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UNITED STATES
EXPLORING EXPEDITION.

DURING THE YEARS

1838, 1839, 1840, 1841, 1842.

UNDER THE COMMAND OF

CHARLES WILKES, U. S. N.

VOL. XVI.

BOTANY.
CRYPTOGAMIA.

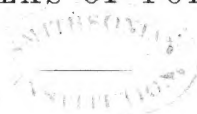
FILICES,

INCLUDING LYCOPODIACEÆ AND HYDROPTERIDES.

BY

WILLIAM D. BRACKENRIDGE.

WITH A FOLIO ATLAS OF FORTY-SIX PLATES.



PHILADELPHIA:
PRINTED BY C. SHERMAN.
1854.

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P R E F A C E.

THE present volume, containing an enumeration and description of all the Ferns collected during the voyage of the United States Exploring Expedition, under Captain Charles Wilkes, in the years 1838 to 1842, inclusive, was commenced by me, at the request of the Joint Library Committee of Congress, as far back as the year 1846; but, owing to other business claiming my attention, it was not ready for the press until near the end of 1848. Circumstances wholly beyond my control having delayed the printing for several years, I have had the opportunity of revising portions of the manuscript by the aid of some works recently published. There are, doubtless, many other works, or scattered memoirs, which should have been consulted, but which were not within my reach.

In this undertaking I have had to encounter many difficulties, owing in the first place to the absence of a good botanical library in Washington; and in the second place, to the want of a collection of authenticated species of exotic Ferns in this country; a want which must have been felt by every one who has had to study any extensive collection of this family of plants. Ferns are so exceedingly diversified in the outline and division of their fronds, and many species of a genus, and even of two distinct genera, so closely resemble each other in their general aspect, that they often baffle the most sagacious botanist, when he endeavours to determine the specimens before him by the aid of descriptions only, or mainly, and especially by the short specific

characters of the earlier authors; in whose day, the position and form of the sori, with the presence or absence, or the form and direction of the indusium, comprised the only points of generic distinction. Such characters prove to be by no means satisfactory, as they frequently brought species together which in habit and structure have little or no affinity with each other.

By the publication, in 1836, of Dr. Presl's "*Tentamen Pteridographiæ*," and by Mr. John Smith, in 1840, of "*An Arrangement and Definition of the Genera of Ferns, &c., &c.*," a wider field has been laid open, by the promulgation of new generic characters, derived from the position and form of the sori, in conjunction with the nature of the venation (the importance of which was long ago pointed out by Mr. Brown); to which Presl has added that of the form and number of the vascular bundles in the stipe. These characters, especially those taken from the subordinate modifications of the venation, have resulted in a great multiplication of genera; many of which are based upon single and trivial points of character, and might with more propriety be viewed as sections or subgenera. The latter conviction has been forced upon me during the progress of this work. But, under the circumstances in which I was placed, I could not pretend to form and act upon an independent judgment in respect to the generic arrangement of Ferns in general. It was, therefore, not only convenient, but necessary, for me to follow some published system as a whole, although I might entertain a confident opinion that the genera were, in many cases, multiplied beyond what a sound judgment would approve. Of the arrangements proposed, that of Dr. Presl is the most elaborate, and accompanied by the most complete catalogue of species and tables of illustrations; and it has been of the greatest use in facilitating the study of Ferns. The generic characters, however, which this author derives from the number of the bundles of vessels in the stipe are neither satisfactory nor readily available, varying as these bundles do in species of the same genus, both in form and number; yet specific characters of this kind might be employed to some advantage, particularly in the examination of living Ferns. But in the

herbarium the stipes are frequently wanting or imperfect; and, when present, these vessels in dried specimens are often very difficult to distinguish.

The arrangement of Mr. John Smith appears to be a great improvement upon that of Presl; and his tribes and genera are better circumscribed, and on the whole much more natural. Having adopted in the present work the greater part of the divisions and genera as established by that author, I may nevertheless take the liberty of stating, that I do not altogether agree with him in the position he has assigned to several genera and species in his system. To him and to Dr. Presl, however, Pteridologists are highly indebted for the light which their investigations have thrown upon a family of plants, the genera of which had become cumbrous and unmanageable by the accumulation of heterogeneous masses of species.

Of the species which are here characterized as new, some probably have already been published, either as species which I have failed to identify, or in recent works which were not accessible to me. I can only say that I have endeavoured to prevent, as far as possible, such an occurrence, by diligently consulting all the authorities which I could command. And in the large collection of Ferns made by the Expedition, most of them on islands in the Pacific Ocean which have not heretofore been much visited by botanical collectors, and where humidity, heat, and shade, elements conducive to the production of Ferns, are combined in a high degree, surely as large a number of new species as are here proposed was naturally to be expected.

The drawings for the accompanying atlas of plates, were made by a young artist, Mr. William S. Lawrence, and he also engraved the plates. As it was his first attempt at this kind of drawing, and not being constantly under my supervision, there frequently occurred omissions, or but partial representations of the minor details; such as the greater or less hirsuteness of the stipes, rhachis, and costa, or in respect to other appendages. This will account for the discrepancies in some few cases between the plates and the letter-press, in these respects.

In the preparation of this volume, the greatest advantage has been derived from the works of Sir William Hooker, particularly his *Genera Filicum*, wherein many of the genera of Dr. Presl and Mr. John Smith are characterized and beautifully illustrated; also from his *Species Filicum* (of which we have seen only the first volume, with two parts of the second); a work which, when completed, will have accomplished more in reducing the vast array of nominal species to an intelligible state, than any work which has yet appeared. M. Spring's admirable monograph of the *Lycopodiaceæ* has facilitated the determination of our species of *Lycopodium* and *Selaginella*.

It has become unnecessary here to discuss those interesting questions which relate to the geographical distribution of the genera and species of Ferns, and the numerical proportions they bear to the rest of the vegetation, in the regions where our collections were principally made; since this portion of the work has devolved upon a naturalist of the Expedition more capable of doing justice to the subject. It will be noticed in the body of this volume, however, that the same Fern has very frequently been met with in two or more remote parts of the globe;—clearly showing that species of this family have a more extensive geographical range than has been generally supposed.

I cannot close these prefatory remarks without tendering my grateful acknowledgments to Dr. John Torrey, of New York, and Dr. Asa Gray, of Cambridge, for the liberality with which books from their libraries have been supplied or consulted, and especially for assistance afforded in translating my English specific characters into Latin. Dr. Gray has also done me the favour to look over the proofs as the work was passing through the press. My thanks are also due to Mr. J. Drayton, for the care bestowed by him in superintending the engraving of the plates.

B O T A N Y.

C R Y P T O G A M I A.

FILICES.

DIV. I. POLYPODIACEÆ, R. BR.

TRIBE I. POLYPODIEÆ, J. SM.

1. GRAMMITIS, Sw., J. Sm.

1. GRAMMITIS NANA, Sp. Nov.

G. rhizomate brevi repente paleaceo; fronde integra linearilanceolata obtusa basi attenuata; venis furcatis; soris planis obliquis.

HAB. Orange Harbour, Tierra del Fuego: among loose rocks; frequent.

Rootstock about one inch long, slender, *creeping*, covered with pale brown reticulated scales: rootlets hard, filiform, and rufous-tomentose. *Fronde* entire, numerous, from one to 4 inches in length, *linear-lanceolate*, obtuse at the point, very much *attenuated at the base*. *Veins* forked, immersed, not perceptible to the naked eye, except when held up between it and the light. *Sori* plane, oblique, produced on the upper half of the frond, the sporangia becoming confluent.

Closely allied to the *G. australis* of Robert Brown, the fronds of which have a short pilose stipe; and, judging from a figure of it in the Voyage of the Astrolabe and Zélée, that species is cæspitose; while in our plant the rootstock is creeping, and the hairs at the base of the stipe are wanting.

2. GRAMMITIS SERRULATA, Sw.

Grammitis serrulata, Sw. Syn. Fil. p. 22; Willd. Spec. Pl. 5, p. 141; Raddi, Plant. Brasil. 1, p. 11, t. 22, f. 2.
Xiphopteris serrulata, Kaulf. Enum. Fil. p. 85.

HAB. Estrella Pass, Organ Mountains, Brazil: on trees; frequent.

2. CALYMMODON, Presl.

(POLYPODII Spec. Nees & Blume.)

1. CALYMMODON HIRTUS, Sp. Nov.

C. cæspitosus; *stipite brevi alato*; *frondibus linearibus profunde pinnatifidis hirsutis*; *pinnis inferioribus sterilibus oblongis obtusis, superioribus suboblongis cucullatis monosorosis*; *soris oblongis*.

HAB. Mount Majajjai, Philippine Islands: on trees.

The plant is 3 to 4 inches high, cæspitose, with a short winged stipe, about one-fourth of an inch in length. Fronds linear, deeply pinnatifid, membranaceous, of a pale straw-colour, and with long hairs on both sides. Lower segments oblong, obtuse, distant, and sterile, with the sinus rounded; those of the upper half of the frond somewhat oblong, cucullate, and bearing within the cowl near the point a single oblong sorus.

This appears to be altogether distinct from the *C. cucullatus* of Presl, which has subcoriaceous and glabrous fronds, quite destitute of hairs.

3. POLYPODIUM, *Linn., J. Sm.*

(ADENOPHORUS, Gaud. MARGINARIA, Bory.)

* CTENOPTERIS, Presl, J. Sm.

1. POLYPODIUM PSEUDO-GRAMMITIS, *Gaud.*

Polypodium pseudo-grammitis, Gaud. Bot. Freyc. Voy. p. 345; Hook. & Arn. Bot. Beech. Voy. p. 103, t. 21, f. B.
Grammitis tenella, Kaulf. Enum. Fil. p. 84.

HAB. Sandwich Islands: on trees.

The linear, slightly undulated fronds of this species, when growing in shady localities, are "very tender and membranaceous," as stated in the Botany of Beechey's Voyage; but in open and exposed localities, they are rigid and coriaceous.

2. POLYPODIUM SUBSPATHULATUM, Sp. Nov. (Tab. 1.)

P. rhizomate cæspitoso; frondibus paucis, sterilibus spathulatis stipitatis integris coriaceis glabris, fertilibus lineari-lanceolatis basi attenuatis margine cum stipite sparsim setosis; venis furcatis; soris biserialibus distantibus subimmersis fere ovalibus; sporangiis echinatis.

HAB. Tahiti, Society Islands: on trees, in mountain forests.

Rootstock cæspitose, short, and squamose. *Fronde few* and very dissimilar in form; the *sterile* one, including the short stipe, 1 to 1½ inches high, *spatulate* in form and destitute of setæ; the *fertile*, 4 to 5 inches in length, *linear-lanceolate*, the base *attenuating* on a slender stipe of about an inch in length, which, with the margin of the frond, is *sparsely beset* with short and brown setæ. *Veins slender and forked*, partially visible to the naked eye on the upper side. *Sori* of a *slightly oval form, subimmersed, distant*, confined to the upper half of the frond, and forming a single line equidistant between the costa and margin; the *sporangia echinate*.

The spatulate sterile fronds, and the fertile ones with partially immersed sori, equidistant between the costa and margin, readily distinguish this from *P. Hookeri*, of this work.

PLATE 1.—Fig. 1. Plant, of the natural size. 1 *a*. Section of a frond, with a single sorus. 1 *b*. Echinate sporangium.—The details more or less magnified.

3. POLYPODIUM CONFORME, Sp. Nov. (Tab. 1.)

P. rhizomate caespitoso; stipitibus brevibus; frondibus lineari-lanceolatis obtusis basi attenuatis membranaceis glabris ad marginem paullulum repandum costaque setosis; venis furcatis; soris biserialibus approximatis planis rotundis costae proximis; sporangiis echinatis.

HAB. Ovolau, Feejee Islands: on rocks and trunks of trees, at an altitude of 2,000 feet.

Rootstock caespitose, about half an inch high, imbricated with pale chaffy scales, the rootlets capillaceous, branching, and slightly rufous-hirsute. *Stipes short and setose*. *Fronde* 4 to 6, smooth and membranaceous, about 4 inches long, linear-lanceolate and slightly attenuated towards the base, the margin very slightly repand, and, with the costa, setose; the hairs of a dark brown colour. Lines of round sori usually on the upper half of the frond, close to the costa, approximating, but seldom confluent. *Sporangia* seated on a long pedicel, echinate.

This differs from *P. subspathulatum* by the plane sori, and their proximity to the costa; and from *P. Hookeri*, by its membranaceous, smooth fronds, and very short stipes.

PLATE 1.—Fig. 2. Plant, of the natural size. 2 *a*. Section of a frond, with a single sorus. 2 *b*. Echinate sporangium.—The details more or less magnified.

4. POLYPODIUM HOOKERI.

Polypodium setigerum, Hook. & Arn. Bot. Beech. Voy. p. 103, t. 21, f. A. (non Blumè.)

HAB. Sandwich Islands. Mount Maijajai, Luzon, Philippine Islands.

In many of our specimens, the stipes are thrice the length of those shown in the figure quoted above, with the sori often continuing downwards to the base of the fronds; added to which, we find the sporangia to be echinate.

5. POLYPODIUM MINIMUM, Sp. Nov. (Tab. 1.)

P. cæspitosum; frondibus linearibus sinuato-pinnatifidis glabris, apice integro crenato sorifero, lobis alternis subrotundis; venis simplicibus; soris ovalibus planis (demum) confluentibus.

HAB. Sandwich Islands: on trees.

Rootstock short, *cæspitose* and squamose, with black and wiry roots. *Fronde* 3 to 6 in a tuft, slightly undulate and *smooth*, usually about 2 inches long, *linear and sinuately-pinnatifid*, with rather more than a third of their length *towards the point entire, slightly crenate and soriferous*; the costa usually black and prominent. *Veins simple* and evident to the naked eye. *Sori oval*, of a dark-brown colour, *ultimately becoming confluent*, and concealing the under surface and costa of the frond. Sporangia seated on a very long pedicel.

This bears a very marked resemblance to the *Grammitis serrulata* of Swartz; but its rootstock is thicker and constantly much shorter, the fronds less erect, with the lobes at the base rounded, towards the point crenate.

PLATE 1.—Fig. 3, 3. Plants, of the natural size. 3 *a*. Section of the fertile part of a frond. 3 *b*. Sporangium. The dissections more or less magnified.

6. POLYPODIUM HAALILIOANUM,* Sp. Nov. (Tab. 1.)

P. cæspitosum; frondibus undulatis membranaceis lineari-lanceolatis

* In memory of M. Haalilio, an intelligent chief of the Sandwich Islands, who visited this country a few years ago, and died soon after his return to his native country.

obtusis sinuato-pinnatifidis basi attenuatis, laciniis alternis rotundato-triangularibus, costa nigra; venis simplicibus; soris planis orbiculatis solitariis; sporangiis cum glandulis clavatis intermixtis.

HAB. Sandwich Islands: in mountains, on trees.

Rootstock cespitose, short, erect and squamose; the rootlets black, capillaceous and branching. Stipes short, almost wanting. *Fronde* 4 to 6 in number, membranaceous, slightly curved or undulated, 3 to 5 inches long, linear-lanceolate and obtuse at the point; the base attenuated; margin sinuately pinnatifid, and in many of the fronds, bluntly serrate towards the point. Lobes alternate, rounded-triangular, each bearing a single round sorus close to the black, slender, and prominent costa. Veins simple and sunk. *Sporangia* intermixed with clavate glandular hairs.

Allied in habit to the *Grammitis myosuroides* of Swartz; but the fronds are attenuated at the base, and the sori strictly those of *Polypodium*.

PLATE 1.—Fig. 4, 4. Plants, of the natural size. 4 a. Section of a frond, with a single sorus. 4 b. Glandular hairs mixed with the sporangia. 4 c. Sporangium. The dissections all more or less magnified.

7. POLYPODIUM CONTIGUUM, Sp. Nov. (Tab. 2.)

P. rhizomate brevi repente; frondibus stipitatis coriaceis glabris subfalcatis profunde pinnatifidis, laciniis oblongo-linearibus alternis integris obtusis; venis obscuris simplicibus; soris approximatis ovalibus planis setosis.

HAB. Muthuata Mountains, Feejee Islands; at an altitude of 2,000 feet.

The *rootstock* of this species, contrasted with the size of its fronds, is very thick and short, creeping, densely imbricated with light-brown, linear, attenuated, reticulated scales. *Fronde* on a short, partially winged stipes, approximate, from 3 to 5 inches long, subfalcate, their circumscription lanceolate, deeply pinnatifid, and narrowing gradually

into an entire point about half an inch in length, with an attenuated base, *smooth, coriaceous* in texture, and of a paler colour on the under than on the upper surface; the *segments oblong-linear, alternate, entire*, towards the point triangular, subrotund at base, and decurrent on the stipes. Rhachis black, glossy, and prominent on the under side, with scattered, horny scales. *Veins sunk and simple*, seldom forked. *Sori plane, oval*, nearer to the margin than costa, 6 to 8 on each segment, becoming confluent; a few short setæ intermingled with the sporangia.

Although much smaller, yet in the habit, consistency, form, and divisions of its fronds, our plant is not unlike the *Davallia contigua* of Swartz.

PLATE 2.—Fig. 1. Plant, of the natural size. 1 *a*. Section of a frond, showing sori. 1 *b*. Hairs from among the sporangia. 1 *c*. Hairs from the under side of the rhachis. 1 *d*. Sporangium and spores. Dissections more or less magnified.

8. POLYPODIUM DECORUM, Sp. Nov. (Tab. 2.)

P. rhizomate brevi repente paleaceo; frondibus breviter stipitatis linearilanceolatis coriaceis glabris acuminatis basi attenuatis pectinato-pinnatifidis, laciniis linearibus alternis integris obtusis; rhachide nigro subtus prominente; venis pinnatis obscuris; soris obliquis subimmersis solitariis demum confluentibus.

HAB. Tahiti, Society Islands: in mountain forests, on trees.

Rootstock short and creeping, densely imbricated with linear, very much attenuated, brown, reticulated *paleæ*. *Fronde* few, erect, *coriaceous and smooth*, pale on the under surface, about 6 inches long, *linear-lanceolate*, somewhat acuminated at the point, with an *attenuated base, pectinate-pinnatifid*. *Segments alternate*, spreading, those about the middle of the frond linear, obtuse, near to the apex and at the base they are triangular-ovate, and decurrent on a smooth stipes, of about half an inch in length. *Rhachis black and prominent on the under side*, with a few scattered, fugacious, dark-brown setæ, which sometimes are found in tufts opposite the base of the sinus. *Veins obscure*, and sunk in the thick substance of the segments, *invariably pinnate*. *Sori* from 8 to 12 on a segment, *subimmersed, oblong, solitary*, and of a dark-

brown colour, *in age becoming confluent*; a few hairs are intermingled with the sporangia.

This has more erect and slender fronds, with narrower segments, and more numerous oblong sunken sori, than the preceding species. Perhaps its nearest affinity is to *P. rigescens* of Bory, from which, however, it is also very distinct.

PLATE 2.—Fig. 2. Plant, of the natural size. 2*a*. Portion of a frond. 2*b*. Hairs from under side of the rhachis. 2*c*. Hairs from among the sporangia. 2*d*. Sporangium. Dissections all more or less magnified.

9. POLYPODIUM ADENOPHORUS, *Hook. & Arn.*

Polypodium Adenophorus, Hook. & Arn. Bot. Beech. Voy. p. 104, t. 22 (opt.).

P. pendulum, Gaud. Bot. Freyc. Voy. p. 349.

Adenophorus pinnatifidus, Gaud. Bot. Freyc. Voy. p. 365.

HAB. Sandwich Islands: on trees.

This has a creeping rootstock and pendent fronds. A state of it exists in the collection, which has dentate segments.

10. POLYPODIUM SARMENTOSUM, Sp. Nov. (Pl. 2.)

P. cæspitosum, sarmentosum; stipitibus brevi subalato; frondibus erectis subcoriaceis oblongo-lanceolatis caudato-acuminatis profunde pinnatifidis subtus sparsim setoso-glandulosis; laciniis linearibus obtusis repando-dentatus; rachide sparsim setoso; venis manifestis pinnatis; soris orbiculatis distantibus irregularibus; sporangiis cum glandulis clavatis articulatis intermixtis.

HAB. Sandwich Islands: on rocks and decayed wood, frequent.

Plant cæspitose, the roots near the surface of the ground producing at irregular distances from the parent stock, small, scaly buds, which ultimately form new plants by throwing out roots and fronds. *Fronde*

erect, coriaceous, from 3 to 5 in a tuft, arising from a short, globose, squamose rootstock, *lanceolate* or *oblong-lanceolate* in form, and contracting rather suddenly into a narrow dentate point, smooth on the upper, with scattered, reddish, clavate glands on the under surface, from 3 to 6 inches long and *deeply pinnatifid*; *segments* alternate, spreading and irregular in their length, *linear, obtuse*, those at the base triangular and decurrent on the short stipes, their margin *repand-dentate*. *Rhachis* of a brownish-black colour, subrotund, prominent, and *sparsely setose on both sides*. *Sori round*, from 1 to 7 on a segment, *solitary and irregular* in their disposition. *Sporangia intermixed with pinkish-coloured, clavate, articulated glands*.

Allied to the preceding, but distinct and well marked as a species.

PLATE 2.—Fig. 3, 3. Plant, of the natural size.—3 *a*. Section of a segment with a sorus. 3 *b*. Hairs from among sporangia. 3 *c*. Hairs from under surface of frond. 3 *d*. Sporangium. More or less magnified.

11. POLYPODIUM VULGARE, *Linn.*

Polypodium vulgare, Willd. Spec. Pl. 5, p. 172; Kaulf. Enum. Fil. p. 100; Hook. Fl. Bor. Am. ii. p. 258.

Var. β . *Frondebibus magnis triangulari-oblongis, laciniis serratis*.

HAB. Port Discovery, Straits of Juan de Fuca, and sand-hills, vicinity of Gray's Harbour, Oregon; β , Island of Madeira.

We do not find that the Oregon plant differs in any important particular from the European form of the species; the outline of the fronds and position of the sori being similar; with the segments perhaps a little more acute. In var. β , the fronds are larger, more membranaceous, with broad, obtuse, serrate segments.

12. POLYPODIUM INTERMEDIUM, *Hook. et Arn.*

Polypodium intermedium, Hook. & Arn. Bot. Beech. Voy. p. 405; Hook. Fl. Bor. Am. ii. p. 258.

P. Scouleri, Hook. & Grev. Ic. Fil. 56?

HAB. San Francisco, California.

The founders of this species considered it distinct from *P. vulgare* of Linnæus, on account of its oval sori and pellucid fronds, with the segments becoming smaller at the base; the first two of these characters being the only ones which apparently present any claims to constancy, induces us to retain the species; we think, however, that the *P. Scouleri* of Hooker and Greville's *Icones Filicum*, is not specifically distinct from the present one, as in the work referred to, it is represented as having a forked free venation; in which particular, as well as in the circumscription of the fronds, it accords with forms in our possession, of what we are perfectly satisfied belong to the true *P. intermedium* of the authors of the *Botany of Beechey's Voyage*.

In Hooker's *Flora Boreali Americana*, we find the *P. Scouleri* referred to *P. (Marginari) Californicum* of Kaulfuss, which latter has the lower exterior venules free and fertile, the upper ones angularly anastomosing; while Presl more properly places it in his *Ctenopteris* division of *Polypodium*, in which the venules are all free.

13. POLYPODIUM PELLUCIDUM, *Kaulf.*

Polypodium pellucidum, Kaulf. Enum. Fil. p. 101; Gaud. Bot. Freyc. Voy. p. 356;
Hook. & Arn. Bot. Beech. Voy. p. 103.

Var. β . *Laciniis linearilanceolatis, acuminatis.*

Var. γ . *Laciniis lobato-dentatis; lobis fertilibus.*

HAB. Sandwich Islands: on trees, and in open plains on decomposed lava, frequent; on Mauna Loa, at an altitude of 8000 feet.

Though closely allied to *P. vulgare*, yet the fronds are usually larger, more coriaceous and rigid, with obtuse repand-dentate segments, and sori seated closer to the margin; veins pellucid, with a faint nervule perceptibly leading from the sori, and terminating in the sinus of the teeth, being an apparent continuation of the fertile veinlet. Plant altogether very variable in the form and indentations

of its segments. The forms β and γ may be considered the two extremes of these variations.

14. POLYPODIUM PLUMULA, *H. B. K.*

Polypodium plumula, *H. B. K.* in Willd. Spec. Pl. v. p. 178; Raddi, Plant. Brazil, p. 18, t. 27, f. 1; Gaud. Bot. Freyc. Voy. p. 355 (excl. synonym.)

HAB. Corcovado, Rio Janeiro, Brazil.

Plant averaging from 10 to 12 inches high. Fronds lanceolate, and attenuated at both ends, deeply pinnatifid. Segments direct and horizontal.

15. POLYPODIUM PARADISEÆ, *Langsd. & Fisch.*

Polypodium paradiseæ, *Langsd. & Fisch.* Ic. Fil. p. 11; Willd. Spec. Pl. v., p. 179; Kaulf. Enum. Fil. p. 105.

HAB. Corcovado, Rio Janeiro, Brazil.

The fronds of this average in height from 18 inches to 3 feet. They are pinnate at base, and deeply pinnatifid towards the point; with subalternate lanceolate-linear, slightly repand, obtuse or acute flexuous segments, from 2 to 3 inches long. Stipes and rhachis round and rufous-pubescent.

Although Gaudichaud has united this to the preceding, it is nevertheless very distinct; and both may be viewed as among the most handsome species of this tribe.

16. POLYPODIUM RECLINATUM, *Sp. Nov.*

P. cæspitosum; *stipitibus brevi tereto hirsuto*; *frondibus flaccidis pendulis hirsutes linearibus pennatis*; *pinnis adnatis alternis ovatis valvato-oblongis basi superiore subariculato, costa flexuosa*; *venis pinnatis*; *sores biserialibus orbiculatis approximatis*; *sporangiiis echinatis.*

HAB. Organ Mountains, Brazil: on rocks and trees.

Rootstock short, globose, and squamose-hirsute, with capillaceous smooth branching rootlets. *Stipes* about half an inch long, *round*, slender, and *hirsute*. *Fronde* flaccid from 6 to 10 inches in length, *pendulous* in their direction, *linear*, obtuse, and *pinnate*, hirsute on both sides, the hairs brown. *Pinnæ* alternate, horizontal, 5 lines long and 3 lines broad, *ovate* or *ovate oblong*, two-thirds of the *base adnate*, the *superior one* auriculate, bearing from 8 to 10 round approximate sori, with echinate sporangia.

On first inspection, we considered this as a mere form of *P. centralum*, Willdenow, but a farther and more careful examination of the hairs on the surface and margin of the pinnæ, with the echinate sporangia, in a great measure convinced us that it is distinct. Willdenow's description, however, is very short and unsatisfactory.

17. POLYPODIUM TENELLUM, Forst.

Polypodium tenellum, Sw. Syn. Fil. p. 38 et 233; Willd. Spec. Pl. 5, p. 185; R. Br. Prodr. Fl. Nov. Holl. p. 147; A. Cunningham. in Hook. Comp. Bot. Mag. ii. p. 363.

HAB. New Zealand: in forests, banks of the Waicaddie River, and vicinity of the Bay of Islands; Illawarra, New South Wales.

This has a very slender, branching, and paleaceous rootstock, ascending the trunks of trees, but sometimes found rambling over rock and decayed timber. Fronds scattered, imparipinnate, with a short sulcate, sparsely paleaceous stipes. Pinnæ distant, alternate, subcoriaceous, lanceolate, and slightly acuminate, with a repand-dentate margin; base unequal and cuneate, with the superior part truncate-auriculate. Sori round, solitary, and seated near the margin.

18. POLYPODIUM TAMARISCINUM, Kaulf.

Polypodium tamariscinum, Kaulf. Enum. Fil. p. 117.
Adenophorus bipinnatus, Gaud. Bot. Freyc. Voy. p. 365, t. 8, f. 2; Hook. & Grev. Ic. Fil. t. 174; Hook. & Arn. Bot. Beech. Voy. p. 105.
A. tamarisci, Hook. & Grev. Ic. Fil. t. 175.

HAB. Sandwich Islands: on trees, frequent.

Kaulfuss, in establishing this species, apparently had before him one of its extreme states; for he describes the fronds as "ovate-oblong, with a caudate and simply pinnatifid apex." But it very gradually passes from this state to its more usual form, which is lanceolate, and a little attenuate at both ends, of which the figure of *Adenophorus bipinnatus* of Gaudichaud in Freycinet's Voyage, is a good illustration.

19. POLYPODIUM HYMENOPHYLLOIDES, *Kaulf.*

Polypodium hymenophylloides, Kaulf., Enum. Fil. p. 118.

Adenophorus minutus, Gaud. Bot. Freyc. Voy. p. 364, t. 8, f. 3.

A. hymenophylloides, Hook. & Grev. Ic. Fil. t. 176; Hook. & Arn. Bot. Beech. Voy. p. 105.

HAB. Sandwich Islands: on trees.

The figure of this species in Hooker and Greville's Icones Filicum, represents the more robust state of the plant, as well as the broadest form that the frond assumes, it being usually linear, and in many of our specimens, as much as 5 inches in length. It is very frequently pendent in habit.

20. POLYPODIUM TRIPINNATIFIDUM.

Adenophorus tripinnatifidus, Gaud. Bot. Freyc. Voy. p. 365, t. 8, f. 1.

HAB. Sandwich Islands: on trees.

The rootstock of this is more slender, and creeps to a greater distance, with both stipes and fronds longer, and the laciniaë narrower and more acute than in *P. tamariscinum*.

* * PHEGopteris, Presl, J. Sm.

21. POLYPODIUM VESTITUM, *Raddi.*

Polypodium vestitum, Raddi, Plant. Brasil. p. 24, t. 36.

HAB. Organ Mountains, Brazil.

Only the upper half of a frond of this is in the collection; but that is in sufficiently good condition to enable us to identify it as Raddi's plant.

22. POLYPODIUM FORMOSUM, *Raddi*.

Polypodium formosum, Raddi, Plant. Brasil. p. 25, t. 38; Gaud. Bot. Freyc. Voy. p. 361.

HAB. Corcovado, Rio Janeiro, and Organ Mountains, Brazil.

The veins of this are branched, but the lower venules occasionally unite with the next ones above, forming elongated areoles. In the plant from the Organ Mountains, the margins of the segments are furnished with a few scattered setose hairs.

23. POLYPODIUM CAUDATUM, *Raddi*.

Polypodium caudatum, Raddi, Plant. Brasil. p. 35, t. 39; Gaud. Bot. Freyc. Voy. p. 361.

HAB. Organ Mountains, Brazil.

Raddi takes no notice of the attenuated, reticulate, brown paleæ on the rhachis and costa beneath; otherwise the description and outline of the figure given by him are good.

24. POLYPODIUM PROCERUM, Sp. Nov. (Pl. 3.)

P. rhizomate repente; frondibus elongatis erectis bipinnatis; pinnis oppositis sessilibus horizontalibus lineari-attenuatis basi pinnatis versus apicem pinnatifidis; pinnulis subalternis oblongis obtusis crenatis; rhachi generali glabro, partialibus costis venisque subtus pubescentibus, facie superiori setosa; venis dichotomis; soris parvis distantibus solitariis; sporangiis echinatis.

HAB. Sandwich Islands: in the thickets of low trees.

Rootstock creeping. Fronds few, attaining a height of 6 to 8 feet,

with an obtusely angular, stout, erect, smooth stipes, and main rachis; the breadth of the frond at base about 18 inches, contracting very gradually upwards for the first 2 or 3 feet, then terminating in an acuminate point, and *bipinnate*. *Pinnæ* about 2 inches apart, *opposite* or somewhat *alternate*, *sessile and horizontal*, sometimes a little undulate, linear, and *attenuating into a lobate serrate point, pinnate at the base*. *Pinnules* numerous, *somewhat alternate*, about an inch in length, *oblong, obtuse*, coarsely *crenate-dentate*, the surface punctulate. *Partial rachis* of a pale straw-colour, *setose on the upper side; the under side*, together with that of the costa, furnished *with a pale short pubescence*. Sori either irregular or biserial.

In habit, this bears a strong resemblance to the *P. Keraudrenianum* of Gaudichaud; but is very distinct in the form and size of the divisions of its fronds.

PLATE 3.—Fig. 1. Section of frond, of the natural size. *a*. Under side of a portion of a fertile pinnule. *b*. Hairs from the veins on the under surface. *c, c*. Sporangia. The analyses magnified.

25. POLYPODIUM KERAUDRENIANUM, *Gaud.*

Polypodium Keraudrenianum, Gaud. Bot. Freyc. Voy. p. 362, t. 7.

HAB. Sandwich Islands: on the margins of forests, among bushes and low trees.

The fronds of this species, which are very long and slender, rise to the height of 12 to 15 feet. They are sustained in a more or less erect position by the reflected points of the pinnæ, which bend over and around the branches and stems of neighbouring plants. Another peculiarity in this Fern is, that the fronds continue to grow at the point, while at the same time, for a distance of 2 to 3 feet from the base upwards, they are fully developed, and bearing ripe sori.

26. POLYPODIUM CRINALE, *Hook. & Arn.*

P. cæspitosum, stipitibus crassis sulcatis dense paleaceis; frondibus bipin-

natis; *pinnis alternis divaricatis*; *pinnulis pinnatifidis oblongo-lanceolatis obtusis rigidis, laciniis ovatis v. ovato-oblongis obtusis, margine crenato incurvo*; *rhachi costaque paleaceo-crinitis*; *venis costæformibus pinnatis*; *soris ad basim crenularum positis.*

Polypodium crinale, Hook. & Arn. Bot. Beech. Voy. p. 105.

HAB. Sandwich Islands: in forests, on the island of Hawaii.

Plant from 4 to 6 feet high, and rusty in its aspect. *Rootstock tufted.* *Stipes* half an inch in diameter at the base, erect, and *sulcate* in front; the surface, when divested of its dense coating of long slender brown palea, is of a pale straw-colour. *Fronde* large and *bipinnate*, with as many as 6 sori on the inferior, and only a solitary sorus on the superior segments. *Sori seated at the base of a crenule*, near its superior margin.

27. POLYPODIUM NEMORALE, Sp. Nov.

P. cæspitosum; *stipitibus glabris teretibus basi paleaceis*; *frondibus laxis bipinnatis*; *pinnis adscendentibus, inferioribus distantibus*; *pinnulis oblongo-lanceolatis attenuatis sessilibus sursum decurrentibus profunde pinnatifidis, laciniis linearibus obtusis serratis*; *rhachi sursum pubescente*; *costa venisque furcatis utrinque villosis*; *soris parvis ad basim dentium solitariis.*

HAB. Tahiti, Society Islands; and Tutuila, Samoan Islands: inhabiting open places in mountain forests.

Fronde lax and *bipinnate*, from 3 to 5 feet high, arising from a short rootstock, with a stout, smooth, round *stipes*, about 18 inches long, furnished with slender fimbriated paleæ at the base. *Pinnæ* rather undulated and *inclined to ascend*; the inferior 2 or 3 pairs distant: these, together with the deeply *pinnatifid pinnules*, contract gradually into a finely serrate point. *Segments* 4 to 6 lines long, 1½ lines broad, *linear, obtuse, and serrate.* *Primary and secondary rhachis* round and smooth on the under, and with a prominent rib on the upper side, clothed with a close white pubescence; the *costa and forked veins villose on both sides.* *Sori small, distant, and biserial, with a single sorus seated on the middle of the base of each tooth or serrature.*

28. POLYPODIUM UNIDENTATUM, *Hook. & Arn.*

P. cæspitosum; frondibus decompositis laxis glabris tripinnatis; pinnulis pinnatifidis lanceolatis attenuatis, laciniis oblongis vel lanceolato-oblongis obtusis subfulcatis crenato-serratis; rhachi glabra sulcata; venis dichotomis.

Polypodium unidentatum, Hook. & Arn. Bot. Beech. Voy. p. 105.

HAB. Sandwich Islands: on the outskirts of forests.

Fronde from 2 to 3 feet high, *decompound*, with a smooth, sulcate, stramineous stipes and rhachis; the primary and secondary divisions *lax*, distant, and spreading. Segments of the pinnules varying in size and form, according to their position on the frond; their margin *crenate-serrate*, with a sharp tooth near the base of the sinus on its lower side. Sori seated on one side and close to the base of a sinus.

29. POLYPODIUM SANDWICENSE, *Hook. & Arn.*

Polypodium Sandwicense, Hook. & Arn. Bot. Beech. Voy. p. 105.

HAB. Sandwich Islands: in forests of Hawaii.

This has large tripinnate fronds, from 3 to 4 feet high, with smooth spreading pinnæ; the ultimate divisions pellucid-punctate, oblong, obtuse, closely serrated with fine incurved sharp teeth. Rhachis and costa sulcate on the upper side, bearing scattered, long, slender paleæ. Veins very evident and forked, with numerous distant sori, seated close to the margin on the inner side of a tooth.

The whole plant has a good deal the habit of the preceding, but is withal distinct.

30. POLYPODIUM RUGULOSUM, *Labill.*

Polypodium rugulosum, Labill. ex Willd. Spec. Pl. 5, p. 206; R. Br. Prodr. Fl. Nov. Holl. p. 147; Kaulf. Enum. Fil. p. 122; Hook. & Arn. Bot. Beech. Voy. p. 52.

HAB. New Zealand; in the vicinity of the Bay of Islands. Valparaiso, Chili.

Kaulfuss united to Labillardiere's *P. rugulosum*, which is said to be a native of New Holland, a fern from Chili; in which he is followed by Hooker and Arnott. For ourselves, we had some doubts at first, as to the identity of our New Zealand plant with the one from Chili; but a careful comparison has convinced us that they are one and the same species; the Chilian plant being only a little more rigid than the New Zealand one, which slight difference may be the result of locality or climate.

31. POLYPODIUM DIVERGENS, Willd.

Polypodium divergens, Willd. Spec. Pl. 5, p. 209.

HAB. Organ Mountains, Brazil.

We doubt very much whether the *P. effusum* of Swartz be specifically distinct from this. The segments of our plant are perfectly smooth and naked, with a very partial pubescence on the upper side of the stipes, rhachis, and costa.

32. POLYPODIUM PALLIDUM, Sp. Nov.

P. caespitosum; stipitibus scabro paleaceo; fronde ampla tripinnata; pinnulis lineari-oblongis obtusis adnatis decurrentibus, inferioribus pinnatifidis, superioribus crenatis, laciniis ovato-oblongis obtusis, margine recurvato, apice dentato, rhachi costa venisque paleaceo-hirsutis; venis dichotomis; soris parvis numerosis juxta marginem positis.

HAB. Tahiti, Society Islands: in woods near Point Venus.

Plant caespitose. Stipes about 2 feet long, of a pale straw-colour, oval and slightly compressed, with two whitish marginal bands in front, which extend to the main rhachis; the surface roughish to the touch, and throughout sparsely furnished with pale, long, slender, fim-

briated paleæ. *Fronde tripinnate*; the primary divisions distant and spreading, the ultimate ones approximate. *Rhachis, costa, and dichotomous veins, on both sides paleaceous-hirsute*, the bleached colour of the paleæ imparting a peculiar blached aspect to the whole plant. *Sori small and numerous* on the upper half of the frond, *seated close to the recurved margin* of the segments. Sporangia brown, with very short pedicels.

4. ALLOSORUS, *Bernh., J. Sm.*

(PTERIDIS, Spec. Linn. CRYPTOGRAMMA, R. Br.)

ALLOSORUS ACROSTICHOIDES.

Cryptogramma acrostichoides, Hook. & Grev. Ic. Fil. t. 29; Hook. Fl. Bor.-Amer. 2, p. 264.

HAB. Mount Rainier range, Oregon; among loose rocks.

We possess only the sterile fronds, and these are in a very young state.

5. NOTHOCHLÆNA, *R. Br., Presl.*

(ACROSTICHI, Spec. Linn. NOTHOCHLÆNÆ, Spec. Kaulf. & Auct.)

1. NOTHOCHLÆNA SINUATA, *Kaulf.*

N. rhizomate brevi repente; frondibus subbipinnatifidis; pinnis ovatis petiolatis, inferioribus pinnatis, superioribus pinnatifido-dentatis subtus paleaceo-squamosis supra viridis parce hirsutis.

Nothochlæna sinuata, Kaulf. Enum. Fil. p. 135.
Acrostichum sinuatum, Willd. Spec. Pl. 5, p. 120.

HAB. Baños, Andes of Peru.

Rootstock creeping, a little over an inch in length, paleaceous-hirsute. Stipe and rhachis paleaceous; paleæ ciliate. Fronds about a span long, lanceolate-ensiform, *bipinnate at base, pinnate towards the point*. *Pinnæ petiolate*, about half an inch in length, *ovate and slightly cordate, the lower 3 or 4 pairs pinnate, upper ones pinnatifid, or bluntly lobed or dentate; upper surface of a dark green colour, with scattered appressed hairs; the lower face densely imbricated with brown, linear-lanceolate, ciliated scales, their points projecting beyond the margin.*

2. NOTHOCHLÆNA HIRSUTA, *Desv.*

Nothochlæna hirsuta, Desv. Jour. Bot. 1, p. 93, ex Kaulf. En. Fil. p. 138.
Pteris hirsuta, Willd. Spec. Pl. 5, p. 390.

HAB. Feejee Islands; in the mountains of Muthuata.

In our specimens, the fronds are much longer and considerably broader than those described by Kaulfuss; but in all other particulars we consider the two plants as identical.

3. NOTHOCHLÆNA PILOSA, *Hook. & Arn.*

Nothochlæna pilosa, Hook. & Arn. Bot. Beech. Voy. p. 47.

Var. β . *Frondebibus lanceolatis; pinnis 2-3 inferioribus distantibus.*

HAB. Tahiti, Society Islands; in dry and rocky places near the coast. β . Feejee Islands; on dry, almost barren hills.

In the var. β . the fronds are longer, and more erect and lanceolate in their outline, than in the Tahiti plant.

4. NOTHOCHLÆNA TENERA, *Hook.*

Nothochlæna tenera, Hook. Bot. Mag. t. 3055; Hook. Gen. Fil. t. 76.

HAB. Peru; in the vicinity of Obrajillo.

This has a slightly revolute margin, and might very readily be taken for a species of *Cheilanthes*.

5. NOTHOCHLÆNA GLABRA, Sp. Nov.

N. stipitibus glabris sulcatus; frondibus triangulari-ovatis bi-tri-pinnatis; pinnulis ovato-oblongis obtusis profunde pinnatifidis utrinque glabris, segmentis oblongis inciso-lobatis vel crenulatis.

HAB. Feejee Islands.

Stipes slender, from 6 to 10 inches long, about the thickness of a quill from the wing of a turtle-dove, *smooth*, glossy, and of a dark brown colour, with a single *furrow in front*. *Fronde* smooth on both sides, from 3 to 6 inches in length, in circumscription *triangular-ovate, bipinnate*, some of the fronds may be said to be *tripinnate*; the primary and secondary divisions *ovate-oblong and obtuse: the ultimate divisions or segments* from 2 to 3 lines long and about 2 lines broad, of an *oblong form, irregularly cut into obtuse lobes or crenatures*. Sporangia in an advanced state projecting beyond the margin of the segments.

6. GYMNOGRAMMA, *Desv., J. Sm.*

(ACROSTICHI, Spec. Linn. GRAMMITIDIS, Spec. Sw. & Auct.)

* *Fronde* glandulosæ vel pilosæ.

1. GYMNOGRAMMA TOMENTOSUM, *Desv.*

Gymnogramma tomentosa, Desv. Jour. Bot. 1, p. 25, ex Kaulf. Enum. Fil. p. 70.

Hemionitis tomentosa, Raddi, Plant. Brazil. p. 8, t. 19.

H. humilis? Velloz. Fl. Flumin. 11, t. 94.

HAB. Rio Janeiro, Brazil; in open hilly places, frequent.

In the *Hemionitis humilis* of the Flora Fluminensis, the base of the fronds is represented as being bipinnate; so that the plant may only be a mere variety of this species.

2. GYMNOGRAMMA CHILENSE, Sp. Nov.

G. frondibus pubescentibus lato-lanceolatis pinnatis; pinnis sessilibus ovatis obtusis pinnatifidis, lobis subrotundis integris vel dentatis.

HAB. Chili, vicinity of Valparaiso; in fissures of moist rocks.

Rootstock short, squamose-hirsute. Stipes and fronds about equal in length, together not exceeding 3 inches in height, everywhere furnished with a pale *pellucid pubescence*. *Fronde broadly-lanceolate, obtuse, and pinnate*. *Pinnæ* subopposite, *deeply pinnatifid*; the inferior ones distant and *sessile*, the superior adnate and decurrent on the compressed rhachis. Sori becoming confluent, and covering the whole of the under surface of the lobes.

It is very probable that this is an already described species, yet we do not find it in any work to which we have access. The species to which it is most nearly allied, is the *G. subglandulosum*, of Hooker and Greville; from which, however, it differs in the smaller fronds, longer stipes, more deeply pinnatifid pinnæ, and in the nature of the pubescence.

3. GYMNOGRAMMA PILOSUM, Sp. Nov. (Tab. 4.)

G. stipitibus glabris semiteretibus; frondibus subcoriaceis basi bipinnatis versus apicem pinnatis; pinnis suboppositis oblongo-lanceolatis acuminate serratis basi inæqualibus subtus costamque pilosis, inferioribus petiolatis, superioribus sessilibus; venis ramosis, venulis furcatis.

HAB. Sandwich Islands; in forests, by the banks of streams; rare.

Rootstock cæspitose. *Stipes* about 20 inches long, of a pale straw-colour, *smooth, semiterete*, and plane on the anterior side. *Fronde large, subcoriaceous*, smooth on the upper, with scattered articulated hairs on the under surface and costa, *bipinnate at the base, and pinnate towards the point*. *Pinnæ* subopposite, 6 to 8 inches long, by 12 to 15 lines broad, of an *oblong-lanceolate* form, narrowing gradually into a

dentate point, the margin very regularly and *finely serrate*, with an unequal, *sometimes rounded, but usually acute base*. Sori becoming confluent and concealing the under surface of the pinnæ, leaving only a naked space at the margin, about 2 lines in breadth.

This differs from the *C. Javanicum* of Blume, in the margin of the pinnæ being serrate, and pilose on the under surface.

PLATE 4.—Fig. 1. Portion of a frond, natural size. 1 *a*. Section of a pinna, showing the sori. 1 *b*. Hairs from the rhachis beneath. 1 *c*, *c*. Sporangia.—The analyses magnified.

4. GYMNOGRAMMA MYRIOPHYLLUM, Sw.

Gymnogramma myriophylla, Sw. ex Kaulf. Enum. Fil. p. 71.

HAB. Organ Mountains, Brazil.

Stipes from 3 to 4 inches long, angular, with the lower half of a purplish-brown colour. Fronds 8 to 10 inches long, slender, tripinnate, and covered all over with a short pubescence. Pinnules small, decurrent, ovate, obtuse, and incised with emarginate segments.

* * *Frondes glabræ vel farinosæ.*

5. GYMNOGRAMMA JAVANICUM, Blume.

Gymnogramma Javanicum, Bl. Enum. Pl. Jav. p. 112.

HAB. Luzon, Philippine Islands; in mountains near Baños.

Blume describes this species as bipinnate at base and pinnate towards the point. We have only a single frond of what we deem to be his plant, and this agrees with all the characters contained in his short description, except that it is simply pinnate.

6. GYMNOGRAMMA TRIANGULARE, Kaulf.

Gymnogramma triangulare, Kaulf. Enum. Fil. p. 73; Hook. & Grev. Ic. Fil. t. 153; Hook. & Arn. Bot. Beech. Voy. p. 161.

HAB. California; in the immediate vicinity of San Francisco.

Our specimens consist of the smaller state of the plant, apparently the same form as that from which Kaulfuss drew up his description. The *G. triangulare*, figured in the *Icones Filicum*, above-cited, is the larger state, and is furnished with a few short spines on the stipes.

7. GYMNOGRAMMA TRIFOLIATUM, Desv.

Gymnogramma trifoliatum, Desv. ex Kaulf. Enum. Fil. p. 72.

Phyllitis ramosa trifida, Sloane, Hist. Jam. p. 88, t. 45, f. 2.

Acrostichum trifoliatum, Linn. Spec. Pl. p. 1527; Sw. Syn. Fil. p. 13; Willd. Spec.

Pl. 5, p. 119.

HAB. Peru; between the town of Callao, and the mouth of the River Rimac, close to the sea-beach.

Whole plant from 3 to 5 feet high: found growing in large patches in the locality mentioned.

8. GYMNOGRAMMA TARTAREUM, Desv.

Gymnogramma tartareum, Desv. ex Kaulf. Enum. Fil. p. 75.

Acrostichum tartareum, Sw. Syn. Fil. p. 15.

Hemionitis dealbata, Willd. Spec. Pl. 5, p. 131.

HAB. Samoan Group; island of Tutuila; sea-coast near Pago-pago Bay; on rocks.

Plant caespitose, with a stipes from 4 to 5 inches in length, angular, glossy, of a brownish-black colour, and squamose-hirsute at the base. Fronds bipinnate, with a thick coating of farina on its under surface. Pinnæ sessile and decurrent on the rhachis, the superior pinnules confluent, oblong, obtuse, and dentate-serrate; the inferior ones somewhat pinnatifid, with subrotund segments, their margins slightly revolute.

9. GYMNOGRAMMA CALOMELANOS, *Kaulf.*

Gymnogramma calomelanos, Kaulf. Enum. Fil. p. 76.

Filix non ramosa major, Sloane, Hist. Jam. p. 92, t. 30, f. 2.

Acrostichum calomelanos, Linn.; Sw. Syn. Fil. p. 15; Willd. Spec. Pl. 5, p. 125;

Langsd. & Fisch. Ic. Fil. p. 6, t. 3; Raddi, Plant. Brasil. p. 7.

HAB. On the Corcovado, Rio Janeiro, Brazil; frequent.

In the Botany of Beechey's Voyage, this is stated to be a native of the Society Islands; but of this we are doubtful. May it not be the preceding species that is there intended?

7. LEPTOGRAMMA, *J. Sm.*

(GRAMMITIDIS Spec., Presl. GYMNOGRAMMITIDIS Spec., Auct. CETERACHIS Spec., Raddi.)

1. LEPTOGRAMMA LOVEI, *J. Sm.*

Leptogramma Lovei, J. Sm. in Hook. Jour. Bot. 4, p. 52.

Gymnogramma Lovei, Hook. & Grev. Ic. Fil. t. 89.

Grammitis totta, Presl, Tent. Pterid. p. 209. (Sect. 3. *Eugrammitis*.)

HAB. Island of Madeira; in moist places.

2. LEPTOGRAMMA POLYPODIOIDES, *J. Sm.*

Leptogramma polypodioides, J. Sm. in Hook. Jour. Bot. 4, p. 52.

Grammitis polypodioides, Presl, Tent. Pterid. p. 209. (Sect. 3. *Eugrammitis*.)

HAB. On the Corcovado, Rio Janeiro, Brazil.

Plant 2 to 2½ feet high, with a creeping rootstock. Stipe long and angular, smooth at the base and slightly hirsute upwards. Fronds pinnate, membranaceous, glabrous. Pinnæ sessile, subopposite, confluent towards the point, oblong-lanceolate, acuminate, and pinnatifid

a little over half way to the costa; the segments oblong, subfalcate, their margins ciliate with short silvery hairs. Rhachis hirsute on the upper side.

3. LEPTOGRAMMA ASPLENIODES, *Kl.*

Ceterach aspidioides, Willd. Spec. Pl. 5, p. 137; Raddi, Plant. Brasil. p. 10, t. 21, f. 1.

HAB. On the Corcovado, Rio Janeiro, Brazil.

8. STEGNOGRAMMA, *Presl, J. Sm.*

1. STEGNOGRAMMA SANDWICENSE, Sp. Nov. (Tab. 4.)

S. subarborescens; *trunco brevi erecto*; *stipitibus semiteretibus sulcatis paleaceo-hirsutis*; *frondibus pinnatis*; *pinnis sessilibus horizontalibus lanceolatis attenuatis arcuatis basi subauriculatis truncatis*; *rhachi trisulcata costa venisque piloso-hirsutis*; *venulis externis nervo intramarginali conjunctis*.

HAB. Hawaii, Sandwich Islands; near the crater of Kilauea, in dry woods.

Trunk 18 inches high, stout and *erect*, crowned by a number of large spreading fronds. *Stipe* 1½ to 2 feet in length, thick, *half round*, with a single groove in front, *paleaceous* at the base, and thickly furnished upwards with *pale hairs*. Fronds pinnate, 2½ to 3 feet long; the *pinnæ sessile*, *lanceolate*, *attenuate*, *arcuate*, somewhat truncate at the base, spreading at *right angles* with the rhachis, distant at the base of the frond, alternate or opposite, from 8 to 10 inches long and 12 to 15 lines broad; the crenatures of the margin large and round. *Rhachis in front trisulcate*, and, together with the *costa* and *veins* on both sides of the frond, *pilose-hirsute*. *Exterior veinlets connected by an intramarginal nerve*. Sporangia nearly sessile and echinate.

The only species of this genus, so far as we are aware, that has hitherto been described, is the *S. aspidioides* of Blume; of which a magnified figure of a portion of the pinnæ is given in Presl's Tent. Pteridographiæ. The Sandwich Island plant differs from that of Java in its stout and erect rootstock or trunk, in its larger fronds, and its longer pinnæ, with an intramarginal nerve combining the outer venules, and in the almost sessile sporangia.

PLATE 4.—Fig. 2. Portion of the middle of a frond. 2 *a, a*. Sections of a pinna, showing the sori. 2 *b, b*. Sporangia. The analyses more or less magnified.

9. MENISCIUM, *Schreb.*

1. MENISCIUM RETICULATUM, *Sw.*

Meniscium reticulatum, Sw. Syn. Fil. p. 19; Willd. Spec. Pl. 5, p. 134.

M. sorbifolium, Langsd. & Fisch. Ic. Fil. p. 6, t. 4.

Lonchitis polypodioides, Velloz. Fl. Flum. 11, t. 100.

HAB. Brazil; in marshes around Estrella, and near Botofogo, Rio Janeiro; frequent.

We consider this to differ from *M. palustre*, Raddi, in its narrower and alternate pinnæ, with repand-crenate margins.

10. GONIOPTERIS, *Presl, J. Sm.*

(POLYPODIUM Spec., Sw. & Auct.)

1. GONIOPTERIS VIVIPARA.

G. stipitibus glabris angulatis canaliculatis; frondibus imparipinnatis; pinnis alternis lanceolatis acuminatis crenato-dentatis supra nitidis; rhachi prolifera; soris sparsis.

Polypodium viviparum, Raddi, Plant. Brasil. p. 22, t. 32.

HAB. On the Corcovado, Rio Janeiro, Brazil; in dense woods.

Fronde from 2 to 3 feet high, *imparipinnate* on a *glabrous and angular stipe*. *Pinnæ alternate*, about 4 inches long and 10 lines broad, *lanceolate, acuminate*, seated on a very short petiole, having a *crenate-dentate margin and glossy upper surface*. *Rhachis* angular and channeled on the upper side, slightly villose, with *proliferous buds* near its extremity, seated in the axils of the pinnæ. *Sori* numerous, distant and *scattered*, except those seated nearest the costa, which are arranged in a partially interrupted line parallel to it.

2. GONIOPTERIS PENNIGERA, J. Sm.

Goniopteris pennigera, J. Sm. in Hook. Jour. Bot. 4, p. 54.
Aspidium pennigerum, Sw. Syn. Fil. p. 49; A. Rich. Bot. Voy. Astrol. p. 67; A. Cunn. in Hook. Comp. to Bot. Mag. 2, p. 367.

HAB. Tipooka, Bay of Islands, New Zealand.

This species sometimes has a rootstock of two or three feet in length.

3. GONIOPTERIS COSTATA, Sp. Nov.

G. frondibus pinnatis; pinnis sessilibus distantibus subalternis glabris lanceolato-linearibus attenuatis pinnatifidis, laciniis oblongis obtusis integris; rhachi sulcata costaque supra pubescentibus; soris numerosis approximatis biserialibus.

HAB. Feejee Islands. Tahiti, Society Islands.

Fronde 2 feet and upwards in length, of a lanceolate-oblong form, *pinnate*. *Pinnæ sessile*, spreading, lower ones opposite and *distant*, those towards the summit *alternate* and approximate, 7 inches long by 7 lines broad, *lanceolate-linear, narrowed* into a serrate point, the lower *pinnatifid* about half way down to the costa, which latter is prominent on the under side; the two lower opposite pair of venules only uniting. *Sori* small, of a yellowish-brown colour, and *crowded*

near the costa, a very few only extending outwards beyond a line with the base of the sinus of the segments.

A very marked resemblance exists between this and the *Filix non ramosa, latius dentata minor* of Plumier's *Plantes de L'Amerique*, t. 17; but the pinnæ in our plant are more distant, with the points less attenuated, and more deeply serrate.

4. GONIOPTERIS GLANDULIFERA, Sp. Nov.

G. stipite nigro angulari basi paleaceo; frondibus pinnatis; pinnis alternis subpetiolatis pinnatifidis coriaceis glabris supra nitidis, laciniis oblongis obtusis margine setosis; rhachi sulcata; soris biserialibus pilosis juxta marginem approximatis.

HAB. Tutuila, Samoan Islands.

Stipe about 2 feet long, stout and obtusely angular, smooth and of a brownish-black colour from the lower end upwards to the base of the frond: on each margin of the front side of the stipe is a row of distant, orbicular, glandular bodies, apparently abortive pinnæ. *Fronde* pinnate, erect, about 4 feet long and 15 inches broad at the middle, of an oblong-lanceolate form. *Pinnæ* coriaceous, alternate, and spreading, seated on a very short petiole, towards the point of the frond sessile and confluent, terminating in a long serrate point, upper surface smooth and shining, the base oblique, truncate-cuneate, and pinnatifid about half way down to the costa: segments oblong, obtuse, with a setose margin. Veins prominent on the upper side, the three lower opposite pair of venules angularly combining. *Sori* biserial and approximate, seated on the free venules of the segments near the margin, seldom on the anastomosing venules. *Sporangia* sessile, and intermingled with short white hairs.

5. GONIOPTERIS LONGISSIMA, Sp. Nov. (Tab. 5.)

G. subarborescens; frondibus magnis pinnatis; pinnis sessilibus horizontalibus subalternis approximatis coriaceis longe linearibus attenuatis

pinnatifidis; laciniis oblongo-linearibus subfalcatis acutis margine venisque setosis; soris parvis approximatis.

HAB. Tahiti, Society Islands: in mountain forests; rare.

Trunk stout, erect, 2 to 3 feet in height, and crowned with *large, spreading, pinnate fronds*, 3 to 4 feet broad. *Pinnæ sessile, horizontal, and approximate, nearly opposite, coriaceous*, smooth on the upper side, 1½ inches broad, *long-linear and attenuated* into an entire serrate point, truncate at the base, and *pinnatifid* about two-thirds down to the costa. *Segments oblong-linear, subfalcate, acute*, and entire, the *margin setose* and a little reflexed; the sinus about half the width of the segments, acute at base. Rhachis thick and subterete, with a single channel in front, beset with scattered paleaceous subulate hairs, of half an inch to an inch in length. Costa on the under side smooth, above rufous-tomentose. *Veins prominent and setose* on the under side, the two inferior opposite pairs of venules uniting. *Sori numerous, small, and approximate*, forming continuous lines from the costa of the pinnæ outwards to near the apex of the segments, equidistant between the margin and costæform vein.

One of the most majestic plants of the tribe *Polypodiæ*; and only once detected by us, on the high mountains of Tahiti, while on a hurried visit to Lake Waihera.

PLATE 5.—Fig. 1. Portion of a frond, of the natural size. 1 *a*. Section of a segment, showing the sori. 1 *b*. Scale from the rhachis. 1 *c*. Sporangium.—More or less magnified.

11. SYNAMMIA, Presl, J. Sm.

(POLYPODII Spec., Cav.)

1. SYNAMMIA TRILOBA, Presl.

Synammia triloba, Presl, Tent. Pterid. p. 212; Hook. Gen. Fil. t. 110.

Polypodium trilobum, Sw. Syn. Fil. p. 30; Willd. Spec. Pl. 5, p. 164; Kaulf. Enum.

Fil. p. 95; Hook. & Arn. Bot. Beech. Voy. p. 52.

HAB. Chili: growing on trees, about six miles south of Valparaiso.

Plant variable in the size, outline, and division of its fronds, as also in the form of the sori, which we find either ovate or oblong; the latter form prevailing.

This species, so far as we are aware, is the only one which properly belongs to the genus *Synammia* as here characterized; although Presl has removed to it the *Grammitis elongata* of Swartz; which Mr. J. Smith places in the genus *Phlebodium* of R. Brown. In *Synammia*, the sori may be said to be those of *Grammitis*, with a venation similar to that of some species of *Goniophlebium* of J. Smith.

12. GONIOPHLEBIUM, Presl, J. Sm.

(POLYPODIUM Spec., Auct. MARGINARIA, Presl.)

The species of this genus varying very much in habit, Mr. J. Smith has very judiciously divided them into four sections.

§ 1. LOPHOLEPIS, J. Sm.

1. GONIOPHLEBIUM AURISSETUM.

Polypodium aurisetum, Raddi, Plant. Brasil. p. 12, t. 23, f. 1.

HAB. Organ Mountains, Brazil: on trees.

Raddi's figure of this slender creeping species, though faint in outline, represents very correctly the habit of the plant, and the form of its diminutive fronds.

2. GONIOPHLEBIUM VACCINIIFOLIUM.

Polypodium vacciniifolium, Langsd. & Fisch. Ic. Fil. p. 8, t. 7; Willd. Spec. Pl. 5, p. 145; Kaulf. Enum. Fil. p. 88; Raddi, Plant. Brasil. p. 13, t. 13, f. 2?

HAB. Vicinity of Rio Janeiro, Brazil: on the trunks of trees.

Raddi quotes Langsdorff's figure of this, under his *Polypodium vacciniifolium*; yet, judging from his own figure and description, we are inclined to believe that his plant may be a different species, or a very decided variety of the present one; the sterile fronds being ovate-lanceolate or oblong-lanceolate. May not Raddi's plant be the *Polypodium ciliatum* of Willdenow?

§ 2. LEPICYSTIS, J. Sm.

3. GONIOPHLEBIUM INCANUM, J. Sm.

Goniophlebium incanum, J. Sm. in Hook. Jour. Bot. 4, p. 56.
Polypodium incanum, Sw. Syn. Fil. 35; Willd. Spec. Pl. 5, p. 147; Kaulf. Enum.
 Fil. p. 103; Gaud. Bot. Freyc. Voy. p. 355.

HAB. Rio Janeiro, Brazil: on old walls, rocks, and the trunks of trees.

4. GONIOPHLEBIUM TWEEDIANUM, J. Sm.

G. rhizomate repente; stipitibus paleaceis; frondibus ovato-lanceolatis profunde pinnatifidis, laciniis remotis alternis erecto-patentibus linearibus subacutis supra nudis subtus lepidotis; squamis ovato-acuminatis peltatis dentatis; soris uniserialibus.

Goniophlebium Tweedianum, J. Sm. in Hook. Jour. Bot. 4, p. 56.
Polypodium Tweedianum, Hook. Ic. Pl. 1, t. 86.

HAB. Andes of Peru: on rocks.

Closely related to the preceding; but quite distinct in the thicker rootstock, the larger and less coriaceous fronds, and the more remote and ascending segments, which are naked on the upper and less scaly on the under surface.

5. GONIOPHLEBIUM HIRSUTISSIMUM.

- Polypodium hirsutissimum*, Raddi, Plant. Brazil. p. 17, t. 26; Gaud. Bot. Freyc. Voy. p. 356.
P. sepultum, Kaulf. Enum. Fil. p. 104.
Acrostichum Lepidopteris, Langsd. & Fisch. Ic. Fil. p. 5, t. 2; Willd. Spec. Pl. 5, p. 113.

§ 3. GONIOPHLEBIUM VERUM, J. Sm.

6. GONIOPHLEBIUM ENSIFOLIUM.

Polypodium ensifolium, Willd. Spec. Pl. 5, p. 152?

HAB. Baños, Andes of Peru : on rocks.

This species has a creeping rootstock, about the thickness of a crowquill, densely imbricated with brown, oblong, reticulated scales. Fronds few, from 4 to 6 inches long, coriaceous, entire, linear-ensiform and attenuate, with an entire revolute margin. Sori small, round, solitary, and equidistant between the costa and margin.

7. GONIOPHLEBIUM ANGUSTIFOLIUM.

G. rhizomate repente ; frondibus rigidis longe lineari-lanceolatis basi attenuatis supra nitidis marginibus revolutis ; soris solitariis vel sub-biserialibus.

Polypodium angustifolium, Sw. Syn. Fil. p. 27; Willd. Spec. Pl. 5, p. 153; Raddi, Plant. Brasil. p. 14, t. 24, f. 2.

HAB. Organ Mountains, Brazil.

Rootstock creeping, nearly as thick as a goosequill, and covered with brown, oblong, acuminate, reticulated paleæ. *Fronds rigid*, approximate, on a short and compressed, margined stipe, *narrowly*

linear-lanceolate, from 12 to 20 inches in length, 3 to 4 lines broad, *attenuated very much towards the base*, wrinkled and *shining on the upper surface*. Costa of a pale yellow colour, prominent on both sides. *Sori* in a single row, with sometimes a few distant ones, forming a kind of a *second row* between the costa and margin.

8. GONIOPHLEBIUM CATHARINÆ.

Polypodium Catharinæ, Langsd. & Fisch. Ic. Fil. p. 9, t. 9; Willd. Spec. Pl. 5, p. 172.
P. glaucum, Raddi, Plant. Brasil. p. 20, t. 29, f. 1?

HAB. Organ Mountains, Brazil: on rocks and trunks of trees.

This has very much the habit of the *Polypodium vulgare*, Linn.; with a more lengthened terminal segment.

9. GONIOPHLEBIUM LÆTUM.

Polypodium lætum, Raddi, Plant. Brasil. p. 19, t. 28.

HAB. Organ Mountains, Brazil.

All the specimens of this plant in the collection are very young, of a pale green colour, and a membranaceous texture.

10. GONIOPHLEBIUM NERIIFOLIUM, Hook.

Goniophlebium neriifolium, Hook. Gen. Fil. t. 70, B.
Polypodium neriifolium, Sw. Syn. Fil. p. 37; Willd. Spec. Pl. 5, p. 194; Raddi, Plant. Brasil. p. 22, t. 31, bis; Gaud. Bot. Freyc. Voy. p. 357.

HAB. On the Corcovado, near Rio Janeiro, Brazil: in forests.

Gaudichaud, with a doubt, refers to this species the *Polypodium meniscifolium* of Langsdorff and Fischer; with what propriety we cannot decide, not having specimens or a figure of the latter plant

to refer to. But we may state, that there are now before us forms of our present species, to which the description of *P. meniscifolium* equally applies. As authority for *G. nerifolium*, we relied principally on the figure in Hooker's Genera Filicum.

11. GONIOPHLEBIUM ALBO-PUNCTATUM.

Polypodium albo-punctatum, Raddi, Plant. Brasil. p. 21, t. 30.

HAB. Organ Mountains, Brazil : in dense forests.

In all respects, save in the larger size of the frond, and the absence of the white dots on the upper surface of the segments, our single specimen of this plant agrees with the figure and description of Raddi : the slight discrepancies may have been the result of some local cause.

12. GONIOPHLEBIUM SERRATIFOLIUM, Sp. Nov.

G. rhizomate repente; stipite semitereti basi paleaceo; fronde membranaceo glabro pinnato; pinnis sessilibus subalternis patentibus linearilanceolatis acuminatis serratis basi obtuse cuneatis; soris orbiculatis approximatis uniserialibus.

HAB. Feejee and Samoan Islands.

Stipe about 18 inches long, about the thickness of a goosequill, straw-coloured and *angular in front, the back round* and of a chestnut-brown colour; the *paleæ at the base* long, slender, pointed, and beautifully reticulated. *Fronde membranaceous*, 2 to 3 feet in length; the *subalternate, smooth, sessile, spreading, linear-lanceolate pinnæ* from 6 to 8 inches long, and 6 to 8 lines broad, with a *coarsely serrate margin*, and a *bluntly cuneate base*, articulated with the rhachis. Veins slender, and distinct to the naked eye on both sides. *Sori* rather large, *round, and approximate*, forming a continuous line almost to the apex of the pinnæ, on each side of and close to the costa.

13. NIPHOBOLUS, *Kaulf.*1. NIPHOBOLUS RUPESTRIS, *Spreng.*

N. rhizomate gracili repente ramoso; frondibus integris stellato-pubescentibus subtus canescentibus, sterilibus ovatis vel obovato-oblongis, fertilibus lanceolato-linearibus obtusis basi attenuatis; soris confertis demum confluentibus.

Niphobolus rupestris, Spreng. ex Hook. & Grev. Ic. Fil. t. 93; A. Cunn. in Hook. Bot. Mag. 2, p. 363.

Polypodium rupestre, R. Br. Prodr. Fl. Nov. Holl. p. 146.

HAB. Vicinity of Sydney, New South Wales. Bay of Islands, New Zealand: on rocks and trunks of trees.

Rootstock creeping, long and slender, branched, covered with brown slender paleæ. Fronds entire, the under surface with a dense, stellate, brownish-white pubescence, imparting a somewhat hoary aspect; the upper surface less so; the sterile fronds orbicular, ovate or ovate-oblong, from one-fourth to nearly an inch in length, seated on a short stipe usually about half the length of the frond itself; the fertile ones lance-linear, obtuse, much attenuated at the base, from one to 2 inches long; the stipe nearly of the same length. Sori scattered, crowded, and becoming confluent.

2. NIPHOBOLUS CARNOSUS, *Blume.*

Niphobolus carnosus, Blume, Enum. Pl. Jav. fasc. 2, p. 105.

HAB. Island of Mindanao, Philippine Group: on trees close to the sea-beach.

Closely allied to the *N. rupestris*; from which it differs in the larger sterile fronds, and the smaller crowded sori, immersed in the dense stellate pubescence.

3. NIPHOBOLUS BICOLOR, Kaulf.

N. rhizomate elongato repente ramoso; frondibus integerrimis stellato-pubescentibus subtus incanis, sterilibus lanceolatis obtusis basi attenuatis, fertilibus lineari-lanceolatis, costâ prominente; soris distantibus vel approximatis.

Niphobolus bicolor, Kaulf. Enum. Fil. p. 128; Hook. & Grev. Ic. Fil. t. 44; A. Cunn. in Hook. Comp. to Bot. Mag. p. 363.

Polypodium stellatum, Sw. Syn. Fil. p. 25; Willd. Spec. Pl. 5, p. 151; A. Rich. Bot. Voy. Astrol. p. 64 (excl. syn. R. Br.).

HAB. Bay of Islands, New Zealand. Tahiti, Society Islands: on trees.

Rootstock long, creeping, branched, rooting, and covered with brown slender paleæ. Fronds entire; the under surface with a dense coating of whitish stellate pubescence, and a prominent costa; the upper surface smooth, with only a few scattered stellate scales: the sterile fronds lanceolate, much attenuated at the base, and from 3 to 4 inches long; the fertile linear-lanceolate, obtuse, frequently contracted towards the point, from 3 to 5 inches long, with a stipe about equal in length to that of the sterile fronds. Sori usually confined to the upper half of the frond, either distant or approximate, and sometimes confluent.

Richard, in the Botany of the Astrolabe, has referred to this species the *Polypodium rupestre* of R. Brown, which is the *Niphobolus rupestris* of the present work; and we admit that there are many points in which the two are very much alike; yet marks of difference are very evident by which they can be distinguished. In *N. bicolor*, the whole plant is invariably of a more robust habit, with fronds three to four times the length of those of *N. rupestris*; the sterile fronds are of a lanceolate form, while the fertile ones have a more prominent costa beneath, and the upper surface more sparsely furnished with stellate pubescence.

4. NIPHOBOLUS ADNASCENS, *Kaulf.*

Niphobolus adnascens, Kaulf. Enum. Fil. p. 124.

Polypodium adnascens, Sw. Syn. Fil. p. 25 & 222, t. 2; Willd. Spec. Pl. 5, p. 145.

HAB. Tahiti, Society Islands. Feejee and Samoan Islands.

The sori in the present species are small, sunken, crowded, and scattered, intermingled with stellate pedicellate scales, and occupying the upper half of the frond, the margin of which is recurved, the lower half having a prominent costa on the under side.

5. NIPHOBOLUS VARIUS, *Kaulf.*

Niphobolus varius, Kaulf. Enum. Fil. p. 125; Blume, Enum. Pl. Jav. fasc. 2, p. 106.

HAB. Island of Marongas, Sooloo Group. Mangsi Islands.

This differs from the preceding species principally in its longer, linear-lanceolate fronds, and more prominent smooth costa.

6. NIPHOBOLUS GLABER, *Kaulf, l. c.*

HAB. Island of Singapore: on trees.

Rootstock about the thickness of a crowquill, much branched, covered with brown peltate scales, which have a dark spot in the centre. Fronds distant, 8 to 12 inches long, linear-lanceolate, attenuate at both ends; the margin revolute; upper surface smooth, the lower with a dense, pale yellow, stellated pubescence. Costa above plane, beneath prominent and somewhat triangular. Sori confined to the upper half of the frond, small and very much crowded towards the point.

This is readily distinguished from any of the foregoing species, by the fronds being longer, more linear in form, attenuated to both ends, and with a smooth upper surface.

14. CYRTOPHLEBIUM, *R. Br., J. Sm.*

(POLYPODII Spec., Auct. CAMPYLONEURUM, Presl.)

1. CYRTOPHLEBIUM REPENS, *J. Sm.**Cyrtophlebium repens*, J. Sm. in Hook. Jour. Bot. 4, p. 58.*Polypodium repens*, Sw. Syn. Fil. p. 29; Gaud. Bot. Freyc. Voy. p. 347.*P. lapathifolium*, Raddi, Plant. Brasil. p. 15, t. 24, f. 3.

HAB. On the Corcovado, Rio Janeiro, Brazil: on moist rocks.

This is a much smaller Fern in all its parts than the following species, with the fronds less shining and coriaceous.

2. CYRTOPHLEBIUM NITIDUM, *J. Sm.**Cyrtophlebium nitidum*, J. Sm. in Hook. Jour. Bot. 4, p. 58.*Polypodium nitidum*, Kaulf. Enum. Fil. p. 92.

HAB. Organ Mountains, Brazil.

A beautiful and well-marked species, which, although partaking of the habit and character of the *C. Phyllitidis*, J. Smith (*Polypodium Phyllitidis*, Linn.), is readily distinguished by its more shining fronds, attenuated into a narrow point, with pale costa and veins; the former somewhat plane on the upper side and angular beneath.

3. CYRTOPHLEBIUM DECURRENS, *J. Sm.**Cyrtophlebium decurrens*, J. Sm. in Hook. Jour. Bot. 4, p. 58.*Polypodium decurrens*, Raddi, Plant. Brasil. p. 23, t. 33.

HAB. Organ Mountains, Brazil; in moist shady forests.

Unlike the two preceding species, this has large, pinnate fronds, 3 to 4 feet high, inclined to become black in drying; with alternate, ascending, elongated-lanceolate, and acuminate pinnæ, which are from 6 to 8 inches in length, and frequently an inch broad, the base decurrent on a rhachis which is very much channeled in front. Sori small, distant, commonly in two, but sometimes in three, rows between the costæform veins.

15. PHLEBODIUM, *R. Br., J. Sm.*

(POLYPODII Spec., Auct. PLEOPELTIDIS Spec., H. B. K., Presl. SYNAMLE Spec., Presl.)

Mr. John Smith divides *Phlebodium* into two sections, which, he observes, might with no great impropriety be considered as distinct genera. The first embraces the genus *Pleopeltis* of Humboldt and Presl, a large number of the species belonging to which, have simple (or rarely pinnatifid), coriaceous, squamiferous fronds, with a very obscure and sunken venation, and oval or oblong sori. In the second section, which he denominates *Phlebodium verum*, the species have usually large, smooth, pinnatifid or pinnate fronds, whose venation is more apparent than in the preceding, and evidently of the same anastomosing character. We retain these as divisions or sections, not perceiving that any advantage would result in adopting them as distinct genera.

§ 4. PLEOPELTIS, *J. Sm.*

1. PHLEBODIUM PERCUSSUM, *J. Sm.*

Phlebodium percussum, *J. Sm.* in Hook. Jour. Bot. 4, p. 59.

Polypodium percussum, Cav. ex Sw. Syn. Fil. p. 26; Willd. Spec. Pl. 5, p. 151; Langsd. & Fisch. Ic. Fil. p. 8, t. 6; Kaulf. Enum. Fil. p. 90; Raddi, Plant. Brasil. p. 14, t. 24, f. 1; Gaud. Bot. Freyc. Voy. p. 436.

Pleopeltis percussa, Hook. & Grev. Ic. Fil. t. 67; Presl, Tent. Pterid. p. 196, t. 7, f. 35.

HAB. Organ Mountains, Brazil.

2. PHLEBODIUM ELONGATUM, *J. Sm.*

Phlebodium elongatum, *J. Sm.* in *Hook. Jour. Bot.* 4, p. 59.

Grammitis elongata, *Raddi, Plant. Brasil.* p. 11.

HAB. Organ Mountains, Brazil.

Rootstock slender, creeping, rufous-tomentose. Fronds coriaceous, with scattered stellate scales on the upper and under surface, 4 to 6 inches long, linear-lanceolate, the point frequently attenuate, the base always so, on a very short stipe. Sori few, oblong-linear, partially sunken, equidistant between the margin and the costa, and parallel with the latter, which is about equally prominent on both sides.

3. PHLEBODIUM ANGUSTATUM, *J. Sm.*

Phlebodium angustatum, *J. Sm.* in *Hook. Jour. Bot.* 4, p. 59.

Polypodium pleopeltifolium, *Raddi, Plant. Brasil.* p. 16, t. 21, f. 2; *Gaud. Bot. Freyc. Voy.* p. 350.

HAB. Vicinity of Rio Janeiro, Brazil.

Raddi describes and figures the fronds of this species as being deeply pinnatifid; but we find a great variety of forms among our specimens. A large portion of them may be said to be digitato-bi-tripartite, as in *Drynaria (Polypodium) tridactylum* of *Wallich*.

§ 2. PHLEBODIUM VERUM, *J. Sm.*4. PHLEBODIUM AUREUM, *J. Sm.*

Phlebodium aureum, *J. Sm.* in *Hook. Jour. Bot.* 4, p. 59.

Polypodium majus aureum, *Plum. Plant. de L'Amériq.* t. 35.

P. aureum, *Sw. Syn. Fil.* p. 32; *Willd. Spec. Pl.* 5, p. 169.

HAB. Organ Mountains, Brazil.

The figure of this beautiful Fern in *Plumier's Plantes de L'Améri-*

que, represents very truthfully the outline of the frond, and the thick, creeping rootstock. It is a well-known species both in the herbarium and the greenhouse: in the latter it has long been cultivated as an ornamental plant.

16. DRYNARIA, Bory, J. Sm.

(POLYPODIUM Spec., Auct. DIPTERIS, Reinw. PHYMATODES, Presl. MICROSORUM, Link.)

* *Fronde integræ uniformes.*

† *Sori superficiales, uniserialis inter costam et marginem vel venas primarias.*

1. DRYNARIA ACUMINATA, Sp. Nov.

D. rhizomate gracili repente paleaceo; frondibus integris glabris lanceolatis acuminatis obtusis; soris magnis rotundis distantibus uniserialibus ad apicem usque frondis extensis.

HAB. Feejee and Samoan Islands. Tahiti, Society Islands.

Rootstock long, slender, and creeping, much branched, and clinging by its brown tomentose rootlets to rocks and trunks of trees, the surface thinly covered with dark gray, elongated, reticulated, spinulose-fimbriated paleæ. Stipes a quarter to half an inch in length, naked and margined. Fronds 1½ to 4 inches long, and about 6 lines broad, subcoriaceous, naked, glabrous, lanceolate, entire, and gradually contracted into a narrow obtuse point, the base decurrent on the short stipe; the costa slender and about equally prominent on both sides. Sori large, round, or slightly oval, extending to the point of the frond, and forming a single row, equidistant between the margin and costa.

2. DRYNARIA ELONGATA.

D. rhizomate repente; frondibus paucis lineari-lanceolatis elongatis acuminatis basi attenuatis coriaceis utrinque glabris supra punctis nigris

conspersis, margine reflexo subundulato; soris uniserialibus solitariis ovalibus oblongisve squamis peltatis fuscis primum tectis, mox nudis.

Pleopeltis elongata, Kaulf. Enum. Fil. p. 246.

Polypodium atro-punctatum, Gaud. Bot. Freyc. Voy. p. 346; Hook. & Arn. Bot. Beech. Voy. p. 103.

HAB. Sandwich Islands: on trees, frequent.

Rootstock short and *creeping*, about the thickness of a crow-quill, covered with oblong, attenuated, reticulated scales. *Stipes* very short or wanting. *Fronde* few, coriaceous, linear-lanceolate, elongated, acuminate, the base much attenuated, varying from 5 to 12 inches in length and 3 to 6 lines in breadth, smooth on both sides, with scattered and small black dots on the upper surface, and minute, scattered, fugacious, dark brown, oblong, acuminate, reticulated, spinose-serrate scales on the under surface; the margin entire, reflexed, and slightly undulate. *Sori* large, confined to the upper half of the frond; the dark brown peltate scales covering them are very fugacious, and only to be found on the young sori.

3. DRYNARIA CRASSIFOLIA, J. Sm.

Drynaria crassifolia, J. Sm. in Hook. Jour. Bot. 4, p. 61.

Polypodium crassifolium, Linn. ex Sw. Syn. Fil. p. 27; Willd. Spec. Pl. 5, p. 161; Kaulf. Enum. Fil. p. 93; Gaud. Bot. Freyc. Voy. p. 347; Velloz. Fl. Flum. 11, t. 58.

P. coriaceum, Raddi, Plant. Brasil. p. 16, t. 25.

HAB. Organ Mountains, Brazil: on trees.

†† *Sori* superficiales, numerosi sed sparsi.

4. DRYNARIA PULVERULENTA, Sp. Nov.

D. frondibus confertis sessilibus coriaceis lanceolatis acuminatis basi attenuatis margine integris reflexis, costa subtus prominente; soris parvis approximatis.

HAB. Luzon, Philippine Islands: on trees in mountain forests, near Baños.

The *fronds* of this species are few in number, *tufted*, and *destitute of a proper stipes*, about 10 inches long and an inch broad, *lanceolate*, *entire*, *attenuate at the base*, somewhat rigid, *coriaceous*, smooth, with a *reflexed margin*, and of a dull brown colour when dry. *Sori* mostly confined to the upper half of the frond, *very small and crowded*.

5. DRYNARIA OBTUSATA, Sp. Nov.

D. stipitibus brevibus; frondibus lanceolatis obtusis basi attenuatis membranaceis integris, costa straminea utrinque prominente; soris parvis sed numerosis approximatis.

HAB. Ovolau, Feejee Islands; on trees.

Stipes smooth, not more than an inch in length, or nearly wanting. *Fronde*s few, from 15 to 20 inches long, and 1½ inches broad, *lanceolate*, with an acuminate but *obtuse point* and a much *attenuated base*, of a *somewhat delicate texture*, and slightly shining on the upper surface. *Costa* straw-coloured, *prominent on both sides*, plane on the upper and angular on the under side. Veins distant, together with the venules slender and evident. *Sori* *very small*, numerous, confined to the upper half of the frond, and occupying its full breadth.

This has very much the habit of *D. (Polypodium) longifrons* of Wallich. But the fronds of our plant are broader, with a more obtuse apex, smaller, and with more numerous sori, which extend to the very margin.

6. DRYNARIA POLYCARPA.

Polypodium polycarpon, Sw. Syn. Fil. p. 30 & 227; Willd. Spec. Pl. 5, p. 159.

HAB. Tahiti, Society Islands. Tutuila, Samoan Islands. Mindanao, Philippine Islands. Sooloo Islands.

Swartz's description of *Polypodium polycarpon* is perfectly applicable to our plant; but the wide geographical range we here give the species might lead to the supposition, that the plant from islands in the Pacific may be something different from that of the Sooloo and Philippine Islands. A close examination and comparison of the whole, however, has convinced us that they are one and the same species. Still, it must be confessed, that we experience no small difficulty in identifying those species of *Drynaria* which have entire fronds and scattered sori. This is frequently owing to the short specific definitions given by authors, together with the complex nature of the venation, as well as to a difference in the consistency and form of the fronds of the same species, from different localities, and even from the same root.

7. DRYNARIA LONGIFOLIA, Sp. Nov.

D. rhizomate repente; stipitibus brevibus sulcatis; frondibus linearilanceolatis utrinque attenuatis subcoriaceis glabris margine reflexis subcrenatis; costa subtus prominente; soris parvis rotundis numerosis sed sparsis.

HAB. Luzon, Philippine Islands; in forests on the mountains, near Baños.

The *rootstock* of this, although *creeping*, is short and paleaceous. *Stipes* margined, from one to 3 inches high, of a dark brown colour, and *sulcate* in front. *Fronds* from 1½ to 2 feet long, and from 10 lines to 1½ inches broad, *linear-lanceolate*, and very much *attenuated at both ends*, the upper surface *smooth*; the *costa* and veins very thick and *prominent underneath*. *Sori* small, round, scattered, but approximate, and borne from the base to the tip of the frond.

This differs from the preceding species, in the narrower and attenuated fronds, the prominent veins beneath, and in the sori extending from the base to the point.

* * *Fronde cordato-hastatæ vel bipartito-lobatæ.*

8. *DRYNARIA SPECTRUM, J. Sm.*

D. rhizomate elongato repente squamoso; stipitibus glabris angulatis; frondibus paucis cordato-hastatis 3-5-lobatis, lobis lato-lanceolatis acutis vel acuminatis; soris paucis parvis sparsis remotis.

Drynaria Spectrum, J. Sm. in Hook. Jour. Bot. 4, p. 61.

Polypodium Spectrum, Kaulf. Enum. Fil. p. 94; Hook. & Arn. Bot. Beech. p. 103.

P. Thouinianum, Gaud. Bot. Freyc. Voy. p. 348, t. 5, f. 1.

HAB. Sandwich Islands; frequent.

Rootstock long and creeping, about the thickness of a crow-quill, with black lanceolate scales pressed close to the surface. The fronds are few, from 10 to 15 inches long (including the smooth and angular stipe), and from 6 to 10 inches in diameter, rather rigid, with both surfaces somewhat wrinkled, having a cordate-hastate base, with from 2 to 5 broad-lanceolate, acute or acuminate lobes; each lobe with a very strong vein or costa passing through its centre. Sori few, small, distant, and seated on the recurved venules, which terminate in the nearly quadrangular meshes, formed by the reticulated veins.

9. *DRYNARIA HORSFIELDII, J. Sm.*

D. rhizomate crasso repente crinito-squamoso; stipite elongato glabro sulcato; fronde bipartita coriacea glabra subtus glauca, lobis palmato-laciniatis, laciniis lato-lanceolatis acuminatis obtusis serratis, costa dichotoma; soris parvis numerosis.

Drynaria Horsfieldii, J. Sm. in Hook. Jour. of Bot. 4, p. 61.

Polypodium Dipteris, Blume, Enum. Plant. Jav. p. 135.

HAB. Ovolau, Feejee Islands; at an elevation of 2,000 feet. Mount Maijaijai, Luzon, Philippine Islands.

Plant terrestrial, growing in large patches or groups, in open elevated situations. *Rootstock creeping* above ground, about the thickness of a man's finger, and together with the base of the stipe, furnished with long, brownish-black, *slender scales*. *Stipe erect*, 2 feet or more in length, *smooth*, of a tawny-brown colour, and *channelled* in front. *Fronde* reniform in circumscription, about 2 feet broad, *coriaceous*, *smooth above*, and *glaucous beneath*, *deeply two-parted*; the lobes *palmate-laciniate*, with *broadly lanceolate*, *acuminate*, *obtuse*, *coarsely serrate segments*. *Costa dichotomous*, smooth, in a young state woolly, branching once or twice after entering the segments, and not unfrequently the ultimate forkings uniting again, forming thereby elongated areoles. Between the branches of the costa, the reticulations of the primary veins are beautiful, and not a little singular in their arrangement. The veins start at almost regular distances, and at right angles with the costa, the spaces between being partitioned off by cross veins into oblong and nearly quadrangular meshes, within which the venules form a smaller set of reticulations, of a nearly similar form to those by which they are enclosed. With an eye-glass there can be seen to exist, within the last, a third and more minute, delicate, and obscure set of reticulations, formed by transparent veinlets, the meshes of which are more irregular in their form; and on these veinlets at their intersection, the *small sori* are seated.

Between this and the *D. (Polypodium) Wallichii* of R. Brown, as figured by Hooker and Greville, in the *Icones Filicum*, t. 168 & 169, there is only a slight difference; which consists principally in the fronds of our plant being glaucous on the under surface, with serrate segments, and the costa always branching after entering these.

* * * *Fronde pinnatifidæ vel basi pinnatæ.*

10. DRYNARIA ACUMINATA, Sp. Nov.

= *rejuvenata*
cf. p. 213

D. fronde glabra membranacea profunde pinnatifida, laciniis subalternis elongato-lanceolatis acuminatis margine repandis; costa subtus prominente; sori sparsis rotundis distantibus subimmersis.

HAB. Island of Savaii, Samoan Group.

In the divisions of the fronds and general aspect of the plant, this bears a marked resemblance to *D. phymatodes* of this work. But its fronds are larger and more membranaceous; the segments diminishing in size towards the terminal one, which is small; and the sori more numerous and scattered.

11. DRYNARIA DECURRENS, Sp. Nov.

D. rhizomate brevi repente paleaceo; stipite gracili semitereti supra sulcato marginato; fronde glabra subcoriacea profunde pinnatifida, laciniis oppositis adscendentibus linearilanceolatis attenuatis margine repando-undulatis, infimis decurrentibus; soris parvis ovalibus sparsis et distantibus.

HAB. Mountains near Baños, Luzon, Philippine Islands: on wet rocks.

Rootstock about the thickness of a crow-quill, short, creeping, and paleaceous; the paleæ oblong-lanceolate, attenuate, reticulated, spinulose-serrate on the margin. *Stipe* slender, naked, and from 3 to 6 inches high, with 2 or 3 shallow grooves in front, and a narrow margin widening upwards. *Fronde* few, erect, from 3 to 6 inches in length, ovate-oblong, acute, cuneate at the base, smooth on both sides, and deeply pinnatifid; its segments from 5 to 9 in number, distant, opposite, and ascending, from 3 to 4 lines broad, linear-lanceolate and attenuated into a long slender point, with a slightly repand-undulate margin. *Sori* small, oval or oblong, produced irregularly over the whole of the under surface of the frond.

In size and habit, this resembles *Phlebodium angustum*, J. Smith, of this work.

12. DRYNARIA ALATA, Sp. Nov. (Tab. 6.)

D. stipite glabro stramineo semitereti; fronde membranacea glabra basi pinnata versus apicem pinnatifida; pinnis alternis distantibus lanceolatis attenuatis margine sinuato-dentatis; soris parvis rotundis sparsis et distantibus.

HAB. Ovolau, Feejee Islands.

Stipes and *fronds* smooth, about equal in length, of a straw colour; the latter broadly-ovate, obtuse, membranaceous, and a little more than a foot long, pinnate at the base and deeply pinnatifid towards the point. Pinnæ distant, alternate, divaricate, lanceolate, attenuate, from 6 to 8 inches long and 10 lines broad, the margin sinuate-dentate, and base of the two or three inferior pairs cuneate and decurrent on the rhachis. Rhachis and costa smooth, of a straw colour, naked and prominent on the under side. Sori most profuse towards the summit of the frond, small, round, scattered, and distant.

PLATE 6.—Fig. 1. Entire frond, natural size. *a, a, a.* Sections of a pinna, showing the venation and sori. *b, b.* Sporangia.—The analyses more or less magnified.

13. DRYNARIA COADUNATA, Sp. Nov.

D. stipite acute angulato paleaceo; fronde glabra membranacea basi pinnata versus apicem pinnatifida; pinnis suboppositis divaricatis oblongo-lanceolatis sinuato-pinnatifidis, infimis petiolulatis triangularibus basi obliquis, laciniis triangulari-ovatis obtusis crenatis; rhachi costaque glanduloso-pubescentibus; soris numerosis parvis rotundis sparsis.

HAB. Sandal-wood Bay, Feejee Islands: in mountain forests.

Stipe sharply angled, of a dark brown colour, sparsely furnished with long, slender, fugacious, chaffy scales. *Fronde glabrous, membranaceous*, about 2 feet in length, ovate-oblong, acute, cordate, and pinnate at the base: the pinnæ confluent upwards and forming a deeply serrate point to the frond; the lowest pair triangular in outline and oblique at the base, with 2 or 3 large triangular-ovate, lobate-sinuate, obtuse segments on the lower side.

We find no published species with which this satisfactorily agrees. It is altogether distinct from any Fern in our collection, and was detected only once in the above-mentioned locality.

* * * * *Fronde bipinnatæ.*

14. DRYNARIA LATIFOLIA.

D. stipite glabro stramineo; fronde membranacea bipinnata; pinnulis oblongis lanceolatis petiolatis sinuato-pinnatifidis basi cordatis, laciniis oblongo-lanceolatis acuminatis subrepandis; soris parvis sparsis.

Polypodium latifolium, Forst. ex Sw. Syn. Fil. p. 39 & 234; Willd. Spec. Pl. 5, p. 205; Hook. & Arn. Bot. Beech. Voy. p. 74.

HAB. Tahiti, Society Islands.

Stipe smooth and of a straw-colour. Frond membranaceous, bipinnate. Pinnules oblong-lanceolate, petiolate, sinuately pinnatifid, cordate at the base; the segments oblong-lanceolate, acuminate, and somewhat repand. Sori small and scattered.

In the outline of the segments a considerable variety of forms is found to exist. Mr. John Smith, in his *Enumeratio Filicum Philippinarum*, refers this species to the genus *Aspidium* of Schott. We have searched in vain for what might be considered a proper indusium, but find nothing resembling it; neither can we detect any character that would warrant the removal of the plant from *Drynaria*, as that genus is now characterized.

* * * * * *Fronde palmatæ vel pinnatifidæ. (Sori immersi, uni-biseriales, rariusve sparsi.)*

15. DRYNARIA PALMATA, J. Sm.

Drynaria palmata, J. Sm. in Hook. Jour. Bot. 3, p. 397.
Polypodium palmatum, Blume, Enum. Pl. Jav., p. 131.

HAB. Luzon, Philippine Islands: on trees, in mountain forests.

On comparing this with the *D. (Polypodium) tridactylum*, of Wallich, as figured in Hooker and Greville's *Icones Filicum*, we find that,

in the outline and division of the fronds, it resembles that species very much. In the present species, however, the venation is more obscure; the sori form a single and continuous line the whole length of the segments, about equidistant between the costa and margin; and the bases of the inferior segments are less decurrent on the stipe than in the species referred to.

16. DRYNARIA BILLARDIERI.

Polypodium Billardieri, R. Br. Prodr. Fl. Nov. Holl. p. 147; Gaud. Bot. Freyc. Voy. p. 351; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 362.
P. diversifolium, Willd. Spec. Pl. 5, p. 166.
P. phymatodes, A. Rich. Bot. Voy. Astrol. p. 66 (excl. syn. Forst.).

HAB. Bay of Islands, New Zealand. Illawarra, New South Wales: on trees.

In this, as in the following species, the divisions of the fronds present a great variety of forms, from entire and elongated-lanceolate, through various degrees of the lobed and digitate kind, to pinnatifid, with numerous lanceolate segments, the terminal one the longest, and with the lateral ones, bearing a single row of prominent, somewhat sunken sori near the margin.

17. DRYNARIA MAXIMA, Sp. Nov. (Tab. 7.)

D. stipite alato; fronde glabra sinuato-pinnatifida vel pinnatifida; laciniis lanceolatis oblongisve acuminatis v. obtusis, terminali elongata lata repando-sinuata; rhachi subtereti prominente; soris sparsis oblongis vel rotundis distantibus.

HAB. Tahiti, Society Islands; in mountain forests.

Whole plant from 3 to 5 feet high, with a stout creeping rootstock. *Stipe* short, smooth, semiterete, and channeled in front, *broadly winged*, the wing widening upwards. *Fronde* smooth, subcoriaceous, the upper surface shining, irregular in its outline and divisions, *sinuately-pinnatifid, or pinnatifid* down to within 1½ inches of the rhachis:

lateral segments distant, lanceolate and acuminate, 6 to 8 inches in length, or short and rather oblong; the terminal one from 10 to 15 inches long, by 2 to 3 inches broad, obtuse, with a repand-sinuate margin; the sinus broad and rounded at the base. Rhachis smooth and prominent, particularly so on the lower side. Sori partially sunk, large, round or oblong in form, distant and scattered irregularly over the whole of the under surface of the frond. Sporangia intermingled with clavate articulated glands. On the upper surface of the fronds are protuberances corresponding in form and opposite to the sori beneath, with a small cavity on their top.

So far as we are aware, this is the largest species of *Drynaria* known. Its nearest affinity is to *D. (Polypodium) phymatodes* of Linnæus; from which however it is entirely distinct. A full set of specimens shows great irregularity in the division of the fronds and the position of the sori.

PLATE 7.—Fig. 1. Summit of a frond, of the natural size. *a*. Entire frond, one-fourth of the natural size. *b, b*. Section of a frond, showing the sori and venation. *c, c*. Vertical section of the same, showing the partially sunken sori. *d, d*. Sporangia.—The details more or less magnified.

18. DRYNARIA PUSTULATA, *J. Sm.*

Drynaria pustulata, *J. Sm.* in *Hook. Jour. Bot.* 4, p. 61.

Polypodium pustulatum, *Sw.* *Syn. Fil.* p. 31 & 229; *Willd. Spec. Pl.* 5, p. 168;

A. Cunn. in *Hook. Comp. Bot. Mag.* 2, p. 363.

HAB. Vicinity of the Bay of Islands, New Zealand. Auckland Islands: on rocks and trees, sometimes on the ground.

This, like its near ally *D. phymatodes*, and perhaps in a still greater degree, is found to vary in the size and divisions of its fronds; the more usual state of which is to be pinnatifid, with oblong-lanceolate, acuminate segments, diminishing in size towards the point, with an entire thickened margin. The sori are most profuse on the upper half of the frond, extending from the rhachis to the very point of the

segments, and usually forming a single row, about equidistant between the costa and margin.

19. *DRYNARIA VULGARIS*, *J. Sm.*

Drynaria vulgaris, *J. Sm.* in *Hook. Jour. Bot.* 4, p. 61.

Polypodium phymatodes, *Sw. Syn. Fil.* p. 30; *Willd. Spec. Pl.* 5, p. 167.

P. grossum, *Langsd. & Fisch. Ic. Fil.* p. 9, t. 8.

HAB. Paumotu Islands. Tahiti, Society Islands. Samoan and Feejee Islands. Tongatabu. Philippine and Mangsi Islands: on rocks and trees; frequent.

The relationship of this to the preceding is very close; but in the following particulars it seems to differ: the whole plant is larger, the fronds less coriaceous, and a little shining on the upper surface: the segments are more distant, with the margin slightly recurved and not so evidently thickened: the sori are larger, distant, orbicular, or elliptical, and arranged in a single row equidistant between the costa and margin; with more or less of a tendency (apparent through a great number of specimens) to bear a double row of sori on each side of the costa: and in some specimens from the Feejee and Mangsi Islands this row is complete: the venules are more slender, and the areoles smaller.

On the low coral islands of the Paumotu group, which are scantily furnished with vegetation, and near the shores of the higher islands in the Pacific Ocean, within twenty degrees of the equator, the present species is of very frequent occurrence, luxuriating in barren and exposed situations.

20. *DRYNARIA ALTERNIFOLIA*.

D. stipite glabro semitereti; fronde subcoriacea profunde pinnatifida, laciniis subalternis distantibus patentibus lineari-lanceolatis attenuatis,

marginē repando-dentato; soris rotundis uniserialibus subimmersis distantibus.

Polypodium alternifolium, Willd. Spec. Pl. 5, p. 168.

HAB. Sandal-wood Bay, Feejee Islands.

Stipe smooth and half round. Frond somewhat coriaceous and deeply pinnatifid; its segments somewhat alternate and spreading, linear-lanceolate, attenuate to a point, the margin repand-dentate. Sori round, arranged in a single row, subimmersed, distant.

This considerably resembles some forms of the preceding species; but differs in its narrower, longer and more distant, attenuated, repand-dentate segments, with smaller sori: these are about the size of mustard-seed, arranged in a single line, situated much closer to the costa, and less immersed.

21. DRYNARIA GLAUCA, Sp. Nov.

D. stipite glabro tereti basi squamoso; fronde coriacea utrinque glauca profunde pinnatifida, laciniis suboppositis lineari-lanceolatis leviter acuminatis; soris parvis rotundis solitariis uniserialibus.

HAB. Mount Maijajai, Luzon, Philippine Islands.

Stipe from 6 to 8 inches long, about the thickness of the quill of a pigeon, *round and smooth*, with a few slender subulate *scales at the base*. *Frond coriaceous*, a little longer than the stipe, oblong and acuminate in circumscription, *glaucous beneath*, partially so on the upper surface, *deeply pinnatifid*: *segments subopposite*, distant, the terminal one the longest, *linear-lanceolate and slightly acuminate*, or *linear-oblong and mucronulate* (so in one of our specimens, which is perhaps distorted from the attack of insects), the margin thickened. *Sori small, round, solitary*, confined to the upper half of the frond, and arranged *in a single row*, equidistant between the costa and margin, and continuing to within half an inch of the apex of the segments.

* * * * * *Frondes dissimilares.* (*Sori uniseriales costæ paralleli, vel biseriales venis primariis paralleli.*)

22. DRYNARIA QUERCIFOLIA, *J. Sm.*

Drynaria quercifolia, *J. Sm.* in *Hook. Jour. Bot.* 4, p. 61.

Polypodium quercifolium, *Sw.* *Syn. Fil.* p. 32; *Willd. Spec. Pl.* 5, p. 170; *Kaulf. Enum. Fil.* p. 97; *Blume, Enum. Plant. Jav. fasc. 2*, p. 135; *Gaud. Bot. Freyc. Voy.* p. 353.

HAB. Mindanao, Philippine Islands: on trees.

23. DRYNARIA DIVERSIFOLIA, *J. Sm.*

D. rhizomate repente; frondibus sterilibus cordato-ovatis acuminatis lobato-sinuatis utrinque squamoso-hirsutis, fertilibus stipitatis glabris pinnatis; pinnis articulatis brevi-petiolulatis rigidis divaricatis lanceolato-linearibus acuminatis margine crenato undulatis basi obliquis cuneatis; soris rotundis subimmersis uniseriatis.

Drynaria diversifolia, *J. Sm.* in *Hook. Jour. Bot.* 4, p. 61.

Polypodium diversifolium, *R. Br. Prodr. Fl. Nov. Holl.* p. 147; *Gaud. Bot. Freyc. Voy.* p. 355.

HAB. Ovolau, Feejee Islands; on trees near the coast.

Plant forming large patches, having a thick, short, *creeping root-stock*, which is covered with slender brown fimbriated paleæ. *Frondes* numerous and crowded; the *sterile ones sessile*, of a brown colour when recent, *squamoso-hirsute* on both sides, from 6 to 8 inches long and 3 to 4 lines broad near the base, *cordate-ovate and acuminate*; the *margin sinuately lobed*; the lobes crenate: scales on the surface slender and deeply lacinated. *Fertile fronds pinnate* to the very point, with a firm, smooth, ash-gray rhachis and stipe, the latter about 6 inches long, nearly round, with a shallow channel in front. *Pinnæ* numerous, nearly opposite, from 4 to 6 inches long and about 4 lines broad, seated on a very short petiole, which is *articulated with the rhachis*,

lanceolate-linear, acuminate, with a crenate undulate margin, and an unequal cuneate base. Sori round, subimmersed, and solitary, forming a continuous row the whole length, equidistant between the costa and margin.

17. *AGLAOMORPHA*, Schott, *J. Sm.*

(*PSYGMIMUM*, Presl.)

1. *AGLAOMORPHA MEYENIANA*, Schott.

Aglaomorpha Meyeniana, Schott, Gen. Fil. t. 19, ex J. Sm. in Hook. Jour. Bot. 4, p. 63; Hook. Gen. Fil. t. 91.
Psidium elegans, Presl, Tent. Pterid. p. 200, t. 8, f. 21 & 22.

HAB. Mountains near Baños, Luzon, Philippine Islands.

This interesting and singular Fern was found by us inhabiting cliffs and branches of trees, where it forms large tufts or bunches. The sterile fronds are brown, rigid, cordate-ovate, and sessile, about 6 inches in length; in a recent state they have very much the appearance of dry oak leaves. In the fertile frond, the lower half is pinnatifid and sterile, the upper half pinnate; the pinnæ long, slender, sinuously pinnatifid or lobed, and articulated with the rhachis. We find the sporangia to be produced on the confluence of two venules, and often only on one, as mentioned by Sir William J. Hooker; but we have not been able to detect them seated on the confluence of several venules, as stated by Mr. J. Smith.

18. *DICTYOPTERIS*, Presl, *J. Sm.*

(*POLYPODII*, Sp. Auct.)

Distinguished from the preceding genus, and also from *Drynaria*, by the absence of free veinlets, terminating within the areoles.

1. DICTYOPTERIS ATTENUATA, *Presl.*

Dictyopteris attenuata, Presl, Tent. Pterid. p. 194, t. 8, f. 8; Hook. Gen. Fil. t. 71, B.
Polypodium attenuatum, R. Br. Prodr. Fl. Nov. Holl. p. 146; A. Rich. Bot. Voy.
 Astrol. p. 62; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 362.

HAB. Bay of Islands, New Zealand: on trunks and branches of trees; frequent.

2. DICTYOPTERIS IRREGULARIS, *Presl?*

D. stipite glabro sulcato; fronde glabra pinnata; pinnis subalternis oblongo-lanceolatis acuminatis pinnatifidis, laciniis oblongis acutis subfalcatis sinuato-dentatis; soris numerosis inordinatis.

Dictyopteris irregularis, Presl, Tent. Pterid. p. 194, t. 8, f. 7?

HAB. Mountains near Baños, Luzon, Philippine Islands.

Plant about 3 feet high. *Stipe glabrous, sulcate*, and frond about equal in length; the latter *smooth, simply pinnate*, and drying black. *Pinnæ subalternate*, remote, and seated on a short petiole, *oblong-lanceolate, acuminate, pinnatifid* about half way down to the costa; the inferior 2 or 3 pairs deeply pinnatifid at the base. *Segments* from 4 to 6 lines broad, *oblong, acute, subfalcate*, and confluent towards the apex of the pinnæ, the margin irregularly and bluntly serrate. The sinuses are rounded at the base, and about half the breadth of the segments. Rhachis slightly compressed, with several shallow furrows in front.

This agrees very well with the sectional figure of *D. irregularis*, given in Presl's Tentamen Pteridographiæ; but not having seen any description of the species, we have adopted Presl's name with a doubt.

19. SELLIGUEA, *Bory, J. Sm.*

(CETERACHIS Spec. Hook. & Grev. POLYPODII & GRAMMITIDIS Spec. Wall.)

1. SELLIGUEA INVOLUTA.

Grammitis involuta, Don. Prodr. Fl. Nepal. p. 14; Hook. & Grev. Ic. Fil. t. 53.

HAB. Samoan and Feejee Islands: high on the branches of trees.

In a recent state, the fronds of this species are not involute; and although in our specimens they are not so large as represented in the Icones Filicum, the plant is evidently the same.

2. SELLIGUEA ALIENA, Sp. Nov.

S. rhizomate repente; stipitibus elongatis marginatis; frondibus integris glabris membranaceis lanceolatis caudato-acuminatis basi attenuatis margine repandis; soris obliquis continuis marginem vix attingentibus.

HAB. Mountains near Baños, Luzon, Philippine Islands.

The *fronds* are about 9 inches long, and 1½ inches broad, *smooth, membranaceous, lanceolate*, and terminating in a tail-like point, the base decurrent on a slender margined stipe, nearly as long as the frond.

Closely related to *S. (Ceterach) paniculata* of Hooker and Greville; but in our plant the fronds are much longer, both the base and the point being more lengthened out, and the sori do not advance so close to the margin. It is nearly allied also to the *Grammitis membranacea* of Blume.

3. SELLIGUEA PLANTAGINEA, Sp. Nov.

S. rhizomate repente squamoso; frondibus coriáceis glabris supra nitidis oblongo-lanceolatis attenuatis basi leviter decurrentibus margine crebre crenato-undulatis; soris obliquis latis interruptis.

HAB. Tahiti, Society Islands: terrestrial, in high mountain forests.

Rootstock creeping, about the thickness of a goosequill, closely covered with oblong, attenuated scales. *Fronde*s distant, *smooth*, and of a firm consistence, erect, about 10 inches in length, and 1½ inches broad, *oblong-lanceolate*, *attenuated* very gradually into a narrow point; the base *decurrent* for a short distance on the stipe; which is smooth, semi-terete, angular in front, and about 4 inches long. *Sori broad*, partially *interrupted*, occupying nearly the whole of the space between the oblique primary veins, and extending outwards to the thickened *crenate-undulate margin*.

The sori in this species are broad, and sometimes divided into round, ovate, or oblong heaps, showing an affinity with many species of *Drynaria*; but the more usual form which they present is oblong-linear or linear: we have therefore referred the plant to *Selliguea*.

20. TÆNITIS, Sw., Presl.

(TÆNITIDIS Spec. Willd. & Auct.)

1. TÆNITIS BLECHNOIDES, Sw.

Tænitis blechnoides, Sw. Syn. Fil. p. 24 & 220; Willd. Spec. Pl. 5, p. 135; Blume, Enum. Plant. Jav. p. 108; Presl, Tent. Pterid. p. 226, t. 10, f. 4; Hook. Gen. Fil. t. 77, B.

HAB. Singapore.

21. TÆNIOPSIS, J. Sm.

(VITTARIÆ Spec. Auct. HAPLOPTERIDIS Spec. Presl. TÆNIOPTERIS, Hook.)

The species belonging to this genus are of the same habit as those of *Vittaria*, from which they differ only in having the line of sori situated a little within the margin.

1. TÆNIOPSIS GRAMINIFOLIA, *J. Sm.*

Tæniopsis graminifolia, *J. Sm.* in *Hook. Jour. of Bot.* 4, p. 67.
Vittaria graminifolia, *Kaulf. Enum. Fil.* p. 192.

HAB. Organ Mountains, Brazil.

Plant terrestrial and caespitose, with erect fronds, costate, about a span long, and a little more than one line broad. Sori forming a continuous line the whole length of the frond, a little nearer to the margin than the costa.

2. TÆNIOPSIS RICHIANA,* *Sp. Nov.*

T. rhizomate crasso repente paleaceo; fronde pendula subcoriacea lineari-ensiformi basi attenuata plana costata; soris latis; sporangiis pilis clavatis articulatis intermixtis.

HAB. Ovolau, Feejee Islands: in mountain forests, on trees; rare.

Rootstock thick and creeping, of a sooty-black colour, paleaceous; the paleæ linear-lanceolate, attenuate, and reticulated. Fronds pendulous, 2 to 3 feet long, subcoriaceous, linear-ensiform, about 6 lines broad, plane, attenuate at the base, the point subacute. Veins evident, oblique, simple, but occasionally forked. Sori broad, about one line broad, produced on the upper half of the frond only, close to the margin and continuous; the sporangia pedicellate, intermingled with numerous dark brown, articulated, clavate hairs.

22. VITTARIA, *J. E. Sm.*1. VITTARIA ENSIFORMIS, *Sw.*

Vittaria ensiformis, *Sw. Syn. Fil.* p. 109; *Willd. Spec. Pl.* 5, p. 406; *Blume, Enum. Plant. Jav.* p. 198; *Presl, Tent. Pterid.* p. 165.

* We have named this species in compliment to William Rich, Esq., the principal botanist of the Exploring Expedition.

HAB. Mount Maijajai, Luzon, Philippine Islands.

Rootstock crinite-paleaceous; the paleæ of a light straw-colour, entire, linear, attenuate, and reticulated. Fronds erect, rigid, linear-ensiform, subfalcate, and obscurely costate.

2. VITTARIA INTERMEDIA, *Blume*.

Vittaria intermedia, Blume, Enum. Plant. Jav. p. 199.

HAB. Mountains near Baños, Luzon, Philippine Islands.

Rootstock creeping, crinite-paleaceous. Fronds subfalcate, from 12 to 15 inches high, somewhat stipitate, costate, linear, and very much attenuated at both ends.

This is distinguished from the preceding species by its more creeping rootstock, the substipitate attenuate fronds, and the evident costa; but we do not find the margin to be so decidedly revolute as it is described by Blume.

3. VITTARIA RIGIDA, *Kaulf*.

Vittaria rigida, Kaulf. Enum. Fil. p. 193.

HAB. Sandwich Islands: on trees; frequent.

Rootstock short and creeping, of a sooty-brown colour, paleaceous-hirsute; the paleæ dark brown, linear-lanceolate, spinulose-serrate, and beautifully reticulated. Fronds from 3 to 6 in a tuft, usually erect, from 5 to 30 inches long, and averaging 2 lines in breadth, plane, rigid, linear-ensiform, tapering more towards the base than the point, which sometimes presents a truncated appearance, as if bitten off by some animal; the costa on the lower half of the frond is evident.

The fronds of this species vary much in length: in dry exposed

situations, they are short, rigid, and erect; while in sheltered, warm, humid localities they are much longer, more flaccid, and pendulous.

4. VITTARIA PLANTAGINEA, *Bory.*

Vittaria plantaginea, Bory, ex. Willd. Spec. Pl. 5, p. 406; Hook. & Grev. Ic. Fil. t. 187.

HAB. Tahiti, Society Islands. Feejee Islands: on trees.

Rootstock creeping, nearly as thick as a goosequill, and closely covered with dark brown, setose, linear-lanceolate, subulate, reticulated paleæ. Fronds numerous, approximate, 10 to 12 inches in length, erect, subcoriaceous, linear or linear-lanceolate, acuminate and about 3 lines broad; the costa obscure.

The principal difference between this and the preceding species consists in the thicker and longer rootstock, the darker brown setose-subulate paleæ, and the more numerous fronds.

5. VITTARIA ELONGATA, *Sw.*

Vittaria elongata, Sw. Syn. Fil. p. 109 & 302; Willd. Spec. Pl. 5, p. 406; Blume, Enum. Plant. Jav. p. 200; Hook. & Arn. Bot. Beech. Voy. p. 107.

HAB. Tahiti, Society Islands: on trees.

Rootstock creeping and paleaceous. Fronds membranaceous, 4 to 6 feet long, linear, pendulous, 3 to 4 lines broad, and very much attenuated at the base, towards the point less so. Veins obscure; the costa only evident on the lower half of the frond.

In the Botany of Beechey's Voyage, we find this species enumerated among plants collected at the Sandwich Islands, where alone the *V. rigida* of Kaulfuss has hitherto been found; while in the same work the latter plant is said to occur at the Society Islands. There has evidently been a transposition of the stations of the two species.

23. ANTROPHYUM, *Kaulf.** *Ecostata.*1. ANTROPHYUM RETICULATUM, *Kaulf.*

Antrophyum reticulatum, Kaulf. Enum. Fil. p. 198; Blume, Enum. Plant. Jav. p. 110.

Hemionitis reticulata, Forst. ex. Sw. Syn. Fil. p. 20 & 208; Willd. Spec. Pl. 5, p. 128.

HAB. Tahiti, Society Islands. Mindanao, Philippine Islands.

Fronde from 10 to 20 inches long and one to 2 inches broad, elongated-lanceolate and acuminate, the base attenuate and decurrent on the stipe, with a pellucid margin; the sporangia immersed; and the sori villous.

2. ANTROPHYUM ANGUSTATUM, Sp. Nov.

A. frondibus stipitatis coriaceis linearilanceolatis attenuatis obtusis basi decurrentibus ecostatis; sporangiis profunde immersis.

HAB. Tahiti, Society Islands: on trees, in mountain forests.

Rootstock short and creeping, paleaceous-hirsute; the paleæ oblong, much attenuated, beautifully and delicately reticulated, the margin spinulose-serrate. Stipe 4 inches long, slightly compressed. Fronds numerous, approximate, from 8 to 10 inches long, and about 6 lines broad, coriaceous, linear-lanceolate, tapering gradually into a rounded or sometimes acute point, the base decurrent a short distance on the stipe; the meshes of the reticulated veins much elongated: costa none. Sori linear, continuous and naked; the sporangia deeply immersed in the substance of the frond.

From *A. reticulatum* this differs by its longer stipes, narrower fronds, and deeper immersed sori.

3. ANTROPHYUM PUMILUM, *Kaulf.*

Antrophyum pumilum, Kaulf. Enum. Fil. p. 197.

Hemionitis immersa, Bory, ex Willd. Spec. Pl. 5, p. 127.

HAB. Mangsi Islands: forming dense patches on trunks of trees.

None of the fronds of this well-marked species are over 1½ inches in length: they are oblong, obtuse, and attenuated at the base, which, as well as the costa and occasionally the margin of the fronds, is furnished with scattered, slender, reticulated, spinulose, brown scales. Sori interrupted, with immersed sporangia.

4. ANTROPHYUM PLANTAGINEUM, *Kaulf.*

Antrophyum plantagineum, Kaulf. Enum. Fil. p. 197; Blume, Enum. Plant. Jav. p. 109; Hook. & Arn. Bot. Beech. Voy. p. 74; Hook. Gen. Fil. t. 109, A.

HAB. Tahiti, Society Islands: on rocks and trunks of trees.

Fronds oblong-lanceolate, attenuating on a stipes of 3 to 5 inches in length.

To this species is nearly related the *Antrophyum Boryanum*, Spreng., as figured in Hooker and Greville's *Icones Filicum*; and we are not satisfied that the one is anything more than a slight variety of the other. In *A. Boryanum* the fronds are described as "oblongo-ellipticis obovatisve acutis," with the areoles formed by the veins not quite so much elongated as in our specimens of the *A. plantagineum*; but in the latter respect, as well as in the outline of the fronds, both are liable to considerable variation.

* * *Costata.*

5. ANTROPHYUM ALATUM, Sp. Nov.

A. frondibus subcoriaceis costatis lanceolato-oblongis acuminatis basi angusta in stipitem brevem attenuatis; soris villosis immersis.

HAB. Tahiti, Society Islands. Samoan and Feejee Islands: on trees.

Rootstock short; the rootlets thick, and closely covered with brownish pubescence. Stipe about one inch in length, or almost entirely wanting. *Fronde* subcoriaceous, tufted, from 8 to 12 inches in length and 3 to 4 inches broad, lance-oblong, and terminating in an acuminate point a little over an inch in length, the base attenuated very gradually, and decurrent on the short stipe. Costa elevated on the under side, and very evident on the lower part of the frond for more than two-thirds of its length. *Sori* villose, immersed, forming irregular and interrupted lines along the sides of the elongated angular areoles.

This is evidently allied to the *A. semicostatum* of Blume.

6. ANTROPHYUM SUBFALCATUM, Sp. Nov.

A. frondibus subcoriaceis costatis linearilanceolatis basi angusta in stipitem brevem attenuatis; areolis anguste linearibus; sori nudis subimmersis.

HAB. Ovolau, Feejee Islands: on trees: rare.

Rootstock not over an inch in length, furnished with tomentose rootlets. Stipes about 1½ inches long. *Fronde* tufted, costate, subcoriaceous, 8 to 10 inches long, and 4 to 6 lines broad, linear-lanceolate, subfalcate, with a rather acute point, the base tapering gradually into the short stipe, of a yellowish-green tint, smooth on the under and slightly wrinkled on the upper surface. Costa (in a dry state) of a pale straw-colour; the areoles formed by the venation are long-linear, and angular at the ends. Lines of *sori* few, often continuing uninterrupted for a distance of 2 or 3 inches, a little winding in their direction, and generally nearer to the margin than the costa, with naked and partially immersed sporangia.

Allied to *A. falcatum* of Blume; but distinct in the narrow, slightly falcate fronds, and in the presence of a costa. In its linear and somewhat continuous line of sori, it presents a strong affinity with the

genus *Polytaenium* of Desvaux, which embraces only one known species, the *P. (Antrophyum) lineatum* of Kaulfuss. To this, our plant bears a striking similarity in the size and outline of its fronds, thus proving to some extent, that the genus *Polytaenium* differs little from *Antrophyum*, either in habit, or in the nature of its sori.

24. HEMIONITIS, Linn.

1. HEMIONITIS ELONGATA, Sp. Nov. (Tab. 8.)

H. rhizomate repente; stipite semitereti basi setoso; fronde coriacea glabra simplici ternata vel pinnata; pinnis (5-7) lineari-lanceolatis attenuatis basi oblique cuneatis margine cartilagineo leviter undulatis; soris interruptis vel reticulatis.

HAB. Feejee Islands: terrestrial, at an elevation of 3,000 feet.

Rootstock short and *creeping*, of a dark brown colour, setose; the rootlets tomentose. *Stipe* about the thickness of a crowquill, 6 to 15 inches in length, *semiterete*, smooth and shining, slightly scabrous and *setose at the base*. *Fronde* usually about the same length as the stipe, either *simple, ternate, or pinnate*. *Pinnæ* 5 to 7 in number, ascending, about 8 lines broad, *linear-lanceolate, attenuated* into rather an obtuse point, the inferior ones seated on a short petiole, the superior sessile and decurrent, smooth and coriaceous, with a hard, thickened, slightly *undulate and partially recurved margin*. *Costa* thick and prominent beneath. *Areoles* unequal, elongated, and angular; those nearest the costa the largest. The lines of *sori* are frequently *interrupted*, but in some of our specimens they unite and form a short crescent or full areole. Sporangia mixed with articulated hairs.

This interesting Fern differs somewhat in habit from other species of *Hemionitis*; but the character of its reticulated venation, and the superficial sori are in strict conformity with that genus. We do not think the slight interruption of the lines of sori (which may not under all circumstances be constant) is sufficient ground on which to establish a new genus.

PLATE 8.—Fig. 1, 1. Plants, natural size. 1 *a*. Cross section of the stipe. 1 *b*. Hairs from the base of the stipe. 1 *c*. Section of a pinna. 1 *d*. Articulated hairs mixed with the sporangia. 1 *e, e*. Sporangia.—The details magnified.

25. CERATOPTERIS, *Brongn.*

(ACROSTICHI Spec. Linn. PTERIDIS Spec. Sw., Willd. ELLOBOCARPUS, Kaulf.)

1. CERATOPTERIS THALICTROIDES, *Brongn.*

Ceratopteris thalictroides, Brongn. ex Hook. Gen. Fil. t. 12.

Pteris thalictroides, Sw. ex Willd. Spec. Pl. 5, p. 378.

Ellobocarpus oleraceus, Kaulf. Enum. Fil. p. 148.

HAB. Luzon, Philippine Islands: in fosses near the city of Manilla, and marshy grounds, Santa Cruz.

TRIBE II. ACROSTICHIEÆ, J. SM.

26. ELAPHOGLOSSUM, *Schott.*

(ACROSTICHI Spec. Auct. OLFERSLÆ Spec. Presl.)

1. ELAPHOGLOSSUM RADDIANUM.

Acrostichum Raddianum, Hook. & Grev. Ic. Fil. t. 4.

A. spathulinum, Raddi, Plant. Brasil. p. 3, t. 15, f. 2.

HAB. Estrella Pass, Organ Mountains, Brazil; on trees and rocks.

An excellent figure of this plant is given in Hooker and Greville's *Icones Filicum*.

Our specimens, it will be observed, are from the locality where Raddi first detected the species.

2. ELAPHOGLOSSUM SAMOENSE, Sp. Nov.

E. cæspitosum; stipite tereti villoso; frondibus simplicibus subcoriaceis oblongo-lanceolatis obtusis utrinque sparse villosis, fertilibus multo minoribus lanceolatis obtusis; venis prominentibus furcatis patentibus.

HAB. Tutuila, Samoan Islands; in the vicinity of Pago-pago Bay, in mountain forests: on trees.

Rootstock cæspitose, short and globose, coated with ferruginous, villose, squamose scales. Sterile fronds subcoriaceous, oblong-lanceolate, obtuse, about a span long, and 10 lines broad, villous with sparse, brown hairs on the margin, together with the forked veins and costa, which are prominent on both sides; the fertile fronds lanceolate, obtuse, 2½ inches long by 6 lines broad. Stipe about 4 inches long, that of the sterile frond about half this length, densely villous; the hairs a little deflexed.

This is related to *Acrostichum strictum* of Raddi; but the fertile frond is much smaller in proportion to the sterile one than in Raddi's plant, which has a shorter stipe and narrower sterile fronds.

3. ELAPHOGLOSSUM SPLENDENS.

E. rhizomate cæspitoso; frondibus confertis elongato-lanceolatis apice acutis basi subattenuatis utrinque paleaceo-squamosis, squamis lanceolatis ciliato-dentatis.

Acrostichum splendens, Bory, ex Willd. Spec. Pl. 5, p. 104; Gaud. Bot. Freyc. Voy. p. 303; Hook. & Arn. Bot. Beech. Voy. p. 103.

HAB. Sandwich Islands: on trees and rocks; on the latter at an elevation of 8,000 feet.

The rootstock is usually cæspitose, but sometimes forms a short

erect trunk, 3 or 4 inches in height. Stipes from 2 to 3 inches long, paleaceous-squamose. Sterile and fertile *fronds* about equal in size, from 6 to 12 inches long, and usually an inch broad, *elongated-lanceolate*, *acute*; the surface on both sides almost entirely concealed by chestnut-brown, *ciliate-dentate scales*.

4. ELAPHOGLOSSUM INTERMEDIUM, Sp. Nov.

E. cæspitosum; *stipite paleaceo*; *frondibus oblongo-lanceolatis basi attenuatis utrinque squamosis, squamis imbricatis ovato-lanceolatis ciliato-dentatis*.

HAB. Organ Mountains, Brazil.

Stipe from 3 to 4 inches long, thickly covered with *chaffy*, straw-coloured, membranaceous, *ciliate-dentate scales*. *Fronde* usually from 8 to 10 inches long, and a little over an inch broad at the middle, *oblong-lanceolate*, the point rather obtuse, the base *attenuated* on the stipe, both sides closely *imbricated with ciliate-dentate scales*. The fertile fronds (though somewhat mutilated) are apparently of the same size and outline as the sterile, but with a little longer stipe.

This is closely allied to the preceding species, as also to the *E. (Acrostichum) vestitum* of Lowe, a native of the island of Madeira. It differs from the latter only in its stipe being a little longer, in the absence of blackish scales on the stipe, as well as on the costa; and in the more densely imbricated scales on both surfaces of the frond.

5. ELAPHOGLOSSUM HYBRIDUM.

Acrostichum hybridum, Bory, ex Willd. Spec. Pl. 5, p. 107; Raddi, Plant. Brasil. p. 4, t. 16; Hook. & Grev. Ic. Fil. t. 21; Gaud. Bot. Freyc. Voy. p. 303.

HAB. Organ Mountains, Brazil.

The sterile fronds in our specimens are broader and more rounded at the base than those represented in the *Icones Filicum*; yet we feel satisfied that they belong to the same species.

6. ELAPHOGLOSSUM LONGIPES, Sp. Nov. (Tab. 9.)

E. rhizomate repente dense squamoso; stipitibus elongatis gracilibus parce squamosis; frondibus lineari-lanceolatis utrinque attenuatis supra squamosis, fertilibus minoribus lanceolatis obtusis; squamis oblongo-lanceolatis spinuloso-dentatis; venis patentibus; venulis plerumque furcatis.

HAB. Baños, Andes of Peru.

Rootstock long and *creeping*, about the thickness of a crowquill, covered with narrow, lanceolate, blackish, rigid, spinulose-dentate *scales*. *Stipes* of both kinds of fronds equal in length, from 7 to 8 inches long, slightly compressed, *squamosa*, the scales covering about half of the surface. Sterile *fronds* from 3 to 5 inches long, and about 6 to 8 lines broad, somewhat *linear-lanceolate* and *attenuate* at base, the *upper surface* only covered with *oblong-lanceolate*, *spinulose-dentate* *scales*; the *fertile* shorter, 2½ to 3 inches long, *lanceolate*, *obtuse*, slightly *attenuate* at the base, *squamosa* on the upper surface.

This is related to *Acrostichum lepidotum* of Willdenow; but it differs in the fronds being squamosa only on the upper surface, and also in the greater length of its stipe.

PLATE 9.—Fig. 2. Portion of a plant, of the natural size. 2 a, 2 a. Scales from the stipe.—Magnified.

7. ELAPHOGLOSSUM NITIDUM, Sp. Nov. (Tab. 9.)

E. rhizomate repente squamoso; stipitibus gracilibus compressis squamosis; frondibus glabris nitidis ovato-oblongis acuminatis basi attenuatis, fertilibus minoribus lanceolatis; venulis furcatis prominentibus.

HAB. Sandwich Islands; on trunks and branches of trees.

Rootstock long, slender, branched, *creeping*, *chaffy* with linear-lanceolate, reticulated brown *scales*. *Stipes* slender, from 2 to 3 inches

long, slightly *compressed* and sparsely *squamose*; both kinds about equal in length. Sterile *fronds* quite *smooth and glossy* on both sides, with very *prominent forked veins*, from 3 to 4 inches in length and 12 to 15 lines *broad, ovate-oblong*, having a short *acuminate* obtuse point and an *attenuated* base; the *fertile smaller, lanceolate*, one to 1½ inches long, and 6 lines broad.

The sterile state of this very distinct species occurs very frequently in dense humid forests on the Island of Hawaii; but fertile fronds are rarely to be found.

PLATE 9.—Fig. 3. Plant, of the natural size. 3 *a*. Scale from the rhizoma. 3 *b*. Scales from the stipe. 3 *c*. Sporangium.—Magnified,

8. ELAPHOGLOSSUM VISCOSUM, *J. Sm.*

Elaphoglossum viscosum, *J. Sm.* in *Hook. Jour. Bot.* 4, p. 148.

Acrostichum viscosum, *Sw. Syn. Fil.* p. 10 & 193; *Willd. Spec. Pl.* 5, p. 103; *Hook.*

& *Grev. Ic. Fil.* t. 61 (opt.).

Olfersia viscosa, *Presl, Tent. Pterid.* p. 234.

HAB. Organ Mountains, Brazil: terrestrial.

There are few of the membranaceous, reticulated, ciliate scales present on our specimens, and these are scattered over the under surface of the sterile fronds.

9. ELAPHOGLOSSUM ÆMULUM.

E. rhizomate repente paleaceo-squamoso; stipitibus glabris semiteretibus supra sulcatis; frondibus stipitatis coriaceis oblongo-lanceolatis marginatis basi attenuatis, fertilibus longe stipitatis.

Acrostichum æmulum, *Kaulf. Enum. Fil.* p. 63.

Olfersia æmula, *Presl, Tent. Pterid.* p. 235.

HAB. Sandwich Islands: on trunks of trees, and rocks, as high as 8,000 feet above the level of the ocean.

Rootstock creeping, nearly as thick as a goosequill, and closely imbricated with brown *paleaceous scales*. *Stipe smooth*, semiterete, with a single shallow *groove* in front, and a few scattered blunt paleæ near the base, that of the fertile frond about twice the length of the sterile one. Both kinds of fronds are about equal in size: they average from 2 to 8 inches in length, and from 5 to 12 lines in breadth; in outline they are *oblong-lanceolate*, with an *attenuated base*, and a somewhat hardened curved margin. Veins sunk, forked, and parallel.

10. ELAPHOGLOSSUM FEEJEENSE, Sp. Nov.

E. rhizomate brevi crasso repente paleaceo; stipitibus semiteretibus basi paleaceis, fertilibus longioribus; frondibus coriaceis submarginatis utrinque lepidotis, sterili oblongo-lanceolata obtusa basi anguste attenuata, fertili parva oblonga obtusa basi leviter attenuata; venis immersis parallelis furcatis.

HAB. Feejee Islands: on trees; vicinity of Sandal-wood Bay.

Rootstock thick, short, and creeping, densely imbricated with long, slender, reticulated, serrate, light-brown *paleæ*. *Fronds crowded*: *stipe* of the sterile 3 to 5 inches long, that of the fertile more slender, from 10 to 12 inches, smooth, *half round*, slightly margined upwards, and *paleaceous at the base*: the sterile frond about a span long and one inch broad, *oblong-lanceolate, obtuse, much attenuated at the base*, with a partially thickened margin; both surfaces dotted with numerous small, reddish, *peltate scales*, which extend sometimes to the costa and stipe: *fertile fronds smaller, oblong, obtuse, 3 inches long, by 10 lines broad, with a very slightly attenuated base.*

This differs from the preceding species in the obtuse fronds, and in the presence of numerous small peltate scales on both surfaces.

11. ELAPHOGLOSSUM OBTUSIFOLIUM.

E. rhizomate crasso brevi repente paleaceo; stipitibus semiteretibus basi paleaceis; frondibus coriaceis glabris submarginatis obscure lepidotis obovato-oblongis obtusis basi attenuatis, fertili angustiori et stipite longiori; venis immersis parallelis et furcatis.

Acrostichum obtusifolium, Blume, Enum. Plant. Jav. p. 102 (non Willd.).

Olfersia Blumeana, Presl. Tent. Pterid. p. 235.

HAB. Ovolau, Feejee Islands: on rocks and trees, at an altitude of 2,000 feet.

Rootstock short and creeping, shaggy with slender, plane, brown, *paleaceous scales*. *Fertile frond coriaceous, glabrous*, smaller and narrower, and with the *stipe* twice as long as in the sterile one; the latter in both *semiterete*, with a shallow groove in front, and beset with slender brown paleæ at the base. *Veins immersed, parallel, and forked*.

This differs from our *E. Feejeense* in the shorter and broader *obovate-oblong fronds*, which are less attenuated at the base, in the shorter and stouter *stipe*, and in the almost entire absence of peltate scales, which form such a conspicuous feature in that species.

The *Acrostichum obtusifolium* of Willdenow has been referred by Presl to his genus *Gymnopteris*, which has anastomosing veins.

12. ELAPHOGLOSSUM TAHITENSE, Sp. Nov.

E. rhizomate brevi repente paleaceo; stipitibus semiteretibus basi paleaceis, paleis reticulatis anguste linearibus attenuatis; frondibus submarginatis elongato-lanceolatis obtusis basi attenuatis utrinque lepidotis; venis immersis parallelis et furcatis.

HAB. Tahiti, Society Islands: terrestrial, in mountain forests.

All our specimens of this species are rather imperfect. *Stipes* of both kinds of fronds about equal, *half round*, 4 inches long, *paleaceous at the base*. Sterile fronds 14 inches long, 15 lines broad, *with small peltate scales on both sides*: fertile apparently smaller.

In size and habit this is like the *E. gorgoneum*; but it differs from it in the presence of paleæ on the *stipe*, and peltate scales on the surface of the fronds, as well as in the free venules.

13. ELAPHOGLOSSUM LINGUA.

E. rhizomate repente paleaceo; stipitibus elongatis glabris subtetragonis sulcatis; frondibus glabris marginatis ovato-lanceolatis obtusis basi attenuatis; fertili anguste elongato-lanceolata; venis parallelis furcatis.

Acrostichum Lingua, Raddi, Plant. Brasil. p. 5, t. 15, f. 4.

Olfersia Lingua, Presl, Tent. Pterid. p. 235.

HAB. Organ Mountains, Brazil.

Stipes of the sterile and fertile fronds nearly equal in length, that of the fertile a little the longer, rather *slender*, *quadrangular* and *channeled* in front, from 12 to 15 inches in length. Sterile frond about 8 inches long and 3 inches broad; the fertile one narrower; both of them slightly *attenuate at the base*.

In all our specimens of this species, the stipes are longer than in Raddi's figure; but, making due allowance for the effects of local causes, we cannot doubt the identity of the two plants.

14. ELAPHOGLOSSUM GORGONEUM.

Acrostichum gorgoneum, Kaulf. Enum. Fil. p. 63.

Olfersia gorgonea, Presl. Tent. Pterid. p. 235.

HAB. Sandwich Islands: terrestrial, in mountain forests of Kauai.

The point of the fronds of this species is not always obtuse, as described by Kaulfuss, but in many instances acute or shortly acuminate. It may also be remarked, that the apices of the parallel venules are united by a transverse intramarginal vein; in which particular it accords with the genus *Aconiopteris* of Presl: this, however, has excurrent free veinlets, terminating between the junction of the parallel venules and the margin. In our plant, the free marginal veinlets are wanting; and in that respect it resembles the genus *Olfersia* of Raddi; yet with neither of these does it so well agree, as with the genus to which we have here referred it.

27. STENOCHLÆNA, *J. Sm.*

(ACROSTICHI Spec. Auct. LOMARIE Spec. Willd., Kaulf. OLFERSIÆ Spec. Presl.)

The most obvious differences between this genus and *Elaphoglossum* are the scandent habit of the species, and the usually pinnate fronds, the pinnæ articulated with the rhachis.

1. STENOCHLÆNA OLEANDRÆFOLIA, *Sp. Nov.*

S. rhizomate scandente; stipitibus glabris basi teretibus paleaceis; frondibus coriaceis latis pinnatis; pinnis petiolatis, sterilibus late linearilanceolatis acuminatis basi oblique cuneatis margine integerrimis recurvis, fertilibus linearibus elongatis acutis basi rotundatis margine leviter undulatis; rhachi paleacea hirsuta.

HAB. Feejee Islands: ascending the trunks of trees.

Rootstock long and *climbing*, about the thickness of the little finger, and almost entirely concealed by ochraceous, long, slender, submembranaceous paleæ. *Stipes smooth*, about 5 inches long; both kinds about equal, nearly *terete at the base*, with a shallow groove in front towards the base of the frond, and densely covered with long, slender, reflexed and twisted, brown *paleæ*. Both kinds of *fronds* are about equal in size, *broad*, from 15 to 18 inches long, very *coriaceous*, *pinnate*. *Pinnæ* from 12 to 14 in number, about a span long, *petiolate*; the petiole very distinctly articulated with the rhachis: sterile ones 9 lines broad, *linear-lanceolate*, tapering rather suddenly into a short *acuminate point*, the base *obliquely cuneate*; the margin rather *thick and recurved*: *fertile fronds* 3 to 4 lines broad, *long-linear*, *acute*, with a *rounded base* and a somewhat *undulated margin*.

2. STENOCHLÆNA LONGIFOLIA, *J. Sm.*

Stenochlæna longifolia, *J. Sm.* in *Hook. Jour. Bot.* 4, p. 149.

Lomaria longifolia, *Kaulf. Enum. Fil.* p. 152.

HAB. Tutuila, Samoan Islands. Organ Mountains, Brazil.

Rootstock scandent on trees, and imbricated with pale, rigid, linear-lanceolate, attenuate, fimbriated scales; the surface on removal of the scales is rough to the touch. Fronds long, pinnate. Pinnæ sessile, elongated-lanceolate, acuminate, with a rounded cuneate base, the margin repand-dentate, of a darker green on the upper than on the under surface. Veins on the under side prominent, either simple or forked near the costa, and parallel.

The Samoan and Brazilian plants are similar in every respect. In our specimens of both the fertile fronds are in too young a state for satisfactory examination.

3. STENOCHLÆNA VARIABILIS.

S. rhizomate stipitibusque paleaceis; frondibus pinnatis; pinnis alternis brevi-stipitatis, sterilibus glabris supra nitidis lanceolatis acuminatis basi attenuatis, fertilibus linearibus; venis prominentibus simplicibus raro furcatis.

Lomaria variabilis, Willd. Spec. Pl. 5, p. 294; Blume, Enum. Plant. Jav. p. 203?

HAB. Ovolau, Feejee Islands: ascending the trunks of trees.

Rootstock scandent, thick (succulent in a recent state), and imbricated with slender, entire, lanceolate, attenuate, *chaffy scales*, which extend to the lower half of the stipes. *Fronds pinnate*; the sterile much the longer (our fertile specimens are all very young). *Pinnæ* on a short petiole (with the exception of the terminal one, which is sessile), articulated with the rhachis, *lanceolate, acuminate, attenuate at the base*, from 5 to 6 inches long and 10 lines broad, smooth on both surfaces, of a dark green colour and glossy on the upper, with very *prominent, simple, parallel veins, which occasionally fork* near the costa; the margin slightly undulate: *fertile pinnæ* from 6 to 7 inches long, *linear*. Stipe and rhachis smooth, nearly round, with a shallow groove in front.

From *S. longifolia* this is distinguished by the pinnæ of the sterile

fronds being narrower and attenuated at the base, with a more gradual acuminate point.

4. STENOCHLÆNA SCANDENS, *J. Sm.*

S. rhizomate scandente nudo; stipite glabro subtereti; frondibus coriaceis glabris pinnatis; pinnis sterilibus subpetiolatis oblongo-lanceolatis acuminatis basi oblique cuneatis margine spinuloso-serratis; pinnis fertilibus elongato-linearibus margine integris revolutis; venis prominentibus approximatis parallelis.

Stenochlæna scandens, *J. Sm.* in *Hook. Jour. Bot.* 4, p. 149; *Hook. Gen. Fil.* t. 105, B. *Lomaria scandens*, *Willd. Spec. Pl.* 5, p. 293; *Blume, Enum. Pl. Jav.* p. 203.

HAB. Singapore. Rewa, Feejee Islands: on trees.

The climbing rootstock of this species is long and branching, destitute of scales, emitting its rootlets in tufts or bundles. *Stipe naked*, from 10 to 12 inches in length, *nearly round*, with a shallow furrow in front. *Fronde coriaceous*, large and broad; the sterile ones usually the smaller. *Pinnæ* 25 to 30 in number, 4 to 6 inches long, and from 10 to 15 lines broad, with a short, *oblique, cuneate base*, the *petioles very short* and articulated with the rhachis; the margin hard, furnished with sharp teeth; the upper surface shining, with a close *parallel striated venation: fertile pinnæ elongated-linear*, scarcely 2 lines broad, from 8 to 10 inches long, with an entire, reflected, indusiform margin.

5. STENOCHLÆNA HETEROMORPHA, *J. Sm.*

Stenochlæna heteromorpha, *J. Sm.* in *Hook. Jour. Bot.* 4, p. 149. *Lomaria filiformis*, *A. Cunn.* in *Hook. Comp. Bot. Mag.* 2, p. 363.

HAB. Vicinity of the Bay of Islands, New Zealand; frequent.

This is a very distinct species, and interesting as regards its mode of growth. The creeping rootstock (which is at first slender, but increases in thickness towards the point, and is often branched),

ascends the trunks of trees to a height of 20 or 30 feet, clinging to the bark by means of its wiry pilose rootlets, and producing, from the ground upwards, numerous small sterile fronds, and at the points, a tuft of fertile ones, 3 to 5 in number. These fertile fronds are usually about half the length of the sterile ones immediately surrounding them, and both kinds are pinnate. Pinnæ seated on a short petiole, lanceolate, with an attenuate apex, truncate-cordate at the base, and serrulate on the margin: fertile ones long-linear; the sori becoming confluent and concealing the whole under surface.

6. STENOCHLÆNA FEEJEENSIS, Sp. Nov. (Tab. 11.)

S. rhizomate scandente nigro squamoso-hirsuto; stipite brevi tereti squamoso; frondibus membranaceis lanceolatis pinnatis; pinnis subalternis petiolatis ovato-oblongis obtusis serratis; rhachi pubescente.

HAB. Sandalwood Bay, Feejee Islands: on trees.

Habit and aspect of the plant a good deal like the preceding, but much smaller in all its parts. Stipe about one inch long. Pinnæ 8 lines long, by 3 lines broad, seated on a short articulated petiole, the margin deeply and rather irregularly serrated. Fertile frond not seen.

PLATE 11.—Fig. 1. Portion of a plant, natural size. 1 a. Pinna, to show the venation. 1 b. Scale from the rhizoma.—Magnified.

28. POLYBOTRYA, H. B. K., Kaulf.

(ACROSTICHI Spec. Sw. RHIPIDOPTERIS, Schott.)

1. POLYBOTRYA EXALTATA, Sp. Nov.

P. stipite semitereto sulcato squamoso-hirsuto; frondibus pinnatis apice radicantibus; pinnis sterilibus subpetiolatis oblongo-lanceolatis basi truncato-auriculatis margine serrulatis; pinnis fertilibus oblongis v. ovato-oblongis margine integris revolutis subtus sporangiferis; rhachi squamosa marginata.

HAB. Mount Maquiling, near Baños, Luzon, Philippine Islands.

Both kinds of *fronds* are *pinnate*, and about equal in height; the sterile one with a *squamose rhachis*, the upper half of which has a narrow *marginal wing*, and *rooting at the apex*. *Pinnæ* alternate, horizontal, 2 to 2½ inches long and 6 lines broad, *oblong-lanceolate*, with an irregularly *serrate margin*; the base *truncate* and slightly *auriculate*; the *stipe* slender, about 6 inches long, *sulcate* and sparsely *squamose-hirsute*. *Fertile fronds* shorter and narrower, with a *stipe* one foot in length: *pinnæ* 6 to 8 lines long, *oblong or ovate-oblong*, the *margin recurved* and entire.

Allied to *Polybotrya marginata* of Blume. The whole habit of the plant is somewhat that of many species of *Nephrolepis*.

2. POLYBOTRYA MARATTIOIDES, Sp. Nov.

P. rhizomate scandente; stipite angulari rufo-squamoso; frondibus membranaceis glabris impari-pinnatis; pinnis suboppositis sessilibus oblongo-lanceolatis acuminatis serratis basi oblique cuneatis; rhachi squamosa marginata.

HAB. Island of Savaii, Samoan Group.

Rootstock smooth, long, and *climbing*. *Stipe* angular, from 10 to 12 inches in length, with numerous small, appressed, peltate, *reddish scales* on its surface. The *fronds* are *membranaceous, glabrous, impari-pinnate*, with from 6 to 8 pairs of *pinnæ*; which are *nearly opposite, sessile, spreading, oblong-lanceolate* and slightly *acuminate*, deeply *serrated* towards the point, from 4 to 5 inches long, and 10 to 12 lines broad, with an *oblique cuneate base*. *Rhachis margined*, and together with the costa sparsely *squamose*. Veins slender, parallel, simple or sometimes forking close to the costa. (Fertile fronds wanting.)

This is distinct from the preceding species, in its shorter and broader frond, with fewer and larger, deeply serrate pinnæ, which are not articulated with the rhachis. The pinnæ very much resemble in their outline, some states of the pinnules of *Marattia fraxinea*; the

nature of the venation and texture of the fronds are also not very dissimilar in the two plants.

3. POLYBOTRYA OSMUNDACEA, H. B. K.

Folybotrya osmundacea, H. B. K. Nov. Gen. & Spec. 1, p. 28, t. 2; Willd. Spec. Pl. 5, p. 99; Kaulf. Enum. Fil. p. 56; Hook. Gen. Fil. t. 78, B.

HAB. Organ Mountains, and Corcovado, near Rio Janeiro, Brazil.

Specimens of this from the vicinity of Rio have the rhachis, costa, and veins sparsely pilose underneath; while in those from the Organ Mountains the hairs are confined to the rhachis and costa.

4. POLYBOTRYA WILKESIANA, Sp. Nov. (Tab. 10.)

P. rhizomate scandente; stipite semitereti superne sulcato vix piloso, frondibus glabris bipinnatis; pinnis oblongo-lanceolatis; pinnulis sterilibus submembranaceis sessilibus lanceolatis margine serratis basi oblique cuneatis integris, fertilibus minoribus subpetiolatis linearibus obtusis subtus sporangiferis; rhachi squamoso-hirsuta.

Sterile and fertile *fronds bipinnate*, about equal in size, 2 to 2½ feet long, exclusive of the *stipe*, which is smooth, somewhat angular, *sulcate in front* and of a pale straw colour; the fertile one stout and sparsely pilose. *Pinnæ* on both subalternate, *oblong-lanceolate*, articulate with the rhachis, rather distant and spreading; the rhachis of the sterile with a narrow margin; that of the fertile together with the main *rhachis, squamose-hirsute*. *Pinnules* 8 lines long; sterile one *sessile*, 2½ lines broad, *lanceolate* and *serrate*, with an *oblique wedge-shaped base*; the fertile smaller, *linear, obtuse*, entire, and *petiolate*, petiole compressed, the margin slightly reflexed, entire, and *sporangiferous* beneath. *Rootstock climbing*.

We are not acquainted with any species to which this is closely allied.

PLATE 10.—Fig. 1. 1. Fronds, of the natural size. 1 *a*. Fertile pinnule. 1 *b*. Sterile pinnule. 1 *c*. Scales, from the rhachis. 1 *d*. Sporangium.—Magnified.

29. OLFERSIA, *Raddi*.1. OLFERSIA CORCOVADENSIS, *Raddi*.

O. stipitibus glabris sulcatis; frondibus pinnatis; pinnis alternis, sterilibus subsessilibus ovato-lanceolatis acuminatis integris apice falcatis, fertilibus linearibus brevi-petiolatis.

Olfersia Corcovadensis, Raddi, Plant. Brasil. p. 7, t. 14; Gaud. Bot. Freyc. Voy. p. 308; Hook. Gen. Fil. t. 79 (opt.).

HAB. Corcovado, Rio Janeiro, Brazil: on trees.

Stipes of both kinds of fronds long, *smooth*, shining, semiterete, and *channeled* in front. Sterile fronds glabrous, impari-pinnate. *Pinnæ* alternate, *sessile*, *ovate-lanceolate*, *acuminate* and *falcate* at the apex, with an obliquely cuneate base and slightly repand-crenate margin. *Fertile* pinnæ contracted, *linear*, attenuated, and seated on a short *petiole*.

30. ACROSTICHUM, *Presl*.

(ACROSTICHI Spec. Linn. & Auct.)

1. ACROSTICHUM RETICULATUM, *Kaulf*.

A. rhizomate crasso repente dense paleaceo; stipitibus sulcatis basi paleaceis, fertili longiore; frondibus coriaceis oblongo-lanceolatis obtusis submarginatis basi attenuatis.

Acrostichum reticulatum, Kaulf. Enum. Fil. p. 64.

HAB. Sandwich Islands; frequent and usually terrestrial.

Rootstock short, *thick*, *creeping*, and densely *paleaceous*; the paleæ oblong, attenuate, and fimbriated. *Stipes* firm, smooth, and semi-

terete, with a single groove in front, and from 3 to 5 inches in length, *sparsely paleaceous at the base; the fertile one longer*. Sterile and fertile *fronds* usually about the same size, from 4 to 5 inches long, smooth, very *coriaceous, oblong-lanceolate, obtuse, attenuate* at the base, with a thickened entire margin.

2. ACROSTICHUM AUREUM, *Linn.*

Acrostichum aureum, Linn. ex Willd. Spec. Pl. 5, p. 116; Kaulf. Enum. Fil. p. 65; Gaud. Bot. Freyc. Voy. p. 305; Hook. & Arn. Bot. Beech. Voy. p. 73.

HAB. Tahiti, Society Islands. Samoan and Feejee Islands. Tongatabu. Luzon, Philippine Islands: in marshy grounds; frequent.

Among our numerous specimens from all the localities above-cited, we find forms or states of *A. aureum*, Linn., from the same place, and even from the same plant, to which the descriptions of *A. speciosum* and *A. inaequale* of Willdenow apply in almost every particular; and, although we have not authentic specimens of these species for comparison, we have strong doubts whether they are distinct, although Blume and Presl have retained them. Farther, we question very much whether the *A. danææfolium* of Langsdorff and Fischer ought not to be referred here also?

3. ACROSTICHUM DANÆÆFOLIUM, *Langsd. & Fisch.*

Acrostichum danææfolium, Langsd. & Fisch. Ic. Fil. p. 5, t. 1; Willd. Spec. Pl. 5, p. 118; Kaulf. Enum. Fil. p. 64.

HAB. Vicinity of Rio Janeiro and near Estrella, Brazil: in marshes; frequent.

31. LOMAGRAMMA, *J. Sm.*

The author of this genus founded it upon a solitary species from the Philippine Islands; and it is with much satisfaction that we are enabled to extend its geographical range, and to add what we con-

sider to be a second species. In the general habit of *Lomagramma*, and in the articulation of the pinnæ with the rhachis, it resembles *Stenochlæna*; from which, however, it is distinguished by a reticulated venation, and in the fertile pinnæ being destitute of an indusium, bearing the sporangia "on the marginal portion" of their disk.

1. LOMAGRAMMA PTEROIDES, *J. Sm.*

L. rhizomate scandente; stipitibus sulcatis paleaceis; frondibus pinnatis; pinnis sterilibus alternis sessilibus linearilanceolatis acuminatis apice repando-dentatis basi obtusis, fertilibus contractis linearibus attenuatis basi subauriculatis; rhachi costaque sparsim paleaceis.

Lomagramma pteroides, *J. Sm.* in *Hook. Jour. Bot.* p. 152.

HAB. Vicinity of Pago-pago Bay, Island of Tutuila, Samoan Group: on trees.

Rootstock scandent, stout, and, with the *sulcate stipes* of both kinds of fronds *paleaceous*; the paleæ of a dark brown colour, long, slender, and reticulated. *Sterile frond* a little the longer, *pinnate*; pinnæ 6 inches long and an inch broad, *sessile*, *alternate*, smooth on both sides, subcoriaceous, *linear-lanceolate*, with a slightly *acuminate*, *repand-dentate* point, and an obtuse or rounded base; the *costa* on the under side *sparsely paleaceous*. *Fertile pinnæ* from 4 to 6 inches long, *contracted*, and seated on a very short petiole, *linear-attenuate*, and slightly *flexuose*, with a dilated *subauriculate* base. Sori continuing the whole length of the pinnæ.

2. LOMAGRAMMA? POLYPHYLLA, *Sp. Nov.* (Tab. 12.)

L. rhizomate scandente; stipitibus sulcatis furfuraceo-squamosis; frondibus bipinnatis; pinnis petiolatis alternis; rhachi marginata paleaceo-hirsuta; pinnulis glabris approximatis subalternis sessilibus oblongo-lanceolatis crenatis; costis sparsim paleaceis.

HAB. Ovolau, Feejee Islands: on trunks of trees.

Stipes thick and of a pale straw colour, about 8 inches long, with a few brown *furfuraceous scales*, which extend to the rhachis. Sterile fronds *bipinnate*, large, 2 to 3 feet long. *Pinnules* numerous, *approximate*, *glabrous*, *subalternate*, *sessile*, about one inch long and 3 to 4 lines broad, *oblong-lanceolate*, the margin irregularly *crenate*. Rhachis of the pinnæ with two broad marginal lines in front (a character not well represented in the figure), beset with slender fugacious paleæ. Fertile fronds wanting.

In the absence of the fertile fronds we infer from the habit of the sterile ones, with their articulated pinnæ and uniform reticulated venation, that our plant belongs to the present genus.

PLATE 12.—Fig. 1. A pinna, showing its articulation with the rhachis, of the natural size. 1 *a*. Under side of a pinnule. 1 *b*. Scales from the rhachis beneath.—Magnified.

32. PLATYCERIUM, *Desv.*

(ACROSTICHI Spec. Sw. & Auct.)

1. PLATYCERIUM ALCICORNE, *Desv.*

Platycerium alcicorne, Desv. ex Presl, Tent. Pterid. p. 240, t. 10, f. 12.
Acrostichum alcicorne, Sw. Syn. Fil. p. 12 & 196; Willd. Spec. Pl. 5, p. 111; R. Br. Prodr. Fl. Nov. Holl. p. 145.

HAB. Illawarra and Hunter's River, New South Wales.

2. PLATYCERIUM BIFORME, *Blume.*

Platycerium biforme, Blume, ex Presl, Tent. Pterid. p. 240; Hook. Gen. Fil. t. 80, B.
Acrostichum biforme, Sw. Syn. Fil. p. 12; Willd. Spec. Pl. 5, p. 111; Blume, Enum. Pl. Jav. p. 103.

HAB. Island of Singapore: on trees.

The fronds of this in our possession are very large, but without fructification. They resemble very much the *Platycterium* (*Acrostichum*) *grande* of A. Cunningham, a native of Moreton Bay; which we saw in a cultivated state at Sydney, New South Wales, and which is well represented in the Narrative of the Expedition, Vol. II., p. 181.

33. CYRTOGONIUM, *J. Sm.*

(ACROSTICHI Spec. Auct. CAMPIUM, Presl. PÆCILOPTERIS, Presl. JENKINSIA, Hook.)

1. CYRTOGONIUM RIVULARE, Sp. Nov. (Tab. 11.)

C. rhizomate repente; stipitibus angularibus paleaceis; frondibus membranaceis glabris oblongis attenuatis basi pinnatis versus apicem sinuato-pinnatifidis, fertilibus minoribus; pinnis integris oblongo-lanceolatis vel ovatis obtusis subfalcatis apice proliferis.

HAB. Ovolau, Feejee Islands: banks of streams, on wet rocks, in shady places.

Rootstock creeping, about the thickness of a goosequill, and paleaceous; the paleæ reticulate, ovate-oblong, attenuate, dentate. Stipes angular, slightly furrowed, 4 to 5 inches long; that of the fertile frond 12 to 14 inches long, and, together with the rhachis, bearing slender rufous paleæ. Sterile fronds 8 to 10 inches long, smooth and membranaceous, oblong, attenuated, the base pinnate, towards the apex sinuato-pinnatifid, the latter with the obtuse points of the pinnæ proliferous. Fertile fronds small, not exceeding 4 inches in length, with the points of the pinnæ oblong-lanceolate or ovate, more rounded than in the sterile ones. Sporangia of a pale straw-colour, concealing the whole of the under surface.

PLATE 11.—Fig. 2. Plant, of the natural size. 2 a. A scale from the stipe. 2 b, b. Sporangia.—Magnified.

2. CYRTOGONIUM ACUMINATUM, Sp. Nov.

C. rhizomate scandente; stipitibus glabris superne sulcatis; frondibus coriaceis pinnatis; pinnis paucis distantibus subpetiolatis alternis oblongo-lanceolatis caudato-acuminatis margine repando-dentatis, terminali longiore infra apicem prolifero.

HAB. Mountain forests, near Baños, Luzon, Philippine Islands: on trees.

Rootstock long, climbing, squamose. *Stipes* 5 to 8 inches in length; that of the fertile frond a little the longer, glabrous, angular at the base, sulcate upwards. Sterile fronds a little over a foot in length, pinnate. Pinnæ 6 to 8 in number, alternate, the terminal one the largest, oblong-lanceolate, caudate-acuminate, with a proliferous bud on the rhachis near the point; margin repand-dentate. Fertile frond rather the smaller, with 4 or 5 pinnæ; these have less of the tail-like point peculiar to the sterile ones; the rhachis in both slightly margined.

3. CYRTOGONIUM PALUSTRE, Sp. Nov. (Tab. 12.)

C. terrestre; stipitibus semiteretibus sulcatis parce paleaceis; frondibus membranaceis glabris pinnatis apice sinuato proliferis; pinnis oblongo-lanceolatis pinnatifidis acuminatis basi oblique cuneatis, laciniis oblongis crenato-denticulatis, fertilibus minoribus oblongo-lanceolatis petiolatis integris.

HAB. Tahiti, Society Islands: in marshy grounds near the coast.

Stipes from 10 to 12 inches in length, half round, with 2 to 3 shallow grooves in front, densely paleaceous at the base, towards the summit less so; the paleæ oblong, acuminate, reticulate, with a ragged dentate margin. Sterile fronds deltoid-oblong, acuminate, rooting at the apex, smooth, rather membranaceous, pinnate at the base, sinuate-pinnatifid towards the point. Inferior pinnæ 4 to 5 inches long and an inch broad, subpetiolate, nearly opposite, oblong-lanceolate, acumi-

nate, *pinnatifid*, with an *oblique cuneate* base; the middle ones adnate and decurrent; while those toward the point are confluent, entire, subfalcate and obtuse. *Segments oblong* or triangular-ovate, the margin denticulate, with a single stiff hair seated at the base of the sinus. *Fertile fronds narrower*, with from 14 to 16 pinnæ: these are distant, a little over an inch long (the terminal one the largest), 4 to 6 lines broad, obtuse, with a crenate margin. Veins prominent on both sides, the anastomosing venules slender.

In the division of the fronds and the form of the pinnæ, this species is related to *Gymnopteris aliena* of Presl, from which however it differs in the absence of free venules in the meshes. It is more closely allied, perhaps, to *Acrostichum Quoyanum* of Gaudichaud, yet from this it is sufficiently distinct.

PLATE 12.—Fig. 2, 2. Sterile and fertile fronds, of the natural size. 2 *a.* Cross section of the stipe. 2 *b.* Scale, from the stipe. 2 *c, c.* Sporangia.—Magnified.

4. CYRTOGONIUM SCANDENS, *J. Sm.*

Cyrtogonium scandens, *J. Sm.* in *Hook. Jour. of Bot.* 4, p. 154.

Acrostichum scandens, *Raddi, Plant. Brasil.* p. 6, t. 18.

HAB. Estrella Pass, Organ Mountains, Brazil.

The figure of *Raddi*, quoted above, though smaller than our specimens, is a tolerably good representation of the species. *Raddi* also, with a doubt, quotes as a synonyme the *Acrostichum fraxinifolium* of *Presl*; but that is indeed a very distinct plant, both in habit and character of its venation.

5. CYRTOGONIUM SERRATIFOLIUM, *J. Sm.*

Cyrtogonium serratifolium, *J. Sm.* in *Hook. Jour. Bot.* 4, p. 154.

Acrostichum serratifolium, *Mert. ex Kaulf. Enum. Fil.* p. 66.

Pæcilopteris fraxinifolia, *Presl.*; *Hook. Gen. Fil.* t. 81, B.

HAB. Vicinity of Rio Janeiro, Brazil.

34. PHOTINOPTERIS, *J. Sm.*1. PHOTINOPTERIS HORSFIELDII, *J. Sm.*

Photinopteris Horsfieldii, *J. Sm.* in *Hook. Jour. Bot.* 4, p. 155; *Hook. Gen. Fil.* t. 92.

HAB. Mountains near Baños, Luzon, Philippine Islands: on trees.

The rigid, coriaceous, very peculiar and striking aspect which the sterile part of this Fern presents, is not unlike some species of the genus *Ficus*. We were not fortunate enough, during a short excursion into the interior of Luzon, to detect the fertile fronds.

35. GYMNOPTERIS, *Presl.*

ACROSTICHI *Spec. Linn., Sw. & Auct.* GYMNOPTERIDIS *Spec. Bernh.* LOMARIÆ, *Spec. Willd.* HYMENOLEPIS & LEPTOCHILUS, *Kaulf.*)

Presl, in his *Tentamen Pteridographiæ*, in defining this genus, divides the species into two groups, viz.: “§ I. GYMNOPTERIS.—*Frons apice fertilis aut frondes dissimiles. Venæ internæ aut prominulæ. Venulæ in maculas hexaganoideas anastomosantes.*” Under this section he enumerates *G. spicata* and five other species. “§ II. ANAPAUSIA. *Frondes dissimiles, coriaceæ aut herbaceæ. Venæ internæ aut elevatæ costæformes. Venulæ in maculas transversim et irregulariter parallelogrammas lateribus curvatis anastomosantes.*” To this last section belong the *G. latifolia* and *nicotianæfolia*, with other two allied species.

1. GYMNOPTERIS SPICATA, *Presl.*

Gymnopteris spicata, *Presl, Tent. Pterid.* p. 244.

Lomaria spicata, *Willd. Spec. Pl.* 5, p. 289.

Hymenolepis ophioglossoides, *Kaulf. Enum. Fil.* p. 146, t. 1, f. 9; *Blume, Enum. Pl. Jav.* p. 200.

TRIBE III. PTERIDEÆ, J. SM.

36. HYPOLEPIS, *Bernh., Presl.*1. HYPOLEPIS TENUIFOLIA, *Bernh.*

H. rhizomate subgloboso; frondibus amplis tri-quadripinnatis, laciniis oblongis obtusis, inferioribus subpinnatifidis, superioribus coadunatis; rhachi pilosa; soris parvis; indusiis oblongis subreniformibus.

Hypolepis tenuifolia, Bernh. ex Presl, Tent. Pterid. p. 162, t. 6, f. 24.

Cheilanthes arborescens, Sw. Syn. Fil. p. 139, t. 336; Willd. Spec. Pl. 5, p. 462.

HAB. Tutuila, Samoan Group.

Fronde very large, from 3 to 5 feet high, from a globular rootstock, somewhat rigid, 3 to 4 times divided, with broad spreading pinnæ. Pinnules pinnate at the base, pinnatifid towards the point: segments linear-oblong, obtuse, dentate-serrate; the inferior ones pinnatifid, and bearing on their margin from 2 to 6 or sometimes even 8 small sori. *Rhachis* of the primary and secondary divisions rufous-pilose on both sides, and sulcate on the upper one. *Indusia* oblong, somewhat reniform.

There is little doubt of this being the *Cheilanthes arborescens* of Swartz (*Lonchitis tenuifolia*, Forst.); but we are at a loss to know what could have induced both Forster and Swartz to describe the plant as arborescent.

2. HYPOLEPIS DISSECTA.

H. rhizomate repente; frondibus amplis tri-quadripinnatis, laciniis lineari-oblongis obtusis subtus pubescentibus, inferioribus subpinnatifidis, superioribus coadunatis; stipitibus rhachibusque leviter rufopubescentibus; soris parvis solitariis.

Cheilanthes dissecta, Hook. & Arn. Bot. of Beech. Voy. p. 75.

HAB. Tahiti, Society Islands : in mountain forests.

Rootstock creeping. Stipes thick and angular, smooth, with a short brown pubescence in front. *Fronde large, 3 to 4 times pinnately divided.* Pinnules pinnate at the base, pinnatifid towards the point; the inferior segments *lobate-pinnatifid, pubescent underneath.* *Primary and secondary rhachis rufous-pubescent.* *Sori solitary, small, from 2 to 4 on a segment, with a pale, semilunate, scarious indusium.*

That there is a difference between this and the *H. tenuifolia* is very obvious at first sight, although not so easily pointed out in words. In the present species, the whole of the divisions of its fronds are more distant; the hairs on the rhachis of a downy character; the sori fewer, more distant, and smaller; and the pale indusia more lunate than in *H. tenuifolia*.

3. HYPOLEPIS RUGULOSA, Hook.

Hypolepis rugulosa, Hook. Spec., Fil 2, p. 68.

HAB. Tahiti, Society Islands.

The fronds of this species are large and tripinnate, with a dark brown, glossy, slightly scabrous, flexuose rhachis; the divisions alternate and divaricate; the ultimate ones from 2 to 4 lines long and 1½ lines broad, with incised, obtuse, recurved lobes, which are smooth on both sides. Sori few, 2 to 4 on a segment, with a half round, membranaceous indusium.

We possess only a portion of a frond of this species, and that in a very young state. It is very distinct, and readily distinguished from either of the two preceding species, by its flexuose rhachis, and the almost total absence of hair or down.

37. CHEILANTHES, Sw., Presl.

(NOTHOLÆNÆ Spec. J. Sm. CASSEBEERÆ Spec. Auct.)

The genus *Cassebeera*, as restricted by Kaulfuss and Presl, appears to us a very natural one, on account of the geminate sori and the peculiar habit of the few species which it embraces. Mr. J. Smith has framed the technical character of *Cassebeera* so as to include several species of *Cheilanthes* and *Pteris* of authors; nearly all of which we restore to their original genera, where, as regards both their habit and the character of their sori, they appear to us to belong, rather than to the *Cassebeera* of Kaulfuss.

1. CHEILANTHES VESTITA, Sw.

Cheilanthes vestita, Sw. Syn. Fil. p. 128; Willd. Spec. Pl. 5, p. 458; Hook. Fl. Bor. Amer. 2, p. 264.

HAB. Banks of Spipen River, Oregon. Butes, in the valley of the Sacramento River, California: in rocky situations.

2. CHEILANTHES AMBIGUA, A. Rich.?

C. frondibus bipinnatis; laciniis oblongis sessilibus subobtusis incisedentatis revolutis; soris subrotundis interruptis vel lateralibus confluentibus nudis, rhachibus costis et laciniis paleaceo-hirsutis.

Cheilanthes ambigua, A. Rich. Bot. Voy. Astrol. p. 84; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 366.

HAB. Vicinity of the Bay of Islands, New Zealand.

Rootstock short and creeping. *Fronde*s tufted, about a span high, *bipinnate*, with short paleaceous stipes. Pinnæ opposite and sessile, not exceeding half an inch in length, the 2 or 3 inferior pairs distant.

The *segments sessile, oblong, somewhat obtuse, dentate, and, together with the rhachis and costa, hirsute with slender paleæ and hairs, of a light brown colour. Sori round or oblong, laterally becoming confluent, forming a slightly interrupted broad sorus, partially concealed by the indusium, which consists of the scarcely changed, revolute, dentate margin.*

In the nature of its broad sorus this has a strong affinity with some species of *Platyloma* of Mr. J. Smith.

3. CHEILANTHES TENUIFOLIA, Sw.

Cheilanthes tenuifolia, Sw. Syn. Fil. p. 129 & 332; Willd. Spec. Pl. 5, p. 460; R. Br. Prodr. Fl. Nov. Holl. p. 155; Kaulf. Enum. Fil. p. 214; Blume, Enum. Pl. Jav. p. 137; A. Rich. in Bot. Voy. Astrol. p. 83; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 366; Hook. Spec. Fil. 2, p. 82, t. 87, C.

HAB. Hunter's River, and vicinity of Sydney, New South Wales. Vicinity of the Bay of Islands, New Zealand: in rocky places.

4. CHEILANTHES LENTIGERA, Sw.

Cheilanthes lentigera, Sw. Syn. Fil. p. 128 & 328; Willd. Spec. Pl. 5, p. 460.

HAB. Vicinity of Obrajillo, Peru.

5. CHEILANTHES SPECTABILIS, Kaulf.

Cheilanthes spectabilis, Kaulf. Enum. Fil. p. 214.
C. Brasiliensis, Raddi, Plant. Brasil. p. 60, t. 75, f. 2.
Hypolepis coniiifolia, Presl, Tent. Pterid. p. 162; Hook. Spec. Fil. 2, p. 73, f. 88, B.

HAB. Organ Mountains, Brazil.

Whole plant from 3 to 5 feet in height, with a black shining stipe, which, together with the main rhachis, is slightly margined. Fronds broadly lanceolate, attenuate, and tripinnate; the primary divisions

alternate. Pinnules adnate or sessile, deltoid-oblong, crenate, and smooth on both sides. Sori punctiform and becoming confluent. Indusium membranaceous and dentate.

6. CHEILANTHES RADIATA, *J. Sm.*

Cheilanthes radiata, *J. Sm.* in *Hook. Jour. of Bot.* 4, p. 159.

Adiantum radiatum, *Linn. ex Sw. Syn. Fil.* p. 121; *Willd. Spec. Pl.* 5, p. 437; *Kaulf. Enum. Fil.* p. 303.

HAB. Vicinity of Rio Janeiro, Brazil.

38. PLATYLOMA, *J. Sm.*

(PTERIDIS *Spec. Auct.* ALLOSORI *Spec. Presl.*)

1. PLATYLOMA ROTUNDIFOLIA, *J. Sm.*

P. rhizomate repente; frondibus pinnatis; pinnis alternis ovatis ellipticisve breviter petiolatis integris apice subito acuminatis.

Platyloma rotundifolia, *J. Sm.* in *Hook. Jour. Bot.* 4, p. 160, sine char.

Pteris rotundifolia, *Forst. Prodr. Fl. Ins. Austr.* p. 79; *Willd. Spec. Pl.* 5, p. 363;

A. Rich. Bot. Voy. Astrol. p. 78; *A. Cunn. in Hook, Comp. Bot. Mag.* 2, p. 365.

HAB. Port Jackson and Illawarra, New South Wales. Vicinity of the Bay of Islands, New Zealand: frequent.

Rootstock creeping, above ground squamose. Stipes terete, squamose-hispid. *Fronde pinnate*, erect: *pinnæ alternate*, articulated on a short petiole, *ovate or elliptical-oblong*, about 6 inches in length and from 3 to 4 lines broad, with a short and *abruptly acuminated point*; the margin entire and slightly crenate.

2. PLATYLOMA BROWNI, *J. Sm.*

Platyloma Brownii, *J. Sm.* in *Hook. Gen. Fil.* t. 115, A.

Adiantum paradoxum, *R. Br. Prodr. Fl. Nov. Holl.* p. 155.

HAB. Near Port Jackson and Hunter's River, New South Wales.

Plant similar in habit to the preceding species, but of a much larger size, and with oblong, linear-lanceolate, subfalcate pinnæ.

3. PLATYLOMA TERNIFOLIA.

Pteris subverticillata, Sw. Syn. Fil. p. 103; Willd. Spec. Pl. 5, p. 375.

P. ternifolia, Cav.; Hook. & Grev. Ic. Fil. t. 126 (opt.).

HAB. Baños, Andes of Peru. Sandwich Islands: frequent on mountains.

At the Sandwich Islands, where our finest specimens were procured, this beautiful species was found inhabiting arid and exposed situations, growing among decomposed lava, and there forming tufts 6 to 10 inches in diameter. In ascending Mouna Loa and Mouna Kea, it was observed in great luxuriance at an elevation of 8,000 feet.

4. PLATYLOMA ANDROMEDÆFOLIA, *J. Sm.*

Platyloma andromedæfolia, *J. Sm.* in Hook. Jour. Bot. 4, p. 160.

Pteris andromedæfolia, Kaulf. Enum. Fil. p. 188; Hook. & Arn. Bot. Beech. Voy. p. 406.

HAB. Hills in the vicinity of the Bay of San Francisco, California.

39. ADIANTUM, *Linn., J. Sm.*

* *Frondes simplices.*

1. ADIANTUM RENIFORME, *Linn.*

Adiantum reniforme, Sw. Syn. Fil. p. 120; Willd. Spec. Pl. 5, p. 427; Kaulf. Enum. Fil. p. 199; Hook. Spec. Fil. 2, p. 2, t. 71, A.

HAB. Island of Madeira: in woods and fissures of rocks, in the vicinity of Santa Anna.

Kaulfuss refers to this the *A. asarifolium* of Willdenow, which is a native of the Isle of Bourbon.

* * *Frondes pinnatifidæ.*

2. ADIANTUM LUNULATUM, *Burm.*

A. frondibus pinnatis; pinnis petiolatis quasi dimidiatis oblongo-lunulatis obtusis margine superiori repando-dentatis basi oblique cuneatis; soris linearibus interruptis.

Adiantum lunulatum, *Burm.* in *Willd. Spec. Pl. 5*, p. 430; *Kaulf. Enum. Fil. p. 205*; *Don, Prodr. Flor. Nepal. p. 16*; *Hook. & Grev. Ic. Fil. t. 104.*

HAB. Samoan and Feejee Islands. Luzon, Philippine Islands.

In our Samoan specimens the fronds are young and without fructification, terminating in a filiform, naked rhachis, which extends 2 or 3 inches beyond where the pinnæ cease, and roots at the point; a character already noticed by Kaulfuss.

3. ADIANTUM CAUDATUM, *Linn.*

A. frondibus lineari-oblongis pinnatis; pinnis alternis oblongis obtusis dimidiatis utrinque hirsutis margine superiori incisiss basi truncato-cuneatis; rhachi hirsuta apice producto nudo radicante; soris oblongis; indusio piloso.

Adiantum caudatum, *Linn.*; *Sw. Syn. Fil. p. 122*; *Willd. Spec. Pl. 5*, p. 431; *Kaulf. Enum. Fil. p. 201.*

HAB. Vicinity of Baños, Luzon, Philippine Islands.

Plant forming dense patches. *Fronde* linear-oblong and pinnate, with a stipe about an inch long; the *rhachis* lengthened into a naked filiform point, which throws out roots at its extremity, and ultimately produces a young plant. *Pinnæ* half an inch long, alternate, oblong, obtuse, dimidiate; superior base truncate-cuneate; upper margin deeply

incised; the apices of the segments emarginate, bearing *oblong sori*. *Indusium hairy*. Whole plant furnished with articulated fulvous hairs.

* * * *Frondes bi-tripinnatifidæ*.

4. ADIANTUM OBTUSUM, *Desv.*

Adiantum obtusum, Hook. & Grev. Ic. Fil. t. 188 (opt.); Hook. Spec. Fil. 2, p. 19.

HAB. Brazil: in woods, on the Corcovado, Rio Janeiro, and Organ Mountains.

This does not in any way differ from the plant figured in the Icones Filicum, which is said to have been received from the Island of Trinidad. May not the *Pteris adiantoides* of the Flora Fluminensis, 11, t. 88, be an indifferently executed figure of this species?

5. ADIANTUM CAPILLUS VENERIS, *Linn.*

Adiantum Capillus Veneris, Linn.; ex Willd. Spec. Pl. 5, p. 449; Gaud. Bot. Freyc. Voy. p. 404.

HAB. Island of Madeira. Sandwich Islands: in fissures of moist rocks. Sea-coast near Hilo, island of Hawaii. Valley of Nuuanu, island of Oahu: on the banks of streams.

Gaudichaud also detected this species at the Sandwich Islands. We have made a careful comparison of specimens from the latter country with those of the *A. Capillus Veneris* collected by us on the Island of Madeira, and find the two to be in every respect alike; which is farther evidence of the great geographical range of some species of Ferns.

6. ADIANTUM SCABRUM, *Kaulf.*

Adiantum scabrum, Kaulf. Enum. Fil. p. 207; Hook. & Arn. Bot. Beech. Voy. p. 53.

HAB. Vicinity of Valparaiso, Chili; frequent.

In all our specimens of this the fronds are bipinnate, with orbicular-reniform and dentate pinnules, hairy on both sides.

7. ADIANTUM CHILENSE, *Kaulf.*

A. stipite lævi nitente; frondibus bi-tripinnatis; pinnulis petiolulatis rigidiusculis subreniformi-cuneatis crenatis; indusiis transversim oblongis approximatis.

Var. α . GLABRA: *frondibus omnino glabris.*

Adiantum Chilense, Kaulf. Enum. Fil. p. 207; Hook. & Arn. Bot. Beech. Voy. p. 53.

Var. β . HIRSUTA: *venis pinnularum utrinque parce pilosis.*

A. Chilense, β . hirsuta, Hook. & Grev. Ic. Fil. t. 173; Hook. Spec. Fil. 2, p. 43.

HAB. α . California, vicinity of Monterey and valley of the Sacramento. β . Chili, near Casa Blanca and Valparaiso.

The only difference between the Chilian and Californian plant consists in the presence of sparse whitish hairs on both sides of the pinnules of the former: these hairs arise from the veins, and are usually more numerous on the upper than the under surface.

8. ADIANTUM CUNEATUM, *Langsd. & Fisch.*

Adiantum cuneatum, Langsd. & Fisch. Ic. Fil. p. 23; Willd. Spec. Pl. 5, p. 450; Raddi, Plant. Brasil. p. 59, t. 78, f. 2; Kaulf. Enum. Fil. p. 206; Hook. & Grev. Ic. Fil. t. 30; Gaud. Bot. Freyc. Voy. p. 404; Hook. & Arn. Bot. Beech. Voy. p. 53.

HAB. Brazil: vicinity of Rio Janeiro, and in the Organ Mountains. Peru, near Obrajillo?

9. ADIANTUM ASSIMILE, *Sw.*

Adiantum assimile, Sw. Syn. Fil. p. 125 & 323, t. 3, f. 4; Willd. Spec. Pl. 5, p. 453; R. Br. Prodr. Fl. Nov. Holl. p. 155; Gaud. Bot. Freyc. Voy. p. 405.
A. trigonum, Labill. ex Willd. Spec. Pl. 5, p. 453; Hook. Spec. Fil. 2, p. 37.

HAB. Vicinity of Sydney and Hunter's River, New South Wales.

So closely allied is this to the *A. cuneatum* of Langsdorff and Fischer, that it is only to be distinguished by its somewhat more erect and slender fronds, with pinnules not so evidently lobed. Its affinity is also very close to the *A. Æthiopicum* of Linnæus.

10. ADIANTUM AFFINE, Willd.

Adiantum affine, Willd. Spec. Pl. 5, p. 448; A. Rich. Bot. Voy. Astrol. p. 87; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 366; Hook. Spec. Fil. 2, p. 32.

HAB. New Zealand; in the vicinity of the Bay of Islands.

11. ADIANTUM HISPIDULUM, Sw.

A. stipite angulato scabro paleaceo-hirsuto; frondibus oblongis acuminatis bi-tripinnatis; pinnis alternis patentibus; pinnulis trapezoideis obtusis striatis hispidis, margine superiore profunde dentato, inferiore integerrimo; rhachi communi et partialibus scabris hirsutis; indusio reniformi hispidulo.

Adiantum hispidulum, Sw. Syn. Fil. p. 124, ex Willd. Spec. Pl. 5, p. 444; A. Rich. Bot. Voy. Astrol. p. 88.

HAB. Vicinity of the Bay of Islands, New Zealand.

Stipe angular and slender, about 10 inches long, of a purplish-black colour, *rough* to the touch, and, with the creeping rootstock and *rhachis*, *paleaceous-hirsute*. *Fronde tripinnate* at base, bipinnate towards the point. *Pinnæ alternate, spreading*, the terminal one longest. *Pinnules* on a short petiole, *subtrapeziform*, occasionally rhomboid-ovate, *obtuse*, and slightly falcate, *hispid* with dark brown hairs underneath; the *superior margin* and rounded point *obtusely and deeply dentate*, the *inferior one entire*. Sori situated on a slight notch near the centre of a tooth, 4 to 6 on the superior margin and 2 to 3 on the obtuse point. *Indusium reniform*, a little *hispid*.

Mr. A. Cunningham in his "Specimen of the Botany of New Zealand," published in Hooker's Companion to the Botanical Magazine, vol. 2, p. 366, has united to this the *A. pubescens* of Willdenow; but, if we have correctly identified the *A. hispidulum* of Swartz, the two plants are obviously very distinct; particularly in the circumscription and division of the fronds, the size and form of the pinnules, and the colour of the hairs.

* * * * *Fronde ternatæ vel pedatæ.*

12. ADIANTUM TERNATUM, H. B. K.

A. stipite angulato; frondibus pinnatis ternatisve etiam bipinnatis; pinnis glabris rhomboideo-lanceolatis acuminatis nunc oblongis subdimidiatis apice spinuloso-dentatis basi truncato-cuneatis; rhachi rufotomentosa; soris oblongis contiguâ marginem superiorem totum atque inferiorem ad medium usque replentibus.

Adiantum ternatum, H. B. K. ex Willd. Spec. Pl. 5, p. 436.

A. triangulatum, Kaulf. Enum. Fil. p. 204?

A. fovearum, Raddi, Plant. Brasil. p. 58, t. 77?

HAB. Brazil; in the vicinity of Rio Janeiro.

Stipe angular, 8 inches to a foot in length, black, glossy, and rufous-tomentose. *Fronde* about equal in length with the stipe, varying from simply *pinnate* to *ternate*, and even sometimes *bipinnate*, with approximating pinnæ 1 to 1½ inches in length, seated on a very short petiole, glabrous on both sides, *rhomboid-lanceolate* and slightly *acuminate*, subfalcate, or *subdimidiato-oblong*, the base *truncate-cuneate*; superior margin and outer half of the inferior one cut into broad teeth, the apex and margin of the sterile pinnæ dentate with sharp teeth. *Rhachis* angular, densely *rufous-tomentose*. *Sori* 8 to 10 on the upper, and 4 to 6 on the lower and outer margin, *contiguous*, and produced frequently to the very point.

Willdenow does not appear to have seen fertile specimens of this species; from this circumstance, as well as from convincing proof of the variable character in the divisions of the fronds and form of the

pinnæ in the plant before us, we are of opinion that the *A. triangulatum* of Kaulfuss and *A. fovearum* of Raddi are not specifically distinct from it.

13. ADIANTUM PEDATUM, *Linn.*

Adiantum pedatum, Sw. Syn. Fil. p. 121; Willd. Spec. Pl. 5, p. 438; Kaulf. Enum. Fil. p. 202; Hook. Fl. Bor. Amer. 2, p. 264.

HAB. Banks of Chickeeles River, and in woods near Fort Nisqually, Oregon.

This does not differ from the plant of the United States and Canada. Chamisso found it as far north as Unalashka.

14. ADIANTUM PATENS, *Willd.*

Adiantum patens, Willd. Spec. Pl. 5, p. 439; Hook. Spec. Fil. 2, p. 29.

HAB. On the Corcovado, Rio Janeiro, Brazil.

Very closely allied to the *A. pedatum* of Linnæus; from which it may be said to differ only in its more approximate, broader, obtuse, darker-green pinnæ, with a partial rufous pubescence on the upper side of the rhachis of its branches.

15. ADIANTUM PUBESCENS, *Willd.*

Adiantum pubescens, Willd. Spec. Pl. 5, p. 439; A. Rich. Bot. Voy. Astrol. p. 89; Hook. & Arn. Bot. Beech. Voy. p. 75.

Var. β . DIVARICATUM: *ramis divaricatis; pinnis subflabellatis oblongis.*

HAB. Tahiti, Society Islands. Feejee Islands. Bay of Islands, New Zealand. Hunter's River, and shores of Port Jackson, New South Wales. β . Muniai, Feejee Islands.

The usual form of this occurs very frequently, in dry rocky situations at all the habitats cited. In the var. β . the stipes are more slender, *their branches divaricate*, and the *somewhat flabellate pinnæ* shorter than in the original.

* * * * * *Frondes supradecompositæ.*

16. ADIANTUM FORMOSUM, *R. Br.*

Adiantum formosum, R. Br. Prodr. Fl. Nov. Holl. p. 155; A. Rich. Bot. Voy. Astrol. p. 88; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 366.

HAB. Illawarra, and shores of Port Jackson, New South Wales.

The stipes of this are nearly round, black, shining, and rough. Fronds supradecomposed, and rising to the height of 4 to 5 feet. Pinnules numerous, glabrous, subrhomboid, crenate-dentate. Partial rhachis pilose. Sori punctiform, with a reniform indusium.

17. ADIANTUM PENTADACTYLON, *Langsd. & Fisch.*

Adiantum pentadactylon, Langsd. & Fisch. Ic. Fil. p. 22; Willd. Spec. Pl. 5, p. 448; Kaulf. Enum. Fil. p. 206; Hook. & Grev. Ic. Fil. t. 98.

HAB. Organ Mountains, Brazil.

Closely allied to the *A. trapeziforme* of Linnæus; but easily recognised by its more acuminate and incisely-lobed pinnules.

18. ADIANTUM TRUNCATUM, *Raddi.*

Adiantum truncatum, Raddi, Plant. Brasil. p. 59, t. 78, f. 1.

A. betulinum, Kaulf. Enum. Fil. p. 207.

A. conicum, Velloz. Fl. Flumin. 11, t. 97.

HAB. Organ Mountains, Brazil.

There are few species of *Adiantum* that exhibit such a distinct

impress of character as the present one, with its large supradecom-
pound fronds, and spreading branches, bearing pinnules about an inch
long, ovate-lanceolate, acute, and crenate, with an oblique truncate
base. Sori laterally oblong, approximate, with a smooth reniform
indusium.

40. DORYOPTERIS, *J. Sm.*

(PTERIDIS Spec. Linn., Raddi. LITOBROCHLE Spec. Presl.)

Under this genus Mr. J. Smith has enumerated eight species, which
form a very natural group; the whole having smooth ebenous stipes,
and coriaceous fronds, which are either simple, cordate, digitate-
palmate or pinnatifid, and the veins so sunk in the substance of the
fronds as to be hardly discernible. The sori and venation are similar
to *Litobrochia*, but the species retained under *Litobrochia* by Mr. J.
Smith, are of quite a different habit and consistence.

1. DORYOPTERIS SAGITTIFOLIA, *J. Sm.*

Doryopteris sagittifolia, *J. Sm.* in Hook. Jour. Bot. 4, p. 163.

Pteris sagittifolia, Raddi, Plant. Brasil. p. 43, t. 63, f. 1; Gaud. Bot. Freyc. Voy.
p. 384.

HAB. Organ Mountains, Brazil.

Plant 12 to 15 inches high. Stipes and fronds about equal in
length; the latter from an inch to 1½ inches broad, with the lower
surface of a pale green colour.

2. DORYOPTERIS VARIANS, *J. Sm.*

Doryopteris varians, *J. Sm.* in Hook. Jour. Bot. 4, p. 163.

Pteris varians, Raddi, Plant. Brasil. p. 44, t. 64, f. 1.

HAB. On the Corcovado, Rio Janeiro, Brazil; frequent.

3. DORYOPTERIS PEDATA.

Litobrochia pedata, Presl, Tent. Pterid. p. 149, t. 5, f. 25.

Pteris pedata, Langsd. & Fisch. Ic. Fil. p. 17; Willd. Spec. Pl. 5, p. 358 (pro parte); Raddi, Plant. Brasil. p. 47, t. 65, f. 3, t. 66 & 66 bis; Hook. & Arn. Bot. Beech. Voy. p. 107.

HAB. On the Corcovado, Rio Janeiro, Brazil. Sandwich Islands.

This is very variable in the division of its fronds and the form of the segments. The sinus is either rounded or acute at base.

Among Pteridologists there appears to exist some difference of opinion as to what really is the true *Pteris pedata* of Linnæus. Mr. John Smith, in his "Arrangement and Definition of the Genera of Ferns," and likewise in the "Enumeratio Filicum Philippinarum," refers it to the genus *Cassebeera*, which has forked veins, with direct free venules. Presl, on the other hand, in his Tentamen Pteridographiæ, places it in his genus *Litobrochia*, where the veins are reticulated. Langsdorff and Fischer describe the *P. pedata* as furnished with a reticulated venation; their figure we have not seen. We agree with the latter authorities, and with Presl, in considering the plant with reticulated veins as the true *P. pedata* of Linnæus. Some states of *P. geraniifolia* of Raddi (which has a forked free venation) might readily be mistaken for it, when not carefully examined.

4. DORYOPTERIS DECORA, Sp. Nov. (Tab. 13.)

D. cæspitosa; *stipitibus lævibus semiteretibus basi paleaceo-hirsutis*; *frondibus glabris late ovatis cordatis basi pinnatis apicem versus pinnatifidis*; *pinnis pinnatipartitis, laciniis linearibus obtusis, sinu angulato*; *soris fere continuis*.

HAB. Sandwich Islands; in exposed situations, in crevices of rocks, and among decomposed lava.

Plant from 3 to 10 inches high, *cæspitose*. Rootstock short and

squamose: rootlets filiform, fulvous-tomentose. *Stipes* of a sooty-brown colour, *smooth*, shining, *semiterete*, plane in front, with a narrow margin, *squamose-hirsute* at base; the scales slender, linear, attenuate, with a black costæform line in the centre. *Fronde* broad-ovate, *cordate*, sometimes showing a tendency to be five-angled, *glabrous*, and of a whitish-green colour on the under surface, *pinnate at the base*, the *upper half pinnatifid*. *Pinnæ* opposite, consisting of 3 to 4 pairs, spreading, deeply *pinnatifid*. *Segments* one to 1½ inches long, about 2 lines broad, *linear*, *obtuse*, the lower and inferior one often again divided. *Sinus* wide and *angular*. Veins very slender and usually evident to the naked eye, forming very long, oblique, angular areoles. *Sori continuous*, seldom interrupted, except at the base of the sinus, where they are altogether wanting. Indusium plane and rather broad.

Although the fronds of this are not strictly pedate, yet they may be said to resemble in many respects some forms of *D. pedata*; but its much smaller size, deeper divided and less coriaceous fronds, the narrower and more uniform size of its segments, the sori being interrupted in the sinus, together with its paler stipe, readily distinguish it from that species.

PLATE 13.—Fig. 1. Entire plant, of the natural size. 1 *a*. Section of a segment, showing the venation and sori. 1 *b*. Scale from the base of the stipe. 1 *c, c*. Sporangia. 1 *d*. Sporules.—The details magnified.

41. LITOBROCHIA, Presl, J. Sm.

(PTERIDIS Spec. Linn. & Auct. CAMPTERIA, Presl.)

In the few species which compose the genus *Campteria* of Presl, only the lower venules next the midrib anastomose, and their habit not differing in any way from many genuine species of *Litobrochia*, Mr. J. Smith has very properly united them to the present genus.

* *Frondes pinnatæ.*

1. LITOBROCHIA GRANDIFOLIA, *J. Sm.*

Litobrochia grandifolia, *J. Sm.* in *Hook. Jour. Bot.* 4, p. 163.

Pteris grandifolia, *Linn. ex Willd. Spec. Pl.* 5, p. 369; *Agardh. Gen. Pterid.* p. 7.

HAB. Vicinity of Rio Janeiro and the Organ Mountains, Brazil.

Whole plant usually from 3 to 5 feet high. Fronds smooth, erect, oblong, and simply pinnate; the pinnæ subpetiolate, elongated lanceolate and oblique at the base, with a perfect reticulated venation. Stipes smooth, sulcate, and of a dull chestnut-brown colour.

Presl appears to have committed an error in representing the *Pteris grandifolia* of Linnæus, in his *Tentamen Pteridographiæ*, t. 5, f. 16, as having a simply forked venation.

2. LITOBROCHIA DENTICULATA, *Presl.*

Litobrochia denticulata, *Presl, Tent. Pterid.* p. 149, t. 5, f. 20.

Pteris denticulata, *Sw. Syn. Fil.* p. 97; *Willd. Spec. Pl.* 5, p. 372; *Kaulf. Enum.*

Fil. p. 187; *Hook. & Grev. Ic. Fil.* t. 28; *Agardh. Gen. Pterid.* p. 56.

HAB. Organ Mountains and vicinity of Rio Janeiro, Brazil.

This is a very variable plant, the most common form of which is represented in Hooker and Greville's *Icones Filicum*; and we are inclined to think, that the *Pteris serrata* of the *Flora Fluminensis*, t. 82, and *Pteris palmata*, t. 87, of the same work, are nothing more than varieties of it.

* * *Frondes pinnatæ; pinnis pinnatifidis.*

3. LITOBROCHIA COMANS, *Presl.*

Litobrochia comans, *Presl, Tent. Pterid.* p. 149.

Pteris comans, *Forst. ex Sw. Syn. Fil.* p. 98; *Willd. Spec. Pl.* 5, p. 381; *A. Rich.*

Bot. Voy. Astrol. p. 79; *A. Cunn. in Hook. Comp. Bot. Mag.* p. 365; *Agardh. Gen. Pterid.* p. 59.

HAB. Tahiti, Society Islands. Ovolau, Feejee Islands: in mountain forests.

In specimens from the Feejee Islands the segments of the fronds are longer and more attenuated, less falcate, with the apices more dentate, rather than "serrate," as in the original form; of which it may be viewed as only a slight variety. The Tahiti specimens agree perfectly with Willdenow's and Agardh's description.

4. LITOBROCHIA DECURRENS, Presl.

Litobrochia decurrens, Presl, Tent. Pterid. p. 149.

Pteris decurrens, Raddi, Plant. Brasil. p. 48, t. 69 bis; Agardh. Gen. Pterid. p. 61.

HAB. Organ Mountains, and vicinity of Rio Janeiro, Brazil.

An admirable description is given of this by Agardh in his *Recensio Specierum Generis Pteridis*; to which we have nothing to add, save that it is a very common Fern in the forests around the base of the Corcovado.

* * * *Fronde bipinnatæ; pinnulis pinnatifidis.*

5. LITOBROCHIA MACILENTA, J. Sm.

Litobrochia macilenta, J. Sm. in Hook. Jour. Bot. 4, p. 163.

Pteris macilenta, A. Rich. Bot. Voy. Astrol. p. 82, t. 12; A. Cunn. in Hook. Comp. Bot. Mag. p. 365; Presl, Tent. Pterid. p. 145.

HAB. Tippona, Bay of Islands, New Zealand: in woods.

Presl, in his *Tentamen Pteridographiæ*, refers this to *Pteris*; but it more properly belongs to his genus *Campyleria*, in which the lower venules anastomose. The figure of *Pteris macilenta* in the Botany of the Voyage of the Astrolabe, it is true, represents a forked venation, which circumstance may have misled Presl, as Richard, in his description of the species, takes no notice of its lower venules anastomosing.

6. LITOBROCHIA POLITA, J. Sm.

Litobrochia polita, J. Sm. in Hook. Jour. Bot. 4, p. 163.

Pteris polita, Link, Hort. Berol.; Agardh. Gen. Pterid. p. 65.

HAB. Vicinity of Rio Janeiro, Brazil.

The solitary specimen of this, in our collection, wholly agrees with cultivated ones, procured in 1836, from the Royal Botanic Garden at Berlin.

* * * * *Fronde pedatæ vel ternatæ, ramis bipinnatifidis vel pinnatis.*

7. LITOBROCHIA INTERMEDIA.

L. stipitibus hinc canaliculatis glabris; frondibus pedatis, ramis bipinnatifidis, lateralibus tripartitis; pinnulis alternis sessilibus lanceolatis acuminatis pinnatifidis membranaceis glabris, laciniis oblongis subfalcatis apice subacuto crenulatis.

Pteris intermedia, Blume, Enum. Plant. Jav. p. 211.

HAB. Mindanao, one of the Philippine Islands. Manua and Savaii, Samoan Islands.

Stipe naked and smooth, semiterete, channeled in front. *Fronde* pedate, together with the stipe from 4 to 5 feet high, smooth, flaccid, and of a pale green colour; the branches bipinnatifid, the lateral ones tripartite. *Pinnules* alternate, sessile, lanceolate, acuminate, pinnatifid, membranaceous; the segments oblong, somewhat falcate; the margins from the base of the sinus, outwards for about two-thirds of the whole length are soriferous, the apices rather acute and crenulate. Lower veins arcuately anastomosing; the superior veins and venules reticulated; their meshes irregular in form and unequal in size.

8. LITOBROCHIA DIVARICATA, Sp. Nov.

L. stipitibus lævibus castaneis semiteretibus hinc canaliculatis; frondibus ternatis, divisionibus primariis bipartitis patentibus, secundariis pinnatis; pinnulis sessilibus alternis lineari-lanceolatis acuminatis pinnatipartitis, laciniis lineari-oblongis subfalcatibus apice obtuso crenulatis.

HAB. Feejee Islands: on the margin of cultivated lands.

Plant from 4 to 6 feet high, forming dense thickets. *Fronde* smooth, *ternate*; the primary divisions from 2 to 2½ feet in length, spreading, and divided into two equal *pinnate branches*. *Pinnæ* deeply *pinnatifid*, *alternate*, approximate, from 35 to 40 in number, *sessile* or *subsessile*, *linear-lanceolate*, and narrowing into an entire *crenulate* point of about 1½ inches in length. *Segments* from 8 to 10 lines long, by 2½ lines broad, *linear-oblong*, *obtuse*, *subfalcate*, the *point crenulate*. Sinus rounded at the base, the width outwards generally about half that of the segment, but sometimes towards the base of the *pinnæ* the intervening space is equal to the breadth of the segment itself. *Stipe* thick, *smooth* and glossy, of a dull *brown colour*, *semiterete*, *channeled in front*. Rhachis, costa, and veins of a reddish-brown hue; the lower veins of each opposite pair of segments *rectangularly combining*, forming a low arch parallel to the rhachis of the *pinna*; the outer ones *irregularly and arcuately uniting*: *venules* usually free.

Distinguished from the preceding species by the fewer divisions of its fronds; the longer, more acuminated, and deeply pinnatifid *pinnæ*; and the larger and more obtuse segments, with the rhachis, costa, and veins of a darker colour.

* * * * * *Fronde tripinnatæ, divisionibus ultimis crenatis vel sinuatis.*

9. LITOBROCHIA ELEGANS.

Pteris elegans, Sw. Syn. Fil. p. 104; Willd. Spec. Pl. 5, p. 390.

Var. α . BRASILIENSIS: *stipite atropurpureo; laciniis ovato-oblongis subcrenulatis.*

Pteris elegans, α . *Brasiliensis*, Agardh, Gen. Pterid. p. 76.

HAB. Vicinity of Rio Janeiro, Brazil.

The stipe of this is dark purple, very stout, round, smooth, and about 6 inches long. Fronds bi-tripinnate, smooth, and glaucous beneath. Pinnæ subverticillate, with adnate and nearly opposite pinnules, which are either pinnate or repand-pinnatifid. Segments ovate-oblong, acute, with a partially crenate margin.

We have relied chiefly on Agardh's authority for this being a variety of the *Pteris elegans* of Swartz; with whose description it well agrees.

10. LITOBROCHIA VESPERTILIONIS, Presl.

L. rhizomate repente squamoso; frondibus glabris tripinnatis; pinnulis sessilibus ovato-lanceolatis profunde pinnatifidis, laciniis oblongis obtusis, fructiferis triangularibus, infimis repando-lobatis.

Litobrochia vesperitilionis, Presl, Tent. Pterid. p. 149.

Pteris vesperitilionis, Labill. Bot. N. Holl. 2, p. 96, t. 245; Willd. Spec. Pl. 5, p. 400; R. Br. Prodr. Fl. Nov. Holl. p. 154; Gaud. Bot. Freyc. Voy. p. 392; Agardh, Gen. Pterid. p. 80.

HAB. Port Jackson, New South Wales. Bay of Islands, New Zealand: inhabiting thickets of bushes on the margins of forests.

Rootstock creeping and closely covered with linear-lanceolate, dark brown, reticulated scales. *Fronds* varying from 2 to 8 feet in height, spreading, *smooth* on both sides, somewhat glaucous beneath, *bi-tripinnate*, with distant, opposite or subalternate, *ovate-lanceolate, deeply pinnatifid pinnules*. *Segments oblong, obtuse*, or in the New Zealand plant broad-lanceolate, their margins lobed or *repand-sinuate*; the latter

character being most obvious in the barren fronds, or those in a partial state of fructification.

11. LITOBROCHIA SINUATA, Sp. Nov. (Tab. 14.)

L. rhizomate repente; stipite lævi tereti; fronde tripinnata; pinnis patentibus ovatis acutis; pinnulis subtus glaucis oblongo-lanceolatis margine sinuatis basi obliquis obtuse cuneatis, inferioribus subsessilibus, superioribus coadunatis; venulis infimis arcuato-anastomosantibus, exterioribus reticulatis.

HAB. Ovolau, Feejee Islands; in thickets, at an altitude of 2,000 feet.

Rootstock creeping. Frond subscandent, 18 feet and upwards in height, large, spreading, glaucous on the under surface, the upper of a pale green colour, *tripinnate*. *Primary divisions* alternate and stipitate, the ultimate ones subalternate, *oblong-lanceolate*, the margin for two-thirds of its whole length *sinuate*, with an entire acute point; *the base oblique and bluntly wedge-shaped*. *Stipe* long, round, smooth and glossy, and of a yellowish-brown colour. Indusium narrow, plane, and continuing to within half an inch of the point of the pinnules. Lower opposite pair of *venules anastomosing*, and forming a *low arch* nearly parallel with the costa; the outer venules forming irregular, oblong, angular areoles.

Our figure represents the most common state of the plant; which we found to be most luxuriant when inhabiting thickets of low trees and shrubs, their branches supporting its tall fronds.

PLATE 14.—Fig. 1. Portion of a frond, of the natural size. 1 *a*. Section of a pinnule, showing the under side. 1 *b*, *b*. Sporangia.—The details magnified.

42. PTERIS, *Linn., J. Sm.*

(PTERIDIS Spec. Presl. ALLOSORI Spec. Presl.)

§ 1. EUPTERIS, Agardh.

* *Frondes pedatæ vel ternatæ.*1. PTERIS GERANIFOLIA, *Raddi.**Pteris geraniifolia*, Raddi, Plant. Brasil. p. 46, t. 67.*P. Pohliana*, Presl, Tent. Pterid. p. 145.*P. laciniata*, Velloz. Fl. Flumin. 11, t. 89.

HAB. Organ Mountains, Brazil. Society, Samoan, and Feejee Islands.

Of the identity of the plant from islands in the Pacific with Raddi's from Brazil, there can be no doubt; the specimens from the latter country, however, are a little the larger. We have not seen the figure of the *P. concolor* of Langsdorff and Fischer, from the Marquesas Islands; but from their description it must be very closely allied to the present species.

2. PTERIS SULPHUREA, *Sw.**Pteris sulphurea*, Sw. Syn. Fil. p. 105; Willd. Spec. Pl. 5, p. 362.

HAB. Vicinity of Obrajillo, Peru.

Whole plant 8 to 10 inches in height, with a smooth, round, ebenous, glossy stipe, a little thicker than a quill from the wing of a sparrow, about 6 inches long, squamose at base. Fronds ternate, 2 to 3 inches in length, pentangular-oblong, with a slightly acuminate point; the lower surface covered with a yellow powder. Lateral divisions sessile and pinnate; intermediate and terminal ones petio-

late. Pinnæ deeply pinnatifid, with linear-oblong, obtuse segments, and a continuous indusium, which has a crenate membranaceous margin.

* * *Fronde pinnatæ.*

3. PTERIS LONGIFOLIA, *Linn.*

Pteris longifolia, Willd. Spec. Pl. 5, p. 369; Kaulf. Enum. Fil. p. 186; Agardh, Gen. Pterid. p. 1 (pro parte).

HAB. Baños, Luzon, Philippine Islands.

Our specimens of this, though rather depauperate, accord in all essential particulars with Willdenow's description. But we cannot agree with Agardh, in referring the *P. stipularis* of Linnæus hither. The figure of it quoted by him in Plumier's *Plantes de l'Amerique*, t. 19, appears to us very distinct, on account of the lanceolate stipules at the base of its more approximate pinnæ.

4. PTERIS TENUIFOLIA, Sp. Nov.

P. rhizomate brevi horizontali; stipite semitereti scabro paleaceo-hirsuto; fronde pinnata; pinnis sessilibus alternis linearibus sursum attenuatis margine revolutis crenato-serratis, basi inæquali superne truncata inferne subauriculata; indusio angusto membranaceo stramineo.

HAB. Tongataboo: in savannas.

Rootstock short, horizontal, brown, densely paleaceous. Stipe slender, of a straw-colour, from 4 to 5 inches long, half round, and sulcate in front, together with the rhachis slightly rough and paleaceous-hirsute: paleæ slender and tapering to a very fine point, reticulated, the meshes linear-oblong and irregular in their length. Fronds broad-lanceolate, a little attenuated at the base, from 15 to 20 inches long, pinnate. Pinnæ sessile, alternate, spreading, straight, about an inch apart, from 4 to 5 inches long by 2 to 3 lines broad, linear, and gradually narrowing

into a finely serrulate barren point; the *margin* of the fertile portion *revolute* and *crenate*; the *base unequal*, its *superior half truncate*, the *inferior* with a small *round lobe*. *Indusium narrow, membranaceous, straw-coloured*.

This is closely related to the preceding species; but is readily distinguished by the narrower pinnæ, as well as the more slender and scabrous stipe and rhachis.

5. PTERIS PELLUCIDA, *Presl?*

Pteris pellucida, Presl? ex Agardh, Gen. Pterid. p. 10.

HAB. Mountains, near Baños, Luzon, Philippine Islands.

This has slender and naked stipes, and smooth pellucid fronds, which are either ternate or pinnate. Pinnæ opposite, ascending, sessile, elongated-lanceolate, and acuminate, the point crenate, and the base somewhat wedge-shaped; about two-thirds of the margin on the upper portion is fertile and contracted. We doubt whether this is specifically distinct from the *Pteris stenophylla* of Hooker and Greville's *Icones Filicum*, t. 130.

* * * *Frondes simplices pinnatifidæ (pinnis inferioribus divisis)*.

6. PTERIS CRETICA, *Linn.*

Pteris Cretica, Willd. Spec. Pl. 5, p. 374; Blume, Enum. Plant. Jav. p. 209; Agardh, Gen. Pterid. p. 9.

HAB. Kaala Mountains, Oahu, Sandwich Islands; rare.

This coincides so well with the species quoted, that we do not think it can with propriety be separated from it.

7. PTERIS UMBROSA, *R. Br.*

P. stipite scabro semitereti hinc trisulcato atro-brunneo; frondibus pin-

natis late ovatis rigidis; pinnis suboppositis lineariformibus decurrentibus, infimis bi-tripartitis pinnatisve; rhachi alata; venis parallelis simplicibus sæpiusve furcatis.

Pteris umbrosa, R. Br. Prodr. Fl. Nov. Holl. p. 154; Agardh, Gen. Pterid. p. 13.

HAB. Port Jackson, New South Wales.

Fronde broadly ovate, from 12 to 16 inches long, by a foot wide, *pinnate*. *Pinnæ* nearly opposite, linear-ensiform, from 6 to 8 inches long, about 4 lines broad, somewhat *rigid*, with faint pellucid dots on the surface, the inferior margin *decurrent* and forming a broad *wing* to the *rhachis*; *inferior pair* of *pinnæ* stipitate, and either once or twice divided or *pinnate*. *Stipes* of a dark brown colour, from 15 to 20 inches long, *semiterete*, *trisulcate* in front, slightly *scabrous*. *Sori* seldom interrupted, continuing down along the wings of the *rhachis*. *Veins parallel*, prominent, sometimes *simple*, but usually *forked*.

* * * * *Fronde* *pinnatæ* (*pinnis inferioribus bi-tripartitis*).

8. PTERIS CRENATA, Sw.

Pteris crenata, Sw. Syn. Fil. p. 96 & 290; Willd. Spec. Pl. 5, p. 373; Blume, Enum. Plant. Jav. p. 209; Agardh, Gen. Pterid. p. 14.

HAB. Tahiti, Society Islands. Samoan, Feejee, and Philippine Islands; frequent.

Near the sea-coast, and particularly in the vicinity of native villages and dwellings: very abundant in shady situations.

9. PTERIS NEMORALIS, Willd.

Pteris nemoralis, Willd. Spec. Pl. 5, p. 386; Blume, Enum. Plant. Jav. p. 210; Agardh, Gen. Pterid. p. 25.

HAB. Tahiti, Society Islands. Samoan, Feejee, and Philippine Islands.

This species has a consistency and form of frond in many respects approaching very closely to others of the genus: we fear, therefore, that species have been referred hither by authors which do not properly belong to it. Willdenow describes the stipe as from 4 to 6 inches long; whereas in ours it is usually from 12 to 18 inches.

10. *PTERIS BLUMEANA*, *Agardh*.

Pteris Blumeana, Agardh, Gen. Pterid. p. 22.

P. scabra? Gaud. Bot. Freyc. Voy. p. 390.

P. normalis, Blume, Enum. Plant. Jav. p. 211.

HAB. Tahiti, Society Islands. Samoan Islands; rare.

This is distinguished from the *P. nemoralis* of Willdenow by its larger fronds, more deeply pinnatifid pinnæ, with longer linear segments, and by the presence of numerous appressed setæ on the upper side of the costa.

11. *PTERIS EXCELSA*, *Gaud.*

Pteris excelsa, Gaud. Bot. Freyc. Voy. p. 388; Agardh. Gen. Pterid. p. 21.

HAB. Sandwich Islands; frequent.

A noble species, with smooth, upright, pinnate fronds, varying in height from 3 to 5 feet. Pinnæ sessile, ascending, elongated-lanceolate, pinnatisect; the lower pair usually bipartite. Segments from 50 to 70 in number, lanceolate, acuminate, subfalcate, the apex more or less serrate. Stipe and rhachis smooth, angular, sulcate, of a pale straw, or of a chestnut-brown colour.

12. *PTERIS TERMINALIS*, *Wallich*.

Pteris terminalis, Wallich, ex Agardh, Gen. Pterid. p. 20.

HAB. Mountains near Baños, Luzon, Philippine Islands.

Very nearly related to the preceding species; indeed differing only in its less angular stipes and more membranaceous fronds, with divaricate segments.

13. PTERIS ARGUTA, Vahl.

Pteris arguta, Vahl; Willd. Spec. Pl. 5, p. 387; Agardh, Gen. Pterid. p. 36.

HAB. Madeira and St. Helena. (The St. Helena plant differs in no respect from that of Madeira.)

* * * * * *Fronde tripinnatifidæ vel tripinnatæ.*

14. PTERIS IRREGULARIS, Kaulf.

Pteris irregularis, Kaulf. Enum. Fil. p. 189; Agardh, Gen. Pterid. p. 18.
P. alata, Gaud. Bot. Freyc. Voy. p. 391, t. 19; Hook. & Arn. Bot. Beech. Voy. p. 107.

HAB. Sandwich Islands; frequent.

The specific name of Kaulfuss is certainly a very appropriate one, as there are few Ferns where irregularity in the division of its fronds prevails to such an extent as in the present species; varying as they do from bipinnatifid with the pinnules linear-lanceolate and entire, to tripinnatifid, the segments oblong, obtuse, subfalcate, and the margin crenate-dentate. The veins are usually forked, but occasionally two of the venules unite and form elongated areoles.

15. PTERIS TREMULA, R. Br.

Pteris tremula, R. Br. Prodr. Fl. Nov. Holl. p. 154; Agardh, Gen. Pterid. p. 40.
P. chrysocarpa, Link. Hort. Berol.
P. affinis, A. Rich. Bot. Voy. Astrol. p. 81?

HAB. Bay of Islands, New Zealand: along the margins of woods.

Specimens of *Pteris chrysocarpa* of Link, from the Royal Botanic

Garden of Berlin, in our possession, are not specifically distinct from this New Zealand plant.

16. PTERIS SCABERULA, A. Rich.

P. stipite semitereti piloso scabro; frondibus coriaceis tripinnatis; pinnulis fertilibus alternis elliptico-lanceolatis acutis basi attenuatis, summis confluentibus et in laciniam angustatam integram aut dentatam desinentibus, sterilibus dentato-serratis; rhachi scabra.

Pteris scaberula, A. Rich. Bot. Voy. Astrol. 1, p. 82, t. 11; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 365.

HAB. Bay of Islands, New Zealand: in open dry woods.

Rootstock elongated underground. *Stipe* from 12 to 15 inches long, half round, with a single furrow in front, of a chestnut-brown colour, together with the *rhachis scabrous*, and sparsely *hirsute* with slender articulated hairs. *Fronde*s broad-lanceolate, acuminate, strictly *tripinnate*, coriaceous, from 15 to 20 inches long: *divisions alternate*, the sterile segments *obtusely serrate*; while in the fertile ones there are only a few serratures towards their points. The immersed veins, are either simple or forked.

§ 2. ORINTHOPTERIS, Agardh.

* *Fronde*s decompositæ et coriaceæ.

† *Segmentis distantibus, cum lobulo interposito.*

17. PTERIS ESCULENTA, Forst.

P. stipite angulato hinc canaliculato; frondibus rigidis tripinnatis; pinnis pinnulisque triangulari-oblongis pinnatisectis, laciniis linearibus obtusis distantibus decurrentibus cum lobulo interposito margine revolutis crenatis subtus pubescentibus, terminali elongata, sinu triangulari; rhachi cum costa lævi basi nodoso-articulata; indusio membranaceo subreplicato.

Pteris esculenta, Forst. ex Willd. Spec. Pl. 5, p. 401; R. Br. Prodr. Fl. Nov. Holl. p. 154; Agardh, Gen. Pterid. p. 45.

HAB. Hills around the Bay of Islands, New Zealand. Hunter's River and Port Jackson, New South Wales. Feejee Islands.

Stipes angular and somewhat *channeled* in front. *Fronde rigid*, spreading and *tripinnate*. Both the *pinnæ* and *pinnules* are *triangular-oblong*, and *pinnatisect*. The *segments* are *linear*, with an *obtuse point*, and *distant, decurrent* on the rhachis, with an *intermediate lobule*, the *margin reflected and crenate*, the *under surface* furnished with a *short pubescence*, the *terminal segment* considerably *the longest*; the *sinus triangular*. *Rhachis and costa quite smooth, nodose and articulated at base*. *Indusium smooth, membranaceous, somewhat replicate*.

In this species a very considerable difference occurs in the length of the segments and their relative proximity to each other, in specimens from the three countries named. In our New Zealand plant the segments are usually somewhat over an inch in length, and from 3 to 6 lines apart; while the Australian form holds an intermediate position, in this particular, between the former and the Feejee plant; the latter agreeing with Agardh's description. In all, the decurrent crescent-shaped lobule between the segments is present, and the dark brown, nodose, apparent articulations at the junction of the rhachis and costa with each other.

By some oversight in collecting, our specimens from New Zealand are not a fair sample of this most common of all Ferns in that country, where its underground rhizoma, even now, but in a less degree than when Captain Cook visited these islands, is used by the natives as an article of food.

18. PTERIS ARACHNOIDEA, Kaulf.

Pteris arachnoidea, Kaulf. Enum. Fil. p. 190; Agardh, Gen. Pterid. p. 46.

HAB. Organ Mountains, and vicinity of Rio Janeiro, Brazil.

We can perceive no essential difference between this and *P. esculenta* of Forster, save in its more divaricate pinnæ and their broader segments.

19. PTERIS SEMIHASTATA, *Wallich*.

Pteris semihastata, Wallich, ex Agardh, Gen. Pterid. p. 48.

HAB. Singapore: in open situations.

This seems to hold an intermediate position between the *P. esculenta* of Forster and *P. aquilina* of Linnæus; differing from the former in the almost total absence of the lobule between the segments, which are much shorter, and villous on the under surface. In the latter particular, as also in the habit and form of the divisions of the frond, it approaches very nearly indeed to states of *P. aquilina*; from which it appears to differ only in the decurrent and semiauriculate tendency of the base of its segments.

†† *Segmentis absque lobulo interposito.*

20. PTERIS AQUILINA, *Linn.*

Pteris aquilina, Linn.; Willd. Spec. Pl. 5, p. 402; Agardh, Gen. Pterid. p. 49; Hook. Fl. Bor. Amer. 2, p. 263.

Var. β . *frondibus subtus plus minusve tomentosis.*

Pteris decomposita, Gaud. Bot. Freyc. Voy. p. 393; Agardh, Gen. Pterid. p. 53.
P. lanuginosa, Hook. & Arn. Bot. Beech. Voy. p. 405.

HAB. Island of Madeira. Vicinity of Cape Town, Cape of Good Hope. Var. β . Northwest Coast of America, from Puget Sound, Oregon, to San Francisco, California. Sandwich Islands; as high as 8,000 feet above the level of the ocean.

The *P. decomposita* of Gaudichaud, as characterized by him and retained by Agardh as a species, we cannot regard as anything more than a mere variety of *P. aquilina*, with fronds more or less tomentose on the under surface, and varying in this respect in proportion to the elevation at which the specimens were obtained; as those

found as high as 8,000 feet are densely tomentose beneath; while others, collected on flat lands near the coast, are almost entirely destitute of hairs, and, as would naturally be expected, more luxuriant in growth, with broader pinnules and segments than in the mountain form. The former agrees with the state found in Oregon and California, which also varies in the more or less tomentose nature of its fronds. Kaulfuss refers the Californian plant to *P. lanuginosa* of Bory and Willdenow: if he is correct in so doing, then the *P. lanuginosa* of Bory is not specifically distinct from the *P. aquilina*.

43. ONYCHIUM, *Kaulf.*

(LEPTOSTEGIA, D. Don. ALLOSORI Spec. Presl.)

This genus is distinguished from *Pteris* "by the fertile segments being so narrow that the two sori are confluent, the free margins of the two indusia conniving over the midrib, at length opening as it were by a longitudinal suture;" the habit of the few species composing it being also distinct.

1. ONYCHIUM DENSUM, Sp. Nov. (Tab. 13.)

O. cæspitosum; stipite semitereti hinc sulcato; fronde 3-4-pinnata glabra; pinnis pinnulisque confertis linearibus acutis subpetiolatis.

HAB. Oregon; on the banks of Rogue's River; rare.

Plant tufted, from 8 to 9 inches high, with smooth, brown, glossy stipes, about a span long, and a little thicker than a quill from a sparrow's wing, *nearly round*, with a single shallow groove in front. *Fronds* about 2 inches long, ovate in outline, *smooth, quadripinnate* at the base and *tripinnate* towards the point; primary and secondary divisions alternate and seated on a very *short petiole*, decurrent on the rhachis. *Pinnules crowded*, of a pale straw colour, varying from 3 to 5 lines in length, less than a line in breadth, *linear*, with a *stiff acute* point and a *cuneate* base, the margin slightly revolute and partially crenate. Indusium of a rather firm texture; its margin a

little ragged; the opposite edges, in a dry state, approaching so close as almost to conceal the costa and the axillary sporangia.

Detected by us only in the above locality, during a hurried journey made through that country in the autumn of 1841. In habit the plant bears a close resemblance to the *Allosorus acrostichoides*.

PLATE 13.—Fig. 2. Entire plant, of the natural size. 2 *a*. Section of a pinnule. 2 *b*. Sporangia. 2 *c*. Sporules.—The details are magnified.

44. LOMARIA, Willd.

(STEGANIA, R. Br.)

* *Fronde pinnatæ vel profunde pinnatifidæ.*

1. LOMARIA DISCOLOR, Willd.

Lomaria discolor, Willd. Spec. Pl. 5, p. 293; A. Rich. Bot. Voy. Astrol. p. 87; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 363.

HAB. Vicinity of the Bay of Islands, New Zealand: in woods; frequent. Illawarra, New South Wales.

A handsome and well-marked species, and, judging from our specimens, very constant in its character. In habit it very much resembles many species of *Nephrolepis*.

2. LOMARIA LANCEOLATA, A. Cunn.

Lomaria lanceolata, A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 363.
Stegania lanceolata, R. Br. Prodr. Fl. Nov. Holl. p. 152; A. Rich. Bot. Voy. Astrol. p. 68.

HAB. Wangarara Bay, New Zealand: in woods.

The sterile fronds are pinnatifid; the fertile ones pinnate, about

equal in length, 6 to 8 inches. The species appears to be rare, as we only found it in the locality above mentioned.

3. LOMARIA MELANOCAULON, Sp. Nov.

L. stipite lævi atro; frondibus ovato-oblongis acuminatis glabris basi pinnatis apicem versus profunde pinnatifidis; pinnis sterilium oblongo-lanceolatis acuminatis subfalcatis margine punctatis apice crenatis basi hinc auriculatis decurrentibus, terminali longiore, fertilium linearibus mucronatis; indusio lacero.

HAB. Mount Majajai, Luzon, Philippine Islands.

Stipes 8 inches long, smooth and black. *Fronde* of both kinds about equal, and the same length as the stipe, ovate-oblong, smooth, acuminate, pinnate at the base, towards the point deeply pinnatifid. *Pinnæ* of the sterile ones 2 inches and upwards in length, oblong-lanceolate, about 7 lines broad, tapering into a short acuminate point, with a short and broad, rounded, decurrent wing at base, the terminal one the longest, the margin punctate, the apex crenate, the inferior base auriculate and decurrent: fertile pinnæ linear, mucronate. *Indusium* mucronate.

Related to *L. punctata* of Blume; but differing in its fronds being rounder at the base and in the absence there of minute obtuse pinnæ; also in the greater breadth of its sterile pinnæ.

4. LOMARIA CORIACEA, Sp. Nov.

L. stipite lævi subtereti hinc sulcato; frondibus coriaceis glabris late ovatis acuminatis pinnatis basi lobulis rotundis interpositis; pinnis sterilibus distantibus alternis adnatis lanceolato-linearibus acuminatis margine punctatis basi hinc subauriculatis decurrentibus, fertilibus elongato-linearibus obtusis; venis immersis; indusio lacero.

HAB. Feejee Islands: in mountain forests; rare.

Stipe of the sterile frond a span long; that of the fertile a little

longer, firm, *smooth*, and *nearly round*, with a shallow *groove* in front, of a dark brown colour at the base, upwards of a straw colour. *Fronde*s about a foot long, *broad-ovate* and *pinnate*, with from 6 to 8 small obtuse lobules at base extending down to the stipe. *Pinnæ coriaceous*, from 12 to 14 in number, 5 inches and upwards in length, and from 8 to 10 lines broad, *lance-linear*, *acuminate*, *adnate*; *inferior base subauriculate and decurrent*; the margin a little thickened, beautifully and regularly punctate. *Fertile pinnæ long-linear*, *obtuse*, with a somewhat cartilaginous and *lacerated indusium*; the two lines of sori becoming confluent. *Veins immersed*.

This species very closely approaches the *L. elongata* of Blume; but his description is so short, that we cannot venture to refer our plant to it.

5. LOMARIA SPICANT, *Desv.*

Lomaria spicant, Desv.; Presl. Tent. Pterid. p. 142.

Blechnum boreale, Sw. Syn. Fil. p. 115; Willd. Spec. Pl. 5, p. 408; Hook. Fl. Bor. Amer. 2, p. 263.

HAB. Pico Ruivo, Madeira. Straits of Juan de Fuca, Oregon: in forests.

6. LOMARIA ALPINA, *Hook.*

L. rhizomate repente; stipite lævi nigricante parce paleaceo; frondibus lineari-lanceolatis, sterilibus pinnatipartitis, pinnis alternis glabris oblongis obtusis margine revolutis; fr. fertilibus pinnatis, pinnis sessilibus lineari-oblongis obtusis; rhachi antice sulcata paleacea, paleis oblongis acutis; venis perspicuis; indusio membranaceo lacero.

Lomaria alpina, Hook. f. Fl. Antarc. p. 392, t. 150.

Stegania alpina, R. Br. Prodr. Fl. Nov. Holl. p. 152.

Lomaria polypodioides, Gaud. in Bot. Freyc. Voy. p. 399.

HAB. Tierra del Fuego: in thickets of bushes and marshy grounds.

Whole plant about 10 inches high. *Rootstock* long, blackish, *creep-*

ing, and about the thickness of a crowquill, with numerous brown pubescent fibres. *Stipe* of the fertile frond about twice the length of the sterile one, *smooth*, shining, and nearly round, of a *blackish* colour, to within an inch of the lower pinnæ, then, together with the rhachis brown and sparsely *paleaceous*. The two kinds of fronds about equal in length, the sterile one the broadest.

Related to the preceding species; from which it differs in the longer and creeping rootstock, the constantly much smaller and deeper divided fronds, with shorter, more obtuse and crowded pinnæ, and the almost entire absence of short lobes on the stipe, so peculiar to *L. spicant*; as well as in the consistence of its indusium.

7. LOMARIA ONOCLEOIDES, Spreng.

Lomaria onocleoides, Spreng. ex Presl, Tent. Pterid. p. 142.

Blechnum onocleoides, Sw. Syn. Fil. p. 115; Willd. Spec. Pl. 5, p. 409.

HAB. Organ Mountains, and vicinity of Rio Janeiro, Brazil.

Both kinds of fronds in this species are strictly lanceolate; the sterile one coriaceous, deeply pinnatifid, and glabrous, with immersed, forked, parallel veins; its pinnæ subfalcate, linear-lanceolate, acuminate; the margin beset above with raised dots. Fertile fronds pinnate, with long-linear and distant pinnæ, mucronate at the point.

8. LOMARIA DOODIODES, Sp. Nov.

L. stipite subtrigono brevi purpurascente lævi; frondibus sterilibus rigidis lanceolatis attenuatis pinnatipartitis; pinnis confertis oblongo-lanceolatis falcatis obtusis margine reflexis crenato-dentatis; fr. fertilibus lanceolatis pinnatis caudato-acuminatis basi attenuatis; pinnis remotis elongato-linearibus acutis; indusio membranaceo.

HAB. Sandal-wood Bay, Feejee Islands.

Stipe short, somewhat three-angled, smooth, and of a purplish colour. Sterile fronds rigid, lanceolate, deeply pinnatifid. Pinnæ rather crowded, of an oblong-lanceolate form, obtuse and falcate; inferior ones

nearly round, their *margins reflexed* and *crenate-dentate*: *fertile fronds lanceolate* and *pinnate*, the apex narrowed into a long *tail-like point*, the *base attenuated*. *Pinnæ distant, long-linear, and acute*. *Indusium membranaceous*.

The size and outline of the sterile fronds resemble very much those of *Doodia aspera* of Robert Brown.

9. LOMARIA NUDA, Labill.

Lomaria nuda, Labill. ex Willd. Spec. Pl. 5, p. 289; R. Br. Prodr. Fl. Nov. Holl. p. 153; Presl, Tent. Pterid. p. 142.

HAB. New South Wales.

Stipes smooth, shining, and angular, having a few linear-attenuate scales at the base, and, with the inferior half of the rhachis, black.

10. LOMARIA PILOSA, Sp. Nov. (Tab. 15.)

L. stipite semitereti punctis elevatis aspero basi squamigero; frondibus rigidis deltoideo-ovatis acuminatis pinnatis; sterilium pinnis adnatis suboppositis oblongo-linearibus attenuatis margine revolutis undulatis basi superne subauriculatis; fertilium elongato-linearibus obtusis basi superne lobato-auriculatis, venis prominentibus costisque subtus pilosis; indusio membranaceo lacero.

HAB. Feejee Islands: in mountain forests; rare.

Stipe of a pale straw colour, from 10 to 12 inches long, *half round*, with a shallow *channel* in front, and at the base having long, slender, attenuate, dark brown scales, *roughened* with a number of short, hard, raised points. *Fronde pinnate, deltoid-ovate, acuminate*, 16 to 18 inches long, 10 to 12 inches broad at the base, of a lively green colour, *rigid*, smooth on the upper surface, while beneath *the veins are very prominent*, and with the *costa pilose* with weak, whitish, articulated hairs. Inferior sterile *pinnæ nearly opposite* and deflexed; a little towards the point alternate, approximate, and nearly horizontal; the fertile *pinnæ*

are more distant and ascending in their direction. *Indusium membranaceous, lacerated*.

PLATE 15.—Fig. 1. 1. Sterile and fertile fronds, of the natural size. 1 *a*. Section of the stipe, at the base. 1 *b*. Section, showing the under side of a sterile pinna. 1 *c*. Section, showing the sporangia and receptacle. 1 *d*. Scale from the base of the stipe. 1 *e*. Hairs from veins on the under side.—The details magnified.

11. LOMARIA GILLIESII, *Hook. & Grev.*

Lomaria Gilliesii, Hook. & Grev. Ic. Fil. t. 207; Presl, Tent. Pterid. p. 143.

HAB. Organ Mountains, Brazil.

Here we have a plant from a humid, densely wooded, mountainous region of Brazil, agreeing precisely with the figure and description of one from Mendoza.

12. LOMARIA CHILENSIS, *Kaulf.*

Lomaria Chilensis, Kaulf. Enum. Fil. p. 154; Hook. Gen. Fil. t. 64, B.

HAB. Vicinity of Valparaiso, Chili.

Plant large and of a very robust habit, growing in patches or groups, in valleys near the sea-coast, a few miles south of Valparaiso, where it is to be met with in abundance.

13. LOMARIA MAGELLANICA, *Desvaux.*

Lomaria Magellanica, Desvaux, ex Hook. f. Fl. Antarc. p. 393.
L. setigera, Gaud. Bot. Freyc. Voy. p. 400.

HAB. Vicinity of Orange Harbour, Tierra del Fuego.

This is undoubtedly the *L. Magellanica* of Desvaux, which Gaudi-

chaud with a doubt, refers as a synonyme to his *L. setigera*. The species is a noble one; its rigid fronds arise from the crown of a short thick trunk, forming altogether a sort of miniature tree, which inhabits the more sheltered declivities of the rugged bleak hills peculiar to that country, and among thickets of *Fagus antarctica* and *Drimys Winteri*.

14. LOMARIA CAPENSIS, Willd.

Lomaria capensis, Willd. Spec. Pl. 5, p. 291.

HAB. Cape of Good Hope; at the base of Table Mountain.

The pinnæ of the sterile fronds are very much crowded, alternate, sessile and lanceolate, attenuate, with a finely serrulate margin, semi-cordate and clasping at the base; those of the fertile frond about an inch apart, long-linear, with a paleaceous rhachis. Our specimens are without stipes, and the fertile fronds are too young for us to detect the crenate incised indusium described by Willdenow.

15. LOMARIA PROCERA, Spreng.

Lomaria procera, Spreng. ex A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 363 (excl. var.); Hook. & Arn. Bot. Beech. Voy. p. 75.

Blechnum procerum, Sw. Syn. Fil. p. 115; Willd. Spec. Pl. 5, p. 415.

Stegania procera, R. Br. Prodr. Fl. Nov. Holl. p. 153; A. Rich. Bot. Voy. Astrol. 1832, p. 86, t. 13, excl. ster. frond.

HAB. Marshes, in the vicinity of the Bay of Islands, New Zealand. Tahiti, Society Islands: in mountain forests.

The figure in the Botany of the Voyage of the Astrolabe, cited above, purporting to be the *Stegania procera* of R. Brown, appears very evidently to be composed of two distinct species; the sterile frond being that of *P. discolor* of Willdenow; the fertile clearly belonging to the plant now under consideration. Hooker and Arnott, in the Botany of Beechey's Voyage, were correct, we think, in referring the Tahiti plant hither.

* * *Frondes bipinnate.*

16. LOMARIA FRASERI, A. Cunn.

Lomaria Fraseri, A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 364; Hook. Ic. Pl. 2, t. 185 (opt. quoad frondes).

HAB. Vicinity of the Bay of Islands, New Zealand: in wet, shady forests.

The trunk or stock of our plant is erect and simple (not scandent, as stated by Allan Cunningham), from 18 inches to 3 feet in height, by half an inch to an inch in diameter, its surface closely covered with the persistent imbricated bases of the old squamose stipes, while its interior is firm and woody: it is crowned with from 4 to 12 fronds which vary from 12 to 18 inches in length. During our botanical excursions in the vicinity of the Bay of Islands, this Fern was found growing in almost all the wet, shady forests we entered, and was generally called by our party, the "miniature tree Fern." It was not noted at the time, nor do we remember ever having seen a plant of it inclining to climb, or even to lean towards any object for support; but the trunk is usually solitary and erect.

45. BLECHNUM, Linn.

* *Frondes integerrimæ.*

1. BLECHNUM LANCEOLATUM, Raddi.

Blechnum lanceolatum, Raddi, Plant. Brasil. p. 52, t. 60, f. 3; Gaud. Bot. Freyc. Voy. p. 394.

HAB. On the Corcovado, Rio Janeiro: on moist rocks and trees; frequent.

In this the fronds are not always strictly entire and linear-lanceo-

late; as we have frequently seen them in a state of cultivation, bearing a short segment or lobe on each side of the costa, near the base; a circumstance which induces us to believe, that the *B. trifoliatum* of Kaulfuss is only a mere form of the present species. Farther, the minute tubercles described by him as existing on the stipe of *B. trifoliatum*, are also present in our *B. lanceolatum*, thereby strengthening our belief of the unity of what has heretofore been considered two distinct species.

* * *Fronde pinnatæ.*

2. BLECHNUM OCCIDENTALE, *Linn.*

Blechnum occidentale, Linn. ex Sw. Syn. Fil. p. 113; Willd. Spec. Pl. 5, p. 412; Gaud. Bot. Freyc. Voy. p. 395; Hook. Gen. Fil. t. 54, B.

HAB. Environs of Rio Janeiro, Brazil; of very frequent occurrence.

3. BLECHNUM GLANDULOSUM, *Kaulf.?*

Blechnum glandulosum? Kaulf. Enum. Fil. p. 161.

HAB. Organ Mountains, Brazil.

Our specimens of this are young, but they agree in a great measure with the character of the species. Gaudichaud, with a doubt, refers this to the *B. occidentale* of Swartz; but we incline to consider the two as distinct.

4. BLECHNUM GRACILE, *Kaulf.*

Blechnum gracile, Kaulf. Enum. Fil. p. 158.

HAB. Vicinity of Rio Janeiro, Brazil.

5. BLECHNUM AUSTRALE, *Linn.*

Blechnum australe, Linn. ex Sw. Syn. Fil. p. 114; Willd. Spec. Pl. 5, p. 410.

HAB. Cape of Good Hope: abundant at the base of Table Mountain.

In this the fertile pinnæ are considerably contracted, with the lines of sori very close to the margin; so that it might be taken for a species of *Lomaria*.

6. BLECHNUM HASTATUM, *Kaulf.*

Blechnum hastatum, Kaulf. Enum. Fil. p. 161; Hook. & Arn. Bot. Beech. Voy. p. 52.

HAB. Vicinity of Valparaiso, Chili.

Stipes (in a dry state) angular, from 8 to 10 inches long, with numerous slender brown scales at the base. Fronds erect, from 12 to 20 inches in length, pinnate. Pinnæ oblong-lanceolate, cordate and hastate at the base; the fertile linear-lanceolate and auriculate; inferior ones short and distant, with a few scattered and weak brown hairs on the under surface. Line of sori distant from the costa, and interrupted in the inferior pinnæ.

7. BLECHNUM CARTILAGINEUM, *Sw.*

Blechnum cartilagineum, Sw. Syn. Fil. p. 114 & 312; Willd. Spec. Pl. 5, p. 411; R. Br. Prodr. Fl. Nov. Holl. p. 152; Presl, Tent. Pterid. p. 103.

HAB. Lower Hunter's River, and in the vicinity of Port Jackson, New South Wales.

A very handsome and well-marked species. Fronds rigid, from 12 to 18 inches long, elongated-lanceolate, slightly acuminate, pinnate at the base, towards the point deeply pinnatifid. Pinnæ alternate, sub-falcate, linear-lanceolate, attenuate, spinulose-serrate, with the base adnate and dilated; inferior ones remote, while towards the point they become confluent, giving to the winged costa there a zigzag appearance. Stipe 10 to 12 inches in length, angular; the lower half squamose and scabrous; the raised points and scales black. Lines of

sori close to the costa, continuous. Sporangia of the two opposite sori becoming confluent and concealing the costa. Margin of the indusium lacerated.

8. BLECHNUM VITTATUM, Sp. Nov. (Tab. 16.)

B. stipite lævi semitereti basi paleaceo-crinito; frondibus membranaceis glabris oblongo-lanceolatis pinnatis; pinnis alternis, sterilibus linearilanceolatis attenuatis serrulatis basi dilatatis, fertilibus contractis lanceolato-linearibus acutis basi dilatatis; venis simplicibus vel furcatis parallelis; soris costæ approximatis continuis; indusio cartilagineo integerrimo.

HAB. Feejee Islands: in wet lands.

Both kinds of fronds about equal in height. *Stipe* 15 inches in length, thickly beset with long, slender, *black scales* at the base, *semiterete, smooth*, with a shallow groove in front, of a chestnut-brown colour and beautifully striped with black, the stripes continuing several inches up the rhachis. *Fronde membranaceous, glabrous oblong-lanceolate*, 18 inches to 2 feet long, *pinnate*. *Pinnæ alternate* and spreading; in the sterile fronds *linear-lanceolate*; the lower ones distant and sessile, while towards the point they are adnate and approximate; in the fertile ones, they are more distant, *long-linear, acute*, and becoming broader where the sori cease, which is generally about an inch from the point; the *base* usually *dilated*. Rhachis naked, with a raised furrowed bar in front. *Veins* divaricating and *parallel, usually simple*, but sometimes *forking* close to the costa. *Sori close to the costa*, and furnished with a narrow *plane, cartilaginous, entire indusium*.

PLATE 16.—Fig. 1. 1. Sterile and fertile fronds, one-half their natural size. 1 *a*. Section of a sterile frond, of the natural size. 1 *b*. Section of the fertile frond, of the natural size. 1 *c*. Section of a stipe, showing the stripes, of the natural size. 1 *d*. Section of a pinna, showing sporangia and receptacle. 1 *e*. Scales from base of the stipe. 1 *f*. Sporangia.—The details more or less magnified.

9. BLECHNUM BRASILIENSE, *Desv.*

Blechnum Brasiliense, Desv. ex Kaulf. Enum. Fil. p. 159.
B. Corcovadense, Raddi, Plant. Brasil. p. 54, t. 61, bis.
B. Fluminensis, Velloz. Fl. Flum. 11, t. 106.

HAB. Botofogo, near Rio Janeiro, and also in the Organ Mountains, Brazil: in marshes and on the moist banks of streams; frequent.

10. BLECHNUM ORIENTALE, *Linn.*

Blechnum orientale, Sw. Syn. Fil. p. 114; Willd. Spec. Pl. 5, 414; Blume, Enum. Plant. Jav. p. 197; Gaud. Bot. Freyc. Voy. p. 396; Hook. & Arn. Bot. Beech. Voy. p. 75.

HAB. Tahiti, Society Islands. Feejee and Samoan Islands.

On the island of Tahiti, this species is met with in great abundance in marshy grounds near the coast, usually in company with *Acrostichum aureum*, Linn. The fronds are pinnate, smooth on both sides, and glossy on the upper surface, varying in height from 1½ to 2 feet and upwards, according to local circumstances. Pinnæ approximate, alternate, sessile, linear-lanceolate, attenuate, entire; the base oblique and rounded, with a few short obtuse lobes on the stipe; the latter nearly round, and furnished at the base with long, narrow, chaffy scales. Sori close to the costa.

11. BLECHNUM CALOPHYLLUM, *Langsd. & Fisch.*

Blechnum calophyllum, Langsd. & Fisch. Ic. Fil. t. 23; Willd. Spec. Pl. 5, p. 415.
B. stagninum, Raddi, Plant. Brasil. p. 54, t. 62.

HAB. Trexal, at the base of Organ Mountains; and also in the vicinity of Rio Janeiro, Brazil: in marshes and along the margins of streams.

* * * *Frondes bipinnatæ.*

12. BLECHNUM FONTANESIANUM, *Gaud.*

Blechnum Fontesianum, Gaud. Bot. Freyc. Voy. p. 397, t. 15.

Sadleria cyatheoides, Kaulf. Enum. Fil. p. 162; Hook. & Arn. Bot. Beech. Voy. p. 107.

HAB. Sandwich Islands: frequent.

Plant arborescent in form, having a very stout trunk, attaining sometimes to the height of 2 feet; the petioles of the old fronds remaining attached to its sides. The soft portion of its interior is sometimes roasted and eaten by the natives as food.

For a correct miniature outline of the whole plant, see Narrative of the Expedition, Vol. IV. p. 231.

13. BLECHNUM PALLIDUM.

B. stipite angulato scabrido paleaceo; frondibus bipinnatis; pinnis sessilibus alternis adscendentibus lineari-lanceolatis apice acuminato profunde serratis basi subauriculatis; pinnulis approximatis coriaceis oblongo-linearibus leviter falcatis obtusis nervosis margine revolutis dentatis; rhachi paleacea; indusio coriaceo fusco integerrimo.

Sadleria pallida, Hook. & Arn. Bot. Beech. Voy. p. 75 & 107.

HAB. Sandwich Islands.

Rootstock short, erect. *Stipe* 1½ to 2 feet in length, about the thickness of the little finger, *angular*, with a shallow groove in front, *paleaceous*, *roughish* to the touch; paleæ of a light straw colour, long-linear, attenuate. *Fronde* *bipinnate*, about the same length as the *stipe*, lance-oblong, with slightly incurved *linear-lanceolate ascending pinnæ*, from 6 to 8 inches in length, pinnate at the base, and terminated by a deep and coarsely *serrate point*. *Pinnules approximate, coriaceous,*

8 to 10 lines long, 2 to 2½ lines broad, *oblong-linear*, somewhat *falcate* and *obtuse*, the base a little dilated, the *margin recurved* (in a dry state), toward the point *dentate*; the veins on both sides conspicuously evident, usually forked between the sporangiferous receptacle and margin, and, together with the base of the sinus of that portion of the pinnæ that is pinnatifid, translucent when held up between the eye and the light. *Rhachis chaffy*, with long, narrow, straw-coloured *paleæ*. Sori close to the costa, becoming confluent and concealing the latter, and continuing outwards to within a line's breadth of the point. *Indusium coriaceous, fuscous, entire*.

This is distinguished from *B. Fontanesianum* by its broader pinnæ, more approximate and broader, obtuse, nervose pinnules, the paleaceous rhachis, and paler indusium.

14. BLECHNUM POLYSTICHOIDES, Sp. Nov.

B. caespitosum; *stipitibus hinc sulcatis paleaceis asperis*; *frondibus subcoriaceis glabris bipinnatis*; *pinnis alternis sessilibus divaricatis oblongo-lanceolatis basi pinnatis apice lobato-crenatis*; *pinnulis triangulari-ovatis obtusis margine revolutis-crenatis*; *rhachi costaque crebre paleaceis*; *venis immersis furcatis*; *indusio cartilagineo lacero*.

HAB. Sandwich Islands: along the margins of streams; rare.

Stipes tufted, 6 to 8 inches long (in a dry state angular), with a shallow groove in front, of a reddish-brown colour, *asperous*, and together with the *rhachis and costa* densely *paleaceous*; the *paleæ* broad at the base, linear, attenuate, and of the same colour as the stipe. *Fronde subcoriaceous, glabrous*, from 8 to 12 inches in length, oblong-lanceolate and slightly acuminate, *bipinnate*, the point simply pinnate. *Pinnæ alternate and sessile, oblong-lanceolate, spreading, the base pinnate, the apices lobate-crenate*. *Pinnules* (in a dry state) wrinkled on the upper surface, 3 lines long, and about 2½ lines broad, *triangular-ovate*, the *margin recurved and crenate*, with *sunken forked veins*. Sori distant from the costa, and extending outwards from the base about two-thirds of the whole length of the pinnules. *Indusium*

dark brown and *cartilaginous*, its margin slightly *lacerated*; the sporangia in an advanced state covering the not very evident costa.

This is very distinct from either of the two preceding species, in the smaller size of the fronds, the shorter and broader pinnules, and the asperous and densely paleaceous reddish stipe and rhachis. May it not be the *B. squarrosum*? figured in the Voyage of the Bonite, which we have never had an opportunity to examine. The whole plant partakes a good deal of the habit of many species of *Polystichum* of Roth.

46. DICLIDOPTERIS, Nov. Gen.

Venæ simplicissimæ, rectæ, liberæ, intramarginales, nempe unica inter costam subtus prominentem et margines frondis angusto-linearis æquidistans, receptaculum sporangiferum continuum efficiens, indusium angusto-lineare homogeneous (texturæ frondis) planum, margine libero costam respiciente, gerens. Sporangia pedicellata. Sporulæ triangulares.

1. DICLIDOPTERIS ANGUSTISSIMA. (Tab. 17.)

HAB. Samoan and Feejee Islands: on trunks of trees in humid forests.

Rootstock short, creeping. Fronds numerous, tufted, membranaceous, entire, linear, acute, from 3 to 6 inches long and about a line broad: costa on the under side prominent: veins scarcely evident, a single one starting off from the costa each side, near the base of the frond, and continuing for nearly its whole length, equidistant between the costa and margin. Occasionally this vein is wanting on one side; consequently such a frond has only one linear simple sorus. Sporangia becoming confluent and concealing the costa.

This has the habit of *Monogramma* of Schkuhr, a genus which has no lateral veins nor indusium. But its nearest affinity is to *Blechnum*,

from which it differs in habit, venation, and the thick, scarcely altered indusium; the fronds being so narrow that the sporangia of the two sori become confluent; in this particular resembling a single segment of *Onychium*, where the veins are combined by a transverse sporangiferous receptacle, as in *Blechnum*.—The name of the genus is compounded of *δικλις*, *two-valved*, and *περις*, *fern*; alluding to the apparently bivalvular indusium.

PLATE 17.—Fig. 1. Plant, of the natural size. 1 *a*. Portion of a frond, showing the sori. 1 *b*. Similar portion, with the indusium removed on one side. 1 *c*. Cross section of a sterile frond. 1 *d*. Cross section of a fertile frond, showing the position of the sporangiferous receptacle. 1 *e*. A similar section, showing a single receptacle only on one side of the costa. 1 *f, f*. Sporangia. 1 *g*. Sporules.—The details magnified.

47. SALPICHLÆNA, *J. Sm.*

(BLECHNI Spec. Kaulf.)

This is distinguished from *Blechnum* by its climbing habit, and by the venules being combined with an intramarginal vein, and by a vaulted indusium, “bearing a portion of the sporangia along its lengthened attachment at the base.”

I. SALPICHLÆNA VOLUBILE, *J. Sm.*

Salpichlæna volubile, *J. Sm.* in *Hook. Jour. Bot.* 4, p. 168; *Hook. Gen. Fil.* t. 93.
Blechnum volubile, *Kaulf. Enum. Fil.* p. 159.

HAB. In thickets, on the banks of the Rio Paibana, Brazil.

As belonging to the present tribe, this is indeed a very interesting and singular Fern; having bipinnate, scandent, flexuose fronds, which climb among and over bushes and low trees by means of the reflexed petioles of the pinnæ: these, in all instances that we have seen, are

impari-pinnate. The pinnules, of from 4 to 7 pairs with an odd one, are linear-lanceolate, acuminate, from 6 to 10 inches long and from 8 lines to an inch broad; the margin entire, slightly undulate and revolute; the petiole of the terminal one about an inch long; of the lateral ones about half that length. Stipe and rhachis smooth and firm, nearly round, with a narrow channel in front. Sori close to and parallel with the costa, having a broad and vaulted indusium, of a dark brown colour. We never found the fronds to ascend bushes and trees so high as to make it impracticable, when standing on the ground, to obtain perfect fertile specimens.

48. DOODIA, *R. Br., J. Sm.*

Although this genus agrees in habit with *Blechnum*, yet it differs from that genus by the interrupted sori; and from *Woodwardia* by its less immersed sporangia, plane indusium, and more elevated venation on the under side.

1. DOODIA ASPERA, *R. Br.*

Doodia aspera, *R. Br. Prodr. Fl. Nov. Holl.* p. 151; *A. Rich. Bot. Voy. Astrolab.* p. 76; *A. Cunn. in Hook. Comp. to Bot. Mag.* 2, p. 364.

HAB. Vicinity of Port Jackson, New South Wales. Bay of Islands, New Zealand.

The sori of the New Zealand plant occupy only a single row; while in that from New South Wales, they are frequently in two rows on each side of the costa, the result of a second anastomosis of the venules. In other respects the two plants are similar.

2. DOODIA KUNTHIANA, *Gaud.*

Doodia Kunthiana, *Gaud. Bot. Freyc. Voy.* p. 401, t. 14; *Hook. & Arn. Bot. Beech. Voy.* p. 74 & 107; *A. Cunn. in Hook. Comp. Bot. Mag.* 2, p. 365; *Hook. Gen. Fil.* t. 54, A, f. 1-5.

Var. β . *pinnis remotis; soris fere biserialibus*.

HAB. Sandwich Islands; frequent. Vicinity of the Bay of Islands, New Zealand. β . Feejee Islands.

In the Feejee plant, the *pinnæ are remote*, and sometimes an inch or 1½ inches apart, with a *nearly double series of sori*, which, in a few instances, also occurs in some of the New Zealand specimens; but those from the latter country and the Sandwich Islands, in all other essential particulars, correspond with the figure and description of Gaudichaud.

49. WOODWARDIA, Sm.

1. WOODWARDIA RADICANS, Sw.

Woodwardia radicans, Sw. Syn. Fil. p. 117; Willd. Spec. Pl. 5, p. 418.

HAB. Island of Madeira.

2. WOODWARDIA CHAMISSOL.

W. stipite hinc canaliculato basi paleaceo; frondibus erectis rigidis coriaceis pinnatis; pinnis sessilibus subalternis patentibus pinnatipartitis, laciniis lanceolatis acuminatis subrepandis spinuloso-serratis, sinubus rotundatis.

Woodwardia radicans, Kaulf. Enum. Fil. p. 163, ex parte; Hook. & Arn. Bot. Beech. Voy. p. 162, non Sw.

HAB. Monterey and San Francisco; also in mountains, on the upper waters of the Sacramento River, California.

Stipe about a foot long, round, with a single *groove in front*, and scattered raised points on its surface, clothed with long brown *paleæ at the base*. *Fronds erect*, 2 to 3 feet long, in circumscription oblong-lanceolate, *rigid, coriaceous, pinnate*, the point deeply pinnatifid, the

under surface of a paler colour than the upper. *Pinnæ sessile*, spreading, *subalternate*, and *deeply pinnatifid*; the inferior 3 to 4 pairs distant. *Segments lanceolate*, partially *acuminate*, falcate, with a *spinulose-serrate*, somewhat *repand* margin, the lower and inferior one adnate to the rhachis; the latter in a young state paleaceous-hirsute. *Sinus* usually about as wide as the breadth of the segments, and *rounded at the base*. Veins of a pale colour, transparent, and not anastomosing more than twice; the venules towards the margin parallel and free.

This has been referred by Kaulfuss to the *Woodwardia radicans* of Swartz, in which he is followed by Hooker and Arnott, in the Botany of Beechey's Voyage; while we cannot but consider the Californian plant as a distinct species, on account of the erect fronds, the total absence of any proliferous bud on the rhachis, the more falcate segments, with a wide sinus, rounded at the base, and the pale veins, which are not so compoundly reticulated.

TRIBE IV. ASPLENIEÆ, J. SM.

THIS tribe Mr. J. Smith has divided into two sections; the first embracing those genera having a forked or pinnate free venation; the second, such as possess pinnate or forked veins, with the venules variously anastomosing or reticulated.

50. DIPLAZIUM, Sw.

* *Frondes indivisæ.*

1. DIPLAZIUM PLANTAGINEUM, Sw.

Diplazium plantagineum, Sw. Syn. Fil. p. 91, t. 2, f. 4; Willd. Spec. Pl. 5, p. 351;

Gaud. Bot. Freyc. Voy. p. 322.

D. acuminatum, Raddi, Plant. Brasil. p. 41, t. 57, f. 2.

HAB. Organ Mountains, Brazil.

The plant is tufted, and has a smooth, slender, and slightly angular stipe, sulcate in front, from 8 to 10 inches long, with a few short and blackish scales at the base. Fronds simple, smooth on both sides, oblong-lanceolate, acuminate; the margin at the base crenate, towards the point serrate.

* * *Fronde pinnatæ.*

2. DIPLAZIUM PROLIFERUM, Sp. Nov.

D. caespitosum; stipitibus semiteretibus hinc sulcatis pubescentibus; frondibus membranaceis glabris elongato-lanceolatis pinnatis; pinnis alternis horizontalibus oblongo-lanceolatis obtuse serratis basi truncato-auriculatis, inferioribus petiolatis, summis confluentibus; rhachi prolifera cum costa pubescente; indusiis membranaceis angustis.

HAB. Tahiti, Society Islands: in mountain forests; rare.

Stipes 8 to 10 inches long, rather slender, *semiterete*, *sulcate* in front, slightly *pubescent*. *Fronde* smooth on both sides, *membranaceous*, of an *elongated lanceolate* form, and *pinnate*. *Pinnæ* *alternate*, about 2 inches long and 6 to 8 lines broad, *oblong-lanceolate*, and sometimes slightly acuminate, the margin *bluntly serrate*, the base *truncate*, the superior angle partially *auriculate*; *inferior* ones seated on a short *petiole*, while towards the point they become sessile and *confluent*. *Rhachis* and *costa* covered with a short brown *pubescence*; the former producing a *proliferous* scaly bud, within two inches of the point of the frond. The venules on the upper surface along the margin of the pinnæ are elevated and pale, and appear as if beset with appressed hairs. *Indusium* *membranaceous*, *narrow*, and only double on the lower and exterior venules.

The claim of this to rank as a *Diplazium* rests entirely on the lower and exterior venules bearing double sori; the other veinlets producing only a single sorus, as in *Asplenium*.

3. DIPLAZIUM BULBIFERUM, Sp. Nov. (Tab. 18.)

D. rhizomate brevi repente; stipitibus angulatis hinc sulcatis glabris basi paleaceis; frondibus subcoriaceis ovato-oblongis acuminatis pinnatis; pinnis petiolatis apicem versus confluentibus alternis adscendentibus elongato-lanceolatis inciso-lobatis acuminatis basi obliquis cuneatis, lobis subrotundis dentatis; rhachi prolifera; soris plurimis; indusiis membranaceis linearibus integerrimis.

HAB. Feejee Islands: in the vicinity of Sandalwood Bay.

Rootstock short, black, and *creeping*. *Stipes* a foot long, about the thickness of a crowquill, *smooth* and *angular*, with a shallow *furrow* in front, *chaffy* at the base with a number of long and slender black scales. *Fronde*s a little longer than the stipes, *subcoriaceous*, *ovate-oblong*, *acuminate*, and *pinnate*. *Pinnæ* at the base rather distant and *petiolate*, becoming *confluent towards the apex*, smooth on both sides, the upper surface of a dark green colour and shining, from 3 to 4 inches long, and about 6 lines broad, contracting into a sharply serrate point; the rhachis producing in the axils of the upper pinnæ one or two *proliferous buds*, at a distance of 3 or 4 inches below the point. *Indusium* linear, entire, membranaceous, only *binate* or *double* on the lower and exterior venules.

The nearest relationship of this species appears to be with *D. alternifolium* of Blume; whose description is too short for us to say how far the two plants really differ.

PLATE 18.—Fig. 1. Frond, of the natural size. 1 *a*. Cross section of the stipe. 1 *b*. Scale from the base of the stipe. 1 *c*. Section of a pinna, showing a *binate* indusium. 1 *d*. Sporangium.—The details more or less magnified.

* * * *Fronde*s pinnatæ, pinnis pinnatifidis.

4. DIPLAZIUM CONGRUUM, Sp. Nov. (Tab. 18.)

D. stipitibus semiteretibus hinc sulcatis paleaceo-hirsutis; frondibus mem-

branceis glabris oblongo-lanceolatis acuminatis pinnatis; pinnis sessilibus alternis oblongo-lanceolatis acuminatis pinnatifidis, laciniis oblongis obtusis crenatis; rachis costa venisque paleaceo-hirsutis; soris obliquis; indusio membranaceo.

HAB. Samoan and Feejee Islands: in moist forest lands.

Stipes slender, from 10 to 12 inches long, *half round*, with 2 to 3 shallow *furrows in front*, and *hirsute* (in a recent state) with slender, shrivelled, reticulated *paleæ*. *Fronde oblong-lanceolate* in circumscription, *pinnate*, with an *acuminate*, pinnatifid point, its consistency tending to *membranaceous*. *Pinnæ* at the base of frond rather distant, *sessile and alternate, oblong-lanceolate*, acuminate, deeply *pinnatifid*, their points entire or serrate. *Segments oblong, obtuse, subfalcate, crenate*; the sinus rounded at base. *Rachis, costa, and veins*, with brown, chaffy, *hirsute* scales. *Sori* short, *oblique*, and crowded. *Indusium membranaceous*, brown, usually simple, only *binate* on the lower and exterior venules.

This species is evidently related to *D. tomentosum* of Blume; judging from his description.

PLATE 18.—Fig. 2. Frond, of the natural size. 2 *a*. Cross section of the stipe. 2 *b*. Scale from the stipe. 2 *c*. Section of a pinna, showing a *binate* indusium. 2 *d*. Sporangia.—The details more or less magnified.

5. DIPLAZIUM SHEPHERDI, Presl.

Diplazium Shepherdii, Presl, Tent. Pterid. p. 114.

Asplenium ambiguum, Raddi, Plant. Brasil. p. 38, t. 54.

HAB. Organ Mountains, Brazil.

Raddi's figure of *Asplenium ambiguum* is a good outline representation of our plant: his placing the species in *Asplenium*, shows that he did not detect the *binate* sori on the lower and exterior venules.

6. DIPLAZIUM FALCATUM, Sp. Nov.

D. stipitibus angulatis hinc sulcatis lævibus; frondibus glabris membranaceis bipinnatis; pinnis alternis divergentibus, inferioribus distantibus petiolatis pinnatis, summis sessilibus coadunatis profunde pinnatifidis; pinnulis laciniisve oblongo-lanceolatis vel oblongis obtusis falcatis grosse serratis, serraturis dentatis; rhachi lævi sulcata; soris elongatis decussatis; indusio membranaceo.

HAB. Island of Tutuila, Samoan Group: in forests, near Pago-pago Bay.

Fronde glabrous, membranaceous, rather lax in habit, 2 feet and upwards in length, from 12 to 14 inches broad, in circumscription ovate-oblong-acuminate, smooth on both sides, bipinnate at the base; the inferior divergent pinnæ, distant and petiolate, while towards the apex they are sessile, and only deeply pinnatifid, becoming confluent in the acuminate point. Pinnules or lobes one to 1½ inches in length, oblong-lanceolate or oblong, obtuse, the margin coarsely and deeply serrated, the points of the serratures sharply toothed. Stipe and rhachis smooth, angled, sulcate in front. Sori elongated, decussate. Indusium membranaceous.

Distinguished from the preceding species by its larger fronds, bipinnate at the base, and by the oblong-lanceolate, falcate, and coarsely serrate pinnules.

* * * * *Fronde bipinnatæ, pinnulis pinnatifidis.*

7. DIPLAZIUM ARBORESCENS, Sw.

Diplazium arborescens, Sw. Syn. Fil. p. 92; Willd. Spec. Pl. 5, p. 354; Hook. & Arn. Bot. Beech. Voy. p. 74.

HAB. Tahiti, Society Islands. Samoan and Feejee Islands; where it abounds.

Willdenow's description of this species is pretty full, and includes all the essential characteristics of our plant.

8. *DIPLAZIUM MELANOCALON*, Sp. Nov.

D. stipitibus nigris lævibus angulatis; frondibus glabris bipinnatis; pinnis oblongo-lanceolatis attenuatis; pinnulis alternis sessilibus lanceolatis acuminatis pinnatifidis basi truncato-cuneatis supra atroviridibus subtus pallidis, laciniis oblongis falcatis subacutis serrulatis; rhachi communi flexuosa; soris brevibus decussatis.

HAB. Ovolau, Feejee Islands.

Fronde large, 4 to 5 feet long, the divisions spreading, *smooth* on both sides, of a much paler colour on the under than upper surface, *bipinnate*. *Pinnæ oblong-lanceolate, attenuating* into a sharply serrate point. *Pinnules alternate and sessile, lanceolate, acuminate, pinnatifid; the base truncate-cuneate. Segments oblong, falcate, subacute, serrulate. Stipes and rhachis smooth and angular, of a dull black colour; the main rhachis flexuose. Sori short, decussate.*

In habit and general aspect this very much resembles the *D. arborescens* of Swartz; but it is readily distinguished by its black, angular stipe, its flexuose rhachis, and by the sharper and more attenuated primary divisions of the fronds.

9. *DIPLAZIUM ARNOTTII*.

D. stipitibus lævibus angulatis hinc sulcatis; frondibus glabris bipinnatis; pinnulis subremotis patentibus lanceolatis acuminatis pinnatifidis, laciniis ovato-oblongis subfalcatis obtusis crenato-lobatis; soris plurimis obliquis; indusio sæpe binato.

Asplenium diplazioides, Hook. & Arn. Bot. Beech. Voy. p. 107.

HAB. Sandwich Islands; frequent.

We have little doubt that this is the *Asplenium diplazioides* of the authors of the Botany of Beechey's Voyage. The species is a handsome one, with a habit much like that of *D. arborescens* of Swartz, and the plant altogether is as large as that showy species. The lower and exterior venule of the segments usually produces a binate indusium.

10. DIPLAZIUM SPECIOSUM, Sp. Nov.

D. frondibus magnis bipinnatis glabris supra nitidis; pinnis oblongis acuminatis; pinnulis alternis, inferioribus subpetiolatis, superioribus sessilibus confluentibus, omnibus oblongo-lanceolatis acuminatis lobato-dentatis basi truncato-cuneatis, lobis latis truncatis dentatis; rhachi cum costa laevi supra sulcata; venulis oblique parallelis, infimis tantum soros binatos gerentibus; indusio angusto lineari lacero.

HAB. Island of Savaii, Samoan Group.

Fronde bipinnate, 6 to 8 feet long, glabrous, shining above; the divisions rather distant and spreading, the primary ones terminated by a long, narrow, acuminate point. Pinnules alternate, spreading at right angles with the secondary rhachis; the lower ones on a short petiole; towards the point they become sessile and confluent; they are usually 3 inches long, by 8 lines broad, oblong-lanceolate, acuminate, the point serrate, the margin lobate-dentate, with a somewhat truncate-cuneate base; the lobes short, broad, and truncate. Rhachis and costa on the posterior side smooth and rounded, while in front the former is furnished with a double, the latter with only a single groove. Venules obliquely parallel: the lower opposite pair of each fascicle terminate in the base of the narrow sinus, and bear on their sides binate sori; the outer venules bear a simple sorus only. Indusium narrowly linear, lacerate on the margin.

This is a very handsome, and, so far as we can ascertain, an undescribed species. Its nearest affinity is, we think, with the *D. dilatatum* of Blume.

51. ASPLENIUM, *Linn., J. Sm.*

(CÆNOPTERIS, Berg. DAREA, Willd. ACROPTERIS, Link. ATHYRIUM, Roth. ALLANTODIA, Sp. R. Br.)

The genus *Darea* of Jussieu and Willdenow includes a number of species, the ultimate divisions or laciniae of whose fronds are so narrow as to bear only one sorus; and Mr. Brown has already observed, that it cannot with propriety be separated from *Asplenium*. In this opinion he is followed by Mr. J. Smith, who retains *Darea* as a group under *Asplenium*; and includes in another group the genus *Athyrium* of Roth and species of *Allantodia* of Brown, whose principal distinction consists in their vaulted, short, cylindrical, sometimes curved indusium. Presl retains *Athyrium* as a genus, including also under it some species of *Allantodia* of Brown, and places it in *Aspleniaceæ*, under his second section, *Blechnaceæ*, which, certainly, is not the most natural association for it.

§ 1. ASPLENIUM VERUM, J. Sm.

* *Frondes integræ vel lobatæ.*

1. ASPLENIUM CRENULATUM, *Presl.*

Asplenium crenulatum, Presl, Tent. Pterid. p. 106.

A. Brasiliensis, Hort.

A. Nidus, Raddi, Plant. Brasil. p. 34, t. 53, non Linn.

HAB. Organ Mountains, Brazil: epiphytic on trees.

In habit, size, and form of its fronds this has very much the appearance of *A. Nidus* of Linnæus, the *Thamnopteris Nidus* of this work; but it is readily distinguished from that species by the margin of the fronds being crenate and decurrent on a stipe of from 5 to 6 inches in length, at the same time, the points of the lines of sori approach closer to the margin.

2. ASPLENIUM FEEJEENSIS, Sp. Nov. (Tab. 19.)

A. frondibus stipitatis membranaceis glabris elongato-lanceolatis attenuatis apice obtusis proliferis margine subrepandis; stipite basi costaque subtus squamosis; venis furcatis; indusio angusto-lineari integerrimo.

HAB. Feejee and Samoan Islands: on trees and moist rocks.

Stipe angular, about a span long, *squamosæ at the base*; the *costa* on the under side chaffy, with short, scattered, attenuate, reticulated scales, their margin sometimes spinulose-dentate. *Fronde* 1½ feet in length and from 2½ to 3 inches broad, *smooth, membranaceous*, and somewhat flaccid, *elongated-lanceolate*, and narrowing gradually into an obtuse *proliferous point*, the *margin* very *slightly repand*. *Veins usually forked*, seldom simple; the *venules* slender, oblique, and parallel. *Sori* rather distant, and almost invariably produced on the upper half of the frond, the outer points of the lines of *sori* terminating about the same distance from the margin as the inner point is from the *costa*. *Indusium narrowly linear, entire*, and persistent.

This seems to be related to the *A. squamulatum* of Blume.

PLATE 19.—Fig. 1. Frond, of the natural size. 1 *a*. Scale from under side of the *costa*. 1 *b*. Sporangium.—Magnified.

3. ASPLENIUM AMBOINENSE, Willd. (Tab. 19.)

A. rhizomate repente; stipite brevi squamoso; frondibus coriaceis glabris lanceolatis breviter acuminatis basi attenuatis in stipitem decurrentibus marginibus subrevolutis, costa juxta apicem prolifera; venis obliquis parallelis simplicibus rariusve furcatis; soris approximatis; indusio coriaceo integerrimo.

Asplenium Amboinense, Willd. Spec. Pl. 5, p. 303.

HAB. Ovolau, Feejee Islands: on rocks and trunks of trees, at an altitude of 2,000 feet.

Rootstock creeping, about the thickness of a goosequill, and with the *short stipe* closely covered with black, acuminate, finely reticulated *scales*. *Fronde*s scattered and erect, one to 2 feet long, by one to 2 inches broad, *smooth, coriaceous, lanceolate, attenuated* at the base; while near the point on one side is a sinus, with a proliferous bud at its base, arising from the side of the costa, beyond which the frond terminates in a short tail-like *acumination*, about half an inch in length. *Sori approximate*, and commonly occupying only the upper half of the frond, but sometimes continuing down to the base, the sporangia becoming confluent. *Indusium coriaceous, entire*.

PLATE 19.—Fig. 2. Fronds, of the natural size. 2 *a*. Section of a frond, showing the proliferous bud at the point. 2 *b*. Section of a frond, showing the indusium. 2 *c*. Scale from the base of the stipe. 2 *d*. Sporangium. 2 *e*. Sporules.—The details more or less magnified.

4. ASPLENIUM PALMATUM, Lam.

Asplenium palmatum, Lam. ex Sw. Syn. Fil. p. 75; Willd. Spec. Pl. 5, p. 306; Kaulf. Enum. Fil. p. 166.

HAB. Island of Madeira: in woods, near St. Anna.

This well-known and very beautiful Fern was found in great abundance by us, in moist, shady places.

* * *Fronde*s pinnatæ.

5. ASPLENIUM PULCHELLUM, Raddi.

Asplenium pulchellum, Raddi, Plant. Brasil. p. 37, t. 52, f. 2; Gaud. Bot. Freyc. Voy. p. 315.

HAB. Estrella Pass, Organ Mountains, Brazil: terrestrial in humid places.

This has a short and erect rootstock, bearing a tuft of pinnate fronds, 3 to 4 inches high.

6. *ASPLENium SEMICORDATUM, Raddi.*

Asplenium semicordatum, Raddi, Plant. Brasil. p. 36, t. 52, f. 1.

HAB. Organ Mountains, Brazil.

All our specimens of this are very young, yet far enough advanced to enable us to identify it as Raddi's plant.

7. *ASPLENium RESECTUM, Sm.*

Asplenium resectum, Sw. Syn. Fil. p. 80; Willd. Spec. Pl. 5, p. 322; Hook. & Grev. Ic. Fil. t. 114; Hook. & Arn. Bot. Beech. Voy. p. 106.
A. inæquilaterale, Bory, in Willd. Spec. Pl. 5. p. 322.

HAB. Feejee, Sandwich, and Society Islands: frequent.

The figure of this in the *Icones Filicum* is smaller than our specimens from the Society and Sandwich Islands; otherwise, the outline and general character of the species are well represented.

8. *ASPLENium TENERUM, Sw.*

Asplenium tenerum, Sw. Syn. Fil. p. 78 & 266; Willd. Spec. Pl. 5, p. 317; Hook. & Arn. Bot. Beech. Voy. p. 74.

HAB. Samoan Islands. Tahiti, Society Islands: frequent.

9. *ASPLENium SALICIFOLIUM, Linn.?*

Asplenium salicifolium, Linn.? ex Willd. Spec. Pl. 5, p. 313; Raddi, Plant. Brasil. p. 35, t. 50.

HAB. On the Corcovado, and Organ Mountains, Brazil: on wet rocks, by margins of streams.

We are satisfied that this is the *A. salicifolium* of Raddi, but doubt its being that of Linnæus. At least, the *Lonchitis glabra major*, t. 27, of Plumier's Pl. Amer. seems to be very distinct from that represented by Raddi, who also quotes Plumier with a doubt, and by mistake cites the wrong plate (17).

10. ASPLENIUM PAVONICUM, Sp. Nov. (Tab. 20.)

A. caespitosum; stipite nigro nitente semitereti parce muricato; frondibus oblongo-linearibus pinnatis; pinnis subsessilibus membranaceis oblongis obtusis crenato-serratis basi inferne truncato-cuneatis superne semi-auriculatis; rhachi apice prolifera; indusiis lineari-oblongis integerrimis.

HAB. Sandwich Islands: in shady, humid forests; rare.

Rootstock short and fibrous. *Stipe half round*, from 3 to 4 inches long, *black and shining*, with two angles in front, and a few sparse, short and hard, *spinulose points* on the surface. *Fronde caespitose*, 8 to 10 inches in length, *oblong-linear*, in a young state attenuating towards the point, truncate at the base, *pinnate*. *Pinnæ subsessile, membranaceous*, crowded, from 8 to 10 lines long and 4 lines broad, *oblong, obtuse*, the superior and outer inferior half *crenate-serrate*, the base unequal, the *superior half truncate and auriculate*, inferior one *cuneate* and entire, the lower one or two pairs of pinnæ a little deflexed. *Rhachis proliferous at the apex*. Sori from 6 to 9 on a pinna, with a brown, plane, *entire, linear-oblong indusium*.

From *A. tenerum*, this is distinguished by the black and spinulose stipe, and the narrower fronds, rooting at the apex, with fewer and shorter sori.

PLATE 20.—Fig. 1. Plant, of the natural size. 1 *a*. Pinna, showing the indusium. 1 *b*. Sporangia.—The details magnified.

11. ASPLENIUM MARINUM, Linn.

Asplenium marinum, Linn. ex Sw. Syn. Fil. p. 67; Willd. Spec. Pl. 5, p. 318.

HAB. Island of Madeira: on rocks and in caves, along the sea-coast, near Porto Dolgada.

12. ASPLENIUM ANCEPS, *Soland.*

Asplenium anceps, Soland. ex. Hook. & Grev. Ic. Fil. t. 195.

HAB. Pico Ruivo, island of Madeira.

13. ASPLENIUM MENZIESII, *Hook. & Grev.*

Asplenium Menziesii, Hook. & Grev. Ic. Fil. t. 100. (opt.)

HAB. Sandwich Islands: in forests, island of Hawaii; rare.

14. ASPLENIUM MONANTHEMUM, *Sm.* (Tab. 20.)

Asplenium monanthemum, Sm. ex Sw. Syn. Fil. p. 80; Willd. Spec. Pl. 5, p. 322.

HAB. Island of Madeira, near St. Anna: in woods. Sandwich Islands, on East Maui: on the margin of a crater.

In many of our specimens, from both localities, a small scaly bulb is present on the stipe, a short distance below the inferior pair of pinnæ, from which spring one or two fronds: by a declination of the stipe, these bulbs throw out roots into the ground, and a new plant is thus formed. The plants from the two countries are in all respects similar: that figured is from the Sandwich Islands.

PLATE 20.—Fig. 2. Plant, of the natural size. 2 *a.* A pinna; magnified.

15. ASPLENIUM DENSUM, Sp. Nov. (Tab. 20.)

A. stipite brevi atro nitente; frondibus erectis linearibus pinnatis; pinnis articulatis subsessilibus ovatis seu ovato-oblongis basi truncato-cuneatis;

rhachi alato-marginata; venis immersis furcatis; indusio lato membranaceo lacero.

HAB. Sandwich Islands; on Mouna Loa and Mouna Kea, island of Hawaii; also Mouna Haleakala, East Maui: at an altitude of 8,000 to 10,000 feet. Obrajillo, Andes of Peru.

Plant tufted; the rootstock short and scaly, with many slender, wiry, black, rootlets. *Fronde erect*, numerous, *linear*, from 3 inches to a foot high, with *ovate or ovate-oblong*, coriaceous, crenate, and *nearly sessile pinnæ, articulated* on a short petiole, and falling off at an advanced age, having a denuded, asperous, *winged rhachis*, which, together with the *stipe*, is *black and shining*; the latter varying from one to 4 inches in length. *Veins* immersed, so as not to be visible to the naked eye, *forking* near the costa. Sori from 6 to 8 on a pinna. Sporangia in an advanced state becoming confluent. *Indusium broad, membranaceous, lacerated.*

This differs from the *A. Trichomanes* of Linnæus only in its winged rhachis and fewer sori.

PLATE 20.—Fig. 3. Portion of a plant, of the natural size. 3 a. Portion of the frond; magnified.

16. ASPLENIUM SIMILE, *Blume?*

Asplenium simile, Blume, Enum. Plant. Jav. 2, p. 181?

HAB. Mount Maijajai, Luzon, Philippine Islands.

This has a stipe 6 inches long, smooth and round, about the thickness of a crowquill at the base. Fronds somewhat over a foot in length, oblong-lanceolate, acuminate, pinnate. Pinnæ alternate, petiolate, coriaceous, glabrous, $3\frac{1}{2}$ inches long and 5 lines broad, elongated-lanceolate, with a very long acuminate point; the base unequal and cuneate; the margin sharply serrate. Rhachis semiterete, and somewhat angular in front. Costa prominent on the upper side. Sori numerous, oblique and decussate.

Although we have affixed the mark of doubt, our plant corresponds to Blume's description : still, in the absence of a more detailed account, or a figure of his plant, we cannot be perfectly assured.

17. ASPLENIUM PROTENSUM, *Kaulf.*

Asplenium protensum, Kaulf. Enum. Fil. p. 167.

HAB. Sandwich Islands ; on Oahu and Hawaii.

This species has a stipe of about 8 inches in length, smooth, angular, and of a dark brown colour, with a broad and shallow channel in front. Fronds 12 to 15 inches long, pinnate. Pinnæ $1\frac{1}{2}$ inches distant, subalternate, petiolate, smooth, coriaceous, 3 or 4 inches long and 5 or 6 lines broad, lanceolate and attenuate ; the inferior ones crenate ; the superior serrate ; the base unequal and cuneate, its upper side frequently rounded : petiole compressed and decurrent on the rhachis, its posterior side round, with a narrow channel in front. Sori long, oblique and parallel ; the pale entire indusium in an advanced state becoming reflexed ; the sporangia then confluent.

18. ASPLENIUM ENATUM, Sp. Nov. (Tab. 21.)

A. stipite lævi angulato ; frondibus glabris pinnatis ; pinnis petiolatis alternis distantibus membranaceis oblongo-lanceolatis inæqualiter serratis basi oblique cuneatis ; rhachi costaque proliferis ; soris obliquis remotis ; indusio angusto-lineari integerrimo.

HAB. Sandwich Islands : on the Kaala Mountains, Oahu.

Whole plant rather flaccid. *Stipe* 10 to 12 inches long, somewhat angular, smooth. *Fronds* $1\frac{1}{2}$ feet long, smooth, simply pinnate. *Pinnæ* alternate, on a short *petiole*, the lower ones distant, towards the apex a little more approximate, membranaceous, 3 to $3\frac{1}{2}$ inches long, by 6 to 8 lines broad, oblong-lanceolate, bluntly and irregularly serrate ; the base unequal and cuneate, the superior half semitruncate. Point of the *rhachis* and *costa* on the upper side *proliferous*. *Sori* distant, oblique,

and confined to the upper half of the frond. *Indusium narrowly linear, entire.*

This is very distinct from the preceding species, in the membranaceous and serrate pinnæ, broader at the base, with a proliferous costa and distant sori. Its affinity is perhaps closer to the following.

PLATE 21.—Fig. 1. Frond, of the natural size. 1 *a*. Section of a pinna, showing the indusium. 1 *b*, 1 *b*. Sporangia.—The details magnified.

19. ASPLENIUM OBLIQUUM, *Forst.*

Asplenium obliquum, Forst. ex Sw. Syn. Fil. p. 78 & 268; Willd. Spec. Pl. 5, p. 315; A. Rich. Bot. Voy. Astrol. p. 72.

A. lucidum, Forst. ex Sw. Syn. Fil. p. 78 & 269; Willd. Spec. Pl. 5, p. 315.

HAB. Sandwich Islands; frequent. Vicinity of the Bay of Islands, New Zealand: in forests.

This we believe to be the most variable species belonging to the present group of *Asplenium*. In the Sandwich Island plant the pinnæ vary in form from rhomboid to nearly trapezoid, and are about 4 inches long and 2 inches broad; thence passing through a number of intermediate forms to linear-lanceolate and attenuate, then 6 inches long, by 6 lines broad: in many instances, the superior half of the base is acutely auriculate. Some of these forms are quite membranaceous, and the margin serrate only towards the point, the base usually unequal and cuneate. The fronds are from 18 inches to 4 feet long: stipes about half that length, smooth, naked, rather stout for their length, and sulcate in front, with a tuft of lanceolate, lacerated, reticulated scales at the base. Sori sometimes distant; but occasionally an evident disposition is shown to produce double or binate sori, as in *Diplazium*. The New Zealand plant agrees with Swartz and Willdenow's description of *A. obliquum*.

A. Richard has already united to this the *A. lucidum* of Forster, and we believe correctly; as forms of the present species are to be found which answer to the character of both.

20. ASPLENIUM SCLEROPRIUM, *Montagne*.

Asplenium scleroprium, Montagne, Crypt. Bot. Voy. Astrol. & Zelee, 1844, t. 1, f. D.

HAB. Lord Auckland Islands.

The pinnæ of this are more crowded than in *A. obliquum*, and of a lanceolate, acuminate, subfalcate form, unequal and cuneate at the base, with short sori and confluent sporangia. The margins of the pinnæ in our specimens are not so regularly biserrate as represented in the figure.

21. ASPLENIUM OBTUSATUM, *Forst.*

Asplenium obtusatum, Forst. ex Sw. Syn. Fil. p. 78 & 267; Willd. Spec. Pl. 5, p. 317; R. Br. Prodr. Fl. Nov. Holl. p. 150; A. Cunn. in Hook. Comp. to Bot. Mag. 2, p. 364; Montagne, Crypt. Bot. Voy. of the Astrol. & Zelee, 1844, t. 1, f. B.

HAB. Lord Auckland Islands.

The *A. apicedentatum* of Montagne appears to be merely a variety of the present species, differing from it only by a slight contraction of the pinnæ into an apiculate tooth.

22. ASPLENIUM DISTANS, Sp. Nov.

A. frondibus glabris membranaceis pinnatis; pinnis divaricatis alternis remotis lineari-lanceolatis attenuatis serrulatis basi inæqualibus cuneatis; rhachi hinc sulcata; venis simplicibus furcatisve divaricatis; soris approximatis confluentibus; indusio lineari coriaceo integerrimo recurvo.

HAB. Island of Savaii, Samoan Group.

Stipe not preserved. *Fronde* large, smooth, membranaceous, and somewhat flaccid, simply pinnate. *Pinnæ* 6 inches long and 8 lines broad, the inferior ones petiolate, towards the point sessile, rather remote,

alternate, divaricate, linear-lanceolate, acuminate and serrulate, the base unequal and cuneate, the inferior half often slightly rounded. Rhachis naked, sulcate on the upper side. Veins thickish, of a pale claret-colour, mostly simple, but occasionally forking near the costa. Sori approximate, in an advanced stage becoming confluent and concealing nearly the whole of the under surface of the pinnæ, the costa and half a line in breadth at the margin only being naked. Indusium narrow, recurved, black, coriaceous, entire.

The affinity of this with the species immediately preceding is certainly very remote, but in the grouping of a limited number of species of a large genus, such associations will occur. We are at a loss to decide to what known species the present plant is most related.

§ 2. ACROPTERIS, Link, J. Sm.

* *Frondes pinnatæ.*

23. ASPLENIUM FLABELLIFOLIUM, Cav.

Asplenium flabellifolium, Cav. ex Sw. Syn. Fil. p. 81 & 273, t. 3, f. 2; Willd. Spec. Pl. 5, p. 333; R. Br. Prodr. Fl. Nov. Holl. p. 150; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 364.

HAB. Vicinity of Port Jackson and Puen Baen, New South Wales. New Zealand, near Manawa Bay; in crevices of rocks: also in the interior of the Northern Island; among decomposed lava.

Remarkable for its rambling habit, flabelliform pinnæ, and the attenuated filiform rhachis, rooting at the point.

24. ASPLENIUM RHOMBOIDEUM, Sp. Nov. (Tab. 21.)

A. stipite filiformi prolifero; frondibus glabris membranaceis lineari-lanceolatis pinnatis; pinnis ovato-rhombeis bipartitis integrisve basi inæqualibus cuneatis, segmentis ovato-cuneatis crenatis; rhachi hinc sulcata; venis ramosis; indusio lineari-oblongo plano stramineo integerrimo.

HAB. Baños, Andes of Peru : in crevices of rocks.

Stipe prostrate, *filiform*, *proliferous*, and dichotomous, 4 to 6 inches long, of a sooty-brown colour. *Fronde*s about a span long, *linear-lanceolate*, *pinnate*. *Pinnæ* of a livid green colour, *smooth* and *membranaceous*, subpetiolate, 5 to 6 lines long and about 4 lines broad, of a *rhombic-ovate* form, having an *unequal cuneate base*, and parted into two *ovate-cuneate segments*, the inferior one the larger, their apices irregularly *crenate*. *Rhachis sulcate*. *Veins* forked or *branching*. Sori usually two in number on the smaller, and 3 to 5 on the larger segments. *Indusium linear-oblong*, *entire*, *plane*, and of a pale *straw-colour*. Whole plant slender and of a rambling habit.

Nearly allied to the *A. triphyllum* of Presl, as figured in Hooker and Greville's *Icones Filicum*; but that is bipinnate, the fronds proliferous at the apex, and bearing a solitary sorus on each pinnule.

PLATE 21.—Fig. 2. Fronds, of the natural size. 2 a. Under side of a pinna, showing the indusium; magnified.

25. ASPLENIUM FALCATUM, Lam.

Asplenium falcatum, Lam. ex Sw. Syn. Fil. p. 77; Willd. Spec. Pl. 5, p. 325; A. Rich. Bot. Voy. Astrol. p. 73; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 364.

Var. β . ATTENUATUM: *pinnis in acumen elongatum angustum productis*. (Tab. 22.)

HAB. Samoan Islands. Tongatabu. Vicinity of the Bay of Islands New Zealand. Tahiti, Society Islands. Var. β . Feejee Islands.

This species occurs frequently on all the groups of islands in the Pacific Ocean here designated. In our var. β . *attenuatum*, the pinnæ contract gradually in a long slender point.

PLATE 22.—Fig. 1. 1 a. Section of a pinna. 1 b. Section of the

same, showing an indusium and the insertion of the sporangia. 1 *c*. Scale from base of a stipe. 1 *d*. Sporangium.—More or less magnified.

26. ASPLENIUM CONTIGUUM, *Kaulf.*

Asplenium contiguum, Kaulf. Enum. Fil. p. 172; Hook. & Arn. Bot. Beech. Voy. p. 106.

HAB. Sandwich Islands.

The stipe of this is semiterete, sulcate in front, smooth, and from 6 to 8 inches long. Fronds nearly twice the length of the stipe, and pinnate. Pinnæ 2 to 2½ inches long, subpetiolate, striate, linear-lanceolate, attenuate, with an inciso-serrate margin, the serratures dentate, the superior base roundly cuneate or auriculate, the inferior half as if cut off and attenuate. Rhachis frequently bearing a few slender paleæ. Sori contiguous to and nearly parallel with the almost evanescent costa.

Very closely allied to the *A. falcatum* of Lamarck, and only distinguished from it by the more direct and narrower pinnæ, and the sori more parallel with the costa. It is very distinct from *A. horridum*, Kaulf., of which Gaudichaud considered it only a variety.

27. ASPLENIUM FILIFORME, *Kaulf.*

Asplenium filiforme, Kaulf. Enum. Fil. p. 172; Hook. & Arn. Bot. Beech. Voy. p. 106.

HAB. Maui, Sandwich Islands.

This differs from the preceding species only in its longer and narrower, lanceolate-linear, attenuate, and even setaceous pinnæ.

28. ASPLENIUM HORRIDUM, *Kaulf.*

Asplenium horridum, Kaulf. Enum. Fil. p. 173; Hook. & Arn. Bot. Beech. Voy. p. 106.

HAB. Sandwich Islands: frequent.

In this we have a very robust and coarse plant, with a nearly round stipe, having a shallow groove in front, from 8 to 10 inches long, about the thickness of a swan's quill, and, together with the rhachis, densely rufous-hirsute. Fronds $2\frac{1}{2}$ to 4 feet long, rigid, coriaceous, and pinnate. Pinnæ approximate, from 4 to 7 inches long by 6 lines broad, linear-lanceolate, attenuate, inciso-lobate; the lobes oblong and crenate at the apex, the lower and superior one the broadest. Almost all the sori are contiguous to and parallel with the costa; in the latter particular resembling the *A. serra* of Langsdorff and Fischer; while, in the form and division of the pinnæ its affinity is more with the *A. caudatum* of Forster.

* * *Frondes bipinnatae.*

29. ASPLENIUM MACRAEI, *Hook. & Grev.*

Asplenium Macraei, Hook. & Grev. Ic. Fil. t. 217.

HAB. Sandwich Islands: in open and dry mountain ridges.

In our numerous specimens of this species we find the fronds in general to be longer, and not so broadly lanceolate, as represented in the Icones Filicum.

30. ASPLENIUM TRIPHYLLUM, *Presl.*

Asplenium triphyllum, Presl, ex Hook. & Grev. Ic. Fil. t. 88.

HAB. Baños, Andes of Peru: in fissures of rocks.

A charming little species, not over 4 inches in length, with the fronds decumbent, and proliferous both at the base and apex. The plant is admirably illustrated in the Icones Filicum, above cited.

31. ASPLENIUM IMBRICATUM, *Hook. & Grev.*

A. stipitibus nudis gracilibus semiteretibus; frondibus lineari-lanceolatis

bi-tripinnatis bulbiferis; pinnis imbricatis; pinnulis cuneatis bi-tridentatis; soris plerumque solitariis.

Asplenium imbricatum, Hook. & Grev. Ic. Fil. t. 165.

HAB. Obrajillo and Culnai, Andes of Peru.

Stipes slender, 2 to 3 inches long, about the thickness of a sparrow's quill, smooth and naked, half round. Fronds 8 to 12 inches long, linear-lanceolate, bipinnate, rarely tripinnate, with a scaly bulb on the rhachis between the two inferior pinnæ. Pinnæ on a short petiole, imbricated, in outline deltoid-ovate. Pinnules from 3 to 5 in number, smooth, cuneate, and sessile, about 3 or 4 lines long, the terminal one the largest, entire, bi-tridentate. Veins simple or bi-trichotomous. Sori oblong, solitary, seldom 2 on a pinnule. Indusium membranaceous, entire, and of a straw-colour.

There is no doubt of our plant being identical with that figured in the *Icones Filicum*, notwithstanding that the authors of the species did not notice the scaly bulb on the rhachis, between the inferior pair of pinnæ; an appendage, that by accident, or some other cause, might not have been present on their specimens, but which is very evident on all of ours.

32. ASPLENIUM ATTENUATUM, Kaulf.

Asplenium attenuatum, Kaulf. Enum. Fil. p. 174.

HAB. Estrella Pass, Organ Mountains, Brazil.

There is only one perfect specimen of this rather elegant Fern in the collection; and this is somewhat larger than the plant described by Kaulfuss.

33. ASPLENIUM PSEUDO-NITIDUM, Raddi.

Asplenium pseudo-nitidum, Raddi, Plant. Brasil. p. 39, t. 55.

HAB. Organ Mountains, Brazil.

We have some doubts as to whether the *A. Martinicense* of Willdenow be specifically distinct from the present plant.

34. *ASPENIUM INSITICIUM*, Sp. Nov. (Tab. 22.)

A. stipitibus semiteretibus parce paleaceo-hirsutis; frondibus proliferis bipinnatis; pinnis petiolatis basi pinnatis vel pinnatipartitis versus apicem inciso-serratis; pinnulis glabris coriaceis obovato-cuneatis basi integris apice duplicato-dentatis; venis flabellatis, venulis furcatis; soris linearibus divergentibus; indusio integerrimo coriaceo.

HAB. Sandwich Islands: in forests.

Stipes about 12 inches long, of a dingy brown colour, *half-round*, with two ribs in front, *hirsute* with scattered slender *paleæ*, which extend to the rhachis. *Fronde* *bipinnate* at the base, and narrowing gradually into a simply pinnate point. *Pinnæ* with a *petiole* 6 lines long, alternate, ovate-oblong and acuminate, *pinnate* or *deeply pinnatifid* at the base, and terminating in an *incisely serrate* point. *Pinnules* half an inch to an inch long, *smooth*, *coriaceous*, striate on the upper surface, *obovate-cuneate* and decurrent, the rounded *point doubly-toothed*. Secondary rhachis compressed and, with the primary one, *proliferous* on the upper side near the apex. *Veins radiating* from the base of the pinnules, and *forking* once or twice before reaching the margin. *Sori* 4 to 6 on each pinnule, long, *linear*, and *diverging* from the evanescent costa. *Indusium coriaceous, entire*, of a light brown colour.

PLATE 22.—Fig. 2. 2 *a*. Under side of a pinnule. 2 *b*. Section of a pinnule, showing the indusium and insertion of the sporangia. 2 *c*. Scale from the base of a stipe. 2 *d*. Sporangia.—More or less magnified.

35. *ASPENIUM CANARIENSE*, *Bory*.

Asplenium Canariense, Bory, in Willd. Spec. Pl. 5, p. 339.

HAB. Island of Madeira; on the sea-coast, east of Funchal: in crevices of rocks.

None of our specimens of this species are more than a foot in height.

36. ASPLENIUM FURCATUM, *Thunb.*

Asplenium furcatum, Thunb. ex Sw. Syn. Fil. p. 83; Willd. Spec. Pl. 5, p. 340; Kaulf. Enum. Fil. p. 174.

Var. β . *pinnis caudato-acuminatis*.

HAB. Vicinity of Cape Town, Cape of Good Hope. Sandwich Islands. Var. β . Kaala Mountains, Oahu, Sandwich Islands.

Our variety β . with caudate-acuminate pinnae, is the extreme of various forms of the plant from the Sandwich Islands, some of which do not differ from those of the Cape of Good Hope, either in texture or in the form of the divisions of the fronds.

37. ASPLENIUM RIPARIUM, Sp. Nov.

A. stipitibus subteretibus antice trisulcatis; frondibus bipinnatis; pinnis alternis petiolatis oblongo-lanceolatis caudato-acuminatis; pinnulis coriaceis rhomboideo-oblongis acutis basi cuneatis inciso-lobatis latere superiori auriculatis, lobis lineari-oblongis inaequaliter dentatis; rhachi paleaceo-hirsuta; venis radiatis furcatis; soris angusto-linearibus; indusio coriaceo.

HAB. Mountains near Baños, Luzon, Philippine Islands.

Stipes about the thickness of a crowquill, and nearly round, with three shallow grooves in front, chaffy with scattered, short, reticulated scales, which extend to the rhachis. *Fronds* bipinnate, rather rigid, 12 to 18 inches in length, together with the pinnae oblong-lanceolate, and contracting gradually into a narrow serrate acumination. *Pinnules* numerous, coriaceous, 6 to 8 lines long, rhomboid-oblong or linear-oblong, acute, with an unequally cuneate and incisely lobed base, the lower and superior lobe the largest, irregularly and rather sharply dentate at the point. *Sori* parallel with the obscure costa, or rising

from near the base of the pinnule and diverging into the lobes. *Indusium* narrowly linear, entire, and very *coriaceous*.

This appears to be closely related to the *A. angustatum* of Blume.

38. *ASPLENIUM CRISTATUM*, Sp. Nov. (Tab. 21.)

A. stipitibus brevibus angulatis squamosis; frondibus oblongo-lanceolatis acuminatis bipinnatis; pinnis subalternis horizontalibus basi pinnatis apice inciso-serratis; pinnulis membranaceis obovato-cuneatis bifidis vel trifidis, segmentis truncato-cuneatis duplicato-dentatis; venis ramosis; soris paucis linearibus; indusio membranaceo stramineo integerrimo.

HAB. Mountains near Baños, Luzon, Philippine Islands.

Stipes short (2 to 3 inches long), of a dark brown colour, closely covered at the base with slender *scales*, which extend in a scattered manner up the rhachis. *Fronde* nearly a foot long, of a beautiful deep green colour, and, with the slightly petiolate pinnæ, *oblong-lanceolate*, contracting rather suddenly into a sharply *serrate point*. *Pinnules membranaceous*, 8 to 10 in number, 4 to 6 lines long, *obovate-cuneate*, the inferior pair *trifid*, or externally *bifid*; the divisions or segments *truncate-cuneate*, *doubly toothed*, the teeth rather sharp. *Sori* one or two on each segment, with a straw-coloured *linear, entire, membranaceous indusium*.

Manifestly allied to the *A. cuneatum* of Lamarek; but distinguished by the pinnules being more deeply divided.

PLATE 21.—Fig. 3. A frond of the natural size. 3 a. Under side of a pinnule, showing the indusium; magnified.

39. *ASPLENIUM CUNEATUM*, Lam.

Asplenium cuneatum, Lam. ex. Sw. Syn. Fil. p. 84; Willd. Spec. Pl. 5, p. 344;

Blume, Enum. Plant. Jav. 2, p. 187.

Ruta Muraria maxima, Sloane, Hist. Jam. p. 93; t. 46, f. 2.

HAB. Luzon, Philippine Islands. Feejee and Samoan Islands. Tahiti, Society Islands. Organ Mountains, Brazil.

The plants from these various localities are in no way different from each other.

40. *ASPLENIUM ACUMINATUM*, Hook. & Arn.

Asplenium acuminatum, Hook. & Arn. Bot. Beech. Voy. p. 106.

HAB. Sandwich Islands; abundant on high mountains behind Honolulu, Oahu.

The fronds of this, with the stipe, are from 2 to 3½ feet long, bipinnate, with elongated-lanceolate and very much acuminate pinnæ. The numerous pinnules are subject to great variation in their size and form; being sometimes lanceolate, acute, and incisely-pinnatifid, about 1½ inches long, the superior base subauriculate; or lanceolate and dentate-serrate, cuneate at the base, and less than an inch in length. Both forms are striate-venose on the upper surface. Sori parallel and a little oblique with the obscure costa.

41. *ASPLENIUM PATENS*, Kaulf.

A. stipitibus semiteretibus paleaceo-hirsutis; frondibus bipinnatis; pinnis alternis patentibus; pinnulis membranaceis oblongo-lanceolatis acutis pinnatifidis, laciniis oblongis cuneatis apice inciso-dentatis, singulis soros 2-4 oblongos gerentibus.

Asplenium patens, Kaulf. Enum. Fil. p. 175; Hook. & Arn. Bot. Beech. Voy. p. 106.

HAB. Sandwich Islands: on mountains behind Honolulu, Oahu.

Stipes about a foot long, half round, sulcate in front, and with the rachis paleaceous-hirsute. *Fronds* linear-oblong, bipinnate, a little lax in their habit, 1½ to 2 feet long, the pinnæ alternate and spreading. *Pinnules* membranaceous, oblong-lanceolate, acute, pinnatifid, one to 1½ inches in length; the lobes oblong-cuneate, incisely toothed at the apex. *Sori* oblong, 2 or 3, sometimes 4 on a segment or lobe.

The paleæ on the stipe and rhachis are rather fugacious, and may not have been present on the single specimen examined by Kaulfuss, as neither he nor the authors of the Botany of Beechey's Voyage have noticed them.

42. ASPLENIUM MAGELLANICUM, *Kaulf.*

Asplenium Magellanicum, Kaulf. Enum. Fil. p. 175; Spreng. Syst. Veg. 4, p. 88; Hook. & Grev. Ic. Fil. t. 180.

HAB. Tierra del Fuego: in thickets of bushes, in the vicinity of Orange Harbour.

Plant cæspitose, usually about a span high, the rootlets densely coated with a rufous tomentum. Fronds deltoid-ovate, slightly acuminate, either twice or thrice pinnate, smooth, and succulent when recent. Pinnules bi-trilobate; the lobes obovate, entire, emarginate, or denticulate. Indusium semiorbicular, membranaceous.

43. ASPLENIUM ADIANTUM-NIGRUM, *Linn.*

Asplenium Adiantum-nigrum, Linn.; Sw. Syn. Fil. p. 84; Willd. Spec. Pl. 5, p. 346; Engl. Bot. t. 1950.

A. patens, Gaud. Bot. Freyc. Voy. p. 320, non Kaulf.

HAB. Hawaii, Sandwich Islands; on Mouna Loa and Mouna Kea, at an altitude of from 8,000 to 10,000 feet; growing among decomposed lava.

We are convinced, from the note of Gaudichaud, in the Botany of Freycinet's Voyage, under *A. patens*, and the synonyme adduced, that his plant was really the *A. Adiantum-nigrum* of Linnæus, the same as that now under consideration, a very distinct species indeed from the *A. patens* of Kaulfuss; which has fronds of a much larger size, more lax and open in their divisions, of a membranaceous texture, and with only one or two, seldom three sori on each lobe. The European and Sandwich Island specimens of *A. Adiantum-nigrum* do not essentially differ from each other.

* * * *Frondes tripinnatæ.*

44. *ASPLENIUM ACUTUM*, *Bory.*

Asplenium acutum, Bory, in Willd. Spec. Pl. 5, p. 347; Kaulf. Enum. Fil. p. 176.

HAB. Island of Madeira; near the summit of the Pico Ruivo.

Remarkable for the long acuminate points of the frond, and the very acute, slightly bidentate divisions.

45. *ASPLENIUM LASERPITHIFOLIUM*, *Lam.*

Asplenium laserpitiifolium, Lam. ex Sw. Syn. Fil. p. 85; Willd. Spec. Pl. 5, p. 347; Kaulf. Enum. Fil. p. 176; Gaud. Bot. Freyc. Voy. p. 321.

HAB. Samoan and Feejee Islands. Tahiti, Society Islands.

The fronds from young plants of this species might very readily be mistaken for those of *A. cuneatum*, Swartz.

46. *ASPLENIUM RACHIRHIZON*, *Raddi.*

Asplenium rachirhizon, Raddi, Plant. Brasil. p. 39, t. 56.

HAB. Organ Mountains, Brazil.

This, as Raddi has justly observed, is a very elegant species; it has a stipe about a span long and as thick as a crowquill, black, glossy, and sulcate in front. Fronds 15 to 18 inches long, glabrous and tripinnate: primary pinnæ nearly opposite, diverging, and imbricated. Pinnules 3 lines long, membranaceous, ovate, acute, bifid, or emarginate. Rhachis very much elongated, filiform, and rooting at the point. Sori short, semi-oblong, solitary on each pinnule. Indusium entire, of a pale straw colour.

* * * * *Frondes decompositæ.*

47. ASPLENIUM SCANDICINUM, *Kaulf.*

Asplenium scandicinum, Kaulf. Enum. Fil. p. 177.

HAB. Organ Mountains, Brazil: on trees and decayed wood.

The fronds of this are very graceful, flaccid, glabrous, and decom-
pound, from one to 1½ feet long; the inferior branches from three to
four times pinnate. Pinnules ovate-cuneate, incisely-dentate; each
segment bearing from one to 3 sori.

§ 3. DAREA, Willd.

* *Frondes pinnatæ.*

48. ASPLENIUM FLACCIDUM, *Forst.*

Asplenium flaccidum, Forst. Prodr. Fl. Ins. Austr. n. 426.

A. heterophyllum, A. Rich. Bot. Voy. Astrol. p. 74, excl. syn. R. Br.

Cænopteris flaccida, Sw. Syn. Fil. p. 87 & 281; A. Cunn. in Hook. Comp. Bot.

Mag. 2, p. 364.

Darea flaccida, Willd. Spec. Pl. 5, p. 295.

HAB. Vicinity of the Bay of Islands, New Zealand: epiphytical.

This species is remarkable for its smooth, pallid, coriaceous, flaccid
fronds, which are constantly pinnate; the pinnæ distant or crowded,
sometimes entire or merely dentate, but usually pinnatifid two-thirds
down to the costa; each segment bearing a single sorus.

* * *Frondes bipinnatæ.*

49. ASPLENIUM BULBIFERUM, *Forst.*

*A. stipitibus semiteretibus sulcatis squamosis; frondibus bipinnatis;
pinnis suboppositis, proliferis; pinnulis oblongis membranaceis glabris*

inciso-pinnatifidis vel serratis basi cuneatis decurrentibus, laciniis lineari-oblongis subfalcatis bi-tridentatis; soris brevibus submarginatilibus.

Asplenium bulbiferum, Forst. ex Sw. Syn. Fil. p. 84; Willd. Spec. Pl. 5, p. 345;
 A. Rich. Bot. Voy. Astrol. p. 75; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 364;
 Montag. Bot. Astrol. & Zelee (1844), t. 3, f. I.
A. laxum, Montag. Bot. Astrol. & Zelee (1844), t. 3, f. J.

HAB. Vicinity of the Bay of Islands, New Zealand: in moist and shady forests.

Stipes 10 to 15 inches in length, smooth, *half round* and *furrowed* in front, bearing narrow *chaffy scales* near their base, and together with the rhachis of a straw colour. *Fronde*s twice the length of the stipe, smooth and somewhat *membranaceous*, oblong-lanceolate, acuminate, and *bipinnate*. *Pinnæ* spreading and *subopposite* at the base, while towards the apex they are more alternately arranged; the costa proliferous on the upper side near the apex, and with short, brown, reticulated scales on the under side. *Pinnules* *oblong*, acute or obtuse, and *serrated* or *incisely pinnatifid*, the base *wedge-shaped* and *decurrent* on the costa, the lower and superior one the largest. *Segments* *linear-oblong*, somewhat *falcate* in form, and *bi-tridentate*. *Sori* *short*, somewhat *marginal*, and quite numerous on the upper half of the frond.

In the Botany of the Voyage of the Astrolabe & Zelee (1844), we find the present species figured on the same plate with a plant named *A. laxum* of R. Brown. If the latter be a correct delineation of Mr. Brown's plant, then we must unite the two species, as A. Richard, in the Botany of the Astrolabe, has already done. The slight difference, in the two figures referred to, consists in the fronds and pinnæ of *A. laxum* terminating in a short and sharp acuminate point, and perhaps in the presence of a greater number of slender paleæ on the rhachis, as well as in the absence of the proliferous buds, usually present on *A. bulbiferum*.

50. ASPLENIUM STRICTUM, Sp. Nov. (Tab. 23.)

A. stipitibus teretibus marginatis; frondibus erectis lineari-lanceolatis

bipinnatis; pinnis patentibus oblongo-lanceolatis; pinnulis oblongis obtusis falcatis integris vel bi-trifidis, infimis cum terminali profunde pinnatifidis; rhachi marginata; soris submarginalibus.

HAB. Kauai, Sandwich Islands: on open mountain ridges.

Plant tufted, from 25 to 30 fronds in a tuft. Rootstock globose and densely imbricated with slender, attenuated, black, reticulated scales. *Stipes* one to 3 inches long, and a little thicker than the quill of a sparrow, of a dull brown colour, *terete, margined*. *Fronds* 10 to 12 inches high, *erect, linear-lanceolate*, rather *rigid*, and *bipinnate* to the very apex. *Pinnæ* alternate, sessile, *spreading*, from 8 to 10 lines long, *oblong-lanceolate*, unequal at the base. *Pinnules* obovate or *oblong, obtuse*; the *lower and terminal* one the largest and *deeply pinnatifid*, outwards *bifid or trifid*; the 2 or 3 next the point *entire and falcate*. *Rhachis margined* throughout. *Sori submarginal*, solitary on the superior or inner side of the pinnules, with an *entire, oblong, or lunate*, somewhat coriaceous, straw-coloured indusium, which extends beyond the margin.

This is closely allied to the *A. (Cænopteris) rhizophyllum* of Smith. But the fronds are longer, narrower, more erect, and destitute of bulbs at the point, while the pinnules are more contracted, and the sori nearer to the margin than in that species.

PLATE 23.—Fig. 1. Plant, of the natural size. 1 *a*. Pinna. 1 *b*. Portion of a pinna, showing the indusium.—The details more or less magnified.

51. ASPLENIUM FÆNICULACEUM, *Humb. & Kunth*.

Asplenium fœniculaceum, Humboldt & Kunth, ex Hook. & Grev. Ic. Fil. t. 92.

HAB. Organ Mountains, Brazil.

All the specimens in our possession are young, yet we feel satisfied of its being the *A. fœniculaceum* of Humboldt and Kunth, as figured by Hooker and Greville.

52. ASPLENIUM FURCATUM.

A. stipitibus compressis basi paleaceis; frondibus lineari-lanceolatis bipinnatis; pinnis suboppositis pinnatipartitis, laciniis lineari-subspathulatis obtusis, infimis summisque bipartitis; rhachi compressa alata; soris submarginalibus.

Darea furcata, Willd. Spec. Pl. 5, p. 297; Blume, Enum. Plant. Jav. fasc. 2, p. 207.

HAB. Ovolau, Feejee Islands.

Rootstock long, filiform. *Stipes* 2 to 4 inches long, rather compressed and angular, chaffy with a few slender paleæ at the base, and with scattered brown hairs, which extend to the compressed winged rhachis and the segments of the young fronds only. *Fronde*s tufted, about a span long, linear-lanceolate, bipinnate. *Pinnæ* subopposite and deeply pinnatifid. *Segments* linear, obtuse, the fertile ones subspatulate, the lower and superior two-parted. *Sori* submarginal, solitary on the inner and superior half and towards the points of the segments.

* * * *Fronde*s tripinnatæ.

53. ASPLENIUM DISSECTUM, Sp. Nov. (Tab. 24.)

A. stipitibus semiteretibus rhachique sulcatis paleaceo-hirsutis; frondibus coriaceis tripinnatis; pinnulis ovato-oblongis pinnatifidis, laciniis lineari-oblongis cuneatis bi-tridentatis; soris lineari-oblongis solitariis rariusve in laciniis geminis.

HAB. Sandwich Islands; in forests, on the island of Hawaii.

Rootstock globose. *Stipes* half round, grooved in front, 8 to 10 inches long, and together with the rhachis paleaceous-hirsute. *Fronde*s coriaceous, from 15 to 18 inches long, and about 12 inches broad, constantly tripinnate; the primary divisions ovate-oblong, pinnatifid, with linear-oblong, often subfalcate and cuneate, bi-tridentate segments, 3 lines long and nearly one line broad, bearing single or seldom a pair of linear-oblong sori on each segment.

Although this is altogether a very distinct plant, yet its habit in some measure resembles the *A. patens* of Kaulfuss, from which it differs in the fronds being more deeply divided, and seldom bearing more than one sorus on a segment.

PLATE 24.—Fig. 1. Frond, of the natural size. 1 *a*. Pinnule, showing the indusium. 1 *b*. A scale, from the base of the stipe. 1 *c*. Sporangium.—All more or less magnified.

54. ASPLENIUM MULTIFIDUM, Sp. Nov. (Tab. 23.)

A. stipitibus lævibus angulatis sulcatis squamosis; frondibus membranaceis tripinnatis; divisionibus primariis alternis imbricatis oblongis acuminatis; pinnulis oblongis obtusis pinnatifidatis, laciniis linear-oblongis obtusis, inferioribus bi-trifidis; rhachi parce squamosa; soris semi-oblongis submarginalibus; indusio integerrimo.

HAB. Tahiti, Society Islands, and Ovolau, Feejee Islands: in mountain forests.

Plant large and graceful in its habit. *Stipes* 1½ feet long, and about the thickness of a goosequill, of a grayish-brown colour, *smooth, angular, sulcate* in front, *chaffy* with scattered, peltate, lacerated, brown scales, which continue upwards on the rhachis and costa. *Fronds membranaceous*, glabrous, 2 feet and upwards in length, *tripinnate*, the *primary divisions alternate, imbricated*, spreading, and with the secondary ones contracting into a sharp pinnatifid point. *Pinnules oblong, obtuse, deeply pinnatifid*; the *segments linear-oblong, obtuse*, 2 or 3 lines long and less than a line in breadth, the *inferior ones twice or thrice divided*, bearing a single *oblong sorus* on their inner margin, which has an *entire indusium*.

This is one of the most graceful Ferns of the tribe, and is allied to the *A. (Darea) cicutarium* of Willdenow: but that is bipinnate, and its sori are shorter.

PLATE 23.—Fig. 2. Portion of a frond, of the natural size. 2 *a*. A segment, showing the indusium. 2 *b*. Sporangia.—The details magnified.

55. ASPLENIUM DUBIUM, Sp. Nov.

A. rhizomate repente; stipitibus angulatis parce paleaceo-hirsutis; frondibus membranaceis glabris deltoideo-ovatis bi-tripinnatis; pinnis suboppositis patentibus oblongo-lanceolatis; pinnulis linear-oblongis inciso-pinnatifidis, laciniis linearibus obtusis; rhachi compressa marginata.

HAB. Sandalwood Bay, Feejee Islands.

This is a Fern apparently belonging to the *Darea* section of *Asplenium*, having a black creeping rootstock, and angular, sparsely-paleaceous hirsute stipes, with small, scattered, membranaceous, smooth, deltoideo-ovate, bi-tripinnate fronds. The pinnæ are subopposite, spreading, and oblong-lanceolate in form. Pinnules linear-oblong and inciso-pinnatifid, with linear and obtuse segments, and a compressed margined rhachis.

Our specimens are entirely destitute of sori.

§ 4. ATHYRIUM, Roth.

* *Frondes pinnatæ.*

56. ASPLENIUM DEPARIOIDES, Sp. Nov.

A. stipitibus angulatis hinc sulcatis; frondibus membranaceis glabris pinnatis; pinnis alternis sessilibus linear-lanceolatis pinnatipartitis, apice acuminato dentato, laciniis oblongis obtusis subfalcatis dentatis; rhachi prolifera; venis pinnatis; soris oblongis remotis submarginatilibus.

HAB. Sandwich Islands; on the Kaala Mountains, Oahu.

Stipes a foot or a foot and a half long, about the thickness of a goose-quill, smooth, angular, sulcate in front. *Fronds* 3 feet and upwards in length, membranaceous, smooth, elongated-lanceolate in circumscription, pinnate. *Pinnæ* alternate or subalternate, spreading, sessile, linear-lanceolate, deeply pinnatifid, from 6 to 8 inches in length, terminating

in a narrow dentate point; segments oblong, obtuse, slightly falcate and dentate, 6 lines long by 2 lines broad, the sinus wide and rounded at the base. Rhachis proliferous. Veins pinnate; venules simple, bearing oblong and remote sori, the outer ends of which extend almost to the margin of the segment. Indusium brown, entire, in the dry state hard and recurved.

This possesses the same form of frond, proliferous rhachis, and venation as *Deparia prolifera* of Hooker. But the sori are in strict conformity with species forming the present section of *Asplenium*.

* * *Fronde bipinnate.*

57. *ASPLENIUM FILIX-FŒMINA, R. Br.*

Asplenium Filix-fœmina, R. Br. ex J. Sm. in Hook. Jour. Bot. 4, p. 174.

Aspidium Filix-fœmina, Willd. Spec. Pl. 5, p. 276.

Athyrium Filix-fœmina, Presl, Tent. Pterid. p. 98.

HAB. Island of Madeira; in woods, near Santa Anna.

Our specimen is more delicate in texture than the ordinary European form of the species, and the pinnules are more deeply incised than in the plant represented at page 63 of Newman's British Ferns.

58. *ASPLENIUM UMBROSUM, J. Sm.*

Asplenium umbrosum, J. Sm. in Hook. Jour. Bot. 4, p. 174.

Aspidium umbrosum, Sw. Syn. Fil. p. 60; Willd. Spec. Pl. 5, p. 283.

Allantodia umbrosa, Kaulf. Enum. Fil. p. 179.

Athyrium umbrosum, Presl, Tent. Pterid. p. 98.

HAB. Island of Madeira; in woods, near Santa Anna.

59. *ASPLENIUM AUSTRALE.*

A. stipitibus lævibus sulcatis; frondibus bipinnatis membranaceis flaccidis; pinnulis oblongo-lanceolatis pinnatifidis, laciniis oblongis obtusis

serratis; rhachi partiali compressa; soris plurimis lineari-oblongis costæ approximatis; indusio fornicato.

Allantodia australis, R. Br. Prodr. Fl. Nov. Holl. p. 149.

Athyrium australe, Hook. Gen. Fil. t. 16?

HAB. New Zealand; in woods, in the vicinity of Wangarara Bay.

Stipes smooth and channelled in front. Fronds membranaceous, flaccid, and bipinnate. Pinnules oblong-lanceolate, pinnatifid; the segments oblong, obtuse, serrate; the secondary rhachis compressed. Sori numerous, linear-oblong, situated close to the costa; indusium vaulted.

This has very much the appearance of the preceding species: but the segments are not so deeply serrated, and the indusium is less membranaceous.

* * * *Frondes tripinnatæ.*

60. ASPLENIUM MULTISECTUM.

A. stipitibus semiteretibus hinc sulcatis basi parce paleaceis; frondibus tripinnatis; pinnis secundariis ovato-lanceolatis; pinnulis pinnatifidis; laciniis lineari-lanceolatis sæpius bidentatis, infimis incisis; soris juxta basim dentium intus solitariis; indusio membranaceo.

Aspidium scandicinum, Willd. Spec. Pl. 5, 285.

Allantodia scandicina, Kaulf. Enum. Fil. p. 179.

Athyrium scandicinum, Presl, Tent. Pterid. p. 98.

HAB. Sandwich Islands; in forests.

Plant cæspitose, 1½ to 2 feet high. Stipes usually a little shorter than the fronds, of a pale straw colour, half round, channelled in front, and paleaceous at the base. Fronds somewhat flaccid and delicately tripinnate: secondary pinnæ ovate-lanceolate: pinnules pinnatifid. Segments linear-lanceolate, and usually divided into two setaceous teeth; with a single sorus on the inner side near the base of each. Indusium smooth and membranaceous.

61. ASPLENIUM POIRETIANUM, *Gaud.*

Asplenium Poiretianum, Gaud. Bot. Freyc. Voy. p. 321, t. 13; Hook. & Arn. Bot. Beech. Voy. p. 107.

Athyrium Poiretianum, Presl, Tent. Pterid. p. 98.

HAB. Sandwich Islands; in moist shady forests; frequent.

Although very distinct, this nevertheless possesses a habit and aspect a good deal like the preceding species; but on examination it is readily recognised by its densely paleaceous stipes, larger fronds, broader segments, and the reniform indusium seated on the costa of segments, not on the teeth.

52. NEOTTOPTERIS, *J. Sm.*

(ASPLENII Spec. Linn. & Auct.)

Presl, in his Tentamen Pteridographiæ, divides the genus *Asplenium* into two sections; the first section, "*Thamnopteris*," embracing only the *A. Nidus* of Linnæus. On this and some other closely allied species Mr. J. Smith subsequently founded the genus *Neottopteris*; and we are also of the opinion that they ought to be separated from *Asplenium*, on account of the apices of the venules being combined by a transverse marginal vein.

1. NEOTTOPTERIS NIDUS.

Neottopteris vulgaris, J. Sm. in Hook. Jour. Bot. 4, p. 176.

Asplenium Nidus, Linn.; Sw. Syn. Fil. p. 74; Willd. Spec. Pl. 5, p. 303; Kaulf. Enum. Fil. p. 164.

Var. β . *frondibus bi-tripedalibus elongato-lanceolatis, apice undulato obtuso.*

Var. γ . *frondibus tri-quadripedalibus lanceolatis acutis basi attenuatis.*

Var. δ . *frondibus sesqui-bipedalibus lanceolatis acutis apice undulatis basi subattenuatis.*

Var. ϵ . *frondibus tri-quadripedalibus elongato-lanceolatis apiculatis margine crenatis.*

HAB. Sandwich Islands. Tahiti, Society Islands. Var. β . Sandwich Islands; with elongated-lanceolate fronds, 2 or 3 feet long, the point undulate and obtuse. Var. γ . Paumotu, Society, and Samoan Islands; also Tongatabu, Friendly Islands; a form with lanceolate and acute fronds, 3 or 4 feet long, attenuated at the base. Var. δ . Feejee Islands; with fronds $1\frac{1}{2}$ to 2 feet long, lanceolate, acute, the point undulate, the base slightly attenuated. Var. ϵ . Illawarra, New South Wales; a form with the fronds 3 or 4 feet long, elongated-lanceolate, apiculate, the margin crenate.

Usually only the upper half of the frond in all these forms is fertile, and each venule is sporangiferous; the sori commencing near the costa and continuing outwards to within half an inch of the margin.

2. NEOTTOPTERIS PHYLLITIDIS, J. Sm.

N. frondibus lanceolatis acuminatis integerrimis basi attenuatis subcoriaceis; soriis parallellis remotis; indusio membranaceo persistente.

Neottopteris Phyllitidis, J. Sm. in Hook. Jour. Bot. 4, p. 176.

Asplenium Phyllitidis, Don, Prodr. Fl. Nepal. p. 7.

HAB. Mountains near Baños, Luzon, Philippine Islands.

Fronds 2 feet long by about 3 inches broad, lanceolate, acuminate, entire, subcoriaceous, with an attenuated base. *Sori* distant and parallel, with a membranaceous persistent indusium. The habit is similar to that of *N. Nidus*; from which it differs in the fronds being narrower and more attenuated at the base than in the usual form of that species; the lines of sori are also more distant, only every second or third venule being sporangiferous; and the sori extend from the costa to within two lines of the margin.

53. HEMIDICTYON, *Presl, J. Sm.*

(ASPLENII Spec. Linn.)

1. HEMIDICTYON MARGINATUM, *Presl.**Hemidictyon marginatum*, Presl, Tent. Pterid. p. 110, t. 3, f. 24; Hook. Gen. Fil. t. 55, A.*Asplenium marginatum*, Linn. ex Willd. Spec. Pl. 5, p. 309; Velloz. Fl. Flum. 11, t. 101.

HAB. Forests at the base of the Corcovado, near Rio Janeiro, Brazil.

We concur with Mr. J. Smith in the propriety of restricting this genus (so far as known) to the present species. Presl referred to it the *Asplenium Douglasii* of Hooker and Greville, and also, but with a doubt, the *Allantodia Brunonis* of Wallich: the former has the marginal veinlets free, while the indusium of the latter in a recent state is cylindrical.

54. CALLIPTERIS, *Bory, J. Sm.*

(ASPLENII Spec. Sw. & Auct. DIPLAZII Spec. Sw. & Auct. ANISOGONIUM, Presl. DIGRAMMARIA, Presl.)

1. CALLIPTERIS PROLIFERA, *Bory.**Callipteris prolifera*, J. Sm. in Hook. Jour. Bot. 4, p. 179.*Asplenium decussatum*, Sw. Syn. Fil. p. 76 & 260; Willd. Spec. Pl. 5, p. 310.*Anisogonium decussatum*, Presl; Hook. Gen. Fil. t. 56, f. A.

Var. β . *pinnis basi pinnatis sursum pinnatifidis apice grosse serratis, laciniis oblongis acutis subfalcatis.*

HAB. Feejee Islands. Var. β . Feejee Islands.

The usual form occurs very frequently in marshy grounds, near the sea-coast. Fronds attaining the height of from 6 to 8 feet, and constantly pinnate; the margin of the pinnæ coarsely serrate; and proliferous buds are borne on the rhachis, in the axils of the pinnæ. Stipes muricated. In var. β . the fronds grow to a much larger size, and have their pinnæ again pinnate at the base, barely pinnatifid above and coarsely serrate towards the point; the segments oblong, acute, somewhat falcate.

2. CALLIPTERIS MALABARICA, J. Sm.

Callipteris Malabarica, J. Sm. in Hook. Jour. Bot. 4, p. 179.
Asplenium ambiguum, Sw. Syn. Fil. p. 81 & 274; Willd. Spec. Pl. 5, p. 343.
Diplazium Malabaricum, Blume, Enum. Plant. Jav. p. 193.
Digrammaria ambigua, Presl, ex Hook. Gen. Fil. t. 56, C.

HAB. Feejee Islands. Luzon and Mindanao, Philippine Islands.

The rootstock frequently assumes an arborescent habit. In the Luzon plant, the pinnules are not so deeply serrated as in the Feejee and Mindanao forms; the two latter agree in outline, and both possess a venation similar to the sectional figure in Hooker's Genera Filicum.

TRIBE V. ASPIDIEÆ, J. SM.

55. MATONIA, R. Br.

1. MATONIA PECTINATA, R. Br.

Matonia pectinata, Presl, Tent. Pterid. p. 62; Hook. Gen. Fil. t. 43; J. Sm. in Hook. Jour. Bot. 4, p. 182.

HAB. Mount Ophir, Peninsula of Malacca.

Fine specimens of this beautiful and remarkable Fern were presented to the Expedition by Mr. Balistier, United States Consul at Singapore, labelled as from the above locality, where, so far as we know, it has only yet been detected. In all our specimens, the peculiar "orbicular, peltate indusium" has entirely disappeared, leaving only a very few sessile sporangia attached to the receptacle. The habit of the plant, its firm stipes and glaucous fronds, together with the "sporangia of each sorus being definite," indicate some relationship with *Gleichenia*, an affinity noticed by Mr. J. Smith, who, however, on account of the presence of "a peltate centrally attached indusium," placed the genus in *Aspidiaceæ*. Presl refers it to the *Cyatheaceæ*.

56. ASPIDIUM, *Sw., Presl, J. Sm.*

1. ASPIDIUM ALATUM, *Wall.*

Aspidium alatum, Wall. ex Hook. & Grev. Ic. Fil. t. 184.

HAB. Tahiti, Society Islands. Samoan and Feejee Islands.

This handsome species is admirably delineated by Hooker and Greville in their *Icones Filicum*. It is gratifying to us to be able to assign it a greater geographical range.

2. ASPIDIUM REPANDUM, *Willd.*

A. stipitibus glabris semiteretibus sulcatis basi paleaceis; frondibus membranaceis glabris pinnatis; pinnis sessilibus elongato-lanceolatis acuminatis basi subcuneatis margine repandis, terminali bi-tripartita; soris plurimis magnis biserialibus.

Aspidium repandum, Willd. Spec. Pl. 5, p. 216; Blume, Enum. Plant. Jav. p. 144.

HAB. Forests near Baños, Luzon, Philippine Islands. Tahiti, Society Islands.

Fronde pinnate, smooth, of a membranaceous texture, and from 15 to 25 inches long. *Pinnæ* consisting of from 4 to 6 pairs, with an odd one, the inferior 3 or 4 pairs sessile, the superior ones decurrent, elongate-lanceolate, acuminate, with a somewhat wedge-shaped base and repand margin, from 6 to 8 inches long, and 2 inches broad, the terminal one 2-3-parted in a lobate-pinnatifid manner. *Stipes* 2 feet and upwards in length, about the thickness of a goose-quill, smooth, half-round, and grooved in front, with long, slender, acuminate, reticulated, chaffy scales at the base. *Sori* numerous and large, and arranged outward from the costa to the margin in a nearly biserial manner.

This differs from the preceding species in its pinnate and less membranaceous fronds (at least they are so at the base), and repand pinnæ, the terminal one 2-3-parted; and also in the absence of the broad wing on the stipe, peculiar to that species.

3. ASPIDIUM MACROPHYLLUM, Sw.

Aspidium macrophyllum, Sw. Syn. Fil. p. 43 & 239; Willd. Spec. Pl. 5, p. 217; Raddi, Plant. Brasil. p. 29.

HAB. Woods, on the Corcovado, near Rio Janeiro, Brazil.

When growing in the shade (which is the usual station for the species) the fronds are large, 2 or 3 feet high, with remote and membranaceous pinnæ; while in open situations they are more compact in their habit, with pinnæ consequently of a firmer texture, and the costa above partially pubescent.

4. ASPIDIUM IRREGULARE, Sp. Nov.

A. stipitibus nigris lævibus angulatis; frondibus membranaceis bipinnatis; pinnulis oblongo-lanceolatis acuminatis acutisve margine lobato-sinuatis basi cordatis, supremis coadunatis, lobis crenatis; rhachi costaque fusco-pubescentibus; soris parvis biserialibus; indusio orbiculari crenato.

Var. β . *frondibus ternatisectis, divisionibus triangulatis pinnatis; pinnis petiolatis lobato-pinnatifidis.*

HAB. Feejee Islands: in forests, vicinity of Sandalwood Bay.

Stipes of a *glossy-black* colour, *smooth, angular*, with a shallow groove in front, stout and paleaceous at base, tapering gradually to the base of the frond, varying from 12 to 20 inches in length. *Fronde membranaceous*, about equal in length with the stipe, triangular-oblong. and *bipinnate* at the base. Pinnæ petiolate and ascending, pinnate at the base, pinnatifid towards the summit, and terminating in an acuminate entire point. *Pinnules* alternate, *oblong-lanceolate, acuminate or acute*, with an *unequal cordate base*; the margin lobate-sinuate; the upper surface with slight protuberances opposite the sori. *Rhachis and costa* above clothed with a short *brown pubescence*. *Sori small*, numerous, usually produced *in two rows* between the transverse primary veins, and in some specimens they have a scattered appearance, furnished with a peltate, *orbicular, crenate indusium*. In var. β . the *fronds* are strictly *ternate*, with the leaflets *pinnate* at the base; the terminal one sometimes two-parted; but between this and the bipinnate form, we have intermediate grades in the divisions of the fronds, which renders it evident that this is only an extreme state of the species.

57. S A G E N I A, Presl.

(ASPIDIUM Spec. Auct.)

1. S A G E N I A H I P P O C R E P I S, Presl.

S. stipitibus semiteretibus hinc sulcatis basi paleaceis; frondibus pinnatis; pinnis ovato-oblongis seu oblongo-lanceolatis apicem versus decurrentibus et confluentibus, inferioribus petiolatis vel sessilibus pinnatifidis, laciniis lanceolato-oblongis lobato-sinuatis, lobis dentatis; rhachi venis marginibusque pilosis; soris sparsis; indusio orbiculari margine parum undulato.

Sagenia Hippocrepis, Presl, Tent. Pterid. p. 86, t. 2, f. 24 & 25; Hook. Gen. Fil. t. 53, f. A.

Aspidium Hippocrepis, Sw. Syn. Fil. p. 51; Wil.d. Spec. Pl. 5, p. 235.

HAB. Sandwich Islands: in mountain forests.

In this species a great diversity occurs, both in the size and division of the *fronds*; these vary from 5 to 15 inches in length, oblong, acute, cordate at the base and *pinnate*, sometimes pinnatifid, *towards the point confluent and decurrent*. *Segments lance-oblong*, with a *lobate-sinuate margin*, which, with the *costa* and *veins* on the upper side, are furnished with scattered *short hairs*. *Sori scattered*, numerous on the small as well as on the larger fronds, and on some may be said to be crowded and partially confluent. *Indusium orbicular*, with a *slightly undulated margin*.

This is certainly the *Aspidium Hippocrepis* of Swartz; at least it agrees with portions of the fronds figured under the name of *Sagenia Hippocrepis*, by Presl and Hooker; it is a plant of very frequent occurrence in humid forests, at an elevation of from 2 to 8000 feet, on various islands of the Sandwich Group.

2. SAGENIA APIIFOLIA, J. Sm.?

Sagenia apiifolia, J. Sm. in Hook. Jour. Bot. 4, p. 184?

Nephrodium apiifolium, Hook. & Arn. Bot. Beech. Voy. p. 105.

Aspidium sinuatum, Gaud. Bot. Freyc. Voy. p. 343, non Labill.

Tectaria japonica
(Mitt.)

HAB. Sandwich Islands; on the mountains behind Honolulu.

The fronds of this are large and bipinnate, rising to a height of 3 to 5 feet, with stout, smooth, purplish-black stipes. The primary pinnæ are distant, subopposite and divaricate; the secondary ones broadly lanceolate and pinnatifid; the segments membranaceous, oblong-lanceolate, entire or sinuate-pinnatifid, with a slightly ciliate margin, and puberulent on the upper surface. Sori few, small, subserial, with an entire and orbicular indusium.

We have no means of ascertaining satisfactorily that this is the *S. apiifolia* of Mr. J. Smith; but we are confident that it is the *Aspidium sinuatum* of Gaudichaud, and also the *Nephrodium apiifolium* of Hooker and Arnott, who have adopted Schkuhr's specific name with a doubt, and which Gaudichaud, also with a doubt, employed as a synonyme to his plant.

3. SAGENIA VARIA, Presl?

S. stipitibus nitidis compressis trisulcatis pilosis; frondibus membranaceis basi bipinnatis apicem versus pinnatis; pinnis alternis lanceolato-oblongis, inferioribus pinnatis, superioribus pinnatifidis apice confluentibus; laciniis oblongis obtusis crenatis; costa venisque supra rufo-pubescentibus; soris parvis subseriatis; indusio?

Sagenia varia, Presl, Tent. Pterid. p. 87? sine char.

Aspidium varium, Willd. Spec. Pl. 5, p. 236?

HAB. Tutuila, Samoan Islands: in forests.

The description of this by Willdenow, under *Aspidium varium*, embraces several states of the plant. Ours differs slightly from all of them, more especially in the presence of a rufous pubescence on the *costa* and *veins* on the *upper side*; and on its *crenate segments*: but these characters not being strongly marked and subject to variation, together with the circumstance of our being in possession of only a single specimen, and that without perfect sori, induce us to adopt the above name, although with a mark of doubt.

58. PLOCNEMIA, Presl, J. Sm.

(POLYPODII Spec. Gaud.)

Venæ furcatæ: venulæ inferiores arcuatæ et angulato-anastomosantes, areolas inæquales formantes; superiores liberæ sporangiferæ. Sporangia in medio dorso venularum. Sori globosi. Indusium reniforme. J. Sm.—Caudex subarborescens. Stipites semiteretes, sulcati, cum rhachi costaque rufo-pubescentes. Frondes bipinnatæ; pinnulis lineari-lanceolatis acuminatis basi truncatis pinnatifidis, summis confluentibus; laciniis ovato-oblongis seu lineari-oblongis subfalcatibus acutis serratis, dente obtuso ad angulum sinus internum. Sori parvi, approximati, inter costam et margines laciniarum æquidistantes uniseriales; sporangiis pilis clavatis intermixtis.

1. PLOCNEMIA LEUCEANA, *Presl.*

Plocnemia Leuceana, Presl, Tent. Pterid. p. 184, t. 7, f. 12; J. Sm. in Hook. Jour. Bot. 4, p. 184; Hook. Gen. Fil. t. 97.

Polypodium Leuceanum, Gaud. Bot. Freyc. Voy. p. 361, t. 6.

HAB. Samoan and Feejee Islands.

The rhizoma or trunk of this truly beautiful Fern is short, thick, *erect*, and surmounted by large, spreading, bipinnate fronds, from 12 to 15 feet in length. All our specimens are prolific in sori, which are arranged in a single row on the segments, equidistant between the costa and margin, commencing in a line with the base of the sinus and continuing outwards to the very point: in one or two specimens the divisions of the fronds are shorter and more contracted than in the usual form; and in this state of the plant there is a row of distant and larger sori, running parallel with the costa of the pinnules and seated on an inferior veinlet arising from the arched venules, the former terminating in the blunt tooth at the base of the sinus.

59. CYRTOMIUM, *Presl.*

(ASPIDIUM Spec. Sw., Wall.)

1. CYRTOMIUM CARYOTIDEUM, *Presl.*

Cyrtomium caryotideum, Presl, Tent. Pterid. p. 86, t. 2, f. 26; Hook. Gen. Fil. t. 49, C.

Aspidium caryotideum, Wall. ex Hook. & Grev. Ic. Fil. t. 69 (opt.).

HAB. Mountains of East Maui, Sandwich Islands; rare.

This species was founded upon a Fern from the East Indies, and figured in the *Icones Filicum*, of which our Sandwich Island plant is almost a perfect counterpart; although in some of our specimens the pinnæ are sometimes three-lobed.

60. NEPHRODIUM, *Schott, Presl, J. Sm.*

(ASPIDIUM Spec. Auct. CYCLODIUM, Presl.)

1. NEPHRODIUM PROPINQUUM, *R. Br.*

N. stipite elongato lævi angulato; frondibus pinnatis; pinnis subpetiolatis ensiformibus acuminatis inciso-pinnatifidis apice integris basi truncato-cuneatis, lobis triangulari-oblongis; costa parce paleacea venisque pubescentibus atomis resinosis conspersis; soris submarginalibus confluentibus; indusio piloso.

Nephrodium propinquum, R. Br. Prodr. Fl. Nov. Holl. p. 148; Hook. & Arn. Bot. Beech. Voy. p. 74.

Polystichum propinquum, Gaud. Bot. Freyc. Voy. p. 330?

HAB. Tahiti, Society Islands. Feejee Islands. New South Wales.

Stipe elongated, usually much longer than the frond, slender, *smooth, angular*, sulcate in front, and of a chestnut-brown colour. *Fronde erect, pinnate*. *Pinnæ subpetiolate*, distant at the base, crowded towards the summit, somewhat alternate, smooth on the upper surface, *ensiform*, slightly *acuminate*, *incisely pinnatifid*, the *base truncate-cuneate*, the *point entire* and crenate. *Costa chaffy* on the under side with a few scattered fugacious and obtuse paleæ, and, together with the *veins, pubescent*, a few *resinous globules* intermingled with the short hairs. Secondary pair of venules partially uniting at the base of the sinus. *Sori confluent, submarginal*, produced only on the free venules. *Indusium hairy*.

2. NEPHRODIUM RESINIFERUM, *Hook. & Arn.*

Nephrodium resiniferum, Hook. & Arn. Bot. Beech. Voy. p. 105.

Aspidium resiniferum, Kaulf. Enum. Fil. p. 237.

HAB. Sandwich Islands: in open marshy grounds; frequent.

This approaches so closely to the preceding species, that it is only to be distinguished by the longer fronds, and the somewhat broader pinnæ, divided in a pinnatifid manner, with resinous globules on the veins beneath; and even these slight distinctions are not perfectly constant.

3. NEPHRODIUM MOLLE, *Schott.*

Nephrodium molle, Schott, ex Hook. Gen. Fil. t. 48, B, f. 1-5.

Aspidium molle, Sw. Syn. Fil. p. 49? Willd. Spec. Pl. 5, p. 246.

Polystichium molle, Gaud. Bot. Freyc. Voy. p. 326.

HAB. Tahiti, Society Islands. Savaii, Samoan Islands. Ovolau, Feejee Islands. Luzon, Philippine Islands. Island of Madeira.

Our specimens of this from the islands in the Pacific Ocean do not differ materially from the Madeira plant; although there are varieties, originating from slight modifications in the form of the pinnæ, with the surface more or less hairy. In the Samoan specimens the pinnæ are lanceolate, with a narrow caudate-acuminate and toothed point, soriferous almost to its very apex, and the costa and rhachis densely villous on both sides; while the Feejee plant is less villous, and the pinnæ lanceolate, slightly acuminate, and bearing a profusion of sori. Our Tahiti specimens are larger than the preceding varieties, and, being very young, are consequently more flaccid, but otherwise they very much resemble the plant from Madeira. The two inferior segments, and particularly the upper one of the two, are considerably larger than the rest, in all these forms.

4. NEPHRODIUM PUBESCENS, Sp. Nov.

N. stipite gracili sulcato pubescente; frondibus oblongis membranaceis pinnatis; pinnis sessilibus alternis divaricatis infinis deflexis linearilanceolatis pinnatifidis acuminatis apice integris basi truncato-cuneatis, laciniis oblongis obtusis; rhachi costa venisque utrinque pubescentibus; soris magnis inter costam et marginem æquidistantibus; indusio reniformi hirsuto.

HAB. Luzon, in the neighbourhood of Baños, Philippine Islands.

Stipe slender, about a span long, nearly round, *sulcate* in front, and covered with a short brown *pubescence*. *Fronde membranaceous*, about 10 inches in length, of an *oblong* form, *pinnate*. *Pinnæ sessile*, *alternate and divaricate*, the *inferior* two pairs *deflexed*, *linear-lanceolate*, *acuminate*, *pinnatifid* about half way down to the costa, the *base truncate-cuneate*, the *point entire* for about half an inch. *Segments oblong*, *obtuse*, slightly *falcate*. *Rhachis, costa and veins hairy* on both *sides* with a short, brown *pubescence*. *Sori large*, arranged in a single row about half-way *between the costa and margin* of the segments, having a *kidney-shaped, hairy indusium*.

In many respects this is very closely related to the *N. molle* of Schott.; but it has a much smaller frond, a shorter and more slender stipe, and narrower pinnæ, the two inferior pairs considerably deflexed.

5. NEPHRODIUM TRANSVERSARIUM, Sp. Nov.

N. stipite sulcato rufo-tomentoso; frondibus membranaceis glabris pinnatis; pinnis sessilibus alternis linearilanceolatis rectis subpinnatifidis basi truncato-cuneatis apice integris, inferioribus brevioribus distantibus, laciniis semi-oblongis obtusis integerrimis; costa utrinque pubescente; soris numerosis transversim biserialibus confluentibus; indusio glabro reniformi.

HAB. Tutuila, Samoan Islands.

Stipe short, about the thickness of the little finger, *sulcate* in front, and covered with a short *reddish-brown tomentum*. *Fronde large, membranaceous, glabrous*, from 3 to 4 feet in length, in circumscription *elongated-lanceolate*, attenuate at the base, *pinnate*. *Pinnæ sessile-alternate*, *straight and divaricate*, from 6 to 8 inches long, *linear, lanceolate* and attenuated into a sharp, *entire point*, of about an inch in length, the remaining part *pinnatifid* nearly half-way down to the costa into *semi-oblong, obtuse*, slightly *falcate segments*, beset with very

minute tubercles on both surfaces. *Costa on both sides pubescent. Sori numerous, transversely biserial, the lines close to the costæform vein of the segment, becoming confluent. Indusium reniform, smooth, and persistent.*

In habit this is similar to the *Aspidium patens* of Swartz; which, however, has an entirely free venation, and the lowest pair of segments usually much larger than the others.

6. NEPHRODIUM HUDSONIANUM,* Sp. Nov. (Tab. 25.)

N. stipite lævi trisulcato; frondibus membranaceis pinnatis; pinnis subalternis sessilibus linearilanceolatis attenuatis pinnatifidis utrinque tuberculatis apice integris basi truncato-cuneatis, infimis distantibus cordato-ovatis, laciniis oblongis obtusis subfalcatis; rhachi costaque supra pubescentibus; soris parvis; indusio cordato-reniformi hirsuto.

HAB. Sandwich Islands: among bushes, on the margins of forests.

Stipe smooth, semiterete, trisulcate in front. Fronds large, membranaceous, 3 or 4 feet in length, in circumscription lanceolate and attenuate at the base, pinnate, with a pinnatifid point. Pinnæ from 6 to 8 inches long, and 8 to 10 lines broad, subalternate, sessile, linear-lanceolate and attenuate, pinnatifid at the base about half way down to the costa, incisely serrate towards the point, which is entire for about an inch; the inferior ones distant, short and cordate-ovate, all beset with small tubercles on both sides. Segments oblong, with an obtuse, minutely dentate apex, falcate, or sometimes straight, the margin occasionally pubescent with a few and short scattered hairs. Rhachis and costa pubescent above, with sparse whitish hairs. Sori small, biserial, about equidistant between the costæform vein and the margin of the segments, having a cordate-reniform indusium, hirsute with a few hairs in its centre.

Although very distinct, yet in some points this bears a strong resemblance to the *N. cyatheoides* of J. Smith; but the fronds are more membranaceous, and the pinnæ pinnatifid, the inferior pair of

* In compliment to Captain William L. Hudson, of the United States Navy, commander of the Peacock, one of the vessels of the Expedition.

venules only anastomosing, and the sori, moreover, are seated at a greater distance from the costæform vein.

PLATE 25.—Fig. 1. Portions of a frond, of the natural size. 1 *a*. Section of a pinna, showing the position of the sori, and the tubercles on the under surface. 1 *b*. Sorus. 1 *c*. Indusium. 1 *d, d*. Sporangia. 1 *e*. Sporules.—Magnified.

7. NEPHRODIUM UNITUM, R. Br.?

Nephrodium unitum, R. Br. Prodr. Fl. Nov. Holl. p. 148? Hook. Gen. Fil. t. 48, B, f. 6.

Aspidium unitum, Hook. & Arn. Bot. Beech. Voy. p. 256.

HAB. Tahiti, Society Islands. Feejee Islands.

There are two states of this in the collection: one with large and somewhat lax fronds, and linear-attenuated pinnæ, the inferior ones considerably the smaller: the other form with erect and rather rigid fronds, and shorter ensiform pinnæ. In both varieties the fronds are smooth on the upper surface, and with two or three of the opposite pairs of venules anastomosing. In this particular, as also in the fronds being pubescent beneath, it agrees with the plant of Hooker and Arnott, as represented in Hooker's Genera Filicum, where the sori are shown as being produced only on the free venules; while in our plant they are borne on the anastomosing venules alike with the free, and are furnished with a slightly hairy indusium. We are not altogether satisfied that this is truly the *N. unitum* of R. Brown; but have no doubt of its being the plant of Hooker and Arnott.

8. NEPHRODIUM CYATHEOIDES, J. Sm.

Nephrodium cyatheoides, J. Sm. in Hook. Jour. Bot. 4, p. 188.

N. Dubrueilianum, Hook. & Arn. Bot. Beech. Voy. p. 105.

Aspidium cyatheoides, Kaulf. Enum. Fil. p. 234.

Polystichum Dubrueilianum, Gaud. Bot. Freyc. Voy. p. 333, t. 9.

HAB. Sandwich Islands: along the banks of streams, frequent.

The plant is subject to variation in the depth and form of the serratures of the pinnæ. These Kaulfuss describes as being pubescent beneath; but we find, among a very full suite of specimens, very few to which this character would apply, the majority being glabrous on both sides, although furnished with minute tubercles on the surface. The lower 6 or 7 pairs of opposite alternate venules are angularly anastomosing. Sori seated on and near to the base of the anastomosing venules, close to the costæform vein. Indusium, like the surface of the pinnæ, either naked or hairy, orbicular in form, with a deep sinus at the point of attachment.

61. WOODSIA, *R. Br., Hook., J. Sm.*

(PHYSEMATIUM, Kaulf. HYMENOCYSTIS, C. A. Meyer. POLYPODIUM Spec. Auct.)

1. WOODSIA INCISA, *Hook. & Grev.*

Woodsia incisa, Hook. & Grev. Ic. Fil. t. 191; Hook. Spec. Fil. 1, p. 63, subgen. *Perrinia*.

HAB. Obrajillo, Andes of Peru.

All our specimens of this, although considerably smaller, accord in their essential characteristics with Hooker and Greville's figure and description of the species.

2. WOODSIA ILVENSIS, *R. Br.*

Woodsia Ilvensis, R. Br. in Linn. Trans. 11, p. 173; Hook. Fl. Bor.-Amer. 2, p. 259; Hook. Spec. Fil. p. 63.

HAB. Oregon; on the banks of the Columbia River, near Fort Okonagan: in rocky places; rare.

Plant about 6 inches high, with from 20 to 30 fronds in a tuft. Stipe, rhachis, costa, and veins crinite, and with a few large, pale-brown, entire, chaffy scales at the base of the former.

62. LASTREA, *Bory, Presl, J. Sm.*

(ASPIDIUM, POLYSTICHI, & NEPHRODII Spec. Auct. THELYPTERIS, Schott.)

* *Fronde pinnatæ; pinnis pinnatifidis.*

1. LASTREA ARTICULATA, Sp. Nov. (Tab. 26.)

L. rhizomate repente; stipite tereti articulado rufo-pubescente; frondibus subcoriaceis pinnatis; pinnis sessilibus alternis oblongo-lanceolatis pinnatifidis supra pubescentibus apice subacuto serratis basi truncato-cuneatis, superioribus coadunatis crenato-dentatis, laciniis semi-oblongis obtusis, costa venisque utrinque rufo-pubescentibus; soris sparsis; indusio reniformi-orbiculato lacero.

HAB. Ovolau, Feejee Islands: in mountain forests; on rocks and trees.

Rootstock long, slender, branched, *creeping*, about the thickness of a quill from the wing of a pigeon, with a few scattered minute scales on its surface. *Stipe* round, one or 2 inches long, *articulated* near the base, *rufous-pubescent*. *Fronde* subcoriaceous, lance-oblong, acuminate, from 3 to 9 inches long, *pinnate* at the base, towards the point *pinnatifid*, and terminating in a serrate point. *Pinnæ* sessile, alternate, horizontal, *oblong-lanceolate*, most of them over an inch in length and 4 to 5 lines broad, *truncate-cuneate* at the base, *pinnatifid* about half-way down to the costa, towards the somewhat obtuse point bluntly serrate, *pubescent* on the upper surface. *Segments* semi-oblong, obtuse, entire. *Rhachis, costa, and veins* rufous-pubescent throughout. *Sori* scattered, seated on the apices of the first and second lower and superior venules; the *indusium* of a pale-brown colour, and of a round-reniform shape, its margin lacerated.

In habit this beautiful little Fern approaches, we must confess, very near to species of *Nephrolepis*, as that genus is now constituted; but the pinnæ not being articulated with the rhachis, and the scat-

tered sori prove that it does not properly belong to that genus; while the articulation of the stipe near its base shows an affinity, on the other hand, with *Oleandra*.

PLATE 26.—Fig. 1. Fronds, of the natural size. 1 *a*. Upper side of a pinna. 1 *b*. A small portion of the same, seen from beneath, with a perfect sorus. 1 *c*. Sporangium.—The details more or less magnified.

2. LASTREA DISTANS, Sp. Nov.

L. frondibus glabris pinnatis, pinnis distantibus subalternis petiolulatis linearilanceolatis acuminatis pinnatipartitis, laciniis linearibus subfalcatis apice obtuse dentatis; rhachi angulata paleaceo-hirsuta; costa subtus squamosa; soris parvis biserialibus; indusio rotundato-reniformi lacero.

HAB. Organ Mountains, Brazil: in shady forests.

Of this there is in the collection only a section, about 18 inches in length, of what appears to have been a very long and slender *frond*, which is *simply pinnate*. *Pinnæ* from 3 to 4 inches apart, on a *short petiole* a quarter of an inch long, *subalternate* and horizontal, *linear-lanceolate*, *acuminate*, 6 to 8 inches long and $1\frac{1}{2}$ inches broad near the truncated base, where they are *pinnatifid down almost to the costa*, less so towards the point, which is entire and slightly serrate: *segments linear, slightly falcate*, serrate with from 3 to 4 unequal *obtuse teeth at the point*. *Rhachis angular*, covered with entangled *slender paleæ and soft hairs*. *Costa chaffy* beneath with oblong, caudate-acuminate, reticulate, spinuose-serrate scales, of a darker colour than the costa itself. *Sori small*, occupying a single row on each side of the costa of the segments, nearer to it than to the margin, furnished with a membranaceous, *roundish-reniform*, and slightly *lacerated indusium*.

We know not that this has heretofore been described. It differs from the *Aspidium invisum* of Swartz, to which it is allied, by its distant, horizontal, deeply pinnatifid, and petiolate pinnæ.

3. *LASTREA FALCICULATA*, Presl.

Lastrea falciculata, Presl, Tent. Pterid. p. 75, t. 2, f. 3.
Aspidium falciculatum, Raddi, Plant. Brasil. p. 31, t. 47.
Polystichum falciculatum, Gaud. Bot. Freyc. Voy. p. 328?

HAB. Vicinity of Rio Janeiro, Brazil: in forests.

4. *LASTREA PATENS*, Presl.

Lastrea patens, Presl, Tent. Pterid. p. 75.
Aspidium patens, Sw. Syn. Fil. p. 49; Raddi, Plant. Brasil. p. 32, t. 48.

HAB. Rio Janeiro, Brazil. Vicinity of Lima, Peru.

5. *LASTREA ATTENUATA*, Sp. Nov. (Tab. 26.)

L. stipite lævi sulcato; frondibus pinnatis; pinnis alternis oblongo-lanceolatis caudato-acuminatis pinnatipartitis apice serrulatis supra glabris subtus glanduloso-pubescentibus, laciniis oblongo-lanceolatis acutis falcatis; costa utrinque pubescente; soris parvis biserialibus; indusio reniformi piloso; sporangiis sessilibus glanduliferis.

HAB. Tahiti, Society Islands: in mountain forests.

Stipe smooth, sulcate, with a single narrow groove in front. *Fronde* 3 feet and upwards in length, elongated-lanceolate, rather flaccid, smooth on the upper surface, *glandular-pubescent beneath, pinnate*; the apex pinnatifid. *Pinnæ* distant, spreading, *alternate*, 5 or 6 inches long, an inch broad, *oblong-lanceolate, pinnatifid almost to the costa* at the base, and contracting rather gradually into a long, somewhat *caudate, finely serrate point*. *Segments oblong-lanceolate, acute, falcate*, the margin entire, recurved, with appressed hairs, the two inferior pairs much the shortest. *Rhachis and costa* more densely *pubescent* on the upper than on the under side; the former bearing a short and obtuse black gland at the base of the petiole of the pinnæ on the inferior

side (inframarginal). Venules prominent on the upper surface. *Sori* small, biserial, in rather interrupted lines, and situated nearer the costæform vein than the margin, furnished with a small *reniform*, hairy *indusium*; the *sessile sporangia* bearing one or two *clavate glands* on the side, near to the top.

PLATE 26.—Fig. 2. Upper half of a frond, of the natural size. 2 *a*. Section of a segment, under side, with a perfect sorus. 2 *b*. Section of the costa, showing the hairs of the upper side. 2 *c*, 2 *c*. Sporangia.—The details more or less magnified.

6. LASTREA GLOBULIFERA, Sp. Nov.

L. stipite lævi angulato sulcato; frondibus glabris membranaceis pinnatis; pinnis oppositis sessilibus horizontalibus lineari-attenuatis pinnatipartitis utrinque resinoso-atomiferis basi truncatis apice repandodentatis, laciniis lineari-oblongis obtusis margine dentatis; costa supra pubescente; soris parvis submarginalibus; indusio reniformi hirsuto margine globulis resinosis ornato.

HAB. Hawaii, Sandwich Islands: in dense forests.

Fronde tufted, smooth on both sides, membranaceous and somewhat flaccid, elongated-lanceolate, pinnate, with the point pinnatifid, usually about 3 feet high, on a short and smooth, angular stipe, having a single channel in front. *Pinnæ* about an inch apart, sessile, opposite and horizontal, 4 to 6 inches long and 8 lines broad, linear, deeply pinnatifid at the base, and tapering gradually into a repand-dentate point, beset with numerous claret-coloured resinous globules on both sides. *Segments* linear-oblong, obtuse towards the point, becoming somewhat triangular-oblong, the inferior pair the largest, the margin with crenules or blunt teeth. *Costa* on the upper side pubescent. *Sori* of a golden hue, small, seated near the margin, and confined principally to the outer half of the segments. *Indusium* reniform, hirsute, entire, but margined with a row of resinous globules, which, when examined through a lens, present a very beautiful appearance.

This is very distinct from the preceding species, nor do we know of any one to which it is closely allied.

7. LASTREA ELONGATA, Presl.

Lastrea elongata, Presl, Tent. Pterid. p. 76.

Aspidium elongatum, Sw. Syn. Fil. p. 55; Willd. Spec. Pl. 5, p. 269.

Nephrodium elongatum, Hook. & Grev. Ic. Fil. t. 234.

HAB. Island of Madeira.

8. LASTREA TRUNCATA, Sp. Nov. (Tab. 27.)

L. stipite dense paleaceo-hirsuto; frondibus glabris pinnatis; pinnis lanceolatis acuminatis pinnatipartitis apice dentatis, laciniis linear-oblongis dentatis truncatis; rhachi costaque utrinque paleaceo-hirsutis; soris biserialibus; indusio rotundato-reniformi integerrimo sinu profundo.

HAB. Mouna Kea, Hawaii; and Mouna Haleakala, Maui, Sandwich Islands: at an elevation of from 8,000 to 10,000 feet.

Stipe from 8 to 10 inches in length, angular, the surface thickly covered with dense, long and narrow, rufous, paleaceous hairs. *Fronde* smooth, oblong-lanceolate in outline, with a very slightly acuminate point, pinnate. *Pinnæ* alternate, seated on a very short petiole, lanceolate, deeply pinnatifid, and terminating in an acuminate, rather bluntly serrated or toothed point, truncate at the base, about 4 inches long and 8 lines broad, of a paler colour on the under than upper surface, the inferior 2 or 3 pairs rather distant and deflexed. *Segments* linear-oblong, very slightly falcate, truncate, with from 4 to 8 unequal sharp teeth; the inferior pair on the 3 or 4 lowermost pinnæ have their margins slightly toothed or lobed. *Rhachis and costa* paleaceous hirsute throughout. *Veins* on both sides considerably immersed. *Sori* confined to the superior half of the frond, biserial, each row about equidistant between the costæform vein of the segment and its margin. *Indusium* of a dark brown colour, entire, round-reniform, with a deep sinus at the point of attachment.

A well-marked species, but closely related to the preceding.

PLATE 27.—Fig. 1. Frond, of the natural size. 1 *a*. Dorsal view of a portion of a pinna. 1 *b*. Section of a segment, with a single sorus. 1 *c*. Smaller portion of the same, showing the insertion of the sporangia. 1 *d*. Scale from the rhachis. 1 *e*, 1 *e*. Sporangia.—All more or less magnified.

* * *Fronde bipinnatæ; pinnulis pinnatifidis vel profunde serratis.*

9. LASTREA ARGUTA.

L. stipite parce paleaceo sulcato; frondibus bipinnatis; pinnulis oblongis obtusis apice argute serratis, infimis longioribus subpinnatifidis, laciniis subrotundis mucronato-serratis; soris biserialibus costæ approximatis; indusio rotundato-reniformi sinu profundo.

Aspidium argutum, Kaulf. Enum. Fil. p. 242; Hook. & Arn. Bot. Beech. Voy. p. 162 & 405.

HAB. Oregon and California; from the Umqua River to Monterey.

Related to the *L. elongata* of this work; but with the pinnules usually lobed or pinnatifid, and destitute of the resinous globules which occur on the surface of the pinnules in that species.

10. LASTREA LATIFRONS, Sp. Nov.

L. frondibus inferne bipinnatis apice pinnatifidis membranaceis glabris; pinnis sessilibus subalternis adscendentibus, inferioribus pinnatis, superioribus pinnatifidis; pinnulis oblongo-lanceolatis subfalcatis incisobobatis decurrentibus, summis confluentibus, lobis semi-oblongis crenatis; rhachi cum costa infra paleacea supra rufo-pubescente; soris solitariis fere marginalibus; indusio magno rotundato-reniformi integerrimo.

HAB. Oahu, Sandwich Islands: on the high mountains behind Honolulu.

Stipes wanting. *Fronde membranaceous, glabrous* on both sides, about 18 inches long, cordate-ovate, *bipinnate* at the base, towards the

extremity simply *pinnate*, with a slightly prolonged *pinnatifid point*; inferior 3 or 4 pairs of *pinnæ sessile, ascending, pinnate* at the base, while towards the point they are decurrent and deeply *pinnatifid*, with a bluntly serrated point: *pinnules* from one to 2 inches in length and 4 to 5 lines broad, *lance-oblong, subfalcate, incisely-lobed* or obtusely and deeply serrate; the *lobes semi-oblong, incurved, and crenate*. *Rhachis* (main and secondary) beset with scattered, slender, *reticulated paleæ* on the *under side*, the *upper* with a short *brown pubescence*. *Sori solitary*, and arranged in an irregular line *near the margin* of the pinnules, seated close to the base of the sinus of the lobes. *Indusium large, round-reniform, entire*, with a deep sinus at the point of attachment.

11. LASTREA PALLENS, Sp. Nov.

L. stipite sulcato crebre paleaceo; frondibus membranaceis bipinnatis apice pinnatifidis; pinnulis oblongo-lanceolatis seu lanceolatis utrinque strigoso-hirsutis, inferioribus petiolatis pinnatifidis, superioribus sessilibus decurrentibus serratis, laciniis triangulari-oblongis acutis subfalcatis; rhachi cum costa paleacea; soris parvis sparsis; indusio rotundato-reniformi lacero.

HAB. Forests near Baños, Luzon, Philippine Islands.

Stipe a little over a foot in length, about the thickness of a goose-quill, slightly compressed, *sulcate* in front, shaggy with the long and slender *brown paleæ*, which almost conceal its surface. *Fronde membranaceous*, about 2 feet long, ovate and acuminate in outline, of a paler colour on the under than upper surface, *bipinnate* at the base, towards the point decreasing gradually in the number and deepness of its divisions, and terminating in a *deeply pinnatifid point*: *pinnules* from one to 1½ inches long, *oblong-lanceolate or lanceolate, subfalcate*, with a very slight inclination to a trapezoidal form; the inferior ones somewhat *petiolate* and *deeply pinnatifid*; the *superior sessile*, bluntly serrate, both *strigose* with short appressed hairs, but most so on the *upper surface*. *Rhachis* (primary and secondary) together with the *costa* of the pinnules, furnished with *scattered paleæ* appressed to the surface. Veins dichotomous. *Sori punctiform, scattered and distant*, with a small, lacerated, fugacious, *round-reniform indusium*.

* * * *Fronde tripinnatæ vel subtripinnatæ.*

12. LASTREA SQUAMIGERA.

Nephrodium squamigerum, Hook. & Arn. Bot. Beech. Voy. p. 106?

HAB. Kaala Mountains, Oahu, Sandwich Islands. Eimeo, Society Islands. Ovolau, Feejee Islands.

The fronds of this in our collection are flaccid, and, together with the stipe, from 3 to 4 feet high, subtripinnate at the base, upwards bipinnate, with a simply pinnatifid point. Pinnules oblong, obtuse, somewhat falcate, decurrent at the base, pinnatifid. Stipe, rhachis, and costa beneath concealed by numerous pale, chaffy, reticulated, fimbriate scales, appressed to the surface; the secondary rhachis above with a brownish short pubescence. Sori small, seated about equidistant between the costæform vein and the margin of the segments, provided with a delicate, reniform, hirsute, fimbriated indusium.

We have but little doubt that this is the *Nephrodium squamigerum* of Hooker and Arnott. Our specimens from the Feejee Islands agree more fully with their description than does the single one from the Sandwich Islands, which is rather young; the scales on the rhachis and costa of the latter are more numerous and broader than on the former; but there is no character that we can discover which would justify us in considering the plants from the three habitats as distinct from each other, or from the species to which we have referred them.

13. LASTREA VELUTINA.

Aspidium velutinum, A. Rich. Bot. Voy. Astrol. p. 70; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 367.

HAB. Northern island of New Zealand: in forests, on the margin of an extinct crater.

The stipe of this species is almost twice the length of the frond,

slender, with 3 or 4 shallow grooves in front, and beset with brown glandular hairs. Fronds broadly-ovate, cordate, acuminate, subtripinnate at the base, about the middle bipinnate, with a pinnatifid point. Pinnules subpinnatifid, oblong-lanceolate, acute, and, with the rhachis and costa on both sides, rufous-tomentose. Sori very small.

14. *LASTREA TENUIFOLIA*, Sp. Nov.

L. stipite angulato squamoso-hirsuto; frondibus membranaceis basi fere tripinnatis sursum bipinnatis apice pinnatifido; pinnulis oblongo-lanceolatis acutis pinnatipartitis basi obliquis adnato-decurrentibus, laciniis lineari-oblongis, inferioribus inciso-serratis; rhachi costa venisque utrinque paleaceis glanduloso-hirsutis; soris parvis; indusio reniformi lacero.

HAB. Ovolau, Feejee Islands: in mountain forests.

Stipe a little over a foot in length, about the thickness of a crow-quill, obtusely angled, furnished with glandular, articulated hairs, intermingled with slender brownish scales. *Fronds* membranaceous, about equal in length with the stipe, triangular-ovate, ending in a narrow, acuminate, pinnatifid point, and slightly cordate at the base, where they are subtripinnate, bipinnate about the middle. *Pinnules* about 1½ inches long, oblong-lanceolate, acute, deeply pinnatifid. *Segments* linear-oblong, acute, the inferior ones deeply serrated, or even pinnatifid on many of the pinnules, the lower and inferior one the shortest, adnate, decurrent, triangular. *Rhachis, costa, and veins* on both sides beset with numerous slender scales and short glandular hairs, of a brownish colour. *Sori* numerous, small, rather distant, seated about equidistant between the costæform vein and the margin of the segments. *Indusium* reniform and much lacerated.

This apparently is nearly related to *Aspidium tenuisectum* of Blume.

15. *LASTREA GLABELLA*.

Nephrodium glabellum, A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 367.

HAB. Vicinity of the Bay of Islands, New Zealand: in humid forests.

Stipe about 15 inches long, as thick as a crowquill, naked and sulcate in front, with a few narrow scales at the base. Fronds of a lively green colour, from 12 to 15 inches long, broad-ovate, acuminate, somewhat cordate at the base, where they are tripinnate, bipinnate about the middle. Pinnæ alternate, petiolate, oblong-lanceolate, and tapering rather gradually into a finely serrate point. Pinnules petiolate, somewhat rhomboidal-oblong, acute, incisely-serrate, the inferior ones pinnatifid, beset with very minute, appressed, glandular hairs on both surfaces. Rhachis on the upper side almost concealed by a brownish pubescence. Sori rather large when contrasted with the narrow divisions of the fronds, with a flat round-reniform indusium, having a deep sinus at the point of attachment.

16. LASTREA ÆMULA.

Aspidium æmulum, Sw. Syn. Fil. p. 60; Willd. Spec. Pl. 5, p. 283.
Polystichum æmulum, Presl, Tent. Pterid. p. 83.

HAB. Pico Ruivo, island of Madeira.

Presl places this in his genus *Polystichum*, the species of which have an orbicular and peltate indusium. But in our plant, which we take for the true *A. æmulum* of Swartz, we find the indusium to be reniform, and the consistence of its fronds also agrees with other true species of *Lastrea*, to which genus we therefore refer it.

17. LASTREA GLABRA, Sp. Nov.

L. stipite gracili parce paleaceo; frondibus membranaceis glabris tripinnatis; pinnis primariis subalternis; pinnulis rhomboideo-oblongis obtusis inciso-lobatis, infimis profunde pinnatifidis, lobis semi-oblongis spinuloso-serratis; soris parvis submarginalibus; indusio rotundato-reniformi integerrimo.

HAB. Sandwich Islands: in elevated forest lands of Hawaii and Oahu.

Fronds membranaceous, smooth on both sides, tripinnate, triangular-

ovate, acuminate, and varying from one to 1½ feet in length, with a *stipe* which is usually a little shorter than itself, *sulcate* in front, *sparsely chaffy* with large, brown, attenuated *paleæ*, which are somewhat crowded and imbricated at the base. Ultimate divisions of the frond or *pinnules* crowded, *oblong, obtuse*, half an inch to an inch in length, *incisely lobed* or *pinnatifid*. *Segments* nearly *oblong, incisely lobed* or *serrate*, with a single sorus seated near the base of the sinus. *Sori* small, *submarginal*, sometimes confluent; the *indusium* *round-reniform* and *entire*.

This is a very neat and delicate Fern in all its parts, and is not unlike some of the more deeply divided forms of *Aspidium dilatatum*, Swartz.

18. LASTREA RUBIGINOSA, Sp. Nov.

L. stipite angulato sulcato paleaceo-hirsuto; frondibus subcoriaceis basi tripinnatis sursum bipinnatis; pinnis primariis sessilibus suboppositis, secundariis oblongo-lanceolatis; pinnulis laciniisve lineari-oblongis obtusis subfalcatis crenatis; rhachi rufo-hirsuta; costa venisque utrinque piloso-glandulosis; soris costæ approximatis magnis solitariis; indusio coriaceo rotundato-reniformi integerrimo.

HAB. Sandwich Islands: in dense humid forests.

Whole plant of a rusty brown colour. *Stipe* 10 to 12 inches in length, *angular, sulcate* in front, *chaffy* with copious, slender, dark-brown *paleæ* intermingled with the hairs, the latter extending to the main rhachis. *Fronde* one to 1½ feet in length, in circumscription triangular-ovate, *tripinnate* at the base, *bipinnate* about the middle, *subcoriaceous*; the divisions rather crowded. *Primary pinnæ sessile*, nearly *opposite*, *divaricate* and *direct*; the *secondary* ones *oblong-lanceolate*, the inferior *pinnate*, the superior *deeply pinnatifid* or *lobed*. *Pinnules* or *segments* *linear-oblong, obtuse, subfalcate, crenate*, from 3 to 6 lines long and 1½ to 2 lines broad; the inferior pair always the longest and broadest. *Costa and veins* beset with amber-coloured, *glandular hairs* on both sides. *Sori* large, *solitary*, forming a single

row on each side, placed *near the costa* of the pinnules or segments, furnished with a flat, entire, firm, *round-reniform indusium*.

A well-marked species, readily distinguished by its rusty appearance, and by the large subcostal sori.

* * * * *Fronde decompositæ, divisionibus tripinnatis.*

19. LASTREA DAVALLIOIDES, Sp. Nov.

L. stipite tereti scabro basi squamoso; frondibus subcoriaceis decompositis, divisionibus tripinnatis; pinnis primariis et secundariis oblongis acuminatis; pinnulis rhomboideo-lanceolatis pinnatifidis, laciniis lanceolato-linearibus acutis inciso-serratis; rhachi cum costa furfuraceo-hirsuta; soris solitariis; indusio rotundato-reniformi integerrimo.

HAB. Tahiti, Society Islands: in mountain forests.

Stipe 2 feet and upwards in length, about the thickness of a quill from the wing of a swan, perfectly *round*, firm, slightly *scabrous*, *chaffy* with long and slender paleæ at the base. *Fronde* large and spreading, *subcoriaceous*, smooth on both sides, somewhat shining above, *decompound*, the primary and secondary divisions of the branches terminating in a sharply serrate point. *Pinnules* usually less than an inch in length, somewhat *rhombic-lanceolate*, *deeply pinnatifid*, decurrent. *Segments lance-linear*, *acute*, and cut into 3 to 5 sharp teeth. *Rhachis* throughout and *costa* of the laciniæ *furfuraceous-hirsute* with short brown hairs. *Sori* small and *solitary*, seated on the middle of the teeth near their base; furnished with a persistent, *round-reniform*, *entire indusium*.

In habit and general appearance this is very much like *Davallia elata* of Swartz. It is closely related to the *Aspidium expansum* of Willdenow.

63. POLYSTICHUM, Roth, Presl, J. Sm.

(ASPIDIUM Spec. Sw. & Auct. TECTARIA, Cav. RUMOHRA, Raddi.)

Polystichum aculeatum and *P. Lonchitis* may be considered the types

of this genus, which embraces a large number of species of a rigid habit, the ultimate divisions of their fronds usually spinulose.

* *Fronde pinnatæ.*

1. POLYSTICHUM LONCHITIS, *Roth.*

Polystichum Lonchitis, Roth, in Willd. Spec. Pl. 5, p. 224.

HAB. Pico Ruivo, island of Madeira.

In our few specimens the pinnæ are much less mucronately serrate than in the usual European form of the species.

2. POLYSTICHUM MUNITUM, *Presl.*

Polystichum munitum, Presl, Tent. Pterid. p. 83.

Aspidium munitum, Kaulf. Enum. Fil. p. 236; Hook. & Arn. Bot. Beech. Voy. p. 162 & 405; Hook. Fl. Bor.-Amer. 2, p. 261.

HAB. Oregon and California; from Puget Sound to San Francisco: in forests, near the sea-coast.

Although there is a considerable resemblance between this and the *P.* (*Aspidium*) *acrostichioides*, yet it is nevertheless readily distinguished from that species, by its taller and more rigid fronds, with linear-lanceolate pinnæ, the fertile ones not at all contracted, their margin mucronately serrate with appressed and sometimes bidentate serratures, and the large sori, arranged in a single row nearer to the margin of the pinnæ than to the costa. The sori ultimately become confluent.

3. POLYSTICHUM MOHRIOIDES, *Presl.*

Polystichum mohrioides, Presl, Tent. Pterid. p. 83.

Aspidium mohrioides, Bory, in Mem. Soc. Linn. Par. 4, p. 597, & in Duperr. Voy. p. 267, t. 35.

Aspidium (*Polystichum*) *mohrioides*, Hook. f. Fl. Antarc. 2, p. 392, t. 149.

HAB. Orange Harbour, Tierra del Fuego: among loose rocks.

The specimens are smaller and more condensed than those figured by Bory St. Vincent; the fronds being only 3 or 4 inches high, and much smaller than the Magellanic form so admirably figured by Dr. Hooker.

* * *Fronde bipinnate.*

4. POLYSTICHUM HALEAKALENSE, Sp. Nov. (Tab. 28.)

P. stipite paleaceo et hirsuto; frondibus bipinnatis; pinnis alternis subsessilibus oblongo-lanceolatis; pinnulis rhomboideo-oblongis acutis inciso-lobatis, lobis spinuloso-dentatis; rhachi costa venisque paleaceo-villosis; soris magnis; indusio orbiculari peltato membranaceo lacero.

HAB. Sandwich Islands; on Mouna Kea, Hawaii, and Mouna Haleakala, East Maui.

Rootstock globose and paleaceous. *Stipe* from 4 to 6 inches long, about the thickness of a crowquill, angular, of a pale straw-colour, partially covered by long lanceolate, attenuated, spinulose-dentate *paleæ*, intermingled with hairs. *Fronde* from 6 inches to a foot in length, in circumscription elongated-lanceolate, somewhat flaccid and slender, but erect, *bipinnate*. *Pinnæ* alternate, oblong-lanceolate, seated on a very short *petiole*, the inferior ones rather distant and deflexed. *Pinnules* about half an inch in length, somewhat rhombic-oblong, acute, the superior half the larger; lower pinnules deeply pinnatifid; the upper ones incisely lobate; the lobes terminated by sharp teeth. *Rhachis*, *costa*, and *veins* thickly beset with paleaceous hairs. *Sori* large, scattered, confluent with age, and concealing nearly the whole of the under surface of the pinnules; the *indusium* membranaceous, orbicular and peltate, its margin lacerated.

This is allied to the following species, from which however it is sufficiently distinct, in the much smaller size of the whole plant, the shorter pinnæ, and the deeper incised pinnules.

PLATE 28.—Fig. 1. Plant, of the natural size. 1 a. Pinnule,

showing its under surface. 1 *b*. Dorsal view of a small portion of the same, with a single entire sorus. 1 *c*. The indusium, with a scale in its centre. 1 *d*. A scale, from the costa. 1 *e*. A scale, from the stipe. 1 *f*, *f*. Sporangia.—The details all more or less magnified.

5. POLYSTICHUM VESTITUM, *Presl*.

Polystichum vestitum, Presl, Tent. Pterid. p. 83; Montag. Bot. Voy. Astrol. & Zelee (1843), t. 4, f. 8.

Aspidium vestitum, Sw. Syn. Fil. p. 53; Willd. Spec. Pl. 5, p. 261; Kaulf. Enum. Fil. p. 241; A. Rich. Bot. Voy. Astrol. p. 68; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 364; Hook. f. Fl. Antarc. 2, p. 392.

HAB. Tierra del Fuego.

6. POLYSTICHUM VENUSTUM, *Montag*.

Polystichum venustum, Montag. Bot. Voy. Astrol. & Zelee (1843), t. 5, f. M & N.

Aspidium venustum, Hook. f. Fl. Antarc. 1, p. 106.

HAB. Auckland Islands.

There is between this and the preceding species a very strong resemblance: the difference between the two principally consists in the present plant having more rigid fronds, broader paleæ on the rhachis, shorter and less attenuated pinnae, and the pinnules not so deeply lobed; yet we have states of *P. vestitum*, from Tierra del Fuego, between which and the present species it is difficult to discover any difference.

7. POLYSTICHUM ACULEATUM, *Roth*.

Polystichum aculeatum, Roth, in Willd. Spec. Pl. 5, p. 258.

Aspidium aculeatum, Sw. Syn. Fil. p. 53.

HAB. Island of Madeira.

8. POLYSTICHUM PLATYPHYLLUM, Presl?

P. stipite sulcato paleaceo-hirsuto; frondibus bipinnatis apice pinnatis; pinnis subpetiolatis alternis adscendentibus; pinnulis glabris trapezoideo-oblongis acutis spinuloso-serratis basi supra auriculatis; rhachis cum costa rufo-villosa; soris magnis solitariis sparsis.

Polystichum platyphyllum, Presl, Tent. Pterid. p. 84?

Aspidium platyphyllum, Willd. Spec. Pl. 5, p. 255.

HAB. Organ Mountains, Brazil.

Stipe a foot and upwards in length, *sulcate in front, chaffy-hirsute* with long, brown, entangled, slender paleæ. *Fronde*s about 20 inches in length, elongated-lanceolate, somewhat flaccid, *bipinnate* for more than two-thirds of its whole length, towards the *point simply pinnate*. Inferior *pinnæ* distant and subalternate, the upper ones *alternate*, approximate, *ascending*, seated on a *very short petiole*, oblong-lanceolate and attenuated into a deep and sharply serrate point. *Pinnules* smooth on both sides, of a lively green colour, subcoriaceous, from 8 to 10 lines long and 5 to 6 lines broad, *trapezoidal-oblong*, slightly falcate, *acute, spinulose-serrate, the superior base auriculate-lobed*. *Rhachis* (main and secondary) *villous* on both sides, together with the costaeform veins beneath, with copious *brown hairs*. *Sori* large and *solitary*, rather *sparse*: the indusium so obliterated that its form cannot be distinctly made out in the specimens.

We have little doubt that this is the *Aspidium platyphyllum* of Willdenow; although the pinnules of our plant are somewhat larger than he describes them.

9. POLYSTICHUM CORIACEUM, Schott.

P. stipite aspero paleaceo; frondibus subbipinnatis coriaceis glabris; pinnis alternis lanceolatis acuminatis basi pinnatis; pinnulis ovato-oblongis acutis vel lanceolatis argute serratis; rhachis cum costa crinito-paleacea; soris solitariis subseriatis; indusio magno peltato integerrimo.

Polystichum coriaceum, Schott, ex Presl, Tent. Pterid. p. 84.

Aspidium coriaceum, Sw. Syn. Fil. p. 75, excl. syn. nisi Forst.; Willd. Spec. Pl. 5, p. 268, pro parte; R. Br. Prodr. Fl. Nov. Holl. p. 148; A. Rich. Bot. Voy. Astrol. p. 71; Gaud. Bot. Freyc. Voy. p. 344.

HAB. Vicinity of the Bay of Islands, New Zealand.

Stipe from a span to a foot in length, slightly compressed, with a shallow groove in front, *rough* to the touch, *chaffy* with copious, large, blackish, entire, attenuated scales at the base, more sparsely paleaceous above. *Fronde*s usually about the same length as the stipe, rigid, *coriaceous*, triangular-oblong and acuminate, both sides alike in colour, *smooth*, *somewhat bipinnate*, that is, the alternate pinnæ are pinnate at the base and pinnatifid towards the point, which is acuminate and sharply serrate. *Pinnules* or segments from one to two and a half inches in length, oblique, either *ovate-oblong and acute*, or *lanceolate, sharply serrate*, sometimes crenate-dentate, beset with dots or raised points on the upper side, opposite the sori. *Rhachis and costa crinite-paleaceous*. *Sori solitary, somewhat in rows*. *Indusium large, peltate, entire*.

This is subject to much variation in the number of the divisions of its fronds and the form of its pinnules. Mr. Brown describes the fronds as decomposite and deltoid, and A. Richard as subbipinnate; and to states of the plant described by the latter, ours approaches very closely.

* * * *Fronde*s decompositæ vel tripinnatæ.

10. POLYSTICHUM DISCOLOR.

P. stipite lævi sulcato paleaceo; frondibus coriaceis decompositis triangulari-ovatis, divisionibus tripinnatis; pinnulis petiolulatis lanceolatis lobato-serratis, infimis pinnatifidatis, laciniis oblongis obtusis dentibus latis serratis; soris magnis solitariis; indusio orbiculari peltato integerrimo.

Aspidium discolor, Langsd. & Fisch. Ic. Fil. p. 16.

Rumohra aspidioides, Raddi, Plant. Brasil. p. 28, t. 43; Gaud. Bot. Freyc. Voy. p. 345.

HAB. Organ Mountains, and vicinity of Rio Janeiro, Brazil.

Stipe smooth, usually longer than the frond, about the thickness of a goosequill, rounded behind, angular and *sulcate* in front, *chaffy* with broad and membranaceous brown paleæ, which, on being removed, leave a small black dot at the point of attachment. *Fronde*s from one to 2 feet in length, and as much in breadth at their base, *triangular-ovate and decompose*; the branches *tripinnate*, *coriaceous*, smooth on both sides, and of a much paler colour on the lower surface: the ultimate divisions or *pinnules petiolulate*, *lanceolate*, a little unequal at the base and *lobate-serrate*, the inferior ones *deeply pinnatifid*. *Segments oblong*, *obtuse*, *toothed with very broad serratures*. Primary rhachis, together with that of the ultimate divisions, *pilose-paleaceous*. *Sori* large and *solitary*, with a *round, peltate, entire*, caducous *indusium*.

Kaulfuss has united this to the preceding species; but, although the two have some points in common, they are nevertheless distinct. The present species has large and decompose fronds, of a much paler colour on the under than upper surface, smoother stipes, and a larger, entire, caducous indusium.

11. POLYSTICHUM HISPIDUM, J. Sm.

Polystichum hispidum, J. Sm. in Hook. Jour. Bot. 4, p. 195.

Aspidium hispidum, Sw. Syn. Fil. p. 56; Willd. Spec. Pl. 5, p. 266; A. Rich. Bot.

Voy. Astrol. p. 69; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 367.

HAB. Forests, in the vicinity of the Bay of Islands, New Zealand.

An elegant and rather remarkable species, on account of its dark brown, hispid stipes, usually about the same length as the frond, with a single groove in front; the cross section reniform. Fronds almost invariably tripinnate, at least at the base, bearing a profusion of large sori; each serrature or incision having a single sorus near its base.

64. DIDYMOCHLÆNA, Desv.

(ASPIDIUM Spec. Sw. & Auct. TEGULARIA, Reinw. DIPLAZIUM Spec. Raddi. MONOCHLÆNA, Gaud.)

1. DIDYMOCHLÆNA SINUOSA, *Desv.*

Didymochlæna sinuosa, Desv. ex Kaulf. Enum. Fil. p. 184; Hook. Gen. Fil. t. 8.

Aspidium truncatulum, Sw. Syn. Fil. p. 52; Willd. Spec. Pl. 5, p. 156.

Diplazium pulcherrimum, Raddi, Plant. Brasil. p. 42, t. 59.

Monochlæna sinuosa, Gaud. Bot. Freyc. Voy. p. 340, t. 12.

HAB. On the Corcovado, Rio Janeiro: in forests. Feejee Islands; at an altitude of 2,000 feet.

Plant with a trunk one to 1½ feet high and from 10 to 15 inches in diameter, to which the base of the old stipes remain attached, crowned with from 8 to 12 erect fronds, which vary from 4 to 7 feet in length, and are of a paler colour on the under than upper surface.

We were not a little astonished and delighted on detecting, in the mountain forests of the Feejee Islands, this Fern, which we had previously found in Brazil, and supposed to be indigenous to the latter country only. The plants from both countries are identically the same, with the slight difference, that the Feejee plant is somewhat the smaller of the two.

65. NEPHROLEPIS, *Schott, Presl.*

(ASPIDIUM Spec. Sw. & Auct. NEPHRODII Spec. R. Br., Gaud.)

1. NEPHROLEPIS REPENS, Sp. Nov.

N. rhizomate filiformi repente; frondibus sessilibus lineari-lanceolatis pinnatis; pinnis membranaceis glabris lineari-oblongis obtusis dentatis, basi supra truncato-auriculata rhachi pubescenti parallela infra vix cuneata; soris magnis; indusio cordato-reniformi integerrimo.

HAB. Feejee Islands: on trunks of trees.

Rootstock long and slender, creeping, branched, about the thickness

of a quill from the wing of a sparrow, firm, and clothed with round, peltate, lacerated, brown scales and short fibrils, by which it clings to the bark of trees. *Fronde*s scattered, destitute of any proper stipe, from 4 inches to a span long, *linear-lanceolate* and *pinnate*. *Pinnæ membranaceous*, *smooth* on both sides, distant, from 6 to 8 lines long and 2 to 4 lines broad, subsessile, *linear-oblong*, *obtuse*; sterile ones entire, the fertile bluntly *toothed*; their superior base *truncate-cuneate* and parallel with the rhachis, the *inferior* one *slightly cuneate*; a few scattered hairs on the costæform vein on the upper side. *Rhachis* canaliculate and *pubescent*. *Sori* large, submarginal, 6 to 8 on the upper, and 3 to 5 on the lower margin of the pinnæ. *Inclusivum* entire, its form somewhat between *cordate* and *reniform*.

The creeping rootstock of this very neat little species ascends the trunks of trees; unlike other species of the genus which have come under our notice.

2. NEPHROLEPIS OBTUSIFOLIA, Presl?

N. stipite brevi canaliculato paleaceo-hirsuto; frondibus erectis pinnatis; pinnis sessilibus horizontalibus oblongis obtusis dentato-serratis, basi supra truncato-auriculata infra subcordata; rhachi pilosa; soris submarginalibus; indusio reniformi.

Nephrolepis obtusifolia, Presl, Tent. Pterid. p. 80?

Aspidium obtusifolium, Willd. Spec. Pl. 5, p. 231; Blume, Enum. Plant. Jav. p. 145.

HAB. Ovolau, and vicinity of Sandalwood Bay, Feejee Islands.

*Fronde*s erect, 6 to 8 in a cluster, from 15 to 18 inches high, linear, attenuated at both ends, *pinnate*, with a slender, *short stipe*, of 1½ or 2 inches in length, beset with brown *paleaceous hairs*, and having a *shallow channel* in front, which is deeper in the *hairy rhachis*. *Pinnæ sessile*, *horizontal*, approximate, from 6 to 8 lines long and 2 to 2½ lines broad, *oblong*, *obtuse*, the margin in the sterile ones finely, in the fertile bluntly *dentate-serrate*; the *superior* base *truncate* and *slightly auriculate*, the *inferior* *subcordate*. *Sori* seated close to the *margin*, from 6 to 8 on the superior and as many on the inferior margin,

marked with corresponding faint chalky-looking dots on the upper surface. *Indusium reniform.*

3. NEPHROLEPIS EXALTATA, Schott.

Nephrolepis exaltata, Schott, ex Hook. Gen Fil. t. 35.

Aspidium exaltatum, Sw. Syn. Fil. p. 45; Willd. Spec. Pl. 5, p. 229; Raddi, Plant.

Brasil. p. 30, t. 46; Kaulf. Enum. Fil. p. 236.

Nephrodium exaltatum, Gaud. Bot. Freyc. Voy. p. 336.

HAB. Sandwich Islands.

The figure of the Brazilian plant by Raddi is a very fair representation of that of the Sandwich Islands; where it occurs very frequently on the outskirts of forests and among bushes, on shady banks and on the steep ridges, so common in that country.

4. NEPHROLEPIS PENDULA, J. Sm.

Nephrolepis pendula, J. Sm. in Hook. Jour. Bot. 4, p. 197.

Aspidium pendulum, Raddi, Plant. Brasil. p. 30, t. 45.

Nephrodium pendulum, Gaud. Bot. Freyc. Voy. p. 337.

HAB. Organ Mountains, Brazil.

This so much resembles the preceding species, that it might with no great impropriety be viewed as a mere form of it; the difference consisting principally in the more membranaceous, narrower, subfalcate and slightly deflexed pinnæ of the present plant. The latter character depends very much upon the position and direction of the frond when growing, whether pendent, inclined, or erect; and the texture of the pinnæ we know to be affected by the greater or less degree of shade and moisture to which the plant is exposed.

5. NEPHROLEPIS HIRSUTULA, Presl?

Nephrolepis hirsutula, Presl, Tent. Pterid. p. 79?

Aspidium hirsutulum, Sw. Syn. Fil. p. 45 & 241; Willd. Spec. Pl. 5, p. 232.

Nephrodium hirsutulum, Gaud. Bot. Freyc. Voy. p. 339.

HAB. Samoan and Feejee Islands. Tongatabu, Friendly Islands. Luzon, Philippine Islands.

There is a great similarity in the general habit of the species comprised under this genus. In the present plant the fronds vary from 3 to 5 feet in height, with a round and rufous paleaceous-hirsute stipe and rhachis, having a shallow furrow in front. Pinnæ at the base of the frond rather distant, sessile, and sterile; the intermediate and superior ones more approximate and fertile, from 2 to 4 inches in length, linear-lanceolate, acuminate, dentate-serrate, the teeth irregular in size; the superior base truncate-auriculate (the auricle somewhat oblong and obtuse), the inferior base rounded, and with yellowish-brown paleaceous hairs on both sides. Sori large, solitary, and submarginal, with small pits of a blackish colour on the upper surface opposite them. Indusium round-reniform and persistent.

6. NEPHROLEPIS SPLENDENS, Presl?

Nephrolepis splendens, Presl, Tent. Pterid. p. 79.?

Aspidium splendens, Willd. Spec. Pl. 5, p. 220.

Nephrodium splendens, Gaud. Bot. Freyc. Voy. p. 337.

HAB. Feejee and Samoan Islands. Tahiti, Society Islands. Mangsi Islands.

This is a noble and very distinct species, with pinnate fronds, varying in height from 4 to 8 feet: stipe paleaceous at the base, naked and smooth towards the summit, and, together with the rhachis, having a shallow furrow in front. Pinnæ linear-lanceolate, acuminate, usually straight, but sometimes a little falcate, the margin bluntly and irregularly serrate, the base obtusely cuneate, from 4 to 9 inches long, half an inch to an inch broad, smooth on both sides, membranaceous or subcoriaceous, according to the exposure of the plant to the light when growing, with a line of dark concave spots on the upper surface opposite the sori, having a white dot in the centre of each, and a row of still smaller white dots at the termination of the venules within the margin: the superior base of the pinnæ in the Tahiti and Samoan plants is truncate and somewhat auriculate. Sori

large, in a single row about 2 lines breadth within the margin. Indusium round-reniform and entire.

7. NEPHROLEPIS BISERRATA, *Presl?*

Nephrolepis biserrata, Presl, Tent. Pterid. p. 79?

Aspidium biserratum? Sw. Syn. Fil. p. 46 & 242; Willd. Spec. Pl. 5, p. 231.

HAB. Sandalwood Bay, Feejee Islands.

This, though much smaller in all its parts, approaches very closely to the *N. splendens*, of which it may possibly be only a well-marked variety; but the single specimen we possess does not enable us to decide this point. The pinnæ are shorter and narrower, and have a much more attenuated point; the margin is bluntly-serrate, the serratures bidentate; the superior base truncate-cuneate, the inferior rounded; both sides are smooth, and without the chalky dots on the upper surface; and the sori are a little closer to the margin than in *N. splendens*.

66. OLEANDRA, *Cav.*

(ASPIDIUM Spec. Sw. & Auct. NEURONIA, Don.)

I. OLEANDRA NERIIFORMIS, *Cav.*

O. rhizomate tereti ramoso squamoso; stipite brevi basi articulato; frondibus fasciculatis glabris coriaceis linearilanceolatis acuminatis; soris approximatis uniserialibus costæ proximis; indusio reniformi integerrimo persistente.

Oleandra neriiformis, Cav. ex J. Sm. in Hook. Jour. Bot. 4, p. 197.

Aspidium neriiforme, Sw. Syn. Fil. p. 42 & 237; Willd. Spec. Pl. 5, p. 213; Blume, Enum. Plant. Jav. fasc. 2, p. 140.

HAB. Ovolau, and vicinity of Sandalwood Bay, Feejee Islands; at the altitude of 2,000 feet.

Whole plant from 3 to 5 feet high, growing in groups in open situations, in company with *Drynaria Horsfieldii*. Rootstock erect, round, much branched, about a quarter of an inch in diameter, brittle and hollow, the surface studded with the persistent portion of the stipes below the articulation, and beautifully imbricated with slender, attenuated, fimbriate, blackish scales. Fronds smooth, in tufts of from 4 to 12 in number, at the extremities of the branches, with a stipe nearly an inch in length, articulated near its base, linear-lanceolate, tapering gradually into a slender point, coriaceous, from 8 to 10 inches long and 10 lines broad; the margin somewhat wavy; young fronds clothed with soft hairs on both sides, which disappear in age, and with a few scattered slender paleæ on the costa beneath. Veins forking near the costa, or sometimes simple. Sori approximate, forming a continuous regular row close to the costa, furnished with a brown, persistent, reniform, entire indusium.

There is not, perhaps, among the whole family of Ferns a more remarkable or striking species than this: its peculiar, hard, erect, branching rootstock, bearing its leaves or fronds in tufts at the extremities, reminding one, in the living state, more of a *Nerium Oleander*, or a Willow, than of a Fern.

2. OLEANDRA HIRTA, Sp. Nov. (Tab. 29.)

O. rhizomate repente paleaceo; stipite paleaceo-hirsuto medio articulado; frondibus membranaceis lanceolatis acutis basi attenuatis utrinque piloso-hirsutis; costa subtus parce paleacea; soris fere biserialibus irregularibus; indusio reniformi integerrimo parce piloso.

HAB. Organ Mountains, Brazil: on rocks and trees; rare.

Rootstock long and creeping, about the thickness of a crowquill, glaucous, clothed with slender, brown, spinulose-serrate paleæ, and with distant, long, brown, pubescent fibrils. Stipe slender, paleaceous-hirsute, from 2 to 4 inches long, articulated about the middle. Fronds scattered, from 15 to 18 inches in length, 1½ inches broad, lanceolate, with a slightly acute point and an attenuated base, membranaceous, pilose-hirsute on both sides; the costa beneath round, black, and promi-

ment, with a shallow furrow on the upper side, *paleaceous-hirsute*, the scattered and slender, fimbriate paleæ intermingled with the hairs. Veins sometimes simple, but usually forked once or twice; and sometimes two opposite venules are angularly united, thereby forming elongated areoles. *Sori* solitary, forming a transverse and prominent *irregular* line, which sometimes appears as if double, parallel with the costa and 2 to 3 lines distant from it. *Indusium* of a brown colour, *reniform* and *entire*, with a few *hairs* near its centre.

This is nearly related to the *O. pilosa* of Hooker, the base of a frond of which, with a section of the same showing the sori, is figured in his *Genera Filicum*. Our plant has a longer stipe, articulated about the middle; the fronds have a long attenuated base, and an entire, not ciliated indusium.

PLATE 29.—Fig. 1. Portion of the plant, of the natural size. 1 *a*. Section of a frond. 1 *b*. Smaller portion, with a single sorus. 1 *c*. Scale from the rootstock. 1 *d*. Hairs from the surface of the frond. 1 *e*, *e*. Sporangia.—The details more or less magnified.

TRIBE VI. DICKSONIÆ, J. SM.

67. ISOLOMA, *J. Sm.*

(LINDSÆÆ Spec. Wall., Presl, Hook. & Grev.)

1. ISOLOMA LANUGINOSA, *J. Sm.*

I. rhizomate brevi erecto; stipite semitereto antice unisulcato paleaceo-hirsuto; frondibus cæspitosis linearilanceolatis pinnatis; pinnis plurimis approximatis subcoriaceis oblongo-ellipticis lanceolatisve subfalcatis obtusis vel subacutis basi truncato-auriculatis articulatis lana decidua utrinque tomentosis; costa centrali; venis patentibus apice intra marginem cretaceo-punctigeris; soris marginalibus continuis.

Isoloma lanuginosa, J. Sm. in Lond. Jour. Bot. 1, p. 421; Hook. Gen. Fil. t. 102.
Lindsæa (Eulindsæa) lanuginosa, Wall. ex Hook. Spec. Fil. 1, p. 210.

HAB. Matia or Aurora Island, Society Group.

Rootstock short, erect (4 or more inches high), covered with the base of the old stipes, and throwing out all round strong lateral roots, which support it in an erect position. *Stipe* 6 to 12 inches long, often as thick as a swan's quill, *nearly round, with a single groove in front*, which continues up the rhachis; the surface in a recent state concealed with *reddish-brown paleæ*, intermingled with *matted hairs*, which finally disappear. *Fronds* from one to 4 feet in height, usually erect, and growing *in tufts, linear-lanceolate, pinnate*; the young ones having a rusty appearance from the presence of reddish-brown *deciduous scales and matted woolly hairs* on both sides. *Pinnæ numerous, close together, subcoriaceous, oblong-elliptical or lanceolate, subfalcate, obtuse or slightly acute* at the point, and *truncate-auriculate at the base*, where they are articulated with the rhachis, furnished with a row of white *chalky dots* at the points of the veins on the *upper surface just within the margin*. *Sori marginal, continuous*, usually confined to those pinnæ situated on the upper half of the frond.

The cretaceous intramarginal line of dots on the upper surface of the pinnæ, the articulation of the latter with the rhachis, and the habit and general appearance of the whole plant, present a strong resemblance to species of the genus *Nephrolepis*, Schott.

68. SCHIZOLOMA, Gaud., Presl.

(LINDSÆÆ Spec. Dryand., Sw., Kaulf. PTERIDIS Spec. Auct.)

1. SCHIZOLOMA AGATHI,* Sp. Nov. (Tab. 30.)

S. rhizomate brevi repente; stipite lævi triquetro basi paleaceo; frondibus erectis glabris lanceolatis pinnatis; pinnis remotis petiolatis

* This species is dedicated to the memory of Mr. A. T. Agate, one of the artists of the Expedition.

suboppositis patentibus lineari-ensiformibus obtusis margine integerrimis basi obliquis cuneatis superne subauriculatis; soris continuis; indusio proprio margine subæquali.

HAB. Feejee Islands: in open grassy places.

Rhizoma short and creeping, about the thickness of a crowquill. Fronds few, *erect* and tufted, from 10 to 12 inches long, *lanceolate*, *smooth*, *pinnate*, with a very *slender*, *smooth*, *triangular stipe* of about the same length, bearing a few scattered, reticulated, slender *scales* at base. *Pinnæ distant, subopposite, linear-ensiform, seated on a short petiole*, 15 to 30 in number, 2 to 3 inches long by 3 lines broad, *obtuse at the point*, and with an *oblique*, rather bluntly *wedge-shaped base*, the *superior half with a round auricle*, the texture inclining to membranaceous. Venation rather obscure, the venules slender and forming elongated oblique areoles. *Sori continuous; the special indusium nearly equal with the margin.*

This is related to *Lindsæa ensifolia*, Swartz, as figured by Hooker and Greville in their *Icones Filicum*; but it differs in the longer and broader fronds, and the more numerous pinnæ, which have an oblique and subauriculate superior base. It is also closely allied to the *Schizoloma Billardieri* of Gaudichaud.

PLATE 30.—Fig. 1. Frond, of the natural size. 1 *a.* Section of a pinna, with the indusium turned back, to show the sporangia. 1 *b.* Scales from base of the stipe. 1 *c.* A sporangium. 1 *d.* Sporules.—More or less magnified.

69. DIELLIA,* Nov. Gen.

Costa pinnarum centralis. Venæ furcatæ: venulæ in areolas elongatas obliquas anastomosantes, apicibus liberis vel juxta marginem per recep-

* The genus is dedicated to the memory of the Rev. John Diell, late Chaplain for American seamen at Honolulu; whose zealous endeavours in forming collections, and in making known the Natural History (especially the Botany and Conchology) of the Sandwich Islands, well deserve this commemoration.

taculum sporangiferum interruptum transversim connexis. Sori distantes. Indusium lineari-oblongum, marginem pinnæ fere adæquans. Sporangia pedicellata.

The genus here proposed, with some hesitation, embraces three Ferns of the Sandwich Islands, which differ from *Schizoloma* principally in their interrupted sori. In this respect they have a considerable affinity with *Synaphlebium*; but in that genus the costa is eccentric or wanting.

1. *DIELLIA ERECTA*, Sp. Nov. (Tab. 31.)

D. frondibus cæspitosis glabris elongato-lanceolatis pinnatis; pinnis subsessilibus subalternis horizontalibus subcoriaceis lineari-hastatis repandis basi truncata superne auriculatis; indusio margine breviori; stipite elongato cum rhachi subtereti lævi nudo rufescente antice bilineato.

HAB. Sandwich Islands: in mountain forests of the western division of Maui.

Fronde tufted, from 12 to 15 inches in length, of an *elongated-lanceolate* form, rather rigid, *glabrous*, *pinnate*. *Pinnæ horizontal*, from 40 to 50 in number, somewhat *linear-hastate*, *subcoriaceous*, about 2 inches in length by 3 lines broad, *somewhat alternate*, the inferior ones about an inch apart, but more approximated towards the apex of the frond, the *margin repand* and entire, the base broad and *truncate*, its *superior half auriculate* and twice as broad as the inferior one: usually there are one or two pairs of short ovate pinnæ present at the base of the frond. *Indusium* membranaceous, of a pale straw colour, and *not equal with the margin*. *Stipe elongated*, 6 to 10 inches long, of a *reddish-brown tint*, *smooth and glossy*, *nearly round*, and furnished with *two narrow marginal lines in front*, and a few stiff scales at the base.

PLATE 31.—Fig. 2. A frond, of the natural size. 2 *a*. Dorsal view of a section of a fertile pinna. 2 *b*, 2 *b*. Sporangia.—The details magnified.

2. *DIELLIA FALCATA*, Sp. Nov. (Tab. 31.)

D. rhizomate globoso; stipite brunneo tereti brevi crebre paleaceo; frondibus cæspitosis glabris lanceolatis falcato-decurvis basi attenuatis pinnatis; pinnis sessilibus coriaceis subalternis horizontalibus lineari-ensiformibus (imisve parvis deltoideo-ovatis) repandis basi truncata superne auriculatis; indusio sublineari marginem adæquante.

HAB. Kaala Mountains, Oahu, Sandwich Islands: on open and dry rocky ridges; rare.

Rootstock short and globular. Stipe about 2 or 3 inches long, terete, of a dull brown colour, and densely chaffy with ligulate, membranaceous, entire, reticulated paleæ. Fronds few, tufted, rather rigid, lanceolate, slightly attenuated at the base, having a graceful, falcate curve, pinnate. Pinnæ sessile, horizontal, glabrous on both sides, coriaceous, linear-ensiform, approximate; their margins slightly repand; the base truncate, broad and unequal, the superior half auriculate and twice the breadth of the inferior one; the terminal pinna short and hastate, the small ones at the base deltoïd-ovate or cordate. Rhachis naked, smooth, slightly margined. Indusium usually equal with the margin, almost linear, sometimes semilunate.

This differs from the preceding species in its shorter and paleaceous stipe; in the falcate fronds tapering at the base; and in having the indusium about equal with the margin.

PLATE 31.—Fig. 1. Portion of a plant, of the natural size. 1 a. Dorsal view of a section of a pinna. 1 b. Scale from the stipe. 1 c, 1 c. Sporangia.—The details magnified.

3. *DIELLIA PUMILA*, Sp. Nov.

D. rhizomate cæspitoso; stipite nudo atro nitente filiformi; frondibus coriaceis glabris lineari-lanceolatis pinnatis; pinnis alternis confertis sessilibus triangulari-ovatis repandis basi truncata superne auriculatis; indusio stramineo marginem adæquante.

HAB. Oahu, Sandwich Islands: in the crevices of rocks; rare.

Whole plant about 3 inches in height, having a *cæspitose rootstock*, and *slender, linear-lanceolate, pinnate fronds*, supported by wiry, *slender, naked, black and glossy stipes*, of about an inch in length. *Pinnæ* small, *sessile, alternate, crowded, coriaceous* and opaque, 3 lines long by 2 lines broad, *triangular-ovate*, the margin entire and *repand*; the *base truncate*, its *superior half auriculate*. *Indusium* rather coriaceous, *straw-coloured, equal with the margin*.

This is very distinct in character from the two preceding species; and the habitats of each are also very dissimilar. In none of the localities were plants of either of the species plentiful.

70. LINDSÆA, *Dryand.*

1. LINDSÆA LINEARIS, *Sw.*

Lindsæa linearis, Sw. Syn. Fil. p. 118 & 318, t. 3, f. 3; R. Br. Prodr. Fl. Nov. Holl. p. 156; A. Rich. Bot. Voy. Astrol. p. 85; A. Cunn. in Hook. Comp. Bot. Mag. p. 366; Hook. Spec. Fil. 1, p. 206.
L. lunata, Willd. Spec. Pl. 5, p. 421.

HAB. Vicinity of the Bay of Islands, New Zealand. Port Jackson, New South Wales.

From the latter country we have specimens of this Fern over 18 inches long. Stipe naked, purplish, glossy, usually about the same length as the frond itself.

2. LINDSÆA MICROPHYLLA, *Sw.*

Lindsæa microphylla, Sw. Syn. Fil. p. 120 & 319; Willd. Spec. Pl. 5, p. 426; R. Br. Prodr. Fl. Nov. Holl. p. 156; Hook. & Grev. Ic. Fil. t. 194; Hook. Spec. Fil. 1, p. 218.

HAB. Port Jackson, New South Wales.

In the vicinity of Sydney we found this species in considerable abundance on what is called "the north shore," inhabiting rocky situations; the soil in which it grew consisting of sharp white sand and vegetable earth in about equal proportions.

3. *LINDSÆA TRICHOMANOIDES*, *Dryand.*

Lindsæa trichomanoides, Dryand. in Linn. Trans. 3, p. 43, t. 11; Sw. Syn. Fil. p. 119; Willd. Spec. Pl. 5, p. 425; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 366; Hook. Spec. Fil. 1, p. 218.

HAB. Vicinity of the Bay of Islands, New Zealand; frequent.

Of this, fronds are to be met with, arising from the same root-stock, which accord equally well with the description of *L. Lessonii* of Bory, in Hooker's Species Filicum, as with that of *L. trichomanoides* of Dryander, of the same work; the lower part of the fronds being either bi- or tripinnate, while they are simply pinnate towards the point; the pinnæ oblong-lanceolate, and with the pinnules cuneate at the base: yet the greater part of our specimens agree with Dryander's figure above-cited.

4. *LINDSÆA GARDNERI*, *Hook.*

Lindsæa Gardneri, Hook. Spec. Fil. 1, p. 213, t. 65, C. (opt.)

HAB. Organ Mountains, Brazil.

A very pretty species, nearly related to the *L. Catharinæ* of Sir William Hooker.

5. *LINDSÆA OBLONGIFOLIA*, *Reinv.?*

Lindsæa oblongifolia, J. Sm. in Hook. Jour. Bot. 3, p. 415 (sine char.); Hook. Spec. Fil. 1, p. 206, t. 61, D.

HAB. Mountains near Baños, Luzon, Philippine Islands.

All our specimens are unfortunately without stipes; but the fronds themselves correspond to the figures given in the Species Filicum.

6. LINDSÆA TRAPEZIFORMIS, *Dryand.*

Lindsæa trapeziformis, Dryand. in Linn. Trans. 3, p. 42, t. 9; Willd. Spec. Pl. 5, p. 424; Kaulf. Enum. Fil. p. 220; Hook. Gen. Fil. t. 63, A.; Hook. Spec. Fil. 1, p. 214.

L. nitidissima, Willd. Spec. Pl. 5, p. 423.

HAB. On the Corcovado, Rio Janeiro, Brazil.

Dryander's figure of this, in the Linnæan Transactions, is tolerably characteristic of our plant, particularly as regards the form and direction of the pinnules; but the pinnæ are delineated as more numerous, distant, and spreading than in our specimens.

7. LINDSÆA RIGIDA, *J. Sm.*

Lindsæa rigida, J. Sm. in Hook. Jour. Bot. 3, p. 415 (sine char.); Hook. Spec. Fil. 1, p. 217.

HAB. Mount Ophir, Malacca.

Although the fronds of this are very rigid, they are nevertheless remarkable for the graceful falcate form of their pinnæ, and the great regularity in the size and form of the pinnules.

The Expedition is indebted to Mr. Balestier, United States Consul at Singapore, for specimens of this very handsome Fern.

71. SYNAPHLEBIUM, *J. Sm.*

(LINDSÆÆ Spec. Reinw., Blume, Wall.)

1. SYNAPHLEBIUM RECURVATUM.

Lindsæa recurvata, Wall.; Hook. Spec. Fil. 1, p. 222, t. 70, A. (subgen. *Schizoloma*).
L. nitens, Blume, Enum. Plant. Jav. p. 217.

HAB. Mount Majajjai, Luzon, Philippine Islands.

Referred by us, without a doubt, as identical with the plant cited in Hooker's *Species Filicum*.

2. *SYNAPHLEBIUM PULCHRUM*, Sp. Nov.

S. rhizomate gracili repente; stipite quadrangulari nudo fronde breviorē; frondibus oblongo-lanceolatis pinnatis; pinnis subcoriaceis alternis patentibus subsessilibus dimidiato-oblongis obtusis, margine superiori lobato-crenato, inferiori costæformi sursum curvato, basi truncato-cuneata; soris oblongis per totam latitudinem loborum continuis indusio proprio margine breviorē.

HAB. Tutuila, Samoan Islands; and Sandalwood Bay, Feejee Islands: in mountain forests, on trees.

Rootstock slender and creeping, about the thickness of a pigeon's quill, rufous-hirsute. Stipe 4 inches long, quadrangular, straw-coloured, naked, shorter than the frond. Fronds oblong-lanceolate, from 4 to 6 inches long by an inch broad, somewhat coriaceous, pinnate. Pinnæ from 25 to 30 in number, alternate, spreading, subsessile, dimidiato-oblong, obtuse, from 4 to 6 lines in length by 3 lines broad, approximate, the base truncate-cuneate, the inferior margin costæform and curved upwards, the superior one lobate-crenate; the crenatures soriferous. Sori oblong, with a membranaceous continuous special indusium, which is shorter than the margin. Veins forming elongated meshes, 2 or 3 of them combining in each lobe, and forming the interrupted sporangiferous receptacle.

We view this as a very distinct species; yet, at first sight, it might be mistaken for the *Lindsæa cultrata* of Swartz; which however has a forked venation. In the present genus our plant would stand next to the *S. recurvatum* of J. Smith.

3. *SYNAPHLEBIUM PICKERINGII*, Sp. Nov. (Tab. 30.)

S. rhizomate gracili repente; stipite angulari basi squamoso; frondibus glabris lineari-ensiformibus pinnatis; pinnis plurimis approximatis alternis membranaceis dimidiato-oblongis obtusis, margine inferiori integerrimo, superiori obtuse lobato, basi truncato-cuneata; indusio

proprio membranaceo oblongo seu reniformi margine brevior; venis paucis, venulis angulato-anastomosantibus aut liberis.

HAB. Savaii, Samoan Islands.

Rootstock long, slender and creeping, ascending the trunks of trees. *Stipe* quadrangular, squamose at the base, smooth and slender above, from 3 to 4 inches in length, of a reddish-brown colour, the scales at base slender and reticulated. *Fronde* from a foot to 15 inches long, elastic, smooth, linear-ensiform, pinnate to the apex. *Pinnæ* alternate, numerous, membranaceous, crowded, dimidiate-oblong, obtuse, the base truncate-cuneate, the inferior margin entire, the superior margin cut into 5 to 6 round lobes, the upper portion of each lobe bearing within its margin a transversely oblong or reniform indusium of a delicate membranaceous texture, shorter than the margin, and resting on a single vein, or on a combination of two venules.

In habit and in the form of the pinnæ our plant very much resembles the *Odontoloma Boryanum* of J. Smith, which has a free or forked venation, and the superior margin of the pinnæ incisely dentate. In the present species the majority of the veins anastomose, forming from 2 to 4 elongated and angular areoles in each pinnæ; so that it may be said to possess the venation of *Synaphlebium*, with the sori of *Odontoloma*.

PLATE 30.—Fig. 2. Portion of a plant, of the natural size. 2 a. A pinna, slightly magnified, to show the anastomosing venules. 2 b. Dorsal view of a lobe, with a single sorus, and a portion of the indusium turned back to show the sporangia. 2 c. A sporangium.—The dissections more or less magnified.

4. SYNAPHLEBIUM DAVALLIOIDES, J. Sm.

Synaphlebium davallioides, J. Sm. in Lond. Jour. Bot. 1, p. 424.

Lindsæa davallioides, Blume, Enum. Plant. Jav. p. 218; Hook. Spec. Fil. 1, p. 224, t. 68, A. (subgen. *Schizoloma*).

Davallia Kunzeana, Hook. Spec. Fil. 1, p. 177.

HAB. Feejee Islands; and Tutuila, Samoan Islands: terrestrial.

This is a very handsome species, and of common occurrence in mountain forests, in the interior of these islands.

72. ODONTOLOMA, *J. Sm.*

(SACCOLOMÆ Spec. Presl. LINDSÆÆ Spec. Reinw., Blume.)

The species embraced under this genus agree in habit and venation with *Lindsæa*, but have the sori interrupted, on account of the upper margin of the pinnæ being lobed, serrated, or crenate-toothed; each lobe or tooth bearing near its base a solitary sorus seated on the apex of a single vein, or rarely on the combined apices of two adjoining veins, as sometimes happens in the *O. pulchellum* of J. Smith. The special indusium is membranaceous, and rounded, or very slightly reniform.

1. ODONTOLOMA PULCHELLUM, *J. Sm.*

Odontoloma pulchellum, J. Sm. in Lond. Jour. Bot. 1, p. 424.

Davallia (*Odontoloma*) *pulchella*, Hook. Spec. Fil. 1, p. 175, B.

HAB. Mount Majajai, Luzon, Philippine Islands.

The figure cited represents the lower and middle portion of a frond, and a magnified pinna: the pinnæ in our plant, though otherwise similar, are seated on a petiole a little longer than there represented.

2. ODONTOLOMA BORYANUM, *J. Sm.*

Odontoloma Boryanum, J. Sm. in Lond. Jour. Bot. 1, p. 424; Hook. Gen. Fil. t. 114, B.

Dicksonia repens, Willd. Spec. Pl. 5, p. 482.

Saccoloma Boryana, Presl, Tent. Pterid. p. 126, t. 4, f. 20.

Davallia (*Odontoloma*) *Boryana*, Hook. Spec. Fil. 1, p. 175, pro parte.

HAB. Luzon, Philippine Islands: in mountain forests, clinging to the trunks of trees.

A good illustration of the form of the pinnules and the sori of this Fern may be found in Hooker's Genera Filicum. We mention this, on account of the species having often been confounded with others of a similar habit.

3. ODONTOLOMA MACRÆANA.

O. rhizomate repente squamoso; stipite lævi angulato; frondibus linearilanceolatis pinnatis; pinnis plurimis alternis membranaceis glabris dimidiato-oblongis obtusis basi obliqua truncato-cuneata, margine inferiori integerrimo subcurvato, superiori crenato; soris rotundis; indusio semiorbiculari.

Davallia Macræana, Hook. & Arn. Bot. Beech. Voy. p. 108.

HAB. Sandwich Islands: frequent.

Rootstock creeping, ascending the trunks of trees to a height of 20 feet, about the thickness of a crowquill, and thinly covered with rigid, short, ferruginous, reticulated scales. *Stipe* 2 to 4 inches long, smooth, bearing a few slender scales at the base, and together with the rhachis angular, of a pale straw colour. *Fronde*s usually from a foot to 15 inches in length, linear-lanceolate, pinnate, attenuated very gradually towards both ends. *Pinnæ* numerous, about 10 lines long by 3 lines broad, membranaceous, smooth, dimidiato-oblong, the point rounded, the superior margin crenate, the crenules soriferous; the round sori forming a continuous line from the angle of the truncate-cuneate base along the upper edge and round the point to the termination of the inferior margin, the latter usually somewhat recurved for about half its length; the truncate-cuneate base approximating to and parallel with the rhachis. *Sori* round; the *indusium* membranaceous and subrotund when seated on one venule, or reniform when resting on two conjoined venules, considerably shorter than the crenules. Veins oblique, forking once or twice after leaving the primary nerve or costa.

We cannot agree with Sir William Hooker, in the opinion that this is a mere state of *Saccoloma* (*Davallia*) *Boryana* of Presl, the

Odontoloma Boryanum, of J. Smith, and of this work; the form, texture, and direction of the pinnæ of the latter being very different from that of the present species.

4. ODONTOLOMA TENUIFOLIUM, *J. Sm.*

Odontoloma tenuifolium, *J. Sm.* in *Hook. Jour. Bot.* 3, p. 415.

Lindsæa tenuifolia, *Blume, Enum. Plant. Jav.* p. 219.

Davallia (Odontoloma) Blumeana, *Hook. Spec. Fil.* 1, p. 177, t. 54, A.

HAB. Islands of Tutuila and Savaii, Samoan Group.

Excepting some species of *Hymenophyllum* and *Trichomanes*, there is perhaps no Fern that has the divisions of its fronds so delicately membranaceous, or so elegantly arranged and finely divided as the present species. The figure in Hooker's *Species Filicum* is very characteristic: the segments of the pinnules, however, in many of our specimens, are not so deeply divided as they are there represented.

73. HUMATA, *Cav., J. Sm.*

(DAVALLIÆ *Spec. Auct.*)

Venæ simplices vel furcatæ; venulis parallelis apice sporangiferis. Indusium orbiculare seu reniforme, coriaceum, marginem fere adæquans, apice cum lateribus liberum. Sporangia pedicellata.—Rhizomata repentes squamosi: frondes coriaceæ, aut integræ aut bi-tripinnatisectæ.

* *Frondes steriles integerrimæ, fertiles sinuatæ.*

1. HUMATA OPHIOGLOSSA, *Cav.*

Humata ophioglossa, *J. Sm.* in *Lond. Jour. Bot.* 1, p. 425.

Davallia heterophylla, *Sw. Syn. Fil.* p. 130 & 337; *Willd. Spec. Pl.* 5, p. 465;

Hook. & Grev. Ic. Fil. t. 230; *Hook. Spec. Fil.* 1, p. 152 (subgen. *Humata*).

HAB. Tahiti, Society Islands; also Samoan and Feejee Islands.

At the Samoan Islands this species is of very frequent occurrence; its wiry rootstocks rambling over rocks, and clinging by its rootlets to the trunks of trees. We do not find it recorded in any work, as having been heretofore detected in the islands in the Pacific Ocean.

* * *Frondes pinnatifidæ, segmentis pinnisve infimis pinnatifidis seu lobatis.*

2. HUMATA POLYPODIOIDES, Sp. Nov. (Tab. 32.)

H. rhizomate ramoso gracili repente squamoso; stipite compresso; frondibus coriaceis triangulari-oblongis acuminatis pinnatifidis basi cordatis, segmentis sterilium oblongis obtusis apice dentatis, infimis margine inferiori lobatis; segmentis fertilium crenato-dentatis; indusio majusculo subcoriaceo orbiculari ultra sinum dentium productis; venis furcatis.

HAB. Direction Island, and Vanua Levu, Feejee Islands.

Plant scandent. *Rootstock creeping and branched, slender, of a firm texture, about the thickness of a crowquill, producing rootlets from the axils of the branches and buds; the surface rough and closely imbricated with setose scales, which are attached by a point or disc near their middle, on which they can be turned as on a pivot. Fronds scattered, coriaceous, raised on a compressed stipe (of nearly half an inch in length), about 2 inches long by one inch broad, triangular-oblong, acuminate, slightly cordate at the base, and pinnatifid; the fertile one generally the smallest; the sterile one resembling very much a starved specimen of the common Polypodium vulgare. Sterile segments oblong, obtuse, toothed at the apex, the inferior pair lobed; the fertile segments crenate-dentate. Sori copious, and concealing half of the under surface of the frond; the rather large and orbicular, coriaceous indusium projecting beyond the sinus of the teeth. Veins forked, immersed, much more evident on the under than the upper surface.*

PLATE 32.—Fig. 1. Portion of a plant, of the natural size. 1 a. Dorsal view of a portion of the sterile frond, showing the vena-

tion. 1 *b*. Same view of a portion of the fertile frond, showing the form of the indusium. 1 *c*. Single sorus, with the indusium cut away, to show the insertion of the sporangia. 1 *d*. Scale from the rootstock. 1 *e*. Sporangium.—The details more or less magnified.

3. HUMATA PECTINATA, *J. Sm.*

Humata pectinata, *J. Sm.* in *Lond. Jour. Bot.* 1, p. 425.

Davallia pectinata, *Sw. Syn. Fil.* p. 130; *Willd. Spec. Pl.* 5, p. 465; *Hook. & Grev. Ic. Fil.* t. 139; *Hook. Spec. Fil.* 1, p. 153 (subgen. *Humata*).

HAB. Tahiti, Society Islands: in mountain forests, on the trunks of trees.

The figure given in the *Icones Filicum* represents the usual state of the plant; but we possess specimens of nearly twice the size, and with the inferior pinnae deeply pinnatifid, the superior ones incisely serrate.

4. HUMATA PARALLELA.

Davallia parallela, *Wall.*; *Hook. Spec. Fil.* 1, p. 153, t. 42, A. (subgen. *Humata*).

Nephrodium Gaimardianum, *Gaud. Bot. Freyc. Voy.* p. 335, t. 12, f. 1.

HAB. Samoan Islands: on rocks and trunks of trees.

We find the sterile and fertile fronds, in all our examples of the plant, to be uniform in size. In the *Species Filicum* the sterile frond is represented as much the larger; which goes to show that the species is subject to variation in this particular. The species is nearly allied to the preceding, but is readily distinguished by the less deltoid fronds, not so deeply pinnatifid, with more approximate and parallel segments, the indusium pointing to the extremity of the segments, a character clearly pointed out by Sir William Hooker in his *Species Filicum*. The *Nephrodium Gaimardianum* of Gaudichaud, which is identically the same as our plant, is stated by that author to be a native of the Sandwich Islands, in which he is followed by Sir William Hooker; but our own observations, as well as those of others

on the vegetation of these islands, make it rather doubtful as to whether Gaudichaud may not have erred in assigning that country as the habitat.

* * * *Frondes subternatae, bipinnatae, vel bi-tripinnatifidae.*

5. HUMATA CUMINGII.

Davallia (Humata) Cumingii, Hook. Spec. Fil. 1, p. 155, t. 45, B.

HAB. Mountains, near Baños, Luzon, Philippine Islands: on trees.

Rootstock long, creeping, and paleaceous. Stipes from 3 to 4 inches long, setose-paleaceous. Fronds very coriaceous, cordate-ovate, acuminate, bipinnate; the segments dentate-serrate, shining on both sides, underneath of a pale green colour. Sori numerous, seated in the sinuses of the teeth. The sterile fronds are in general larger than those represented in Hooker's Species Filicum.

6. HUMATA SERRATA, Sp. Nov.

H. rhizomate repente squamoso; stipite setoso-paleaceo; frondibus coriaceis glabris cordato-ovatis; sterilibus pinnatis, pinnis oblongo-ovatis inciso-pinnatifidis, laciniis linear-oblongis dentatis; fertilibus acuminatis basi tripinnatis superne bipinnatis, pinnis petiolatis, pinnulis linearilanceolatis acutis inciso-serratis; rhachi costaque marginatis; soris parvis sinibus serraturarum insertis; indusio orbiculari margine æquali.

HAB. Feejee and Samoan Islands: clinging to the trunks of trees.

Rootstock slender and creeping, of a dark brown colour, closely covered with linear-lanceolate scales, which are attached by a point near their base. Stipe slender, setose-paleaceous. Fronds smooth, coriaceous, cordate-ovate; the sterile one (including the stipe) not over 2 inches long, pinnate; the oblong-ovate pinnae incisely pinnatifid, the divisions linear-oblong and toothed: fertile frond (including the stipe) about a span high, acuminate, tripinnate at the base, towards the apex

bipinnate; the *pinnæ* seated on a short *petiole*; the *pinnules* or ultimate divisions *linear-lanceolate* and *incisely serrate*. *Rhachis* and *costa* in both kinds of fronds furnished with a *narrow margin*. *Sori* numerous and *small*, seated in the *sinuses* of the *serratures*, and furnished with a *round indusium*, which is about *equal* with the *margin*.

Our plant is nearly related to the *Davallia alpina* of Blume; but it differs in its tripinnate fertile fronds, the petiolate pinnæ, and the orbicular indusium.

7. HUMATA BOTRYCHIOIDES, Sp. Nov. (Tab. 32.)

H. rhizomate repente squamoso; *stipite gracili setoso-paleaceo*; *frondibus glabris coriaceis triangulari-ovatis*; *sterilibus pinnatis, pinnis sessilibus oblongo-lanceolatis inciso-pinnatifidis, laciniis oblongis obtusis crenulatis*; *fertilibus bipinnatis, pinnis infimis petiolatis oblongo-lanceolatis, pinnulis linearibus lobato-crenatis*; *costa marginata*; *venis incrassatis furcatis*; *indusio coriaceo reniformi crenulas æquantibus*.

HAB. Feejee Islands: at the elevation of 2,000 feet; ascending the trunks of trees.

Rootstock round, firm, and *creeping*, about the thickness of a goose-quill, closely covered with fuliginous oblong-lanceolate *scales*, attached by a point near their centre. *Stipe* slender, *setose-paleaceous*; that of the fertile frond the longer. *Fronds* few, of a rigid texture, *smooth* on both sides, *triangular-ovate*, or somewhat five-angled, and arising from the points of spurs or branchlets. *Sterile frond* coriaceous, *pinnate*, glossy on the upper side, which is of a dark green colour; the under surface much paler and striated in appearance: *pinnæ sessile, oblong-lanceolate* in form, and *incisely pinnatifid*; the segments *oblong and obtuse*, more or less *crenulate-dentate*. *Fertile frond* the larger, *bipinnate*, with subalternate pinnæ; the *inferior pair petiolate, oblong-lanceolate*, the ultimate divisions so contracted that the parenchyma is almost entirely wanting, except in the crenules, the terminal one of which is bidentate: the whole frond has much the appearance of the fertile spike of some species of *Botrychium*. *Costa margined*;

the veins very thick, sunken, and forked. *Indusium coriaceous, reniform, about equal with the margin of the crenules.*

PLATE 32.—Fig. 2. Portion of a plant, of the natural size. 2 a. Dorsal view of a portion of a sterile frond, showing its venation. 2 b. Portion of a fertile frond, showing the sori, with and without the indusium. 2 c. Scale from a rootstock. 2 d. Sporangium.—The details more or less magnified.

74. CYSTOPTERIS, *Bernh., J. Sm., Hook.*

(POLYPODII Spec. Linn. ASPIDIUM Spec. Sw. & Auct. CYATHEÆ Spec. Sm. ATHYRII Spec. Roth.)

In habit the few species which *Cystopteris* contains claim a strong affinity with *Leucostegia* and *Microlepia* of Presl and J. Smith. The sori it is true, are seated on the back of a segment, but yet not farther removed from the margin than we find them in *Microlepia trichosticha* and some states of *M. polypodioides*. The indusium of *Cystopteris* is inflated or cucullate, but laterally attached by a broad base, as in *Leucostegia*. Hence our reason for placing it in the *Davalliæ* section of the *Dicksoniæ*.

1. CYSTOPTERIS DOUGLASII, *Hook.*

Cystopteris Douglasii, Hook. Spec. Fil. 1, p. 200.

HAB. Sandwich Islands: on mountains, at the elevation of 4,000 feet.

Plant with a short and globose rootstock, covered with long brown hairs and slender paleæ. Stipe naked, from one to 3 inches long, slender, compressed, smooth, furnished with narrow and membranaceous chaffy scales at the base. Fronds generally about equal in length with the stipe, oblong-lanceolate, pinnate at the base, towards the point pinnatifid. Inferior pinnæ broadly-ovate, obtuse, pinnatifid;

the superior oblong, dentate-serrate, coadunate and decurrent; the segments oblong, obtuse, also dentate-serrate. Costa of the pinnæ very slender, not much thicker than the veins.

2. CYSTOPTERIS TASMANICA, *Hook.*

Cystopteris Tasmanica, Hook. Spec. Fil. 1, p. 199.

HAB. Hunter's River, New South Wales.

Whole plant of a more humble growth, in general, than the *C. Douglasii*, with a shorter but thicker stipe, which seldom exceeds an inch in length, and bears a few, scattered, slender, scales at the base. Fronds 2 or 3 inches long, oblong or oblong-lanceolate, pinnate. Pinnæ broadly-ovate, incisely lobed or pinnatifid; the upper ones decurrent. Segments ovate, obtuse, dentate. Veins forked, of a dull brown colour. Sori few. Indusium broadly ovate, but we do not find it at all acuminate, as described by Sir William Hooker.

3. CYSTOPTERIS FRAGILIS, *Bernh.*

Cystopteris fragilis, Bernh. Jour. Bot. 2, p. 27; Hook. Spec. Fil. 1, p. 197.
Aspidium fragile, Sw. Syn. Fil. p. 58; Willd. Spec. Pl. 5, p. 280.

HAB. Var. α . Culnai and Obrajillo, Andes of Peru. Island of Madeira. Var. β . Oregon; on the banks of the Spipen River. Var. γ . Vicinity of Orange Harbour, Tierra del Fuego.

We have given the plants from the above very distant localities as varieties of the *C. fragilis* of Bernhardt. The first resembles very much the usual European form of the species, differing principally in the fronds in a dry state being of a darker colour, and in the larger and more numerous sori, which in an advanced state become confluent. In the second variety, from the interior of the Oregon, the fronds are less deeply divided, being scarcely bipinnate; with distant, oblong, obtuse, inciso-lobate pinnæ, the inferior pair pinnate; the lobes or segments ovate, obtuse, dentate, and decurrent; the sori very small and distant. The third variety, from Tierra del Fuego,

has bipinnate fronds of a flaccid consistence and pale-green colour; the pinnæ distant and ascending; with linear-oblong, inciso-dentate pinnules; each segment or tooth bearing a single small sorus near its centre. These three varieties present at first sight a oneness of appearance, and differ only in the greater or less degree of depth in the colour and in the incisions, and in the general outline of the ultimate divisions of the fronds, the consistence of which, as well as the size and number of the sori, are very much influenced by local circumstances, and therefore not to be relied upon as distinctive characters.

4. CYSTOPTERIS SANDWICENSIS, Sp. Nov.

C. stipitibus lævibus hinc sulcatis basi paleaceis; frondibus membranaceis glabris punctatis late oblongis acuminatis bipinnatis; pinnis remotis suboppositis, infimis petiolatis, superioribus sessilibus decurrentibus; pinnulis oblongis obtusis lobato-dentatis basi obliquis decurrentibus, summis confluentibus; venis pallidis tenuibus; soris parvis; indusio oblongo cucullato apice dentato.

HAB. Kaala Mountains, Oahu, Sandwich Islands.

Stipes 5 to 6 inches long, *smooth*, and of a pale straw colour; *the base chaffy* with a few slender scales. *Fronds bipinnate*, from 8 inches to a foot in length, *broad-oblong, membranaceous*, rather flaccid and of a pale green colour, minutely *punctate*. *Pinnæ nearly opposite*, the lower ones *distant*, but becoming crowded towards the point. *Pinnules oblong, obtuse, lobate-dentate, oblique at the base, decurrent*, the superior ones *confluent* and forming a lobate-dentate point to the pinnæ; *veins very slender, and pale*. *Sori numerous and small* in proportion to the size of the frond. *Indusium oblong, cucullate, with a toothed apex.*

This is distinguished from *C. Douglasii*, by its larger and more deeply divided fronds; the ultimate divisions are narrower; the stipe is usually half the length of the frond; and the sori are smaller. Its nearest affinity is to some of the broad and least divided states of *C. fragilis*.

75. MICROLEPIA, *Presl, J. Sm.*

(DAVALLIÆ Spec. Auct. CIBOTII Spec. Presl.)

1. MICROLEPIA GRACILIS, *J. Sm.**Microlepia gracilis*, *J. Sm.* in *Lond. Jour. Bot.* 1, p. 427.*Davallia gracilis*, *Blume, Enum. Plant. Jav.* p. 233; *Hook. Spec. Fil.* 1, p. 184.

HAB. Mount Majajai, Luzon, Philippine Islands.

Stipes somewhat four-angled, smooth, and of a dull brown colour. Fronds glabrous, rather firm in texture, smooth on both sides, bipinnate at the base, pinnate or pinnatifid towards the point. Pinnæ lanceolate, acuminate. Pinnules lance-linear, obtuse, the margin crenate-serrate, the base cuneate and decurrent. Sori small, submarginal.

The single specimen of this species in the collection is somewhat mutilated; yet enough remains to satisfy us that it is the plant of the authors referred to.

2. MICROLEPIA INÆQUALIS, *Presl: var. MINOR.* (Tab. 33.)

M. rhizomate repente; frondibus magnis subcoriaceis tripinnatis glabris supra nitidis, divisionibus primariis et secundariis alternis; pinnulis subrhombéo-lanceolatis seu oblongo-lanceolatis acutis vel acuminatis basi oblique cuneatis pinnatifidis inciso-serratisve; laciniis lanceolato-oblongis acutis dentatis; rhachi pinnarum subalatis; venis utrinque prominulis; soris parvis, singulis juxta apicem dentis primarii seu basim dentis axillaris insertis; indusio subscarioso semi-cyathiformi apice truncato.

Microlepia inæqualis, *Presl, Tent. Pterid.* p. 125.*Davallia (Microlepia) inæqualis, γ. minor*, *Hook. Spec. Fil.* p. 180, t. 58, A.

HAB. Island of Savaii, Samoan Group.

Rootstock short and creeping. *Fronde* smooth, very large, elastic, and of a rigid consistence, *tripinnate*, the *upper surface glossy*, the lower of a pale green colour; the *divisions* both primary and secondary *alternate*, *petiolate*, spreading, above confluent, and contracted gradually into a narrow serrate point. *Ultimate pinnæ* somewhat *rhombic-lanceolate*, or *oblong-lanceolate*, the point *acute*, the base somewhat *oblique and cuneate*, and pinnatifid almost to the costa, or else incisely serrate; the *segments lance-oblong*, slightly falcate, *toothed*. *Rhachis* of the ultimate pinnæ margined with a *very narrow wing*. *Sori* small, from 2 to 6 on a segment, and seated either *close to the point* of a main or at the *base of an axillary tooth*; the *indusium* thin and *scarious*, *half cup-shaped*, attenuated at the base, its somewhat *truncated apex* about equalling the margin of the sinus or tooth.

PLATE 33.—Fig. 1. A portion of a frond, of the natural size. 1 *a*. View of a portion of an ultimate pinna, from underneath. 1 *b*. A single sorus, showing the form of the indusium. 1 *c*. A single sorus, with the indusium removed, so as to show the insertion of the sporangia. 1 *d, d*. Sporangia.—The details more or less magnified.

3. MICROLEPIA TENUIS, Sp. Nov.

M. rhizomate repente; stipitibus lævibus teretibus hinc sulcatis; frondibus membranaceis glabris oblongo-lanceolatis acuminatis tripinnatis divisionibus primariis et secundariis alternis petiolatis distantibus apice caudato-acuminatis serratisque; pinnulis subrhombico-oblongis acutis inciso-serratis basi cuneatis; laciniis lineari-oblongis obtusis bi-tridentatis; venis utrinque prominulis; soris parvis singulis juxta basim dentis; indusio scarioso oblongo basi attenuato.

HAB. Feejee Islands; frequent.

Rootstock creeping. *Stipes* about a foot in length, of the thickness of a crowquill, *smooth, round*, yellowish-brown, *grooved* with a shallow channel in front, bearing a few stiff scales at the base. *Fronde* from a span to 15 inches long, rather *membranaceous, smooth, oblong-lanceolate*,

acuminate, of a lively green colour, delicately *tripinnate*; the *divisions distant* and *alternate*, the *primary* and *secondary* ones contracting above rather suddenly into a *long* and finely *serrate point*. *Ultimate pinnæ* somewhat *rhombic-oblong*, *acute*, deeply *incised* at the *cuneate base*, and *serrate* towards the point. *Segments linear-oblong*, with 2 or 3 *teeth* at their *obtuse* points. Rhachis and costa slender, slightly flexuose. Sori seated at the base of an axillary tooth, or sometimes occupying the whole breadth of a main tooth, furnished with a *scarious* special *indusium*, of an *oblong* form, *attenuated at the base*.

Closely as this is related in many respects to the *M. inæqualis* of Presl, we cannot but consider it as distinct. In a very full suite of specimens we find that the fronds do not exceed one-fourth the usual size of that species. They are membranaceous and delicately divided, with obtuse laciniae; and the scarious indusium is attenuated at the base; in the latter character somewhat agreeing with the *M. inæqualis*, *γ. minor*; but the fronds in that species are of a rigid texture.

4. MICROLEPIA PAPILLOSA, Sp. Nov. (Tab. 34.)

M. stipitibus lævibus rigidis semiteretibus; frondibus magnis coriaceis papillois bi-tripinnatis; pinnis primariis cum secundariis inferioribus distantibus petiolatis subrhombico-lanceolatis acuminatis; pinnulis oblongo-lanceolatis acutis, infimis pinnatifidis apicem versus incisoserratis, segmentis lanceolatis subfalcatis margine dentato-serratis basi oblique cuneatis; soris juxta marginem inferiorem dentium; indusio semi-oblongo apice dentato.

HAB. Sandalwood Bay, Feejee Islands; on dry hills.

Stipes nearly round, but furnished with a shallow groove in front, *smooth, very firm*, and of a chestnut-brown colour. *Fronds bi-tripinnate, large and spreading*, of a firm *coriaceous* consistence, the upper surface shining and of a darker green than the lower, *papillose* with numerous whitish tubercles or excrescences of irregular size dotting both surfaces; these dots occur throughout all our specimens,

and are quite evident to the naked eye. Primary and lower secondary *pinnæ distant, petiolate*, somewhat *rhombic-lanceolate*, tapering gradually into an *acuminate* serrate point, the base more or less unequal, owing to the lower and superior divisions being longer, and standing more at right angles with their support than the inferior ones. *Pinnules oblong-lanceolate*, the lower ones deeply pinnatifid, while towards the apex they are cut into sharp teeth; the *segments lanceolate* in form, *oblique* at the base, and *somewhat falcate*. *Sori* few, small, seated *near the inner edge of a tooth or serrature*. *Indusium semi-oblong*, half cup-shaped, furnished with one or two *blunt teeth on the upper margin*.

This species is allied to *Davallia (Microlepia) Amboynensis* of Hooker; from which it differs in the form of the indusium, in the greater size of its fronds, and in the presence of papillose tubercles on their surface.

PLATE 34.—Fig. 1. A portion of a frond, of the natural size. 1 *a*. View of the under side of a smaller portion of the same, showing the tubercles. 1 *b*. Smaller portion, showing a single sorus, with the special indusium removed. 1 *c*, *c*. Sporangia. 1 *d*. Sporules.—The details more or less magnified.

5. MICROLEPIA POLYPODIOIDES, Presl.

Microlepia polypodioides, Presl, Tent. Pterid. p. 125.

Dicksonia polypodioides, Sw. Syn. Fil. p. 137 & 356; Willd. Spec. Pl. 5, p. 488.

Davallia flaccida, R. Br. Prodr. Fl. Nov. Holl. p. 157.

D. polypodioides, Don, Prodr. Fl. Nep. p. 10; Hook. Spec. Fil. 1, p. 181.

HAB. Feejee and Samoan Islands. Mount Majajjai, Luzon, Philippine Islands.

To this Sir William Hooker, in his *Species Filicum*, has united, doubtless correctly, a vast assemblage of species of different authors; the species being subject to great variation in the hairiness of its veins, costa, rhachis, and indusium, as well as in the form and incision of the ultimate divisions of its fronds.

6. MICROLEPIA TRICHOSTICHA, *J. Sm.*

Microlepia trichosticha, *J. Sm.* in *Hook. Jour. Bot.* 3, p. 416.

Davallia (Microlepia) trichosticha, *Hook. Spec. Fil.* 1, p. 183.

HAB. Caldera, Mindanao, Philippine Islands.

This differs from the preceding species in its smaller sori, placed at a greater distance from the margin; and in having the ultimate divisions of the fronds not so deeply parted, bearing a close pubescence on their under surface, and slightly hairy above.

7. MICROLEPIA HIRTA, *Presl.*

Microlepia hirta, *Presl.* *Tent. Pterid.* p. 125.

Davallia hirta, *Kaulf. Enum. Fil.* p. 223; *Hook. & Arn. Bot. Beech. Voy.* p. 108;

Hook. Spec. Fil. 1, p. 181.

Dicksonia Kaulfussiana, *Gaud. Bot. Freyc. Voy.* p. 368; *Hook. Spec. Fil.* 1, p. 71.

HAB. Sandwich Islands; where it is of very frequent occurrence, on the islands of Hawaii and Oahu, in open places.

A truly *Davallioïd* plant: although the small lobe on which the sorus is seated appears sometimes to connive with the (special) indusium, yet this character is not constant; nor is the lobule then so changed as to justify the referring of the plant to *Dicksonia*. Sir William Hooker, in his *Species Filicum*, after having placed it in *Dicksonia*, removed it to his *Microlepia* section of *Davallia*.—The species varies much in the greater or less hairiness of its stipe, rhachis, costa, veins, and indusium.

In the vicinity of Hilo, island of Hawaii, we detected a variety, having large and lax fronds, which resembles some states of *M. polypodioides*, and may probably be the variety of that species, noticed by Sir William Hooker, in his *Species Filicum*, as a native of the Sandwich Islands.

76. DEPARIA, *Hook. & Grev.*

(DICKSONIÆ Spec. Kaulf. CIBOTII Spec. Presl.)

1. DEPARIA PROLIFERA, *Hook. & Arn.**Deparia prolifera*, Hook. & Arn. Bot. Beech. Voy. p. 108; Hook. Gen. Fil. t. 44, B, & Spec. Fil. 1, p. 84.*D. Macraei*, Hook. & Grev. Ic. Fil. t. 154.*Dicksonia prolifera*, Kaulf. Enum. Fil. p. 225.*Cibotium proliferum*, Presl, Tent. Pterid. p. 69, t. 11, f. 10.

HAB. Sandwich Islands: in forests.

Hooker and Greville, in the *Icones Filicum*, have very accurately characterized this Fern as a genus distinct from *Dicksonia* and *Cibotium*. Kaulfuss, who first described the species, placed it in the former genus; to which it certainly claims a stronger affinity than to *Cibotium*, where Presl referred it. In a few instances we have found the sori on the back of a venule, near its point, when the indusium is oblique and subcylindrical; but the more usual state of the plant, as regards the form of the indusium and the position of the sori, is that represented in the *Icones Filicum*.

77. DAVALLIA, *Sm.** *Frondes pinnatifidæ.*1. DAVALLIA EMERSONI, *Hook. & Grev.**Davallia Emersoni*, Hook. & Grev. Ic. Fil. t. 105; Hook. Spec. Fil. 1, p. 161, subgen. *Prosaptia*.*Prosaptia Emersoni*, Presl, Tent. Pterid. p. 166.

HAB. Tahiti, Society Islands. Samoan Islands: on trees; rare.

The figure cited is an excellent representation of our form of this species.

2. DAVALLIA CONTIGUA, Sw.

Davallia contigua, Sw. Syn. Fil. p. 130 & 339; Willd. Spec. Pl. 5, p. 465; Blume, Enum. Pl. Jav. 2, p. 230; Hook. & Grev. Ic. Fil. t. 141; Hook. Spec. Fil. 1, p. 161.
Prosaptia contigua, Presl, Tent. Pterid. p. 166.
Polypodium contiguum, J. Sm. in Hook. Jour. Bot. 4, p. 47.

HAB. Tahiti, Society Islands. Samoan and Feejee Islands: on trees; frequent.

This and the preceding have been referred by Mr. J. Smith to *Polypodium*; and Presl has placed them among his *Gymnosoreæ*. In the position of the sori of this species, in the structure of the cavity in which the sporangia are situated, as well as in its nature and consistence, we find a striking resemblance to several Ferns which are admitted by authors as true species of *Davallia*, viz.: *D. gibberosa*, Swartz, *D. Lindeni* and *D. Schimperii*, Hooker. In all of these, the cup-shaped cavity, occupying the dilated apices of the deeply divided fronds, is formed by the scarcely altered edges of the same; and, although *D. Emersoni* and *D. contigua* possess a habit very different from these species, yet the character of the fructification is so much alike in both, that we consider the most appropriate position for the two species now under consideration to be in *Davallia*.

* * *Fronde quinatæ seu pinnatæ.*

3. DAVALLIA PENTAPHYLLA, Blume. (Tab. 35.)

D. rhizomate repente crinito-paleaceo; stipitibus nudis semiteretibus; frondibus coriaceis glabris subtus argenteo-nitidis late ovatis acuminate quinatis vel pinnatis; pinnis suboppositis lineari-lanceolatis attenuatis basi cuneatis, infimis binatis, sterilibus integerrimis vel apice serratis, fertilibus dentatis; venis immersis furcatis; indusio tubuloso apice truncato; sporangiis subexsertis.

Davallia pentaphylla, Blume, Enum. Pl. Jav. p. 232; Hook Spec. Fil. 1, p. 163.

HAB. Ovolau and Sandalwood Bay, Feejee Islands: on trunks of trees, at the altitude of 2,000 feet.

Rootstock very long and *creeping*, the surface closely imbricated with oblong and caudate-acuminate, brown *scales*, attached by a point at their middle. *Stipes* about 3 inches long, *naked*, *nearly round*, with a very shallow groove in front. *Fronde*s distant, *coriaceous* and *smooth*, of a broad-ovate acuminate form, and *quinate*, or more usually *pinnate*, of a *glossy silver hue on the under surface*, above of a dark green and scarcely shining. *Pinnæ* *subopposite*, spreading, from 5 to 9 in number, *linear-lanceolate*, *attenuate*, *cuneate at the base*, the *inferior pair* petiolate and almost always *binate*; the *margin* of the *sterile pinnæ* *entire*, except about an inch at the *point*, which is *serrate*; the *fertile* bluntly *toothed*, and soriferous for about two-thirds of their length, furnished with a single sorus on each tooth; the *truncate apex* of the *tubular indusium* nearly equal with the edge of the tooth, beyond which the older sporangia project a little. Rhachis compressed and margined; the *forked veins*, though *sunken*, are still perceptible to the naked eye, giving to the surface of the fronds a slightly striated appearance.

PLATE 35.—Fig. 1. Portion of a plant, of the natural size. 1 *a*. Dorsal view of a section of a pinna. 1 *b*. Section of the rootstock. 1 *c*. Scale from the rootstock. 1 *d*. A single sorus, with the special indusium removed. 1 *e*. Sporangium. 1 *f*. Sporules.—The details more or less magnified.

4. *DAVALLIA PYCNOCARPA*, Sp. Nov. (Tab. 35.)

D. rhizomate repente crinito-paleaceo; stipitibus nudis semiteretibus; frondibus deltoideo-ovatis coriaceis glabris quinato-pinnatis; pinnis subsessilibus, sterilibus lanceolatis serrulatis, fertilibus lineari-lanceolatis obtusis, infimis uni-bilobatis margine duplicato-dentatis a basi usque ad apicem creberrime soriferis; indusio oblongo apice truncato; sporangiis subexsertis; venis immersis simplicissimis vel furcatis.

HAB. Muthuata Mountains, Feejee Islands: on rocks and trunks of trees.

Rootstock long, black, and *creeping*, closely imbricated with oblong, caudate-acuminate *scales*. *Stipes* slender and *nearly round*, with a slight furrow in front. Fronds *deltoid-ovate*, *smooth and coriaceous*, constantly *quinate-pinnate*; the height of the fertile one, with the stipes, from 6 to 8 inches. *Pinnæ* subopposite, *nearly sessile*, the terminal one the longest, *linear-lanceolate*, *obtuse*, the margin *doubly-toothed*, the inferior pair furnished with a segment or lobe below. Sterile frond smaller, strictly *quinate*; the *pinnæ* *sessile*, opposite, and *lanceolate*, their margins finely serrate, both surfaces smooth and glossy, the under one can scarcely be called silvery, although *paler* than the upper. *Indusium* short, *oblong*, *truncate*; the *sori* forming a *continuous marginal chain* the whole length of the *pinna*. *Veins* *immersed*, either wholly *simple* or *forked*.

Closely related to the preceding; yet distinct from it in the smaller *quinate* fronds, the narrower *pinnæ*, with a *doubly-toothed* margin *soriferous* the whole length, and in the shorter and more *cup-shaped* *indusium*.

PLATE 35.—Fig. 2. Portion of a plant, of the natural size. 2 *a*. View of a portion of a *pinna*, from below. 2 *b*. Cross section of the *rhizoma*. 2 *c*. A *scale*, from the same. 2 *d*. A *sorus*, with the special *indusium* removed. 2 *e*. *Sporangium*.—The details more or less magnified.

* * * *Frondes tripinnate seu decompositæ.*

5. DAVALLIA CANARIENSIS, Sm.

Davallia Canariensis, Sm. ex Sw. Syn. Fil. p. 134; Willd. Spec. Pl. 5, p. 474; Hook. Spec. Fil. 1, p. 169, t. 56, A.

HAB. Island of Madeira: on trees and rocks; frequent on the north side of the island.

This has been long and well known as the "Hare's-foot Fern," on account of the appearance of its stout and creeping, scaly, brown rootstock.

6. *DAVALLIA PYXIDATA*, Cav.

Davallia pyxidata, Sw. Syn. Fil. p. 132; Willd. Spec. Pl. 5, p. 471; R. Br. Prodr. Fl. Nov. Holl. p. 157; Hook. Spec. Fil. 1, p. 169, t. 55, C. f. 1, 2.

HAB. Vicinity of Port Jackson, and Puen Buen, New South Wales.

In habit this is very much like the preceding species; but the fronds are less compoundly divided, and the scales on the rhizoma more slender and hairy.

7. *DAVALLIA SOLIDA*, Sw.

D. rhizomate valido repente paleis brunneis imbricatis vestito; stipitibus nudis lævibus semiteretibus hinc sulcatis; frondibus coriaceis tri-subquadripinnatis; pinnis acuminatis; pinnulis trapeziformibus acutis vel acuminatis, ultimis oblongo-lanceolatis in apicem crenato-serratum confluentibus; indusio lineari-oblongo apice rotundato in dentem vel segmentum immersis hinc vel utrinque anguste alatis, alis in dentem acutum productis; sporangiis exsertis.

Davallia solida, Sw. Syn. Fil. p. 132 & 375; Willd. Spec. Pl. 5, p. 470; Blume, Enum. Plant. Jav. p. 234; Hook. Spec. Fil. 1, p. 163, t. 42, B.

Var. δ . PENTAGONA: *frondibus minoribus late ovatis acuminatis bipinnatis; pinnis lanceolato-oblongis acuminatis; pinnulis inciso-lobatis, lobis in apicem obtusum dentatum confluentibus; indusio lineari basi attenuato utrinque haud dentato.*

HAB. Tongatabu; also Samoan and Society Islands. Var. δ . Island of Manua, Samoan Group.

Rootstock creeping, often as thick as the little finger, *densely clothed with brown scales*. *Stipes* long, *naked and smooth*, about half round, *channelled in front*. *Fronde* large, *coriaceous*, sometimes quite rigid, *tri-quadripinnate*; with spreading *acuminate pinnæ*. *Pinnules* *trapeziform*, and either terminating in an *acute* or very much

acuminated point. *Ultimate divisions oblong-lanceolate* or oblong and obtuse, *uniting into an acuminate* or obtuse crenate-serrate point. Sori very crowded, and furnished with a *linear-oblong indusium*, the apex of which is *rounded, seated in a tooth or segment, margined by a narrow wing on one or both sides*, but usually on the outer side, terminating in a sharp tooth.

In var. *α*. the *fronds* are *smaller, broad-ovate, and bipinnate*, with *lance-oblong acuminate pinnæ*, and *incisely lobed pinnules*; the lobes *confluent into a blunt, dentate point*. The *indusium* is quite *linear* and *attenuate at the base*, the tooth on the outer side wanting.

The great variety of forms which this species assumes, in the division of the fronds and the length of the indusium, is more or less the result of local causes; those plants inhabiting arid and rocky places, or growing on trees overhanging the scorching coral shores of these islands, produce small, compact, and very coriaceous fronds, with an indusium usually longer than in the individuals inhabiting forest regions, where the atmosphere is humid; in such localities the fronds are much larger, flaccid, and more compound. Our var. *δ*. although a wide removal from the usual form of the species, closely approaches the var. *β*. *latifolia* of Hooker's Species Filicum; but the fronds are much smaller and the indusium longer.

8. DAVALLIA TAHITENSIS, Sp. Nov.

D. rhizomate repente; stipitibus gracilibus angulatis hinc sulcatis; frondibus coriaceis glabris late quinquangulati-ovatis bi-tripinnatis; pinnis ovatis acuminatis; pinnulis oblongo-lanceolatis obtusis basi cuneatis inciso-dentatis apicem versus confluentibus; indusio lineari-oblongo truncato in dentem vel segmentum immersis, ala marginali angusta indusium adæquante; sporangiis paullo exsertis.

HAB. Tahiti, Society Islands: on trunks of trees, at the elevation of 3,000 feet.

Whole plant about a span high; with a *creeping rootstock*. *Fronds ovate-five-angled*, rather rigid, *smooth* and glossy on both sides, *bi-tripinnate*; the divisions approximate; the primary ones somewhat

trapezoid-ovate, acuminate; the ultimate ones oblong-lanceolate, obtuse, incisely-dentate, the base wedge-shaped, uniting towards the point. Stipes slender and angular, with a shallow groove in front. Indusium of a reddish-brown colour, seated in a segment or tooth, linear-oblong, truncate, the marginal wing narrow, not extending beyond the apex of the indusium. Sporangia somewhat exerted.

This is a very pretty little species, related in many respects to some forms of the preceding, yet differing in the much smaller fronds, and the greater delicacy of its various parts. Its nearest affinity, however, is with *D. Lindleyi* of Hooker's Species Filicum; next to which it should stand.

9. DAVALLIA FEEJEENSIS, Hook.

D. rhizomate valido repente paleis brunneis laceris imbricatis tecto; stipitibus subteretibus hinc sulcatis; frondibus coriaceis late ovatis acuminatis pinnato-decompositis; pinnis suboppositis; pinnulis lato-lanceolatis acuminatis pinnatipartitis, laciniis "erecto-patentibus fere appressis angusto-linearibus simplicibus vel bifidis;" indusio lineari apice truncato in apicem laciniarum immersis, alis angustissimis utrinque in dentem acutum productis vel edentulis.

Davallia Feejeensis, Hook. Spec. Fil. 1, p. 166, t. 55, D.

HAB. Nukalou and Ovolau, Feejee Islands: on trees.

A very graceful species, of frequent occurrence at these islands, clinging to the trunks and branches of trees by the fibrils of its *thick, squamose, creeping rootstock*, and never found at any great distance from the coast. *Fronds* large, and, with the *somewhat round and furrowed stipes*, usually about 2 feet high, *broad-ovate, acuminate, coriaceous, decomponently pinnate: primary divisions subopposite, the ultimate divisions narrow-linear, simple or bifid*, sometimes dilated at their points, in which is seated the long and *slender indusium*. The latter has a *truncate apex*, and a very narrow wing on each side, terminating in the form of a tooth, which however is sometimes wanting. In a young state, the rhachis and costa are covered with whitish arachnoid hairs, which at length disappear.

10. *DAVALLIA ELATA*, Sw.

Davallia elata, Sw. Syn. Fil. p. 131 & 344; Willd. Spec. Pl. 5, p. 472; Blume, Enum. Plant. Jav. p. 236; Hook. Spec. Fil. 1, p. 166, t. 55, A.

HAB. Tahiti, Society Islands. Samoan Islands.

Plant large, from 3 to 4 feet high. Fronds quadripinnate, elastic, glossy on both sides, and with a striated appearance on the surface between the veins: divisions very much acuminate, the ultimate ones or laciniaë incisely-serrate. Sori short, and seated in the apices of the incisions or serratures. Special indusium attenuated at the point, free for about one-third of its length, furnished with a sharp tooth on each side, or sometimes with only a single tooth on the outer side.

11. *DAVALLIA PATENS*, Sw.

Davallia patens, Sw. Syn. Fil. p. 132 & 348; Willd. Spec. Pl. 5, p. 473; Blume, Enum. Plant. Jav. p. 236; Hook. Spec. Fil. 1, p. 166.

HAB. Island of Marangos, Sooloo Group.

The fronds of this are bipinnate, very rigid and glossy; the pinnæ and pinnules subalternate, spreading, and very much acuminate; the striæ or false veins still more evident than in the preceding species: ultimate divisions lanceolate and serrulate. Sori short, seated in the serratures, with two sharp teeth projecting beyond the apex of the indusium, the outer tooth the longer.

12. *DAVALLIA ELEGANS*, Sw.

Davallia elegans, Sw. Syn. Fil. p. 132 & 347; Willd. Spec. Pl. 5, p. 471; Blume, Enum. Plant. Jav. p. 235; Hook. Spec. Fil. 1, p. 165.

HAB. Mount Majajai, Luzon, Philippine Islands.

Our single specimen of this is not very perfect, consisting merely

of the upper part of what appears to have been a very large quadri-pinnate frond. This has a slightly striated surface; the ultimate pinnules are incisely serrate, with sori seated in the apices of the incisions, between two unequal teeth.

13. DAVALLIA TENUIFOLIA, Sw.

Davallia tenuifolia, Sw. Syn. Fil. p. 133 & 350; Willd. Spec. Pl. 5, p. 477; Blume, Enum. Plant. Jav. p. 239; Presl, Tent. Pterid. p. 129, t. 4, f. 27; Hook. Spec. Fil. 1, p. 186.
D. remota, Kaulf. Enum. Fil. p. 223; Hook. & Arn. Bot. Beech. Voy. p. 108.

Var. β . LATIFOLIA: *pinnulis laciniisve ultimis obovatis cuneatis*.

HAB. Feejee Islands. Tahiti, Society Islands. Sandwich Islands.
 Var. β . Ovolau, Feejee Islands.

Plant terrestrial; the rhizoma short and thick; the fronds tufted. It abounds at the Sandwich Islands, inhabiting, as on other islands in the Pacific, low savannas and open places on the declivities of the minor ranges of mountains. In our variety β . the ultimate divisions are twice the breadth of the usual form; in both, it frequently happens that two venules unite at the base of the indusium, thereby forming an elongated areole. May not our variety be the *D. cuneiformis* of Swartz?

14. DAVALLIA GIBBEROSA, Sw.

Davallia gibberosa, Sw. Syn. Fil. p. 134 & 351; Willd. Spec. Pl. 5, p. 475; Hook. & Arn. Bot. Beech. Voy. p. 75; Hook. Spec. Fil. 1, p. 192.

HAB. Tahiti, Society Islands: in mountain forests.

This handsome species is well described by Sir William Hooker in his Species Filicum. But among our specimens we find one or two in which the rhachis and costa of the ultimate divisions are more compressed than in the usual form of the species, and these bear small proliferous buds on the upper surface, while a few scattered

reticulated bullate scales beset the lower; yet in other respects apparently they do not differ from what we consider the type of the species.

78. TRICHOMANES, *Linn.*

* *Rhizoma gracilis, repens; frondibus sparsis.*

1. TRICHOMANES RENIFORME, *Forst.*

Trichomanes reniforme, Forst. ex Sw. Syn. Fil. p. 141 & 369; Willd. Spec. Pl. 5, p. 498; Hook. & Grev. Ic. Fil. t. 31; A. Rich. Bot. Voy. Astrol. p. 95; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 368; Hook. Spec. Fil. 1, p. 115.

HAB. In the vicinity of the Bay of Islands, New Zealand: on trunks of trees and moist rocks; frequent.

The reniform fronds of this species, with the dichotomous veins radiating from the base, are truly beautiful when held up between the eye and the light. Among a great number of specimens in the collection, we have observed none of the veins to anastomose, as, in Hooker's Species Filicum, they are said occasionally to do.

2. TRICHOMANES MUSCOIDES, *Sw.*

Trichomanes muscoides, Sw. Syn. Fil. p. 141; Willd. Spec. Pl. 5, p. 500; Hook. & Grev. Ic. Fil. t. 179; Hook. Spec. Fil. 1, p. 117.

HAB. Feejee Islands: in humid mountain forests, on rocks and the trunks of trees.

A very humble species, not much over an inch in height, with membranaceous and obovate or oblong fronds, cuneate at the base, and slightly sinuate, furnished with an evident intramarginal vein. The partially two-lipped indusium is immersed in the apex of the lobes, and about equal with them. Stipe very short, and with the slender creeping rootstock slightly tomentose.

3. TRICHOMANES PARVULUM, Poir.

Trichomanes parvulum, Poir. ex Kaulf. Enum. Fil. p. 260; Blume, Enum. Pl. Jav. 2, p. 223; Hook. Spec. Fil. 1, p. 118, t. 39, A (opt.).

HAB. Vicinity of Hilo, Sandwich Islands: on moist rocks.

A very pretty little species, whose fronds, with the stipe, not exceeding half an inch in height, are very likely to be overlooked by collectors, from their growing among and almost entirely concealed by various kinds of mosses, many of them larger than itself.

4. TRICHOMANES ERECTUM, Sp. Nov. (Tab. 36.)

T. rhizomate filiformi repente parce rufo-tomentoso; stipite brevi alato; frondibus erectis ovato-oblongis bipinnatifidis; pinnis remotis alternis erecto-patentibus; laciniis angusto-linearibus emarginatis vel obtusis; indusio supra-axillari cylindrico prorsus immerso basi attenuato, ore integerrimo subpatente; receptaculo ad medium usque exserto.

HAB. Feejee Islands: on Bread-fruit trees; rare.

This is a very slender species, with a delicate, *filiform*, *creeping*, *rufous-tomentose* rootstock, and *erect*, *ovate-oblong* fronds, from one to 2 inches in height, deeply *bipinnatifid*, and *raised* on a *short winged* stipe: *primary divisions distant*, *alternate*, *ascending*, and *unequal* in length, the inferior ones *decurrent*. *Laciniae narrow-linear*, either *emarginate* or *obtuse*. *Indusium immersed its whole length* in a short and *nearly axillary* lacinia, arising from the inner edge of the pinna, *cylindrical*, with an *attenuated* base and a *somewhat spreading*, *entire* mouth; the *receptacle exerted* for nearly *half its length*.

Related to the *T. intramarginale* of Hooker and Greville; which, however, bears the sori on the apices of the laciniae, and has also a very evident intramarginal nerve, which does not exist in our plant.

PLATE 36.—Fig. 1. Plant, of the natural size. 1 a. View of a portion of the frond, from beneath, slightly magnified.

5. TRICHOMANES TENUE, Sp. Nov. (Tab. 36.)

T. rhizomate gracili repente; stipite gracili marginato; frondibus glabris flaccidis ovato-lanceolatis tripinnatipartitis; pinnis primariis alternis patentibus; laciniiis angusto-linearibus obtusis, ultimis bifidis; indusio supra-axillari prorsus immerso cylindrico basi attenuato, ore patente vix bilabiato; receptaculo setaceo, indusium bis superante.

HAB. Tahiti, Society Islands: in mountain forests, on trees.

The *rootstock* of this is *slender and creeping*. *Stipe* about an inch long, with a *narrow margin* of half a line in breadth. *Fronde* smooth, *flaccid*, 3 to 4 inches in length, of an *ovate-lanceolate* form, *deeply thrice pinnatifidly divided*; the primary *divisions alternate and spreading*. *Lacinie* very *narrow-linear*, finely reticulated; the *ultimate* ones short and *bifid*; the fructiferous ones broadest. *Rhachis* somewhat flexuose, about as broad as the lacinia. *Indusium immersed its whole length* in a short *supra-axillary lacinia*, usually close to the main rhachis, *cylindrical*, with an *attenuated base* and a *spreading mouth*, which is *scarcely two-lipped*. *Receptacle slender, exerted about twice the length of the indusium*. The whole plant is very graceful in its growth, and apparently one not before described.

PLATE 36.—Fig. 2. Portion of a plant, of the natural size. 2 a. Dorsal view of a portion of a frond, slightly magnified.

6. TRICHOMANES PYXIDIFERUM, Linn.

Trichomanes pyxidiferum, Linn. ex Sw. Syn. Fil. p. 143; Willd. Spec. Pl. 5, p. 508; Raddi, Plant. Brasil. p. 64? Hook. & Grev. Ic. Fil. t. 206; Hook. Spec. Fil. 1, p. 124.

HAB. Organ Mountains, Brazil: terrestrial.

This is evidently the *T. pyxidiferum*, described by Swartz and Willdenow, and we believe also that figured by Hooker and Greville,

although their plant is much larger than ours, and the receptacle more exserted. The latter, however, is not a reliable character, particularly in dried specimens, and the size of the plant is influenced more or less by the nature of the locality.

7. TRICHOMANES FILICULA, Bory.

Trichomanes Filicula, Bory, in Duperrey, Voy. 1, p. 283; Hook. & Arn. Bot. Beech. Voy. p. 76; Hook. Spec. Fil. 1, p. 124.
Hymenophyllum Filicula, Willd. Spec. Pl. 5, p. 528.

HAB. Tahiti, Society Islands. Samoan and Feejee Islands: on rocks, dead wood, and the trunks of trees; frequent.

Willdenow certainly was not far wrong in referring this to *Hymenophyllum*, and we consider its claims as good to remain in that genus as in *Trichomanes*. The very evident two-lipped indusium, with a receptacle in most cases included, indeed very seldom exserted, ally it to *Hymenophyllum*; while on the other hand, its aspect and the narrow cylindrical indusium, tapering at the base, refer it to the present genus.

8. TRICHOMANES HUMILE, Forst.

Trichomanes humile, Forst. ex Sw. Syn. Fil. p. 143 & 371; Willd. Spec. Pl. 5, p. 507; Hook. & Grev. Ic. Fil. t. 85; Hook. & Arn. Bot. Beech. Voy. p. 76; Hook. Spec. Fil. 1, p. 123.

HAB. Tahiti, Society Islands, and Feejee Islands; frequent.

9. TRICHOMANES DRAYTONIANUM, Sp. Nov. (Tab. 36.)

T. rhizomate repente pubescente; stipite brevi compresso; frondibus lato-lanceolatis glabris bipinnatifidis; pinnis primariis rhomboideo-ovatis; laciniis brevibus suboblongis obtusis simplicibus seu bifidis; indusio supra-axillari cylindraco basi attenuato ad medium usque immerso, ore patente; receptaculo filiformi indusium fere bis superante.

HAB. Sandwich Islands; in humid forests, creeping over the trunks of trees.

Rootstock creeping and *pubescent*, stout in proportion to the size of the fronds; the rootlets *tomentose* with a dense coating of short black hairs. *Stipe* flattened, about half an inch in length, smooth, with a narrow margin, which increases in breadth towards the base of the frond. *Fronde* broad-lanceolate, glabrous, 2 inches and upwards in length, by 8 to 10 lines broad, of a pale green colour, deeply *bipinnatifid* at the base; the *primary divisions* somewhat rhombic-ovate and less deeply divided: *laciniæ* short, nearly oblong, obtuse, simple, or else *bifid* or bidentate. Rhachis and veins stout and of a dull-brown colour. *Indusium supra-axillary*, *subcylindrical*, *immersed*, about half its length, attenuated at the base, the mouth spreading, scarcely two-tipped, its diameter nearly equal to the length; the wings on the outer side sometimes wanting. *Receptacle* filiform, exerted about twice the length of the indusium.

Related to the preceding species; but readily distinguished by its only partially immersed indusium, with a more spreading mouth, and by the absence of a thickened margin to the frond.

PLATE 36.—Fig. 3. Portion of a plant, of the natural size. 3 a. View of a portion of a frond underneath, slightly magnified.

10. TRICHOMANES MELANORHIZON, Hook.

Trichomanes melanorhizon, Hook. Spec. Fil. 1, p. 140.

HAB. Mountains, near Baños, Luzon, Philippine Islands.

Plant very small, growing in the crevices of wet rocks, in deeply shaded situations. Fronds broadly ovate, tripinnatifid, and, together with the stipe, a little over an inch in height.

Hooker describes the fronds as "pinnate; pinnæ bipinnatifid." But we find the margin of the pinnæ to be decurrent on the rhachis, in our smaller specimens, so that the species may be considered as tripinnatifid.

11. TRICHOMANES ALBUM, Blume? (Tab. 36.)

T. rhizomate filiformi piloso; stipite tereti gracili glabro; frondibus ovato-oblongis strigosis albidis bipinnatifidis; pinnis oppositis ovato-lanceolatis basi cuneatis; laciniis cuneiformibus incisis, ultimis linearibus apice obtuso bifidis vel emarginatis; indusio supra-axillari oblongo basi tantum immerso, ore truncato; receptaculo brevi incluso.

Trichomanes album, Blume? Enum. Pl. Jav. 2, p. 226.

HAB. Mount Majajai, Luzon, Philippine Islands: on trees.

Rootstock filiform and pilose. Stipe round, slender, smooth, from one to 2 inches long. Fronds about the same length as the stipe, ovate-oblong, bipinnatifid, both surfaces whitish, and with the margin of the laciniae strigose-hirsute, the hairs of a pale brown colour. Pinnæ opposite, ovate-lanceolate, cuneate at the base; the laciniae wedge-shaped and deeply incised, the ultimate one linear, obtuse or slightly emarginate at the point. Sori confined to the upper half of the frond, and seated near the rhachis. Indusium supra-axillary, oblong, truncate, the base partially immersed, the mouth truncate, the short receptacle appears to be always included.

We suppose this to be the *T. album* of Blume; yet, as his short description leaves much room for doubt, we have given a figure of it.

PLATE 36.—Fig. 4. Portion of a plant, of the natural size. 4 a. View of a portion of a frond underneath, slightly magnified.

* * *Rhizoma elongatum, repens; frondibus remotis.*

12. TRICHOMANES RADICANS, Sw.

Trichomanes radicans, Sw. Syn. Fil. p. 143; Willd. Spec. Pl. 5, p. 513; Kaulf. Enum. Fil. p. 267; Hook. Spec. Fil. 1, p. 125.

HAB. Sandwich Islands. Organ Mountains, Brazil: mostly on the trunks of trees.

From the Sandwich Islands we have two states of this: one with stipes from 3 to 5 inches long; the fronds elongated-lanceolate, tripinnatifid, and from 12 to 18 inches in length; the indusium supra-axillary, free, cylindrical, long, and tapering at the base, with a slightly spreading entire mouth: this form inhabits shady forests. The other form has sessile fronds (or the stipes not over an inch in length), oblong-lanceolate, tripinnatifid, and from 5 to 6 inches long; the indusium shorter and more spreading at the mouth: this is found in exposed situations. The Brazilian plant, in the outline of its fronds and the length of the stipe, resembles the larger elongated form from the Sandwich Islands; but its primary divisions are more distant, the laciniae and wings of the rhachis much narrower. In the two latter the form and position of the indusium are similar, and it is not decidedly two-lipped.

Sir William Hooker in his *Species Filicum* has, perhaps justly, included under *T. radicans* a vast assemblage of species of various authors, and from widely remote countries.

13. TRICHOMANES BRACHYPUS, *Kunze*.

Trichomanes brachypus, Kunze, ex Hook. Spec. Fil. 1, p. 121.
T. radicans, Hook. & Grev. Ic. Fil. t. 218, excl. syn.

HAB. Vicinity of Rio Janeiro, and Organ Mountains, Brazil.

Rootstock very long, slender, and creeping. Fronds sessile, ovate-oblong or oblong-lanceolate, bipinnatifid. Primary divisions divergent; the ultimate divisions once or twice divided into short and obtuse laciniae.

The collection contains a considerable number of specimens (all of them sterile) of what we take for a state of *T. brachypus*, Kunze, as described by Sir William Hooker in his *Species Filicum*, and previously figured in the *Icones Filicum*, under the name of *T. radicans*. In the figure the primary segments are represented as being more horizontal than we find them in our specimen.

* * * *Rhizoma validum, breve, repens; frondibus cæspitosis.*

14. TRICHOMANES FÆNICULACEUM, *Bory.*

Trichomanes fœniculaceum, Bory, in Willd. Spec. Pl. 5, p. 511; Hook. Spec. Fil. 1, p. 135.

T. meifolium, Kaulf. Enum. Fil. p. 365, t. 2.

HAB. Mount Ophir, island of Sumatra.

Rootstock thick and creeping, clothed with slender and articulated scales. Fronds erect and rigid, of a chestnut-brown colour when dry.

Closely related to the following species. Specimens of this handsome and very distinct *Trichomanes* were presented to the Expedition by Mr. Balestier, United States Consul at Singapore, with the above habitat appended to them.

15. TRICHOMANES CAUDATUM, Sp. Nov. (Tab. 36.)

T. rhizomate abbreviato crasso repente fulvo-tomentoso; stipite brevi tereti scabro; frondibus (in sicco elasticis) elongato-lanceolatis caudato-acuminatis pinnatis; pinnis subalternis (inferioribus subremotis) oblongo-lanceolatis acuminatis bipinnatifidis; laciniis ultimis approximatis angusto-linearibus obtusis simplicibus vel bifidis; rhachi subalata; indusio terminali vel supra-axillari cylindrico basi attenuato semi-immerso seu anguste alato, ore patente integerrimo; receptaculo exserto.

HAB. Tahiti, Society Islands: on trees, in mountain forests.

Rootstock short and thick, creeping, densely tomentose with brownish short hairs. Stipe about 2 inches long, terete, slightly rough to the touch. Fronds very graceful, and in a dry state quite elastic, 10 to 15 inches long by 3 inches broad, elongated-lanceolate, pinnate, and as well as the oblong-lanceolate and bipinnatifid pinnæ (which are rather

distant at the base) tapering into a narrow, *tail-like*, serrate point. Pinnules or secondary divisions approximate and somewhat imbricated; the ultimate ones less so; these are *narrow-linear*, short and *obtuse*, their apices either *simple* or *bifid*. *Rhachis* round at the base, *narrowly-winged* upwards, and slightly scabrous on the under side. Veins throughout very thick and prominent. Sori copious all over the frond. *Indusium cylindrical*, with an *attenuated base* and a *spreading, entire mouth*, seated on a short *supra-axillary* lacinia, or else *terminal, partially* immersed, or with *two wings*, which are sometimes so narrow as scarcely to be perceptible. *Receptacle exserted*, about twice the length of the indusium, and quite straight.

This is closely related to the *T. angustatum* of Carmichael, as figured in Hooker and Greville's *Icones Filicum*.

PLATE 36.—Fig. 5. Frond, of the natural size. 5 *a*. View of a portion of the same, from beneath. 5 *b*. Sorus, with part of the indusium removed. 5 *c*. Sporangia.—The details more or less magnified.

* * * * *Rhizoma cæspitosum*.

16. TRICHOMANES SMITHII, Hook.

Trichomanes Smithii, Hook. Ic. Pl. 8, t. 704, & Spec. Fil. 1, p. 138.

HAB. Mountains near Baños, Luzon, Philippine Islands: on trunks of trees.

A charming species, and very peculiar in its cellular structure. The fronds are from 4 to 6 inches long, very slender, and delicately "subpalmato-pinnatifid," with elongated, remote, spreading lacinia; the ultimate ones the longest. Cells linear and transversely arranged in longitudinal rows, traversed by oblique partitions, the marginal row the smallest. Indusium urceolate, coriaceous, seated on a short and supra-axillary lacinia, almost free, having only a narrow wing at the base, which sometimes extends to the spreading mouth. Receptacle very long, slender and curved, exserted at least four times the length of the indusium.

17. TRICHOMANES POLYANTHOS, *Hook.*

Trichomanes polyanthos, Hook. Ic. Pl. 8, t. 703, & Spec. Fil. 1, p. 138.

HAB. Feejee Islands: terrestrial.

Plant tufted. Stipes 4 to 6 inches long, stout, terete, scabrous, and beset with sparse, long, brown hairs. Fronds 8 to 12 inches long, ovate-lanceolate, pinnate. Pinnæ lanceolate, spreading, subfalcate, tripinnatifid; the crowded segments and laciniaë linear, obtuse, with thick prominent veins. Sori numerous, equally distributed all over the frond, with a supra-axillary, campanulate, short, free indusium; the receptacle short and included.

18. TRICHOMANES ANCEPS, β ., *Hook.*

Trichomanes anceps, var. β ., Hook. Spec. Fil. 1, p. 135, t. 40, C. f. 3.

HAB. Tahiti, Society Islands. Samoan and Feejee Islands. Luzon, Philippine Islands: terrestrial.

Our plant is without doubt Sir William Hooker's variety β . of this species; which occurs very frequently at all the above groups of islands, and has the faculty of producing new individuals from viviparous buds, formed on the thick black roots. Fronds tufted, from 6 to 15 inches long, somewhat rigid, pinnate. Pinnæ distant, at least next the base, spreading; the ultimate divisions narrowly linear-filiform, beset with bristle-like scales throughout. Rhachis broad, compressed, and margined by flat edges. Stipe from 2 inches to a span long, of a dull brown colour, subterete, ancipital, the margins widening towards the base of the frond. Indusium small, free, supra-axillary, cylindrical, slightly curved and attenuated at the base; the mouth entire and spreading. Receptacle slightly exerted.

The difference between this and the type of the species consists in the presence of capillary paleæ on the surface of the whole plant, and

in the ultimate divisions of the fronds being narrower and more setaceous.

19. TRICHOMANES EXALTATUM, Sp. Nov.

T. rhizomate cæspitoso; frondibus rigidis erectis oblongo-lanceolatis bipinnatis; pinnis remotis suboppositis patentibus elongato-lanceolatis acuminatis; pinnulis oblongo-ovatis bipinnatifidis, laciniis linearibus obtusis, stipite rhachique communi et partiali teretibus rufo-pilosis; indusio supra-axillari campanulato libero, ore integerrimo; receptaculo clavato vix exserto.

HAB. Feejee Islands: in mountain forests, at the elevation of 1,500 feet.

Rootstock tufted. Fronds rigid, from 1½ to 2 feet long, and 8 to 12 inches broad, erect, oblong-lanceolate, bipinnate. Inferior pinnæ distant, subopposite, spreading, elongated-lanceolate; the superior ones more approximate and ascending in their direction, and tapering gradually into a finely pinnatifid point. Ultimate divisions or laciniæ short, crowded, narrow-linear, obtuse. Stipe from 8 to 10 inches long, stout, and together with the main and secondary rhachis terete, beset with reddish-brown hairs. Sori very numerous, particularly on the upper half of the frond. Indusium supra-axillary, free, nearly bell-shaped, with an entire mouth. Receptacle clavate, scarcely exserted. Whole plant of a dull dark green when dry.

Perhaps the largest species of the genus. It is related to *T. meifolium*, Bory; but has much larger fronds, the inferior pinnæ more distant, and the indusium shorter as well as wider at the mouth.

20. TRICHOMANES MEIFOLIUM, Bory.

Trichomanes meifolium, Bory, in Willd. Spec. Pl. 5, p. 509; Blume, Enum. Pl. Jav. p. 227; Hook. Spec. Fil. 1, p. 137.

HAB. Luzon, Philippine Islands. Tahiti, Society Islands. Sandwich Islands.

In the Hawaiian plant, the fronds are more erect and rigid in consistence; their ultimate divisions broader and less deeply divided, and the indusium shorter and wider at the mouth than in that from Luzon. The Tahiti specimens agree with those of the Sandwich Islands. On the first examination we supposed that these might constitute a distinct species; but a closer comparison did not reveal any further or more important differences between them and the Luzon plant.

21. TRICHOMANES LONGISETUM, *Bory.*

Trichomanes longisetum, Bory, in Willd. Spec. Pl. 5, p. 510; Hook. Spec. Fil. 1, p. 137.

HAB. Feejee Islands: on trees, in mountain forests; rare.

A well-marked species; distinguished from the preceding by its much smaller fronds, with the rhachis winged above; its pinnæ narrower, more distant, and deflexed, with linear-capillaceous and forked lacinia; the indusium curved; the receptacle long and filiform, exerted nearly half an inch.

22. TRICHOMANES RIGIDUM, *Sw.*

Trichomanes rigidum, Sw. Syn. Fil. p. 144; Willd. Spec. Pl. 5, p. 512; Hook. Spec. Fil. 1, p. 133.

T. Mandiocanum, Raddi, Plant. Brasil. 1, p. 64, t. 79, f. 2.

T. achilleæfolium, Willd. Spec. Pl. 5, p. 512.

HAB. Tahiti, Society Islands. β . Feejee Islands.

The rootstock of this sometimes rises to a height of one or two inches, bearing on its crown 4 to 8 fronds, with a stipe 2 to 5 inches long; the latter is round, with two narrow marginal lines, and beset with brown compressed hairs at the base. Fronds usually rather longer than the stipe, oblong, acuminate, bipinnate, with linear-lanceolate, inciso-pinnatifid pinnules; the lacinia linear, acute, bifid or trifid; the primary and secondary rhachis slightly margined. Indu-

sium supra-axillary on the inner edge of a lacinia, somewhat urceolate-cylindrical, the mouth entire. Receptacle slender, and sometimes exserted for half an inch.

The specimens from the Feejee Islands evidently belong to the variety β . of Hooker, having their "ultimate and penultimate divisions broader and more crowded." The round stipe and main rhachis are not unlike those of *T. angustatum*, to which also, the outline and colour of its fronds bear no inconsiderable resemblance.

23. TRICHOMANES ELONGATUM, A. Cunn.

Trichomanes elongatum, A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 368; Hook. Ic. Pl. 8, t. 701, & Spec. Fil. 1, p. 134.

HAB. Vicinity of the Bay of Islands, New Zealand: in dense and humid forests; terrestrial.

Plant caespitose; the rootstock erect and slightly elongated, crowned by a tuft of nearly erect fronds, 4 to 6 in number, of a deep green colour, 3 or 4 inches long, deltoid-ovate, and bipinnate. Pinnules crowded and imbricated, oblong, cuneate at the base, incisely-lobed; the laciniae entire and acute, or bifid, with a very thick and prominent venation. Sori copious. Indusium supra-axillary, free, cylindrical, with an attenuated base, and an entire scarcely spreading mouth. Receptacle curved, exserted twice or thrice the length of the indusium. Stipe from 3 to 6 inches long, with a few scattered brown scaly hairs at the base; the rhachis perfectly round and smooth.

This species, so far as we can learn, has only been detected on the northern island of New Zealand. It is very nearly related to the *T. rigidum* of Swartz, and differs from that species only by the broader and imbricated pinnules, the larger and more cylindrical indusium, and the round stipe and main rhachis.

24. TRICHOMANES JAVANICUM, Blume.

Trichomanes Javanicum, Blume, Enum. Pl. Jav. p. 224; Hook. & Grev. Ic. Fil. t. 240; Hook. Spec. Fil. 1, p. 130.

T. alatum, Bory, in Duperr. Voy. Bot. p. 282, t. 38, f. 2.

HAB. Feejee Islands. Samoan Islands. Luzon, Philippine Islands; terrestrial.

This is an extremely well-marked species, of peculiar habit, and of frequent occurrence on these islands, in humid mountain forests. The rootstock is erect, from one to 3 inches high, supported all round by strong and black, wiry roots, and bearing at its summit the nearly erect pinnate fronds, from 3 to 6 in number, and 6 or 8 inches in length, of a harsh and firm consistence, and usually drying black; the stipe and rhachis round, not very distinctly margined, beset with scattered blackish hairs. Pinnæ alternate, subpetiolate, linear-oblong, obtuse and obliquely cuneate at the base, the upper margin and sometimes the outer half of the lower one deeply incised or serrate. The urceolate and nearly free indusium is seated in the sinuses of the laciniaë, its mouth entire; and the straight receptacle is exerted for about half its length.

79. HYMENOPHYLLUM, *Sm.*

* *Frondes glabræ, pinnatifidæ.*

1. HYMENOPHYLLUM ASPLENIODES, *Sw.*

Hymenophyllum asplenoides, Sw. Syn. Fil. p. 145; Willd. Spec. Pl. 5, p. 516; Hook. Spec. Fil. 1, p. 87.

HAB. Organ Mountains, Brazil: growing on the trunks and branches of trees.

A well-marked species, with a slender creeping rhizoma, and fili-form stipes, usually about half as long as the fronds, which average from 3 to 4 inches in length, and are oblong-lanceolate in form, sometimes linear-oblong, and pinnatifid a little more than half-way down to the rhachis, when dry of a reddish-brown colour; the segments obtusely lobed, beautifully punctate-reticulated. Indusium orbicular and two-valved, a little sunk in the points of the lobes; the receptacle short and included.

* * *Frondeſ bi-tripinnatifidæ, ciliatæ vel pilosæ.*

2. HYMENOPHYLLUM CILIATUM, *Sw.*

Hymenophyllum ciliatum, Sw. Syn. Fil. p. 147; Willd. Spec. Pl. 5, p. 519; Hook. & Grev. Ic. Fil. t. 35; Hook. Spec. Fil. 1, p. 88.

HAB. Organ Mountains, Brazil: on moist rocks.

The excellent figure in the *Icones Filicum* represents the indusium precisely as it exists in our plant; that is, not at all "cordate or oblique" at the base, a character which is, however, said by Sir William Hooker, in his *Species Filicum*, to be very constant.

3. HYMENOPHYLLUM LANCEOLATUM, *Hook. & Arn.*

Hymenophyllum lanceolatum, Hook. & Arn. Bot. Beech. Voy. p. 109; Hook. Spec. Fil. 1, p. 94, t. 34, B.

HAB. Sandwich Islands.

This is of very frequent occurrence, creeping on rocks and the trunks of trees. Its broadly lanceolate and bipinnatifid fronds, with appressed, simple, or forked hairs on the margin of the segments and costa, and the orbicular, ciliated indusium, are its most characteristic features. The fronds and slender rootstock in a recent state are of a brown colour. In elevated and exposed situations it assumes the dwarf, compact habit of *T. obtusum*, from which it is then known only by the fronds being less hirsute and more contracted into a point.

4. HYMENOPHYLLUM OBTUSUM, *Hook. & Arn.*

Hymenophyllum obtusum, Hook. & Arn. Bot. Beech. Voy. p. 109; Hook. Spec. Fil. 1, p. 93, t. 33, D.

HAB. Sandwich Islands.

This very interesting, neat, and rather rare species, was detected by us growing on the trunks of different species of *Cibotium*; its small, black, wiry, creeping roots insinuating themselves into the bases of the decayed stipes of these arborescent Ferns, and frequently covering their whole trunk with its oblong, obtuse, tripinnatifid, ferruginous, hairy fronds.

* * * *Fronde pinnatæ seu bi-tripinnatifidæ (haud pilosæ), marginibus serratis vel dentatis.*

5. HYMENOPHYLLUM TUNBRIDGENSE, Sm.

Hymenophyllum Tunbridgense, Sm. ex Sw. Syn. Fil. p. 147; Willd. Spec. Pl. 5, p. 520; Br. Prodr. Fl. Nov. Holl. p. 159; A. Rich. Bot. Voy. Astrol. p. 91; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 369; Newm. Brit. Ferns, p. 93; Hook. Spec. Fil. 1, p. 95.
H. minimum, A. Rich. Bot. Voy. Astrol. p. 91, t. 14, f. 2.

HAB. Vicinity of the Bay of Islands, New Zealand: on moist rocks and the trunks of trees, in shady woods.

In Newman's History of British Ferns, we find a good figure of this species, with which our plant agrees in all essential characteristics; the principal difference between the two consisting in the relative size of the plants, the New Zealand one being considerably the smaller.

6. HYMENOPHYLLUM WILSONI, Hook.

Hymenophyllum Wilsoni, Hook. Brit. Fl. ed. 4, p. 390, Engl. Bot. Suppl. t. 2686, & Spec. Fil. 1, p. 95.

HAB. Orange Harbour, Tierra del Fuego: on rocks and wet, shady banks.

The habit of the plant, as well as the form and nature of the serratures of the fronds (which are somewhat smaller), are certainly very much like the preceding species; the frond with the stipe not

being over an inch in height. The principal difference consists in the somewhat more inflated indusium of the present plant, and its entire valves.

7. HYMENOPHYLLUM AFFINE, Sp. Nov. (Tab. 37.)

H. rhizomate filiformi repente; stipitibus brevibus tenuibus teretibus parce villosis; frondibus parvis membranaceis late ovatis bipinnatifidis; pinnis imbricato-confertis subflabellatis, laciniis linear-oblongis obtusis simplicibus vel bifidis spinuloso-serratis; indusio supra-axillari obovato basi subimmerso infra medium usque bivalvi, labiis integerrimis; receptaculo brevi incluso.

HAB. Ovolau, Feejee Islands: on rocks.

Rootstock long, *filiform*, and *creeping*. *Stipes* about half an inch in length, very slender, *terete*, sparingly *villous*. *Fronde* *bipinnatifid*, from half an inch to an inch in length, *membranaceous*, *broad-ovate* or *ovate* in circumscription, with *imbricated* and somewhat *subflabelliform* *pinnæ*; the *lacinæ* *linear-oblong*, *obtuse* and *simple*, or *oblong* and *bifid*, the margin *spinulose-serrate*. *Sori* few on the upper half of the fronds; the *indusium supra axillary*, *obovate*, *plane*, and *two-valved* for fully two-thirds of its length, the margin of the *lips entire*, the base only *slightly immersed* in a short segment. *Receptacle short included*.

This is related to the *H. Tunbridgense*; from which it is distinguished by the shorter stipe, the broader fronds, the crowded and imbricated pinnæ, and particularly by its obovate, deeply divided, entire-lipped indusium. In the latter respect it resembles more the *H. Wilsoni*, but the indusium is not inflated at the base as in that species; the form of the fronds and direction of the pinnæ are also very different.

PLATE 37.—Fig. 1. Plant, of the natural size. 1 *a*. Portion of the same, seen from beneath. 1 *b*. View of a single sorus, with one-half of the indusium removed. 1 *c*. Sporangium.—The details more or less magnified.

8. HYMENOPHYLLUM SECUNDUM, *Hook. & Grev.*

Hymenophyllum secundum, Hook. & Grev. Ic. Fil. t. 133; Hook. Spec. Fil. 1, p. 100.

HAB. Good Success Bay, and Orange Harbour, Tierra del Fuego: on trunks of trees, and mossy banks, among bushes.

Our numerous specimens of this species are none of them nearly so large as the figure in the Icones Filicum, with which in other respects they perfectly agree.

9. HYMENOPHYLLUM NEESII, *Hook.*

Hymenophyllum Neesii, Hook. Spec. Fil. 1, p. 99.

Trichomanes Neesii, Blume, Enum. Plant. Jav. 2, p. 226.

HAB. Mount Majajai, Luzon, Philippine Islands.

We cannot determine whether the present species ought to be retained in *Hymenophyllum* or be remanded to *Trichomanes*, owing to the mutilated condition of the few specimens we have to examine, and therefore follow Sir William Hooker, who refers it to the present genus. The few indusia on our specimens are oblong, and divided for one-third of their length into two somewhat acute and dentate valves; the receptacle extends as far as the tips of the valves, but not beyond them.

10. HYMENOPHYLLUM FEEJEENSIS, Sp. Nov. (Tab. 37.)

H. stipitibus gracilibus teretibus glabris; frondibus late ovatis acuminatis pinnatis; pinnis alternis patentibus ovato-oblongis bi-tripinnatifidis, laciniis angusto-linearibus obtusis spinuloso-dentatis; rhachi flexuosa sursum marginata; soris terminalibus vel supra-axillaribus; indusio ovato bipartito, valvis superne argute serratis; receptaculo incluso.

HAB. Ovolau, Feejee Islands: on moist rocks and trees, at the elevation of 2,000 feet.

Plant very abundant in the above localities. Rootstock setose. *Stipes* 3 inches and upwards in length, *slender, smooth, terete*. *Fronde*s usually about the same length as the stipe, elastic, *broad-ovate*, contracting into an *acuminate* point, *pinnate*, at least near the base, where the main rhachis is occasionally slightly margined, and usually with the secondary rhachis a little *flexuose*. *Pinnæ* *alternate, spreading, ovate-oblong*; the inferior ones distant and *tripinnatifid*; the superior bipinnatifid; the *laciniæ* short, *narrow-linear, obtuse, spinulose-dentate*. *Rhachis* *flexuose, margined* towards the upper portion. *Sori* few, confined to the upper half of the frond, and situated either on short *supra-axillary* laciniæ, which is their usual position, or on the points of the outer laciniæ. *Indusium* small, *ovate*, and split into *two valves* almost to its base, which is slightly immersed in the lacinia, the upper half of the valves *sharply serrated*. *Receptacle* *included*.

In habit and general characters this stands near to *H. bivalve*, Swartz; but it differs from that species in its slightly margined rhachis, and the sharply serrated indusium.

PLATE 37.—Fig. 2. Plant, of the natural size. 2 *a*. Portion of a frond, seen from beneath. 2 *b*. View of a sorus, with one-half of the indusium removed. 2 *c*. Sporangia.—The details more or less magnified.

11. HYMENOPHYLLUM TORTUOSUM, *Banks & Soland.*

Hymenophyllum tortuosum, Banks & Soland.; Hook. & Grev. Ic. Fil. t. 129; Hook. Spec. Fil. 1, p. 99.

HAB. Orange Harbour and Good Success Bay, Tierra del Fuego: very abundant on mossy and shady banks, and occasionally creeping up the trunks of trees. Remarkable on account of the tortuous nature of the wings on the stipe and rhachis.

12. HYMENOPHYLLUM FUCOIDES, Sw.

Hymenophyllum fucoides, Sw. Syn. Fil. p. 146; Willd. Spec. Pl. 5, p. 522; Hook. Spec. Fil. 1, p. 101.

HAB. Organ Mountains, Brazil.

The species sometimes produces its sori in pairs on the tips of the somewhat bifid or emarginate laciniaë.

* * * * *Fronde pinnatisectæ, marginibus integerrimis, nec ciliatis nec serratis.*

13. HYMENOPHYLLUM DILATATUM, Sw.

Hymenophyllum dilatatum, Sw. Syn. Fil. p. 147 & 373; Willd. Spec. Pl. 5, p. 533; Blume, Enum. Plant. Jav. 2, p. 221; Hook. & Grev. Ic. Fil. t. 60; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 368; Hook. Spec. Fil. 1, p. 104.

HAB. Vicinity of the Bay of Islands, New Zealand: in deep and damp forests, on dead wood and trees; frequent. Feejee Islands; rare. Luzon, Philippine Islands.

Some specimens of this very handsome species are over two feet in length; the fronds oblong, acuminate, and tripinnatifid, somewhat lucid. Sori terminal, invariably borne towards the summit of the fronds, or at least confined to the upper half. Sporangia in age projecting beyond the margin of the two-valved, orbicular indusium; the tip of the clavate receptacle then about equal with the margin of the valves.

14. HYMENOPHYLLUM FORMOSUM, Sp. Nov. (Tab. 37.)

H. stipitibus basi teretibus superne alatis; frondibus erectis oblongo-lanceolatis acuminatis tripinnatifidatis; pinnis primariis alternis adscendentibus, secundariis ovatis obtusis subpalmatis; laciniis angustolinearibus obtusis simplicibus vel bifidis; soris paucis supra-axilla-

ribus; indusio orbiculari inflato basi in laciniam brevem immerso bipartito, valvis integerrimis; receptaculo brevi apice capitato.

HAB. Mountain forests of Tahiti, Society Islands: on rocks and trunks of trees.

Rootstock very long and creeping. *Stipes* smooth, *terete* at the base but *margined* above. *Fronde* erect, quite elastic, drying of a dull brown colour, of an *oblong-lanceolate* form, *acuminate*, *tripinnatifid*, and frequently with a partially caudate-acuminate point, from 8 to 10 inches in length and 4 to 6 inches broad; all the divisions rather crowded; the *primary* ones *alternate*, *ascending*, somewhat imbricated and pointing upwards; the *secondary* ones broad-ovate, *obtuse*, and divided in a palmated manner; the *laciniæ* *narrow-linear*, *obtuse*, *simple* or *bifid*. *Sori* rather few, confined to the upper half of the frond, seated on *short lateral laciniæ* (*supra-axillary*). *Indusium orbicular*, *inflated*, *entire*, the base *slightly immersed*, the two valves divided almost to the base, and enclosing the *short capitate receptacle*.

A very handsome species, allied to *H. dilatatum*, Swartz, in the tripinnatifid fronds and the subpalmate secondary divisions: but differing in the more crowded and ascending primary divisions, which are not at all translucent; also in the supra-axillary sori and the anomalous capitate receptacle.

PLATE 37.—Fig. 3. Frond, of the natural size. 3 *a.* Portion of the same. 3 *b.* A single sorus, with the indusium removed. 3 *c.* A sporangium.—More or less magnified.

15. HYMENOPHYLLUM RECURVUM, Gaud.

Hymenophyllum recurvum, Gaud. Bot. Freyc. Voy. p. 376; Hook. & Arn. Bot. Beech. Voy. p. 109; Hook. Spec. Fil. 1, p. 104, t. 37, C.

HAB. Sandwich Islands; where it is a very common Fern, on the trunks of trees.

This is the most variable species of the genus that has come under

our notice. The fronds are either bipinnatifid or tripinnatifid, with the primary divisions recurved or ascending; and the tips of the laciniaë are usually emarginate (a character overlooked by Gaudichaud). The stipes are either very slightly margined or winged. The indusium is either orbicular and entire, or ovate and serrate at the upper margin, its position either supra-axillary or terminal (the latter seldom), the base immersed, while above it is two-valved about half-way down.

16. HYMENOPHYLLUM POLYANTHOS, Sw.

Hymenophyllum polyanthos, Sw. Syn. Fil. p. 149; Willd. Spec. Pl. 5, p. 530; Hook. Spec. Fil. 1, p. 106; *H. abietinum*, Hook. & Grev. Ic. Fil. t. 127.

HAB. Vicinity of Rio Janeiro, and also in the Organ Mountains, Brazil.

Our plant is 4 or 5 inches high, with ovate-oblong and tripinnatifid fronds; the inferior pinnæ small and rather distant. Stipes slightly winged. Indusium ovate and partially immersed, divided into two valves almost to its base.

In his Species Filicum, Sir William Hooker has referred to *H. polyanthos* a great number of nominal species, established by various authors. Whether this view be ultimately adopted or not, his excellent judgment, and the vast amount of materials at his command, entitle his opinions to the highest consideration.

17. HYMENOPHYLLUM GRACILE, Bory.

Hymenophyllum gracile, Bory, in Willd. Spec. Pl. 5, p. 527; Hook. & Grev. Ic. Fil. t. 198; Hook. Spec. Fil. 1, p. 110.

HAB. Tahiti, Society Islands: in mountain forests, growing on the trunks of trees.

The inferior pinnæ in our plant are shorter than they are represented in Hooker and Greville's Icones Filicum; giving the outline of

the frond an oblong-lanceolate form. The laciniaë are short and obtuse, frequently bifid. Indusium of an oblong-ovate form, its base partially immersed in the tips of the laciniaë.

18. HYMENOPHYLLUM CAUDICULATUM, *Mart.*

Hymenophyllum caudiculatum, Mart. ex Hook. Spec. Fil. 1, p. 102.

HAB. Organ Mountains, Brazil: growing on rocks and trees.

Plant from 4 to 6 inches high. Stipe terete, broadly winged, the wings extending almost to the base. Fronds somewhat rigid, erect, broad-ovate or ovate-lanceolate, acuminate, and tripinnatifid, somewhat glossy, and of a dark brown colour when dry; the primary divisions very much crowded, a little imbricated and spreading, oblong-lanceolate, and terminating in a lengthened caudate point; secondary divisions simple or subpalmate. Laciniaë short, linear-oblong, obtuse, emarginate. Rhachis broadly winged, the wings slightly undulated. Sori supra-axillary or terminal. Indusium large, compressed, two-valved to its base, orbicular, sometimes a little reniform in shape, and erose on the upper margin. Receptacle short and thick at the end, as in our *H. formosum*.

This is certainly the *H. caudiculatum* of Martius, as described by Sir William Hooker in his Species Filicum, where he refers a plant from Chiloe to it. The species is well marked by the broadly-winged stipe and rhachis, the long caudate points of the pinnæ, and sometimes of the points of the fronds also, and the very large orbicular indusia.

19. HYMENOPHYLLUM FLEXUOSUM, *A. Cunn.*

Hymenophyllum flexuosum, A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 369; Hook. Spec. Fil. 1, p. 105.

HAB. Vicinity of the Bay of Islands, New Zealand; growing among decayed leaves, in humid forests.

A very beautiful species, having a broad and crisped wing on its rhachis and the upper half of the terete stipe, which, together with the three or four times pinnate fronds, averages from 8 to 10 inches in length, the latter usually twice as long as the former. Sori seated on the tips of short laciniae near the point of the pinna. Indusium orbicular and divided into two valves down to the base; the valves convex and entire. According to Sir William Hooker this is closely related to the *H. crispatum* of Wallich.

* * * * * *Frondes inferne pinnatæ, superne pinnatipartitæ; laciniiis planis integerrimis.*

20. HYMENOPHYLLUM FLABELLATUM, *Labill.*

Hymenophyllum flabellatum, Labill. Pl. Nov. Holl. 2, p. 101, t. 250, f. 1; Willd. Spec. Pl. 5, p. 526; Hook. Spec. Fil. 1, p. 111.
H. nitens, R. Br. Prodr. Fl. Nov. Holl. p. 159; Hook. & Grev. Ic. Fil. t. 197; A. Rich. Bot. Voy. Astrol. p. 94; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 369.

HAB. Vicinity of the Bay of Islands, New Zealand. Also in the Feejee Islands.

The figure of *H. nitens* in the Icones Filicum is a very characteristic representation of our Feejee plant. The New Zealand plant is much smaller; the fronds ovate and cordate at the base. In both the rhizoma and stipe are pilose.

21. HYMENOPHYLLUM DEMISSUM, *Sw.*

Hymenophyllum demissum, Sw. Syn. Fil. p. 147 & 374; Willd. Spec. Pl. 5, p. 528; A. Rich. Bot. Voy. Astrol. p. 92; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 369; Hook. Spec. Fil. 1, p. 109.

HAB. Vicinity of the Bay of Islands, New Zealand; frequent, and usually terrestrial: growing in forests, commonly on decayed wood and leaves.

80. SITOLOBIUM, *Desv., J. Sm.*

(DICKSONIÆ Spec. Sw. & Auct. CULCITA Spec. Presl. PATANIA, Presl.)

1. SITOLOBIUM DUBIUM.

Davallia dubia, R. Br. Prodr. Fl. Nov. Holl. p. 157.*Dicksonia dubia*, Gaud. Bot. Freyc. Voy. p. 367; Hook. Spec. Fil. 1, p. 71, t. 24, C.*Balantium Brownianum*, Presl, Tent. Pterid. p. 134, t. 5, f. 4.

HAB. Vicinity of Port Jackson, New South Wales.

We have failed to make out such an evident accessory indusium as that shown by Presl in his Tentamen Pteridographiæ. Our plant may not be fully developed in all its parts; yet the form of the indusium is precisely that figured by Hooker in his Species Filicum. But setting aside the ill-defined accessory indusium, which consists of the scarcely changed lobule or tooth of the frond, the habit of the plant harmonizes with the present genus.

2. SITOLOBIUM STRAMINEUM.

Dicksonia straminea, Labill. Sert. Austr. Cal. p. 7, t. 10; Hook. Spec. Fil. 1, p. 71.

HAB. Somu Somu, Feejee Islands.

This differs but little from the preceding species, and is only to be distinguished by its larger fronds, which are smooth on the upper surface, and by its larger special indusium, the upper or accessory one formed by a more evident changed and reflexed lobule or tooth of the frond.

3. SITOLOBIUM ADIANTOIDES, *J. Sm.**Sitobium adiantoides*, J. Sm. in Lond. Jour. Bot. 1, p. 434.

Dicksonia adiantoides, Humb. & Bonpl. ex Willd. Spec. Pl. p. 488; Hook. Spec. Fil. 1, p. 75, t. 26, B.

HAB. Organ Mountains, Brazil.

This is a large, handsome, and very distinct species, having smooth and tripinnate fronds.

4. *SITOLBIUM SAMOENSE*, Sp. Nov. (Tab. 38.)

L. stipite lævi; frondibus amplis glabris flaccidis tripinnatis; pinnis primariis et secundariis oblongo-lanceolatis acuminatis apice serratis; pinnulis lanceolato-oblongis obtusis lobato-serratis basi obliquis cuneatis, lobo infimo superiore majore; rhachi partiali costa venisque dichotomis pilis articulatis hirsutis; soris parvis in dente brevi prope basim sinuum impositis solitariis; indusio reflexo cyathiformi.

HAB. Island of Savaii, Samoan Group.

Stipe smooth. Fronds very large, tripinnate, glabrous on both sides, flaccid, the upper surface somewhat shining. The primary and secondary divisions are alternate and spreading, oblong-lanceolate, and contracted rather suddenly into a finely serrated point. Pinnules about half an inch in length, approximate, lance-oblong, obtuse, obliquely cuneate at the base, lobate-serrate, the points of the lobes sometimes bluntly toothed and slightly recurved, the lower and superior one invariably the largest. The rhachis of the primary and secondary pinnæ on the upper side are partially furnished with a short rufous pubescence; while on the under side only the secondary ones, with the costa and veins, are beset with scattered articulated hairs. Sori very small, a single one being seated on a short tooth arising from the inner edge of the lobes of the pinnules, near the base of the sinuses. Indusium reflexed, cup-shaped, its mouth quite entire.

This species is closely related to *Dicksonia apiifolia*, Swartz; but is distinguished by its more reflexed, cup-shaped indusium, and apparently larger fronds.

PLATE 3. Fig. 1. Part of a frond, of the natural size. 1 *a*. Dorsal view of a portion of the same. 1 *b*. Smaller portion, showing a single sorus. 1 *c*. Sporangium.—The dissections more or less magnified.

5. SITOLOBIUM TENERUM.

Dicksonia tenera, Presl, Tent. Pterid. p. 136, t. 5, f. 6 & 7; Hook. Gen. Fil. t. 61, A.

HAB. On the Organ Mountains, Brazil.

We have in our possession specimens of *Dicksonia adiantoides*, Link., procured from the Royal Botanic Gardens, Berlin, with which our Brazilian plant perfectly agrees; and the latter, on the other hand, corresponds equally well with the *Dicksonia tenera*, Presl, as figured in Hooker's Genera Filicum. The indusium is cup-shaped, but sometimes it shows a slight disposition to be two-lipped.

6. SITOLOBIUM RUBIGINOSUM, *J. Sm.*

Sitobium rubiginosum, *J. Sm.* in Lond. Jour. Bot. 1, p. 434.
Dicksonia rubiginosa, Kaulf. Enum. Fil. p. 226; Hook. Spec. Fil. 1, p. 79, t. 27, A.

HAB. On the Corcovado, near Rio Janeiro, Brazil. (All the specimens are destitute of sori.)

7. SITOLOBIUM SCANDENS?

S. frondibus tripinnatis membranaceis glabris; pinnis oppositis sessilibus remotis patentibus oblongo-lanceolatis acuminatis; pinnulis suboppositis oblongo-lanceolatis pinnatipartitis, segmentis subdimidiato-oblongis obtusis obtuse lobato-dentatis; rhachi primaria straminea angulata partialibusque aculeatis; costa rufo-hirsuta; venis tenuibus, venulis dichotomis.

Dicksonia scandens, Blume, Enum. Plant. Jav. 2, p. 240? Hook. Spec. Fil. 1, p. 78.

HAB. Tahiti, Society Islands: on the northwest slope of Mount Aorai.

The fronds are smooth, membranaceous, and tripinnate; the pinnae opposite, sessil, distant, oblong-lanceolate, acuminate, and spreading; the pinnules nearly opposite, oblong-lanceolate, and deeply pinnatifid; the segments subdimidiate-oblong, obtuse, and bluntly lobate-dentate. The primary rachis is angular, of a pale straw-colour, and together with the secondary ones, beset with numerous brown and glossy prickles, which are frequently double or approximate in pairs. *Costa rufous-hirsute.* Veins slender, the venules forking.

The only specimen of this singular Fern in the collection is destitute of sori, about fifteen inches in length, and consists of the extremity of what apparently has been a large frond; it was collected by Mr. James D. Dana, Mineralogist to the Expedition, while on an excursion to the summit of Mount Aorai.

The character of the frond agrees so nearly with the description of the *Dicksonia scandens* of Blume, that we cannot, in the absence of the sori, do otherwise than refer it provisionally to that species.

81. DICKSONIA, *L'Herit., J. Sm.*

(BALANTII Spec. Kaulf. CULCITA, Presl.)

1. DICKSONIA SQUARROSA, *Sw.*

Dicksonia squarrosa, Sw. Syn. Fil. p. 136 & 355; Willd. Spec. Pl. 5, p. 485; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 367; Hook. Spec. Fil. 1, p. 68.

HAB. On high ridges; vicinity of the Bay of Islands, and Wangarara Bay (Northern Island), New Zealand.

A beautiful arborescent Fern; with a stout and erect trunk, from 4 to 6 feet high, crowned by a compact head of short and rigid fronds. The points and serratures of its divisions are quite pungent. Stipes short and black, their surface closely studded with short, hard, raised points, and with long, spreading, brownish hairs at the base. The plant is usually found in open and unshaded situations.

2. *DICKSONIA SELLOWIANA*, *Hook.*

Dicksonia Sellowiana, Hook. Spec. Fil. 1, p. 67, t. 22, B.

HAB. Organ Mountains, Brazil.

In character this agrees precisely with the description and the small figure in Hooker's Species Filicum. When the fronds are young, the rhachis of the pinnules is furnished with articulated and somewhat appressed hairs, which disappear with age.

3. *DICKSONIA BERTEROANA*, *Hook.*

Dicksonia (Balantium) Berteroana, Hook. Spec. Fil. 1, p. 67, t. 23, A.

HAB. Ovolau, Feejee Islands: at the altitude of 2,000 feet.

Arborescent. Trunk 4 to 6 feet high, bearing large, spreading, tripinnate, coriaceous, glabrous fronds, with a very thick and slightly woolly stipe and main rhachis. Pinnules oblong-lanceolate, acuminate, deeply pinnatifid, the point entire and serrate, of a paler colour on the under than the upper surface, somewhat imbricated. Segments oblong-ovate, subacute, serrated, somewhat falcate, the inferior one often with a lobe at the base: rhachis of the primary and secondary divisions clothed with a close fulvous tomentum above. Fertile fronds smaller, quadripinnate, the ultimate divisions parted down to the costa into 6 or 8 lobes; or, in other words, the foliaceous substance of the frond is so contracted, that little more than the mere costa and veins are present, these being at most slightly winged; each lobe terminated by a single large sorus. The accessory indusium is more concave, and larger than the special one.

With the exception of the following species, this is perhaps the most elegant of the genus. The fronds are not always strictly of two kinds, for sometimes we find at the base of a generally sterile frond, one or two contracted and fertile pinnules; and, on the other hand, what would be considered a fertile frond, frequently bears sterile pinnules at the middle of the pinnæ or elsewhere.

4. DICKSONIA TORREYANA, Sp. Nov.* (Tab. 38.)

D. arborescens; stipitibus glabris semiteretibus; frondibus supradecompositis flaccidis; pinnis primariis et secundariis ovato-oblongis acuminatis; pinnulis ultimis oblongo-lanceolatis acutis pinnatifidis basi obliquis, laciniis oblongo-lanceolatis dentatis; rhachi ultima costisque subtus parce pilosis; soris parvis sinubus dentium impositis; indusio fere membranaceo, valvis æqualibus.

HAB. Feejee Islands; in mountain forests; rare.

Trunk from 8 to 10 feet high, its surface rough, owing to the base of the old stipes remaining attached to it. *Fronde* few and, with the smooth and semiterete stipe, from 8 to 12 feet long, flaccid, spreading and supra-decompound; the primary and secondary divisions ovate-oblong, unequal at the base, tapering gradually into a slender and finely serrated point; the ultimate divisions approximate and somewhat imbricated, oblong-lanceolate, acute, and pinnatifid; the segments lance-oblong, toothed. *Rhachis* and *costa* of the ultimate divisions pilose with scattered hairs beneath, while in the young fronds the rhachis, costa, and veins throughout are closely beset with weak and whitish hairs, which almost entirely disappear at maturity. Veins pinnate, the venules forked. Sori small and rather numerous, seated in the sinuses of the teeth, and continuing outwards almost to the tips of the pinnules. *Special and accessory indusium* about equal in size, of a pale straw colour, rather membranaceous, and breaking down under a very slight pressure. The whole plant is very graceful, and the fronds more compoundly divided than in any other species with which we are acquainted.

PLATE 38.—Fig. 2. Portion of a frond, of the natural size. 2 a. A portion of the same, seen from beneath. 2 b. Smaller portion, with a single sorus. 2 c. A sporangium.—The dissections more or less magnified.

* Named in compliment to Professor John Torrey, one of our oldest and most distinguished American botanists.

82. CIBOTIUM, *Kaulf.*

(PINONIA, Gaud.)

This genus is distinguished from *Dicksonia* and other allied genera by its very coriaceous or horny indusium, the valves of which point downwards; the outer valve of the same substance as the inner, quite independent of, and altogether of a different consistence from the margin of the frond.

1. CIBOTIUM GLAUCUM, *Hook. & Arn.*

Cibotium glaucum, Hook. & Arn. Bot. Beech. Voy. p. 108 (excl. syn. Kaulf. & Gaud.); Hook. Spec. Fil. 1, p. 82, t. 29, A.

HAB. Sandwich Islands.

Plant arborescent. Trunk from 6 to 8 feet high, rather slender for its stature, and crowned with large, spreading, smooth, subcoriaceous, bipinnate fronds, which are glaucous beneath, and with linear-oblong, acuminate, deeply pinnatifid, sessile pinnules, having serrated points. Segments alternate, oblong and falcate, their apices acute and crenate. Sori numerous, borne in a row near the margin, and continuing outwards about two-thirds of the length of the segments; the inner valve of the indusium narrower and longer than the outer.

Of the three species of *Cibotium* detected by us at the Sandwich Islands, the present is decidedly the most graceful, and, as far as our observations extended, the rarest; as we only found it on the island of Hawaii, in deep shady forests.

2. CIBOTIUM CHAMISSOI, *Kaulf.*

Cibotium Chamissoi, Kaulf. Enum. Fil. p. 230, t. 1, 14; Hook. Spec. Fil. 1, p. 83. *Pinonia splendens*, Gaud. Bot. Freyc. Voy. p. 369, t. 21.

HAB. Sandwich Islands.

Very distinct from the preceding species. Plant arborescent; the trunk from 4 to 6 feet high. Stipes of a reddish-brown colour, and with the main rhachis nearly round; but the former with a strong rib on each side, its surface rough with numerous hard and elevated black points. Fronds short, broad and spreading, coriaceous, bipinnate, of a paler colour on the under than the upper surface. Pinnules lance-oblong, acuminate, pinnatifid about two-thirds down to the rhachis; the point for about an inch entire, or lobate-crenate. Segments ovate-oblong, obtuse, entire or finely crenate. Sori copious, from 4 to 14 on each segment, seated close to the margin, and often continuing outwards to the very point. Indusium large and horny, of a brown colour; the valves unequal, the inner one longer and narrower than the outer.

This principally inhabits the outskirts of forests. It is liable to vary in the depth of the divisions of its pinnules. The trunk is not quite so tall as in *C. glaucum*, but like it is somewhat slender, considering its large crown of fronds. Individuals were frequently observed growing close to the trunks of forest trees, the upper half of the trunk of the Fern inclining towards and often leaning against that of the trees, as if making use of them to support its heavy head of fronds.

3. *CIBOTIUM MENZIESII*, *Hook.*

Cibotium Menziesii, Hook. Spec. Fil. 1, p. 84, t. 29, C.

HAB. Sandwich Islands; frequent.

This is again very different from either of the two preceding species; having a shorter and thicker trunk, and shorter and more coriaceous fronds, which are smooth on both sides; the under surface of the pinnules glaucous, or at least of a much paler colour than the upper, and lance-oblong, acuminate, pinnatifid nearly to the rhachis, or sinuately pinnatifid; the segments or lobes ovate or ovate-oblong, obtuse, and crenate; the numerous large sori seated close to the margin, and extending from the base of the wide sinus nearly to the point of the segments. Inner valve of the indusium larger and nar-

rower than the outer. Stipes thick, smooth, semiterete, sulcate in front, clothed with long and brown, arachnoid-woolly hairs at the base.

The soft and fine, chestnut-brown, arachnoid-woolly hairs from the base of the stipes, and in which the circinnate young fronds nestle, is collected by the foreign residents and the more refined of the native population of the Sandwich Islands, and used to stuff beds, pillow-cases, and chair-cushions.

TRIBE VII. CYATHEÆ, GAUD., HOOK.

83. CYATHEA, *Sm.*

(DISPHENIA, Presl.)

1. CYATHEA DEALBATA, *Sw.*

Cyathea dealbata, Sw. Syn. Fil. p. 140 & 365; Willd. Spec. Pl. 5, p. 495; A. Rich. Bot. Voy. Astrol. p. 77, t. 10; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 368; Hook. Spec. Fil. 1, p. 27.

HAB. Vicinity of the Bay of Islands, New Zealand.

The plant is diffused throughout woods and sheltered ravines. Trunk from 8 to 12 feet in height.

2. CYATHEA MEDULLARIS, *Sw.*

Cyathea medullaris, Sw. Syn. Fil. p. 140 & 366; Willd. Spec. Pl. 5, p. 494; A. Rich. Bot. Voy. Astrol. p. 78; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 368; Hook. Spec. Fil. 1, p. 26, pro parte.

HAB. Vicinity of the Bay of Islands, New Zealand.

This fine Tree-Fern has a trunk from 15 to 30 feet high, terminated by numerous large fronds, which are often 15 feet in length, including their stipe, and form a rather loose and irregular crown or head.

3. CYATHEA CANALICULATA, Willd.

C. stipite crasso minutim tuberculato; frondibus bipinnatis subcoriaceis; pinnulis alternis oblongo-lanceolatis acuminatis profunde pinnatifidis utrinque glabris, segmentis lineari-oblongis obtusis serratis, infimis sæpe lobato-pinnatifidis; rhachi communi antice canaliculata, partialibus supra plus minus tomentosis; venis subtus prominulis bis terve furcatis; soris a costa subremotis; indusio membranaceo irregulariter rumpente.

Cyathea canaliculata, Willd. Herb. ex Spreng. Syst. Veg. 4, p. 126; Hook. Spec. Fil. 1, p. 23, t. 11, B.

HAB. Tahiti, Society Islands: in mountain forests.

Stipe thick, beset with *minute tubercles* on the surface. The *fronds* are large, somewhat *coriaceous*, *bipinnate*, *smooth on both sides*, and of a pale green colour when dry; the *pinnules alternate*, somewhat over 6 inches in length and 1½ inches broad, *oblong-lanceolate*, *acuminate*, *pinnate at the base*, *deeply pinnatifid* towards the point; the base of the sinuses *angular*. *Segments linear-oblong*, broad at the base, *obtuse at the point*, the margin *irregularly serrated* or toothed; the 2 or 3 *inferior pairs* again *slightly pinnatifid*. *Main rhachis channelled in front*; the secondary rhachis, together with the costa of the pinnules above, furnished with a short and pale brown tomentum. *Veins prominent on the under side*, *twice or thrice forked* in a branching manner. *Sori at some distance from the costa*, having a *membranaceous indusium which bursts irregularly*.

The figure of this species in Hooker's Species Filicum is a very fair illustration of a like portion of our plant. The specimens were young when collected; the short tomentum present on the rhachis may disappear in age.

4. CYATHEA AFFINIS, Sw.?

C. stipite semitereti basi paleaceo antice sulcato tuberculato; frondibus glabris subcoriaceis bipinnatis; pinnulis oblongis nunc lineari-lanceolatis acuminatis pinnatipartitis, segmentis lineari-oblongis subfalcatis obtusis crenatis, infinis minoribus; costa subtus squamis laceris bullatis induta; venis tenuibus furcatis; soris inter costam et marginem æquidistantibus; indusio irregulariter rumpente.

Cyathea affinis, Sw. Syn. Fil. p. 140 & 368?; Willd. Spec. Pl. 5, p. 494?

HAB. Feejee and Samoan Islands.

Trunk from 20 to 30 feet high. *Fronde*s broad, smooth, subcoriaceous, pinnate; the inferior pinnæ small and distant, on a short, thick, half-round stipe, which at the base is sulcate in front, and has a compact line of long paleæ seated on the edge of the furrows: paleæ entire, about an inch long, the point much attenuated. *Pinnules* oblong or sometimes linear-lanceolate, acuminate, pinnatifid almost to the rhachis. *Segments* linear-oblong, obtuse, somewhat falcate and crenate; the lower and inferior one much the smallest, with numerous, pale, bullate, lacerated scales on the costa beneath; while on the upper side the rhachis and costa are furnished with a short brown pubescence. *Veins* very slender, and forking once or twice. *Sori* numerous, seated half-way between the margin and costa, forming a continuous line from the base of the segments to their apex. *Indusium* at first globular, at length bursting open at the top irregularly, forming a ragged-mouthed cup, which ultimately breaks into 4 or 5 lobes.

We have reason to believe that we are correct in referring our plant to the *C. affinis* of Swartz. It certainly is distinct from *C. medullaris* of the same author, to which Sir William Hooker, in his Species Filicum, has united it. Our present species differs from *C. medullaris* in its shorter pinnæ; its broader and obtuse segments, with the sori seated a greater distance from the costa; the fronds are of a darker green, and less harsh in their consistence; the tubercles on the stipe are larger and more numerous, and the paleæ at the base are longer.

84. ALSOPHILA, *R. Br., Presl.*

(CYATHEÆ Spec. Auct. CHNOOPHORA, Kaulf.)

1. ALSOPHILA AUSTRALIS, *R. Br.*

Alsophila australis, *R. Br. Prodr. Fl. Nov. Holl.* p. 158; *Hook. Spec. Fil.* 1, p. 50, t. 19, A.

HAB. Illawarra, New South Wales.

Trunk from 10 to 15 feet high. Stipes sharply muricated, almost aculeate; and on the costa beneath are a few very conspicuous bulate scales.

2. ALSOPHILA FEROX, *Presl.*

Alsophila ferox, *Presl, Tent. Pterid.* p. 62; *Hook. Spec. Fil.* 1, p. 41.
Polypodium aculeatum, *Raddi, Plant. Brasil.* 1, p. 27, t. 42.

HAB. On the Corcovado, near Rio Janeiro, and the Organ Mountains, Brazil.

Trunk from 8 to 12 feet high, having the remains of the old stipes attached. Stipes thick and glossy, armed with long and sharp prickles. Fronds very large, bipinnate, and rather flaccid, the lower pinnæ small and distant. Segments linear-oblong, falcate, and serrate. Rhachis, costa, and veins clothed with a yellowish-brown pubescence on both sides. Sori copious, in a single row about half-way between the costa and margin, terminating about the breadth of 2 lines from the point of the segments. Sporangia confluent and concealing the costa, seated on a hairy receptacle.

We have relied almost entirely upon the authority of Sir William Hooker for this being the *A. ferox* of Presl: it is evidently the *Polypodium aculeatum* of Raddi.

3. ALSOPHILA HIRTA, *Kaulf.*

Alsophila hirta, Kaulf. Enum. Fil. p. 249; Gaud. Bot. Freyc. Voy. p. 366.

A. hirsuta, Hook. Spec. Fil. 1, p. 45.

Polypodium axillare, Raddi, Plant. Brasil. 1, p. 27, t. 41.

HAB. Vicinity of Rio Janeiro, and Organ Mountains, Brazil.

The upper portion of the stipe of this is thick, smooth, and furrowed in front, with a very few scattered, raised points on its surface. The fronds are large, lax, and bipinnate, with the pinnules pinnatifid nearly to the rhachis; the primary divisions are distant, and the main rhachis towards the extremity slender and flexuose, and, with the secondary one, hairy on the upper side, while on the costa beneath are scattered chaffy, lacerated, whitish, small scales. Segments oblong-linear, slightly falcate and dentate, bearing from 10 to 18 sori, which are axillary on the forkings of the veins.

4. ALSOPHILA CAUDATA, *J. Sm.*

Alsophila caudata, J. Sm. in Lond. Hook. Jour. Bot. 3, p. 419; Hook. Spec. Fil. 1, p. 52, t. 20, B.

HAB. Luzon, Philippine Islands, near Baños: in mountain forests.

Whole plant unarmed. Fronds bipinnate, smooth, quite coriaceous, and of a pale colour on both sides, somewhat glossy or glaucous beneath. Pinnules sessile, the lower and inferior one adnate with the rhachis, oblong-lanceolate, caudate-acuminate, and deeply pinnatifid. Segments linear-oblong, subfalcate, obtuse or slightly acute, and serrated, the lowest pair sometimes pinnatifid. Sori from 10 to 16 on a segment, seated close to the costa, which is partially concealed by the light brown scales at the base of the receptacles.

5. ALSOPHILA LUNULATA, *R. Br.?* (Tab. 39.)

A. arborescens; *stipitibus crassis rhachibusque asperis; frondibus amplis*

subcoriaceis glabris bipinnatis; pinnulis sessilibus oblongo-lanceolatis caudato-acuminatis basi pinnatis apice serratis, segmentis lineari-oblongis falcatis subacutis serratis, sterilibus biserratis; rhachi supra tomentosa; costis subtus bullato-squamosis; venis prominulis furcatis parce setosis; soris plurimis costæ quam margini proximis squamæ destitutis; pilis articulatis inter sporangia.

Alsophila lunulata, R. Br. Prodr. Fl. Nov. Holl. p. 158 (adnot.)?; Hook. Spec. Fil. 1, p. 51.?

Polypodium lunulatum, Forst. ex Sw. Syn. Fil. p. 40 & 235.?

HAB. Samoan and Feejee Islands: in low, marshy places. Also Bay of Islands, New Zealand.

Trunk *arborescent*, from 15 to 20 feet high, very stout and quite straight; the stipes fall off and leave numerous oblong, whitish, smooth cicatrices, the surface between which is covered with a thick coating of long, slender, pale, chaffy scales, mixed with black, wiry roots; the whole crowned by numerous, large, and *spreading*, elegant, *smooth*, somewhat coriaceous, bipinnate fronds; the stipes, together with the primary and secondary *rhachis*, *roughened* with numerous, hard, raised points. *Pinnules sessile*, oblong-lanceolate, with a caudate-acuminate, serrate point. *Segments linear-oblong, falcate, somewhat acute, serrate*, in the sterile ones biserrate. *Rhachis tomentose above*, while the *costa beneath* is furnished with *pale bullate scales*. The veins are *prominent, sparsely setose*, and once or twice forked. *Sori numerous*, seated nearer to the costa than the margin, and *destitute of a scale at the base*. *Sporangia mixed with jointed hairs*.

Independent of the cicatrized trunk, the narrow and setaceous points of the pinnules distinguish this species from all others of the Pacific Islands, with which we are acquainted. Perhaps that to which it approaches the nearest is the *A. caudata* of J. Smith, who surmised that his plant might not be different from the *A. lunulata* of R. Brown, concerning which very little appears to be known. We therefore venture to give a figure of what we have doubtfully assumed to be Mr. Brown's plant, and the *Polypodium lunulatum* of Forster.

PLATE 39.—Fig. 1. Portion of a frond, of the natural size. 1 a.

Dorsal view of a portion of the main rhachis. 1 *b*. Dorsal view of a small portion of the frond. 1 *c, c*. Hairs from veins on the under side. 1 *d*. Scales from the under side of the costa. 1 *e*. Vertical section of a sorus. 1 *f*. Hairs from the receptacle. 1 *g*. Sporangium.—The dissections more or less magnified.

6. ALSOPHILA SAMOENSIS, Sp. Nov. (Tab. 40.)

A. arborescens, inermis; stipitibus cum rhachi communi supra fulvo-tomentosis; frondibus glabris fere membranaceis bipinnatis; pinnulis sessilibus elongato-lanceolatis vix acuminatis pinnatifidis, segmentis oblongis obtusis subfalcatis serratis; rhachibus partialibus cum costa venisque (tenuibus furcatis supra setosis) subtus bullato-squamosis; soris paucis infra-axillaribus costæ plusquam margini proximis; receptaculo columnari squama lacera stipato; pilis clavatis inter sporangia.

HAB. Samoan Islands.

Plant *arborescent* and *destitute of prickles*. *Stipes and main rhachis above* furnished with a short and *tawny tomentum*. *Fronds* rather flaccid, *smooth, submembranaceous, bipinnate*; the primary divisions rather distant and spreading. *Pinnules sessile, elongated-lanceolate*, with a *slightly acuminated serrate point*, deeply *pinnatifid* at the base, while towards the point they are less so. *Segments oblong, obtuse*, very slightly falcate and serrated, beset with *bullate scales on the costa and veins beneath*; the rhachis of the pinnæ and pinnules furnished above with *setose hairs*. *Veins slender*, and most prominent on the under side, usually only once forked. *Sori few and small*, from 4 to 8 on a segment, seated on the veins immediately below the fork, and *closer to the costa than the margin*. *Receptacle columnar*, furnished with a small *lacerated scale* at its base. *Sporangia mixed with articulated, clavate hairs*.

PLATE 40.—Fig. 1. Portion of a frond, of the natural size. 1 *a*. Small portion of the frond, seen from below. 1 *b*. Small portion of the costa of a pinnule, seen from above. 1 *c*. Hairs from the costa. 1 *d*. Hairs from veins on the under side. 1 *e*. Receptacle. 1 *f*.

Scale from the base of the receptacle. 1 *g*. Hairs from the receptacle. 1 *h*, *h*, *h*. Sporangia. 1 *i*. Sporules.—The dissections more or less magnified.

7. ALSOPHILA TAHITENSIS, Sp. Nov. (Tab. 40.)

A. frondibus bipinnatis; pinnulis parvis sessilibus glabris oblongo-lanceolatis profunde pinnatifidis, segmentis oblongis obtusis crenulatis; rhachi communi flexuosa partialibusque supra rufo-tomentosis; costa subtus bullato-squamosa; venis simplicibus vel furcatis; soris costæ proximis basi indusio semicalyciformi membranaceo lacero intus stipatis; receptaculo subgloboso; pilis inter sporangia nullis.

HAB. Tahiti, Society Islands.

Fronde bipinnate, apparently unarmed, having a rusty appearance; the *divisions small and crowded*. *Pinnules sessile, smooth*, usually from one to 1½ inches long and 3 to 4 lines broad, *oblong-lanceolate, pinnatifid* almost to the rhachis. *Segments* scarcely 2 lines long and not quite a line broad, *oblong, obtuse, crenulate*. *Primary rhachis flexuose*, shrinking in drying, and, together with the secondary, *rufous-tomentose above*; the *costa beneath* furnished with lacerated, *rusty, bullate scales*. Veins thick, those nearest the base of the segments only are forked. *Sori* copious, crowded, seated *near the costa*, on the veins below the forkings, on a *subglobose receptacle*, having at its base on the inner side a *membranaceous, semicalyciform indusium*, the margin of which is lacerated; in a recent state it nearly covers the sorus.

We unfortunately possess only the summit of a frond of this very interesting species, whose calyciform indusium points to its affinity with *Hemitelia*, R. Brown; but with which its habit and venation do not at all agree.

PLATE 40.—Fig. 2. Portion of a frond, of the natural size. 2 *a*. Smaller portion of a frond, as seen from beneath. 2 *b*. Scale from under side of the costa. 2 *c*. Indusium. 2 *d*. Vertical section of a sorus. 2 *e*, *e*. Sporangia.—The dissections all more or less magnified.

8. ALSOPHILA TRUNCATA, Sp. Nov. (Tab. 41.)

A. arborescens; stipitibus rhachique communi subteretibus furfuraceis muricatis; frondibus tripinnatis coriaceis; pinnis oblongo-lanceolatis; pinnulis breviter petiolulatis linearibus obtusis basi truncatis margine reflexo repando-crenatis; rhachibus partialibus costisque subtus squamosis; venis plerumque furcatis; soris axillaribus 8-10 in quaque pinnula inter costam et marginem æquidistantibus; receptaculo vix elevato piloso.

HAB. Feejee and Samoan Islands: in mountain forests; rare.

Plant *arborescent*. *Stipe* firm and *nearly round*, and, together with the main and *rhachis* of the primary pinnæ, *muricated*; the surface beneath its dull brown and *furfuraceous* coating is glossy, as if varnished, and of a reddish-brown colour. *Fronde* large, *tripinnate*, *coriaceous*. Primary and secondary pinnæ *oblong-lanceolate*, acuminate or somewhat acute. *Pinnules* not over 3 or 4 lines in length, and scarcely a line broad, seated on a *very short petiole*, *linear*, with an obtuse point and a *truncated base*, the *reflexed margin repand-crenate*. Secondary rhachis furnished beneath with lacerated scales, while the costa of the pinnules beneath is beset with small bullate scales. *Veins forked*, seldom simple. *Sori* about *equidistant* between the costa and margin, on the forking of the veins, and without any evident scale at the base of the *slightly elevated hairy receptacle*.

PLATE 41.—Fig. 1. Portion of a frond, of the natural size. 1 *a*. A small portion of the frond, seen from beneath. 1 *b*. Scale from the rhachis. 1 *c, c*. Sporangia.—The dissections more or less magnified.

9. ALSOPHILA DECURRENS, Hook.

Alsophila decurrens, Hook. Spec. Fil. 1, p. 51.

HAB. Samoan Islands; frequent.

Trunk short and thick, from 2 to 4 feet high, having the base of the old stipes still attached. Fronds large and rather flaccid, tripinnate. The inferior pinnæ are small and distant, with the main and secondary rhachis slender. The ultimate divisions small, beset with white bullate scales beneath, and sparse hairs on the veins on the upper side. Sori small and copious, one on each segment, near its base, destitute of a scale. There are a few hairs on the somewhat elevated receptacle.

85. TRICHOPTERIS, *Presl.*

1. TRICHOPTERIS EXCELSA, *Presl.*

Trichopteris excelsa, Presl, Tent. Pterid. p. 59, t. 1, f. 10; Hook. Gen. Fil. t. 34.
Polypodium Tænitis, Roth, ex Kaulf. Enum. Fil. p. 119.
P. Corcovadense, Raddi, Plant. Brasil. 1, p. 26, t. 40.
Alsophila Tænitis, Hook. Spec. Fil. 1, p. 35.

HAB. On the Corcovado, Rio Janeiro, Brazil.

DIV. II. GLEICHENIACEÆ, R. BR.

86. GLEICHENIA, Willd., Presl.

(CALYMELLA, Presl.)

1. GLEICHENIA RUPESTRIS, R. Br.

Gleichenia rupestris, R. Br. Prodr. Fl. Nov. Holl. p. 160; Hook. Spec. Fil. 1, p. 2, t. 1, B.

HAB. New South Wales, at Elizabeth Bay, Port Jackson: among rocks in shady situations; frequent.

2. GLEICHENIA HECISTOPHYLLA, A. Cunn.

Gleichenia hecistophylla, A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 361; Hook. Spec. Fil. 1, p. 4, t. 2, B.

HAB. Vicinity of the Bay of Islands, New Zealand: in open, hilly lands.

This is very closely related indeed to the *G. semivestita* of Labillardiere, as represented in Hooker's Species Filicum; and we doubt much whether the slight difference there shown, would justify their being retained as distinct species.

3. GLEICHENIA VULCANICA, Blume.

Gleichenia vulcanica, Blume, Enum. Plant. Jav. 2, p. 251; Hook. Spec. Fil. 1, p. 4.

HAB. Mount Ophir, Malacca.

A very small specimen of this was received by the Expedition, from Mr. Balestier, United States Consul at Singapore. The specimen is without fructification, and otherwise not in a very good condition to determine whether it is specifically distinct from *G. semi-vestita*, Labill., to which Mr. John Smith, in his *Enumeratio Filicum Philippinarum*, has referred it. The form of the pinnules and segments is certainly much the same; but the common rachis in our plant is densely covered on both sides with brown and slender paleæ.

87. MERTENSIA, Willd., Presl.

(GLEICHENIÆ, Spec. R. Br. & Auct.)

* *Stipes simplex: frondes bipinnatæ; pinnulis pinnatifidis.*

1. MERTENSIA GLAUCA, Sw.?

Mertensia glauca, Sw. Syn. Fil. p. 164 & 390?
Gleichenia glauca, Hook. Spec. Fil. 1, p. 4, t. 3, B.

HAB. Oahu, Sandwich Islands; at the elevation of 1,500 feet.

The figure in Hooker's *Species Filicum* accurately depicts a very marked character in this species, namely, the incised inferior pair of segments, which present a crested appearance close along the rachis.

2. MERTENSIA GLABRA, Sp. Nov.

M. stipite elongato lævi cum rhachi antice plano leviter marginato; frondibus glabris coriaceis bipinnatis; pinnis amplis oppositis divaricatis; pinnulis alternis petiolulatis lineari-lanceolatis acuminatis pinnatipartitis, segmentis lineari-oblongis obtusis integerrimis subtus subglaucis; venis furcatis; sporangiis ternis vel quaternis.

HAB. Sandwich Islands; on mountains of Kauai and Hawaii; at the elevation of 1,000 to 1,500 feet.

Stipe smooth, together with the rhachis, flat above, slightly margined. Fronds glabrous, coriaceous, bipinnate, and (with the stipes) 6 to 8 feet high. Pinnæ large, 3 to 4 feet long, by 20 inches broad, opposite, spreading at right angles to the rhachis. Pinnules alternate, seated on a short petiole, linear-lanceolate, acuminate, deeply pinnatifid. Segments linear-oblong, entire, somewhat glaucous beneath, and having forked veins. Sporangia 3 or 4 in a sorus.

The habit of this species is very much that of the preceding; from which it differs principally in its fronds being much larger, and not so glaucous beneath, in the longer pinnules, seated on a short footstalk, and in the absence of the crested appendages. Like that species, it forms dense and almost impenetrable thickets along the slopes of the ridges which jut off from the higher mountain ranges of the Sandwich Islands; reminding us very much of the entangled masses of *Pteris esculenta*, at New Zealand.

* * *Frondes di-trichotomæ, divisionibus pinnatis, segmentis in stipitem furcatum decurrentibus.*

3. MERTENSIA FLABELLATA, Presl.

Mertensia flabellata, Presl, Tent. Pterid. p. 51.

Gleichenia flabellata, R. Br. Prodr. Fl. Nov. Holl. p. 161; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 361; Hook. Spec. Fil. 1, p. 6.

HAB. Vicinity of Port Jackson, New South Wales. Bay of Islands, New Zealand.

The tips of the branches are not so caudate in the New Zealand plant as in that from New South Wales. In the latter, also, the rhachis is slightly pubescent.

4. MERTENSIA ACUTIFOLIA.

Gleichenia acutifolia, Hook. Spec. Fil. 1, p. 7, t. 8, A, opt.

HAB. Orange Harbour, Tierra del Fuego.

5. *MERTENSIA FLAGELLARIS*, Bory.

Mertensia flagellaris, Bory, in Willd. Spec. Pl. 5, p. 74.
Gleichenia flagellaris, Hook. Spec. Fil. 1, p. 10.

HAB. Ovolau, Feejee Islands.

This is very evidently the plant described by Willdenow and Sir William Hooker. There are a few sporangia on one of our specimens, generally 3 or 4 in a cluster.

6. *MERTENSIA SUBFLABELLATA*, Sp. Nov.

M. stipite gracili tereti glabro basi paleaceo; frondibus ter dichotomis subflabelliformibus; pinnis linearibus acuminatis pinnatipartitis apice integris, segmentis alternis triangulari-ovatis subtus glaucis margine revolutis; costa subtus paleis membranaceis elongatis fimbriata supra pilis gracilibus crinita; venis furcatis; sporangiis binis quaternisve majusculis.

HAB. On the Organ Mountains, Brazil.

Whole plant from 10 to 15 inches high. *Stipe slender, smooth, and terete, chaffy* with narrow and rigid ciliated scales at the base. *Fronde* never more than thrice branched; the *pinnæ* ascending, linear, acuminate, deeply pinnatifid, with an entire point of about half an inch in length. *Segments* short, alternate, triangular-ovate, with revolute margins, very glaucous underneath; the *costa* beneath partially concealed by long and brown, fimbriated, chaffy scales, above beset with tufts of long and weak, whitish hairs. *Sporangia* large, 2 to 4 in a cluster.

This is evidently related to *Gleichenia revoluta*, H. B. K. But it differs in the absence of a central main rhachis or stipe to the frond, which is only three times branched; the branches terminating in an entire point.

7. MERTENSIA VESTITA.

Gleichenia vestita, Blume, Enum. Pl. Jav. 2, p. 249? Hook. Spec. Fil. 1, p. 10?

HAB. Mount Majajjai, Luzon, Philippine Islands.

No little difficulty is experienced in identifying species of this genus, particularly when the specific character is drawn up in such brief terms as is that of the present one by Blume; yet it embraces most of the essential characteristics of our plant, which is so closely related to *Gleichenia revoluta*, H. B. K. and of Hooker's *Species Filicum*, as to differ only in its more acuminate branches, and half-lanceolate segments: the fimbriated paleæ on the rhachis are present in both; but they are perhaps a little more crowded in the present plant.

8. MERTENSIA HAWAIIENSIS.

Gleichenia Owhyhensis, Hook. Spec. Fil. 1, p. 9.

HAB. Sandwich Islands: in forests; rather rare.

This is a very distinct and handsome species, allied, according to Sir William Hooker, to his *Gleichenia longipinnata*, "especially in the hairy rhachis."

9. MERTENSIA BIFIDA, Willd.

Mertensia bifida, Willd. Spec. Pl. 5, p. 73; Sw. Syn. Fil. p. 164.

HAB. Vicinity of Rio Janeiro, Brazil.

In the height, division of its fronds, and direction and breadth of the branches, the present species very nearly approaches the preceding; but differs in its narrower and more distant segments,

with their points truncate or emarginate, the slight pubescence beneath of a lighter colour. Sir William Hooker refers this to the *M. pubescens* of Willdenow; but we view the two plants, as truly distinct species.

10. *MERTENSIA PUBESCENS*, Willd.

Mertensia pubescens, Willd. Spec. Pl. 5, p. 73.

Gleichenia pubescens, Hook. Spec. Fil. 1, p. 8, pro parte.

HAB. Organ Mountains, Brazil.

We consider this as distinct from the preceding species, on account of its narrower branches, the inferior ones more spreading; the shorter and less horizontal segments beset underneath with a dense and rusty coating of a cobwebby substance; and, moreover, the paleæ on the stipe and rhachis are of a more membranaceous or scarios texture. The *M. immersa* of Kaulfuss, as figured in Hooker and Greville's *Icones Filicum*, somewhat represents our plant; but it has broader and more lanceolate branches.

* * * *Stipes dichotomus, divisionibus nudis flexuosis; pinnis unijugis.*

11. *MERTENSIA GLAUDESCENS*, Willd.

Mertensia glaucescens, Willd. Spec. Pl. 5, p. 72.

M. emarginata, Raddi, Plant. Brasil. 1, p. 72, t. 6.

M. Brasiliana, Gaud. Bot. Freyc. Voy. p. 301.

Gleichenia Hermannii, Hook. & Grev. Ic. Fil. t. 14, excl. syn.

G. glaucescens, Hook. Spec. Fil. 1, p. 11.

HAB. Organ Mountains, Brazil.

The glaucous surface of the pinnæ underneath is partially concealed by a ferruginous and cobwebby down: the points of the segments are almost always emarginate. Sporangia from 8 to 10 in a cluster.

* * * * *Stipes repitito-di-trichotomus*; pinnis bijugis, pari infimo minori e basi dichotomorum, segmentis haud decurrentibus.

12. MERTENSIA DICHOTOMA, Willd.

Mertensia dichotoma, Willd. Spec. Pl. 5, p. 71; Sw. Syn. Fil. p. 163; Gaud. Bot.

Freye. Voy. p. 301.

Gleichenia Hermannii, R. Br. Prodr. Fl. Nov. Holl. p. 161.

G. dichotoma, Hook. Spec. Fil. 1, p. 12.

HAB. Feejee Islands. Tahiti, Society Islands. Sandwich Islands. Singapore.

Several forms of this species occur in the herbarium of the Expedition. In one from Tahiti, the pinnæ terminate in a caudate entire point, from 2 to 3 inches in length; and the segments are a little falcate, and longer than in any other form. The plants from New Zealand, the Feejee Islands, and the single specimen from Tahiti are very much alike: they are slender in their habit, the pinnæ very glaucous beneath, and the segments rather short. In the Sandwich Island form, the branches are short and broad-lanceolate, with emarginate segments, slightly glaucous and glabrous beneath.

13. MERTENSIA KLOTZSCHII.

Gleichenia Klotzschii, Hook. Spec. Fil. 1, p. 13, t. 5, B.

HAB. Vicinity of Rio Janeiro, Brazil.

So closely does this resemble some of the forms of the preceding, that it scarcely merits to rank as a distinct species; differing only in the upper side of the pinnæ being of a more livid green, and in the presence on the under surface of ferrugineous entangled hairs.

14. MERTENSIA EMARGINATA, Sp. Nov. (Tab. 42.)

M. stipite lævi tereti di-trichotomo, divisionibus ultimis unijugis cum

jugo minore deflexo infra furcationem, axillis gemmiparis; pinnis oblongo-lanceolatis subfalcatis rigidis pinnatipartitis, segmentis approximatis linearibus emarginatis margine revolutis supra nitidis subtus rhachique rufo-tomentosis; soris e sporangiis 8-12 conflatis in lanam nidulantibus.

HAB. Sandwich Islands; Hawaii: on open mountain ridges.

Plant from 8 to 10 feet in height, forming dense, entangled masses. First and second divisions of the *round and smooth stipe trichotomous*, the others *dichotomous*; the *ultimate branches* bearing a pair of very *rigid, oblong-lanceolate, subfalcate pinnæ*, which are *pinnatifid* to the rhachis: *segments approximate, linear*, constantly and distinctly *emarginate*, and, together with the rhachis *beneath, tomentose* with a dense coating of a fine rusty and woolly substance, which extends to the forkings of the stipe. The pair of pinnæ immediately below the di-trichotomous divisions are from 4 to 6 inches long, of a broad-lanceolate form, and somewhat acuminate at the point. *Buds in the forks* of the branches, enclosed by two foliaceous auriculated lobes. Veins pinnately forked, most prominent on the upper surface. *Sori nearly concealed by the dense wool*, only a few of the *sporangia* showing themselves; these are from 8 to 12 *in a cluster*, seated on the lower exterior venule.

The habit of this species, though more robust, is somewhat similar to the preceding; but the very rigid consistence of the pinnæ, the strongly marked emarginate segments, the dense coating of brown wool beneath, and the inferior pair of pinnæ arising from the stipe immediately below the forkings of the branches (not from the base of the branches themselves, as in that species), are sufficient marks by which the two may be distinguished.

PLATE 42.—Fig. 1. Portion of a frond, of the natural size. 1 *a*. A portion of a segment as viewed from beneath, with part of the wool removed, to show the venation and sori. 1 *b*. Sporangia.—Dissections more or less magnified.

DIV. III. SCHIZÆACEÆ, MART.

88. LYGODIUM, Sw.

(HYDROGLOSSUM, Willd.)

1. LYGODIUM MICROPHYLLUM, R. Br.

Lygodium microphyllum, R. Br. Prodr. Fl. Nov. Holl. p. 162; Blume, Enum. Pl. Jav. 2, p. 253.

Hydroglossum scandens, Willd. Spec. Pl. 5, p. 77.

HAB. Singapore: in cleared lands, climbing over low bushes.

Fronds glabrous, conjugate-pinnate. Sterile pinnæ oblong-lanceolate, obtuse, entire, subcordate at the base, about an inch long and 4 lines broad, articulated with the petiole, the margin finely serrated. Fertile pinnæ oblong-ovate, truncate or subcordate at the base, 8 to 10 lines long, and 4 to 6 lines broad.

2. LYGODIUM CIRCINATUM, Sw.

Lygodium circinatum, Sw. Syn. Fil. p. 153; Kaulf. Enum. Fil. p. 46; Blume, Enum. Pl. Jav. 2, p. 253.

Hydroglossum circinatum, Willd. Spec. Pl. 5, p. 83.

HAB. Mountains near Baños, Luzon, Philippine Islands.

Fronds smooth, either conjugate, binate, or ternate-palmate; the segments or lobes elongated-lanceolate, entire, and not articulated at the base.

3. LYGODIUM ARTICULATUM, *A. Rich.*

Lygodium articulatum, A. Rich. Bot. Voy. Astrol. p. 96, t. 15; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 362.

HAB. Vicinity of the Bay of Islands, New Zealand: in thickets.

This is one of the most distinct and remarkable species of the genus, and is admirably characterized by A. Richard, in his Botany of the Voyage of the Astrolabe. In the neighbourhood of the Bay of Islands the plant occurs very frequently along the margins of forests, where its tough, wiry, and climbing stems entangle the low bushes and trees, making a passage among them very difficult.

4. LYGODIUM VOLUBILE, *Sw.*

Lygodium volubile, Sw. Syn. Fil. p. 152.
Hydroglossum volubile, Willd. Spec. Pl. 5, p. 78; Raddi, Plant. Brasil. 1, p. 68, t. 81
Ophioglossum scandens, Velloz. Fl. Flum. 11, t. 53.

HAB. Rio Janeiro, and Organ Mountains, Brazil.

In the base of the pinnæ of this species a vast variety of forms present themselves, it being either cuneate, subrotund, truncate, cordate, or auriculate-hastate, and articulated with the petiole; the surface is more or less pubescent according to the nature of the locality, and even on the same individual specimens are found which vary in this respect. The figure given by Raddi, represents the most common form. Perhaps the *L. lucens* and *L. hirtum* of Kaulfuss ought to be referred hither.

5. LYGODIUM PUBESCENS, *Kaulf.*

Lygodium pubescens, Kaulf. Enum. Fil. p. 47.
L. tenue, Blume, Enum. Pl. Jav. 2, p. 254?

HAB. Mount Majajai, and near Baños, Luzon, Philippine Islands.

The *L. tenue* of Blume does not appear to be more than a variety of the present species.

89. LYGODICTYON, *J. Sm.*

(LYGODII Spec. Schk. HYDROGLOSSI Spec. Willd.)

The single species on which Mr. J. Smith has founded the present genus, is distinguished from true *Lygodium* by its reticulated venation, and by the petiole of the sterile pinnæ being articulated. The latter character we find to extend to the fertile pinnæ also; and the articulation is not confined to this plant alone, but is very evident also in several species having free veins, such as *Lygodium articulatum*, A. Richard, and *L. volubile*, Swartz, &c. Therefore *Lygodictyon*, if retained as a genus, must rest exclusively upon the reticulated venation.

1. LYGODICTYON SCHKUHRII, *J. Sm.*

Lygodictyon Schkuhrii, *J. Sm.* in *Lond. Jour. Bot.* 2, p. 383.

L. Forsteri, *Hook. Gen. Fil.* t. 111, f. B.

Lygodium reticulatum, *Schk. Crypt.* t. 139.

Hydroglossum polycarpum, *Willd. Spec. Pl.* 5, p. 79.

HAB. Tahiti, Society Islands. Feejee Islands; where it is of frequent occurrence.

90. SCHIZÆA, *Sw.*

1. SCHIZÆA PECTINATA, *Sw.*

Schizæa pectinata, *Sw. Syn. Fil.* p. 150; *Willd. Spec. Pl.* 5, p. 85; *Kaulf. Enum.*

Fil. p. 49.

HAB. Vicinity of Cape Town, Cape of Good Hope.

The fronds are glabrous, about 8 inches high, simple, linear-filiform, compressed and channelled. Fertile appendages recurved, pinnate. Pinnæ pectinate, about 12 to 15 pairs; the margin of the indusium ciliate.

2. SCHIZÆA PROPINQUA, A. Cunn.

Schizæa propinqua, A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 362.

HAB. Vicinity of the Bay of Islands, New Zealand; frequent in high, open lands.

Rootstock subterranean; the fronds undivided, and from 10 to 15 inches high, terete, and filiform, with a single groove on the back. Fertile appendages about an inch long, nearly erect, pinnate. Pinnæ from 18 to 25 pairs. Indusium lacerated.

3. SCHIZÆA AUSTRALIS, Gaud.

S. frondibus fasciculatis cæspitosis simplicissimis flexuosis linearibus compressis postice sulcatis antice ocellato-notatis; appendicibus fertilibus suberectis pinnatis, pinnis 5-7-jugis palmato-lobatis.

Schizæa australis, Gaud. Bot. Freyc. Voy. p. 296; Hook. f. Fl. Antarc. 1, p. 111.
S. palmata, Montagne, Bot. Voy. Astrol. & Zelee (1844), t. 4, f. Z, sine descr.

HAB. Sandwich Islands. Tahiti, Society Islands: on trees, at an elevation of 3,000 feet.

Fronde tufted, from 10 to 15 in number, and 4 to 8 inches high, arising from a thick globose rootstock, narrow-linear, rigid, somewhat flexuose, compressed, smooth, with a single groove behind, and two opposite slightly depressed lines of ovate spots in front, the margins of which are sometimes ciliate. Fertile appendages nearly erect, not quite half an inch in length, pinnate, and of a deep brown colour. Pinnæ from 5 to 7 pairs, their slightly reflexed indusiiform margin divided into palmate lobes.

There can be little doubt about this being the *S. australis* of Gaudichaud; and that it is the *S. palmata* of Montagne, we also are satisfied from the figure in the Botany of the Astrolabe and Zelee, where it is said to be a native of Lord Auckland's Islands. From both of these our plant seems to differ only in the fronds being a little longer: a difference which the greater warmth of the climate, compared with that of the Auckland or Falkland groups, may sufficiently account for.

4. SCHIZÆA BIFIDA, Sw.

Schizæa bifida, Sw. Syn. Fil. p. 151; Willd. Spec. Pl. 5, p. 87; R. Br. Prodr. Fl. Nov. Holl. p. 162; A. Rich. Bot. Voy. Astrol. p. 95; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 362.

HAB. Port Jackson, New South Wales. Vicinity of the Bay of Islands, New Zealand.

Among the specimens from New South Wales we find instances of simple, bifid, trifid, and even quadrifid fronds. Those from New Zealand are almost always bifid.

5. SCHIZÆA DICHOTOMA, Sw.

Schizæa dichotoma, Sw. Syn. Fil. p. 150; Willd. Spec. Pl. 5, p. 87; R. Br. Prodr. Fl. Nov. Holl. p. 162; Blume, Enum. Pl. Jav. 2, p. 255; Hook. & Grev. Ic. Fil. t. 17; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 362; Hook. Gen. Fil. t. 19.

HAB. Feejee Islands; frequent in barren districts.

Rootstock creeping under ground, about the thickness of a crow-quill, pilose, and of a dark brown colour, with very few fibrils. Fronds 8 to 12 inches long, erect, somewhat flabelliform, repeatedly dichotomous. Branches narrow-linear, compressed, with a strong costa and a thick marginal nerve, which is a little rough to the touch. Fertile appendages slightly curved backwards, 4 to 6 lines long, pinnate. Pinnæ 18 to 20 pairs, sometimes bifid; their costa and indusiiform margin pilose.

6. SCHIZÆA CRISTATA, Willd.

Schizæa cristata, Willd. Spec. Pl. 5, p. 88.

HAB. Tahiti, Society Islands. Feejee Islands.

Related to the preceding species in habit; but altogether a much handsomer species. Fronds repeatedly dichotomous, and flabelliform in circumscription; the segments linear, compressed, slightly scabrous, attenuated at the point, with a prominent midrib. Fertile appendages small, suberect, with 4 or 5 pairs of pinnæ, having an indusiiform crinite margin.

91. ACTINOSTACHYS, Wall.

(SCHIZÆÆ Spec. Sw., Schk.)

The genus *Actinostachys*, as here adopted, differs from true *Schizæa* in the fertile appendages being digitate, and in the quadriserial disposition of its sporangia, that is, they are arranged in two rows on both sides of the costa of the segments.

1. ACTINOSTACHYS DIGITATA, J. Sm.

Actinostachys digitata, J. Sm. in Lond. Jour. Bot. 2, p. 385.

Schizæa digitata, Sw. Syn. Fil. p. 150 & 380, t. 4, f. 1; Willd. Spec. Pl. 5, p. 87;
Blume, Enum. Pl. Jav. 2, p. 255.

HAB. Feejee Islands. Mountains near Baños, Luzon, Philippine Islands.

This has a habit similar to that of *Schizæa trilateralis* of Schkuhr, and might readily be mistaken for it, but for the broader fronds, the more erect fertile appendages, and the entire absence of the chaffy hairs, intermingled with the sporangia in that species.

92. ANEMIA, *Sw.*1. ANEMIA MANDIOCANA, *Raddi.*

Anemia Mandiocana, Raddi, Plant. Brasil. 1, p. 70, t. 9, f. 1; Gaud. Bot. Freyc. Voy. p. 295.

HAB. Vicinity of Rio Janeiro, Brazil; frequent in dry and thinly wooded places.

Some of our specimens exhibit only a single fertile panicle on a frond; but the absence of the second one may have resulted from an injury sustained when young.

2. ANEMIA COLLINA, *Raddi.*

Anemia collina, Raddi, Plant. Brasil. 1, p. 71, t. 12; Gaud. Bot. Freyc. Voy. p. 295.

HAB. On the Corcovado, near Rio Janeiro, Brazil.

This species is closely related to *A. hirta*, Swartz: the sterile part of the frond, however, is narrower and more elongated; the pinnæ approach more to a dimidiate form, and are cuncate at the base. Stipe and rhachis covered with yellowish-brown woolly hairs.

3. ANEMIA RADICANS, var. β ., *Raddi.*

Anemia radicans, var. β ., Raddi, Plant. Brasil. 1, p. 70, t. 11.

HAB. Vicinity of Rio Janeiro, Brazil.

Raddi considers this as only a variety of his *A. radicans*, the difference consisting in the pinnæ being more distant, fewer in number, and more rounded at the point. Both possess a singular mode of reproduction; the rhachis of the sterile segment becoming lengthened beyond the pinnæ into a long and slender, naked, deflexed, tail-like point, developing a bud at its extremity, which, by rooting in the ground, soon gives rise to a new plant.

4. ANEMIA REPENS, *Raddi*.

Anemia repens, Raddi, Plant. Brasil. 1, p. 71, t. 9, f. a, 2; Gaud. Bot. Freyc. Voy. p. 295.

HAB. On the Corcovado, Rio Janeiro, Brazil: on exposed and gravelly banks.

Plant about 8 inches high. Rootstock thick and creeping, rufous-tomentose. Stipe semiterete, sulcate in front, and hairy. Sterile fronds and segments pinnate. Pinnæ oblong, obtuse, cuneate at the base, incisely dentate, villose on both sides. Panicle (with its peduncle) twice the length of the sterile segment.

5. ANEMIA FLEXUOSA, *Sw.?*

Anemia flexuosa, Sw. Syn. Fil. p. 156? Willd. Spec. Pl. 5, p. 93? Raddi, Plant. Brasil. 1, p. 71, t. 13; Gaud. Bot. Freyc. Voy. p. 295.

HAB. Botofogo, vicinity of Rio Janeiro, and Organ Mountains, Brazil.

Sterile fronds and sterile segments of the fertile ones pinnate, of a triangular-oblong form, and pubescent on both sides. Pinnæ elongated-oblong, obtuse, incisely-pinnatifid; the inferior ones nearly opposite; the superior alternate. Segments oblong, obtuse, dentate. Fertile panicles (with their peduncles) scarcely longer than the sterile segment.—This is evidently the *A. flexuosa* of Raddi; but we are not so certain that it is the original *A. flexuosa* of Swartz and Willdenow, their description being so brief.

93. ANEMIDICTYON, *J. Sm.*

(ANEMIÆ Spec. Sw. & Auct.)

The reticulated venation of *Anemidictyon* is the only character which distinguishes it from *Anemia*.

1. ANEMIDICTYON PHYLLITIDIS, *J. Sm.*

Anemidictyon Phyllitidis, *J. Sm.* in *Hook. Gen. Fil.* t. 103.

Anemia Phyllitidis, *Sw. Syn. Fil.* p. 155; *Kaulf. Enum. Fil.* p. 51.

A. longifolia, *Raddi, Plant. Brasil.* 1, p. 69, t. 8.

HAB. Vicinity of Rio Janeiro, Brazil; frequent.

This is an old and well-known species, gathered by almost all botanical collectors who have visited Rio.

2. ANEMIDICTYON FRAXINIFOLIA, *J. Sm.*

Anemidictyon fraxinifolia, *J. Sm.* in *Lond. Jour. Bot.* 2, p. 387.

Anemia fraxinifolia, *Raddi, Plant. Brasil.* 1, p. 69, t. 8, bis; *Gaud. Bot. Freyc. Voy.* p. 294.

HAB. Vicinity of Rio Janeiro, Brazil.

Scarcely distinct from the preceding species; the difference between the two, consisting principally in the shorter and broader pinnæ of the present species, with a greater tendency to be opposite in their arrangement, and ovate-lanceolate in form; the base not quite so wedge-shaped; the margin unequally dentate; and the stipe and rachis less hairy.

94. MOHRIA, *Sw.*

(OSMUNDÆ *Spec. Lam.* ADIANTI *Spec. Linn.*)

1. MOHRIA THURIFRAGA, *Sw.*

Mohria thurifraga, *Sw. Syn. Fil.* p. 159 & 385, t. 5; *Willd. Spec. Pl.* 5, p. 76; *Kaulf. Enum. Fil.* p. 44; *Hook. Gen. Fil.* t. 104, B.

HAB. Table Mountain, Cape of Good Hope.

DIV. IV. OSMUNDACEÆ, MART.

95. OSMUNDA, *Linn.*

1. OSMUNDA SPECTABILIS, var. β . BRASILIENSIS, *Hook. & Grev.*

Osmunda spectabilis, var. β . *Brasiliensis*, Hook. Bot. Misc. 3, p. 230.

HAB. In marshes, at the base of the Organ Mountains, Brazil.

96. TODEA, *Willd.*

1. TODEA AFRICANA, *Willd.*

Todea Africana, Willd. Spec. Pl. 5, p. 76; Sw. Syn. Fil. p. 162 & 388; Hook. Bot. Misc. 3, p. 231; Hook. Gen. Fil. t. 46, B.

HAB. Cape of Good Hope. Port Jackson, New South Wales.

In the Australian plant the pinnules are longer and narrower than in that of the Cape of Good Hope.

2. TODEA HYMENOPHYLLOIDES, *A. Rich.*

Todea hymenophylloides, A. Rich. Bot. Voy. Astrol. p. 97, t. 16.

T. pellucida, Carnichael, in Hook. Bot. Misc. 3, p. 232; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 362; Hook. Ic. Pl. I. t. 8.

HAB. Vicinity of the Bay of Islands, New Zealand; frequent in shady, wet forests.

3. *TODEA WILKESIANA*, Sp. Nov. (Tab. 43.)

T. caudice erecto; stipitibus levibus semiteretibus antice sulcatis; frondibus membranaceis glabris bipinnatis; pinnis sessilibus oblongo-lanceolatis, inferioribus deflexis; rhachibus pilosis alatis; pinnulis oblongis obtusis dentatis basi oblique cuneatis pellucido-punctatis.

HAB. Ovolau, Feejee Islands: in humid mountain forests; rare.

Trunk erect, 18 or 20 inches high, 1½ inches in diameter, squamose towards the apex, and furnished near the base with strong, black, and wiry roots, about the thickness of a crowquill; the surface roughened by the raised scars of fronds that have fallen off; these are arranged in a somewhat whorled manner, the scars of every third whorl being less elevated than the intermediate ones, giving to the trunk a winged appearance: the trunk, within the outer rind, is composed of numerous hard, oval rings, diminishing in size towards a central, pithy, circular column, and lined with a whitish pithy plate, the space between these oval rings being filled up with brown parenchymatous tissue: the summit crowned by 10 to 12 spreading fronds. *Stipes smooth, half-round, sulcate in front*, and 8 to 10 inches long. *Fronds membranaceous, smooth*, 2 feet and upwards in length, broad-lanceolate or oblong-lanceolate, *bipinnate*. *Pinnæ sessile*, subopposite, *oblong-lanceolate*, spreading, the *inferior* 2 or 3 pairs distant and *deflexed*. *Pinnules oblong, obtuse, dentate, the base obliquely cuncate, pellucid-punctate* with numerous small, brownish spots. *Rhachis of the pinnæ winged and pilose*; the hairs articulated. Veins simple; the lower and interior first and second pairs sometimes forked. Sori numerous.

Closely allied to *T. Fraseri*; from which it is distinguished by the larger and more lanceolate fronds, the distant and deflexed lower pinnæ, the pilose rhachis, and the dentate pinnules marked with brown spots.

PLATE 43.—Fig. 1. Entire plant, reduced to a scale of an inch to a foot. 1 *a*. Frond, of the natural size. 1 *b*. Transverse section of the trunk, of the natural size. 1 *c*. Dorsal view of a small portion of the frond. 1 *d*. Hairs from the same. 1 *e, e*. Sporangia. 1 *f*. Sporules.—Details more or less magnified.

DIIV. V. MARATTIACEÆ, KAULF.

97. ANGIOPTERIS, Hoffm.

1. ANGIOPTERIS EVECTA, Hoffm.

Angiopteris evecta, Hoffm. ex Sw. Syn. Fil. p. 166 & 395; Willd. Spec. Pl. 5, p. 69;
Hook. & Grev. Ic. Fil. t. 36; Gaud. Bot. Freyc. Voy. p. 292; Hook. Bot. Misc.
3, p. 227; Hook. Gen. Fil. t. 10.

HAB. Tahiti, Society Islands. Samoan and Feejee Islands.

Trunk from 2 to 3 feet high and 1½ to 2 feet in diameter, composed externally of thick and succulent, blackish scales; the whole crowned with from 10 to 15 luxuriant, spreading, bipinnate fronds, which measure from 12 to 16 feet in length, including the stipe. Plants of the above dimensions were found in deep valleys, in the mountain forests of Tahiti; while on Savaii, one of the Samoan Islands, Dr. Pickering observed even larger individuals. By the aid of a lens we find faint indications of a nerve, arising from the sinus of the teeth of the pinnules, and running inwards parallel with and equidistant between the veins, terminating near the costa. A similar nerve is said to exist in the *A. longifolia*, of Hooker and Greville.

2. ANGIOPTERIS ATTENUATA, Sp. Nov.

A. arborescens; frondibus bipinnatis; pinnulis suboppositis lineari-lanceolatis attenuatis margine dentatis apice serratis basi cordato-truncatis; rhachi subtus parce paleaceo-hirsuta; venis simplicibus furcatisve nervo intermedio pellucido adjecto; soris intramarginalibus approximatis.

HAB. Luzon, Philippine Islands; on Mount Majajai, at the elevation of 3,000 feet.

Trunk stout, 4 to 6 feet high, crowned with *bipinnate fronds*, of 15 feet in length. Pinnæ $2\frac{1}{2}$ to 3 feet long, and furnished with upwards of 90 *pinnules*: these are *linear-lanceolate*, *nearly opposite*, usually 4 or 5 inches long and 5 lines broad, *attenuated* into a narrow, sterile, *serrated point*, of about an inch in length, the *margin* obtusely *dentate*, the *base cordate-truncate*. *Rhachis* of the pinnules on the *under side* beset with brown, shrivelled, *paleaceous hairs*. *Veins* either *simple* or *forked*, furnished with a slender and *pellucid intermediate nerve*. Line of *sori* close *within the margin*, narrow and *approximate*, with from 9 to 11 sporangia in each receptacle.

This is distinguished from *A. evecta* by the more elevated trunk, the longer pinnæ, with a much greater number of narrower attenuated pinnules; by the nerve between the veins being more evident, and the sporangia smaller and fewer. To judge from the description of *A. longifolia* of Hooker and Greville, our plant is more nearly allied to it.

98. M A R A T T I A, Sw.

(MYRIOTHECA, Bory.)

1. MARATTIA ALATA, Sw.

Marattia alata, Sw. Syn. Fil. p. 168; Willd. Spec. Pl. 5, p. 66; Hook. & Arn. Bot. Beech. Voy. p. 102; Hook. Bot. Misc. 3, p. 224; Hook. Gen. Fil. t. 26.

HAB. Sandwich Islands; frequent in humid forests.

Rootstock globose, formed of numerous thick and succulent, black scales. Stipes from 3 to 5 feet long, smooth, sulcate in front. Fronds constantly tripinnate, with large and spreading pinnæ. Pinnules subpetiolate, oblong, subacute, and serrate. Rhachis of the secondary pinnæ winged, and sparsely furnished beneath with lacerated brown scales. Sporangia usually 10 on a pinnule.

2. MARATTIA CICUTÆFOLIA, *Kaulf.*

Marattia cicutaefolia, Kaulf. Enum. Fil. p. 32; Hook. Bot. Misc. 3, p. 226.
M. fraxinea, Raddi, Plant. Brasil. 1, p. 74, t. 82.

HAB. In forests, on the Corcovado, near Rio Janeiro, and Organ Mountains, Brazil.

This bears a considerable resemblance to the *M. sorbifolia*, Swartz, and *M. fraxinea*, Smith; but is readily distinguished by its more delicate texture, the deeper serrate margin of its pinnules, and by the interrupted or vacant spaces in the lines of sporangia.

3. MARATTIA FRAXINEA, *Sm.*

Marattia fraxinea, Sm. ex Willd. Spec. Pl. 5, p. 66; Hook. Bot. Misc. 3, p. 225.

HAB. Tahiti, Society Islands.

Distinct from *M. cicutaefolia* in the shorter and opposite pinnæ, the larger and more coriaceous, serrulate pinnules, with the line of sporangiferous receptacles continuous, and seated about half a line from the margin.

4. MARATTIA SORBIFOLIA, *Sw.*

Marattia sorbifolia, Sw. Syn. Fil. p. 168; Willd. Spec. Pl. 5, p. 67; Blume, Enum. Pl. Jav. 2, p. 256; Hook. Bot. Misc. 3, p. 225.

HAB. Ovolau, Feejee Islands.

From the preceding species this may be recognised by its attenuated pinnæ, its narrower and more numerous, coriaceous, deeply serrated pinnules, of a pale green colour on the under surface; the line of sporangia more distant from the margin, and the sporangia themselves shorter.

99. EUPODIUM, *J. Sm.*

(MARATTIÆ Spec. Kaulf., Raddi.)

1. EUPODIUM KAULFUSSII, *J. Sm.*

Eupodium Kaulfussii, *J. Sm.* in *Lond. Jour. Bot.* 2, p. 392; *Hook. Gen. Fil.* t. 118.
Marattia alata, *Kaulf. Enum. Fil.* p. 32, in *Obs.*; *Raddi, Plant. Brasil.* 1, p. 74, t. 83, 84.

HAB. On the Corcovado, Rio de Janeiro, Brazil: in humid forests; frequent.

Fronds large, 4 feet and upwards in length, quadripinnate: divisions spreading; the ultimate ones sessile, half an inch to an inch in length, oblong-lanceolate, laciniate, or obtusely serrate, according to their position on the frond, articulated with the winged rhachis. Veins simple or forked, each vein or venule bearing a single sporangium.

DIV. VI. OPHIOGLOSSÆ, R. BR.

100. OPHIOGLOSSUM, *Linn.*

* *Frondes costa percursæ.*

1. OPHIOGLOSSUM ELLIPTICUM, *Hook. & Grev.*

Ophioglossum ellipticum, Hook. & Grev. Ic. Fil. t. 40, A; Hook. Bot. Misc. 3, p. 217.

HAB. On Kauai, Maui, and Hawaii, Sandwich Islands.

Our plant does not differ in any perceptible character from that of Demarara, figured in Hooker and Greville's *Icones Filicum*. About Koloa, on the island of Kauai, we found it inhabiting low and undulating pasture lands; and on the mountains of Maui, it was detected at the elevation of from 6,000 to 8,000 feet.

* * *Frondes ecostate.*

2. OPHIOGLOSSUM VULGATUM, *Linn.*

Ophioglossum vulgatum, Linn. ex Sw. Syn. Fil. p. 169; Willd. Spec. Pl. 5, p. 58;
Hook. Bot. Misc. 3, p. 216.

HAB. Island of Madeira: on the slopes of the Pico Ruivo.

The peduncle of the spike in the Madeira plant, is a little longer, compared with the length of the frond, than is usually the case in the European plant.

3. OPHIOGLOSSUM ELONGATUM, *A. Cunn.*

Ophioglossum elongatum, *A. Cunn.* in *Hook. Comp. Bot. Mag.* 2, p. 361.

HAB. Wangarara Bay, Northern Island, New Zealand.

In the size and outline of the fronds, and the length of the peduncle and spike, this species bears a strong resemblance to the *O. ellipticum* of Hooker and Greville. But the costa or midrib in the present plant is much less prominent, and the meshes of the venation are more elongated. The stipe is also longer.

4. OPHIOGLOSSUM CONCINNUM, *Sp. Nov.* (Tab. 44.)

O. pygmæum; *radice fibrosa*; *spica caulina*; *fronde subcoriacea elliptico-lanceolata basi attenuata*; *venis crebre reticulatis*.

HAB. On sand-hills, near Wailuku, island of Maui, Sandwich Islands.

Root composed of a few, short, fleshy fibres. Stipe $1\frac{1}{2}$ inches in length, erect. *Fronds* of a firm texture, *elliptical-lanceolate* and *attenuated* on the stipe, about an inch long, 4 to 6 lines broad; the *veins* *closely reticulated*, with free veinlets in the areoles. Peduncle a little shorter than the frond, terminating in a compressed linear spike, of about half an inch in length.

PLATE 44.—Fig. 1. Plant, of the natural size. 1 *a.* Portion of the frond. 1 *b.* Portion of the spike.—The details magnified.

5. OPHIOGLOSSUM RETICULATUM, *Linn.*

Ophioglossum reticulatum, *Linn. ex Sw. Syn. Fil.* p. 170; *Willd. Spec. Pl.* 5, p. 60; *Hook. & Grev. Ic. Fil.* t. 20; *Hook. Bot. Misc.* 3, p. 217.

HAB. Tutuila, Samoan Islands. Brazil: in marshes, at the base of the Organ Mountains.

Hooker and Greville, in their *Icones Filicum*, have figured a state of this from the Mauritius, with which our plant from the Samoan Islands agrees. In the Brazilian plant the substance of the frond is of a firmer texture, less cordate at the base, and the point more acute than in the Samoan one; but the relative length of the scape and frond, and the other characters, entirely correspond with the figure to which we have referred.

6. *OPHIOGLOSSUM PENDULUM*, *Linn.*

Ophioglossum pendulum, Linn. ex Sw. Syn. Fil. p. 170; Willd. Spec. Pl. 5, p. 60;
Hook. & Grev. Ic. Fil. t. 19; Hook. Bot. Misc. 3, p. 219; Hook. & Arn. Bot.
Beech. Voy. p. 73 & 102.

HAB. Sandwich Islands. Tahiti, Society Islands. Samoan and Feejee Islands; on trees.

The figure of this species in Hooker and Greville's *Icones Filicum*, exhibits a spike which, for length, far exceeds any we have ever seen: on the other hand, among our specimens from the Samoan Islands, there are individuals whose fronds measure over 4 feet in length: the shortest ones in our possession, were gathered at the Sandwich Islands; and a considerable number of them are simple and falcate in form; these are probably of the var. "*β. Fronde falcata*," of Hooker and Greville. This latter form occurs only on elevated situations, where the plant is exposed to the light and a strong current of air.

101. *BOTRYCHIUM*, *Sw.*

1. *BOTRYCHIUM FUMARIOIDES*, *Willd.*

Botrychium fumarioides, Willd. Spec. Pl. 5, p. 63.
B. lunarioides, Hook. Bot. Misc. 3, p. 221.
B. obliquum, Muhl. in Willd. Spec. Pl. 5, p. 63.

HAB. Oregon; on the Mount Rainier range, and in the vicinity of Gray's Harbour: in meadow lands.

So far as we are aware, this species has not hitherto been detected west of the Rocky Mountains, where it is of less frequent occurrence than the following.

2. BOTRYCHIUM VIRGINICUM, Sw.

Botrychium Virginicum, Sw. Syn. Fil. p. 171; Willd. Spec. Pl. 5, p. 64; Hook. Bot. Misc. 3, p. 223; Hook. Fl. Bor. Amer. 2, p. 266.

HAB. Oregon; on the Mount Rainier range: in meadow lands; frequent.

The Oregon plant does not differ in any way from specimens collected in Maryland and Virginia.

3. BOTRYCHIUM AUSTRALE, R. Br.

Botrychium australe, R. Br. Prodr. Fl. Nov. Holl. p. 164; Hook. Bot. Misc. 3, p. 223; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 361.

HAB. Wangarara Bay, Northern Island, New Zealand: in meadow lands.

Sir William Hooker justly observes, that "this comes very near to the preceding in size, habit, and other characters." But we would remark that, in the New Zealand plant, the scape bears the frond close to its base; whereas, in *B. Virginicum*, it is borne a little above the middle of the scape.

4. BOTRYCHIUM SUBBIFOLIATUM, Sp. Nov. (Tab. 44.)

B. frondibus sterilibus binis rariusve solitariis e stipite communi tripollicari lato-ovatis basi cordatis ternatis, divisionibus petiolatis bipinnatifidis, segmentis ovatis obtusis dentatis; spica bi-tripinnata.

HAB. Hawaii and Maui, Sandwich Islands: in shady places.

Root composed of a fascicle of coarse, black, fleshy fibres. Scape 10 to 15 inches in length, smooth, succulent, and about the thickness of a goosequill, with a shallow channel in front, bearing the usual frond, 3 to 4 inches above the base, and frequently a second one below it, as shown in our figure. *Fronde* broad-ovate in circumscription, and *cordate at the base*, smooth, membranaceous, and *ternate*, with a stipe 3 to 4 inches long; the *divisions petiolate*, the central one the largest, *bipinnatifid*. Pinnæ or secondary divisions, oblong and subacute; the segments or *lobes ovate, obtuse, irregularly toothed*. *Spike* 6 inches in length, oblong-lanceolate, *twice or thrice divided*, and surmounting the frond; the small, tawny, double-rowed, sessile capsules are somewhat crowded on its subdivisions.

This is related to *B. daucifolium* of Wallich; which has a spike about equal in height with the frond, and a much shorter stipe, seated higher upon the scape.

PLATE 44.—Fig. 2. Plant, of the natural size. 2 *a*. A segment. 2 *b*. A portion of a fertile spike. 2 *c*. Sporules.—Dissections magnified.

102. HELMINTHOSTACHYS, *Kaulf.*

1. HELMINTHOSTACHYS DULCIS, *Kaulf.*

Helminthostachys dulcis, Kaulf. Enum. Fil. p. 29, t. 1, f. 1; Blume, Enum. Pl. Jav. 2, p. 258; Hook. Bot. Misc. 3, p. 220; Hook. Gen. Fil. t. 47, opt.
Botrychium Zeylanicum, Sw. Syn. Fil. p. 172; Willd. Spec. Pl. 5, p. 65.

HAB. Mindanao, Philippine Islands; in the vicinity of Fort Caldera: in low and wet forest lands, growing in the shade.

LYCOPODIACEÆ.

1. PSILOTUM, Sw.

1. PSILOTUM TRIQUETRUM, Sw.

Psilotum triquetrum, Sw. Syn. Fil. p. 187; Hook. Bot. Misc. 2, p. 362; Hook. Gen. Fil. t. 87; Spring, in Mem. Acad. Brux. 24, p. 269.
Bernhardia dichotoma, Willd. Spec. Pl. 5, p. 56; Gaud. Bot. Freyc. Voy. p. 290.

HAB. Sandwich Islands. Tahiti, Society Islands. Samoan Islands.
Parasitical on the trunks of the Cocoanut, and other trees.

2. PSILOTUM COMPLANATUM, Sw.

Psilotum complanatum, Sw. Syn. Fil. p. 188 & 414, t. 4, f. 5; Hook. Bot. Misc. 2, p. 362; Hook. & Arn. Bot. Beech. Voy. p. 102; Spring, in Mem. Acad. Brux. 24, p. 271.
Bernhardia complanata, Willd. Spec. Pl. 5, p. 57.

HAB. Tahiti, Society Islands. Sandwich Islands.

2. TMESIPTERIS, Bernh.

1. TMESIPTERIS FORSTERI, Endl.

Tmesipteris Forsteri, Endl. Prodr. Fl. Ins. Norf. p. 6; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 360; Spring, in Mem. Acad. Brux. 24, p. 265.
T. Tannensis, Sw. Syn. Fil. p. 187; Hook. Bot. Misc. 2, p. 363.

HAB. Tahiti, Society Islands. New Zealand; in the vicinity of the Bay of Islands.

3. LYCOPODIUM, *Linn.*

§ 1. EXSTIPULATÆ.

* *Capsulis axillaribus.*

1. LYCOPODIUM ERUBESCENS, Sp. Nov. (Tab. 45.)

L. caulibus rubentibus erectis dichotomis; ramis apice obtusis; foliis suboctofariis homomorphis planis lineari-lanceolatis acutis integerrimis patentibus; capsulis axillaribus.

HAB. Sandwich Islands; on Mouna Haleakala, East Maui: in wet lands, at the altitude of 6,000 feet.

Plant tufted, from 4 to 8 inches in height, having a brown appearance in a recent state; the *stems*, when divested of their leaves, are of a *reddish* colour, erect, seldom assurgent at the base, branched twice or thrice in a *dichotomous* manner. The *branches* are about equal in thickness from the base to the *obtuse apex*. *Leaves all of one size and form*, $1\frac{1}{2}$ lines long and about half a line broad, *linear-lanceolate*, acute, *entire*, the lower half somewhat appressed to the stem, the upper half bent outwards, all arranged in a *somewhat eight-ranked* manner. *Capsules* somewhat compressed and reniform, of a pale yellow colour, persistent *in the axils* of the leaves, those of the preceding years being present as low down as the primary divisions of the stems.

The habit of this is very much that of the following species; but it is quite distinct in the form of its leaves, and in the colour and direction of its branches.

PLATE 45.—Fig. 1. Plant, of the natural size. 1 *a*. Section of a stem. 1 *b*. Leaf, with a capsule at its base. 1 *c*. Spores.—The details more or less magnified.

2. LYCOPODIUM HALEAKALÆ, Sp. Nov. (Tab. 45.)

L. caulibus erectis dichotomis; ramis crassis obtusis confertis fastigiatis; foliis subsexfariis homomorphis ovato-lanceolatis acutis integerrimis subimbricatis apice subrecurvis; capsulis axillaribus.

HAB. Sandwich Islands; on Mouna Haleakala, East Maui: in wet land, at the altitude of 7,000 feet.

Plant growing in tufts, of a rather rigid consistence, from 4 to 6 inches in height, of a pale green colour. *Stems* usually *erect*, and twice or thrice branched in a *dichotomous* manner. *Branches* *thick, crowded*, obtuse, their summits about equal in height. *Leaves* *somewhat six-ranked, slightly imbricated*, about 2 lines long and one line broad, *ovate-lanceolate, acute*, a little convex on the outer side, and slightly concave within, the rather stiff *apex turned slightly outwards*, with 2 or 3 minute teeth near the point, the thick base decurrent on the stem. *Capsules* compressed, reniform, *axillary*, of a yellow colour, and only partially concealed by the leaves, the old ones persistent on the stem to within an inch of the ground.

This species is closely allied to the *L. compactum* of Hooker. But that has obtuse and distinctly serrated leaves, with an incurved point, and a manifest keel on the outer side.

PLATE 45.—Fig. 2. Plant, of the natural size. 2 *a*. Section of a branch. 2 *b, b*. Leaves, with capsules at their base. 2 *c*. Spores.—The details more or less magnified.

3. LYCOPODIUM REFLEXUM, Lam.

Lycopodium reflexum, Lam. ex Willd. Spec. Pl. 5, p. 52; Spring, in Endl. & Mart. Fl. Brasil. 1, p. 110, & Mem. Acad. Brux. 15, p. 25 & 24, p. 10.

L. rigidum, Sw. Syn. Fil. p. 176; Raddi, Plant. Brasil. p. 78; Gaud. Bot. Freyc. Voy. p. 289.

HAB. Estrella Pass, Organ Mountains, Brazil.

4. LYCOPODIUM SULCINERVIUM, *Spring*.

Lycopodium sulcinervium, Spring, in Mem. Acad. Brux. 15, p. 39.

HAB. Sandwich Islands: on trees, in mountain forests.

This species is very closely allied to the *L. serratum* of Thunberg, as figured in Hooker and Greville's *Icones Filicum*; but the plant is smaller in all its parts, with subserrate leaves, the midrib of which is more elevated on the upper, and more furrowed on the under side.

5. LYCOPODIUM LUCIDULUM, *Michx.*

Lycopodium lucidulum, Michx. Fl. Bor. Amer. 2, p. 284; Sw. Syn. Fil. p. 176; Willd. Spec. Pl. 5, p. 51; Hook. Bot. Misc. 2, p. 365, & Fl. Bor. Amer. 2, p. 266; Spring, in Mem. Acad. Brux. 15, p. 37.

HAB. Oregon; in forests, on the Mount Rainier range.

6. LYCOPODIUM SELAGO, *Linn.*

Lycopodium Selago, Linn. Spec. Pl. p. 1565; Sw. Syn. Fil. p. 176; Willd. Spec. Pl. 5, p. 49; Kaulf. Enum. Fil. p. 20; Hook. Bot. Misc. 2, p. 363; Hook. Fl. Bor. Amer. 2, p. 266; Spring, in Mem. Acad. Brux. 15, p. 19, & 24, p. 5.

HAB. Island of Madeira; on high lands near Estroza Pass.

7. LYCOPODIUM LINIFOLIUM, *Linn.*

Lycopodium linifolium, Linn. Spec. Pl. p. 1563; Sw. Syn. Fil. p. 175; Willd. Spec. Pl. 5, p. 47; Spring, in Endl. & Mart. Fl. Brasil, 1, p. 113, & Mem. Acad. Brux. 15, p. 30, & 24, p. 12.

HAB. Organ Mountains, Brazil; on trees, in dense forests.

Plant apparently tufted, and very graceful in its growth. Stems

filiform, flexuose, the flexions or bends each about 2 lines long, flaccid, and in a dry state somewhat angular, and from 3 to 5 times branched in a dichotomous manner. Leaves distant, somewhat membranaceous, arranged in a dichotomous manner (a single leaf arising from the outer angle of each flexion); about 6 lines long and one line broad, lanceolate-linear, entire, and attenuated into a long and sharp point of a reddish tint, the base contracted and twisted, a very evident nerve running through the centre, which is sulcate on the upper side, and somewhat keeled underneath. Capsules reniform, solitary or scattered near the base of the branches, towards the apices approximate or crowded.

8. LYCOPIDIUM SQUARROSUM, *Forst.*

Lycopodium squarrosum, Forst. Prodr. p. 86; Sw. Syn. Fil. p. 177 & 400; Willd. Spec. Pl. 5, p. 27; Blume, Enum. Pl. Jav. 2, p. 265; Spring, in Mem. Acad. Brux. 15, p. 52, & 24, p. 23.

HAB. Feejee Islands; and Tahiti, Society Islands.

From the Feejee Islands, there is a form of the species of a more robust habit, and with leaves inclined to be more rigid.

9. LYCOPIDIUM MANDIOCCANUM, *Raddi.*

Lycopodium Mandioccanum, Raddi, Plant. Brasil. 1, p. 77, t. 4; Gaud. Bot. Freyc. Voy. p. 290; Spring, in Endl. & Mart. Fl. Brasil. 1, p. 110, & Mem. Acad. Brux. 15, p. 45, & 24, p. 20.

L. dichotomum, Hook. Bot. Misc. 2, p. 367.

HAB. Organ Mountains, Brazil.

10. LYCOPIDIUM POLYTRICHOIDES, *Kaulf.*

Lycopodium polytrichoides, Kaulf. Enum. Fil. p. 6; Spring, in Mem. Acad. Brux. 15, p. 73, & 24, p. 32.

HAB. Sandwich Islands: on trees, and on large blocks of lava.

In the young state this bears a marked resemblance to the preceding species; but the adult plant is readily distinguished by its somewhat quadrangular branches, and erect, appressed, carinate leaves; which at the base of the stem are subulate, setaceous, and entire, while those of the branches are much shorter, ovate, apiculate, and acute.

11. LYCOPODIUM VERTICILLATUM, *Linn.*

- Lycopodium verticillatum*, Linn. ex Sw. Syn. Fil. p. 175; Spring, in Mem. Acad. Brux. 15, p. 46, & 24, p. 21.
L. acerosum, Willd. Spec. Pl. 5, p. 53; Hook. Bot. Misc. 2, p. 366; Spring, in Endl. & Mart. Fl. Brasil. p. 111.
L. filiforme, Sw. Syn. Fil. p. 174 & 398, t. 4, f. 3; Willd. Spec. Pl. 5, p. 54; Raddi, Plant. Brasil. p. 77, t. 4, bis, f. 1; Gaud. Bot. Freyc. Voy. p. 290.

HAB. Organ Mountains, Brazil.

* * *Capsulis spicatis.*

12. LYCOPODIUM LATERALE, *R. Br.*

- Lycopodium laterale*, R. Br. Prodr. Fl. Nov. Holl. 1, p. 165; Hook. Bot. Misc. 2, p. 371; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 361; Spring, in Mem. Acad. Brux. 15, p. 82; Hook. f. Fl. Nov. Zeal. 2, p. 54.

HAB. Vicinity of Port Jackson, New South Wales. Bay of Islands, New Zealand: in marshes. (The whole plant does not exceed ten inches in height.)

13. LYCOPODIUM DENSUM, *Labill.*

- Lycopodium densum*, Labill. Pl. Nov. Holl. 2, p. 104, t. 251, f. 1; Willd. Spec. Pl. 5, p. 22; Hook. Bot. Misc. 2, p. 368; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 306; Spring, in Mem. Acad. Brux. 15, p. 86; Hook. f. Fl. Nov. Zeal. 2, p. 53.

HAB. Vicinity of the Bay of Islands, New Zealand: in open, elevated situations, among bushes.

This species, though less a lover of shade than the *L. dendroideum*, is very similar in habit; but has its leaves more appressed to the stem, and the spikes are shorter and more numerous.

14. LYCOPODIUM CERNUUM, *Linn.*

Lycopodium cernuum, Linn. ex Sw. Syn. Fil. p. 178; Raddi, Pl. Brasil. 1, p. 78; Gaud. Bot. Freyc. Voy. p. 284; Hook. Bot. Misc. 2, p. 369 (excl. β . *curvatum* & syn.); Spring, in Mem. Acad. Brux. 15, p. 79, pro parte.

HAB. Vicinity of Estrella and Rio Janeiro, Brazil. Tahiti, Society Islands. Samoan and Feejee Islands.

In the plants from the Pacific Islands the stems are furnished with a short pubescence, of which the Brazilian plant is destitute.

15. LYCOPODIUM CURVATUM, *Sw.*

Lycopodium curvatum, Sw. Syn. Fil. p. 178 & 402; Willd. Spec. Pl. 5, p. 31; Blume, Enum. Pl. Jav. 2, p. 266; Gaud. Bot. Freyc. Voy. p. 284; Spring, in Mem. Acad. Brux. 15, p. 81.

HAB. Sandwich Islands; frequent.

We concur with Blume and Gaudichaud in considering this as distinct from *L. cernuum*, Linn., to which it has sometimes been referred. The whole plant is larger, of a more rigid and robust habit, with broader and stiffer incurved leaves; and the spikes are almost invariably longer, their scales broader and more spreading.

16. LYCOPODIUM LAXUM, *Presl.*

Lycopodium laxum, Presl, Rel. Hænk. p. 83; Spring, in Mem. Acad. Brux. 15, p. 60. *L. acrostachyum*, Hook. & Grev. Ic. Fil. t. 181. *L. flagellaria*, Bory; Hook. Bot. Misc. 2, p. 370, & 3, p. 105.

HAB. Tahiti, Society Islands. Samoan and Feejee Islands: common on trees.

17. LYCOPODIUM VARIUM, *R. Br.*

Lycopodium varium, R. Br. Prodr. Fl. Nov. Holl. p. 165; Hook. & Grev. Ic. Fil. t. 112; Spring, in Mem. Acad. Brux. 15, p. 57, & 24, p. 24; Hook. f. Fl. Antarc. p. 115, & Fl. Nov. Zeal. 2, p. 52.

HAB. Lord Auckland Islands. New Zealand; on the banks of the Waicaddie River.

Specimens of what we take to be a variety of this species (without fructification) were collected by Dr. Silas Holmes, Surgeon of the Brig Porpoise, on the Lord Auckland Islands. They are once or twice branched, erect, rigid, and from 8 to 10 inches high; the stems are about the thickness of a crowquill, closely beset with long, linear, coriaceous, obtuse leaves, having a revolute margin, and arranged in a somewhat six-ranked manner.

18. LYCOPODIUM PHLEGMARIA, *Linn.*

Lycopodium Phlegmaria, Linn. ex. Sw. Syn. Fil. p. 176; Willd. Spec. Pl. 5, p. 10; Gaud. Bot. Freyc. Voy. p. 281; Blume, Enum. Pl. Jav. 2, p. 261; Hook. Bot. Misc. 2, p. 373; Spring, in Mem. Acad. Brux. 15, p. 63.
L. mirabile, Willd. Spec. Pl. 5, p. 11; Kaulf. Enum. Fil. p. 5.

HAB. Tahiti, Society Islands. Samoan and Feejee Islands. Mount Majaijai, Luzon, Philippine Islands: on trees.

Our specimen from the Philippine Islands accords with the character given by Blume of his var. *ε. gracilescens*. Those from the Pacific Islands are of the normal form.

19. LYCOPODIUM PACHYSTACHYON, *Spring.*

Lycopodium pachystachyon, Spring, in Mem. Acad. Brux. 15, p. 66.
L. phyllanthum, Hook. & Arn. Bot. Beech. Voy. p. 102; Spring, in Mem. Acad. Brux. 15, p. 73.

HAB. Sandwich Islands; frequent on trees and decayed wood, on all the islands of this group visited by us.

20. LYCOPODIUM NUTANS, Sp. Nov. (Tab. 46.)

L. caule rigido erecto dichotomo; foliis verticillatis divaricatis lanceolato-linearibus integerrimis acutis margine revolutis; spicis crassis teretibus obtusis dichotomis nutantibus; squamis imbricatis oblongis acuminatis; capsulis reniformibus.

HAB. Sandwich Islands: high mountains of Oahu, growing on trees; rare.

Stem erect, rigid, about the thickness of a goosequill, from 14 to 18 inches high, twice or thrice *dichotomously branched*. *Leaves rigid*, approximate, *verticillate*, 4 or 5 in a whorl, the lower ones a little deflexed, those of the branches *divaricate, lance-linear, acute*, 8 to 10 lines long and 1½ lines broad, the *margin revolute and entire*, those towards the base of the spike the shortest; the nerve on the upper side slightly carinate, beneath plane. *Spikes 3 to 5 inches in length* and about one-fourth of an inch in diameter, *stout, round, nodding*, and once or twice *dichotomously branched*; the branches tapering very gradually towards the apex, which is *obtuse*. *Scales 3 or 4 times longer than the capsules, erect, imbricated, oblong, acuminate*. *Capsules two-valved, of a pale straw-colour, reniform, and entirely concealed by the scales.*

This is one of the most robust species of the genus. It is very well distinguished from the preceding by its stouter stem, and its thick and nodding spikes: the leaves on the stems also are more crowded, and the scales of the spikes are of considerably greater length.

PLATE 46.—Fig. 1. A portion of a plant, of the natural size. 1 *a*. Leaf from the stem. 1 *b*. Scale from a spike, with a capsule at the base. 1 *c*. Cross section of the stem. 1 *d*. A capsule. 1 *e*. Spores.—The details magnified.

21. LYCOPODIUM NUMMULARIFOLIUM, *Blume*.

Lycopodium nummularifolium, Blume, Enum. Pl. Jav. 2, p. 263; Hook. Bot. Misc. 2, p. 374; Spring, in Mem. Acad. Brux. 15, p. 68.
L. rotundifolium, Hook. & Grev. Ic. Fil. t. 212?

HAB. Feejee Islands: on trees.

This is very evidently the plant of Blume, although none of our specimens exhibit such a decidedly pendulous habit as the *L. rotundifolium* of the Icones Filicum; which, however, in other respects accords with our plant.

22. LYCOPODIUM PINIFOLIUM, *Blume*.

Lycopodium pinifolium, Blume, Enum. Pl. Jav. 2, p. 264; Spring, in Mem. Acad. Brux. 15, p. 58.

HAB. Mount Majajai, Luzon, Philippine Islands.

This is closely allied to some of the forms of *L. varium*, R. Brown; from which it differs by the narrower and more acute leaves, and the ovate, acuminate, mucronate scales.

23. LYCOPODIUM CLAVATUM, *Linn.*

Lycopodium clavatum, Linn. ex Sw. Syn. Fil. p. 179; Willd. Spec. Pl. 5, p. 16; Kaulf. Enum. Fil. p. 8; Hook. Bot. Misc. 2, p. 375; Hook. Fl. Bor. Amer. 2, p. 267; Spring, in Mem. Acad. Brux. 15, p. 89, & 24, p. 42.
L. piliferum, Raddi, Plant. Brasil. p. 79, t. 3.

HAB. Oregon: in pine forests, at the base of Mount Rainier. Organ Mountains, Brazil.

Our specimens from Oregon are without fertile spikes; their leaves are narrow and much attenuated, with minute teeth on the margin,

and the capillary point peculiar to many forms of this species is very short. The Brazilian specimens are tolerably well represented by Raddi's figure of his *L. piliferum*; in which the capillary point is half as long as the leaf itself.

24. LYCOPIDIUM VENUSTULUM, *Gaud.*

Lycopodium venustulum, Gaud. Bot. Freyc. Voy. p. 283, t. 22; Spring, in Mem. Acad. Brux. 15, p. 84.

HAB. Sandwich Islands; on mountains of Hawaii and Oahu; at an elevation of from 4,000 to 8,000 feet.

Hooker and Greville, in the Botanical Miscellany, have referred this to the *L. aristatum*, Humboldt; a species with which we are not acquainted, and we therefore prefer following M. Spring, who considers the two plants as distinct. The leaves are shorter, incurved, more crowded, and somewhat imbricated; the spikes are much longer; the scales larger; and the diaphanous hair at the point is also longer than in the preceding species, to which in habit it bears considerable resemblance.

Gaudichaud's figure represents that state of the plant, found in sheltered situations, which has the leaves less crowded and more spreading than in specimens from more elevated, arid, and exposed localities.

25. LYCOPIDIUM MAGELLANICUM, *Sw.*

Lycopodium Magellanicum, Sw. Syn. Fil. p. 180; Willd. Spec. Pl. 5, p. 15; Gaud. Bot. Freyc. Voy. p. 282; Hook. Bot. Misc. 2, p. 377; Spring, in Mem. Acad. Brux. 15, p. 96.

L. clavatum, var. Hook. f. Fl. Antarc. p. 113.

HAB. Orange Harbour, Tierra del Fuego; frequent.

26. LYCOPODIUM HETEROPHYLLUM, *Hook. & Grev.*

Lycopodium heterophyllum, Hook. & Grev. Ic. Fil. t. 113; Spring, in Mem. Acad. Brux. 15, p. 88.

HAB. Sandwich Islands; on Mouna Loa, Hawaii, at the altitude of 8,000 feet.

The leaves of the branches and peduncles are very dissimilar; those of the former being subulate, entire, spreading, and slightly incurved at the point; while those of the peduncles are more distant, their margins spinulose-serrate, and bearing at the point a slender, diaphanous hair. The spikes are usually in threes, and scarcely over an inch in length.

§ 2. STIPULATÆ.

* *Ramis complanatis erectis.*

27. LYCOPODIUM COMPLANATUM, *Linn.*

Lycopodium complanatum, Linn. ex Sw. Syn. Fil. p. 180; Willd. Spec. Pl. 5, p. 19; Hook. Bot. Misc. 2, p. 378; Hook. Fl. Bor. Amer. 2, p. 267; Spring, in Mem. Acad. Brux. 15, p. 101.

L. thyoides, Raddi, Plant. Brasil. p. 80; Gaud. Bot. Freyc. Voy. p. 284.

HAB. Brazil: on the Organ Mountains. Tahiti, Society Islands: on mountain ridges, destitute of trees.

Our North American plant and various specimens from elevated situations within the tropics do not differ in any important character from each other; at least so far as concerns the Brazilian and Tahitian plants.

28. LYCOPODIUM VOLUBILE, *Forst.*

Lycopodium volubile, Forst. ex Sw. Syn. Fil. p. 180; Willd. Spec. Pl. 5, p. 13; Hook. & Grev. Ic. Fil. t. 170; Hook. Bot. Misc. 2, p. 380; A. Cunn. in Hook. Comp. Bot. Mag. 2, p. 361; Spring, in Mem. Acad. Brux. 15, p. 105.

HAB. New Zealand, vicinity of the Bay of Islands.

This graceful species inhabits elevated, and open places on the margins of forests, forming dense masses, through which it is often very difficult for the traveller to force his way, owing to its wiry stems becoming entangled among the neighbouring bushes.

In Hooker's Botanical Miscellany this is said to be also a native of the Sandwich and Society Islands; but we have some doubts with regard to its ever having been found at the Sandwich Islands.

4. SELAGINELLA, *Beauv., Spring.*

(LYCOPODII Sp. Linn. & Auct.)

§ 1. *Folia (etiam spicarum) homomorpha.*

1. SELAGINELLA RUPESTRIS, *Spring.*

Selaginella rupestris, Spring, in Endl. & Mart. Fl. Brasil. 1, p. 118, & Mem. Acad. Brux. 24, p. 55.

Lycopodium rupestre, Linn.; Sw. Syn. Fil. p. 181; Willd. Spec. Pl. 5, p. 30; Raddi, Plant. Brasil. p. 80, t. 4, bis, f. 2; Gaud. Bot. Freyc. Voy. p. 284; Hook. Bot. Misc. p. 373; Hook. Fl. Bor. Amer. 2, p. 267.

HAB. Oregon: in rocky places, on the banks of the Columbia River, near Fort Okanagan. Peru; in the vicinity of Obrajillo. Brazil; on the Corcovado, Rio Janeiro.

2. SELAGINELLA ULIGINOSA, *Spring.*

Selaginella uliginosa, Spring, in Mem. Acad. Brux. 24, p. 60.

Lycopodium uliginosum, Willd. Spec. Pl. 5, p. 32; R. Br. Prodr. Fl. Nov. Holl. p. 165; Gaud. Bot. Freyc. Voy. p. 285; Hook. Bot. Misc. 2, p. 369.

HAB. Vicinity of Port Jackson, New South Wales.

3. SELAGINELLA DEFLEXA, Sp. Nov. (Tab. 45.)

S. caulibus assurgentibus basi ramosis; ramis gracilibus suberectis; foliis quadriseriatis deflexis oblongis acuminatis carinatis spinuloso-serratis; spicis teretibus sessilibus.

HAB. Kauai and Oahu, Sandwich Islands: in the mountains, on trees; rare.

Plant 4 to 6 inches high, growing in tufts composed of a very few stems, which are *assurgent*, and dividing about an inch above the root into an indefinite number of branches. *Branches nearly erect, slender*, terminated by a yellow, *round, sessile*, fertile *spike*, of an inch or two in length. *Leaves usually in 4 rows, deflexed, oblong-acuminate, keeled behind*, the lower ones nearly entire, those on the upper part of the plant *spinulose-serrate* and more spreading. Antheridia somewhat reniform, filled with a yellowish powder. Oophoridia globose, containing 3 or 4 nearly round, echinate, yellowish grains.

This differs from *S. uliginosa* in its more dense, narrower and longer, deflexed, spinulose-serrate leaves.

PLATE 45.—Fig. 3. Plant, of the natural size. 3 *a, a*. Sections of the stem. 3 *b*. Antheridium. 3 *c*. Oophorium, with a leaf. 3 *d, d*. Oophoridia, showing the dehiscence. 3 *e, e, e*. Grains from the oophoridia.—The details more or less magnified.

§ 2. *Folia dimorpha.*

* *Spicæ quadrangulares, squamis conformibus.*

4. SELAGINELLA ARBUSCULA, Spring.

Selaginella Arbuscula, Spring, in Mem. Acad. Brux. 24, p. 183.

Lycopodium Arbuscula, Kaulf. Enum. Fil. p. 19; Hook. & Arn. Bot. Beech. Voy. p. 102.

HAB. Sandwich Islands: at the elevation of from 1,000 to 5,000 feet.

This species seldom exceeds 5 inches in height; the stems are assurgent, emitting roots at the bends, and dividing upwards into numerous and somewhat erect branches; the branchlets are terminated by one or two quadrangular spikes, about a quarter of an inch in length. Leaves of an ovate-lanceolate form, a little twisted and falcate, the superior margin finely serrated; the inferior at the base sometimes bearded with a few short hairs. Stipules about half the size of the leaves, ovate, mucronate, and sharply serrate; while the scales of the spikes, though somewhat larger than the stipules, are of the same form, and have an evident keel. Antheridia small, orbicular, filled with fine whitish powder. Oophoridia larger than the antheridia, situated near the base of the spike, and containing 3 to 4 angular, whitish globules.

5. SELAGINELLA MENZIESII, *Spring*.

Selaginella Menziesii, Spring, in Mem. Acad. Brux. 24, p. 185.

Lycopodium Menziesii, Hook. Bot. Misc. 2, p. 390; Hook. & Arn. Bot. Beech. Voy. p. 102.

L. Arbuscula, Hook. & Grev. Ic. Fil. t. 200 (non Kaulf.).

HAB. Sandwich Islands: in mountain forests; frequent. Samoan and Feejee Islands.

So far as we are aware, this species has heretofore been found only at the Sandwich Islands. The plants from the Feejee and Samoan groups are larger; and the hairs at the base of the leaves longer, than in those of the Sandwich Islands.

6. SELAGINELLA POUZOLZIANA, *Spring*.

Selaginella Pouzoliana, Spring, in Mem. Acad. Brux. 24, p. 142.

Lycopodium Pouzolzanum, Gaud. Bot. Freyc. Voy. p. 287.

HAB. Mindanao, Philippine Islands: in forests, near Fort Caldera.

This is a very handsome plant, from 1½ to 2 feet in height; the upper surface of the leaves of a dark green colour, the lower paler and somewhat shining. The leaves of the branches contract very gradually into a narrow point; the branches terminated by the spikes, which are from 5 to 7 lines in length.

7. SELAGINELLA ATRO-VIRIDIS, *Spring*.

Selaginella atro-viridis, Spring, in Mem. Acad. Brux. 24, p. 124.

Lycopodium atro-viride, Hook. & Grev. Ic. Fil. t. 39, & Hook. Bot. Misc. 2, p. 387;
Blume, Enum. Pl. Jav. p. 269.

HAB. Tahiti, Society Islands. Samoa and Feejee Islands.

This beautiful species occurs very frequently in all the groups of islands designated above, and inhabits shady and humid situations in mountain forests. Plant from one to two feet high, with a nearly round stem, from which roots are emitted near the base, while above they are sparsely beset with ovate-oblong and appressed leafy scales; the summit is much branched in a dichotomous manner; the branches spreading. Leaves linear-oblong, somewhat falcate, the margin entire, or sometimes finely serrated, of a darker green on the upper than the under side. Stipules ovate-oblong, cuspidate, slightly falcate, about one-fourth or one-fifth the size of the leaves. Spikes either solitary or in pairs, four-angled, and from half an inch to an inch in length; the scales oblong, acuminate, keeled; the margin very finely serrated. Antheridia small, cordate-oblong; the powder whitish. Oophordia ovate, larger than the antheridia, and containing 3 or 4 globular particles.

8. SELAGINELLA APUS, *Spring*.

Selaginella apus, Spring, in Mart. & Endl. Fl. Brasil. 1, p. 119, & Mem. Acad. Brux. 24, p. 76.

Lycopodium apodum, Sw. Syn. Fil. p. 184; Willd. Spec. Pl. 5, p. 38; Hook. Bot. Misc. 2, p. 399.

L. Brasiliense, Raddi, Plant. Brasil. p. 82, t. 1, f. 1.

L. patulum, Gaud. Bot. Freyc. Voy. p. 285.

L. albidulum, Hook. Bot. Misc. 2, p. 398.

HAB. On the Organ Mountains, Brazil.

Plant 3 or 4 inches high, of a pale green colour, composed of slender, branching stems, throwing out roots at the axils of the branches. Leaves distichous, ovate-oblong, acute, and slightly cordate at the base; the margin finely serrated; the nerve slightly keeled on the upper side. Stipules appressed, oval, and somewhat cuspidate, about one-third the size of the leaves, but having longer teeth on the margin. Spikes a little over a quarter of an inch in length, four-angled, usually solitary, with oblong, acuminate, and finely toothed bracts.

9. SELAGINELLA CILIARIS, *Spring*.

Selaginella ciliaris, Spring, in Mem. Acad. Brux. 24, p. 233.

Lycopodium ciliare, Sw. Syn. Fil. p. 185; Willd. Spec. Pl. 5, p. 46; Blume, Enum. Pl. Jav. p. 270.

L. calostachyum, Hook. Bot. Misc. 3, p. 108.

HAB. On mountains, behind the town of Muthuata, Feejee Islands.

The whole plant is from 3 to 5 inches high, and branched from 4 to 6 times in a distichous manner; the lower branches are somewhat assurgent, and with filiform roots springing from the axils; the upper branches are more erect and spreading, the points slightly incurved. Leaves of a darker green on the upper than under surface, on the inferior half of the plant somewhat distant, above more approximated and spreading, ovate-oblong, obtuse, slightly keeled above, and with a narrow channel underneath; the base ciliate, the superior half dilated and partially concealing the stem, the inferior edge decurrent. Stipules about one-fourth the size of the leaves, oval, contracted rather abruptly into a short tail-like point, which is turned a little to one side; the margin ciliated; the nerve forming a slight keel on the

upper side. Spikes solitary, 4 to 5 lines long; the scales somewhat pectinate, and with a more evident denticulate point. Antheridia ovate; the fine powder of a reddish colour. Oophoridia globose; the globules 3 or 4, of a whitish colour.

10. SELAGINELLA NANA, *Desv.*

Selaginella nana, Desv. ex Spring, in Mem. Acad. Brux. 24, p. 240.

HAB. In the vicinity of Pago-pago Bay, Tutuila, one of the Samoan Islands.

Plant small and creeping. Stems rigid, nearly round, prostrate, 2 or 2½ inches long, of a pale straw colour, interruptedly bisulcate on the upper side, and slightly corrugated on the under side, emitting roots from the axils of the somewhat erect and twice or thrice divided branches. Leaves of a dark green colour on the upper, and of a paler green on the under side, about a line long, and half a line broad, a little distant on the main stem, spreading, ovate-oblong, somewhat acute, with the point turned upwards, keeled on the upper side, ciliate-serrate at the base, the inferior margin finely serrated or sometimes entire, the superior half of the base oblique. Stipules about half the size of the leaves, distant, oval, apiculate, serrate, the point turned a little inwards, slightly keeled on the upper side. Spikes 2 to 4 lines long, solitary, or sometimes in pairs. Scales ovate-oblong, acute, spinulose-serrate. Antheridia globose; the powder amber-coloured. Oophoridia globose, enclosing 2 or 3 round and slightly angular grains, of a whitish colour.

Our plant differs a little from that described by Spring; the spikes being somewhat longer, and the margin of the scales not so decidedly ciliate.

11. SELAGINELLA CUPRESSINA, *Spring.*

Selaginella cupressina, Spring, in Mem. Acad. Brux. 24, p. 113.

Lycopodium cupressinum, Willd. Spec. Pl. 5, p. 43.

L. cataphractum, Blume, Enum. Pl. Jav. p. 267.

HAB. Philippine Islands; in the neighbourhood of Baños Luzon.

Stem angular, one to 1½ feet in length, slender, flaccid, creeping, pubescent on the under side; the primary branches short and spreading, once or twice divided in a dichotomous manner. Leaves crowded, about a line long, of a dark green on the upper, and of a silvery hue on the under surface, oblong-lanceolate, slightly falcate and somewhat acute, the margin entire, the base oblique, contracted and rounded, the superior half ciliate, the nerve on the upper side narrow and slightly raised, while underneath it is broader and more elevated, and furnished with a shallow groove along its middle. Stipules from one-third to one-fourth the size of the leaves, ovate or oblong, contracted rather abruptly into a short and awn-like point, which is bent inwards, partially keeled on the upper side; the base oblique, slightly cordate, the margin spinulose-serrate. Spikes 3 to 6 lines long, quadrangular; the scales of a pale green colour, somewhat erect, ovate, acuminate, slightly cordate at the base, their margin finely and sharply serrate; the centre marked with a greenish keel on the outer or under side. Antheridia oblong-ovate; the powder orange-coloured. Oophoridia wanting.

12. SELAGINELLA SULCATA, *Spring.*

Selaginella sulcata, Spring, in Endl. & Mart. Fl. Brasil. 1, p. 230, & Mem. Acad. Brux. 24, p. 214.

Lycopodium sulcatum, Desv. in Lam. Dict. Suppl. 3, p. 549.

L. marginatum, Gaud. Bot. Freyc. Voy. p. 286.

L. plumosum, Velloz. Fl. Flum. 11, t. 113.

L. stoloniferum, Hort.

HAB. In the vicinity of Rio Janeiro, and in the Organ Mountains, Brazil.

This is a plant of very frequent occurrence in thickets of bushes and open forest lands, where it forms large patches; the long, leafy, branching, articulated stems, raised from the ground on extra-axillary roots, of from 2 to 4 inches in length. The spikes are solitary, 5 to 10 lines long, four-angled, and bear, besides the normal ovate-oblong antheridia, one or two of a larger size, situated near the base of the

stipe, and containing, like the first, an ochraceous powder. The oophoridia contain 3 cream-coloured, round, rough-pitted globules.

13. SELAGINELLA SUAVIS, *Spring*.

Selaginella suavis, Spring, in Endl. & Mart. Fl. Brasil. 1, p. 231 (excl. syn. Gaud.), & Mem. Acad. Brux. 24, p. 216.

HAB. On the Organ Mountains, Brazil.

This is closely allied to the preceding species, but is readily distinguished by its smaller size and more compact habit; the articulations of the stems not so evident; the stipules more imbricated, and the awn at the point longer; the roots shorter and axillary.

14. SELAGINELLA DENTICULATA, *Link*.

Selaginella denticulata, Link, Spec. Fil. Hort. Berol. p. 159; Spring, in Mem. Acad. Brux. 24, p. 82.

Lycopodium denticulatum, Linn. Spec. Pl. p. 1569; Sw. Syn. Fil. p. 183; Willd. Spec. Pl. 5, p. 34; Kaulf. Enum. Fil. p. 17.

L. depressum, Sw. Syn. Fil. p. 185 & 412; Willd. Spec. Pl. 5, p. 36.

HAB. Island of Madeira.

* * *Spicæ compressæ, secundæ, squamis dimorphis.*

15. SELAGINELLA MYOSUROIDES, *Spring*.

Selaginella myosuroides, Spring, in Mem. Acad. Brux. 24, p. 236.

Lycopodium myosuroides, Kaulf. Enum. Fil. p. 19.

HAB. Philippine Islands: on mountains, near Baños, Luzon.

Plant from 2 to 5 inches high, much branched: branches flexuose, somewhat erect, sparsely beset with leaves near the base, where a few axillary slender roots are produced; the branchlets short, each bear-

ing a solitary spike. Leaves distant, deeper green on the upper than the under surface, scarcely a line long, and about half a line broad, oblong-lanceolate, acute, the margin somewhat revolute and minutely toothed, the superior half of the base dentate-ciliate; the nerve prominent on the upper side. Stipules divergent, oblong-linear, aristate, keeled; the margin minutely toothed. Spikes 3 to 5 lines long, complanate and pectinate. Anterior bracts or scales somewhat imbricated and spreading, oblong, acuminate; the posterior ones much smaller, ovate-lanceolate, and contracted gradually into a long dentate point; the margin dentate-ciliate; the nerve very prominent. Antheridia globose; the powder orange-coloured. Oophoridia containing 3 round, smooth, pale rose-coloured globules.

HYDROPTERIDES.

1. MARSILEA, *Linn.*

1. MARSILEA QUADRIFOLIA, *Linn.*

Marsilea quadrifolia, Linn.; Willd. Spec. Pl. 5, p. 538; Kaulf. Enum. Fil. p. 271;
Blume, Enum. Pl. Jav. 2, p. 273.

HAB. Feejee Islands; in pools of still water, and plantations of *Caladium esculentum*.

This species has a very extensive geographical distribution, being found, we believe, in all the four quarters of the globe. The veins in this, as in the two following species, radiate from, and fork near the base of the leaves; the veinlets repeatedly anastomosing before reaching the margin, forming long linear meshes; with a more delicate set of reticulated nerves occupying the area within the meshes: these nerves in the present species, are readily detected by the assistance of a common lens.

2. MARSILEA VILLOSA, *Kaulf.*

Marsilea villosa, Kaulf. Enum. Fil. p. 272.

M. vestita, Hook. & Grev. Ic. Fil. t. 159; Hook. Fl. Bor. Amer. 2, p. 268.

HAB. Oregon; in the vicinity of Fort Wallawalla: in lands subject to inundation. California; in the valley of the Sacramento River. Oahu, Sandwich Islands; near Waianae and between Honolulu and Ewa: in moist places. Hunter River, New South Wales; on the margins of ponds.

The plants from these several localities do not differ from each other in any essential respect. The leaves and peduncles, in specimens from the same locality, sometimes vary in being more or less villous. Our Oregon plant is evidently the *M. vestita* of Hooker and Greville, although not quite so hairy in all its parts as represented by their figure. It is very possible that the *M. hirsuta* of R. Brown may be identical with the present species, but we have not the means of determining this point.

3. MARSILEA POLYCARPA, *Hook. & Grev.*

Marsilea polycarpa, Hook. & Grev. Ic. Fil. t. 160.

HAB. Tahiti, Society Islands; at Papeiti and Point Venus: in slow moving waters.

It is gratifying to be able to extend the geographical range of this interesting and beautiful species, which, so far as we know, had been found only in the tropical parts of South America.

2. SALVINIA, *Michx.*

1. SALVINIA ROTUNDIFOLIA, *Willd.*

Salvinia rotundifolia, Willd. Spec. Pl. 5, p. 537; Raddi, Plant. Brasil. 1, p. 1, t. 1, f. 5; Gaud. Bot. Freyc. Voy. p. 406.

HAB. Floating in the Rio Anhumirim, Estrella, Brazil.

2. SALVINIA BILOBA, *Raddi.*

Salvinia biloba, Raddi, Plant. Brasil. 1, p. 1, t. 1, f. 4, a, b.
Marsilea natans, Velloz. Fl. Flum. 11, t. 111.

HAB. Floating in the Rio Anhumirim, Estrella, Brazil; in great abundance.

Very distinct from the preceding species in its two-lobed leaves.

3. AZOLLA, *Lam.*1. AZOLLA MAGELLANICA, *Willd.*

Azolla Magellanica, Willd. Spec. Pl. 5, p. 541; Kaulf. Enum. Fil. p. 273; Gaud. Bot. Freyc. Voy. p. 406.
Salvinia Azolla, Raddi, Plant. Brazil. 1, p. 2, t. 1, f. 3.

HAB. Vicinity of Rio Janeiro, Brazil. Shores of Rio Negro, Patagonia. Chili. Callao, Peru.

This elegant little plant is very plentiful on the muddy shores of the Rio Negro, growing in patches 3 to 6 inches in diameter. In Chili, we found it still more abundant, inhabiting creeks or pools of still water by the margins of streams. The plants from these two countries are identical, while the fronds of the Peruvian plant are much larger and more lax in their growth; but this is to be attributed rather to the warmer climate than to any specific distinction.

2. AZOLLA MICROPHYLLA, *Kaulf.*

Azolla microphylla, Kaulf. Enum. Fil. p. 273; Hook. & Arn. Bot. Beech. Voy. p. 162.

HAB. Vicinity of St. Clara, California: in pools of standing water.

The only difference we can detect between this and the preceding species consists in the much smaller size of the present plant; and perhaps the margins of the leaves are not quite so decidedly membranaceous.

CORRECTIONS.

- Page 8, line 10 from bottom, for "*stipitibus*," read *stipite*.
- 10, " 14 " " for "*Marginari*," read *Marginaria*.
- 11, " 4 " " for "*stipitibus*," read *stipite*.
- 11, " 3 " " for "*hirsutes*," read *hirsutis*.
- " " " " " for "*pennatis*," read *pinnatis*.
- " " " " " for "*valovato*," read *vel ovato*.
- 11, " 2 " " for "*subariculato*," read *subauriculato*.
- 12, " 11, for "*cultralum*," read *cultratum*.
- 14, " 12, for "35," read 25.
- 18, " 10 from bottom, for "*stipitibus*," read *stipite*.
- 20, " 9 " " for "47," read 74.
- 21, " 4, for "*sulcatus*," read *sulcatis*.
- 31, bottom line, for "13," read 23.
- 40, line 9, for "SYNAMLE," read SYNAMMÆ.
- 40, " 4 from bottom, for "436," read 346.
- 40, " 3 " " for "196," read 193.
- 47, " 5 " " for "ACUMINATA," read SYLVATICA.
- 68, " 3, add: (Tab. 9.)
- 68, after line 18, add: PLATE 9.—Fig. 1. Plant, of the natural size. 1 a. Sporangia. 1 b. Sporules.—The dissections magnified.
- 69, line 6 from bottom, close at 107, and add: *A. scolopendri-folium*, before Raddi, Plant. Brasil., &c.
- 92, " 5 from bottom, close at 162. Add: *H. spectabilis*, before Hook., &c.
- 93, " 7, for "p. 303," read 203.

- Page 117, line 19, for "ORINTHOPTERIS," read ORNITHOPTERIS.
121, " 3 from bottom, for "68," read 86.
146, " 5 " " for "*Thamnopteris*," read *Neottopteris*.
147, " 1, for "FEEJEENSIS," read FEEJEENSE.
170, " 1, for "FURCATUM," read BIPINNATUM: there is already
an *Asplenium furcatum*.
205, " 11, for "364," read 367.
207, " 2, for "75," read 57.
225, " 15, after "p. 175," add: t. 53.
226, " 5, for "MACRÆANA," read MACRÆANUM.
228, " 7, for "POLYPODIDOIDES," read POLYPODIOIDES.
244, " 13 from bottom, for "375," read 345.
266, " 7, for "FEEJEENSIS," read FEEJEENSE.
324, bottom line, for "306," read 360.
331, line 6 from bottom, after "Misc." add 2.

I N D E X.

SYNONYMES, AND THE NAMES OF GENERA AND SPECIES INCIDENTALLY MENTIONED,
ARE IN ITALIC.

A.

- Acropteris, 146, 156.
Acrostichieæ, 67.
Acrostichum *æmulum*, 71.
 alcicorne, 84.
 aureum, 82.
 biforme, 84.
 calomelanos, 25.
 danææfolium, 82.
 gorgoneum, 74.
 grande, 85.
 hybridum, 69.
 Lepidopteris, 33.
 Lingua, 74.
 obtusifolium, 73.
 Raddianum, 67.
 reticulatum, 81.
 scandens, 87.
 serratifolium, 87.
 sinuatum, 19.
 spathulinum, 67.
 splendens, 68.
 tartareum, 24.
 trifoliatum, 24.
 viscosum, 71.
Actinostachys *digitata*, 304.
Adenophorus *bipinnatus*, 12.
 hymenophylloides, 13.
 minutus, 13.
 pinnatifidus, 8.
 tamarisci, 12.
Adenophorus tripinnatifidus, 13.
Adiantum *affine*, 98.
 asarifolium, 95.
 assimile, 97.
 betulinum, 101.
Capillus-Veneris, 96.
caudatum, 95.
Chilense, 97.
conicum, 101.
cuneatum, 97.
formosum, 101.
fovearum, 99.
hispidulum, 98.
lunulatum, 95.
obtusum, 96.
paradoxum, 93.
patens, 100.
pedatum, 100.
pentadactylon, 101.
pubescens, 100.
radiatum, 93.
reniforme, 94.
scabrum, 96.
ternatum, 99.
triangulatum, 99.
trigonum, 97.
truncatum, 101.
Aglaomorpha *Meyeniana*, 56.
Allantodia australis, 174.
 Brunonis, 177.
 scandicina, 174.
 umbrosa, 173.

- Allosorus acrostichoides*, 19.
Alsophila australis, 284.
 caudata, 285.
 decurrens, 289.
 ferox, 284.
 hirsuta, 285.
 hirta, 285.
 lunulata, 285.
 Samoensis, 287.
 Tahitensis, 288.
 Tœnitis, 290.
 truncata, 289.
Anemia collina, 305.
 flexuosa, 306.
 fraxinifolia, 307.
 longifolia, 307.
 Mandiocana, 305.
 Phyllitidis, 307.
 radicans, 305.
 repens, 306.
Anemidietyon fraxinifolia, 307.
 Phyllitidis, 307.
Angiopteris attenuata, 310.
 evecta, 310.
Anisogonium decussatum, 177.
Antrophyum alatum, 64.
 angustatum, 63.
 plantagineum, 64.
 pumilum, 64.
 reticulatum, 63.
 subfalcatum, 65.
Aspidiææ, 178.
Aspidium aculeatum, 205.
 alatum, 179.
 argutum, 196.
 biserratum, 213.
 caryotideum, 184.
 coriaceum, 207.
 cyatheoides, 189.
 elongatum, 195.
 exaltatum, 211.
 falciculatum, 193.
 Filix-fœmina, 173.
 fragile, 233.
 Hippocrepis, 181.
 hirsutulum, 211.
 hispidum, 208.
Aspidium irregulare, 180.
 macrophyllum, 180.
 mohrioides, 203.
 molle, 186.
 munitum, 203.
 neriiforme, 213.
 obtusifolium, 210.
 patens, 193.
 pendulum, 211.
 pennigerum, 28.
 platyphyllum, 206.
 repandum, 179.
 resiniferum, 185.
 sinuatum, 182.
 splendens, 212.
 truncatulum, 209.
 umbrosum, 173.
 unitum, 189.
 varium, 183.
 velutinum, 198.
 venustum, 205.
 vestitum, 205.
Asplenieæ, 139.
Asplenium acutum, 166.
 acuminatum, 164.
 Adiantum-nigrum, 165.
 ambiguum, 142, 178.
 Amboinense, 147.
 anceps, 151.
 apicedentatum, 155.
 attenuatum, 160.
 australe, 173.
 bipinnatum, 170.
 Brasiliensis, 146.
 bulbiferum, 167.
 Canariense, 161.
 contiguum, 158.
 crenulatum, 146.
 cristatum, 163.
 cuneatum, 163.
 decussatum, 177.
 densum, 151.
 deparioides, 172.
 diplazioides, 144.
 dissectum, 170.
 distans, 155.
 dubium, 172.

Asplenium enatum, 153.
falcatum, 157.
Feejense, 147.
filiforme, 158.
Filix-fœmina, 173.
flabellifolium, 156.
flaccidum, 167.
fœniculaceum, 169.
furcatum, 162.
heterophyllum, 167.
horridum, 158.
imbricatum, 159.
inequilaterale, 149.
insiticum, 161.
laserpitiifolium, 166.
laxum, 168.
lucidum, 154.
Macræi, 159.
Magellanicum, 165.
marginatum, 177.
marinum, 150.
Martinicense, 161.
Menziesii, 151.
monanthemum, 151.
multifidum, 171.
multisectum, 174.
Nidus, 146, 175.
obliquum, 154.
obtusatum, 155.
palmatum, 148.
patens, 164, 165.
pavonicum, 150.
Phyllitidis, 176.
Poiretianum, 175.
protensum, 153.
pseudo-nitidum, 160.
pulchellum, 148.
rachirhizon, 166.
resectum, 149.
rhomboideum, 156.
riparium, 162.
salicifolium, 149.
scandicinum, 167.
scleroprium, 155.
semicordatum, 149.
simile, 152.
strictum, 168.

Asplenium tenerum, 149.
triphyllum, 159.
umbrosum, 173.
Athyrium australe, 174.
Filix-fœmina, 173.
Poiretianum, 175.
scandicinum, 174.
umbrosum, 173.
Azolla Magellanica, 342.
microphylla, 342.

B.

Balantium Brownianum, 273.
Bernhardia complanata, 319.
dichotoma, 319.
Blechnum australe, 129.
boreale, 123.
Brasiliense, 132.
calophyllum, 132.
cartilagineum, 130.
Corcovadense, 132.
Fluminense, 132.
Fontanesianum, 133.
glandulosum, 129.
gracile, 129.
hastatum, 130.
lanceolatum, 128.
occidentale, 129.
onocleoides, 124.
orientale, 132.
pallidum, 133.
polystichoides, 134.
procerum, 127.
squarrosum, 135.
stagninum, 132.
vittatum, 131.
volubile, 136.
Botrychium australe, 317.
fumarioides, 316.
lunarioides, 316.
obliquum, 316.
subbifoliatum, 317.
Virginicum, 317.
Zeylanicum, 318.

C.

- Cænopteris flaccida*, 167.
Callipteris Malabarica, 178.
 prolifera, 177.
Calmella, 291.
Calymmodon hirtus, 2.
Campium, 85.
Campteria, 104, 106.
Campyloneurum, 39.
Cassebeera, 91.
Ceratopteris thalictroides, 67.
Ceterach, 57.
 aspidioides, 26.
Cheilanthes ambigua, 91.
 arborescens, 89.
 Brasiliensis, 92.
 dissecta, 90.
 lentigera, 92.
 radiata, 93.
 spectabilis, 92.
 tenuifolia, 92.
 vestita, 91.
Chnoophora, 284.
Cibotium Chamissoi, 279.
 glaucum, 279.
 Menziesii, 280.
 proliferum, 240.
Cryptogramma acrostichoides, 19.
Ctenopteris, 3, 10.
Culcita, 273, 276.
Cyathea, 281.
Cyathea affinis, 283.
 canaliculata, 282.
 dealbata, 281.
 medullaris, 281.
Cyclodium, 185.
Cyrtogonium acuminatum, 86.
 palustre, 86.
 rivulare, 85.
 scandens, 87.
 serratifolium, 87.
Cyrtomium caryotideum, 184.
Cyrtophlebium decurrens, 39.
 nitidum, 39.
 repens, 39.
Cystopteris Douglasii, 232.

- Cystopteris fragilis*, 233.
 Sandwicensis, 234.
 Tasmanica, 233.

D.

- Darea flaccida*, 167.
 furcata, 170.
Davallia Blumeana, 227.
 Boryana, 225.
 Canariensis, 243.
 contigua, 241.
 Cumingii, 230.
 dubia, 273.
 elata, 247.
 elegans, 247.
 Emersoni, 240.
 Feejeensis, 246.
 flaccida, 238.
 gibberosa, 241, 248.
 gracilis, 235.
 heterophylla, 227.
 hirta, 239.
 inæqualis, 235.
 Kunzeana, 224.
 Lindeni, 241.
 patens, 247.
 pectinata, 229.
 pentaphylla, 241.
 polypodioides, 238.
 pulchella, 225.
 pycnocarpa, 242.
 pyxidata, 244.
 remota, 248.
 Schimperi, 241.
 solida, 244.
 Tahitensis, 245.
 tenuifolia, 248.
 trichosticha, 239.
Deparia Macraei, 240.
 prolifera, 240.
Dicksoniæ, 215.
Dicksonia adiantoides, 274, 275.
 Berteroana, 277.
 dubia, 273.
 Kaulfussiana, 239.

- Dicksonia polypodioides*, 238.
prolifera, 240.
repens, 225.
rubiginosa, 275.
scandens, 275.
Sellowiana, 277.
squarrosa, 276.
straminea, 273.
tenera, 275.
Torreyana, 278.
- Dielidopteris angustissima*, 135.
Dictyopteris attenuata, 57.
 irregularis, 57.
Didymochlæna sinuosa, 209.
Diellia erecta, 218.
 falcata, 219.
 pumila, 219.
Digrammaria ambigua, 178.
Diplazium acuminatum, 139.
 arborescens, 143.
 Arnottii, 144.
 bulbiferum, 141.
 congruum, 141.
 falcatum, 143.
 Malabaricum, 178.
 melanocaulon, 144.
 plantagineum, 139.
 proliferum, 140.
 pulcherrimum, 209.
 Shepherdi, 142.
 speciosum, 145.
- Dipteris*, 42.
Disphenia, 281.
Doodia aspera, 137.
 Kunthiana, 137.
Doryopteris decora, 103.
 pedata, 103.
 sagittifolia, 102.
 varians, 102.
- Drynaria acuminata*, 42, 47.
 alata, 48.
 alternifolia, 53.
 Billardieri, 51.
 coadunata, 49.
 crassifolia, 43.
 decurrens, 48.
 diversifolia, 55.
- Drynaria elongata*, 42.
 glauca, 54.
 Horsfieldii, 46.
 latifolia, 50.
 longifolia, 45.
 maxima, 51.
 obtusata, 44.
 palmata, 50.
 polycarpa, 44.
 pulverulenta, 43.
 pustulata, 52.
 quercifolia, 55.
 Spectrum, 46.
 sylvatica, 47.
 vulgaris, 53.
- E.
- Elaphoglossum æmulum*, 71.
 Feejeense, 72.
 gorgoneum, 74.
 hybridum, 69.
 intermedium, 69.
 Lingua, 74.
 longipes, 70.
 nitidum, 70.
 obtusifolium, 72.
 Raddianum, 67.
 Samoense, 68.
 splendens, 68.
 Tahitense, 73.
 viscosum, 71.
- Ellobocarpus oleraceus*, 67.
Eupodium Kaulfussii, 313.
Eupteris, 111.
- F.
- Filix non ramosa*, etc., 25.
- G.
- Gleicheniaceæ*, 291.
Gleichenia acutifolia, 293.
 bifida, 295.
 dichotoma, 297.
 flabellata, 293.
 flagellaris, 294.

- Gleichenia glauca*, 292.
glaucescens, 296.
heciostophylla, 291.
Hermanni, 296, 297.
Klotzschii, 297.
Owhyhensis, 295.
pubescens, 296.
rupestris, 291.
semivestita, 292.
Gleichenia vestita, 295.
vulcanica, 291.
Goniophlebium albo-punctatum, 35.
angustifolium, 33.
aurisetum, 31.
Catharinæ, 34.
ensifolium, 33.
hirsutissimum, 33.
incanum, 32.
lætum, 34.
neriifolium, 34.
serratifolium, 35.
Tweedianum, 32.
vacciniifolium, 31.
Goniopteris costata, 28.
glandulifera, 29.
longissima, 29.
pennigera, 28.
vivipara, 27.
Grammitis australis, 2.
elongata, 41.
involuta, 58.
nana, 1.
polypodioides, 25.
serrulata, 2.
tenella, 3.
totta, 25.
Gymnogramma calomelanos, 25.
Chilense, 22.
Javanicum, 23.
Lovei, 25.
myriophyllum, 23.
pilosum, 22.
tartareum, 24.
tomentosum, 21.
triangulare, 23.
trifoliatum, 24.
Gymnopteris, 73.
Gymnopteris spicata, 88.
Gymnosoreæ, 241.

H.
Haplopteris, 59.
Helminthostachys dulcis, 318.
Hemidictyon marginatum, 177.
Hemionitis dealbata, 24.
elongata, 66.
humilis, 21.
immersa, 64.
reticulata, 63.
tomentosa, 21.
Hemitelia, 288.
Humata botrychioides, 231.
Cumingii, 230.
ophioglossa, 227.
parallela, 229.
pectinata, 229.
polypodioides, 228.
serrata, 230.
Hydroglossum circinatum, 299.
polycarpum, 301.
scandens, 299.
volubile, 300.
Hydropterides, 340.
Hymenocystis, 190.
Hymenolepis ophioglossoides, 88.
Hymenophyllum abietinum, 270.
affine, 265.
asplenioides, 262.
caudiculatum, 271.
ciliatum, 263.
demissum, 272.
dilatatum, 268.
Feejeense, 266.
Filicula, 252.
flabellatum, 272.
flexuosum, 271.
formosum, 268.
fucoides, 268.
gracile, 270.
lanceolatum, 263.
minimum, 264.
Neesii, 266.
nitens, 272.

- Hymenophyllum obtusum*, 263.
 polyanthos, 270.
 recurvum, 269.
 secundum, 266.
 tortuosum, 267.
 Tunbridgense, 264.
 Wilsoni, 264.
Hypolepis coniiifolia, 92.
 dissecta, 89.
 rugulosa, 90.
 tenuifolia, 89.
- I.
- Isoloma lanuginosa*, 215.
- J.
- Jenkinsia*, 85.
- L.
- Lastrea æmula*, 200.
 arguta, 196.
 articulata, 191.
 attenuata, 193.
 davallioides, 202.
 distans, 192.
 elongata, 195.
 falciculata, 193.
 glabella, 199.
 glabra, 200.
 globulifera, 194.
 latifrons, 196.
 pallens, 197.
 patens, 193.
 rubiginosa, 201.
 squamigera, 198.
 tenuifolia, 199.
 truncata, 195.
 velutina, 198.
- Lepicystis*, 32.
Leptochilus, 88.
- Leptogramma asplenioides*, 26.
 Lovei, 25.
 polypodioides, 25.
- Leptostegia*, 120.
- Lindsæa davallioides*, 224.
 Gardneri, 221.
 lanuginosa, 216.
 linearis, 220.
 lunata, 220.
 microphylla, 220.
 nitens, 222.
 nitidissima, 222.
 oblongifolia, 221.
 recurvata, 222.
 rigida, 222.
 tenuifolia, 227.
- Lindsæa trapeziformis*, 222.
 trichomanoides, 221.
- Litobrochia*, 102.
- Litobrochia comans*, 105.
 decurrens, 106.
 denticulata, 105.
 divaricata, 108.
 elegans, 108.
 grandifolia, 105.
 intermedia, 107.
 macilenta, 106.
 pedata, 103.
 polita, 107.
 sinuata, 110.
 vespertilionis, 109.
- Lomagramma polyphylla*, 83.
 pteroides, 83.
- Lomaria alpina*, 123.
 capensis, 127.
 Chilensis, 126.
 coriacea, 122.
 discolor, 121, 127.
 doodioides, 124.
 filiformis, 77.
 Fraseri, 128.
 Gilliesii, 126.
 lanceolata, 121.
 longifolia, 75.
 Magellanica, 126.
 melanocaulon, 122.
 nuda, 125.
 onocleoides, 124.
 pilosa, 125.
 polypodioides, 123.

Lomaria procera, 127.
 scandens, 77.
 setigera, 126.
 spicant, 123.
 spicata, 88.
 variabilis, 76.
Lonchitis glabra major, 150.
 polypodioides, 27.
Lopholepis, 31.
 Lycopodiaceæ, 319.
Lycopodium acerosum, 324.
 acrostachyum, 325.
 albidulum, 335.
 apodum, 335.
 Arbuscula, 333.
 aristatum, 329.
 atro-viride, 334.
 Brasiliense, 335.
 calostachyum, 335.
 cataphractum, 336.
 cernuum, 325.
 ciliare, 335.
 clavatum, 329.
 clavatum, 328.
 complanatum, 330.
 cupressinum, 336.
 curvatum, 325.
 densum, 324.
 denticulatum, 338.
 depressum, 338.
 dichotomum, 323.
 erubescens, 320.
 filiforme, 324.
 flagellaria, 325.
 Haleakalea, 321.
 heterophyllum, 330.
 laterale, 324.
 laxum, 325.
 linifolium, 322.
 lucidulum, 322.
 Magellanicum, 329.
 Mandiocanum, 323.
 marginatum, 337.
 Menziesii, 333.
 mirabile, 326.
 myosuroides, 338.
 nummularifolium, 328.

Lycopodium nutans, 327.
 pachystachyon, 326.
 patulum, 335.
 Phlegmaria, 326.
 phyllanthum, 326.
 piliferum, 328.
 pinifolium, 328.
 plusumom, 337.
 polytrichoides, 323.
 Pouzolcianum, 333.
 reflexum, 321.
 rigidum, 321.
 rotundifolium, 328.
 rupestre, 331.
 selago, 322.
 squarrosum, 323.
 stoloniferum, 337.
 sulcatum, 337.
 sulcinervium, 322.
 thyoides, 330.
 uliginosum, 332.
 varium, 326.
 venustulum, 329.
 verticillatum, 324.
 volubile, 331.
Lygodictyon Schkuhrii, 301.
 Forsterii, 301.
Lygodium articulatum, 300.
 circinatum, 299.
 hirtum, 300.
 lucens, 300.
 microphyllum, 299.
 pubescens, 300.
 reticulatum, 301.
 tenue, 300.
 volubile, 300.

M.

Marattiaceæ, 310.
Marattia alata, 311.
 alata, 313.
 cicutæfolia, 312.
 fraxinea, 312.
 sorbifolia, 312.
Marginaria, 3, 31.
Marsilea natans, 341.

- Marsilea polycarpa*, 341.
 quadrifolia, 340.
 vestita, 340.
 villosa, 340.
Matonia pectinata, 178.
Meniscium reticulatum, 27.
 sorbifolium, 27.
Mertensia acutifolia, 293.
 bifida, 295.
 Brasiliana, 296.
 dichotoma, 297.
 emarginata, 297.
 emarginata, 296.
 flabellata, 293.
 flagellaris, 294.
 glabra, 292.
 glauca, 292.
 glaucescens, 296.
 Hawaiensis, 295.
 Klotzschii, 297.
 pubescens, 296.
 subflabellata, 294.
 vestita, 295.
Microlepia gracilis, 235.
 hirta, 239.
 inæqualis, 235.
 papillosa, 237.
 polypodioides, 238.
 tenuis, 236.
 trichosticha, 239.
Microsorium, 42.
Mohria thurifraga, 307.
Monochlæna sinuosa, 209.
Myriothea, 311.
- N.
- Neottopteris Nidus*, 175.
 Phyllitidis, 176.
Nephrodium apifolium, 182.
 cyatheoides, 189.
 Dubrucilianum, 189.
 elongatum, 195.
 exaltatum, 211.
 Gaimardianum, 229.
 glabellum, 199.
 hirsutulum, 211.
 Nephrodium Hudsonianum, 188.
 molle, 186.
 pendulum, 211.
 propinquum, 185.
 pubescens, 186.
 resiniferum, 185.
 splendens, 212.
 squamigerum, 198.
 transversarium, 187.
 unitum, 189.
 Nephrolepis biserrata, 213.
 exaltata, 211.
 hirsutula, 211.
 obtusifolia, 210.
 pendula, 211.
 repens, 209.
 splendens, 212.
 Neuronia, 213.
 Niphobolus adnascens, 38.
 bicolor, 37.
 carnosus, 36.
 glaber, 38.
 rupestris, 36.
 varius, 38.
 Nothoclæna glabra, 21.
 hirsuta, 20.
 pilosa, 20.
 sinuata, 19.
 tenera, 20.
- O.
- Odontoloma Boryanum*, 225.
 Macraeanum, 226.
 pulehellum, 225.
 tenuifolium, 227.
Oleandra hirta, 214.
 neriiformis, 213.
Olfersia æmula, 71.
 Blumeana, 73.
 Corcovadensis, 81.
 gorgonea, 74.
 Lingua, 74.
 viscosa, 71.
Onychium densum, 120.
Ophioglossæ, 314.
Ophioglossum concinnum, 315.

- Ophioglossum ellipticum*, 314.
 elongatum, 315.
 pendulum, 316.
 reticulatum, 315.
 scandens, 300.
 vulgatum, 314.
Ornithopteris, 117.
Osmundaceæ, 308.
Osmunda spectabilis, 308.

P.

- Patania*, 273.
Phegopteris, 13.
Phlebodium angustatum, 41.
 aureum, 41.
 elongatum, 41.
 percussum, 40.
Photinopteris Horsfieldii, 88.
Phyllitis ramosa trifida, 24.
Phymatodes, 42.
Pinonia splendens, 279.
Platyterium alaicorne, 84.
 biforme, 84.
Platyloma andromedæfolia, 94.
 Brownii, 93.
 rotundifolia, 93.
 ternifolia, 94.
Pleopeltis, 40.
Pleopeltis elongata, 43.
 percussa, 40.
Plocnemia Leuceana, 184.
Pœcilopteris fraxinifolia, 87.
Polybotrya exaltata, 78.
 marattioides, 79.
 osmundacea, 80.
 Wilkesiana, 80.
Polypodiaceæ, 1.
Polypodieæ, 1.
Polypodium aculeatum, 284.
 Adenophorus, 8.
 adnascens, 38.
 albo-punctatum, 35.
 alternifolium, 54.
 angustifolium, 33.
 atro-punctatum, 43.
 attenuatum, 57.

- Polypodium aureum*, 41.
 aurisetum, 31.
 axillare, 285.
 Billardieri, 51.
 Catharinæ, 34.
 caudatum, 14.
 conforme, 4.
 contiguum, 241.
 contiguum, 6.
 Corcovadense, 290.
 coriaceum, 43.
 crassifolium, 43.
 crinale, 15.
 cultratum, 12.
 decorum, 7.
 decurrens, 39.
 Dipteris, 46.
 divergens, 18.
 diversifolium, 51, 55.
 ensifolium, 33.
 formosum, 14.
 glaucum, 34.
 grossum, 53.
 Haalilianum, 5.
 hirsutissimum, 33.
 Hookeri, 4.
 hymenophylloides, 13.
 incanum, 32.
 intermedium, 9.
 Keraudrenianum, 15.
 laphathifolium, 39.
 lætum, 34.
 latifolium, 50.
 Leuceanum, 184.
 lunulatum, 286.
 majus aureum, 41.
 minimum, 5.
 nemorale, 16.
 neriifolium, 34.
 nitidum, 39.
 pallidum, 18.
 palmatum, 50.
 paradisææ, 11.
 pellucidum, 10.
 pendulum, 8.
 percussum, 40.
 phymatodes, 51, 53.

- Polypodium pleopeltifolium*, 41.
Plumula, 11.
polycarpon, 44.
procerum, 14.
pseudo-grammitis, 3.
pustulatum, 52.
quercifolium, 55.
reclinatum, 11.
repens, 39.
rugulosum, 17.
rupestre, 36.
Sandwicense, 17.
sarmentosum, 8.
Scouleri, 9.
sepultum, 33.
setigerum, 4.
Spectrum, 46.
stellatum, 37.
subspathulatum, 3.
tamariscinum, 12.
Tænitis, 290.
tenellum, 12.
Thouinianum, 46.
trilobum, 30.
tripinnatifidum, 13.
Tweedianum, 32.
unidentatum, 17.
vacciniifolium, 31.
vestitum, 13.
vulgare, 9.
- Polystichum aculeatum*, 205.
æmulum, 200.
coriaceum, 206.
discolor, 207.
Dubrueilianum, 189.
falciculatum, 193.
Haleakalense, 204.
hispidum, 208.
Lonchitis, 203.
mohrioides, 203.
molle, 186.
munitum, 203.
platyphyllum, 206.
propinquum, 185.
venustum, 205.
vestitum, 205.
- Prosaptia contigua*, 241.
- Prosaptia Emersoni*, 240.
- Psilotum complanatum*, 319.
triquetrum, 319.
- Psygmiium elegans*, 56.
- Pteridææ*, 89.
- Pteris adiantoides*, 96.
affinis, 116.
alata, 116.
andromedæfolia, 94.
aquilina, 119.
arachnoidea, 118.
arguta, 116.
Blumeana, 115.
comans, 105.
chrysocharpa, 116.
crenata, 114.
cretica, 113.
decomposita, 119.
decurrens, 106.
denticulata, 105.
elegans, 108.
esculenta, 117.
excelsa, 115.
geraniifolia, 111.
grandifolia, 105.
hirsuta, 20.
intermedia, 107.
irregularis, 116.
laciniata, 111.
lanuginosa, 119.
longifolia, 112.
macilenta, 106.
nemoralis, 114.
normalis, 115.
palmata, 105.
pedata, 103.
pellucida, 113.
Pohliana, 111.
polita, 107.
rotundifolia, 93.
sagittifolia, 102.
scaberula, 117.
scabra, 115.
semihastata, 119.
serrata, 105.
stenophylla, 113.
stipularis, 112.

Pteris subverticillata, 94.
sulphurea, 111.
tenuifolia, 112.
terminalis, 115.
ternifolia, 94.
thalictroides, 67.
tremula, 116.
umbrosa, 113.
varians, 102.
vespertilionis, 109.

R.

Rhipidopteris, 78.
Ruta-Muraria, etc., 163.
Rumohra aspidioides, 207.

S.

Saccoloma Boryana, 225.
Sadleria cyatheoides, 133.
pallida, 133.
Sagenia apiifolia, 182.
Hippocrepis, 181.
varia, 183.
Salpichlæna volubile, 136.
Salvinia Azolla, 342.
biloba, 341.
rotundifolia, 341.
Schizæaceæ, 299.
Schizæa australis, 302.
bifida, 303.
cristata, 304.
dichotoma, 303.
digitata, 304.
palmata, 302.
pectinata, 301.
propinqua, 302.
trilateralis, 304.
Schizoloma Agatii, 216.
Selaginella apus, 334.
Arbuseula, 332.
atro-viridis, 334.
ciliaris, 335.
cupressina, 336.
deflexa, 332.
denticulata, 338.

Selaginella Menziesii, 333.
myosuroides, 338.
nana, 336.
Pouzolzia, 333.
rupestris, 331.
suaavis, 328.
sulcata, 337.
uliginosa, 331.
Selliguea aliena, 58.
involuta, 58.
plantaginea, 58.
Sitolobium adiantoides, 273.
dubium, 273.
rubiginosum, 275.
Samoense, 274.
scandens, 275.
stramineum, 273.
tenerum, 275.
Stegania alpina, 123.
lanceolata, 121.
procera, 127.
Stegnogramma Sandwicense, 26.
Stenochlæna Feejeensis, 78.
heteromorpha, 77.
oleandræfolia, 75.
longifolia, 75.
scandens, 77.
variabilis, 76.
Synammia triloba, 30, 40.
Synaphlebium davallioides, 224.
Pickeringii, 223.
pulehram, 223.
recurvatum, 222.

T.

Tæniopsis graminifolia, 60.
Richiana, 60.
Tæniopteris, 59.
Tænitis blechnoides, 59.
Tectaria, 202.
Tegularia, 208.
Thamnopteris, 175.
Thelypteris, 191.
Tmesipteris Forsteri, 319.
Tannensis, 319.
Todea Africana, 308.

- Todea hymenophylloides*, 308.
 pellucida, 308.
 Wilkesiana, 309.
- Trichomanes achilleæfolium*, 260.
 alatum, 261.
 album, 254.
 anceps, 258.
 brachypus, 255.
 caudatum, 256.
 Draytonianum, 252.
 elongatum, 261.
 erectum, 250.
 exaltatum, 259.
 Filicula, 252.
 fœniculaceum, 256.
 humile, 252.
 Javanicum, 261.
 longisetum, 260.
 Mandiocanum, 260.
 meifolium, 256, 259.
 melanorhizon, 253.
 muscoïdes, 249.
 Neesii, 266.
 parvulum, 250.
 polyanthos, 258.
 pyxidiferum, 251.
- Trichomanes radicans*, 254, 255.
 reniforme, 249.
 rigidum, 260.
 Smithii, 257.
 tenue, 251.
- Trichopteris excelsa*, 290.
- V.
- Vittaria elongata*, 62.
 ensiformis, 60.
 graminifolia, 60.
 intermedia, 61.
 plantaginea, 62.
 rigida, 61.
- W.
- Woodsia Ilvensis*, 190.
 incisa, 190.
- Woodwardia Chamissoi*, 138.
 radicans, 138.
- X.
- Xiphopteris serrulata*, 2.

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