, F. N. 1. p. 460. AUosorus gracilis (Rup), Bedd. K B. 1. 1. 73.*

Himalayas, Baltic, 9,004/ feet, Kumaon, Champua, io,oo<\ feet, Kashmir, Pir Punjul' 11,000 feet ; Karakorum. 11,000-13,000 feet.

(Also in Canada and Nortl United States.)



N°52.  
PELL. EA COXFOLO. (*Langs and Fisch.*)

2. PELI. > EA CONCOL < R (*Langs and Fisch. under Pteris.*) Stipes 6-9 inches long, nakes<sup>1</sup> erect, wiry, brownish black, po lished, slightly scaly towards tin base; fronds 2-4 inches each wa> deltoid, cut down nearly to th< rachis into 3-4-pinnx on ea side, of which the lowest pair i ninch the largest, with th



pinnales on the lower side much larger than the others, and deeply lobed with broad-oblong segments; rachis and costa dark coloured and polished like the stipe; texture herbaceous; lateral veins once forked; sori in broad marginal lines. *Langs and Fischer, M. J. 21. Pteris geraniifolia, Herb. P. S. L. 4. 37. Pellaea geraniifolia, Hook. Syn. Fil. p. 146.*

Western forests of the Madras Presidency, and in Ceylon up to 4,000 feet, very common.

(Also in Tropical America, Polynesian Islands, North China, Cape Colony, and the Mascarene Islands.)

3. *PELLAEA TAMBURII*. (*Hook.*) Stipes 6-9 inches long, erect, naked, chestnut-brown, polished; fronds about 6 inches each way, subcoriaceous, whitened beneath, deltoid, with three principal lobes, the terminal one cut down nearly to the rachis into several broad opposite lanceolate segments, of which the upper ones are entire and the lower ones larger and sinuate; lateral lobes with the segments on the upper side nearly entire, but those on the lower side prolonged and again deeply lobed, the largest entire divisions about 1 inch deep, 1 inch broad at the base; rachis polished; indusium brownish, continuous, but regularly crenated along the outer edge. *Hook. Syn. Fil. p. 146; Sp. Fil. n. 2129A.*

Tambar Valley, East Nepal.

§ *V. not perceptible; indusium broad, conspicuous.*

4. *PELLAEA NYCTOLEA*. (*Wall. under Pteris*) Caulis short, creeping, stout; stipes 2-5 inches long, very numerous and crowded, rigid, with subulate deciduous chaffy dark brown scales, and as well as the rachis (which is downy on one side) ebeneous; fronds 3-4 or rarely 5 inches long, subdeltoid-oblong, acuminate (sterile ones broader), coriaceous, shining beneath, glabrous, pinnate-pinnatifid, below subbipinnate; pinnae approximate, nearly opposite, broad-lanceolate dimidiate (the inferior half broadest), deeply pinnatifid nearly to the rachis, lowest pair again subpinnate and the secondary pinnae pinnatifid; lobes all oblong entire or sinuate, gradually coming to a sharp point, the lower base decurrent, the lowest inferior lobes

the longest, involucre submarginal, continuous, or here and there interrupted, broad, flat, membranaceous, brown, close-pressed, frequently lobed and crested and transversely wrinkled. (*Woods Cat.* p. 89. *Cheilanthes nudula*, *Hook. Sp. Fil.* ii. p. 112; *Syn. Fil.* p. 149. *Bedd. F. B. F. t.* 322.) (The involucre is sometimes continuous as in *Pteris*, sometimes interrupted and quite like *Cheilanthes*.)

Kashmir, 5,000-6,000 feet, frequent and plentiful to Chumba; scarce eastwards to Kumaon.

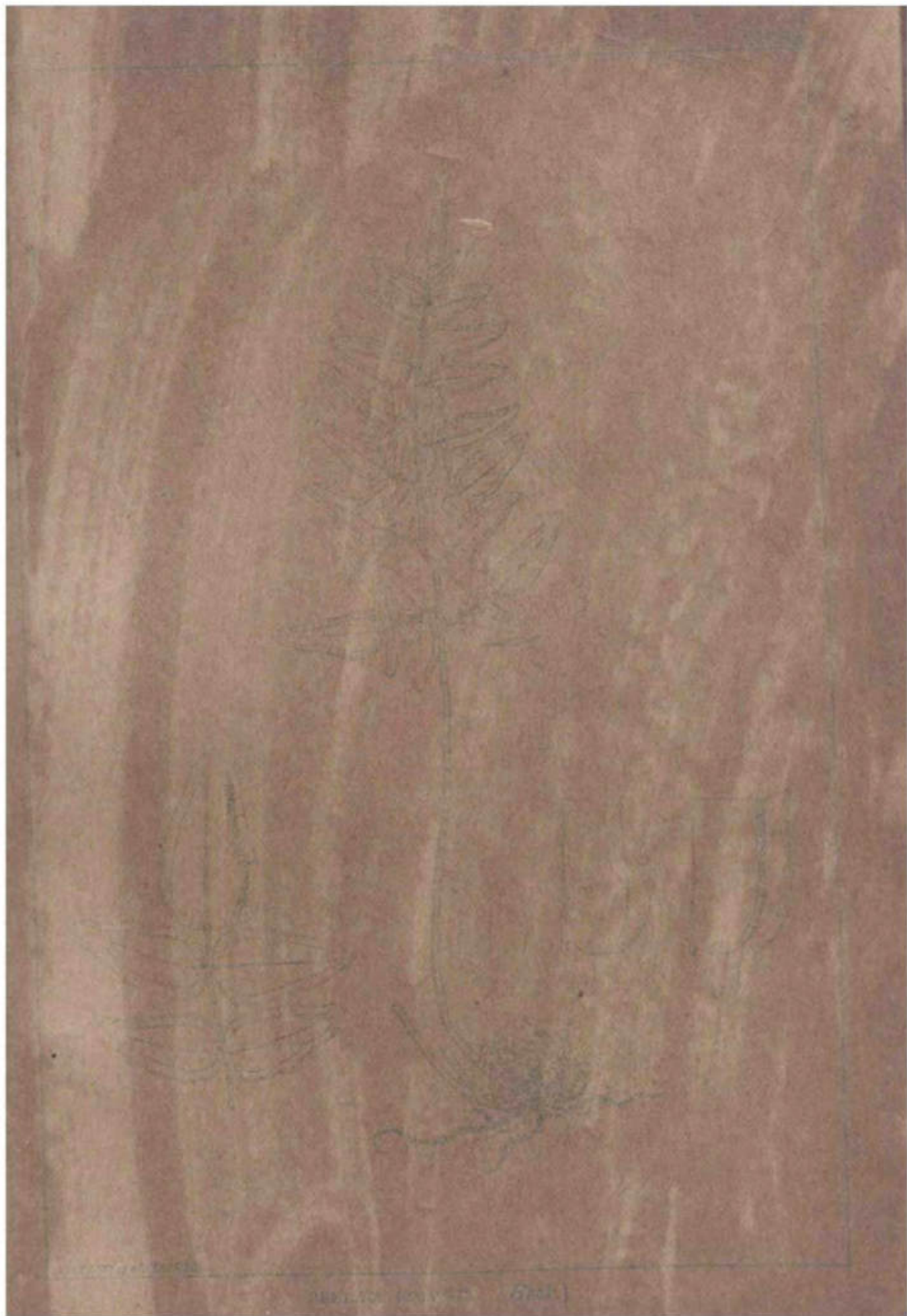
5. *PELLEA BOIVINI*. (*Hook.*) Stipes 4-8 inches long, erect, naked, black, polished, very brittle; fronds 6-9 inches long, 4-6 inches broad, deltoid to lanceolate, pinnate to tripinnate; pinnæ erect-patent or spreading gradually smaller upwards; ultimate pinnules broadly ovate in the more simple forms and linear-lanceolate in the more compound, cordate or rounded at the base, very coriaceous, pale and dull beneath; both surfaces naked; veins sunk in the frond; sori in a continuous line round the segments; involucre membranous,  $\frac{1}{2}$  a line broad. (*Hook. Syn. Fil.* p. 149. *Bedd. F. B. F. t.* 36 (under *Pteris*).

Nilgiris, Sispura and on the ghat, 4,000-5,600 feet; Anamallays, 4,000 feet, dry rocky places; Travancore and Tinnevely Mountains, Ceylon. The Nilgiri and Anamallay plant is the more simple form (pinnate or bipinnate), as represented in the figure; the Travancore plant is much larger and more compound, being tripinnate.

(Also in Madagascar and the Mauritius.)

§§. *Veins usually hidden; indusium so narrow as to be soon hidden by the sori.*

6. *PELLEA FALCATA*. (*Ela.*) Rhizome wide creeping; stipes 3-6 inches long, strong, erect, more or less pubescent and scaly; fronds 6-18 inches long, 1-2 inches broad, linear-oblong, simply pinnate; pinnæ 10-20 on each side, nearly sessile,  $\frac{1}{2}$ -1 inch long,  $\frac{1}{2}$ - $\frac{3}{4}$  inch broad, lanceolate or lanceolate-oblong, usually mucronate, often slightly truncate, cuneate, or tilted and cordate at the base;



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texture coriaceous; rachis densely scaly and pubescent, with surface nearly naked; veins not visible; sori in broad marginal lines, soon hiding the narrow involucre. *Hook. Syn. Fil. p. 151. Bedd. F. 5 t. 1. 22* (under *Platyoma*).

Nilgiris, Anaimallays, and elsewhere on the Western mountain of the Madras Presidency, 2,000-4,000 feet elevation, Malay Peninsula; Ceylon, Teligamma.

(Also in Australia and New Zealand.)

7. *PELLERA CALOMELANOS* (Lévl.) Glabrous, caudex short, thick, very scaly; fronds carinate, subcoriaceous, oblong-triangular,



*PELLERA CALOMELANOS* (Lévl.)  
Base of frond.

bipinnate, pinnules all petiolulate, cordate (rarely subhastate) triangular, very obtuse, entire, sometimes subtrilobate or sinuate at the margin; the sinus deep and narrow; veins dichotomously radiated; sori reniform or sinuate, membranaceous; stipes short, scaly at the base, and as well as the slender rachises and petioles black-ebonaceous, very glossy. *Hook. Sp. Fil. ii. p. 113. Link. Pl. Hort. Botol. p. 63. Hook. Syn. Fil. p. 152. Pteris calomelanos, Bedd. F. B. t. 1. 22.*

N. W. Himalayas, below Almora, 4,000 feet, Tikri in Sirmour, 5,000-6,000 feet.

(Also in Africa, from Abyssinia to Cape of Good Hope.)

#### GENUS XXVIII.—PTERIS. (Linn.)

(From *pteryx*, a wing, the supposed likeness to wings in the branches of the common *Pteris aquilina* or Bracken.)

Sori marginal, linear, continuous, occupying a slender filiform receptacle in the axis of the indusium; indusium the same shape as the sori, usually membranaceous, at first quite covering it, at length more or less spreading.



FERNS. (2)

*Pteris CONCIFFOLIA*. (L.) Stipes 6-12 inches long, nodal, erect, pale, clothed more or less below with pale brown linear scales; fronds 1-2 feet long, 4-9 inches broad, oblong-lanceolate, attenuated below; pinnae sessile, 20-30 on each side, 3-6 inches long,  $\frac{1}{2}$ - $\frac{3}{8}$  inch broad, linear, entire, truncate or cordate or slightly auricled at the base; texture subcoriaceous; rachis naked or slightly scaly below or throughout; both surfaces naked; veins close and fine, usually once branched; indurium membranous, yellowish-brown. *Linna. Sp. Pl.* 1531. *Hook. Syn. Fil. p.* 153. *Budd. F. S. I. t.* 33.

Madras Presidency, in many localities; throughout Bengal in the plains and up to 5,000 feet; Ceylon; Birma.  
(Also widely distributed all round the world.)

2. *Pteris ORIENTALIS*. (L.) Stipes 6-12 inches long, erect, very naked, straw-colored, polished; fronds 6-12 inches long, 4-8 inches broad; lateral pinnae usually in 2-6 opposite sessile pairs, of which the upper one is sometimes a little decurrent, 3-6 inches long,  $\frac{1}{2}$ - $\frac{3}{4}$  inch broad, the sterile ones generally the broadest, spinulose-serrated, the lowest or 2-4 other pairs often cleft down nearly to the base into 2-3 linear pinnules; margins, where barren, spinulose-serrate; rachis and both surfaces naked; texture coriaceous; veins fine, close, parallel or wide apart in the narrow-segmented forms, simple or once forked; involucres membranous. *Linna. Mant. p.* 130. *Hook. Syn. Fil. p.* 154. *Budd. F. S. I. t.* 39.

Madras Presidency, very common from sea-level up to 8,000 feet; Bengal Presidency, very general up to 9,000 feet; Ceylon; Birma.  
(Also widely distributed in Africa, Tropical America, South Europe, and elsewhere.)

VAR.  $\bar{P}$  *HETEROMORPHA*.—Pinnae abnormally pinnatifid. *Pteris heteromorpha*, *Hook. Syn. Fil. p.* 156. *Budd. F. S. I. t.* 39. This is, I think, only a variety of *orientalis*, not a distinct species.  
Birma.

(Also in the Philippine Islands.)

3. *Pteris METALICA*. (Presl.) Stipes 1 foot or more long,

FRONS OF PTERIS LACINIOSA AND CERTAIN OTHERS.

erect, naked; fronds 12-18 inches long, ovate-lanceolate, bipinnate; pinnae acute, sometimes many, sometimes 7-5, 3, or 4, all simple, or the lowest pair 2-fid, often 1 inch broad or rather more; rachis where barren, entire, undulate, crisped or crenulate; rachis naked; texture coriaceous, surfaces bright green or glossy; veins fine, close, simple or forked at right angles from the midrib; indurium membranous. *Pred. Rd. Herb.* 35. *Hook. Syn. Fil.* p. 154. *Cl. Bot.* 2. N. 1. p. 492. *Bedd. P. S. J. L.* 3.

Plains and hills of Bengal up to 3,000 feet elevation; Western forests of Madras Presidency; Birmah.

(Also in Malay Islands, and Guinea Coast.)

VAR. *PTERIS STENOPHYLLA*. (Kuhn) 3-4 or sometimes 2-4 subdigitate, fertile pinnae very long and narrow. *Hook. and Grev. J. Fil.* 1. 130. Gurwhal and Nepal, 3,000-4,000 feet.

4. *PTERIS HOOKERIANA*. (Algarth.) Stipes 6-12 inches long, naked, erect, pale; fronds coriaceous, opaque, pinnate or bipinnate, 9-12 inches long, 6-9 inches broad, with 5-6 pairs of sessile or stalked alternate or opposite entire pinnae, the largest of which is about 6 inches long, 2-3 inch broad, the 2-4 lower pairs more or less pinnatifid; rachis and both surfaces naked; veins about 1 line apart at the base, simple or once-forked, conspicuous above, but scarcely visible beneath, from slightly intermarginal; indurium narrow. *Hook. Syn. Fil.* p. 155. *Bedd. P. S. J. L.* 40.

Ceylon, Adam's Peak, about 2,000 feet elevation, and the Southern provinces at low elevations.

5. *PTERIS DACYLINA*. (Hook.) Stipes 6-9 inches long, slender, wiry, naked; fronds digitate, coriaceous, consisting of 3-7 (usually 5) linear glabrous pinnae, 2-6 inches long by 1-2 lines broad, the barren margins serrate; veins wide apart, thick and conspicuous, simple or forked; indurium broad. *Hook. Syn. Fil.* p. 155. *Bedd. P. S. J. L.* 23.

Khasya, 4,000 feet elevation; Sikkim.

raked; fronds subcoriaceous, more or less dimorphous, up to 12 inches long by 5-6 inches broad, fertile ones with a long terminal pinna, and 2-4 pairs of lateral ones which are simple, forked, trifid or even more compound, the lateral lobes being pinnatifid, the segments very narrow,  $\frac{1}{4}$  inch or less broad, entire; sterile fronds generally smaller, more compound, the lateral pinnae being pinnate, sharply toothed, and much broader than in the fertile; veins forked or simple, diverging at about two-thirds of a right angle from the midrib, very close together.

*Burm. Fl. Ind. p. 230. Hook. Syn. Fil. p. 155. Pteris crenata (Sw.), Badd. R. S. J. t. 35.*

Malabar, rare; Hills of Vingapatam district, common; plains of East Bengal, Bhoim to Chittagong; Ceylon, Birma; and Malay Peninsula.

(Also in Tropical Australia, China, and Polynesia.)

VAR.  $\beta$  GREVILLEANA. Margin of the frond, where barren, with some spinulose teeth, lowest pinnae in the barren frond often pinnate, the segments or pinnules acute. *Clarke, F. N. I. p. 464.* This was included under *cretica* in the Kew Herbarium, but Mr. Clarke has referred it here on account of the venation, and much divided

lower pinna; it has more the habit of *cretica*, I think, than of *ensiformis*.

Sylhet, Mishmee, Khasya, Chittagong Hills.

7. PTERIS GRIFFITHI (*Hook.*) A foot and more high, slender graceful; caudex none; roots of tufted fibres; frond ovate-lanceolate, submembranaceous pinnate, upper pinnae simple, 2 or 3 of the lower pairs again pinnated simple; pinnae and pinnules exactly linear,  $\frac{1}{2}$ -1 $\frac{1}{2}$  inch long, obtuse, mostly opposite, everywhere



N<sup>o</sup> 56

PTERIS DACTYLINA, (*Hook.*)



w. are sessile, with the base adnate and decurrent, so as to form a narrow wing to the rachis; lowest pinnules of the inferior pinnule sometimes again divided, terminal pinnule always elongated; veins distant, once-forked, veinlets divaricating; sori continuous, involucre sub-intramarginal, membranaceous, not reaching to the apex; stipes slender, longer than the fronds, stramineous-brown and a little scaly at the base. *Hook. Sp. Fil.* ii. l. 170, t. 123.V. *Bedd. F. B. I. t.* 24.

Mishmce.

8. *PTERISSEMIPIXXATA*. (L.)  
 Stipes strong, erect, dark brown, polished, hispid at the base, and then furnished with linear scales; fronds 12-18 inches long, 6-9 inches broad, ovate-lanceol; the upper part cut down nearly to the rachis into numerous close entire linear lobes, the largest of which are 1-3 inches long, 1/2-1 inch broad, the lower two-thirds with 6-8 pairs of opposite distantly placed pinnules, with long linear entire points and a broad

entire wing on the upper side of the rachis, the lower side with several linear pinnules 1-2 inches long, 1/2 inch broad; texture scarcely membranaceous; barren segment finely serrated; rachis and surfaces naked; veins simple or once-forked, 1/2 inch apart at the base; involucre membranous. *Hook Syn. Fil.* p. 157. *Linn. Sp. Pl.* 1534. *F. S. I. t.* 34.



N? 57.

*PTERIS GRIFFITHII.* {Hook.}

First Part, Assam to Canton, up to 1,000 feet. (Hance)  
Bir...  
... to Malacca, India, China, and Japan.  
... in Britain, examples of the plants are always semipinnate, but  
... Chinese and Japanese forms the upper margin of the pinnule  
... is more than half.



PLANT QUARTANA (L.)  
PLANT QUARTANA (L.)

9. Pinnate; *Quartana* (Hook.) Super...  
... erect, about 1 foot high, polished  
... : fronds 2-3 feet long, 12-18 inches  
... : 3-4 pinnate; upper pinna linear  
... and recurved down to the next pinna  
... lower ones sometimes 1 foot long, deoid  
... pinnules with simple or branched unia  
... segments, the longest undivided ones  
... inches long, 1/2-3/4 inch broad, those of the  
... pinnae with usually about 7 inches  
... them; the margins very slightly serrate  
... texture subcoriaceous; rachis and surfaces  
... naked; veins fine, simple, or once-forked  
... inclusion narrow-veinaceous. *Hort. Sin.*  
*Vol. 1, 1874, Pl. 1, 1, 191.*  
... Chang

10. Pinnate; *Quartana* (L.) Some glabrous or scabrid  
... highly variable in size and texture, lanceolate or ovate-lanceolate,  
... with 3-7 subordinate pairs of pinnae; in the typical form all except  
... the lowest pair are narrowly oblong, unipinnate or caudate, and cut  
... into nearly the middle into many uniform segments, which are  
... a lower pair entire or serrated, and the lowest pair bipinnate, but  
... some forms several or nearly all the pinnae are bipinnate, and the  
... lowest or the lower pair have several pinnae descending from it a  
... lower pair, and in one form the lowest pair is completely bipinnate  
... on each side of the rachis. Varies from

usually once-forked; lowest veins reaching the margin above the sinus when very deeply cut, at the sinus when less deeply cut; sori generally partial on the segments, rarely continued to the apex. *Jetz. Obs.* vi. 38. *Hook. Syn. Fil.* p. 158. *Bedd. F. S. I. t.* 31.

Throughout India, Ceylon, and the Malay Peninsula, from the plains up to 8,000 feet, very common.

(Also all round the world throughout the tropics and a little beyond them.)

The following varieties are tolerably constant even in cultivation :

VAR. *B* ARGENTEA. Like the type, but with broad white bands down the centre of the pinna?

Nilgiris and Western mountains of the Madras Presidency only [at high altitudes; much in cultivation even in England.

VAR. *J* ASPERICAULIS. Rachis and nerves red ; stipe and rachis asperous, generally very rigid, coriaceous, and shining. (Often called rubro-nerva.)

Wynaad, Coorg, and elsewhere on the western side of Madras (Presidency, 3,000-4,000 feet elevation.

VAR. *C* SETIGERA. Rachises and costules setigerous, very membranaceous in texture, nearly all the pinnae bipartite, the lowest pair with sometimes several pinnae descending along the lower side. *Bedd. F. B. I. t.* 202.

Coorg and Malabar : Moulmein on limestone rocks.

VAR. *£* LUDENTS. Pinnules very abnormally cut, sometimes only with a waved margin for the greater length, then developing normal segments, then again narrowing into only the waved margin. *Bedd. F. S. I. tabs.* 41 and 219 (under Otaria.)

Malabar, Quilon; Ceylon.

Mr. Clarke gives the following varieties for Northern India :

VAR. *ç* KHASIANA. The lowest pinnae with 5 secondary pinnæ

on each side of the rachis (i.e. completely bipinnate), those of the stipes may include smaller than those of the lower.

Khasia, 4,000 feet elevation.

Mr. Clarke says it graduates into the type.

10. *P. BIRMEANA*. Lateral pinnae with 50-60 segments, which are 1 inch long by 3/4 inch broad, equally wide throughout or broader at apex, not lateral, obtuse rounded, entire or crenulate at the barren apex. - A very large fern. *Clarke, F. N. I. 55.*

Chitragong, Terrestrial; Singapore.

Much the habit of longipinnula.

11. *P. BURMAVISA* (Sp. Clarke). Small, with only a pinnate terminal one 6 inches long, with many segments, lateral pair bipinnate, longer than the segments of the terminal pinna, or subobovate.

Phoma, Sikkim bed of the Teesta, 1,000 feet elevation.

Mr. Clarke has constituted this a species in his work on the "Ferns of Northern India," but he now agrees that it is only a variety of quadrifurcata. *Clarke, F. N. I. 56.*

(Mr. Clarke's variety major has arched veins and is *Campteris diamia*.)

12. *P. GREVILLEANA* (Wall.) Dimorphic, barren stipes shorter, winged towards the apex; barren frond pedately 5-6 inches long, scarcely pinnate, margin spinulose-seriate; fertile frond with bipinnate, the lower pair bipartite veins exceedingly obscure. *Bot. Beechey, Cat. 2,680. Agardh, Roem. Gen. Pter. 23. Clarke, l. 54.*

Sylhet, Cachar, Shajon.

*Subsidiarily like quadrifurcata, except that the fronds are dimorphic. Mr. Clarke thinks it is more nearly allied to eastformis.*

13. *P. LINDKINNELA* (Hall). Stipes erect, naked, 2-3 feet; fronds up to 3 feet long, and 18 inches broad, pinnate, pinnules about 5 pairs, large, rather distant, deeply bipinnate, segments entire, linear, filicoid, not distant 1 1/2-2 inches long, 1/4 inch broad, usually lanceolate, crenate, or subentire, the lower pair undivided, or rarely bipinnate; veins of the pinnae, rachis and stipes naked.



veins once forked; stipe continuous nearly to the apex of the segments. *Hook. Syn. Fil. p. 158. Bot. B. S. I. t. 43.*

Sikkim; Khasya; Cachar; Sylhet up to 3,000 feet elevation  
Travancore and Tinnevely Mountains; Malay Peninsula  
(Also in the Malay Islands.)

13. *PTERIS EXCULSA*. (*Gaud.*) Fronds ample, 5-6 feet long, submembranaceous, light green, pinnate; pinnae large, venate, 6 inches to a foot long, numerous, ovate-lanceolate caudate; sessile, lower ones long-petiolate, lowest pair of pinnae entire, or sometimes bipartite, all deeply pinnatifid nearly to the costa; segments (2-3 inches long) from a broad base, linear-lanceolate obtuse serrated subfalcate, lower base decurrent, veins free, forked at or near the middle or 3-4 branched; very rarely a few veinlets anastomose; in-terstices continuous from the base almost to the apex, rather broad; stipes very stout and flexuose; rachises bright castaneous glossy. *Hook. Sp. Fil. v. 183. Gaud. in Frey. Voy. Bot. p. 386. Bedd. J. B. I. t. 248.*

Kumaon, Gurwah; Dalhousie, 4,000-8,000 feet elevation;  
Sikkim 8,000-9,000 feet; Nynce Tal.  
(Also in the Sandwich Islands.)

14. *PTERIS PATENS*. (*Hook.*) Caudex erect; stipes numerous, stout, scaly at their base, rachis stout, glabrous; fronds ample, erect, strict, membranaceous, pinnate; lower pinnae bi-tripartite; pinnae 5-6 inches long, strict horizontally patent, numerous approximate, elongate-oblong, acuminate, rarely subcaudate, sessile or lower ones shortly petiolate, deeply (almost to the rachis) pinnatifid; segments horizontal, very uniform linear, scarcely acuminate, serrulate where sterile, the base dilated decurrently confluent on both sides, especially at the lower base, sometimes 3-art; veins all free, simple or once or twice forked; stipe continuous nearly to the apex. *Hook. Syn. Bot. B. 177. Bedd. P. S. I. t. 205. Campferia patens, Baker. Hook. Syn. Fil. p. 165.* (The supposed narrow costal arches are only a wing to the rachis.)

Mauras Presidency, Carcoorghat, Wynad and Travancore Hills.

2,000-2,500 feet elevation; Ceylon, Darawilla, Matele and Moora forests; above 2,000 feet elevation.

(Also in Borneo, Philippines and Society Islands.)

15. *PTERIS LONGIFOLIA*. (Don.) Fronds membranaceous, furnished above with a few subulate scales on the rachis of the pinnae, and with hairs on the rachis of the segments, rarely divided, or subternately divided into 5-7 segments, lateral divisions multipinnate; pinnae short, petiolate or sessile, lanceolate-acuminate, deeply emarginate to the apex, or with the apex long caudate; segments oblong-ovate subtruncate, serrated at the sterile portions of the apex; sori lateral on the segments, never extending to the apex or base; veins rather remote, all forked, basal ones arising from the axil of the sori, and extending to the margin much above the sori. *G. Don. Proc. Fl. Nep. 15.* *Pteris pellucens, Agardh, Sp. Gen. Bot. 43.* *Hack. Sp. Ill. ii. 100.* *Bedd. Fl. S. I. 1. 32.* (South Indian examples are always ternately divided; but those from N. India have often 5, rarely 7, pinnae.)

All the western hills of the Madras Presidency, 2,000-3,000 feet elevation; Ceylon; Burma; Sikkim, Ehotan; and Khasya 1,000-2,500 feet elevation.

(Also Guinea coast and Guatemala.)

15. *Stipes distant from a long creeping rhizome, indurium double*  
(Genus *Pasia* and *Ornithopteris* of authors.)

16. *PTERIS AQUATINA*. (L.) Rhizome globose, creeping underground; stipes about a foot long, strong, erect, naked; fronds 2-6 feet long, 1-2 feet broad, subdeloid in outline, only the uppermost pinnae simple, the next lanceolate cut down nearly or quite to the rachis into short triangular or linear pinnules, the lowest being stalked, a foot or more long, with ample lanceolate pinnules which are cut down to the rachis into numerous lanceolate segments, which are again fully pinnate; largest entire ultimate segments 4 inches long; lines broad, texture thin or subcoriaceous; rachis and sutures naked or pubescent; veins close, conspicuous, often twice forked; pinnules acute, or the

inner obsolete. *Hook. Syn. Fil. p. 163.* *Linn. Sp. pl. 1533.* *Bedd. F. S. I. t. 42.*

Throughout India, Ceylon, and the Malay Peninsula on the mountains, 2,000-8,000 feet elevation.

(Also throughout the whole world, except the Arctic zones and temperate South America.)

VAR.  $\beta$  ESCULENTA. Ultimate segments distant, linear and elongated. Moulmein and the Malay Peninsula southwards.

### GENUS XXI. X.—CAMPTERIA. (*Presl.*)

(*Kamptos*, arched; the lowest veins meeting and forming an arch.)

As in *Pteris*, but the lowest veinlets from the base of the vein or costule of each segment united with the veinlet from the next costule, and forming long arches along the costa of the pinnae; upper veinlets free.

1. *CAMPTERIA BIARRITA.* (*Linn. under Pteris.*) Quite similar to *Pteris quadriaurita*, except that the costules of the segments are connected by a long arching veinlet; the pinnae are generally less deeply divided, and the plant is generally larger and coarser, but these two latter differences cannot be relied on. *Linn. Sp. Pl. 1534.* *under Pteris.* *Hook. Syn. Fil. p. 164.* *Bedd. F. S. I. t. 44.*

Western parts of Madras Presidency up to 6,000 feet; not common. Pretty general throughout Northern India from the plains up to 6,000 feet. (Ceylon; Malay Peninsula.

(Also in Malay Islands, China, tropical Africa, and Australia.)

2. *CAMPTERIA KLEINTIANA.* (*Presl.*) 4-5 feet high; fronds very large, sub-membranaceous, pedately ovate, pinnate; pinnae sub-sessile lanceolate with a long acumination; lowest pair with two large pinnae descending from the lower margin of the costa; all the pinnae deeply pinnatifid (leaving a broad margin on each side of the costa); segments falcate or long, sterile ones broadly crenated, and fertile ones





SMITHIA TERONIANA (P. B.)

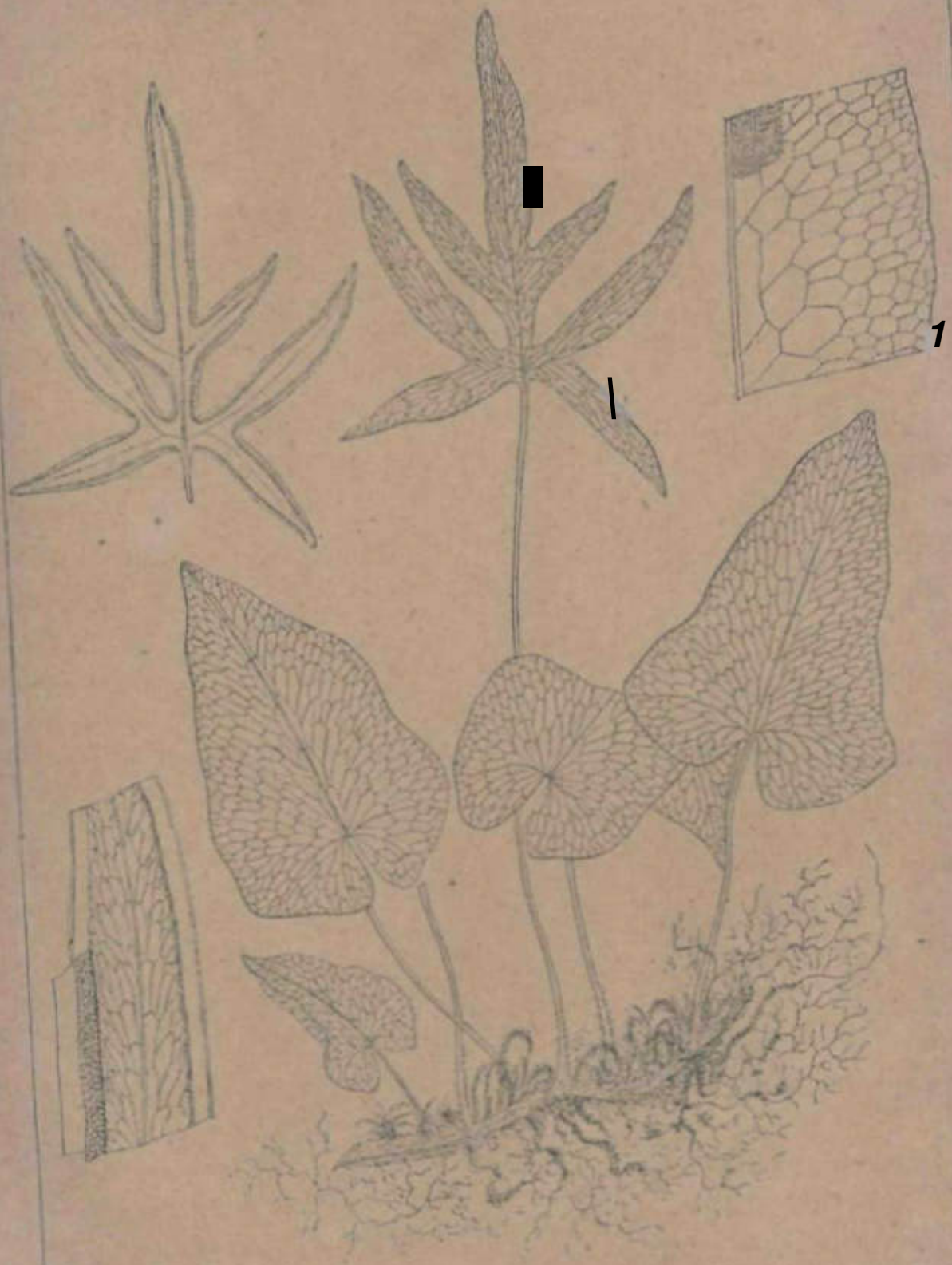
crenated at their sterile apices; basal veins uniting in pairs into an arch below the sinus (one generally proceeding from the costa, the other from the costule), and bearing 3-4 free veinlets; other veinlets forked, terminating in dots within the margin; indusium never reaching the base or apex of the segments. *Klein. Tent. Pter.* 147. <sup>f</sup>- 5\*  
*Pteris geminata*, *Wall. Cat.* 2180. *Hook. Syn. Fil.* 164. *C. Anamallayensis*, *Bedd. F. S. I. t.* 45.

Western mountains of Madras Presidency 2,000-4,500 feet; rather **rare**. United by Hooker and by Clarke with *biaurita* but really quite distinct; its thin texture and very wavy appearance are very unlike any form of *biaurita*; its margin is, besides, always crenated, and the veins never reach the margin, which they always do in *biaurita*. It is one of the most beautiful ferns in the Madras forests, and has been for years in cultivation at Ootacamund. Wight's specimens from Courtallum are named *geminata* in the Kew Herbarium, and there are no specimens from N. India; there are specimens from Johanna Island; also from the Isle of Mayotta, (collected by Lady Barkly), named by Mr. Baker *Campteria maxima*. *Sp. Fil. p.* 480.

3. **CAMPTERIA WALLICHIANA.** (*Ag.*) Fronds ample, glabrous, sub-membranaceous, 3-partite, lateral branches compoundly divided, terminal one elongated, pinnated; pinna? **numerous**, sessile, 4-6 inches long, linear-lanceolate acuminate, deeply pinnatifid; segments linear-lanceolate obtuse, sterile ones serrulate, all<sup>v</sup> approximate, about £ an inch long; basal veins monarculate, the rest free and forked, rarely a solitary areole at the base of the costule; stipes very long, 5-6-feet; stout, rich castaneous, and, as well as the paler-coloured **rachises**, very smooth and glossy. *Ag. Sp. Gen. Pter.p.* 69. *Hook, Sp. Fil.* ii. 206. *Syn. Fil.p.* 165. *Bedd, F. B. I. t.* 2\$andzi>j. *Far. quadripinnata* (*Clarke*) is a very compound form with the pinnae tripinnate; it is probably an abnormal form or monstrosity which would not be constant.

Himalayas from Chumba to **Bhotan** 3,000-8,000 feet, abundant; Khasya.

(Also in the Philippines, Java, and Samoa.)



A. G. SATTLES & CRENSHAW

DORVOPTERIS LUDENS. (Wall.)

GENUS XXX.—DORYOPTERIS. (*l. Smith.*)

(*Dory*, spear; *pterus*, form of the fronds.)

Fronds small, sub-pedate or sagittate, in texture and colour like *Peltaea*; veins copiously anastomosing, without free included veinlets; the rest as in *Pteris*.

i. DORYOPTERIS LUDENS. (*Wall*) Rhizome creeping, furnished with linear adpressed brown scales which have white margins; stipes solitary distant, polished, sometimes with a few scales, and often with dusky sub-tomentose pubescence at base and apex; barren frond on a stipe 3-4 inches long, triangular with two slightly, deflexed basal lobes, to hastate with two basal and two large spreading lateral lobes, the margin entire; fertile frond, on a stipe often 12 inches long, 4-6 inches each way, cut down into five linear-lanceolate or lanceolate lobes, one erect, two spreading and two deflexed, of which all except the last are sometimes again forked; texture coriaceous, ~~cc>sta~~ polished, veins hidden ^sori continuous all round the margin. *Wall. Cat.* 88. *Hook. Syn. Fil.* 166. *Clarke, F N. I.* 470. *Litobrochia ludens* and *pedata*, *Bedd. F. JV.* / . t. 26 and 27.

Chittagong Hills up to 1,000 feet elevation; Orissa, on the Balasore Hills; Birma. (A specimen in Wight's herbarium of this or an allied species is ~~supposed~~ to be from the Dindigul mountains in the Madras Presidency; but it has never been found there of late.)

(Also in the Philippine islands.)

GENUS XXXI.—LITOBROCHIA. (*Presl.*)

(*Lit/tos*, a stone; *hrocha*, spots; the areoles of the net-like veins resembling pavement.)

Veins copiously anastomosing with some free included veinlets; otherwise as in *Pteris*.

1. LITOBROCHIA LIXISA. (*Tiunb.*) Caudex long creeping, subterraneous; stipes and rachis castaneous glossy^; fronds ample, sub-



i. ironROCIA INCISA. (Thunb.)

A. S. LATTELL SCIENTIFIC

membranaceous, diManT~o^te~^ 7~' \_\_\_\_\_  
 tripinnate; pinnre all sessile, su'badnL ?' S,aUCoUS beneath /  
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 and pinnatind; segment ovate ^ J ^ more or ' « deeply 1 b j  
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the oosta and. coitules the larUTt'^^ll anastomwin? . Creoles non.  
 continuous interrupted, n"CL"t ""\* ^^ " inTM'»cres  
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Hook. Sp. Fil. ii. 231. Bedd. F. S. I. t. 224. 72 - ^tobrochia aurita,

Ceylon, central and southern provinces, above 3,000 feet. ra-  
 vancore Hills 3,000-4,000 feet, Sispara ghat on the Niigi A00  
 feet. Sikkim, Bhotan, and Khasya, 3,000-6,500 feet.

(Also widely distributed in the tropi and sub-tropics of America,  
 Africa, Asia, Australia, and Polynesia.)

2. LITOBROCHIA MARGINATA. (*Bory, under Pteris.*) Stipes elon-  
 gated, stout, and with the rachis sub-castaneous; fronds ample,  
 tripartite, lateral branches pinnate, spreading, long petiolate, sub-  
 membranaceous, glabrous; pinnules 4-6 inches or more long, linear-  
 oblong or linear-lanceolate sub-sessile, acuminate, rather deeply  
 pinnatifid; segments approximate, linear-oblong or TM (UP^ards)  
 obtuse or acute, entire or scarcely serrated, a ncl on v at \*u- the apex,  
 nearly half an inch long; sinuses obtuse; basal veins forming a single  
 arc parallel with the costa; veins forming a series of two or more  
 areoles (parallel with the costule), from which proceed free veinlets  
 which do not extend to the margin but terminate with a thickened  
 apex just within it; involucre continuous on the lower two-thirds  
 of the margin of the pinnules not extending to the apex. *Bory. Voy. 2.*  
*p. 192. Hook. Syn. Fil. p. 172. Pteris tripartita, Hook. Sp. Fil. ii.*  
*225. Litobrochia tnpartita>yj, J F. S. I. t. 220.*

Ceylon, common about Calle and the central provinces; Madras  
 Presidency, much cultivated, and said to be found wild in the Cochin  
 forests; Malacca,







GENUS XXXIII.—LOMARIA. (*Willd.*)

(*Loma*, fringe or border; relating to the indusium.)

Sori linear continuous, parallel with the midrib and occupying the whole or nearly the whole, of the space between it and the edge; indusium membranous, formed of the revolute edge of the frond. Fronds dimorphous, usually once or twice pinnatifid or bipinnate, rarely simple or bi-pinnate; veins free; ring of capsule vertical.

1. *LOMARIA PATERSONI*. (*Spreng.*) Rhizome short-creeping; culms 2-3 inches long, wiry, erect, rather scaly below; sterile frond simple, about 1 foot long and 1 inch broad, narrowed at both ends, or pinnatifid, 2 feet or more long, cut down nearly to the rachis into 6-8 segments on each side, which are often 6-9 inches long and nearly 1 inch broad, and suddenly decurrent at the base; texture coriaceous; fertile fronds simple and only  $\frac{1}{2}$  inch broad, or pinnatifid with numerous segments on each side, 6 inches long by  $\frac{1}{2}$  inch broad; or the fronds are sometimes in part sterile, in part fertile; veins prominent in the young sterile fronds, inconspicuous in mature fronds, forked, thickened at the apex close to the margin; sori covering the whole space between midrib and margin. *Spr. 83. Veg. iv. 62. Hook. Syn. Fil. 174. L. elongata* (Blume), *Bedd. P. S. I. 2. 28, 28A.*

Nilgiris and Anamallays 5,000-8,000 feet elevation. Ceylon, 4,000 feet and upwards. Nilgiris examples have the fertile fronds always pinnatifid as far as I have observed, and the sterile ones generally so. From Ceylon I have examples with the sterile and fertile both quite simple.

(Also in the Philippines, Fiji, New Zealand, S. Australia, and Tasmania.)



GENUS XXXIV — PLAGIOGYRIA (Kuhn)

(*Plagia*, oblique; *gyria*, a circle; the oblique ring of the capsule)

As in *Lomatia*, except that the capsules have an oblique ring, and the base of the stipe is suddenly dilated, fleshy, rugose, and furnished with large spongy glands.

1. PLAGIOGYRIA ADNATA (*Blume*). Caudex most short; stipes caespitose, elongated, brown, triquetrous; a span to 11 foot long; slender, naked at the base, dilated and subcarnose, furnished with orbicular spongy glands; fronds a foot and more long, ovate lanceolate, chartaceous-membranaceous, sterile ones bipinnate almost to the rachis, below pinnated, but all the pinnae united by a narrow wing; segments mostly opposite distant lanceolate, much acuminate, more or less falcate; the inferior base round, superior base extended upwards, the margins entire or obscurely toothed, the apex strongly serrated; fertile fronds pinnated; pinnae alternate distant linear sessile, rather obtuse; soft covering the whole under side between the veins and the brown membranaceous very distinct involucre. *Bl. Ind. Bot. Java* 185. *Fl. Ind. Sp. Ind. III. 10. Bot. F. II. 1. 34.*

Khasya, 4,000-5,000 feet elevation.

(Also in Japan and Java) Mr. Clarke thinks it possible that this is not the same as *Khumi* Java plant, as the only example of that is a portion of a fertile frond.

2. PLAGIOGYRIA GLABRA (*Bl.*) Caudex stout erect; stipes elongated, subcompressed tetragonus with two furrows in front, the base dilated triquetrous on the anterior face bearing spongy depressed glands, fronds ovate-oblong 1-2 feet long, pinnated; sterile pinnae numerous, 3-5 inches long, chartaceous, horizontally spreading, sessile or very nearly so, lanceolate, acuminate at the base, notched beneath having a gland as much attached to the rachis as to the very short petiole; the margins finely dentate serrate, rather



A. C. GOTTI &amp; SPENCER

PLAGIOGYRIA ADNATA. (Bl.)

more strongly at the apex, white and almost powdery beneath, green above with a tinge of red; veins copious, compact, simple and forked; ultimate short pinnae confluent into a pinnatifid and lobed caudate apex, fertile pinnae narrow-linear obtuse erect-patent on very short petioles, which sometimes bear a gland beneath; sori and involucre as in other *Plagiogyriae*. *Bl. En. Fil. L. p. 204.* *Lomaria (Plagiogyria) glauca, Hook. Sp. Fil. iii. 22. Bodd. F. B. I. t. 90.*

Khasya, 4,000-5,000 feet elevation. (Probably only a variety of *pycnophylla*.)

(Also in Java.)

3. *PLAGIOGYRIA PYCNOPHYLLA, (Kunze.)* Caudex stout, erect, very woody, and having many wiry roots; fronds fascicled, stipes sub-quadrangular 2-furrowed in front (as is the rachis), at the base dilated fleshy, triquetrous, bearing spongy glands; fronds 1-2 and more feet long, sterile ones, sub-chartaceous opaque, brown when dry, oblong-ovate pinnated for its whole length, except that the small terminal ones are confluent into a lobed (or pinnatifid) and finely acuminate and serrated apex, pinnae horizontally patent sessile or very nearly so, numerous, approximate, narrow oblong-lanceolate very finely almost caudately acuminate, the base very obtuse and truncate (neither dilated nor contracted), at the base beneath furnished with one or two prominent glands (sometimes wanting); the margin very minutely serrulate, the caudate apex strongly serrated; veins numerous, closely placed, simple and forked; fertile fronds narrower pinnated; pinnae linear obtuse on very short petioles with a gland on the under side; involucre at first vaulted, conspicuous, membranaceous, brown, at length forced back by the capsules. *Kunze in Bot. Zeit. iv. p. 143. Hook. Sp. Fil. iii. 21. Bodd. F. B. I. t. 52.*

Nepal and Bhotan, 6,000-11,000 feet; very common at 7,000-8,000 feet. Khasya, 4,000-6,000 feet; Malay Peninsula.

(Also in Java.)

4. *PLAGIOGYRIA EUPHLEBIA, (Kunze.)* Caudex stout woody elongated; stipes a foot or more long, naked erect, triquetrous below,

fronds ovate-lanceolate, 1-2 feet long, 6-12 inches broad; pinnæ  
 1 inch or more apart at the base, 1 stalked except towards the apex,  
 erect-patent, linear 4-6 inches long, 1/4-1/2 inch broad, narrowed at the  
 base on both sides; at the apex, where it is toothed; texture sub-  
 coriaceous; veins prominent; fertile fronds similar, but the pinnæ  
 more distant  
 s erect naked. *Kze. in Bot.*  
*Zeit. 1848, p.*  
 Nepal, 1  
 83. *Bedd. F. B. I. t. 165.*

(Also in Japan and N. Australia.)

### TRIBE VH.-BLECHNEJE.

Sori linear or oblong dorsal, parallel with the midrib and edge  
 of the segments, not close to the latter; indusium the same shape as  
 the sorus, superior, opening towards the midrib.

### GENUS XXXV.-BLECHNUM. (L.)

(One of the Greek names for a fern.)

Sori linear, & with and  
 contiguous to the edge of the frond; frond, uniform or generally pinnate or pinnatifid; veins free. dimorphous.

1. BLECHNUM CARTILAGINEUM I (Swartz.) Caudex oblique.  
 I at the crown with blackish scales; stems densely clothed with blackish scaly and muricated in the lower part.  
 Fronds 1-2 feet long, 6-9 inches broad, linear, 4-6 inches long, 1/4-1/2 inch broad, narrowed gradually, the lowest pinnæ linear distant not reduced to mere auricles. Sori above

*A. I. p. 473. //w/!; .s>; ; ligf- m. i:4 OTrf 3L2:*  
 hmee.-Mr. Clarke refers to this  
 es, which is Australian. Hooker refers to this  
 « to nitidum, an



HETEROSORUS ORIENTALIS

Linerican plant. The two species appear to me so very closely allied as to be distinguished only **with** difficulty, if **at all**; the rachis is slightly puberulous **in** both. The figure / 49, *Ferns Brit Ind.*, given to represent the **Mishmee** plant, is a **copy** of Hooker's **figure** of the American species.

2. **ELECHNUM SERRULATUM.** (*Rich.*) **Caudex** elongated stout ascending; stipes **6-12** inches long, strong, erect, smooth, nearly naked; fronds oblong acuminate, 1-2 feet long, 6-9 inches' broad, with 12-24 pairs of quite distinct articulated linear-oblong pinnae on each side, the largest of which are 4-5 inches long,  $\frac{1}{2}$  inch broad, narrowed gradually towards **the** point and downwards to a **[arrow base ; the margin finely incised;** texture coriaceous; rachis rigid naked; veins very fine and close, not conspicuous; fertile pinnae narrower; sori in a continuous line close to the midrib. *Blk, in Act. Soc. Nat. Par. i. 114. Hook Syn. Fil. 186.*

Malacca.

(Also in tropical America, Australia, Borneo, and New Caledonia.)

3. **BLECHNUM ORIENTALE.** (*Linn.*) **Caudex** stout erect, clothed at the crown with fibrillose dark brown scales; stipes 4-8 inches long, strong, erect, scaly below; fronds 1-5 feet long, 6-36 inches broad, ovate, with very numerous nearly contiguous linear pinnae on each side, which are about  $\frac{1}{2}$  inch broad, narrowed to a long point, the bases quite distinct, the upper ones decurrent, a few of the lowest mere auricles; texture subcoriaceous; rachis and both surfaces naked; veins fine and close; sori in a long continuous line close to the midrib. *Lin. Sp. PL 1535. Hook, Syn. HI 186. Bedd. F. S. I. \* 29.*

Throughout India, **Ceylon**, and the Malay Peninsula, **up** to 3,000 feet in the south, and 4,000 feet on the Himalayas.

(Also **in** the Malay Islands, China, Polynesia and Australia.)

4. **BLECHNUM FINDLAYSANTANUM.** (*Wall*) **Caudex** very small; stipes short; frond ample, 2-4 feet, ovate-lanceolate, sul-



coriaceous, pinnated; pinnae erect-patent, rather distant, 6-12-14 inches long, 1-1½ wide, oblong or elongate-oblong, sessile, obliquely cuneate at the base, entire, upper ones much decurrent, but (except the two upper ones) not coadunate; the apex suddenly and sharply acuminate; several of the lowest pairs abortive, reduced to small hard scales; the surface glossy; veins obscure, compact, parallel; sori close to the costa continuous, narrow-linear; involucre also very narrow and indistinct. *Wall. Cat. n. 2172. Hook. Sp. Fil. iii. 55 and Syn. Fil. p. 187. Bedd. F. B. I. t. 249.*

Penang and the Malay Peninsula. (*Perhaps only a very broad-leaved form of orientale.*)

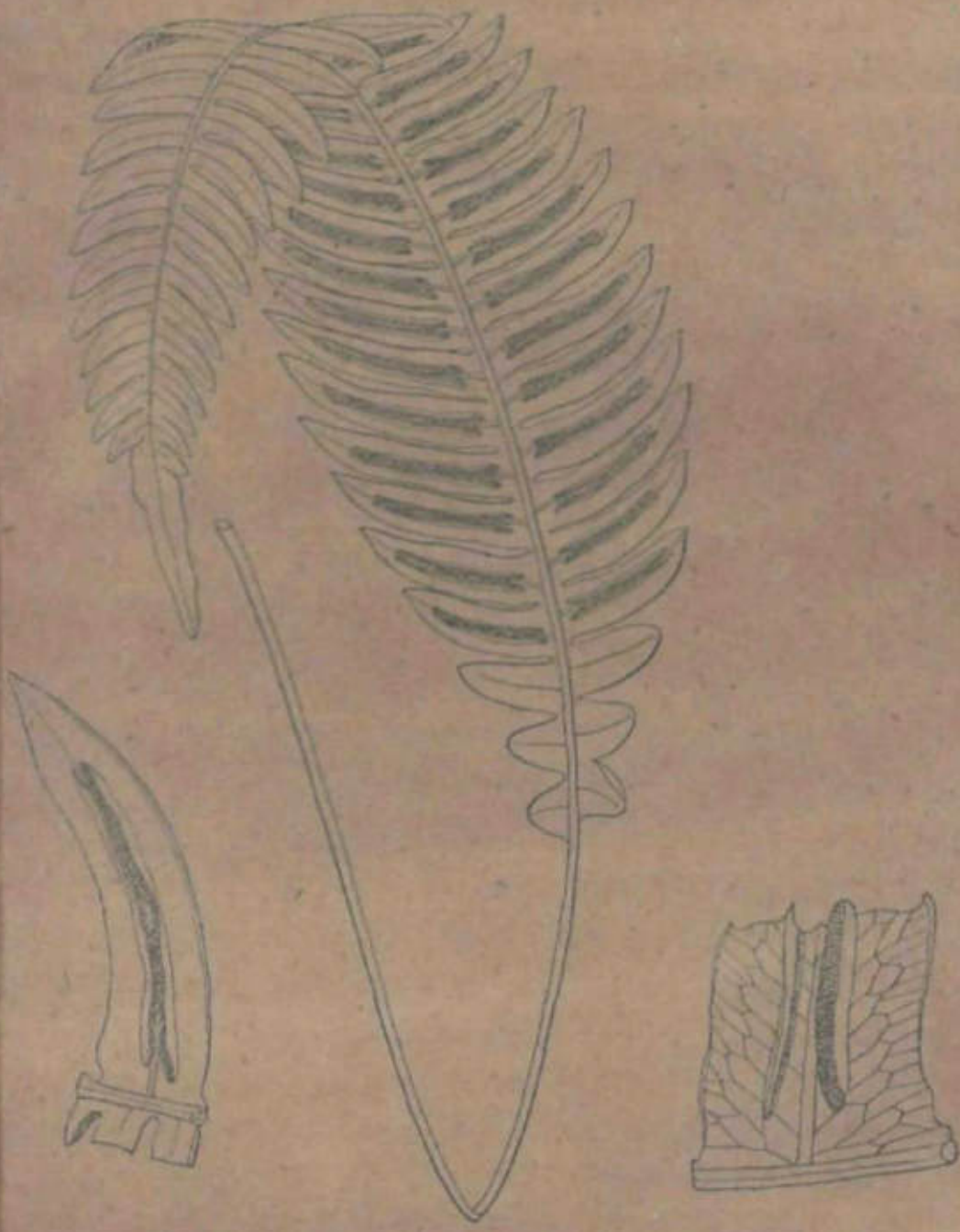
GENUS XXXVI.—BLECHNIDIUM. (*Moore.*)

(Resemblance to Blechnum.)

Like Blechnum, but the veins anastomosing and forming large-arched areoles.

1. BLECHNIDIUM MELANOPUS. (*Hook. under Blechnum.*) Stipes black erect, 6 inches long, naked; fronds broadly falcate-lanceolate, glossy, sub-coriaceous, pinnate; pinnae very approximate from a rather broad adnate base, linear-oblong falcate, somewhat acute, the margin entire, narrowly revolute, uppermost ones gradually confluent into a lanceolate elongated lobe, the lowest 3-4 pair suddenly diminished, short, very obtuse, sub-auriculate at the superior base; veins internal, reticulated, forming large angled areoles next the costa, narrower oblique ones often extending to the margin; ultimate veinlets free and clavate at their apex just within the margin; sori quite close to the costa, continuous, not reaching to the apex of the pinna, lower half of the rachis beneath black. *Hook. Sp. Fil. iii. 64. Syn. Fil. p. 130. Bedd. F. B. I. t. 50.*

Kinabo Hills.



A. NICHOLSON

BLECHNIDIUM MELANOPUS. (Hook.)

GENUS XXXVII.—WOODWARDIA. (*Smith.*)

(In honour of T. J. Woodward, an English Botanist.)

Sori linear or linear-oblong, sunk in cavities of the frond, placed in single rows parallel with and contiguous to the midribs of the pinnae and pinnules; indusium sub-coriaceous, the same shape as the sorus, closing over the cavity like a lid; veins forming a series of costal arches; the rest free or anastomosing; fronds ample and bipinnatifid.

1. WOODWARDIA RADICANS. (*Smith.*) Stipes elongate, with large lanceolate acuminate paleaceous scales at the base; fronds ample, pinnate, subcoriaceous; pinnae distant, often a foot or more long, petiolate, deeply pinnatifid broad-lanceolate acuminate; lacinae ovate-lanceolate, acuminate, subfalcate, spinulose-serrate towards the apex; veins reticulate towards the main costa (of the pinnae), a single series of areoles outside of the sori thence free to the margin; sori parallel with and near to the costule, short oblong, sunk in the cavity of the sorus, which has an elevated margin; involucre vaulted coriaceous; rachis here and there producing large scaly germinating gemmae at the base of some of the pinnae. *Smith. Act. Tur.* v. p. 4-12. *Hook. Sp. Br.* iii. 66. *Syn. Fil.* 138. *Bedd. J. B. J.* 1. 88.

Himalayas, from Kashmir to Bhutan, 3,000-8,000 feet elevation; common in Khasya, 4,000-5,000 feet.

(Also in Java, S. Europe, Macaronesia, California and Mexico.)

GENUS XXXVIII.—DOODIA. (*K. Br.*)

(In honour of Samuel Doody, a British cryptogamist.)

Sori oblong or sub-lunulate, in one or more series, arranged transversely with the veins forming areoles which are superficial, not sunk; involucre membranaceous, of the same form as the sori, opening towards the costa and lying parallel with it; veins uniform, the



H. CATTELL & CRENGER

WOODWARDIA RADICANS. (Sw.)

lower ones acutely anastomosing, forming elongated costal areoles (one or more series), the marginal venules free; fronds pinnate or pinnatifid; segments or pinnae sharply serrated, rhizome sub-;

i. DOODIA DIVES. (*Kan:z.*) Rhizome obliquely ascending, paleaceous, rootlets clothed with black fibre; stipes angled very paleaceous near the base; fronds coriaceous, glabrous oblong, long caudate at the apex, pinnate at the base, with the lower pinnae auricled, pinnatifid above; pinnae and segments patently divergent, oblong, margins pungently serrated; segments of the fertile fronds often distant; sori in one or two series on each side of the costa of the pinna; and segments of the wings of the rachis, lunate, often more or less confluent. *Schk. Fil. Suppl. ii. p. 13. t. 185. Hook. Sp. Fil. iii. 7fl. ML 189. Bedd. F. S. I. t. 222.*

Ceylon, Hackgalla and the central provinces above 4,000 feet elevation.

(Also in Java.)

#### TRIBE VIII.—ASPLENIEFFI.

Sori attached to the veins oblique with regard to the rachis or occasionally sub-parallel with it, linear or oblong or horseshoe shaped; indusium the same shape as the sorus, when single, opening towards the midrib, sometimes double.

#### GENUS XXXIX.—THAMNOPTERIS. (*Presl.*)

(*Thamnos*, a thicket; *ptcris*, fern.)

Sori unilateral linear; indusium linear, straight, simple, free exteriorly; veins forked; venules parallel; their apices combined by a transverse continuous marginal vein; fronds undivided, simple, narrow-lanceolate to broad-lanceolate.

1. THAMNOPTERIS NIDUS. (*Linn.*) Fronds very variable in length and breadth, lanceolate acute or acuminate at the apex.



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LOODIA DIVES (Kunt)

## FERNS OF BRITISH INDIA AND CEYLON.

ing gradually into a short stem, the edge entire, the midrib rounded on the back; texture coriaceous; veins **fine** and parallel, half an inch apart; sori reaching about half-way towards the margin. **Lin.** *PL* 1537. *Hook. Syn. Fil.* 190. *Jkdd. F. B. I. t.* 197.

North India; the Malay Peninsula; Ceylon.

(Also pretty general throughout tropical Asia, Mainland and Madagascar, *Szc.*)

Typical *Nidus* has the fronds up to 6 feet long and 5-6 inches wide, and has not been found in the Madras Presidency.

VAR.  $\beta$  MUS/KFOLIA. (**Mitt.**) Fronds up to 6 feet long and 1 foot broad; sori extending nearly to the margin. **Mett** *Asp. / Hook. Sp. Fil.* iii. 78.

Malacca, Singapore.

(Also in the Philippines.)

VAR.  $\gamma$  PHYLLITIDIS. (**Bon.**) Fronds up to 2 feet long and 2, rarely 3 inches broad. *Bon. Prod. Nep.* 7. *Hook. Sp. Fil.* iii. *Bedd. F. S. I. L* 123.

Western forests of the Madras Presidency, very common in the Himalayas; Khasya; Malay Peninsula.

(Also in Java Luzon, and Samar.)

The above have been considered three different species by many botanists, they are now generally all united under *Nidus*; it appears to be no real difference except as to size, and it is doubtful if this is constant, or that the supposed varieties do not run into each other.

2. **THAMNOPTERIS GREVILLEI.** (**Wall**) Fronds 12-18 inches long by 2-3 broad, lanceolate-spathulate, narrowed to an acute apex and suddenly below to a broad wing to the stipe, which grows gradually narrower downwards, the margin entire; texture coriaceous; midrib keeled below; veins nearly horizontal, those in the base of the frond about \ line apart; sori on most of them extending within a short distance of the edge. **Wall. Cat.** 1036. *Hook. Sp. Fil.* iii. *Bedd. F. B. I. t.* 66.



THAMNOPTERIS GUYILLER (HALL)



**Birma and Mishmee.**

The spatulate fronds with the winged stipe give this fern a different appearance to any form of *Nidus*.

3. **THAMNOPTERIS SIMOXSIANA.** (*Hook.*)\* **Fron**s 12-18 inches long,  $\frac{1}{2}$  inch broad, **tapering** above into an acuminate point, and very gradually below into a short stem, the margin nearly **entire**; midrib only rounded and prominent **below**; texture coriaceous; veins erect-patent, about  $\frac{1}{2}$  line apart; sori copious, reaching from the midrib to within a short distance of the edge. *Hock. Syn. Fil. 191. Beid. F. B. I. t. 247.*

Khasya and Jain tea hills up to 4,000 feet; **Chittagong**; Madras Presidency, on the hills west of **Vizagapatam**, 3,000 feet.

*Air. Clarke is in error in saying that it is found in Malabar and unites it with Nidus, but it would hardly be safe to do so unless it is proved to vary in cultivation.*

GENUS XL.—ASPLENIUM. (*Linn.*)

(//privative; *spkn*, spleen; in allusion to its medical property)

Sori dorsal or sub-marginal, linear or oblong; **indusium** similar in shape, straight, single, plane or tumid, bursting along the edge; veins free.

\* *Fron*s quite entire.

**K** 1. **ASPLENIUM ENSIFORME.** (*Wallick.*) **Stipes tufted 1-3** inches long, firm, erect, scaly below; fronds 8-20 inches long,  $\frac{3}{8}$  inch broad, much **acuminate**; **margin** entire or nearly so, the lower part of frond very **gradually** narrowed; texture coriaceous; indusium immersed, inconspicuous, erect-patent, usually twice forked; sori linear, broad, reaching nearly to the midrib and margin. *Wall. Cat. 200. "Hook. Syn. Fil. p. 191. Jh-dd. F. S. I. t. 125. A. stenophyllum, K. B. I. t. [47.*

Himalayas; **Gurwhal** to Bhotan, 4,000-9,000 feet elevation; Ceylon; Birma; Western forests of Madras Presidency. The 'Indian,' Ceylon, and Birma plant has fronds generally about 3 inches long and nearly 1 inch wide. Some Himalayan examples have very long and very narrow fronds, but they cannot be separated

is variegated, as there are intermediate forms from the Himalayas; they both stain the paper they are dried in, a bright pink colour.

4. *ASPLENIUM GRIFFITHIANUM*. (Hook.) Stipes tufted, erect short; fronds lanceolate, 4-12 inches long,  $\frac{3}{4}$ -1 inch broad, the point acuminate, narrowing below very gradually; the margin undulate, crenate; texture subcoriaceous; veins distant, obscure, usually once forked; sori reaching from the midrib two-thirds of the way to the margin. *Hook. Syn. Fil.* 193. *Bedd. F. B.* 1. t. 53.

Sikkim, below Darjeeling, 4,000 feet elevation, scarce; Mishmee; Khasya, 4,000-5,000 feet elevation. Mergui and Tavoy.

*There is also, in the Kew Herbarium, a fern from Penang, which quite agrees with this, except that it has a slender stipe 6-9 inches long.*

\* \* \* *Fronds lobed or pinnatifid.*

5. *ASPLENIUM ALTERNANS*. (Wall.) Caudex short, descending, copiously rooting, squamose with subulate scales as is the very short (scarcely an inch long) stipe, and base of the costa beneath; fronds caespitose, about a span long, chartaceous, very opaque pale rusty green beneath, glabrous,

lanceolate, scarcely acuminate attenuated below, deeply and regularly pinnatifid throughout; lobes ovate or triangular-oblong with wide sinuses, obtuse, quite entire; veins subflabellate, all free; sori copious on all the lobes in two rows, linear-oblong erect, the superior basal one parallel with the costa. *Wall. Cat.* 221. *Hook. Sp. Fil.* iii. 92. *Syn. Fil.* p. 194. *Bedd. F. B.* 1. t. 59.

N. W. Himalayas, very common 3,000-6,000 feet elevation.



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*ASPLENIUM ENSIFORME*.  
(Wallich.)

extending to west frontier of Kashmir, and eastward to Sikkim, where it is rare.

(Also in Abyssinia.)

\* \* \* *Fronde pinnate.*

4. *ASPLENIUM VIRIDE.*

(Hudson.) Stipes densely tufted ; often brown or blackish, 2-4 inches long, naked ; fronds 4-6 inches long,  $\frac{1}{2}$  inch broad with 12-20 sub-sessile pinnae on each side, which are ovate or elliptic, the upper edge narrowed suddenly **at the** base, the lower obliquely truncate, the outer part deeply crenated; texture herbaceous; rachis naked green ; veins sub-flabellate ; sori copious linear-oblong oblique. *Huds. Fl. Atig.* 453, *Hook. Syn. Fil.* 195. *Bedd. F. B. I.* 64.

Kashmir, 12,000-13,000 feet ; Gulmurg, **Tilail**, Kumaon.

(Also in Europe, Asia, and N. America in Arctic and Alpine regions.)



N972.

*ASPLENIUM ALTERNANS.* (Wall.)

5. *ASPLENIUM TRICHOMANES.* {Linn.) Stipes densely tufted, 1-4 inches long, naked glossy brown or black ; fronds 6-12 inches long, about  $\frac{1}{8}$  inch broad, with 15-30 opposite pairs of sessile horizontal pinnae, which are  $\frac{1}{2}$  inch broad, 1  $\frac{1}{2}$  lines deep, the edge slightly **crenate**, the two sides unequal, the **upper** on the

broadest and narrowed suddenly at the base: texture sub-coriaceous; veins pinnate, inconspicuous; rachis polished; sori linear oblong, 3-6 on each side of the midrib. *L. Sp. Fil.* p. 1545a. *Hook. Syn. Fil.* 196. *Bedd. Fl. S. I. t.* 147.

Kulhatti on the Nilgiris; Himalayas, Kashmir to Kumaon, 5,000-10,000 feet elevation.

(Also in all four quarters of the world, Australia and Polynesia.)

6. *ASPLENIUM NORMALE*. (*Don.*) Stipes 4-6 inches long, tufted, wiry, dark purple, polished; fronds 8-15 inches long,  $1\frac{1}{2}$  inch broad, with very numerous close placed pinnae; the lower ones, which are  $\frac{1}{2}$ -1 inch long,  $\frac{1}{4}$  inch broad, deflexed; the apex obtuse, the edge incised-crenate, the upper side auricled and narrowed suddenly at the base, the lower truncate in a straight line; texture sub-coriaceous; rachis glossy; veins mostly once forked; sori in two rows, very various in direction, some at right angles with the veins, some parallel with them, or in one row, or only 1-2 to each pinna. *Don. Prodr. Fl. Nep.* p. 7. *Hook. Syn. Fil.* p. 197. *Asplenium multijugum* (*Wall.*), *Bedd. Fl. S. I. t.* 133.

Madras Presidency, in the forests of the Western mountains, 3,000-6,000 feet elevation; Ceylon, above 4,000 feet elevation; Himalayas from Nepal to Bhotan, 4,000-8,000 feet; Khasya, 3,000-5,000 feet. Mr. Clarke says some forms are nearly allied to *A. Trichomanes*, others to *monanthemum*, a Madaga fern; Himalayan examples are much more variable than those from South India.

(Also in Canton.)

VAR.  $\beta$ . Pinnae more numerous and overlapping each other, more regular in shape, forming almost parallelograms; sori 1-6, generally confined to the apex, and parallel with the veins, one sori on the upper auricle close to the rachis and parallel with it.

Anamallays, 4,000 feet elevation.

7. *ASPLENIUM SUBAENIUM*. (*Hook.*) Stipes tufted, 2-3 inches long, wiry, blackish, densely fibrillose; frond a span long, lanceolate coriaceous, very opaque, pinnated; pinnae  $\frac{1}{2}$  of an inch long,

numerous, approximate, horizontal sessile, oblong obtuse, upper half obscurely serrated, cuneate at the base, superior base truncated sub-triculate, inferior margin cut off as it were by a straight line; terminal pinna elongated, pinnatifid below; costa and veins sunk, obsolete; sori 2-5, oblong oblique, occupying the disc of the frond between the middle and the apex; involucre firm, membranaceous; rachis ebony-black, terete, rigid, sparsely setose. *Hook. Sp. Pl. iii. 143. Syn. Fil. p. 198. Bedd. F. B. I. t. 238.*

Penang.

8. *ASPLENIUM SEPTENTRIONALE*. (*Lin. under Acrostichum*). Rhizome caudex creeping, densely radiculose, scarcely pubescent; stipes numerous, tufted, 3-6 inches high, erect, flexuose, green brown at the base; fronds 1-2 inches long, coriaceous, glabrous, pinnated; pinnae  $\frac{1}{2}$ -1 inch long; long-petioled, linear or linear-lanceolate, subangulate, often very acute or acuminate, rarely solitary, generally 2-3 alternate entire or forked; lateral segments small subulate rarely lacinated (2-3 acuminate segments); veins forked parallel; sori very long; involucres also much elongated, attached near the margin. *Hook. Sp. Pl. iii. 174. Syn. Fil. p. 198. Bedd. F. B. I. t. 60. Acrostichum septentrionale, Linn. Sp. Pl. 1524. Acropteris, Link.*

Northern India, Kashmir, 9,000-12,000 feet elevation, Garo-whal 8,000 feet.

(Also in Arctic and Alpine Europe, Asia, and America.)

9. *ASPLENIUM LONGISSIMUM*. (*Blume*). Rhizome short-creeping; stipes tufted 3-12 inches long, strong erect, blackish, nearly naked; fronds 2-8 feet long, linear or lanceolate elongate, proliferous and cooling at the apex; pinnae horizontal, very numerous, 2-4 inches long  $\frac{1}{4}$ - $\frac{3}{8}$  inch broad, acuminate, the two sides nearly equal, with a distinct central midrib, the edge slightly toothed, the base on both sides often auricled; texture herbaceous; rachis dark coloured strong, slightly silky; veins forked oblique; sori numerous in two regular rows on each side the midrib, and reaching nearly to the edge. *Blume, Jen. Plant. Java, Fil. 171. Hook. Syn. Fil. 168.*

**Sylhet**, abundant; Malay Peninsula from Moulmein southwards.  
(Also in Mauritius and the Malay Islands.)

10. **ASPLENIUM WIGHTIANUM.** (Wall.) **Stipes tufted 6-9**  
inches long, green, naked; fronds up to 2 feet long, 6-8 inches broad,  
oblong-lanceolate with 6-12 subopposite or alternate pairs of pinnae  
on each side, distinctly stalked, the lower ones rather distant, linear  
with a long acumination,  $\frac{1}{2}$  inch broad, the base gradually  
cuneate-cuncate, often a little unequal, the margin coarsely toothed;  
Colour pale green; **texture** coriaceous or subcoriaceous; veins  
simple, or once forked; sori very regular and parallel, not

reaching the **margin**; indusium broad, pale. *Wall. Cat.*  
2215. *Hook. Syn. Fil.* 199.  
*Beard. F. S.* 7. t. 126, A.  
**Vulcanicum** (Blume), *Hook.*  
*Syn. Fil.* 20T.

(The sterile fronds are  
rarely deeply and irregularly  
pinnatifid, with the segments  
serrated.)

Ceylon; South Indian  
mountains, Pulneys, Anamal-  
lays, Bolampatty Hills, 2,000-  
4,000 feet elevation; Malay  
Peninsula.

In South Indian exam-  
ples the serratures are rather  
deep and the veins generally

11 simple, in a specimen from Birma the serratures are very shall-  
ow and sharp and the veins once forked.

(Also in the Malay Islands.)

**VAR. (1) MICROPHYLLUM.** Pinnae much smaller, with a more  
unequal cuneate base, scarcely acuminate at the apex; serratures  
obtusely rounded, upper basal serratures larger than the others and



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**ASPLESIUM WIGHTIANUM.** (Wall.)

alternata, 15-25 inches long, 1-2 inches broad, midrib

bluish; fronds about 10 inches long by 2 inches broad. *Bedd. F. S. I. t. 127.*

Arumallays; banks of Toracado and elsewhere. I believe this to be only a form of *Wightianum*, though Mr. Baker is inclined to regard it as a distinct species.

11. *ASPENIUM TENEBRUM*. (Forst.) Stipes tufted, firm, erect, greyish, naked; 4-11 inches long; fronds 8-15 inches long, 3-4 inches broad, oblong-lanceolate; pinnae numerous on each side, stalked, horizontal, 2-3 inch broad, more or less bluntly rounded at the apex, the edge rather deeply crenate all round, the two sides unequal, the upper one narrowed, almost at a right angle, sometimes auricled, the lower one obliquely truncate; texture herbaceous; rachis compressed; veins all simple except the lowest superior one, which is always forked except in the uppermost pinnae; sori numerous, regular, parallel, not reaching the margin or midrib. *Forst. Prod. p. 80. Herb. S. O. Fil. p. 201. Asp. elongatum (Sw.), Bedd. F. S. I. t. 224.*

Ceylon; at Oodavella and Matula East, not common. *Mr. Wall sends a specimen with most of the pinnae pinnatifid in their lower half nearly to the rachis.* Singapore, Penang.

(Also in the Philippines, Borneo, Java, Marianne Islands, Tahiti, and New Guinea.)

12. *ASPENIUM LUNULATUM*. (Sill.) Stipes tufted, 2-4 inch long, firm, nearly naked, grey or ochraceous; fronds 3-13 inches long, 1-3 inches broad, narrowly lanceolate-oblong, with many pinnae on each side, which are 1-2 inch broad, bluntish or rounded at the apex, more or less deeply crenate throughout, the sides unequal, the upper one at the base narrowed suddenly at the



ASPENIUM TENEBRUM (Forst.)

at right angle, the lower one obliquely  
 connexed; texture herbaceous-vein, short of both edge and midrib.  
 Syn. Fil. 302. *Asplenium erectum* V. t. 7.  
 VAR. CAROLINENSE. Fronds winged; pinnae 30-40 pair, alternate, long, rounded at the apex, lower ones smaller.  
*Asplenium carolinense* Kze. *Asplenium kaffense* (Raddi), *Asplenium*



ASPLENIUM ZENKERIANUM. (Kze.)

Western parts of the Madras Presidency, Nilgiris, etc., at high elevations; Ceylon, central provinces.

VAR. TRAPEZIIFORME. Fronds about 11-20 inches long; rachis not winged; pinnae about 15-20 pair, the lowest the largest, 1-2 inches long; apex attenuated. *Asplenium trapeziforme* (Roxb.), *Cryptogramma* Bedd. F. S. I. 497.

Nilgiris and Ahmalam Southern India.

Unless a distinct species, which it probably is, *Asplenium* referred to by Hooker and Clarke, as *Asplenium longifolium*, as closely allied to that species, but it is nothing like it, either in texture or cutting.

13. *ASPLENIUM ZENKERIANUM*. (Kze.) Stipes 6-9 inches long, tufted, slightly scaly; fronds oblong-lanceolate, 1-3 feet long, gene-



rally profliferous at the apex; pinnae distant, alternate, 15-20  
 stalked, ligulate-lanceolate acuminate, 3-5 inches long, 1-1½ inch in width  
 crenate, broadly rounded on the upper, cuneate-truncate on the lower  
 side at the base; lowest rather reduced; texture firm; surfaces marked  
 dark green; veins erect-patent, fine distant, forked; sori regular  
 parallel, 3-4 lines long, scarcely produced more than halfway to the  
 margin; indusium firm, broad, *Kze. in Lin.* xxiv. p. 259. *Hook. S. J. Fil.* 484. *Asp. persicifolium* (Hook.), *Bedd. P. S. J. t.* 127.

Nilgiris and Palneys at the higher elevation; Ceylon at New  
 Elya, &c., above 5,000 feet elevation.

14. *ASPLENIUM HIRTUM*. (*Kaulf.*) Stipes tufted, 2-4 inch  
 long, strong, erect, brownish, deciduously scaly; fronds 12-  
 inches long; pinnae very numerous, horizontal, 1-3 inches long,  
 ½-¾ inch broad; the apex rounded or acute; the margin broad  
 not deeply toothed, the base on the upper side conspicuously angled  
 on the lower side rather suddenly but obliquely narrowed; texture  
 coriaceous; rachis dark-coloured, strong, more or less fibrous;  
 veins oblique, inconspicuous; sori in two regular rows which do  
 reach the margin. *Kaulf. En. Fil.* 169. *Hook. Syn. Fil.* p. 194.  
*Bedd. P. S. J. t.* 194.

Sikkim at Lingtam near Darjeeling; Moulmein.

(Also in the Mascareen Islands, Hong Kong, Philippines,  
 Solomon Islands.)

15. *ASPLENIUM AURITUM*. (*Sw.*) Stipes tufted, 4-8 inch  
 long, firm, erect, grey, naked; fronds 3-10 inches long; pinnae  
 10-20 distinctly stalked, horizontal, 2-5 inches long, the apex acute  
 or blunt, either deeply pinnatifid or pinnate throughout, or  
 sharply toothed or variously lobed, especially on the upper side  
 towards the base; texture very coriaceous; rachis firm, erect, with  
 veins close, oblique, inconspicuous; sori in two broad rather close  
 rows. *Sw. Syn. Fil.* 78. *Hook. Syn. Fil.* 268. *Bedd. P. S. J. t.* 194.

South India, rare: Conoor on rocks 5,600 feet elevation  
 in Samanays, bed of the Toracadu river, 4,000 feet.

(Also throughout Tropical America and the West Indies,  
 in the Mascareen Islands.)

*i*(>. ASPLENIUM CRINICAULE. {Hance.) Stipes furnished with  
**ir-like** scales, densely tufted, 3-4 inches long, erect, dark-brown;  
 fronds 6 inches to 2-3 feet long, 1½-4½ inches broad; pinnae 9-25  
 inches long, opposite, sub-opposite or alternate, lanceolate, sub-falcate, with  
 blunt or acuminate apex, the margins deeply incised, often the  
 base and sometimes both the upper and lower base much  
 incised, giving the pinna a hastate shape, the lower base often  
**obliquely truncate**; texture coriaceous; rachis firm, **fibrillose** like  
 stipes; midrib rather indistinct; veins subflabellate; **sori** linear  
**oblique**. Hance, in *Ann. Sc. Nat. Ser.* v. 254. Hook. *Syn. Fil.* p.  
 208. Asp. *Beddomei*, Mett in *Linnaea*, 36, 93. *Aspl. falcatum*,  
*id. F. S. J. t.* 141.

Madras Presidency, on the **Anamallays** and in Coorg, 3,000-  
 4,000 feet elevation; Sikkim, Jain tea hills 4,000-5,000 feet, nearly  
 allied to the next species, and probably only a variety of it.

(Also in China)

17. ASPLENIUM FALCATUM. {Lam.) Stipes tufted, 6-9 inches  
 long, erect, greyish, glabrous, or more or less scaly; fronds 6 inches  
 to 2 feet long or more, 4-8 inches broad; pinnae stalked, 6-20 pairs,  
 alternate, sub-opposite or opposite, lanceolate, often caudate, 1-2  
 inches broad, the edges serrated or lobed, with the lobes serrate, the  
 sides unequal, and the lower one at the base obliquely-truncate;  
 texture coriaceous; rachis glabrous or fibrillose; veins very oblique;  
 in long irregular lines reaching nearly to the margin. *Lam. Enc.* ii.

*Hook. Syn. Fil.* 208. *Bedd. F. S. f. t.* 143, as caudatum,  
 Madras Presidency, Western mountains; Ceylon; Malay Peninsula;  
 Soonderbun; near Koolna in Jessore.

(Also in Australia, S. Africa and its islands, and Polynesia.)

18. ASPLENIUM MACROPHYLLUM. (Sivartz.) As in *falcatum*,  
 the pinnae generally larger and broader, and less cut. *Sw.*  
*Fil.* 1. T] and 261. *Hook. Syn. Fil.* p. 209. *Bedd. F. S. I. t.* 142.  
*Distinct* enough from *falcatum* if typical specimens only are  
 considered, **but** quite passing into it if large suites of specimens are  
 considered, it should, I think, only rank as a variety.

Localities much the same as *falcatum*. Mr. Clarke says either midrib or examples in Ceylon, but I have gathered many specimens there. *Indic.*

19. *ASPENIUM CAUDATUM* (Forst.) As in *falcatum*, but the sori generally confined to two parallel rows close to the midrib, or with a few other short oblique sori. *Forst. Prod.* p. 80. *Hook. Syn. Fil.* p. 209. *Aspl. contiguum*, *Bedd. Fl. S. I.* t. 140. Probably only a variety of *falcatum*.

S. India, on the Western mountains; Ceylon; Malay Peninsula (Also in Australia, Africa, and Brazil.)

20. *ASPENIUM GARDNERI* (Baker) Rhizome short, creeping; stipes grey, 2-6 inches with a few scattered small scales; fronds lanceolate,  $\frac{3}{4}$  to 1 foot long, 3-5 inches broad, often gemmiparous; rachis not winged; pinnae 8-10 pair, distinct, ascending, lanceolate short-stalked, acute, central ones 2-3 inches long  $\frac{3}{4}$  inch broad, toothed, square on the upper side, cuneate on the lower side at the base; veins erect-patent, forked, moderately close; sori regular, parallel,  $\frac{1}{2}$ - $\frac{1}{4}$  inch long. *Hook. Syn. Fil.* p. 485. *Bedd. Suppl. Ferns.* t. 355.

Closely allied to *macrophyllum*, and probably only a variety of it. I have specimens from North India (not gemmiparous), which I do not know whether to refer to this or to *macrophyllum*. All Ceylon specimens are all gemmiparous, and the texture is generally thinner, and the veins further apart.

Ceylon; Khasyz Mountains, Umwai, 3,000 feet elevation.

21. *ASPENIUM PARADOXUM* (Blume) Stipe firm, erect, grey, slightly scaly; fronds 1-2 feet long, with a large oblong-rhomboidal terminal pinna, and 8-12 lateral ones on each side, the lowest of which are 5-6 inches long, 1-1 $\frac{1}{2}$  inches broad, the apex acuminate and slightly toothed, the two sides unequal, the upper one narrowed suddenly almost at a right angle, the lower obliquely cuneate; texture coriaceous; rachis firm, erect, compressed, rather scaly; veins obscure, very oblique, usually once forked; sori reaching nearly from the midrib to the margin. *Bl. Fl. Java.* 179. *Hook. Syn. Fil.* p. 209. *Aspl. zamboides*, *Hook. Sp. Fil.* p. 174. *Bedd. Fl. S. I.* t. 145. *Indic.* 1861. The compressed rachis and short broader almost entire

... this a very different look to *Gardneri* or *macrophyllum*.  
 ... only seen two or three specimens and do not know how far it  
 ... but should not be surprised if it turned out to be only a  
 ... variety of *macrophyllum*.

(Also in Java and Sumatra.)

22. *ASPLENIUM FORMOSUM*. (*Willd.*) Stipes tufted, very  
 short, naked, polished, dark brown; fronds 12-16 inches long; pinnae  
 10-31 pair (lower ones generally reduced), sessile, horizontal, \



each 1<sup>0</sup>n g, by 1<sup>1</sup>/<sub>2</sub>~2<sup>2</sup> lin<sup>cs</sup> deep, the upper edge- deeply cut, the  
 apex rather obtuse, the  
 lower edge truncate in a  
 straight line, so that about  
 half the lower side is cut  
 away; texture herbaceous;  
 veins obscure, simple or  
 forked; sori linear-oblong,  
 short, oblique, confined to the  
 lower side, or 1-4 on each side  
 of the midrib. *Willd. Sp. Pl.*  
*v. 329. Hook. Syn Fil p,*  
*210. Bedd. F. S. Lt 136.*

Southern India, abundant in  
 moist woods at the higher ele-  
 vations on the Nilgiris, Pulneys  
 and Anamallays; Ceylon, rare.

*ASPLENIUM PARADOXUM*. (*Bhune.*)

(Also in Tropical America, the West Indies, and Africa, Angola,  
 and Congo.)

23. *ASPLENIUM UNILATERALE*. (*Lam.*) Stipes scattered slender,  
 naked, dark brown, polished or grey, and opaque, 4-8 inches long;  
 fronds 6-15 inches long, lanceolate-oblong; pinnae; 10-30 pairs  
 sessile horizontal 1-3 inches long, by 1/2 inch broad, in shape  
 almost dimidiate, two-thirds of the lower side being entirely cut away,  
 the apex acute or bluntish, all except the truncate part incised, the  
 lower half of the base narrowed nearly at a right angle; texture  
 herbaceous: rachis usually polished like the stem, or green and

opaque ; veins once or twice forked ; sori not reaching either margin or margin, often quite aliantodioid in South Indian examples.  
*I. a m. E tic. i i.* 305. *Hook. Syn. Fil. p.* 210, under *resect urn.*  
*F. S. I. t.* 132, under *rescctum.*

Madras Presidency, all the Western forests up to 5,000 feet; Himalayas from Chumbha to Lhotan 1,000-5,000 feet; coast eastward of Nepal; Chittagong; Ceylon; Malay Peninsula.

(Also in the Malay Inlands, Polynesia, Japan and Tropical Africa.)

VAR. *p RIVALE.* (*Bedd.*) Pinnae; 30-40 pairs, close set and much smaller than in the type, being only 1/2 inch broad, keeled and almost a parallelogram in shape; sori confined to the outer margin, hakeit resembling normal, var. *ft.*

Pulney Hills and Anamallays, only in beds of rivers.

VAR. *r. UDUM.* (*Atkinson.*) Pinnae very transparent and membranaceous, smaller than in the type, very oblique, and the outer margin often fimbriate. (*Bedd, Supp. Ferns. t.* 357, as var. *decurrens.*)

Himalayas; Dalhousie, 5,500 feet elevation, and other localities; pendant from dripping rocks.

VAR. *I DELICATULUM.* (*Parish.*) Fronds and pinnae, much smaller than in the type, the latter less obliquely cut away on the lower side, and the main vein further from the margin. *Bedd. Supp. Ferns. f.* 358.

Assam, on trees, 3,000 feet elevation. I have only one specimen sent by Mr. Parish.

24. *PLENIUM HETEROCARPUM.* (*Wall.*) Stipes scattered, firm, erect chestnut coloured, polished; fronds up to 2 feet, of which the stipe, is 6-8 inches, membranaceous, glabrous, linear in outline. Pinnae numerous (40 or more), dimidiate, nearly the whole of the lower margin being cut away, about 1 inch long by 1/2 inch broad, upper margin and apex deeply cut, the segments being again bifid on the lower margin entire; sori confined to the segments and directed upwards. *Wall. Cat.* 218. *Hook. Syn. Fil. p.* 210. *Bedd. F. S. I. I.*

Madras Presidency, not uncommon in the Western forests; 4,000-7,000 feet elevation; Himalayas from Nepal to Bhutan.

20-8,000 feet; Khasya, 3,000-5,000 feet; Malay Peninsula, Ceylon, central provinces, above 3,000 feet.

(Also in south-east China and Borneo.)

25. *ASPLENIUM LACINIATUM*. (*Dubl.*) Stipes and rachis with lanceolate or linear scales; fronds linear, up to nearly 2 feet long; pinnae numerous, alternate or subopposite, linear-oblong or half ovate, very much cut away, and unequal at the base, slightly pinnatifid, with the segments serrated, or more or less deeply pinnatifid nearly to the rachis and the segments distant; texture subcoriaceous; veins very oblique; sori copious. *Don. Prod. Fl. Nep. p. 8.* *Hook. Sp. Fl. p. 211.* *Bedd. F. S. I. t. 145.* *Aspl. planicaule* (Wallich), *Hook. Sp. Fl. 211.* *Bedd. F. S. I. t. 139.*

The typical laciniatum of North India has the pinnae elongated and much narrowed towards the apex, and deeply cut into distinct segments; typical planicaule of S. India has very short, half ovate pinnae, scarcely at all cut; there are however many connecting links, and it is impossible, I think, to separate them even as constant varieties. *Var. depauperatum* (*Clarke*) is also found in S. India, but is, I believe, only a starved form.

Madras Presidency, all the Western mountains, 3,000-8,000 feet; Himalayas, Gurwhal to Bhotan; Khasya; Ceylon.

(Also in Japan.)

*VAR. CRINIGERUM*. (*Bedd.*) Pinnae all more deeply and finely cut than any typical laciniatum; stipe very short ( $\frac{3}{4}$  inch), and very scaly; rachis densely scaly; pinnae with long hair-like scales on the nerves beneath.

South India, on the Belarangam Mountains (Mysore), and on the Ghentia Mountains near Ganjam, 3,000-4,000 feet elevation.

26. *ASPLENIUM PUMIUM*. (*Sw.*) Stipes united, 3-4 inches long, erect, glabrous or sparingly pubescent; fronds 2-6 inches each way deltoid, the upper part sinuated only, the lower cut into distinct pinnae, of which the lowest pair is much the largest and often pinnatifid nearly to the midrib; texture herbaceous; sori very oblique, the lower ones sometimes  $\frac{3}{4}$ -1 inch long. *Sw. Fl. Ind. Cey. iii. 376.* (Also in the Indies and Central America.)



W. G. L. LACROIX DEL.

ASPENIUM HETEROCARPUM. (Walt.)

26. *HEMIPHYLLOPS*. (*Poe.*) Fronds smaller, pubescent on obverse on both surfaces; texture exceedingly thin, with prominent venation; pinnae obtuse. *Poe.* 7th Mem. 54. t. 15. *Clarke*, *N. Journ.* p. 482.

Also in Abyssinia, 4,000 feet elevation.

(Also in Abyssinia.)

..... Fronds bi-quadrifid.

27. *ASPLENIUM RUPA-MERAKIA*. (*Linn.*) Stipes tufted, 2-4 inches long, slender, wiry, naked, eisenous towards the base; fronds 2-3 inches long, about 1 inch broad, glabrous, deltoid, cut down to the rachis into a few pinnae on each side, the lower ones again cut down into spatulate cuneate pinnules, which are serrated round the outer edge; texture coriaceous; rachis firm, green, naked; veins labellate; sori copious, margin of indusium imbricate. *Linn. Sp. Pl.* 1541. *Hook. Syn. Fil.* 213. *Bald. F. B. t. 1. 61.*

Kashmir.

(Also in Europe, North Africa, Thibet, Siberia, and the United States.)

28. *ASPLENIUM PEKINENSE*. (*Horn.*) Stipes tufted, 1-3 inches long, with a few linear scales near the base; fronds 2-6 inches long, narrowly oblong, shining, glabrous, with several lanceolate-deltoid pinnae on each side, which are cut down to a compressed rachis into several ovate rhomboidal pinnules on each side, which are again pinnatifid (hence it is bipinnate sub-tripinnate), ultimate segments linear-cuneate, sharply forked or toothed at the apex, entire below; sori 2-6 to a pinnule, ultimately confluent; involucre entire. *Horn. in Seem. Journ. Bot.* v. 262. *Hook. Syn. Fil.* p. 213. *Clarke*, *F. N. J. t.* 56. f. 2.

Kashmir; Jhelum Valley, 2,000-2,500 feet elevation.

(Also in China and Japan.)

29. *ASPLENIUM ADIANTUM-NIGRUM*. (*Linn.*) Stipes tufted, 6-8 inches long, nearly glabrous, polished; fronds bi-tripinnate, below to lanceolate, 6-12 inches long; 4-6 inches broad at the base; pinnae numerous, the lower ones deltoid, their lower pinnules again stalked, and completely pinnate and lanceolate-deltoid in



shape, the ultimate segments ovate or oblong, acutely serrate; texture coriaceous; veins obscure, oblique; sori copious, involucre with an entire margin. *Linn. Sp. PL T 54 r.* *Hook. Syn. Fil. p. 21.*  
*F. IL I. t. 62.*

Kashmir, 5,000-8,000 feet, extending to Dalhousie and Chamba.

(Also in Europe, North Asia, North Africa, South Africa and its islands, and Sandwich Islands.)

30. ASPLENIUM FURCATUM. (*Thunb.*) Stipes tufted, 3-4 inches long, clothed with deciduous woolly hairs, as is the rachis; fronds coriaceous, 6-18 inches long, 4-6 inches broad; pinnae 12-20 pair, lanceolate-deltoid, 1-1.5 inch broad, cut down throughout nearly to the rachis into linear-cuneate pinnules, which are sharply serrate, on the outer edge; veins fiabellate, deeply channelled; sori linear.  
*Prod. FL P. 172.* *Hook. Syn. Fil. p. 215.* *Bedd. F. S. I. t. 114.*

South India, common on the higher Western Ghats, Ootacamund, &c.; Ceylon, 5,000-7,000 feet.

(Also in Tropical America, Polynesian Islands, Australia, Cape Colony, Abyssinia, Mascareen Islands, and Canaries.)

31. ASPLENIUM AFFINE. (*Swarf.*) Stipes 6-12 inches long, firm, erect, grey, nearly naked; fronds 12-18 inches long, 6-12 inches broad; pinnae numerous on each side, the lower ones lanceolate-rhomboidal, cut down to the rachis into numerous distinct rhomboidal pinnules, 4-6 inches long, 1.5-2 inches broad, which are incised or deeply lobed; texture subcoriaceous; rachis firm, naked; veins subflabellate; sori copious, linear.  
*Swarf. in Sw. Journ. 1,800. 11. 56.* *Hook. Syn. Fil. 215.* Asp. **spathulinum** (*J. Sm. F. S. I. 1, 226* (probably taken from a specimen of *furcatum* and not from *affine* as represented at **Ke7c.**)

Ceylon.

(Also in Mascareen Islands, Philippines, Lorneo, Fiji, and Sandwich Islands.)

32. ASPLENIUM NITIDUM. (*Slit'Ortz.*) Stipes 1 foot long, firm, erect, greyish, naked; fronds 2-3 feet long, 1 foot broad; pinnae numerous, lanceolate-deltoid, the lowest 6-9 inches long, 2-3 inches broad, cut down to the rachis into numerous stalked si-

stipules, which are again cut down to the rachis into broad flabellate ovate segments, serrated round the outer edge; texture subcoriaceous; rachis firm, grey, naked; veins channelled, flabellate; sori short, radiant. *Syn. Syn. Fil. p. 280. Hook. Syn. Fil. p. 215. Bedd. F. S. I. t. 148, 149. Asp. laserpitifulium, Bedd. F. S. I. t. 225.*

Sikkim, Bhutan, Assam; Khasya, Cachar, 1,000-4,000 feet elevation; Ceylon; Madras Presidency in the Western forests; Malay Peninsula.

(Also in Malay Islands and S. Africa.)

33. *ASPLENIUM FONTANUM*. (*Berth.*) Stipes tufted, 2-4 inches long, wiry, slender, glabrous; fronds 3-6 inches long, 1-1½ inches broad, oblong-lanceolate; pinnae numerous, the lower ones reduced, often somewhat remote, pinnate, pinnatifid or only toothed; texture herbaceous, rachis and surfaces bright green; veins oblique; sori copious, covering nearly the whole segment. *Berth. in Schrad. Bot. Junc. v. pl. ii. 26. Hook. Syn. Fil. p. 216. Bedd. F. S. I. t. 105.*

Himalayas, from Kashmir to Gurwhal, 5,000-9,000 feet.

(Also in Europe.)

VAR.  $\beta$  *EXIGUUM*. Frondsless divided and more narrow, and an obscure rachis. *Asp. exiguum, Bedd. F. S. I. t. 146.*

Nilgiris, Kullhatty; Himalayas.

34. *ASPLENIUM VARIANS*. (*Hook. and Griseb.*) Stipes tufted, 1-3 inches long, slender, naked, greenish; fronds 4-6 inches long, 1 inch broad, oblong-lanceolate; pinnae 8-12 pair, the lower ones subdeltoid ¼-½ inch long, ¼-½ inch broad, cut down to the rachis into a few cuneate flabellate pinnules, the lowest two lines across sharply toothed on the outer edge; texture thin, herbaceous; rachis slender, naked, green; veins, one carried into each tooth; sori copious. *Hook. Syn. Fil. 216. Bedd. F. S. I. t. 129.*

South India, common on the Nilgiris and the mountains on the west side, 3,000 feet upwards; Himalayas, 6,000-10,000 feet or there eastwards; Ceylon, 3,000 feet and upwards.

A form found at Kullhatty on the Nilgiris, quite rare, with the European lanceolatum. Another form on the Tinnivelly hills west of

*Courtallum* has short deltoid fronds fully 2 inches across at the base and broader pinnules.

(Also in South Africa, North China and Japan.)

**35. ASPLENIUM BULBIFERUM.** (*Forst*) Stipes tufted, 6-12 inches long, **firm**, erect, scaly near the base, sometimes hairy throughout; **fronds 1-4 feet long,\* oblong** to ovate-lanceolate, 2-3 pinnate; pinna: many pair, horizontal, often proliferous from the upper surface, the largest eight inches long, and two inches broad, cut down to a compressed winged rachis, into many lanceolate-deltoid pinnules which are cut into slightly toothed linear oblong flaccid segments; text are herbaceous; veins firm, pinnate; sori oblong, large, often filling the whole segment. *Forst. Fl. Ins. Aust. Prod.* 80. *Hook. Syn. Filp.* 218. *Bedd. F. B. I. t.* 65, as **bullatum** (Wall.)

Nepal, Sikkim, Bhotan, Khasya, 2,000 -6,000 feet; Venang.

(Also in Australia, New Zealand, Mexico, New Caledonia, Natal, and the East African Islands.)

**36. ASPLENIUM TENUIFOLIUM.** (*Don.*) Stipes tufted, 3-6 inches long, slender, glabrous, or with a few hairs; fronds green, **thinly** herbaceous, up to 20 inches long, lanceolate, 3-4 pinnate; pinna: many pair, the lower ones 3 inches long by  $\frac{3}{4}$  inch broad, lower pinnule sub deltoid, cut down to a narrowly winged rachis into spatulate segments, quarter inch or less broad, sharply cut on the outer edge; veins solitary; sori 1-2 to a segment.; *Don. TV. Fl. fcp.* 8. *Hook. Syn. Filp.* 220. *Bedd. F. S. I. t.* 130.

South India, higher ranges of the Nilgiris, Pulmali, and Ammallays; Ceylon at Newera Elya; Himalayas, **Nepal** to Bhotan 5,000-9,000 feet; Khasya, 4,000-5,500 feet; Birma.

\* \* \* \* \* *Ultimate division of the frond, narrow, linear or linear or leaf-oblong, marginal or submarginal. Area of authorship.*

**37. ASPLENIUM RUTIBOLIUM.** (*Kuhn.*) Stipes tufted, 6-9 inches long, compressed, greenish, glabrous; fronds 6-15 inches long, narrowly oblong, glabrous, bipinnate, the rachis often prolonged, naked, and rooting at the apex; pinnae 12-20 pinnae, the lowest sub-deltoid, two inches or more long, cut down to the rachis to many erect-patent distant pinnules on each side, the lowest ones



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the upper side again cut into erect-patent linear segments, the lowest on the under side suppressed; texture coriaceous; rachis compressed; sori linear marginal. *Kze. in Linnaea*, x. 321. *Hook. Syn. Fil.* p. 272. *Bedd. F. S. I. t.* 133.

South India, on the Tinnevely Mountains; Ceylon, Singhe Rajah Forest; Himalayas, Bhotan, and Mishmee; Khasya.

(Also in South Africa, Japan and Fiji.)

38. ASPLENIUM BELANGERI. (*Kze.*) Caudex short, stout, erect; stipes densely tufted, 4 inches to a span long, compressed upwards, greenish; fronds 1-1½ feet long, narrow-oblong (the sides almost forming a parallelogram), acuminate only at the apex, sparingly stellate-squamulose beneath, here and there proliferous, subchartaceous, pale green, bipinnate, primary pinnae from 1-2 inches long, horizontally patent, singularly uniform in the whole length, linear obtuse, nearly sessile, again pinnated (or they may be said to be deeply pinnatifid), pinnules or segments 2-3 lines long, linear-ciliate, or subspathulate, obtuse, straight, or a little curved, decurrent, with the rachis simple monosorous, or the lowest superior one is bifid or subpinnatifid; veins solitary central; sori large, conspicuous, occupying nearly the length of the pinnule, marginal; involucre of the same colour and texture almost of the frond; main rachis compressed, partial ones distinctly winged. *Hook. Sp. Fil.* iii. 209. *Syn. Fil.* p. 273. *Bedd. F. P. I. t.* 237.

The Malay Peninsula.

(Also in Java, Sumatra, and Borneo.)

GENUS XLL.—ATHYRIUM. (*Roth.*)

(*Derivation unknown.*)

As in *Asplenium*, but the involucre, or at least many of them, more or less curved, often horseshoe shaped, rarely quite uniform as in *Lastrea*.

1. ATHYRIUM SPINULOSUM. (*Max.*) Stipes 6-12 inches long, scattered, firm, erect, straw-coloured, furnished more or less with pale brown lanceolate scales. Fronds 6-12 inches, deltid, as broad as long, 3-pinnate; pinnae 9-11 pairs, lowest the largest, 2½-3 inches



ASPLENIUM RUTAFOLIUM. (Kunze.)

broad, ovate-lanceolate; pinnules lanceolate, cut down to the rachis on each side into 6-9 oblong rhomboidal segments two lines long, one line broad, which are sharply toothed or crenated; texture herbaceous; rachis naked or nearly so; sori 2-10 to a segment; indusium slightly curved, or horseshoe-shaped, very small and thin. *Cystopteris*, *Max. Fl. Amur.* 340. *Baker in Hook. Syn. Fil.* 225, under *Asplenium*. *Athyrium subtriangulare* (Hook.), *Bedd. F. B. I.* t. 242. *The supposed species, or variety, subtriangulare, does not differ from spinulosum, except that the veins are less spinulose; it cannot, I think, be considered even a variety.*

Sikkim 10,000-12,000 feet; Lachen, Samding, Yeumtong.

(Also in Manchuria, Amurland and Korea.)

2. *ATHYRIUM ATKINSONI*. (*Bedd.*) Stipes 6-12 inches long, erect, straw-coloured, furnished towards the base with a few long narrow pale-coloured scales; fronds 10-12 inches long, triangular, 10-12 inches broad at basal pinnae, gradually narrowing upwards, bipinnate, with the tertiary pinnae deeply pinnatifid; pinnae 7-8 pairs, the lower much the largest, about three inches broad; texture herbaceous, naked, secondary pinnae with the rachis winged, but the pinnules (tertiary pinnae) often distinctly petioled, at least in the lower portion of the pinnae, pinnatifid  $\frac{1}{2}$ - $\frac{2}{3}$  down, the segments being more or less crenated; sori one to each segment on the basal vein, linear, curved or almost reniform, never double; veins terminating just within the margin. *Bedd. Fern. Sup.* p. 11, t. 359.

Sikkim at high levels.

(*Clarke's variety Andersoni* is *Athyrium fimbriatum*, *Clarke's harapteroides*.)

3. *ATHYRIUM HOHENACKERIANUM*. (*Kze.*) Stipes tufted, 2-4 inches long, clothed throughout rather closely with linear-subulate scales; fronds 6-8 inches long, 1½-3 inches broad, oval-lanceolate; pinnae in numerous pairs, lanceolate, 1-2½ inches long, cut nearly or quite to the rachis into ovate or oblong serrated pinnules; texture herbaceous; rachis naked upwards, scaly below; sori copious; involucre conspicuous, linear-oblong, curved or horseshoe-shaped. *Hook. Syn. Fil.* p. 225. *Bedd. F. B. I.* t. 151.

Madras Presidency in the Western Forests, from the plains up to 5000 feet; Ceylon, Scinde.

*ATHYRIUM FALCATUM*. (*Bedd*) Stipes 1-9 inches long with 1-2 linear golden scales at the base; fronds 6-14 inches long, with rachis above dilated or winged, linear-lanceolate, narrowed at the ends, pinnæ 15-20 on each side, sessile, alternate, 1-1.5 inch long, by 1/3-1/2 inch broad, falcate-ovate, deflexed, obtuse or acuminate, generally with a large obtuse auricle at both the superior and



inferior base, above pinnatifid almost half down to the costa; segments obtuse, crenate; sori numerous on each side of the costa, at length confluent and covering the whole or nearly the whole of the under surface. *Burk. MF.S.* 1/1, 5r. *Asplenium drepanophyllum*, *Baker, Syn. Fil.* 226.

South India, Anamallay Hills, dry grassy places 5,000 feet. Myherida Hill near Berhampore, 4,500 feet; Mahabliwer; Parasnath 4,000 feet.

*ATHYRIUM FALCATUM*. [*Bedd.*]

5. *ATHYRIUM THELYPTERIS*. (\*&\* x.) Stipes 3-8

feet or more, furnished at the base with large lanceolate thin linear scales; fronds generally about 3 feet long and 8 inches broad, lanceolate, gradually narrowed towards the base; pinnæ numerous, 1/2-1 inch long, 1/3-1/2 inch broad, cut three-quarters of the way to the base or more into oblong blunt crenate segments; sori in close parallel rows, short, oblong; indusium persistent. *Michx. Fl. Bor.* 11. 265. *Book. Syn. Fil.* p. 226. *A. allantodioides*, "*Brdd. B. I. t.* 221, *not F.B.Lt.* *A. Lich* is a form of *E. zogonense*.



Himalayas from Kashmir to Bhotan, common in many places.  
(Also in North America, Canada, Amur land.)

6. *ATHYRIUM MACROCARPUM*. - (*Blume*.) Stipes 6-9 inches long, firm, erect, straw coloured, scaly below; fronds up to three feet long, generally lanceolate in outline; pinnae 20-30 pair, very variable in size and cutting, sometimes less than one inch long, and only pinnatifid, usually about four inches, and sometimes 9-10 inches long, again pinnae, with the pinnules deeply pinnatifid, and as large or much larger than the whole pinnae in the less compound forms; texture herbaceous, shining, striate beneath the lowest lobe on the upper side often larger; margin toothed; involucre very large, often reniform (as in *Lastrea*), but always mixed with some that are linear (asplenoid), and horseshoe-shaped, margin more or less fimbriate. *Aspidium macrocarpum*, *Bl. Linn. Fil. Jav.* 162. *Asplenium*, *Hook. Syn. Fil.* p. 227. *Bedd. F. S. L. I.* 152 and 153. *A. squarrosum*, *Wall. Cat.* 350.

South India, very common on the Western Mountains, above 3,000 feet; Ceylon; Himalayas, Gurwhal and Bhotan 2,000-9,000 feet; Khasya; Birma and the Malay Peninsula.

Clarke's variety, *Atkinsoni*, is one of the simplest forms, and is very common on the Nilghis, mixed with the more compound examples and connected by intermediate forms. *Beddome's macrocarpum*, var. *β*, *F. S. L. I.* 153, is at first sight very distinct looking, and is often collected as a *Lastrea*; it is, however, only a state in which the fructification is less and the lamina of the broad more developed than usual.

(Also in Malay Islands, China and Japan.)

V. r. *β*. *LINEATA*. (*Clarke*.) Fronds linear; pinnae short, slightly crenate, in shape much like some forms of the *Polystichum fortunei* variety.

Khasya, 3,000-4,000 feet. I have only seen this in Mr. Clarke's collection, and it looks distinct from any of the simpler forms of *macrocarpum* from Southern India, the pinnae being much less cut.

FERNS OF BRITISH INDIA AND CEYLON.

7. ATHYRIUM NIGRIPES. (Mett )

inches ou  
8-30 in  
to oblo  
about 1  
often dee  
or serrate  
in two  
persistent

t of ground ; stipes tufted, firm, round, glabrous • fronds  
ches long, qmte deltoid, with the lowe t pinn" i e s t

Caudex stout, 2-1  
~«"UVA. OLUUL, uite n 2-1

only slightly curved  
of the pinna ; involucres  
ook. Syn. Fil. 227, not

l b h que rows towards the midrib  
Mett. Famz. Aspl. 1  
B. Ind. E. S. I. t. 157, which is sel

Himalayas, from Kashmir to Bhotm

Y common about DareeUn. f\* 3,000-11,000 feet eleva-  
Khasya 2,000-6,000 feet.

• utherp India or Cevlon the former plant being selenopteris,  
the latter gymno ^ i des.

VAR. β CLARKEI. (Bedd.)

Fronde linear-lanceolate, up to  
3 feet long, and 3-4, rarely 6 inches, broad, gradually narrowed  
at both ends, generally rooting from a bud on the upper side of the  
rachis ; rachis of pinnæ, costa, and veins, sometimes furnished with a  
few weak setæ. Athyrium Clarkei, Bedd. Sup. Ferns, t. 360.

Nepal, Sikkim, common at Surail npir Darjeeling, 6,000 feet ;  
Kulhoit Valley, 6,000-7,000 feet. 17el quite certain now that this  
is only an elongated variety o. nigripes, and Mr. Clarke agrees.

Mr. Clarke's nigripes, var. f ssecta, '...»» to be typical  
nigripes rather more cut than usu,

8. ATHYRIUM SELENOPTERIS. (Kunze)

stipes in  
long, lat  
pinnae 2  
to a vi  
larger  
nile  
dumate  
er curve

kd often 10 inches long, stLineoL; fronds T2' erect ;  
^eolate, somewhat attenuated towards the base, never deltoid ;  
inches long, -rather distant; texture rather flaccid, pinnatifid

fronds in the smaller forms, or al  
firms, the wing of the M ^ £ £ pinnate in the  
sole

Ply Pinnatifid, but with a somewhat decu r n ^ b t t  
segments more or less crenated, or even serrated H

opteris, Clarke, F. N. I. p. 49  
Sep. Ill. p. 228. (in part) as far as

nigripes, var.  
ioides, Hook.  
are concerned,



W. G. H. & C. CO. N. Y.

ADIANTUM FLEXUOSUM (Woods)

the Madagascar plant of Schlecht. *Athyrium pectinatum*, *Bedd.*  
*Lt* 155 (not Wall.) *Athy. nigripes*, *Bedd.* 5. 1. 1. 157.  
 Vladras Presidency, Western Mountains, **Nilgiris**, common at  
 -8,000 feet. **Pulneys, Tinnevelly** Mountains; Ceylon at  
 Elya, and Maturatte, &c,

u **ATHYRIUM GYMNOGRAUMOIDES.** (A 7.) *Bedd.* fronds x large, 5-6  
 long, bi-tripinnate, primary pinna, 12-16 inches long, oblong-  
**Wate, secondary pinnae** up to 41 inches long, by 1\* inch broad,  
 deeply pinnatifid to a winged rachis, or pinnate, the wing being  
*Ci U<sub>1</sub> Uimate se S<sup>ment</sup>* oblong, lobed one-third of the way down ;  
 \*af the midrib. *Mett. AspL p.* 193, l. 6, l. 13-14. *Bedd.*  
*y. \** 156. *En. PL Zej>.p.'3i5.*

-eylon, central provinces 5,000-6,000 **feet**, nearly allied to  
 >ptens. Mr. Baker includes this under *nigripes*, but it is not  
 near the Himalayan plant.

AR. *fi* **ERYTHRORACHIS.** (*Bedd.*) **The** naked stipes and  
 deeply channelled, bright purple; fronds deltoid, much  
 ^r than the type, 6-10 inches **long**, without the stipe, lowest  
 3-4 mches long, the partial **rachis channelled** and winged  
**upper** side, **the pinnules petiolate, 1/2 inch** long, **auricled** at  
 ipenor base and somewhat pinnatifid at the inferior base,  
 te or subemire above, veins pinnate and forked **terminating**  
 1 the mar **g**in; sori **asplenioid** (never double), a few **more**  
 Ir **ved.** *Bedd.* *Sup. Ferns, p.* 12. *Athy. nigripes, Tliw I En.*  
 y- / - 3

on, about **Newera Elya.**

This is **Probably** a distinct species, it is included in the **Kew**  
 of *nigripes*, **but** is nearer to the Nilgiri selenopteris, some  
 nens of which' are also in the Kew packet of *nigripes*, whilst  
**exactly similar are placed with the** South African *aspidioides*.  
 nwaites has also referred it to *nigripes*, but he may not have  
 the Himalayan plant.

**ATHYRIUM FILIX-FCEMINA.** (*Bernh*) *Bedd.* fronds x—4 feet 1 an.  
 e, narrowed at both ends, membranaceous, green, **bi-pinnate**;

rachis soft, appearing triangular or furrowed when dry; primary pinnae narrow linear-oblong, hardly narrowed at the base; secondary pinnae 1/2-1 inch, oblong, patent at right angles to the rachis of the primary pinnae, sessile or decurrent, serrate or pinnatifid; margin bluntly or acutely toothed; involucres in two rows on the secondary pinnae, short, oblong, subsistent. *Bernh. in Schrad. Neu. Journ. i. pt. n. 26. Clarke. F. N. I. p. 491.*

I follow Mr. Clarke here, as he has an intimate knowledge of this fern and its varieties in a growing state, he says that there are two main types of the Himalayan *Filix-femina*, viz.:—1st, with a succulent rachis, appearing triangular or grooved when dry, green, involucre subsistent; 2nd, with a firm rachis, appearing round in the dried specimens, often red; involucre less persistent, often fugacious.

**I** VAR. 1. DENTIGERA. (*Wall.*) Cutting nearly as in the European type (not nearly so fine as in *pectinata*), green, rather succulent, grooved when dry; involucre subquadrate, or horseshoe-shaped, smaller and less persistent than in the European type; (*Polypodium dentigerum*, *Wall. Cat. 334.*)

Himalayas 6,000-11,000 feet, from Kashmir to Bhotan, common from Nepal westwards.

**I** VAR. 2. PECTINATA. (*Wall.*) Very finely cut, tripinnate, 4-pinnatifid, bright green; rachis slender, but scarcely succulent or grooved when dry; involucre subquadrate, or short oblong, little horseshoe-shaped, subsistent. *Wall. Cat. 231. Clarke, F. N. I. t. 57. Bcdd. F. S. l. t. 154, small form.*

Himalayas, Sikkim to Gurwhal 2,000-5,000 feet elevation; Parasnath 4,000-5,000 feet; Mountains of the Godavery and Central India; Mahableswar; Scinde; Mount Aboo.

VAR. 3. ATTENUATA. (*Clarke.*) 1-pinnate; base of the stem densely clothed with broad lanceolate scales; rachis succulent when dry, grooved or triangular; fronds small, very narrow, much tapering at both ends; pinnae patent, very close together, deeply regularly pinnatifid into oblong serrated segments, scarcely a quarter inch long;

involucre small, subquadrate, hardly ever horseshoe-shaped, not very fugacious. *Clarke, F. N. I. t. 59. fig. 1.*

Kashmir, 10,000-12,000 feet, north of the main valley; appears to be only a stunted form of *dentigera*.

VAR. 4. *RETRUSA*. (*Clarke*.) 1-2-pinnate, rachis firm, round when dry; fronds red, never very large; involucre small, fugacious; sori, scattered, round. *Cystopteris retrusa*, *Decne in Jacq. Voy. 176, t. 177. Clarke, F. N. I. t. 59-2.*

Himalayas 10,000-15,000 feet, from Kashmir to Bhotan.

VAR. 5. *FLABELLULATA*. (*Clarke*.) 2-pinnate; rachis firm, round when dry, fronds red, 1-3 feet; secondary pinnæ deeply pinnatifid; segments lacinate; involucre small, fugacious; sori scattered, round. *Clarke, F. N. I. t. 60.*

Sikkim, 13,000 feet; Yakla, Jongri, scarcely distinct from *dentigera*.

VAR. 6. *POLYSPORA*. (*Clarke*.) 2-pinnate, or sub-3-pinnate; rachis firm, round when dry; fronds red, 1-3 feet; involucre large, approximate, very persistent, often reniform; sori large, often ultimately thickly covering the whole of the pinnules. *Clarke, F. N. I. t. 61. fig. 1.*

N. W. Himalayas, 6,000-10,000 feet; Kumaon to Chumba.

Very distinct from the other varieties, and approaching *oxyphyllum*.

VAR. 7. *PARASNATHENSIS*. (*Clarke*.) 1-pinnate, sub-2-pinnate; rachis triangular when dry; fronds reddish, 1½ foot, narrow-oblong, scarcely attenuated at the base; primary pinnæ 1½ inch, broadest at the base; secondary pinnæ ¼-½ inch, acutely toothed, scarcely pinnatifid; involucre short, oblong, in two oblique rows, very persistent. *Clarke, F. N. I. t. 61. fig. 2.*

Parasnath 4,000 feet elevation; probably only a small stunted form of *retrusa*.

33. *ATHYRIUM OXYPHYLLUM*. (*Hook.*) Stipes with many

reddish linear-lanceolate scales at the base; fronds up to 3 feet, oblong-lanceolate, generally 2-pinnate, or in some forms only pinnate; slightly narrowed, never attenuated at the base, coriaceous, rigid, somewhat shining, striated when dry; primary pinnae often falcate, sometimes only pinnatifid half-way to the rachis, 1-2 inches long, generally much larger; 2-4 inches long, and pinnate, the pinnules more or less hastate from one or both of the basal lobes being enlarged or auricled, sub-entire to pinnatifid, and often sharply serrated, particularly at the apex; indusium small, fugacious or wanting. - *Hook. Syn. &l.* 228. *Bedd. F B. l. f.* 67.

The exinvolucrate variety, called *Kulhaitense* by Clarke, is *eberneum*. (Wall.) It only differs in the absence of the involucre; the bipinnate form with short pinna; looks different at first sight, but gradually runs into the larger and more compound forms.

Himalayas, from Gurwhal to **Bhotan**, 4,000-11,000 feet; Khasya 3,000-11,000 feet. I do not *Uel* certain that the Khasya specimen called *stramineum* J. Sm. really belongs here, though it is so sorted in the Kew bundles; it is very like some of the Nilgirjs forms of *Athy-Hum sdenopteris*.



ATHYRIUM BREVISJURUM. (Wall.)

12. ATHYRIUM SOVRUM. (Wall.) Stipes 1 foot and more long stramineous-brown below, glossy; fronds 1-2 feet long, ovate-lanceolate, membranaceous, bi-tripinnate; primary pinna; long-pinnate remote erect-patent, a foot and more long, broad-lanceolate acuminate; secondary pinnae 5-6 inches long, lanceolate, nearly sessile, pinnated; pinnules numerous, approximate, oblong-lanceolate, much acuminate, horizontally patent, 1-1 1/2 inch long, coarsely serrated, rarely subpinnatifid, the serratures very acute, almost

micronate, lowest pinnules more distant on short petiolules, intermediate ones more approximate, the lower base decurrent, upper ones confluent; veins pinnate; veinlets forked once or more; sori generally in two rows, oblique near the costa in the pinnules that are pinnatifid, extending to the lobes, small, short-linear, straight or lunate; involucre slightly convex, jagged at the margin; main rachis stramineous, glossy, flexuose. *Hook. Sp. Fil.* iii. 229. *Wall. n.* 226. (*not Metta*) *Bedd. F. B. I.* 1. 241.

Mishmee; Taongdong Mountains near Ava. The figure is taken from the Ava specimen collected by Wallich, which is bipinnate, the Mishmee specimen is tripinnate.

13. *ATHYRIUM PIMERIATUM*. (*Wall. under Aspidium*.) Stipes stout, darkish brown, glossy, 1 foot and more long, copiously peltate, most so towards the base, with large glossy, tawny, lanceolate-subulate scales, fronds ample, 2-3 feet long, ovate or subdeltoideo-acuminate firm coriaceous, 3-4 pinnate; primary pinnae petiolate (as are the secondary and tertiary ones), 6-12 inches long, distant from a broad base, lanceolate, much acuminate; secondary ones also distant, of the same shape, but not acuminate, 1-1½ inches long, numerous; ultimate pinnules ovate-lanceolate, ½ inch long, superior basal one the longest, acute, all pinnatifid with acute lobes, auricled at the superior base, terminal ones subconfluent; sori 2-5 on each pinna, broad-oblong, or in size almost globose, very prominent and copious; involucre brown, membranaceous, broad, generally crescent-shaped or subreniform, fimbriated, extremely convex, soon forced back by sori; rachises all pale brown, glossy, more or less flexuose. *Wall. Cat.* 339. *Hook. Sp. Fil.* iii. 234. *Syn. Fil.* 229. *Bedd. F. B. I.* 1. 295.

Himalayas, from East Kashmir to Bhotan, 5,000-12,000 feet.

VAR.  $\beta$  *FOLIOSA*. (*Wall.*) Rachis often very red and waved, glandular in the axis of the pinna, ultimate segments broader than the type; sori small. *Wall. Cat.* 359. *Clarke, R. A.* 1. 1. 62.

Sikkim and Nepal at high levels.





ATHYRIUM TIMBRIATUM. (Wall.)

Vas. y. SEMIROPETIOLES. (Clarke.) Involucres small, early disappearing; sori both lateral and terminal on the veins, becoming soon globose, often appearing elevated from the frond. *Cham.*, *F. N. I.* 4. 63, fig. 1. *Asplenium Atkinsoni*, var. *Andersoni*, Clarke, *F. N. I.* 37.

Throughout the Himalayas, 9,000-13,000 feet.

GENUS XLII.—DIPLAZIUM. (Swartz.)

(*Diplazo* to be double; the double indusia or involucre.)

As in *Asplenium*, but some of the sori double, *i. e.*, on each side of the vein, each furnished with a linear indusium, the one opening interiorly, the other exteriorly.

1. *DIPLAZIUM LANCEUM*. (Thunb.) Caulis long-repent, rooting sparingly, scaly, stipes distant 4 inches to a span, very slender, thickened at the base, and paleaceous with black scales; fronds chartaceous, firm, opaque, longer than the stipes, rarely an inch wide, lanceolate, attenuated, and acuminate at each extremity, entire, sometimes a little repand; costa slender, prominent beneath; veins horizontal, fascicled, the superior, and sometimes the inferior, branch only fertile; sori linear, distant, remote from the costa, often diploid. *Thunb. Fl. Jap.* 333. *Hook. Sp. Fl.* iii. 235. *Bedd. Bot. S. I. t.* 27. *Fig. 1.* 1844.

Ceylon, Maule East and Salfragram 2,000-3,000 feet, dies off in dry weather. Assam and N. E. Bengal 500-8,000 feet, extending to Garagong and East Nepal.

(Also in China, Formosa, and Japan.)

2. *DIPLAZIUM SUBSERRATUM*. (L.) Caulis erecting, elongated; fronds membranaceous,  $\frac{1}{2}$  feet long,  $\frac{1}{4}$  inch wide, glabrous and satiny, elongate-oblong, lanceolate, sharply acuminate, gradually attenuated below, obtuse or acute at the base, towards the middle sinuate-crenate, coarsely dentate-serrated nearer the apex; costa slender, firm, prominent beneath; veins fascicled,

## FERNS OF BRITISH INDIA AND CEYLON.

Horizontal or nearly so, one to three of the exterior branches  
 er • IUS ; sori distant, often curved ; involucre often diplazioid, ft  
 linear, occupying about two-thirds of the space between the  
 Knd margin; stipes 1-2 inches long, slender, terete. *Bl. En.j*  
*Hook, Sp. Fil.* iii. 236. *Bedd. F B. I. /.* 289,

I I 'enang.  
 (Also in Java.)

3. **DIPLAZIUM ZEYLANICUM.** (*Hook.*) Caudex terete, repent  
 subterranean, naked, black ; stipes remote, solitary, 4 inches  
 span long, paleaceous with  
 lax dark subulate-lanceo-  
 late scales; fronds herba-  
 ceous, a span to a foot long,  
**r-2 inches broad**, lanceolate  
 acuminate, deeply **pinnati-**  
 fid in the 'middle, pinnate  
 at the base, serrated only  
 towards the apex, lobes  
 and pinnae horizontal, ob-  
 long, obtuse; veins pin-  
 nated, entire or forked;  
 sori linear; involucre  
 with the superior basal  
 one principally diplazioid.  
*Hook. Sp. Fil.* iii. 237.  
*Bedd. F. S. I. t.* 228.

Ceylon, forests of  
 Ambagamwa and Kot-  
 mallee.

W.BA.

DIPLAZIUM LANCEDM (*TJlltnb.*)

4. **DIPLAZIUM PALLIDUM.** (*Bl.*) Stipes a foot or more  
 stramineous, deciduously scaly at the base ; fronds  $1\frac{1}{2}$ -2 fe  
 ovate acuminate, subcoriaceous, often pale whitish-green wh  
 pinnated, pinnae numerous, approximate, mostly petiolate, horb  
 5-6 inches lon;  $\frac{1}{2}$ - $\frac{3}{4}$  of an inch broad, from a somewhat roi

or obliquely cuneated base, linear-oblong, acuminate, serrate, sharply and subspinulose serrated, terminal one petiolate and similar to the rest, or larger and broad and pinnatifid at the base from being formed of dwarfed and confluent pinnae, very coarsely serrated towards the finely acuminate apex; veins very patent, immersed, generally twice dichotomous, the lowest superior branch (arising from near the costa) bearing the linear sori along its whole length, rarely diplozoid, and only from 1-3 at the superior and mostly truncated



1115

*Diplazium torreyi*, (Wall.)

but not auricled base; involucre narrow, firm, membranaceous. *Bl. Eu. Bot. Jan. 176.* *Hook. Sp. Pl. iii. 238.* *Bedd. F. B. I. i. 199.*  
 Birma and the Malay Peninsula.  
 (Also in the Malay Islands and the Philippines.)  
 5. *DIPLAZIUM TORREYI*, (Wall.) *Diplazium torreyi*, (Wall.) Caudex erect or ascending; stipes tufted, 6-12 inches long; fronds 8-10 inches to 1 1/2 foot long, deltoid-oblong, pinnate, pinnae horizontal, numerous, 4-6 inches long, petiolate or sessile, and confluent at the acuminate-pinnatifid apex, from a broad truncated and auricled or generally quite hastate base (having a distinct auricle above and below), linear-lanceolate, obtuse or acuminate, lower ones more or less deeply pinnatifid, intermediate ones obtusely dentate, uppermost ones entire at the margins; veins patent, pinnated in the auricles, the rest once or twice forked; sori linear, elongated, confined to the superior or basal veinlet, and extending its whole length, or on the two outer ones, mostly diplozoid; involucre membranaceous when young. *Wall. Cat. 204.* *Hook. Sp. Pl. iii. 250.* *Bedd. F. B. I. i. 245.*

FERNS OF BRITISH INDIA AND CEYLON.

The Malay Peninsula, Penang, &c.

(Also in the Malay Islands.)

6. *DIPLAZIUM BANTAMENSE*. (Bl.) Rhizome creeping; stipes 6-12 inches long, with lanceolate caducous scales; fronds up to 1½ foot long, simply pinnate; pinnae generally 3-5 on each side, alternate or subopposite, with one terminal one, subcoriaceous, glabrous, generally sharply serrated towards the apex, otherwise nearly entire, 6-9 inches long, by 1-2 broad, somewhat narrowed at the base; apex acuminate or

often caudate; veins pinnate; sori slender, irregular, starting from near the midrib and extending nearly to the margin, or only half-way towards it. *Bl. En. Fl. Jav. Fl.* 190-191. *Hook. Syn. Fil.* p. 231. *D. traximithum* (Wall.), *Bedd. F. B. I. I.* 59.

Madras Presidency, on the Tinnevely and Travancore Hills, Khasya Hills, 4,000 feet elevation; Caenar 500 feet elevation; Malay Peninsula.

(Also in Malay Islands and Southern China.)

7. *DIPLAZIUM SALVATICUM*.

(Presl.) Caulis decumbent; stipes 6 foot long, firm, erect,

naked except at the base, where furnished with scales; fronds 1-3 feet long, simply pinnate, ovate-lanceolate in outline; pinnae numerous, about 6 inches long by 1 inch broad, the apex acuminate or caudate, the margin nearly entire or slightly waved or serrated, particularly towards the apex, but not to more than one line deep (at least in the type); base truncate or narrowed; texture thin, herbaceous; veins pinnate, fine; sori long, linear. *Presl. Bot. Reise, 1842, under Asplenium*

*indian.* *Hook. Syn. Fil.* 231. *Bedd. F. S. I.* 67. *Bl. En. Fl. Jav.* 191.



N°86

*DIPLAZIUM BANTAMENSE*. (Bl.)

Madras Presidency, throughout the Western forests up to 4,500 feet. Ceylon, central provinces; Malay Peninsula.

(Also in Mauritius, Fernando Po, Java, and Borneo.)

VAR.  $\beta$  PRESCOTTIANUM

«, more deeply serrated or cut, base. Wall. Cat. 35. Ho of U. vi. 2 si. Bedd. F. B. j.

Singapore and Penang (perhaps a distinct species).

S. DIPLAZIUM SPECIOSUM. (Met)

long, firm, erect, straw-colored or brown, with 10-20 pairs of innate

A' the pinnatifid apex, the lobes reaching down half to the base; rachis erect, naked; veins

Mng nearly to the edge; rachis 4-sided with sharp angles. A. linatum, Wall. Mett. (,,,, J. and A.). Hook. Syn. Fil. p. 235.

The Malay Peninsula, Tinnelly Mountains. Mr. Clarke

9- DIPLAZIUM KNNATIFIDOPIVNATUM

- long, firm, erect, naked; fronds 9-12 inches long, 1/2 inch broad) the pinnate

base, neat; texture coriaceous; veins obscure, pinnate; sori reaching the margin. Hoof, sfh.

-44. "• 23' - Bedd. F. j, \ /

lishmee; Mr. Clarke has united it with PUT; of which there is only one authentic specimen; this does not represent the fern of a lighter colour and more prominent sori to be quite a different plant.

10. *DIPLAZIUM LONGIFOLIUM* (Hook.) Carter's creek, small, densely clothed with the bases of old stipes, paleaceous, stipes tufted 5-6 inches long, fronds broad-lanceolate, acuminate, membranaceous, a span to 14 inches long, pinnated, pinnatifid at the apex, pinnae on slender petioles,  $1\frac{1}{2}$ -3 inches long, very patent, broad-lanceolate, falcate, sharply acuminate, truncated and auricled at the superior base, inferior base excised, the margin more or less deeply lobed, lobes as well as the auricles spinulose serrate; costa slender, flexuose, vein like; veins in oblique fascicles corresponding to each lobe, dichotomous lowest superior branch only soriferous; sori mostly asplenioid, linear, neither attaining the costa nor the margin. *Don. Prod. III. Nep. 7, under Asplenium. Diplazium lobulosum, Bedd. F. B. I. I. 247. Hook. Sp. Fil. 1. 141. Syn. Fil. 234.*

Mr. Clarke has placed this in *Asplenium*, but there are diplazioid indusia on my specimens, and on some of those at Kew. *Asplenium trapeziforme* (Roxb.) *Bedd. F. S. I. 2. 134*, is not at all allied here, as suggested by Mr. Clarke.

Nepal and Kumaon, 6,000-8,000 feet.



NO. 87.

*DIPLAZIUM LONGIFOLIUM* (Hook.)

11. *DIPLAZIUM TOMENTOSUM* (Hook.) Caudex 1-2 inches, erect, sending down wiry black roots; stipes 6-9 inches long, firm, erect; fronds deltoid-lanceolate, 6-12 inches long, 3-4 inches broad at base and gradually narrowing upwards; pinnae numerous, the lowest pair deflexed, the others horizontal,  $\frac{3}{4}$ - $\frac{5}{8}$  inch broad, narrow-oblong, somewhat falcate, usually auricled at base on the upper side, pinnatifid half or two-thirds down to the midrib in the larger fronds, pubescent in the smaller ones; segments falcate,  $\frac{1}{2}$  inch broad

the subconaceous, main rachis pubescent, rachis of serrand veins beneath somewhat hairy; veins 3-4 on each side lobes; .or long. *Hook. Syn Filf.* <sup>^</sup>. *B J A J ^ U ^*

IB rma and the Malay Peninsula; there is one specimen in the Herbarium marker] IKicn p-ffit, Griffith, but it is very probable that it came from Birma.

(Also in the Malay Islands.)

DIPLAZIUM J/ iKWiebM. 'u' << i i "—creeping or suberect; stipes up to 18 inches long, pubescent or glabrous; fronds herbaceous, 8-18 inches long, 6-8 inches broad, deltoid to lanceolate-pinnate; rachises and costa more or less woolly, with crisped hairs mixed with small scales, or almost quite glabrous; pinnae 6-12 on each side, below the pinnatifid apex, alternate, subopposite, or

lite down to a winged rachis; segments nearl/entire, rounded or falcate apex, or rather deeply pinnatifid; veins in the lobes; veinlets simple or forked

T with minute crisped scales; sori linear, commencing near midrib and cot quite reaching the margin.

*Thunb. Fl. Jap. 334.*  
ium Thwaitesii (A. Br.), *Hook. Syn. Ft. 235. Bedd. F. S. I*

D. lasiopteris (Mett.), *Hook.-Syn. FU. 235. Bedd. F. S. I.*  
>. *Diplazium decussatum* (Wall.), *Bedd. F. B. I. 292.*  
rhizon, *Baker, Syn. Fil. 490.*

I have followed Mr. Clarke in reducing all these species to sum; the typical lasiopteris of

hairy and genera., lanceolae <sup>^</sup> l <sup>^</sup> Z Z Z <sup>^</sup>

-clj but some Japan examples are quite as lanceolate L shaTe al decussatum has short very deltoid fronds, and Thwa S

a large form of decussatum; if only examined, lasiopteris and decussatlm!

be looked upon as distinct species, but when large suit eamens from an extended area are compared) is is ^g

-ep up the supposed different species even as good varieties, h y run one into the other, I have found typical decussatum 1



the rhizome creeping, though it is generally erect; in *Isiopteris* and *Thwaitesii* it is wide creeping. I have seen nothing like Mr. Clarke's variety *chattagramica*, with bipinnate fronds, the secondary pinnae petioled and the rachis not winged, and can hardly fancy it belongs here, the specimen could not be found at Kew, but from the figure in Clarke's Review, it appears to be one of the numerous forms of *latifolium* and perhaps the same as the one he calls *succulentum*. Mr. Clarke is quite wrong in referring *Schkuhrrii* Thwaites here, he did so on a specimen of my *decurrens*, wrongly named *Schkuhrrii*, but *decurrens* (which is Thwaites's *polypodioides* var.  $\beta$  c. p. 3332, and Moore's *dilatatum*, var.  $\beta$  minor), can have no place here.

Madras Presidency, on the Western ghats, the supposed *Isiopteris* at Ootacamund, 7,000 feet, and Poombary on the Pulneys, 7,000 feet; *Decussatum* on the Tinnevelly Hills and Jeypore Hills, West of Vizagapatam, 3,000-4,000 feet. Ceylon, central provinces; N. W. Himalayas; Nepal; Nynee Tal; Kangra; Kumaon; Khasya, 3,000 feet; Malay Peninsula.

(Also in Japan, China, and Polynesia.)

13. *DIPLAZIUM SCHKUHRII*. (*Thwaites*.) Caudex erect; scales dense, small, lanceolate, dark-brown; stipes 9-18 inches long, naked; fronds deltoid-lanceolate, up to 2 feet long, bipinnate below, bipinnatifid above; pinnae alternate, lower ones distant, 6-8 inches long, by 1½-2 inches broad; rachis winged; pinnules distant, sessile, ligulate-oblong, all very regular in shape, ¾-7⁄8 inch long, 2-4 inch broad, pinnatifid about ½ down into rounded lobes; texture rather firm; surfaces glabrous, bright-green; veinlets simple or pinnated in the lobes; sori linear, generally reaching from the midrib to the sinus between the lobes, double or single. In younger plants or smaller specimens, the fronds are often pinnate only, i. e., the primary pinnae only pinnatifid, half to two-thirds to the rachis. *Thw. En. Fl. Zey. p. 385.* (Not *Met. in J. Sm.* which is only a form of *sylvaticum*.) *Hook. Syn. Fil. p. 491.* *Bedd. P. S. t. 1. p. 232.*  
Ceylon; central provinces.

14. *DIPLAZIUM SORACONENSE*. (*Griseb.*) Stipes tufted, stipes

fronds up to 16 inches long, pinnate, with numerous pinnules; sessile, about 6 inches long, by 1/2 inch broad, cut down very regularly throughout two-thirds to the rachis into oblong blunt subnerves, which are of equal breadth, (1/2 inch) throughout to the apex; texture firm; rachis slightly scaly; venulets simple, each occupied entire length from costule to apex by a sorus. /AW. *sj"m* (m part.) *Bedd. K !!. l. . 2+6;*

Malacca and Penang; differs from the North India plant in Utricle lobes with quite parallel edges, its simple veins, and in the figure quoted above is from the Malay plant (though I at the time to be from North India), and there is another variety of the same in the Kew Herbarium, labelled K Haslegrave, but it is probable that Griffith obtained it from Malacca.

15. *DIPLAZIUM* *SL. OLIZKÆ* " *(i/Λ)* Stipe and rachis glabrous or subglabrous; fronds 1/2 feet long, by 10 inches broad; pinna, numerous; the lowest slightly the largest, and upper ones gradually diminishing, the lower opposite or subopposite, the rest alternate; texture subcorky; pinna, very shortly petioled, 5-6 inches long, gradually tapering towards the apex, cut down to 1/2 of the rachis, into oblong, rounded pinnules, which are moderate, broad, and very regularly crenated; main veins slightly wavy, venulets simple or forked towards their apex or below the centre, all very conspicuous; sori 3-7 to each pinnule (on the lower veins only), extending from the main vein to the margin. *Bedd. F. B. I. p. 13 and t. 361*

North India (Dr. Jerdon), probably Khasya. This is not in the Kew Herbarium, and had not been seen by Mr. Clarke when he wrote his Review.

VAR.  $\beta$  *HRSUT.PES.* Differs from the type by the stipes and rachis being very fibrillose, the pinnae being narrowed and the lower ones generally more or less reduced, and in the pinnules being much less incised. *Diplazium so-zogonense, Hook. Syn.*



PLATE 1

INFLUENTIA AFRICANA

36 (in part). **Diplazium** Stoliczkae, *Clarke, F. N. I, p. 50\**  
**Diplazium** thelypteroides, *Bedd. F. B. 7. 1. 68*

**Himalayas; Nepal to Bhotan, 7,000-10,000 feet**

**Darjeeling.** This and the type may run into each other, but as only one specimen of the type is known; they both look very different to the Malay *sorzogonense*, and differ by the lobes being more serrated, the veinlets being often forked, the sori never reaching the margin and being confined to the 3-4 lower veinlets.

16. **DIPLAZIUM ASPERUM.** (*Bl.*) Caudex erect, often quite a large trunk, (like *Alsophila*) stipes main and partial rachises prickly and scaly; fronds large, rather coriaceous, bipinnate with the pinnules pinnatifid nearly to the rachis, pinnules quite at right angles with the rachis, sessile or subsessile, 3-5 inches long, about 1 inch broad, segments very regular, forming an oblong parallelogram, or highly falcate, obtuse, crenate-veinlets

U or nearly all generally soriferous \ sori touching the corners of the margin generally only one of the lower ones double

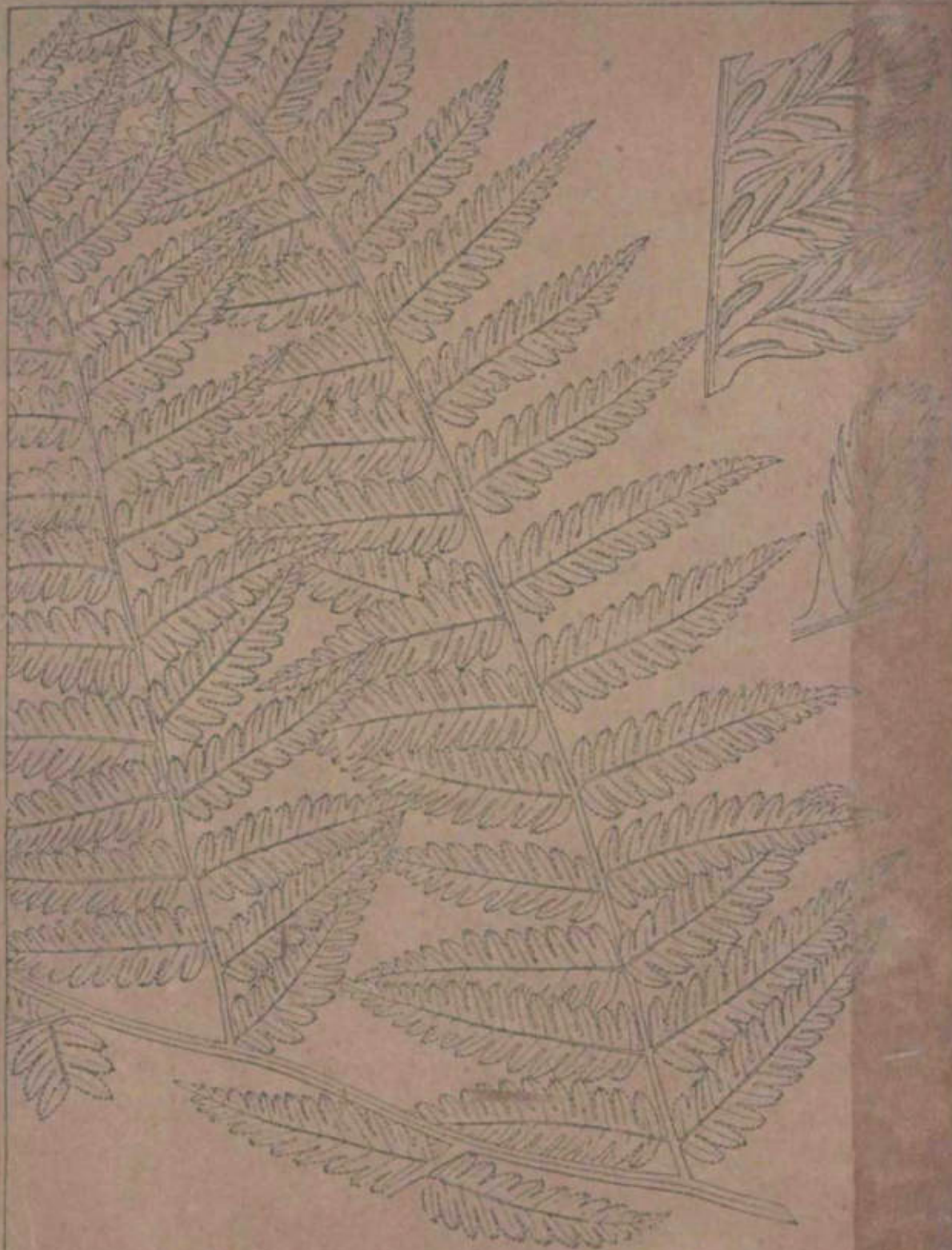
*Bl. En. 195- Uiplaz. polypodioides, Hook. Syn Fil 2, 8 L T A Y*  
*Diplaz. polypodioides, Bedd. F. S. I. t. 63 Dint Jv P Y*

*Clarke, F. N. r. f. s. cno t fi- J; -uiplaz. sikkimense,*  
*• f. i. s. • 65 A--i, scarcely differs, and is certainly,*  
 nearer to this than *polypodioides.* certainly

Malabar Presidency; throughout the Western forests from near the coast up to 3,000 feet, often quite a tree fern. *a. dda' f*  
*Sikkim, banks of the Teesta, 500 feet. l>a f<u, CSts ;*

(Also in Java.)

2. **DIPLAZIUM POLYPODIOIDES.** (*Mett.*) Caudex erect, stout, densely clothed at the crown with long brown fibrillose scales, 1 inch long; stipes densely tufted, stout, green, 1 foot or more long; fronds 4 feet long, and 2 feet wide, bipinnate, with 8-10 primary pinnae on each side below the simple ones, the lower ones generally secondary pinnae 2-4 inches long, cut down nearly to the base in the typical form, but sometimes only 1/3 down; segments 1-2 inches long, crenate or serrate, or forked, sometimes simple; texture herbaceous; surfaces



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DIPLAZIUM POLYPODIOIDES. (Mett.)

glaucous or nearly so; sori in two oblique rows in the segments; rachis linear, commencing at the midrib, but generally falling well short of the margin, lower ones generally double. *Mett. Hort. Fil. Lips.* 73. *Hook. Syn. Fil.* 238 (excluding *asperum* (BL), which differs in its more coriaceous texture, much more regular segments, numerous veinlets, and its prickles.) *Bedd. F. B. I. I.* 293. *Asplenium marginatum*, *Wall. Cat.* 391, *type sheet*.

Madras Presidency, in the Western forests up to 6,000 feet elevation. North India, throughout the Himalayas and Khasya hills; Ceylon; the Malay Peninsula. Clarke's variety "vestita" has the rachises more or less villous or subtomentose, but does not otherwise recede from the type, he says it is confined to the central Himalayas. His variety "sublatifolia" runs into "latifolia," and either belongs to that species, if the two are really distinct, which is very doubtful, his variety "effusum" is *D. umbrosum*, var. *multicaudata*.

(Also in Australia.)

VAR.  $\beta$  DECURRENS. (*Bedd.*) Pinnae more deltoid in form with the secondary pinnae few and distant, and more or less decurrent on the rachis, only cut down a third or half-way to the rachis; veinlets in the segments few, only 3-4; sori curved, generally occupying the whole length of the veinlets, and extending to the margin. *Diplazium decurrens*, *Bedd. F. S. I. I.* 229. *Diplaz. polypodioides*, var.  $\beta$ , *Eno. En. Pl. Zey. p.* 385, *c. p.* 3332. *Diplaz. dilatatum*, var.  $\beta$  *minor*, *Moore, Index Fil.* 327, *in part only*.

A very distinct looking fern, and I believe a good species, but I now prefer to follow Mr. Thwaites (who alone can have seen it growing), and consider it a variety of *polypodioides*. Sir W. Hooker, *Syn. Fil.* 258, has mentioned it under *polypodioides* as perhaps a distinct species. Mr. Baker has included it under *maximum* (Don.), which is otherwise, as far as the Kew bundle is concerned, one of the large forms of *latifolium*, and Mr. Clarke in his Review has named it *Dipl. Schkubrii*, but this was owing to his having received a specimen of it so labelled (evidently by mistake), from Mr. Thwaites Ceylon; Ambagatwa.

18. DIPLAZIUM LAI-FOLIUM. (*Don.*) Like polypodioides, only the secondary pinnae are generally much less cut down, and often much broader, they are sometimes almost entire, or with only shallow serratures, when the fern has quite the appearance of "sylvaticum," only bipinnate instead of simply pinnate; other forms have the secondary pinnae 2 inches (or even more) broad at the base, cut down a third or half-way to the rachis; segments always more or less crenate or serrate; veinlets simple or forked, rather distant, their number depending on the size of the segments (never so numerous as in asperum, except when the segments are double the size of those of that plant); sori narrow, often occupying the whole length of the veinlet, and reaching the margin; indusium sometimes obsolete or early caducous. *Don. Frod. Fl. Nip.* 8. *Hook. Syn. Fil.* 239. *Dip. dilatatum, Hook. Sp. Fil. in.* 258. *Bedd. F. S. I.* 162, a form running nearer to polypodioides. **Dip. maximum**, *Hook. Syn. Fil.* 232, in part.

Madras Presidency, in all the Western forests. North India, throughout the Himalayas and Khasya Hills. Ceylon, Malay Peninsula; from very low altitudes up to 9,000 feet elevation.

(Also in Australia, China and the Philippines.)

If we only included here species with very broad secondary pinnae, not cut more than half-way down to the rachis, this plant would be very distinct from "polypodioides," but I fear this not possible, and in all large herbaria, I find specimens that are very difficult to say which species they should be referred to. **Diplazium torrentium and succulentum** of Clarke cannot be referred into distinct species, unless we also make many more, but they belong to types which, though generally referred here, must, from deeper cutting of their secondary pinnae, go into "polypodioides." The two are to be kept distinct; no figures and no description could enable any one to distinguish some of these forms as species, the only difference often being the extent of the cutting of the secondary pinnae. **D. decurrens** unless a distinct species (which view of the vegetation I think supports), should rather be referred here.

or "polypodioides," but until the plant is better known, I think it safer to follow Mr. Thwaites's view.

Young plants of *latifolium* often produce simply pinnate fronds, which in some of the less cut varieties can scarcely be distinguished from *sylvaticum*, and I think Mr. Clarke's Sylhet specimens, referred by him to *sylvaticum*, belong to *latifolium*.

19. *DIPLAZIUM TRAVANCORICUM*. (Bedd.) A very large fern with trunk-like caudex, secondary pinnae 20-24 inches long, lanceolate, somewhat attenuated at the base, the apex acuminate or caudate, quite pinnate towards the base, the lower pinnules being petioled, the upper ones gradually becoming sessile, then decurrent, and the pinnae terminating with a long broad pinnatifid apex, which for the upper 8 inches or so is only very shallowly incised, lowest 2 or 3 pinnules smaller than the adjoining ones, next in order  $2\frac{1}{2}$ - $3\frac{1}{2}$  inches long, by about 1 inch broad, lanceolate in shape, very slightly serrated towards the apex; veins numerous, prominent and pinnate from a prominent central costa; texture subcoriaceous; surfaces glabrous and striated; sori commencing a little distance from the midrib, and not nearly reaching the margin.

Travancore Hills: Athraymally forests, a very fine new species.

20. *DIPLAZIUM UMBROSUM*. (J. Smith, under *Athyrium*.) Stipes 1 foot or more long, strong, erect, clothed often with dark scales, and sometimes muricate; fronds 3-5 feet long, 12-18 inches broad; primary pinnae ovate-lanceolate to deltoid-lanceolate, up to 18 inches long; secondary pinnae very various, sometimes small and only pinnatifid (in the simpler forms), to quite pinnate with the pinnules pinnatifid in the larger and more compound forms; texture herbaceous; veins pinnate; veinlets simple or forked; sori generally short and near the midrib; indusium very variable, often all asplenoid or diplazoid, often all allantodioid and mixed with very short sori. (Hook. Syn. Bot. 220 and 489 (under *Athyrium*.)

I follow Hooker and Baker, and refer here a good many forms, finally because I now believe they are so closely allied that they really are only varieties of one species, and that some of them are one



into the other even in their restricted areas, and that others are geographical varieties which would not be constant in cultivation, and secondly, because I think any attempt to separate them into species would only add to the present confusion, it being a task that should only be undertaken after a cultivation of all the different forms.

Mr. Clarke has proposed the subgenus *Pseud.-Alh.* for the species with allantodioid sori and free veins, but I am afraid these allantodioid sori, are not constant or to be depended on; *Austrah.*, from the Nilgiris, has the sori often quite allantodioid as figured by me, *tab. 158, F. S. I.*; but I have specimens where all the sori are perfectly diplazioid; again, I have specimens of *Asplenium resectum*, from two different localities, with nearly all the sori allantodioid.

VAR. AUSTRALE. {R. J.Jr.) Stipes often muricate; fronds 3-pinnatifid, often rather flaccid in texture, ultimate segments broad and blunt; sori sometimes quite allantodioid, at other times quite asplenioid or diplazioid; rhizome creeping or erect. *Athyrium australe*, *Bald. F. S. I. t. 158.* *Diplaz. bellum*, *Clarke, F. M. I. p. 496.* *Diplaz. multicaudatum*, var. *tristis*, *Clarke, I. c. p. 512.*

Sikkim, Bhotan; Khasya; Nilgiris and other mountain forests, 5,000-7,000 feet, in South India; Birma.

(Also in Australia and Tropical Africa.)

VAR. IKOCERUM. {Wall.) Rhizome creeping; stipes muricate; fronds very large, moderately firm in texture, primary pinnae nearly 2 feet long, secondary pinnae 5-5\ inches, again pinnatifid with the pinnules about 1 inch long, and pinnatifid about half the rachis; segments oblong, crenate; veinlets in the segments once forked; sori mostly in two rows, near and parallel to the midrib, but other very short sori are scattered on the segments; indusium allanto-dioid. *Wall. Cat 2203.* *Hook. Syn. Fil. 489.* *Diplaz. icocerum*, *Clarke, 495.*



DIPLAZIUM AUSTRALE. ^1;

Himalayas, Siamon to Bhotan, 4,000-8,000 feet, very common; Assam; Khasya, 3,000-6,000 feet, very common.

VAR. MULTICAUDATUM. (Wall.) Rhizome creeping; fronds up to 3 feet; primary pinnae up to 1 foot long; secondary pinnae petioled, about 3 inches long and 1 inch broad, acuminate, cut down nearly to the rachis, the segments oblique to the rachis,  $\frac{1}{2}$ - $\frac{3}{4}$  inch long, rather narrow ligulate, more or less sharply serrated; veinlets



forked or simple; sori oblong or subquadrate near the rachis; lower indusia diplazioid. *Wall. Cat.* 229. *Dipl. Jerdoni, Bedd. F. B. I. t. 327.* *D. Griffithii, Baker, Syn. Fil.* 239. *Bedd. F. B. I.* 328.

Himalayas, from Nepal to Bhotan, 1,000-5,000 feet, common. Khasya, 1,000-5,000 feet; Chittagong, 200-1,000 feet.

VAR. ASSIMILE. (Endl.) Fronds deltoid, membranaceous, flaccid, tripinnate, with the tertiary pinnae (pinnules) very small, deeply pinnatifid; segments rounded entire, to slightly crenated; veins from pinnate to simple or forked, according to the size of the segments; sori oblique from the midrib towards the margin; indusia mostly diplazioid. *Endl. Fl. Norf.* 10. *Bedd. F. S. I. t.* 294. *Athyrium australe, Thun. En. Fl. Zeyl. p.* 385. Perhaps a distinct species.

FIG. 91.  
DIPLAZIUM UMBROSUM,  
VAR. MULTICAUDATUM. (Wall.)

Ceylon, central provinces.

(Also in Norfolk Island and Australia.)

Mr. Clarke informs me that Müller has placed his *Diplazium* in a new genus of Cyathera.

GENUS XLIII.—ANISOGONIUM. (Pres.)

(FIOItt *anisos*, unequal; *gonia* > an angle; the angles of the vein

As in **Diplazium**, but the veins anastomosing.

i. ANISOGONIUM CORDIFOLIUM. {Mett.) Stipes 6-12 inches long, firm, erect, scaly below; fronds 8-12 inches long, 3-4 broad, entire, caudate at the base, the point acuminate or sun with a large terminal and 1 or 2 pairs of smaller but similar sp lateral pinnae; texture coriaceous; vein's\* in close groups d 4, anastomosing copiously in the outer half of the frond; soi ing from the midrib to the edge.

Mett. *Fil. Hort. Lips.p.* 74, t. 12. / 6.

Hook. *Syn. Fil.* 243. *Bedd. F. B. L* t. 331 (the simple form.)

Malacca and Malay Peninsula.

(Also in Philippines and Malay Islands.)

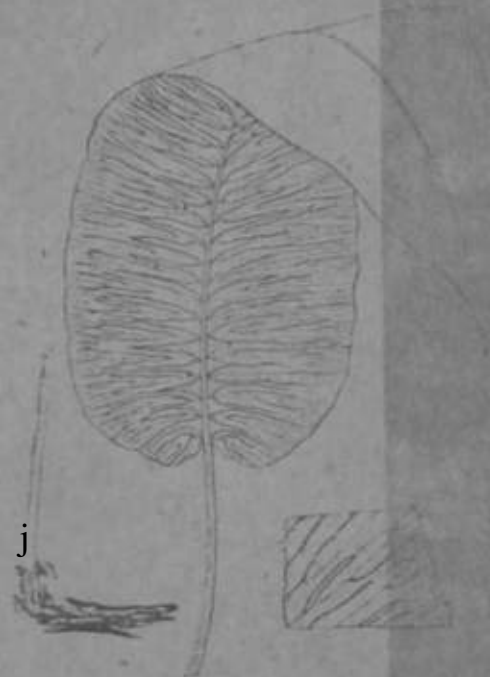
2. ANISOGONIUM LINEOLATUM. (Mett.) Stipe 6-9 inches long, firm, erect, grey, scaly below; fronds occasionally simple, usually with a terminal pinna and 3-6 pairs of lateral ones, which are 6-12 inches long, 2 inches or more broad, entire, often suddenly-acuminate; texture coriaceous; rachis naked; veins 4-8 to a cluster, uniting slightly towards the edge.

Mett. *I. c. p.* 74. *tab.* 11. / 5. Hook. *Syn. Fil.* 243. *Bedd. F. B. L. t.* 332.

Malacca and Malay Peninsula.

(Also in Philippines and Malay Islands.)

3. ANISOGONIUM HETEROPHLEBIUM. {Mett. MSS.) Stipes 1 foot long, grey, scaly throughout; fronds 12-18 inches long, 8-10 inches broad, with 6-8 opposite pairs of pinnae below the pinnatifid apex; the lowest 2 inches or more apart, 3-4 inches long, 1-2 inches broad, the edge undulated, the point acute, the base cordate



Nº 92 ANISOGONIUM CORIOLIUM (Mett.)

on both sides; texture thinly herbaceous, colour dark-green; rachis villous and fibrillose throughout; both surfaces naked; veins pinnate, the groups joining one-third of the way from the midrib to the edge, and the veins of the same and different group anastomosing; sori not reaching the edge, conspicuously diplazoid. *Hook. Syn. Fil.* p. 244. *Bedd. F. B. I. I.* 329.

East Nepal to Mishmee, 4,000-6,000 feet elevation.

4. *ANISOCONIUM ESCULENTUM*. (*Presl.*) Caudex subterrescent,



N° 93

*ANISOCONIUM HETEROPHLEBIUM*. (*Mitt.*)

erect; stipes 1-2 feet long, strongly erect, inflexed; fronds 4-6 feet long, occasionally simply pinnate only, but generally bipinnate; lower pinnae 12-18 inches long, 6-8 inches broad; pinnules 3-6 inches long, 2-1 inch or more broad, the apex acuminate, the edge more or less deeply lobed, the base narrowed suddenly, often auricled; texture subcoriaceous; rachis often pubescent; veins fine, conspicuously pinnate, 6-10 on each side in each lobe, with a distinct barren central midrib; the veinlets of the different clusters beginning to unite a short distance from the

midrib, with lines of sori often on all the lateral veinlets. *Presl. Rel. Hook. v. p. 45. Hook. Syn. Fil.* 244. *Bedd. F. S. I. I.* 164. *Calopteris*. South India, common in the plains on the Western side and up to 3,000 feet. Bengal Plains; Ceylon, Malay Peninsula.

(Also in China, Formosa, and the Malay Islands.)

5. *ANISOCONIUM SMITHIANUM*. (*Diels.*) Caudex oblique, decumbent; stipes thick, 1 foot long, slightly scaly below, furfuraceous



ANISOCORIUM JOHANNESB. 1752

Juglout and rather densely uricatis; from \* 18" ^ inches l  
 Tly as broad, with 4-s p £ an e ? ; fro " \* 18" ^ inches l  
 ind below the point on each side " ^ ? \* 4 ~ 5 < hat « 5  
 9 inches long, 4 inches brC) s, dt, \* e ^ " esl 3 incncs a par+  
 -I inch broad, the edge subenfe T \* ^ 2-3 nch i ^  
 »ated, the base rounded on both! ^ P o, m Slightl > , toothed,  
 "faces and rachis naked the 1 7 ' , teX, ure su coriaceous;  
 vems in groups of 2-3 on 'a sid f er » 'u ^ ated in the ,ow er  
 way across to 'he edge; sor i often! • 1 f  
 the ous, nensly joining  
 Syn. Fil.

Ceylon, Matale East and Oodawe i' ,

GENUS XT TV ,,

(Hen GENUS XLIV. - HEMIDICTYUM - (Presl. }

« half; diktyon net- TM, r portion only of veins

As in Asplenium ein - astomosing obliquely only towards  
 the margin of the frond.



N:95

HEMIDICTYUM CETERACH. (Linn.)

1. HEMIDICTYUM CETERACH.

(f -) Stipes densely tufted,  
 \*-3 inches long, wiry, ebeneous,  
 chaffy; fronds 4-6 inches long,  
 one inch or less broad, linear  
 pinnatifid or scarcely pinnate,  
 lobes alternate obtuse 3/8-1/2  
 inch long, 1/4-3/8 inch broad, with  
 a rounded sinus between them ;  
 texture subcoriaceous, upper  
 surface naked, lower densely  
 coated with small reddish brown  
 ovate membranous scales; sori  
 linear oblique; involucre rudi-  
 mentary. Asplenium Ceterach.  
 Linn. Sp. Pl. 1278. Hook. Syn.  
 am

d-) > Bede

North-we

\* India, Kashmir, 3,000^6,000 fat

elevation.

(Also in Afghanistan, Western Asia, Europe, and North-west Africa.)

2. *HEMIDIETYUM FINLAYSONIANUM*. (Hook.) Stipe 6 inches long, green, subcompressed, nearly naked; fronds usually 1 foot long (often much more), 6-8 inches broad, occasionally simple and entire, generally pinnate with 2-6 opposite pairs of lateral pinnae, the lower ones 4-8 inches long,  $1\frac{1}{2}$ -2 inches broad, the apex very acuminate, the base narrowed into a distinct petiole, the margin entire or irregularly lobed; texture leathery; veins subtabulate, very oblique, anastomosing slightly towards the margin, sometimes bounded by an irregular intramarginal line; sori often  $1\frac{1}{2}$ -2 inches long; rooting buds are often produced from the midribs of the pinnae near the apex. *Hook. Syn. Fil.* 245. *Bidd. F. B. 1. 1. 72.*



N° 96

North and East Bengal, with Assam, up to 3,000 feet, very common, especially in Khasya; Malay Peninsula. *HEMIDIETYUM FINLAYSONIANUM* (Hook.)

GENUS XLV.—*ALLANTOPIA*. (Wall.)

(*Allantos*, a sausage; form of indusium.)

Sori dorsal, linear-oblong, attached to the primary veins; indusium the same shape as the sorus and quite enclosing it, bursting in an irregular line down to the centre, or rarely asplenoid; veins anastomosing and forming several elongated areoles, smaller towards the margin, with free marginal clavate veinlets; fronds pinnate, very membranaceous, (the character of the indusium is not to be relied on, similar sausage-shaped indusia being found in species true *Asplenium* and *Diplazium*.)

1. *ALLANTODIA JAVANICA*. (Bl. under *Asp.*)

1893



ALLANTODIA JAVANICA. (Bl.)



often 2 feet long, 1 foot broad, pinnae 4-8 inches long, 1-1½ inch broad, oblong, entire or slightly crenulate, particularly at the caudate apex, veins forked near the midrib, 2-3 or hexagonal areoles occupying the outer half of the space between midrib and margin; sori confined to the anterior vein of the first fork or areole. *Fl. Es. Pl. Jav. Fil.* 175. *Atlas Brunoniæ (Wall.) Hook. Syn. Fil. p.* 246. *Bedd. F. S. I.* 159.

Nepal and Bhutan, 4,000-7,000 feet elevation; Khasia, Mikir Hills; Ceylon.

(Also in Java and Samoa.)

#### GENUS XLVI.—ACTINIOPTERIS. (*Link.*)

(*Actin*, rays; *pteris*, a fern.)

Sori linear, elongated, submarginal; indusium the same shape as the sorus, folded over it, placed one on each side of the narrow segments of the frond opening towards the midrib; a single species like a miniature palud.

1. ACTINIOPTERIS DICHOTOMA. (*Forsk.*, under *Acrostichum*.)  
Stipes densely tufted, 2-6 inches long; fronds like fans, 1-1½ inch deep, composed of numerous dichotomous segments which are rush-like in texture, not more than ½ line broad, the veins few and sub-parallel with the indistinct midrib, the segments of the fertile frond longer than those of the barren one. *Acrostichum dichotomum*, *Forsk. Fl. Egypt. Arab.* 184. *Actiniopterus radiata*, *Hook. Syn. Fil. p.* 246. *Bedd. F. S. I.* 124.

Throughout India, especially the Peninsula in dry rocky places below 3,000 feet elevation; Ceylon.

(Also in North Africa, Mascareen Islands, Persia, Calcutta.)



7A

ACTINIOPTERIS DICHOTOMA. (Forst.)

## TRIBE IX.—ASPIDIEÆ.

Sori dorsal, subglobose, rarely elliptical; indusium superior, similar in shape to the sori, fixed either by the centre or a sinus.

GENUS XLVII.—DIDYMOCHLÆNA. (*Desf.*)

(*Didymos*, double; *chlæna*, a cloak;—the double indusium.)

Sori elliptical, terminal on a veinlet, but distinctly intramarginal; indusium elliptical, marginate at the base, attached longitudinally to the linear receptacle, free all round the edge; veins subflabellate, *i. e.* their apices clavate; fronds bipinnate, pinnules articulate with the rachis.

1. DIDYMOCHLÆNA LUNULATA. (*Desf.*) Caudex erect, subarborescent; fronds densely tufted, 4-6 feet long, bipinnate; pinnules  $\frac{1}{2}$ -1 inch broad, dimidiate, subquadrangular, entire or slightly sinuated; texture subcoriaceous; veinlets forked or pinnate, their apices marked with white dots; sori 2-6 to a pinnule. *Desf. in Mém. Soc. Linn.* vi. p. 282. *Hook. Syn. Fil.* p. 248. *Bedd. F. J. L.* 1-15. Birmá and the Malay Peninsula.

(Also in Tropical America; East African Islands; Malay Islands; Fiji.)

GENUS XLVIII.—MESOCHLÆNA. (*R. Br.*)

(*Mesos*, middle; *chlæna*, cloak, attachment of the indusium.)

Sori and indusium of *Didymochlæna*, but habit and venation of *Nephrodium*, *i. e.* the lower pair of veinlets anastomose, the others free, parallel; fronds bipinnatifid.

1. MESOCHLÆNA POLYCARPA. (*Bl.* *under Aspidium*.) Caudex erect; stipes tufted, short; fronds 2-3 feet long, 12-18 inches broad, pinnate; pinnae close, very numerous, spreading, dwindling down below to mere auricles, the largest 6-9 inches long,  $\frac{1}{2}$  inch broad, cut down half-way or more to the rachis into linear-oblong lobes; rachis and lower pinnae villosæ; veins very close, pinnate,



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DIDYMOCHLENA LUNULATA. (Desv.)

twelve or more on each side in a lobe ; sori small, dense, ultimately confluent. *Aspidium polycarpum*, *Bl. En. Fil. Jar.* 136. *Dalmanochlæna* *Hook. Syn. Fil. p.* 248. *Mesochlæna polyneura*, *F. B. Lt.* 344. *Nephrodium javanicum*, *Hook. Sp. Fil.* 177.

<sup>1</sup> In the *Syn. Filicum* this genus has been **joined with** *Polystichum* ; but, as **Mr. Smith** has pointed out, **it is really a** *Nephrodium* with the **indusium** elongated.

Malay Peninsula.

(Also in the Malay Islands.)

GENUS XLIX.—POLYSTICHUM. (*Moth*

(*Polys*, many ; *stichos*, order.)

Sori subglobose, dorsal or terminal on the veins ; orbicular, fixed by the centre ; veins all free ; **textui** coriaceous and teeth generally awned,

I. POLYSTICHUM SEMICORDATUM. (*Sw.*) Stripes scattered, 6-12 inches long, fibrillose at the base ; fronds 2-3 feet long simply pinnate ; pinnules 4-6 inches long, 1/2 inch broad, nearly entire, acuminate, cordate or truncate at the base ; **texture** herbaceous or somewhat firm ; surfaces naked and **rachis** nearly so ; veins pinnate, the lower ones ending short of the margin ; sori in 1-3 rows on each side, the inner one the most constant and regular, close to the midrib. *Sw. Syn. Fil. p.* 45. *Hook. Syn. Fil.* 249. *Bedd. F. B. I. t.* 35.

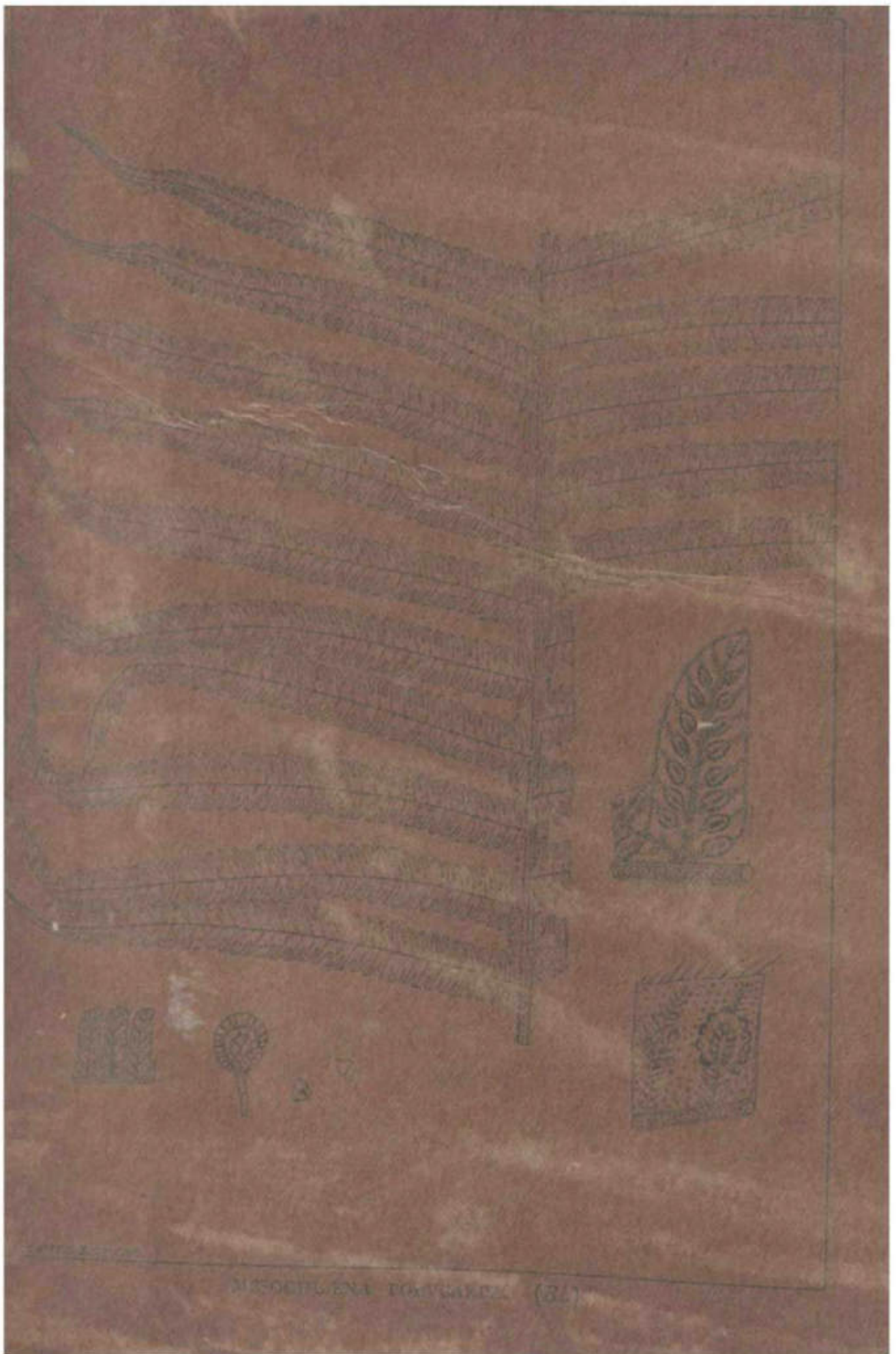
Birma and the Malay Peninsula.

(Also in the Malay Islands, Philippine<sup>1</sup>., and Tropical America.)



Nº10(

POLYSTICHUM SEMICORDATUM



MESOCLERA PORTADA (31)

2. *POLYSTICHUM LONCHITIS*. {*Linn, under Polypoditm.*} Caulis short, stout oblique, densely paleaceous; stipes short paleaceous, lower portion of the rachis with ferruginous large scales; fronds 6-8 inches long, densely tufted, erect rigid, linear or lanceolate, tapering at both ends, pinnated; pinnae numerous, approximate from a broadly nearly sessile obliquely truncated base, ovate or lanceolate, falcate, acute spinulose-serrate, the superior base truncated and auriculate, sori confined to upper portion of the frond in two or more series upon the pinnae; indusium denticulate on the margin. *Hook. Syn. Fil. iv. 8. Sw. Syn. Fil. p. 43. Hook. Syn. Fil. p. 250. Bedd. F. B. I. t. 128. Polypodium Lonchitis, Linn. Sp. pl. 1548.*

North West Himalaya, Kashmir, Sonamurg 11,000 feet elevation. (Also in Arctic and Alpine Europe, Asia, and North America.)

3. *POLYSTICHUM LACHENENSE*. (*Hook.*) Rhizome very scaly, stipes very numerous, thick, densely tufted, scaly, 2-4 inches long; fronds narrow-linear, 4-8 inches long by 1-1.5 inch broad, pinnate, the lower pinnae remote but hardly reduced in size; pinnae 2-3 inches broad, deltoid-ovate, subcoriaceous, lobed more or less or subentire, the apex blunt, the margins spinosely serrated or crenate-serrate; sori 6-12 to a pinna, often covering the whole under side; indusium incised. *Hook. Syn. Fil. p. 250. Clarke, F. IV. I. p. 506. Bedd. F. B. I. t. 32.*

Sikkim, 13,000-16,000 feet, Lachen, Tungu, Samding, 7,000-15,000 feet; Kashmir, Palgram, 13,000 feet.

4. *POLYSTICHUM ATKINSONI*, (*Bedd.*) Rhizome small, stipes 2-3 inches long, thin, stramineous, and with the rachis furnished with a few chaffy scales; fronds 1-3 inches long, 1/2 inch broad, pinnate, the lower pinnae not reduced; pinnae ovate, coriaceous, spinosely-serrated, the superior base often with an auricle; sori 1-3 to a pinna, generally on the upper half only. *Bedd. F. B. I. Suppl. t. 362.*

Sikkim, Yakla Pass 10,000 feet; Lachen 10,000 feet; Bhutan

5. *POLYSTICHUM AURICULATUM*. {*Linn, under Polypodium.*} Stipes tufted, 4-6 inches long, scaly below, or throughout; fronds

1.5 inches long, 2-4½ inch broad, pinnate, not or only slightly attenuated at the base; pinnae numerous, subsessile, oblong or narrowly oblong, auricular falcate, coriaceous, entire, or pinnatifid with the auricle sometimes quite free, lower veinlets in groups of three; sori in two rows one on each side of the midrib, very variable in size; indusium often quite absent. *Linn. Sp. Pl.* 1548. *Hook. Syn. Fil.* 251.

Throughout India and Ceylon.  
(Also in Formosa.)

TYPE. Pinnae submembranaceous, lanceolate falcate, 2-2½ inches long, serrate; upper base square, parallel with rachis and often auricled, lower base much cut away; involucre very fugacious or generally altogether absent. *Hook. Sp. Fil.* iv. 11, t. 218. *Bedd. F. S. I.* 6. 120. *Polypodium harpophyllum* (Zenker), *Hook. Syn. Fil.* 511.

Nilgiris, Pulneys and other Western hills; Madras Presidency, at the higher elevations.

VAR.  $\beta$  MARGINATUM. (Wall.) Pinnae very coriaceous, shining, scaly below, ovate-oblong, closely spinulose, often somewhat lobed; indusium conspicuous, sometimes very large. *Wall. Cat.* 656. *Don. Prod. Fl. Nep.* 3. *Bedd. Sup. Ferns*, t. 563. *Clarke, F. N. I.* 507.

North India; Kunawur to Bhotan, 7,000-10,000 feet elevation.

VAR.  $\gamma$  CAESPITOSUM. (Wall.) Pinnae short, ovate-oblong, margin scarcely spinulose or serrate, sometimes entire; texture scarcely coriaceous; indusium conspicuous, ciliate. *Wall. Cat.* 367. *P. caespitosum*, *Bedd. F. B. I.* t. 33. *Aspid. obliquum*, *Don. Prod. Fl. Nep.* 3. *Clarke, l. c.* 507.

Khasya, 3,000-4,500 feet elevation. Himalayas, Bhotan to Kunawur, 4,000-8,000 feet.

VAR.  $\delta$  LENTUM. (Don.) Pinnae pinnatifid, serrate, usually spinulose, the auricle often nearly free. *Don. Prod. Fl. Nep.* 4. Var. sub-bipinnata (Hook.), *Bedd. F. B. I.* t. 135.

Throughout the Himalayas and Khasya, altitude 1,500-8,000 feet, very common.





A. J. COTTRELL BOST. ENGRAV.

POLYSTICHUM AURICULATUM. (Linn.)

6. *POLYSTICHUM ILICIFOLIUM*. (*Don.*) Stipes densely tufted, 2-4 inches long, clothed with large scales throughout; fronds linear or lanceolate, not attenuated at the base, very coriaceous, pinnate; pinnae either small simple triangular or subrhomboidal, or much larger and again pinnate, naked on both sides and shining, angles spinulose-mucronate; rachis fibrillose; sori mostly in two rows, usually large; indusium peltate; veins immersed. *Don. Prod. Fl. Nep.* 3. *Hook. Syn. Fil.* 251. *Polystichum stimulans* (*Kze.*), *Bedd. F.B. I. t. 33.*

Himalayas, from Chumbra to Sikkim, 7,000-11,000 feet elevation.

The smaller forms with simple pinnae are very distinct, but the larger ones with the pinnae again pinnated, quite graduate into *P. aculeatum*, var. *rufobarbatum* till it becomes quite indistinguishable from forms of that fern, and is probably only a variety of it.



Nº103.

*POLYSTICHUM ILICIFOLIUM*.  
(*Don.*)

Stipes tufted, 2-4 inches long, fibrillose; fronds pinnate-linear up to 7 inches long, subcoriaceous, not gradually attenuated at the base, both surfaces more or less fibrillose; pinnae cut down almost to the rachis, bristly serrate, very unequal at the base, the lower margin being cut away, the upper with the basal lobe much enlarged; veins pinnate or forked in the segments; sori terminal on a veinlet; indusium peltate, bluntly crenated or subentire. *Hook. Syn. Fil.* p. 251, and *2nd Cent. Ferns*, t. 25, in part only. *Bedd. F. B. I. t. 126.*

Himalayas; from Balti to Sikkim, 7,000-13,000 feet elevation.

Very near the smaller forms of *Prescottianum*, but the stipe is fibrillose, not scaly. Hooker's plate is taken from specimens of both species, and it is very probable that they are only varieties of the same plant.

VAR. 13. GRACILIS. Fronds smaller, (3-5 inches long, with the stipe by 1/2 inch broad), margin of pinnae crenate, with acumination (not bristly serrate), involucre reniform. *Clcti*  
A 508. *Lastrea gracilis* (Moore), *Bedd. F. B.* 101 if  
sarsa, var. *gracilis*, *Hook. Syn. Fil* 498.

Sikkim, 11,500 feet elevation. A very doubtful species, which  
Mr. Clarke considers only a variety of *Thomsoni*, so I place it here  
pending, further material. Mr. Clarke says that the involucre is  
polystichoid.

S. POLYSTICHUM ACULEATUM. (Sw.) Stipules 6-12  
inches long, scaly and fibrillose below or throughout; fronds large,  
ovate-lanceolate, **bipinnate**, coriaceous, not attenuated at  
(or only slightly so in some forms); pinnae numerous &  
pinnules oblong, unequal at the base, lower margin  
more or less auricled, margins bristly or spinulose  
more or less coriaceous, under surface generally fibrillose  
pinnate or forked in the segments of the pinnules; sori  
at the apex or at the apex of the lower **veinlets**. *Sw. Schrad.*  
37. *Hook. Syn. Fil* p. 252.

Throughout the Indian region on the mountains.  
(Also throughout the whole world.)

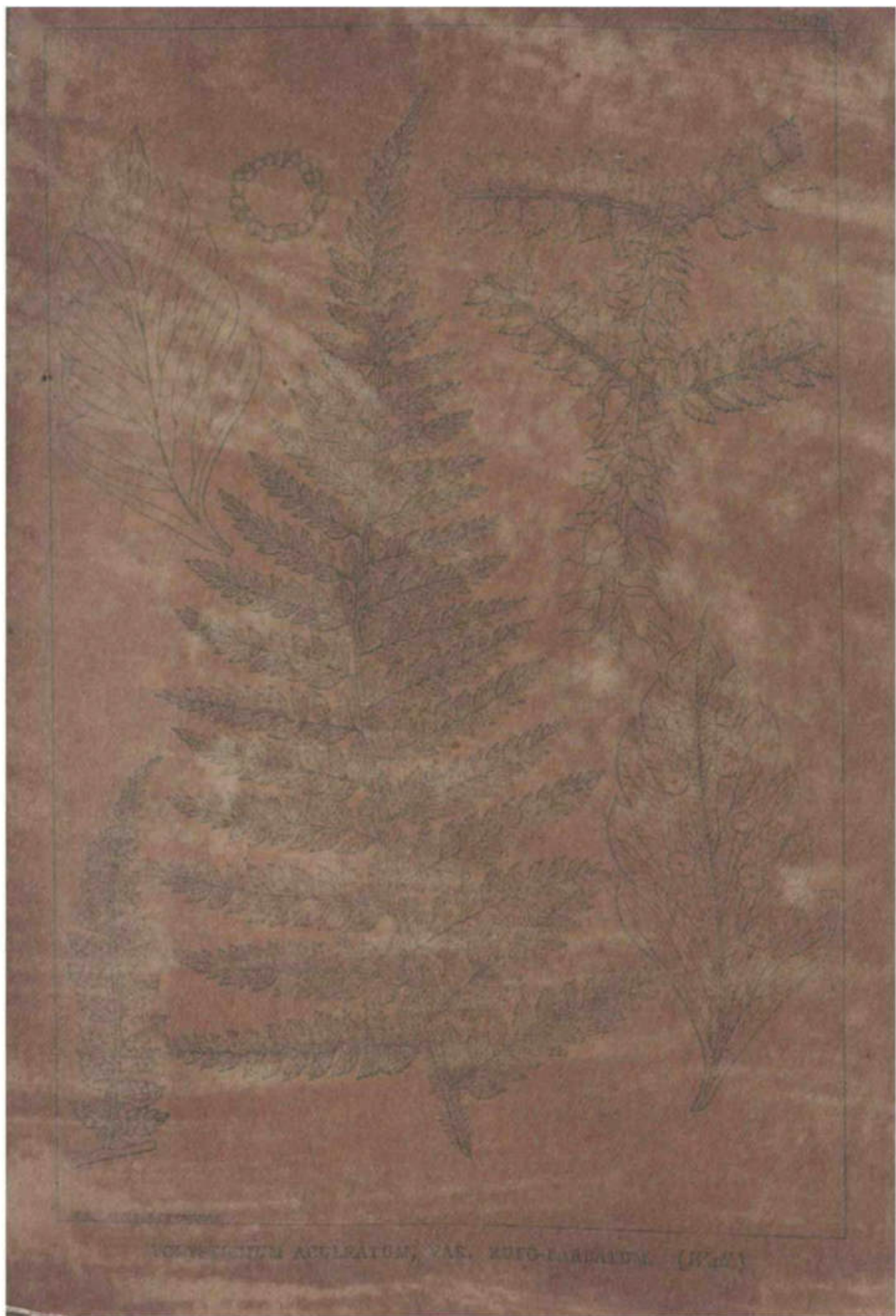
VAR.  $\beta$  LOBATUM. (Eng. bot. t. 1563.) Fronds narrowly  
lanceolate; pinnae hardly pinnate, the lower secondary pinna  
or decurrent. *Clarke, F. N. I.* p. 509.

Throughout the Himalayas.

VAR. 7. RUFO-BAREATUM. (Wall. Cat. 369.) Fronds bipinnate  
very coriaceous, usually reddish; stipes densely clothed  
red scales; rachis with red fibrillae; pinnules naked and  
beneath, in cutting like *ilicifolium*. *P. aculeatum*, *Bedd.*  
**121.** *Polyst. brachypterum*, *Kunze*, No. 906.

Nilgiris and Western mountains of South India • I  
from Kashmir to Bhotan.

VAR. S. ANGULARK. (*fresl. Newm.* 173.) Lax and



*POLYPTICHUM ACULEATUM*, VAR. *NUYO-CARRAIDUM*. (N. S. P.)

texture, pinnules smaller, more numerous, orbicular, rhomboid, mostly auriculate, the serratures setiferous rather than spinulose. *Bedd. F. S. I. t. 121.*

Nilgiris and Western mountains of South India.

VAR.  $\zeta$  SEMIFERTILE. Base of the frond fertile, upper one third barren. (*Clarke, l. c.*)  
Sikkim.

VAR.  $\eta$  BIARISTATUM. (*Bl. En. Pl. Jav. Fil. 154.*) Pinnules large, oblong-falcate, sparingly serrate or spinulose; sori generally round the margin.

Khasya; Ceylon; Malay Peninsula.

VAR.  $\theta$  SETOSUM. (*Wall. Cat. 371.*) Lower surface of frond with very long fibrillæ; rachis with very large scales as well as fibrillæ, pinnules small, quite entire, except the spinulose apex or with very inconspicuous crenatures to represent the usual lobes; serr apical on the lower veinlet of the forked or pinnate vein of the segment (or what would correspond to the segment where the pinnule is entire).

Himalayas, from Kumaon to Sikkim, 5,000-8,000 feet elevation. A well marked form, considered a distinct species by some botanists.

VAR.  $\iota$  ANOMALUM. (*Hook. Sp. Fil. iv. 2.*) Segments blunt or slightly mucronate; sori often, but not always, on the upper surface of the fronds. *Polystichum anomalum, Bedd. F. S. I. t. 219.*

Ceylon; Horton plains and Happutalee, 5,000-6,000 feet elevation.

VAR.  $\kappa$  TRAVANCORICUM. (*Bedd.*) Pinnæ rather distant, lower pair generally deflexed; pinnules prominently petioled, either subentire, large broad deltoid, with the lobing blunt not mucronate, or elongated up to 3 inches long, and pinnatifid or completely pinnate (except an indistinct wing to the rachis), the pinnules distant and again bluntly lobed, 3-4 pair below the pinnatifid apex; rachis and sori scabrous and fibrillose, under surfaces fibrillose.

Travancore and Tinnevely mountains, 4,000-5,000 feet elevation. Distinct variety, but evidently a form of *aculeatum*, the more the pinnules are nearest in shape and cutting to those of *malum* and *bianstatum*; the stem firm.

**with the pinnules short** — Slightly lobed, and others deeply pinnatifid.

VAR. *MUCRONIFOLIUM*. (En. Pl. Fav. Fil. 164.)  
 Fronds 3-pinnate or sub-3-pinnate. (Clarke, l. c. 509.)

Very distinct looking, is tripinnate like the last, but very different, being finely cut with small pinnules.

(Wall-) Stipes short, thick, flaccid with many straw-coloured scales and fibrous; fronds from narrow to broad lanceolate, tapering at the base. Pinnules either short oblong,  $\frac{1}{2}$  inch long, more or less divided, but not to the rachis, or elongate 2-3 inches long and deeply pinnatifid to the rachis or even pinnate; segments with the margin serrate and often hair-pointed, more or less fibrillose beneath. Wall. Cat. 363. Bedd. *Ind. Bot.* 34. Hook. *Syn. Fil.* 253.

*POLYSTRICHUM* » *PRESCOTTIANUM* M. Himalayas — fronds 1-2 feet long.  
 (Wall.)

VAR. *BAURIAWUI*. (amb.) Fronds broad-lanceolate, (9-10 inches broad), very flaccid, the base. Clarke, *N. I. t.* 66.

Sikkim; Yakla, 12,000 feet; very distinct — at first sight, evidently only a flaccid variety of the above.

VAR. *CASTANETUM*. (Clarke), Stipe minutely blackish, rachis blackish, pinnae little pinnatifid. Sikkim, 15,000 feet elevation.



GENUS L.—CYRTOMIUM. (*Presl.*)

(Derivation not known.)

Indusium orbicular, peltate; veins pinnate from a central costa, the lower anterior veinlets free, the rest angularly and irregularly anastomosing, forming unequal and subhexagonal areoles within which are 1-3 excurrent venules, or the upper veinlets only angularly anastomosing; fronds pinnate, coriaceous.

1. *CYRTOMIUM FALCATUM*. (*Sw.*) Stipes tufted, 6-10 inches long, densely clothed below with large dark scales; fronds 1-2 feet long, by 6-9 inches broad, pinnate; pinnae numerous, the lower ones stalked, ovate-acuminate, falcate, 4-6 inches long, by 1-2 inches broad, the edge entire or slightly undulated, the upper side narrowed suddenly, sometimes auricled, the lower rounded or obliquely truncate at the base; texture coriaceous, both surfaces naked, the upper one glossy, primary veins from the midrib of the pinnae parallel to each other nearly to the margin, throwing off pinnately 1-2-3 times inarching veinlets; sori small, copious, scattered. *Saverts, Syn. Fil.* p. 43. *Hook. Syn. Fil.* 257.

VAR.  $\beta$  *CARYOTIDEUM*. (*Wall.*) Pinnules larger, sharply toothed, sometimes deeply lobed towards the base, and generally with a long sharp auricle on one or both sides at the base. *Wall. Cat.* 376. *Bidd. P. S. J. I.* 119.

Nilgiris at the higher elevations. Himalayas from Garwal to Bhotan, 3,000-8,000 feet elevation. Khasya, 3,000-4,000 feet; Ceylon. There is also a variety common on the Nilgiris known as *microptera*, which has more numerous and much smaller pinnae, scarcely at all auricled or lobed, but it graduates into *caryotideum*, though extreme forms look very distinct. The type of *falcatum*, which only differs slightly, is from China, Japan, South Africa, Sandwich Islands, and Madagascar.

2. *CYRTOMIUM CADUCEA*. (*Wall.*) Stipes tufted, 1 foot long, firm erect, stramineous, scaly below; main rachis, sometimes

FERNS OF BRITISH INDIA AND Ceylon.

terminal rooting bud; frond  
*f*, pinna; petioled, numerous  
 subentire to deeply lobed; **ruminate**  
**the midrib of the** **5 5**, **^ - ?** **o ^ \* \* \* \* \***  
 into nearly equally strong, **^** **o ^ \* \* \* \* \*** **^** **o ^ \* \* \* \* \*** **^** **o ^ \* \* \* \* \***  
 > margin, many of them free to the **^** **o ^ \* \* \* \* \*** **^** **o ^ \* \* \* \* \***  
 two rows half-way between the **^** **o ^ \* \* \* \* \*** **^** **o ^ \* \* \* \* \***  
**r and scattered.** **irJ^cTt It T** **TM&n**, or much  
 /• '• 45- Clarke, F. 2V. / / " , **^** **o ^ \* \* \* \* \*** **^** **o ^ \* \* \* \* \*** **^** **o ^ \* \* \* \* \***  
 Himalayas; from Nepal to Bhotin'  
 3,000-5,000 feet elevation. **^** **o ^ \* \* \* \* \*** **^** **o ^ \* \* \* \* \*** **^** **o ^ \* \* \* \* \***

GENUS I.I.--ASPIDIUM. (*Smartz.*)

(*Aspido* " ; the " **duSium** being **y ^** shield.)

Indusium orbicular or reniform  
 - 1, being linear and **TM** **Z ^ ^** **TMS^r** and  
 -> undly anastomosing with generally **r.T^TM\*** **absenti** **vci** **ns**  
 icles compital or often at the apex of the free veinlets; fronds  
 -ious, from simple to tripinnatifid, often membranaceous and

ASPIDIUM SINCAPORIANUM. (*JValHch\ XtW*)

• **tufted**, those of the fertile fronds **£,, S o T "\*\*\*\*\*>**  
 e s ^ more, 2-4 inches broad oblon. **•** **---s** **ng>** fronds  
 . narrowed rather suddenly and then d **•** **o** **acuminat** e at the  
 ; texture herbaceous; primary veins d **S** " , **8radUa**ny at the  
 by transverse **arched** ones, the are **ole** of **I wT" \* ^ ^'**  
**Its, the ultimate ones free;** **sori** **,,,'** **hlchen** **close** **» « • ted**  
 tween the main veins; **S** **4-6 in a**  
 (**I'k**), **H ^ . 5,.. /,/. 2,6. 1** **dd. F. B. I. t. 168.** **Nepbro-**  
**Singapore** and the Malay Peninsula.  
 (Also in the Malay Islands.)

3. ASPIDIUM VASTUM. (*Blume.*) **Rhi7** **ome** **f CreeP** **in** **z** **stipes**  
 p d, narrowly winged often nearly or **quite** **lo** **base, fur-**  
 fl with numerous linear subulate brown **persistent** **es; fronds**

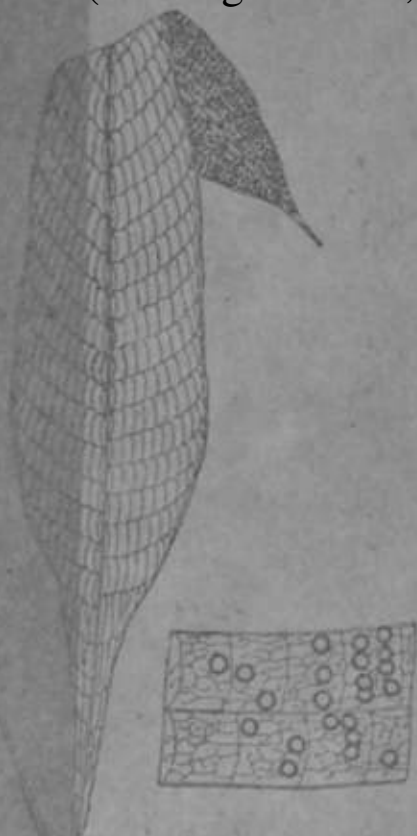




*Handwritten text, possibly a name or number, partially obscured.*

CYRILLIUM PALMATE, VAR. P. C. BAYOTIUM, (W&Z)

ft long, cut down to a broadly-win\*TM, TM u-  
 Pinnae 6-10 inches long, by 1-2 inches wide.  
 • 7-8 main veins distinct nearly to the margin, with prominent cross veins forming a netted and finely veined surface scattered on the netted veins.  
 (8. *Sagenia alata*, (L.) Presl, 69.



IHV107  
 ASPIDIUM SINGAPORIANUM,  
 [Wall.]



Nº108  
 ASPIDIUM VASTUM. (Rottb.)

Bengal, up to 1,000 feet elevation; Arunachal Pradesh; Malay Peninsula, Mishmee; Khasya; in the Malay Islands.)

ASPIDIUM SUBCONFLUENS. (Bcdd.) Stipes tufted, 1-2 feet high, with dark coloured, near-subulate scales; fronds 1-2 feet long, about 1 foot wide, opposite or ^opposite, short, petioled, unequal sided with the

upper pinnales small, falcate subentire, the lower ones much produced, imbricate acuminate, the 2-3 basal ones cut about one-third down into falcate lobes, terminal pinnae deeply pinnatifid, lobes 3-5 inches, pinnatifid a quarter of the way down to the rachis; texture moderately firm, surface glaucous above, pubescent on the veins beneath; veins anastomosing with a few free included veinlets; sori scattered, small, generally on the netted veins; indusium acrostichum reniform, curved, horse-hoe-shaped or nearly peltate, persistent.

*Bald. Syn. Ferns. t. 304.*

Khrevn, 3,000-5,000 feet elevation below Unwal.

4. ASPIDIUM SUBOBLIN-  
NATUM. (*Walt. under Poly-*

*podium.*) Stipes 6 foot or more long, pale brown, naked; fronds 12-18 inches long, 6-9 inches broad, terminal pinna linear-oblong 6-6 inches long, 1 inch broad, entire, narrowed towards both ends, lateral pinnae 4-6 on each side smaller, the lower one or two pairs bipartite; texture herbaceous, veins inconspicuous, the primary ones low before they reach the margin, the rest variously anastomosing, the areoles with free included veinlets; sori minute, scattered,

confined to the connected veinlets; indusium reniform and irregular as in the fig. *Bald. Syn. Fern. t. 50, l. 231. Syn. Fil. 1978. Bald. 2<sup>d</sup> Ed. t. 10, l. 17. Polypodium semibarbatum, Walt. Cat. 28.*

Terminal nearly lanceolate, some forms of polyacanthum, but I think sufficiently distinct.

(Also in Borneo.)

5. ASPIDIUM SUBOBLINATUM. (*Walt.*) Khrevn, 3,000-5,000 feet



ASPIDIUM SUBOBLINATUM. (*Walt.*)

foot or more long; fronds 12-18 inches  
 subdeltoid with a large deeply pinnate  
 below this one or two pinnate  
 forked at the base, or  
 surfaces somewhat  
 main veins distinct to the  
 with free veinlets included in  
 ttered, confined to the connected  
 r. / . 48.



ASPIDIUM SUBTRIPHYLLUM M.  
 (Hook.)

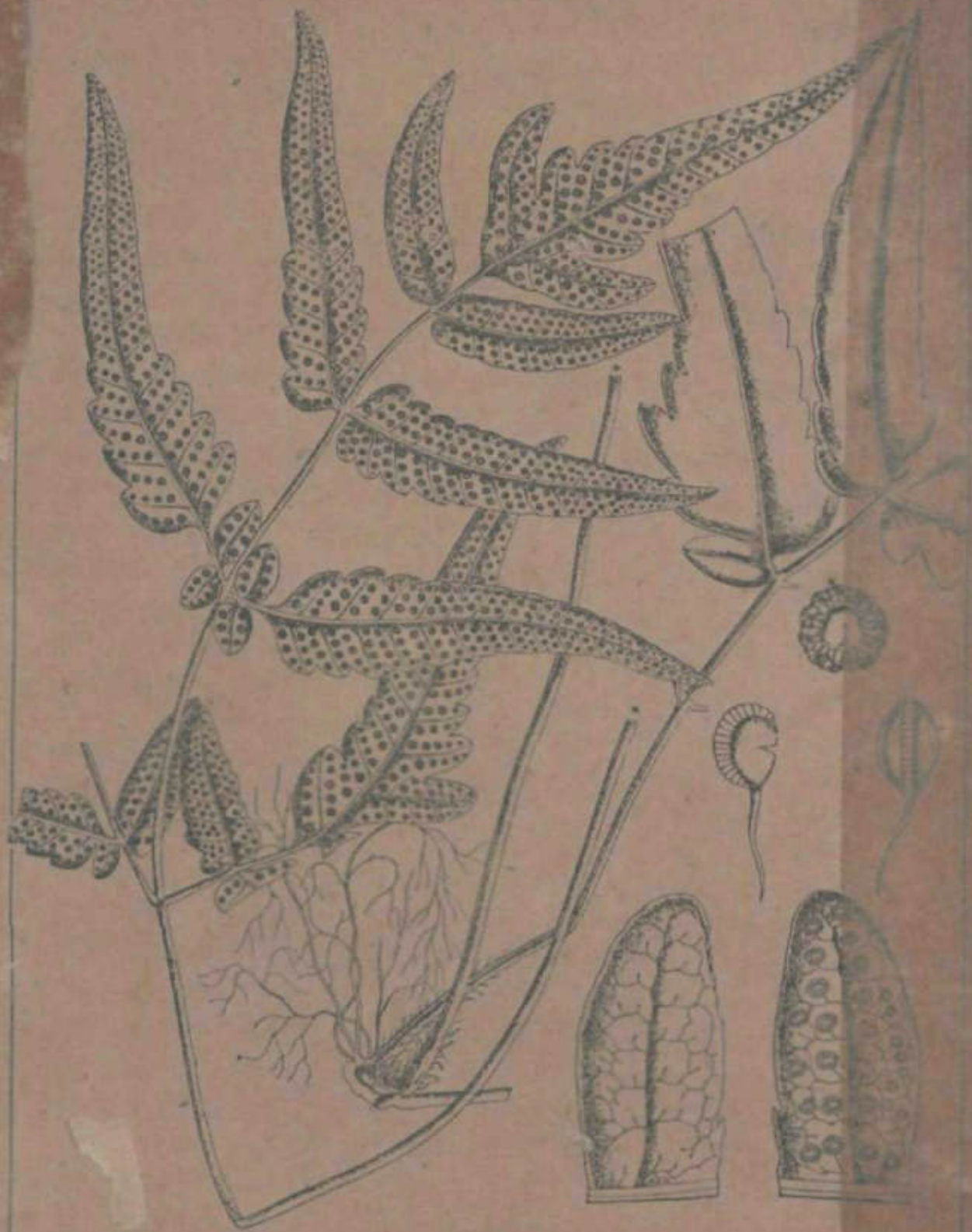
dimorphous, the sterile fronds being  
 Ceylon and the Malay Peninsula.  
 My Ceylon specimens are much smaller  
 than those from Binna, but I believe  
 they are the same species; in habit  
 quite like variolosum, but the  
 instead  
 of at the apex of free veinlets.

6. ASPIDIUM VARIOLOSUM. (Wall.)

Rhizome suberect,  
 near the base of the fronds  
 s tufted, scaly  
 ng  
 ls,

dimorphous, the sterile fronds being  
 subdeltoid in outline, herbaceous in texture, and some  
 \*hat puberulous, especially in the sterile  
 ones; pinnae about  
 low the  
 pinnatifid apex, the lowest pair again  
 pinnated with the pinnules often pin-  
 natifid, the next pair often pinnatifid or  
 i... " " \* - « \* » a less degree

fronds generally narrower and often more  
 very distinct but more so in the fertile than  
 s, with many free included veinlets • sc  
 rays at the apex of the free veinlets, very rarely  
 peltate and reniform on the same frond. Wall.  
 Sup, Ferns, t. 365 {not & yy, / 170, which is



L. S. CATTELL SCULPTOR

ASPIDIUM VARIOSUM. (Wall.)

*acutatifolia*, *Aspidium Zollingerianum*, *Bedd. Sup Ferns. t. 353*, *Smith. J. Ind. Mus.* - *Nephrolepis (Cajupati) patulorum*, *Hook. Syn. Fil. p. 297*, and *Zollingerianum* (*Bedd.*) *in part at least is the Utricle plant.*

East Bengal Plains, abundant from Assam to Chittagong; Tenasserim near Moulmein; Bering.

7. *ASPIDIUM POLYMORPHUM*. (*Wall.*) Rhizome suberect, stipes tufted, yellowish or brown, paleaceous, only at the base; fronds large, 1-4 feet long, by 1 foot or more broad, pinnate; pinnae 3-6 on each side, oblong or elliptic, acuminate, unequal at the base, sometimes contracted when fertile, quite entire to crenate or coarsely toothed, stalked or subsessile, the terminal one often more or less lobed or subpinnatifid, the lowest pair generally (not always) bifurcate; texture herbaceous to subcoriaceous; main veins prominent and distinct to the margin, with many fine included simple or forked venicles; sori on the netted veins, small and scattered in the uncontracted fronds, large and more or less in two rows between the main veins in the contracted ones; indusium reniform, or often quite absent. *Wall. Cat. 33*; *Hook. Syn. Fil. p. 297*. *Bedd. Sup Ferns. t. 116, 117*. *Sagenia siliifolia*, *Baker, Syn. Fil. p. 299*, as far as the *Cuvillatum* plant. *Neph. Wighii*, *Clarke, Bot. J. L. 538*, the contracted form.

Western forests of Madras Presidency, very common up to 4,000 feet. (I do not consider the contracted form even a constant variety.) Northern India from Gurwhal to Mishnee and Chittagong; Ceylon; Birma.

(Also in the Malay Islands, the Philippines and Fernando Po.)

8. *ASPIDIUM SIMONSI*. (*Baker*) Very like *polymorphum*, but with the stipes and rachis polished blackish-purple, lowest pair of pinnae pinnate below, deeply lobed upwards, others more or less bipinnate below and rather deeply lobed throughout, venation as in *polymorphum*; sori rather large (in my specimens), in two series between the main veins, or irregularly scattered sub 4 serial between the main veins. *Hook. Syn. Fil. 504*. *Bedd. Sup Ferns. t. 367*.

Sacchar Hill, Chittagong; Sikkim, and Uthorai. Mr. Clarke takes it a variety of *polymorphum*, and he may be right, but until

more specimens are gathered, I consider it safer not to name it as a new species. Mr. Clarke says he does not see how it differs from *polymorphum*, var. *macrocarpum*, but he has made a new species of that. Both, Baker and Clarke make two sections of *Sagenia*, one with "sori in more than two rows between the principal veins, often irregularly scattered," the other with "sori in two rows between the principal veins," both forms occur in this species and in *polymorphum*, and more or less in *semibipinnatum* and other species, so the definition is only misleading.

9. *ASPIDIUM HETEROCARPUM*. (Bedd.) Rhizome creeping widely; stipes solitary, erect, with lanceolate-linear brown persistent scales at the base; pinnate, very much as in *polymorphum*, but lower pinnae not bifurcate; pinnae

**N**i-5 inches long, narrow-lanceolate, entire, caudate at the apex, subsessile or very shortly stalked, gemmiparous in the axils; main veins distant to nearly the margin, areoles copious with free included veinlets; sori very small on the netted veins, much scattered; indusium reniform or horseshoe-shaped, or sometimes curved or linear, as in *Athyrium* and *Asplenium*. *Sagenia heterocarpa*, Bedd. R. B. I. t. 47. *Sagenia*



N° H2

*ASPIDIUM HETEROCARPUM*. (Bedd.)

*heterosora* (Baker), Hook. Syn. Fil. 504. Clarke, I. c. 537. Assam and Chittagong, in wet flats, near rivers, forming large

**f**roves about 6 feet high.

10. *ASPIDIUM DECURRENS*. (Presl) Rhizome creeping; stipes winged nearly or quite to the base, furnished with numerous subulate brown persistent scales; fronds often 3 feet long,

plexus; the sterile much contracted, pinnatifid down to a broadly winged rachis into 3-4 pair of pinnae or lobes on each side, 6-12 inches long, 1-2½ inches broad, lowest pair often bifurcate, margins quite entire in the sterile, more or less crenate in the fertile, subcoriaceous, glabrous on both sides; main veins distinct nearly to the margin, with cross veins forming series of large areoles in which are included netted veinlets and simple or forked free veinlets; sori large, generally in two pretty regular series between the main veinlets, nearly always at the apex of the free veinlets, often continued all down the wing of the stipes; indusium generally more or less reniform, sometimes elongated and irregular. *Presl. Rel. Hanck.* 28. *Hook. Syn. Fil.* 299. *Sagenia pteropus*, *Bedd. F. S. I. t.* 82.

Eastern Bengal at the foot of the hills, Assam, Cachar, Chittagong; South India in the Bolampatty Hills between Coimbatore and Palghat, 2,000 feet elevation; Tinnevely and Travancore Hills, 2,000-2,500 feet; Ceylon; Malay Peninsula. In habit very like *vastum*, but fertile fronds contracted, and sori differently situated.

(Also in the Malay Islands, South China, Polynesia.)

VAR.  $\beta$ . MINOR. (*Bedd.*) Fronds very small (1 foot long only), sterile 3-5 partite rather thin pinnatifid, fertile deeply pinnatifid, very much contracted, the lobes or pinnae being very narrow. *Sagenia pteropus-minor*, *Bedd. F. S. I. t.* 245.

Ceylon only, in the Doombura district at no great elevation.

11. ASPIDIUM CICUTARIUM. (*Sav.*) Stipes tufted, 1 foot or more long, with many series close to the base; fronds very variable in size, from 8 inches up to several feet, deltoid in outline, apex pinnatifid, below which are 1-4 pair of pinnae, which are either only lobed or completely pinnated with the secondary pinnae deeply pinnatifid, or even again pinnated (*i.e.* tripinnate), with the tertiary pinnae deeply pinnatifid (quadripinnatifid), the lowest pair of pinnae are always deeply pinnatifid or pinnate on the lower margin, but the other pairs are generally much less so and often only lobed; texture thin, surfaces glabrous in some varieties, but in others hairy on the upper surface and puberulous on the costae and costules





1877. L. A. C. P. 347

ASPIDIUM DECURRENS, VAR \* MINOR. (Budd.)

the principal veins tolerably conspicuous to the margin, others copiously netted with often free included veinlets (there are no prominent cross veins forming large well-defined areoles as in some of the species, and the free veinlets are often few only); sori rather large, in two rows between the main veins, on the netted veins (compital) or at the apex of the free veinlets; indusium reniform or peltate. *Synopt. Mett. Ferngatt. Pflanz. und Asp.* 117. *Hook. Syn. Fil.* 299. *Sagenia coarctata* (Wall.), *Bedd. F. S. L.* 1. 81. and 1. 170 (*variolosa*).

Throughout the Indian region, from the plains up to 5,000 feet in South India (both Eastern and Western sides), the more hairy variety, known as *coarctata* only is found, but in Northern India the glabrous variety is also common.

(Also in the tropics throughout the globe.)

12. *ASPIDIUM MULTICAUDATUM*. (Wall.) Stipes 1-3 feet, often densely clothed nearly its whole length with linear-subulate brown persistent scales; fronds 3-4 feet long, with a large terminal pinna deeply pinnatifid, lobes lanceolate acuminate, and several pinnae on each side, the lowest deltoid 1 foot or more long and nearly as broad, deeply pinnatifid above and pinnate below; texture firm herbaceous, rachises beneath rusty; main veins distinct to the margin, areoles with free included veinlets; sori rather large in two rows between the principal veins, or more numerous and scattered, generally at the apex of free veinlets, rarely on the netted veins (compital). *Wall. in Herb. Nephrodium Griffithii* (Baker), *Hook. Syn. Fil.* 300. *Sagenia Griffithii*, *Bedd. F. B. L.* 1. 337.

Khasya Hills, South side up to 1,000 feet elevation. *Birm. Aspidium?* 1. 118, *F. S. L.* is probably this species, or at least closely allied, it has twice been gathered in the Anamallay forests, but young fronds without fructification.

In the *Synopsis Filicum* *Sagenia* is kept up as a section of *Nephrodium* for all species supposed to have a reniform indusium, and *Isosporidium* as a section of *Aspidium* for those with an orbiculate indusium, the result of this has been that allied species like *repandum* and *polymorphum* (probably one and the same plant) and *membranaceum* and (*Tanenu*) *giganteum*, (closely allied if not

varieties one of the other), are placed far apart; it is a fact, however, that most of the species have both orbicular and reniform involucre, sometimes on the same individual, the involucre often varying much more than this, being athyroid and asplenioid. Mr. Clarke has placed both *Aspidium* and *Sagenia* in *Nephrodium*, a genus widely different in habit.

GENUS LII.— PLEOCNEMIA. (*Presl.*)

(*Pleos*, full; *knemia*, rays; in allusion to the venation.)

Only differs from *Aspidium* in its less compound venation, only the lower veins anastomose arcuately forming one series of areoles near the costa (as in *Camptocria*), without any free veinlets within them, the other veins generally all free, or some angularly sinuately anastomosing; sori generally at the apex of the free veinlets outside the areoles, but sometimes some arc on the netted veins, (rarely, compita

**i. PLEOCNEMIA THWAITESII.** (*Bedd.*) Stipes tufted 1-1½ feet long, shining blackish-purple as is the rachis and main costa, basal scales linear dark-brown; fronds deltoid, 1½-2 feet each way, tripinnatifid; lowest pinnai largest deltoid stalked, with several large lanceolate deeply pinnatifid pinnules; texture rather thick and glabrous, veins not conspicuous, glabrous beneath, and also above except the costa and veins which are scurfy or puberulous, lower veinlets forming elongate costal arches, 110 free included veinlets, the involucres clavate apices, none reaching the margin; sori rather large in a single series on each side of the midrib of the segments, all at the apex of the free veinlets; indusium reniform, with the lobes of the sinus broad and overlapping, so that it looks, orbicular. *Sagenia Thwaitesii*, *Bedd. F. S. I. t* 244. *Nephrodium (Sagenia) simulans* (*Baker*), *Hook. Syn. Fil. 300.*

Ceylon, southern provinces near Galle, abundant on the Haycock Mountain. (*C. P.* 3331. *Thw. En. p.* 390.)

**2. PLEOCNEMIA TRIMENI.** (*Bedd.*) Stipes tufted 1-1½ feet long, grey, basal scales linear; fronds 1½-3 feet long, deltoid or deltoid-lanceolate, pinnatifid at the apex, below pinnate with about 5-6 pair of lateral pinnae, which are more or less stalked, and a

more than half-way to the rachis, about 8-9 inches long by 2 broad, and a much larger basal pair which are deltoid, again pinnated with the lower basal pinnae deeply pinnatifid, ultimate lobes bluntish, slightly crenated or nearly entire; texture rather thin; surfaces glabrous on both sides; costas and veins rusty above, less so or nearly glabrous beneath; lower veins forming elongated costal arches near the rachis of the pinna, with generally a second series of areoles formed by the veins again anastomosing angularly, veins of the segments only anastomosing near the midrib and forming one series of arches, the rest free, no free veinlets in the areoles; sori in a single row on each side of the midrib, those towards the margin and apex of the segments apical on the free veinlets, those lower down and nearer the costa of the pinnules generally on connected veins (*i.e.*, compital), indurium reniform. *Sagenia gigantea*, *Bedd. F. S. J. 1. 85* (not the description.) *Pleocnemia gigantea* (Baker), *Hook. Syn. Fil. and Editt. p. 503, not Blume.*



PLEOCNEMIA THWAITESII. (*Bedd.*)

The Kew packet of *giganteum* from which Sir W. Hooker took his description (*Sp. Fil. iv. p. 50*.) contains several different species; the Java specimen being a single pinna of *Aspidium giganteum*, a species distinct from this; the Birma and Assam specimens being *multicaudatum* (Wallich); and the Ceylon specimens being this plant, *Pleocnemia membranacea*, and *P. Thwaitesii*. This not being Blume's *giganteum* I have had to rename it.

Ceylon, central provinces, (C.P. 1351); South India, Anamallays, Palghat side, in the forests near the Nethumpady coffee estates.

3. *PLEOCNEMIA MEMBRANACEA*. (*Hook.*, under *Aspidium*.)  
 Stipes tufted up to 9 inches long, straw-coloured; basal scales linear; fronds up to about 18 inches long, deltoid, bi-tripinnate, pinnatifid at the apex, the lowest pair of pinnae much the largest, long stalked, with the lowest secondary pinnae stalked and again quite pinnate at the base, the pinnules being stalked and deeply pinnatifid, ultimate segments crenulate, upper pinnae gradually less compound; texture thin, membranaceous, upper surface somewhat hairy towards the margins; costae and veins rusty or puberulous, under surface slightly puberulous; lower veins forming long costal arches, the rest free; sori at the apex of free veins; indusium both orbicular and reniform. *Hook. Syn. Fil. p.* 259. *Sagenia gigantea*, var. minor, *Bedd. F. S. I. t.* 243, a small frond less compound than described above. *Thro. En. Pl. Zey. p.* 390. (C. P. 1358.)

Ceylon; in the Doonbera district at no great elevation. Mr. Thwaites had doubts whether this was a variety of the last, or a distinct species; the venation is quite that of the last species, but rather less compound, owing to the fronds being more cut and narrower; it is quite that of *Pleocnemia*, and I find some of the involucres reniform; it is of thinner texture, much more cut and less glabrous than the last, and, I think, may safely be considered a distinct species.

(Also in Java, Philippines, China, and Formosa.)

4. *PLEOCNEMIA MEMBRANIFOLIA*. (*Presl*.) Stipes tufted, furnished with black linear subulate scales more copious towards the base, up to about 1 foot long; fronds seldom more than 1 foot long, from deltoid to ovate, pinnate with a pinnatifid apex, lateral pinnae few pairs opposite or subopposite, 2-4 inches long,  $\frac{3}{4}$ -1 $\frac{1}{2}$  broad, more or less deeply pinnatifid, the segments rounded nearly entire, lowest pair of pinnae much larger, deltoid, pinnatifid or almost pinnate, the lower basal segments being elongated and pinnatifid; main rachis and both surfaces more or less softly hairy, with multicellular hairs; texture softly herbaceous; fertile fronds uniform with the sterile, or more or less contracted, often very much so, lower veins in the sterile and broad fertile fronds most numerous and



PLEOCNEMIA MEMBRANIFOLIA. (Presl.)

forming loops near the costa, sometimes very regularly, sometimes only occasionally, in the contracted fertile fronds all the veins free; sori generally apical on the free veinlets; involucre reniform. *Presl. Rel. Moncl.* 36, t. 5, fig. 3. *Aspidium fuscipes*, *Bald. Sup. Ferns*, t. 366. *Aspidium fuscipes*, *Wallach*, partly, but not the type sheet, which is *Lastrea sagenioides*.

East Bengal Plains, extending into Assam, Cachar, and Chittagong. Khasya and Sikkim hills up to 3,000 feet elevation. Birma and the Malay peninsula. In habit much like small *Aspidium cicutarium*, but venation different, and easily known by the persistent black scales towards the base of the stipe; in the *Synopsis Filicum* it has been erroneously lumped with *Lastrea dissecta* by Hooker and Baker.

5. PLEOCNEMIA CLARKEI. (Bald.) Stipes and rachis slightly pubescent; fronds 2-3 feet long, lanceolate, narrowed at the base into distant auricles, softly shortly villous, herbaceous, pinnate; pinnae numerous, alternate, 1½-2 inches broad, pinnatifid nearly to the rachis, the pinnules lanceolate from a broad base, irregular as to length, and from subentire to deeply pinnatifid (on the same pinna) acute at the apex, lowest veins forming arcs along the costa of the pinnules from which proceed free veinlets, veins of the pinnules pinnate, or once or twice forked, the lowest veinlet of a group often looped with the next group; involucre kidney-shaped, hairy and ciliated. *Bald. Sup. Ferns*, t. 368. *Nephrodium armaxum*, *Clarke, F. N. I.* p. 526.



PLEOCNEMIA CLARKEI. (Bald.)

Sikkim; near Dikeeling, 4,500 feet elevation.

FERNS OF BRITISH INDIA AND CEYLON.

6. PLEOCNEMIA

dens  
hirs  
pinna  
lowes  
the lower side, which are again pinnate with the pinnules stalked,  
& inches long, and deeply pinnatifid, ultimate segments oblong-  
**Hided**, entire or denticulate  
I base; lower veins anastomosing in costal arch.



PLEOCNEMIA LEUZEANA.  
{Hook.}

ree and excurrent, or all the veins of  
the segment arc free, sori copious, usually  
in single rows on each side of  
mixed with yellow glandular hairs; in-  
dusium reniform, early fugacious. Hook.  
Syn. Fil. 295. Bedd. *FB.I.t.* 134.  
North and East Bengal, base of the  
hills to 2,000 feet elevation, Sikkim,  
, Cachar, Khasya, Chittagong;  
Birma, and Malay Peninsula.  
(Also in Malay Islands) China, Poly-  
ncsm, and North Australia.)

GENUS III.-LASTREA. (Presl.)

(After Chev. de Lastre, a French nobleman.)

Sori subglabrous, dorsal or terminal on the vein, **ir.A**  
t t h d by the sinus, or in the first  
orbicular; veins all fronds pinnate  
species sometimes  
compoundly 2-4

*MuHum reniform or orbicular, texture b,orc or less coriaceous*

LASTREA

(M \*\*\*\*\* um.)

Rhizome



creeping; stipes scattered, 6-12 inches long, slender, slightly scaly below; fronds about 1 foot long, by 6-9 inches broad, with a pinnate apex and 2-6 lateral pinnae on each side, which are 1-1½ inch broad, all simply pinnate or the lowest sometimes slightly compound at the base, pinnules subrhomboidal with the lower side much cut away ¼-1 inch long, cut down about a third or half-way to the costa into rounded lobes which terminate with a long bristle, sometimes being more or less serrated; texture subcoriaceous; rachis and both surfaces naked; veins pinnate in the lobes; sori submarginal, indusium reniform or orbicular. *Bedd. F. S. I. t. 109*. *Aspidium amabile*, *Bl. En. II. Jac. Fil. p. 165*. *Hook. Syn. Fil. 254*. *Aspid. rhomboideum*, *Wall. Cat. 364*.

I keep this species in *Lastrea* as I have always found the involucres reniform; they appear, however, to be sometimes orbicular, so that the species has equal right to be a *Polystichum*.

South India, on the Anamallays, Lower Palneys, Travancore, and Tinnevely Hills, 3,000-4,000 feet elevation; Ceylon, central provinces; North India, Nepai, Jauntea, about 4,000 feet, rare.

(Also in the Philippines and South China.)

2. *LASTREA ARISTATA*. (*Sic. under Aspidium*.) Rhizome long, creeping, very scaly; stipes scattered, about 1 foot long, more or less fibrillose, as are the main and partial rachises; fronds about 12-15 inches long, deltoid in outline, pinnate at the apex, below which are 5-6 lateral pinnae on each side, which, except the lower pair, are generally simply pinnate or with a tendency to be bipinnate in their upper basal pinnules, lower pair bipinnate towards the base, the lower basal pinnules being much the largest and quite pinnate, pinnules subrhomboidal with the lower base cut away, more or less lobed, the upper basal lobe being the deepest, lobes copiously toothed, teeth aristate; texture more or less coriaceous; veins pinnate in the lobes, the veinlets being simple or forked; sori apical on the veinlets and well within the margin; indusium reniform or orbicular. *Bedd. F. S. I. t. 101*. *Aspidium aristatum*, *Sie. Syn. Fil. 53*.

South India, very general in the Western forests of the Madras Presidency; Ceylon; Birma.

I have always found the involucre strictly reniform, and Hooker has described it both under *Polystichum* and *Lastrea* (in the latter as *Lastrea platypus*); it is a much less divided fern than *coniifolia*, besides having an utterly different caudex; Mr. Clarke, who unites it with *coniifolia*, states, that he has never been able to see that a creeping caudex accompanies a less divided form, but Mr. Clarke's specimens are all typical *coniifolia*, and there is no *aristata* from the Himalayas as in the Kew Herbarium, and only one poor specimen from Khasya, labelled *Lastrea platypus*.

(Also in Japan, Formosa, South China, Java, Luzon, and Norfolk Island.)

**USTREA AFFINIS.** (*Wall.*) Very similar to *aristata* and *amabilis*, but the lower pinna less compound than in *aristata* and often quite similar to the upper ones; texture much more coriaceous and sori very large. *Wall. Cat.* 370. *Lastrea aristata*, var. *Hamil-Wd. Fern Sup. pi.* 369. *Hook. Syn. Fil.* 216. *Aspidium beciosum* (*Don.*), *Aspidium aristatum*, var. *affinis*, and var. *ini*, *Clarke, l. c.* 511.

I have never seen it growing but Mr. Clarke tells that the rhizome is erect and not creeping, so I cannot consider it a variety of either *aristata* or *amabilis*.

*ini*, Nepal, Assam, **Jaintea**.

**LASTREA CONIIFOLIA.** (*Wall.*) Rhizome erect; fronds very large, ovate, 2-3 feet long, 4-11 ninate; stipes and segments small, coriaceous shining, aristate; sori large and small; indusium reniform or orbicular. *Bedd F p r A A*<sup>&</sup> *Wall Cat* 341. *-A\* I.* 261. *As-*

I have always found the involucre reniform in their young stage, I have had both this and *aristata* in cultivation on the Nikiris for many years, and they show no tendency to run one into the

257  
1691  
1740



Stipes  
t long,  
aked,

(111)  
dd. F. S. I.

o the rachis  
ver ones sometimes

LACTUCA CONSIDOLIA. [H. B. K.]  
the Root of L. consida.

[Himalayas, Kumaon to Bhotan, 4,000-10,000 feet, Khasya, 6,000 feet; South India on the Western mountains; Ceylon; Peninsula.

(Also in Natal, Samoa, and Australia.)

*Indusium always reniform.*

*Pinnae subentire or only slightly lobed (except in forms, and of Walkerce.)*

LASTREA CUSPIDATA. {Mett under Aspidium.) Stipes about 1 foot long, reddish as is the rachis, scaly towards the base; fronds 1-3



feet long, pinnule numerous, linear-lanceolate from a broad base, 4-6 inches long, 1/2-1 inch broad, cuspidate at the base, very shallowly lobed (not 1/2 to the rachis), the lobes sharply serrated; texture scarcely coriaceous; rachis and both surfaces naked; veins pinnate with 3-4 veinlets on each side; sori towards the base of the veinlets; indusium reniform, fugacious. *Mett. Farngat L Ph and Asp 92. Polypodium elongatum, Wall. Cat. 309. Bedd. F. B. I. t. 118. Nephrodium cuspidatum, Hook. Syn. Fil. p. 260.*

**N9119.**  
LASTREA CUSPIDATA.  
{Mett.)

Khasya Hills, 3,000-4,000, feet elevation, near Shillong.

6. LASTREA HIRTIPES. {BL under Aspidium.) Caudex erect - up to about 1 foot long, densely clothed, as is the rachis, with long blackish hair, scales > fronds up to 3 feet long, numerous, linear-lanceolate from a broad base, 4-8 inches long, by nearly the 1/2 -us, linear-lanceolate from a broad base, 4-8 inches long, shallow lobes catching in the lower ones not reduce 1; texture herbaceous"

surfaces naked; veins pinnate; veinlets 4-5 on a side; **indusium** reniform. *Bi En. Pl. Jav.*  
*Bedd. K S. 1.1 96.* Asp. **atratum**, *Wall Cat.* 3 So.

Himalayas, 5,000-9,000 feet, from Nepal to Bhojpur, 4,000-6,000 feet; **South** India, Nilgiris, &c, \ Geylon ;  
 (Also in the Malay Islands **and** Polynesia.)

7. **LASTREA WALKERS.** {*Hook under Polyftodiuni*}

up to 1 \ foot long, clothed **with** linear scales ; fronds up to 3 feet long,  
 long-lanceolate, pinnate; pinnae linear-lanceolate, **si** short-stalked,  
 acuminate, slightly crenate along the margins, lower ones  
**ut** 6 inches long, by about 1 inch broad, lower base cut  
 away, upper base square ; texture subcoriaceous, glabrous ;  
 veins in pinnate groups; **sori** 2-3 serial, between the midrib  
 ! the margin, dorsal on the veinlets ; **indusium** reniform,  
**very** fugacious. **Polypodiium**  
**Walkerse**, *Hook. Syn. Fit 1st ed.* p. 305. *Lastrea*, *2nd ed.* 493-  
*Bedd, F. S. 1. t.*

**Ceyloi.**

VAR. /> **MACROCARPA.**

- Fronds very large, the pinnae slightly lobed, often furnished with a large auricle at the superior base. *Bedd. K. S. 1.1*

Ceylon.

} **PINWATIPIDA.** pinna; pinnatifid nearly to the base, leaving only a broad wing along the rachis, lower ones **i**  
**pinnate.** *Bedd. L e. L 2\c*



LASTREA WALKERS. (M?i20)  
 piRtiPEs. (EA)

VAR. *ORHITHINAEAE*. Pinnae sub-bipinnate. *Bedd. L. 122, 15.*  
Ceylon.

- † 7. *Pinnae* *not* more than half-way to the rachis, compound forms of *Filix Mas*.  
A. Veins generally simple.

8. *LASTREA GRACILESCENS*. (*Bl.*) Stipes tufted, long, slender; fronds oblong-lanceolate, pinnate, lower pinnae scarcely reduced, often deflexed, rachises pilose above, pinnae cut down nearly to the rachis, segments narrow-oblong, obtuse, not much narrowed upwards, veins about six or eight on each side of the costule, the two lowest terminating above the sinus, all generally simple, rarely forked, sori medial on the veins; indusium glabrous or minutely pilose. *Aspidium gracilescens*, *Bl. Fern. Pl. Jac. Fil.* 155. *Hook. Syn. Fil.* 262. *Bedd. L. B. J. 1. 253.* *Clarke, F. N. I. 513 in part.*

Mr. Clarke includes here *L. flaccida* (Hooker), which is certainly a mistake; he also includes the Assam forms of *L. immersa* (*Bedd. F. B. J. 252*) united with the Malay Peninsula plant by Hooker; in this he may be correct, as this plant appears distinct from the Malay one, it is however, much larger than any of Mr. Clarke's specimens of *gracilescens*, and has more veins to the segments.

Nepal, Sikkim, 6,000-8,000 feet elevation, Khasya, 4,000 feet; South India, Mudumally forests, a small form.

(Also in China, Japan and Java.)

Mr. Clarke's variety *decipiens* (Darjeeling, 7,000 feet, and Khasya, Dinging, 5,000 feet) has the fronds shorter and more deltoid, and the veins often branched with the sori subterminal on the upper branch; it is probably a distinct species. His variety *hirsutius* only differs in having the stipes hirsute and in being of rather thicker texture (Khasya and Jaintia, 4,000-5,000 feet); his variety *didymochkenoides* has longer narrower pinnae with very large sori, but runs into the type.

9. *LASTREA IMBERSA*. (*Bl.*) Caudex creeping, stipes elongated 3-4 feet long, fronds rather coriaceous in texture, pinnate, ovate

oblong, or oblong in outline, pinnre 6-10 inches long, sessil  
 1 inch broad, cut down close to the rachis, glabrous above  
 segments, or with occasionally a few distant inconspicuous hairs on  
 the veins, the rachis strigose, frosted beneath on the veins and  
 rachis. with minute yellow glandular dots; segments linear, rather  
 distant; veins simple (or the lowest one very rarely forked), 12-14  
 or even more on each side of the costa; sori medial, one to each  
 vein, much immersed, the depression plainest on the upper side,  
 indusium large, persistent, reniform, but appearing orbicula fr  
 overUpping at the sinus. *Aspidium immeVsum*, i. *En. F*  
*Nephrodmm immersum*, *Hook. Sp. Fil.* 112. *Syn. Fil.* 265.

Malacca and the Malay Peninsula.

< \*Iso m the Philippines and New Caledonia )

252) u down t /<sup>r</sup> r<sup>d</sup> to \*"\*"\*"\* " »«f\* different text ure, less  
 cut down, and with much fewer veins.

,,ftJ% L T! KA ,ALCARAT L (BL) **Caudex erect, sto** ut, stipes  
 ufted fronds lanceolate pinnate, sometimes with auricles I below, up  
 to about 2 feet long, pinna spreading , -4 inches long by | inch to  
 nearly : inch broad, cut down two-thirds or more towards I the rachis  
 nto oblique falcate linear oblong segments, the upper basal one  
 sometimes considerably longer than the others, rachis villo, is, under  
 surface more or less villous, upper surface villous, or glabrous  
 excep the secondary rachis, veinlets 3-8 on a side, sin ple, sori  
 medial, involucre glabrous or villous. *Asp. calcaratum*, *Bl. En.*  
*Jni. Jav*, p. 159. *Lastrea calcamt*, *Hook. s. FU. iv. 93*, and  
*falciloba*, p. 108.

VAR. CILIAIA, type (*Wall. Cat.* 351), texture herbacei, us, lowest  
 pinnules deflexed, no auricles on the stem; stipes round, ed, pinna  
 about 4 inches long, caudate at the apex, nearly 1 inc: broad,  
 indusium hairy or glabrous. *Lastrea falciloba*, *Bedd. F. S. I. 105*,  
*Asp. ciliatum*, *Wall. Cat.* 35,, and *Asp. canum*, *Wall. Cat.*  
*Neph. ciliatum*, *Clarke, F. N. I.* 515, except syn. I. I:  
 (*Redd*), which is *L. cana* {*Baker*}.



*PASTIZA CALCIATA, VAR. CILIATA* (Wall.)



South India, very common in all the Western forests and in Ceylon (exactly corresponding with Wallich's two types). Specimens sent from both these localities were partly referred by Hooker to his *calcarata* and partly to *falciloba*, but he doubted whether the **two** species were really distinct. Also in Khasya, the Himalayas; Birma.

ASP. CALCARATUM, VAK./J. *Thw. En.* 391, L. *calcarata*, *Beck. F. S. t.* 246, is an abnormal form, **with** small narrow pinnae tapering at both ends and less pinnatifid, except sometimes quite at the base, where the segments are almost free and distant; but, as Thwaites says, it passes into the type. A form from Birma also has very narrow pinnae and is densely hairy.

VAR.  $\rho$  SERICEA. (*/ Scott, MS.*) Pinnae short oblong, **1/2** inch long by  $1/4$  inch broad, quite obtuse at the apex, or ending in a short sudden point (never caudate), involucre glabrous, otherwise as in the type. L. *sericea*, *Bedd. R. B. I. t.* 308. This is, perhaps, scarcely distinct as a variety from the type, but its geographical limits are curious, in North India it has only been found in Chittagong, elevation 200 feet, and in South India only on the Jeypore Hills west of **Vizagapatam**, elevation 2,000 feet. I have had it for several years in cultivation and it quite kept its character.

VAR.  $\gamma$  FALCILOBA. (*Clarke.*) Stipes angled and furnished with auricles below the frond; **pinnae** more numerous and narrower, 4 inches long by  $1/2$  inch broad; texture **subcoriaceous** (more like *Ochthodes*); **indicium glabrous**. *Lastrea falciloba* Hook. *Sp. Fil. v.* */.* 108, in part only. *Aspidium hirsutulium*, *Wall. Cat.* 385, type sheet example b, has no auricles on the stipe, and appears to me to belong to the type (*ciliata*), it only consists of a single small frond and might belong to either, but I fear *falciloba* and *ciliata* are not well defined as varieties, but run one into the other. *Clarke, F. N. I.* 515, *excl. I* 105, *Bedd. F. S. I.*

**Khasya** and Sikkim mountains up to 3,000 feet and in the plains.

(Clarke's variety **pubera** does not belong here, *Wall. Cat.* 338, being *Nephrodium arbuscula* (typical), and from the Himalayas near Dindigal, not from Nepal.

11. *LASTREA VIBROSA*. (J. Sm.) Stipes 6 inches or more long, firm, erect, reddish-brown, slightly scaly, finely villous; fronds 9-12 inches long, 4-5 inches broad, oblong-lanceolate, pinnæ close 2-3 inches long, the lower ones somewhat reduced and deflexed, cut nearly to the rachis into close spreading linear-oblong lobes under 1 line broad, textures herbaceous, colour dark green; rachis villous, under surface densely glandular, veinlets 5-6 on a side, sori medial. *Hook. Syn. Fil.* p. 264. *Beid. F. B. I. t.* 334.

Malay Peninsula, at Malacca.

(Also in the Philippines and Borneo.)

12. *LASTREA CRASSIFOLIA*. (Bl.) Stipes tufted 1½ foot long, channelled above slightly hirsute; fronds deltoid ovate, firm herbaceous, pinnate, pinnæ pinnatifid, rachis, costa and costules beneath hirsute, the rest glabrous, pinnæ petiolate (petioles ½ inch long) or sessile, lower ones not reduced in size, pinnatifid nearly two-thirds down to the rachis, segments obtuse subfalcate subentire, basal ones reduced in size, costa deeply channelled above, veinlets simple, the lower pair free (as in *Lastrea*) or joining just before entering the sinus of the segments (as in *Nephrodium*) remaining ones simple (or rarely forked) sori one on, or a little below the centre of each vein, involucre reniform glabrous. *Aspidium, Bl. En. Fil. Jac.* 153. *Hook. Syn. Fil.* 266. *Lastrea nephrodioides, Beid. F. B. I. t.* 199.

Birma and the Malay Peninsula. I also have a specimen collected in Sikkim, 3,000 feet elevation, by the late Mr. Atkinson, which I refer here, as it exactly corresponds in venation; the pinnæ, however, are sessile, and the upper basal segment (or pinnule) somewhat enlarged.

(Also in the Philippines and Java.)

13. *LASTREA CANA*. (Baker.) Stipes densely tufted, 6-10 inches long, finely villous and often furnished with pellucid scales, chiefly towards the base; fronds 8-12 inches long, elongate lanceolate, not narrowed at the base, or suddenly or gradually narrowed into auricles on the stipe, pinnate with numerous pinnæ, terminal ones two inches long by ½ inch broad, cut down nearly to the rachis into close

crenated lobes, texture **herbaceous**, rachis slender, villous, an\* sides slightly so, veinlets 6-8 on a side, simple (very rarely forked), sori small medial on the veins, indusium reniform, glabrous. **Baker, Hook. Syn. Fil. 267, not Wallieh, Bedd F B I. L. Bergiana, Bedd. F B. I. Suppl. t. 370. Aspid. appendic Wall. Cat. 349, type sheet only. Aspid. eberneum, Wai 359, type sheet only.**

Himalayas near Simla, Sikkim, Yakla 8,000 feet elevation. Mr. Clarke thinks this may be only a variety of *ochthodes*, but it has no glands at the base of the pinna; the texture also is different, and it is more hairy.

14. **LASTREA\* BEDDOMEI.** (*Baker*), Rhizome slender, wide creeping; stipes 6-9 inches long, slender, glossy; fronds pinnate up to about 1 foot long, lanceolate elliptic, central **pinna** the **largest** about  $\frac{1}{2}$  inches long,  $\frac{1}{2}$  inch broad! cut down almost to the rachis into close rather acute entire segments under 1 line **broad**, lower pinnae distant and dwindling down very gradually, texture rather firm, veins beneath furnished sparingly with **longish white** needle-like hairs, veinlets 4-5 on each side, simple sori near the margin. **Baker, Hook Syn. Fil. p. 267. L. gracilescens, Bedd. LX S.J.t no.**



No 122,

LASTREA BEDDOMEI.

{*Baker.*}

South India on the Travancore and Tinnevely **Mouij** swampy ground. Ceylon, common in swampy places about **Elya**. A pretty delicate species much cultivated at Ootacan.

15. **LASTREA ELWESII.** (*Baker*) Stipe not seen, minutely pubescent; fronds oblong-lanceolate, narrowed **at** **midrib** at both ends, 16 inches long, by  $\frac{1}{4}$  inches broad, **innate**; pinnae patent, subobtuse, cut down only **one-half**

the middle; segments broad, short, obtuse, lower pinnae much reflexed and gradually shorter; texture moderately firm, surface naked, light green; veinlets distant, simple, about 4 on each side; sori broad marginal; indusium small fugacious. *Hook. Syn. Fil.* 497. *Bedd. Fern. Sup.* 4. 376.

Sikkim (Blakes, only once collected, and a single frond without stipe.)

16. *LASTREA OCHTHODES*. (*Kze.*) Caudex erect, stipes tufted, 1-2 feet long firm, naked or nearly so; fronds 2-4 feet long, 8-10 inches broad; pinnae  $\frac{1}{2}$ -1 inch broad, cut down nearly to the rachis into entire or bluntish, often falcate segments 1-1 $\frac{1}{2}$  lines broad, with a prominent gland at the base beneath, the lower ones gradually reduced; texture subcoriaceous; rachis and underside more or less villous, veinlets prominent, simple 10-15 on a side; sori submarginal. *Aspidium ochthodes*, *Kze. in Linnaea*, xxiv. 282. *Bedd. R. S. L. L.* 106. *Nephrodium prolixum*, *Baker, Syn. Fil.* 268.

Northern India, throughout the Himalayas and Khasia Mountains; South India and Ceylon, throughout the mountain forests; Malay Peninsula.

*VAR. B. TYLODES* (*Kze.*) More coriaceous, rachis and underside glabrous, lower pinnae not gradually reduced, but suddenly abortive and reduced to tuberculated glands, sori at the base of the veins, close to the costules. *Bedd. F. S. L. L.* 107.

South India mountains, rare, and probably the same localities as *ochthodes*; it is, I believe, quite entitled to rank as a species. I have had both in cultivation for many years, and Mr. Thwaites, who cultivated them in Ceylon, considered them distinct species.

17. *LASTREA FAIRBANKIE* (*Bedd.*) Caudex long creeping, as thick as a crow quill, very black, glabrous, but furnished with a few series, copiously rooting, stipes 8-20 inches long stramineous, black at the base, rachis channelled above, glabrous or slightly pubescent with weak glandular hairs; fronds coriaceous 6-10 inches or more long, narrow oblong pinnated, pinnae opposite or alternate, sessile or nearly so, 1-1 $\frac{1}{2}$  inches long, less than  $\frac{1}{2}$  inch broad, linear obtuse or acuminate at the apex, pinnatifid nearly to the rachis, the lower ones

reduced in size and often more distant, the pinnal rachis channelled and glabrous on the upper side, slightly pubescent or glabrous beneath, and there furnished with numerous broad-ovate or lunate very transparent scales, segments oblong to ovate entire much recurved at the margins; veins more or less undulate; venetia simple excurrent at the margin; sori one on the centre of each veinlet; involucre reniform, fimbriate at the margin. *Bedd. F. B. I. t. 254.*

Putney Mountains, in swamps about the south base of Peernall Malley, 4,000 feet elevation. It was also formerly found about the lake at Kodickarnal on the same mountains, but has disappeared from that locality. In my Supplement I have reduced it to *thelypteris*, but now believe it to be distinct. In its reduced lower pinnae it approaches *Biddoni*, but it is much more rigid in texture, and its scaly secondary rachis is quite unlike that fern. I hope it may be further collected. There is a specimen in the British Museum.

*B. Veins forked.*

18. *LASTREA THELYPTERIS*. (Desv.) Rhizome slender, wide-creeeping, stipes about 1 foot long, slender stramineous; fronds 1-2 feet long, 4-6 inches broad, lanceolate, truncate at the base; pinnae spreading,  $\frac{1}{2}$  inch broad, cut down very nearly to the rachis into entire spreading linear oblong lobes, those of the barren frond the broadest, lower pinnae equalling the others, veins forked (upper ones simple) texture herbaceous, rachis and both sides naked, sori small, not confluent, in rows near the recurved edge; indusium small inconspicuous. *Desv. in Mém. Soc. Linn. G. 257. Bedd. F. B. I. t. 44. Hook. Syn. Fil. 271.*

South India, on the Nilgiris, swamps near Ootacamund; North India, Kashmir, Bandipoor, City Lake, 5,600 feet elevation, Kunawur, 6,000 feet.

(Also in Europe, North Asia, North America, Cape Colony and New Zealand.)

19. *LASTREA CRISA*. (Baker.) Stipes firm, erect, grey, villous upwards; fronds 1 $\frac{1}{2}$ -2 feet long, 8-9 inches broad, oblong lanceolate

pinnæ close, 3-4 inch long,  $\frac{3}{4}$ - $\frac{7}{8}$  inch broad, narrowed gradually from the base to the apex, cut down nearly to the rachis into blunt,



N?I23.

LASTRE\* THELYPTEUIS. (Desv.)

entire, pinnules broad, with recurved edges; texture subcoriaceous; rachis villous, and veins beneath slightly so; veinlets about 10 on a

side, mostly forked; sori small, submarginal; involucre ciliated.  
*Hook. Syn. Fil. p. 271. Bedd. F. B. I. t. 335.*

South India, near Cochin, only once collected.

20. *LASTREA FUSCIPES.* (*Wall.*) Stipes trifid, slender 6-12 inches long, dark purplish-brown, scaly below, fronds 12-24 inches long, 6-12 inches broad, oblong-lanceolate, pinnate; pinnae 3-6 inches long, 1 inch broad, the lowest pair rather shorter than the others, and deflexed, and with some of its lower segments often elongated; segments cut down to a broadly-winged rachis, linear-oblong, blunt, entire or slightly crenate; texture herbaceous, rachis polished like the stipe; veinlets 6-8 on each side, simple



*LASTREA SERRATULA.*

or forked, generally excurrent when sterile, but terminating well within the margin when fertile; sori generally apical on a veinlet, sometimes well below the apex; indusium reniform fugacious.  
*Wall. Cat. 361. Lastrea melanopus, Hook. Sp. Fil. iv. 110. Bedd. F. B. I. t. 38. L. sagenioides, Hook. Syn. Fil. 271. Polypodium obscurum, Hook. Sp. Fil. iv. 237. Syn. Fil. 308. Bedd. F. B. I. t. 230.*

Burma and the Malay Peninsula.

(Also in the Philippine Islands.)

The type sheet of *Aspidium fuscipes* in *Willdell's Herbarium*, No. 361, is this plant, but the other sheets are *Pleocnemia membranifolia*.

21. *LASTREA SERRATULA.* (*Willd. under Aspidium*). Stipes

tufted, 1-2 feet long, naked, straw-coloured; fronds up to about 5 feet long pinnate; pinnae shortly stalked up to about 1 foot long by 1 1/2 inch broad; rachis cut down to a broadly winged rachis, the lower ones scarcely reduced; segments 1/2 inch broad, slightly toothed, rather distant, with a tooth in the sinus between them, glabrous or subglabrous, scarcely coriaceous in texture; rachises glabrous on both sides; veins all forked 10-15 on each side; sori small in a single row on each side of the costule, nearer the margin than the costule, always medial on the superior veinlet (never terminal); indusium



reniform glabrous. *Willd. Sp. Pl.* v. 237. *Hook. Syn. Fil.* 272. *L. spectabilis, Hook. Sp. Fil.* iv. 115. *Bedd. Fl. S. I.* t 108.

Mr. Baker says that the groups of veins often join, this I have not seen in my specimens; but very rarely the two forks of the vein join each other before running out at the margin; the veinlet is also always continued beyond the sorus, I have never found a terminal sorus, though they often appear to be so until the frond is held up to the light.

South India, not common; Carcoor ghat, 2,000-2,500 feet; Anamallays and Travancore Hills. Ceylon forests of the central provinces; North India, Assam and Khasia, up to no great elevation; Birma and Malaya Peninsula.

(in the Philippines.)

*LASTREA FLACCIDA. {Hook.}* Stipes tufted, about 1 foot long, glabrous, fronds, 1-1 1/2 feet long, pinnate; pinnae very flaccid membranaceous, 3-4 inches long by nearly 1 inch broad, cut down to the rachis, which has a very distinct narrow wing quite square with the rachis, between the pinnae; pinnae oblong from a very square

N<sup>o</sup> 125

*LASTREA FLACCIDA. {Hook.}*

Sikkim, A

Malaya

Peninsula

Philippines

Slender

and me

to be

the rach





№128.

FERNS OF BRITISH INDIA AND CEYLON.

base, and )btuse at the apex, rather deeply lobed (about half down) ;  
 the segment s being falcate, lower pinnae somewhat distant and a little  
 reduced in size, and sometimes deflexed; main rachis slightly-  
 hairy, par-jial rachis costules and veins furnished with longish weak  
 hairs above, and beneath with long white needle-like hairs ;  
 venis pinna te in the ultimate segments in fully developed fronds',  
 forked or ev en simple in smaller examples ; sori generally terminal  
 or near We apex of a veinlet; indusium small reniform. *Hook Syn*  
*Fl. p. 274. Bedd. F S. I. t. 250.*

*Mr. Clarke has joined this with Z. gracilescens, but quite wron gly*  
*in my opinion, its real affinity is with L. tenericaulis, which it strongly*  
*resembles, and of which it may be a more simple form.*

with India Travancore Hills, rare. Ceylon, about Newera  
 Elya and th e highest part of central provinces. Himalayas up to  
 6,000 feet.

(Also in Java.)

23- |ASTREA BRUNONIANA. (*Wall*) Stipes tufted, 4-6 inches  
 long, black, densely clothed with large dark-brown lanceolate scales,  
 fronds .8 inches long, 2-4 inches broad, with numerous close  
 subequa [ oblong-lanceolate blunt pinnae, the lower ones reduced the  
 largest 1-2 inches long, \ inch broad, cut down nearly to' the  
 rachis into s harply toothed rounded lobes i|-2 Hnes broad, texture  
 herbaceous, , rachises ebeneous and more or less clothed with long  
 fibrillose scales, under surfaces naked, sori copious, medial on the  
 veinlets. \sp. Brunonianum, *Wall Cat 344. Book, Syn FiL 274.*  
*Bedd. F. P. • /- A37-*

Hima iayas, 11,000 to 16,000 feet, Kashmir to Bhotan. Very  
 like *L. odontoloma* in texture and cutting, knowing so little of the  
 plant a H do, I should not like to suggest it is the same, but I had  
 ev at comc ulty in distinguishing between some specimens of these  
 two in th I Kew Herbarium, and Mr. Clarke named one specimen he  
 gav me •f this "odontoloma."

34. LASTREA BAR NIGERA. (*Hook.*) Stipes tufted, 6-12 inches  
 sely clothed with large bright-brown scales and soft silky



Nº 127

*LASTREA BARBIGERA.* (Hook.)



Nº 128.

*LASTREA ODONTOLOMA.* (Hook.)



fronds 2-3 feet long; pinna: close, lanceolate, 4-6 inches long, **chbroj d**, gradually **reduced** below; pinnules oblong, blunt, usually distinct, sometimes subpinnatifid, the **segments With copious** teeth, the **edge** often incurved; texture herbaceous; rachises like the stipe; midrib beneath rather scaly; sori in rows the midrib of the pinnules. *Hook. Syn. Fil.* 274. *Bedd. F. B. I. t. 227.* L. *Fs*:oncri, *Hook. Syn. Fil.* 277. *Eedd. F. B. I. t. 41.*

Himalayas; Kashmir to Sikkim, 11,000-15,000 feet elevation. Nearly allied to *Brunoniana* if it be<sup>1</sup> really distinct, which I doubt.

25. *LASTREA ODONTOLOMA.* (*foore.*) Stipes \*6 inches, soft thick **chestnut-coloured, with** scattered deciduous lax lanceolate scales; fronds up to 10 inches long, by 6-8 inches broad, oblong-lanceolate, truncate at the base; pinnae often widened at the base, 2-pinnate; secondary **pinnae** elliptic-oblong, pinnatifid (sometimes deeply); segments unfurrowed, sharply serrate; texture thin becoming hyaline towards the margin; venation **subflabellate**; involucre fimbriate. *Clarke, J? N. I. p. 521.* L. *Filix-mas*, var. *odontoloma*, *Hook. Syn. Fil. p. 49.* *Bedd. F. Sup. t. 373, not F. S. I. t. r 14 (which is typical Filix-mas.)*

Himalayas, Chumba to Bhotan, 11,000-16,000 feet elevation.

I have followed Air. Clarke in separating this from *Filix-mas*, but I fear I may be wrong in so doing, as specimens of Mr. Clarke's *Filix-mas*, var. *panda* seem to connect this with that protean species; but if it goes into **Filix-mas**, *Brunoniana* and **barbigera** must also be referred there. I find the greatest difficulty in distinguishing between this species and *Brunoniana*, the fimbriate involucre and the truncate base to the frond, seem the only reliable characters, the **former**,<sup>1</sup> however, is of no specific value, and the latter I fear is not constant (unless I still confuse the species), as some specimens which I believe to be *Brunoniana*, and decided by Mr. Clarke to be such, have the fronds **without reduced pinnae** at the base.

26. *LASTREA FILIX-MAS.* (*Linn, inulter Pofypodium*) Stipes tufted, more or less clothed **with** scales, fronds up to about 4 feet long, and about 1 foot broad **pinnate to sub-bipinnate**;

pinnae lanceolate, cut down nearly (scarcely ever quite) to the rachis into close, blunt, regular segments, which are sub-bentire, crenate, or serrulate, lower pinnae sometimes dually reduced, sometimes not at all so; texture generally more or less coriaceous, rachis glabrous, under surface generally naked, sometimes fibrillose, forked, or the lower ones pinnately (sori medial; involucre large) glabrous. Polyp. *Filix-mas*, L. *sp. PL* 1551. *Hook.* p. 272; *Sp. Fil.* iv. 116. *Lastrea odontoloma*. *Bedd. F S.* 7. / . r (typical *Filix-mas*), *Clarke, F N.* I, p-

Throughout the Indian region, but generally confined to the mountains, consider! file.

(Also found throughout the world (in temperate places) except in Australia and America south of Peru).

VAR. 13 PARALLELOGRAMMA. (*Hook. Sp. Fil.* iv. 116.) Pinnate, rarely sub-bipinnate, pinna; often reduced towards the base, segments oblong-parallelogram, generally close and compact, entire, crenated or serrated.

I include under this as varieties, *patentissima*, *fibrillosa*, *apiciflora*, and *Clarkei*. Taking *patentissima* (common throughout the Indian region) as the type, they all show very slight differences, and these are not constant; *apiciflora*, which has generally been made distinct species, is remarkable, on account of the sori being confined to the apex of its segments; Mr. Clarke, however, found it with the sori scattered, though he says it can be distinguished by being remarkably free from fibrillae and gathered, near Darjeeling, with which the fronds are generally more truncate at the base than *pat-*



LASTREA FILIX-MAS. (L.)  
VAR. NII)US. (Clarke.)

but I have specimens where the pinnae are gradually reduced; the involucre is reniform, or quite circular from the overlapping at the sinus. Himalayas, Nepal to Bhutan, 7,500-11,000 feet elevation. *Bedd. F. B. I. t. 40.* — *Vidua.* Tufts very circular, fronds small, lower pinnae a little reduced and deflexed, segments few, sori scattered, but with a tendency to be apical. Sikkim, 9,000-12,000 feet. *Bedd. F. B. I. Sup. t. 377.* — *Clarke.* Tufts circular, fronds tapering much at the base, almost down to the caudex; much smaller than the type, but quite running into it. Sikkim, 9,000-11,000 feet. *Bedd. Fern Sup. t. 371.* Colonel Dyas sends this from Dalhousie with the under surface very fibrillose (*vide* specimen in British Museum). — *Fibrillosa* differs only in having the under surfaces of the pinnae copiously clothed with fibrille. N. W. Himalayas, 9,000-12,000 feet from Kumaon to West Kashmir.

VAR.  $\gamma$  ELONGATA. (*Hook and Grev. Ic. t. 254.*) Fronds truncate at the base, bi-tripinnate, or sometimes pinnate only in forms from high elevations, ultimate segments generally narrowed upwards from a broad base, rachises glabrous or scaly. *Hook. Sp. Fil. iv. 117.* *Bedd. F. S. I. 112.* Var. *marginata*, *Clarke, plate 71.* *Aspid. Canariense, A. Brown.*

South India on the Western mountains, 4,000-6,000 feet elevation; Ceylon; Himalayas and Khasya, 5,000-9,000 feet elevation. *Aspidium rigidum* (*Desv.*) seems quite to run into this. *Aspid. Schimperianum* (*Hochst.*) [intermedia, *Bedd. F. S. I. t. 113*], is only a form at a higher elevation. 2-pinnate or 1-pinnate, with often very large sori; but it quite runs into the type. Nilgiris, higher elevations. Himalayas, 7,000-12,000 feet. This can always be distinguished from large forms of *sparsa* by the lower basal pinnules of the lowest pinnae not being elongated.

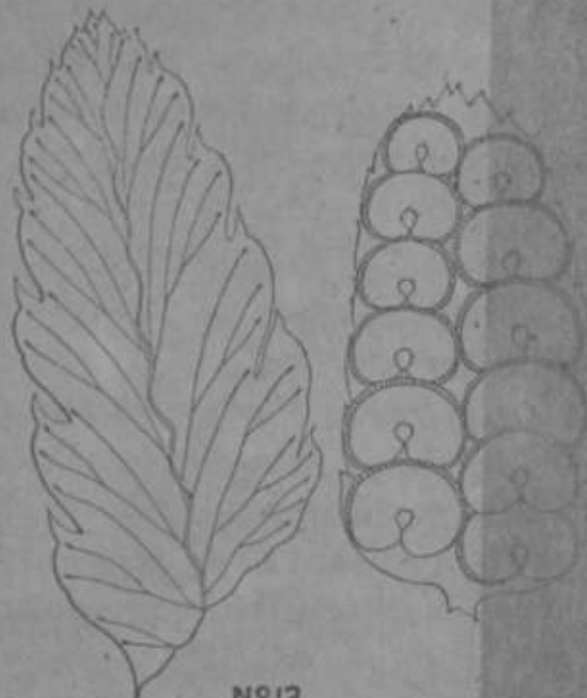
VAR.  $\delta$  COCHLEATA. (*Don.*) Fronds truncate at the base, generally dimorphic, pinnate or sub-bipinnate in the sterile, bipinnate in the fertile; involucre very large and completely covering the under surface of the contracted fertile pinnules, but the broader fronds are sometimes partially, or even wholly, unfructiferous;

FERNS or BRITISH INDIA AND CEYLON.

Rachises glabrous, or sometimes scaly. *Bon. Prod. FL A*  
*Cruda*". *F. S.I. t.* 115. *Arthobotrys macrocarpa*, *Wall. Cat.* 395.  
 North India up to 4,000 feet elevation; South India, Western  
 Mountains 2,000-4,000 feet; Malay Peninsula. A very distinct  
 looking plant in its typical form at low elevations, but running  
 elongata at higher elevations (*vide* forms of my collecting on the  
 Nilgiris and **Brumagherries** in the British Museum).

VAR. £ PANDA. {*Clarke*<sup>^</sup>  
*F. A*<sup>7</sup>. *I. p.* 519, *t.* 68, // > 1.)  
 Fronds simply pinnate, truncate  
 at the base, narrow-oblong,  
**pinna; pinnatifid** towards  
 the midrib, segments sub-  
 spinulose.

Himalayas, Dhurmsala,  
 10,000-11,000 feet elevation.  
 This has much the aspect of  
 odontoloma, and it will pro-  
 bably prove to be a luxuriant  
 form of that plant if a  
 variety of **Filix-mas**, it cer-  
 tainly connects odontoloma  
 with it.



Nº 13 0\*  
 LAS PRA FILIX-MAS. (/.  
 Don.)

VAR. I COCILF.AT\*, I

f t t<sup>1</sup> *Fronds compound, 2-4-pinnate.*

**I** 27. **LASTREA RIGIDA:** (*Desv.*) Stipes tufted, 6 inches  
 densely clothed below with large lanceolate or ovate scales;  
 fronds up to 2 feet long, oblong-lanceolate, largest pinnae 3-4 inches  
 long, 1-1 1/2 inch broad, the pinnules of the lower half free ovate  
 rhomboidal, cut down nearly to the rachis below, teeth mucronate;  
 textureaceous; rachises usually scaly, under side naked or slightly  
 glandular; veinlets subpinnate in the lower lobes of the pinnules;  
 sori midrib; indusium firm prominent. *Hook. Syn. Fit. p.* 275.

*F. N.I. p.* 523.

**I** Very near *L. Filix-mas elongata*, and I cannot say I know any  
 character to distinguish it.

Himalayas, Kashmir to Kumaon 6,000-8,000 feet elevation.  
(Also in Europe, Caucasus, and Cabul.)

28. *LASTREA SPINULOSA*. (Desf.) Stipes tufted, about 1 foot long, sparingly clothed with ovate concolorous scales; fronds 12-18 inches long, 6-8 inches broad, oblong-lanceolate; lower pinnae sub-deltoid, 2-4 inches long, 1½-2 inches broad, the lowest pair about equal to the next; pinnules ovate-lanceolate, the largest about 1 inch long, ½ inch broad, cut down to the rachis below into close oblong lobes with copious aristate teeth; texture herbaceous; rachis stramineous, scarcely scaly; under surface not glandular; colour pale green; involucre not gland-ciliated. *Hook. Brit. F. t. 20.*

VAR. *γ* REMOTA. (*J. B.*) Scales lanceolate, concolorous, extending to the rachis; fronds oblong lanceolate, about 2 feet long, 6 inches broad; pinnae lanceolate, close; pinnules ovate-oblong, only the lowest free, the largest about 1 inch long, ½ inch broad, cut half-way down to the rachis or more; spinulose teeth few; under side and involucre not glandular. *Hook. Brit. F. t. 22. Bedd. F. B. I. t. 336. Asp. eberneum, Wall. Cat. 389, in part.*

Kashmir to Nepal, 6,000-9,000 feet elevation.

(Also in Northern and Alpine Europe, Asia and America.)

29. *LASTREA SPARSA*. (Don.) Rhizome short, suberect, densely covered with lanceolate-linear golden or reddish scales; stipes long, 1 foot or more, with scattered scales; main rachis generally glabrous or subglabrous; fronds ovate, 2-3 pinnate, lowest pinnae the largest, deltoid, with their lower basal pinnules generally compound, pinnules deeply pinnatifid above, less so below, and more or less cut away at the base, ultimate segments oblong or somewhat trapezoidal, coarsely toothed and often quite sharply serrated; texture more or less coriaceous; veins pinnate in the segments terminating within the margin; sori either terminal on a veinlet or well below its apex; indusium reniform. *Don. Prod. Fl. Nep. 6. Bedd. F. B. I. t. 103. Hook. Syn. Fil. Ind. Aspidium marginatum, Wall. Cat. 251, ind. short.*





A. D. CATTELLACENGRAS.

LASTREA SPARSA. (Don.) VAR.  $\gamma$  OBTUSISSIMA. (Mett.)

Himalayas and Khasya, 2,000-6,000 feet, very common; South India, abundant on all the Western mountains and on the hills on the East side; Ceylon; Burma and Malay Peninsula.

(Also in the Malay Islands, China, and Mauritius.)

VAR.  $\beta$  NITIDUL. (Wall. Cat. 392.) Stipes and rachis red, lower pinnae less divided, pinnules less cut; indusium deciduous, *Bedd. F. Sup. l. 374.*

Nepal to Bhutan, 9,000-12,000 feet elevation.

VAR.  $\gamma$  OBTUSISSIMA. (Willd.) Base of stipe clothed with light brown broad chaffy scales, lower pinnae similar to the others; frond less cut, the ultimate segments broader, shorter and bluntly oval to obovate. *Bedd. F. Sup. 375. Kuhn. Lin. 36.*  
Ceylon, Nepal.

VAR.  $\delta$  DELTOIDEA. (Bedd.) Fronds quite deltoid, the upper and lower basal pinnules being much reduced in size. *Bedd. F. S. I. l. 248.*  
Ceylon.

VAR.  $\epsilon$  MINOR. (Thun.) Fronds very small, often only 3 inches, simply pinnate, the pinnae only  $\frac{1}{2}$  inch broad, but in fructification, larger specimens, however, running into the smaller forms of *deltoidea*.  
Ceylon; Simla, North Cachar.

VAR.  $\zeta$  ZEYLANICA. (Bedd.) In texture and colour like *obtusissima*, but much more compound and the basal pinnules larger than the others, main secondary and tertiary rachises more or less matted with black adpressed flutish scales; base of stipes a cushion-like mass of long narrow golden scales. *L. paucinaulifera*, var.  $\beta$  *Zeylanica*. *Bedd. F. Sup. p. 17.*  
Ceylon, Blackpool.

VAR.  $\eta$  UNDULATA. (Thun.) Pinnae deflexed, rachis and secondary rachis geniculate-flexuose. A very curious variety only found on the top of the hill over the Hackgalle Government Gardens.

Ceylon (near Newera Elya), 5,000 feet elevation. *Lastrea* {*Thwaites*\ *B&dd. F. S. I. t. 271.*

Mr. Clarke's variety *latesquama*, does not differ from what I consider the type of **sparsa**, which agrees exactly with *IVall* *Cat. 399.* *Asp. densum*, and *Wall. Cat. 7080, Asp. oppositum.*

30. *LASTREA PULVINULIFERA. (Bedd.)* Stipe up to 30 inches long, furnished **with** a dense cushion-like mass of golden scales at the base (as in *L. odorata*), and clothed throughout (especially in the older specimens), as are the rachis and partial rachises, with numerous narrow black scales, which proceed from a broad base, and which are generally more copious at the axils of the pinnae ; fronds ample, up to 30 inches long (without the stipe) by 18 inches broad near the base, deltoid, tripinnate, coriaceous-herbaceous ; **pinnae gradually** decreasing in size from the base to the apex, lower pair opposite, large deltoid with the pinnules of the lower margin much the largest, remaining **pinnae** alternate or rarely subopposite or opposite ; pinnales up to 4 inches long in the basal pinna, **with** their secondary pinnules equal to the **primary** pinnules on the upper parts of the frond ; segments obtusely rounded, entire or lobed, and occasionally dentate, or crenate, glabrous on both sides, but sometimes furnished with a few weak setae on the costules and veins on the upper side ; veinlets inconspicuous, terminating within the margin ; sori terminal On the lower **veinlet**; involucre reniform glabrous. *Bedd. F. B. L. t. 338.* *Lastrea pulvinulifera* (Baker), *Hook. Syn. Fil. p. 500, in part only.* *Clarke, F. N. I. p. 525, in part only.* *Lastrea sparsa*, var. *squamulosa*, *Clarke, l. c. p. 524, in part.*

Sikkim, very common about Darjeeling. Perhaps only a very compound form of *sparsa*.

31. *LASTREA BUCHANANI. (Baker.)* Stipes **tuft\*** up to 1 foot long, dark coloured at the base, straw-coloured **upward** densely clothed as is the rachis, with long spreading rather rigid black hairs ; fronds ovate to deltoid, tripinnate, **with** the tertiary pinnules from the base to the apex gradually decreasing in size, the basal pinnules largest ; secondary rachis hairy, **lowest** deltoid unequal sided from being more compound at the base.



A. J. CATTALAN, DEL.

PLATYNEURON SPECTABILE, (Willd.)

tertiary rachis a little scaly, ultimate segments oblong blunt; texture subcoriaceous; veins pinnate or forked in the ultimate segments; sori below the middle of the veins and near the costules (never appear on a veinlet as in *pulvinulifera*); involucre reniform, glabrous, persistent. *Hook. Syn. Fil. p.* 498. *Lastrea pulvinulifera*, *Hook. Bot. Beechey*, p. 500, *in part only*. *Nephrodium pulvinulifera*, *Clarke, F. N. I. p.* 525, *in part only*.

Himalayas, near Darjeeling, 7,500 feet elevation.

(Also in Natal and Bourlaim.)

32. *LASTREA SPECTABILIS*, (Wall. under *Aspidium*.) Stipes 1-1½ feet long and with the rachis purple coloured and furnished with patent linear subulate reddish-brown scales; fronds 2-4 feet long, more than a foot broad, subdeloid, tripinnate with the tertiary pinnales deeply pinnatifid, and their segments again crenated or serrated, lower pinnae largest, deltoid, unequal-sided, the two lower basal secondary pinnae being much produced; texture moderately firm, the costa of the pinnales and veins of the segments sparingly furnished with long weak setae most copious on the upper side, otherwise glabrous, setae medial on the upper basal veinlet of the segment; involucre reniform. *Wall. Cat.* 319. *Clarke, F. N. I. p.* 526. *Laurea Hendersoni*, *Bedd. Fern Suppl.* 377.

Khasya on Shillong Hill, 5,000-6,500 feet elevation; Nepal.

33. *LASTREA PROSTRATA*, (Moore under *Pteris*.) Stipes about 1 foot long, firm slightly scaly below; fronds up to 2 feet long, oblong lanceolate, bipinnate with the pinnales deeply pinnatifid, pinnae 4-6 inches long, 2 inches broad, lanceolate, the secondary rachis with a very narrow inconspicuous wing, pinnales stalked, deltoid, unequal-sided, with broad blunt subangular lower segments and prominent teeth, texture rather firm, rachis and both surfaces naked; setae terminal in the teeth which the convex involucre quite conceals. *Dichsodon*, *Moore, Ind. Arch.* 316. *Lastrea demissa*, *Bedd. F. S. I. 136*. *Hook. Syn. Fil.* 277.

South India, on the Annamaly Hills, 2,000 feet elevation; Ceylon, southern provinces.

FURNS OF BRITISH INDIA AND CEYLON.

LA. STKKATHW. UTKS.,, (Baker) Quite like the last in  
 outline and habit, except that the " pinnules are less cut and  
 of having prominent teeth, and the  
 t within the margm ; it is probably only a variety of depari-  
 as that species is very abnormal in the  
 Hook. Sy 277. L. concinna (Thwaites), Bedd.

Ceylon, southern pro-  
 vinces, 2,000 feet elevation.



N9133

LASTREA \ DEPARIOIDES.

{Moore.}

35- LASTREA CRENATA.  
 {forsk under Pofypodium.)

stipes up i\* foot long, straw  
 coloured, glossy, densely  
 clothed at the base with a tuft  
 of golden lanceolate-linear  
 scales, fronds up to 1\* foot  
 long, 3-4-pinnate deltoid  
 lowest pinnae much the latest'  
 deltoid, 6-9 inches long, 3-4  
 inches broad, pinnules lan-

ceolate, often imbricated, with  
 ovate or oblong pinnatifid  
 segments, with blunt rounded

pale green; rachis pilose or  
 us, medial on the veinlets; indusium large, pale coloured,  
 185. Lastrea eriocarpa; (Decne.)  
 S. I. t. 95. Nephrodium odoratum  
 280. Aspidium pilosulum, Wall. Cat.  
 Sid subdiaphanum, 343.

ima Uyas from Gui-whal to Bhotan, 2,000-7,000 feet elevation

2 000-4,500 feet, Chota Nagpore, 2,000^3,000^feet, S i 7  
 a e Anama M, Lenngoondaftn, 5,000 ft. J d c i "  
 ern ghats, but rare ; Ceylon; Malay Peninsula. d else re

(Also in Tropical Africa; Mauritius; South China.)

36. *LASTREA PARISHII*. (*Hook.*) Caudex creeping, stipe 6-9 inches long, slender, naked, ebeneous, fronds small, 6-8 inches each way, deltoid, the lower pinnae much the largest, lower pinnules larger than the others, which are oblong-lanceolate acuminate 1-2 inches long by  $\frac{1}{2}$ - $\frac{1}{4}$  inch broad, cut down nearly to the rachis into close oblong-lanceolate crenated lobes, texture membranaceous, rachises and under surfaces pubescent; veinlets pinnate or forked in the lobes; sori in two rows, not far from the midrib, apical on a veinlet or situated well below the apex, indusium reniform. *Hook. Syn. Fil.* p. 281. *Bedd. F. B. I.* 1. 43.

Birma, Moulmein, moist shady places on limestone rocks.



NO 134

*LASTREA PARISHII*. (*Hook.*)

37. *LASTREA SIKKIMENSIS*. (*Bedd.* under *Polystichum*.) Stipes and rachises rather copiously furnished with persistent ovate acute blackish scales, fronds ovate acuminate up to 3 feet long, subcoriaceous-membranaceous, bipinnate, primary pinnae 4-6 inches long, oblong acuminate, secondary pinnules oblong, deeply pinnatifid,  $\frac{1}{2}$  inch to 1 inch long, tertiary pinnules sharply and deeply cut, with the segments acuminate and imbricate, costa of the pinnules wavy, veins simple or forked, terminating within the margin, sori generally one to each segment, terminal on a veinlet, involucre reniform. *Polystichum sikkimense*, *Bedd. F. B. I.* 1. 127. *Nephrodium*, *Clarke, F. N. I.* 1. 525. *Hook. Syn. Fil.* 256.

Sikkim, Mon Lepcha, 10,000-12,000 feet elevation.

38. *LASTREA BLUMERI*. (*Hook.*) Stipes up to about 2 feet long, stout, very shaggy, with long linear rufous scales, rachises

fronds pubescent, and copiously furnished with rufous scales, fronds  
 [very large ovate in outline, tripinnate, primary pinna; 10-15 inches  
 long, tertiary pinnae 1-2 inch long, pinnatifid nearly to the rachis, the  
 segments oblong entire or rarely rather deeply incised, sparingly  
 hairy above, pubescent on the costa on both sides; veinlets forked  
 simple; sori small medial on the veinlets; involucre reniform  
**obovate.** *Lastrea Blume*, *Hook. Sp. Fil.* iv., n. in part at least  
*id. F. 5.* / \* 249. *L. intermedia* {*Bakr.*}, *Hook. Syn. Fil.* t.  
 3. *L. rhodolepis*, *Clarke, F. N. I.* s<sub>2</sub>( $\lambda$ ).

North India, Sikkim, Assam and Khasia 5,000-7,000 feet •  
 common in the central provinces, 2,000-3,000 feet elevation  
 (Also in Japan; Malay Islands; Polynesia.)

Mr. Clarke states that it is not the *intermedia* of Blume. I do  
 not know whether he is correct in this, but in any case a new name  
 is unnecessary, as it has been published and figured as *Blumei* a name  
 otherwise unoccupied.

39. *LASTREA RECEDENS.* (*Smith.*) Rhizome creeping stip  
 it, villous, clothed at the base with linear scales; fronds ve<sup>v</sup>l<sup>v</sup>  
 ovoid, 3-pinnate above, 4-pinnate below, with the quaternary  
 pinnae deeply pinnatifid, lower pinnae up to nearly 2 feet long (in  
 large specimens) secondary pinna, on the lower side 0-10 inches  
 long, quaternary pinnae 1/2 inch long, the ultimate segments entire  
 or slightly crenated, texture herbaceous, rachises villous, under  
 surface softly hairy on the veins, upper surface near Wlabrou's  
 sept on the costules, veins forked, sori terminal on, or a little  
 low, the apex of a veinlet. *Phegopteris recedens* (*Smith*)  
*Yk. Jour. of Bot.* 'ill 394. *Lastrea recedens*, *Bedd. FS L t 08*  
*-thirds of a small frond.* *Nephrodium*, *Hook. Syn. Fil.* '281

South India, on the lower Pulney Mountains, and Travancore  
 Idimnevelly Hills, 3,000-5,000 feet elevation; Ceylon central  
 provinces, 2,500-5,000 feet elevation.

(Also in the Philippines.)

40. *LASTREA DISSECTA.* (*Forst.*) Rhizome erect, stipes 1 foot  
 more long, a little scaly<sup>1</sup> at the base, fronds ovoid to ovate, u<sup>oot</sup>  
 to



nearly 3 feet long; texture herbaceous, pinnate above, with the pinnae 6-9 inches long by 1½ inch broad, pinnatifid two-thirds towards the rachis, bipinnate below, from some of the lower basal pinnules of the lowest pinna being stalked and much elongated and deeply pinnatifid, and equal to some of the upper primary pinnae; ultimate segments crenulate, a little hairy above (on the lamina, not the veins), with scale-like hairs, quite glabrous below in South Indian examples, but with scale-like hairs in specimens from Ceylon; veinlets forked, always free, a forked veinlet often proceeds from the costa to the margin of the sinus, between the segments; sori apical on the superior veinlet, forming a single row on each side of the segments nearer the margin than the midrib, involucre reniform, glabrous, fertile portions of the frond often much contracted and frond often only partially seeding. *Lastrea membranifolia*, *Bedd. F. S. I. C.* 10, a small frond.

The descriptions of *Lastrea dissecta* in *Hooker's Syn. Fil.* and of *L. membranifolia* in *Hook. Sp. Fil.* includes this species, the variety *ingens* and *Pleocnema membranifolia*.

Madras Presidency, Western mountains, common up to about 5,000 feet elevation; also in the N. Arcot and Vizagapatam Hills, Ceylon, up to 5,000 feet; Birma.

(Also in Malay Islands and Polynesia.)

VAR. *INGENS*. (*Clarke*.) A very large fern, stipe and main rachis pubescent, and with lax narrow-lanceolate sparse brown deciduous scales; fronds up to 9 feet long, the lower pinna 2 feet and more long, bipinnate above, the pinna about 1 foot long by 6 inches broad, the secondary pinnae quite distinct but sessile from a very broad base and deeply pinnatifid, tripinnate below, the lower basal pinnules of the lowest pinna being stalked, elongated and again pinnated, their pinnules (tertiary pinnae) being deeply pinnatifid, and equalling the secondary pinnae above; ultimate segments entire, nearly glabrous above except on the costa, and costules, but there are a few scale-like hairs on the lamina, costa, costules and often the veins beneath furnished with white glaucous multicellular patent hairs; texture, venation and sori exactly as in *dissecta*; involucre reniform.

FERNS OF BRITISH INDIA AND CEYLON.

lobes of the sinus often overlap

wastes \* o ^ \*\*

is ' f " ScedS bUt ^ ' > a d \* - - X on, y

fewS1 h SrV - j had entirely covered

E o : icellu: Ilairs beneath, h

in behir nfn \* CompoUnd, and in the "timate segments

41. LASTREA SPLENDENS. (Hook.) Stipes 2-3 feet long, stout, polished bright chestnut coloured and scaly, as is the main rachis ; fronds long-lanceolate 1/2 to 4 feet, by about 1/2 broad, bipinnate, primary pinnae narrow lanceolate, about 2 inches broad, and nearly the same breadth throughout ; secondary pinnae 20-30 pairs, about 1/2 inch broad, lanceolate-oblong, rounded at the apex, cut about one third towards the rachis into small lobes, the upper, basal one being generally rather larger than the otherS > an more or less serrated .

texture sub-waxy beneath ; sori of narrow winged upwards glabrous above, often scaly beneath ; veinlets pinnate or forked, not reaching the margins ; sori well below the middle of upper veinlet, forming a row on each side of the pinnule near the base. Hook. Syn. Fil. 282. Redd. Ferns of the Malay Peninsula. Sikkim and Bhotan, 6,000-7,000 feet **again**

42. LASTREA ANGUSTIFRONS. (Moore.) Rhizome -ide^ reep- deciduously scaly ; fronds 2 feet

by one inch, glabrous, elongate, 3-pinnate, pinnae distant, erect-patent, flexuose, lanceolate, two inches broad, pinnules distant lanceolate, cut down to the rachis below into subquadrangular toothed segments (tertiary pinnae)  $\frac{1}{2}$  inch broad, texture subcoriaceous; rachis and both sides naked; venlets forked, soon small, low down on the veins near the midrib of the pinnules. *Moore in Hook. Sp. Fil.* iv. p. 126. *Hook. Syn. Fil.* p. 283. *Beard, E. B.* I. L. 249. *T. splendens*, var.  $\beta$ ; *Hook. Sp. Fil.* 126.

Nepal, Sikkim (a little-known plant, perhaps abnormal *Filix-mas* or *splendens*).

43. *LASTREA SCABROSA* (Kuhn) Cander  
 stout, suboblique, densely palaceous, stipes 1-3 feet long, densely palaceous towards the base, scabrous above; fronds membranaceous, semitransparent, deltoid-ovate, acuminate up to about 2 feet long, bipinnate, or subtripinnate above, tripinnate below, pinnae alternate, distant 6-12 inches long, the lowest pair deltoid with some of the inferior basal secondary pinnae enlarged to double the size of the others, which are generally  $1\frac{1}{2}$ -2 inches



LASTREA SCABROSA. (A. DC.)

long and pinnatifid down to a winged rachis (or almost pinnate), the pinnules  $\frac{1}{2}$ - $\frac{3}{4}$  inch long, cut down one-third to half-way to the costa into more or less obtuse segments, venlets prominent, one to each segment, simple or forked, terminating within the margins and ciliate at the apex; costa and veins furnished with weak whitish





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A. C. G. DE GRAS.

LASTREA FERRUGINEA. (Bridle.)

45. *LASTREA BORYANA*. (*Willd. under Aspidium*.) Stipes 2-3 feet long, sparingly scaly near the base; fronds very large, up to 8 feet long by 4 feet broad, herbaceous or almost membranaceous, bipinnate, with the secondary pinnae (3½-6 inches long) pinnatifid down to a very regularly but narrowly winged midrib, pinnules blunt ½-¾ inch long, more or less wide apart at the base, pinnatifid about one-third or half down into small entire segments; rachises and both surfaces naked, or with a little mealy pubescence and a few hairs; veins forked or simple; sori low down on the veins, in a single row on each side of the pinnules near the midrib, generally very small, large in some Himalayan examples, involucre often much lacerated on the margin, very fugacious. *Willd. Sp. Pl.* v. p. 285. *Baker, Syn. Fil.* 284. *Lastrea divisa*, *Hook. Sp. Fil.* iv. 133. *Wall. Cat.* 393. *Bedd. F. S. I.* t. 97. *Polypodium subtripinnatum*, *Clarke, F. N. I.* p. 545, t. 32, fig. 1.

South India, on the Western mountains, 3,000-7,500 feet elevation; Ceylon, central provinces; Himalayas, Gurwal to Bhotan, 4,000-8,000 feet elevation; Khasya; Malay Peninsula. Clarke's variety *microstegioides* does not recede from the type. (Also in Bourbon, Java, and China.)

46. *LASTREA TENERICAGUS*. (*Wallich under Polypodium*.) Caudex erect, furnished with numerous fibrous roots, stipes tufted, below a little scaly, above very glaucous, with a blueish bloom, which easily rubs off; rachis with a line of hairs on the sinuated upper side, glabrous beneath; fronds 1-3 feet and more long, broad ovate-lanceolate acuminate, membranaceous, bipinnate with the pinnules pinnatifid nearly to the costæ, pubescent with long white hairs on the costa and costules on both sides, rachis of the pinnules furnished with a very regular line of dense hairs on the upper side, glabrous and convex below, pinnae rather remote, opposite or alternate, lanceolate acuminate, inferior ones 10-12 inches long by 3 inches broad; pinnules up to 2 inches long, oblong lanceolate from a broad adnate base (which is decurrent so as to form a winged rachis, particularly in the upper pinnae), pinnatifid (in the lower pinnae almost to the costæ); secondary pinnules pinnatifid in the lower pinnae, entire or

with the apex **crenated** in the upper portion of the frond; in the larger ultimate **segments pinnate** with **veinlets simple**, in smaller segments veinlets once-forked only, all terminating **within** the margin; sori medial or terminal on the veinlets, in each ultimate segment, involucre very deciduous. **Polypodium ricaule**, Wall. Cat 335. *Lastrea rliccida*, Thdd R S. L i Pcdyp. **Russellianum**, Wall Cat 7077. *Lastrea* ^ *Baka* ; Syn. *J>i*. 284, in part.

Hooker's and Baker's descriptions of *tenericaulis* and so are made to include *Phegopteris ornata*, a very different fern have never been able to detect an indusium even in the youngest stage of our South Indian plant, and I should follow Wallicj include it in *Phegopteris*, only Mr. Clarke says it is present in Bengal examples.

South India, on the Western mountains, 2,000-3,000 feet elevation, very common; Ceylon, 1,500-3,000. feet; North India, SX from D0 grCat d — " 5 - -00 feet; | Malay

(Also in China, Australia, and Polynesia.)

GENUS LIV.-NEPHRODIUM. (&/oU.)

(From *nephros*, a kidney; shape of indusium.)

Sori indusium SUBS Job0Se, dorsal on \*e veins; (often **athyrid** in o; remform, sometimes wanting; veins pinnate, one or pair anastomosbg angularly with an excun•ent vdnlet fom their junction which is either free or joined in the ang, 90 of J superior pair; fronds always simply pinnate with **pinnatifid**, the Indlan species (rarely simple in species not Indian): erect or creeping. Most of the supposed species of *Goniol* steris fall in here, as an indusium is often present in the very young stage though sometimes entirely absent.

1. NEPHRODIUM OTARIA. (A'ze.) Rhizome creeping, stipe inches long, pale<oloured; fronds 12-i5 inches long, pinnat e, lateral

pinnae distant, 4-6 inches long,  $\frac{1}{2}$  inch broad, linear-oblong, truncate at the base, caudate at the apex, coarsely but shallowly lobed, the lobes serrated; terminal pinna sometimes with larger lobes or auricles towards its base; texture thin herbaceous; rachis and surfaces smooth; veins pinnate in each lobe, 6-8 on each side, the lowest pair anastomosing angularly, with an excurrent vein which either runs out to the margin or occasionally joins one or even two of the superior veins (but the anastomosing is not so systematic as in the other species of the genus); sori medial on the veinlets, most



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NEPHRODIUM OTARIA. (Ktze.)

general, Ceylon, 2,000-3,000 feet elevation.

(Also in Luzon.)

2. NEPHRODIUM UNITUM. (Linn. under *Pteridium*.) Rhizome creeping, stipes 1-2 feet long, brownish naked; fronds about 2 feet long, pinnate, pinnae numerous, 3-5 inches long,  $\frac{1}{2}$  inch broad, cut down about one-third, rarely more, into triangular-acute entire or subentire lobes, lower pinnae not reduced; texture coriaceous; veins pinnate in the lobes, 4-5 on each side, the lowest pair anastomosing

of which are fertile; fertile frond often contracted, but not always; indusium reniform or often asplenoid and elliptoid. *Asplenium otaia*, Kunze, *Hort. Mitt. Aspid.* p. 34. *Hook. Syn. Fil.* 283. *Pleurozema aristata*, *Hook. Sp. Fil.* iv. 62. *Brda. P.S.* 1. t. 83. The sori are quite abnormal, the venation and position of the sori are not at all that of *Pleurozema*.

South India, Anamallay Hills, the dry teak forests, 1,000-2,000 feet elevation, appearing in the rainy season, Tinnevally Hills and elsewhere on the Western ghats, but by no means



angularly, with an excurrent veinlet which runs to the margin or **joins** one rarely two pair of the superior veins; upper surface glabrous, under surface generally very hairy; sori medial on the veins; **indusium reniform, hairy.** *X. Br. Prod, FL Kov. Boll. 148. Hook. Syn. Pil 289. Polypodium unitum, Linn. Sp. PL 1548, in tart. N. propinquum, Hook. Sp. Fil. iv. 79. Bedd. F. S. I. t 80*

**Throughout** the Indian region in swampy places and tanks. (Also in **rropical** Asia, Africa, Australia and America.)

3. NEPHRODIUM PTEROIDES. (*Retz.* under *Polypodium*) Rhizome wide-creeping, stipes

up to 2 feet long & slender, slightly scaly below; fronds up to 4 feet or rather more long and 2 feet broad pinnate. Pinnae spread to nearly 1 inch broad, apex acuminate, acute; texture reduced), cut down only one-third, the lobes triangular, **upper surface** nearly glabrous, under surface with minute glandular pubescence on **all** the veins pinnate. On the **lower** pair with a free excurrent veinlet, the other veins, (7-9 pair), always free; sori towards the apex of the upper veinlets always connate to the lobes or the angles of the lobes. **Polypodium pteroides** (Retz.). *Hook. Syn. Fil. 105. Bedd. F. S. I. t 80.*

(Also in the Philippines.)

Very near *extensum*, but less cut, the anastomosis of the veins angular and the sori terminal.

4. NEPHRODIUM EXTENSUM. (*BL*) Rhizome creeping, stipes up to 2 feet, glabrous or slightly pubescent; fronds up to 4 feet long, and 1 foot broad, pinnate; pinnae about 1 inch broad (lower ones not reduced), cut down two-thirds into linear oblong-falcate slightly crenulate lobes; texture herbaceous; rachis subglabrous, upper surface naked, or with a few distant hairs, under surface with minute glandular pubescence on the veins; veins **pinnate** in the lobes, 10-13 pair, the lowest pair anastomosing at an angle with a free excurrent

veinlet, or meeting just at the sinus without the excurrent veinlet, or the lowest pair is quite free (as in *Lastrea*), the other pairs always all free; sori towards the apex of the veins and present on all or all but the 1-2 lower ones, often much immersed and visible as punctiform dots on the upper surface. *Asp. extensum*, *Bl. En. Pl. Jav. Fil.* 156 *Hook. Syn. Fil.* 289, (not *Bedd. F. S. I. t.* 85, which is large molle). *Asp. aculujugum*, *Wall. Cat.* 343, (not 355, which is *truncatum*). *Nep. punctatum*, *Bedd. F. B. I. t.* 131, (not *punctatum*, *Baker, Syn. Fil.* p. 513, which is *Lastrea ochthodes*, vide specimen in *Kew Herbarium*.)

South India, Tinnevelly Hills, rare; Ceylon, central provinces, 3,000-4,000 feet elevation; Birma, Penang, and Malay Peninsula (Khasya, 2 sheets of Griffiths in the Kew Herbarium, but not found by any one else in North India).

(Also in the Malay Islands.)

5. *NEPHRODIUM MICROSORUM*. (*Clarke*.) Rhizome wide creeping, stipes angled, furnished with linear-subulate long soft brown persistent scales towards the base, more or less softly pubescent as is the rachis; fronds about 2 feet long; pinnae rather distant, sessile, about 4½ inches long, by ½ inches broad, the lower ones somewhat reduced or the stipe with auricles, deeply cut almost to the rachis into linear-oblong tongue-like entire or subentire segments, the upper and lower basal ones often considerably longer than the others; texture thinly herbaceous, both surfaces, especially the under one, furnished with scattered long white needle-like hairs; veins about 13 pairs, the lowest pair always regularly anastomosing at an acute angle very near the costa of the pinnae with an excurrent vein, the other pairs always all free; sori minute, sometimes only near the costa of the pinnae and scarcely extending to the lobes; involucre glabrous caducous. *N. extensum*, var. *microsorum*, *Clarke, F. N. I. t.* 536, and var. *late-repens*.

Sikkim up to 4,000 feet elevation, very abundant about Siligori, near the foot of the Darjeeling Pass.

6. *NEPHRODIUM CUCULLI* (L.) Hook. f. *Bot. Beechey* 1, front 1, front



NEPHRODIUM CUCULLATUM. (Bl.)

long, hairy, strong erect; frond with the main rachis hairy beneath, up to 2 feet long, pinnate; pinnae very close, 3-6 inches long, by  $\frac{1}{2}$  inch broad, cut down scarcely one-third into triangular acute subfalcate lobes, lower pinnae dwindling suddenly into mere auricles; texture very coriaceous, lower surface very pubescent; veins raised when dry, 8-15 pair, 3-5 lower ones uniting; sori towards the apex of the veins, which are generally all soriiferous; indusium prominent, glabrous, persistent. *Aspidium cucullatum*, *Bl. En. Pl. Jac. Fil. Ind. F. S. I. 4. 68*. *Hook. Syn. Fil. 200*. *N. oatum* (*Sieber*), *Walt. Cat. 358*.

Madras Presidency, Western Ghats, not common; Ceylon, Western and Southern provinces, marshy places, common; Malay Peninsula: (Assam doubtful.)

(Also in Mauritius, Malay Islands, and Polynesia.)

7. *NEPHRODIUM PLATUM*. (*Baker*). Rhizome wide-creeping, stipes 1 foot long, downy; rachis downy; fronds oblong lanceolate, 3-4 feet long, pinnate, pinnae small, 9-15 inches long by 1-1 $\frac{1}{2}$  inch broad, cut down nearly two-thirds into close rather falcate blunt lobes; lowest pinnae distant and much reduced or not reduced at all; texture firm, herbaceous, above rachis or pinnae suffuse, and a few hairs on the veins, beneath costules and veins hairy, with loush white firmo-veins 7-10 pair, the lower 3-4 pair anastomosing with excurrent veins, and large medial, involucre minute fugacious. *Baker, Fil. 502*. *Bull. Fern. Sup. 378*.

Himalayas (*Dr. Jerdon*). *Mr. Clark* has stated in his Review that *Dr. Jerdon's* specimen is a *Coniopteris*, but on examining it with me, he acknowledged that it is unlike any *Coniopteris*, and that it is closely allied to, if not identical with, the Mauritius fern; the lower pinnae are not reduced in *Jerdon's* specimen at Kew, but much so in the Mauritius plant, which is the only difference between them, and this variation occurs as much in others of the genus.

(Also in the Mauritius.)

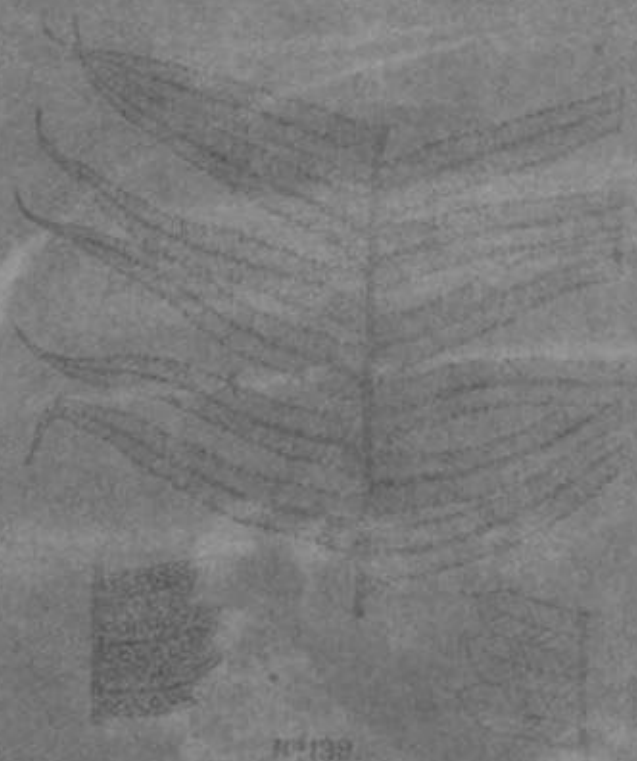
8. *NEPHRODIUM ANIDULUM*. (*Don*). Stipes 1 foot or more long, rachis slightly pubescent; fronds 3-4 feet long 12-15 inches broad;

pinnae rather distant, 6-8 inches long, 2-3 inch broad, cut about one-third of the way down into subtriangular sharp pointed lobes; texture coriaceous; rachis and lower surface hairy; veinlets 8-10 on a side, 5-6 pair anastomose; sori in rows about midway between the midrib and edge; indusium naked, lower pinnae reduced. *Aspid. Don, Prodr. R. Nép. p. 2.* *A. venulosum, Hook. Cat. 352, type sheet.* *A. orbiculatum, Blume.* *Neph. andium, Howe. Syn. Fil. p. 291. Bedd. F. B. I. 3. 247.*

Throughout East Bengal abundant, from the Sunderbans to Assam and the Dehra Doon, up to 3,000 feet elevation.

Malay Peninsula (not in South India or Ceylon.)

9. NEPHRODIUM GLANDULOSUM. (*Hook.*) Stipes approximate, main rachis closely villous, frond 1 foot long, adpressedly strigose on the upper surface; pinnae truncate at the base, subentire, serrate or pinnatifid scarcely one-sixth the way to the midrib; veinlets beneath minutely hirsute, several pairs uniting, indusium reniform, elongate, prominent, firm; sori ultimately often confluent. *Hook. Sp. Fil. iv. 76, partly.* *Clarke, P. N. L. p. 531, 674, and fig. 1.* *Not Bedd. F. B. I. 1. 132, which is trophyllum.*

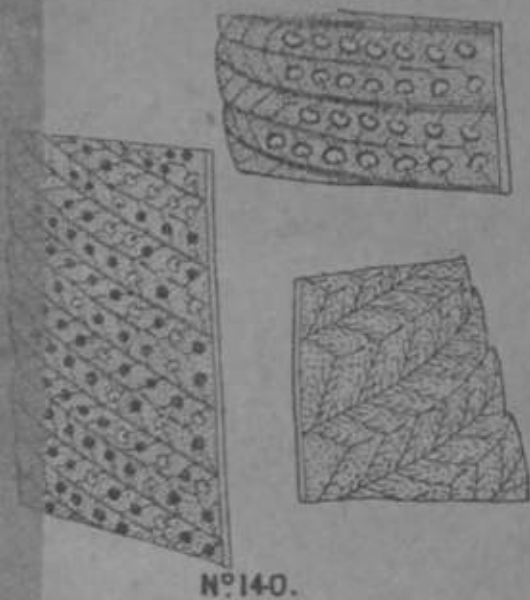


NEPHRODIUM GLANDULOSUM. (*Hook.*)

The above is Mr. Clarke's diagnosis from Blume's specimens collected in Java, but there is an exactly similar specimen in the Kew Herbarium from Griffith, supposed to have been collected in Assam. But Mr. Clarke thinks it is probably from Malacca, but in either case it must be recorded in his work; it differs from the next being a fringed above, but I strongly suspect it is only a slight variety of

it has glandular dots on the under surface, 6-7 pairs of veins, of which the four lower anastomose.

10. NEPHRODIUM UROPHYLLUM. {Wall, under *Polypodium*.)  
**lizome** short creeping; stipes approximate, 2 feet or more, **long**,  
 ut, erect, furnished with lanceolate-linear brown scales below ;  
 nds up to about 4 feet long, pinnate; pinne narrow-oblong,  
 Wssile or sessile, acuminate or caudate at the apex, 6-12 inches  
 ig by i\*-2 inches broad, the margin subentire, slightly crenated or  
 \* very short serratures; upper surface quite glabrous, or the



NEPHRODIUM UROPHYLLUM.

{Wall)

>tcns, *Bedd. F. S. I. t.* 239. *Nephrodium lineatum*, *Presl  
 pin. Botp.* 48. *Hook. Sp. Fil.* iv. 72. *Bedd, F. B. I. i.* 133.  
 sp. **lineatum**, *Bl. En. Fil. Jav.* 144, {not Wall.) *Nephro. glandu-  
 lum*, *Bedd. F. B. I. t.* 132, {not Blume.)

Himalayas, from Gurwhal to Bhotan and Chittagong 1,000-  
 ,000 feet elevation; Ceylon, Oodawella Forest; not in South  
 ndia. There can be no doubt that this is a *Nephrodium*, and that  
 wolucres are often present, though Mr. Clarke has still kept it in  
 oniopteris. Sir W. Hooker described it both as a *Nephrodium* and  
 TM a *Goniopteris*.

(Also in Java and Philippines.)

rachis of the **pinnae** a little stri-  
 gose, under surface quite glabrous  
 or with some minute pubescence  
 on the veins, copious glabrous  
 not glandular punctiform dots  
 are present on both sides; tex-  
 ture subcoriaceous or herbaceous,  
 veins 8-10 pair, rarely 14, all or  
 nearly all anastomosing, the ex-  
 current veinlets either free or  
 joining the pair above; sori  
 small, one to each vein, about  
 its centre; indusium reniform,  
 generally absent. *Wall. Cat.* 299.

*Hook. Syn. Fil. p.* 3 T 4. **Goni-**

11. *NEPHRODIUM MOULMEINENSE*. (Bedd.) Stipes firm, erect, 2 feet or more long; fronds up to 4 feet long, pinnate, pinnae often with a large gland at base, numerous coriaceous, about 1 foot long and  $1\frac{1}{4}$ - $1\frac{1}{2}$  inch broad, narrow oblong, caudate at the apex, the margin with sharp serratures, which are falcate and only about one line deep, sometimes nearly obsolete or obscure, the frond being nearly entire, upper surface generally quite glabrous and shining, under surface with obscure hairs on the costa and veins; veins very prominent 16-21 pair, all but the upper 2-3 pair anastomosing with a zigzag excurrent veinlet united throughout; sori medial on the veins or often near their apex in a single row on each side of the costule; indusium reniform. *Bedd. F. Sup.*

p. 18. *Goniopteris lineata*, *Bedd. F. B. I.*

t. 3. *G. multifineata*, *Bedd. F. B. I. t. 231.*

(not 232. Penangiana, which is the next

species). *Polypodium multifineatum* (Wall.),

*Hook. Syn. Fil.* 316. I have been obliged

to rename this as it is a *Nephrodium*, and

there is another *Neph. multifineatum*, i. e.

Wallich's (our *truncatum*).

South India, very common on the Gol-

condah Hills (west of Vizagapatam) 2,000-

3,000 feet elevation, involucre distinct; (not

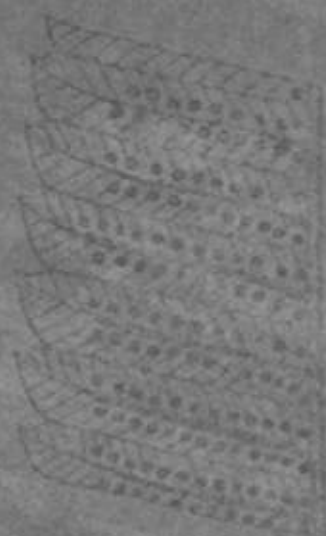
on the Western mountains). Throughout

North India, from the plains up to 5,000

feet elevation, very common; Birma, very common near Moulmein

(involucre distinct); this differs from *prophyllum* in being more

rigid in texture and in having many more veins.



HP141

NEPHRODIUM

MOULMEINENSE. (Bedd.)

12. *NEPHRODIUM COSTRIBUM*. (Wall. under *Polyp. Finlayi*) Stipe

$1\frac{1}{2}$  foot and more long, rather stout, scaleless, glossy, and as well as the

rachis strongly tinged with red (rarely stramineous); fronds 2-3 feet

long, broad-oblong or lanceolate, coriaceous-submembranaceous

pinnated glabrous, pinnae numerous, rather distant, petiole sessile 5-8

inches long,  $\frac{1}{2}$  an inch or a little more broad (on sterile fronds some-

times exceeding an inch) from an obliquely cuneate truncate sessile

base (lower ones rather more attenuated and subpetiolate) lanceolate  
 • elongate-oblong, finely acuminate at the apex, the margin coarsely  
 .id sharply **submucronate-serrated**, serratures pointing a little  
 >ward, uniform; costae prominent beneath, of the same colour as the  
 rachis and stipes, generally reddish, glabrous on both sides 1  
 obscurely hairy on the costa and veins beneath; veinlets about 6-8.  
 >airs, of which all are connivent except 2-3 short pairs in the teeth  
 of the serratures, sori **in** two series generally at the base of the veins

close to the costules, but some-  
 times near the centre of the  
 veins, involucre reniform, very  
 fugacious and only to be de-  
 tected on very young fronds.  
*Bedd. K B. I. t. 220. Poly podium costatum, {Wall.. Herb.)*  
*not Brack. P. (Goniopteris)*  
*Hneatum, Coleb, in Herb. Wall*  
*and Wall Cat. 300. Hook. Sp.*  
*Fil. 12. Poly podium penan-*  
*gianum, Hook. Sp. Fil. v. i\$-*  
*Bedd. F. B. I. t. 232 (slightly*  
 broader **in** the pinnae).

North India, Nepal to  
 Kumaon at **high** elevations;  
 specimens from 1 >r. Stuart  
 (Gurwhal) have the involucre  
 quite distinct; Penang.



N° 142.

NEPHRODIUM ARBUSCULA. {DCSV.)

13. NEPHRODIUM ARBUSCULA. (*Vesv.*) Caudex small erect and  
 trunk-like, stipes tufted, short, slightly pubescent; fronds **12-18**  
 inches long, pinnate, lanceolate in outline, pinnae numerous close, 2-3  
 inches long by about  $\frac{1}{2}$  inch broad, very shortly petioled, rather blunt  
 at the apex, generally auricled at the superior base, **the** margin **with**  
 shallow serratures, lower ones gradually reduced to mere deltoid  
 auricles; texture firm, herbaceous; veins 6-8 pair, the 3-4 lower pair



anastomosing, the upper ones free, rachis pubescent, upper surface glabrous in age, under surface more or less hairy on all the veins; sori solitary near the middle of the 3-4 lower veins, indusium small reniform. *Desf. Mem. Soc. Linn. vi. p. 253. Hook. Syn. Fil. 292. Bedd. F. S. I. t. 87. Neph. Filicilobum, var. pubera, Clarke, F. N. I. p. 515. Wall. Cat. 338. Asp. puberulum.*

South India, Western forests, 2,000-4,000 feet, in beds of rivers; Ceylon, central provinces.

(Also in the Mascarene Islands.)

14. *NEPHRODIUM PENNIGERUM. (Bl.)* Caudex erect; stipe villous or subglabrous up to about 1 foot long; fronds large up to 4 feet long, pinnate, generally with the lower pinnae more or less reduced, sometimes not so; pinnae numerous, spreading 8-10 inches long, 1-1½ inch broad (the fertile sometimes much contracted), apex acuminate, margin cut down only about ¼ towards the rachis into oblong falcate lobes; texture herbaceous, rachis villous, upper surface strigose on the main costa, otherwise glabrous or often more or less strigose particularly near the margins, under surface villous on the veins; veins 8-12 pair, the 5-6 lower ones generally, rarely only 3, anastomosing; sori medial on the veins; involucre reniform, generally persistent. *Aspid. pennigerum, Bl. En. Pl. Jacq. Fil. 183. Hook. Syn. Fil. 292. Neph. abruptum, Bedd. F. S. I. t. 86. Asp. multilineatum, Wall. Cat. 353. Neph. glandulosum, var. late-strigosa, Clarke, F. N. I. p. 532. Neph. pennigerum var. multilineata, Clarke, l. c. p. 532. Neph. abortivum (F. Sm.), Hook. Syn. Fil. p. 292.*

South India, common in all the Western mountain forests; Ceylon, central provinces, 2,000-4,000 feet; East Bengal, from Mishmee to Chittagong, at no great elevation. (Clarke's specimens of *glandulosum* var. *late-strigosa* and *pennigerum* var. *multilineata* are quite the same as the South Indian plant.) Malay Peninsula.

(Also in the Malay Islands and Tropical Africa.)

15. *NEPHRODIUM MOELLE. (Desf.)* Rhizome tufted, or more rarely creeping; stipe and main rachis beneath pubescent, shortly

lairy or glabrous, with few or no scales ; fronds oblong-lanceolate, \*-3  
 •set long, pinnate, pinnae spreading generally about 4-6 inches long b>  
 inch broad, the lower ones generally more or less reduced, often into  
 icre auricles, sometimes not reduced at all, generally cut down  
 bout half-way to the midrib into blunt subfalcate lobes; texture  
 herbaceous, generally more or less pilose on both sides, sometimes  
 [labrous or subglabrous, except in the costas and costules; veins 6-  
 \* pair, pinnate in the lobes, the lowest pair (rarely two) anastomosing  
 nth an excurrent veinlet, involucre reniform glabrous or hairy.  
*Jesv. Mem. Soc. Linn. vi. 258. Hook. Syn. Fil. 293. Bed\*. R S*  
*t. H and extensum t. 85, not BL Polypodium parasiticum*  
*-Jnn.) Asp. solutum Wall Ctf., 350 W tectum, CV. 94. Neph.*  
*lidymosorum, Bedd. F. B. 11. 200.*

Throughout the Indian region from the plains up to 6,000'

(Also throughout the world in tropical and subtropical regions.)

VAR *ft* AMKOINENSE. (*f<sub>n</sub>sl.*) Fronds smaller, papyraceous  
 lore glabrous, pinnae smaller, less cut, being generally only slightly  
 very gradually reduced towards

ins 4-5 pairs, 2 rare, 3 lower P ^ ^ ^ n. acuminate,  
 a-3 lower veins, sometimes confined, the lowest pair generally  
 (didymo-

var. *J3 minor, Bedd. F. B. I, t. 201. Evidently only a form of molle,*  
 sometimes confounded in herbaria with *Arbuscula*.

North India, Bengal and Assam, near the foot of the hills;  
 Ceylon, Ambagama. [C. P. 3390.]

NEPHRODIUM PROCURRENS is a name given by Baker (*Syn.*  
*fil. p. 290.*) to molle with a creeping root, but there are no other  
 characters to distinguish this form, as I have the very large form of  
 10' e with the lower pinnae reduced to deltoid auricles (sent from  
 Ceylon) with the root wide-creeping, as well as forms which have the  
 fronds truncate at the base and no reduced lower pinnae. (*Wail. 40*  
 rd sheet in this form.) x J y

VAR. *puberulum*. (Clark, *R. v. l. f.* 533.) Differs by having the fertile pubescence bright and golden, the fertile fronds longer than the barren, and the pinnae sometimes contracted near the base, the frond truncate at the base, i. e., the lower pinna not reduced. It is to be feared that none of these characters are permanent. It is a form from Sikhim and Bhotan, 1,500-4,000 feet elevation, and from Assam.

*Aspidium multicaule*. (Wall. *Cat.* 348.) Taken by Mr. Clarke in his type of *var. multiplex*, is typical *extensum* (Bl.)

VAR. *puberosum*. (Parish, *Bedd. F. B. l. 1.* 200.) From Tenasserim; is a very hairy form of *molle*, lower pinnae not at all reduced, sometimes twin, confined to the two lower veinlets (the latter character probably not constant). Wall. *Cat.* 351, *Asp. canescens*, from Singapore, second sheet, is this plant.

*Asp. tectum* (Wallich, *Cat.* 304, in *Linnean Herb.*) is a deltoid form of *molle* with no reduction of the lower pinnae, and a creeping root.

16. *NEPHRODIUM CRINIPES*. (Hook.) Stipe up to 1½ foot long, stout, erect, clothed, as is the main rachis, with lanceolate-linear brown scales; fronds about 2-3 feet long, pinnate, dwarfed below into auricles; pinnae horizontal, 4-6½ inches long, ½-¾ inch broad, cut down ¼-½ towards the midrib into oblong scarcely acute lobes, the upper basal one often somewhat enlarged; texture herbaceous, veins beneath minutely pubescent; costa, costules and veins sparingly furnished with longish hairs above; veins 6-8 on a side, the two lowest pair anastomosing; sori medial, but a little nearer the apex than the costule, indusium reniform, glabrous, persistent. *Hook. Sib. Ill.* 204. *Bedd. F. B. l. 6.* 263.

North-east Bengal, up to 1,500 feet elevation, from Nepal to Assam and Chittagong; Malacca (Mr. Clarke's Nilgiri example is a portion of a contracted fertile frond of *pennigerum*.)

17. *NEPHRODIUM FERON*. (Moore.) Stipe 1-2 feet long

*str*<sup>(inff)</sup> densely fibrillose, the hairs long black and leaving the stem rough when they **fall**; fronds 3-4 feet long, pinnate; pinna; rather close spreading, up to 15 inches long, by  $| - i |$  inches broad; apex very acuminate, cut'down about one-third into lanceolate-falcate lobes; texture rigid coriaceous, both surfaces flossy; veins very prominent, 12-15 on each side, the lower (about 5) pairs anastomosing, the excurrent veinlet joined throughout and very prominent; sori basal on the veins close to the costule. *Hook. Syn. Fil* '294. *Bedd. F. N. I. t.* 129.

Kumaon. (Mr. Clarke doubts the Himalayan locality, but there are specimens in Kew Herbarium supposed to have been collected there, and I received it from the Calcutta Herbarium as Himalayan.)

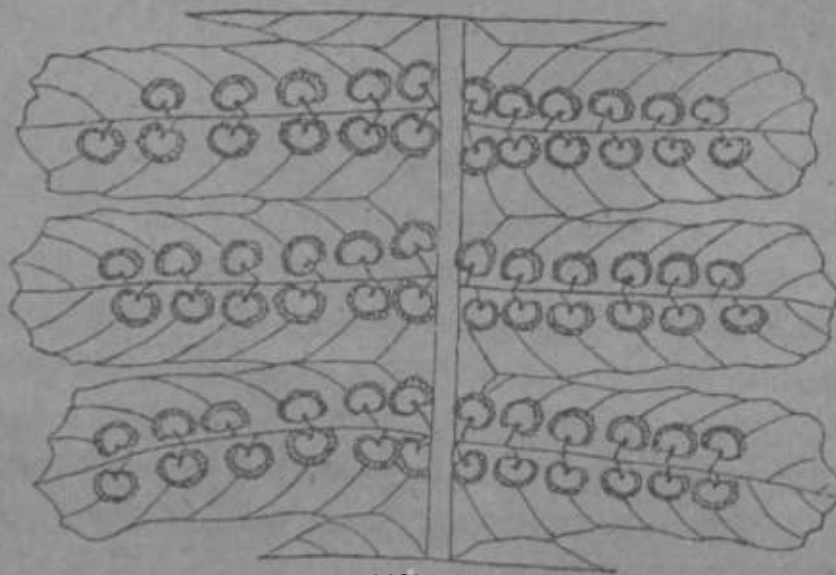
(Also in Java and the Philippines.)

18. NEPHRODIUM TRUNCATUM. (*PresL*) Rhizome short, erect, stipes tufted stout erect up to 2 feet long, greyish naked or slightly **mbescent**; fronds pinnate up to 4 feet long, the lower pinnae reduced often to mere auricles; rachis slightly pubescent or glabrous; pinnae numerous up to 11 inches long by **if** inch broad, acuminate at the apex, sessile or subsessile and often somewhat contracted towards the base, cut down about half-way to the partial rachis into oblong lobes which are more or less square at the apex and crenated; texture herbaceous, upper surface generally glabrous, lower glabrous or slightly pubescent on the costa and veins, and sometimes **with** glandular dots; veins 6-9 pairs, generally the two, rarely 3-4 lower anastomose; sori small medial or nearer the costule than the margin; involucre reniform. *PresL Tent. Pter.* 81. *Hook. Syn. Fil.* 294-*Neph;* *eusorum (Thw.) Bedd. F. S. I.* 130. *Asp. prionophyllum, Wall Cat.* 355. *Asp. multilineatum, Wall. Cat* 353, *from Singapore, 11 'all.* 352, 3 *rd sheet.*

South India, Tinnevely and Travancore Hills; Ceylon, Central Provinces, 2,000-5,000 feet elevation; Cachar and Chittagon; Hills at no elevation; Malay Peninsula.

(Also in Malay Islands, North Australia, and Polynesia.)

19. **NEPHRODIUM TRUNCATUM**. (*Hook*) Stipes tufted, 1-2 feet long, greyish naked : fronds up to 3 feet long, pinnate; pinnae petiolate, often contracted at base, 6-9 inches long,  $1\frac{1}{2}$ - $1\frac{3}{4}$  inches broad cut about one-third or half-way down into blunt slightly falcate lobes, lower pinnae not much smaller **than** the others; texture coriaceous; rachis naked or slightly pubescent, upper surface glabrous except the partial rachis which is slightly hairy, under surface glabrous except the rachis and costules which are slightly hairy; veins 8-12, all free or the lower one anastomosing and with sometimes an excurrent veinlet, a single vein generally rises from the rachis to the pinnae, between the **pinnati** groups of veins and runs to the margin; sori medial on the veins; involucre reniform. *Hook. Syn.*



H?14-3.

**NEPHRODIUM TRUNCATUM** [*Prasl.*]

295. *Beard. F. B.* / 379, **The** lower pair of veins only occasionally anastomose in the Malay Peninsula plant, but in the West Indian plant several pairs generally join; the two plants, however, seem to run one into the other, and I am afraid they also connect *1. Nephrodium crassifolia*.

Malacca and Malay Peninsula.  
(Also in West Indies and Peru.)

*Nephrodium multijugum* (*Baker*), given as a Malay Peninsula

tern (Syn. Fil. 191) is, as far as the new specimen of Wall. Cat. 418 is concerned, *Lasium oethodes*. *Aspidium multilingue*, Wall. Cat. 345, in the Herbarium is, however, *Nephrodium exaltatum*, typical, though related by Clarke to *molle* as a variety. *Nephrod. Henkianum* (Presl.), given in Syn. Fil. p. 191, as a Ceylon fern, does not occur in that island or in our limits.

GENUS LV.—NEPHROLEPIS. (*Schott.*)

(*Nephros*, kidney; *lepis*, scale—the indusium kidney-shaped and scale-like.)

Sori round, arising from the apex of the upper branch of a vein, generally near the edge; indusium reniform or roundish; veins forked, free clavate; fronds simply pinnate with the pinnae articulated at the base, furnished with white cretaceous dots on the upper surface.

1. *NEPHROLEPIS CORDIFOLIA*. (*Lin.* under *Polypodium*.) Caulis suberect, the wiry fibres often bearing tubers; stipes tufted, wiry, 1-4 inches long, slightly scaly; fronds up to 2 feet, pinnate; pinnae numerous, crowded, often imbricated, 1-1½ inch long, by ½-¾ inch broad, usually blunt; margin entire or slightly crenate, the under side rounded or cordate, the upper distinctly articulated at the base; texture rather coriaceous; rachis scaly, both sides nearly glabrous; sori about half-way between the midrib and margin in a single row; indusium firm, persistent, lunate or reniform. *Polypodium cordifolium*, *L. Sp. Pl.* 753. *Nephrolepis tuberosa* (*Presl.*), *Hook. Sp. Fil.* iv. 101. *Bedd. F. S. I.* t. 92.

Throughout the Indian region up to 5,000 feet elevation.

(Also in the tropics of the whole world, and in Japan and New Zealand.)\*

2. *NEPHROLEPIS EXALTATA*. (*Lin.* under *Polypodium*.) Rhizome suberect; stipes tufted, 1-6 inches long, firm, slightly scaly; fronds up to nearly 3 feet long, pinnate; pinnae rather close,



A. S. CATTELL & C<sup>o</sup> ENGRAS

NEPHROLEPIS CORDIFOLIA. (Linn.)

2-3 inches long,  $\frac{1}{2}$ - $\frac{3}{4}$  inch broad, usually acute at the apex, the margin entire or slightly crenate, the superior base with a small narrow angle, the lower base with a smaller rounded one; texture rather coriaceous, both surfaces nearly glabrous, or very scaly particularly when young; sori submarginal; indusium firm, reniform. *Polyodium exaltatum*, *L. Sp. Pl.* 1548. *Nephrolepis exaltata* (*Schott*), *Hook. Syn. Fil.* 361. *Budd. F. S. I.* 4, 93.

South India, the mountain forests of the Eastern and Western sides; East Bengal from Assam to Chittagong, up to 1,000 feet elevation; Ceylon; Malay Peninsula.

(Also in the tropics of nearly all the world.)

3. *NEPHROLEPIS VOLUBILIS*. (*F. Smith, MS.*) Rhizome climbing, up to 50 feet over trees, with adpressed chestnut scales on the short lateral distant spurs, whence spring clusters of stipes; pinnae obtuse or not very acute; venation, sori, &c., as in *exaltata*. *Aspid. exaltata*, *Wall. Cat.* 1031, partly. *Clarke, F. N. I.* p. 541, t. 73.

Sylhet and Chittagong; Malacca.

(Also in Borneo.)

4. *NEPHROLEPIS ACUTA*. (*Presl*) Rhizome short; stipes tufted up to 3 inches or more long, firm, naked or slightly scaly; fronds up to 3 feet long, pinnate; pinnae up to 8 inches long and  $\frac{1}{2}$  inch broad, oblong acuminate, sometimes shortly pectate, the margin slightly crenate; texture thin, both surfaces hairy when young, as is the rachis, but quite glabrous in age; sori near the margin; involucre reniform to suborbicular. *Presl Hook. Sp. Fil.* w. 153. *Budd. F. S. I.* 4, 94. *Neph. biserrata* (*Schott*).

South India, common on the North Arcot Hills, at no great elevation; Ceylon; North India, Chittagong Hills, up to 1,000 feet.

(Also in Tropical Africa.)

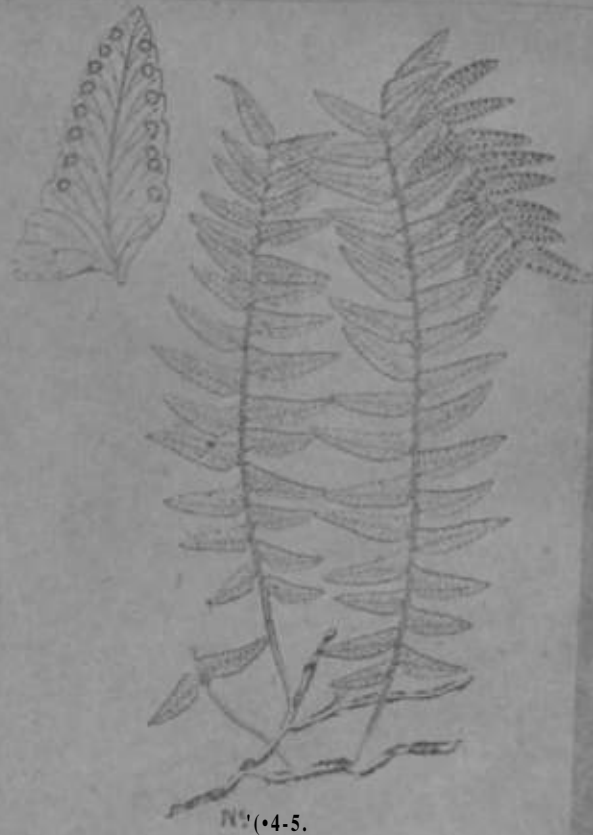
5. *NEPHROLEPIS RAMOSA*. (*Uleani, under Aspidium*) Rhizome slender, wide-creeping; stipes very short, scattered; fronds up to 12 inches long, 1-3 inches broad, pinnate; pinnae  $\frac{1}{2}$ -1 inch long,



1/4 inch broad, slightly crenate, the upper edge auricled and truncate, parallel with the stem, the lower oblique; texture papyraceous, **rachis** villous, both surfaces slightly villous or glabrous in age; sori near the margin; involucre cordiform, roundish fugacious. *Beauv.* in the *Flore cVQware*. *Hook. Syn. Fil.* 301. *Neph. obliterated (Hook), Bedd. F. S. l. 251.*

Ceylon, central provinces, 2,000-5,000 feet, climbing on trees; Malay Peninsula.

(Also in Tropical Africa; Philippines; Australia; Fiji.)



N<sup>o</sup>. 4-5.  
*NEPHROLEPIS RAMOSA. (Beauv.)*

GENUS *LVI\_OLEANDRA. (Car.)*

(Resemblance to the Oleander.)

Sori round ; **T** **M** **^** **\*** **^** **^** **the** base or below the centre of the compact ; **ve** **u** **l** **e** **t** **s** ; involucre reniform; fronds entire lanceolate-elliptical, stems jointed ; **j** — . **vu**, **J** **i** **i** **i** **i** **u**e **w** **i** **a**e **-** **c** **r** **e** **e** **p** **i** **n** **g**.

**i.** *OLEANDRA NERIIFORMIS. (Car.)* Shoots woody, wide-cree, but often suberect, clothed with short adpressed scales which are deciduous; **stipes** short, seldom 1/2 inch long, with the joint below middle; fronds 4-8 inches long, 1/2 inch broad, in opposite pairs or often in terminal whorls, or more rarely scattered, from narrow-linear to oblong-acuminate; texture **subcoriaceous**, both sides glabrous hairy underneath; sori in two rather irregular rows near the middle. *Hook. Fil Exot. t. 58. Syn. Fil 30,2. Bedd R B. I. t 264.*

Himalayas from Nepal eastwards; **Khasya**; 2,000-5,006 feet elevation.

(Also in Central America.)

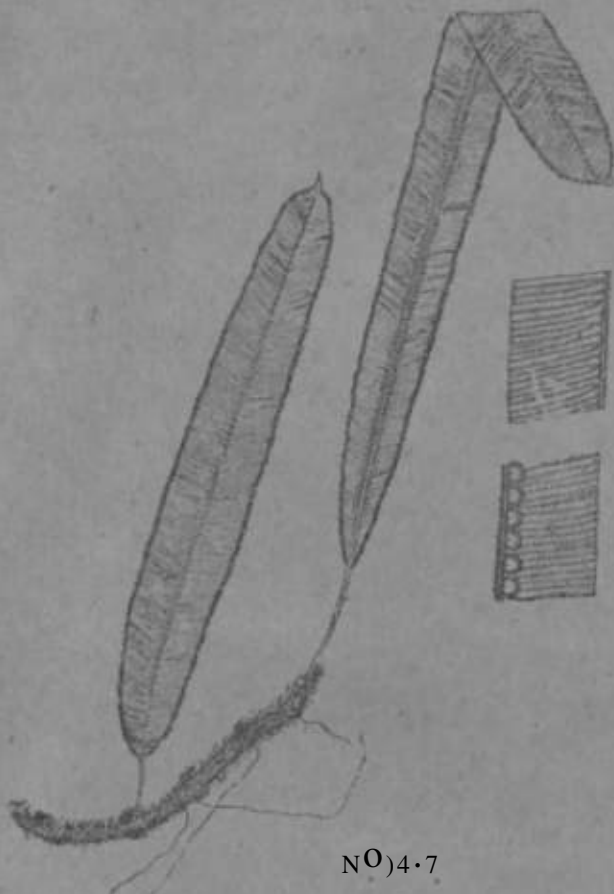


ALSEODAPHNE

ALSEODAPHNE VERIFORMIS (Cav.)

2 OLEANDRA MUS^FOLIA. (*Kunze.*) Shoots firm, wide-creeping, clothed with long golden scales which are not deciduous; fronds generally single scattered, or more rarely in tufts, 1^20 inches long, by about ii inch broad, narrow oblong acuminate on stipes which are <sup>n</sup> inches <sup>n</sup> long and jointed close to the base; <sup>n</sup> texture thin, a <sup>n</sup> hairy on both sides and the midrib scaly below; sori in two <sup>n</sup> gular rows near the midrib. *Met, Fil. jj. p. £ Hook, Syn. Fil. 302. Oleandra neriiformis, Bedd. F. S. I. L*

South India on the JVest<sub>ern</sub> mountains/particularly abundant



in Coorg, rare elsewhere; Ceylon, central provinces. Mr. Clarke considers this species not distinct from the last; they appear to me as distinct as the others; all four, however, are so closely allied that they might be all considered varieties of one species.

3- OLEANDRA WALLICHII. (*Wm.*) Caudex creeping, rooting, thicker than a gnoise-quill, densely clothed with subulate crisped ferruginous, spreading and often reflexed scales thickly tufted at the extremity

OLEANDRA WtUCHn'. (W I

times paleaceous, jointed close to the base, so that the very short lower articulation is concealed among the scales; fronds 6-14 inches long, membranaceous soft, more or less hairy, subelliptic-oblong, the sides parallel, the base often obtuse and rounded, the apex suddenly and sharply acuminate; sori compact, almost imbricated in a continuous line close to and parallel with the costa on each side; involucre reniform, ciliated, opening towards the margin

*Presl, Tent. Prodr. n. 78. Hook. Sp. Fil. iv. 158. Aspid. Wallichii, Hook. Ex. Bot. v. p. 631. 5. Bedd. F. Fl. J. l. 265.*  
Birma and the Malay Peninsula.

4. *OLBANDRA GUMINGII*. (Sw. Sm.)—Caudex creeping, scarcely so thick as a writing pen, clothed with close-pressed subulate imbricated scales, stipes subterminal and subaggregated 2-7 inches long, slightly downy, articulated within  $\frac{1}{2}$ -3 inches from the base; fronds 1-1½ foot long, firm membranaceous, elongate lanceolate acuminate, very much attenuated and gradually decurrent at the base, pubescent-villose on the costa and veins, sori rather large, forming a single and scarcely interrupted line very near to and on each side the costa. *Sw. Sm. in Hook. Jour. Bot. iii. 413. Hook. Sp. Fil. iv. 158. Bedd. F. Fl. J. l. 135.*

Birma and the Malay Peninsula. The Assam locality is doubted by Mr. Clarke, who thinks the specimen in the Kew Herbarium of Griffith's was collected at Malacca. The Nilgiri locality is an error, the specimen being *mussefolia* (Kze).

(Also in the Philippines and Canton.)

B. EXINTOLLERATAE.—Sori without an indusium. Tribes Polypodiæ to Acrosticheæ.

### TRIBE X.—POLYPODIÆ.

Sori on the back of the lobes, round or rarely short-oblong.

\* *Desmodioid sori, habit and mode of growth of Aspidia, the stems continuous with the caudex; sori generally medial on the end.*

#### GENUS LVII.—PHEUOPTERIS. (Fée.)

(*Ph.* & *beech*—the beech fern.)

Sori round, veins forked or pinnate, veinlets free; fronds from pinnate to bipinnate.  *habit of Listeria and some Listeria, but that genus is wanting an indusium.*

1. *PHYGOPTERIS SCOTTII*. (Bedd.) *Candax* suberect, stout tufted, clothed with brownish black subulate scales as is the base of the stipe: fronds pinnate, oblong, with the stipe 10-12 inches long, by about 3 inches broad, rachis furnished with hair-like scales; pinnae alternate 6-7 approximated pairs, with a terminal one, lower pair not much decreased in size, all short oblong or ovate obtuse from a square unequal base about  $1\frac{1}{2}$  inches long, by a little less than 1 inch broad, and furnished with falcate acute serratures, glabrous on both sides, but with a few weak setae or scales on the costa and veins, especially beneath; veins in pinnate groups, the lower veinlet or the two lower not reaching more than half-way to the margin, upper ones terminating in a dot within the margin; sori medial on the lower 2-3 veinlets. *Bedd. F. B. I. t. 345.*

Near Darjeeling, Valley of the Rungbee, 2,000 feet elevation (perhaps an abnormal form of *Lastrea cuspidata* or *hirtipes*).



N9148.

*PHYGOPTERIS SCOTTII*. (Bedd.)

2. *PHYGOPTERIS ERUBESCENS*. (Wail. under *Polypodium*.) Stipes tufted 1-2 feet and more long, stout, as well as the rachis and costa more or less purplish-tawny, fronds in general ample but varying from 1 to 4 feet in length and from 6 inches to more than 2 feet in breadth, firm, sub-coriaceous, broad-ovate acuminate, pinnate, pinnae 3-16 inches long,  $\frac{1}{2}$ - $1\frac{1}{2}$  inch wide, approximate, sessile, elongate-oblong, the sides parallel for a long way and then gradually acuminate to a serrated apex, deeply nearly to the costa pinnatifid, segments oblong, subfalcate, rather acute, entire or obscurely serrated, glabrous above, beneath sparingly furnished with longish white needle-like hairs on the rachis and costae and sometimes on the veins: veins approximate, simple free, two lowermost opposite pair meeting but scarcely uniting at the sinus.

soriferous always at the very base, so as to form two lines or series (at length confluent) one on each side and close to the costa, not extending to the apex of the segment; main rachis stout with a broad groove on the upper side (when dry.) *Wall. Cat. n. 330. Hook. #. Fit. iv. 236. Bedd. A. B. l. l. 213. Hook. Syn. Ft. 306.*

Himalayas, Kashmir to Bhotan, Khasya, 3,000-7,000 feet elevation; Malay Peninsula. It is very like *Lastrea tyloides*.

(Also in Malay Islands.)

3. PHEGOPTERIS AURICULATA (*Wall. 3 Polypodium.*)

**Stipes stoutly with matted hairs; is the rachis),** furnished below with numerous ovate black shining scales; fronds ample, firm, membranaceous, 3 feet and more long, 16 inches broad, oblong-lanceolate, the <sup>fi</sup> <sup>f</sup> <sup>aC</sup> <sup>U</sup> <sup>minate,</sup> <sup>e</sup> <sup>enent</sup> <sup>%</sup> **Squally attenuated below by dwarfing of the pinn\*. pinnated, pinna, numerous, about 8 inch long by 1 inch broad, sessile and furnished at \*L u** under side with a curious hooked gland <sup>s o L l</sup> <sup>?</sup> <sup>^</sup> <sup>^</sup> <sup>fo</sup> <sup>lc\*</sup> <sup>."u,</sup> sometimes nearly a quarter inch long, pinnatifid nearly to the rachis, segments broad oblong, very obtuse, entire, subfalcate, costa costules <sup>and veins</sup> <sup>les between</sup> <sup>margin, lowest</sup> **as, and the segments sparingly hairy on both sides; veins pinnate, simple, extending to the middle, spore cases furnished with a few long weak hairs.** *Polypodium auriculatum, Wall. Cat. 314. Hook. Syn. Fil. 306. Bedd. F. B. I. t. 203.*

Himalayas, from Gurwhal to Bhotan > 5,000-8,000 feet elevation common about Darjeeling > Khasya, Myrung wood 5000 feet elevation. *Polypodium appendiculatum Bedd. F. B. I. 255* is only a state of this with the pinna, not reduced at the base.

(Also in Java.)

4- PHEGOPTERIS VULGARIS. {Mat} Khizorne slender creeping;



ASCATELLACEAE

FILICIS VIBICULATAE FRONDIS

Stipe with large lanceolate yellowish-brown scales near the base ; fronds 6-9 inches long by 4-6 inches broad, subdeltoid, lowest pinnae 6-8 inches long or nearly as long as any above them, main rachis beneath, with small ovate scales, pinnae 1-1.5 inch broad, cut down nearly to the main rachis, lobes oblong blunt or scarcely acute, entire or slightly crenate, 1-2 lines broad, more or less pilose on both sides ; veinlets 6-8 on a side, the lower ones forked; sori nearer the margin than the midrib. *Mett, Fil. Hort. Lips.* 53. *Polypodium Phegopteris*, *Hook. Syn. Fil.* 308. *Clarke, F. N. I.* 544.

Cashmir, above Sonamurg, 11,000 feet elevation,

(Also in North Europe, Asia, and America ; Caucasus and Japan.)

5. PHEGOPTERIS DISTANS. (*Don. under Polypodium.*) Stipe 1-2 feet long, squamose near the base up to 2 feet long, yellowish or dark purplish-brown, glossy; fronds up to about 3 feet long, the lower pinnae generally reduced and distant, sometimes not at all reduced, pinnae 6-8 inches long, 1-1.5 inch broad, cut down nearly or quite to the rachis, do deeply pinnatifid pinnules 1-1.5 inch broad, with blunt or acute toothed or subentire lobes, the base dilated, texture herbaceous, rachis glabrous or rarely glabrous, under surface a little hairy; veinlets pinnate in the ultimate lobes, pellucid; sori generally on the lower veinlets below the apex, or rarely apical, the veinlet not being continued beyond the sorus. *Polypodium*, *Don. Frod., Fl. Nep.* 2. *Polypodium puldosum* (L.), *Bedd. F. S. I. t.* 168. *P. Griffithii*, *Hool Sp. Fil.* jr. 236. *P. longipes*, *Wall. Cat.* 316. *P. adnatum*, *Wall Cat.* 320. *P. brunneum*, *Wall Cat.* 333. This variety "adnata," *Clarke, F. N. I.* 544 (which is *Lastreamicrostegia*, *Hook. Sp. Fil. W.* n. 9 & d. *F. N. I. L.* 39) only differs in being a little more compound and generally bipinnate, but it runs into the type. Var. "glabrata" of Clarke only differs in being somewhat more glabrous. Var. "minor" of Clarke is a smaller, less cut fornij pinna; only 1-2 inches long, pinnatifid only one-third down, but it runs into the type.

North India, from Kashmir to Bhotan, 3,000-8,000 feet elevation, very common ; Khasya, 3,000-5,000 ; South India, on the Western



mountains, 5,000-8,000 feet, very abundant; Ceylon; Malay Peninsula.

6. *PHLEGOPTERIS RUFESCENS*. (*Blume*, under *Polypodium*)

Caudex creeping, furnished with appressed scales and waxy roots, stipe 8-16 inches long and together with the main and partial rachises slightly asperous; fronds 12-18 inches long by 9-12 inches broad, subdeltoid, subcoriaceous, puberulous beneath, with minute yellow hairs, bipinnatifid, *i. e.* lower pair of pinnae often bipinnatifid, upper ones pinnatifid, pinnules oblong obtuse, spinulose-seriate; veins pinnate, 3-4 on a side, veinlets simple or forked, reaching to the margin; sori medial on the veinlets. *Polypodium*, *Bl. Fil. Jav.* p. 194, t. 61. *Hook. Sp. Fil.* iv. 257. *Syn. Fil.* 309. *Bedd. F. S. I. I.* 236. Ceylon, central provinces, 3,000-5,000 feet elevation.

(Also in Java, New Caledonia and Queensland.)



*PHLEGOPTERIS RUFESCENS*. (*Blume*)

7. *PHLEGOPTERIS DRYOPTERIS*. (*Linn.*, under *Polypodium*)

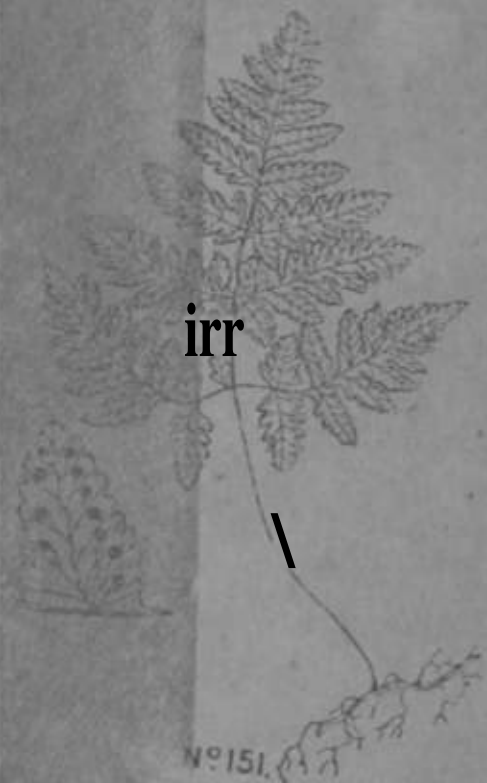
Rhizome creeping; stipe with lanceolate subulate scales near the base; fronds 3-8 inches long and broad, deltoid, 3-pinnate, thin green, nearly glabrous, often glandulose, lower pinnae largest, pinnules lanceolate, only the lowest free, oblong slightly crenate, texture thin herbaceous, rachis glabrous; veins pinnate in the lobes, veinlets forked or simple; sori submarginal a little below the apex of the veinlet. *Polypodium* (*Dryopteris*), *Linn. Sp. Pl.* 1555. *Hook. Syn. Fil.* 309. *Bedd. F. B. I.* t. 24. *Polypodium* *Robertianum*, *Milde, Fil. Eur.* 93.

FERNS OF BRITISH INDIA AND Ceylon.

Kashmir, 7,000-11,000 feet, and eastwards to Kumaon.  
 (Also in Arctic and Alpine Europe, Asia and America.)

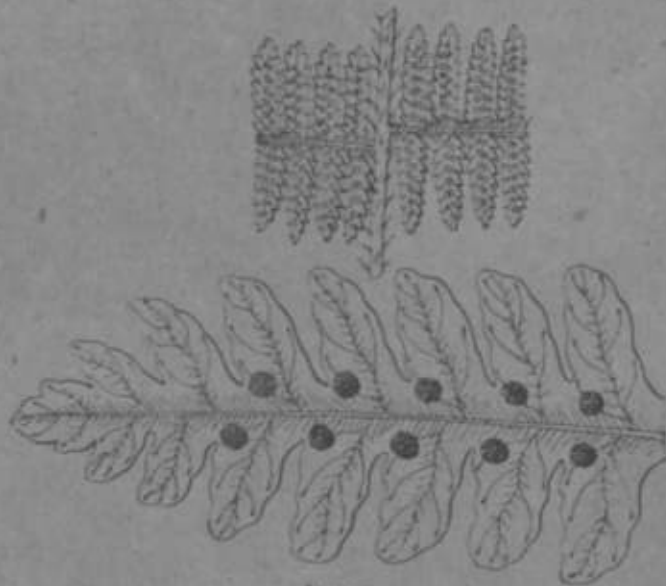
erectly striate, main and partial rachises with lanceolate-linear scales and  
 mucronate, glaucous, or scabrous from their persistent bases, not pilose, viscous or  
 that there are fronds very large up to 15-20 feet long, tripinnate, except  
 or more is a very regular wing to the rachis, pinnae generally 2 feet  
 long and about 1 foot broad.

Dread, secondary pinnae 1-2 inches broad.



No. 151.

PHEGOPTERIS DRYOPTERIS (L.) Unn.



No. 152.

PHEGOPTERIS ORNATA (Wall.)

also scabrous and scaly furnished with long white  
 hairs, tertiary pinnules up to 1/2 inch broad, linear-oblong  
 with square base, resting on the wing of the tertiary rachis,  
 distant from each other, acute or blunt at the apex, deeply often  
 serrate, costa pinnatifid, the costa and veins furnished  
 with needle-like hairs, texture thin herbaceous; veinlets simple or  
 bifid. Wall. Cat. 327. Bedd. F. S. I. t. 171.  
 Phegopteris americana, Hook. Sp. Fil. iv. t. 269, not the description which

*partly refers to Lastrea tenericaulis.* Phegopteris pallida (Brack), Hook. Sp. Fil. iv. 266.

Himalayas from Kumaon to Bhotan, in tropical valleys up to 2,000 feet elevation; common in Chittagong Hills, 500 feet elevation; South India, Carcoor ghat, Malabar and elsewhere along the Western ghats, but not common; Malay Peninsula.

One of the handsomest of Indian ferns, and much in cultivation, it may be a Lastrea (if Phegopteris is to be kept distinct from that genus, the propriety of which I doubt), but no one has yet detected an indusium, in any case it is quite distinct from Lastrea tenericaulis.

(Also in North Australia and Polynesia.)

9. PHEGOPTERIS PUNCTATA. (Thunb. under Polypodium.)

Rhizome firm, wide-creeping, villous; stipes scattered 1-2 feet long and with the lower part of the main rachis more or less viscid-pubescent; fronds 1-4 feet long, tripinnate, pinnae up to about 2 feet long, lanceolate to deltoid, secondary pinnae 4-6 inches long, tertiary pinnae sessile on the rachis, which is not winged, blunt at the apex, and pinnated two-thirds down into short rounded crenated lobes, more or less furnished on both sides with scurfy hair-like scales, the margins often somewhat reflexed, as in Hypolepis; sori copious towards the apex of the veinlets and near the margin. Thunb. Fl. Jap. 337. Phegopteris punctata, Hook. Syn. Fil. p. 312. Polypodium rugulosum, Hook. Sp. Fil. iv. 272. Boed. t. S. I. t. 170. Polyp. rugulosum, Labill. Fl. Nov. Hol. ii. 92 t. 241. Hypolepis hostilis, Presl. (as to the Nilgiri plant.)

Himalayas, from Chumaba to Bhotan and Chittagong, 1,000-5,000 feet elevation; South India, common on the Western mountains at the higher elevations; Ceylon, about Newera Elja; Malay Peninsula.

(Also almost throughout the tropics and south temperate zone extending to Japan, New Zealand, St. Helena, and Chili; not from continental Africa.)

10. PHEGOPTERIS SUBDIGITATA. (Blume, under Polypodium.)

Stipes tufted, firm, continuous with the rachis, fuscaceous, or

nearly naked; fronds very large, 3 feet or more long, broad lanceolate  
 to de Itoid, 3-4 pinnate, the rachis **furfuraceous**, pinnae 8-10 **inch\***s  
 long often **with** clusters of viviparous buds in their axil?, **secondary**  
 pinnae petiolate about 2 inches long; tertiary **pinna** petiolate 1/4-4 inch  
 long, **pinna** **inatifid, and generally pinnate at** the base, the lower lobes  
 incisef I, **the** upper ones generally entire, texture thin **membran** aceous,  
 drying quite green, glabrous; veinlets forked or simple, pellucid, termin-  
 ating veinlet within the margin and clavate at the apex; sori small below  
 the apex K of the veinlet. *Polypodium subdigitatum, Bl. hi Jar.*  
*Fil. 195. t 93. Bedd. F. B. L. t. 229. Hook. Syn. Fil. p. 340.*  
*Phegopteris davallioides (Mett.), Hook. Sp. Fil. iv. 256. Polypodium*  
 •him, *Wall Cat. 326.*

Himalayas, from Nepal to O'Bhntnn A TM~ c 1  
 common: j j wpai LU onoiian, 0,000-9,000 feet elevation,  
 (Als, Malay Peninsula.  
 0 in the Malay Islands.)

#### GENUS. LVIII—GONIOPTERIS. (*PresL*)

(*Gonia, at* >gle; *pteris*, fern-the veinlets meeting and forming angles.)  
 Habit and venation of *Nephrodium*, *U*, veins pinnate, the  
 lowest or several pairs of veinlets of contiguous groups anastomosing  
 at an angle • from which proceeds an excurrent veinlet; stipes con-  
 tinuous with *rhizome*; fronds pinnate, in fact, all the characters  
 as in *Nephrodium*, except that there is no indusium to the sorus.

All the supposed Indian species except the following have been  
 proved to possess an indusium in a young stage or under certain  
 conditions, so that they have been transferred to *Nephrodium*, the  
 following species deviates somewhat from the habit of *Nephrodium*  
 in its elongated proliferous non-seeding fronds, and in being often  
 copiously branched from the **axils**, the sori are often those of *Menis-*  
 chium rather than *Goniopteris*^.

1. *GONIOPTERIS PROLIFERA. (Roxb.)* Rhizome stout, wide-  
 creeping; fronds 1-2 feet long, pinnate, often **flagelliform** and  
 much elongated but then non-seeding, with pinnae more or less  
 branched and rooting from the apex or some of its axils, often also



A. N. GAY &amp; F. P. THOMAS

GONIOPTERIS PROLIFERA. (Roxb.)

fringed by complete pinnate fronds springing from the axils of the pinnae, pinnae generally 4-6 inches long,  $\frac{1}{2}$ - $\frac{3}{4}$  inch broad, the margin bluntly lobed or crenated, the apex blunt or acute; texture herbaceous or subcoriaceous, rachis and under side glabrous or slightly pubescent; veinlets fine, 6-10 on a side; sori medial, punctiform oblong or even linear and often confluent in age. *Roeb. Wall. Cat.* 312, in *Calce Fern. Nat. Hist.* iv. 430. t. 32. *Hook. Syn. Fil.* 315. *Bedd. F. S. I. I.* 172. *Menisium, Swartz.*

Throughout the Indian region generally on banks of rivers and ditches in the plains or low down on the hills.

(Also in North Australia, Tropical and South Africa and its Islands; Philippines; New Caledonia; South China.)

#### GENUS LIX.—DICTYOPTERIS. (*Brid.*)

(*Dicty*, in, a net; *pteris*, fern—the veins netted.)

Habit and venation of *Aspidium*, *ie.*, veins copiously anastomosing with or without free included veinlets, only differing from *Aspidium* in wanting an indusium.

1. *DICTYOPTERIS BARBERI*. (*Hook.*) Stipes tufted, 6-12 inches long, slightly scaly at the base; fronds palmately 5-lobed or more usually bipinnate with a large terminal segment and 1-4 pairs of pinnae, the upper ones oblong-lanceolate, 4-6 inches long, 1 inch broad, nearly entire, the lowest pair with a deep lanceolate lobe at the base on the lower side, texture subcoriaceous, both sides naked; areoles rather large and regular, with copious free veinlets; sori copious, principally in two rows near the main veins, dorsal or terminal on a vein or veinlet. *Hook. Sp. v. p.* 100. *Syn. Fil.* 317. *Bedd. F. S. I. I.* 332.

Malacca.

(Also in the Malay Islands.)

2. *DICTYOPTERIS TENERIFERENS*. (*Hook.*) Caudex small, creeping underground, scaleless with very few radiates, stipes few, remote,

slender, glossy, stramineous, the base very tomentose with a few sparse scales partly subterraneous, attached to the caudex by a small point; fronds thin, membranaceous pale-green, glabrous, subpubescent on the veins, 6-9 inches long, quite as broad as long, cordate, subternate; or pinnated with 3-9 subfalcate pinnae, 1: ones nearly opposite, petiolate, lowest pair half ovate, acuminate 4-6 inches long, lobate-pinnatifid, those of the superior margin broad ovate nearly equal subdentate blunt lobes the inferior ones much pinnatifid, acuminate, the basal ones acute, the lateral ones lanceolate, pinnatifid, ternate.

acuminate, deeply pinnatifid especially at the base; veinlets uniformly reticulated, areoles with no included free veinlets, costular areoles large; sori rather irregularly scattered, dorsal or ventral. *Hook. Sp. FU.* v. 10, f. F. B. I. f. 4.

**Moulmein;** very like small specimens of *Aspidhimenophyllum* in habit and outline, but there are no free veins, and the sori are more scattered and larger, and show no signs of an indusium.



*DICRYPYOPTERIS BARBERI.* (Hook.)

**3- DicrvoPTERIS CHATTAGRAMICA. (Clarke.)** Rhizome stout; stipes 10-12 inches long, tufted, long, black with small scales near the base; fronds deltoid, distinctly dimorphic, pinnate bipinnatifid upwards about 10-12 inches long by 6-7 inches lower pinnate deltoid with the lower basal lobes much enlarged margins pinnatifid, surfaces pubescent, the margin with minute multicellular hairs; sori naked, medial or terminal on the pinnae. *Clarke, F. N. I. p. 548, t. 81.*

**Chittagong** at no elevation, very general.

4. *DICTYOPTERIS DIFFORMIS*. (*Bl. under Polypodium*.) Caudex stout ascending, stipes tufted, 4 inches to 1½ foot in length, black setaceous-paleaceous at the base; fronds subcoriaceous, minutely pellucid-punctulate glabrous, often subglaucous beneath, pinnate with very numerous pinnae, from 6 inches to a foot long, 1-3 inches wide, more or less petiolate, broadoblong, acuminate, the lowest pair half-ovate, unequally bipartite, lowest segments deflexed and sometimes free and 3-5 inches long, all of them more or less deeply lobed, often to within one-third of the costa, the lobes oblong, acute, or



No 155.

*DICTYOPTERIS CHATTAGNAMICA*, (*Clarke*.)

*Polypodium confuens*, *Wall. Cat.* 325.

The Malay Peninsula, Tenasserim, Malacca.

(Also in the Malay Islands.)

5. *DICTYOPTERIS POLYCARPA*. (*Mett. under Phlegopteris*.) Stipe 6 inches long, reddish yellow, slightly pilose upwards; frond deltoid bipinnatifid, 6-15 inches long, pinnae 6 pairs, lowest largest deltoid unequal sided, stalked tripartite, central ligulate acuminate crenate.

acuminate entire or sinuate-lobate, terminal pinna petiolate pinnatifid, costule one to each lobe, the veins anastomose copiously, forming elongated areoles, which are longest near the costa and costules, areoles frequently including a free veinlet; sori dorsal or com-pital, or rarely terminal on the free veins, copious but rarely approaching the costa. *Polypodium difforme*, *Bl. Fil. Jav.* 135. *Hook. Syn. Fil.* 318. *Dictyopteris irregularis* (*Presl.*), *Hook. Sp. Fil.* v. 101. *Bl. Fil. Jav.* 164, t. 72. *Beds. F. B. I.* t. 77.





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DICTYOPTERIS DIFFORMIS. (Bl.)

texture membranaceous, surfaces glabrous; main veins distinct to margin; areoles with free included veinlets; sori copiously scattered, terminal or compital. — *Mett. Kunz. Lin. 36, p. 124.* — *Baker, Hook. Syn. Fil. 506.*

(Malacca.)

60. *DICTYOPTERIS HETEROSOMA*. (*Baker*.) Stipe short brown, with spreading linear scales; fronds oblong-spathulate, 2-3 feet long, simple pinnatifid, the lowest foot only a narrow wing to the rachis, above this 3-4 pairs of distant oblong-lanceolate acuminate pinnae, 1-2 inches broad at middle, confluent in a narrow ring, the lowest simple or bipartite, texture thin but firm, surfaces glabrous, ribs naked brownish; main veins distinct to edge, 3-4 lines apart with distinct arches between them, and copious small areoles with free included veinlets; sori very abundant, small irregular, often confluent. — *Baker, Hook. Syn. Fil. 506.*

(Malacca, (habit of *Aspidium vastum*.)

\* *Evenobryoid series.* — Stems articulated at the point of junction with the rhizome; sori generally, not always, terminal on the veins.

#### GENUS LX. — POLYPODIUM (*Lin.*)

(*Poly*, many; *pous*, foot; *polypus*, — the rhizome when destitute of fronds, having the appearance of some kinds of sea *polypus*.)

Veins all free; sori naked, generally punctiform, round, rarely oblong, generally terminal on the veinlets, or more rarely below the apex; fronds simple or pinnatifid or rarely pinnate or more compound.

\* *Fronds entire.*

1. *POLYPODIUM PARASITICUM*. (*Mett.*) Rhizome erect, rarely creeping; stipes tufted, subsessile, hairy or fuscous; fronds 2-3 inches long, 1- $\frac{1}{2}$  inch broad (rarely more), narrow linear (rarely abnormally pinnatifid), blunt at the apex, gradually narrowed to the

base, the margin entire or slightly undulated, texture herbaceous, subcoriaceous, both sides more or less clothed with long hairs; veins simple, very short and indistinct; sori round, tending to be oblong, in a long row on each side close to the midrib. *Hook. Syn. Fil. p. 319.* *S. J. t. 165.* 1\*. *mediale (Baker), Hook. Syn. Fil. p. 507.*

South India, common on the Nilgiris and other Western mountains at the highest elevations; Ceylon. (This includes *P. medu Baker*, the sori often being linear and globose on different fronds of the same plant, as in my figure quoted above). Mr. Wall sends some specimens from Ceylon with a creeping root, but I never saw it creeping in the Nilgiri plant.

2. POLYPODIUM SUBEVENOSUM. (*Baker.*)

Stipes tufted, very short, black wiry; fronds 3-4 inches long, 1 inch broad, ligulate, the point bluntish, the lower part narrowed very gradually, the edge slightly repand, texture subcoriaceous, colour bright green, the rachis black, slightly furfuraceous below; veins

simple, very short and indistinct; sori round, tending to be oblong, in a long row on each side close to the midrib. *Sjw. Flip. 320. Bedd. F. B. I, t. 323.*

Penang.

3- POLYPODIUM ZEYLANICUM. (*MeU.*) Rhizome strong,



POLYPODIUM PARASITICUM, (*MeU.*)



creeping, clothed with broad grey scales; stipe 1 inch or more long, clothed with soft spreading hairs; fronds 8-12 inches long,  $\frac{1}{2}$ - $\frac{2}{3}$  inch broad, acuminate, the base narrowed very gradually, the margins slightly undulated; texture submembranaceous, both sides naked; veins forked oblique, rarely simple; sori round, at the apex of the upper veinlet, or at the apex of the vein when simple, forming a single row on each side of the costa. *Hook. Sp. Fil.* 321. *Bedd. F. R. I.* 217. Ceylon, Newera Elya, on rocks and trees.

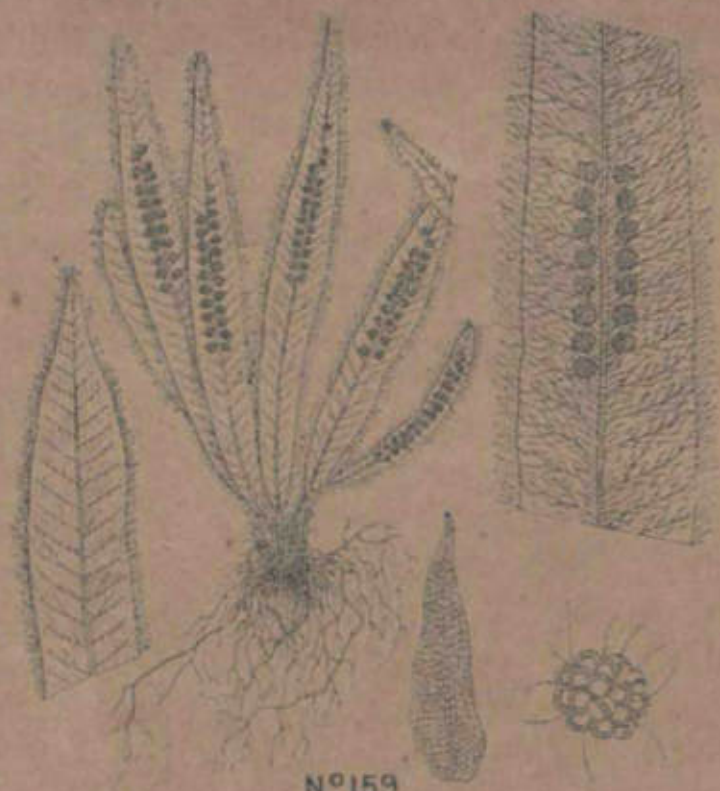
4. *POLYPODIUM WALLI* (*Bedd.*) Rhizome creeping, scaly, furnished with numerous thick black wiry roots; stipes 3-6 lines long, scaly and hairy; fronds linear-lanceolate with a blunt apex 3 inches long by  $\frac{1}{2}$  inch broad, thick, coriaceous, the veins quite hidden, more or less clothed on both sides and on the margins with delicate black hairs, veins thick, forked (or simple towards the apex of the frond), sori large, round, terminal on the superior veinlet and forming a regular row on each side about midway between the costa and the margin. *Bedd. Fern. Sup. I.* 350. *Polypodium parasiticum*, var. *pilosiusculum*, *Thunb. MS. C. P.* 3921.

Ceylon, Adam's Peak; allied to *parasiticum*, but much larger and of much thicker texture.

5. *POLYPODIUM HIRTELLUM* (*Bl.*) Caudex small ascending, scaly above; stipes tufted  $\frac{1}{2}$ - $\frac{1}{3}$  inch long, slender, filiform, villous, with spreading reddish-brown hairs, fronds firm-membranaceous, linear-oblong to lanceolate, 1-4 or more inches long,  $\frac{1}{2}$ - $\frac{1}{3}$  of an inch broad, quite entire at the margin, attenuated at the base, rather densely villous and ciliated with similar hairs to those of the stipes; veins spreading, simple or often forked near the base; sori in a single regular series close to the costa, veins when simple soriiferous near their base, when forked, soriiferous at the apex of the short fork. *Bl. En. Fil. Jacq.* p. 123. *Hook. Sp. Fil.* iv. 166. *Polypodium hirtum*, *Hook. Sp. Fil.* iv. 170, (not *Mett.*), *Bedd. F. R. I.* 212. *P. lasiosorum* (*Hook.*), *Bedd. F. R. I.* 1, 172.

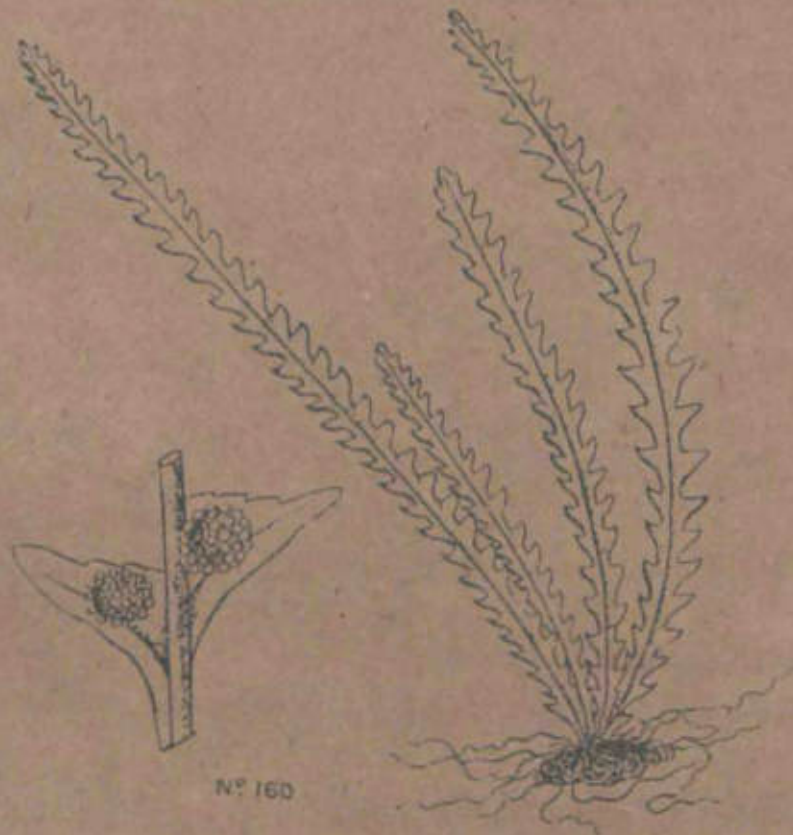
Ceylon.

(Also in Java and Luzon.)



Nº 159

POLYPODIUM HIRTELLUM. (Bl.)



Nº 160

POLYPODIUM CORNIGERUM. (Baker.)

6. *POLYPODIUM SASSIFRAXUM* (Hook.) Caudex small erect or ascending, scaly; stipes scarcely any; fronds tufted, membranaceous, firm, 3-9 inches long, 2-3 lines wide, linear, scarcely acuminate, obtuse, attenuated at the base; veins oblique, approximate, forked, sori oblong, parallel with the costa in lines or series intermediate between the costa and the margin, medial on the upper vertical. *Hook. Fl. Ind. iv. 168. Syn. Fil. p. 322. Bull. F. B. t. 6. 111.* Penang.

(Also in the Philippines.)

\*\* *Fronde pinnatifida*

7. *POLYPODIUM CORNIGERUM* (Hook.) Fronds tufted, subsessile, erect ligulate, 3-4 inches long, 2-2½ lines broad, pinnatifid, or subpinnate, lobes 20-32 jugate, diminishing in size from middle of frond both ways; almost triangular, subacute, repand on the upper edge; texture subcoriaceous, surfaces glabrous; veins one to each lobe, forked, falling far short of the margin; sori large, round, solitary or fork, close to main rachis and medial on the vein. *Hook. Syn. Fil. 507. Boiss. Fern. Sup. t. 381.*

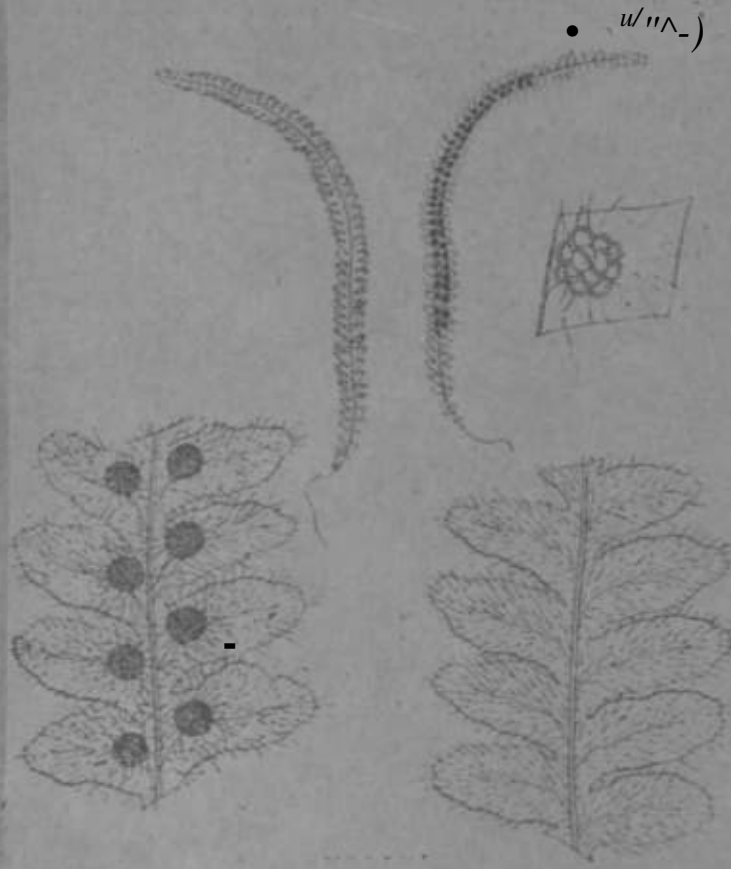
Ceylon; Horton plains, rare. (C. P. 3005.)



8. *POLYPODIUM CUCULLI* (*POLYPODIUM CUCULLATUM* (L.) Presl.) (New.) Caudex very small, ascending; stipes densely tufted, 1-3 lines long, naked; fronds subcoriaceous or somewhat membranaceous, 3-5 inches long, 2-3 lines broad, flaccid, linear-ovate, acuminate, deeply nearly to the costa pinnatifid; the lobes linear

oblong \*-f line broad, those of the upper half fertile, broader and with the edges upcurved so as to clasp the large solitary sorus ; costa and sometimes the frond deciduously pilose. *Hook. Syn. Fil.* 324. *Calymmodon cucullatus (PresL), Bedd. F. S. I. l. 2\*r>*

Ceylon, on rocks and trees, central and southern provinces 3,000-5,000 feet elevation.



• <sup>w/"/^-</sup> Stipes tufted, <sup>very</sup> short, fringed with soft hair-fronds up to about 14 inches long, by 1 inch broad, flaccid, cut down nearly to the rachis into linear-oblong entire or slightly undulated blunt lobes 2-3 lines broad, texture thick subcoriaceous; rachis and both sides sparingly hairy veinlets simple; sort apical on the veinlets, sunk in an oval cavity (having an elevation on the upper side of

**POLYPODIUM TRICHOMANOIDES.** (*Sw.*)

L ; J •- TT 1 o ZN

mdrib. *Hook. Syn. Fil.* 325. *Bedd. F. B. L t* 173.

Khasya 3,000-4000 feet, near Cherra; Assam! from Cherra to Towye and Jarain in Jaintea, 3,000-4,000 feet elevation, not plentiful anywhere.

10. **POLYPODIUM TRICHOMANOIDES.** (*Sn.*) Caudex short, erect, P<sup>t</sup> xleaceous above, densely rooting with wiry fibres ; stipes short ^-1 inch long, densely tufted, patent-villous with long fibrous hVir<sup>s</sup> fronds 3-4 inches to a span long, 2 -4 lines wide, rigid-membmnaceous)

^ fr01ld > in rows of  
4 ~ 6 on each side of the



linear, attenuated at both extremities, deeply nearly to the costa pinnatifid or almost pinnate (quite so at the very base), lobes horizontally patent from a broad base, ovate or oblong entire; sub-concave beneath, sub-deciduously ciliated with long fibrous or blackish patent hairs: veins solitary in each lobe, simple or forked, each lobe having a single sorus near the base of the veins and the costa. *Hook. Sp. Fil.* iv. 178: *Syn. Fil.* 326. *Bedd. F. B. I. t.* 2.

Sikkim, 9,000-12,000 feet elevation.

(Also in South America, Brazil and Ecuador: and Cuba.)

11. *POLYPODIUM GLANDULOSUM*. (*Hook.*) Caudex small, in distinct, clinging to the bark of trees by conious rooting fibres, the rest of the plant all over pilose-glandulose, most so beneath: stipes tufted 2-3 lines long, fronds 2-4 inches long, 1 inch broad, linear obtuse, scarcely attenuated at either extremity, rather firm-membranaceous, sub-succulent, deeply nearly to the rachis pinnatifid; segments ovate, sub-acute, horizontally patent, decurrent at the base, lowermost ones free, all of them serrate-pinnatifid, costule, and rather distant few and oblique simple veins indistinct: sori 1-6 to each segment globose. *Hook. Sp. Fil.* iv. 193. *Syn. Fil.* 327. *Bedd. F. S. I. t.* 238b.

Ceylon, in the central provinces, Rambode, and summit of Wattakella Hill.

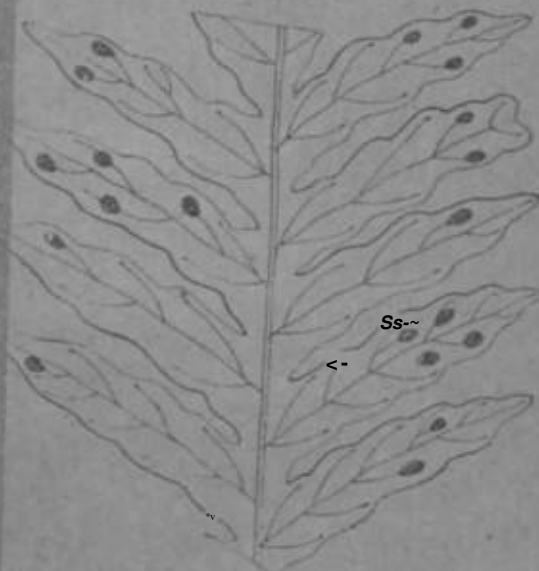


Nº163.  
*POLYPODIUM GLANDULOSUM*. (*Hook.*)

12. *POLYPODIUM THWAITESII*. (*Bedd.*) Caudex creeping, clothed with lanceolate scales; fronds sessile or subsessile, sub-coriaceous, perfectly glabrous, 2-4 inches long by about 1 inch broad, lanceolate or oblanceolate, deeply almost to the rachis pinnatifid: lobes 1-2 lines broad, lanceolate, blunt, rather ascending, more or less repand or sinuate-pinnatifid, the lower reduced gradually to a narrow wing: veinlets distant, erect-patent, simple or more rarely forked, where simple soriferous at the apex, where:

worked the superior **veiiilet** only is soriferous; sori round, slightly immersed. *Bedd. F. B. I. t. 188. 'Baker, in Hook. Syn. Fil. p. 508.*

Ceylon, about Dickoya, on treesj very sweet scented (C.P. 3) 900).



No 164.

**OLY1>OJUIUM THWAITESII.** (*Bedd.*)

«3- HOLVPODIUII DEODRUM.  
(*Brack.*) Caudex short, rather thick, creeping, densely **ferruginous-squamose**, stipes approximate, **sub-terminal** on the caudex, 2-4 lines long; fronds coriaceous, glabrous, 6-12 inches long, 1-1 1/2 inch broad, narrow-lanceolate, much and almost caudate-acuminate, the base very **gradually attenuated** into the short stipe, **deeply** and nearly to the rachis pinnatifid, segments horizontally patent, narrow-oblong obtuse, quite entire, below gradually becoming shorter and broader and forming shallow elongated lobed wings at the base; costaglabrous or **pilosulous**, costule and veins quite sunk and inconspicuous; sori oblong, 2-S in a row, on each side of the costule, and apical on the short veins, which do not nearly reach the margin, **partially** sunk in a hairy **cavity** (but with no raised border). *Hook. Sp. Fil. iv. 179. Brack. Fit. Un. Si.*

*Exp. p. 7, t. 2, f. 2. Bedd. F. B. I. t. 238A. P. serra, Wall. Cat. t. 313.*

South India, on the Tinnevely Mountains near Courtallum; Ceylon, Singhe Rajah Forest; Singapore and Mount Ophir; North-west India, near Mandal (Edgeworth).

(Also in Borneo, Luzon, Tahiti.)

14. *POLYPODIUM TUSCATEM*. (Bl.) Stipes tufted, 1-3 inches long, densely clothed with soft spreading hairs; fronds 3-6 inches long, 1-1 inch broad, cut down nearly to the rachis throughout into close entire obtuse pinnae, 1 line broad, the lower ones shorter and broader, texture subcoriaceous, rachis and both sides thinly clothed with soft hairs; veins obscure, simple; sori forming a close row on each side the midrib, at last filling nearly the whole surface.

Hook. Syn. Fil. p. 331.

Bedd. F. Fl. I. t. 334.

Ceylon.

(Also in Java.)

\* \* \* Fronds pinnate.

15. *POLYPODIUM ONIQUATUM*. (Bl.) Stipes tufted, 1 inch or more long, rigid, naked or vil-  
 POLYPODIUM DECORUM. (Linn.)  
 lous; fronds up to 15 inches long and 2 inches broad, pinnate, being cut down to the rachis throughout into entire close subhorizontal linear pinnae, 7-12 lines broad, dilated at the base, the lower ones dwarfed, texture subcoriaceous; rachis naked or hispid, both sides naked; veinlets simple, not reaching the margin; soft sori in a cavity 4-6 on each side, basal on the pinnae, the edges of the



FIG. 14.

FIG. 15.



STELLA S. V. ENERAL

J'OLYTODIACEAE OBUQUATUM. (Bl.)

tei tile **pinnae** sometimes **undulated**. *Hook. Syn. Fil.* 328. *Bedd. F. 5. l.* 167. *Cryptosorus, Fee.* **Ccelopteris, A. Br.**

South India, Anamallay Mountains, • up the Toracadu 4,000-5,000 feet elevation, Tinnevelly and Travancore Ceylon, common on trees about Newera Elya.

*Bedd.*  
*River Hills,*

16. POLYPODIUM

KKI'ANDULUM. (*Mt'tt.*)

Caudex stout, erect, with densely matted roots; stipes tufted, very short, naked or hairy; fronds 4-6 inches long, about i inch broad, cut down to the rachis throughout, into erect-patent blunt crenated pinnae 1-1 lines broad; texture subcoriaceous; rachis naked, or with a few very long hairs; surfaces naked, or **with** long hairs beneath on the costa; veinlets simple, falling short of the margin; sori slightly immersed, filling nearly **the** whole space between ' the



POLYPODIUM RKPAXDULUM. (*Mett.*)

the midrib and the margin, and apical on the veinlets. *Hook. Syn. Fil.* 328. *Polypodium subfalcatum*, var. *!*?, *Bedd. F. B. I. t.* 169. *Polyp. minutum* (*Baker*), *Hook. Syn. Fil.* 32S, as far as the *Ceylon plant is concerned.* *C. P.* 3073.

Ceylon, higher parts of central provinces, on trjnks of tre\*

17. *Polypodium subfalcatum* (Bl.) Rhizome erect; stipes decumbently tufted, clothed with soft spreading hairs; fronds 2-10 inches long, by 3-4 inch broad pinnate, i.e. cut down to the rachis into close spreading pinnae; pinnae hairs on both sides, soft in texture, rather sharply toothed sometimes one-third or half down, decurrent at the base, the lower ones gradually reduced; veinlets simple, not reaching the margin; sori apical on the veinlets one to each tooth or lobe of the pinna. *Bl. Fl. Ind. 1861. t. 37. A. B. Hook. 274. Fil. 318.*

*Polyp. parvulum, Bedd. K. S. t. 1. 166, not Bory. P. subfalcatum, Bedd. E. B. t. 1. 189, fig. A. Anal. Bot. B. 1. P. parvulum, Thw. Jm. Pl. Zey. p. 304 in part, C. P. 1290, not 3073. It differs from the last in being soft in texture instead of coriaceous, in being much more hairy (repandum being generally quite glabrous) in being serrate instead of crenulate, and in the sori not being immersed. Mr. Flourens included them both under his parvulum.*

N° 163.

18. *Polypodium subfalcatum* (Bl.) Hook. and Mr. Baker has the former both under repandum and minimum in the *Synopsis Filicum*.

South India, Nilgiris Lamb's Rock near Coonoor, Anamallay forests of Toracodu river, 4500-4 feet; Cayton, central provinces; South India, Malabar from Gurwah to Bhyang, 2000-9,000 feet elevation; Khasya. Mr. Clarke says that some of the Khasya specimens are as small as *P. trichomanoides*, but that species has only one sorus to each pinna, while this has one pinna per sori, or



A. E. CATTALINI - INTRA

POLYPODIUM DAREFORI (it W. Hook.)

one to each lobe of the pinna, besides the sori are differently situated.

\* \* \* \* \* *Fronds compound.*

18. *POLYPODIUM DAKARFOLEH*, (Hook.) Rhizome stout, creeping, clothed densely with filiform golden scales; stipes 6-9 inches long, articulated on the rhizome, naked, glossy; fronds 12-18 inches long, 3-12 inches broad, sub-deltoid, 3-4-pinnate; Darea-like; pinnae 1-2 inches broad, lanceolate deltoid; secondary pinnae  $\frac{1}{2}$  inch long, tertiary pinnae small, forked or pinnate; the ultimate segments narrow, almost filiform bluish, texture herbaceous, rachis glossy, both sides quite naked; veins one to each ultimate segment, not reaching the margin, and thickened at the apex, and bearing the sorus low down; sori extending beyond the margins of the segments; indusium none. *Hook. Sp. Fil.* iv. 236. *Syn. Fil.* 339. *Acrophorus Hookeri*, *Bedd. Fl. B. I.* 95 (not Moore, which is *Leucostegia Hookeri*.)

Himalayas and Khasya, 4,000-5,000 feet elevation. This cannot belong to *Phegopteris* as the stipes are articulated with the rhizome; it is very probably a *Leucostegia*, but no indusium is to be detected in the many examples that I have examined; it has long been confused with *Leucostegia Hookeri*, which it closely resembles in habit.

#### GENUS LXI.—GONIOPHLEBIUM. (Presl.)

(*Gonia*, angle; *phebes*, veins—the veins forming angles.)

Veins forming ample regular areoles, each with a simple or rarely forked but included veinlet, on which the sorus is terminal, often in the basal areoles only, but sometimes also in the second or even the third row, marginal veinlets free; sori non-indusiate, globose or rarely oblong; fronds pinnatifid or pinnate (simple in some species not Indian); rhizome wide-creeping, the stipe articulate on the rhizome; pinnae articulate with the rachis.



\* *Fronds pinnatifid or somewhat pinnate at the base only.*

i. GONIOPHLEBIUM AMIENUM, (Wall.) Caudex creep stout, densely paleaceous, with ferruginous subulate scales, w are sub-adpressed, never hair-pointed ; stipes a span to a foot more long, stramineous or brown ; fronds r to nearly 2 feet long 6-10 inches wide, glabrous or sub-pubescent, ovate, terminating ! lanceolate acuminate subentire segment, deeply pinnatifid to w 2-3 lines of the costa, segments horizontal, more or less approxit 3-8 inches long, \- \ inch wide, - subfalcate from a broad ensiform gradually acuminate, entire, or coarsely dentate-serrate lowest pair deflexeH, veins forming one costal series of mode sized soriferous areoles, and sometimes two (the second not ferous), marginal veinlets free, soriferous veinlet always arising the vein at a distance from the costa; sori subglobose sunk ( lose on the upper side.) *Hook. Sp. Fil.* v. 24. *Wall, Cat. n* *Bedd. F. B. l. t. 5.* *HK Sp. Fil. 341-*

Himalayas, from Gurwhal to Bhotan, 4,000-11,000 f< vation, common; Khasya 3,000-6,000 feet. (Clarke's tonglensis from Tonglu near Darjeeling, appears only to drt the pinnre being blunt at the apex, there is, however, only om specimen known of it.)

2. GONIOPHLEBIUM SUBAMJKNUM. {Clarke.) Rhizome si: densely clothed with grey-brown lanceolate-subulate scales, whi subadpressed, never hair-pointed, nearthe base of the main are sometimes ovate or lanceolate scales ; stiprS about 2 inches fronds 6 inches long, deeply pinnatifid nearly to the racl. his. low segments much abbreviated and deflexed, all serrated at the margin costal arches of the main rachis continued nearly or quite to tl of the frond ; main rachis above glabrous or puberulous. *R N. Lp. 550\* / . 82, / 2.*

Very nearly allied to amsenum, and perhaps only a forrr| differs in its slender rhizome and small size.

Himalayas, on the ridge between Sikkim and Nepal, ij 12,000 feet elevation, very abundant.



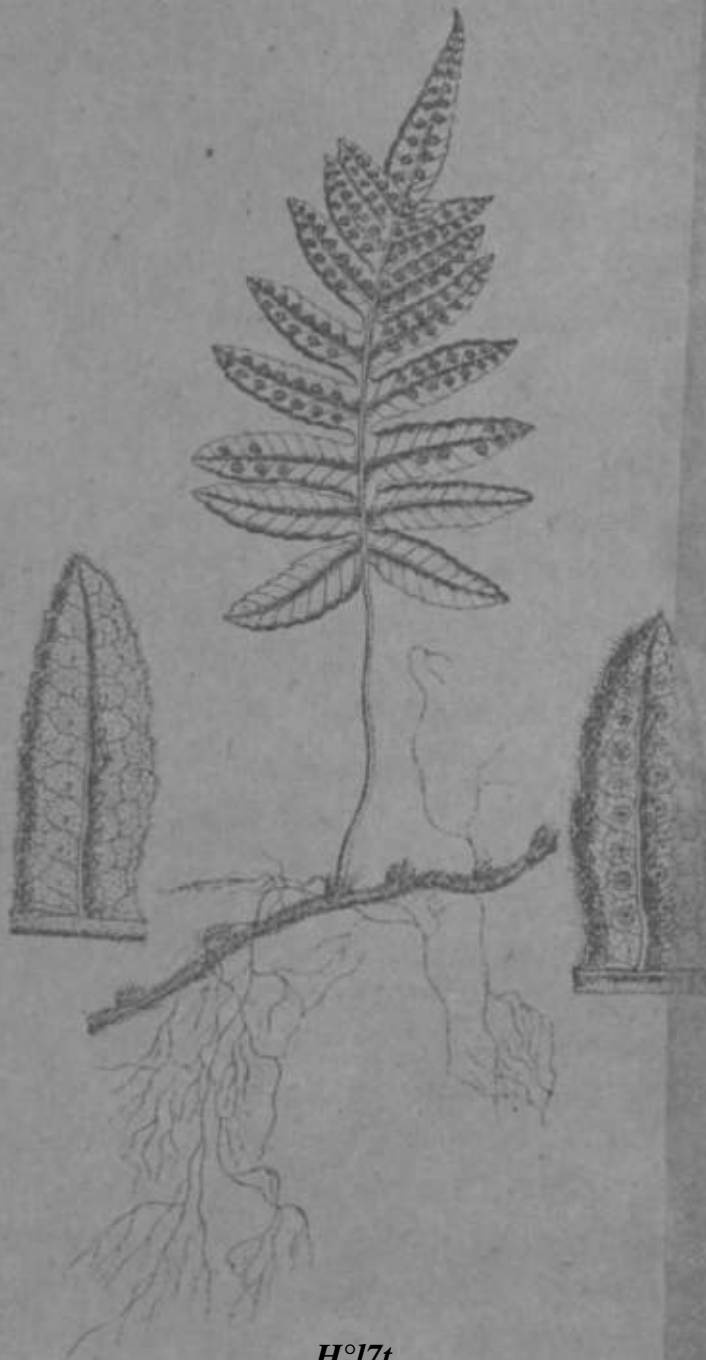
1877

POSTHIERIDIUM WILSONI (1911)

3. GONIOPHLEBIUM LACHNOPUS. (Wall.) Rhizome more slender than in amenum, densely clothed with hair-pointed brown-black scales spreading from small bases ; base of the rachis often with a few similar scales; stipe 2-4 inches long, slender naked ; fronds flaccid, 12~18 inches long, 3-4 inches broad, cut down nearly to the rachis into spreading slightly-toothed segments  $\frac{1}{2}$  inch broad, texture herbaceous, both sides naked, or the rachis beneath slightly scaly, and pubescent above; coslalaroles in a single series (never two as sometimes occurs in amrenum), or rarely the veins are all free (not forming areoles); sori in a single series in the areoles, or at the apex of the forked vein, not when there is no anastomosis. Wall. Cat. 310. Book. Syn. Fit. 342. Bedd.Rj). 1.

163. Clarke, F. N, 1. SSi-

Himalayas, from ashmir to lihotan, 2,000-3,000 feet elevation, very common. Khasya, 3,000 - 5,000 feet elevation.



H<sup>o</sup>17t.

GONIOPHLEBIUM FRYTIROCARPUM. (Mett.)

4. GONIOPHLEBIUM ERVTHROCARPUM. (Mett.) Rhizome  $\frac{1}{2}$  line thick, glaucous, firm, wide-creeping, scales lanceolate, dark-castaneous.

ninate, not hair-pointed; stipe 3-4 inches long, naked, stramineous, very slender; frond oblong-deltoid, 3-4 inches long, 1½-2 inches broad, pinnatifid nearly to the rachis, lobes 5-10 jugate, linguate blunt, 3-4 lines broad, obscurely repand, adnate, only the lowest narrowed at the base, on the lower side scarcely shortened, texture rigidly subcoriaceous; rachis and costas below and under surface pilose; main veins raised, very distinct to nearly the edges, costal areoles in one or two series, the second series when present generally without a free veinlet in lower areole, sometimes forked, or rarely netted and graduating into the venation of *Pleopeltis*; sori in a single series in the lower areoles. *Mett. Kuhn. Linn.* 36, p. 135. *Hook. Syn. Fil.* 511. *Bedd. F. B. I. Sup.* 382.

All my specimens from Messrs. Clarke and Atkinson have typical *Goniophlebium* venation, so also have nearly all the specimens at Kew. Mr. Clarke, however, has removed the species to *Pleopeltis*, because some specimens gathered by him have the costal areoles less defined and the veinlets somewhat netted and graduating into the venation of *Pleopeltis*. I look upon these as abnormal, the whole habit of the plant being that of *Goniophlebium*.

Sikkim, Lacheen, 9,000-11,000 feet elevation, Yakla valley, 6,000 feet.

5. *GONIOPHEBIUM HENDERSONI*. (*Atkinson, MS.*) Rhizome very slender, glaucous, wide-creeping, clothed with hair-pointed scales; stipes 3-4 inches long, naked or scaly, very slender, grey, stramineous; fronds narrow-lanceolate 3-10 inches long, 1½-2 inches broad, deeply nearly to the rachis pinnatifid, or the lower lobes or pinnae quite free; pinnae or lobes 20-30 pair, patent lanceolate acute, 3-4 lines broad, distally incised, all except the lowest dilated at their base, texture moderately firm, surfaces green, naked; areoles and sori uniserial, the latter near the midrib, not crowded, occasionally the veins are all or nearly all quite free and not anastomosing, or forming areoles, costal arches of the main rachis prominent, very long and narrow, absent of course at the base of the larger fronds, where it is pinnate, not pinnatifid. *Hook. Syn. Fil.* p. 511. *Bedd. F. B. I. t.* 383.



PLANTAE CANADENSIS

STYLIS BENTONIANIS

(Himalayas, dividing ridge between Sikkim and Nepal, and north of the Jongri, 11,000 to 13,000 feet elevation, very abundant,

6. GONIOPHLEBIUM MICRORHIZOMA. (*Clarke.*) Rhizome 1 line thick, firm wide-creeping, clothed with grey-brown ovate or lanceolate scales, not hair-pointed; base of the rachis often with a few similar scales, 4-5 inches long; fronds lanceolate, often caudate at the apex, about 1 foot long by 3-4 inches wide, deeply nearly to the rachis bifid, the lowest pinn\* sometimes free; pinnae 20-to pair blunt lanceolate acute, 3-4 lines broad, distantly incised, texture hercynian. Rachis glabrous above, castaneous beneath; areoles and sori serial, or all the veins often quite free, and not forming areoles.  
*Clarke, F. N. I. 551. Hook. Syn. Fit. p. 511. Bedd. R. & S. 384.*  
 Kashmir to Bhotan, 5,000-8,000 feet elevation, very common.'

\* \* *Fronde distinctly pinnate throughout*

7. GONIOPHLEBIUM MOLLE. (*Bedd.*) Rhizome creeping, size of the stem of a tobacco pipe, densely covered with reddish brown tomentose scales; fronds 1 foot long, 7-8 inches broad; oblong-acute membranaceous, pinnae numerous, 3-4 inches long, an inch wide, furnished on both sides as is the rachis with soft weak whitish hairs, serrate-crenate, superior base often subauricled, superior one persistent on the rachis, remainder sessile from a broad base of the rachis, inferior ones subpetiolate; veins forming two series of areoles, the outer of which has the secondary veinlet arising from the side of the areole distant from the costa, marginal veinlets free or rarely uniting, simple or forked. *Bedd. F. B. L. t. 200. Polypodium Beddomei Clarke. Hook. Syn. Fit. 2nd Edit. 344.*

Malay Peninsula, in Tenasserim.

8. GONIOPHLEBIUM SUBAURICULATUM. {*BL under Polypodium*} Rhizome creeping, stoloniferous, densely clothed with narrow acuminate, often hair-pointed scales, subpruinately stiped a span to a foot and more long, sparingly paleaceous, rufous-brown; fronds firm coriaceous, glabrous, 2-6 feet long, a foot and more wide, pinnate, pinnate horizontal, numerous yet remote, 3-10 inches long, an inch wide, shortly petioled and jointed on the rachis from a

some what cordate or truncated and occasionally auricled base, linear-lanceolate, finely and gradually acuminate, serrated; veins forming a double costular series of areoles, including a free venule, of which the lower series is soriferous, marginal veinlets free; sori in a single series forming slightly elevated pustules on the superior side. *Bl. Fl. Jav. p. 177, t. 83. How. Sp. Fl. v. 32. Bedd. F. B. t. 78.*

N<sup>o</sup>173.

Khasya, 3,000-5,000 feet elevation; Malay Peninsula. *GONIOPHLEBIUM SERRUCELLATUM* (L.) (P. G.)  
(Also in Malay Islands and Queensland.)

9. *GONIOPHLEBIUM ARGUTUM*. (Wall. under *Polypodium*.)

Rhizome thick as a writing-quill, squarrose with ovate-acute short blackish or brown glossy spreading scales, stipes 3-4 inches to a span long, brown glossy; fronds firm-membranaceous, glabrous, 1-2 feet long, 3-10 inches broad, pinnated, pinnae distant sub-horizontally patent, 4-6 inches long;  $\frac{1}{2}$ - $\frac{1}{4}$  inch wide, from a broader but obtusely and oblique cuneated or subtruncated base (rarely rotundate-auricled) elongate-oblong, acuminate, rather obtusely serrated, lower ones often opposite, the rest alternate, superior ones more

N<sup>o</sup>174.

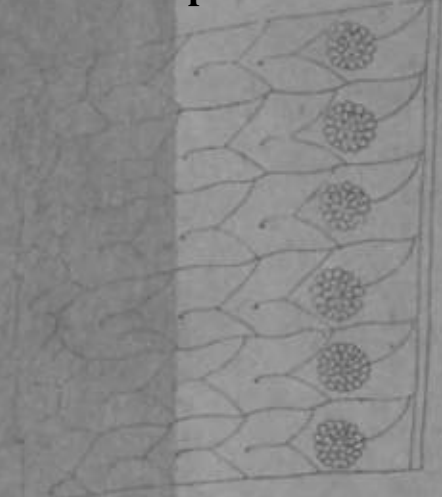
*GONIOPHLEBIUM ARGUTUM*. (Wall.)  
or less adnate and decurrent, terminal one similar to the rest, veins forming a costal series of large oblong soriferous areoles; marginal veins ending in a thickened apex within the margin all free; sori super-

le apex of the free veins in the costal areoles. *Wall. Cat. Hook. Sp. Fil. v. 32. Bedd, F. B. I. t. 6.*

ilayas, from Kashmir to Ehnhn \* \* r - \  
-unotan, 4,000-9,000 feet eleva-  
common. Closely allied to the last specie:

**JONIOPHLEBIUM VERRUCOSUM.** (*Wall, under Poly/odium.*)

long, stout creeping, very paleaceous: **strpes** 11 foot and more  
^long-acuminate, **nrm-merabranaceous**,  
but distant, 6-9 inches long, **I-I £**  
inch broad, oblong costate. **S**, **tl** **cul** **ate** **u** **P** **o** **n** the **rachls**, suddenly and  
**pidate** **^acmninate** entire or serrated chiefly towards the apex,



nearly sessile, the base obliquely cuneate ;  
primary veins slender but straight and  
parallel costuliform, forming with the  
anastomosing veins four or five series of  
areoles each with a free included **veinlet**,  
**but** of which the lowest series only is so-  
**nterousj** sori in a single series next the  
costa sunk in a deep cavity, having a cor-  
responding pustule on. the upper **side**.

*TM%Cat.n. 296. Hook. Sp. Fil. v. 31.*

No 175.

JONIOPHLEBIUM VERRUCOSUM

**Malacca and Penang.**  
**(Also in the Philippi<sub>nes</sub>.)**

ronthe Anuruan because ,he pinna an **J** **cula** **J** **^** **t/l** the  
•"• lie has constituted the genus *Schellokpis* for them.

**GENUS LXII.-NIPHOBOLUS.** (AW/.)

if snow; **bolus**, a large pill **\_** **the** **snmv\_** **uke** **^** **an** **<** **1**  
**round sori.**)

on their under surface natted with woolly or cottony  
**I** son globose or elliptic, superficial or immersed, buried  
•.entu,n; veins mternal, obscure, pinnate, prominent c.r



uniform from a central costa, venules anastomosing sometimes transversely parallel, forming parallelogrammoid areoles, with excurrent free or occasionally connivent or anastomosed veinlets, sometimes uniting in roundish or oblong hexagonal unequal oblique areoles, with variously directed simple or divaricately forked veinlets, the veins of the fertile frond when contracted less developed; fronds simple or rarely lobed, rigid, coriaceous, opaque, the fertile often contracted.

1. *NIPHOBOLUS ADNASCENS*. (Sw.) under *Polypodium*. Rhizome wide-creeping, paleaceous with lanceolate-sericeous scales; stipes distant, 1-2 inches long, furnished at the base with lanceolate-linear often hairy scales; fronds dimorphous, carnos. coriaceous, dark green above, but hoary with sparse stellated pubescence beneath, and paler and even white with more copious compact hairs; sterile fronds, 2-4 inches long, spatulate or elliptical-lanceolate, obtuse; fertile ones, 6-8 inches long, linear or oblong obtuse or acute, both kinds tapering below into the stipe, costa sub-carinate, costules sunk obscure, their areoles including four (sometimes only three or two) veinlets, which are generally free with clavate apices, though they sometimes anastomose, soon deep sunk in the tomentum and in the substance of the frond on each side of the costa, arranged 5-6 in obliquely transverse series, capsules long stalked, mixed with long stalked stellated scales. *Syn. Syn. Fil.* pp. 25 and 228. *Hooker's Sp. Fil.* v. 47. *Bedd. P. S. I. I.* 127. *Wall. Cat.* 268. *Polyp. verrucosum*, *Wall. Cat.* n. 267. *P. vittarioides*, *Wall. Cat.* p. 270. *P. pertusum*, *Wall. Cat.* 267.

Throughout India from the plains up to 4,500 elevation: Ceylon; Malay Peninsula.

(Also in China; Fiji; Mascareen Islands, Cameroon Mountains.)

2. *NIPHOBOLUS LAEVIS*. (L. Sw.) Rhizome slender, wide-creeping, clothed with linear sericeous scales; stipes distant, somewhat hairy  $\frac{1}{2}$  inch to nearly 2 inches long, furnished with a tuft of scales at their base; fronds coriaceous, linear-lanceolate, much narrowed towards the apex, 2-6 inches long,  $\frac{1}{2}$ - $\frac{3}{4}$  inch broad, glabrous above, hairy with stellate pubescence beneath; venation obscure, costules thin, areoles in three series between the costa and margin, with one



NIPHOBOLUS ADNASCENS. (Nig.)

two or three clavate veinlets in each, which are variously directed, free or rarely joined to the base of the areole above, some large partially sunk in the tomentum, often confined to the apex of the frond, or scattered, or covering nearly all the under surface. *Bedd. F. B. I. t. 161.* *P. Niphobolus jaintense, Clarke, F. N. S. t. 552, t. 82.*

Khasya hills, Jaintea, Jaram, 3,500 feet elevation. Considered a variety of *adnascens* by Mr. Baker, but sufficiently distinct in its venation, I think, to rank as a species.

3. *NIPHOBOLUS ACROSTICHOIDES.* (Sw.) Rhizome wide-creeping, branched, younger portions squarrose, with rather large bright ferruginous lanceolate scales; stipes 1-3 inches long furnished at the base with obtuse scales; frond hard coriaceous, 1-2 feet and more long,  $\frac{1}{2}$ -1 inch wide, glabrous above, beneath whitish or tawny, stellate-tomentose (tomentum very deciduous) elongate-lanceolate or linear obtuse; sterile fronds generally the broadest; areoles 5-7 between the costa and margin, each with 3-6 veinlets free and simple, or variously forked and anastomosing; sori rather small, prominent, very compact, generally occupying the upper part of the frond, arranged in 6-8 oblique very close series between the costules. *Sw. Syn. Fil. p. 29 and 225.* *Hook. Sp. Fil. v. 44.* *Bedd. F. B. I. t. 31.* *Polyp. furfuraceum, Wall. Cat. n. 278.*

Birma and the Malay Peninsula generally. I have specimens from Tenasserim 2 feet long and only  $\frac{1}{4}$  inch wide.

4. *NIPHOBOLUS HETERACTIS.* (Mett.) Rhizome wide-creeping, the scales copious lanceolate-linear, not adpressed golden; stipes distant up to 7 inches long, more or less scaly; fronds oblong, with a long acumination about 6 inches long by 1 $\frac{1}{2}$  inches broad, coriaceous, the fertile not generally contracted, upper surface glabrous lower clothed with close compact stellate scales, the rays of which broad, with filamentous hairs admixed; areoles in 3-6 between the costa and margin, each including 2-3 veinlets, are generally forked and more or less anastomosing; sori few and prominent. *Mett. Kuhn in Linn. 36. 146.* *Claytonia, Wall. 535.* *N. Lingua, Hook. Syn. Fil. 352, in part. arboriferous, F. Sept. t. 355.* *the lesser variety*

FERNS OF BRITISH INDIA AND CEYLON

Sikkim and Bhotan, 4,000-6,000 feet elevation; Khasya, 4,000-5,000 feet. This is very near the Japan Lingua, but it appears sufficiently to be considered a species, besides the **filamentous hairs radiating** round the scales, which it requires a magnifying glass to detect, the habit is somewhat different and the scales of the rhizome more free and copious.

3. NIPHOBOLUS PANNOSUS. (Mett.) Rhizome wide-creeping, slender, scales linear, dark coloured, closely adpressed; stipes up to 6 inches long, steliately scaly; fronds lanceolate up to 6 inches long by 1 inch broad, narrowed at both ends, coriaceous, glabrous above, at least in age, beneath densely matted with stellate scales, the rays of which are hair-like; areoles in about seven series between the costa and margin, each including 2-4 veinlets which are simple, forked, free, or variously anastomosing; sori crowded, rather small, 5-6 in a row between the main veins, not reaching the margins. Mett. 'Kuh...



m>7. NIPHOBOLUS PANNOSUS. (Mett.) Linn. 36, l. 141. Hook. Syn. Aiphobolus Lingua, Bedd. F. S. I. t. 240. Rhizome, up to 3,000 feet elevation; renasserim.

NIPHOBOLUS STIGMOSUS. (Sw.) Rhizome wide-creeping, stout, glabrous with slender subulate scales; stipes subaggregate, slender, angled; fronds a span to 1-2 feet and more long, and more broad, firm, coriaceous, in age glabrous beneath, densely stellate-tomentose and subfurfuraceous (tomentose), lanceolate or suboblanceolate acuminate,

gradually tapering below and decurrent upon the stipes, costules distinct, elevated on the under side; sori immersed, very minute and numerous, arranged in compact closely placed lines or series between the costules and in equally-compact series transversely with areoles in about 10 series between the costa and margin, each including many veinlets which are much branched and anastomosing.

*Siv. Syn. Fil.* 29, 226. *N. costatus*, *Jfool Sp. Fil.* v. 50. *Cat. p.* 265. *Bedd. F. B. l. l.* 120.

Himalayas, from Gurwhal to Bhotan, 2,000-6,000 feet elevation; Khasya, 2,000-3,000 feet; Paras'nath, 2,500 feet; Tenasserim; Golcondah Hills West of Vizagapatam. My Birma specimens have very long stipes and the frond scarcely decurrent, my Himalaya and Vizagatarn specimens have the frond very much decurrent, and the stipe very short.

7. *NIPHOBOLUS SUBFURFURACEUS*. (*Hook.*) Rhizome short, branched, creeping, the younger branches paleaceous with ferruginous subulate scales, stipes subaggregated, 4-5 inches long, nearly glabrous; fronds 24-30 inches long, 4-5 inches

wide, broad-lanceolate or oblanceolate, sharply acuminate, gradually and much attenuated upon the stipes, glabrous above, minutely sellate-tomentose beneath, the tomentum thin, firm, close so as to appear subfurfuraceous or compactly pannose-whitish colour, costa stout, costules evident but not elevated; venation indistinct, quite that of true *Campyloneuron*, the areoles 15-20 in a series between the costa and the margin, each numerous (8-9) included free or scarcely anastomosing soriferous veinlets; sori rather small, elevated, subglobose (not in the keel),

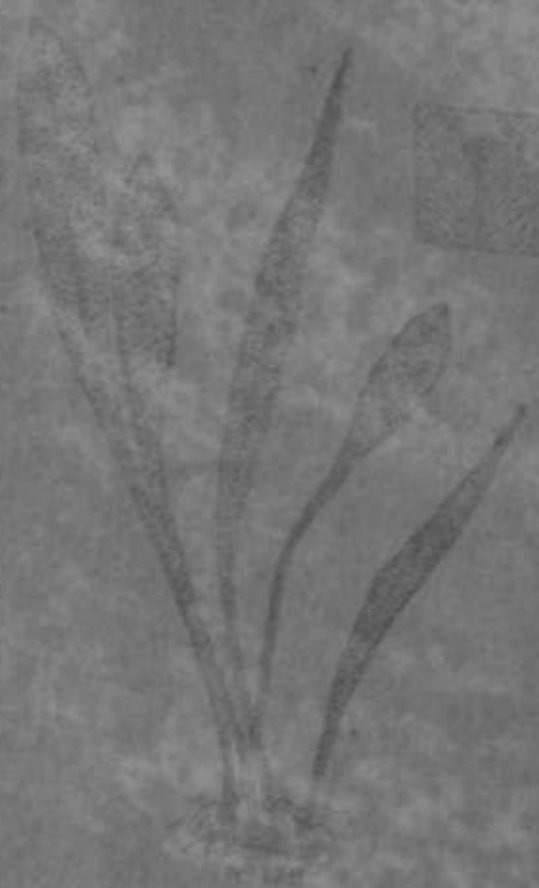


N<sup>o</sup> 178.  
*NIPHOBOLUS STIGMATUS*. (*Sw.*)

forming as many arched series between the costules as there are areoles. *Hort. No. III. v. 57. Bull. E. I. I. 259.*

Liboran and Mishmee. The areoles are much more numerous than in *Symostis*, and the included veins also more numerous, but much less anastomosing, the fronds in the specimens are of thinner texture, the venicels being visible (without soaking the frond).

8. *Nipponia viscosa*. (III.) Rhizome creeping, paleaceous



with ferruginous scales, stipe 2-grooved short scarcely any or 3-5 inches long, and then winged or margined to the base; fronds coriaceous 6 inches to a foot and nine long, 1/2 an inch to 1-1 1/2 inch wide, lanceolate or linear-lanceolate or even linear, often finely acuminate, the margin quite entire for rarely spuriously and very unequally serratifid with remote long and narrow segments), from near the middle gradually attenuated downwards to the caudex, at first wholly tomentose with ferruginous stiffened hairs, at length glabrous on the upper side and depressed-punctate, the dots corresponding with the sori; venation quite sunk,

*Nipponia viscosa*. (III.)

veins pinnate but not prominent, venules transversely parallel and remote, with the veins parallelogrammoid areoles (about five between costa and margin), with two, sometimes only one, excurrent free elate veinlets in each areole; sori copious and at first quite sunk among the tomentum appearing in the form of small tubercles, at length a circular opening appears, but the sori scarcely rise above the surface of the tomentum, arranged in *Hort. No. III. v. 58. Bull. E. I. I. 259.*

*Nipponia viscosa*. (III.) *Bull. E. I. I. 259.*

**Dolypodium** porosum, Wall. Cat n. 266. **Niph.** Schmidianus, Bot. Zeit yip. 121. Polyp, mysurense {Heym\ Wall. Cat. Niph. floccigerus (Mefft.), Bedd. F. Sup. t 386,

South India, Western mountains, 4,000-8,000 feet elev; Ceylon, central provinces; Himalayas and Khasya, 2,000-7,000 feet elevation; Malay Peninsula. (The **Khasya floccigerii!** differs in the fronds being narrower.)

9. **NIPHOBOLUS FLOCCIJOSUS.**

(Don.) Rhizome short, stout densely scaly, especially at base of stipes, with finely subulate golden scales; stipes 2-8 inches long, aggregated, clothed as are the fronds with dense whitish or brownish stellate tomentum; fronds 4-16 inches long by 1-1 1/2 broad, coriaceous, lanceolate, finely acuminate, subsinate, moderately attenuated and decurrent, or broad and unequally hastate at the base, in age glabrous, above and blackish punctate, venation immersed, costules indistinct, areoles 9-16 each with 3-5 included veinlets which are generally free, simple or forked, more rarely anastomosing with a



**NIPHOBOLUS FLOCCULOSUS.** **Veinlet** from the top of the areole; sori scarcely sunk, slightly elevated above the tomentum, very copious, arranged in regular rows between the costules. Don. Frod. FL Nep. intergibilis, Hook. Sp. Fih v. 49. Bedd. F. B. I A 162. Plum, Wall. Cat. 265, partly.

Himalay -, **Gunvhal** to Bhotan, up to 5,000 feet elevation; Khasya, extending into the Sylhet plains.

10. **NIPHOBOLUS GARDNERI**, (Meth'u.) Rhizome short

the younger portions densely ferruginous-paleaceous; sub-  
 ovinate, arising from a scaly branch of the caudex, 2-4 inches  
 fronds about a foot long, canose coriaceous lanceolate, ab-



N° 181

*NIPHOBOLUS GARDNERI* (Muhl.)

the main costa and margin, each including 2-3 veinlets, which are  
 generally simple with 2 clavate apex rarely forked and rarely  
 anastomosing with adjoining veinlets; soft superficial (not sunk) in



*NIPHOBOLUS PENANGIANUS* (Hook.)

base much and gradually attenuated to the margin are finely  
 serrated; abrous above (at least in primary) beneath glabrous  
 with fine stellated aciculation intercalary but abundant

tively acuminate, gradually atten-  
 uated upon the stipes, densely  
 coated with a very compact firm  
 subfarinaceous mass of whitish  
 or ferruginous stellated tomentum,  
 costa and primary veins or cost-  
 aules slightly elevated beneath,  
 venation of *Campylotryum*,  
 secondary transverse veins more

obscure, areoles about 7 between  
 the main costa and margin, each including 2-3 veinlets, which are  
 generally simple with 2 clavate apex rarely forked and rarely  
 anastomosing with adjoining veinlets; soft superficial (not sunk) in  
 3-4 series, parallel with the cos-  
 tules and 70-12 transverse series  
 between the costa and the margin.

*Meth. Polypod. p. 129. Hook. Sp. Fil. v. 51. Bedd. F. S. I. t. 242.*

Ceylon, rocks and trees in  
 central and southern provinces up  
 to 3,000 feet; South India, Ana-  
 malay Hills, 3,000 feet elevation.

VI. *NIPHOBOLUS PENANGIANUS* (Hook.)

*(H. K.)* Rhizome short-  
 creeping; stipes scarcely any,  
 fronds submembranaceous, 1-  
 foot and more long, 2-3 inches wide,  
 obt. necculars finely acuminate, the

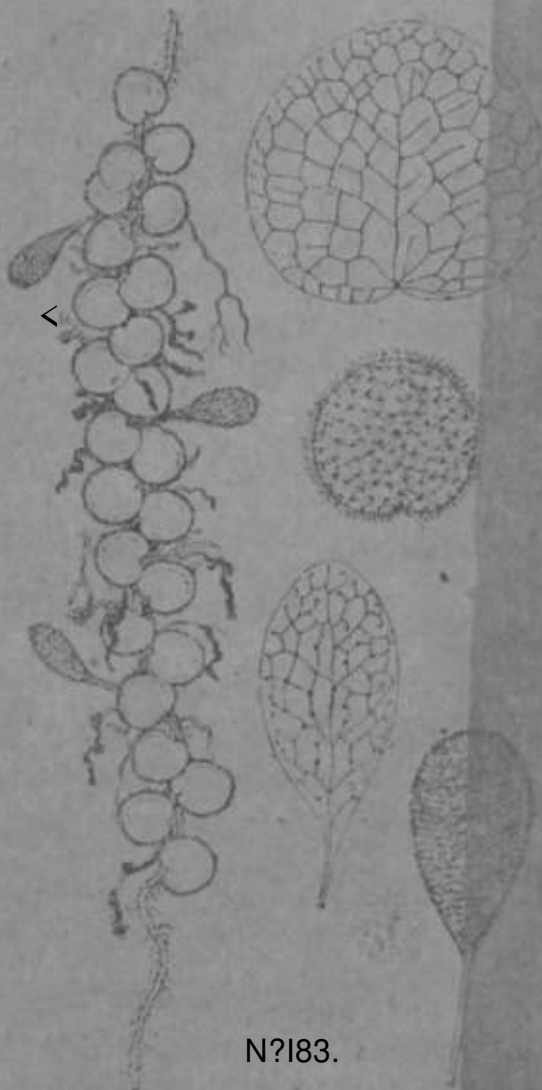
base much and gradually attenuated to the margin are finely  
 serrated; abrous above (at least in primary) beneath glabrous  
 with fine stellated aciculation intercalary but abundant



when viewed between the eye and the light, costules are areolate, areoles 10-12 between the costa and the margin, including simple or forked clavate soriferous veinlets; sori prominent (not sunk), forming a broad mass in the disk of the upper half of the frond, not reaching the margin; capsules mixed with long stipitate peltate stellated scales. *Hook. Sp. Fil.* v. 52. *Hook. Ic. PL t. 203. Gen. Fil.* 83, *Polycarpinm, Pr. Bedd. F. B. l. l.* 121.

Penang, Tenasserim-(Parish).

12. NIPHOBOLUS BOOTHII. (*Hook.*) Rhizome short with lanceolate-linear golden scales; stipes 8-16 inches long, and stout in proportion, tawny brown, paleaceous, with imbricating ferruginous lanceolate scales only at the very base; frond carnose-coriaceous, 16-24 inches long, 3-4 inches wide, elliptic-lanceolate, obtusely acuminate, moderately attenuated, glabrous, and punctated above with minute blackish dots (probably corresponding with the receptacles of the sori), beneath covered with a dense velvety mass of ferruginous stellated tomentum; primary costular veins evident but not prominent, united by transverse arched veins, forming many series of areoles, each with few included veinlets, which are much



branched or anastomosing; sori small, partially sunk in the tomentum forming transverse lines between the costules and as many as their areoles. *Hook, Sp. Fil* v. 53, *Bedd. F. B. I. L* 25S, Bhotan.

NIPHOBOLUS MUMMULARI (Melt.)

13. *NIPHOBLUS NUMMULARIFOLIUS*. (*Sie.* under *Acrostichum*). Rhizome slender wide-creeping, filiform, clothed with bright ferruginous lanceolate fibrillose scales; fronds dimorphous, carnosaceous, the barren ones roundish or elliptical, subsessile  $\frac{1}{2}$ –1 inch each way, the fertile ones longer and narrower,  $1\frac{1}{2}$ –2 inches long,  $\frac{1}{2}$ – $\frac{3}{4}$  inch broad, upper surface naked, at least in age, lower densely coated with loose ferruginous woolly tomentum; veins forming areoles regular in size and shape, empty or with one free veinlet, marginal veinlets free; sori close, scattered, sometimes covering the whole surface. *Sie. Syn. Fil.* 191, 419 to 2. Polyp. nummularifolium. *Mett. Pargalt Polyp.* 127, t. 3. *Hook. Sp. Fil.* v. 54. *Syn. Fil.* 351. *Bedd. F. B. I.* t. 320. *Gleuoglossa, Presl.*

East Bengal, Bhotan, Assam, Khasya, Cachar, up to 2,500 feet elevation. There is a variety from Khasya (*obovatum*, Mett.) with the sterile fronds obovate on a  $\frac{1}{4}$  inch petiole. This species is anomalous in the genus, I do not think it is a *Niphobolus* at all, but probably a *Drymoglossum*.

#### GENUS LXIII.—DIPPERIS. (*Reinw.*)

(*Di*, two; *ptera*, fern—the fan-like fronds in two parts.)

Fronds adherent to the caudex, flabellate in two halves which are deeply lobed from their circumference in the direction of the base, secondary veins forming many areoles, including free or netted veinlets; sori punctiform, numerous, scattered small, or in a single series.

1. *DIPPERIS WALLICHI*. (*Bk.*) Rhizome stout, creeping, clothed with appressed copious black hard subulate setaceous scales wrinkled at the back; stipes 1–2 and more feet long, smooth and pushed, distal erect; fronds coriaceous, 1–2½ feet long and much wider than long, dark-green above, whitish or ferruginous beneath, flabelliform bipartite into two nearly equal broad-cuneate portions which are palmately and dichotomously divided, ultimate segments 6–10 inches long,  $1\frac{1}{2}$ –2 inches wide, oblong acuminate; costa from the summit of the stipes dichotomously branched through the



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•3

G. SCOTT & TENGRAK

DIPTERIS WALLICHII. (Br.)

back of the frond, a single pair runs through each terminal segment connivent at the apices; venation manifest prominent beneath, all the costae are united by transverse flexuose costules, these by a longitudinal flexuose vein through the middle into two nearly equal series of costular areoles, then again into lesser ones all subquadragular; sori small, superficial copious, scattered in the areoles, but generally in series more or less perfect and accompanied by a resinous or gummy substance. *R. Br. in Hook. and Grev. Ic. Fil. t. 168-9. Hook. Sp. Fil. v. 99. Wall. Cat. n. 237. Bedd. F. B. I. t. 80.*



N°135

DIPTERIS HORSFIELDII. (Br.)

main veins confluent, not gummy. *R. Br. Hook. Sp. Fil. v. p. 93. Bedd. F. B. I. t. 321. Polyp. conjugatum, Kaulf. (not Lam.) Polyp. Dipteris (Bl.), Hook. Syn. Fil. 392.*

Malacca, Penang and Singapore.

(Also in the Malay and Pacific Islands.)

3. DIPTERIS LOBBIANA. (Hook.) Stipes 1 foot and more long; rachis coriaceous, 8-12 inches long, flabelliform, glabrous, 3-4 times

Khasya, up to 4,000 feet, Berpahi, 2,000 feet, and elsewhere, Cachar, at Luckipoor, 250 feet elevation, Jaintea, Sylhet station in the plains.

## 2. DIPTERIS HORSFIELDII.

(Br.) Stipe strong, 3-5 feet long; frond 1-3 feet long, and much broader, the main lobes reaching three-quarters of the way down, the edges sharply toothed, texture subcoriaceous, upper surface dark green, lower very glaucous, main veins very prominent, dichotomously forked; areoles copious, sori very minute, scattered irregularly, especially plentiful near the



N°186.

DIPTERIS LOBBIANA. (Hook.)



N°187.

DIPTERIS LOBBIANA. (Hook.)

**Digitately** dichotomous, dark brownish-green above, pale and tawny **beneath**, segments 4-8 inches long, scarcely half an inch wide, linear-oblong lanceolate, finely acuminate **costate** entire; venation manifest the costules form a costal series of large soriferous areoles, the rest of the veins unite, constituting lesser areoles and include free veinlets • *m* 1-2 in each primary areole (sometimes confluent) in a single **Lines** very near the costa. *Book. Sp. Fit.* v. 100. *Hook in Kew Gard. Miscv p. 100, L\**. *Bedd. F, B. 11, . 233.* **Polypodium furcatum**, *Baker in Syn. Fil. ft.* 362.

Malacca, on Mount Ophir.

#### GENUS LXIV.-DRYNARIA. (*Bory.*)

(*Dryads*, the **sterile** fronds being like oak-leaves, a tree sacred to the **Dryads.**)

Fronds articulate with the caudex, with either a separate sterile frond like an oak leaf, or the base of the frond pinnatifid and oak-leaf-like; veins copiously anastomosing, forming quadrate or hexagonal areoles; sori small, round or oval, numerous

**1. DRYNARIA CORONANS.** (*Wall*) **Rhizome** thick, creeping, branched and interwoven, **vulvous-paleaceous** with golden scales. Fronds large uniform, when growing arranged in a circle, firm 'coriaceous', but rather thin and translucent, two and more feet long. **Leaf** broad sessile cordate, **lobate-pinnatifid** base (then suddenly contracted), lanceolate, deeply almost to the **rachis** pinnatifid, segments 1-2 inches long, 1/2-1 inch and more wide, oblong-lanceolate, acuminate, lower ones gradually shorter, entire, incised at the margin • venation very manifest, costules parallel extending to the **margin** these are connected by transverse veins forming 5-6 soriferous areoles and then again generally two or three others which include free veinlets; sori oval, often confluent longitudinally, solitary in the primary areoles, forming an eccentric series always nearer one costule than the opposite one. *Wall. Cat, n.* 288. *Hook. Sp. Fil.* v. 94

*Bedd. F. B. I. t. 13.* *D. conjugata*, *Hook. Syn. Fil.* 366 (not *Lam.*)

Himalayas, Nepal to Bhotan, 1,000-4,000 feet elevation, rare. Khasya, 1,000-3,000 feet common. Chittagong Hills, 500 feet elevation. Tenasserim and Malay Peninsula.

(Also in Hong Kong and Formosa.)

2. *DRYNARIA SPLENDENS*. (*Hook.*) Rhizome woody, the scales grey, fibrillose, adpressed; fronds subsessile, 2-3 feet long, 1 foot or more broad, the lower part barren, cut down nearly or quite to the rachis, into erect-patent entire acute lobes 4-8 inches long, 1-2 inches broad, the upper fertile pinnae distant, ligulate, 4-8 inches long,  $\frac{1}{2}$ - $\frac{3}{4}$  inch broad; main veins distinct, with distinct transverse veinlets and copious intermediate ones and free veinlets; sori oblong or sub-quadrangular, filling up the whole of the fertile pinnae except the midrib. *Hook. Sp. Fil.* v. 96. *Syn. Fil.* 367.



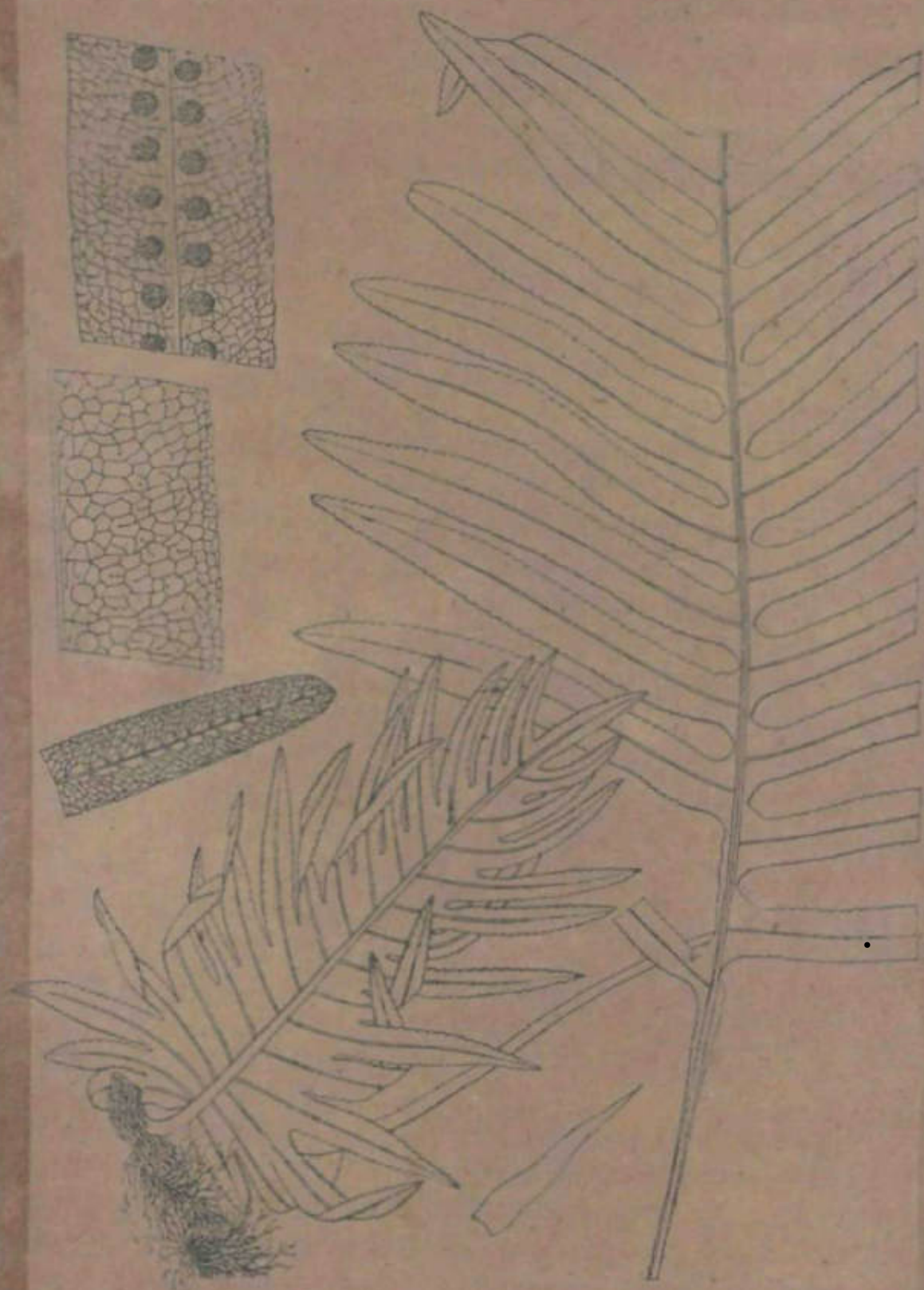
*DRYNARIA SPLENDENS*. (*Hook.*)

*Bedd. F. B. I. t. 316.* *Dryostachyum*, *J. Sm.*

Singapore.

(Also in the Philippines.)

3. *DRYNARIA PROPINQUA*. (*Wall.*) Rhizome stout, creeping, the scales lanceolate-linear pubescent; fronds glabrous, dimorphous, the barren ones 3-9 inches long, 3-4 inches broad, cut half or three-quarters down into bluntish or acute lobes, the fertile ones 1-3 feet long, often 1 foot broad, with a distinct stem, the lobes 1-6 inches long,  $\frac{1}{2}$ - $\frac{3}{4}$  inch broad, reaching down nearly or quite to the rachis.



CATTILLI NCHONGAT

DRYNARIA *pR*<sup>ri</sup> PINQUII. (i/rall.)



obscurely serrated, texture subcoriaceous; main veins of the fertile fronds ramifying, not carried in distinct parallel lines to the margin, areoles copious, the free veinlets few and variously directed; sori in a single row near the midrib, placed at the point of union of several veinlets. *Wall. Cat.* 293. *Hook. Syn. Fil.* 367. *Bedd. F. B. I. I. 1.* 160. *Pleopeltis Panshii, Bedd. F. B. I. I. 125.*

Himalayas, from Gurwhal to Bhotan, 2,000-7,000 feet elevation, Khasya, very common; Birma and Malay Peninsula.

(Also in Java.)

4. *DRYNAIA MOLLIS.* (*Bedd.*) Rhizome creeping, clothed with subulate golden transparent ciliated scales; fronds firm-membranaceous dimorphous; sterile ones 2-6 inches long, sessile ovate glabrous, deeply pinnatifid with the sinuses very narrow and the segments sometimes overlapping each other, fertile fronds very shortly stipitate (the dwarfed lower segments often extending nearly to the base of the rachis), ovate-lanceolate up to 1½ feet long, 2-4 inches broad, furnished with soft hairs on both sides and ciliated, deeply almost to the rachis pinnatifid, segments lanceolate 1-2 inches long, ½-¾ inch broad, nearly horizontal, rather distant, the sinus being very broad, the lower ones dwarfed and gradually reduced to a decurrent wing; venation very prominent in the sterile fronds, but much less so in the fertile ones than in *D. propinqua*; veins forming three or four series of rather regular areoles in which are sometimes included free veinlets, sori forming only a single series close to the costa, each sorus being on the vein between the first and second areole. *Bedd. F. B. I. I. 216.* Polyp. (*Drynaria*) *ivale, Mill. in Hook. Syn. Fil. p. 367, a later name.*

Himalayas, Nynce Tal, Gurwhal, Kumaon, 6,000-9,000 feet elevation.

5. *DRYNAIA QUERCIFOLIA.* (*L.*) Rhizome creeping, short, stout, densely clothed with red-brown satiny lanceolate-subulate soft scales, which have a cordate base, and are 2-4 inch long; fronds coriaceous or subcoriaceous of two kinds, sterile ones varying in



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*DRYOPTERIS MOLLIS.* (Bedd.)

... but soon turning dark brown; glossy, coriaceous  
 ... pinnatifid, sometimes half way down to the costa; fertile  
 ... long, long-petiolate broad-ovate deeply nearly to the rachis  
 ... segments 5-9 inches long, 1-1 1/2 inch wide, oblong acuminate  
 ... venation manifest, costules distinct rather distant, united by  
 ... forming 4-6 primary soriferous areoles filled up with  
 ... small quadrangular areoles with or without tree veins; sori  
 ... numerous, two in each primary areole, conspicious  
 ... between and parallel  
 ... Polypodium  
 ... *Lin. Sp. Pl. p. 1547.*  
 ... *Fl. v. p. 66. Benth.*

... in the Indian region  
 ... very low down on  
 ... on trees or rocks.

... *LYRENARIA LINNÆI (Bory.)*  
 ... the scales 1-2  
 ... from a petiole base  
 ... obtuse, with a de-  
 ... venation; fronds dimor-  
 ... barren ones sessile  
 ... bluntly lobed, the  
 ... stalked 2-3 feet  
 ... inches broad, cut  
 ... the rachis, into entire erect-patent lanceolate  
 ... both sides naked; main veins distinct to the edge  
 ... areoles between them, with copious small sori  
 ... *Sw. Bot. Voy. Se. Nat. v. p. 464, t. 12. Hook. Syn. Fl.*  
 ... *Ind. v. p. 345.*

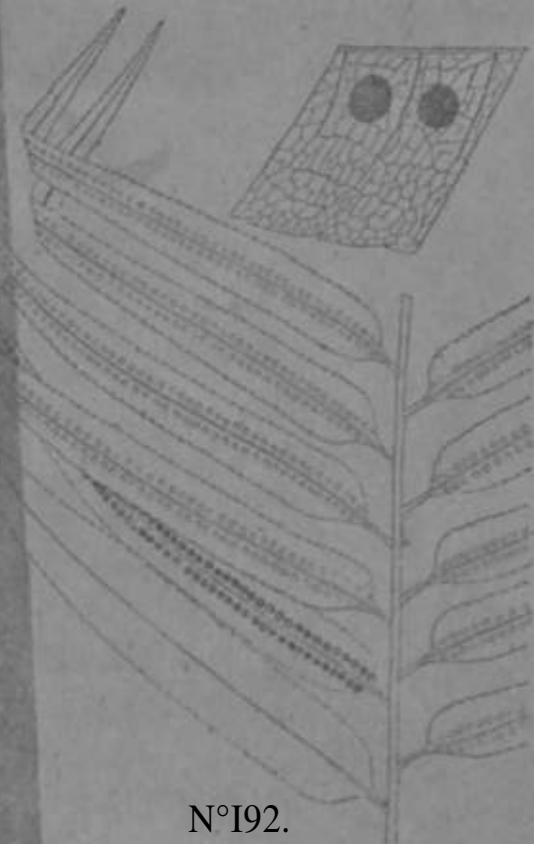


... *LYRENARIA QUERCIFOLIA (Lam.)*

... Malay Peninsula ... Very like *quercifolia*, but the  
 ... and the sori ... and the sori small ...  
 ...

...riation it might be passed by in the field or in the herbarium.  
...lerci folia.

7. DRYNARIA RIGIDULA. (Sw.) Rhizome stout (creeping, the



the scales fibrillose dark-brown, fronds dimorphous, the barren ones sessile, 6-9 inches long, rarely more, 3-4 inches broad, cut down  $\frac{1}{2}$ - $\frac{1}{3}$  towards the rachis into blunt lobes, or rarely quite pinnate at the apex, the fertile 2-4 feet long, 12-18 inches broad, long-stalked pinnate, pinnae one inch or more apart, narrow or stalked at the base, 6-12 inches long,  $\frac{1}{4}$ - $\frac{3}{8}$  inch broad, the point acuminate, the edge more or less deeply incise\*, crenate, texture rather corklike.

N°192.

DRYNARIA RIGIDULA. (Sw.)

and both surfaces naked, main veins not distinct to the

areoles copious, free veinlets few; sori immersed in a single row half-way between the edge and midrib. Sw, *Sen. Fil.* 230. *Hook. Sp. Fil.* 368. *Drynaria diversifolia* (R. & Jr.), *Hook. Sp. Fil.* 368. *Bedd. F. S. I.* t 314.

Malacca.

Also in tropical Australia, Malay Islands, the tropical Pacific

GENUS LXV.—PLEOPELTIS. (H. & B.)

full; *peltis*, shield—the sori often furnished with round scales.)

veins copiously anastomosing, forming copious irregular areoles, laterally free included veinlets regarding in various directions

the sori various in position, generally on the back of unite<sup>1</sup> veinlets fronds simple, pinnatifid or pinnate, articulate with the caudex. In the *Synopsis Filiaun* Phymatodes is the name adopted for this genus (or subgenus only in that work); this name, however, is < much later date than Pleopeltis, having been instituted by Pres in 1836, Pieopeltis by Humboldt and Bonpland in "1810. Son authors split the genus up into many genera.

<sup>T</sup> *rnmtis siutfft \ttiso 3-5 lobed in pieropus.*)

**A. Main veins not distinct \*» \*?>•' <'?'<\*'•**

1. PLEOPELTIS ACCEDENS. (B/.) Rhuome wide-creeper slender filiform, scarcely paleaceous, attached to the bark of tree<sup>^</sup>: copious woolly radicles, stipes scattered 2-5 lines long; frond coriaceous, opaque, glabrous entire, sterile ones 1-11 inch long, < ovate obtuse, fertile ones 2-3. | inches long, from a broad c base, long-acuminate; venation obscure, costules indistinct, von forming three large areoles (in each of which is one large forke veinlet) and a smaller marginal areole; sori large for the size of tl- plant on the acuminate portion in a single series on each side t the costa. *Bl. En. Fil Jar. p. 121. Hook. Sp. FU v. 66.*

*F.B. /./ 215..*

Malacca.

(Also in the Philippines, the Malay Islands, Polynesia.)

2. PLEOPELTIS ROSTRATA. (*Hook.*) Rhizome very slemk wide-creeping, furnished with lanceolate-linear scales, stipes distai i-2 inches long, naked; fronds lanceolate-acuminate, somewhat d morphic, the barren often being broader, coriaceous glabrous, tl margin entire; veins immersed, main veins indistinct, areoles irr. ular, including simple or forked free veinlets; sori in a single row . each side close to the midrib. *Hook. Sy/r FU. 353- ^- F- M- t. 159.*

Sikkim and Bhotan, 6,000 feet elevation, abundant; Khas\ 4,000-5,000 feet elevation.

183. *Eleocharis lineata*. (Thunb.) Rhizome wide-creeping, woody, the scales lanceolate dull-brown, never with hairs, stipes from one line to 2 inches long, rarely with any scales; fronds 6-12 inches long, rarely more, 1-3 inch broad, entire, narrowed gradually at both ends, texture coriaceous, both sides naked or nearly so; areoles



N° 183

*Eleocharis rostrata*. (Hook.)

Regular with forked fine veinlets; are. superficial or scarcely imbedded; never sunk in a cyst, large prominent, forming a single row halfway between the costa and margin, when young covered with brownish thin peltate scales. Thunb. Fl. Jap. 335. Hort. Sicc. VII. 33. July, 2. (uniforme. Wall. Cat. 271. 2nd 305. (synonym.) P. Wightianum. Wall. Cat. 272. Arab. unum, 47. 27. glaucatum, 27.

*Pleopeltis linearis*, Hook. Exot. Fl. 1. 63. ?• *Wightianui*, Hook. Bot. Beechey, 1847, p. 180. (P. linearis) Wall. Cat. 271, types here,\* I believe, and not to *linearis*, it has larger fronds, but narrow and coriaceous and the veins hidden.)

Himalayas, 1,000-10,000 feet elevation, very common, Jharkhand; throughout South India; Ceylon; Malay Peninsula.

(Also in the Malay Islands, China, Japan, Central and South Africa and its Islands.)

VAR. *STENOPHYLLA*. {Clarke.) With the fronds only 1-1.5 feet broad and the sori projecting beyond the margin, but always superficial, is only a form of *linearis*, and it quite graduates into the type, his var. "polymorpha" is an abnormal form of *linearis* with the fronds pinnatifid (such as occurs in many other ferns,)



N°194.

4. *PLEOPHYLLIS SIMPLEX*. {Siv.)  
*linearis* like *linearis*, only the fronds are of thinner texture and much larger, up to 2 feet long by 1-2 inches broad, the veins more distinct, the sori always more or less deeply sunk and forming pustules on the upper side of the fronds, sometimes quite sunk in a cyst with visible margins, but never nearly so prominent as in *stenophylla*, which also differs in its smaller size, more rigid texture and fewer veins. Sw. Syn. Fil. 27. *excavatum* (Bory.) Willd. Sp. PL v. 158. P- *Grevilleana* Wall. Cat. 5169. P. *sesquipedale*, Wall. Cat 275. P- *linearis* simplex, Hook, Syn. Fil. 354-

Himalayas, confounded by Hooker (in his Sp. Sit.)^ Clarke with *linearis*, but kept distinct by all other botani

made a distinct variety of *linearis* by Mr. Baker in the *Son. Ind.*, but Mr. Baker now agrees that it should be made a distinct species; the scales of the rhizome differ from those of "*linearis*," but the fronds are almost exactly similar to that species, and I had previously confounded it with that (not with *linearis*).

5. *PLEOPHLEBIS CLATHRATA*. (Clarke.) Rhizome short creeping, with ovate acute, often hair pointed scales; fronds small, stipe often as long as the frond; sori mixed with sessile irregularly peltate and lacerate clathrate scales. *Clarke, F. N. I.*, p. 559, t. 82, fig. 1.

Kashmir, Pir Pinjul, 11,000-12,000 feet elevation.

(Also in Afghanistan.)

Mr. Clarke thinks it may be high level form of *linearis*, but that the scales are peculiar, the texture thinner, the venation consequently more conspicuous, and the stipe longer.

6. *PLEOPHLEBIS STENOPHYLLA*. (Bl.) Rhizome creeping, paleaceous, with glossy subulate pale imbricated ferruginous scales, stipes 1-2 inches long, distant; fronds firm-coriaceous, very rigid, glabrous polished, 4-9 inches long,  $\frac{1}{2}$ - $\frac{1}{4}$  inch, or rarely more wide, linear-oblong obtuse, the margin thickened and subreflexed, broadly crenate-serrate, rarely narrowing upwards, but much and gradually attenuated below on the stipes; costa prominent beneath, costules none; veins anastomosing so as to form oblong, hexagonal oblique areoles, generally quite empty or with rarely a fine included veinlet; sori rather distant oval, arranged in a series close to the margin, deeply sunk in a cyst, forming elevated pustules on the upper side one to each crenature, the margin of the cavity elevated. *Bl. Fil. Jav.*, p. 135, t. 55, f. 4. *Hook. Sp. Ind.*, v. 65. *Mett. Polyp.*, p. 99, t. 1, f. 31-34 *variation*. *Bedd. F. B. I.*, 234.

Mr. Clarke states that this comes between "*linearis*" type and his variety "*peristis*," but both these ferns have different venation, and neither have the sori sunk in cysts; this has the sori always much nearer the margin than the midrib even in the broader forms.

Malacca.

(Also in the Philippines.)



7. PLEOPELTIS SINUOSA. (Wall.) Rhizome much branched, long-creeping or scandent on trees, sparingly radiculose, half to two inches thick, almost woody when dry, carnose when added, as it were, with large conical processes upon which they are or have been articulated, and which appear to increase after the fronds have fallen, the whole densely covered (as if were tessellated) with nearly orbicular appressed whitish scales with a dark spot in the centre, stipes 1-2 inches long, glabrous and scaleless; fronds sub-dimorphous, subcoriaceous glabrous, sterile ones 3-6-7 inches long, 1-1.5 inch broad, subelliptical, oblong obtuse entire, fertile ones longer, sometimes 1 foot-16 inches long, 1/4 of an inch wide, linear-oblong obtuse, the margins more or less sinuated, the base in both attenuate-decurrent; venation copiously anastomosing, forming large very irregular areoles filled with lesser ones (formed by more slender veins), and these include branched or simple veinlets which occasionally again anastomose; sori remote, large, oblong, immersed in cysts, which form pustules on the upper side, arranged in a single series nearer the margin than the costa.

*Cat. n. 2231. Hook. Sp. Fl. v. 61. Bedd. F. B. L. t. 8.*

Malacca.

(Also in the Soloman Islands, Amboyna and New Hebrides.)

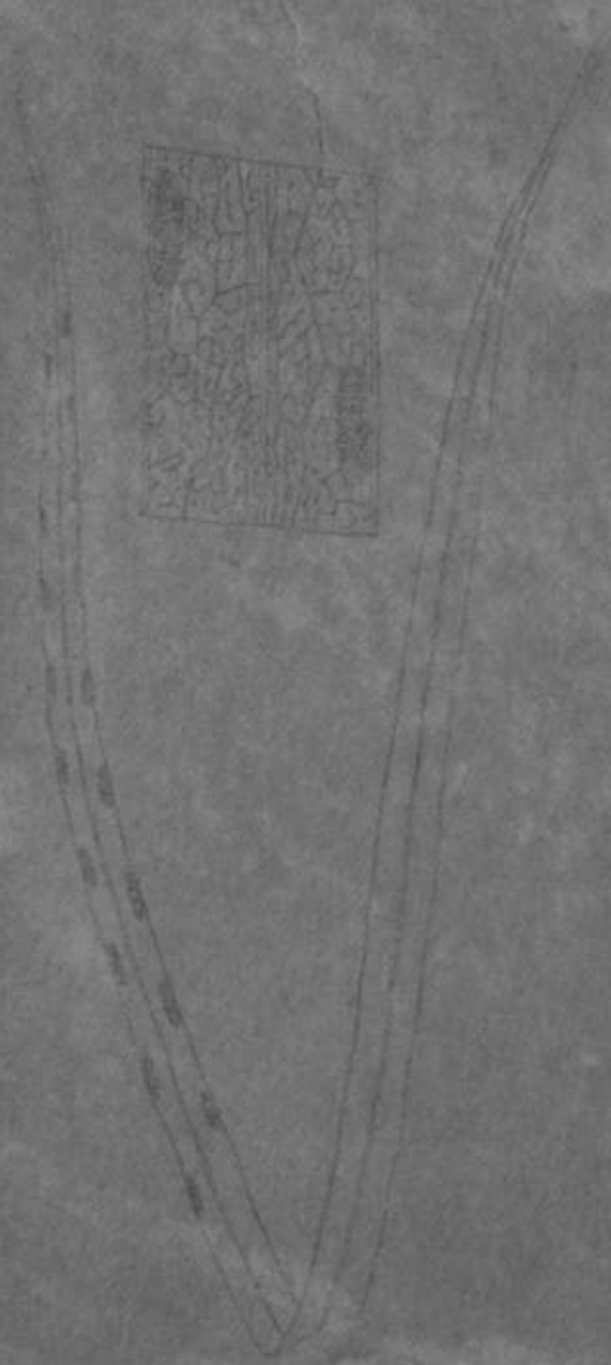


Nº 195.

PLEOPELTIS SINUOSA. (Wall.)

8. PLEOPELTIS LOXGIFOLIA. (Metten.) Rhizome horizontal, creeping, thick squamose, stipes approximate, 2-3 inches long, fronds 1-2-3 feet long, 1-1.5 inch wide, thick, carnose-con:

glabrous, linear-lanceolate, glaucously acuminate, gradually long attenuated below on the stipes, entire, the margins subrevolute, venation external very indistinct, costules veiniform, united by transverse veins



into rather large areoles then into irregular lesser ones, which include free veinlets; sori compital oblong, forming a line or series near the margin rather close placed, sunk in cysts, and forming a corresponding elevated line on the upper surface, capsules mixed with long-stipitate scales. *Metten. Polyp. p. 87. Hook. Sp. Fil. v. 60. Bidd. F. B. I. t. 7. P. contiguum, Wall. Cat. 285.*

Birma and the Malay Peninsula generally, Mergui, Singapore, &c.; North India, Kumaon.

(Also in the Philippines and Malay Islands.)

9. *FILIOPELTIS SUPERFICIALIS. (Bl.)* Rhizome wide-creeping, thick as a crow-quill, the scales ovate and lanceolate acute, spreading, brown shining, stipes up to six inches long, often curved, sometimes with ovate scales; fronds lanceolate-linear (often forked at the apex), subcoriaceous, narrowed,

Nº 195.  
*FILIOPELTIS LONGIFOLIA. (Metten.)*  
gradually at both ends; the margins entire, 6-12 inches long, by 1-2 inches broad, glabrous, areoles numerous with free veinlets; sori

copious scattered irregularly, compital, large or small. Polyp  
**superficiale**, *BL En. PL Jar. Fil. 123.* *Hook. Syn. Fil 355 •*

Khasya Hills, 4,000-6,000 feet elevation, extending to the  
 Naga country to the east, and to Bhotan and Mishmee ;  
 Peninsula.

(Also in South China.)

**B** TO. **PLEOPELTIS LAECOLATA**. (L.) Rhizome long-ci  
 paleaceous, with lanceolate ferruginous scales, stipes remote,  
 inches long; fronds coriaceous, 3-9 inches long, ir-f inch  
 lanceolate, more or less acuminate, long and gradually attenuaiB  
 the base, copiously furnished, with orbicular ovate, small appfe  
 peltate scales dark in the centre, pale in the circumference and fl  
 ticulate; veins immersed indistinct, the primary veins form  
 obliquely elongated areoles, which include very irregular and d  
 sized areoles, and a few free veinlets which are rarely forked,  
 generally very large and often exceedingly prominent, pulvinate  
 base or oval, stalked scales mixed with the spore cases. Pol}  
**ceolatum**, *Linn. Sp. Pl. 1082.* *1<sup>o</sup>. lep Idota, Hook. Sj>. Fil. M*  
*Willd. in Schkcht Adunbr., p. 17. Bedd. F. S. I. t. 18T.*  
*angustata var- depauperata, Clarke, F. N. I. p. 559.*

Nilgiris and higher mountains on the West side of the  
 Presidency ; Assam (one poor specimen' in Kew Herbarium);  
 Ion, Ambawalla estate.

(Also in Tropical America and the West Indies, South  
 and its islands; St. Helena ; Sandwich Islands.)

**I** 11. **PLI SOPEL. PIS'ANGUSTATA**. (SW) Rhizome long-cree  
 branched, paleaceous with falcate subulate-setaceous scales, \  
 remote, 1^4 inches long; fronds 5 inches to a span or more  
 | -2 inches wide, tapering below into a petiole, glabrous above, cl  
 beneath with cottony tomentum which is deciduous, coriac  
 oblong-lanceolate; venation sunk obscure, costular areoles^  
 free or branched and more or less connected veinlets; son  
 large, subglobose oval, partially sunk in the frond, very cc



PTEROPELTIS LANCEOLATA. (L.)

forming a single series on each side between the costa and margin, generally towards the apex only, sometimes longitudinally confluent. *See Syn. Fil. pp. 27 and 224.* *Niphobolus angustatus, Hook. Sp. Fil. v. 43. Bedd. F. S. I. t. 185.* *Niphopsis, J. Sm.* *Pleopeltis macrosora, Presl.* *Polypodium sphaerocephalum, Wall. Cat. n. 272.*

Malay Peninsula, Singapore, Malacca, and Penang. South India (?) I have never detected it, though I have a specimen said to have been collected on the Nilgiris, and Hooker gives Tranquebar as a locality.

(Also in the Malay Islands and North-east Australia.)

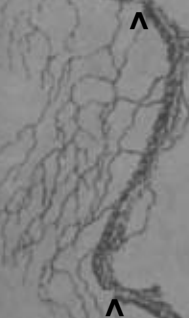
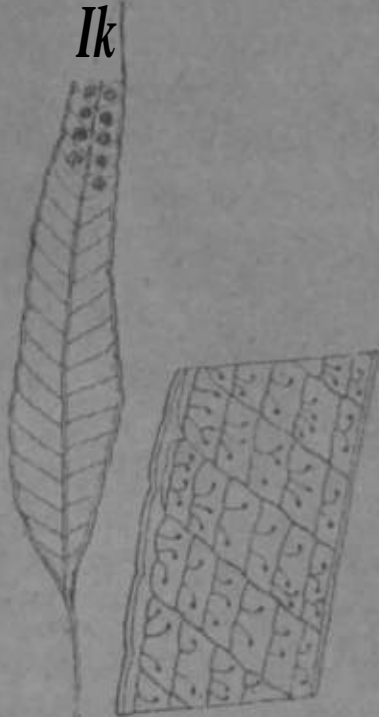
12. *PLEOPELTIS NORMALIS.* (*Don.*) Rhizome scandent, thick as a crowquill, with ovate or lanceolate almost hair-pointed adpressed scales, which carry erect from their backs tufts of linear stiff black-red bristles; fronds narrowed much at the base, sometimes to the very foot of the stipe, usually broadest near the middle, 1-2 feet long, by 1-2 inches broad, submembranaceous glabrous, a few scattered ovate close-adpressed scales often present on the stipes and near the base of the main rachis beneath; venation as in linearis, main veins very indistinct and areoles with free included veinlets; sori large, superficial or a little immersed, often in several rows, or irregularly in one row, or rarely regular in one row. *Don. Prod. Fl. Nep. 1. Clarke, F. N. I. 558. Hook. Syn. Fil. 358, in part. Bedd. F. B. I. t. 10. P. longifrons, Wall. Cat. 274.*

Himalayas, Nepal to Bhotan, 4,000-8,000 feet elevation, Khasya, 3,000-5,000 feet; Tenasserim on Mooléyit 5,000 feet elevation.

B. *Main veins distinct to the edge, or nearly to the edge.*

13. *PLEOPELTIS RHYNCOPHYLLA.* (*Hook.*) Rhizome creeping, slender, paleaceous, subsquarrose with subulate ferruginous scales, stipes scattered, slender, 1-2 inches long of the sterile frond, 2-4 of the fertile one; fronds firm, subcoriaceous, glossy, slightly thickened, remotely crenate, sterile ones 1-2 inches long, elliptical, or subovate, obtuse, fertile ones 3-6 inches long, lanceolate from near the base,

gradually and long-acuminated, below attenuated; venation distinct, **slightly** prominent, the costules connected by transverse veins forming areoles which enclose free veinlets, which latter sometimes



Nº 198.

PLEOPELTIS RUYNCOPIIYLLA.  
{Hook.}

elevation. Khasya, 4,000-5,000 feet.

with opposite veins; the sori mostly confined to the narrow acuminate apex, and when mature very large in a single series on each side of the costa. *Book. Sp. Fit.* v. 65. *Hook. Ic. Plant*, 655 (part 55 of *Cent of Ferns.*) *Bedd. KB. L t.* 9/

Khasya, 4,000-5,500 feet elevation; Tenasserim on **Mooleyit**, 5,000 feet elevation.

14. PLEOPELTIS GRIFFITHIANA.  
{Hook.} Rhizome wide-creeping, as thick as a crowquill, the scales dense, lanceolate-subulate, brown, spreading; stipes 3-6 inches long, firm, erect; fronds 6-8 inches long, up to 2½ inches broad, coriaceous, lanceolate or ovate-lanceolate, the apex acute, the margin more or less repand, the base rounded or suddenly narrowed; main veins very **distinct** to the edge, areoles fine, hidden with copious free simple or forked veinlets; sori large, one between each main vein in a single row close to the costa, often extending more than half-way to the base of the frond. *Hook. Syn. Fil.*

10. 359- *Bedd. F. B. I. t.* 158.

Si/kkim and Bhotan, 6,000-9,000

15. PLEOPELTIS OVATA. (L'ali.) Rhizome wide-creeping,

thick as a crowquill, scale: lanceolate-linear, brown spreading; stipes 4-8 inches long, firm, erect, slightly scaly below; fronds 6-12 inches long, up to 3 inches broad, ovate-lanceolate, the apex acute, the margin entire, the base narrowed suddenly, texture herbaceous, both sides glabrous; main veins distinct to nearly the edge, with copious areoles including free forked veinlets; sori large irregularly scattered near the costa. *Polypodium ovatum*, *Willd. Cat.* 276. *Hook. Syn. Fl.* 359. *Bedd. F. B. I. t.* 157.

Sikkim, Chundaguri, Bhotan, Khasya, 4,000 feet elevation, at Bishop's Falls, Shillong, rare.

16. *PLEOPETIS MEMBRANACEA*.

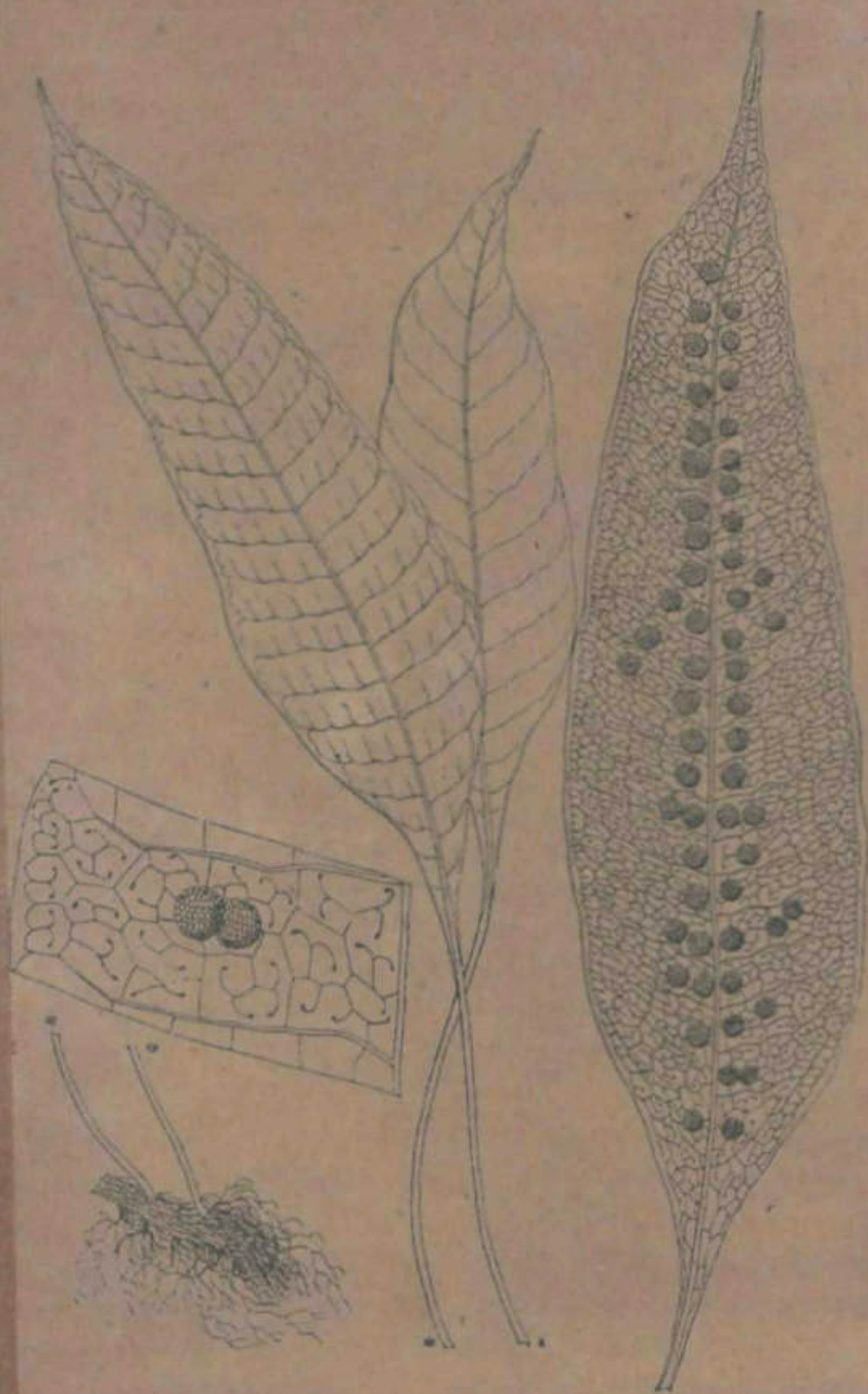
(*Don*) Rhizome short creeping, stout, the younger portion paleaceous, with blackish-green ovate acuminate scales; stipes distant or subaggregated, 1-5 inches long, if longer winged above with the decurrent base of the frond; fronds 6 inches to 2-3 feet long, by less than an inch to 6 inches broad, thin membranaceous and translucent, lanceolate or oblong-lanceolate, or oblanceolate, acuminate, the base long attenuated and much gradually decurrent upon the stipes,



Nº 193

*PLEOPETIS GRIFFITHIANA*. (*Hassk.*)

glabrous, the margin entire (or rarely more or less deeply sinuate-lobate or pinnatifid, and even fimbriated throughout the whole length with long narrow unequal segments); venation very distinct, main veins horizontal or nearly so, slender, usually remote, connected by transverse veins which form the primary areoles, and these are filled up with irregular network, of which the areoles are very unequal and include copious free veinlets; sori compital, rather small, usually in two series between the costules, more or less numerous according



CATTÉLAC'ES

PLEOPELTIS OVATA. (Wall.)



to the width of the frond, rarely reduced to one sorus near the costa, where a single series parallel with the costa is formed, not unfrequently there are 3-4-5 series (not very regular) between the costa, (in one instance a single series only appears between the costules, and those of a very large size and abnormal in form, often oval or oblong and lying parallel with the costules). *Don Prod. Fl. Nep. p. 2.* *Hooker Sp. Fil. v. 70.* Polyp. grandifolium, *Wall. Cat. n. 282.* *P. heterocarpum, Bl. Fil. Jav. p. 167, t. 75.* *Bedd. F. S. I. t. 177.*

Himalayas, from Gurjhal and Bhotan, 3,000-8,000 feet elevation, Khasya, 2,000-5,000 feet, Chota Nagpore, Parasnath; South India, mountainous tracts on both sides of the Presidency, 2,000-5,000 feet elevation; fronds varying from  $\frac{1}{2}$  inch to 5 inches in breadth; Ceylon. It only appears with the rainy season and I du down in November.

17. PLEOPELTIS ZIPPELLII. (*Bl.*) Rhizome slender, creeping shortly, scales lanceolate acute; fronds lanceolate, often quite caudate at the apex, narrowed gradually at the base into a short stipe (or more rarely there is a stipe about 2 inches long), subcoriaceous, margin entire or a little undulate, lower part of the rachis beneath sometimes with a few scales; primary veins prominent and near the margin, areoles copious, with free included simple or forked veinlets; sori compital in two rows between the primary veins and in about four rows between the costa and margin. *Bl. Pl. Jav. Fil. 172, t. 80.* *Hook. Sp. Fil. v. 72.* *Pleopeltis heterocarpa, Hook. Syn. Fil. p. 360, (not Bl.)* *Bedd. F. B. I. 319, (venation not correct, as not showing the free veinlets.)*

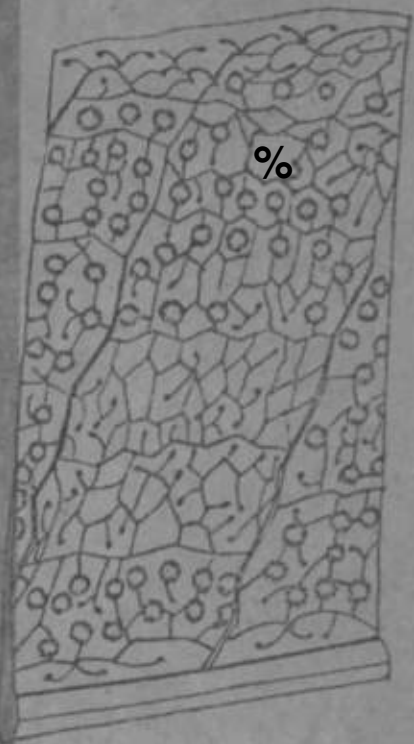
Himalayas, Dalhousie (*Dyas*), Sikkim and Bhotan, 2,000-6,000 feet elevation, Khasya, 2,000-4,000 feet elevation, (not in Ceylon as stated by Clarke).

(Also in Java and Philippines.)

18. PLEOPELTIS PUNCTATA. (*Linn. under Acrostichum.*) Rhizome scarcely creeping, stout, clothed with brownish ovate or lanceolate scales; fronds 1-3 feet long, 1-3 inches broad, lanceolate, subsessile,

gradually narrowed at the base, acute or blunt  
 coriaceous, very glabrous; venation immersed  
 main veins fine but distinct to the  
 smaller areoles, in which are free  
 clavate apices; sori compact, very  
 generally only on the upper half of the  
 in *Scr. Jour.*, Soo, ii. i, P. k. o. L. t. : ^

**Jolycephalum.**



So to about, 1,1^, WeSten moUntains "I'  
 up to 3,000 feet elevation Bengal plains, and  
 Peninsula; Malay

(Also in China, Malay Islands, North  
 Australia, Polynesia, Southern and Central  
 Africa and the islands.)

19. PLEOPELTIS MUSEFOLIA. (Bl.)  
 In every wa punctata, so that the  
 same descrip^, I do for both, except  
 'hat the texture in h- this is, like that of ni-  
 Sheens and he, mionitidea, thin and  
 papery, w the veins rominent

N?201> tt'niist punctata has fleshy eaves> In tex,,  
 | - o n , , n ; , , , , C , , , , ture l j k e . ^  
 nopteris Nidus - << ^  
 79. Hook. Syn. Fil. 360

Malacca.

(Also in the Malay Islands.)

so. PLEOPELTIS HEMIONITIDEA. - (^//) PL-  
 Rhizome ««Pingf  
 furnished with wiry scaly fibrous root!  
 hards; fronds 6 inches to . \* foot W  
 ^naceous subchartaceous, subtransparent ve  
 Kd lanceolate, gradually acuminate into a  
 1-2 inches broad, mem-  
 ry dark shining green,  
 fine point at the apex

and gradually attenuated at the base, being winged nearly all down the stipe, entire glabrous, costa slightly scaly beneath near the base; venation very prominent, main veins blackish, pinnate nearly horizontal, areoles in about five series, subquadrate, in which are free veinlets which are either simple or forked, but without clavate apices; sori compital, rather large, forming one series between the main veins, very irregular in shape and size, subglobose or oblong, or even (by confluence) linear. *Wall. Cat. p. 284. Hook. Sp. Fil. v. 73. Bedd. R. B. t. 1. 183.*

South India, on the Western mountains, rather common in Coorg, 5,000 feet elevation, rare elsewhere; Himalayas, Nepal, Bhotan, 2,000-7,000 feet elevation, Khasya, 1,000-5,000 feet elevation, Chitungong, 1,000 feet elevation.

(Also in South China and Malay Islands.)

21. *PLEOPELTIS PTEROPUS*,

(*Bl.*) Aquatic, rhizome creeping, branched, the young apices only paleaceous, with blackish lanceolate subulate scales; stipes more or less apart, 1-3-4 inches to 1 foot long, winged upwards, and as well as the back of the costa and costules furfuraceous-squamose; fronds 2-3-9 inches long,  $\frac{1}{2}$ -1 $\frac{1}{2}$  and 2 inches wide, firm membranaceous, very dark dirty green (when dry often black), lanceolate acuminate entire, or 3-lobate, or 3-partite, or 5-lobed, terminal lobes up to 3 inches long, lateral ones 3-5 inches, below long tapering into a gradually decurrent wing upon the petiole, glabrous above, margin entire; venation very conspicuous, main veins prominent beneath, rather wide apart, extending about two thirds of the way to the margin, then uniting and forming large costar



*PLEOPELTIS HENICOSTIDA*, (*Wall.*)



A. S. SUTHERLAND, OF NZ.

PTEROPELTIS PTEROPUS (Bl.)

areoles, within which the sori have their origin, a second series of smaller areoles is formed nearer the margin, and these and the rest of the frond are filled up with a net-work of smaller irregular areoles including free simple or forked veinlets which have clavate apices. Sori small not very numerous, 1-3 in each large areole, commonly upon the secondary veins of the primary areole, often confluent into transverse, oblong or linear (grammitoid) sori. *BLFLJav. Fil* 168, t. 76. *Polypodium tri-dactylon*, *Wall. Cat. n.* 315. *Hook. Sp. Fil* v. 75. *Hook. et Grcv, l.,- Fil* t. 209. . *Bedd. F. B. It w.*

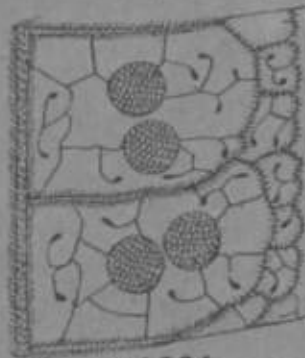
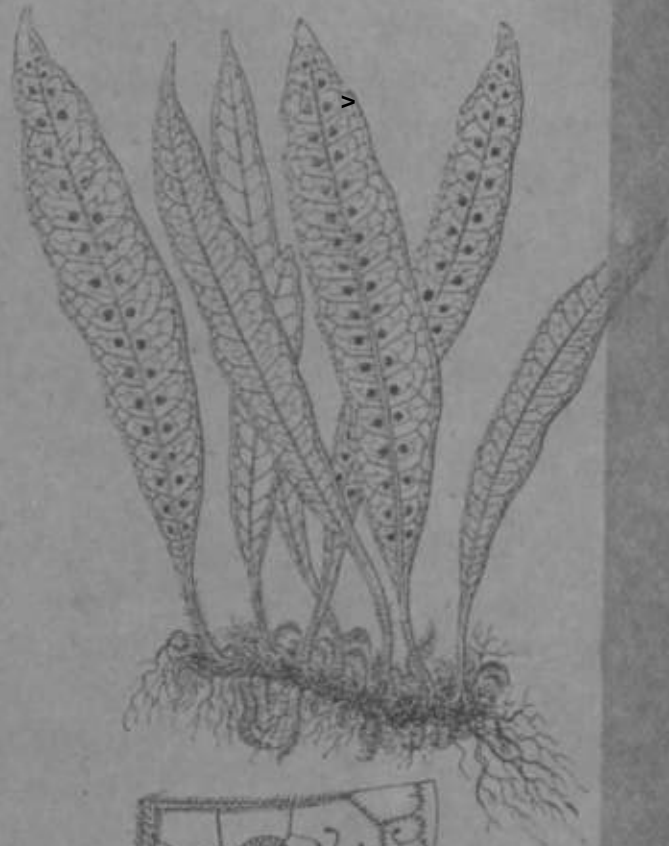
North India, **Sikkim** and **BhoUn**, 1,000-4,000 feet elevation j **Khasya** from no elevation up to 4,000 feet, in the plains at **Mymensingh**, **Chittagong**, plains up to 1,000 feet; **Malay Peninsula**.

(Also in the Philip-pines and South China.)

**VAR. MINOR.** Fronds always small and simple 3-4 inches long, by j 1/2 inch broad, never lobed.

*Bedd. F. S. It. 179. .*

South India, **AnamaUays** and **Bolampatty Valley**, 3,000-4,000 feet elevation, in rivers on rocks under water, fructifying when water subsides after the rainy season ; **Ceylon**. This may not be entitled to rank as a permanent variety, as Mr. Clarke says the N<sup>o</sup>



N<sup>o</sup> 204.

PLEOPELTIS PTEROPUS. VAR. MINOR,  
(BL.)

FERNS OF BRITISH INDIA AND CEYLON.

Indian plant is small and simple at the higher elevations; but I never saw 3-lobed examples in South India or Ceylon, or fronds more than about 3 inches long.

VAR. *OSTERIFORMIS*. (*Wall. Cat. 380.*) Fronds very narrow and ribbon-like, 4-7 inches long, by 1-3 lines broad. *Hook. Syn. Bot.* 357. *Bidd. Bot. Ind.* 123. Baker is wrong in saying there are no free veinlets; it differs from the last in no way except in the narrowness of the fronds, and it is certainly only a local variety.

Tenasserim, beds of rivers at the foot of Mooley.

\*\* Fronds finely pinnatifid.



no 205.

22. *PLEOPETIS HASTATA*

(*Thunb.*) Rhizome creeping, stout, paleaceous with dense subulate or hair-pointed falcate ferruginous scales; stipes 2-5 inches long; fronds coriaceous, 3-12 inches and more long, deltoid-ovate acuminate, trifid or deeply pinnatifid to within half an inch of the rachis, with 5-12 segments, which are 3-6 inches long, 1/2 to 1 inch wide, very patent from a broad base oblong-lanceolate, very finely acuminate entire or repand or denticulate, thickened at the margin, the lowest ones emiccate-decurrent, terminal segment often the longest and most narrowly acuminate; venation conspicuous, main veins often prominent beneath, distant, united by transverse veins forming 3-4 series of primary arcules, which are filled up by lesser ones including free veinlets; one large net-work, arranged in a single series nearer the base than the margin. *Thunb. Fl. Jap.* 375. *Polypodium oxylobum*. *Wall. Cat.* 204. *Bidd. Bot. Ind.* 123. *Pleopeltis trifida*, *Don.*

*PLEOPETIS HASTATA*. (*Thunb.*)

acuminate; venation conspicuous, main veins often prominent beneath, distant, united by transverse veins forming 3-4 series of primary arcules, which are filled up by lesser ones including free veinlets; one large net-work, arranged in a single series nearer the base than the margin. *Thunb. Fl. Jap.* 375. *Polypodium oxylobum*. *Wall. Cat.* 204. *Bidd. Bot. Ind.* 123. *Pleopeltis trifida*, *Don.*

*Prod. Ft. Nep. \$.* Hook. *Syn. Fil.* 36, *Pleopeltis malacodon*, *Beud.*  
# *Sup.* ^387.

Young rhizomes often produce only very small fronds, which are staple or trilobate only; (var. *Thunbergii*, *Clarke*), This can at once be known from *malacodon* by the base of the lowest pair of pinnae (*i.e.*, base of the frond) being always a little decurrent on the apex of the stipe, (not scooped out and subcordate) and being subentire or only a little denticulate instead of acutely serrate; Mr. Clarke, however, is wrong in saying that it is always **quite entire**, my specimens (looked at under a lens) are always more or less toothed.

Throughout the Indian region on the mountains; in South India between 5,000-8,600 feet elevation; in the North 2,000-10,000 feet.

*PLEOPELTIS MALACODON.* (*Hook.*) In all respects like *nastata* only that the base of the frond is scooped out and **subcordate**; (instead of being a little **decurrent**), and the margins are acute or serrate, sometimes **incurvate** or spinescent. *Hook. Sp. Fil.* v. p. 563, *a variety less serrated, rather varied in form*, both protest against this being considered different. I should have so placed it, "

g those of a variety rather than of a species.

**Himalayas**, Nepal to **Bhotan**, 10,000-13,000 feet elevation. Sometimes more erect (the pinnae or rather segments) narrow less prominently serrated; scales of rhizome blacker. *Pleopeltis Steudartii*, *Bedd. F. f.* 204, *as of Baker, Syn. Jut.* 51 (*Clarke*).

**Propinquum**, var. *///*. p. **cryptobum**, *l. Smith.* MS. *Clarke, F. A. l. l.* 33.

Nepal to Bhotan, 9,000-12,000 feet elevation (pendant inflorescences); I think that Sir W. Hooker may be safely followed in regarding this only a variety of *malacodon*.

*PLEOPELTIS MALACODON.* (*Hook.*) Rhizome stout creeping

elongated and knotted with short frondiferous branches, everywhere densely imbricated with intensely black polished ovate lanceolate subcoriaceous concave scales, fuscous-pubescent at the margins, and not hair-pointed; stipes 6-9 inches long, glabrous, glossy; fronds 6-18 inches long, 8-10 inches broad, cut down to a broadly winged rachis into 6-20 pair of pinnae or segments,  $\frac{1}{2}$ -1 $\frac{1}{2}$  inch broad, the lowest pair generally deflexed, and either a little decurrent on the stipe, or scooped out and subcordate at their bases, sometimes quite patent as are the other pinnae, all a little serrulate, finely acuminate,

N<sup>o</sup> 206.

PLEOPELTIS INCURVATA. (Bl.)

though closely allied to *hastata*, seems to be sufficiently distinct as a species in its peculiar rhizome, the fronds both in it and in *malacodon*, var. *majas*, are sometimes cordate, sometimes decurrent at the base; in *malacodon* type (in very many specimens examined) they are always cordate, and in *hastata* always decurrent.

Himalayas, from Ghutwal to Bhotan, 6,000-12,000 feet elevation.

25. PLEOPELTIS INCURVATA. (Bl.) Rhizome creeping, palaceous, with adpressed scales; stipes scattered, a span to a foot long

glabrous, except the rachises which are generally puberulous, and the main rachis sometimes scaly beneath; main veins distinct to the margin, areoles with copious free veinlets; sori in a single row near the midrib. *Hook. Sp. Bot.* v. 88. *Bedd. F. B. J.* 138. I cannot separate Clarke's variety "*Oakesii*" from the type; his variety "*Parishii*" is a *Drynaria* as far as the Moulemein plant is concerned; Jerdon's Khasya specimen being a single small sterile frond without rhizome, which may be *ebenipes* or *hastata*. *Ebenipes*,



of the sterile frond, 2 feet of the fertile, glossy brown ; fronds 1  
 coriaceous glossy dimorphous, sterile ones 6-10 inches long, 8 in-  
 to 1 foot wide, hastate, tripartite, simply ovate or pinnatifid T  
 4-6 lateral lobes, lobes ovate-acuminate entire horizontal, terr  
 one very large, **all** thickened at the margin; main veins disti  
 but immer sed, other veins internal and very indistinct; areoles  
 free i ncluded simple or forked veinlets ; fertile fronds very bl  
**stipitate**, 10 inches to a foot long, nearly as much wide, very bi-  
**ovate** deeply pinnatifid nearly to the rachis, below subpinnate, **segrffi**  
 5-15, 4-8 inches long, very  
 remote, linear and acuminatj,  
 decurrent at the base ; son  
 Kse, copious, oval, sunk into  
 a very deep cavity which forms  
 a circular, elevated truncated  
 tubercle on the opposite side.  
 occupying the space between  
 the costa and the margin in a  
 single series. *BL Fil.Jav.p.*  
 15 \*i\* 65. *Hook. Sp. Fit v.*  
 77- *Bedd. F.B.I.* 124.

Malacca.

(Also in the Malay

26. PLEOPELTIS INSIGNIS.

(*BL*) Rhizome short-creep-  
 ing, paleaceous, **with** decidu-  
 ous ferruginous scales • stipes

1-2 inches or more long (according to the length of the decurr  
 wing of the frond); fronds sub triangular-ovate, membranace  
 glabrous, 4-9 inches long (independent of the decurrent wing),  
**nearly** as much broad, subdeltoid, deeply pinnatifid, with 5-9 la  
 olate spreading acuminate segments; the base of the fronds sul  
 neate and decurrently attenuated so that the stipes is winged for



N?207.

PLEOPELTIS INSIGNIS. (*BL*) I

greater part or even the whole of its length; venation distinct, main veins slender, united by transverse veins, forming 3-4 series of areolae, including free divaricating veinlets; sori very small, circumpetal, generally two on each transverse veinlet, but appearing to be irregularly scattered. *Bl. Ind. Jav. p. 266, t. 74. Hook. Sp. Fil. v. 73. Bedd. F. S. I. t. 214.*

Malacca.

(Also in the Philippines and Java.)

27. *PLEOPELTIS PHYMATODES.* (L.) Rhizome very wide-creeping, woody, the scales dark brown fibrillose; stipes 3-12 inches long, firm, erect, glossy; fronds varying from simple oblong lanceolate 6 inches long, to deeply pinnatifid and 3 feet long, lobes numerous entire, acuminate, lanceolate-oblong 4-8 inches long by 1-1½ inch broad, texture coriaceous, both sides glabrous; no distinct main veins, areolae fine with copious free veinlets; sori large, more or less immersed, 1-2 serial or scattered. *Linu. Mant. p. 360. Hook. Syn. Fil. 364. Bedd. F. S. I. 173. Polyt. alternifolium, Wall. Cat. 289, 5pt. sheet.*

Ceylon; Malabar and Travancore, cultivated only (?); Malay Peninsula.

(Also throughout the tropics of the old world, the continent of India excepted.)

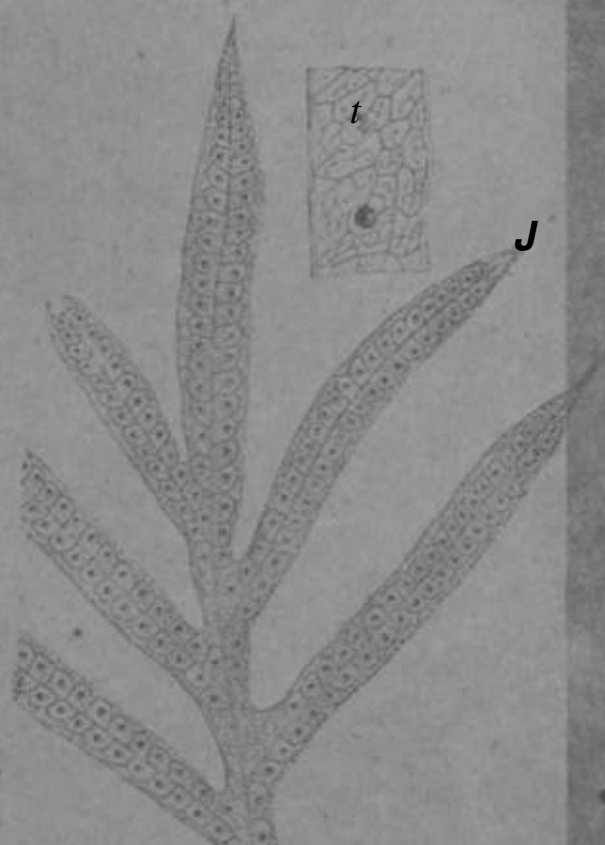
28. *PLEOPELTIS LONGISSIMA.* (Bl.) Rhizome wide-creeping; the scales ovate adpressed; stipes 3-4 feet long, glossy straw-coloured; fronds 1-4 feet long, 6-12 inches broad, cut down very nearly to the rachis (often leaving only the narrowest sign of a wing) into 3-20 erect-patent acuminate linear-subentire segments or pinnae, which are ½-2 inch broad, texture papery, both sides glabrous; primary veins not very distinct, areolae numerous, with free included simple or forked veinlets, with slightly clavate apices; sori in close single rows near the midrib, deeply sunk and forming papilla on the upper surface. *Bl. En. Pl. Jav. t. 127. Hook. Syn. Fil. 366. Bedd. F. Sep. 388. Wall. Cat. 289, 3rd sheet (alternifolium, var. polyphyllum).*

Assam, Gowhatty, Sylhet, Furidpore (floating in jheels.)  
(Also in the Philippines, Formosa, and Malay Islands.)

29. PLEOPELTIS NIGRESCENS. (*ffl.*) Very like longissima, the wing to the rachis broader and the pinnae broader (*i.e.* incl rather more crisp in texture and the veins more prominent : perhaps only a variety, but I have never seen longissima in a state. *Bl. En. Fil Jav.* 127. *P. longissima*, *Bedd. F S. I.* 176. *Wall. Cat.* 289, 2nd sheet (alternifolium).

South. India, on rocks, about the foot of the Western Ghats, (foot of Sispara and Carcoor ghats), not ascending the mountains to any elevation, and never growing in places; Ceylon. An exceedingly handsome fern.

30. PLEOPELTIS DELATATA. (*Wall.*) Rhizome stout creeping, paleaceous with ovate reticulated scales; stipes 1', 2' and more long, but strongly winged the whole length by the decurrent base of the frond; fronds 1 1/2 - 2 and 3 feet long, 1 foot and more wide, membranaceous, light-green, glabrous, oblong-ovate, pinnatifid to within 1/2 inch of the rachis (less towards the base), segments 6-10, 5-8 inches long (shorter towards the apex), finely veined, oblong-lanceolate acuminate, subentire, suddenly decurrently veined, primary veins wavy, forming large primary areoles which extend towards the margin and include the sori, these and the remaining of the segments are occupied by lesser irregular areoles including many free veinlets, their branches moderately divaricating; sori plentiful, very small, often oval or more or less elongated, compital



KI?206.

PLEOPELTIS NIGRESCENS, (*Bl.*)

the secondary veins and veinlets. *Wall. Cat. n. 295. Hook. Sp. Fil. v. 85. Bedd. F. B. I. t. 122.*

North India, from Nepal to Bhotan, 3,000-8,000 feet elevation, Khasya, 2,000-6,000 feet; Ceylon, forests above Telgama, 4,000 feet elevation; Tenasserim and Malay Peninsula.

(Also in Samoa.)

\*\*\* *Fronds pinnate.*

30. PLEOPELTIS PALMATA. (Bl.)



Nº 209.

PLEOPELTIS DILATATA. (Wall.)

including free incurved clavate veinlets; sori rather large in a single row, midway between the costa and margin. *Bl. Fil. Jav. p. 150, t. 64. Hook. Syn. Fil. 368. Bedd. F. B. I. t. 156.*

Malay Peninsula, Singapore, Penang and Malacca.

(Also in the Malay Islands and Philippines.)

31. PLEOPELTIS JUGLANDIFOLIA. (Don). Rhizome stout creeping, with many spreading lanceolate subulate bright-ferruginous scales; stipes 1 foot or more long, firm, erect, glossy; fronds 1½-2 feet long, 1 foot or more broad; pinnae 8-10 on a side in pairs, which are 1-2



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inches apart, not quite opposite, articulated with the rachis, **M\*inf1**  
 broad, the apex caudate; the margin thickened and \*  
 lobed, sessile from a rounded base, or attenuated and petioled, tex-  
 \*ture subcoriaceous, both sides glabrous; main veins distinct \* the  
 margin; areoles copious, hidden, including free veinlets; sori large,  
 one between each main vein, forming a single row, **Tf "w"**  
 broader than the margin (rarely in two rows). *Don. Fl. Nep. 3.*  
*Hook. Syn. Fil. 368. P. capitellata, Wall. Cat. 306. Bedd. F. B. 7*  
 12.

VAR. TENUICAUDA. (*Hook.*) Pinnae gradually narrowed and  
 truncate at the base and petiolate; quite runs into the type and cannot  
 be considered a variety. *P. Himalayas, from Gurwhal to Bhotan*  
 very common, Khasya, 2,000-5,000 feet. *2,000 ~ 9,000 feet elevation*

33- PLEOPELLTIS LEHMANNI. (*Mett.*) P V  
 with ovate or orbicular glabrous ^ J S ' S ? sepings, do the d  
 humiliation; stipes 8 inches or more U, T? " & very long S  
 the rachis and frond; fronds 1-2 feet ^ous as well as  
 alternate; pinnae opposite or subopposite ^ J ^ Submembranceous  
 alternate (one long petioled), linear or obcordate, articulated at the base  
 with a caudate  
 acumination 4-6 inches long, about 1/2 inch h  
 abruptly excised, inferior base amplexicaule f 1 o ^ Superior base  
 slightly repand; main veins evident not t margin entire or  
 margin, connected by the transverse vein, w r w S quite to the  
 areoles in which are free simple or m about 4 series  
 forked veinlets with c Uvate  
 ; sori irregular, generally 4-6 j n b v o rows bet\*een the main  
 5ns. *Mett Poly.p. 229. Bedd. R B. 7. 26c* *Hook. Syn. Fil.*  
 569.

Sikkim, 4,000-8,000 feet elevation; Birma  
 (*Pleopeltis mouleimensis, Bedd. F B. 7*)  
 single specimen in Mr. Parish's possession, is  
 probably this, imper-  
 glandifolia.)

34- PLEOPELTIS HIMALAYENSIS (*Hook.*) Rhizome glaucous



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GEOPHELTIS LEHMANNI (Metz)

sepings, clothed with bright ferruginous hair-like scales ; stipes a m to i foot and more long ; fronds i - ^ foot long, submembra- eous, sometimes pubescent or even subtomentose, glabrous sub- naceous in age, pinnated, pinnae almost invariably opposite sessile distant pairs 5-8-9 inches long, by i | - 2 inches broad ^ an • luse base, eHptical-oblong, finely and long-caudately acuminate are, but with a very distinct membranous hyaline margin ; main ns manifest connected by transverse ones forming areo es, of nch one or all are soriferous, these areoles are filled up with a net-



;\$%fr

work of lesser areoles which have free included veinlets; son often large, , - 2 in the primary are6les, hence they are 1-2 serial between the main veins, and 3-4 serial in a Section parallel with the «>sta. Hook. \$p. mi. v. 9,. Bedd.JP B.I.,. 318. Poly- podium venusturn, Wall. Cat. 305, not of Be,v.

Himalayas, 6,000-10,000 f(Jet Ovation, from Nepal lo Bhotan, Khasya -Hills (JerJ on), young pJants ofteiv have simple or 3-lobed fronds. Mettenius considers it only ^ variety of Lehmanni. Mr. Clark e calls the tomentose

N°2i2

PLEOPELTIS MALAYENSIS. (IfooA.)

I

iety var. niphoboloides, but it graduates into the type 35. PLEOPELTIS LEIORH12.V. iWalL) Rh ; r o m e very thick, ;hy,wide-creep.ng covered with ovate adp\_r\_e\_s\_s\_e\_d peltate,slaty-brown les ; stipes i -, feet long erect; fronds 2-4 feet long, L feet «d ; pmnre narrow lanceolate-lmear coriaceous acuminate at the :x, margins ent.re, sessUe and rather decurrent at the base, or



attenuated and petioled, both sides glabrous; main veins scarcely more prominent than the rest, areoles with copious free veinlets; sori large, in a single row, a little nearer the midrib than the margin. Polypodium, *Wall. Cat.* 303, *type sheet*, *Hook. Syn. Fil.* 369. *Bedd. F. S. L.* 174.

South India, common on all the Western mountains, 2,000-4,000 feet, on rocks; North India, from no elevation up to 4,000 feet.

## TRIBE II.—GRAMMITIDÆ.

Sori on the back of the lobes, more than twice as long as broad, usually linear.

(*Ch. (S. f. 09 f. 11)*)

## GENUS LXVI.—NOTHOLAENA. (*R. Br.*)

(*Nothos. spuriosus; lanas*, wool—the scales on back of frond pseudo-woolly.)

Sori marginal, at first oblong or roundish, soon confluent into a continuous marginal line, without a distinct involucre, but with the edge of the frond frequently inflexed; veins free; fronds adherent to the caudex, pinnate or bipinnate.

6. NOTHOLAENA MARANTÆ. (*L. under Acrostichum*.) Rhizome stout, horizontal, densely paleaceous with soft silky ferruginous finely pointed subulate scales; stipes generally stout purplish-black, 3-4 inches long, aggregated, setosely and densely hirsute, as well as the rachis; fronds 4-10 inches long, 2-2½ inches wide, oblong-lanceolate, coriaceous, glabrous above, beneath densely clothed with ferruginous oblong-lanceolate imbricated scales, bipinnate, primary pinnae petiolate or sessile from a broadish obtuse base, oblong-acuminate, pinnales not numerous, approximate, sessile, 2-3 lines long, very obtuse entire, upper ones confluent at the base (as are the terminal primary pinnae), the edge scarcely reflexed; sori forming a broad border extending some way from the margin towards the caudex.



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NOTHOLAENA MARANTK. (Linn.)

much concealed by the paleaceous covering. *Linn. Sp. Pl.* 1527. *Notholaena Marantæ*, *R. Br.* *Nothochlaena*, *Hook. Sp. Fil.* v. 120. *Bedd. F. B. I. t. 1.*

Alpine Himalayas, from Kashmir to Kumaon, rare; Sikkim, 9,000-15,000 feet elevation, Lachen Valley.

(Also in South Europe and the Mediterranean region, from Macaronesia to the Caucasus and Abyssinia.)

2. *NOTHOLENA VELLEA*. (*R. Br.*) Stipes densely tufted, woolly, wiry, short; fronds 8-9 inches long, 1-1½ inch broad, oblong-lanceolate, bipinnate, pinnæ close lanceolate, the central ones the largest, with close roundish or oblong entire or 3-lobed **pin!**ules; texture herbaceous but thick, both sides, especially the lower, coated with whitish or subferruginous tomentum, rachis bright chestnut-brown, more or less woolly. *R. Br. Prod.* p. 146. *N. lanuginosa*, *Desv. Hook. Syn. Fil.* p. 370.

Pangi and Lahul in Chumba, Cashmere.

(Also in Afghanistan, South Europe, Madeira, Cape Verd Isles, Algiers.)

GENUS LXVII.—MONOGRAMME. (*Schk.*)

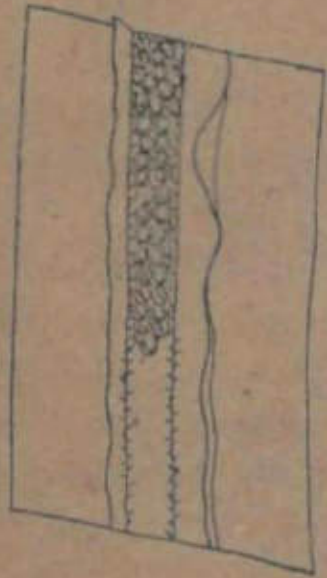
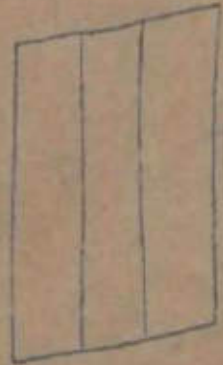
(*Mono*, one; *gramme*, a line—sori in a single line on each frond.)

Sori subimmersed, linear elongated close to the midrib on one or both sides, the receptacles formed of a portion of the costa; veins consisting only of a costa; fronds small, grass or rush-like, simple or forked, rhizome creeping.

1. *MONOGRAMME PARADOXA*. (*Fée.*) Rhizome creeping, hairy; fronds linear filiform, grass-like, 2-12 inches long, ¼-½ line broad; sori within a vaginiform expansion of the costa, one side of which is larger than the other. *Fée. Vitt.* p. 38. *M. Junghuhnii*, *Hook. Sp. Fil.* v. 123. *Bedd. F. S. I. t. 210.*

Ceylon, 3,000-5,000 feet elevation, not very common.

(Also in Java, Philippines, Queensland and Polynesian Islands.)



A. J. O. S. P. S. P. N. C. R. A. S.

**E** GENUS LXVIII—LEPTOGRAMME. (*l. Sm.*)

(*Leptos*, slender ; *gramme*, a line.)

**E** Sori arising from the veins over the under surface of the frond, linear or linear oblong, simple; veins free; fronds bi-tripinnatifid, adherent to the caudex, habit and mode of growth of *Phegopteris* and *Lastrea*, and only differing from the former in its donated sori.

1. LEPTOGRAMME TOTTA. (*Schl.*) Rhizome scarcely creeping, stipes subtufted, 6-12 inches long, pilose, below scaly; fronds 12-18 inches long, 6-8 inches broad, pinnate, both sides pilose, pinnie lanceolate, f-i inch broad, pinnatifid half-way to the midrib, lobes blunt, entire or subentire,  $\frac{1}{2}$  lines broad) herbaceous in texture; veinlets simple 5-7 on each side with the linear oblong sori medial. *Schlecht, Adumbr.* 15, 1, 6. **Book. Syn. Fil.** 376. **Grammitis** Totta, *Bedd. A S. J.* 1. 49.

South India, very common on the mountains on the west side to the highest elevations; Ceylon at the highest elevations; North India, North-west Himalayas, Kashmir to Bhotan, 6,000 feet elevation, rare, Khasya, 3,000-5,000 feet elevation, common.

(Also in Java, China, Japan, and Africa and its islands.)

2. LEPTOGRAMME AURITA. (*Hook.*) Rhizome extensively creeping; stipe 1 foot long, naked, glossy, the base curved and furnished with a few deflexed ovate acute scales; fronds up to 2 feet long, and 1 foot broad, pinnate, pinnae in distant pairs pinnatifid nearly or quite to the rachis into lanceolate entire or crenate lobes, the lowest on one or both sides longer than the others and pinnatifid, the others sometimes unequal, texture subcoriaceous, rachis glossy, both surfaces generally glabrous; veinlets mostly forked; sori oblong. *Hook. Syn. Fil.* 377. *Gymnogramme*, *Hook. Sp. Fil.* v. 14. *Grammitis aurita*, *Bedd. F. B. L.* 1. 152.

Sikkim and Bhotan, 3,000-6,000 feet elevation, Assam, Khasya, 2,000-5,000 feet elevation.

VAR. LEVTNGII. (*Clarke.*) Fronds weak and flaccid, pinnae  $\frac{1}{2}$  inch



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LEPTOGRAMME TOTTA. (S. W.)

long only, and f inch bro\*d, not auriculate, lower ones very distant, all sparingly covered on both sides with long needle-like weak hairs. *Clarke, F N. I. p. 568.*

**I** Kashmir, Jhelum and Chittapani valleys, 4,000-7,000 feet elevation (Levinge), Sutlej, 9,000 feet elevation (Stewart).

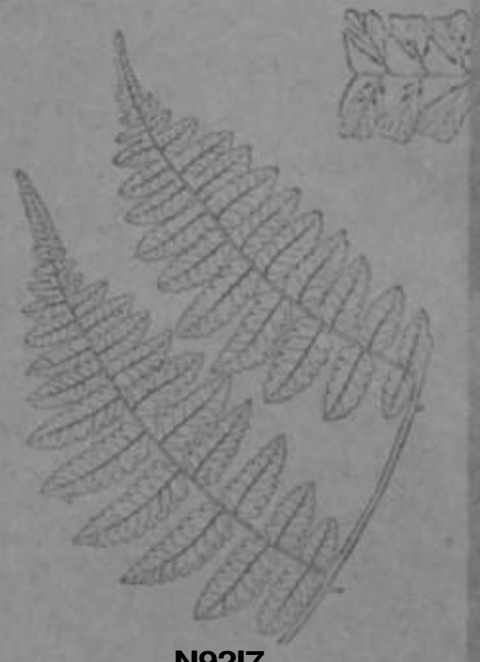
**3. LEPTOGRAMME OPACA. (Spr.) gtipes 1 \ and more feet loi**

tufted, scaly near the base ; fronds 2 feet and more long 12-15 inch



**N°216.**

**LEPTOGRAMME** *arrita*. (Hook.)



**N9217.**

**LEPTOGRAMME** *opaca*. (Spr.)

wide at base, subdeltoid-ovate acute membranaceous, pubescent on the rachises and costal, bipinnate, lower primary pinnae petiolate 6-8 inches long, 3-4 inches wide, oblong-ovate, their pinnules an ml wide, oblong sessile and adnate, and slightly decurrent at the base obtuse or acute, pinnatifid, the lobes retuse or emarginate and toothed; veins pinnate in each lobe of the pinnules or large segments, veinlets forked or simple, soriiferous towards the base! the lower branches ; sori oblong, forked. *Syn. Fit. 378. Gymn*

gramma, *Hook. Sp. Fil.* v. p. 143. *Spr. Syst. Veg.* iv. 39. *Beard. F. B. I. t.* 238. *Gymnogramma obtusata*, *Bl. Fil. Jav.* p. 97, t. 43. and *Hook. Sp. Fil.* v. 143.

Nepal to Bhotan, 4,000-7,000 feet elevation; Khasya, 3,000-5,000 feet elevation.

(Also in Java.)

### GENUS LXXIX.—STEGNOGRAMME. (*Bl.*)

(*Stegnos*, a cover; *gramme*, a line.)

As in *Leptogramme*, only the veinlets of contiguous groups uniting as in *Nephrodium*, fronds pinnate; habit and mode of growth of *Nephrodium* and *Goniopteris*, only differing from the latter in its linear sori.

1. *STEGNOGRAMME ASPIDIODES*. (*Hook.*) Fronds hairy on both sides, especially the veins, ovate-lanceolate acuminate, pinnate, firm-membranaceous, pinnae opposite or alternate, sessile subtruncate or acute at the base, 3-4 inches long, rarely an inch wide, oblong-lanceolate, pinnatifid  $\frac{1}{2}$ - $\frac{3}{4}$  the way to the midrib; veins 5-6 pair, 2-5 lower united, with an excurrent spurious vein reaching to the sinus, those in the lobes free, all soriferous; sori linear-oblong, nearly the length of the veins. *Hook. Sp. Fil.* v. 150. *Bl. Fil. Jav.* p. 172. *Bedd. F. B. I. t.* 149.

Khasya, 4,000-6,000 feet elevation; Ceylon (?).

(Also in Java.)

### GENUS LXX.—GYMNOGRAMME. (*Desv.*)

(*Gymnos*, naked; *gramme*, a line.)

Sori arising from the veins over the under surface of the frond; linear or linear-oblong, forked or sometimes simple; veins forked, veinlets free; fronds various, adherent to the caudex, habit and mode of growth of *Cheilanthes*.





W

4 2 CAPTULES <?+?>?

STEONOGRAMME ASPIDIoidES. (Hook.)

3. *GYMNOGRAMME MICROPHYLLA*. (*Hook.*) Stipes densely tufted, 2-4 inches long, slender, fragile, glossy brown; fronds 1½-3 inches long, deltoid quadripinnatifid, pinnae close, the lower ones deltoid; pinnules deltoid, ultimate segments  $\frac{1}{2}$ - $\frac{1}{3}$  of an inch, obovate-oblong, texture pellucid herbaceous; veins and sori one to each ultimate segment. *Hook. Syn. Fil.* 383. *Bedd. Fl. B. I.* 4. 148. (habit of *leptophylla*, but not annual.)



*GYMNOGRAMME MICROPHYLLA*. (*Hook.*)

Khasya, Surareen, 5,000 feet elevation, Sikkim, Torglo, 7,000-10,000 feet elevation, Sinchal, 8,000 feet elevation, Dikeeling, 7,500 feet elevation.

GENUS LXXI.—*SYNGRAMME*. (*J. Sm.*)

(*Syn* to unite; *gramme*, a line—sori often in united lines.)

Sori long linear, arising from the veins and veinlets on the under surface, veins forked close to the midrib or higher up, veinlets parallel

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1887

NY 222

simple and sometimes anastomosing, or regularly anastomosing near the margin, forming a continuous marginal vein, with one or more series of marginal areoles-; fronds various, adherent to the caudex: habit of Diplazium.

i. SYNGRAMME FRAXINEA. (Don. under Diplazium.) Rhizome creeping; stipes naked, glabrous, 1-4 feet long; fronds 1-4 feet long, simply pinnate with the pinna, a foot or rather more long, attenuated at the base, stalked, and 2 inches broad, or bipinnate, the secondary Pinnæ 3 inches long by 1/2 inch broad, sessile or subsessile with a broad rounded base, in both forms finely acuminate, texture firm-taceous, glabrous, or a little pilose beneath, entire or subentire, finely toothed; veins very close, forked from the base near the margin or much higher up, one or both of the branches often again forked rarely joining with the next group of veins; sori running along all the branches, but stopping far short of the margin. Diplazium

Gymnogramma javanica, R & L. 232, the pinnate form. F. B. I. t. 57, the bipinnate form. Wall. Cat. 3

Himalayas, from Chumba to Bhotan, 1,000-8,000 feet elevation, Sikkim, 1,000-5,000 feet elevation; Ceylon, 5,000-10,000 feet elevation; Malay Peninsula, Tenasserim, &c. (Wall. Cat. 3)

This Fern should certainly be associated with "Wallichii" and "Smafolium," with which it quite agrees in habit, the anastomosing of the veins is rare, but I detect it in all my specimens.

SYNGRAMME VESTITA. (Wall. Cat. 3, i.) Stipes tufted 3-6 feet high, densely matted at the base; fronds 6-12 inches long, 1/2-1 inch broad, densely

silky; fronds near base, simply pinnate, 6-12 inch long, 1/2-1 inch broad; pinnae, 14 on each side in distant sub opposite pairs, ovate

but finely ferruginous hairs; venation, especially the primary veins, densely coated with fine velvety ferruginous hairs; vein.

H'di;

forked or pinnate, where pinnate the lower branches generally anastomose; sori universal on the veins. *Bedd. F. B. Ind. 154.* *Grammitis vestita, Wall. Cat. 12.* *Gymnogramme vestita, Hook. Syn. Fil. 379.*

Himalayas from Chamba to Nepal, 6,000-9,000 feet elevation.

(Also in China.)

3. *SYNCRAMME WAL-  
LICHII.* (*Hook.*) Stipes tufted up to 20 inches long, firm, glossy brown, fibrillose near the base; fronds up to one foot long by 2½ inches broad, elliptic-lanceolate, simple, acuminate, entire at the margin, the base narrowed very gradually, texture subcoriaceous, both sides glabrous; veins fine parallel, simple, or forked from the base or much higher up, rarely joining with the contiguous group about the centre, but all anastomosing near the margin and forming 2-3 small oblong hexagonal areoles; sori on all the straight veins, but scarcely extending to anastomosing ones near the margin. *Bedd.*



NO 223.

*SYNCRAMME VESTITA.* (*Wall.*)

*F. B. Ind. 153.* *Gymnogramme, Hook. Syn. Fil. v. p. 155, t. 300.*



N°224.

ENGRAMME ALISMIFOLIA. (Hook.)



N°225.

SELLIGURA FEEI. (Hook.)

Singapore.

(Also in Borneo.)

4. *SYNCRAMIS ALISMIFOLIA*. (Hook.) Caudex creeping, stipes a span to a foot and more long, blackish-purple; fronds subcoriaceous, simple 5-8 inches long,  $2\frac{1}{4}$  inches wide near the base, from a rounded base, ovate or ovate-lanceolate, finely serrated, vein numerous, approximate, simple or forked, anastomosing near the margin into 1-2 series of oblong hexagonal areoles; sori narrow-linear on all the straight veins, but scarcely extending to the anastomosing ones. *Bedd. F. B. I. I.* 240. *Gymnogramme*, *Hook. Bot. Beechey. v.* 155.

Singapore.

#### GENUS LXXII.—SELLIGUEA. (Bory.)

(After Selligue, a Frenchman.)

Veins prominent, compound, anastomosing, with free included veinlets in the areoles; sori long linear; fronds simple, pinnatifid, rarely pinnate, articulate with the caudex; habit and mode of growth of *Pleopeltis*, from which genus it only differs in the sori being long linear.

\* *Fronds simple.*

1. *SELLIGUEA FEEI*. (Hook.) Rhizome firm, wide creeping, the scales bright brown, fibrillose; fronds dimorphic, the sterile ones 3-4 $\frac{1}{2}$  inches long,  $1\frac{1}{2}$ -2 $\frac{1}{4}$  inches broad, on stems 3 $\frac{1}{2}$ -6 inches long, the fertile ones narrower and more contracted at the base on stems 6-10 inches long, both acute, entire, very coriaceous and glabrous, and veins very prominent to the margin,  $\frac{1}{4}$  inch apart, veinlets obscure, forming copious areoles, with free included clavate venules; sori linear immersed in single rows, rarely interrupted, between the main veins, not quite reaching the margin. *Hook. Bot. Beechey. v.* 158. *Bedd. F. B. I. I.* 151.

Malay Peninsula, Penang, Singapore.

(Also in the Malay Islands.)







A. SCARLETTI (1875)

ELLIGULA BRADYI (Thunb.)

\* \* *Fronde compomid.*

4. SELLIGUEA ELLIPTICA. (T/wnb.) Rhizome woody, wide-creeping; stipes up to 2 feet or more long, erect, naked, straw-coloured; fronds 12-18 inches long, by 6-12 inches broad, generally pinnatifid clearly to the rachis into 4-10 pinnae on each side, sometimes subpalmately divided into 3-5 lobes, more rarely quite simple, or quite pinnate: lobes or pinnae linear-oblong acuminate,  $\frac{1}{2}$ - $1\frac{1}{2}$  inch broad, texture subcoriaceous, quite glabrous; main veins slender not distinct to the edge, areoles unequal, with copious free included clavate veinlets; sori linear oblique, reaching the midrib but not the margin, sometimes interrupted and punctiform. *Polypodium ellipticum*, Thunb. *FL Jap.* 335. *Selliguea decurrens*, Hook. *Syn. Fil.* 389. *Bedd. F. B. Lt.* 150. *Wall. Cat.* 5 and 776.

Himalayas, Nepal to Bhotan; Khasya, elevation 2,000-5,000 feet; Malay Peninsula, Tenasserim.

(Also in the Philippines, Queensland and Formosa.)

5. SELLIGUEA MAINGAYI. (Baker.) Stipe 1½ feet, dull brown, thickened; fronds deltoid, under 1 foot long pinnate, with 5 oblong-lanceolate pinnae, the end one largest, 5-6 inches long, 2-2.1 inches broad, slightly repand, narrowed gradually at the base, the lowest pinna distant, texture membranaceous, glabrous, main veins distinct to the edge,  $\frac{1}{4}$  inch apart, areoles copious, minute, with free included veinlets; sori very copious, minute irregular, punctiform or confluent lines or curves. *Baker in Hook. Syn. Fil.* p. 517.

Malacca.

## GENUS LXXIIL—LOXOGRAMME. (Presl.)

(*Loxos*, oblique; *gramme*, a line.)

Characters of *Selliguea*, but differing in the fronds being adherent to the caudex (not articulate), and in their flaccid leathery texture and hidden venation.

1. LOXOGRAMME LANCEOLATA. (Sw. undi' r Gram //ifis.) **Rhi-**

some slender, wide-creeping; scales small, linear, brown; fronds 6-8 inches long by  $\frac{1}{8}$ - $\frac{3}{4}$  inch broad, linear lanceolate, the apex acute, the margin entire, the lower third narrowed gradually into a very short stipe, texture thick, coriaceous but flaccid, both sides glabrous; venation obscure, costal areoles numerous, small, without, or more rarely with, free included veinlets, the midrib much more slender than the sori; the sori shorter and often nearly parallel, or quite parallel to the midrib. *Grammitis lanceolata*, *si*, *Syn. Fil.* 22, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

Southern India, Nilgiris, the higher Western mountains, 8,000 feet elevation, (rare compared with *involute*). Ceylon, above Newera Eliya, rare; Khasya, 4,000-5,000 feet elevation. (Also in China, Japan, Piji, Samoa, and Africa, with its eastern islands)

2. LOXOGRAMME INVOLUTA. (*Dominica* 1. *tinder Grammitis*.) Rhizome stout, creeping, the scales lanceolate, by 8 inches long, the margin short

Rhizome venous, but flaccid, both sides, sori numerous, free included veinlets, the midrib nearly to the margin. *Do.*, 7-7. *Nip.*, 4. *Selliguea*, *J. Torr.* *Sp. Fil.* v. 155. *Syn. Fil.* p. 387. *Loxogramma involuta*, *Bettl.* *F. S. I.* 1. 50. *MI.* 0, 7 and 10.

Very common on the mountains throughout the Indian region, Himalayas, 2,000-7,000 feet elevation; Southern India and Ceylon, 5,000-8,000 feet

Perhaps only a large form of *lanceolata*. Baker says there are no free included veinlets, but I find them always present in the plant, (Sir J. Hooker says sometimes), generally absent though sometimes present in *lanceolata*.

(Also in the Malay Islands and Polynesia.)

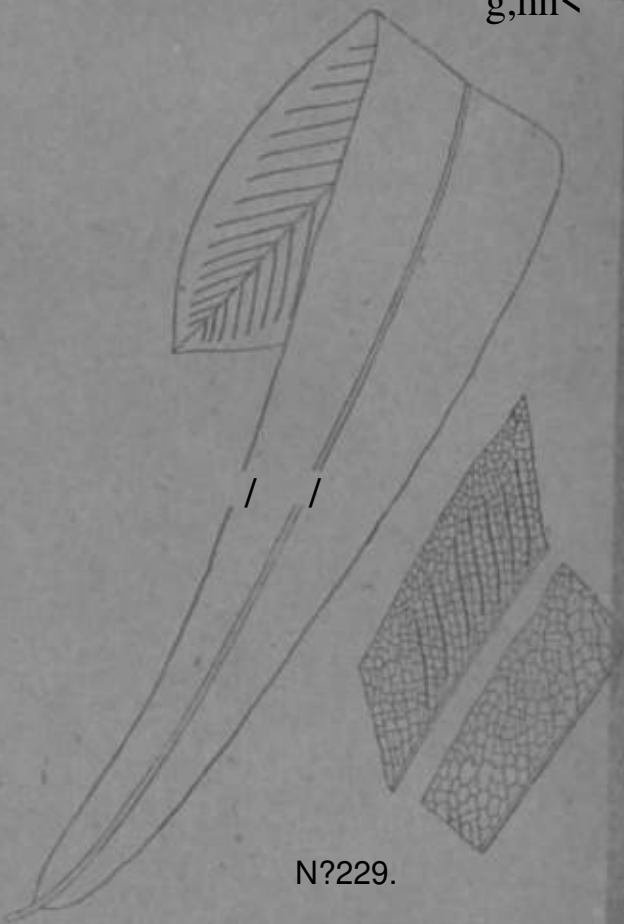
3. LOXOGRAMME AVE... (Baker) Rhizome creeping; sti]



A. LITTLELAND

PHONOGRAPHIC SCULPTURE (Dob)

about **1 inch long**, fronds glabrous, coriaceous, 18-20 inch long, oblong, spathulate, broader upwards, but narrowed and acute at the apex, about 3 inches wide in the widest part, glabrous on both sides, texture less coriaceous than in the last two; venation more evident, reticulated with free veinlets in some of the areoles, no prominent costules though the primary veins are slightly



thicker than the others; sori in narrow linear more or less flexuose, parallel lines in the upper portion of the frond not touching the costa nor extending to the margin.

The Malay Peninsula, Penang.

LOXOGRAMME AVENIA. {Baker.}

(Also in the Malay Islands.)

**GENUS LXXIV.-BRAINEA.** (L. &.)

(After C. Braine who first introduced the fern.)

Sori linear simple or branched, usually on the veins which fork at the costal areoles and on the bases of the free transverse veins more extended and confluent; veins united as to form one series of oblong or triangular costal areoles, the rest free, simple and generally all free towards the apex of the frond; sori arborescent; fronds **pitted** continuous with the caudex.

BRAINEA (Hook.) Caudex as thick as a man



ISOETES (L.) MICHX.

arm, clothed with shaggy dark-brown ferruginous subulate scales, 1/2 inch long; stipes stout, firm, 3-4 inches long, scaly or at the base; fronds coriaceous bright-green (**Lomaria-like**), pinnate, **occasionally below partially bipinnate; pinn\*** numerous, close, horizontal, 5-6 inches long, 4 lines broad, base cordate, linear-oblong, **acuminate**, finely serrate. *Hook. Syn. Fil.* 390. *Bidd. R. B. I. t.* 139.

Khasya Hills, 3,000-4,000 feet elevation, **Pomrang** and **Jaink\*** Malay Peninsula, in **Tenasserim**, the **fir forests (Parish)**, on **Mooley**, 4,000 feet (Beddome.)

(Also in Hong Kong.)

GENUS LXXV.-MENISCIUM. {*Schreb.*}

{*Meniskos*, crescent; shape of fructification,}

**sori** naked, oblong or linear, occupying the transverse com, **veinlets; veins pinnate**, veinlets numerous, the opposite ones in an arc or angle and sending out from the angle a free or • **venule** • fronds **simple** or pinnate, (only differs from **Goptens** in the shape of the **sori**.)

**MENISCIUM**. {*&w.*} Rhizome firm, wide-creeping with chesnut lanceolate-linear sori at the extremities; stipes stem **sightly** pubescent, of the fertile frond 1 foot long or more, often sterile often shorter; fronds **3-foliate** or with 5 or more **pinn\***, terminal one much the largest, all oblong-lanceolate with a **br** **base** and acute apex, about 4-6 inches long by 1/2 inch broad stalked or sessile, margin entire or subrepand, the fertile ones of **narrower**, texture herbaceous, slightly pubescent beneath- **areo**, 6-9 between midrib and margin. *Sw. Syn. Fil.* 19, 206. *Hook. Syn. Fil.* 391. *Bedd. R. S. I. t.* 56. *Wall. Cat.* 61.

South India, **Bolampatty** Valley, Anamallays, Travancore, 2,000-3,000 feet elevation, gregarious and forming very large beds, **near** **ilwaystnfoliate, rarely 5-foliate; Ceylon, Matale and Saffragam, 2,000** 5,000 feet; North India, Eastern Bengal, Cachar, **Chittagong, Sikki** U no great elevation • Malay Peninsula.

(Also in China and Philippines.)



MONOTON TRIFOLIOL. (S.)



VAR. *ft* PARISHII, pinnae 9-13, Tenasserim and Mishi  
*Bedd. F. B. I. t.* 184; this probably runs into the type, but then  
 nothing like it in South India.

2. MENISCIUM THWAITESII. (*Hook.*) Rhizome wide-crec  
 thick as a crowquill, stipes 9-12 inches long, angled, naked e  
 at the base, fronds 8-10 inches long, 4-6 inches broad at b  
 deltoid or subdeltoid, the apex acuminate and more or less pinn  
 below which arc several l'near oblong rather deeply cren



MENISCIUM THWAITESII. (*Hook.*) MENISCIUM SALICIFOLIUM. (*Wall.*)  
 pinnae; the lowest stalked, the others sessile or subsessile, \-i inch  
 broad, often suddenly narrowed at the base, texture herba  
 below a little pubescent, above glabrous or nearly so, exec  
 costa; areoles generally 5 series between the costa and malj  
*Hook. Syn. Fil p.* 391. *Bedd, F. S. I. t* 223.

South India, Nilgiris, west slopes below Sispara, 3,000 feet  
 elevation; Ceylon, Matale, 3,000 feet elevation.

3. MENISCIUM SALICIFOLIUM. (*Wall.*) Stipe 1 foot or r\*  
 long, stramineous or pale-brown, glossy; fronds 12-18 inches 1.



ANTROPHYUM PLANTAGINEUM. (Kaulf.)

by being plicate on the upper surface, but this peculiarity occurs also in the South Indian plant and is not a specific character; *reticulatum* can always be distinguished from "*plantagineum*" by its longer and narrower fronds, and generally also by the presence of numerous barren sporangiastra.

South India, rare, on the Tinnevely and Travancore Mountains, 3,000 feet elevation; Ceylon, southern and central provinces, up to 4,000 feet; Himalayas and Khasya, up to 5,000 feet; Malay Peninsula.

(Also in Polynesia and Queensland.)

VAR.  $\beta$  PARVULUM.

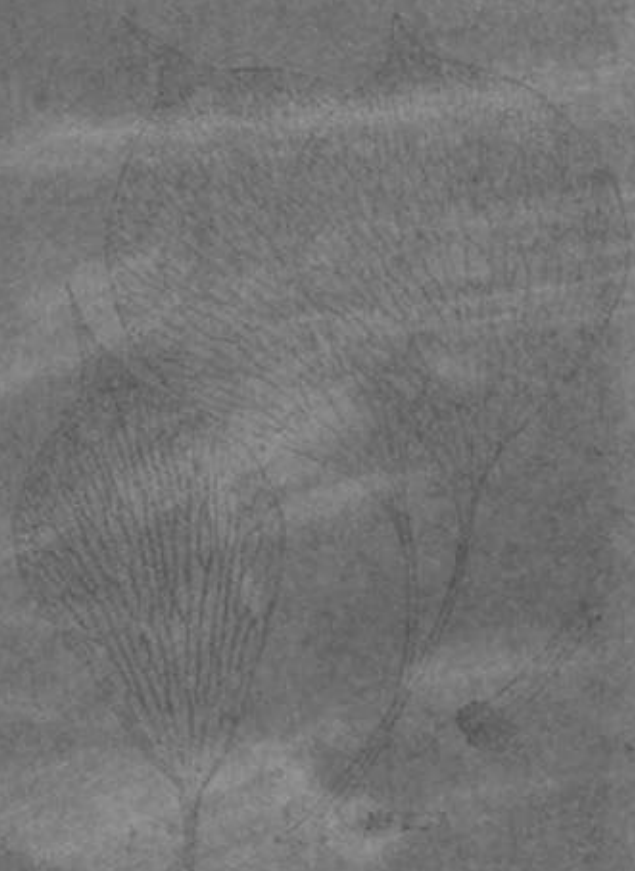
(Bl.) Fronds very small, 1-4 inches long, by  $\frac{1}{4}$ - $\frac{1}{2}$  inch broad. *Ant. parvulum* (Bl.), *Fil. J. n. 38, l. 34.* *Hook. Sp. Fil. v. 170.* *Bedd. F. B. I. t. 207.*

Sikkim, Yoksum, 4,500 feet, Khasya; Penang.

(Also in Java.)

2. *ANTROPHYUM PLANTAGINEUM.* (Kaulf.) Stipe distinct, 1-4 inches long; fronds oblong, broadest towards the apex, then suddenly narrowed into an acute point, 4-10 inches long, and up to 2 inches broad, no midrib or an inconspicuous one towards the base; sori deeply immersed, sometimes distinctly raised on the upper surface making the frond plicate above. *Kaulf. Bory. in Voy. de la Coq. Bot. Crypt. t. 23.* *Bedd. F. S. I. t. 52* (*reticulatum*).

South India, on the Western mountains, 3,000-5,500 feet



*ANTROPHYUM LATIFOLIUM.* (Bl.)

elevation, not very common ; Ceylon, central provinces ; Himalayas and Khasya up to 5,000 feet; Malay Peninsula.

(Also in the Malay Islands, Philippines and Polynesian Islands.)

3. ANTROPHYUM TATIFOLIUM. (*Bl.*) Stipe long up to 7 inches; fronds large, broadly obovate or round, up to 4? inches wide, acuminate or acutely lobed at the apex, no midrib; sori superficial or immersed, with the frond plicate above. *Bl. Fi. Jav. Fit.* 75. *Bedd. F. B. I.* f. 176.

Sikkim and Bhotan, 2,000-6,000 feet ; Assam and Khasya 2,000-4,000 feet elevation.

(Also in Java.)

Supposed to differ from the last by the sori being superficial; they however are deeply immersed in some of my specimens, so it only differs in its much broader frond and longer stipes ; all the three so-called species are probably only varieties of one plant.

#### GENUS LXXVIL—VITTARIA. (*Sm*)

(*Vitta.*) a ribband, the ribband-like frond.)

Veins simple, forming an acute angle with the midrib, their apices prolonged into a transverse marginal vein, which becomes the receptacle, or veins forked without the transverse marginal vein ; sori situated in an extrorse groove of the margin, or in a slightly intra-marginal line with the unaltered edge of the frond produced beyond and often rolled over it; fronds adherent to the caudex, linear, grass- or tape-like.

1. VITTARIA ELONGATA. (*Sw.*) Rhizome creeping, scales many, with black hair-like points; fronds up to 2-3 feet long, generally only 1 inch broad, acuminate, grass-like, but rather firm in texture, **mid-**rib generally more or less distinct beneath ; veins simple, oblique, immersed, parallel, connected by an intramarginal veinlet; sori quite sink in an extrorse marginal groove. *Sw. Syt. Fil.* 109, 302. *IVall.* Taf. 14.. *Bedd. F. S. I. t.* 21.

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VITTARIA MONOSTACHYA (L.) DC.

South India, on the Western mountains, 2,000-5,000 feet elevation; Ceylon, central provinces; North India, about 4,000 feet elevation; Malay Peninsula (also in the Malay Islands, - Africa, and Mauritius.) Polynesia; Tropical

2. VITTARIA SIKKIMENSIS. (Kuhn) Fronds shortly creeping, with slaty-rufous hair-pointed sori, up to 4 inches long, but often much shorter, fronds subobtusely; midrib beneath obscure or slightly depressed; sori sunk



Fig. 239.

VITTARIA SIKKIMENSIS, (Kuhn.)

in a large extrorse marginal furrow. Kuhn in Linnaea xxxvi. 66. Clarke, F. N. I. p. 574. minor var. minima, Hook. Sp. Fil. v. Bedd. F. B. I. t. 56 (not minor of Icc).

5f

in 2,000-6,000 feet elevation, Kom Khasya, Mowlong 2,500 feet elevation; Tenasserim.

4

Tenasserim specimens are the same as the Sikkim, and when Mr. Clarke stated that the Moulmein an distinct, he had in his eye only the IL

the next species). I have never seen the Tenasserim more than 2 inches long, and the Sikkim plant is

so-common in this small state, though often the soral groove is extrorse as in Vittaria (final as in the section Taniopsis) and it differs from elongate except in its probably only a variety of it.

3- VITTARIA FALCATA. (Kutlze.) Fronds, broad, the apex blunt, the lower part narrow, texture leathery and very thick, usually a distinct raised midrib

attaining the apex in the barren fronds, but lost in the fertile ones; veins short, oblique, parallel, immersed; sori quite sunk, in deep intramarginal grooves. *Kunze. Herb. Syn. III. 395. V. javana and minor Fée 3rd. Mém. Foug.*

Malacca.

(Also in the Philippines.)

4. *VITTARIA ANDONENSIS*. (Fée.) Fronds 4-5 inches long, by 1-1½ lines broad, smooth, submembranaceous, falcate acuminate, tapering below into a petiole; costa slender, disappearing below the apex; veins curved, equal approximate; sori closely marginal, outside of the margin resembling a false involucre; pedicel flexuose, convoluted, scaly, scales cancellate, rigidly united at the margin. *Fée. Ann. Bot. Par. 1845. (not det.) Hook. Sp. Pl. v. 177. Bedd. Bot. J. 1. 117.*

Malabar. This seems as distinct a species as most of this group, though it is possible it may be a small form of *scolopendrina*, the veins are combined where fertile by an intramarginal vein which runs along the centre of the receptacle.

(Also in Amboyna.)

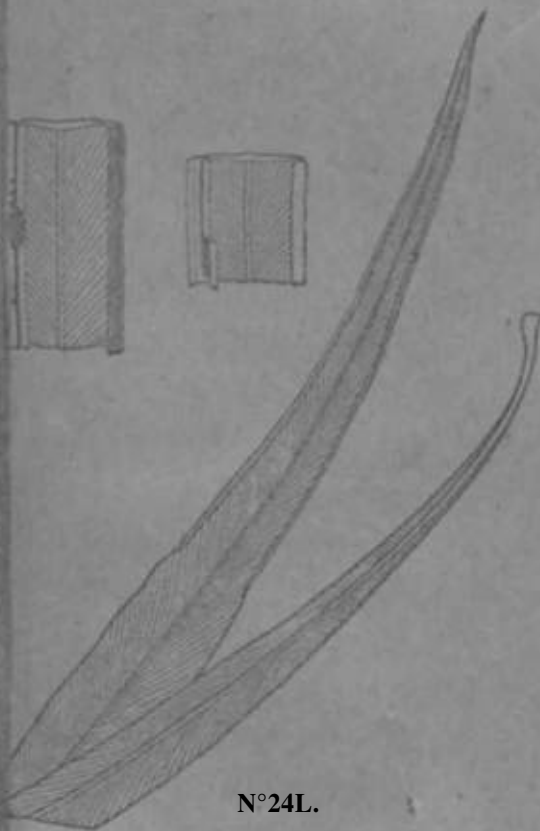
5. *VITTARIA LINEATA*. (Sax.) Rhizome very short creeping; stipes tufted, scales acuminate with caudate points, fronds up to 8 inches long, ½-1 inch broad, narrowed gradually downwards to the stout compressed stipe, the margin often reflexed; texture thin, a distinct raised midrib from the base to the apex; veins simple, immersed, parallel, very oblique; sori in a broad intramarginal shallow furrow, the edge of the frond distinctly beyond the furrow and at first wrapped over it. *Sax. Syn. 181 p. 109. Hook. Syn. III. 396. Triep.opsis lineata, Bedd. Bot. S. I. 1. 54.* Fée separated the Indian plant from the American under the name of *flexuosa*, and Mr. Clarke has adopted that name, but the two plants seem identical.

South India, on the Western mountains, 2,000-6,000 feet elevation; Ceylon, central provinces, common; Himalayas, 2,000-12,000 feet elevation, from Garwhal to Bhotan, Khasya, 1,000-6,000 feet elevation; Malay Peninsula.

(Also in Tropical America, and the West Indies, Africa and its  
 E. Stem Islands.)



(*lopendrina*, *Pr. Tent. Pier. p. 141.* *Hook. Syn. Fil. p. 396.*  
*Tamiopsis, Becc. F. S. l. l. 212.*  
*Vitt. Zeylanica, Fée.*



*VITTARIA SCOLOPENDRINA* [NA] *Presl.*  
 deep furrow confined to the ver-  
 ch **thickened** upper **half of the** frond, where the midrib and veins

#### 6. VITTARIA SCOLOPENDRINA.

(*Presl.*) Caudex creeping, paleaceous with subulate scales; fronds linear lanceolate acuminate, membranaceous, gradually attenuated at both ends, 16-28 inches long by 1 inch broad, glabrous on both sides, scarcely stipitate; midrib thick; sori sunk in a furrow within the margin of the upper portion of the fronds, inner margin of the furrow winged, margin of the frond revolute over the fructification **diaphanous** or subnuculate. **Haplopteris**

*lopendrina*, *Pr. Tent. Pier. p. 141.* *Hook. Syn. Fil. p. 396.*  
*Tamiopsis, Becc. F. S. l. l. 212.*  
*Vitt. Zeylanica, Fée.*

Ceylon, southern and central provinces, on rocks up to 3,000 feet elevation; Himalaya?, Sikkim, Assam, Lhotan.

(Also in New Guinea, Philippines, Malay Islands, Seychelles, and Mozambique.)

#### 7. VITTARIA SULCATA.

(*Kuhn.*) Rhizome short creeping, scales dense lanceolate, pale brown; fronds crowded, ligulate, obtuse, sessile, narrowed to the base, 2-4 inches long, 1 inch broad; sori in an intramarginal deep furrow confined to the ver-





A. S. CATTELL *icr.* ENGRAY

TENITIS BLKINOIDES. (Sw.)

the veins less minute visible in the barren lower half, veins forked or rarely with two branches, venicles slightly clavate at the apex not reaching the margin, margin beyond the scrob groove very thick.  
*Eubl. Linnæa*, 36, p. 68. *Yamopsis talcata*, *Budd. F. B. I. t.* 215.  
 Ceylon, 4,000-5,000 feet elevation, the forked venation is abnormal in the genus.

GENUS LXXVIII.—*TENNETIS*. (*Willd.*)

(From *tanna*, a billot or ribbon.)

Veins reticulated, forming oblong hexagonal oblique angles; areoliform, but the line sometimes interrupted, forming a univascular band between the midrib and margin; fronds adherent to the caudex.

1. *TENNETIS BLECHNOIDES*. (*Sw.*) Rhizome creeping, caudex 4-5 inches long, firm, naked, glossy, fronds 1-2 feet long, 8-12 inches broad, pinnate; pinnae of barren frond 2-3 on each side, 4-5 inches broad, oblong-lanceolate, the point acuminate, the edge thickened and wavy, the base cuneate, the lower ones striated, fertile pinnae more numerous and narrower, texture coriaceous, areolae copious, oblique, without free veinlets; vein in a continuous nearly interrupted line, about midway between the edge and midrib.  
*Kuhn. Syn. Fil.* 124 and 220. *Hook. Syn. Fil.* 397. *Budd. F. B. I.* 215.

Ceylon, in the forests about Galle. Malay Peninsula, in Tenasserim and further south; Sylhet (?).  
 (Also in the Philippines.)

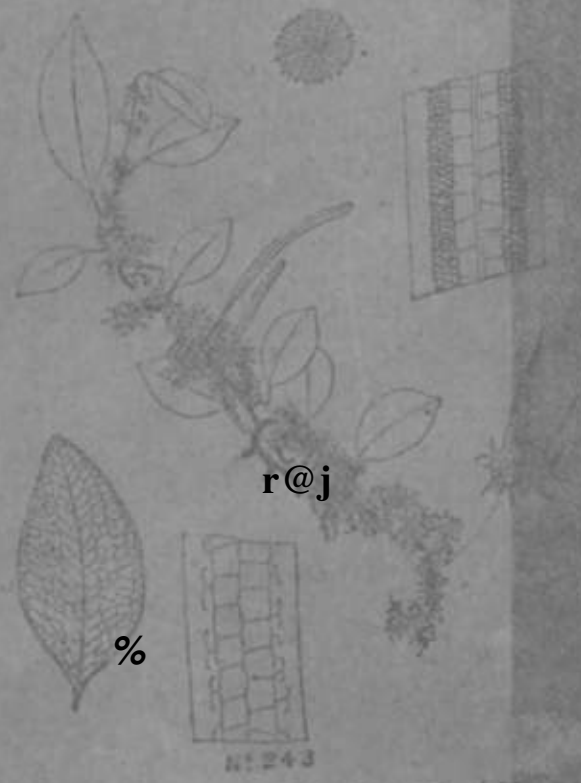
GENUS LXXIX.—*DRYMOGLOSSUM*. (*Willd.*)

(*Drymos*, wood; *glossa*, tongue).

Veins obscure, compoundly anastomosing in the sterile fronds, forming 7-8 series of angles between the midrib and the margin, each including simple or forked free veinlets, with clavate apices; fronds adhere with the caudex, dimorphous, the sterile broad and

**short**, the fertile long and narrow; sori linear, scarcely immersed centrally or **submarginal**; often at length confluent and covering the whole underneath surface of the frond; **caudex wide-creeping** trees.

i. **DRYMOGLOSSUM CARNOSUM.** (*Hook.*) Rhizome long, filiform, wiry, clothed with peltate lanceolate-linear toothed scales, which often \* **hair-pointed**; stipes 2 lines to 1 inch long, distant sterile fronds simple, of two kinds, sterile one from the base (and then generally orbicular or subcordate) to 2 and even 3 inches long, and then elliptical or obovate or spatulate or even lanceolate and acuminate, thick and fleshy, coriaceous when dry, faintly costate on the under side; veins anastomosing, the areoles including free veinlets, **fertile fronds** 1-2½ inches long, linear-spathulate obtuse; sori linear continuous forming a line intermediate between the costa and the margin, soon confluent, and representing one broad band, nearly as broad as the **frond, when young covered** by numerous peltate pedicelled scales. *Hook. Sp. Fil. v.189. Nothochlœna? (Taenitis?) car Wall. Cat. n. 138. Bedd. F. B. I. t. 55.*



**Nepal, Sikkim, Bhotan, 2,000-5,000 feet elevation, common. (Also in China and Japan.)**

2. **DRYMOGLOSSUM PILOSELLOIDES.** (*Presl.*) Rhizome filiform, wiry, clothed with adpressed, diamond shaped peltate venated scales, which are sometimes hair-pointed; stipes about 2 inches long in the sterile, often about 1 inch long in the fertile fronds dimorphous, the barren ones roundish or obovate, 2-2 in

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DR. RICHARD ...

DRYMOGLOSTIS PEGANOLIDES. (Pohl)

long, 1 inch broad, very thick and fleshy, and when young more or less covered with stellate hairs, the fertile ones, 2-4 inches long  $\frac{1}{8}$ - $\frac{1}{4}$  inch broad; veins immersed, areoles with copious free veinlets; sori in broad continuous marginal lines often at length confluent and covering the whole under surface, capsules mixed with a few stellate paraphyses. *JvcsL Tent. Pterid.* :27, t. 10. *Bedd. F. S. I. t.* 55 and *R. S. I. t.* 186 (*Niphobolus nummularifolius*).

**Bengal** Plains; Birma; Ceylon; South India, common in the Malabar plains, (Calicut, &c. on trees), also on the mountains, up to about 2,000 feet elevation, (Anamallays, **Wynad**, Coorg, &c.)

(Also in Java Philippines and Japan.)

**VAR.  $\beta$  BEDDOMEI.** Mr. Clarke proposes the name *Beddomei* for a specimen from the Anamallays figured by me (*tab.* 186 *R. S. I.*) because the fronds have stellate hairs and the scales of the rhizome are more pointed, but I find this stellate pubescence is always more or less present on the young fronds of Himalayan examples, and the rhizome scales are quite as hair-pointed in some specimens from Java, Philippines, and Japan, the fertile fronds are shorter and narrower in this South Indian form, and the broader usually sterile fronds sometimes fructify towards the apex, but I am not inclined to consider it even a permanent variety, as I believe it runs into the type with longer fertile fronds, which is also found in Southern India.

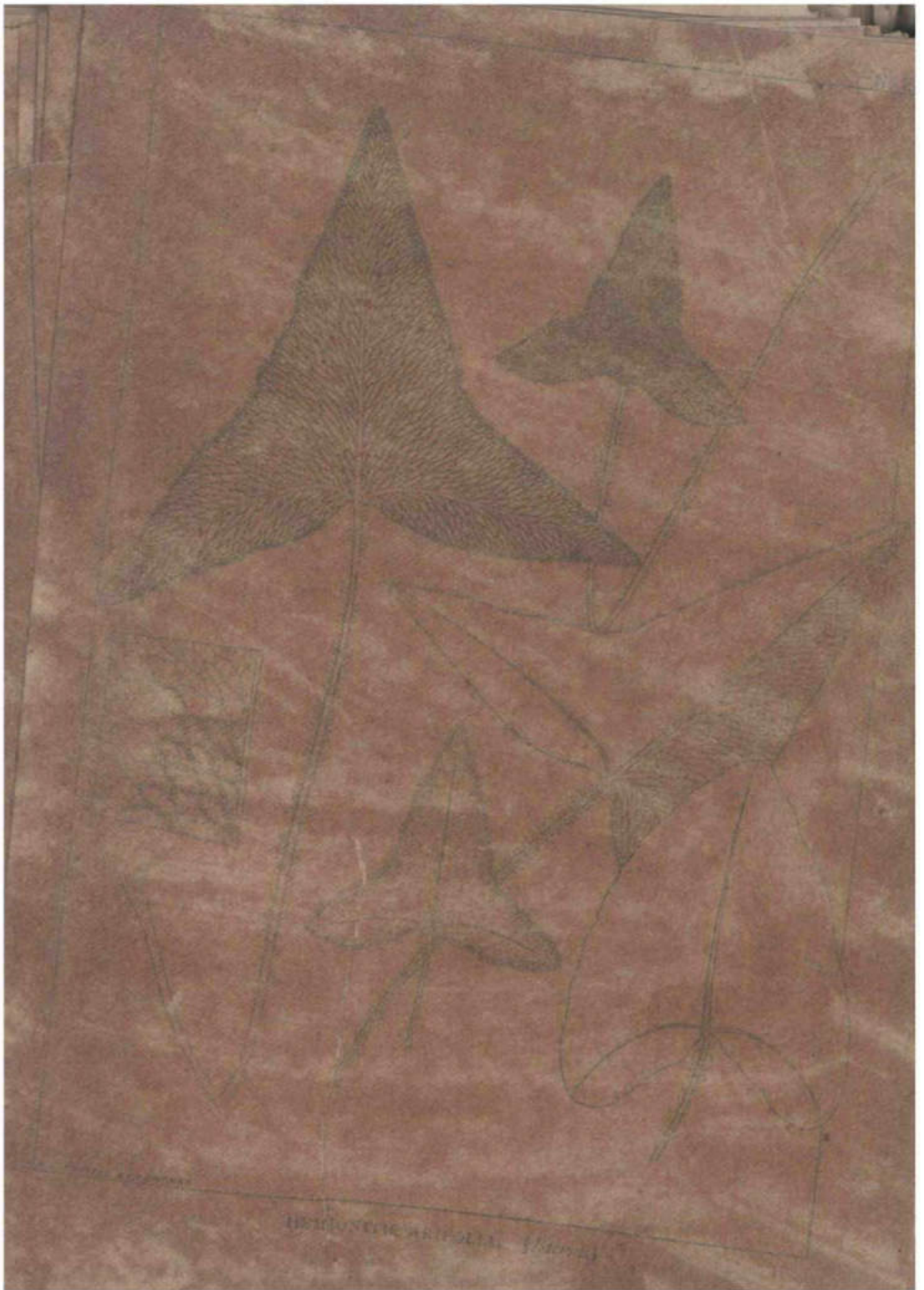
(*Niphobolus nummularifolius*, though I have included it in that genus, rather belongs here, it has exactly similar venation.)

GENUS LXXX.—HEMIONITIS. (Z.)

{*Hemionos*, a mule —the mule fern.)

Sori continuous along the veins and copiously reticulated; veins copiously anastomosing, forming numerous areoles which have rarely a free veinlet in them, which when present is also soriferous; fronds adherent to the caudex, simple, pinnatifid, or pinnate.

1. **HEMIONITIS ARIFOLIA.** {*Burin, uhjfer Asplenium*) Caudex



erect, short; stipb of the barren frond, 2-4 inches long, of the fertile often i foot long, dark chesnut-brown, glossy densely fibrillose towards the base; fronds 2-3 inches each way, cordate-hastate, the barren ones bluntish at the apex, with generally rounded (rarely pointed) basal lobes and a deep sinus, the fertile ones with the lobes more produced and pointed, texture more or less coriaceous, juncobrous above, somewhat villous beneath; **areoles** oblique, numerous, free veinlets none or very rare. *Bttrm. FL Ind.* 23 1. II. cor: *lifallo* (Roxb.) *Bedd. F. S. L t.* 53.

South India, common in the plains and on the mountains up to nearly 3,000 feet elevation; East Bengal plains; Ceylon; Birna.

(Also in the Philippine s.)

2. **HEMIONITIS** Griffithii. [Hook. *Fil. et Thorns.*] Rhizome-shortcreeping; **stipes** paleaceous and coarsely hirsute, 8-12 inches long; fronds 12-16 inches long, 6-10 inches broad, subdeltoid, pinnatifid or pinnate with 2-4 pinnae on each side, which are 1-1½ inch broad, entire or crenated, acuminate, texture herbaceous, rachis and both surfaces hairy on the venation; main veins prominent, generally barren, the veinlets reticulated into copious areoles all soriferous. Rarely there are free included veinlets, which are also soriferous. *Hook. Sp. Fil.* v. 192. *Dictyocline Griffithii* (Moore), *Bedd. F. B. I.*



HEMIONITIS GRIFFITHII.

{Hook, d Thorns.}

Khasya, Cherra, 4,000-5000 feet elevation.'

(Also in Formosa.)

TRIBE XII.—ACROSTICHEÆ.

Sori spread in a stratum over the under surface, or rarely over both surfaces of the frond, not confined to the veins only.

GENUS LXXXI.—ELAPHOGLOSSUM. (Schott.)

(*Elaphos*, a stag; *glossa*, tongue.)

Veins free, simple or forked, their apices sometimes clavate, fronds simple, entire, sessile or stipitate, the fertile somewhat contracted and generally sporangiferous over the whole under surface; stipes adherent to the rhizome, but generally pseudo-articulate a little above the base.

1. *ELAPHOGLOSSUM CONFORME*. (Sw.) Rhizome woody, wide creeping, scales blackish, ovate, jagged, not hair-pointed; stipes firm erect, 2-3 inches long in the sterile, and often much more in the fertile, black at the base up to the pseudo-articulation, where it breaks off in age, generally clothed with sheathing scales; sterile fronds 2-7 inches long, seldom more than 1 inch broad, narrow-lanceolate acuminate, furnished with deciduous scales on both sides, quite glabrous in age, margin slightly revolute in age; veins hidden, generally once-forked, just reaching the margin; fertile fronds somewhat contracted. *Sw. Syn. Fil.* 10, 193, t. 1. *Bedd. P. S. I. t.* 198. *Hook. Syn. Fil.* 401.

South India, Western mountains, at the higher elevations, very common; Ceylon; Malay Peninsula; Sikkim and Nepal, 6,000-9,000 feet elevation, Khasya, 4,500-6,000 feet elevation.

(Also in Australia, Central and South Africa, Queensland, Polynesia, and the Malay Islands.)

2. *ELAPHOGLOSSUM LATIFOLIUM*. (Sw.) Rhizome woody, wide creeping, scales bright chestnut or golden, lanceolate and more pointed than in *conforme*; stipes longer than in *conforme* and the deciduous scales not sheathing; fronds much larger than in *conforme*, and generally over 2 inches broad, margin diaphanous and much





PLANTAGO LANCEOLATA (L.) STEUD.

thickened; veins prominent, apices thickly clavate, and not reaching the margin. *Sw. in Schrad. Journ. Elaph. laurifolium, Bedd. F. S. I. t. 200.*

South India, Nilgiris, and Anamallays, at the higher elevations, rare compared with *conforme*; Ceylon, in central provinces; (not in North India.)

(Also in Cuba and Tropical America.)

3- ELAPHOGLOSSUM NORRISII. (*Hook*) Rhizome stout,



woody, the scales long, linear, dull-brown; barren frond sessile! or nearly so, tufted, 12-18 inches long > 1-i inch broad, the point blunt, the lower half narrowed very gradually, texture coriaceous, both sides nearly naked; veins immersed, indistinct; fertile frond much narrower than the other.

*Hook. Sp.v. p. 215. Syn. Fil. 401.*

Tcnarig.

4- ELAPHOGLOSSUM STIGMATOLEPIS. (*Me.*) Rhizome stout, woody, creeping, the scales dense reddish-brown, long linear lanceolate, hair-pointed, not jagged on the margin, scales of the stipe like those of the rhizome, not

leathing, very dense towards the base; barren fronds lanceolate, 8-12 inches long, f-i inch broad, acute, narrowed very gradually towards the base into a stipe 1-3 inches long, texture coriaceous as in the last two, upper surface naked, lower thickly scattered over with small scales; veins apparent, fine, close, forked, or more rarely simple, fertile fronds smaller, contracted and on longer stipes. *Fig. uMim Foug. t. 25. Bedd. R. S. 7. l. 199. Hook. Syn. Fil. p. 521.*



Nº 249.

ELAPHOGLOSSUM STIGMATOLOBES. (P. G.)



Nº 250.

ELAPHOGLOSSUM VISCOSUM. (Sw.)



Nº 251.

ELAPHOGLOSSUM SQUAMOSUM. (Sw.)



Nº 252.

ELAPHOGLOSSUM SPATULATUM. (Sw.)

• South India, Nilgiris, and Palani

5. ELAPHOGLOSSUM VISCOSUM (Sw.)

the scales bright-brown, narrow, linear-lanceolate, 6-9 inches long, pointed distally at both ends, densely covered with pubescence, glabrous above. Fronds scaly and with stellate pubescence well within the margin. Veins well marked, their clavate ends forked, fertile fronds contracted and on a longer stipe.

Fil. 10, 193. Bedd. F. and on a longer stipe. Sw. ligerum, Wall.

South India, Western Ghats

• up the TOTOXWVE COI 4,000 feet, on -m and Nepal, 6,000-8,000 feet; North India, (It has been proposed to Khasya, 4,000-6,000 Himalayan under the name of a South Indian plant *Lm* Ulsh the -; *ligerum*, but I cannot dis- (Also in Tropical America • T ds; and the Malay Islands.) and its eastern

i. ELAPHOGLOSSUM SQUAMOSUM (Sw.)

scaly; the scales black margined, very scaly, fronds linear-lanceolate, 1-2 inches long, gradually attenuated sides with velvety ciliated scales, densely covered on the back, texture flaccid; veins hidden or forked. & in

South India, Nilgiris, Anamallays' T. 7" \*9? vation not common; Ceylon, 3-4"

in Tropical America and West India \*3" J Mascareen Islands; Guinea Coast J ?\*\*\*< S. T. dwich • Madeira and Azores.)

• ELAPHOGLOSSUM SPATHULATUM (Sw.)

Rhizome short, creeping, densely furnished with numerous wiry roots; stipes 2-4

inches long, densely covered with reddish setaceous scales, fronds linear-lanceolate to rhomboid-lanceolate 1-2 inches long, covered on both sides with numerous hair-like scales, fertile fronds broad ovate, smaller than the sterile ones. — *Sw. Syn. Fil. p. 10.* *Bell. F. S. I. t. 213.* *Acrostichum piloselloides, var. ♂ spathulatum.* *Hook. Sp. Fil. v. 228.*

Ceylon, about Newera Elya, and in the southern provinces.

(Also in Tropical America and West Indies; Natal and Mascareen Islands; and Tristan d'Acunha.)

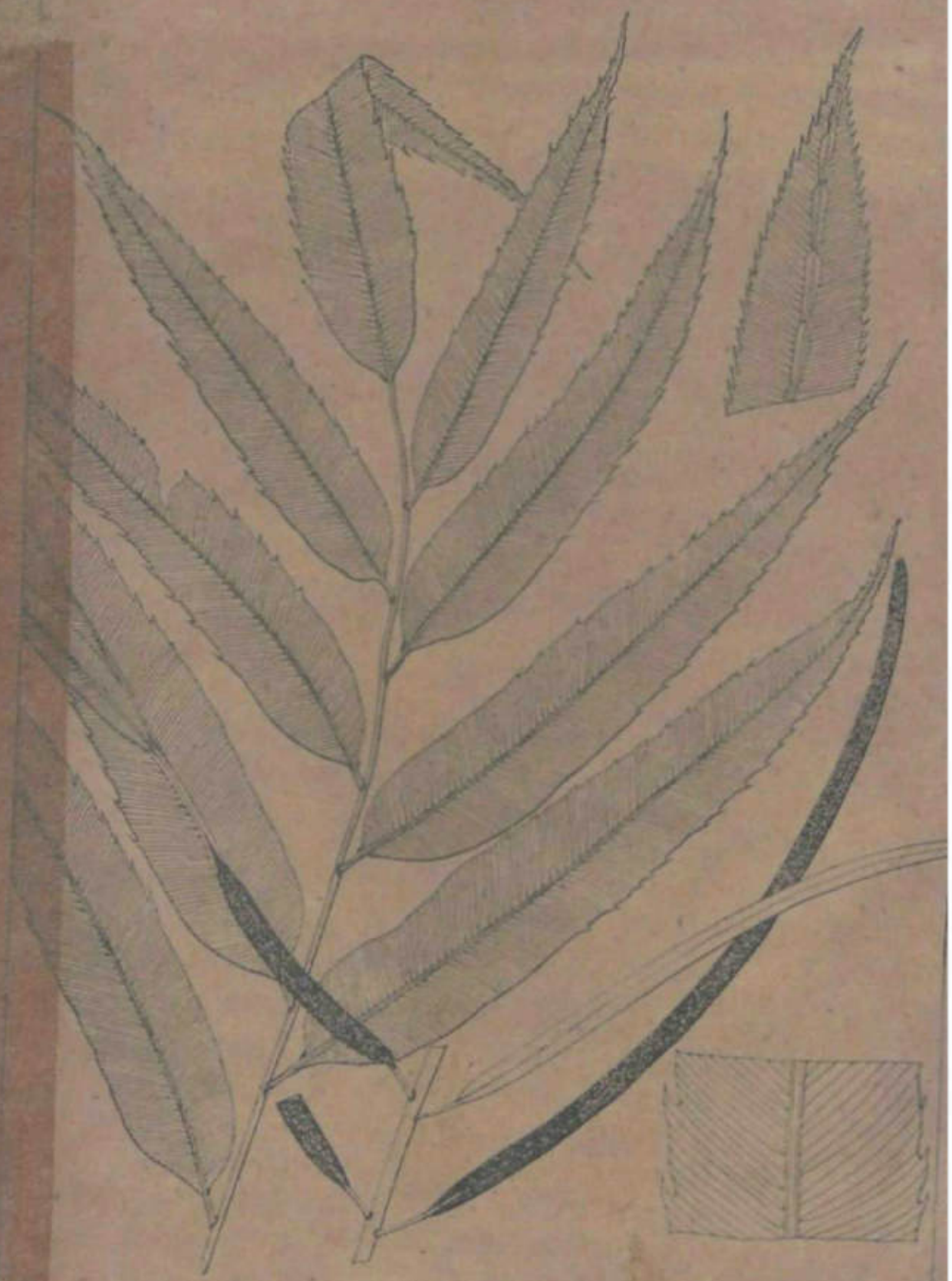
GENUS LXXXII.—STENOCHLENA. (*J. Sm.*)

(*Stenos*, narrow; *chlema*, cloak; the narrow involute margin.)

Fronde simply pinnate, the fertile contracted and very narrow, the sterile with the habit of *Lomaria*; veins simple or forked, fine and close, generally quite free to the margin, or rarely the two forks or even two separate veins anastomose; stipes adherent to the rhizome; pinnae articulate with the rachis. (In palustre, the rachis or costa of the sterile pinnae is winged, particularly towards the apex, which wing has been called an obscure transverse vein, anastomosing in loops, the same occurs in *Pteris patens*, and some *Athyriums* (very apparent in *Athy. fimbriatum, var. sphaeropteroides*) and it can scarcely be called a true vein.

1. STENOCHLENA PALUSTRE. (*Linn. under Polypodium.*) Rhizome scandent, (often reaching the tops of the highest trees), fronds glabrous, shining, of hard texture, pinnate, 3-4 feet long, pinnae articulated numerous, alternate or opposite, lanceolate acuminate, pungently serrate towards the apex, oblique at the base, and furnished with a marginal gland on the upper edge, 5-10 inches long, 1-1½ inch broad, fertile fronds very much contracted; veins simple or forked, generally free to the thickened margin, rarely the forks or two separate veins anastomose in the middle of, or towards the margin of the pinnae; rachis of sterile pinnae winged, particularly towards the margin, and forming a pseudo vein parallel with it.

Spina



STENOCHLENA PALUSTRE. (Linn.)

*Burm. Fl. Zey.* 254. *S. scandens*, *J. Smith, in Hook. Journ. of Bot.* iii. 401. *Bedd. F. S. I. t.* 201. *Lomaria scandens*, *Willd. Sp. Pl.* 293.

South India, in the plains on the West Coast and up the mountains to about 3,000 feet elevation; Ceylon. North India in the plains of Bengal and at low elevations on the hills; Malay Peninsula. (*Davallia achilleifolia*, *Wall.* *Teratophyllum aculeatum*, *Mett. Ann. Mus. Long. Bot.* 4, 296. *Bedd. F. B. I. t.* 209, is an abnormal form of this plant, showing clearly a winged partial rachis.)

(Also in South China, Queensland; and Fiji.)

2. *STENOCHLENA SORBIFOLIA*. (*L.*) Rhizome thick, woody, often 20 feet long, clasping trees like a cable, sometimes prickly, scales lanceolate-subulate, large; fronds up to 18 inches long, simply pinnate, barren pinnae 3-8 inches long, about 1 inch broad, bluntly pointed, margin entire or toothed, 3-20 on each side, articulated at the base, texture subcoriaceous, glabrous, or nearly so on both sides, rachis often winged, fertile pinnae smaller, much contracted, about  $\frac{1}{4}$  inch broad. *Acrostichum sorbifolium*, *Linn. Sp. Pl.* p. 1526. *Lomariopsis*, *Hook. Syn. Fil.* p. 412. *Bedd. F. B. I. t.* 192.

The Malay Peninsula, Tenasserim, Malacca. *Bedd. F. B. I. t.* 210, is an abnormal bipinnate form of this plant in which the rachis of the pinnae is very broadly winged with small pinnules resembling the leaves of *Feronia elephantum*. *Lomaria limonifolia*, *Walt. Cat.* 35, is the same form.

(Also in Tropical America and West Indies: Fiji; Samoa;



*STENOCHLEENA SORBIFOLIA*. (*L.*)

New Caledonia; Philippines; Cochin Ph; ; M<sup>f</sup>asc<sup>Λ</sup>een Islam  
 Hi Tropical Africa.)

GENUS j.: XXXIII. — POLYBOTRYA

(Poly, many; botrys<sup>Λ</sup> **bunch**-\* allusion to the fructification.:

Fronds pinnate, bipinnatifid or C.,KK' •

**larioid in habit, gene<sub>ra</sub>l, ...!** <sup>SUBB, 1) Innate, \*\*• ^rile nc</sup>  
 Fronds pinnate, all free; stipes adherent to the rhizome.

i. POLYBOTRYA APPENDICULATA <sup>iW;jUΛ ! K</sup> rhizome thick

**rt-creeping**, stipes and rachis scaly, ' $\leq=J$ ' • <sup>^ ^ 3 dpressed</sup>

Fronds pinnate, glabrous, **the sterill** ones viviparous at the apex

2-3 inches long,  $\frac{1}{2}$  inch broad, rather deeply crenated with

ptaceous bristle between each crenature, superior basal crenature

largest, inferior base cuneate and **shghtly** unequal; veins **not**

terminal, pinnate free • <sup>tile fronds much contracted, pinnæ much</sup>

Watt. Cat. 28 and 268s <sup>Willd. Sp. Pl. 114. Bedd. F. S. I.</sup>

**Common throughout the Indian region  
 (Also in Philippines and Hong Kong.)"**

The above description only relates to the type, but <sup>ere ar,</sup>  
 several varieties more or less permanent.

V. i. R. *ji* MAJOR. Stipes and rachis very thick

'• in diameter, rough with dense addressed scurf' "<sup>^ ^ "</sup>

»in breadth, not auricled at the superior <sup>^ o T</sup> ' "

**lual** at the inferior; main veins very prominent an, <sup>cuneate an<l</sup>

•like venlets more numerous and very prominent <sup>straight and</sup>

1: a very large fern, unlike any forms in Southern <sup>India or</sup>  
 Ceylon.

R. 7 ASPLENHFOUA. (<sup>^0/y</sup>) Rachis with copious linear  
 -es, fronds seldom U i u s at the apex; pinnæ very





A. S. CATTELL SCULPSIT

POLYBOTRYA APPENDICULATA, (Willd.) VAR. ASPLENIIFOLIA.

unequal sided, the inferior basal portion being much cut away. The upper side deeper cut than in the type. *P. asplenifolia*, *Bory.*, in *Belong. Voy. B. I.* 23, t. 3. *Bedd. E. S. I.* t. 195. *Acrost. Wightianum*, *Wall. Cat.* 2763.



No. 286.

*POLYBOTRYA APPENDICULATA*, (*Willd.*) *VAR. 2* *HAMILTONIANA*.

Characters in cultivation.

South India, in moist evergreen forests on the western side, up to nearly 4,000 feet elevation. (Not found in North India.)

This can only be considered a variety of this variable species, it looks, however, very different when growing, being a much brighter green and a far prettier species than the type, it is constant to its char-

*VAR. 2* *HAMILTONIANA*, (*Wall.*) Fertile pinnae interrupted,

the sori in bead-like clusters. *Wall. Cat.* 29. *Bedd. E. S. I.* t. 111, the lower 3 figures. *Polyb. Helferiana* (*Kze.*), *Salm. Supp.* 2 p. 47. t. 114.

Chittagong, Assam, Tenasserim, and Malaya Peninsula generally.



No. 287.

*POLYBOTRYA APPENDICULATA*, (*Willd.*) *VAR. 3* *COSTULATA*.

Stipules up to  $\frac{1}{2}$  inches long, and again deeply pinnatifid.

*VAR. 3* *COSTULATA*, (*Hook.*) Sterile pinnae pinnatifid  $\frac{1}{2}$ — $\frac{1}{3}$  down to the rachis; main veins costulate and prominent, the lowest pair of pinnae often more or less bipinnate, both in the sterile and fertile, sometimes half deltoid and deeply bipinnate at the base, the

*Hook. Sp. Fil. p. 252. Bedd. F. B. I. t no, and in right-hand top fig.*

Tenasserim; Khasya; Jeypore Hills, Wett of Vizagapatam. This variety can at once be distinguished by the much more deeply pinnatifid pinnae, and by its costulate main veins, but the bipinnate character is not so constant; some specimens from Birma (*fide Bedd. F. B. I. t. no*) have the lowest pinnae deeply bipinnate in both sterile and fertile; and some specimens from Khasya and Jeypore are only slightly bipinnate in the sterile only, whilst other specimens from Birma have the lowest pinnae quite unchanged (*vide Bedd. F. B. I. A in, right-hand top figure.*)

**VAR. £ SUBINTEGRA.** Pinnae almost entire, of a very dull colour and more coriaceous than in the type, not at all or very slightly auricled at the superior base, and the inferior base rounder and not at all unequal. *Bedd. F. B. I. A in, left-hand top figure.* Birma only.

#### GENUS LXXXIV.—ACONIOPTERIS. (*FresL*)

(*Akon*, a point, *andptens*; the veins forming pointed angles near the margin.)

As in *Elaphoglossum*, only the veins are combined near the margin by a straight or zigzag vein.

1. ACONIOPTERIS OORONGA. (*A'aulfi*) Rhizome very short with ovate-lanceolate obtuse, brown-red scales; stipes tufted, 1 or 2 inches long, being usually winged near the base by the decurrent frond; barren fronds simple entire narrowly elliptic, tapering at both ends, 3-5 inches long, by 1/4 inch broad; glabrous, but with peltate flat scales, sparingly scattered on the surface beneath; midrib stiff texture firm, but diaphanous; veins parallel, above simple or furcate the marginal vein more distinct, and further from the margin than examples from Polynesia. *Kaulf. En. Fil. 63. Clarke, A. N.*



Khasya, above Shaila, 2,500 feet elevation, lately discovered by Mr. Clarke, but only in a barren state, so it is doubtful whether it is this species, though it must be closely allied.

(Also in the Sandwich and Society Islands,)

GENUS LXXXV.—GYMNOPTERIS. (*Benth*)

(*Gyrnnos*, naked ; *pterus*; seeding naked.)

Veins copiously anastomosing with free, veinlets in the areoles; the primary veins costaeform or obsolete; fronds simple or pinnate, generally dimorphous the fertile much contracted, or rarely simple uniform and bearing the sori on the contracted apex; stipules adherent to the rhizome,.

**1** 1. GYMNOPTERIS VARIABILIS. (*Hook.*) Rhizome more or less creeping, squamose, with ovate or lanceolate scales ; sterile fronds membranaceous to subcoriaceous, generally about 1 foot or a little more long and 1/2 to 1 inches wide, ovate-lanceolate acuminate, often long decurrent on the stipe nearly to its base; costules generally more or less distinct, sometimes very prominent, zigzag or quite straight; areoles copious with free included veinlets; fertile fronds contracted and narrow, and normally entirely covered with sori, but in some cases the broader fronds are dotted all over with large polypodioid sori. *Hook. Sp. Fit.* v. 277. *Bedd. F. B. I. t.* 272.

**Sikkim, Bhotan, Assam, Khasya, Cachar,** up to 4,000 feet elevation. South India (rare, compared with the variety lanceolata) Tinnevely mountains, fronds very thin and membranaceous and decurrent nearly to the base of the stipe, main veins wavy, but very prominent, Jeypore Hills (Vizagapatam), texture thicker and colour deeper green, very decurrent, main veins very prominent and nearly straight, polypodioid sori over many of the broad fronds; *Birma.*

VAR. **β** LANCEOLATA'. (*Hook.*) Main veins none, or more or less indistinct. *Gymnopteris lanceolata*, *Hook. Sp. Fit.* v. 276. *G. Fe'i* (*Moore*), *Bedd. F. S. I. t.* 48.

Very common throughout the Western forests of the Madras Presidency and Bombay; Ceylon; Birma. Also in Chota Nagpore, and on Parashath; in typical forms there are no main veins, and all the venation is indistinct, but other forms run too closely into *variabilis* for it to be considered a distinct species; the fronds are often quite rounded at the base, but at other times nearly as decurrent as in *variabilis*, the seeding is normally over the whole of the under surface of the fertile frond, but sometimes it is in a broad line on each side of the costa, leaving a considerable margin of the lamina without seed, or at other times the seeding is punctiform or granularoid (*Bedd. F. B. I. I.* 274), or the upper half



GYMNOPTERIS UNILA. (M. H.)

of the frond is contracted and scaberous, as in *Gymnopteris spicata*, (*Hymenolepis* of authors). In South Canara and Coorg there are forms with both sterile and fertile fronds 3-lobed (*Bedd. F. B. I. I.* 273), and in Ceylon, pinnatifid forms (*Bedd. F. S. I. I.* 211) with often as many as five distinct pinnae on each side the rachis, with only a narrow wing, but as the ordinary form is sometimes mixed with these even on the same root they can only be considered abnormal forms, not distinct varieties.

VAR.  $\gamma$  AXILLARIS. (Cav.) This is a name given to a variety with a long slender tortuous rhizome, which creeps up trees, but it scarcely differs otherwise, the main veins are less prominent than in *variabilis*, but more so than in *lanceolata*. *Cav. Prodr.* 1801, p. 582. *Hook. Sp. Fil.* 8, 276. *Bedd. F. B. I. I.* 271.

South India, in all the western forests; Plains of Bengal and Assam; Birma.

2. GYMNOPTERIS MINOR. (Merrill.) Small, rhizome creeping,

thick as a sparrow's quill, scaly at the apex, scales lanceolate ; stipes remote, slender, 1-3 or in those of the fertile frond 4 inches long;; sterile fronds membranaceous, 1\~2 inches long, oblong or broad-lanceolate, costate, tapering into a stipe 2§ inches long ; costules indistinct, areoles with a free included clavate veinlet, smaller towards the margin; fertile fronds 2 inches long, linear obtuse. *Metten. Fit Hort. Lips. p. 20. Hook. Sp. Fil. v. 277. Bedd. F. B. I. t. 116.*

Khisya Hills, 2,000-4,500 feet, in river sands, perhaps only a small form of *variabilis* var. *lanceolata*.

3. GYMNOPTERIS WALLII. (*Baker.*) Rhizome slender, width



GYMNOPTERIS METALLICA A. (*Bedd.*)

GYMNOPTERIS SPICATA.. (*/> /*)

creeping, scales minute, grey, lanceolate acuminate ; sterile frond linear, sessile, 8-9 inches long, under \ inch broad, narrowed U both ends, obscurely repand, texture thin but rigid, surfaces naked bright green ; midrib stramineous, veins slender, immersed, forming a single costal row of long areoles, usually with a free decurved veinlet springing from the outer border; fertile frond filiform, 6-8 inclu

long long stalks, fructification often interrupted. *Baker in Hook. Syn. Bot. 523.* *Bedd. F. S. I. Sup. 1. 389.*

Ceylon, southern provinces, Moorowa, rocky cavines.

8. GYMNOPTERIS METALLICA (Bedd.) Fronds quite sessile, 3-7 inches long, up to nearly 1 inch broad, of a deep shining metallic blue; main veins not prominent and often not distinguishable from the others; fertile fronds only serrate towards the apex. *Bedd. F. S. I. 1. 390.*

Ceylon, Haycock Mountain near Galle in dense forests on rocks, 2,000 feet elevation.

9. GYMNOPTERIS SPICATA (L. f.) Rhizome woody, short, creeping; stipe 1-2 inches long, firm; fronds 6-18 inches long, 1/2 inch broad, the upper part for 4-6 inches, suddenly or gradually contracted and fertile, the edge entire, the lower part narrowed very gradually; texture sub-mucous, surfaces naked; no distinct main veins, areoles uniform, hexagonal, with copious free, simple or forked venulets; sori raised with peltate sporangia. *Sw. Bot. Sup. 444, under Acrostichum.* *Gymnopteris, Presl. Tent. Bot. 244, t. 12.* *Acrostichum, Hook. Syn. Bot. 421.* *Hymenolepis spicata, Bedd. F. S. I. 1. 36.*

North India, Sikken and Bhutan, 4,000-7,000 feet elevation. *Sw. Bot. Sup. 444, under Acrostichum.* *Gymnopteris, Presl. Tent. Bot. 244, t. 12.* *Acrostichum, Hook. Syn. Bot. 421.* *Hymenolepis spicata, Bedd. F. S. I. 1. 36.*

*Hymenolepis* has been proposed as a genus or subgenus for this species, as the fructification is on the contracted apex of the fronds, instead of being on a separate frond; the same peculiarity occurs occasionally in other species, and I have similarly contracted fronds of *G. variabilis* var. *lan-colata*, which if separated from their rhizome and other fronds could not be distinguished from this species, so I do not think the genus can hold good.

10. GYMNOPTERIS TERRESTRIS (Retz.) Rhizome stout, creeping, alveolar, hair-pointed; stipe of the barren frond 1-2 inches long, clothed with soft spreading ferruginous hairs; barren frond 3-4 inches



long, 1½-2 inches broad, the terminal pinna with blunt rounded lobes reaching sometimes ½ of the way to the rachis, below this usually a single pair of small sessile ovate blunt auriculate lateral ones, texture thin, herbaceous, veins beneath hairy; main veins sometimes distinct to the edge, at other times hardly distinguishable from the other veins, with copious areoles, including free veinlets; fertile fronds with a terminal pinna, 1-2 inches long ½ inch broad, and a pair of smaller lateral ones, the stipe slender, 6-9 inches long, naked except at the base. *Acrostichum quadrifolium*. *Retz. Obs. Bot.* 6, p. 39. *Hook. Syn. Bot.* p. 418. *Bedd. F. S. I. I.* 37.

Tinnevely and Travancore Hills, up to 12,000 feet elevation, Anamallays; Ceylon, about Colombo.

7. *GYMNOPTERIS FLAGELLIFERA*.

(Wall.) Rhizome short, terrestrial, or scandent several feet up trees, strong, densely scaly with brown lanceolate scales at the extremities, and throwing out rootlets encircling the boughs; stipes often densely scaly, fronds simple or 3-foliate or pinnate with 5-11 pinnae, the terminal pinna often much prolonged and rooting at the apex; pinnae stalked, entire or 1-2-foliate, or even lobed, 4-5 inches long by 2 inches broad; main veins very prominent to the margin, areolae copious with or without free veinlets; fertile pinnae more or less contracted, generally without any free veinlets in the areolae, wholly soriferous or partially covered with meniscioid sori; texture herbaceous, drying a dull brown colour. *Wall. Cat.* 25. *Clarke, F. N. I.* p. 579. *Pachipteris flagellifera*, *Bedd. F. B. I. I.* 112.



N 262

(Kth)

North India, Sikkim and Assam, Cachar and Chittagong up to 9,000 feet elevation; Birma. Some of my Birma specimens have all the fronds simple, and are then hardly distinguishable from "varinbilis" (var.) except by the peculiar colour and scaly stipe, others have

the fronds **all** 3-foliolate and the **pinnae** often deeply **lob** rticularly the two lower ones, these simple and **3-foliolate** fronds grow on the same rhizome, the broad sterile fronds are often partially seeded particularly on the long terminal **cauda**. I have only seen pinnate fronds on North Indian examples.

Sir W. Hooker in his *Sfi. Fil* gives Malabar for a locality and quotes Rheede, Hort. Malab. xii. n, which p late is **Drynaria quercifolia**; «. 19 is probably intended, which however is *Gymnopteris subcrenata*. On one of Wallich's sheets of this fern (25, No. 3) there is written, Kheede, Malab. xii. t. 19.

8. **GYMNOPTERIS SUBREPANDA**. (*Book.*) Rhizome woody, creeping; stipes of barren fronds stout erect, nearly naked; barren fronds varying from simple, 1 foot long, 1½-2 inches broad, to 2 feet long, 1 foot broad, copiously pinnate, with several **linear-oblong** entire or subrepand **pinnae** on each side, which are sometimes 6-9 inches long, 2 inches broad, texture **subcoriaceous**, surfaces and **this naked**; main veins distinct nearly to the edge, with **copious areoles**, with free **veinlets** between them; fertile fronds like the **offaei**, **'t waller**. *Syn. Fil. p.* 419. *Hook Sp. Fil y* . p. 275. *Bedd. F. B. L* ' 339-

Penantr.

This is nearly allied to the more pinnate varieties of flagellifera. Hodgson's specimen from the Himalayas referred here in the Kew Herb, certainly belongs to **flagellifera**.

9. **GYMNOPTERIS TRICUSPIS**. (*Hook*) **rhizome creeping**, clothed with subulate setaceous ferruginous scales : stipes 1 foot long, of the fertile frond; sterile frond subcoriaceous, **subtriangular-audate**, 8-10 inches long, 10-12 inches wide at the base, including the spread of the lateral lobes, deeply trilobate or 4-lobed, **lateral lobes** 5 inches or more long, 1\* inch wide, horizontally patent, intermediate one 6 inches and more long, 2 inches wide, all of them **oblate**. acuminate, entire unicostate; venation manifest, **costules distant**, indistinct, connected by transverse **irregular** curved **forming large areoles** and **lesser ones** which have copious

free branched and diverging veinlets; fertile fronds much elongated but contracted, tripartite nearly to the base, segments scarcely  $\frac{1}{2}$  an inch wide, linear strap-shaped acuminate, lateral ones 9-10 inches long, erect-subpatent, intermediate one a foot and more long; sori generally universal except on the costa, or sometimes the terminal lobe only is soriferous, or rarely the apex only of one or more lobes is contracted and soriferous as in *Gymnopteris spicata*. *Hook. Sp. Fil.* v. 272. *Bedd. F. B. I. I.* 55.

Sikkim, at Goke below Darjeeling, 1,500 feet elevation.

10. *Gymnopteris contaminans*. (Wall.) Rhizome thick, short, creeping; stipes scaly; fronds glabrous, pinnate, 1-2 feet long, of which the stipe is about  $\frac{1}{4}$ ; rachis generally more or less winged, sometimes prominently, more or less scaly; pinnae 11-30 alternate sessile or very shortly petiolate, lanceolate from nearly entire to slightly crenated, or pinnatifid one-third down, with the segments serrated, terminal pinnae often more or less elongated, generally viviparous (the lateral ones rarely so); primary veins rather distant more or less conspicuous two-thirds of the way to the margin, areoles broad, in 3-4 series, the costal ones without any veinlets, the others with generally several veinlets irregularly disposed, mostly joining with the areole above, but some free with clavate apices; fertile pinnae much contracted, entire or sinuate pinnatifid according to the form of the sterile, generally wholly soriferous, rarely only partially contracted into seed. *Aerostichum contaminans*, *Wall. Cat.* 22, and *crispatulum*, *Cat.* 24. *Pachopteris repanda*, *Bedd. F. S. I. I.* 202. *Semicordata*, *Baker, Syn. Fil.* 122. *Bedd. F. B. I. I.* 220. *Blumiana*, *Hook. Syn.*



11763. *Gymnopteris thibetica*. (Hook.)



W. & A. G. SUTHERLAND

GYMNOPTERIS CONTAMINANS. (Wall.)

*Fl. p.* 223 (at least as far as the North Indian specimens are concerned).  
*Accos. terminans*, *Wall. Cat.* 2162.

South India, most abundant in all the Western coast moist forests from the plains up to about 4,000 feet; East Bengal, the lower hills up to 3,000 feet elevation; Ceylon (reperandum of *Th. En.*); Birma, common.

11. *GYMNOPTERIS SUBCRENATA* (*Hook. and Grev. under Accos.*

*trichoman.*) Rhizome thick, fronds glabrous pilinate, 3-4 feet, of which the stipe is sometimes nearly half; stipes and rachis furnished with a few scales; sterile fronds, pinnae 4-12 alternate or sub-opposite petiolate, broad lanceolate sinuate or wavyed, with a longish serrated acumination, terminal pinnae much the longest (sometimes 2 feet long), proliferous at the apex; primary veins close, costate and conspicuous nearly to the margin, veinlets anastomosing pretty regularly at right angles, from which proceed one or two generally free veinlets with clavate apices; fertile fronds



10285.

*GYMNOPTERIS SUBCRENATA*,  
 (*Hook. and Grev.*)

conform to sterile, but much contracted. *Hook and Grev. Ic. Fil.* 110. *Pteropteris terminans*, *Bedd. F. S. T. t.* 223 (not *Wall.*). *P. Hookerianum*, *Moore, Thw. En. p.* 380, *proliera*. *Hook. Ic. Pl. t.* 681-2. *Rhede, Hort. Malab.* xii. 19.

South India, not uncommon in the Western moist forests of the Madras and Bombay Presidencies, up to about 4,000 feet elevation; Ceylon, central provinces.

This fern is not known from North India (Mr. Clarke's Chittagong specimens being *costata*), it has generally fewer and larger **pinn\*** than **contaminate**, sometimes up to 2 inches long, and they are never quite sessile, the venation differs considerably, the primary veins are much more conspicuous or closer together, the areoles narrow and generally with an acute apex, the lowest ones empty, the others with often only one free excurrent veinlet (and then the venation is quite that of *Meniscium*), there are, however, often two or sometimes three excurrent veinlets, which are very irregular, free or anastomosing amongst themselves, or with the superior areole.



GYMNOPTERIS COSTATA. (Wall.)

12. GYMNOPTERIS COSTATA.

(IV(?)) Rhizome creeping, furnished with subulate scales; stipes up to 11 feet long; fronds up to 2 feet long or more, pinnate, **pinnae** up to 14 inches long by 3 inches broad, petiolate, acute, margin entire, sinuate, or crenate; primary veins very prominent and generally much raised, close together, areoles numerous, but varying with the breadth of the pinnae, basal ones small (sometimes obsolete) empty, several excurrent veinlets from all the other areoles which

are irregular, sometimes free and sometimes anastomosing. , Wall.

\*t. 26. *Bedd. F. B. I.* 113. *Hook. Sp. Fit.* v. 262, *deltigerum* and *undulatum*, *Wall Cat.* 59 and 140. *Bedd. F. B.* 7. 114 and 115, are or *ly* abnormal forms, such as occur more or less in nearly all the other species of *Gymnopteris* and cannot be recorded as varieties.

Mr. Clarke has again transferred the former, which was *Meniscium wallich*, to that genus, but he now acknowledges that he was wrong, and that the venation is different to *Meniscium*, the same

meniscioid form being very common in flagelliferæ). Sir W. Hooker in his *Syn. Fil.* quite correctly described this species and its varieties: but he lumped subrenata with contaminans, though he had formerly distinguished it, first under the name of subrenata, and afterwards as prolifera. Mr. Baker, not understanding the three species, lumped them all in his edition of the Synopsis; and Mr. Clarke, not knowing subrenata, has puzzled peridologists with a lot of varieties which do not exist; I have had subrenata and contaminans (very common South Indian plants) for many years in cultivation, and costata (not South Indian) I have seen in abundance in Birma, and know them to be three distinct species without any permanent varieties, though all three variable, as are nearly all other Gymnopteris.

North India, Nepal and Chittagong, up to 3,000 feet elevation; Birma. (Some of the larger forms turn very red in drying.) The meniscioid form (deltigera) is common in Sikkim and Assam, the undulate form (formerly described as a genus, Jenkinsia) is, I believe, only from Birma.

*Acros. virens.* *Wall. Cat.* 1033, from Tavoy, is a blank sheet, so it is impossible to say whether the fern intended to be represented was this species or contaminans: it could not be subrenata, as it does not grow in Birma.



GYMNOPTERIS PRESLIANA. (Hook.)

13. GYMNOPTERIS PRESLIANA. (Hook.) Rhizome stout creeping, paleaceous with narrow attenuated lanceolate scales; stipes 4-5

inches long, more or less scaly, as is the rachis and petioles, fronds 6-12 inches long, pinnated glabrous, pinnæ submembranaceous, remote, subopposite, petiolate, 2-4 inches long,  $\frac{1}{2}$  an inch wide, narrow lanceolate acuminate at both ends, rachis more or less winged, specially towards the apex of the frond; fertile fronds generally longer stipitate, pinnæ much partially fertile, costules and opposite veinlets, which **7** \* an acute angle, from which \* proceed a veinlet, which is either **7** \* or joined to the veins above, marginal (veins free, terminating in a dot within the margin. *Hook. Sp. Fil.* v. 265. *Syn. Fil.* 420. *Bedd. F. B.* t. 269 (under *Precilopteris*.)

South India, Coorg, at the foot of the Bhagamandal ghat at no elevation. I have only found this fern in the South Indian (Law). I have only mentioned, but it is probably more common in the Bombay Presidency; it is of much thinner texture than *contaminans*, the pinnæ differently shaped, and the venation more that of subcre

(Also in the Philippines.)

**GENUS U XXV [-ACROSTICHUM. U.)**

«. highest; sticks, order-fructification at the top of the frond.)

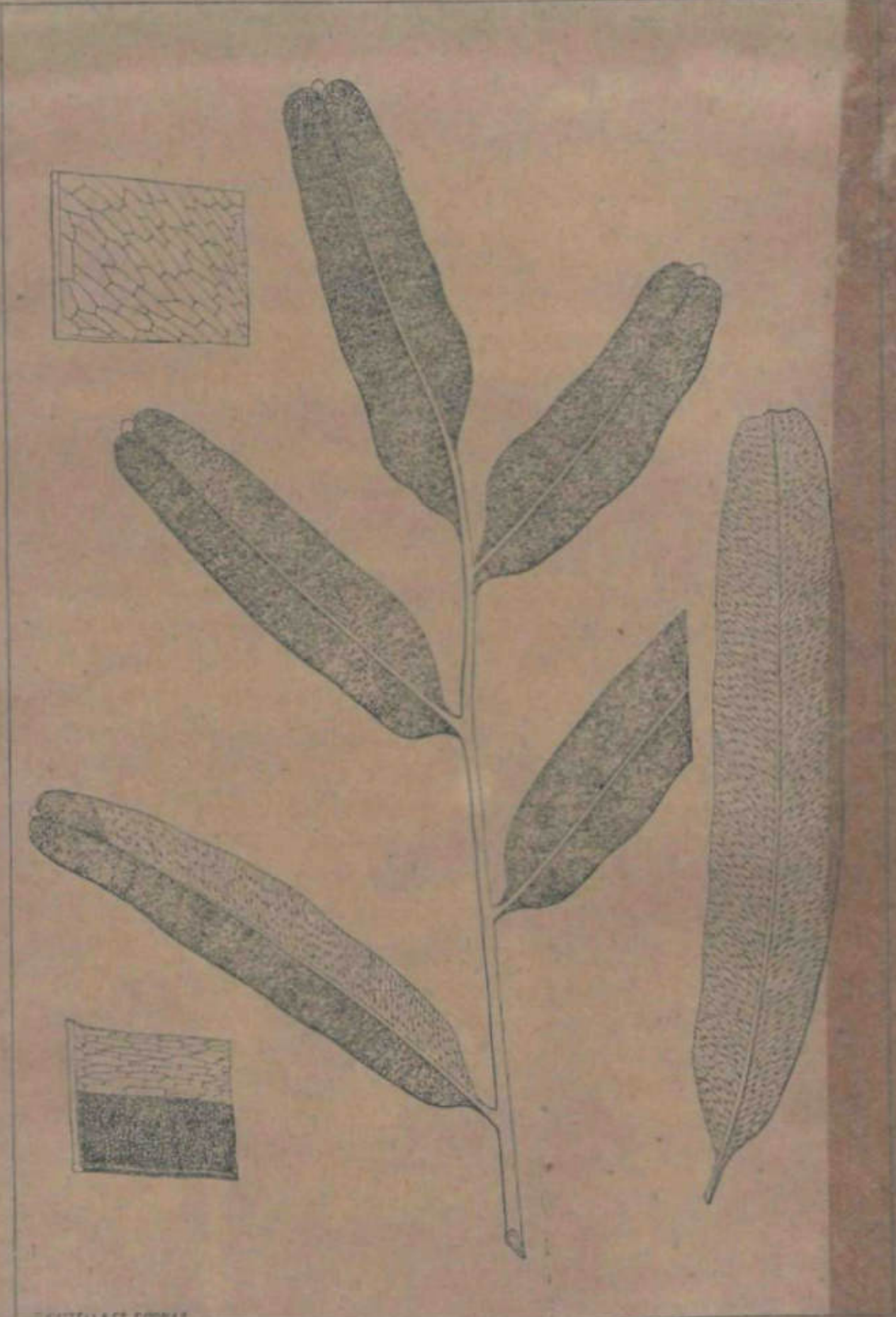
Veins uniform, copiously anastomosing, forming numerous sub-quadrate areoles without free included veins, no main veins present. Pinnate, the upper pinnæ fertile and usually stalked, ligulate-oblong,  $\frac{1}{2}$  to 1 inch long, 1 to 2 lines broad, the base sometimes retuse. Wh a mucro, subcre. texture coriaceous. **olly so-** ifrous on the lower surface; stipes adherent to the caudex.

1. ACROSTICHUM AUREUM. (L)

Caudex erect; stipe tufted, strong, erect, glossy, 20 feet long. S. « ft broad. Linné \* the upper pinnæ fertile and slightly oblong,  $\frac{1}{2}$  to 1 inch long, 1 to 2 lines broad, the base sometimes retuse. Wh a mucro, subcre. texture coriaceous. **olly so-** ifrous on the lower surface; stipes adherent to the caudex. *Linn. Sp. Pl.* 1525. *Bedd.*



f



W. HAYES, LITH. THOMAS

ACROSTICHUM AUREUM, (L.in.)

Tidal backwaters throughout the Indian region.  
 (Also throughout the world in warm countries near the sea.)

GENUS LXXXVII.—PHOTINOPTERIS. (*J. Sm.*)

(*Phœcinus*, shining; *pteris*, a fern.)

Veins copiously anastomosing, forming numerous areoles with free included veinlets, the primary veins costiform; fronds pinnate, the upper pinna much contracted and wholly soriferous on the under side; stipe adherent to the rhizome, pinnae articulate with the rachis. (Very like *Drynaria* in its pinnae and venation, but the venation is adherent not articulate.)

1. PHOTINOPTERIS RICHA. (*Walt.*) Rhizome repent or scandent, paleaceous, with elongated brown subulate fringed scales mixed with hair-like ones in age, white glabrescent; stipes short, nearly as thick as a writing pen; fronds 1½-3 feet long, broad-lanceolate, very hard-erectaceous glossy, pinnate; sterile pinnae long-petiolate, distant 3-branched and more long, broad ovate, acuminate, the apex generally caudate and curved upward; venation manifest, elevated on both sides, costules subflexuose, united by transverse veins into four-angled areoles, which are again divided into lesser areoles including branched free clavate veinlets; petioles articulated on the rachis and dilated into a large orbicular scutiform base; sometimes these sterile pinnae occupy the whole frond, more frequently the rachis is suddenly elongated at the apex, and bears 2-13 distant very contracted narrow-linear and fertile pinnae, 5-12 inches long, soriferous except on the costa and on the slightly revolute margin. *Wall. Cat. n. 27. Hook. Sp. Fil. v. 281. Bald. F. B. F. l. 211.*

Malay Peninsula; Singapore.  
 (Also in the Malay Islands, and Philippines.)

2. PHOTINOPTERIS DRYNARIOIDES. (*Hook.*) Fronds sessile, several feet long, 1 foot or more broad, the upper part with numerous distant 4-ontarioid pinnae, sometimes 1 foot long, 1 line broad, below



A. J. CRUTTEN & CO. LONDON

PHOTINOPTERIS RIGIDA. (I; *alt.*)



Nº 370

*CHROMOLAIS DRYEALOIDES*. (Hook.)



Nº 371

*PLATYCERUM GRANDE*. (L. Sw.)

this pinnatifid, with numerous close entire lanceolate acuminate lobes 4-6 inches long,  $1\frac{1}{2}$ - $1\frac{1}{4}$  inch broad which reach down nearly to the rachis, all articulated, the lower ones passing down gradually into a more undulated wing to the rachis, which is continued to its very base; texture very coriaceous; main veins raised, with transverse veinlets, and between them copious small areoles with fine veinlets.

*Hook. Syn. Fil. p. 425. Sp. Fil. v. 282. Bidd. F. B. I. t. 325.*

Malay Peninsula, Penang.

(Also in the Solomon Islands.)

GENUS LXXXVIII.—  
*PLATYCERIUM*. (Des.)

(*Platys*, broad *ceros*, a horn — stag's horn fern.)

Sori occupying a portion only of the under side of the disk of the fertile fronds and forming large, often uniform patches, frequently at the sinuses of the primary lobes, main veins costeform,

prominent, furcate, free or anastomosing, veinlets copiously **anastomosing**, forming large oblong areoles usually **with** free included simple or forked veinlets; fronds dimorphous, the sterile sessile, oblique, reniform, round or elongated, the fertile dichotomously forked with stag-horn-like divisions, in texture and pubescence resembling *Niphobolus*; articulate **with the caudex**.

i. **PLATYCEPHALUM GRANDE.** (*J. Sm*) Barren fronds very large, suborbicular, convex or the upper ones erect, deeply lacinated with spreading or inflexed divisions; fertile fronds 4-6 feet long, pendent in pairs, the disk **broad-cuneate**, **with** the sorus against the upper edge, occupying the disk only, with an elongated dichotomously forked division beyond it at each corner; both surfaces green and smooth. *J. Sm. in Hook. Journ. Bot Hi p. 402. Hook. Syn. Fil. p. 425, Bedd. F. B. I. t. 326.* There is only one soriferous patch to each frond.

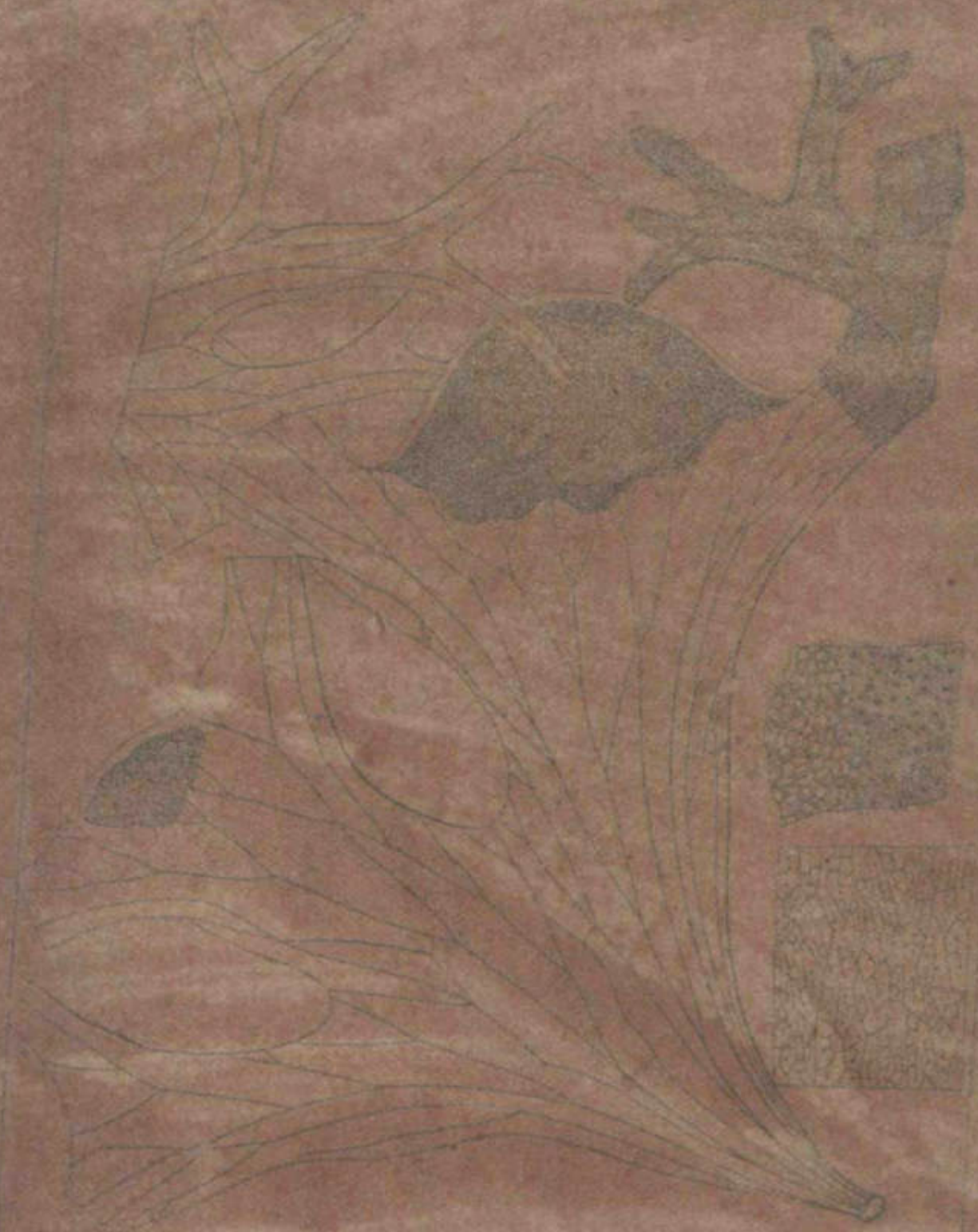
Singapore.

(Also in **Philippines** and North Australia.)

2. **PLATYCERIUM WALLICHII.** (*Hook.*) Fronds ample, bifarious, at length glabrous; sterile ones imbricated below, **irregularly sinuate-lobate**, above elongated, dilated deeply and much dichotomously pinnatifid, segments patent-inflexed; fertile fronds **geminately**; very broadly flabellate-cuneate, twice dichotomous suddenly **narrowed** at the base, each primary division or segment bears a sorus on the disk (hence there are two sorus on each frond), which is semicircular and very much produced in the sinus itself, the terminal segments beyond the soriferous disk are several times dichotomous and pendent, primary veins dichotomous, parallel elevated here and there, anastomosing into broad elongated areoles which are occupied by lesser ones with numerous free-branched included veinlets. *Hook. Sp. Fil. v. 284. Acrostichum alcicorne, Wall Cat n. 19, {not Linn. Bedd. F. B. L. t. 108.*

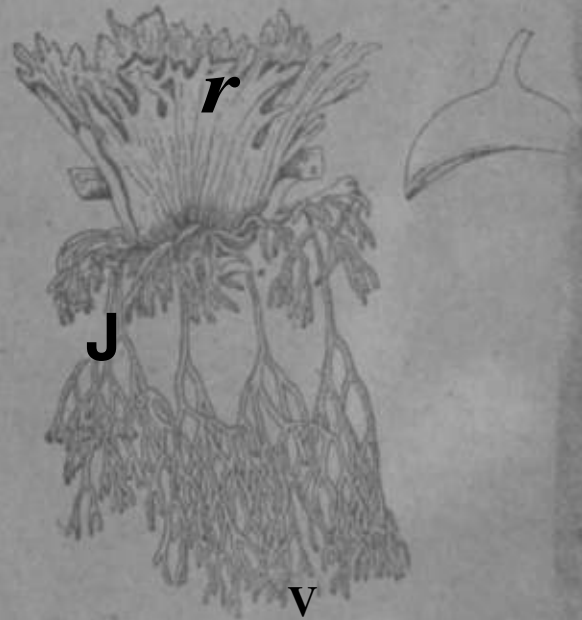
Malay Peninsula, Tenasserim.

3. **PLATYCERIUM BIFORME.** (*Bl.*) Fronds ample, bifarious, at



PLATYCODON WALLERII (Hook.)

length glabrous; sterile ones imbricated, very thick and cork) towards the base, subrotund but very varied in circumscription, orb and sinuated at the margin, coarsely-reticulate-venose ; fertile frond? rather long-stipitate of great size, 5-15 feet long, from a subcuneate base, repeatedly dichotomous, the segments loriform, flaccid and pendent, fertile segments quite different from the rest, forming a large reniform, stipitate, shield-like receptacle, 6-8 inches or more in diameter, wholly soriferous beneath, except at the margin. *Jav. fl.* 14, t. 18. *Hook. Sp. Fil.* v. 285. *Bedd. F B. l.* t. 109 and 224. *A. fuciforme, Wall. Cat. n.* 20.



N?273.

PLATYCERIUM BIFURCATUM ME. (L.)

Malay Peninsula, Tenasserim, Mergui, Singapore.  
(Also in the Malay Islands and Philippines.)

### SUB-ORDER III.—OSMUNDACEÆ.

Capsule 2-valved, opening across the apex, furnished with a short horizontal wing ; vernation circinate.

#### GENUS LXXXIX.—OSMUNDA. (Lin) ,

(*Osmunder*, one of the names of Thor, a Celtic divinity.)

Fertile frond wholly, on the upper or middle portion, contracted forming simple or compound sporangiferous panicles ; veins free; fronds pinnate or bipinnate, articulated with the rachis.

1. OSMUNDA JAVANICA. (L.) Stipes tufted, 6-12 inches long, firm erect, naked ; fronds up to 3 feet long, 8-12 inches broad, bipinnate, the lower or central pinnae fertile ; barren pinnae 4-8 inches



GONOLOBUS JAVANICUS (1871)



long,  $\frac{1}{2}$ –1 inch broad, cuneate at the base, and often slightly stalked, the edge entire or sharply toothed; texture coriaceous, rachis and both sides glabrous; fertile pinnae shorter, made up of numerous close but distinct oblong sessile clusters. *Bl. Enum. p. 252. Bedd. F. S. I. 1. 77.*

Ceylon, about Newera Elya; South India, cultivated only (?); Malay Peninsula; Tenasserim, banks of rivers in the plains. This is commonly in cultivation in Southern India, but I very much doubt if it is wild; I have never found it myself, though I have specimens said to have been collected in the Western ghats.

(Also in Java.)



OSMUNDA CLAYTONIANA. (L.)

OSMUNDA REGALIS. (L.)

2. OSMUNDA CLAYTONIANA. (Linn.) Stipes tufted, 1–1000 or more long, clothed with loose woolly ferruginous tomentum when young, at length glabrous; rhizoids 1–2 feet long, 8–12 inches broad, sharply pinnate; pinnae deeply pinnatifid, the uppermost and lower barren, some of the intermediate fertile, barren ones lanceolate, 4–6 inches long,  $\frac{1}{2}$  inch or more broad, the lobes oblong, entire; texture

herbaceous, fertile pinnae shorter, pinnules dense cylindrical. *Lin. S/*>. **PL 1521.** *Bedd. P. f. I. 1.187.*

Himalayas from Kashmir to Bhotan, 6,000-10,000 feet elevation. Khasya, 4,500-6,000 feet.

(Also in North America.)

3. **ObMCNDA REGALIS.** (Z.)

Stipes tufted, 12-18 inches long, firm, erect, naked; fronds 2-4 feet long, 1 foot or more broad, bipinnate, the barren and fertile separate, or the frond barren below and fertile above, barren pinnae 6-12 inches long, 2-4 inches broad, pinnules sessile or slightly stalked, 1-2 inches long, 1/2-1 inch broad, oblong, blunt, often unequal at the base, the edge finely serrulate, texture subcoriaceous, rachis and both sides naked, fertile pinnules cylindrical, forming a copious panicle. **Z. Sp. PL 152.** *Bedd, P. S. I. t 76.*

South India, common on the Western mountains at the higher elevations; North India, Kumaon, Bhotan, Khasya, 4,000-6,000 feet, (small, the fertile and barren fronds generally separate.)



Nº 277.

SCHIZÆA MALACCANA. {Baker.}

SUB-ORDER IV.—SCHIZÆACEÆ.

Capsule 2-valved, opening down the side, crowned by a complete perculiform ring; venation circinate.



1. 1/2 nat. grand. 1/2000

SCLEPHYLLUM THALICTROIDES. (Sage)

GENUS XC—SCHIZ<sup>EA</sup>. (*Smith.*)

(*Schizo*, I cut; the cut fertile segments.)

Capsules sessile in 2-4 rows which cover one side of distichous spikes, which form separate fertile segments at the apex of the fronds; veins free.

1. SCHIZ<sup>EA</sup> MALACCANA. (*Baker.*) Stipes dense, not distinguishable from the frond, which is 4-8 inches long, weak, flexuose, subterete, channelled in front not more than 1 line thick, the barren

and fertile ones similar; fertile segment erect, often bilateral) - } inch deep with 3-6 slender spreading spikes on each side, the lowest 2-2 \ lines long.

*Syn. Filp.* 428. *Bedd.F.B.* 1. -55-

Malay Peninsula.

(Also in the Malay Islands and Philippines.)



*iJBKt* N?279.

2. SCHIZ<sup>EA</sup> DICHOTOMY (*Sw.*) Stipes 6-18 inches long & firm, erect, glossy, channelled on the face above; fronds fan-like in general outline, 6-9 inches each way, many times dichotomously forked, the ultimate divisions 1

inch broad, with 1 fertile segment to each, \- \ inch long, rachis often curved with 4-10 close spreading spikes on each: *Hook. Syn. Fil. p. 43° - Bedd, F. S. L t. 65.*

South India, on the Western mountains; Malay Peninsula.

(Also in Tropical America and West Indies; Australia, New Zealand, Polynesia, Philippines, and Mascarene Islands.)

10-15 inches long by 2-3 lines broad, bearing a digitate fertile crest at the apex; crest 8-14, parted to the base, segments 1 inch long by a line broad; sori in 4 series (*i.e.*, 2 series each side the costa).

*Sw. Syn. Fil.* 150, 380, t. 4. *Bedd. F. S. I.* 268.

North India, Khasya and Chittagong; Ceylon; Malay Peninsula (Also in the Malay Islands; Fiji and Philippines.)

GENUS XCI.—ANEMIA. (*Sw.*)

(From *ancimon*, naked—the naked spikes.)

Capsules small, very abundant, forming a copiously branched panicle quite distinct from the leafy part of the frond; fronds pinnate or bi-tripinnatifid; veins free.

1. ANEMIA TOMENTOSA. (*Sw.*) Stipes 6-12 inches long strong, erect, clothed with deciduous ferruginous hairs; fronds ternately divided, the two lateral branches fertile, the terminal one spreading, sterile bipinnate, with the pinnules variously lobed or pinnatifid, texture herbaceous, rachis and both surfaces pilose; veins fine, laciniate, *Hook. Syn. Fil.* 433. *Anemia Wightiana* (*Gard.*), *Bedd. F. S. I.* t. 66.

South India, Nilgiris (Sispara ghat), Anamallays, Pulney Hills, Travancore Hills, 3,000-4,000 feet elevation.

(Also in Mexico, Peru and West Indies.)

GENUS XCII.—LYGODIUM. (*Sw.*)

(*Lygodes*, flexible—the climbing habit.)

Capsules solitary (or casually in pairs), in the axils of large imbricated clasping involucrets, which form spikes either in separate pinnae or in lateral rows along the edge of the leafy ones; fronds decurrent, pinnae conjugate palmate-lobed, pinnatifid or pinnate; veins forked, free.



1. *LYCIDIUM CIRCINATUM*. (Sw.) Fully developed barren frond, bipartite into 2 palmate lobes or simply palmate, primary petiole so much reduced that the stalk seems almost to spring from the main rachis, secondary petiole 1-2 inches long, firm, naked, pinnules digitate, with 5-6 long lanceolate lobes, reaching nearly down to the base, or once or even twice forked, ultimate barren divisions 4-12 inches long,  $\frac{1}{2}$ - $\frac{3}{4}$  inch broad, the fertile ones contracted sometimes so much so, that the lamina is nearly lost, the spikes 1-2 lines long in close marginal rows, texture subcoriaceous, surfaces naked. (Sw. *Syn. Fil.* 153. *Thun. En. Pl. Zey. p.* 379. *pedatum*, Sw. 154. *L. dichotomum*, *Bedd. F. S. I.* 62. *Wall. Cat.* 176. *Hoop. Syn. Fil.* 437.

North India, Chittagong Hills; Ceylon, western, central, and southern provinces, up to 2,000 feet elevation; Malay Peninsula.

(Also in the Malay Islands; Philippines; Hong Kong and Chusan.)

2. *LYCIDIUM MICROPHYLLUM*. (R. Br.) Fronds simply pinnate, pinnules petioled, 3-4 on each side of the zigzag rachis, with a terminal one which is more or less lobed, barren pinnae ovate-oblong, blunt, the margin subentire or rarely somewhat lobed, the base rounded or cordate, fertile ones short, deltoid, with generally a very rounded apex, and a square base and lobed round the margin. (R. Br. *Prod.* 162. *Wall. Cat.* 173. *L. scandens*, *Bedd. F. S. I.* 61.

South India, Malabar and West Coast generally, very common in the plains, and also in the Wynad, up to about 3,000 feet eleva-



No 281  
*LYCIDIUM CIRCINATUM*. (Sw.)



LYGODIUM MICROPHYLLUM. (R. Br.)



tion; Ceylon, abundant;-North India, Bengal plains, rare; Malay Peninsula.

(Also in the Malay Islands.)

3. **LYGODIUM FLEXUOSUM.** (SW.) Fronds glabrous or slightly hairy, pair of fronds stipitate-pinnate with the pinnules **ogam pinnate** or variously lobed, or subpalmate, all serrulate; sori **truding from the margin**; texture subcoriaceous. *S10. Syn. Fu* 153. *Bedd. F.*



11?283.

LYGODIUM FLEXUOSUM. (Sw.)

-4



N" 2G4.

LYGODIUM POLYSTACHYUM. (Wat)

, *S. I. t* 63. *L. pinnatifidum*, Sw. 153. *L. longifolium*, Wall. *Cal*

175.

South India, on both sides of the Madras Presidency, **common** up to about 4,000 feet elevation; North India, plains, and up to 5,000 feet on the Himalayas; Ceylon; Malay Peninsula.

(Also in the Malay Islands; Philippines; North Australia and Tropical Africa.)

4. **LYGODIUM JAPONICUM.** (SW.) AS in flexuosum, only th;

the pinnae are much smaller, with the pinnules smaller and finely cut. The sterile ones often so contracted that there is little or no lamina present. *Siv. Syn. Fil.* 154. *Bedd. F. S. I. t. 64. Wall. Cat.* 2201.

North India, abundant, extending west to Kashmir, up to 5,000 ft. elevation; South India, Western mountains, rare. It is probably only a form of *flexuosum*.

(Also in Japan, China, Australia, Malay Islands and Philippines.)

22. *LACODIUM POLYSTACHYUM*. (*Wall.*) Stem creeping, slightly pilose; fronds conjugate pinnate, membranaceous, pinnae petiolate, furnished with a tufted gland at the apex of the petiole, deltoid-ovate to lanceolate, glandular-pilose on the rachis of the pinnae costa and veins, pinnae fixed more than half down to the costa, segments with a rounded apex, entire or slightly crenate; costa of the pinnae and central vein (or costule) of segments flexuose; veinlets simple or forked; fertile segments contracted. *Hook. Syn. Fil.* 138. *Bedd. F. S. I. t. 300.*

Malay Peninsula, Tenasserim.

## SUB ORDER V.—MARATTIACEÆ.

Capsule opening by a slit down one side or a pore at the apex, without a wing, usually joined together in concrete masses (*synangia*); venation circinate.

### GENUS XXIII.—ANGIOPTERIS. (*Hoffm.*)

(*Anglo*, open; *pteris*, fern—the open sporangia.)

Capsules opening by a slit down the side, sessile, very close to one another, but not concrete, arranged in a linear-oblong or boat-shaped band of sporangia near the edge of the frond; veins simple or forked, free; fronds very large, bipinnate, springing from between two fleshy stipuleform appendages; the base of the stipules clavate pseudo-articulate with the axis; pinnae and pinnules articulate with the rachis.



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ANGIOPTERIS ERECTA. (Hoffirt.)

2. *ANGIOPTERIS ERECTA*. (*Hoffm.*)—Caudex erect, often 2 feet thick, and as much or more in height; fronds 6-20 feet long, pinnæ 1-3 feet long, spreading, the lowest the largest, rachis swollen at the base, pinnules 4-12 inches long,  $\frac{1}{2}$ -1 $\frac{1}{2}$  inch broad, linear oblong, sessile or shortly stalked, the apex acuminate, the edge entire or toothed, particularly towards the apex, texture herbaceous to subcoriaceous, glabrous, shining; veins subparallel; sori of 8-15 capsules. *Hoffm. Krypt. Gew. 4. 151. Bedd. F. S. 1. 1. 78.*

Throughout the Indian region up to 7,000 feet elevation.

(Also in Japan, Tropical Australia, New Caledonia, Madagascar, and Polynesia.)

#### GENUS XCIV.—MARATTIA (*Sm.*)

(After Maratti of Tuscany, a writer on Ferns.)

Capsules sessile or stalked, 4-12 concrete in boat-shaped synangia, which consist of two opposite rows of capsules and open by slits down their inner faces, with or without an inferior involucre; veins simple or forked, free; fronds bi-tripinnate, large, springing from between two fleshy stipulaform appendages (which sometimes assume the character of abnormal fronds); pinnules articulate with the rachis.

1. *MARATTIA FRAXINEA?* (*Smith.*) Stipes 1-2 feet long,  $\frac{1}{2}$ -1 $\frac{1}{2}$  inch thick, smooth deciduously scaly or swollen in the lower part; fronds 10 to 35 feet long, bipinnate, or sometimes tripinnate; pinnæ 1-2 feet long, pinnules oblong-lanceolate, 4-6 inches long  $\frac{1}{2}$ -1 $\frac{1}{2}$  inches broad, the apex acuminate, the edge generally serrate, more rarely entire, the base cuneate, or slightly rounded, texture rather coriaceous, glabrous, the rachis of pinnæ sometimes slightly winged; synangia submarginal, in close rows, the receptacle linear with 6-12 capsules on each side, an obscure fimbriated inferior involucre often present. *Bow. & Sm. Fl. 440. Bedd. F. S. 1. 1. 19.*

South India, Western parts of the Madras Presidency, 4,000-5,000 feet elevation (not very so common as *Angiopteris* which it



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MARATTIA FRAXINEA, (Stn.)

much resembles in general habit); Ceylon, central provinces, above 5,000 feet elevation; Malay Peninsula.

(Also all round the world in the tropics and a little beyond in the southern zone.)

GENUS XCV.—KAULFUSSIA. (*Blume.*)

(After Kaulfuss, of Halle, a writer on Ferns.)

Capsules sessile, 10-15, quite concrete, in raised circular masses, which are hollow in the centre, with the oblong apertures on the inner face; veins costaeform, parallel veinlets copiously anastomosing with free venules in the areoles; fronds 2-3 feet high, long stipate palmately lobed, and springing from two short fleshy stipuleform appendages; lobes of the fronds oblong elliptical; a genus of a single species.

1. KAULFUSSIA ESCULIBOLIA. (*BL.*) Stipes 12-18 inches long, herbaceous, auricled at the base; fronds digitate (like a chesnut leaf), or ternate; the central pinnæ the largest, oblong, spatulate, 6-12 inches long, 3-4 inches broad, the others smaller, margins entire or lobed, texture fleshy-herbaceous; sori copious scattered. *R. Er. Pl. Jav. Pil.* 260. *Bedd. F. B. Ind.* 185, (free included veinlets not shown). *K. assamica*, *Griff. Nat.* 1. ii. 628.

North India, Assam; Cachar, Chittagong Hills, 250 feet elevation.

(Also in the Malay Islands and Philippines.)

SUB ORDER VI.—OPHIOGLOSSACEÆ.

Capsule deeply 2-valved, opening down the side nearly to the base, without a ring; vernation erect; terrestrial or epiphytic.

GENUS XCVI.—OPHIOGLOSSUM. (*L.*)

(*Ophis*, a snake; *glossa*, a tongue.)

Capsules sessile, arranged in two rows, forming a narrow close spiral which arises from the base or centre of the barren segment.



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KAULIFUSSIA ÆSCULIFOLIA. (?/.)

rarely distinct, rising direct from the costa; veins reticulated; fronds simple entire, rarely palmate.

1. *OPHIOGLOSSUM VULGARUM* (L.) Rhizome not tuberous, short, or elongated, producing annually 1-2 fronds; fronds 6-9 inches long, the sterile division generally placed about the middle, 2-4 inch long, 1-2 inches broad, ovate or ovate-oblong, without a



No 288.

*OPHIOGLOSSUM VULGARUM* (L.) a distinct haft, texture stouter than in the others, the midrib usually indistinct; fertile spike 1 inch long or rather more, on a peduncle 2-4 inches long, and considerably overtopping the sterile division when fully mature. *Lin. Sp. Pl.* 1516.

Sikkim, Goke, 4,000 feet elevation, Kungai camp, below Darjeeling, 2,000 feet elevation.

(Widely spread in Europe; Africa, and its eastern islands; America; Japan; Australia; New Zealand, and Sandwich Islands.)

2. *OPHIOGLOSSUM NUDICAULE* (L. f.) Rhizome small, slightly tuberous; fronds 1 inch or more long, the sterile division placed not far from the base, 1-1 1/2 inch long, 2-3 lines broad, linear to ovate, without

a haft, or with only a slight one, the texture thin but with no evident costa and veins not distinct; fertile spike 1/2 inch long, the peduncle often 2 inches long, very slender. *Siv. Syn. Fil.* 4. 4. *O. parvifolium*, *Hook. and Grev. Bot. F. S. Ind.* 71. South India, Anamallay Forests, 2,500 feet elevation, and elsewhere on the Western mountains; Malay Peninsula.

(Also in America from United States southward to Brazil, New Guat. land, and Tropical Africa.)



3. *OPHIOGLOSSUM FIBROSUM*. (Schum.) Rhizome a large round white bulb with numerous fibrous rootlets; stipe very short with the sterile division close to its base; the latter  $1\frac{1}{2}$ -2 inches long, by  $\frac{1}{2}$  inch broad, lanceolate, acute or obtuse, the texture thick and opaque; midrib prominent, venation indistinct (except when dried), fertile spike  $1\frac{1}{2}$ -2 inches long on a spike 4-5 inches long. Schum. *K. Danske. Vid. Afh.* iv. 226. *O. Wightii*, Hook and Grev. *Bot. Afh.* iii. 218. *O. brevipes*, Bedd. *F. S. I.* t. 72.

South India, Anamallay teak forests, 2,000-3,000 feet elevation.

(Also in Tropical Africa, Guinea Coast; Ascension Island.)

4. *OPHIOGLOSSUM RETICULATUM*. (L.) Rhizome cylindrical, elongated with many fibrous rootlets; fronds 6-12 inches long, the sterile division placed a little below the middle,  $1\frac{1}{2}$ -3 inches long, by 1-2 inches broad, with a distinct haft, and distinctly cordate at the base, the apex blunt or acute, texture thin; veins prominent, but usually no midrib; fertile spike 1 inch or more long on a slender peduncle, 2-4 inches long. Linn. *Sp. Pl.* 1518. Hook. *Syn. Fil.* p. 446. Bedd. *F. S. I.* t. 70. *O. cordifolium* (Roxb.), Wall. *Cat.* 57.

South India, Nilgiris and Anamallays, 2,000 feet elevation and upwards; Ceylon, Newera Elya; Himalayas; Malay Peninsula.

(Also in Malay Islands; Polynesia; Tropical America; Africa, Mascareen Islands; Philippines.)

5. *OPHIOGLOSSUM PENDULUM*. (L.) Epiphytic on tree



*OPHIOGLOSSUM FIBROSUM*, (Schum.)



OPHIOGLOSSUM RETICULATUM (L.)

fronds pendulous, ribbon-like, without a distinct stem, 1-3 feet long, 1-3 inches broad, simple or forked, texture fleshy; no midrib and the veining not distinct; fertile spike single, arising low down on, but above the base of, the sterile segment, 2-6 inches long, on a peduncle shorter than itself. *Linn. Sp. Pl.* 1518. *Bedd. F. S. I.* t. 269.

Ceylon, at no great elevation; Malay Peninsula; Assam (?)

(Also in Malay and Polynesian Islands; Mauritius; Australia, Philippines.)



№221.

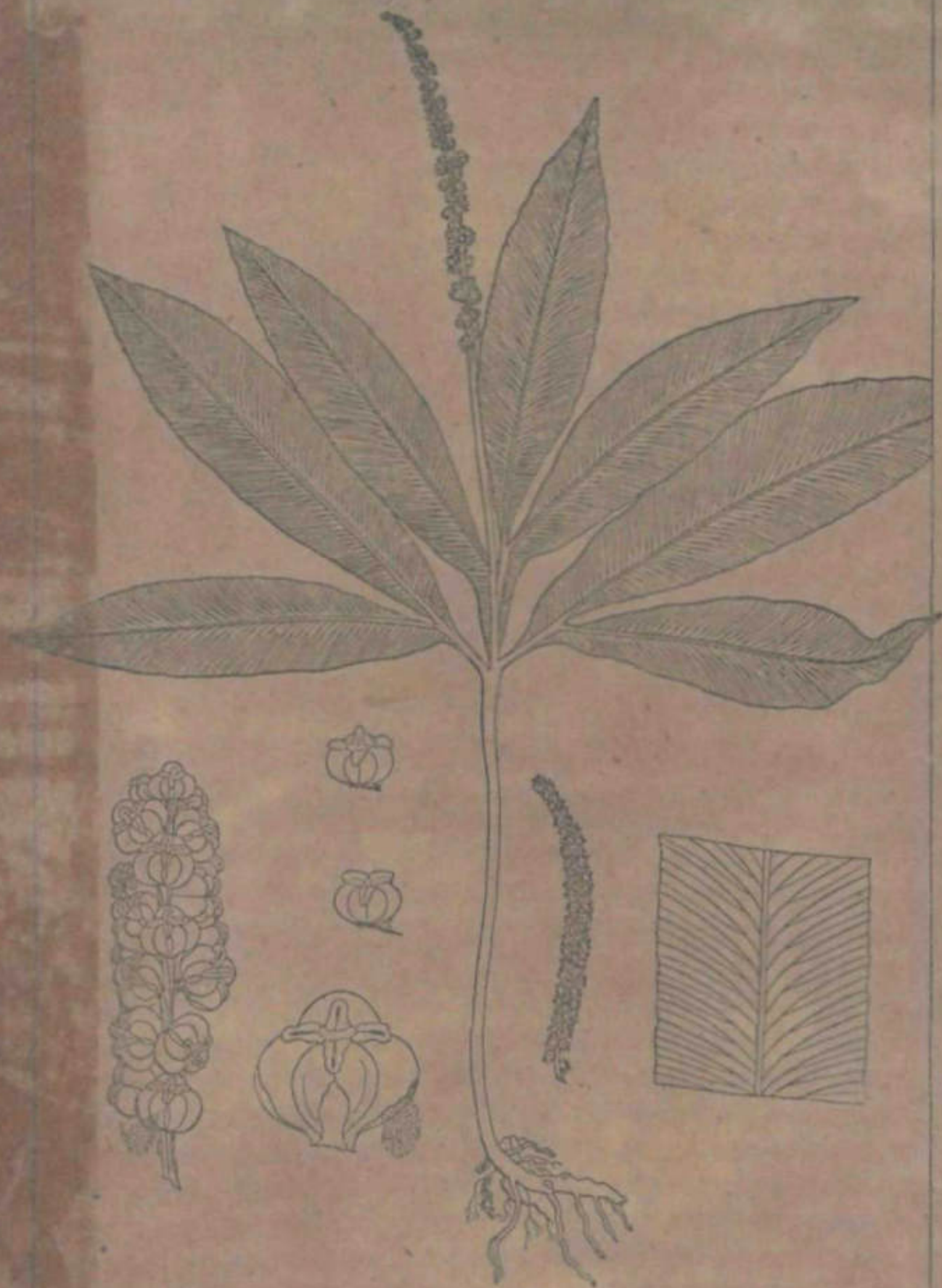
OPHIDGLOSSUM PENDULUM. (L.)

GENUS XCVII.—HELMINTHOSTACHYS. (*Kauff.*)

(*Helminthos*, a worm; *stachys*, a spike.)

Capsules in long crested clusters which form a long loose spike; veins forked, free; fertile spike rising from the base of the leafy segment; fronds stipate, sterile segments foliaceous, digitate. A genus of a single species.

1. HELMINTHOSTACHYS ZEYLANICA. (*Linn. under Osmunda*)  
Rhizome thick, fleshy, creeping; stipes often 1 foot long, barren segment palmately pinnate, often in three principal divisions which are stalked, and again forked or pinnate, the ultimate divisions linear-oblong, 3-4 inches long,  $\frac{1}{4}$ -1 inch broad, the apex acuminate, the edge slightly toothed or entire, texture herbaceous; fertile spike solitary, arising from the base of the barren segment, 3-4 inches long,  $\frac{1}{2}$  inch broad, the firm peduncle about as long as the fructification. *Linn. Sp. Pl.* 1519. *Hook. and Bauer, Gen. Fl.* t. 438. *Bedd. F. S. I.* t. 69.



HELMINTHOSTACHYS ZEYLANICA. (Linn.)

South India, Western forests in swampy places up to 3,000 feet elevation; Ceylon, about Colombo and other parts of Western and Southern provinces; North India, Bengal plains to Assam and Cachar; Malay Peninsula.

(Also in Tropical Australia, Malay Islands, Philippines and New Caledonia.)

GENUS XCVIII.—BOTRYCHIUM. (Sw.)

(*Botrys*, a bunch; fructification like a bunch of grapes.)

Capsules sessile, arranged in two rows, on the face of spikes which form a compound panicle; veins forked, free; fronds erect, the sterile segments foliaceous, deltoid, bi-tripinnately compound, rarely pinnate; fertile segments rachiform, compound paniculate.



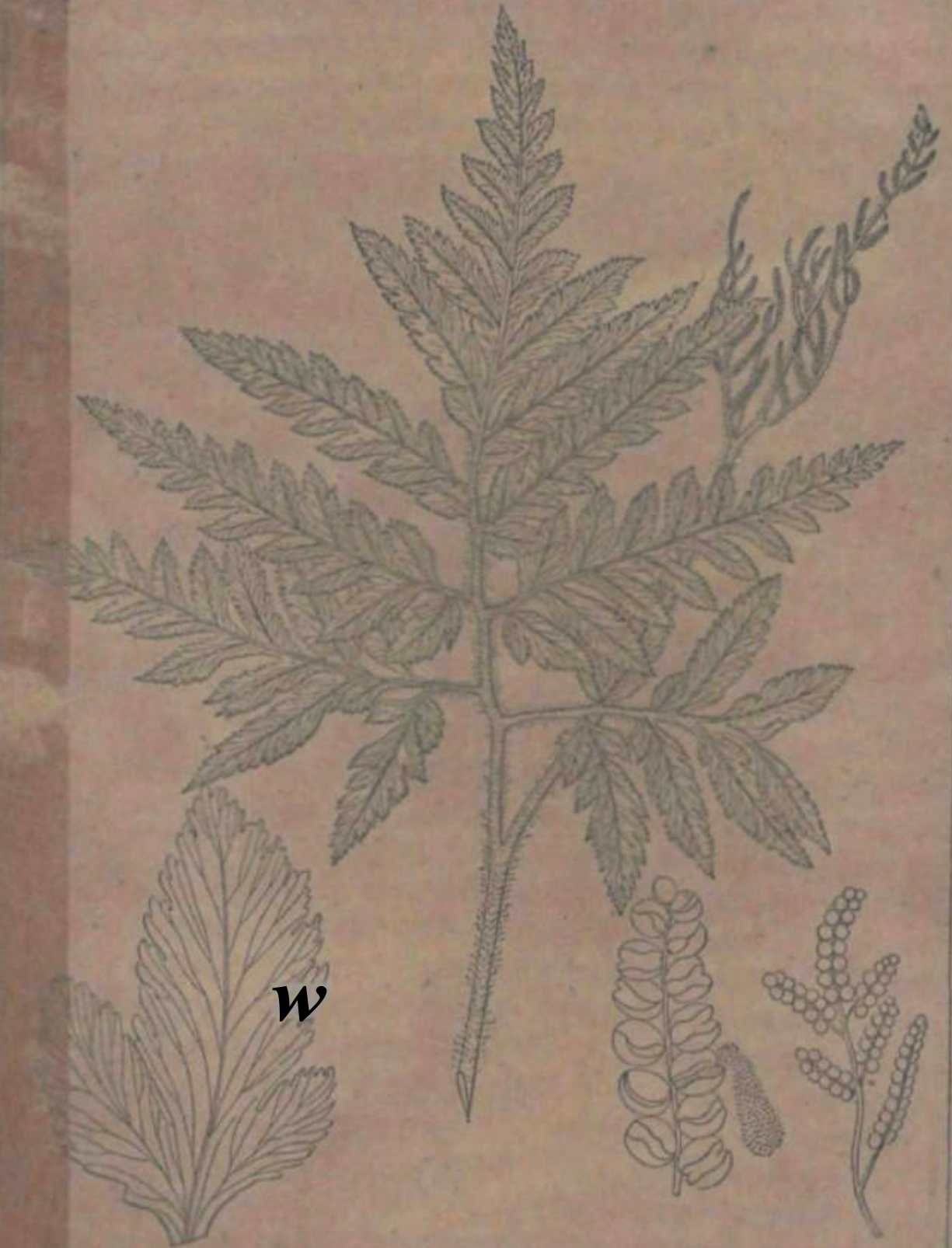
NO 293.  
BOTRYCHIUM  
LUNARIA. (L.)

1. BOTRYCHIUM LUNARIA. (*L. under Osmunda.*) Rhizome small, scarcely thickened, enclosed by brown sheaths furnished with stoutish fleshy brittle branched roots; stipes erect, smooth, cylindrical, hollow, succulent, veneration plicate or folded straight, the fertile branch clasped by the sterile before unfolding, fronds solitary, 3-10 inches high, firm, stout fleshy, sterile branch oblong, pinnate smooth, pinnæ 4-7 pairs flabellate or lunate, the margins crenate (rarely partially fertile) fertile branch pinnate or bipinnate; venation (barren pinnæ) flabellately-furcate, i.e. the vein enters at the base and is repeatedly forked, veins not quite extending to the margin. *Lin. Sp. Pl.* 1519. *Sw. Syn. Fil.* 170. *Bedd. F. B. I. t.* 208.

North India, Sikkim, Lachen, 11,000-13,000 feet elevation, Kumaon, 12,000 feet.

(Also the arctic and cold temperate zone, extending to South Europe; Patagonia; Australia.)

2. BOTRYCHIUM DAUCIFOLIUM. (Wall.) Stipes stout, 6-12



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BOTRYCHIUM DAUCIFOLIUM. (Wall.)

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inches long, the sterile portion with a stalk, 1-6 inches long, prolonged beyond the fertile spike, 6-12 inches each way; deltoid, natisid or tripinnate; the lower pinnae much the largest; segments lanceolate-oblong,  $\frac{1}{2}$ - $\frac{3}{4}$  inch broad, finely toothed; fertile segments about equalling the sterile segment when mature; panicle 2-3 inches long tripinnate, not very close. *Wall. Hook. and Grev. Bot. Beech. Fil. t. 161.* B. subcarnosum, *Wall. Cat. 49. Bedd. R. S. J. t. 161.*

Throughout the Indian region, up to 8,000 feet elevation.  
(Also in Java and Polynesia.)

3. BOTRYCHIUM VIRGINIANUM. (*L. under Osmunda.*)  
Stipes 3-18 inches long, sterile portion not prolonged beyond the fertile spike 4-12 inches each way; deltoid, quadripinnatisid, lower pinnae much the largest, pinnules ovate-oblong, close cut down to a broadly winged rachis into finely cut linear-oblong segments, both sides naked or slightly hairy; fertile branch of the rachis springing from the base of the sterile portion (*i.e.* sterile portion, sessile), or from the middle of it. *Linn. Sp. Pl. 1519. Sw. Syn. Fil. 171.*



BOTRYCHIUM VIRGINIANUM (L.)  
VAR. LANUGINOSUM.

VAR.  $\beta$  LANUGINOSUM. (*Sp. Wall. Cat. 48.*) Fertile branch arising from the middle of the sterile portion. *Bedd. R. S. J. t. 161. Moore, Ind. Bot. 213. Hook. Gard. Ferns, t. 29.* In the 19th American plant, the fertile branch arises from the base of the sterile portion, and the latter is quite glabrous, in the Indian plant the fertile branch always springs from well above the base, and the sterile

more or less hairy, they are, however, only considered

South India, at the higher elevations on the Western mountains (only appearing in the rains); Ceylon, about Newera Elya ; North India, on the Himalayas, Kumaon to Bhotan, 5,000-8,000 feet elevation, Khasya, 4,000-6,000 feet elevation.

(The typical plant is widespread in Europe, America and Japan.)







*OTRICHENIA GLAUCA* (Hook.)



W. & A. G. S. 1844

CYATHEA HOOKERI. (Taw.)



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## ADDITIONS AND CORRECTIONS.

At page 16, after No. 10, insert :—

ALSOPH. LA KING. (Clarke MS. in Kew Herb.), a tree fern, 10 feet high, rachis purplish shining glabrous, rachis of pinnae purplish glabrous and some what\* glaucous, pinnae 20-24 inches long, pinnules about 3 inches long by half inch broad) coriaceous, of a blueish glaucous tint, the rachis very scaly beneath and hairy above, cut nearly to the base into oblong crenated segments, the midrib much raised and very prominent (particularly in the fruit) forked from a little above the base; veins much raised and very prominent; veins once more rarely simple, receptacles

Malay Peninsula at Laroot, in Perak, at 5,000 feet elevation, lately discovered by Dr. King's collectors.

At page 20, line 15. for 1,200, read 1,200—12,000.

At page 28, for plate 14, read plate 15.

At page 29, for plate 15, read plate 14.

var. At page 292, 8th line from bottom for *This variety*, read *The*

At page 295, 8th line from bottom for *rugulosum* Labill., read *rugosum*

At page 439, 4th line from bottom, for *U*, read *as that.*



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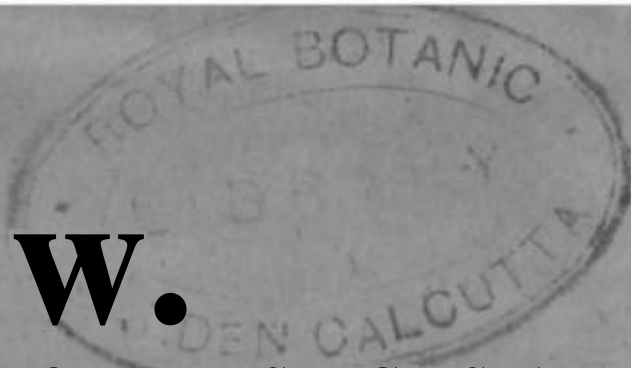
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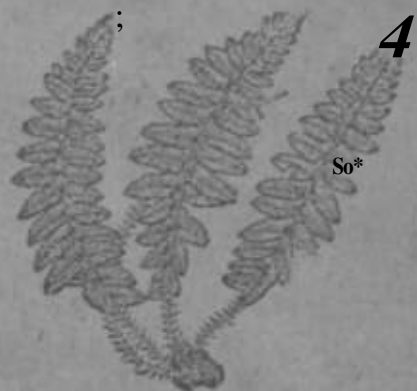
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SUPPLEMENT  
TO THE  
FERNS OF BRITISH INDIA, CEYLON,  
AND THE MALAY PENINSULA.

SUB-ORDER GLEICHENIACEÆ.

1. GLEICHENIA DICARPA. (*Br.*) Fronds dichotomous, divaricate; branches pinnate, pinnae pinnatifid, narrow-linear, segments orbicular, cucullate and reflexed beneath, capsules about two concealed within the bead-like lobes, and mixed with ferruginous, paleaceous hairs, which often extend to the rachis.

VAR. *β* ALPINA. (*Br.*) Generally smaller and more compact; rachis and young shoots ferruginous with paleaceous wool. *Hook. Sp. Fil.* p. 12.

Perak. (*Father Scortchini. King, No. 7,345.*)

(Also in the Malay Islands, Tasmania, and New Zealand.)

3. GLEICHENIA NORRISHI. Perak. (*Scortchini. King, No. 1,694.*)

3A. GLEICHENIA FLAGELLARIS. (*Spr.*) Branches of the frond several times dichotomous, copiously foliaceous, paleaceous, or at length smooth; pinnae erect-patent or divaricating, varying from linear-lanceolate to broad-lanceolate, 5-12 inches or more long, segments suboriaceous, linear, obtuse or prominently emarginate at the apex, glaucous beneath, and often furnished with ferruginous down, capsules 2-4. *Hook. Syn. Fil.* p. 14.

Penang and Perak, at sea level. (*Scortechini*. Day.)

(Also in the Malay Islands, Java, Fiji, Mauritius, Bourbon, Madagascar.)

3B. GLEICIKNIAHIRTA. (*Bl.*) » Fronds chartaceous when dry opaque, green above, beneath glaucous (particularly on the rachis and costas), with the small gemma; densely paleaceous with ferruginous lanceolate scales paler at the margin and ciliated length bare on the costa, many times dichotomous; branches ascendanti-flabellate; primary ones 1 inch long, nudate; secondary ones 1½ inch long, subnudate; tertiary ones, subelongate • ultimate ones (or pinnae), 7-9 inches long, standing at an angle of 30°, linear gradually attenuated, deeply pinnatifid, lobes 8 inches long, 1 inch broad, oblong-linear, obtuse, slightly curved the margin revolute, the sides entire, the apex denticulate • slender; sori between the costa and the margin of veins lax, capsules. *Hook. Syn. Fil.* p. 14.

Penang. (*Sir W. Norn's.*)

## SUB-ORDER II—POLYPODIACEAE:

### TRIBE I.-CYATHEAE:

2 CVATHKA BRUXONIS, Perak, up to 500 feet alt. (*Scortechini* /*Jay.*)

4. CVATHHA SPINULOSA. *Hemitelia* *Beddomei* (*Clarke*) is a synonym.

2. AMPHICOSMIA DECIPIENS. This is now considered by Indian botanists, as not distinct from *Cyathea spinulosa*.

3. AMPHICOSMIA BRUNONIANA. The involucre is completely spherical in the young state, so this is transferred to *Cyathea* / Clarke and Baker. *Jour. Linn. Soc.* xxiy. p. 40. *Vir. ft* *Scottii* is ornata.

4. AMPHICOSMIA ALTERXAXS. The involucre is completely spherical, so this becomes CYATHEA ALTERNAXS. (*Wall*) *C sarawakensis*, *Hook. Syn. Fil.* p. 25, is the same plant, but a



later name than that of Wallich. *Cyathea Lobbiana* (Hook.) is also a synonym.

3. *ALSOPHILA ORNATA*, *Alsophila Oldhami* (Bedd.) (A. Scotti Baker) is a synonym. The veinlets vary from simple to forked or pinnate. *Alsophila sikkimensis*, Clarke and Baker, Jour. Linn. Soc. vol. xxiv. p. 409. (*Alsophila latebrosa*, var.  $\beta$  Scott. *Hemitelia Brunoniana*, var.  $\beta$  Scott. Clarke, Bot. L. 431. *Handbook*, p. 10) Rungbee, alt. 5,500 feet, is only a form with the segments of the fertile pinnules unusually large, deeply crenated, with many three-branched veinlets; I do not know whether it is constant enough to be considered a variety.

4A. *ALSOPHILA TRICHODESMA*. (Scott.) Bedd. Jour. of Bot. vol. xxv. p. 321. "Trunk middle sized, slender; stipules scaly at the base; fronds 4-6 feet long, bipinnate; rachis scabrid above, clothed with adpressed spreading semi-viscous copious jointed hairs; pinnæ shortly petiolated, narrow lanceolate, 24-30 inches long by 6-8 inches broad; partial rachis clothed with the same hairs as the main rachis, stramineous; pinnules linear-lanceolate, 3-4 inches by  $\frac{1}{2}$  inch, thinly herbaceous, clothed with the same hairs as the rachis on both sides and on the costules and veins, cut down nearly to the rachis into linear, obtuse, crenulate, rather distant segments; veinlets 7-8 on each side, forked; sori medial, 5-6 on each side of the costule."

Perak (*Scartechina*). Its nearest ally is *Als. Andersoni*, of which it is, perhaps, only a variety.

5. *ALSOPHILA OLDHAMI*. Omit this species, it being a synonym of *ornata*. The cutting of the pinnules is variable.

6A. *ALSOPHILA OBSCURA*. (Scott.) Bedd. Jour. of Bot. vol. xxv. p. 321. Caudex 6-7 feet high; stipules 1-2 feet, densely clothed downwards, with long lanceolate, sharply- serrated scales; fronds 4-5 feet by 2 feet, bipinnate, rachis scaly above, naked beneath; pinnæ, the middle ones about 1-1½ feet by 3-4 inches, diminishing in size toward both ends; rachis with above, naked

beneath; pinnules all free, lanceolate-oblong, base parallel with the rachis, apex obtuse,  $1\frac{1}{2}$ -3 inches by  $\frac{1}{2}$  inch, subcoriaceous, glabrous on both sides, except on the hairy costa and scaly bullate costules beneath; cut half-way down to the rachis into broad obtuse segments; veins 4-5 in each segment, simple or more commonly forked; sori medial on the lower veinlets, occupying the undivided portion of the pinnules mixed with transparent moniliform hairs.

Perak on Mt. Idjo, 4,000-5,000 feet alt. (*Scortechini, Day*) Nearly allied to *comosa*, turns black in drying, the pinnules falling off.

8. *ALSOPHILA COMMUTATA* Perak, alt. 5,000 feet. (*Day, Scortechini.*)

11. *ALSOPHILA KINGI*. (*Handbook, additions and corrections.*) *Allophila Bakeri* Zeller (*Ext. du Bulletin de la Soc. Bot. de France, tom. xxxii.*) is a synonym.

12. *ALSOPHILA DUBIA*. (*Bedd.*) Stipes?, main rachis, and rachis of pinnae purple-brown, slightly furfuraceous above, glabrous below; fronds subcoriaceous-membranous; primary pinnae 16-20 inches long, pinnate with the apex only pinnatifid; pinnules about 4 inches long by  $\frac{3}{4}$  inches broad on petioles 1-1 $\frac{1}{2}$  lines long, more or less truncate at the base, much acuminate at the apex, pinnatifid only about one-sixth of the way to the costule, the very shallow lobes rather truncate; costules scaly below or at length glabrous, furfuraceous above; veins pinnate, veinlets simple; sori large, generally only in 1-2 rows, *i.e.*, on the 1-2 lower veinlets only, but sometimes in 3-4 rows, *i.e.*, on 3-4 veinlets, and then near the base of the veinlets, and consequently parallel with the primary vein, and not shaped like an inverted V as in *glabra*. (*Jour. Bot. vol. xxx. p. 321.*)

Perak, 4,000 feet alt. (*Day.*) Its nearest ally is *podophylla* (*Hooker*).

(also in Java.)

1. *DIACALPE ASPIDIROIDES*. Kōhima, 5,000-6,000 feet alt.  
 2. Omit *Diacalpe fœniculacea* here: it is *LASTREA FœNICULACEA*, the involucre being reniform or polystichoid.

TRIBE IA.—MATONIEÆ.

Indusium umbrella-shaped, 6-lobed.

*MATONIA PECTINATA*, Perak. (*Scortchinskii*.)

TRIBE II.—DICKSONIÆ.

*STRUTHIOPTERIS ORIENTALIS*. 9,000-12,000 feet alt.

*WOODSIA HYPERBOREA*. Rohtang Pass, between Kullu and Lahoul. (*Dr. Cutteli*.) Gurhwal, Kamaon, and West Nepal. (*Dr. Dulluc*.)

(Also in Afghanistan.)

2. *Woodsia lanosa*. Omit this species altogether: it is *Gymnogramme Andersoni*.

GENUS IX.—DICKSONIA. (*L'Hortier*.)

(After James Dickson, a cryptogamic botanist.)

Indusium coriaceous two-valved, the outer valve formed of a more or less attenuated lobule of the pinnule cucullate, sometimes equalling in size, but generally larger than, the inner valve. Veins simple, forked, or pinnate; veinlets free.

Distinguished from *Dennstædtia* by its two-valved indusium, and from *Cibotium* by the more or less herbaceous texture of the outer valve of the indusium, it being a partially-changed portion of the frond.

*DICKSONIA AMPLA*. (*Baker*.) Rhizome creeping, 3 inch thick, clothed with dark scales; fronds 4 feet or more long, glabrous, deltoid, tripinnate, firm in texture; rachis brown, unarmed, pubescent only down the channelled face; pinnae oblong-lanceolate, the lower ones the largest, 2-3 feet long, 10 inches broad;

pinnules lanceolate-acuminate, cut down to the costa or narrow wing, segments  $\frac{1}{2}$  inch broad; veins pinnate, venulets 6-8 pair erecto-patent, forked or simple; sori placed on the edge of the tertiary segments, principally near the base; indusium with the outer valve large, glabrous, semi-orbicular. *Baker, Jour. Lin. Soc. xxii. p. 223.*

Perak, 2,000-2,500 feet alt. (*Sarntechini, King, No. 2,159.*)  
(Also in North Borneo.)

2. *DICKSONIA KINGI* (*n. sp.*)—Stipes stout, erect, about 18 inches long; fronds 3-4 feet long, deltoid, lanceolate, quadri-pinnatifid; pinnae 8-10 inches long, the lower ones deltoid lanceolate, lanceolate to linear-lanceolate upwards; secondary pinnae, the lower ones  $2\frac{1}{2}$  inches long, the others about 1 inch, cut down nearly or quite to the rachis into oblong broadly-toothed lobes; texture coriaceous, perfectly glabrous; sori terminal on the thickened veins and exerted beyond the margin.

Perak, dense jungle, 3,000-4,000 feet on Gunung Batu, and at Larut (*King's collectors, No. 8058, 2118*), very similar in habit to *Microlepia moluccana*, but the indusium distinctly that of *Dicksonia*.

*CROTIDIUM BAROMETZ.* Perak, 1,500 feet alt. (*Day, Sarntechini*.)

#### GENUS XI.—*LECANOPTERIS.* (*Blume.*)

(From *lecanoe*, a bowl, and *pteria*.)

Differs from *Dicksonia* in having the indusium formed from a single valve, and in its curious rhizome, which forms a thick, spreading crust, clothed with small papate scales. Venation of *Pleopeltis*, copiously anastomosing, and forming areoles, in which are included free veinlets.

*LECANOPTERIS CARNOSA.* (*Blume.*) Rhizome very thick, fleshy; stipes 1-6 inches long, glabrous; fronds coriaceous,

FERNS OF BRITISH INDIA AND

CEYLON.

o-labrous, 1-2 feet or more long, if-<sup>5</sup> inches broad, linear-oblong, being inconspicuous, pinnatifid or nearly pinnate, from the wing runs into the more or less developed wing to the rachis), J-i men broad; margin entire when sterile, lobed when fertile, apex gen-1 y• rounded (but acuminate in the upper lobes in some examples); W\*\* of fertile pinnules 3-6 on each side, dilated at the apex into a cupuliform cartilaginous cup, which forms thejindusiu\* and 1 reflexed when dry; veins immersed, except the costa; areoles conspicuous.

Perak. (*J\* Day. King.*)

(Also in the Malay Islands and the Philippines.)

1. DENXSTVEDTIA SCABRA. Near Simla, 5>°o-6,c  
(*Dl. Watt.*)

2 DFNNSTVEDTIA APPKNDICULATA, VAR. ELWESTI  
*Elwe'sii, Baker; Bedd> Handbook, l. 26.* Amplj  
collected by Mr. Levinge prove this to be only a glal  
appendiculata.

SUB-ORDER.-HYMENOPHYLLACE

This tribe is now removed from this sub-order (PolJ  
y Mr. Baker, and made a sub-order of itself, standing  
Gleicheniacee and Polypodiaceze.

4. HYMENOPHYLLUM POLYANTHOS VAR. 7  
Perak, 4,000 feet alt. (*Day, Scortechinu*)

5, HYMENQPHYLLUM AUSTRALE (*Willa.*)  
older name than javanicum. (*Spreng.*)  
Naga Hills, on Jakpho, 7,500 feet alt.  
Var. /3 badium. Perak, 4,000 feet. (*Day. Scortechinu*)

5A. HVMKXOPHYLLUM DILATATUM. (*Sw.*) " Stipe 3-4 inches  
long, erect, wiry, slightly winged above; fronds 6-12 inches long,  
4-6° inches broad, ovate-lanceolate tr\* pinnatifid main rachis  
winged throughout, the wing quite flat; pinn, rhomboidal  
lanceolate, divided down nearly to the racnis, me lower pinnat

again pinnatifid: sori 2-3 to a pinna terminal or axillary on the segments on both sides, divided about half-way down; valves rounded entire, clusters often exserted." *Hook. Syn. Fil. p. 62.*

H. formosum Bracken. H. Junghuhnii and eximium, *V. D. B. Perak. (Day. King.)* The fern referred by me to *varium* R. Br. in my list of Mr. Day's Perak ferns is only a small form of this species.

(Also in New Zealand, Java, Tahiti, Samoa, Aneiteum, Fiji, and other Polynesian Islands.)

9A. HYMENOPHYLLUM FLACIDUM. (*Van den Bosch*) (*H. denticulatum* var.  $\beta$  *flacidum*, *Bedd.'s Handbook*, p. 35.) This is a good species.

10. HYMENOPHYLLUM NEESII. Perak, 5,000 feet alt.

11. HYMENOPHYLLUM ACULEATUM. *V. D. B.* "Stipe 1-2 in. long, naked or slightly winged; frond broadly ovate, triangular, deeply tripinnatifid, 1-2 inches long, more than 1 inch broad below; rachis margined throughout with a wing which is thickly beset with aristate teeth; pinnae crisped, the lower ones flabellate-pinnatifid nearly down to the midrib; the ultimate segments very narrow, 2-3 lines long, and deeply cut up nearly to the midrib by numerous strong aristate teeth; sori solitary supra-axillary spinose on the back, divided about half-way down with ovate spinoso-serrated valves." *Van den Bosch, Hymenophyllaceae Javanicae pl. xxxi; sabinifolium, Baker, Syn. Fil. p. 71.*

The leafy portion is hardly more than bristly teeth, imparting to it a resemblance to *Lycopodium cernuum*.

Perak, 4,000 feet alt. Penang, 3,000 feet alt. (*Day, King*.)

Also in Java.

12. TRILEPTOMYS WALLI. (*Theobald*.) Rhizome filiform, wide-creeping; fronds ovate-orbicular, ciliated entire,  $\frac{1}{2}$ - $\frac{1}{4}$  inch long; veins distinct, simple, spirious, venules none; sori solitary at

the end of the distinct midrib ; indusium funnel-shaped imbricated, with a broad entire collar-like border.

Southern forests of Ceylon.

2. TRICHOMANES EXIGUUM. *T. setigerum* Jemn. (*Journ. of Bot* 1881, /i. 52) is a synonym.

(Also in Cuba and Jamaica.)

3. TRICHOMANES XEILGHERREXSE. Perak. (*Scortechim*, *King*.)

5. TRICHOMANES MUSCOIDES. Perak. (*King*.)

6. TRICHOMANES PARVULUM. Perak. (*Scortechimi*.) *Ceylon*, [*Trimcn.*]

13. TRICHOMANES BIPUNCTATUM. Perak, 4,000 feet alt. (*Day*)  
 Var. *S late alatum*. *V. D. B.* Similar to the type, but fronds sessile. Rungbee, Sikkim. *V. arlr, Jour, Linn. Soc.* vol. xxiv. p. 410.

15. TRICHOMAXES BIRMANICUM. Omit this species, as it is only a finely-cut form of *radicans*.

16. TRICHOMAXES RADICANS. Telaasserim on the Mook *vit Mt.*  
 Perak. (*King*.)

17. TRICHOMANES AI *RICULATUM*, Perak. 3,000 feet. (*Day*)  
*kortechini*.)

18. TRICHOMAXES JAVANICUM. (*Bl.*) Perak. (*King*.)

20. TRICHOMAXES HISPIDULUM. (*Mett.*) " Rhizome woody, suberect; scales minute, subulate bright-brown ; stipe 1-2 foot long, winged, and slightly crinite upwards ; fronds 1-2 foot, deltoid 4-pinnatifid ; main rachis narrowly winged throughout ; pinnae close deltoid, lowest much the largest, 1-3 <sup>m</sup> cent produced on the lower side ; pinnules close, lower deltoid, truncate on the lower side at base ; ultimate lobes distinct broad, 1-1 line long ; texture rather thick ; colour, dark olive

green; surfaces naked; sori copious, placed on the upper side of ultimate lobes; involucre minute, free, funnel-shaped, with a ciliated entire mouth and long receptacle." *Hook. Syn. Fil.* p. 466. *Kuhn, Linn.* xxxv. p. 389.

Perak. (*Scortechini, King.*)

(Also near Labuan, in Borneo.)\*

21. TRICHOMANES GEMMATUM. (*J. Sm.*) "Rhizome strong, wiry, tomentose, beset with numerous long black wiry fibres; stipes 1-3 inches long, naked, wiry, winged above; fronds 2-6 inches long, 1-2 inches broad, erect, subrigid, ovate-oblong, bipinnatifid; main rachis narrowly winged; pinnae erecto-patent, cut down to a narrowly winged rachis, lower pinnules deeply forked with subrigid, linear-filiform segments  $1\frac{1}{2}$ -2 lines long; cellules large; sori 1-8 to a pinna, minute axillary; the tube turbinate stalked; the mouth nearly truncate." *Hook. Syn. Fil.* 87. *T. cellulorum, Sturm.* *Hook. Second Cent. Ferns*, t. 63. *T. filiforme, Sturm.* *T. longisetum, Brack.* *T. Asce-Grayi, V. D. B.* *T. feniculaceum, Hook. Sp. i. p.* 135 (in part).

Perak. (*Scortechini.*)

(Also in Java, Philippines, Polynesian Islands, Venezuela, North of Brazil.)

22. TRICHOMANES MAXIMUM. (*Bl.*) "Rhizome stout, creeping; stipe strong, erect, 3-6 inches long; fronds, 12-18 inches long, 6-9 inches broad, ovate, quadripinnatifid; pinnae erecto-patent, ovate-lanceolate, the largest 4-6 inches long, 2 inches broad; pinnules lanceolate-deltoid, 1 inch or more long, cut down to the rachis into segments, which are again deeply pinnatifid, ultimate segment  $1\frac{1}{2}$ -2 lines long, slightly flattened; texture subrigid, surface naked, dark-green; a central costa only in each segment; sori 2-3 to a pinnule; involucre cylindrical, the mouth dilated but not 2-lipped." *Hook. Syn. Fil.* p. 86. *T. anceps, var.  $\beta$ , Hook. Sp. Fil. i. p.* 135 l. 40 c. 3. *T. intermedium, V. D. B.*

Perak. (*Scortechini, King.*)

(Also in Java, Borneo, and Polynesian Islands.)



23. TRICHOMANES PLUMA. (*Hook.*) " Rhizome short, ing, clothed with dense minute fibrillose bright-brown scales, stipe 2-4 inches long, terete, wiry ; fronds lanceolate, 4-6 j inches long, 1-1½ inches broad compound; rachis stiff, terete trrough-out; pinnae crowded, 20-30-jugate spreading, under § inch b broad, lower pinnules sparsely pinnatifid, cut into distant bris tie-like dichotomously-forked lobes, J~£<sup>m c n</sup> l<sup>o n g</sup> which spread in all directions; sori few placed near base of upper pinnse ; in volucre under -| line long, stalked, with a funnel-shaped tube, t truncate mouth, and very long receptacle." *Hook, Syn. Fit. 4< tab. 997.*

Perak. (*Scortechini.*)

(Also in the Malay Islands.)

24. TRICHOMANES APIIFOLIUM. (*PresL*) Stipes tuft ed, 2-4 inches long, strong, erect, more or less fibrillose, and ' the talz densely so at the crown ; fronds 9-38 inches long, 4-? inches broad, ovate, quadripinnatifid, the main rachis only slightly winged towards the apex ; lower pinccc 4-6 inches 1< long, 1-1½ inch broad, lanceolate acuminate ; pinnules with m numerous segments, which are again cut down into slightly flattened ultimate divisions about 1 line long ; texture subrigid, surface naked, a single costa only in each segment ; sori 2-12 to a pinnule, small, the involucre short turbinate. *Syn. Fil. 1. 36.*

Mount Ophir, Malacca. (*Dr. King's collectors,*)

(Also in Java, Philippines, Polynesian Islands, and Norfolk Island.)

25. TRICHOMANES PARVIFLORUM. (*Pair.*) Stipes neatly tufted, erect, wiry, 2-4 inches long, naked or tomentose fronds 4-8 inches long, 1^3 inch broad, erect, rigid, ovate-lanceolate; main rachis naked or slightly winged above; lower pinnae spread- ing or erecto-patent, 1-1^ inch long, cut down quite or nearly to the rachis ; pinnules regularly pinnatifid, with simple 01 forked linear filiform segments i-ii lines long ; texture subcoriaceous

sori 2-3 to a pinna, minute axillary; the mouth rather spreading, but not two-lipped. *Hook. Syn. Fil.* 88. *T. feniculaceum*.

(L. C.)

Perak. (*Day*.) Singapore. (*Moore's Herb.*)

(Also in Borneo, Mauritius, Bourbon, and Queensland.)

#### TRIBE IV — DAVALLIÆ.

3A. HUMATA, SESSILEFOLIA. (*Bl.*) "Rhizome very long, wide, creeping, densely clothed with rigid filiform scales; fronds subsessile, 2-4 inches long, 1-1½ inch broad, ovate-lanceolate, cut down nearly to the rachis into parallel linear-oblong entire or shallowly lobed, the lower side of the lower one sometimes deeply pinnatifid; texture subcoriaceous; sori in two rows in the lobes, occupying the greater part of the space between the costa and margin." *Hook. Syn. Fil.* p. 89.

Singapore. (*Sinclair*.) Also in *Moore's Herbarium*.

(Also in Java, Celebes, and Fiji.)

4A. HUMATA, FISSATIFIDA. (*Baker*.) Rhizome slender, firm, wide-creeping, clothed with close-pressed ovate peltate scales, glaucous beneath the scales; stipes distant, firm, erect, stramineous, up to 4 inches long; fronds elongate-deltoid, broadest at the base, gradually narrowed towards the apex, 3-3½ inches long by 2½ inches broad at base, pinnatifid nearly to the rachis into numerous deltoid-lanceolate, entire or slightly lobed segments, the lowest pair much the broadest, deltoid, lobed on the lower margin; texture rigidly coriaceous; veins simple or forked; sori terminal on the veins; indusium rigid, persistent, much broader than long. *Baker, Jour. Linn. Soc.* xiv. 257.

Larut, Perak, on trees in dense jungle, 3,500-4,500 feet alt. (*Dr. King's Collect.* No. 6903.)

(Also in Borneo, on the Niah Hills.)

2. *LEUCOSTEGIA MEMBRANULOSA*. Near Darjeeling, 6,000 feet alt. (*Livingst.*)

3. *LEUCOSTEGIA MULTIDENTATA*. Kohima, 6,000 feet alt. (*Walt.*)

4. *LEUCOSTEGIA ASSAMICA*. Kohima, 4,500 feet alt.; N. Manipure, 5,500 feet alt. (*Clarke.*)

The Kohima specimens are more finely cut, and the segments closer than in the type.

5. *LEUCOSTEGIA IMMERSA*. Chamba (*McDonell*); Simla (*Cuttell*); N. Manipure, 6,000 feet (*Walt.*)

6. *LEUCOSTEGIA HOOKERI*. Yunan. (*Delavay.*)

7. *LEUCOSTEGIA PULCHRA*. Chumba; Kullu; Simla; Kashmir, up to 10,000 feet alt. Perak.

VAR.  $\beta$  DELAVAYI. Ultimate segments very finely cut, being narrower than the sori, and of more rigid texture. *Clarke, Jour. Linn. Soc.* xxiv. 410.

Khasia, at Maophlang, 5,600 feet alt., and at the Vale of Rocks, 5,000 feet alt. (*Clarke.*)  
(Also in Yunan.)

9. *LEUCOSTEGIA HYMENOPHYLLOIDES*. Perak, 3,000 feet alt. (*Day, Scortechini.*)

11. *LEUCOSTEGIA NODOSA*. Perak. (*Scortechini.*)

12. *LEUCOSTEGIA YAKLAENSIS*, (*n. sp.*) Stipe 1 foot or more long, furnished with large lanceolate acuminate membranous scales, more copious towards the base; fronds deltoid lanceolate  $1\frac{1}{2}$ -2 feet long quadripinnate; pinnae erecto-patent, lanceolate, attenuated towards the apex and base 6-12 inches long,  $3\frac{1}{2}$ -8

inches broad at the centre, somewhat coriaceous in texture; secondary pinnae oblong lanceolate; tertiary about  $\frac{1}{2}$  inch long, deltoid or deltoid oblong, with 4-10 distinctly petioled small pinnules, the lowest superior one again pinnatifid, the others inciso-dentate; partial rachises glabrous or sparingly scaly; a gland present on the main rachis at the insertion of the pinnae; veins swollen, pinnate or forked in the ultimate lobes; sori axillary; indusium as in the genus.

Yakla, Sikkim (No. 9,829, *Clarke*, under the name of *Atlyrium Atkinsoni* var. *Andersoni*, but not the fern described *Wai-such*). Yaksam (*Anderson*), 4,500 feet alt. (No. 1,512).

1. PROSAPTIA EMERSONI. Perak, (*Day*, *Scortechin*.)

2. PROSAPTIA CONTIGUA. Singapore. Perak (*Day*, *Scortechini*. *King*, No. 2,107.)

1. DAVALLIA TRIPHYLLA. Perak. (*Dr. King's collectors*, No. 974 and 8,149.)

2. DAYALLIA SOLIDA. Perak, sea level. (*Day*.)

5. DAVALLIA DIVARICATA. Munipore. (*Watt*.) Katakhal Forest, Cachar (*Mann*). Of very large size and dull coloured, instead of shining, stipes 18 inches long; fronds 3 feet long and nearly 3 feet set broad; lower pinnae 16 inches long.

7. DAVALLIA LORRAINEI. Perak. (*King*, No. 6,381.)

8. DAYALLIA BULLATA.

VAR. *p* CVPHOCHLAMYS. *Clarke*, *Jour. Linn.* &v. xxiv. p. 411; involucre broadly campanulate, the mouth wider and more open; scale 3 of the rhizome not ciliate.

Khasia, near Shillong, 4,000 feet alt. (*Clarke*. *Mann*.)

2. MICROLEPIA PINNATA.

VAR. LUZONICA. (*Hook.*) Pinnæ lobed, lobes up to  $1\frac{1}{2}$  inch long, erecto-patent.

Larut, Perak, 2,000-3,000 feet alt. (*King, No. 2,144.*)

Dr. King's specimens differ from those of Java and the Philippines and from Sir W. Hooker's fig. in *Sp. Fil.*, in having only the central portion of the pinnæ expanded into lobes  $1-1\frac{1}{2}$  inch long on each side, there being a long caudate apex, and a long entire basal portion.

6. MICROLEPIA KURZII. Perak\* (*Dr. King's collectors, No. 2,397.*)

FOA. MICROLEPIA MOLUCCANA. (*Bl.*) Stipe strong, erect, about 1 foot high; fronds 2-4 feet long, 9-18 inches broad, deltoid, quadripinnatifid; lower pinnæ lanceolate, 9-12 inches long, 4-6 inches broad, the segments of the pinnules cut down to the rachis into broadly-toothed oblong lobes in the lower part; texture subcoriaceous; both surfaces naked; sori 1-6 in a lobe placed in the teeth, small, submarginal, *Hook. Syn. Fil. p. 99.* *D. inequalis*  $\gamma$  minor. *Hook. Sp. Fil. i. p. 180, tab. 58.* (*D. campyleura, Kze.*)

Khasia (*Griffith.*) Perak, 3,000-4,000 feet alt. (*Scortechini.*) (Also in the Malay, Philippine, and Polynesian Islands.)

1. STENOLOMA CHINENSIS. Simla. (*Trotter.*)

1. CYSTOPTERIS FRAGILIS. Cashmir, 5,000 feet alt. (*Trotter.*)

1A. CYSTOPTERIS MONTANA. (*Link.*) Rhizome wide, creeping; stipe slender, erect, 6-9 inches long; frond about 6 inches each way, deltoid, quadripinnatifid; lowest pinnules deltoid lanceolate,  $1-1\frac{1}{2}$  inches long,  $\frac{1}{4}-\frac{1}{2}$  inch broad; segments cut down

to the rachis below, the lobes oblong, 2 lines long, 1 line broad, deeply and sharply toothed ; texture thinly herbaceous; sori small, 18-24 to the lower segments." *Hook. Syn. Fil* p. 104.

Cashmir.

(Also mountains of Scandinavia, Scotland, and Central Europe ; Kamschatka and N. America.)

IB. CYSTOPTERIS SUDETICA. (*A. Br. and Milde.*) Rhizome wide-creeping glabrous ; stipe slender elongate, 4-6 inches long ; frond 4-5 inches long by 4 inches broad at base, triangular tripinnate ; pinnae lanceolate acuminate, herbaceous in texture the final segments obtuse inciso-denticulate ; sori large  $x \sim \%$  to the larger segments; indusium glabrous. *Hook. Syn. Fil* IO-\*  
C. moupinensis Franchet Pl. David, ii. 149, *Davallia triangularis*. *Baker*). *Ann. Bot.* v. 1891.

Chambi (*Dr. King*, No. 83), Moupine, Thibet, Yunan. In outline like *montana*, but texture cutting and shape of the segments like *fragilis*.

"\*Also in China, Silesia, and the Carpathians.)

>. CYSTOPTERIS SETOSA. Khasia Hills. (*Mann.*)

### TRIBE V.—LINDSAYEAE.

3A. LINDSAYA BORNEENSIS. (*Hook.*) " Rhizome short, creeping, pileaceous ; stipe strong, erect, polished, 9-15 inches long ; fronds 12-18 inches long, 9-12 inches broad, with a long unbranched apex and 6-9 erecto-patent branches on each side, which are 6-9 inches long ; pinnules 3-4 lines long, 1^2 lines deep, closely placed or even imbricated, quite entire, the outer edge blunt • texture pellucido-herbaceous; veins prominent sori in a continuous marginal line." *Hook. Syn. Fil* p. 107.

Perak. (*Scortechini*.)

(Also in Borneo.)

4. LINDSAYA ORBICULATA. Mr. Wall has sent from Ceylon specimens quite connecting schizophylla with the type. (*Vide specimens in Kew Herb.*)

6. LINDSAYA RIGIDA. Perak. (*Scortechini.*)

8. LINDSAYA DIVERGENS. Perak. (*Scortechini.*) Penang 2,000-3,000 feet alt. (*Day.*)

10. LINDSAYA HETEROPHYLLA. This can only be considered a free-veined variety of *Schizoloma heterophylla*; the venation is very untrustworthy in *Lindsaya* and *Schizoloma*.

1. SCHIZOLOMA LOBATA. Perak. (*Scortechini. King.*) Some of King's specimens have free veins.

2. SCHIZOLOMA DAVALLIODES. Perak. (*Scortechini. King.*)

3. SCHIZOLOMA CORDATA. Gathered lately in Borneo by Hose.

5. SCHIZOLOMA ENSIFOLIA. Perak. (*King's collectors, Nos. 1,179.*)

#### TRIBE VI.—PTERIDEÆ.

2. ADIANTUM LUNULATUM. Perak. Sea level. (*Day.*) Some specimens from the Bombay Presidency and other parts of India have the pinnules quite entire.

VAR.  $\beta$  METTENII; caudatum var.  $\gamma$  soboliferum is, I believe, a synonym here; at least I cannot distinguish Wallich's specimens in the Linnæan and Kew Herbaria. *Mettanii* has been found in the Philippines.

3A. ADIANTUM FEGEWORTHII. (*Hook.*) Stipe elongate, slender, as well as the rachis, orbaceous glabrous; frond linear-oblong.

elongated attenuated often rooting at apex, and there bare of pinnae • pinnae nearly sessile, alternate dimidiato-oblong, rather acute the upper base truncated and parallel with the rachis ; upper margin obscurely lobed ; lobes truncated, each bearing an oblong elongated sorus. *Hook. Sp. Fil.\** 14. ADIANTUM CUM-DATUM, VAR. 0 EDGEWORTHII *Bcdd. Handbook, p. 84.*

4. ADIANTUM CAPILLUS-VENERIS VAR. FERGUSONI. *Moore, Gard. Chron.* 1884, »• 360. A very fine large form of this species, now in cultivation in England, originated as a sport, it is supposed, in a garden at Columbo (Ceylon).

4A ADIANTUM CAPILLUS-VENERIS VAR. WATTII. Rhizome creeping, sparingly scaly; stipes up to 7-8 inches long, naked, slender, castaneous or black, shining ; fronds deltoid or sub-deltoid 3-pinnate, glabrous, moderately firm, up to 1 foot long 4-7 inches broad at base, with a long unbranched apex ; pinnae erecto-patent, gradually smaller and simpler upwards ; secondary pinnae erect, with 3-6 stalked pinnules, which are entire or variously lobed, obscurely crenulate when sterile ; sori 1-4 to a pinnule ; indusium firm from orbicular or reniform to oblong, the shape depending on the cutting of the segment. *Adiantum Wattii. Baker. Jour. Bot. xviii. 381 tab. 14* (from small poor specimens). *Adiantum Levingei. Baker, Jour. Bot v. 1891.*

' N. India, Chingtang, 3,000 feet alt. Sikkim (*Levinge*). Chamba State. (*Watt.*) Pangi, Chenab Valley, 8,000 feet alt. (*McDonell*) Copious specimens from these localities prove that Mr. Baker's supposed species belong to the same plant. I cannot regard it as more than a slight variety of *Capillus-Veneris*, very similar to some of the Crimean forms; in fact some of my specimens of var. *Loweii* from the Crimea might be ranged with it.

5. ADIANTUM ETHIOPICUM. Afghanistan.

6A. ADIANTUM DAVIDI. (*Franchet.*) Caudex creeping ; stipe black, shining, stiff, 6-10 inches long ; frond broad, triangular,



acuminâte, 3-6 inches long,  $2\frac{1}{2}$ -5 inches broad at the base, texture coriaceous, tripinnate, more or less glaucous beneath, the tertiary pinnules or segments inversely triangular, subflabellate, the broad apex very sharply toothed, the teeth long; sori 1-2 to each segment. *Franchet Pl. David* ii. 150.

Moupin, Thibet (*Père David*) differs from *venustum* in its triangular form, its coriaceous texture, and in the shape of its ultimate pinnules.

7. ADIANTUM PEDATUM. Kangra (*Cuttell*), Chamba (*McDonell*), Hatuj 10,000 feet alt. (*Blanford*).

#### GENUS XXIVA.—HYPOLEPIS.

(*Hypo*, under; *lepis*, a scale.)

Sori marginal at the apex of the veins, small, distinct, occupying the axils of the lobes. Indusium small, suborbicular, membranous, formed out of the reflexed margins. Veins simple or forked, free.

Rhizome wide-creeping. Fronds large, compound.

HYPOLEPIS PUNCTATA. (*n. sp.*) Rhizome large, wide-creeping; fronds 4-6 feet long, quadripinnatifid, bright green in colour, rachises strigose; pinna herbaceous, about 2 feet long and more than a foot broad at base, on petioles about 2 inches long; secondary pinnae lanceolate, 6-8 inches long; tertiary pinnae about  $1\frac{1}{2}$  inches long,  $\frac{3}{8}$  inch broad, cut down nearly to the rachis (leaving a wing) into 10-12 oblong obtuse segments on each side which are bluntly lobed, surfaces glabrous, the tertiary rachis and midrib with a few longish white hairs on both sides; sori in the axils of the 1-2 lower lobes on each side of the segments.

Larut, Perak, 4,400 feet-6,000 feet alt. (*Dr. King's collector*, No. 5,015.)

This is exactly like *Phegopteris punctata* in cutting, &c. but having a most distinct membranaceous indusium, I cannot refer it

to that genus, the *Phegopteris*, however, will, I expect, eventually be referred here (see the remarks in *Syn. Fit.* under *Hypolepis Purdieana* and *Phegopteris punctata*, // 130 and 312). I have never detected a regular indusium in the *Phegopteris*, but the unchanged margin of the frond is often relaxed over the sorus.

t. CUEILANTHES DUTHIEL. {*Baker, Ann. Bot'vol. v* }  
 Caudex erect; stipes densely tufted, castaneous, glabrous, 1-1\* inch long, with a few scales towards the base; fronds oblong-deltoid, membranous, glabrous, pinnate, pinnatifid upwards, 2 inches long, green on both surfaces; pinnae oblong-deltoid, sessile, the lowest the largest, produced on the lower side • pinnules oblong, J-J inch broad; sori placed all round the edge of the pinnules, usually orbicular, rarely confluent; indusium grey, glabrous, orbicular-reniform, persistent. Cutting of *subvillosa*, but different in its indusium. It belongs to Fee's section *Adiantopsis*, which has the involucre distinct and roundish, confined to the apex of a single veinlet, instead of being more or less 3 confluent.

Rock crevices near the Kinari Pass, 12,000-13,000 feet alt. (*Garhwal*).

4A. CHKILANTHES TRICOPHYLLA, (*Baker.*) Caudex erect; stipes tufted, pubescent, brown, 4-5 inches long; fronds oblong-lanceolate, tripinnatifid, coriaceous; a foot long, 3-4. inches broad; main rachis flexuose, pubescent, glaucous, sparingly hairy above, less so or glabrous beneath; pinnae patent, oblong-lanceolate; secondary pinnae shortly petioled, triangular from a broad base, cut down nearly to the rachis into linear falcate segments the lower ones about 1/2 inch long; veins invisible; indusium broad, whitish, continuous, persistent. (*Baker, Ann. Bot v. 1891.*)

Yunan; on the mountain Yanin Glan, above Lan Kong. (*L~)elavay.*)

7. CHEILANTHES TENUICOLLIS. Ceylon. (*Tn'men.*)

8. CHEILANTHES FARINOSA. Mr. Blandford has proposed the name of anceps for the lanceolate variety of farinosa, so common on all the mountain ranges in India ; it, however, was figured by Hooker in his *Sp. Fil.* as *bullosa* (*Kze.*, vol. *U. pi.* 9) and afterwards by me under the same name, *l.* 192, *Ferns of India*. I afterwards found, by long observation, that it runs so imperceptibly into the more deltoid forms which grow at low elevations that I did not even propose it as a distinct variety in my handbook ; the stipes and rachises vary from being very slender to quite glabrous, (*Vide Kunze Linnwa.* xxiv. p. 272). *U.* ; separate name is given to this form it should be *var. bullata* (*Kze.*)

CHEILANTHES FARINOSA VAR. DIMORPHA. (*Blanf.*) ^ "Stipes slender, 2-6 inches long, light brown, naked or bearing a few thin, brown and translucent-lanceolate scales near the base; form\* dimorphous, one form narrow-lanceolate, 4-5 inches long, 1/2 inch broad, thin papyraceous, lower 3-4 pairs of pinnae subequal distant, under surface thickly coated, upper surface sprinkled with white powder, segments narrow-oblong; the other form obovate lanceolate, pinnae close triangular ; lower two pairs equal, both forms fertile, involucres as in typical farinosa." *Blandford's Journ. Asiatic Soc. of Bengal, vol. lviii. p. 2, 1. 3<sup>o</sup>2-*

Nagkanda, 8,300-8,500 feet alt. ; Darjeeling, 8,000 feet alt. ; Nankow, 2,500 feet alt. *Clarke*, No. 4J.686 *Cheilanthes farinosa* var. *tenera*. *Clarke and Baker, Ferns of N. India J. Linn. Soc. vol. xxiv. p. 411.*

A delicate, slender plant. I have never seen any form like it in Southern India. I attach no importance to the dimorphism of the fronds, as typical farinosa and some other of the variety show this tendency more or less.

CHEILANTHES FARINOSA VAR. BUBDIMORPHA. *Clarke and Baker, Ferns of N. India, four. Linn. Soc. vol. xxiv. p. 411.* Shillong, 2,000

The character of this variety is a very short, triangular frond on a very long stipe; it is, however, only an extreme form of deltoid **farinosa**; some of my fronds are 14-15 inches long including the stipe, the frondiferous apex being only 3 inches; the shorter stiped fronds are, however, all fertile in my examples, and of the same triangular form; it approaches *C. argentea*, but the frond is much more cut.

*CHEILANTHES FARINOSA* VAR. *ALBO-MARGINATA*. (= *Cheilanthes albo-marginata*, No. 10 of *Handbook*.) Typical specimens of this fern differ from *Dalhousiæ* in the scales having translucent margins, in the presence of farina, and in the involucre being much lacerate; it is so closely allied to *Dalhousiæ* that I now place it also as a variety of *farinosa*; the character of the scales is not constant.

9A. *CHEILANTHES DELAVAYI*. (*Baker*.) Caudex erect; stipes tufted, hairy, castaneous, 5-6 inches long; frond deltoid or oblong-deltoid, tripinnatifid, 6 inches long, 2-3 inches broad herbaceous, green on both surfaces, a little pubescent; lower pinnae the largest deltoid-petioled; secondary pinnae deltoid,  $\frac{1}{3}$ - $\frac{1}{2}$  inches broad, cut down nearly to the rachis into contiguous oblong segments; veins clearly visible, pinnate in the segments, the veinlets forked; indusium continuous, pale coloured crenate persistent. *Baker, Ann. Bot.* v. 1891.

Yunan, Shwang Sheteon, above Tapintze, near Tali. (*Delavay*.) Very near some of the less cut forms of *subvillosa*, and probably only a deltoid form of that species.

12. *CHEILANTHES ARGENTEA*. The Birmese locality is the Zwakabin Mountain, where it was collected by Mr. Parish at 1800 feet alt.

*Pellaea tambura* (*Hook.*), *Handbook*, p. 101, is a synonym here.

VAR. MUL-HSECTUM. Very distinct as the ^extreme forms of this appear, Dr. Watt has supplied me with ^jery comple e series, graduating from the most simple form of japomcum to the finest cut multisectum ; the latter is very common about Simla, 6,000-9,000 feet alt,

1. CRYPTOGRAMME CRISPA. Gathered by Prain in the crater on Barren Island, Andamans.

(Also in Afghanistan.)

3. PELL<sup>^</sup>A TAMBURU. Omit this species ; it is a synonym of *Cheilanthes argentea*.

1. PTERIS LONGIFOLIA. Perak. (*Day, Scortcchun*)

2. PTERIS CRKTICA. Perak.

(3. PTERIS KNSIFORMIS.

VAR. *fi* GREVILLEANA. This is probably only a variety of *Ureviileana* No. 11, as suspected by Mettenius. Specimens a collected by Bishop Hose in Borneo have the ironods of both c the same root. I have not seen the digitate fronds on any ot tne N. Indian examples.

10. PTERIS QUADRIAURITA.

VAR. SETIOERA. The oldest name for this is *Pteris hamulosa*. (*Wallich*); it should be PTERIS QUADRI-AUKITA VAR. *HAMVLOS*. , {*Wall.*)

VAR. , suBQinNATA. (*Wall.*) A small form, 8-10 inches high ; stipes stramineous ; fronds short deltoid, lateral pinnae often only 1-2, rarely 3-4 pair, with a large terminal central pinna, segments long, nearly equally broad throughout, spreading at right angles from the midrib, lower basal segments of the lower pinn\* only slightly enlarged and pinnatifid, or quite entire and uniform with the others.

Nepal {*Wallich*), Kumaon 3,000 feet alt. at Bagasar {*Strnchy an I » f a ^ , « )* , Lachen Valley (*.Lcvingc*). Mr. Levmgc s

specimens are more slender than Wallich's type more papyraceous in texture and furnished with a broad white band down the centre of each pinna; it would be a very pretty plant for cultivation.

VAR.  $\kappa$  ASPERULA (*f. Sm.*) Stipe up to 2 feet long, together with the rachis asperous, pinnae comb-like, with a long caudate apex, cut down nearly or quite to the rachis into numerous narrow pinnules 1 inch long,  $\frac{1}{2}$  inch broad, numerous long stiff setae on the rachis of the pinnae and midrib of pinnules.

Garo Hills, Assam, on the Tura Peak, 3,000 feet alt. (*G. Mann.*)  
A very elegant variety.

VAR.  $\lambda$  DEPAUPERATA. Pinnæ 4-6 pair, the lower ones gradually diminishing in size, and the lowest simply pinnate, without any auricles, so that the frond is obovate in outline, apex of pinna sometimes long caudate.

Perak at no elevation (*Kunth*, No. 1,405); Manipore (*Dr. Watt*, No. 5,992); S. Andaman Islands (*Prain*).

11. PTERIS GREVILLEANA. *Pteris quadriaurita* var. *digitata*. *Baker Jour. Bot.* 1879, p. 40. Lakhimpore, 300 feet alt. Garo on the Garo Hills, 1,200 feet alt. (*Clarke*). Cachar, (*Keenan*). Perak. (*King's collectors*, No. 7,092.)

Also in Tonquin; Borneo. (*Burbridge and Hase.*)

13. PTERIS EXCOLSA. Specimens collected in the Khasia Hills by Jerdon have the rachis, partial rachis, and midrib finely scaly underneath. Mann sends specimens from the North Cachar Hills, 2,500 feet alt., with the lower pinnae bipartite, and occasional campteroid venation; *excolsa* can be easily distinguished from *longipinnula* by the stipes and rachis being bright chestnut-coloured; in *longipinnula* they are bright green or stramineous.

14. PTERIS PATENS. Birma. Perak, 5,700 feet alt. (*Day*.)

15. CAMPTERIA MALAYANA.

Dr. King's collectors have gathered in Perak a variety with the fronds glaucous underneath, No. 1,338.

There is a white banded variety of this common in Ceylon, exactly similar to *Pteris quadriaurita*, var. *argentea*, except in venation; the same is common in cultivation in England.

VAR. MAJOR. Segments very large, as in *longipinnula*; veins excurrent at the margins; lower pinnae bipartite.

Sikkim. (*Dr. Watt*)

2. CAMPTERIA KLEIMAXA.

(Also in Madagascar, Aritananariria. Zambesi.)

5. \* CAMPTERIA WALLICHIANA. N. Manipore. (*Watt, Ch...*)

1. DORYOPTERIS LUDENS. Limestone rocks at Mouli (*Parish*) Naga Hills, 750 feet alt. (*Clarke*); Chattick, on the eastern range in Manipore, 5,000 feet alt. (*Watt*), very abundant.

2. LITOBROCHIA IXCISA. • Perak, 3,000 feet (*Day*); Manipore, 3,500 feet alt. (*Clarke*).

VAR. INTEGRIFOLIA. Pinnae petiolate; pinnules subpetiolar long, linear, acuminate, perfectly entire, obliquely cordate at the base, the basal pair not auricle-like, and an inch or more distant from the rachis; veins copiously anastomosing; sori continuous almost to the apex of the finely-acuminated point.

Maxwell's Hill, Perak. (*Day*.) I do not know how far this variety is constant; it looks very distinct from the ordinary form; Mr. Day collected • copious specimens. In the vast material at Kew from many countries there are no entire pinnuled specimens except from Perak, some specimens from Aneitium have the pinnules only slightly lobed,

3. *Litobrochia marginata* should be altered to *L. TRIPALITA* (*She*), that being the oldest name. Perak up to 3,000 alt, (*Day*).

*cor/echini*)  
1

2. *LOMARIA PROCERA*. (Spr.) Caudex stout, woody, elongated, clothed with large ovate or lanceolate ferruginous scales; stipes 6-12 inches long, stout, erect, scaly; barren frond, ovate or deltoid-triangular, 1-4 feet long, 6-12 inches broad; pinnae linear, 3-12 inches long,  $\frac{1}{2}$ -1 inch broad, the lower ones often stalked, the base rounded, cordate, or auricled, gradually narrowed into a point at apex entire or slightly toothed, texture coriaceous; veins fine, close and parallel, simple or forked; midrib beneath more or less chaffy; fertile pinnae much contracted; involucre broad, membranaceous ciliated.

Perak, Gunong, Bata-Putcho, 3,000-4,000 feet alt. on rocks in rich soil. (Dr. King's collector, No. 8,065.) In King's specimens the fronds are quite triangular, the whole of the stipe and rachis is densely covered with large orange brown scales; it is the variety called *vestita* by Blume.

1. *PLAGIOGYRIA ADNATA*. Birma, Nat. Young, 7,500 feet alt.

#### GENUS XXXVI.—*SADLERIA*. (Kaulf.)

Sori in a continuous line close to the midrib on both sides, placed on an elevated receptacle; involucre narrow subcoriaceous, at first wrapped over the sorus, afterwards spreading; veins forming a series of costal arches; caudex 3-4 feet high, arborescent.

*SADLERIA CYATHEOIDES*. (Kaulf.) "Stipes strong, erect, 6-18 inches long, naked except at the base, where it is densely clothed with long linear scales; fronds 4-6 feet long, 9-18 inches broad; pinnae 8-12 inches long,  $\frac{1}{2}$ - $\frac{3}{4}$  inch broad, cut down to the rachis into very numerous connected linear pinnules,  $\frac{1}{8}$ - $\frac{1}{2}$  inch broad, acute or bluntish; texture coriaceous; veins immersed and inconspicuous; rachis stout, naked." Hook. Syn. Fil. 187.

Perak. (Day.)

(Also in Sumatra and Sandwich Islands.)



TRIBE VIII.—ASPLENIEIE.

1. ASPLENIUM ENSIFORME. Mussoorie. {Hope.}

2A. ASPLENIUM MACTIERI. (Bcdd.) Caudex small, erect, scaly scales dark brown, with a paler margin, lanceolate from a broad base, finely acuminate ; stipes 6-9 inches long, pale yellow whitish at the base ; fronds 6-9 inches long, if inches broad, gradually narrowed below, gradually or finely acuminate at the apex, the margin crenate or serrate, texture subcoriaceous ; veins distinct, usually once forked from near the base, occasionally again forked towards the apex, not quite reaching the margin ; sori reaching from the midrib two-thirds towards the margin ; indusium broad and very prominent. *Jour. Bot.* 1888, 3.

Penang. (Mactier.) 1 Allied to Griffithianum, but with 3 long slender stipe, rather more coriaceous and paler in colour,

2B. ASPLENIUM SCORTECHINII. (Bcdd.) Stipes tufted, short, erect ; fronds linear-lanceolate, 2-2<sup>1</sup>/<sub>2</sub> feet long by about 1 inch broad, gradually attenuated below into the stipe and at the apex into a fine long point, the margin entire or sub-entire, texture coriaceous, glabrous, or with a few scales on the lower surface ; veins rather distant, once forked from below the middle ; sori exactly at right angles to the midrib, reaching two-thirds of the way to the edge. *Jour. Bot.* 1887, 322.

Perak, 3,000-4,000 feet alt. Caulfield's Hill. (Day. *Scortechinii* King, No. 2,149.) Near Griffithianum, but fronds longer with a much finer point, and the indusium quite square to the rachis.

2B. ASPLENIUM SQUAMULATUM. (B.) Stipes tufted, 1-2 inches long, strong, scaly below ; fronds lanceolate, 1 foot to nearly 3 feet long, 2-4<sup>1</sup>/<sub>2</sub> inches broad, broadest a little above the centre, very gradually narrowed below, and more suddenly upwards to an acuminate apex, and there sometimes pro-

texture coriaceous; veins simple or forked, one line apart, inconspicuous, not quite reaching the margin; sori extending from close to the midrib to  $\frac{1}{4}$ — $\frac{1}{2}$  inch of the margin; rachis stout, pale, furfuraceous on the underside, glabrous above. *Hook. Syn. Fil. p. 192.*

Perak, near Taepeng, at no elevation. (*Day, Scorletchum. King, No. 1,927.*)

Habit of *Thamnopteris*, but without the transverse inter-marginal vein.

(Also in Java, Borneo, and Philippines.)

20. *ASPLENIUM AMBOINENSE*. (*Willd.*) Rhizome creeping; stipes 1-6 inches long, more or less scaly; fronds lanceolate, 18-24 inches long by  $1\frac{1}{2}$ -2 inches broad, very gradually narrowed below, rather suddenly narrowed towards the apex into an acuminate point, where it is often proliferous, the margin entire or obscurely crenated, texture subcoriaceous, slightly scaly below and on the rachis; veins nearly at right angles with the rachis, simple or once forked  $\frac{1}{2}$  inch apart; sori extending from the midrib about two-thirds of the way to the margin. *Aspl. fijeense Brack. Hook. Syn. Fil. p. 192.*

Mergui and Tavoy. (*Parish.*) Perak, 3,000-4,000 feet alt. (*Day and Scorletchum; King, No. 2,141.*)

(Also in Fiji, Samoa, and Aneitium.)

3. *ASPLENIUM ALTERNANS*. Kbaria Hills, 3,000-4,000 feet. (*Mann.*)

4. *ASPLENIUM VIRIDE*. (Also in Afghanistan.)

5. *ASPLENIUM TRICHOMANES*. The altitude should be 4,000 to 11,000 feet.

6. *ASPLENIUM NORMALE*. Perak, 1,500 feet alt. (*Day.*)

(Also in Japan, Siam, Sumatra, and Madagascar.)

7. *ASPLENIUM SUBAERNIUM*. Perak. (*Scorletchum.*)

8. *ASPLENIUM SEPTENTRIONALE*. Lahoul, 13,000 feet, and up to the snow line. (*Trotter*.)

Also in Afghanistan, 7,000-11,000 feet alt.; Baramulla, 3,000-6,000 feet alt. (*Miss Farrall*.)

9. *ASPLENIUM LONGISSIMUM*. Garo Hills. Mumpore, 100-1,000 feet alt.

10. *ASPLENIUM WIGHTIANUM*—the variety *vulcanicum*. Perak. (*Dr. King*, No. 8,130, 8,424.)

VAR.  $\beta$  *MICROPHYLLUM*. Omit this, as it is *Asp. tenerum*.

11. *ASPLENIUM TENERUM*. South India on the Anamallay Hills. (*Asplenium Wightianum*, var.  $\beta$  *Bedd. Handbook*, p. 176.)

13A. *ASPLENIUM BORNEENSE*. (*Hook.*) Stipe 1-4 inches long, stout, arcuate fibrillose, fronds 1-3 feet long, 1-2½ inches broad, with very numerous sessile or shortly-petioled pinnae, the lower ones very gradually smaller, the central one ¼ to ⅓ inch deep, the point bluntly rounded, the upper edge inciso-lobate, auricled inwards and narrowed suddenly at the base, the rest and the outer part of the lower edge, which is very obliquely truncated at the base, distinctly toothed; texture herbaceous; rachis firm, nearly naked; veins flabellate in the outer half of the pinnae; sori few, almost in parallel rows. *Hook. Syn. Fil.* 203.

Perak. (*Day. King*, No. 1,928; alt. 500 feet.)

(Also in Borneo.)

14. *ASPLENIUM HIRTUM*. Madremacam Island, Mergui. Perak, 1,000-3,000 feet alt. (*Day*.)

10A. *ASPLENIUM DIMIDIATUM*. (*Sw.*) Stipes tufted, 3-12 inches long, blackish, slightly paleaceous; firm erect; fronds 6-15 inches long; pinnae 6-9 pairs, 1½-3 inches long, ¼-1 inch broad.

ovate-acuminate, the lower base obliquely truncate, the rest of the margin very sharply inciso-serrate, the upper base enlarged into a rounded or obovate lobe ; texture coriaceous ; veins close, pinnulate ; no distinct midrib ; sori narrow, long linear. *Hook. Syn. Fil.* 209.

Goping, Perak. (*Dr. Kings collector, No. 432.*) Perhaps only a variety of *falcatum*, but the pinnae are broader below and shorter.

(Also in Tonquin, Tropical America, Cuba.)

21. *ASPLKNIUM PARADOXUM.* {*King, No. 411, 7,164.*}

23. *ASPLKXIUM UNILATERAL?.*

VAR. *DELICATULUM.* Taok, Mr. Parish informs me, is the locality for this variety.

25. *ASPLENIUM LACINIATUM.*

VAR. *DEPAUPERATUM.* {*Clarke.*} Fronds small, 7-14 inches long ; pinnae small, 1-1½ inches long ; pinnatifid less than halfway to the midrib ; margins obtusely & acutely toothed. *Clarkt F. V. I. p. 482.*

I have received large specimens of this from Mr. Blandford, and agree with him that it must be recorded as a variety. It seems to connect some of the varieties of *furcatum* with this species, if it is not rather a variety of that fern. *Wall. Cat. 234, depauperatum*, is not this variety, but typical *Iaciniatum*.

VAR. *CRINIGKRUM.* Dr. Watt has collected fine specimens of this fern in Munipore. (No. 5,849.) It should perhaps be raised to specific rank between *furcatum* and *Iaciniatum*. Watt's specimens are put with *furcatum* at Kew, a species which does not occur in N. India.

27. *ASPLENIUM RUTAMTJARRIA.* Nepal, Kumaon, 10,000-12,000 feet alt. {*Duthic.*}  
(ALSO in Afghanistan.)

27A. *ASPLENIUM GERMANICUM*. (Wieg.) "Stipes densely tufted, 2-4 inches long, naked, slender, ebeneous; fronds 2-3 inches long,  $\frac{1}{2}$ -1 inch broad, lanceolate, cut down to the rachis into a few distant narrow flabellato-cuneate pinnae on each side the lowest of which are again deeply cleft and also slightly inciso-serrate towards the point; texture coriaceous; veins obscure subparallel; sori linear, when mature covering the whole breadth, but falling short of the point of the pinnae." *Hook. Syn. Fil.* 212.

Kashmir.

(Also in Scotland and Norway to Hungary and Dalmatia.)

28. *ASPLENIUM SAULII*. (*Hook.*) VAR. *PEKINENSE*. (*Hance.*) (= *Asp. pekinense*, *Handbook.*) Further specimens have shown that this is only a less compound variety of *Saulii*.

30. *ASPLENIUM FORCATUM*. Mr. Trimen sends from Passara, 1,500 feet alt., in Ceylon, a variety (probably abnormal) with the pinnae cut into filiform pinnules.

*ASPLENIUM FONTANUM*. Simla, 7,000-9,000 feet alt.

(Also in Afghanistan.)

VAR.  $\gamma$  *YUNANENSE*. (*Franchet.*) Stipes densely tufted, short; fronds 4-6 inches long, linear,  $\frac{1}{2}$ -1 inch broad, pinnules broad, lanceolate, cut down halfway or more to the rachis into several incised, small, oblong, or falcate lobes, the lowest superior one being generally larger and pinnatifid. *Asplenium yunanense*. *Franchet in Bull. Bot. Soc. France*, xxxii.

\* Yunnan. (*Delavay*) Seems scarcely to differ from typical *fontanum*.

✓ 34. *ASPLENIUM VARLEANS*. Khasia Hills, 4,000 feet. (*Munz.*) (Also in Afghanistan, 11,000 feet alt.)

34A. *ASPLENIUM MOUPINENSE*. (*Franchet.*) Rhizome short, scales black; linear, long-acuminate; stipes tufted, coriaceous.

•lightly scaly, 1-2 inches long ; fronds 5-8 inches long  
 broad at middle, thick and firm in texture, narrow lanceolate,  
 much attenuated at the base, subbipinnate ; pinnules <sup>1-1 1/2</sup> inch  
 very deep, pinnules obovate,  
 use or 2-3 lobate ; veins pinnate,  
 veinlets forked ; sori oblong, straight ; indusium membranaceous,  
 pellucid. *Franchet, Pl. David. ii.*

Moupin, Thibet. Said to be near *varians*, but inner texture, and the segments closer.

38. ASPLENIUM BELANGERI. Manipore. (H. Na 7,480.)

1. ATHYRIUM SPINULOSUM. Chumba (*Dr. King, No. 8,500.*) Rhizome wide-creeping

2. ATHYRIUM ATKINSONI. Rhizome thick, upright ; fronds aggregated. Easily distinguished by its upright, very deltoid shape ; it is not a very good specimen of *fimbriatum*. It has lately been collected in the Jalori Pass, 10,000 feet (No. 490), and by Mr. Duthie - in the fimbriatum, and in part *Leucostegia yaklaensis* (Mr. Clarke's *Atkinsoni*, var. *Andersoni*).

4. ATHYRIUM DREPANOPHYLLUM. (*Baker.*) (*falcatum* *Bedd.*)  
 Anammarree Hills. (*Duthie and Blanford*)  
*farm.*) Asia Hills.

5. ATHYRIUM THELYPTEROIDES. Mt. Simala - 8,500-9,000  
 Bt alt.

7. ATHYRIUM NIGRIPES, Fronds deltoid, bipinnate.  
 Reduction of

VAR. TENUIFRONS. (*Wall. Cat.* 206.) Very like the type, fronds gradually attenuated towards the base, intermediate between the type, and *Clarkei*, not nearly so narrow or elongate\* as the latter, and not rooting at the apex; the channelled second rachis, the channelled midrib of the pinnae, and sometimes veins furnished with weak setae on the upper surface, as in type and in *Clarkei* (which distinguishes this species easily from some of the varieties of *felix-foemina*). Referred in the *Synopsis* to *felix-foemina*, and by Mr. Clarke as a synonym of *Clarkei*. Considered a species by some pteridologists.

VAR. STRAMINEUM. (*Moore, Index Fil.* 1. 188.) Stipe rachis pale yellow, pinnae distant, very narrow, scarcely 1 line broad, not attenuated at base, texture rigid, pinnules distant.

Khasia, 4,000-5,000 feet alt. (*Book, and Thomson.*) Shilloi Khasia Hills, 5,000 feet alt. (*G. Mann*), Min Sardan, Sikim, 12,000 feet alt. (*King*.)

8. ATHYRIUM SOLENOPTERIS. Kashmir, Khasia, Kohi 6,000 feet alt. (*Watt.*) Kunze's name is *solenopteris* (not *opteris*).

8A. ATHYRIUM ATRATUM. («, *sp.*) Rhizome erect, furnished with numerous long, stiff, wiry roots, crown furnished with narrow, linear, glabrous, pale-coloured scales; stipes aggregate, glabrous, 1-3 inches long; fronds 6-12 inches long, 2-4 inches broad, lanceolate, attenuate at both ends bipinnate, turning black in drying; pinnae: oblong acuminate (the lower pinnae being the largest), about 1/2 inch broad; pinnules (the lower ones distinctly stalked) dimidiate, being always more or less cut away at the base and more developed on the upper side, cut down towards the midrib into several small lobes which have 2-4 sharp unequal serratures at the otherwise rounded apex; veins forked bipinnate in the lobes; sori very small, about the centre of veins; indusium athyrioid, fugacious,

Muniporc. (*Wait, Atf.* 6,159.) Easily recognised by its near

jet-black colony when dry; not like any other species that I am acquainted with.

8b. *ATHYRIUM McDONELLI*. (Bedd.) Rhizome stout, creeping; stipes much thickened at the base, about 12 inches long, furnished with a few deciduous large lanceolate scales, and furfuraceous, as is the rachis, with tawny, curled, hair-like scales; fronds pinnate, about 12 inches long by 8-10 inches broad at the base, ovate to deltoid-lanceolate; pinnae lanceolate, about 18-20 pairs, alternate or subopposite, 4-5 inches long by about 1½ inch broad, pinnatifid nearly to the midrib, leaving only a winged margin to the villous partial rachis; pinnules ligulate-oblong from a square base, about ½ inch broad, cut down about ¼ into small oblong lobes; texture herbaceous; surfaces naked or nearly so; veins one to each lobe, forked or pinnate or rarely simple; sori one to each lobe, not reaching the margin; involucre athyrioid or asplenoid, generally very hippocrepiform, never diplazioid. *Bedd. Jour. of Bot. March, 1839, p. 73.*

Chamba State, 5,000 feet alt. (*McDonell*) A very distinct species, with the habit of the Ceylonese *Diplazium Schkuhrii* and the Cuban *Diplazium conchatum*.

8c. *ATHYRIUM DUTHIEL*. (Bedd.) Rhizome wide-creeping, black, nearly naked; stipe 3-4 inches long, furnished with a few ovate or lanceolate deciduous scales, glabrous, pinkish; fronds narrow, ovate-lanceolate, about 12 inches long, 3-4 inches broad; pinnae lanceolate, alternate, about 20 on each side; lower ones gradually reduced; the central ones 1½-2 inches long, ½-¾ inch broad, pinnatifid nearly or quite to the rachis into sharply-toothed obovate or lanceolate lobes about two lines broad; texture herbaceous; rachises glabrous pinkish furnished with a few deciduous large lanceolate scales; both surfaces glabrous; veinlets forked, sori asplenoid or hippocrepiform, 6-8 to each pinnule or lobe, 2-4, 3-4 on each side on the lower veinlets, midway between the edge and the midrib. *Bedd. Jour. of Bot. March, 1839, p. 73.*



N. W. Himalayas ; Gangotree, near the source of the Ganges, under Srikanta, 12,000-13,000 feet alt. At Ralam glacie, Kumaon, 12,000-13,000 feet alt. (*Dr. Duthie.*) Very similar in cutting to *Lastrea Brunoniana*, in which bundle they were first detected at Kew by Mr. Hope.

9. *ATHYRIUM CXYMNOGRAMMUM* IDES, VAR. *ERYTHRORACHIS* Dr. Trimen considers this a distinct species,

10. *ATHYRIUM FILIX-FEMINA*,

VAR. *DENTIGERUM*. Rootstock erect or sub-erect; fronds very large, gradually reduced towards the base, often 1 foot broad at the centre, bipinnate-tripinnatifid, or from the presence of a wing joining the pinnules only bipinnatifid.

VAR. *PECTINATUM*. Omit this as a variety; it is described below as a species.

VAR. *ATTENUATUM*. Rootstock erect or sub-erect ; stems numerous, tufted ; fronds narrow lanceolate or linear, gradually reduced below, 8-16 inches long by 1-3 inches broad at the centre, pinnate with the pinnules pinnatifid, or in rare cases sub-bipinnate.

I refer here *paraspathensis* (*Clarke*) and all the bipinnate forms with small, rather narrow fronds gradually reduced towards the base, some of the larger forms run very close to *deltigerum*, I suspect it quite graduates into that variety. *Clarke's* variety, *elongata* belongs here.

VAR. *RETUSA*. Rootstock sub-erect or decumbent; stems tufted; fronds very similar to those of *Schimperi*, but always only bipinnatifid, the pinnules being connected by a conspicuous wing, generally subdeltoid-lanceolate, the lower pinnule being rarely attenuated. I refer here, *rupicola* (*Engelm.*)—*retusa* var. *rubricaulis* (*Clarke*), *retusa* var. *heterodiplazium* (*Clarke*)—it generally grows in rocky crevices.

VAR. POLYSPORA. Omit this, as it is described below as a species, *Schimper*.

10A. *ATHYRIUM SCHIMPERI*. (*A. Br.*) Rhizome wide-creeping, scales linear or lanceolate; stipes 6-9 inches long, stramineous; fronds lanceolate, gradually reduced below, up to about 18 inches long, 9 inches broad at centre, rachis stramineous, bipinnate-tripinnatifid, or sometimes, from the pinnules being only cut down to a rather broadly-winged rachis, only bipinnatifid; colour bright green, texture firm, lobes sharply inciso-dentate. *Syn. Fil. p. 489.* *Athy. Filix-femina* var. *polyspora*. *Clarke, F. N. I. Handbook, p. 170*, and probably *A. flabellulatum* (*Clarke*). Scarcely distinguishable from *Filix-femina* var. *retusa*, except in its widely-creeping rootstock.

(Also in Abyssinia and the Cameroon Mountains.)

12A. *ATHYRIUM PECTINATUM*. (*Wall.*) Rootstock wide-creeping, scaly; stipes stramineous, often up to 2 feet long; fronds membranaceous, glabrous, 1-2 feet long by 9-12 inches broad, oblong-lanceolate to deltoid-lanceolate bipinnate (but quadri-pinnatifid), pinnae erecto-patent, much attenuated at the apex; secondary pinnae ovate-oblong from a broad base, cut down to the fine narrow wing of the tertiary rachis, into 6-8 delicately cut lobes or tertiary pinnae on each side, which are again very finely cut into sharp segments. *Wall. Cat. 231.* *Hook. Sp. Fil. vol. 3, p. 225.*

Mussoorie, 5,300 feet; Dehra Dun, 2,500 feet; Dalhousie; Simla, 6,000-8,000 feet; Nepal; Parasnath.

VAR.  $\beta$  TENELLUM. A small fern, lower pinnae often more or less reduced, but except in its more lanceolate form and much smaller size scarcely differing from the type. *Bedd. F. S. I. tab. 154.*

Central India; Mts. of the Godavery; Mahableshwar; Scinde, Mount Abu; Muzipore.

13. *ATHYRIUM FIMBRIATUM*. Fronds very large, up to 6-8 feet high, tri-quadrifid, primary pinnae 10-20 inches long, 6-14 inches broad, texture generally firm; rootstock creeping; stipes solitary, distant.

I consider the var. *sphaeropteroides* of Clarke and of my handbook synonymous with the type of *fimbriatum* of Wallich and Sir W. Hooker. (Clarke, however, has issued several ferns under this name, and under the name of *Andersoni* var. *Atkinsoni*.) I also include here Clarke's *Atkinsoni* var. *Andersoni*. Clarke's Pl. 62 fig. 2 *foliolosa* is one side of a pinna of this species. In some of the specimens collected near Simla (Bagi Forest, 9,500 feet alt.) the lamina is much developed, and Dr. Watt informs me that these rarely seed, and then only very partially; these forms are generally only tripinnate (this is Clarke's Pl. 62, fig. 2). In the more compound quadrifid forms collected in the same locality the seeding is very copious, often quite concealing the lamina (Clarke's plate 57, a small pinna). *Asplenium lastreoides* (*Baker, Jour. Bot.* 1888), from Mount Omei, in China, is, I think, this species, being quite similar to Dr. Watt's specimens. *Davallia athyriifolia* (*Baker, Jour. Bot.* v. 1891), Yunnan Mountains, near Tai, is also a synonym here, (exactly corresponding with a specimen of Edgeworth's, from the Himalaya). It is characteristic of this plant to have the sori, or a great proportion of them, very short and quite leucostegioid, but some asplenioid sori are always present.

*VAR. squamatum*. More delicate in texture and finer in cutting than the type, otherwise very similar in size, &c., except that the secondary and tertiary rachises, and even the midrib beneath, are furnished with deciduous scales; indusium more persistent and more truly athyrioid, being hypocrepiform and allantodioid.

Sara, 11,000 feet alt. Chumba. (*Clarke, No. 24,152, in Kew Herb.*)

13A. *ATHYRIUM FOLIOLOSUM*. (*Wall.*) Rootstock erect or

rect; stipes approximate; rachis with a gland at the axis 01  
 pinnae; stipes and rachis often red; fronds up to 3 feet  
 ; primary pinnae 5-8 inches long, generally about li **inch**  
 I, but varying from 1 to 3 inches; lowest secondary pinnule on  
 -superior base of the pinnae, always more or less elongated,  
 >ften double the size of the others; lowest superior lobe of  
 >innule also elongated; sori strictly athyrioid ' *Bedd P N*  
*J. p.* / . ccxcv. *Wall. Cat* 339, first sheet **in** *Linn Herb* h  
 id being *Athyr. macrocarpum*). *ClarkJZJ* 62 " \* / 1  
 :ropteroides) a good figure of this plant, **but** scafcelj  
 ing the enlarged lowest secondary pinnule at th > \  
**of the Pinn**^ which is most characteristic of this fern This  
 t, I think, rank as a species, being nearer \* <<  
 than 1 to *fimbriatum*. g ^ t0 macrocarpum

Near Simla, on the Thibet road, at S.000 feet ah • nhi 1  
 00 feet alt.; Sikkim, Darjiling & c U n e f f , D h T M a l a ,  
 on has the lamina much more finely cut anH \$ T M .  
 3| so as to entirely conceal the lamina; k \ T 1 0 " ^  
 fern, but evidently only a variety, as I have also from Jerdon an  
 intermediate form, where the lamina i s not so much reduced;  
 development of the lamina at the expense of the sori and  
*versa* is very common with many ferns, but more particu-  
 larly with *Athyrium*. Jerdon's two **for**^ both represented also  
 in the Kew Herbarium, certainly run in rhV of macro-  
 carp , .. ^ Li e u neuuon secondary  
 pinnum, but they are more cut, and the lowest superior  
 iule is much more produced.

2. DIPLAZIUM SUBSERRATUM. Perak, < 000 f^f alt. (*Day*,  
*Scartechint.*) ^

4A. DIPLAZIUM LARUTENSE. (,, ^ i . ^ I Z Q m Q erect; stipe  
 ut 1 foot long, firm, erect, naked; fronds narrow , linear-  
 olate, about 1 foot long by i|-2 inches broad , broadest at  
 ase, gradually tapering upwards; pinnate, pinnatifid towards  
 pex; rachis deeply channelled above; **pinna**; numerous

horizontal, oblong, with a broad base and very rounded apex,  $\frac{1}{2}$  inch broad; margin slightly crenate, the superior base slightly lobed; texture coriaceous, partial rachis channelled; veins simple, or the lowest ones forked; sori the lowest one sometimes diplazioid, but all generally asplenioid, reaching from midrib to margin.

Larut, Perak, 1,800 feet alt. (*Dr. King's collector*, No. 1,913.)

6. DIPLAZIUM BANTAMENSE. Kohima, 4,500 feet alt. (*Clarke*.)

10. DIPLAZIUM LONGIFOLIUM. Mussoorie (*Hopfe*); Simla (*Trotter*.)

11. DIPLAZIUM TOMENTOSUM. Madrema >can Island, Mergui; Perak. (*King*, 8,521.)

11A. DIPLAZIUM CHLOROPHYLLUM. (*Baker*.) "Stipes tufted, dull grey-green, pubescent, as is the rachis,  $\frac{1}{2}$  foot long; fronds oblong lanceolate, simply pinnate, 1 foot long, 4-5 inches broad, moderately firm in texture, green on both sides, minutely paleaceous; above, densely clothed with minute linear-subulate scales on the veins beneath; pinnæ about 20 on a side, close, lanceolate, sessile, acute, crenulate towards the tips, conspicuously auricled on the upper side *i at 1* he base, the central ones 2-2 $\frac{1}{2}$  inches long,  $\frac{1}{2}$ - $\frac{3}{8}$  inch broad, the lowest strongly deflexed; veins erecto-patent, deeply forked; sori falling but little short of both midrib and margin,  $\frac{1}{4}$ - $\frac{1}{2}$  inch long, rarely diplazioid; indusium crisped, narrow, moderately firm in pa; e-brown, glabrous, persistent." *Baker, Journ. Bot.* 1885, p. 104.

Penang. (*Curtis*.) Very near tomentosum, of which perhaps it is only a variety.

(Also in Formosa.)

12. DIPLAZIUM SORZOGONENSE. Perak, up to 2,000 feet alt. (*Dav*.)

VAR. MAJOR. Stipes 2½ feet long; fronds dark green, pinnules glabrous, the three lower pair very small. *Tt* <sup>set long,</sup>  
 > foot long, 2-2½ inches broad, cut down the rachis into <sup>about</sup>  
 narrow-oblong slightly crenated segments. "L" <sup>trachis into</sup>  
 sometimes simple, sori reaching to midrib. <sup>generally forked,</sup>  
 Perak, top of Gunong Booboo (No. 7403.) Perhaps a distinct species. <sup>T ^</sup>  
 us <sup>s<sub>ze</sub></sup> to distinguish it from *sorzogonense*. <sup>ft'\*\*\*></sup>  
 "S h t t l e e X C e P l"

15. *DIPLAZIUM SORZOGONENSE* VAR.  $\beta$  *STOLICZKÆ*. Pin  
 1-1¼ inch broad; pinnules distinctly lobed at the margins, veins  
 6-8, often forked. <sup>veins</sup>

15\* *DIPLAZIUM SORZOGONENSE* VAR.  $\gamma$  *HIRSUTIPES*. Stipes  
 very hirsute at the base, with hair-like scales, pinnules <sup>inches</sup>  
 ad, entire or very slightly crenated, pinnae 6-8 often forked.  
 These two last Mr. Baker thinks they can be considered as  
 varieties of No. 24) the Malay peninsula. <sup>"</sup>  
 pinnae 6-8 inch broad, entire, fern, which has the  
 generally all simple, very rarely <sup>ZS</sup> Pinnules, 6-8 veins,

16. *DIPLAZIUM ASPERUM*. Perak, (Scortechini; King 534  
 10,849-)

17. *DIPLAZIUM POLYPODIOIDES*. Dr W  
 young uncurled fronds are eaten, as a spinach, by the hill  
 people in the Punjab, and are called Kasmor.

*DIPLAZIUM UMBROSUM* VAR. *MULTICAUDATUM*.  
 (Hope). Mussoorie.

3A. *ANISOGONIUM DECUSSATUM*. <sup>ft<sup>m</sup></sup> \ <sup>u</sup> •  
 erect, often muricated; fronds 2 A \* , <sup>PGS</sup> 2 feet long -  
 on each side, which are 6-10 inch long, with numerous  
 lobes, often proliferous in the axils. <sup>10 inch, J<sub>2</sub> in</sup> <sup>es</sup>  
 lobed; texture herbaceous or <sup>se near</sup> <sup>I</sup> <sup>entire</sup> or  
 or subcoriaceous; veins in

copiously pinnated groups with a distinct barren vein in centre, uniting one-third of the distance from the midrib to edge ; but only those of different groups joining one another reaching nearly to the edge and copiously double.

Perak. In dense forests on Birch's Hill. (•#<>•)

(Also in the Malay and Polynesian Islands ; Queensl; Mascareen Islands ; Angola and Guinea coast.)

i. HEMIDICTYUM CETERACH. Chumba. {McDonnell}

(Also in Afghanistan.)

### TRIBE Villa—SCOLOPENDRIEIE,

Sori as in Aspleniere, except that the involucre? are arranged in pairs, and open towards each other.

### GENUS XLVIA.—SCOLOPENDRIUM,

Character of the tribe.

i. SCOLOPENDRIUM DELAYAYI. (*Franchet*). Rhizome short, oblique, clothed with thickish lanceolate subulate scales; 3-4 inches long, brown or blackish, glabrous, shining, slender fronds green, pellucid, thin, entire, orbicular or suborbic j-i } inch diameter, cordate at the base, the sinus open, closed, margin hyaline, no midrib, veins several times for a few anastomosing towards the edge of the frond ; sori elongate, not reaching the apex of the frond, indusium thinly membranous, persistent. *Franchet, in Bull. Bot. Soc. France, 1885.*

North Muniore, 3,000-4000 feet. (*Clarke, Watt*.) Thibet on mountains near Tali. This species belongs to the sub-genus Schaffneria, characterised by having no midrib, and the veins anastomosing only at their apices.

## TRIBE IX.—ASPIDIÆ

1. DIDYMOCHLENA LUNULATA. Jakorsung Peak, Jaintea Hills, Assam, 4,000 feet alt. (G. Mann.)

1. MESOCHLENA POLYCARPA. Omit this genus altogether, the species being referred to Nephrodium further on.

1. POLYSTICHUM SEMICORDATUM. Perak. (King, No. 8,282.)

5A. POLYSTICHUM OTOPHORUM. (Franchet.) Rhizome stout thick, densely clothed with ovate-lanceolate fuscous opaque pointed scales; stipes 3-4 inches long, stramineous; frond pinnate linear-lanceolate, coriaceous, pale green, scarcely attenuated below, 5-12 inches long, 1-1½ inches broad; pinnae numerous (about 40), furnished with subulate scales on the lower surface, short petioled lanceolate obtuse mucronate, obscurely toothed; on the upper side a free erect obliquely ovate basal lobe is present, and sometimes 1-2 smaller ones on the lower side; veins pinnate, veinlets forked; sori very small in a continuous line near the margin (as in Nephrolepis); indusium coriaceous peltate, margin entire, soon deciduous. Franchet, Pl. David ii.

Moupin, Thibet. Near some forms of P. Atkinsoni.

5A. POLYSTICHUM MOUPINENSE. (Franchet.) Rhizome? stipe 2-3 inches long, furnished towards the base with broad ovate and linear subulate scales; frond 6-9 inches long, about 1 inch broad, linear-lanceolate, attenuated below, pinnate firm, pale green, rachis furnished with narrow lanceolate and subulate scales; segments 21-28 pair shortly petioled, furnished with subulate scales beneath, ovate-rhomboid, inciso-pinnatifid, more or less distinctly auricled on the upper side, lobes ovate with mucronate teeth; veins pinnate, veinlets forked; sori 2-4 to a lobe; indusium firm. Franchet, Pl. David ii.

Moupin, Thibet. I have not seen this. From the description it must be near auriculatum, var. marginatum, which



however I have not seen **with** the frond less than  $x^*$  inch in S <sup>th.</sup> Franchet considers it intermediate between *Prescottianum* and *auriculatum*,

#### 8, POLYSTICHUM ACULEATUM.

VAR. ACAKTHOPHYLLUM. (*Franchet*) Rhizome short erect trunk-like; stipes 3-4 inches long, numerous stramineous paleaceous, scales tawny, some narrow-linear, others broadly ovate, cuspidate jagged or fimbriate at the margins; frond narrow lanceolate acuminate, somewhat attenuated below (rachis furnished with linear setaceous scales), 4-10 inches long,  $\wedge$ -2 inches broad • pinnules sessile, or nearly so, oblong, mucronately pointed lobed U way down into very prickly-pointed more or less **falcate** segments, the superior basal one being the largest. *Aspidium acanthophyllum*, *Bull. Soc. Bot. France*, 1885.

Near Simla, 7,000 feet alt. at Mashobea (*Hope*); Sikkim Gharwal; Naini Tal (*Dyas*), **Yunan** (*Dclavay*).

Very variable in the size and cutting of its pinnules, runn hi its smallest forms near typical *ilicdefolium*, and in its large ones approaching *rufo-barbatum*, it has generally been sorted with one of these two by Indian botanists; it is entitled, I think, to variety name, Mr. Hope having proposed this long ago.

VAR. *I* ANOMALUM. Add as synonym *Aspidium aristatum* var. *Thwaitesii*. *Baker and Clarke Jour. Linn. Soc.* xxiv. 1. 41 The pinnules vary from quite entire to deeply pinnatifid or  $\llcorner$  pinnate.

#### 9. POLYSTICHUM PRESCOTTIANUM.

(Also in Afghanistan.)

VAR. **BAKERTANUM**. Mr. Baker has made this a species, but cannot say that I agree.

#### 1, CYRTOMIUM FALCATUM.

VAR.  $\beta$  CARVOTIDKUM. Simla (*Blanford*), Chumba (*TroUc* Kashmir (*TrotkvX* The Ceylon locality is an error.

2. *CYRTOMIUM CADUCUM*. There are apparently two varieties of this species—one with the pinnae coriaceous, the veins nearly always free, the pinnae often becoming much lobed, pinnatifid or even perfectly pinnate—the other much thinner in texture, the veins rather copiously anastomosing, even half way between the midrib and margin, the pinnae never becoming pinnatifid. The former is abundant on the Khasia Hills, the latter near Darjeeling and at Manipore.

1. *ASPIDIUM SINGAPURIANUM*. Perak sea level. (Day.) The rhizome is erect in all Mr. Day's specimens.

1A. *ASPIDIUM KÜNSTLERI*. (*n. sp.*) Stipe, rachis, and partial rachis minutely pubescent; frond 1-1½ feet long, deltoid-ovate, pinnate, upper pinnae narrow-lanceolate, about 5 inches long by ½-1 inch broad, entire or with scalloped margins, lowest pair broad deltoid, the lower margin towards the base being produced into 3-4 long lobes, the largest being 4-5 inches long, upper margin deeply scalloped, texture rather coriaceous, surfaces glabrous, except the main veins, primary veins zigzag, tolerably prominent nearly to the margin, cross veins forming areoles, free veins rare not forked; sori very small, numerous, and scattered between the main veins generally on connected veinlets.

Gopong, Perak. King's collector, No. 405. Outline of *pachyphyllum*, but pinnae much narrower, venation and sori different.

1B. *ASPIDIUM TRICHOSPE*. (*n. sp.*) Caudex stout, erect; stipes 8-18 inches long, naked or nearly so, winged upwards; fronds 10-12 inches long, 7-8 inches broad, deeply trifoliate; lobes lanceolate, long-acuminate, the lateral ones 5-6 inches long, 1½-2 inches broad, the intermediate one about 10 inches long, 2½-3 inches broad; margins entire; texture papyraceo-herbaceous, glabrous above, slightly pilose on the costa and veins beneath; primary veins prominent nearly to the margin, about ½ inch apart, connected by prominent transverse veins, between

which are copious small areoles with free included veinlets; sori small, copious; indusium peltate, rather persistent.

Perak, Gopang. (*Dr. King's collectors, No. 975.*) Habit of *platanifolia*, a Javan species, but fronds much more divided—possibly only a more simple form of *vastum*.

2. *ASPIDIUM VASTUM*. Mr. Mann informs me that in Assam this fern has an erect rhizome and tufted stipes. *Dictyopteris heterosora* Baker is a synonym here. Perak. (*King, No. 382.*)

2A. *ASPIDIUM ANGULATUM*. (*J. Sm.*) Stipe 1-2 feet long, glossy, ebeneous, scaly below; fronds 1-2 feet long, pinnate with a large cordate oblong entire or deeply 3-lobed terminal pinna 8-10 inches broad at base, and 1-2 lateral ones on each side, the lowest ones 6-12 inches long, often deeply 2-3 lobate, texture papyraceo-herbaceous, midrib glossy ebeneous; primary veins prominent and distinct to the edge, areoles copious, with free included veinlets; sori very small, scattered, very abundant, involucre minute. *Hook. Syn. Fil. 251.*

Perak (*Scortechini*); Gopang, Perak (*King's collector, No. 586.*)  
(Also in Java and Sumatra.)

3. *ASPIDIUM SUBCONVOLVENS*. Balipara Forest. Dartang, Assam. (*Mann.*)

5. *ASPIDIUM SUBTRIPHYLLUM*. Mr. Parish collected specimens in Tenasserim with fronds 3 feet long by 2½ feet broad across the lower pinnae. Perak, 500-800 feet alt. (*King, No. 457, 4,713, and 5,908.*)

6. *ASPIDIUM VARIOLOSUM*. Perak. (*Scortechini, King, No. 4,862.*) Mergui. Some Birman examples have a decumbent rhizome.

7. *ASPIDIUM POLYMORPHUM*. Perak, 2,000 feet alt. (*Day.*)  
There is a specimen of the form with contracted fertile fronds and large sori in the Herbarium of the Natural History Museum.

S. Kensington), collected in Northern India by Hooker & Thomson (i.e. the fern Mr. Clarke calls *Asp. Wightii*).

8. *ASPIDIUM SIMONSII*. Nambur Forest Assam. (Mann.)  
Quite distinct from polymorphum.

10. *ASPIDIUM DECURRENS* VAR.  $\beta$  MINOR. Dr. Trimen assures me that this fern, which is common about Kandy, is a very distinct species, so it must stand under the name described and figured in the Ferns of Southern India, tab. ccxlv. *Aspidium pteropus-minor*.

9. *ASPIDIUM HETKROSORUM*. {Baker.) Naga Hills, 500 feet alt. at Neechoogard. {Clarke.) The name is changed from *Heterocarpum*, as that name is occupied by a *Nephrodium*.

9A. *ASPIDIUM REPANDUM*. (Willd.) \* furnished with a few hair-like scales upwards; fronds 2-3 feet long, pinnae each side, 6-12 inches long, slightly sinuate at the margins, apex of the lowest pair stalked bipartite; texture as distinct to the edge, the areoles large in two rows between the main vein peltate.

Larut, Perak, 2,500-3,500 feet alt. (N. King's collectors, No. 6,305.)

(Also in the Philippines.)

10A. *ASPIDIUM PACHYPHYLLUM*. (Hook.) long, naked, brownish; fronds 2-3 feet long with an oblong-lanceolate entire or sinuate pinnae 12 inches long, 1-2 inches broad, and 4-8 terminal pinnae lateral ones on each side, the lower ones with 2-3 unequal lobes, 8-9 inches long, texture subcoriaceous;

primary veins straight and distant nearly to the edge ; areolet fine, with copious free included veinlets ; sori large, in two regular rows ; indusium reniform. *Hook. Syn. Fil.* 297. *A. grande. J. Sin Hook. Sp. Fil.* iv. 55.

Perak, sea level. {*Day; King, No. 2,347-*} Perhaps only a form of *repandum*, with reniform instead of polystichoid involucre.

(Also in the Malay Islands, Philippines, and Solomon-Islands.)

12. *ASPIDIUM MULTICAUDATUM.* (*Wall. Cat., 377.*) Perak at the Taepang Waterfall, at no elevation. {*King's collectors Wallich's specimens were collected at Chappedong, Binna. The sori are, I believe, always apical on the free veinlets, the magnified section showing the venation in page 337, F.B.L not being correct*

12A. *Aspidium DUBIUM.* {*n. sp.*} Stipes up to 3 feet long, 1/2 inch thick at base, furnished copiously towards the base with narrow-lanceolate scales ; fronds up to 4 feet long by the same breadth across the base ; bipinnate below, pinnate upwards, and pinnatifid towards the apex ; the pinnae and pinnules cut deeply down into lanceolate acuminate lobes ; texture papery herbaceous ; hairy on the veins, especially on the under surface ; main veins distinct to the edge, with copious areoles and many free included forked veinlets even in the acuminate lobes ; sori large, generally in a single row on each side of main veins, on connected veinlets, or terminating free veinlets. *Nephrodium cicutarium* var. ? *dubia.* *Clarke and Baker, Linn. Soc. Jour. xxiv. p. 417.*

Makum Forest, Lukhimpur, Assam. {*Maun, Clarke.*} This has the outline, texture, and colour of *multicaudatum*, but the venation of *cicutarium* ; in this the venation is more copious, with numerous forked free veinlets, the veins anastomosing copiously even in the lobes ; the large sori often compound ; in *multicaudatum* the venation is not so copious, free veins few and not forked, the venation in the lobes nearly quite free ; the sori smaller and much more scattered, and always terminating free veinlets.

2. *PLEOCNEMIA TRIMENI*. This must be altered to *Pleocnemia gigantea* (Bl.), as it is the same as the Java plant of Blume. It is the *gigantea* of the second edition of the *Syn. Fil.* p. 503, but only partly that of *Hooker's Sp. Fil.* iv. p. 50, and of first edition of the *Syn. Fil.* Perak (*Dr. King's collectors, No. 327 and 2,043*)

23. *PLEOCNEMIA MEGALOCARPA*. (*Hook. under Dictyopteris*.) Caudex erect, scaly at the crown; stipes stout, 18-20 inches long, scaly towards the base; fronds 2 feet or more long; oblong-deloid, pinnate; pinnae about 10 inches long, 3½ inches broad, cut down to a broad rachis into narrow oblong crenated segments about ½ inch long, ⅓ inch broad; texture subcoriaceous, opaque; above furnished with scattered, small, jointed, transparent scales; venation pleocnemoid in the wing, and there forming areoles; in the lobes also the veins anastomose, and form a series of areoles near the midrib, but are free towards the margin; sort medial or nearly so on the veins, in two rows on each side of the costa along the wing, and in a single row on each side of the midrib in the segments. *Hook. Sp. Fil.* v. 102. *Syn. Fil.* 318. *Nephrodium oligodictyon*. *Baker, Ann. Bot.* v. 328.

Larut, Perak, 2,000-2,500 feet alt. (*King's collector, No. 2,236.*)  
(Also in Java.)

3. *PLEOCNEMIA MEMBRANACEA*. Perak, 300-600 feet alt. (*Sarntehin, King, No. 2,191.*)

4. *PLEOCNEMIA MEMBRANIFOLIA*. The lamina of the fertile fronds in the Indian examples often becomes very contracted and narrow, though it is sometimes as fully developed as in the sterile frond—these contracted forms Mr. Clarke calls var. *dimorpha* (*Jour. Linn. Soc.* xxv. 96.) From the Malay Peninsula, however, Sarntehin forwarded examples as fully contracted as any typical *Aerostichum* (*Stenosemia*) *auritum*, together with various intermediate stages from quite uncontracted, and pointed out that there is no distinction between the two ferns. He is quite correct, the sterile fronds, scales, indumentum, &c. offering no

distinctive character, so that *Stenogramma aurita* must become a synonym here; there is a fine suite of specimens in the Herbarium of the Natural History Museum. *King's collectors*, No. 465, 442, 5, 871. *Dictyopteris chattagramica* (Clarke), *Handbook*, p. 299, is a synonym here.

5. PLEOCNEMIA CLARKEI. This name should stand, and not give way to *artlinexum*, a later name, the other supposed *Clarkei*. *Nephrodium Clarkei* Baker (named long after this fern) being only a slight variety of *Filix-mas* var.  $\beta$ , the same as *Wall. Cat.* 340 and as *paleaceum* Don.

6. PLEOCNEMIA LEUZEANA. This has been gathered by Dr. King's collectors in Perak, with the subarborescent caudex densely clothed with long, close, wool-like hairs. *King's collectors*, No. 2,058, 4, 195.

1A. LASTREA ICENICULACEA. (See *Diacalpe iceniculacea*, *Handbook*, p. 18.) This fern should be placed here; its involucre in the normal state are reniform or polystichoid as in the other species of this section. *Lastrea aristata* var. *dissecta* (Moore) is a synonym.

1B. LASTREA WATTH. (*Bedd. Jour. Bot.* 1868.) Rhizome? stipes stramineous, 4-5 inches long, clothed with a few light-coloured deciduous scales; fronds 1 foot or more long, by 2-2½ inches broad, tripinnate, broadest in the centre, gradually narrowed towards the apex and base; rachis naked; texture subcoriaceous, surfaces glossy; ultimate segments obovate to lanceolate, sharply acuminate, or more rarely with a rounded apex, more or less 2-lobed; veins 1-forked in the ultimate segments; sori apical on the short lower veinlet, often furnished with a few deciduous hair-like scales.

East Manipore, at Kayang, on the frontier, 6,000 feet alt. (*Dr. Wall.*)

This species much resembles *iceniculacea* in its ultimate cutting and texture, but it is much less compound, with long

narrow fronds, I have not detected an indusium in the few specimens (over-ripe) which I have seen, but I feel sure its position is here.

3. *LASTREA AFFINIS*. A very variable species, and the caudex is sometimes creeping and sometimes erect. Mann sends very fine specimens from Jowai, Jaintia Hills, Assam, 4,000 feet alt., with the pinnules very large, this is Clarke's var. *assamica*. Clarke's *affinis* has smaller pinnules (No. 44,762), but I have intermediates, and cannot distinguish them as varieties.

VAR. *CORNU-CERVI*. (*Dox.*) Pinnules very coriaceous, cuneate, eroso-laciniate. Bhotan. (*Hook. f. et Thoms.*) Appears to be an abnormal or diseased form—there are copious specimens in the Natural History Museum and Kew Herbaria, but it does not appear to have been gathered since Hooker collected it.

4. *LASTREA CONIFOLIA*. The large compound forms of this with an erect caudex, and the smaller deltoid *aristata* with a long creeping rhizome, both so common in Southern India, are as distinct as ferns can well be, and keep their characters in cultivation, but when the mass of material at Kew from various countries is under review, every variation of cutting is seen, and there are many varieties or forms that, in the absence of roots, would puzzle any pteridologist to say whether they belonged to *aristata* or to *conifolia*; nor is it always easy to draw a line between *aristata* and *affinis*, though typical forms differ widely. The Ceylon var. of *conifolia* (*C. P.* 3,938) is much less cut than the South Indian plant.

4A. *LASTREA VARIA*. (*Linna. under Polypodium.*) Rhizome erect, or subrepent; stipes up to nearly 2 feet long, densely scaly at the base, scales long, linear-subulate, hair-like towards the apex, chestnut coloured, glossy; rachis and partial rachis scaly, but scales soon deciduous; fronds 1-1½ feet long, 8-12 inches broad at base, lanceolate-deltoid, lower pinnule much the largest, sub-deltoid unequal sided, the lower pinnules being much produced



and pinnatifid, the other pinnae stalked, pinnate or only pinnatifid, gradually decreasing and less compound upwards, but the lowest pinnule on the lower side almost always enlarged, pinnules petioled or sessile, oblong from a broad equal base, more or less pinnatifid, with the lobes obtuse, sometimes apiculate towards the apex, but never aristate; texture very coriaceous, both surfaces naked; sori apical or nearly so on the veins, in two rows nearer the margin than the midrib; involucre reniform or peltate. *Syn. Fil. p. 253. Hook. Sp. Fil. iv. tab. cc. xvi. coriacea. Hope Jour. Bot. 1890.*

Kopili Hot Springs, N. Cachar, 1,000 feet alt. (*G. Mann.*) This can at once be distinguished from affinis to which it is allied by the equal base of the pinnules and by the rounded, not aristate lobes, the scales also differ, and it is much more coriaceous, the fertile fronds are sometimes considerably contracted. It is like aristata and affinis very variable. The Indian specimens are rather more coriaceous and less cut than those from China and Japan. (Also in China and Japan.)

8. *LASTREA GRACILESCENS.* Type—Rootstock thick, horizontal, creeping; stipes approximate.

VAR. *GLANDULIGERA.* (*Kunze.*) Rootstock thin, wiry, wide-creeping; stipes distant, slender.

VAR. *DECIPIENS.* (*Clarke.*) Rootstock short, creeping; stipes approximate; fronds deltoid, shorter than in type or glanduligera, pinnae rather broader.

In all three varieties the veins are nearly all simple, though here and there branched veins occur in all; the sori are almost always apical on the veins, or nearly so, though in some Khasian (from Surureen) and in some Japanese examples of the type they are occasionally medial; the involucre is small, generally glabrous, though sometimes hairy; the lamina is always glabrous, though the costas are more or less hairy. I cannot distinguish glanduligera from the type except by the rootstock, and Clarke's

decipiens, I fear, is not always constant in its deltoid form and runs into the type. Dr. Watt has collected glanduligera abundantly in Manipore (pinnae often very narrow and pinnule: revolute). Mr. Mann sends very fine specimens of the same from Sebsagur, in Assam, the frond with stipe nearly 30 inches long the pinnules sharply lobed at the margins. Mr. Day also collected it in Perak.

I exclude Clarke's *van hirsutipes* and describe it as a species as the rhizome is erect and the sori basal or medial on the veins

8A. *LASTRUM HIRSUTIPES*. Rootstock apparently erect, with tufted stipes; stipe hirsute, rather densely so at the base, that of the fertile fronds much elongated (15-20 inches long); fronds lanceolate 10 inches or more long by 4-8 inches broad, texture coarser than in *gracilescens* and drying rather black, the fertile often more or less contracted; the pinnae cut down two-thirds or more toward the costa into oblong blunt segments, which are a little hairy both on the veins and lamina above, the costas densely clothed with, rather short hairs; veins all simple; sori large, basal or medial on the veins in two rows close to the midrib, indusium hairy often didymochlaenoid. *Neph. gracilescens* var. *hirsutipes* Clarke *KNJ* p. 514- Khasis and Jaintia, 4,000-5,000 feet alt.; also var. *didymochlaenoides* *I.e.* Khasia Sohra Coalhill 4,000 feet alt., which only differs in the stipe being less hairy and the involucres being larger. This fern does not appear to have been gathered except by Mr. Clarke. I have only seen a few specimens and hope it will be searched for.

8B. *LASTREA THIBETICA* (*ranohet*) Rhizome? stipes about 6 inches long, furnished with narrow-lanceolate fulvous scales fronds about 2 feet long by 7 inches broad at middle, attenuate at the base, papyraceous, pale green, pinnate; rachis and pedicels furnished with linear scales; pinnae 25-30 sessile narrow lanceolate from a scarcely broader base, acuminate, patent slightly bilobate, the veins underneath pubescent, lobed down about halfway to the rachis; lobes ovate, rounded, obsolete toothed

veins pinnate, veinlets 6-7 in the lobes simple; sori small, 4-8 to each lobe, midway between the midrib and margin; indusium small, coriaceous, reniform, margin entire, soon deciduous. *Franchet, Pl. David ii.* Thibet, Moupin in woods. Habit of patens, but firm in texture and frond much attenuated downwards. I have not seen it.

9. *LASTREA IMMERSA*. Perak. (*King, No. 2,368.*) Stipes tufted, base of stipe and young unfolded fronds densely covered with blackish linear-lanceolate hair-pointed scales; some forms have the pinnules very narrow.

10. *LASTREA CALCARATA*.

VAR.  $\beta$  *SERICEA*. Perak. (*Scortechini*.)

11. *LASTREA VISCOSA*. Perak. (*Day, Scortechini, King.*)

11A. *LASTREA UNIDENTATA*. (*n. sp.*) Caudex? stipe nearly 2 feet, densely villous, as is the rachis, with fine hair-like jointed scales; fronds 2-3 feet long, pinnate, with the lower pinnæ not smaller than those just above, but deflexed; pinnæ about 7 inches long by 1-1½ inch broad, cut down nearly to the rachis into narrow-oblong segments, which are entire or subentire, except a large tooth-like lobe on one side at the base, near the sinus (most prominent in the lower pinnæ); texture herbaceous or subcoriaceous; rachis of the pinnæ densely strigose above, furnished beneath with long white weak hairs; midrib of the pinnules slightly hairy on both sides, the laminae below furnished with glandular dots; veins 11-12 pair, all simple, or the lowest forked; sori medial on the veins; indusium persistent.

Perak, dense jungle on the top of the Gunung Boobo. *King's collectors, No. 7,434 (in part.)*

12. *LASTREA CRASSIFOLIA*. Perak, near Taepang, 2,000 feet alt. (*Day, King.*) The rhizome is creeping. *Wall. Cat. 355* second sheet belongs here, first sheet being truncatum.

## 14. LASTREA BEDDOMEL

(Also in Thibet, China, and the Philippine.)

15. LASTREA ELWESII. Copious specimens were gathered by Mr Levinge's collectors at a high level in Sikkim ; stipe 1 foot or more to first auricle, bright chestnut-coloured, shining ; frond narrowly rowed from the middle to both ends, the lower pinnae gradually smaller and running down into mere auricles.

16. LASTREA OCHTHODES. Omit the Ceylon locality, Thwaites's fern being *Nephrodium extensum*.

17. LASTREA FAIRBANKS should be THELYPTERIS VAR. *SQUAMIGERUM* (*Sc/t.*), distinguished from the type by the presence of broad ovate or lunate transparent scales on the underside of the partial rachis ; it is also much more rigid than the type, the veins generally, though not always simple. *Sch. Arch-mb.* 23, tab, 11. *Mccttenius Farngatt*, 112. *Me Mhnmrc*, vii. 104. *Aspidium squamuhsum*, *Hook. Fl. N. Zeal*, xi. 20. (Also at the Cape of Good Hope and in New Zealand.)

21 A. LASTREA DAYI. (*Bedd.*) Stipes 1-2 feet long, stramineous, glabrous, or with a few hair-like scales towards the base ; fronds 1-2 feet long ; pinnae 5-6 inches long,  $\frac{1}{2}$  inch broad, lower ones scarcely at all reduced, cut down nearly to the rachis into linear oblong lobes  $\frac{1}{2}$  lines broad, texture papyraceo-herbaceous glabrous on both sides except the rachis above, which is finely puberulous ; veins 6-8 on each side, simple, not reaching the margin ; sori at the apex of the veins not immersed ; involucre leaf-like, persistent. *Bedd. Jour. Bot.* vol. xxv. 1887, p. 328.

Perak, Maxwell's Hill, 3,000 feet alt. (*Day.*)

Habit of some of the forms of *Phegopteris distans*. Also closely allied to *Lastrea singalanensis*.

21n. LASTREA SIKQALANENSIS. (*Baker.*) Caudex ? stipes about 1 foot long ; fronds lanceolate about 2 feet long, pinnate

with the pinnae pinnatifid nearly to the rachis, rachis stramineous and nearly glabrous; pinnae about 7 inches long, cut down nearly to the rachis; segments narrow-oblong,  $\frac{3}{4}$  inch long by  $1\frac{1}{2}$  lines broad with irregular shallow lobes, chiefly about the centre; texture herbaceous, under surface densely covered with black glandular dots, partial rachis and midrib slightly hairy; above, the partial rachis and midrib rather densely strigose; veins about 10 pair, chiefly forked; sori medial, indusium rather persistent. (*Baker, Jour. Bot.* 1880, 212.)

Perak, open jungle at 3,500-4,000 feet alt. (*King's collectors, No.* 3,520.) The pinnae are much longer than in the Sumatran specimen described by Mr. Baker.

(Also in Sumatra on Mount Singalan.)

22. *LASTREA FLACCIDA*. Perak, Maxwell's Hill, 3,000 feet alt. (*Day*.)

23. *LASTREA BRUNONIANA*. The copious scales on the stipe are early deciduous. Mr. Baker considers this and *barbigera* as varieties of one species.

25. *LASTREA ODONTOLOMA*. This is certainly only a variety of *Filix-mas*, and should be placed there as *Lastrea Filix-mas* var. *serrato-dentata*, the name of *odontoloma* having been given by Moore to Clarke's *normalis*, which was also first figured by me under that name in the *Ferns of Southern India*, though afterwards changed by an error. (*Baker*.)

26. *LASTREA FILIX-MAS*. The European type does not occur in India.

VAR. *ODONTOLOMA*. (*Moore*.) *Bedd. Ferns Southern India, tab.* 11. Rhizome erect; stipe and main rachis more or less scaly, densely so when young, but scales soon deciduous; fronds bipinnate, oblong-lanceolate to ovate, or deltoid-lanceolate, nearly or quite glabrous; pinnae 3-5 inches long by 1-1 $\frac{1}{2}$  inches broad,

laiceolate; pinnules about 15 pair, about 1 inch long by  $\frac{1}{2}$ - $\frac{3}{4}$  inch broad (those of the lower side of the 1-2 lower pinnae sometimes more developed), cut down  $\frac{1}{2}$ - $\frac{3}{4}$  towards the midrib into obtuse lobes which are sharply toothed, or sometimes, especially towards the apex of the frond, entire or nearly entire except the sharp serratures, sori small. Var. *normalis*, Clarke, *F. N. I. I.* 519. *Nephrodium lacerum*, Baker, *Syn. Fil.* 273, since referred to *Filix mas* in the *Ann. Bot.* Dr. Watt has collected specimens in Manipure, and Mr. Levinge in Sikkim (Badam Tham), quite intermediate between this and *cochleata*. Baker's *lacerum* is from Japan.

VAR.  $\beta$  PARALLELOGRAMMA. Clarke's var.  *khasiana* is a synonym here; it only differs in the apex of the pinnules being rather more sharply serrated, it is from Nongbri in Khasia.

The sub-variety of this called *Clarkei* is *paleacea* Don.

VAR.  $\gamma$  ELONGATA. North India botanists appear to have adopted Wallich's name of *marginata* for this variety; *elongata*, Swartz, *Syn. Fil.* 117, is the older name, and was adopted by Sir W. Hooker in his *Sfl. Fil.* vol. iv., and by Booker and Griseb.  *Ic. Fil. L. 234* Wallich's name being given as a synonym;  *Ic. Fil. t. 234*, Wallich's name being given as a synonym as been collected on Maxwell's Hill, in Perak, 3,000 feet alt. Day.

VAR.  $\delta$  COCHLEATA. Wallich's *Arthobotrys avana* is this species, with the fertile segments so contracted as to be quite bead-like; it is from Ava,

VAR.  $\epsilon$  PANDA. This fine fern may be said to resemble *odontoloma* (Moore), with the pinnae pinnatifid only, instead of being pinnate; it has apparently been collected only by Mr. Clarke. There are specimens at Kew which are intermediate between this variety and *Schimperiana*.

VAR. SUBTRIANGULARIS. Crown of the rhizome and base of stipes furnished with long black linear-pointed scales; stipes

10-12 inches long ; frond about 1 foot long, and nearly as broad at the base, deltoid, bipinnate ; pinnae erecto-patent ; rachis and partial rachis channelled above ; pinnules subentire, or with a few shallow falcate sharply-serrated lobes, and with hook-like serratures at the apex ; veins pinnate or forked, not reaching the margin ; sori medial on the veinlets. *Lastrea subtriangularis*; *Hope, Jour. BoU Nov. 1890.* ? *Nephrodium erythrosorum*. *Hoot Syn. Filix 273*, since referred to *Filix-mas* by Mr. Baker.

Jaintea Hills, 3,000 feet alt. ; Assam. (*Mann.*) Mr. Hooibosch also gives the locality of Lankot, 800 feet alt., southern face of Khasia Hills. A deltoid form of *Filix-mas* near Moore's *odontoloma*, it has quite the habit of the Ceylon *sparsa* var. *deltoides*, but is more coriaceous, with the pinnules less cut. *Aspidium nitidulum*, *Wall. Cat 392*, type sheet in the *Linnean Herbarium*, seems rather to belong here than to *sparsa*. Some of the North Indian varieties of the very variable *L. sparsa* var. *obtusissima* are very striking, and might as well be referred to *Filix-mas* as to *sparsa*. Air. Clarke felt the same difficulty, vide his remarks at page 95 *Jour. Linn. Soc.* vol. xxv. In the Kew Herbarium there is a frond of this (exactly agreeing with Moore's specimens) collected by Griffith in Assam ; it is pasted down on the same sheet with a frond of typical *sparsa* collected elsewhere. *Nephrodium erythrosora* of the Kew Herbarium is very variable if all the specimens belong to the same species ; some seem certainly to belong here, others agree with the Nilgiri form of *odontoloma* whilst others nearly agree with *varia*. They are all from Japan and China, and are probably all forms of *Filix-mas*.

VAR. ASSAMENSIS. Basal scales like those of *subtriangularis* ; fronds very similar to Moore's *odontoloma*, only narrow lanceolate, the lower pinnae diminishing considerably ; the pinnules or segments (the frond being often only bipinnatifid) parallelogrammoid, scarcely ever lobed, but with a few sharp teeth on the lateral margins, the square apex furnished with sharp teeth ; veins forked from the midrib of segments, not reaching the

margin; sori apical or towards the apex of the veinlets. *Lastrea assamensis* Hope, *Jour. Bot.* 1890.

Nambur Forest, Assam. (Jain.) Mr. Hope also gives as localities Lakhimpur, in the Upper Dehing Forest; Garo Hills, 1,000 feet alt.; and he states that the lower pinnæ are sometimes not reduced; it comes nearest to Moore's *odontoloma*. Mr. Baker informs me that it is very close to some of the European forms of the type of *Filix-mas*.

VAR. SCHIMPERIANA. The typical form of this is well marked, though I formerly followed Sir W. Hooker in including it under *elongata*; it is intermediate between *cochleata* and *odontoloma*. (Moore.) There are two forms in N. India, a large and a small variety. I have only seen the latter (*L. intermedia*, *Bedd. F. S. I. tab.* 113) in Southern India. In the Kew Herbarium there is a specimen collected by General Strachey which is intermediate between this and *elongata*, *vid.*, the habit of *elongata* with the very large sori of this variety, and a specimen collected by Colonel Bates above Simla, quite intermediate between this and *cochleata*.

VAR. LACHOONGENSIS. Stipes 8-9 inches, densely clothed towards the base with orange-coloured very thin lanceolate hair-pointed scales; fronds elongate-deltoid, about 2 feet long; pinnæ, the lower pair 4-5 inches long by 1½ inch broad, gradually decreasing upwards, cut down to the base or nearly to the base (leaving a very narrow wing to the rachis) into oblong blunt segments, which have a broad square base, about 1 inch long by ¾ inch broad, nearly entire, except the rather sharply-toothed apex, or in some of the lower larger ones a tendency to become pinnatifid; veins very deeply channelled, especially on the lower surface; sori very large, in a single row on each side of and close to the midrib.

Lachoong, in Sikkin, at 12,000 feet alt., collected by Mr. Levinge's Bhootea collector. (Burr.) Lachen, 9,000 feet alt. (King.)



This very handsome fern may be characterised as *odontoloma*, with the pinnules much larger and entire, very large sori a deeply channelled veins ; it is a link between *odontoloma panda*, and approaches *serrato-dentata* in its very finely serrated margins.

27. *LASTREA RIGIDA*. All the specimens I formerly placed here I now refer to *Filix-mas elongata*. I much doubt if this species is represented in Northern India, at least as distinct from *remota*.

28. *LASTREA SPINULOSA*. *Tab. 336 F.BJ.* belongs here, and not to var. *remota* ; it was gathered by Jerdon, in Cashmir I believe, and does not appear to have been found by any other collectors.

VAR. *REMOTA*, The form gathered at Nakhunda and its vicinity between 8,000-9,500 feet alt. is very uniform in its character, it is not quite the European form, though closely allied, it can be easily distinguished from *Filix-mas, var. cloingata* by its much more herbaceous texture, I suspect, however, it is subject to considerable variation in different localities, as I have seen examples (in Mr. Mann's herbarium) gathered by Mr. Trotter at 7,000 feet alt. Hazara district which are deltoid in outline, the pinnules broader, the lower pinnules being considerably elongated and looser in habit ; Mr. Trotter refers this to *rigida*. Mr. Hope has also sent specimens to Kew, gathered at the base of the Himalayas, in which the pinnules are much less cut than in the type, which have been referred to *rigida var. pallida*. I believe these are all varieties of the same fern which goes by the name of *remota*, but it seems to me that it has equal or more claim to be considered a variety of *rigida*. Mr. Blair mentions black scales as a distinguishing mark between this and *elongata* ; my specimens gathered at Nakhunda 8,500 feet (*Watt*); Chatri, 7,500 feet (*MeDonell*); Jangla, 9,000 feet (*Donnell*) and in Kashmir (*Jerdon*) have all golden-brown chaffy scales, my only specimens with black scales were gathered at Basrah.

10,000 feet (*Loc. No. 348*). Mr. Blanford also mentions that the fronds of *remota* are narrower and more oblong than those of *elongata*; this is generally the case, but Trotter's Hazara examples are quite delatoid.

29. *LASTREA SPARSA*. *Asp. pellucidum*. Franchet *Fl. David* ii. 157, Thibet is var. *nitidula*. (Clarke)

VAR.  $\gamma$  *OBTUSISSIMA*. Dulkajhar, 500 feet alt. Sikkim, Terai (*No. 36,790*, Clarke), Kohima 4,750 feet alt. (*No. 41,639*, Clarke). I have not seen Clarke's var. of *sparsa* from Naga Hills, mentioned at page 95, *Jour. Linn. Soc.* xxv., but from the description, have no doubt that it belongs here.

30A. *LASTREA OBOVATA*. (Baker.) Rhizome erect; stipe a foot long, scaly at the base and sparingly so above; scales lanceolate blackish; fronds oblong-deltoid, decomposed thin, glabrous, 2-4 feet or rather more long, lower pinnae the largest produced on the lower side, as in *sparsa*, central ones oblong-lanceolate, about 1 foot long, secondary pinnae 2-3 inches long, pinnate or pinnatifid, final segments obovate or oblong obtuse  $\frac{1}{2}$ - $\frac{1}{3}$  inches broad; veins pinnate in the final segments, veinlets very ascending; sori terminal or medial on the veins, indusium small fugaceous. Baker, *Jour. of Bot.* 1890, 265.

Digboi, Makam Forest, Lakhimpur, Assam. (G. Mann.)  
(Also in Tonquin.)

The Assam specimens have the sori generally, but not always terminal; in the Tonquin specimens they are almost all medial on the veins, but occasionally terminal. It is nearly allied to *sparsa*, but a much larger fern.

31. *LASTREA PULVINULIFERA*. Col. Henderson has collected this with the fronds 3 feet long and 2 feet broad at the base.

32A. *LASTREA PADANGENSIS*. (*n. sp.*) Rhizome erect; stipes 8-9 inches long, furnished with long hair-like scales as are the

rachis, partial rachis and costules of the pinnules ; fronds 1-2 feet long, narrow deltoid-lanceolate bipinnate-tripinnatifid, moderately firm in texture, lower pinnae the largest, deltoid, the lower pinnules being considerably elongated ; upper pinnae 2-4 inches long, secondary pinnules 1-1½ inch long, the lower ones cut down nearly to the rachis into lanceolate entire or slightly crenate lobes, both surfaces sparingly covered with minute hairs, midrib of ultimate segments wavy, veins distant, simple or forked, not reaching the margin, sori medial, indusium not seen.

Batang, Padang district, Perak, on the banks of the Padang River, close to the water's edge. (*King's collector*, No. 8,038.) Nearest to *leucostipes* (*Baker*), a species from Formosa,

35. *LASTREA CRENATA*, Mussoorie (*Hope*.) Kashmir, Chamba, Simla, and Hazara. (*Trotter*.) *Lastrea Fordei* (*Baker*, *Jour. Bot.*, 1889, 177), from Kwantung, China, is a synonym.

38. *LASTREA INTERMEDIA*. (*BL*) Stipe, rachis, &c, with long linear, hair-pointed rufous scales : fronds 1-1½ feet long by 6-9 inches broad, deltoid-lanceolate, pinnate, with all but the lower, or sometimes two lower pair of pinnae simply pinnatifid nearly to the rachis, the lower or two lower pair with their lower segments much elongated and again pinnatifid. *BL En. Fil. Java*, p. 161. *Hook. Sp. Fil.* iv. 135. *Nephrodium Mannii*, *Hope, Jour. of Bot.* 1890. *Lastrea propinqua*, *J. Sm.* *Lastrea sarawakensis*, *Baker Jour. Linn. Soc.* xxvi. 225^

Makum Forest, Lukhimpur, Upper Assam ; Khasia Hills, southern base ; Cachar, up to 500 feet alt. (*G. Mann*) ; Padang (*Curtis*)', Perak (*Day*).

(Also in Java, Philippines and Borneo.)

VAR. 0 *BLUMEI*. Stipes, rachis, &c, as in the type ; fronds much larger, tripinnate as described under *Blumei* at page 259, *Handbook*.

Ceylon, Perak and Penang. (*Scortchim, Day*.)

(Also in Sumatra, Java, Borneo, Ceram, Samoa, and Philippines.)

VAR.  $\gamma$  RHODOLEPIS. (Clarke.) Similar to var.  $\beta$ , only the stipe, rachis, &c., copiously furnished with adpressed or sub-adpressed, ovate, acute, hyaline, reticulated scales, instead of the hair-like scales. *Clarke, R. N. I. p. 526.*

N. India, Sikkim, 1,000 feet alt. (*Hooker and Thomson*); Shillong, 3,500 feet alt. (*Clarke*); Chittagong, 150 feet alt. (*Clarke*); Khasia (*Simons*); Assam (*Griffith*). Mr. Clarke also states that it is found up to 7,000 feet alt.

(Also in China, Formosa, Japan, Fiji and Samoa. Japan examples vary from as simple as *intermedia* (type) to fully tripinnate.)

Blume's type specimen at Kew, and his description, and that of Sir W. Hooker prove that the more simple variety, lately described by Mr. Hope under the name of *Mannii*, is the type of *intermedia*. Mr. Mann informs me that the simple variety does not run into compound forms in Assam, which is curious, as it certainly does so elsewhere, so that Sir W. Hooker did not even think it necessary to record them as varieties, the fact that the simple form only of the hairy variety occurs in N. India, and the compound form only in Ceylon, has compelled me to give them distinct names as varieties, the two ferns looking very different without intermediates. It will be seen that the distribution of the hairy and scaly varieties is not strictly geographical, both being found in Samoa, and the scaly variety in Fiji, the indumentum varies considerably in the Ceylon examples, but it is never so scaly as in *rhodolepis*.

41. *LASTREA SPLENDENS.*

(Also in West China.)

42. *LASTREA ANGUSTIFRONS.* A very distinct species, in its widely creeping rhizome. Only gathered by Wallich.

45. *LASTREA BORYANA*. Chamba (*McDonell*), Simla (*Blanford*).

45A. *LASTREA MEGAPHYLLA*. (*Baker*.) A large compound fern, in cutting much like *Boryana*, but texture of *Filix-mas elongata*; fronds several feet long, bipinnate tripinnatifid, primary pinnae distinctly stalked, 16 inches or more long, secondary pinnae on short distinct stalks, narrow lanceolate, about 3 inches long by  $\frac{1}{4}$ — $\frac{2}{5}$  inches broad, cut down to a winged rachis into oblong obtuse  $\frac{1}{2}$  inch broad lobes, which are irregularly and bluntly crenated, texture subcoriaceous; surfaces quite glabrous; veins pinnate in the lobes, veinlets forked towards their apices, or the lower ones pinnate, terminating short of the margin; sori medial on the upper branch of the forked veinlets, 4-5 on each side of the lobes; indusium reniform, persistent. *Baker, Jour. Linn. Soc.* xxii. 227. Larut, Perak, at 3,000 feet alt. (*Dr. King's collector*, Nos. 2,822 and 6,952.)

(Also in Borneo.)

### NEPHRODIUM.

The following key to this genus is given in hopes that it may aid in the determination of the species of this difficult genus, and stimulate the collection of better specimens showing the entire stipe and rhizome; the frond of a *Nephrodium* is of little value as a specimen, unless the whole stipe is shown, and even the rhizome is very important. A larger suite of specimens of some of the more critical species will probably prove that I have wrongly lumped or divided some species, but I trust that my labours will lead to a better elucidation of the different species by field botanists. No genus has, I believe, been less understood; owing chiefly to the want of perfect specimens, the lumping of critical species has made the study of the genus very difficult. Sir W. Hooker, in his "Species Filicum," included four or five species under *molle*, and in the "Synopsis Filicum," *multilincatum* (*Wall.*), an auricled fern has been included under *pennigerum*, which I believe never has auricles; and *lineatum* and *asperum* of

\*lume have been lumped with *gland, losum*, which caused Mr Clarke to place pennigerum also in that species.

NKPHRODIUM.

i. Involucres prominent.

A. Rhizome wide-creeping.

,H JL<sub>t</sub> LOW<sub>6r</sub> ^ " " T 0 1 redUCed, or Slight, y so in molliusculum  
id sometimes in namburensis

•Only i pair of veins anastomose, or rarely 2 in unitum

1. SIBPECTIXATUM. Venation and sori anomalous.

2. UNITUM. A swamp fern, no auricles on the pinnae.

3. PTEROIPES. Sori confined to the lobes.

4. EXTENSUM. Venation often, lastreoid, when anastomosing the angle acute at apex.

5. TM ° j " t a W Anastomosis at a very obtuse angle, shortly hairy, or nearly glabrous.

6. MOLXMSCULUM. Venation of procures, surfaces with long needle-like hairs.

7. BIAURETUM. A swamp fern, some lower pinnae auricled at superior base.

\*2-4 pair of veins anastomosing.

8. NAMBURENSE.

b. Lower pinnae considerably reduced.

9. GUCULLATUM. Very coriaceous and hairy, 5-6 pair of veins anastomose.

10. ARIDUM. Very coriaceous and hairy, 5-6 pair of veins anastomose.

ir. PAPYRACEUM. Papyraceous nearly glabrous, 6-7 pair of veins anastomose.

B. Rhizome erect, sub-erect, or occasionally somewhat creeping in molle, amboinense and pennigerum. P

a. Sori punctiform even in age.

\*Only 1 pair of veins anastomose, rarely 2 in polycarpum.

12. POLYCARPUM. Auricled. Indusium didymochlanoid.

13. TECTUM. No auricles, frond deltoid or some of the lower pinnae reduced and deflexed.

14. BRACHYODON. No auricles. Venation often lastreoid, 1 free vein arises from rachis between the groups.

15. HETEROCARPON. Auricles or glands. Pinnae 4-6 inches long; coriáceo-herbaceous.

16. PERAKENSE. Auricled. Pinnae 1-2½ inches long, softly herbaceous, densely hairy.

\*\*2 or more pair of veins anastomose, occasionally only 1 in molle.

17. GLAUCOSTIPES. Stipe glaucous, regular auricles below pinnae, 2 pair of veins anastomose.

18. MOLLE. Herbaceous, more or less pilose, no regular auricles, 1-2 pair of veins anastomose.

19. MOLLE VAR. MAJOR. Larger than type, very prominent auricles below the pinnae.

20. ANBOINENSE. Papyraceous, generally much auricled; pinnae narrow entire or nearly so, 2-3 pair of veins anastomose.

21. EVOLUTUM. No regular auricles. Papyraceous, pinnae distant and very broad, 3-6 pair of veins anastomose.

22. ARBUSCULA. River bed fern, prominent auricles below, 3-4 pair of veins anastomose.

23. TRUNCATUM. Lobes generally square at apex; 2-4 pair of veins anastomose; auricles abortive.

24- MULTILINEATUM. Lobes very shallow ; 5-8 pair of veins anastomose ; rounded prominent auricles

25. SAKAYANUM. Sori basal on veins ; 3 pair of veins anastomose.

26. PENNIGEROM. No auricles below ; 5-8 pair of veins anastomose, except in fertile contracted

27. LARUTENSE. Indusium didymochtenoid, stipe auncled, 5-6 pair of veins anastomose.

28. CR ^ E S. Very crinite stipes, 2 pair of veins anastomose ; sori medial.

29. PEROX. Very crinite stipes, 5 pair of veins anastomose ; sori basal.

\*. Sori becoming meniscioid in age.

So. GLANDULOSUM. Sterile pinna, broad ; 8-10 pair of veins anastomose.

31. LINEATUM. Pinnae narrow, 4-5 veins anastomose.

ii. Involucres rarely visible, except in young state, often entirely absent ?

32. COSTATUM. 4-6 pair of veins anastomose.

33- UROPHYLLUM. 8-12 pair of veins anastomose ; sori often becoming meniscioid.

34- MOULMIENENSE. 14-18 pair of veins anastomose.

N.B.—Jerdon's elatum (?) is not included in this list, the stipe and rhizome being unknown.

1. NEPHRODIUM SUBPECTIXATIUM. (Wail) name must replace that of Otaria; Wallich having collected the species the Ava Mountains, vide his specimens so named, Wall. Cat. 311 in the Linnasan Herbarium.

Mr. Mann informs me that the Khasia specimens alluded to by Clarke, Jour. Linn. Soc. XXIV, A 416, were cultivated from Nilgi pores.



2. NEPHRODIUM UNITUM. Perak sea level. (*Day, King*)

Nephr. Haenkeanum, *Syn. Fil.* p. 291, as to the Ceylon specimen, is this species.

4. NEPHRODIUM EXTENSUM. N. Wakefieldii, *Baker, Ann. Bot.* 1891, is a synonym here; it was collected in Mombasa. The second sheet of *Wall. Cat.* 348 is this species, the first sheet is *Nephrodium polycarpum*.

NEPHRODIUM PROCURRENS. (*Mett.*) Rhizome wide-creeping, 2-3 lines in diameter, clothed sparingly with deciduous golden linear scales; stipes approximate, up to  $1\frac{1}{2}$  feet long, a few deciduous scales towards the base; fronds deltoid to deltoid-lanceolate,  $1\frac{1}{2}$  feet or more long by nearly a foot broad; rachis more or less hairy or nearly glabrous; pinnae many pair (12-27) patent, the lower ones generally not at all reduced, or the lowest somewhat smaller and deflexed, narrow-linear, acuminate  $\frac{5}{8}$  inch broad, cut down nearly to the rachis into narrow oblong entire lobes, the lower ones, *v. c.*, those nearest the rachis, often suddenly reduced in size; texture papyraceo-membranaceous, varying from very hairy to nearly quite glabrous, often furnished beneath with golden pubescence in the way of close pressed hairs or oblong dots more on the lamina than on the veins; veins 9-12 pair, all simple, the lowest pair only anastomosing at a very obtuse angle near the costa of the pinna, with a long excurrent veinlet; sori medial on the veins; involucre glabrous or hairy. *Mett. Mig. Ann. Mus. Bot.* 231. *Hook. Syn. Fil.* p. 290. *Nephrodium procurrens*, *Clarke, F. N. I.* p. 530, in part only *N. parasiticum* var. *aureum*, *Clarke l. c.* p. 533. Not *Wall. Cat.* 349, third sheet, as stated in *Handbook*, that being *N. molliusculum*.

Sikkim road from Tongiu (*Levinge*); Salim, 2,000 feet alt. (*Levinke*); Mongpo, 1,000 feet alt. (*Clarke*, No. 30,221); Nunklow, 4,000 feet alt.; Khasia (*Clarke*, 44,845); Nungpo, 1,500 feet alt.; Khasia (*Clarke*, 40,696); Manipore (*Watt*); Garo and Khasia Hills, 800-2,500 feet alt. (*Mann*, the more glabrous var.); Garo Hills (*Mann*, the more hairy var.)

This has the venation of molliusculum, but differs in its deltoid form, narrower pinnae, in its lower pinnules being dwarfed or uniform in size instead of being enlarged, and in the absence of needle-like hairs; it differs from extensum in the lower anastomosing veins being straight, anastomosing in a very obtuse angle instead of being semicircular and anastomosing at a very acute angle at the apex; the fertile fronds are sometimes on elongated stipes; golden pubescence or golden dots are often present and it has then been called aureum.

5. NEPHRODIUM MOIXIUSCULUM. Wall, Cat. 332 Nephrolium  
 »  $TTTJ^*r$ .  $\wedge C T^{OVnm}$  {Clark  $\wedge$  N. **microsorium**  
 •Handbook). N. **Hopei** [Baker, Ann. Bot 1891), Also Wall Cat 49, third sheet.

Dehra Dun 1,500 feet alt (Hope); Manipore (Watt); Kohima. 1,000 feet alt. {Clarke as extensum in Linn-Jour. xxv. l. 95 }

NEPHRODIUM BIAURITUM. (n. s.)\* Rh<sup>o</sup>me wide-creeping, stout .lines thick; scales few, linear-lanceolate, early deciduous; sori xj to xi inches apart, glabrous stramineous 8-9 inches long; fronds narrow oblong or lanceolate, r-ij feet long by 7-7 inches broad, pinnate-bipinnatifid the lowest pair of JLL generally slightly reduced in size; pinnae  $14 - 1$ , opposite pairs rather distant from each other, j - , inch broad, cut own half way or three-quarters into lanceolate rather acute lobes, the lowest superior lobe of the lowest or 2-, lower pinna produced into a long pinnatifid auricle; texture firm, herbaceous; above, rachis of pinna; and midrib hairy the veins ad lamina with a few minute hairs; below, rachis and veins with rather long white hairs, lamina minutely glandular; veins simple, about 12 pair, excurrent at margins, the lowest pair distally anastomosing at a very obtuse angle, forming a long narrow channel nearly parallel with the rachis, with a long veinlet excurrent into the sinus; sori medial; indusium small, very fugacious.

Dubri Assam plains, Chur lands, subject to inundation. (fam.,) lx has the habit of Gymnogramme aurita, which

has probably caused it to be overlooked, though in a well-frequented road. In this fern it is the superior lower lobe that is enlarged, in the *Gymnogramme* the inferior, or sometimes both.

*NEPHRODIUM NAMBURENSE.* (*n. sp.*) Rhizome thin wiry, wide-creeping, 1-1½ lines in diameter; stipes distant, up to 12 inches long; fronds subdeltoid, about 8-15 inches long by 5½ broad, generally no reduction of the lower pinnæ, but sometimes 1, rarely 2 lower pair distant and reduced, main rachis densely strigose, with curled hair-like scales; pinnæ often few, 3-5 sometimes 8-10 pair, patent, lanceolate from a square base, which is parallel with the rachis, acuminate, ¾ to 1 inch broad, cut down about ¼ or less into falcate segments, the lowest superior one often somewhat enlarged, texture herbaceous, glabrous above except the costas, and below except the costas and main veins; veins about 10 pair, all simple, the 3-4 lower (rarely only 2) anastomosing, the lowest at a very obtuse angle; sori medial on the veins.

Assam, on the Nagore road, Nambur Forest, 4 miles from Ohgori; also at Bor-Bheel, Upper Dahing Forest. (*G. Mann.*)

Nearest to *MOLLE*, from which its remarkable rhizome, and distant stipes, easily distinguish it, it also differs in its generally deltoid form, and very strigose rachis; its venation readily distinguishes it from *PROCURRENS*.

8. *NEPHRODIUM ARIDUM.* Chamba (*McDonell*). Perak (*King, No. 1,025*).

*NEPHRODIUM PAPYRACEUM.* (*n. sp.*) Rhizome strong, wide-creeping, ¼ inch diameter; stipes distant up to 4 feet long, glabrous or nearly so, furnished with a few small distant abortive auricles below the frond; fronds pinnate, 3-4 feet long; pinnæ (3-4 of the lower ones suddenly reduced and small) about 1-foot long, 1 inch broad, glabrous and shining above except the slightly pubescent costa, and below except a slight glandular pubescence on the raised veins, papyraceous or papyraceo-coriaceous in texture.



two veinlets, so as to become quite meniscioid, as sometimes occurs in, *Nephrodium urophyllum*, and in the Sumatran *Aspidium* *snfohum*. \*

Perak. (Dr. King's collector, No. 8659, 8660. Day)  
(Also in Sumatra, Java and Philippines.)

This fern is not found in N. India, Mr. Clarke's specimens all belonging to *pennigerum*. *Nephrodium asperum* of Bl. united with this in the Synopsis and in Kew Herbarium. *Nephrodium urophyllum* with the involucres more persistent than usual; *Nephrodium lineatum* (\*/.), also referred here by Kew authorities, is a well-marked species described below.

NEPHRODIUM <sup>AEATM</sup>M. {BL} Rhizome erect; stip. 12-20 inches long, or sterile frond often much elongated; fronds pinnate, the fertile generally contracted, about 1 foot long by 3-5½ inches broad, pinnæ 12-14 pair; sessile with a truncate base parallel with the rachis, somewhat auricled at the upper base and sometimes at the lower, ½-¾ inch broad, lanceolate, the apex gradually attenuated and acuminate, margins generally more or less crenated, particularly towards the apex, but sometimes quite entire, sterile pinnæ opposite or alternate, sometimes very close and overlapping, fertile pinnæ often distant; texture herbaceous; rachis strigose, surfaces nearly veins 3-5 pair all anastomosing, coming meniscioid; involucres not very fugacious, often setose or glandular. *Bl. En. Fil. Jav. p. 114*. *Scortechini. King, No. 497*. *Bl. 118*, typical specimen at Kew.

Perak, sea level. (Day. *Scortechini. King, No. 497*.)  
(Also in Java.)

This fern published by me in the List of Mr. Day's Perak ferns, *r. Bot. 1887*, as "*Selaginogramme aspidioides* var. *new species*." *Scortechini* with fertile fronds contracted, perhaps a *Meniscium auriculatum* (Sw/.), which he, however, subsequently altered to *Selaginogramme aspidioides*. *have now examined better specimens*

which clearly show the involucre, and I find that it is *Blume lineatum*, included at Kew under *glandulosum*, to which it is somewhat allied in its meniscioid tendency; but differs by its more numerous, narrower and tapering pinnae, it has an entirely different habit the sterile fronds having the aspect of a *Polybotry*.

10. *NEPHRODIUM UROPHYLLUM*. The synonym of *Asplenium lineatum* (*Bl.*) must be omitted here. *N. lineatum*, *Hook. Syn. Fil.*, is partly this fern and partly Blume's plant. *N. lineatum* *Bedd. Fl. N. I. tab. cxxxiii.*, is this plant.

*Meniscium cuspidatum* must be entered here as a synonym (*vide* remarks under that species), or as a meniscioid variety; the form of that fern with very red stipe and rachis (called *ruber* by Clarke), which is the extreme meniscioid variety, is also found in Fiji.

I refer here *Nephradium asperum* (*Blume*), which is made a synonym of *N. glandulosum* in the *Syn. Fil.*; it appears to me only to differ in having the involucre much more prominent and the margins more serrated; I have the same fern from Khasia, collected by Oldham, figured at *tab. cxxxii. F. B.* as *glandulosum*, but afterwards referred to *urophyllum* in *Humboldt*. I may be wrong in referring it here, and it may have to stand under Blume's name, but in any case it is more allied to *urophyllum* than to *glandulosum*, and it is found in the Khasia Hills as well as in Java, typical *glandulosum* not being known from Northern India.

VAR. *PINWILLEI*. Pinna lanceolate, very broad in the middle, considerably attenuated at both ends, often long caudate at the apex, margins rather sharply serrated. (*Goniopteris*) *Pinwillei* *Baker, Ann. Bot. v. 46.*

Malacca (*Pinwillei*): *Per...* In my List of Mr. Day's plants I referred this to *N. cuspidatum*; in some of Mr. Day's specimens the petiole margins, <sup>so</sup>n medial, <sub>le</sub> margins, ft <sub>b</sub> "overing", is also found in Borneo. *Ancitium*, *Sulu*, and

FERNS OF BRITISH INDIA AND CEYLON.

II. NEPHRODIUM MOULMEIKENSE. This species is creeping specimens lately received in very young state show ciliate involucres on almost all the sori. Mr. Mann sends very fine specimens from the Nambur Forest in Assam, with the pins 2\ inches broad.—*Wall. Cat.* 300. *Polypodium lincatum* is mixture of this species and the next (*costatum*).

12. NEPHRODIUM COSTATUM. The rhizome is sometimes creeping, sometimes erect; gathered by Mr. Clarke in the Jambou Valley, Cashmir, 4,000 feet alt.

13. NEPHRODIUM ARBUSCULA.—The fronds sometimes attain 3 feet in length.

NEPHRODIUM LARUTENSE. (n. sp.) Stipe 8-12 inches long furnished with very regular auricles below the pinnae, dense, villous with short hairs, as is the rachis; fronds 2-3 feet long; pinnae 10-12 inches long by 1\ inch broad, finely acuminate at the apex, broadly truncate at base, only cut down about 1\ towards the costa into short subfalcate lobes, texture herbaceous, colour very deep green; above, the costa, midrib, veins and lamina hairy; below, costa, midrib and veins hairy, the lamina furnished with minute resinous dots; veins about 10 pair, much ascending, 5-6 lower pair anastomosing; sori medial, indusium elongate didymochloenoid hairy.

Perak. (*Day. Dr. King* \* *uuhivv*, Nos. 850 and 2,3\* incorrectly referred by me to *sagittatifolium* in my catalogue of Mr. Day's plants. This will be placed in *Mesochloena* by those who keep up that genus.

14. NEPHRODIUM PENNIGERUM. (*Hook, zu part.*)

The typical plant, which occurs in N. India, S. India and Ceylon, has no reduction of the lower pinnae and auricles, 5-8 pair of veins anastomose, -except in contracted fertile pinnae, and the rhizome is often, if not always, more or less creeping. In the description in the *Handbook*, instead

"generally with the lower pinnae more or less reduced, sometimes not so," insert *no reduction of lower pinnae and no auricles*, and omit from the synonyms *Neph. pennigerum*, *Bl.*; *multilineatum*, *Wall. Cat.* 353; and *pennigerum* var. *multilineatum* *Clarke* (the 1st being *multilineatum*, *Wall.*; the 2nd, *multilineatum* partly and *truncatum* partly; the 3rd, *evolutum*).

Darrang in Assam (*Mann*), Sylhet (*Griffith*), Burkul and Kaslong in Chittagong (*Clarke*, No. 8,276), Jirie Ghat, Manipore, 300 feet alt. (*Clarke*, No. 42,581), Wynad, Malabar (*Henderson*, fronds 8 feet long). The Ceylon specimen referred to *abortivum* in the *Synopsis Filicum* is this species.

In the Herbarium of the Nat. Hist. Museum there is a specimen, collected in Mysore by Buchanan, with the pinnae elongato-triangular, the apical portion being much contracted and in seed, the lower portion broad and sterile; at Kew a similar form, collected in Chittagong; in South Indian examples often some portions or one side of a pinna only, will be contracted and fertile. Mr. Mann sends both the contracted and uncontracted varieties from Assam.

Both in the *Species Filicum* and in the *Synopsis* the description of this fern includes *multilineatum* *Wall.*, a South Malay peninsula fern, of a different texture and colour, with a stipe furnished with very regular auricles, which has lately been gathered copiously by Scortechini, Day, King and others.

VAR. MALAYENSE. More herbaceous in texture, pinnae cut down rather deeper, only 2-3 lower pair of veins anastomosing, surfaces rather densely covered on both sides (veins and lamina) with short hairs.

Perak (*Scortechini*, *Day*, *King*, No. 2,360.) Tenasserim (*Parish*).

*NEPHRODIUM POLYCARPUM.* (*Bl.*) *Mesochlona polycarpa* *Handbook*.

Perak (*Day*.) Mr. Day collected two forms of this, one with the pinnae  $\frac{3}{4}$  inch broad; the other with them  $1\frac{1}{4}$  inch broad.



the veinlets often forked and even pinnate, and occasionally anastomosing towards the margins; both are very hairy on both sides, densely resinopunctate below on the lamina. If distinct as varieties (which I doubt), the former is the type, and to it belongs *Wall. Cat.* 348, *multijugum*, *1st sheet* in *Linnean Herb*, (the *2nd sheet* being *extensum*), and *Wall. Cat.* 354, *canescens*, *1st sheet* only. The broader variety has been described by Mr. Baker as *Nephrodium microchlamys*, *Jour. Lin. Sac. Bot.* xv. 107, from Little Kei Island, and as *Lastrea microchlamys* by De Vreisse.

Dr. King's collectors have since collected both forms, No. 371 the narrow form, No. 557 the broad form.

*Mesochleena villosa* {*Wall.*) in the Kew Herb, is only the apex of a frond, collected in Northern India by Hooker and Thomson, 4-5 pair of veins anastomose; it is probably an undescribed *Nephrodium*.

NEPHRODIUM AMBOINEXSE, (*Presl.*) Rhizome erect or somewhat creeping; fronds with the short stipe about 2 feet long, rarely more; pinnae 7-25, the lower ones very gradually decreasing in size and reduced to mere auricles, often sagittate or butterfly-shaped, the others rather close, alternate, or opposite, 2-3 inches long by  $\frac{1}{2}$  -  $\frac{1}{4}$  inches broad, sometimes long caudate, quite entire, or with shallow crenatures or lobes, glabrous on both sides except the costa above, or rarely the costa and costule<sup>^</sup> beneath slightly pilose; texture thin, papyraceous; veins generally 5-6, rarely 7-8 on a side; 2-3 lower pair anastomose; sori medial on the veins. *Nephr. latipinna* (*Hook.*) of the *Syn. Fil.* belongs here; it has been collected by Dr. King in Perak (No. 8,800), quite running into this species.

Ceylon; Birma, Thaliya Zaik, Atharan River (*Parish*); Bhotan (*Griffith*); Concan (*Law*); Mergui (*Wight*); Kusalong, Chittagong (*Clarke*); Nambur Forest (*Mann*), rhizome erect. Dambu, Garo Hills, 1,000 feet alt. (*Mann*), rhizome shortly creeping.

(Also in Borneo and Philippines.)

15. *NEPHRODIUM MOLLE*. Typical *molle* is always more or less shortly pilose on both sides, and of soft texture, never papery; in some forms the lowest or two lower pinnae are only a little reduced and deflexed; in others several pair, rarely more than three or four, are more or less reduced in size and distance from the others, but there is never a reduction to mere auricles, such forms belonging to the next variety, or to *amboinense*; the rhizome is generally erect, but occasionally decidedly creeping, but not to the same extent as those in the first section.

VAR. MAJOR. Rhizome erect, or somewhat creeping; fronds very large, often 4-5 feet high, 8-13 inches broad; pinnae very numerous, the lower ones generally gradually reduced to butterfly-like auricles down to the base of the stipe, more glabrous than type, often quite glabrous except the costa above; pinnae cut down  $\frac{1}{3}$ - $\frac{1}{2}$  way towards the rachis; veins 7-8, the 2-3 lower pair anastomosing; sori medial generally on all the veins except the 1-2 apical ones.

Travancore and Tinnevelly Hills; Mussoorie, 5,500 feet alt. (*Hope*); Nynsee Tal. (*Dyas*); Ceylon (*Wall.*); Singapore (*Wall. Cat.* 352, 2nd sheet, Linn. Herb.).

(Also in Sumatra, Herb. Nat. Hist. Mus.)

Mr. Hope considers this a well-marked fern, and says that it is subarborescent, and of a brilliant green colour: his specimens have quite an erect caudex; Mr. Wall's Ceylon specimens, however, have a decidedly creeping root; at Kew it has generally been put in the *amboinense* bundle, though some specimens have been placed in *molle* and some in *procurrens*; it never has the texture of *amboinense*, and the pinnae are deeper cut; it is a most marked fern when fully auricled nearly down to the base of the stipe, but I find this is not always constant, as I have specimens, which run *molle* rather close.

*NEPHRODIUM EVOLUTUM*. (*n. sp.*) Rhizome strong, erect or sub-erect; fronds up to 3-4 feet or more long, of which the stipe

is about 1 foot ; pinnae sessile or shortly stalked, generally distant, 7-12 on each side, the 2-3 lower ones generally very distant, suddenly reduced and small, or auricle-like, the upper ones 5-7 inches long by 1-2 inches broad, texture papyraceous, the margins shortly lobed, the lobes about  $\frac{1}{2}$  of the distance to the costa, rounded but sometimes apiculate, perfectly glabrous on both sides, except the costa above ; veins 8-11 on each side, the 3-6 lower pair anastomosing, either joining the opposite vein or alternate with it, and joining the spurious costule ; sori medial, or rather below the middle of the veins. *Nephrodium pennigerum* var. *multilineatum*, *Clarke, F.N.I.* 532 (Nos. 43,103, 19,678, 19,884, 19,898.) *N. amboinense* var. *evolutum*, *Clarke, Jour. Linn. Soc. Bot.* xxiv. 417 (Nos. 44,509, 44,525, 44,534)? *N. amboinense*, *Clarke, Jour. Linn. Soc.* xxv. 95 (No. 40,852).

Shillong, 3,500 feet alt. and Tura, Garo Hills, 4,000 feet alt. ; Nambre Forest, Assam ; Neechoogard, Naga Hills, 500 feet alt. (*Clarke*). Below Shilloag, 4,500 feet, Khasia (*Mann*), Burkul, Chittagong (*Clarke*).

In both this and *molle* var. *major*, the veins of the lowest pinnules (*i.e.* the ones nearest the main rachis) are occasionally forked and anastomose towards the margins ; this, however, occurs in several other species. This is a well-marked fern, distinguished by its very papyraceous texture and its broad distant pinnae. The Java specimen in the *amboinense* bundle at Kew, with which Mr. Clarke compares it (*Jour. Linn. Soc.* xxv. 95), is only the apex of a frond, very distinct from this, probably *Arbuscula* ; with critical *Nephrodiums* it is absolutely necessary for determination to have the whole frond and stipe, also the rhizome if possible.

*EVOLUTUM* VAR. *ft.* Rhizome creeping, pinnae narrower than in the type and more rigid in texture. *Nephrodium procurrens* var. *microlobum* [*Clarke, Linn. Soc. Jour.* xxiv. p. 416).

Kopili Hot Springs, N. Cachar Hills, 1,000 feet alt. (*G. Mann*), Nambre Forest, Assam (*Clarke*, No. 40,811), perhaps a distinct species. I have only seen two specimens.

16. *NEPHRODIUM CRINIPES*. Perak. (*Scortchium*. King, No. 7, 126). In King's specimens, which are very large, the stipe is covered with very large patent scales; they were collected between 3,000 and 3,500 feet alt.

17. *NEPHRODIUM PEROX*. Perak. 3,000-4,000 feet alt. (*Day*, *Kmz.*)

18. *NEPHRODIUM TRUNCATUM*. Add as synonym *abortivum* *Meth.* t. 19. pg. 5-7 (see type specimen at Kew). Omit the synonym of *multilimeatum*, *Wall. Cat.* 353, 3rd sheet from Singapore, but the other sheets belong here.

*NEPHRODIUM SAKAYENSE*. (*Zeiller*.) 3-4 feet high, stipes densely tufted; fronds oval-lanceolate, pinnate; rachis channelled above and there clothed with hair-like scales and a few larger scales; pinnæ linear-lanceolate acuminate, 8-10 inches long by about  $\frac{3}{4}$  inch broad, cut down more than  $\frac{1}{2}$  into rounded somewhat falcate obscurely crenulated lobes, which are furnished on the veins above with whitish needle-like hairs, glabrous but finely glandular below; veins 8-10 pair, the three lower pair anastomosing, the lowest at a very obtuse angle with a long excurrent veinlet; sori very small, basal on the 4-5 lower veins; indusium fugacious. *Zeiller, Bull. Bot. Soc. France, vol. xxxii. p. 74.*

In the Sakaye country, valley of the Kiang River, near the Riam Mountain, Perak. I have only seen two pinnæ; the description is partly taken from Zeiller's; it is only the lowest pair of veins that anastomose with each other, the next two pair anastomose with the spurious vein formed by the membrane filling up the lower part of the sinus.

*NEPHRODIUM HETEROCARPUM*. (*B.*) Rhizome strong erect stipes tufted, 1-2 feet long, slender, villose; fronds 2-3 feet long, 8-14 inches broad, the fertile often contracted and sometimes with elongated stipes; pinnæ 5-6 inches long,  $\frac{1}{2}$  inch broad, cut down  $\frac{1}{2}$  or half towards rachis into linear-oblong subfalcate or truncated entire lobes, lower pinnæ abruptly dwarfed

or only represented by glands; texture coriaceous-herbaceous, rachis villose, and under surface glandular, the veins above often with a few long white hairs; veinlets 8-10 (in the contracted fertile only five), the lowest pair only anastomosing, with an excurrent veinlet, all more or less strigose beneath as is the partial rachis; sori medial, or sometimes near the base of the veinlets. *Syn. Fil.* 293; *Bl. Fil. Jav.* p. 155.

Malacca in ditches (*Pinwill*), Malay Peninsula (*Sir W. Norris*), Perak, 2,500-3,000 feet alt. (*King*, No. 6,345). Singapore, Green Hill (*Hullett*).

NEPHRODIUM TECTUM. (*Wall.*) Rhizome strong erect; stipes densely tufted; fronds deltoid or somewhat lanceolate, 12-15 inches long, 6-7 inches broad; pinnae cut down  $\frac{2}{3}$ 's or more towards the rachis into entire slightly falcate segments, lowest pinnae scarcely or not at all reduced, but gradually deflexed or the 2-3 lower pair rather suddenly reduced and much deflexed, but not distant from the others; texture firm herbaceous, costa midrib and lamina on both sides rather densely covered with long white needle-like hairs; veins 7-8 pair the lowest only anastomosing at a very obtuse angle (as in *procurrens*) with a long excurrent veinlet; sori on nearly all the veins, or often confined to the lowest pair, nearly apical; indusium often very hairy. *Wall. Cat.* 394 and *Cat.* 354 in part pasted down, with the apex of a frond of another species of the genus--*Nephrodium molle* var. *didymosorum*. (*Parish.*) *Handbook*, 379. (Rhizome incorrectly described.)

Singapore (*Wallich*); Tenasserim (*Parish*); Perak (*King*, Nos. 1,205 and 8,757).

One of *King's* examples has the rhizome, which is erect and strong, and quite unlike that of *procurrens*; the venation is that of *procurrens* (not of *molle*); only there are fewer veins. *Wallich's* and *Parish's* specimens are quite deltoid; *King's* have generally 2-3 of the lower pinnae reduced and deflexed, but I believe they belong to the same species.

NEPHRODIUM GLAUCOSTIPES. (*U. sj.*) Stipes scaly at the base, glaucous as is the main rachis ; fronds 3-4 feet long, pinnate, the lower pinnae very gradually reduced in size, becoming at first small and hastate or semihastate, and at length mere auricles down to almost the base of the stipe ; central pinnae 5-6 inches long, 1 to 1½ inches broad, cut down half way into oblong rounded lobes, rather papyraceous in texture, glabrous on both sides, the upper above minutely villose, below quite glabrous ; veins about 10 pair, the two lower anastomosing ; sori medial, all the veins being soriferous.

Larut, Perak, 300-400 feet alt. (*Kings collector* No. 2,046) *Pinjar heterocarpon*.

NEPHRODIUM PERAKENSE. (*Bedd.*) Caudex small, erect ; stipes slender, villous ; fronds pinnate, 12-14 inches long, 2-5 inches broad, oblong-lanceolate, central pinnae the largest, lower ones gradually reduced to saggitate auricles, pinnae 1-2 inches long by ½-1 inch broad, cut down about half way to the rachis into close, rather pointed lobes, texture softly herbaceous ; veins 4-5 on each side, simple, the lower pair anastomosing with a long excurrent veinlet ; stipes, rachis and both sides of the frond copiously furnished with long whitish soft hairs ; sori near the apex of the veins. *Bedd. Jour. of Bot* 1888, 4. *Lastrea perakensis*, *Baker, Ann. Bot.* 1891.

Perak, Birch's Hill, 4,000 feet alt. on exposed rocks (*Day*). In outline similar to *Lastrea Beddomei*, but of a very soft texture and densely hairy.

NEPHRODIUM MULTILINEATUM. (*Wall*) Rhizome erect ; stipes furnished with a few lanceolate scales at the base ; fronds 1 foot or more long, 1½ feet broad, pinnate, gradually dwindling down nearly to the base of the stipe into small rounded auricles (as in *Arbuscula*) ; pinnae sessile or shortly petioled, 1 inch broad, very acuminate at the apex, base truncated, the margins cut down only about ½ towards the costa into rounded lobes, very finely villose on the costa and veins, otherwise glabrous.

on both sides; veins about seven pair, of which 5-6 anastomose; sori medial, involucre persistent. *Wall. Cat.* 353, 3rd sheet, in *Linn. Herb.*, also in Kew Herb. as far as the Penang plant is concerned. *Mett. Parungit*, p. 108. *Nephr. megophyllum*, *Mett. Mag. Mus. Bot.* 233, not *multilineatum* (*Mett.*), which is *aridum*. *Nephrodium pennigerum* (*Bl.*).

Penang Hill and Perak (*Wallich. Day. King. No.* 1,831); Assam (*Mann*). This is the *Nephrodium eminens* in my list of Mr. Day's Perak plants, but not Mr. Baker's species. Wallich's sheet of the Penang fern (not showing the base of the frond or the auricles) was referred by Sir W. Hooker in his *St. Fil.* and also in the *Syn. Fil.* to *pennigerum*. Other examples from the Malay Peninsula, Java, &c., are put into *truncatum* at Kew; it differs from both in its very prominent auricles, cutting, and venation. The pinnae in Mann's Assam plant are rather deeper cut than in the Malay fern, and only 3-4 veins anastomose, so I may be wrong in referring it here.

(Also in Java and Sumatra, the Sumatran specimens more pubescent than those from the Malay Peninsula and Java.)

4. *NEPHROLEPIS ACUTA*. Perak sea level. - (*Day. King. No.* 1,05 and 4,955.) Fronds 10 feet long, pinnae 8-9 inches long.

6. *NEPHROLEPIS DAVALLIODES*. (*Koe.*) "Caudex short, stoloniferous; stipes tufted, 1 foot or more long, scaly towards the base; fronds narrow lanceolate drooping, 2-3 feet long, 1 foot or more broad; lower pinnae barren, 3-8 inches long,  $\frac{1}{2}$  inch broad; the apex acuminate, the edge incise-crenate to a depth of 1 line or less; fertile pinnae narrower, the lobes deeper and bearing each a single sorus at the point; texture sub-coriaceous; rachis furfuraceous, both sides nearly naked; involucre reniform." *Hook. Syn. Fil.*, p. 302. *Ophioglossum acuminatum* (*Hort.*).

Perak, 3,000-5,000 feet alt. (*Day. Scottellani. King. Nos.* 6,395, and 5,007 a form or variety with the fertile pinnae not contracted.)

(Also in Java.)

1. OLEANDRA NERIIFORMIS. Perak, 5,000 feet alt. (*Dr. Scortechini*.)
2. OLEANDRA MUSJEFOLIA. Perak. (*Scortechini*.)
3. OLEANDRA WALLICHII. Simla, Mussoorie, Garhwal Kohima, 6,000 feet.
- 4 OLEANDRA CL-MIXGII. West Munipore.

### TRIBE X.—POLYPODIES.

1. PHEGOPTERIS SCOTTII. This is probably only an exinvolucrate variety of *Lastrea hirtipes*. Clarke's *Nephrodium hirtipes* var. *exinvolucrata* *Jour. Linn. Soc.* xxv. p. 93, has the pinnae of *hirtipes*, not the short ovate ones of *Scottii* (type).

5A. PHEGOPTERIS HEXAGONOPTERUM. [*Michx.*] Rhizome wide-creeping; stipes 2-8 inches long, slender, stramineous, naked, glossy; fronds 8-12 inches long, nearly as broad, deltoid, lower pinnae 4-6 inches long, the lowest pair deflexed, often those of the lower side 1-2 inches long, pinnatifid half-way down with broad blunt lobes; texture thinly herbaceous, under side slightly villose; veinlets pinnate in the lobes; sori marginal. *Hook, Syn. fil.* 309.

Zanscar, north of Simla. (*Dr. Watt*)

(Also Canada, southwards to Florida.)

5. PHEGOPTERIS DISTAXIS. {Also in China and Formosa.)

7. PHEGOPTERIS DRYOPTERIS. (Also in Afghanistan.)

7A. PHEGOPTERIS DAVIDI. [*Franchet*] Rhizome? stipe canaliculate, about 1 inch long, furnished with ovate-lanceolate canaliculate scales; fronds subcoriaceous, intensely green opaque, lanceolate, attenuated below, bipinnatifid, 6-10 inches



long, 2½-4 inches broad; rachis sparingly furnished with minute scales; pinnae lanceolate, patent, or slightly ascending, sessile, cut down nearly to the rachis into ovate, rounded, crenate, or bicrenate segments; veins pinnate, veinlets forked; sori ovate or rotundate, 4-8 to each lobe on the middle of the veins, half way between midrib and margin. *Franchet Pl. Davidii*.

Moupin, in mountain woods. Habit of the European *Phegopteris alpestris*, but texture thicker, the pinnae closer, and the sori larger.

9A. *PHEGOPTERIS MANIPURENSIS*. (*Budda*). Rhizome erect; stipes up to 20 inches or more long, densely furnished with large, broad, lanceolate, acuminate, membranaceous, pale brown scales; fronds 1½ feet or more long by 16 inches broad, deltoid-lanceolate or deltoid-ovate, tripinnate, with the tertiary pinnae pinnatifid; rachises furnished with ferruginous, curled, many-jointed, hair-like scales, the main one somewhat flexuose; pinnae erecto-patent, about 3 inches broad, the lowest ones as large or nearly as large as the next above, with their lower secondary pinnae generally more or less produced; secondary pinnae 3-4 inch broad; tertiary pinnae from a broad sessile base pinnatifid nearly half way down, with a square or somewhat rounded, deeply-serrated apex; texture herbaceous, both sides furnished with hair-like scales, similar to those on the rachis; sori generally one to each ultimate segment, medial, apical, or nearly apical on the lower veinlets. *Bedd. Jour. of Bot.* 1838, 235.

Sirohiparar, 6,000-7,000 feet alt.; Manipur (*Dr. Wall*); Mairang, Khasia Hills, 5,000 feet alt. (*Moss*); Nepal (*Wallich Cat.* 323, 2nd sheet).

Very similar in habit to *Lastrea scabrosa*, from which it differs in its indumentum and the shape of the tertiary pinnules, the lower secondary pinnules of the lowest pair of pinnae are sometimes not at all produced, and never so much so as in *Lastrea scabrosa*; there is no trace of any indusium in the youngest examples. *Lastrea scabrosa* is also, I believe, a true *Phegopteris*.

OB PHKGOPTERIS LASKRPITIIFOLIA. (*Scort.*) " Stipes tufted, fine, stramineous, 12-16 inches long, scaly downwards, naked above • fronds as long, deltoid-ovate, tripinnate ; rachis glabrous ; pinnae numerous, lowest 4-6 inches long by 2-3 inches broad ; secondary pinnae 1-2 inches by f-i inch, those on the lower side of the rachis the largest, naked on both sides, shining above ; pinnules ovate-oblong, rounded.  $\frac{1}{3}$ - $\frac{2}{3}$  inch long ; base unequal, obliquely truncate on the lower side, broadly lobed on the margin ; veins pinnate in each lobule, not reaching the edge ; sori terminal, large, 1-2 on the lowest superior veinlet of each lobe. Habit of *Asplenium laserpitiifolium* [*Metl.*], except that the stipes are longer, the pinnules larger and not imbricate ; its position is near *P. Hasseltii*. *Bcdd. Jour, of BoL vol. 25, 1887, p. 324.*

Perak. (*Scortechim. King, No. 2,208.*)

ii, PHEGOPTERIS KINGI. (*n. sp.*) Caudex ? fronds large Uipinnate-quadripinnatifid, pinnae about 1\ feet long ; secondary pinnae about 4 inches long by \ inches broad, cut down almost or uuite to the rachis into oblong or obovate-oblong, rather deeply **lobed** segments, nearly \ inch long by about \ inch broad, glabrous on both sides except a few weak seUe chiefly on the veins, membranaceous and rather flaccid in texture ; veins forked ; sori medial at the fork.

Larut Perak, 1,000-1500 feet alt. [*Kingscollectors, JVo.2,250*] ; it may be a *Lastrea*, but I have not been able, to detect any tra\* of involucre.

2. DICTYOPTERIS TENIUIFOLIA. This delicate little species [r Parish informs me, grows on limestone hills near Moulmein, appearing only in the rains.

3. DICTYOPTERIS CHATTAGRAMICA. (*Clarke*) Is only a synonym of *Pleocnemia membranifolia*.

DICTYOPTERIS POLYCARPA. I have never seen this species ;

it is not represented at Kew, or probably, in any herbarium in England.

6. *DICTYOPTERIS HETEROSORA*. Omit this species, it being *Aspidium vastum*.

3. *DICTYOPTERIS DIFFORMIS*. Perak, sea level. (*Dav. King*.)

1. *POLYPODIUM PARASITICUM*. The rhizome is generally creeping, though sometimes erect; the fronds are sometimes quite glabrous, at least in age.

4. *POLYPODIUM WALLII*. Dr. Trimen has named this in his systematic catalogue of Ceylon plants "*pilosiusculum*" (*Hook.*) That, however, is a Java fern, only known to Sir W. Hooker by Blume's fig. (*Fil. jav. tab. 46, fig. 2*), which, though in outline very like the small *parasiticum*, must be very distinct, as it has pinnate veins with 3-4 branches. Thwaites' MS. name on the specimens at Kew is *parasiticum* var. *latiusculum*. It may be a variety of No. 1, but as it is so very much larger and more coriaceous, and as there are no intermediates, as far as I know, I think it may be considered distinct.

2. *POLYPODIUM SUBREVENOSUM*. Perak. (*Scortechini*.)

5. *POLYPODIUM HIRTELLEUM*. Perak. (*Scortechini*.)  
(Also in China.)

5A. *POLYPODIUM UNIVERSE*. (*Baker*.) Densely tufted; fronds simple sessile, rigidly coriaceous, linear,  $1\frac{1}{2}$ -2 inches long,  $\frac{1}{2}$ - $\frac{3}{4}$  inch broad above the middle, narrowed gradually to the base, furnished with deciduous brown hairs, midrib distinct; veins immersed, hidden; sori oblong crowded, uniseriate, confined to the upper part of the frond, where they fill up the whole of the

space between the midrib and margin. *Baker, Ann. Bot. Soc. Lond.* vol. v., 464.

Penang. (*Curtis*.)

5B. POLYPODIUM ADSPERSUM. (*BL*) Rhizome creeping, squamose, scales ovate, oblong, acuminate, entire yellowish, deciduous; fronds sessile, linear, 3-7 inches long, 1-4 inch broad, above sparingly nigro-punctate, coriaceous, glabrous; veins inconspicuous, once forked not reaching the margin, the upper fork short; sori subrotund (or oblong when young)<sup>1</sup> on the upper shorter veinlet parallel with and near the costa. *BL En. Fl. Jav.*

Singapore, Lobb. (*In Moore's Herbarium.*)

(Also in Java.)

5C. POLYPODIUM SETIGERUM. (*BL*) "Stipes densely tufted, clothed with long soft-spreading ferruginous hairs 2-3 inches long; fronds 8-12 inches long, 1/2 inch broad, the point acute, the lower part narrowed rather suddenly, the edge entire; texture subconaceous, both sides thinly clothed with long soft hairs like the stem; veins pinnate; sori round, in long rows close to the midrib." *Hook. Syti. Fit. p.* 320.

Singapore. (*In Moore's Herbarium*)

(Also in Java.)

51. POLYPODIUM SUBPILNATIFIDUM. (*BL*) - Fronds tufted sessile, 4-6 inches long, 2 lines broad, attenuated at the base, split down nearly to the rachis into lobes the upper edge of which is nearly straight and horizontal, and the lower very oblique; texture subcoriaceous, both sides naked; veins forked, the upper branch bearing a solitary sorus on each lobe.<sup>1</sup> *Hook S*<sup>1</sup>

554.

Malay Peninsula; Gounong Korbou. (*M.J. de Morgan.*)

(Also in Java and Sandwich Islands.)

7. POLYPODIUM CORNIGERUM. Perak. Mount Idjo, 5,000 feet alt. {Day, Scortechinii.)

S. POLYPODIUM CUCULLATUM. Perak. [Scortechinii King, No. 6,972.)

(Also in New Guinea and Fiji.)

8A. POLYPODIUM STREPTOPHYLLUM. {Baker.) "Densely tufted; stipe scarcely any; frond linear, 3-4 inches long by 1 inch broad, cut down to the rachis into many ligulate, entire slightly twisted, adnate, contiguous pinnae of a line broad, with a single medial nerve, and a single superficial sorus at the tip; firm in texture, green and glabrous on both surfaces; lower pinnae gradually reduced in size." Baker, Jour. Bot. 1879, 42.

Singapore. {Murdoch.) Near cucullatum, but fully pinnate with apical sori.

9. POLYPODIUM KHASVANUM Perak, 4,000 feet alt. {Day, Scortechinii.)

10. POLYPODIUM TRIANGULARE. Jakpho, Naga Hills 9,000 feet alt. {Clarke.)

(Also mountains of Mozambique, 5,000 feet alt.)

10A. POLYPODIUM TRIANGULARE. (Scortechinii.) Rhizoides erect, short, covered with scales; fronds tufted, subsessile, linear attenuated at both ends, 6-8 inches by 1 inch, thick, coriaceous glabrous, whitish beneath, cut down to the rachis into thick distichous triangular segments, which are obtuse when sterile and acute when fertile, convex above, flat on the lower surface veins hidden, sori sunk in a deep pit towards the apex of the superior triangular segments, the lamina on both sides at the apex being folded inwards. Bcdd. in Jour. Bot., 1887, vol. xxv, p. 324 with Fig.

Perak. Mount Idjo, 5,000 feet alt. (Scortechinii, Day, King.)

14. *POLYPODIUM FUSCAYUM*. Perak, 3,000-4,000 feet alt. (*Day, Scottechin.*) The Ceylon locality must be omitted, the species not being found in that island.

(Also in Sumatra.)

15. *POLYPODIUM NOTAX*. (*Bl.*) Rhizome short, creeping; stipes and rachis puberulous; fronds linear-lanceolate, deeply pinnatifid, subcoriaceous, glabrous, or slightly pilose; segments alternate, linear, obtuse, entire, the lower ones triangular; veins simple, inconspicuous; sori not sunk, medial on the veins in a single row between the costa and the margin. *Bl. Fil. Jacq.* 183, t. 66. Near *obliquatum*, but sori not immersed; scales of the caudex loosely imbricate, elongato-linear, setaceo-acuminate, long ciliate; fronds 5-14 inches long,  $\frac{1}{2}$ -1 $\frac{1}{2}$  inches broad, segments subhorizontal or erecto-patent, dotted underneath.

Malacca, Mount Ophir, on trees. (*Moore's Herb.*)

(Also in Java.)

17. *POLYPODIUM SUBFALCATUM*. Perak, 3,000-4,000 feet alt. (*Day, Scottechin.*)

*POLYPODIUM VULGARE*. (*L.*) "Rhizome stout, the scales bright ferruginous, stipes 2-4 inches long, firm erect stramineous; fronds 6-12 inches long, 3-6 inches broad, cut down nearly or quite to the rachis into close entire or slightly toothed usually blunt pinnae  $\frac{1}{2}$ -2 inch broad; texture herbaceous or subcoriaceous, both sides naked; veins pinnate; sori large, uniserial." *Hook. Syn. Fl.* p. 354.

Tibet. (*Father David*)

(Also throughout Europe, the Azores, Madeira, Japan, Cape Colony. N. America—Sitka southward to California and the north of America.)

*POLYPODIUM PAPILLOSUM*. (*Bl.*) Rhizome stout, wide-creeping scaly; stipes 4-6 inches long, erect, slender, rigid

naked ; fronds i foot or more long, 2 inches broad, cut down to the rachis into close horizontal, almost entire, or faintly crenated pinnae, 2-3 lines broad ; texture papyraceo-herbaceous ; rachis and both surfaces naked ; veins black, distinct, once forked ; sori in rows near the edge, deeply immersed, the cavity prominent on the upper side," *Hook. Syn. Fil* 332, 2 cent, t. 46.

Perak, 3,000 feet alt. (*Scortechini. Day, King, Nos. 1,994 and 7,206.*)

(Also in Java and Philippines.)

POLVPODIUM TENUISRCTUM, (*Bf.*) " Stipe tufted, short, wiry, 1-2 inches long, clothed with soft spreading hairs ; fronds 6-9 inches long, 1J-2 inches broad ; pinnae close, 2 lines broad, cut down to a narrow rachis into linear very regular erecto-patent lobes; texture subcoriaceous, rachis erect straight villose, both sides naked ; veinlets simple, immersed 1 to each lobe ; sori much broader than the lobes, placed at their base,<sup>M</sup> *Book. Syii* ~?il338.

Perak, 4,000 feet alt. (*Day, Scortcchim.*)

(Also in Java.)

1. GOXIOPHLEBIUM AMCENUM. Simla and Kullu (*Trotter*) Chumba [*McDonnell*].

(Also in China.)

Mr. C. B. Clarke has gathered a variety of this in Khasi \With the fronds furnished with copious short pubescence on th under surface, which he'calls VAR. PILOSA. *Jour. Linn. Soc.* xxiv / .417.

IA. GONIOPHLKBIUM YUXAXENSE. (*Franchet*) Rhizome stoiu, creeping, densely covered with closely imbricated scales, th fibrous roots also furnished with hair-like scales, stipes 4-5 inch( long, pinkish, nearly glabrous ; fronds 8-12 inches long b 4-5 inches broad at base, deltoid-lanceolate, cut down nearly t the rachis into lanceolate, acuminate, obscurely crenated pinn:

half an inch broad, sparingly hairy on both sides, rachis and costae with lanceolate, hair-pointed scales, areole and sori in a single series. (*Franchet, Bull. Soc. Bot. France, 1885.*)

Yunan, Mao-kou-chang near Tali (near amicum).

3. GONIPHLEBIUM LACHNOPTIS. *Goniophlebium Fieldingianum* (*Moore, Ind. Fil., 389*) is a synonym.

3A. GONIPHLEBIUM NIPONICUM VAR. WATTII. (*Bedd. Jour. Bot., 1888.*) Rhizome wide-creeping, brittle, glaucous, naked or nearly so; stipes 3-6 inches long, hairy; fronds solidly hairy 8-12 inches long by 2-4 inches broad, pinnatifid to within  $\frac{1}{4}$  inch of the rachis; segments ciliated, 20-25 pairs entire or obscurely crenate, oblong from a broad base, blunt at the apex, lowest pair deflexed and slightly reduced; areolae in a single series; sori in a single row, nearer the midrib than the margin.

Koupra, 4,000-5,000 feet alt. (*Dr. Watt.*)

Dr. Watt writes that it is a beautiful fern with delicate green leaves, the glaucous rhizome creeping on trees and often suspended in the air; it only differs from typical *niponicum* which is from China and Japan, in the rhizome being more glaucous and glabrous and in the indumentum on the fronds being less thick.

6. GONIPHLEBIUM MICRORHIZOMA. Also in Yunan.

7. GONIPHLEBIUM MOLLE. Waytamargay, in the Shan States. (*Parish.*)

8. GONIPHLEBIUM SUBAURICULATUM. Perak. (*Kuhn, Mus. 5,740, 8,308.*)

9. GONIPHLEBIUM ARGUTUM. Mr. Clarke has gathered specimens in Khasya, with the base of the pinnae often subauri-



culate, which he calls *forma khasiana*. {*Jour. Linn. Soc.* xxiv. p. 417.)

10. GONIOPHLEBIUM VERRUCOSUM. Perak, 4,000 feet alt. (*Lay. King, No. 424, 965, 6,321.*)  
(Also in Queensland and New Guinea.)

11. GONIOPHLEBIUM KORTHALSI. (*Mett.*) Rhizome wide-creeping, about 1/2 inch thick, scales small, subulate, ciliated; stipes 5-6 inches long, glabrous; fronds 1-2 feet long, broadest at base, pinnate, texture subcoriaceous; pinnae lax, spreading sessile or distinctly petioled, 5-8 inches long, 1-2 inches broad lanceolate, attenuated at the base and finely caudate at the apex; the margins slightly crenated, but towards the apex sharply toothed; areoles in 3-4 rows; sori in 3 rows between the midrib and margin. *Mett. Fil. Ind.* ii. 223. *Hook. Syn. Fil.* 345.

Larut, Perak, at no elevation, hanging from trees, (*Di King's collector, No. 2,943.*)  
(Also in Sumatra.)

12. GONIOPHLEBIUM MOUPINE. (*Fraitchet*) "Rhizome slender, long creeping, scales small, tawny, ovate, jagged, sometimes deciduous; fronds distant, dimorphous, very glaucous, glabrous on both surfaces, thickly coriaceous, shortly stipitate; sterile fronds 1-2 inches long, broad, ovate-obovate, or ovato-lanceolate, apex obtuse or rounded, veins hidden; fertile fronds 1-2 inches long, oblong or linear-oblong, much attenuated below, apex obtuse; sori uniseriate close to the costa." *Fraitchet, PL David*, 11.

Moupin, Thibet, creeping on rocks amongst moss, hair of *Drymoglossum carnosum*.

7. NIPHOBOLUS SUBFURFURACEUS. Manipore, 3,500 feet alt.

8. NIPHOBOLUS FISSILIS.  
(Also in China, Madagascar, and the Zambesi Highlands.)

VAR. *SPERMOPHYLLUS*.—Fronde 12-15 inches long, 2-4 lines broad.

Munipore at Mao, 6,000 feet alt. (*Walt.*) This has longer and much narrower fronds than the Khasyan *floccigerus*, which I have already united with *fissus*.

11. *NIPHOBOLUS PENANGIANUS*. Perak. (*Sarntechini*. *King*, Nos. 461 and 7083.)

12. *NIPHOBOLUS BOOTHII*. This has been found in Thibet, and described under the name of *Polypodium Drakeanum*, by *Franchet Fl. David*.

13. *NIPHOBOLUS NIMMULARIFOLIUS*. Perak. (*Sarntechini*, *King*.)

1. *DIPTERIS WALLICHII*. West Munipore, 300-1,000 feet alt.; often 12 feet high.

2. *DIPTERIS LOBBIANA*. Perak. (*Sarntechini*.)

1. *DRYNARIA CORONANS*. Kohima, 4,500 feet alt.

1A. *DRYNARIA FORTUNEL*. (*Kunze*.) "Rhizome woody, the scales linear, bright, ferruginous; fronds dimorphous, the barren ones 2-3 inches long, 1-1½ inches broad, the upper lobes deltoid, acute, the fertile ones 12-18 inches long, 4-6 inches broad, cut down nearly or quite to the rachis into lanceolate or oblong, acute or bluntish, entire erecto-patent lobes 2-4 inches long, ½-1 inch broad; texture subcoriaceous; main veins distinct 1-2 lines apart, connected by prominent transverse veinlets, with a few faint ones in the intervals; sori in single rows of 3-4 between the main veins." *Hook. Syn. Fil.* p. 367.

Thibet. (*David*.)

(Also in South China.)

3. DRYNARIA PROPINQUA. Kohima, 6,000 feet alt.

4. DRYNARIA MOLLIS. Kullu and Simla {Trotter), Chumba  
(*M<sup>J</sup>cDpnml*)

7. DRYNARIA RIOIDULA. Perak, 3,000 feet alt. (Day), *Polypodium glaucostipes* Wall. *Cat.* 297.

DRYXARIA HERACLUM. (Kunze.) " Rhizome stout, the scales long silky, fibrillose bright brown ; fronds 3-6 feet long, 2 feet or more broad, the base with a cordate lobed wing 3-4 inches broad, the upper part cut down to a broadly-winged rachis into entire acute lobes, which are often 12-18 inches long, 3-4 inches broad ; texture rigid, both sides naked; main veins distinct to the edge, with 6-8 irregular quadrangular areolae between the midrib and edge, enclosing smaller ones with copious free veinlets ; sori small, copious, scattered, slightly immersed." *Hook. Syn. Fil.* 366.

Perak, 3,000-4,000 feet alt. [*Day, Scortechin* & King.]  
(Also in Java and Philippines.)

1. PLEOPELTIS ACHARDIANA. Perak, 3,000 feet alt. (Day, *Scortechin*, King, No. 1,900.)

1 A, PLEOPELTIS WRAYI. (Baker.) " Rhizome slender, wide-creeper, pale dense lanceolate acuminate ciliated, ferruginous ; fronds simple dimorphic, sterile oblanceolate, obtuse, thick, glabrous 1-1<sup>1</sup>/<sub>2</sub> inches long, 1/2-3/4 inch broad, with a naked stipe 1-15 lines long, fertile, with a longer stipe and a linear blade 2-3 inches long, 1/4-1/2 inch broad ; sori globose, superficial, medial." *Ann. Bot.* vol. v. 1. 473.

Perak, Mount Idjo, on trees 5,000 feet alt. {Day, *Scortechin*, Wray. King, Nos. 2,358, 3,673.)

2. PLEOPELTIS ROSTRATA. - Kohima, 5,500 feet alt.  
(Also in West China.)

5. PLEOPELTIS CLATHRATA. Simla (*Trotter*), Chumbia  
(*Medonell*).  
(Also in North China.)

6. PLEOPELTIS STENOPHYLLA. Perak, 5,000 feet (*Day, Scortechini, King, No. 2,350.*) *Pleopeltis Morgani* (*Zeiller, Bulletin de la Soc. Bot. de France, tom xxxii, p. 76*) is a synonym.

7. PLEOPELTIS SINUOSA. Perak, sea level. (*Day, King, No. 321.*)

13. PLEOPELTIS RHYNCOPHYLLA. Mr. Levinge has collected this in Sikkim with the fertile fronds 15 inches long, very much narrowed towards the apex.

13A. PLEOPELTIS RUPESTRIS. (*Bl.*) Rhizome woody, the scales squarrose dull-brown linear-acuminate; stipes 4-8 inches long, firm, erect; fronds 4-8 inches long, 1-1½ inches broad, the apex acuminate, the edge entire or obscurely repand; texture coriaceous, both sides naked; main veins very distinct, the areolae hidden; sori in two rows between the main veins, 6-8 between the 3 midrib and edge, not immersed. *Hook. Syn. Fil. p. 359.*

Perak, 4,000 feet alt. (*Day, Scortechini, King, No. 7,355.*)  
(Also in Java and the Philippines.)

14. PLEOPELTIS GRIFFITHIANA. Manipore, 5,500 alt.

15. PLEOPELTIS ENSATA (*Thunb.*), is an older name than *ovata*, so must take precedence. North Manipore.

15A. PLEOPELTIS PLATYPHYLLA. (*Ste.*) Rhizome woody, the scales dense, long subulate, nearly black; stipes 3-4 inches long, strong erect; fronds 12-18 inches long, 2-4 inches broad, the apex

acute, the edge translucent, entire, or more or less scalloped; texture very thick and rigid, both sides naked; main veins very distinct and raised, the areoles hidden; the upper surface with close, small, dirty-white dots; sori much immersed in single rows between the main veins, 8-9 between midrib and margin. *Hutch. Sp. Fil.* p. 359. *Polypodium crassinervium*, *Bl.*

Perak, 3,000 feet alt. (*Day, Scortechini, King, No. 2,007*)  
(Also in Java.)

16. *PLEOPELTIS MEMBRANACEA*. Simla, 5,000 feet alt. KASHMIR.

(Also in West China and the Philippines.)

16A. *PLEOPELTIS SCORTECHINI*. (*Baker*.) Rhizome woody, wide-creeping, flexuose calvate, stipes brown, naked, 15-16 inches long; fronds lanceolate to oblanceolate, acuminate, membranaceous or submembranaceous, glabrous, 16-18 inches long by 3-3½ inches broad, obscurely repand, narrowed gradually from the middle to the base; main veins distinct to nearly the edge, ½ inch apart; areoles copious with free included veinlets, clearly visible when held up to the light; sori minute superficial, scattered between the main veins, often confluent. *Baker, Ann. Bot.* vol. v. 477. *Nephrodium pteropodium*, *Baker, Journ. Bot.* 1888, 232 (*pleiopodium* by error, *Ann. Bot.* 1891).

Perak. (*Scortechini, Day, King, No. 8,382*)  
(Also in W. Borneo.)

17. *PLEOPELTIS ZIPPPELLI*. West Manipore, 1,000 feet alt.

18. *PLEOPELTIS MUSAFOLIA*. Perak. (*Scortechini, Day, King, No. 862*). King, No. 6,260 appears also to belong here, but differs in its dull colour, and indistinct veinlets.

(Also in New Guinea.)

20. *PLEOPELTIS MEMORABILIS*. West Manipore.

22A. *PLEOPELTIS HASTATA*. (Thunb.) Rhizome firm, the scales linear, spreading, bright-ferruginous; stipes 2-4 inches long, firm, erect, glossy; fronds 4-6 inches long, simple lanceolate  $\frac{3}{4}$ -1 $\frac{1}{2}$  inches broad, or 3-lobed with the lateral lobes like the terminal one, but smaller; texture coriaceous; both surfaces naked; main veins distinct to the edge, parallel with copious fine areole between them, with free included veinlets; sori in a single row, nearer the middle than the edge. *Hook. Syn. Fil.* 361.

Thibet. (Franchet.)

(Also in Japan and Formosa.)

22B. *PLEOPELTIS TRIFIDA*. (Don.) This species is quite distinct from Thunberg's *hastata*, with which I united it in my *Hort. Acad.*

23. *PLEOPELTIS MALACODON*. Kulu and Simla. (Trotter.)

VAR.  $\beta$ . *MALACODON*. Chundah (McDonell), Mizanorie (Hope), Khasya, 5,000 feet alt. (Clarke.)

23A. *PLEOPELTIS CRENATO-PINNATA*. (Clarke.) Rhizome slender creeping, densely clothed with small lanceolate fuscous deciduous scales; stipes 3-6 inches long slender, nearly naked; fronds elongate-triangular, 3-5 inches long, pinnatifid nearly to the rachis, glabrous, segments with shallow wavy crenations or some of the lower ones irregularly pinnatifid; main veins more or less distinct nearly to the edge, areole with free veinlets inconspicuous except when held up to the light; sori solitary between the main veins. *Jour. Linn. Soc. bot.* xxv. p. 99.

N. Manipore, 3,500-4,000 feet alt. (Clarke, Watt), Yunan (Lobley.)

23B. *PLEOPELTIS GLABRIFOLIA*. (Franchet.) Rhizome creeping, densely clothed with brown lanceolate scales; stipe 4-5 inches long, pale brown glabrous; frond 3-4 inches long, 2 $\frac{1}{4}$ -3 inches

broad, glabrous, coriaceous, glaucous, deltoid-ovate pinnatifid, pinnae confluent into a narrow wing at the base, 2-3 on each side, oblong obtuse or ovate, margin thinly coriaceous, unequally crenulate or minutely serrulate, the lower pair sometimes deeply lobed, the lobes obtuse; veins distinct to the edge, with transverse veinlets and copious fine areolæ between them; sori uniserial, close to the costa. *Franchet, Bull. Soc. Bot. France, 1885, p. 29.*

Yunnan, on Mount Che-teno-tze, near Tali.

24. *PLEOPELTIS EBENIFRS.* Kullu and Simla, 9,000 feet alt. (*Trotter*); Chutuba (*McDonell*).

27. *PLEOPELTIS PHYMATODES.* Perak. (*Scortechini*) Both Dr. King's and Mr. Levinge's collectors have gathered what appear to be simple-fronded examples of this species at a high level in Sikkim.

28. *PLEOPELTIS LONGISSIMA.* Perak. (*Scortechini*, *King*, No. 412.)

29. *PLEOPELTIS NIGRESCENS.* Sylhet and Nowgong (*Mann*); Perak sea level (*Day*, *Scortechini*). Mr. Baker states that this species is probably *P. membranifolia*, *R. Br. prod.* 147, which name would have priority.

(Also in Queensland.)

30A. *PLEOPELTIS LACINATA.* (*Bt.*) Rhizome wide-creeping, the scales lanceolate, ciliated, bright-ferruginous; stipes 6-12 inches long, firm, erect, glossy; fronds 8-18 inches long,  $\frac{1}{2}$  to 1 foot or more broad, cut down throughout to a narrow winged rachis into lobes 4-9 inches long,  $\frac{1}{4}$ - $\frac{1}{2}$  inch broad, the point much acuminate, the edge slightly undulated, the lower ones deflexed; texture subcoriaceous, both sides naked; main veins distinct to nearly the edge; areolæ fine, with copious free veinlets; sori uniserial immersed, forming pustules on the upper

surface.<sup>1</sup> *Hook Syn. Fil* p. 3<sup>5</sup>\* \*\* macrochasma, *Baker*  
*Trimen, Jour. Bot.* 1880, />. 216.

Perak, Caulfield's Hill, 5,500 feet alt. (*Day, King.*)

(Also in Sumatra and Java.)

32. PLEOPKLTIS JUGLANDIFOUA. Munipore, 7,500 feet.

(*Watt*)

Small undivided and trifid fronds often occur in this, as  
trifida and himalayensis ; var. pauper, *Clarke, Jour. Linn. Soc.*  
xxiv. 418, is described from these simple fronds. Fronds with  
solitary and with twin sori may be found on the same plant, s<sup>o</sup>  
that Clarke's biserialis cannot be considered as a variety.

33. PLEOPKLTIS LEHMANM. Khasia Hills, 5,000 feet alt.

(*Mann*)

Mr. Baker considers this species a variety of himalayensis,  
but the fronds are more membranous, the pinnae narrower, and  
without the hyaline margin ; I have not seen intermediate forms.

34. PLEOPELTIS HIMALAYENSIS.

(Also in Western China.)

[PLEOPELTIS WARDII. (*Clarke, Jour. Linn. Soc.* xxv. / . 99'  
*tab.* 43.) "Rhizome creeping, furnished with many soft lanceolate  
spreading yellowish-brown scales ; stipes naked, 6-18 inches long >  
fronds 1-3 feet long, pinnate ; pinnae broadly lanceolate caudate,  
margin hyaline undulated ; main veins parallel, 30-40 on each  
side of the costa ; sori large in a single series between the main  
veins, 1-6 between the costa and margin. **Kegwima** Edge, 7,<sup>oo</sup>  
feet alt. ; Naga Hills. I cannot regard this as anything but  
luxuriant HIMALAYENSIS. Mr. Clarke considers it a distinct species  
on account of the uniseriate character of the sori ; I have speci-  
mens, however, of himalayensis showing both forms on the  
same plant, and- the same variation occurs in juglandifoha ;  
do not see that it can even be made a variety,]



## ORDER XL—GRAMMITIDÆ.

## GENUS LXVI.—NOTHOCHLÆNA. (NOT NOTHOLÆNA.)

1. MONOGRAMME PARADOXA. Perak. (*Sorechtzky*.)

2. LEPTOGRAMME TOTTA. Chumba; Kullu; Simla.

3. LEPTOGRAMME LEVINGII. (*Clacke*.) Rhizome slender, wide-creeping, furnished with deciduous, lanceolate, membranaceous scales; stipe naked, up to 1 foot long, stramineous, with a dark base; fronds lanceolate or oblong-lanceolate, 1-1½ feet long, 3-5½ inches broad at the middle, narrowed at the base, pinnate; the pinnae lanceolate, sessile, ½-¾ inch broad, cut down nearly to the rachis into oblong more or less crenated segments, some of the lower pinnae generally distant and broader, with some of the segments more or less irregularly pinnatifid; texture membranous, both sides hairy, the under surface with needle-like weak hairs; veins erecto-patent, simple or forked; sori generally globose, sometimes oblong, nearer the margin than the midrib. *Baker, Ann. Bot. vol. v. p. 483.*  
*Gymnogramme aurita* var. *Levingii*, *Beddome's Handbook*, p. 317.  
 Chumba (*McDonnell*); Simla (*Watt, &c.*)

GYMNOGRAMME DELAVAYI. (*Baker*.) Rhizome erect or short-creeping, densely covered with hair-like orange scales; stipes tufted, about 3 inches long, black shining, but slightly scaly; fronds oblong lanceolate, 3-4 inches long, simply pinnate; pinnae about 12 subopposite pair, narrow-oblong ¾-1 inch long by less than ¼ inch broad, glabrous above, densely covered beneath with closely packed lanceolate orange scales, texture coriaceous; veins hidden once or twice forked; sori oblique hidden beneath the scales. *Ann. Bot. v. 484.*

Yunnan (*Delavay*).

1. GYMNOGRAMME ANDERSOXI. *Woodsia lanosa* (*Hook*) is a synonym.

2. GYMNOGRAMME LEPTOPHYLLA, Kumaon ; Ceylon. (*Tritnen*)

(Also in Madagascar and Paraguay.)

i. SYNGRAMME FRAXINEA. King's collectors gathered the road form partially bipinnate, in Perak. (No. 6,493.)

(Also in West China and Madagascar.)

3. SYNGRAMME WALLICHII. Perak. (*Scortechini*)

3A. SYNGRAMME LOBBIANA. (*Hook*) Rhizome creeping) **Upes** approximate glossy ebeneous, 2-7 inches long ; fronds 6-10 inches long, 1-1½ inches broad, linear-oblong entire, the apex acuminate, the base narrowed ; texture coriaceous, both sides naked ; veins parallel simple or forked anastomosing near the margin ; sori copious on all the veins nearly reaching the margin. *Hook*\*. *Syn. Fil.* 386. *Hook. Sp. Fil.* v. tab. 300.

Mountains of Perak (*Dr. King's collectors*, No. 205).

(Also in Borneo.)

4. SYNGRAMME ALISMIFOLIA. Perak. [*Scortechini* & *U*']

4A. SYNGRAMME DAYI. (*Bedd. Jour, Bot* 1888, v. // - 279<sup>B\*</sup>) Rhizome creeping, somewhat fibrillose ; fronds narrow-linear, (entire or obscurely crenated, 4-7 inches long by 1½ line<sup>S</sup> broad, gradually attenuated at the base, but on a distinct stipe 1½ inch long ; texture in age coriaceous ; veins obscure in the old fronds, evident in the young, simple or once forked, the apices running into a submarginal transverse-continuous or interrupted vein ; sori narrow-linear thread-like, the length of the veins.

Perak, on quartz rocks ; the pass between Kiuala-Kansa

and Kinta, about 2,000 feet alt. (*Day*). The affinity of this interesting little fern is with *S. borneensis* (*Hook.*), though apart from its sori it has quite the aspect of a *Polypodium*.

31. *SELLIGUEA FERT.* (*Wall. Cat. 8*, *Gymnogramme diversifolia*. Singapore.)

32. *SELLIGUEA CAMPYLONEUROIDES.* (*Baker.*) Rhizome woody, wide-creeping,  $\frac{1}{2}$  inch diameter; scales small lanceolate, dark brown; stipes winged, from very short up to 8 inches long; fronds rather rigid in texture, simple oblong, cuspidate, much attenuated at the base, glabrous, up to 20 inches long by  $4\frac{1}{2}$  inches broad at middle; main veins very distinct,  $\frac{1}{2}$ - $\frac{3}{4}$  inch apart, regularly produced from the midrib to the margin, with distinct arching cross veins enclosing each several areoles with free included veins, or in some fronds, main veins only  $\frac{1}{3}$  inch apart, the cross veinlets not arched, and no free veinlets; sori in single interrupted rows, reaching all the way from midrib to margin. *Baker, Jour. Linn. Soc.* xxiv, p. 261.

Selama, Perak. (*Dr. King's collector*, No. 3,112.)

(Also in Borneo.)

36. *SELLIGUEA MEMBRANACEA.* (*Hook.*) Rhizome wide-creeping, the scales small, linear, nearly black; stipes 2-6 inches long, nearly naked; fronds 6-12 inches long, 1-2 $\frac{1}{2}$  inches broad, lanceolate, gradually much attenuated at the base, finely acuminate at apex; margins entire; texture papyraceous, glabrous; primary veins very slender, about  $\frac{1}{8}$  inch apart, distinct to nearly the margin, united by transverse veinlets, forming large hexagonal areoles with free included veinlets; sori in oblique parallel interrupted lines between each main vein. *Hook. Syn. Fil.* p. 338.

Perak, at the Rampa river (*Dr. King's collector*, Nos. 948, 2,986 and 3,844). Singapore (*Macle's Herb.*)

(Also in the Malay Islands and the Philippines.)

## 4. SHLLIGUEA ELLIPTICA. Kohima and N. Munipore.

1. LOXOGRAMME LANCEOLATA. Perak, (*Scortedhint, A/ing.*)  
(Also in Kaffraria.)

3. LOXOGRAMME AVENIA. (*Baker.*) *Wall. Cat. No. 10,*  
*Grammitis macrophylla*, is this species.

2. MENISCIUM TRIPHYLLUM VAR.  $\triangleright$  PARISHII. This should I think, be considered a distinct species from triphyllum. Grim<sup>115</sup> Mishmee specimens differ from the Tenasserim ones by being densely covered with longish white hairs on the under surrect, it is *M. villosum* (*/ Sm.*) and might be called Parishii var. villosum.

4. MENISCIUM CUSMDATUM. This species I fear cannot stand; the connivent transverse veinlets have each a single punctiform sorus in the young state, these afterwards enlarge and join, covering the whole of the two veinlets, many punctiform sori however, always to be detected in the most meniscioid state. In all Herbaria I find this and *Goniopteris urophylla* very much mixed up together, in fact, they are the same forms; specimens where punctiform sori predominate are put into *urophylla*, the meniscioid forms here; others, intermediate, are left doing nothing, being shifted backwards and forwards, being labelled with various names; Sir W. Hooker came to this opinion, and I am convinced he was right. As already stated I have constantly detected nephrodioid involucre in *urophylla*, and I have placed *Nephrodium*; I have no doubt they will be detected in more meniscioid forms, if fronds are examined in a very young state; exactly the same variations from nephrodioid to meniscioid can be seen in *Nephrodium glandulosum* ( $\wedge$ ), *Nephrodium lineatum* (*Bk*), and in the Javanese *Aspidium*

1. ANTROPHYLLUM RETICULATUM.  
(Also in Madagascar.)

IA. AXTROPHYUM CORIACEUM. (*Wall.*) Fronds 0-15 men-  
long by\*\_2 inches broad; narrowed very gradually from the  
centre to "the base, and more suddenly to the acute apex ; texture  
very thick, no midrib, the areoles very long and narrow, very  
distinctly raised on the upper surface ; the sori quite immersed,  
sometimes confluent. *Syn. Fil. p.* 393.

Himalayas, Perak (*King*, No, 565). Scarcely distinct from  
reticulatum.

IB ANTROPHYUM SEMICOSTATUM. (*Bl*) Fronds 6-18 inches  
long by .2-4 inches broad ; broadest about J of the way down,  
suddenly narrowed to an acute point, and very gradually to the  
base ; a distinct blackish midrib in the lower half, the centra)  
areoles often 2^3 inches long, J inch broad ; sori copious, often  
joining, rising above the surface, *Syn. FiL* 393-

Perak (*King's collector*] No. 3>^079)- Malacca.

(Also in the Philippines and Polynesian Islands.)

2. ANTROPHYUM PLANTAGINKUM.

VAR. *fl* ANGU.STIFOLIUM. (*Brack.*) Stipe 6 inches long  
frond ligulate, 12 inches long by | inch broad, texture thinner  
than in the type. *Book. Syn. Fil.* 393.

Malay Peninsula, Gounong, Sonoy (*M. Dc A/organ*). & -  
*Bull de la &JC. de France*, xxxii./ 77.

1. VITTARIA ELONGATA. Mann gathered specimens 1  
Lukhimpore, Assam, with fronds f inch wide.

3, VITTARIA KALCATA. Perak. (*Scortcchiui.*)

6. VITTARIA SCOLOPENDUINA, Perak, 2,000-3,000 feet a  
{*Day, Scortcchini.*}

(Also Fiji, Bourbon and Mauritius.)

7. VITTARTA SULCATA. Perak. (*Day.*)

(Also in New Guinea.)

2. DRYMOGLOSSUM PILOSELLOIDES. Perak, sea level. (*Dc*  
*King.*)

## TRIBE XII.—ACROSTICHEÆ

2. ELAPHOGLOSSUM LATIFOLIUM. Perak (Dr. King's collectors, No. 5,374.) Variety with very short stipe.

3. ELAPHOGLOSSUM NORRISHI. Perak (Dr. King's collectors, No. 2,322.)

2. STENOCHLENA SORBIFOLIA. N. Cachar Hills, Assam. (Mann.)

1. POLYBOTHRIA APPENDICULATA. Perak, 4,000 feet alt. (Day, King.)

GENUS LXXXIV.—ACONIOPTERIS. Omit this genus altogether, Clarke's plant being stunted Thrinopteris.

1. GYMNOPTERIS VARIABILIS. Perak, 4,000 feet alt. (Day, Scortechini.) Mr. Mann informs me that he considers the variety axillaris a very good species, and Dr. Trimen considers Wallis and metallica varieties of variabilis.

5. GYMNOPTERIS SPICATA. Perak (Day, Scortechini.)

VAR.  $\beta$  LATIFRONS. Fronds 2 feet 6 inches long by 2½ inches broad, the fertile apex 7-8 inches long.

Perak, 3,000-4,000 feet alt. (Day, King, No. 1,100.)

7. GYMNOPTERIS FLAGELLIFERA. Perak (King's collectors.)

(Also in Borneo, Sumatra, Solomon Islands, and New Guinea.)

8. GYMNOPTERIS SUBREPANDA. Perak (Day, Scortechini, King.)

10. GYMNOPTERIS FORTAMINANS. Perak (Scortechini.)

The form figured in the *Handbook* is exactly the same as Wallich's type in Linnæan Herbarium, v. Wallich from Courtallum in the Madras Pres. Vight, the pinnae in the South Indian plant vary from 1½ to 6 inches in length by ½ to 1 inch in breadth, and from quite entire, to serrate\* or less lobed both in sterile and fertile fronds, the rachis sometimes prominently winged; the fertile fronds generally soriferous throughout, are sometimes only contracted and soriferous, entire pinna or portions of uncontracted and sterile; they are, however, all the same species, no variations being permanent enough to authorise even varieties, and semicordata, Baker, is a common form. *Wall. Cat. 22*, also named contaminans by Wallich, is from N. India, but does not differ from the South Indian form except in having rather narrow, about 7 inches long, pinnae, about 7 inches long, 1 inch broad. *Clarke, F.*

Mr. Mann sends fine specimens from **Tu Peak, Garo Hills, Assam, 3,000 feet alt.**

VAR. CRISPATULA. *Wall. Cat. 24*- Rachis and reddish, fronds much more rigid in texture, pinna; 4-6 inch broad, margin more entire; very constant in character. *Clarke, Zyl I. tab, Uxxiv. fig. 2 b. d.* Khasia Hills, south side of the range (V. Mann). Jynteapore, Sylhet, 2,000 feet alt. (baric.) Liam, Khasia, 2,500 feet alt. (*Clarke.*) This is represented in South India.

13- GYMNOPTERIS PRESLIANA.  
(Also Fernando Po.)

GENUS LXXXVA.-LOMAGRAMMA. (/ *Smith.*)  
(*Loma*, an edge; *gramma*, a line.)

Veins reticulated in hexagonal areoles, the areoles nearest the costa being broader and larger, no free veinlets; fronds pinnate, dimorphous, the fertile much contracted and more or

less covered with sori, pinnae articulated. Rhizome 50 feet long; wide-creeping over trees.

This genus is allied to *Stenochilama*, and like that often has the rachis winged, and is liable to variations of abnormal sterile growth; it differs in its venation, which is that of *Neurocallis* and *Acrostichum*, genera widely differing otherwise in their short erect rhizomes and adherent pinnae. The name was given by J. Smith on the supposition that the sori were always marginal and linear, as the specimens he worked with had only semi-contracted fertile fronds seeding along the margins (a variation so common in all the ferns of this tribe), though the normal state of the fertile frond is to be entirely covered with seed on the under side.

*LOMAGRANMA LOMARIOIDES.* (*Bl.* under *Leptochilus*; *Hook.* under *Acrostichum*.) Rhizome strong, wide-creeping, and epiphytic on trees covered with a deciduous spongy indumentum, stipes 6-8 inches long, deciduously scaly; fronds up to 3 feet long by 1 foot or rather more broad, with numerous sessile, articulated pinnae, the sterile ones 1 inch broad, the apex acuminate, the margin with distant, shallow, rather falcate serratures, more prominent towards the apex, the base generally rounded; texture very thin, membranaceous, transparent, pellucid-dotted, the rachis and costa beneath scaly, the former more or less winged, particularly towards the apex; veins prominent and raised on both sides, fertile pinnae  $\frac{1}{2}$  inch broad, normally soriferous over the whole of the under surface, but sometimes only partially contracted and soriferous. *Hook. Syn. Bot.* p. 423. *Leptochilus lomarioides* (*Blume*). *Cheilolepton Blumeanum*, *For. Bor.* p. 89, tab. 51 (1844). *Neurocallis lomarioides*, *Prosl. Epim.* 377 (1845). *Acrostichum Blumeanum*, *Hook. Sp. Fil.* v. *Lomagrauma pteroides*, *J. Sm. and Moore, Index Fil.* xxxi. *Neurocallis* (*Cheilolepton*) *lomarioides*, *Moore, Ind. Fil.* xix. *Cyrtogonium polyphyllum*, *J. Sm. (in part), Nat. Hist. Museum Herb.*

Makum Forest, Lukhimpore, Assam (*Munro*), pinnae 5-6



inches long.—Assam (*Griffith*), pinnæ 2\ inches long. *Cyrtogonium pinnatum*, *J. Sm. Hist. Fit.* 142—(*Chorizopteris pinnata*, *Moore, Ind. Fl.* xix., represents abnormal small growth collected in Assam by Griffith, and *Chorizopteris bipinnata* is small abnormal bipinnate growth from Fiji.) Though best known under the specific name of *Blumeana*, Blume's name of *lomarioides* is the oldest and must be adopted. As to the genus, it is only *Leptochilus* in part of Blume, a name occupied in the *Syngne* for a section of *Gymnopteris*, so I have adopted J. Smith's name. (Also in the Philippines, Java, Fiji, and Solomon Island.)

*LOMA GRAMMA PERAKTENSIS* (L. S.) *khizome* 40-50 feet long, 1 in. diameter, epiphytic on trees; stipes 6-8 inches apart, about 1 foot long, slightly scaly, but scales soon deciduous, not winged upwards; frond 3-4 feet long, very similar to those of *Blumeana*, but coriaceous-herbaceous in texture, pinnae entire or obscurely serrated, quite glabrous or costa very slightly scaly; veins sunk and scarcely visible, venation very similar to *Blumeana* but closer and costal areoles smaller; fertile pinnae 1-1½ lines broad.

Perak, 400 feet alt. (*Day*) Referred by me to *Blumeana* in my List of Day's Perak ferns. Perak, 2,500-3,000 feet alt. (*Day, King's collectors*, No. 8,345), the pinnae all fall off in drying, much more so than in *Blumeana*.

1. *PHOTINOPTERIS RIGIDA*. Perak, 3,000 feet alt. (*Day, Scortechini*.)

2. *PHOTINOPTERIS DRYNARIOIDES*. Perak, 2,000 feet alt. On tops of highest trees. (*Day*.)

2. *PLATYCKRIUM WALLICHII*. Muniore. (*Watt*.) In these Muniore specimens, the terminal segments of the fern: beyond the usual soriferous disks, are again furnished with small soriferous patches; I am not aware that this ever occurs in the Malay Peninsula fern; if this is the case, the Muniore species may be a good variety.

## SUB-ORDER IV.—SCHIZÆACEÆ.

## 3. LYGODIUM FLENUOSUM.

VAR. ALTA, *Clarke, Linn. Jour.-Bot.* xxi, 181, tab. xxiv.  
Scandent, branches pendant, 30 feet long, fronds 1-pinnate, pinnæ both sterile and fertile 8 inches long,  $\frac{1}{2}$  inch broad, truncate, caudate or auriculate at the base, petioles  $\frac{1}{2}$ - $\frac{1}{4}$  inch long.

West Manipore, 750 feet alt. (*Clarke*.) I do not consider that this differs from the type. King's collectors send the same form from Perak (No. 2,975) the pinnules are subject to great variation.

## 5. LYGODIUM POLYSTACHYUM.

(Also in Anam.)

## SUB-ORDER V.—MARATTIACEÆ.

1. KALPUSIA ESCULENTA, Perak. (*Saurichim, King*.)

## SUB-ORDER VI.—OPHIOGLOSSACEÆ.

1. OPHIOGLOSSUM GRAMINEUM, (*Willd.*) Rootstock tuberous; fronds 1-3 inches long, the sterile division at, below, or slightly above the centre,  $\frac{1}{2}$ -1 inch long, narrow-linear acuminate, the base scarcely narrowed; no midrib, veins prominent and thickened, all springing from the base of the lamina reticulated upwards, few or no free veinlets. *Willd. in Ag. Erf.* 1802, p. 18, tab. 1. *Ophioglossum lusitanicum, Sw. Fil.* 445, in part (the Indian plant).

South India (*Wight*); Calcutta, Lucksagar tank (*Walt*);  
Ceylon, Unia-oya, Cent. Prov. (*Trimen*).

1. *OPHIOGLOSSUM VULGATUM*. I believe all the Himalayan specimens are referable to *reticulatum*; I can see no difference in the venation.

2. *OPHIOGLOSSUM NUDICAULE*. Some of the smaller specimens of this have quite the grass-like fronds of *gramineum*, and these do not differ from that fern in venation, when the fronds are broader like the specimens figured in *R. S. I. tab. 71*; the venation is more complicated, and there are a few free veinlets, I suspect it is only a form of *gramineum*; this would reduce our Indian species to four.

3. *OPHIOGLOSSUM FIBROSUM*. This is found in Ceylon (*Tenantes, C. P. 3,993*). Dr. *Trimen* also sends a smaller variety collected at Puttalam, which has the fronds obovate to oblong, but with exactly the same venation.

Occasionally there is a single thickened central vein forming a midrib nearly to the apex of the frond, but more frequently there are 2-3 strong central veins running parallel and close to each other, which fork more or less upwards and disappear well short of the apex of the lamina, there are numerous free and often forked veinlets in the areoles. *Ophioglossum costatum* (*R. Br.*) is apparently the same fern.

4. *OPHIOGLOSSUM RETICULATUM*. Parasnath, 2,500 feet alt.

5. *OPHIOGLOSSUM PENDULUM*. *O. intermedium* (*Hook. Syn. Fil.*) is a synonym. Makum Forest, Lakhimpore, Assam (*Mann*).  
(Also in Borneo.)

*HELMINTHOSYACHYS ZEYLANICA*.  
(Also in Solomon Islands and New Guinea.)

1. *BOTRYCHIUM LUNARIA*. Hailu Hill, Baga Dist. 9,000 feet alt., near Simla (*Watt*).

(Also in Afghanistan, 9,000 feet alt., New Zealand, and United States.)

1. *BOTRYCHIUM TERNATUM*. (*Sw.*) Stipe 1-2 inches long; petiole of the sterile segment 2-8 inches long, the latter 3-6 inches each way, deltoid tri-quadripinnatifid; lower pinnæ much the largest and pinnules of the lower side larger than the others, oblong or sub-deltoid, stalked, the ultimate divisions oblong or obovate, often  $\frac{1}{2}$  inch broad, blunt or acute, slightly toothed; fertile peduncle up to 18 inches long, generally considerably overtopping the sterile segment; panicle 1-7 inches long, deltoid very compound. *Hook. Syn. Fil.* p. 248.

Near Simla at Chadwick Falls, 6,000 feet alt. (*Dr. Watt*); Summer Hill, 7,400 feet alt. (*Collett*); Mashobra, 8,000 feet alt. (*Watt*); Nainee Tal (*Lewinger*); Sikkim (*Clarke*).

(Also in Australia, Tasmania, New Zealand, Japan, Lapland to Siberia, Pyrenees, United States southward to New Grenada.)

2. *BOTRYCHIUM VIRGINIANUM* VAR. *LANUGINOSUM*. Simla, Chamba, and Mussoorie.



