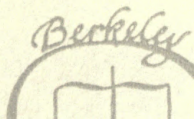
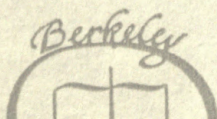
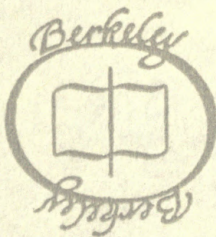
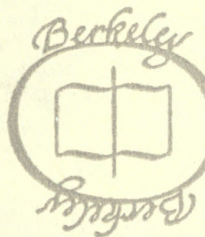
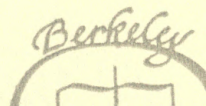
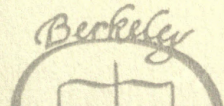
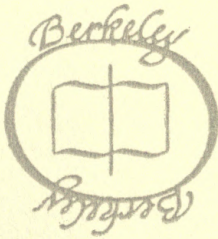
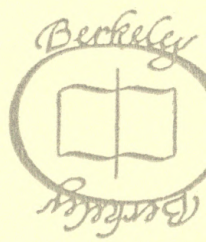
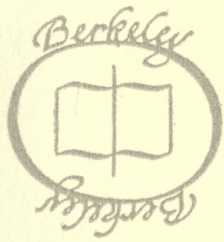
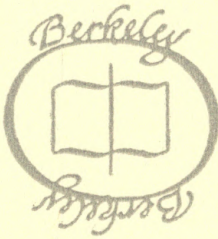
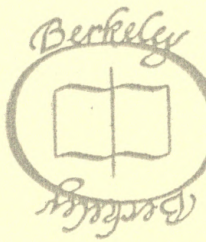
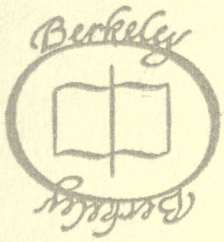


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SYNOPSIS FILICUM;

OR,

A SYNOPSIS OF ALL KNOWN FERNS.





# SYNOPSIS FILICUM;

OR,

# A SYNOPSIS OF ALL KNOWN FERNS,

INCLUDING THE

OSMUNDACEÆ, SCHIZÆACEÆ, MARATTIACEÆ, AND  
OPHIOGLOSSACEÆ

(CHIEFLY DERIVED FROM THE KEW HERBARIUM).

ACCOMPANIED BY FIGURES

REPRESENTING THE ESSENTIAL CHARACTERS OF EACH GENUS.

BY THE LATE

SIR WILLIAM JACKSON HOOKER, K.H.,

D.C.L., F.R.S., A.S., AND L.S.,

DIRECTOR OF THE ROYAL GARDENS OF KEW,

AND

JOHN GILBERT BAKER, F.L.S.,

ASSISTANT CURATOR OF THE KEW HERBARIUM.



LONDON:

ROBERT HARDWICKE, 192, PICCADILLY.

1868.

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## EDITOR'S PREFACE.

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WHILST the sheet which terminates at page 48 was passing through the press, Sir W. Hooker's long career of botanical authorship was somewhat unexpectedly terminated by his death. This is not the place to enlarge upon the services which in many different ways he rendered to botanical science, or to do more than allude to the regret which will be felt by many who had waited for this long-planned work, that he was not spared to complete it. I need only say that having been honoured by Dr. Hooker with the request that I should carry it out, and having been entrusted by him with the manuscript notes prepared by his father, and the copy of the "Species Filicum" annotated in contemplation of this work, and having had full access to the specimens from which the descriptions in the "Species Filicum" were made, I have done my best to carry out this "Synopsis" to a conclusion in strict accordance with the original plan.

The principal collection which we have received at Kew since the original preface was written is a beautiful series of the ferns of New Granada, gathered by MM. Lindig and Triana, for which we have to thank the authorities of the Paris Museum. This contained a considerable number of new species, which were described by Professor Mettenius, whose loss in the prime of life we have also had to deplore since the work was commenced. For other novelties we have also to thank Lady Barkly, Dr. Thwaites, and Mrs. Lyell. Partly in consequence of these additions, we have been obliged to extend the work to ten parts instead of nine, as was planned originally. The total number of species admitted and described is 2,235.

A paper by myself, containing a summary of the leading features of fern-geography, based upon this work, will appear in the part for 1868 (vol. xxvi. part i.) of the "Transactions of the Linnean Society."

J. G. BAKER.

Kew, February, 1868.

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PHYSICS DEPARTMENT  
5300 S. DICKINSON DRIVE  
CHICAGO, ILLINOIS 60637



## PREFACE.

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THE Author, having recently completed his "Species Filicum,"\* now offers to the public a "Synopsis of all known Ferns," which contains, besides brief diagnoses of the species described more in detail in that work, together with their geographical distribution as far as yet ascertained, such additions and corrections as have come to his knowledge, together with an account of the Sub-Orders OSMUNDACEÆ, SCHIZÆACEÆ, MARATTIACEÆ, and OPHIOGLOSSACEÆ. He does not, however, propose to include the *Lycopodiaceæ*, *Salviniaceæ*, *Marsileaceæ*, *Isoetaceæ*, and *Equisetaceæ*, which differ much from these, and it may be said from each other, and which have of late engaged the study of several able monographers. He further intends to depart from the scope of the "Species Filicum" in another point, which requires a few words of explanation.

In the Introduction to the "Species Filicum," the Author stated that he had included in that work a considerable number of imperfectly described species, of which he had seen neither specimens nor figures, solely because they had been proposed by authors of reputation. These he now thinks it desirable to omit. No doubt many are described under different names; of others there is no prospect of anything further being known; and of all the characters are so vague, or imperfect, or prolix, that it is impossible to define them by brief diagnostic characters, such as alone are suited to the pages of a *Synopsis*.

After upwards of half a century, more or less continuously passed in the study of Ferns in the richest Herbarium of that Order in the world (his own), and latterly with the aid of the finest in cultivation (that of the Royal Gardens of Kew);† and after the devotion of fully half that number

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\* In 5 vols. 8vo, with 300 plates representing upwards of 500 species.

† The formation of this fine collection is mainly due to the exertions and ability of Mr. John Smith, who for forty-three years held an important position among the officers of the Royal Gardens. His knowledge of Ferns, and his writings upon them, justly entitle him to rank among the most distinguished Pteridologists of the present day.



of years to the preparation and publication of the "Species Filicum" and other works on the same subject, the Author feels satisfied that these doubtful and imperfectly described species form the greatest obstacle to any satisfactory advance in descriptive Pteridology.\* He may, indeed, point with satisfaction to the fact, that before he undertook his work their number was many times greater than that still cumbering the volumes. But there is little satisfaction in the reflection that for the identification of a great majority the Author is indebted more to some happy accident, to the possession of copious and varying suites of specimens, or to circumstances connected with the history or locality of the species, than to their published descriptions or to scientific evidence.

There have been two fruitful sources of these "bad species":—the first, the idea that geographical limits must limit the dispersion of species; the second, that any single characteristic, however minute, if only either constant or prevalent in a given area, is of specific value. Such arbitrary conclusions have led to the well-known *Osmunda regalis* receiving different names in many different countries, and to the forms of our *Aspidium* (*Polystichum*) *aculeatum* having even more names in our own country, and still others in exotic regions. The errors arising from the first are corrected as rapidly as botanical and geographical discoveries advance together; but it is not so with those due to the second source, for the difficulty of limiting these variable species is so great, that it often becomes impossible to frame such diagnoses as shall include all the varieties of one species, and exclude the varieties of another closely allied species. In all these cases we must trust to time and experience to test our conclusions; and such difficulties should teach us to look with indulgence on the views of those who differ in opinion from ourselves.

The same remarks apply to the genera as to the species of Ferns; the former having been, in the Author's opinion, unnecessarily multiplied. It

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\* In connection with Fern history, Mr. Thomas Moore undertook the publication of an extremely useful work under the title of "Index Filicum," to consist of a Synopsis, with characters of the genera, and an enumeration of the species of Ferns, with synonyms, references, &c. &c., accompanied by excellent outline figures of the genera. It is compiled with great industry and ability, and enumerates in an alphabetical arrangement of the genera, from *Acrophorus* to *Goniophlebium* inclusive, 1,730 species of true Ferns. The list of synonyms, both of genera and species, shows at a glance how much Pteridologists have been at variance on these points. The species enumerated in our "Species Filicum" amount to 2,401; according to Mr. Moore, the number of known Ferns would be 2,782.

is the case here as with other scientific systems : those are the best characters which lead to a knowledge of the object sought for in the nearest and clearest way, keeping in view also as much as possible its natural affinities. The difficulties certainly are greater in the cryptogams than among the flowering plants, because their characters are fewer, and the forms of their organs more variable as regards size and shape.

In regard to the genera, the publisher has judiciously desired that nine plates should be devoted to their illustration. They are all drawn from nature by the talented Mr. Fitch, F.L.S., and on the same plan as the plates of Ferns in Hooker and Arnott's late editions of the "British Flora."

References are given to the volumes and pages of the "Species Filicum" for fuller characters of the genera and species, as well as for figures, more precise localities, and more copious observations ; and it is hoped that the present volume will form a useful *vade-mecum* for the travelling botanist and the cultivator of Ferns, and for ready consultation in the Herbarium.

The Author cannot close these introductory remarks without expressing his acknowledgments to numerous friends and correspondents for their valuable communications of specimens (often accompanied by notes) from various parts of the world. Many of these are recorded under their habitats (or localities) in his former work ; and a repetition of them would be out of place in this. But space must still be found for the names of those persons to whom we are indebted for the discovery of any new species, or any new or interesting locality in connection with the geographical distribution of plants.

The commencement of the Author's formation of a Fern-Herbarium dates as far back as 1811, with the correspondence of the illustrious Swartz, only four years after the publication of his invaluable "Synopsis Filicum ;" a model for future works of the kind. It is, however, from comparatively new and distant regions, which have been within the last half century so extensively explored by our men of science, that the most important collections have been derived, and to these botanists and travellers he is anxious thus to express his obligations : —

From the *East Indies*, including the *Malay Peninsula* and *Islands* :—  
From Wallich, Buchanan, Hamilton, Hooker fil. and Thomson, Gideon Thomson, Beddome, Lady Dalhousie, Anderson, Falconer, Jamieson, Edgeworth, Sir Frederick Adam Jacquemont, Blume, Miquel, De Vriese, Teijsmann, Sir William Norris, Thomas Lobb, Cuming, Wallace, Low,

Hindes, Barber, Parish, Teschemacher, Motley, Millett, Wight, Stocks, Helfer, McIvor.

*Ceylon* :—General and Mrs. Walker, Gardner, Thwaites, Emerson.

*Pacific Islands* :—Forster, Menzies, Chamisso, Beechey, Brackenridge, Seemann, Vieillard and Deplanche and Lenormand (from *N. Caledonia*), Hillebrand, Rev. T. Powell, Milne and MacGillivray (in Denham's voyage), Sinclair, Bidwill, Harvey, Labillardiere, Macrae, Nightingale, Barclay, Lay and Collie, Diell, Bennett, Douglas.

*Africa, East and West*, including the principal *Islands* in the *Atlantic*, and on the east side, such as *Madagascar, Mauritius, Bourbon, Seychelles, Johanna, &c.* :—Pappe and Rawson, Ecklon, Zeyher, Burke, Harvey, Admiral Sir Fred. Grey, Telfair, Sir Henry and Lady Barkly, Bojer, Ayres, Bouton, Carmichael, Kirk, Meller, Livingstone, Speke and Grant, Mann, Barter (in Baikie's exped.), the two Vogels, Webb, Lowe, Lyall, Forbes, Petit-Thouars, Mund, Krauss, Saltzmann, Schimper, Miller, Browne, Col. Blgrave, Gerrard, Vilette, Atherstone, Sanderson, Sutherland, Melliss, Haughton, Gueinzius, Plant, Ansell, Curror, Hutton, Bowie, Alexander Prior, Swinburne Ward (*Seychelles*).

*China, Japan, and Formosa* :—Brackenridge, Alexander, Hance, Vachell, Oldham, Wilford, Champion, Urquhart, Loraine, Ringgold and Rogers, C. Wright, Hodgson, Babington, Swinhoe, Taite.

*South America*, from *Mexico* to the extreme south of that continent, including the *West Indian Islands* :—Swartz, Bancroft, Bertero, Poeppig, Richard, Bridges, King, Jameson, Mathews, Skinner, Gardner, Sellow, Tweedie, Galeotti, Imray, Hostmann, Linden, Martius, C. Wright, Chamisso, Lockhart, Schiede and Deppe, Moricand, Guilding, Wiles, Parker, Sir Hercules Robinson, Beyrich, Shach, Distin, Schomburgk, Appun, Raddi, Macfadyen, Purdie, Boog, Salzman, Hartweg, Wm. Lobb, Miers, Ruiz and Pavon, Goudot, Humboldt, Blanchet, Burchell, Darwin, Le Prieur, Tweedie, Vautier, Spruce, Consul Glennie, Swainson, Funck, Wilson, Liebmann, L'Herminier, Claussen, Hindes, Jürgensen, MacLean, Alexander Prior, Moritz, Andrieux, Fendler, Schlim, Heward, Otto, Holton, Jervisse, Sir Charles Bunbury, Philippi, Cuming, Lechler, March, Germain, Hayes, Salvin and Godman, Cruickshanks.

*North America, United States, Canada, and British Columbia*, to the extreme *Arctic shores and Islands* :—Pursh, Douglas, T. Drummond, Bourgeau, Torrey, Short, Asa Gray, Peters, Menzies, Franklin, Parry, Ross (uncle and nephew), Richardson, and various officers of all the Government Arctic expeditions, Lyall, Booth, Scouler, Tolmie, Macoun,



Mrs. Percival, Eaton, Bigelow, Nuttall, Greene, Chapman, Bridges, Geyer, Goldie.

*Australia and New Zealand* :—Brown, Müller (including his own collections and those of the various Government explorations in Australia), Hill, Sieber, C. Moore, Allan and Richard Cunningham, Gunn, Lawrence, Archer, Backhouse, Harvey, Bynoe, Fraser, Js. Drummond, Heward, Simmons, Beckler, Colenso, Dieffenbach, Edgerley, Sinclair, Lyall, Raoul, Haast, Bidwill, Travers, Maling, Hector and Buchanan, Miss Nelson, Mrs. Jones, Bolton, Menzies, Stephenson, Jolliffe, Munro, Robertson.

Many of the above explorers have sent collections from other countries they have visited, besides those under which their names stand ; and it should be observed that this list does not include the names of numerous travellers who have rendered themselves useful by disposing of their collections to botanists.

ROYAL GARDENS, KEW,

*April*, 1865.

LIST OF ABBREVIATIONS OF WORDS OF FREQUENT OCCURRENCE IN THE FOLLOWING PAGES.

BOTANICAL TERMS.

*Caud.* = caudex, from which arises the frond or stipes.

*St.* = stipes, or stipites, which support the frond.

*Fr.* = frond, or fronds.

*Pinnl.* = pinnule, or pinnules.

*Invol.* = involucre, by many botanists called indusium.

*Recept.* = receptacle, that which bears the sori or capsules; prominent in most *Cyathea*; elongated and columnar, or even bristle-shaped, in *Hymenophyllum* and *Trichomanes*.

*Caps.* = capsule, or capsules.

*Segm.* = segment, segments, or lobes: often used indifferently; but a segment generally indicates a deeper or more elongated lobe.

*Prim.* = primary, or first division of a compoundly pinnate or pinnatifid frond; thus prim. div., or prim. pinna or pinnl.

*Second.* = secondary; the second principal division, or pinna, of a frond.

MEASURES OF LENGTH.

*Ft.* = foot, or feet.

*In.* = inch, or inches.

*lin.* = line,  $\frac{1}{12}$  of an inch.

*l.* = long; thus, 1 in. l., 1 ft. l.

*w. br.* = wide or broad; thus, 1 line w. or 1 in. br.

AUTHORS' NAMES AND THEIR WORKS.

*W.* = Willd. = Willdenow. Thus, *W. Sp.* = Willdenow's Species Plantarum.

*Sw.* = Swartz; generally, unless when otherwise mentioned, referring to his Synopsis Filicum.

*Schk.* = Schkuhr, as *Schk. F.* = Schkuhr's Filices.

*Kze. in Schk.* = Kunze, in *Schk. Fil. Suppl.*

*Hk. Sp.* = Hooker, Species Filicum.

*Hk. et Gr. F.* = Hooker and Greville's Icones Filicum.

*Hk. Ic.* = Hooker, Icones Plantarum.

*Hk. Cent. F.* = Hooker's Century of Ferns, which corresponds with vol. 10 of Icones Plantarum.

*Hk. F. Ex.* = Hooker's Filices Exoticæ.

*Hk. G. P.* = Hooker's Garden Ferns.

*Hk. 2d. Cent. F.* = Hooker's 2d. Century of Ferns.

*Hab.* = habitat, or locality, indicating the native country of the species.

Names of countries are so commonly abbreviated in descriptive Botany, that they scarcely need explanation: *N. Am.* = North America, *S. Am.* = South America, &c. &c. *Malaya* = Malay Islands and Archipelago. "India" generally implies the British possessions of the mainland, exclusive of *N. Ind.* = North India, chiefly comprising the Himalayan range, and exclusive of the Indian islands. *Mex.* = Mexico. *Pacif.* = Islands of the the the Pacific, unless otherwise expressed, &c. &c.

TABLE OF THE ARRANGEMENTS OF THE ORDERS AND GENERA OF THE TRUE FERNS IN THE FOLLOWING PAGES, WITH REFERENCES TO THE NUMBERING OF EACH GENUS, AND TO THE FIGURES OF THE GENERA ON THE PLATES.

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SUB-ORD. II. POLYPODIACEÆ. GEN. 3—61. TAB. I. f. 3—12, and  
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TAB. I. f. 4. GEN. 5. *Hemitelia*. TAB. I. f. 5. GEN. 6. *Alsophila*.  
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*Sphaeropteris*. TAB. I. f. 12. GEN. 13. *Dicksonia*. TAB. II. f. 13.  
GEN. 14. *Deparia*. TAB. II. f. 14.

TRIBE III. HYMENOPHYLLÆ. GEN. 15. *Loxsonia*. TAB. II. f. 15. GEN.  
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TRIBE V. LINDSAYÆ. GEN. 20. *Lindsaya*. TAB. II. f. 20. GEN. 20 *bis*,  
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*gramme*. TAB. III. f. 29. GEN. 30. *Pellaea*. TAB. III. f. 30. GEN.  
31. *Pteris*. TAB. III. f. 31. GEN. 32. *Ceratopteris*. TAB. III. f. 32.  
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\* The numbering which precedes each genus corresponds with the number of the genus in the following pages; and it may be observed that the same numbering corresponds with the respective compartments on the plates, the compartments bearing the same numeral as that of the genus.



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TRIBE VIII. ASPLENIEÆ. GEN. 38. *Asplenium*. TAB. IV. f. 38. GEN. 39. *Allantodia*. TAB. IV. f. 39. GEN. 40. *Actiniopteris*. TAB. IV. f. 40.

TRIBE IX. SCOLOPENDRIEÆ. GEN. 41. *Scolopendrium*. TAB. IV. f. 41.

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B. EXINVOLUCRATÆ. *Sori destitute of involucre*. GEN. 48-61. TAB. V. f. 48, TAB. VI.-VIII. f. 49-61.

TRIBE XI. POLYPODIEÆ. GEN. 48. *Polypodium*. TAB. V. f. 48.

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TRIBE XIII. ACROSTICHEÆ. GEN. 60. *Acrostichum*. TAB. VII. and TAB. VIII. f. 60. GEN. 61. *Platyserium*. TAB. VIII. f. 61.

SUB-ORD. III. OSMUNDACEÆ. GEN. 62. *Osmunda*. TAB. VIII. f. 62. GEN. 63. *Todea*. TAB. VIII. f. 63.

SUB-ORD. IV. SCHIZÆACEÆ. GEN. 64. *Schizæa*. TAB. VIII. f. 64. GEN. 65. *Anemia*. TAB. VIII. f. 65. GEN. 66. *Mohria*. TAB. VIII. f. 66. GEN. 67. *Trochopteris*. TAB. VIII. f. 67. GEN. 68. *Lygodium*. TAB. IX. f. 68.

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SUB-ORD. VI. OPHIOGLOSSACEÆ. GEN. 73. *Ophioglossum*. TAB. IX. f. 73. GEN. 74. *Helminthostachys*. TAB. IX. f. 74. GEN. 75. *Botrychium*. TAB. IX. f. 75.

ORD. FILICES. *Ferns.*

*Capsules* (sporangia) 1-celled, usually membranaceous and dorsal, or marginal, encircled by a complete or incomplete, jointed, elastic *ring*, collected in *clusters* (*sori*) of a definite but varied form, with or without a covering (*involucre*, often called *indusium*); or paniced or even spicate, rarely laxly scattered; or the capsules have the ring obsolete, or none, or the ring is confined to the apex of the capsule, where it forms a longitudinally striated crown, bursting vertically; or the capsules are sunk in a many-celled, fleshy or corky *receptacle* of varied forms, opening by pores or clefts on the upper surface. *Spores* minute, various in form.—Vernation generally *circinate*, rarely *erect*. GEN. 1-75. TAB. I.-IX. Fig. 1-75.

SUB-ORD. I. GLEICHENIACEÆ, *Br.*

*Sori* dorsal, of few (2-10) capsules. *Capsules* opening vertically, surrounded by a broad, transverse, complete *ring*. *Invol.* O.—*Caud.* mostly *creeping*. *St.* often *dichotomous*. *Fronds* rigid, generally large and dichotomously branched, frequently bearing *axillary buds*. Vernation *circinate*. (GEN. 1, 2.) TAB. I. f. 1, 2.

GEN. 1. PLATYZOMA, *Br.*

*Sori* of few sessile *caps.* ("mixed with a pulverulent substance," *Br.*), arising from the apex of simple *veinlets*, and concealed by the singularly revolute margins of the *pinnæ*.—*Caudex* *creeping*, beautifully *sericeo-paleaceous*. *Stipites* *tufted*.—*Fronds* 8 in. to 1 ft. l., *pinnated*, with small, *coriaceous*, *cucullate pinnæ*, scarcely 1 line l. TAB. I. f. 1.

1. *P. microphyllum*, *Br.*—*Hk. Sp.* 1. p. 2.

*Hab.* Trop. and subtrop. Australia.—A genus too nearly allied to *Gleichenia*.

GEN. 2. GLEICHENIA, *Sm.*

*Sori* of few (2-4 rarely 5-10) sessile *caps.*, situated on a lower exterior *veinlet*.—*Caud.* mostly *creeping*. *Fr.* rarely *unbranched*, generally *dichotomously divided*, often *proliferous* from the *axils* of the *forks*; *pinnæ* *deeply pinnatifid*, with the segments small and *concave*, *suborbicular*, or *pectinate* with *elongated lobes*. TAB. I. f. 2.

§ *Eugleichenia*. *Sori* solitary at the apex of a *veinlet* on the superior base of a *lobe*; *lobes* of the *pinnæ* small, *suborbicular*. Sp. 1-6.

1. *G.* (Engl.) *moniliformis*, *Moore*; *caud.* slender, *substipitiform*, *erect*, branched; *st.* *tufted*, 3-4 in. l.; *fr.* *coriaceous*, 8-12 in. l., 3 in. br., *linear*, *deeply pinnatifid*; *lobes* numerous, broad, *concave* beneath; *sori* solitary, mixed with *ferruginous hairs*.—*Stromatopteris*, *Mett. in Ann. Sc. N.* 1861, p. 84. t. 3.

*Hab.* New Caledonia, *Viellard*, n. 1571.—A very remarkable species, but scarcely differing from the present genus.

2. *G.* (Engl.) *polypodioides*, *Sm.*; *lobes* of the *pinnæ* *ovate*, *glaucous* beneath; *caps.* 3-4, sunk in a cavity forming a flat-topped *sorus*.—*Schk. F.* t. 149; *Hk. Sp.* 1. p. 3. *G. glauca*, *Sw.* (*non Hk. Sp.* 1. p. 4).

*Hab.* S. Afr.; Cape Colony (north to Angola, *Welwitsch*).

3. *G.* (Engl.) *circinata*, *Sw.*; *lobes* of the *pinnæ* *ovate* or *subrotund* (most so when fertile), more or less *glaucous* beneath, the margins slightly recurved; *caps.* 3-4, superficial, *branches* and *rachis* *glabrous*, or more or less clothed with *chaffy pubescence*.—*G. microphylla*, *Br. Hk. Sp.* 1. p. 3. *G. Speluncæ*, *Br. Hk. Sp.* 1. p. 2. t. 1. B.; *Guill. Ic. Pl. Austr.* t. 12. *G. semivestita*, *Lab. Sert. N. Cal. t.* 11; *Hk. Sp.* 1. p. 3. t. 2. A (*rachises* and young *fr.* very *paleaceo-pubescent*).

*Hab.* Australia, Tasmania, N. Zeal., N. Caledonia, Malacca.

4. *G.* (Eugl.) *rupestris*, Br.; glabrous, lobes of the *pinnæ* rounded or obtusely subquadrangular, coriaceous, the margins thickened and recurved, subglaucous beneath; *sori* of 3-4 *caps.*, superficial.—*Hk. Sp.* 1. p. 2. t. 1. B.

Hab. Port Jackson and N. W. Austral., *Mueller.*—Too near, I fear, to *G. circinata*.

5. *G.* (Eugl.) *Boryi*, Kze.; small; *fr.* subelliptical, 4 in. l. by 3 in. br., bipinnate; *prim. pinnæ* 4, subopposite, ultimate pair constituting a fork; *terminal pinnl.* elongate; *lobes* of the ultimate *pinnæ* very small,  $\frac{1}{4}$  in. l., suborbicular-concave, glaucous beneath; *sori* of few *caps.*, mixed with copious ferruginous wool.—*Kze. in Schk. t.* 70. f. 1.

Hab. Bourbon, *Bory.*

6. *G. dicarpa*, Br.; *lobes* of the *pinnæ* orbicular, subhemispherical, very fornicate; *caps.* about 2, concealed within the almost slipper-shaped lobes, and mixed with ferruginous paleaceous hairs, which often extend to the rachis.—*Hk. Sp.* 1. p. 3. t. 1. C. and *F. Ex. t.* 40.— $\beta$  *alpina*; generally smaller and more compact, *rachis* and young shoots ferruginous, with paleaceous wool. *G. alpina*, Br. *Hk. et Gr. F. t.* 58; *Hook. Sp.* 1. p. 2. *G. hecistophylla*, A. Cunn. *Hk. Sp.* 1. p. 4. t. 2. B. *G. Vulcanica*, Bl. *Hk. Sp.* 1. p. 4.

Hab. Australia and Tasmania, frequent. Isle of Pines, *Denham.* N. Cal., *Vieillard.*— $\beta$ . High mountains, Tasmania, N. Zealand, Malay Isles (*G. Vulcanica*, Bl.).

§§ *Mertensia.* *Sori* near the middle of, or at the forking of, the veinlets, the ultimate *pinnæ* pectinate; *segm.* linear or oblong, rarely subovate, much longer than in the preceding section. *St.* forked, or, from the development of an axillary bud, proliferous and pinnated; *pinnæ* very long and pinnated; *pinnl.* deeply pinnatifid. *Sp.* 7-21.

\* *Stipes* forked, branched, and copiously bipinnate. *Sp.* 7.

7. *G.* (Mert.) *longissima*, Bl.; large, often many ft. long; *st.* stout, forked; *branches* very long, bearing numerous close-placed *pinnæ* 4-6-8 in. l., 1-2 in. br., deeply pinnatifid to the rachis; the *segm.* linear, acuminate, or oblong, paler or more or less glaucous beneath, glabrous, or (especially when found at great elevations) densely ferrugineo-tomentose, and very paleaceous on the *st. rachis* and young shoots; *caps.* 3-5, often mixed with hairs.—*Hk. Sp.* 1. p. 4. *G. glauca*, *Hk. Sp.* 1. p. 4. t. 3. B., not Sw. *M. glabra*, *Brack.* *G. gigantea*, *Wall. in Hk. Sp.* 1. p. 5. t. 3. A. *G. excelsa*, *J. Sm. Hk. Sp.* 1. p. 5. t. 4. B. *G. Bancroftii*, *Hk. Sp.* 1. p. 5. t. 4. A. *M. pinnata*, *Kze.*— $\beta$ . *arachnoides*, frond cobwebby. *G. arachnoides*, *Mett. in Ann. Bot. L. Bat.* 1. p. 47. *G. bullata*, *Moore.*

Hab. China and Japan, common, and mostly very glaucous beneath; Bengal, Malay Islands and Peninsula, Sandwich Isles, W. Indies, N. Grenada, Mexico, and Guatemala.— $\beta$  Borneo, elev. 7,000 ft., Low. Java, *Blume, De Vriese.*—My copious specimens from the above localities quite satisfy me that the supposed species enumerated are trifling modifications of one and the same.

\*\* *Fr. dichotomous* (rarely simple); *pinnatifid*; in other words, the leafy or frondose portion is not confined to the forked apices, but is decurrent upon the branched portion of the *st.* *Sp.* 8-21.

8. *G.* (Mert.) *flabellata*, Br.; *fr.* very proliferous; *branches* dichotomously flabelliform, submembranaceous; *pinnæ* ascending, a span and more l., 1-2 in. br., lanceolate, subcaudato-acuminate, closely pectinato-pinnatifid; *segm.* linear, suberecto-patent.—*Hk. Sp.* 1. p. 6. *Hk. F. Ex. t.* 71.

Hab. N. to S. Australia and Tasmania; N. Zealand; N. Cal., *Vieillard.*

9. *G.* (Mert.) *tenera*, Br.; "*fr. dichotomous, proliferous; branches lanceolate pinnatifid; pinnæ (segm.) linear, entire, divaricated, slightly hairy; rachis scaly, caps. 3-5, inserted, sessile,*" *Br.*—*Hk. Sp.* 1. p. 6.

Hab. Tasmania.—What I suppose to be this, is probably a small and young form of *G. flabellata* with shorter and more spreading *segm.*, and is slightly and partially villous and scaly.



10. G. (Mert.) *Cunninghami*, Hew. ; *st.* and *costæ* beneath hairy and deciduously scaly ; *fr.* often proliferous, coriaceous ; *branches* dichotomously flabelliform, glaucous beneath, and hairy ; *pinnæ* linear-lanceolate, acuminate, often falcate, 4-6 in. l.,  $\frac{1}{2}$ -1 in. br. ; *segm.* linear, acute ; *caps.* 2-4 in a sorus.—*Hk. Sp.* 1. p. 6. t. 6. B. *Hk. fil. N. Zeal.* 2. t. 71.

Hab. N. Zealand.

11. G. (Mert.) *umbraculifera*, Moore ; *st.* and *rachis* deciduously tomentose and subpaleaceous ; *fr.* often proliferous, flaccido-coriaceous ; *branches* dichotomously flabelliform, scarcely glaucous beneath ; *pinnæ* 4-6 in. l., 1 in. br., lanceolate, subcaudato-acuminate, pectinato-pinnatifid ; *lobes* narrow-linear ; *sori* of 3-5 *caps.*—Mertensia, *Kze. in Linn.* 18. p. 114.

Hab. S. Africa.—Perhaps too near *G. Cunninghami* of N. Zealand.

12. G. (Mert.) *pedalis*, Klfs. ; *st.* and *rachis* with deciduous, chaffy scales ; *fr.* often proliferous ; *branches* dichotomously flabelliform, subcoriaceous, yellow-green when dry ; *pinnæ* linear-lanceolate, spreading or recurved, 4-6 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., deeply pinnatifid, oblong-ovate, subglaucous beneath, horizontal, the margins scarcely recurved ; *sori* of 2-4 *caps.*—*Hk. Sp.* 1. p. 6. f. 8. B.

Hab. Chili, as far south as Valdivia ; Juan Fernandez, Bertero.

13. G. (Mert.) *cryptocarpa*, Hk. ; glabrous ; *fr.* proliferous, coriaceous, deep yellow or yellow-brown when dry ; *branches* dichotomously flabelliform ; *pinnæ* broad-lanceolate, suberect and compact, 4-5 in. l., 1 in. br., pectinato-pinnatifid ; *segm.* narrow-linear, strongly veined, the margins singularly revolute, concealing the *sori* ; *caps.* 1-4 in a sorus.—*Hk. Sp.* 1. p. 7. t. 6. A.

Hab. S. Chili and Chiloe ; Falkland Islands.

14. G. (Mert.) *quadripartita*, Hk. ; *fr.* coriaceous, black when dry, rufous-brown beneath, and there deciduously chaffy on the *costæ*, not proliferous, only once forked ; each *branch* flabelliformly dichotomous ; *pinnæ* lanceolate, acuminate, falcately curved, pectinato-pinnatifid, 4-6 in. l., 1-1 $\frac{1}{2}$  in. br. ; *lobes* narrow-linear, subfalcate, sharply acute, the margins a little recurved ; *caps.* 1-3 in a sorus.—Mertensia, *Poir.* G. acutifolia, *Hk. Sp.* 1. p. 7. t. 8. A.

Hab. Straits of Magellan, Port Famine.—Very dark coloured, quite black above when dry, red-brown beneath, remarkable in not being proliferous. This and the three preceding species have a strong family resemblance, and a very compact habit ; yet each seems to be uniform in its respective characters.

15. G. (Mert.) *revoluta*, H. B. K. ; *st.* and *rachis* paleaceous, especially beneath ; *fr.* repeatedly dichotomous, rarely proliferous, rigid, subcoriaceous (*gemmæ* often foliaceous) ; *pinnæ* linear-acuminate, 5-7 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., deeply pinnatifid, much and laxly divaricated and falcate ; *lobes* ovate, horizontal, obtuse with the margin recurved, subglaucous beneath ; *caps.* 2-4.—*Hk. Sp.* 1. p. 7. t. 7. A. *M. pruinata*, *Mart. (Kze.)*. *M. subflabellata*, *Brack. (Moore)*.

Hab. Andes of Quito, alt. 9-10,000 ft., *Humboldt*. Brazil (*Klotzsch in Herb. Nostr.*). *Brackenridge*? Summit of the Blue Mountains, Jamaica, *Purdie*.—My authentic specimen of *M. subflabellata*, *Brack.*, is more glabrous, and has slenderer and less divaricating *pinnæ* than true *revoluta*.

16. G. (Mert.) *simplex*, Hk. ; *st.* subpaleaceous, undivided ; *fr.* simple, linear-lanceolate, pectinato-pinnatifid, acuminate at the apex, or, if undeveloped there, sericeo-paleaceous (rarely, in that state, with circinate heads), 6-14 in. l.,  $\frac{1}{2}$ -1 in. br. ; *lowest segm.* free, all obliquely patent, from a broad base linear-oblong, glaucous beneath ; *caps.* 2-4, mixed with rufous hairs.—*Hk. Ic. Pl.* 1. t. 92. *Sp. p.* 7.

Hab. Andes of Quito and Peru.

17. G. (Mert.) *pubescens*, H. B. K. ; *st.* and *rachises* often paleaceous or woolly ; *branches* of the *fr.* repeatedly dichotomous, subcoriaceous, leafy ; *pinnæ* 5 in. to

2 ft. l., 1-2 in. br., pectinato-pinnatifid, clothed with cobwebby, deciduous pubescence, generally ferruginous beneath; *segm.* spreading, linear, obtuse or retuse; *caps.* 2-5, often concealed among the pubescence.—*Hk. Sp.* 1. p. 8. *M. immersa*, *Klf. Hk. et Grev. Ic. F. t.* 15 (*excellent*). *G. tomentosa*, *Sw. Hk. Sp.* 1. p. 13. — $\beta$  more or less glabrous. *M. furcata*, *Sw. G. Mathewsii*, *Hk. Sp.* p. 9. t. 7. B. *M. farinosa*, *Klf. Hk. Sp.* p. 9.— $\gamma$  *longipinnata*; *pinnæ* 2 ft. l., 3 in. wide. *G. longipinnata*, *Hk. Sp.* 1. p. 9. *M. grandis*, *Fée, in Hb. nostr.*

Hab. Tropical America abundant; very variable in the more or less decurrent lobes of the frond, and in the presence or absence of tomentum and scales.

18. *G. (Mert.) Owhyhensis*, *Hk.*; *st.* above much compressed, and winged with 2 elevated ciliated lateral lines; *fronds* subcoriaceous, 3-4 times or more dichotomous, leafy; *pinnæ* lanceolate, acuminate, a span to 1 ft. l., 2-2½ in. w.; *segm.* linear, horizontal, tapering and acute, cobwebby on the costa and veins beneath; *caps.* 2-4.—*Hk. Sp.* 1. p. 9. *Mert. Hawaiensis*, *Brack. Fil. U. S. Expl. Exp. p.* 295.

Hab. Owhyhee. *Macrae, Brackenridge.*

19. *G. (Mert.) flagellaris*, *Spr.*; *branches* of the *fr.* glabrous, repeatedly dichotomous, copiously foliaceous, glabrous, often glaucous beneath, subcoriaceous-membranaceous; *pinnæ* erecto-patent or divaricating, extremely variable, broad- or narrow- or linear-lanceolate, 5-6 in. to a ft. and more l.; *segm.* ½-2 in. and more l., linear, sometimes ferrugineo-tomentose at the base beneath; *caps.* 2-4.—*Hk. Sp.* 1. p. 10. *Mertensia*, *Bory. G. lævigata*, *W. Hk. Sp.* 1. p. 10. *G. bifurcata*, *Bl. Hk. Sp.* 1. p. 11. *Mert. plumæformis*, *Pr. Epim. p.* 24. t. 15 (*very good*). *G. bracteata*, *Bl. in Hb. Hook. (axillary gemmæ pectinato-bracteate; branches of the fr. contracted).*

Hab. Mauritius and Bourbon, Madagascar; Java and Malay Islands abundant; Fiji, *Milne*.—The Malayan form of this is very large and rigid, yet the ramification and the copious foliaceous branches are the same as in the Mauritian and Madagascar form.

20. *G. (Mert.) hirta*, *Bl.*; "*fr.* chartaceous when dry, opaque, green above, beneath cæruleo-pruinata (very glaucous on the rachises and costæ), together with the (small) *gemmae* densely paleaceous with ferruginous, lanceolate scales, paler at the margin and ciliated, at length bare on the costæ, many times dichotomous; *branches* ascendenti-flabellate; *prim. ones* 1 in. l., nude; *second. ones* 1½ in. l., subnude; *tertiary ones* subelongate; *ult. ones* (or *pinnæ*) 7-9 in. l., standing at an angle of 30°, linear, gradually attenuated, deeply pinnatifid; *lobes* 3 in. l., 1½ in. br. (oblong-) linear, obtuse, slightly curved, the margin revolute, the sides entire, the apex denticulate; *veins* lax, slender; *sori* between the costa and the margin, of 3-5 *caps.*" *Mett.—Hk. Sp.* 1. p. 11. *Mett. in Miq. Ann. Mus. Bot. L. Bat.* 1. p. 48.

Hab. Malay Islands, *Reinwardt, Sir W. Norris*.—It is but recently that I have received specimens of this from Sir W. Norris, but unfortunately all sterile ones.

21. *G. (Mert.) vestita*, *Bl.*; "*fr.* chartaceous or subcoriaceous, dark opaque-green above, pruinose beneath, ferruginously fimbriato-paleaceous on the *rachises*, *costæ*, and *gemmae*, many times dichotomous; *inf. branches* 1-2 in. l., subdivergent; *ult. ones* (or *pinnæ*) 6-8 in. l., all deeply pinnatifid; *segm.* approximate, patent, 4-5 lines l., 2½ lines br., oblong or ovato-oblong, rather obtuse or shortly apiculate, entire; *gemmae* pinnatifidly bracteate; *veins* lax, evident beneath, prominent above; *caps.* 5, large," *Mett.—Hk. Sp.* 1. p. 10. *Mett. in Miq. Ann. Mus. Bot. L. Bat.* p. 48.

Hab. Malay Islands, *Blume, Van Hasselt*.—I possess authentic specimens of this from *Blume*, quite glaucous beneath; those from *Gédé (Van Hasselt)* are not at all glaucous. *Blume* notices its close affinity with *G. lævigata*, which we unite with *G. flagellaris*. It is a stouter-growing plant, with broader and shorter segments. *Mettenius*, with equal justice, says it is almost to be looked upon as a large form of *G. revoluta* (n. 15), with large and less ciliated chaffy scales and more distinct veins.

§§§ *Stipes zigzag, branched; branches bearing from 1-3 pairs of forked divaricating pinnæ; segments never decurrent.* Sp. 22.



22. *G. (Mert.) pectinata*, Pr. (character given in the section).—*G. glaucescens*, *H. B. K. Hk. Sp. 1. p. 11.* *Mertensia Hermanni*, *Hk. et Gr. Ic. F. t. 14 (excl. synonyms).* *Mertensia nervosa*, *Klfs. Gleichenia*, *Hk. Sp. 1. p. 12. t. 5. A.*

Hab. Tropical S. America, common.— $\beta$ . Brazil.—The only species of this section, and not to be confounded with any other. Glabrous or pubescent beneath, very frequently glaucous. Sori of 8–10 capsules. *M. nervosa*, *Klfs.*, is merely a young form of this.

§ 4. *Stipes zigzag, repeatedly di- or trichotomous, the ultimate branches bearing a pair of forked pinnæ: a distinct pair of pinnæ also arises from the base of the forked branches (not of the frond). Segments never decurrent.* Sp. 23.

23. *G. (Mert.) dichotoma*, Willd. (character given in the section).—*Hk. Sp. 1. p. 12.* *G. Hermanni*, *Br. (not Hk. & Gr.)*. Besides the many synonyms given in *Sp. Fil. l. c.*, I may add *M. pteridifolia*, *Pr. Epim. p. 23. t. 14* (a terminal fork only); *M. rufinervis*, *Mart. Hk. Sp. 1. p. 11.* *G. Klotzschii*, *Hk. Sp. 1. p. 13. t. 5. B.* *M. revoluta*, *Kl. Hb. nostr. (not of H. B. K.)*. *M. crassifolia*, *Pr. Epim. p. 23. t. 13.* *G. ferruginea*, *Bl. (not Desv.) Hk. Sp. 1. p. 10.* *Mett. in Miq. Ann. Mus. Bot. L. Bat. 1. p. 50.* *M. emarginata*, *Brack. Fil. U. S. Expl. Exp. p. 297. t. 42* (very ferrugineo-tomentose beneath, and with the segments often emarginate; as they are in the glabrous var. of *G. dichotoma*).

Hab. Tropical and subtropical regions, almost universal, in the New and in the Old Worlds; Pacific Islands, and as far north as Japan.—As *G. pectinata* is a solitary species of its section, so is *G. dichotoma* of the present one. Besides being most extensively geographically distributed, it is very variable in the size of the pinnæ and in the shape of the segments, and in being more or less glabrous or densely tomentose beneath, green or glaucous, and very variable in the texture of the frond: but the pairs of accessory pinnæ at the base of a fork are invariably present. There are also abnormal or aberrant forms. Among them I have specimens with lobes of the pinnæ free (pinules), and more or less deeply pinnatifid, from Penang and Java. I have others from Java, which Mettenius (*Ann. Mus. Bot. L. Bat.*) calls var. *alternans*, in which the primary divisions of the stipes are scarcely dichotomous, but alternate, “frondes inæqualiter dichotomæ.”—In regard to size, some of the pinnæ are 1-1½ ft. l., and some are 6 in. br. Occasionally, the lowest pair of lobes is much elongated, reflected, and pinnatifid.

## SUB-ORD. II. POLYPODIACEÆ.

Sori dorsal or marginal, subglobose, of many capsules, with or without an involucre, usually pedicellate, more or less completely surrounded with a jointed vertical and elastic ring, and bursting transversely (except in *Hymenophyllæ*). TRIBE I.—XIII. GEN. 3–61. TAB. I. f. 3–12, and TAB. I.—VIII. f. 13–61, inclusive.

A. INVOLUCRATÆ. Sori furnished with an involucre (except in *Alsophila*). TRIBE I.—VIII. GEN. 3–47.

### TRIBE I. CYATHEÆ.

Sori dorsal, globose, often at or near the forking of a vein. Caps. numerous, often very compact, sessile or stalked, generally on an elevated receptacle, often mixed with hairs, obovate, usually with a broad, vertical, or suboblique elastic ring. Invol. (wanting in *Alsophila*) inferior, including the sorus, lateral and resembling a scale on the under side of the sorus, or cup-shaped, often, when young, enveloping the sorus, eventually opening at the summit, or breaking down, with a more or less regular margin.—Caud. very generally arborescent. Tropical or subtropical. GEN. 3–8.

### GEN. 3. THYRSOPTERIS, Kze.

Sori globose, marginal, collected into a panicle distinct from the sterile pinnæ. Caps. sessile, on a globose receptacle. Invol. inferior, cup-shaped, the mouth entire.—Fronds decom-pound, sterile portions bipinnate with lanceolate, incised pinnales; fertile ones 3-pinnate, of which each pinnule becomes a raceme of stalked involucre. TAB. 1. f. 3.



1. *T. elegans*, Kze., in *Schk. Fil. Suppl. p. 3. t. 1. Hk. Sp. 1. p. 65.*

Hab. Juan Fernandez, Bertero.—A solitary and very rare Fern. I remove this genus to the Tribe *Cyathea*, to which, I think, it has a closer affinity than to *Dicksonia*.

#### GEN. 4. CYATHEA, Sm.

*Sori* on a vein, or in the axil of the forking of a vein. *Recept.* elevated, globose, or elongated. *Invol.* globose, inferior, covering the whole sorus, afterwards breaking at the summit and forming a more or less persistent cup, even or irregular at the margin.—*Arborescent, tropical or subtropical. St. often aculeated. Fronds simple or pinnate, or decomposundly pinnate.* TAB. I. f. 4.

##### \* *Fronds undivided. Sp. 1.*

1. *C. sinuata*, Hk. & Gr.; *caud.* slender, erect, 2-4 ft. l.; *fr.* simple, 2-3 ft. l., 1-2½ in. w., elongato-lanceolate, sinuated at the margin, acuminate, tapering into a short stipes at the base.—*Hk. Sp. 1. p. 15*; and *Gard. F. t. 21. Thw. En. Pl. Cey. p. 396.*

Hab. Wooded mountains, Ceylon, rare; most abundant in the Singhe-rajah Forest.—If not among the smallest, certainly among the most elegant and graceful of cyatheaceous plants, and the only one we know with quite simple fronds. A native only of Ceylon.

##### \*\* *Fronds pinnate. Sp. 2, 3.*

2. *C. Brunonis*, Wall.; *fr.* large, pinnate, glossy; *pinnae* 8-14 in. l., oblong-lanceolate, finely acuminate.—*Hk. Sp. p. 15*; *Gen. F. t. 2.*

Hab. Malay Islands, frequent.—Caudex unknown to me.

3. *C. Hookeri*, Thw.; small but arborescent; *caud.* 1½ in. thick; *st.* short, black, muricated at the base and subpaleaceous; *fr.* coriaceous-membranaceous, 2-3 ft. l., 4-5 in. w., elongato-lanceolate, acuminate, pinnate, pinnatifid at the apex; *pinnae* from a broad base auricled on both sides, sublinear-lanceolate, acuminate, subsessile, coarsely dentato-pinnatifid, more or less entire towards the apex; *veins* pinnated; *sori* dorsal on the veins or in the lower axils; *invol.* breaking into irregular lobes.—*Thw. En. Pl. Cey. p. 396.*

Hab. Forest of Singhe Rajah, Ceylon, *Thwaites, C.P. 3722.*—A very distinct and peculiar species.

##### \*\*\* *Fronds decomposundly pinnate.\* Sp. 4-55.*

##### † *Species of tropical America. Sp. 4-24.*

4. *C. arborea*, Sm.; unarmed or copiously prickly, often strongly so at the base of the *st.*; *st.* and *rachis* pale brown, or dark purple, or black; *fr.* ample, bipinnate; *second. pinnae* 5-8 in. l., sessile, oblong-lanceolate, deeply pinnatifid or again pinnate; *lobes* or *pinnae* oblong, subfalcate, serrated, paler beneath; *invol.* chartaceous, pale or dark brown, exactly cup-shaped in maturity, with a beautifully even margin.—*Hk. Sp. 1. p. 17.*—Var. *pallida*; *st., rachis,* and *invol.* pale-coloured. *C. elegans, Hew. C. Grevilliana, Mart. Hk. Sp. 1. p. 22. C. minor, Eat.*

Hab. W. Ind. Islands; most abundant in Jamaica, both varieties. Brazil, *Pohl.*—I have again examined with great care the two states of this plant, and am only the more confirmed in my opinion that they constitute but one species.

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\* The three preceding species are readily enough distinguished by the undivided or simply pinnated structure of the frond, combined with other peculiarities: but it is far otherwise with those which follow, whose fronds are more compoundly divided, which present a much greater similarity one with another, and of which, on account of their frequently gigantic size, we rarely receive other than mere fragments, telling nothing of their arborescent trunks or caudices, and rarely of their stipites, which often present useful characters. I am unable to offer any better sections or subdivisions than according to the countries they inhabit.

5. *C. serra*, W. ; *st.* thicker than one's finger, more or less muricated (as well as the *rachis*), densely paleaceous with large whitish scales 1-1½ in. l. ; *fr.* bipinnate ; *pinnl.* lanceolate, deeply pinnatifid, 6-8 in. l., lanceolate, acuminate, deeply pinnatifid ; *lobes* linear-oblong, acute, serrated, falcate, glabrous ; *rachis* and *costæ* slightly hairy ; *sori* generally covering the whole of the lobes ; *invol.* very thin and membranaceous, at length forming a shallow cup, entire or more or less torn at the margin.—*Hk. Sp. 1. p. 17. t. 9. A. C. bicrenata, Liebm.*

Hab. W. Indies, Brazil, Mexico. Guatemala ?, *Salvin & Godwood* (not at all muricated).

6. *C. insignis*, Eat. ; *st.* very paleaceous at the base with long, glossy, subulate scales ; *fr.* ample, coriaceous, glabrous, dark-green, glaucous beneath, all the *rachises* and *costæ* beneath muricated ; *prim. pinnae* 3 ft. l. ; *second. ones* 7-8 in. l., ½-¾ in. w., elongato-oblong, finely acuminate, sessile, pinnatifid nearly to the costa ; *lobes* oblong-falcate, obtuse, quite entire, the margin slightly reflexed ; *sori* copious ; *invol.* firm-membranaceous, cinnabar-brown, sub-pruinose (with a glaucous tint), often breaking down into 4 subequal valves.—*Eat. in Fil. Wright, et Fendl. p. 215.*

Hab. Jamaica, on St. Catharine's Peak ; elev. 5,000 ft., *Wilson*, n. 716. Cuba, *Wright*, n. 1064. Mountain forests, Vera Cruz, *Salvin*.—A fine species, quite free from scales, except in the stoutest portion of the stipes I possess, where there are traces of long subulate glossy dark-brown ones, free from hairs ; fronds glaucous beneath, and with very peculiar involucre.

7. *C. Imrayana*, Hk. ; *st.* and *rachis* pale or dark-brown, sparsely tuberculato-asperous, beneath and on the *costæ* and *costules* more or less copiously clothed with ferruginous down and scurfy with small, lacinated, often bullate scales ; *fr.* subcoriaceous, bipinnate ; *pinnl.* lanceolate, acuminate, serrate, deeply pinnatifid ; *lobes* oblong or linear-subfalcate, generally nearly entire ; *sori* near the costa ; *invol.* globose, membranaceous, fragile, breaking down very irregularly.—*Hk. Sp. 1. p. 18. t. 9. B. (excl. var. β.).* “*C. Tussacii, Desv., Kze. in H. nostr.*—*β. subnudata* ; main *rachis* with the scales deciduous. *C. muricata W. ? Griseb. ?*

Hab. West Indian Islands. Caracas.—*C. muricata* is a species of Willdenow, founded on the most unsatisfactory figure of Plumier. The generally copious scurfy scales on the underside of the frond are mainly characteristic of our *C. Imrayana*. It appears to be a high mountain species, gathered on the Blue Mountain Peak in Jamaica ; alt. 5,000 ft.

8. *C. balanocarpa*, Eat. ; “*st.* sparsely aculeated at the base and paleaceous with brown, narrow scales ; *fr.* glabrous, ample, bipinnate ;” *pinnae* 12-15 in. l., 2 in. br., oblong, acuminate ; *pinnl.* very numerous, 2-2½ in. l., 2½ lines w., linear-oblong, obtuse crenato-lobate in their lower half, with a distinct, rounded auricle at the inferior base, the superior half of the *pinnl.*, or less, entire ; *sori*, one corresponding to each lobe of the *pinnl.* ; *invol.* mamillæform, subcoriaceous with a circular opening at the apex from which the capsules soon protrude.—*Eat. Fil. Wright, et Fendl. p. 215.*

Hab. Cuba, *C. Wright*, n. 1063.—A most distinct and well-marked species, admirably distinguished by Mr. Eaton, *l. c.*

9. *C. cuspidata*, Kze. ; “*fr.* bipinnate ; *pinnl.* alternate, subsessile, divergent, oblong, cuspidate, 4½-6 in. l. by 1½ in. w., unequal at the base, deeply pinnatifid,” having beneath a few deciduous whitish scales ; *lobes* linear-falcate, the lower fertile portion a little contracted, crenulate at the apex, and acute ; *sori* costal ; *invol.* cinnamon-brown, firm, bursting very irregularly, “*stipes* hairy at the base.”—*Hk. Sp. 1. p. 19. t. 12. A.*

Hab. Peru, *Poeppig*.—My fragments received from Dr. Kunze in many respects resemble some of the forms of *C. arborea* ; but the involucre are very different.

10. *C. divergens*, Kze. ; base of the stout *st.* muricated, furfuraceo-tomentose



and scaly (on the upper side) with firm, intensely black, lanceolate, very long-pointed *scales* having a pale margin; *fr.* large, glabrous, bipinnate, petiolate; *pinnl.* firm-coriaceous, 4-6 in. l., 1-1½ in. w., from a broad base oblong, acuminate, deeply pinnatifid; *lobes* rather distant, oblong-falcate, acute, subserrated; *sori* costal, numerous; *invol.* membranaceous, fragile, soon breaking in a very irregular manner.—*Hk. Sp.* 1. p. 19. t. 11. A.

Hab. Peru, Ecuador, alt. 11,000 ft., *Spruce*, n. 5367. N. Grenada, *Schlim*, n. 480.—“*Caud.* arboreous, 40 ft. high, 1 ft. in diam. *Fr.* 7 ft. long, including the stipes. *Pinnæ* 12 on each side, excluding the few minute terminal ones.” *Spruce*.

11. *C. gracilis*, Griseb.; *st.* strongly muricated at the base; *fr.* bipinnate, glabrous; *prim.* and *second. pinnæ* long-petioled, deltoideo-acuminate, the latter 3-4 in. l., 1-1½ in. w. at the base, deeply pinnatifid; *lobes* oblong, obtuse, serrated, *sori* copious, generally confined to the superior half of the lobes; *invol.* dark-brown, bursting into somewhat regular valves or lobes to near the cup-like base.—*Griseb. Fl. B. W. Ind.* p. 704.

Hab. Jamaica, *Wilson, Purdie*. Antioquia, *Jervise*.—Allied, as Dr. Grisebach says, to *C. divergens*, but very distinct. A peculiar feature is given to this plant by the unusual length of the petioles, generally 2-2½ in. l., and by the pinnules being truncated at the base. Next to this species, Grisebach, *l. c.*, places “*C. tenera*, Hook.,” as a W. Indian Fern, by which he probably intends *Alsophila tenera*, of J. Smith, which I have placed among “species dubiæ,” in *Sp. Fil.* p. 49. But the original specimens are very imperfect; and, unless better known to Dr. Grisebach than to me, I should doubt the correctness of its being identical with *Hemitelia multiflora*, Br.; the latter, I believe, is a very dubious plant.

12. *C. Mettenii*, Karst. “*caud.* arborescent bald (not clothed with the bases of old leaves), squamose above; *st.* brunneo-squarrose at the base, unarmed; *fr.* lanceolate, 6 ft. and more long, 3-4 ft. w., ovate-lanceolate, acute, bipinnate; *pinnl.* 2 in. l., from a broad base lanceolate, deeply pinnatifid, deciduous; *costæ* and *veins* on both sides squamose-pilose; *lobes* falcate, oblong, obtuse, obsolete serrated, glaucous beneath; *veins* generally forked, soriferous at the fork; *invol.* globose, breaking open irregularly.”—*Karst. Fl. Columb.* 1. p. 113. t. 56.

Hab. Andes of Bogota, alt. 14,200 ft., *Karsten*. Tarapota, Eastern Peru, *Spruce*, n. 4723.—Mr. Spruce’s fronds entirely correspond with the beautiful figure and the description of Karsten. The stipes is castaneous, and very smooth; the scales at its base are unilateral, very large, and point upwards, glossy black, as if varnished, and have a ferruginous margin.

13. *C. squamipes*, Karst.; *st.* strongly aculeate, thick as a child’s wrist below, and there clothed with long narrow castaneous *scales*; *rachis* and *costæ* more or less muricated and downy; *fr.* 10-12 ft. l., bipinnate; *pinnæ* 12-14 in. l.; *pinnl.* 2-3 in. l., hairy on the veins beneath, 5 lines w., linear-oblong, short-acuminate; *sori* copious, close to the costule; *invol.* pale, membranaceous, globose, opening at the apex by a circular but rather irregular mouth.—*Karst. Fl. Columb.* t. 99 & 100, 3 b.

Hab. Mountain of Merida, Columbia, alt. 6-9,000 ft., *Karsten*. Tarapota, E. Peru, *Spruce*, n. 4729.

14. *C. incana*, Karst.; “*caud.* arborescent, densely scaly; *st.* scaly only below, and tomentose with linear *scales*; *pinnæ* and *pinnl.* linear-lanceolate, deciduous; *lobes* oblong, falcate, subacute, *fertile ones* nearly entire, *sterile ones* slightly serrated, with the *veins* generally forked, soriferous at the fork; *invol.* pilose, membranaceous, irregularly opening at the apex.”—*Karst. Fl. Columb.* t. 37.

Hab. Andes of Bogota, alt. 15,000 ft., *Karsten*.—Beautiful as is the figure, and laboured as is the descriptive portion of the text, there is such an absence of allusion to allied species (except slightly to “*C. straminea*, Karst.,” and to *C. Schanschin* of Martius), that I dare not express any opinion on its validity.

15. *C. frondosa*, Karst.; “*caud.* lofty, unarmed, squamose with linear-subulate



*scales*, acuminate, frondose at the summit; *fr.* ovato-lanceolate, 12-14 ft. l. by 6 ft. w.; *pinnl.* 4-5 in. l., from a broad base lanceolate; *lobes* oblong, margins recurved, penniveined; *veins* forked, their branches clavato-incrassate at the apex, terminating near the margin, and as well on the *prim.* and *second. costæ* pilose and squamose; *sori* near the costule at the furcature of the veins; *invol.* globose, glabrous, opening irregularly at the summit; *recept.* globose, entire, pilose."—*Karst. Fl. Columb.* 1. t. 74.

Hab. Andes of Bogota, alt. 14,400 ft., *Karsten*.—Apparently allied to *C. arborea*, var. *pallida*, and to *C. Schanschin*; but, unfortunately, no essentially distinguishing features are pointed out.

16. *C. equestris*, Kze.; "*fr.* vast, coriaceous, bipinnate; *pinnæ* long-petiolate, lanceolate; *pinnl.* remote, alternate, petiolate, confluent into an acuminate apex of the *pinna*, *lower ones* divaricato-reflexed, *middle ones* divergent, *superior ones* patent, all oblong-lanceolate, pinnatifid, unequal at the base, acuminate; *lobes* falcato-oblong, rather obtuse, serrulate, *lower ones* soriferous; *sori* near the costule irregular; *costæ* and *petioles* hairy above; *partial rachises* at the base sparingly aculeolate, beneath towards the base hairy."—*Kze. in Schk. Suppl.* t. 76. *Hk. Sp.* 1. p. 19.

Hab. Peru, *Poeppig*.—The author compares this with our *C. divergens*; but his figure, and a pinna I possess from the author, show a greater resemblance to *Hemitelia Guianensis*, Hk. It is, however, a true *Cyathea*. This was quite unknown to me at the time I published the *Sp. Fil.* I have since received a pinna from the late Professor Kunze. It is 5 in. l., nearly 1½ in. br., oblong-acuminate, quite glabrous; segments very close-placed, 7 lines l. by 3-4 br., quite plane.

17. *C. Beyrichiana*, Pr.; *st.* aculeate and at the base clothed with long, brown, chaffy hairs; *fr.* ample, subcoriaceous, bipinnate; *rachises* and *costa* more or less downy; *prim. pinnæ* 1½ ft. l.; *pinnl.* 3-3½ in. l., sessile, oblong, acuminate, deeply, nearly to the costa, pinnatifid; *lobes* linear-oblong, subfalcate, the margins obscurely serrate, recurved; *sori* rather copious and close to the costule, not extending to the margin; *invol.* dark-brown, firm, and persistent, lax, often splitting at the back and spreading or bifid, to all appearance covering the whole sorus in an early stage.—*Hk. Sp.* 1. p. 21. and *l.c. Pl.* t. 623. *Amphicosmia*, *Moore*.

Hab. Brazil.—I scarcely think it correct to refer this to the *Amphicosmia* section of *Hemitelia*, as Mr. Moore has done; but, indeed, both the genera and species of *Cyatheaceous* ferns present great difficulties in the way of accurate determination. *Beyrich* looked upon this Fern as an *Alsophila*; but that it cannot be.

18. *C. vestita*, Mart.; "*fr.* bipinnate; *st.* and *rachis* shortly and sharply aculeated; *partial rachis* and *veins* with rusty hairs; *pinnl.* pubescenti-villous beneath, linear-acuminate, deeply pinnatifid, the *lobes* falcato-lanceolate, acute, crenulate with 6-10 *sori* in each."—*Mart. l.c. Pl. Cr.* p. 75. t. 52. *C. Delgadii*, *Pohl. (Moore)*.

Hab. Brazil, *Martius*, *Pohl.*, *Gardner*, n. 1907 (*Moore*).—There seem to be no tangible characters to mark this species, if such it be.

19. *C. hirtula*, Mart.; "*fr.* bipinnate; *st.* sharply aculeate and the *rachis* villous with brownish hairs and sparingly paleaceous; *pinnl.* slightly pubescenti-hirsute on both sides, linear, acute, pinnatifid; the *lobes* ovato-lanceolate, rather obtuse, subcrenulate or entire; *sori* in each segment few and basal."—*Mart. l.c.*, p. 76. t. 53. *Hk. Sp.* p. 20.

Hab. Brazil, *Martius*. Guiana, *R. Schamburgk*, n. 1124a (according to *Kunze* and *Moore*).—Unknown to me.

20. *C. Schanschin*, Mart.; "*fr.* bipinnate; *st.* and *rachis* sharply aculeated, and, as well as the *rachis* and *veins*, strigoso-villous; *pinnl.* downy, linear, cuspidato-acuminate, pinnatifid; *lobes* linear-oblong, obliquely rotundate, subcrenulate;

sori 6-10 in each segment."—*Mart. l. c.*, p. 77. t. 54. *Hk. Sp. 1. p. 20.* *C. oligocarpa*, *Kze.*

Hab. Brazil, Venezuela, Peru, Mexico, Guatemala, *Salvin & Godman*, n. 358? and 14?—Martius has well represented in his plate the copious, glossy, ferruginous scales which clothe the nascent frond (t. 54, f. 1), of which the author takes no notice in his diagnosis. In the absence of these on our copious specimens, named and unnamed, I could not refer to any essential distinguishing character. Among our thus authenticated specimens are Fendler's, n. 54, and Sellow, from *Herb. Reg. Bras.*—Such good figures as those of Martius must not be thought light of; but even they require to be accompanied by good diagnoses, and, unless they are specially well-marked species, with some notice also of the affinities.

21. *C. Sprucei*, *Hk.*; *caud.* 15 ft. high; *st.* stout, furfureaceous brown, 1 ft. l., bearing "long, slender, exceedingly fragile *aculei*," mixed with strong black spines 1-3 lines l., with a broad dilated base; base of the *st.* clothed with very long, silky or woolly, deciduous, crinite, pale scales, which have a dark line down the centre; *fr.* 5 ft. l., lanceolate, bipinnate, glabrous or only slightly pubescent on the costæ, subrigido-coriaceous; *prim. pinnae* 1-2 ft. l., oblong, acuminate; *pinnl.* approximate, horizontal, 2 in. l., subsessile, narrow-oblong, deeply pinnatifid; *lobes* narrow, ovate, acute, the margins slightly recurved, entire; *sori* very copious; *invol.* fragile, breaking into irregular lobes.

Hab. Ecuador, Montaña di Canelos, and Tungaragua, alt. 4,000-6,500 ft.; and Chimborazo, alt. 3,000-4,000 ft., *Spruce*, n. 5744.—This I at first took for *C. Schanschin*, but the stipes (a portion of a tree-Fern too much neglected by plant-collectors in general) is quite different.

22. *C. Mexicana*, *Schlecht.*; unarmed; *rachis* and *costa* above pubescenti-scabrous; *fr.* bipinnate; *pinnl.* lanceolate, acuminate, 3-4 in. l., pinnatifid, glabrous; *lobes* oblong, slightly falcate, rather obtuse, serrated; *sori* chiefly at the lower half of the lobe, on the back of a simple vein or at the forking of a divided vein; *invol.* very thin and membranaceous, fragile, and soon obliterated.—*Schlecht. in Linn. 5. p. 616.* *Hk. Sp. 1. p. 15.* *C. denudans*, *Kze.* and *C. hexagona*, *Fée (Moore)*.

Hab. Mexico.—I find this species to have the sorus sometimes on the back of a single vein, and sometimes on the fork of a vein, so that there is no reason to separate this species, as some authors have done, from the great mass of *Cyathea* which have bi-tripinnate fronds, with which, too, it is naturally allied. Presl. gives a figure of the venation (*Tent. Pterid. t. 1. f. 8*), but only represents the simple form, with dorsal sori.

23. *C. Gardneri*, *Hk.*; *fr.* bipinnate; *st.* and *main rachis* nearly glabrous; *pinnl.* gradually and at the apex much acuminate, pinnatifid; *lobes* oblong, erecto-patent, obtuse, falcate, serrated, villous beneath, especially on the costa and veins, *lowest inferior one* adnato-decurrent; *sori* covering the whole underside of the lobe; *invol.* almost globose, pale-brown, opaque, with a dark mammillate apex, at length bursting with a small aperture at the top.—*Hk. Sp. p. 21. t. 10. A. (where, for Tab. X. A. read Tab. X. B.)*

Hab. Brasil, *Gardner*.—A species of peculiar aspect, and remarkable for the adnate and subdecurrent base of the pinnules. The involucre seem also to be unusually persistent.

24. *C. ebenina*, *Karst.*; *st.* paleaceous below with large, lanceolate, glossy, firm, acuminate scales, dark in the centre, and slightly asperous (scarcely aculeate) ebeneous-black, as well the principal rachises; *fr.* glabrous, 5-6 ft. l., firm-membranaceous, bipinnate; *prim. pinnae* 12-14 in. l.; *pinnl.* distant, all rather long-petiolate, 3 in. l., from a broad, oblong base, acuminate, pinnatifid, deeply so and subpinnate below; *lobes* broad, obtuse, serrate; *sori* rather sparse; *invol.* with the cup breaking into unequal lobes.—*Karst. Fl. Columb. p. 3. t. 2. and t. 100. f. 2. (caudex.)*

Hab. Columbia, alt. 15,000 ft., *Moritz, in Hb. Nostr.*—A very well-marked species;



in its much-petiolated pinnules resembling some species of *Hemitelia*. Caudex 18 ft. high, very slender, denudate.

25. *C. microphylla*, Mett.; *caud.* 4 ft. high; *st.* and *rachises* very decidedly ferrugineo-tomentose; *fr.* 2-3 ft. long, oblong-ovate, acuminate, tripinnate; *prim. pinnae* sessile, broad-oblong, acuminate; *second. ones* similar to them but smaller, crowded; *pinnl.* small, scarcely 2 lines l., ovato-oblong, deeply pinnatifid; *lobes* oblong, obtuse, single-veined, entire; *sorus* solitary at the base of the veinlet; *invol.* globose, breaking irregularly into 3-4 portions.—Mett. in *Lechl. F. Per.* p. 23; *Hk. 2nd Cent. of Ferns*, t. 99.

Hab. Andes of Peru and Ecuador, *Lechler*, *Jameson*, *Spruce*.—A remarkable and most distinct species, with very compound fronds, and the smallest pinnules of any species of the genus.

†† *Species of tropical and subtropical Africa, including the adjacent islands, Madagascar, Mauritius, Bourbon, Seychelles, &c.* Sp. 26-34.

26. *C. Drègei*, Kze.; unarmed, or only rough with small tubercles at the base of the *st.*, and there paleaceous with rather large, lanceolate-subulate, glossy, ferruginous *scales*; *fr.* bipinnate; *pinnl.* sessile, 2-3 in. l., glabrous or a little arachnoid at the base beneath, narrow-oblong, acuminate, deeply pinnatifid; *lobes* oblong-ovate, subfalcate, obtuse, more or less serrated; *invol.* fragile, opening at the top and forming a cup with a small slightly irregular margin.—*Hk. Sp. 1. p.* 23. *t.* 10. B. and *t.* 17. A. (lobes more serrated). *C. Burkei*, *Hk. Sp. 1. t.* 17. B.; lobes of the pinnules rather broader.

Hab. S. E. Africa, Natal, Macalisberg, as far as the Zambesi; Moramballa, alt. 3,000 ft., *Livingstone*, *Kirk* ("caudex 4 ft. high").—The only *Cyathea*, I believe, inhabiting South Africa, but not extending to the extreme south.

27. *C. Manniana*, Hk.; *caud.* 30 ft. l.; *st.* and *rachises* pale-brown, glossy, muricate, glabrous; *fr.* subcoriaceous, glabrous, tripinnate; *prim. pinnae* 2 ft. l., 8 in. w.; *second. pinnae*  $\frac{1}{2}$  in. w., sessile oblong, pinnatifid only towards the narrow acuminate apices; *pinnl.* narrow-oblong, falcate, acute, serrated; *veins* forked, not prominent; *sori* rather large, few, mostly on the lower half of the *pinnl.*, and mixed with ovate, fringed *scales*; *invol.* lax, deep-cupshaped, but breaking down at the margin, and subsistent.

Hab. Fernando Po and Cameroon Mountains, alt. 3-4,000 ft., *G. Mann*.—Quite different from any other tropical African *Cyathea* I am acquainted with.

28. *C. Welwitschii*, Hk.; *caud.* 20-25 ft. l.; *st.* scarcely any (2-3 in. l. in my specimens), as thick as a swan's quill, castaneous, paleaceous, with large, subulate, firm, glossy *scales*, tuberculato-muricate, as is the base of the rachis, the rest glabrous; *rachis* also castaneous; *fr.* 3 ft. and more l., subcoriaceous, very dark-green and slightly hairy above, paler and more villous with spreading hairs beneath, ovato-lanceolate, contracted below and there bearing numerous dwarfed *pinnae*, bipinnate; *prim. pinn.* 6 in. l., 1 in. w., sessile, pinnatifid only at the short acuminate apex; *pinnl.* and *lobes* very patent, oblong and obtuse, subfalcate, strongly crenato-serrate; *veins* prominent beneath, forked; *sori* mostly near the base of the *pinnl.* at the forking, and near the costule; *invol.* shallow-cupshaped (possibly imperfect), surrounding the whole base of the *sorus*; *costae* on both sides densely and subferruginously villous.

Hab. W. Africa, Island of St. Thomas, in the Bight of Biafra, alt. 3-7,000 ft., *Welwitsch*, n. 66, *G. Mann*.—Remarkable for the contraction of the lower portion of the frond, formed by dwarfed *pinnae*, which extend nearly to the base of the stipes: thus the fronds are subsessile.

29. *C. Camerooniana*, Hk.; *st.* 1-2 ft. and more l., paleaceous with appressed, subulate *scales* at the base, scarcely asperous, and, as well as the *rachis* (paleaceous-hirsute upwards only) rufo-castaneous; *fr.* 4 ft. or more l., 14-16 in. w., subcoriaceo-membranaceous, bipinnate, quite glabrous, above dark green, paler



beneath; the *costæ* and *costules* paleaceo-hirsute on both sides; *pinnæ* 6-8 in. l., sessile, oblong acuminate, pinnate, or very deeply pinnatifid nearly to the costa; *pinnl.* or *lobes* 7-8 lines l., obtuse, subfalcate, serrato-dentate; *veins* forked; *sori* at the fork; *invol.* very thin, membranaceous, fugacious, leaving a shallow ragged cup, most permanent at the inferior side.

Hab. Cameroon Mountains, alt. 3-4,000 ft., *G. Mann.*—Habit. of *C. Welwitschii*, but not tubercled on the rachis, quite glabrous on the fronds, except on the *costæ* and *costules*; and the lower *pinnæ* are not dwarfed.

30. *C. Angolensis*, Welw; "*caud.* 12-15 ft. l., 8 in. in diam.; *fr.* 6-8 ft. l." (probably including the *st.*, which in the specimens is 1½ ft. or more, castaneous, slightly muricato-tuberculate and fusco-paleaceous at the base, the rest smooth), bipinnate, glabrous, subcoriaceous-membranaceous, paler and subglaucous beneath; *prim. pinnæ* 1½ ft. and more l., oblong-acuminate; *pinnl.* 3 in. l., sessile, oblong, pinnatifid nearly to the base, sometimes ferrugineo-tomentose in the axils, deeply and nearly to the rachis pinnatifid (subpinnate at the very base); *lobes* oblong, subfalcate, obtuse, the margin a little thickened, subserrate; *sori* at the forking of the veins, chiefly on the lower half of the lobe and near the *costule*; *invol.* cup-shaped, short, but broken down and sublobed at the margin.—*Welw. Phys.-Geogr. in Ann. Cons. Ultram.* 1858, p. 358.

Hab. Benguilla, distr. Huilla, Trop. W. Afr., alt. 3,500-5,550 ft.; very rare, *Welwitsch*, n. 186 and 83.—The *sori* are rather old, and the involucre does not probably represent their earlier form.

31. *C. Kirkii*, Hk.; main *rachis* unarmed, and, as well as the *second. ones*, decidedly pubescent and paleaceo-crinite with subulate, often spreading, black *scales*, pale at the margin; *fr.* firm-membranaceous, dark-green, a little paler beneath, glabrous, hirsutulous on the *costæ* on both sides; *prim. pinnæ* 22 in. l., 8 in. w., oblong-acuminate; *pinnl.* ½-¾ in. w., oblong, rather suddenly acuminate, deeply pinnatifid (almost pinnate); *lobes* or *ult. pinnl.* approximate, oblong, obtuse, slightly crenate; *veins* forked; *sori* near the *costule*, and in my solitary specimen near the base of the lobe; *invol.* membranaceous, breaking down into irregular lobes, but with the largest lobe generally at the inferior base of the sorus, hence somewhat hemitelioid.

Hab. Johanna Island, alt. 2,000 ft., *Dr. Kirk.*—Unwilling as I am to found a new species on a mere fragment, though perfect in itself, I am, on the other hand, very unwilling to leave unnoticed a tree-Fern from so little known a country as Johanna Island.

32. *C. Sechellarum*, Mett.; *st.* tuberculato-asperous, and, as well as the main *rachis*, ebeneous-purple; *fr.* subcoriaceous, glabrous, dark-green above, paler beneath; *prim. pinnæ* 1½-2 ft. l., 8-9 in. w.; *pinnl.* 6-8 lines w., oblong, acuminate, deeply pinnatifid; *lobes* linear-oblong, acute, falcate, serrated; *veins* distinct, forked; *sori* mostly in the lower half of the lobes, and near the *costule*; *invol.* membranaceous, pateriform, persistent.—*Mett. in Miq. Ann. Mus. Bot. L. Bat.* 1. p. 58.

Hab. Seychelles, *Pervillé*, n. 365, *bis*, and 76a (ex Herb. Mus. Par. in Hb. Nostr.); since received from *Swinburne Ward, Esq.* (No. 2).—My own specimens are from the same source as those described by *Mettenius*, who observes that the species has the habit of *C. spinulosa*, Wall. (from India), but the frond is coriaceous, the rachis muricate, not spinulose, the *invol.* entire, persistent, not soon breaking down into fragments.

33. *C. excelsa*, Sw.; unarmed; *fr.* bipinnate, coriaceous-membranaceous; *prim. pinnæ* 2 ft. l., 6-8 in. w.; *pinnl.* 3-4 in. l., ½ in. w., sessile, deeply pinnatifid, subpinnate at the base; *lobes* oblong, obliquely subacute, serrated, scaleless; *veins* once forked near the base; *sori* in the fork near the costa; *invol.* membranaceous, very glossy, fragile, bursting irregularly into lobes, rarely sub-2-valved.—*III. Sp.* 1. p. 24. t. 12. B.

Hab. Bourbon and Mauritius.

34. *C. canaliculata*, W. ; unarmed or indistinctly tuberculate ; *fr.* glabrous, bipinnate ; *prim. pinnæ* 8-13 in. l., oblong, acuminate, bipinnate, pinnatifid at the apex ; *pinnl.* sessile, 1-1½ in. l., oblong, subacute, entire or serrated ; *veins* copious, twice or thrice forked ; *sori* copious near the costa ; *invol.* at first globose, then breaking down into 3-4 tolerably regular lobes ; *st.* and the stout main *rachis* brown or purple-black.—*Hk. Sp. 1. p. 23. t. 11. B.*— $\beta$  *latifolia* ; larger *pinnl.* broader.—*Sp. Fil. p. 24. t. 13. A.*

Hab. Mauritius and Bourbon ; Madagascar, *Newton*.—It is possible that this may have tripinnate fronds, but my numerous specimens are not large enough to indicate if it be so. The species is very distinct, but varies much in the size of the pinnules.

†† *Species of India, including Ceylon and the Malay Peninsula and Islands.*  
Sp. 35-45.

35. *C. spinulosa*, Wall. ; *st.* and main *rachis* strongly aculeated, often dark-purple ; *fr.* glabrous, ample, subflaccid ; *pinnl.* oblong, acuminate ; *lobes* acute, serrulate, small bullate *scales* on the costules beneath ; *sori* copious, close to the costules ; *invol.* globose, very thin, membranaceous, fragile, soon breaking irregularly.—*Wall. Cat. n. 173. Hk. Sp. 1. p. 25. t. 12. C.*

Hab. Continent of India generally. Ousima, S. Japan, *C. Wright, in Hb. Nostr.*

36. *C. crenulata*, Bl. ; unarmed ; *fr.* bipinnate, subcoriaceous ; *pinnl.* oblong, lanceolate, short-acuminate, 2-3 in. l., dark, livid green, paler beneath, minutely chaffy at the costæ ; *lobes* approximate, oblong, subacute, subfalcate, crenulato-serrate ; *sori* close to the costa ; *invol.* membranaceous, pale or chestnut-brown, fragile, soon breaking into very irregular lobes.—*Hk. Sp. 1. p. 25. Mett. in Miq. Ann. Mus. Bot. L. Bat. 1. p. 56. C. excelsa, Kze.*

Hab. Java.—This presents no very striking specific character. Mettenius, who gives a very full description, *l. c.*, remarks, "Indusio conditione et consistentia ab speciebus antecedentibus diversa ; viz. *C. Javanica, Korthalsii, hymenodes, Zollingeriana, orientalis, and Sechellarum.*"

37. *C. Javanica*, Bl. ; "arboreous, unarmed ; *fr.* bipinnate, subcoriaceous ; *pinnl.* lanceolate, acuminate, deeply pinnatifid, bullato-squamulose at the base of the costa ; *lobes* linear-subfalcate, obtuso-crenulate or entire, plane ; *sori* 2-5, parallel to the costa ; *second. rachis* paleaceous-tomentose ; *prim. one* asperulous, with minute bristles."—*Bl. En. p. 245. Hk. Sp. 1. p. 26. Mett. in Miq. Ann. Mus. Bot. L. Bat. 1. p. 56.*

Hab. Java, Sumatra.—Mettenius describes the involucre as rigidly membranaceous, but breaking down into a nearly plane circular base : this is true in some of my authentic specimens ; in others it breaks into unequally-lobed cups. Notwithstanding the careful descriptions of Dr. Mettenius of the Malayan species of *Cyathea*, I fear we have yet much to learn with regard to their limits.

38. *C. integra*, J. Sm. ; unarmed ; *fr.* firm-membranaceous, brownish-green, paler beneath, glabrous ; *prim. pinnæ* ample, 1½ ft. l. ; *pinnl.* sessile or petiolate, 3-5 in. l., from a subtruncated base oblong-acuminate, pinnatifid ½-⅔ of the way to the costa, broad-oblong, subfalcate, acute, serrated ; *sori* in 2 series, intermediate between the costule and margin ; *invol.* pale-membranaceous, breaking down into a persistent, lobed cup.—*Hk. Sp. 1. p. 26 ; and in Ic. Pl. 7. t. 638. Mett. in Miq., l. c. 1. p. 55.*— $\beta$  *petiolata, Hk. Ic. Pl. 7. t. 638. f. 2. C. petiolata, J. Sm.*

Hab. Amboyna, and Philippine Islands.

39. *C. Sarawakensis*, Hk. ; *caud.* 12 ft. l. ; *gen. and part. rachises* smooth and glossy ; *fr.* ample, glabrous, subcoriaceous, bipinnate ; *prim. pinnæ* distant, petiolate, 20 in. l. or more, 6 in. w., broad-oblong, pinnatifid only at the acuminate apices ; *pinnl.* numerous, approximate, horizontal, sessile, 4-6 lines wide, oblong-acuminate, crenato-serrate, obliquely cuneate at the base ; *veins* approximate, bi-trifurcate ; *sori* dorsal or, rarely in the axils of the veins, globose ; *invol.* a thin,



fragile membrane, at first covering the whole sorus, breaking down into irregular lobes.

Hab. Sarawak, Borneo, *Thos. Lobb*, n. 166.—Apparently a very distinct species, which I only possess from the above locality.

40. *C. assimilis*, Hk. ; *caud.* 20 ft. high ; *st.* bright chestnut, slightly muricated and fringed on one side with long, ferruginous scales ; *fr.* ample, coriaceous-membranaceous, bi-tripinnate ; *prim. pinnæ* nearly 1 ft. l., 3-4 in. w., broad-oblong acuminate, petiolate, glabrous ; *pinnl.* and *prim. sup. pinnæ* deeply, almost to the costa, pinnatifid (lowest inf. lobe always the smallest), from 4-5 lines l., oblong, very obtuse, subfalcate, coarsely toothed ; *sup. rachis* and underside of the *costæ* subsquamose ; *veins* simple or once or twice forked ; *sori* dorsal or, in the axis of the fork, subglobose ; *invol.* at first entire, very thin and filmy, breaking down into very irregular lobes.

Hab. Hills, Sarawak, Borneo, *T. Lobb*, n. 168.—This has much the general aspect of *Alsophila squamulata* (*Gymnosphaera*, Bl.), but is more compound, and has the true involucre of a *Cyathea*.

41. *C. Lobbiana*, Hk. ; *fr.* ample, subcoriaceous, pinnate, pinnatifid at the acuminate apex, everywhere smooth, glabrous, and destitute of scales ; *pinnæ* petiolate ; *inferior ones* (the largest of our specimens) 9-10 in. l., 2-2½ in. w., oblong, deeply acuminate nearly to the rachis, pinnatifid, or pinnate only at the very base ; *lowest inferior pinnl.* always the smallest ; *lobes* or *pinnl.* horizontal, spreading, obtuse, obscurely serrated ; *super. pinnæ* gradually smaller, obtuse, sessile ; *veins* distinct, approximate, simple or forked ; *sori* globose, dorsal, or rarely in the axil of the veins, in 2 rows, one on each side the costule ; *invol.* a very thin, delicate membrane, at first investing the whole sorus, at length deliquescent, as it were, at the summit, and breaking down irregularly.

Hab. Sarawak, Borneo, *T. Lobb*.—My largest pinnæ have a very close affinity with those of *Alsophila alternans* ; but here is a most distinct though almost filmy involucre.

42. *C. hymenodes*, Mett. ; glabrous ; *prim. rachis* dark purple-brown, subasperous ; *pinnl.* 3 in. l., oblong, acuminate, sessile, subcoriaceous, dark lurid green on both sides ; *costæ* beneath minutely and sparsely scaly ; *lobes* very compact, so as to close the sinus, oblong-falcate, very obtuse, obscurely serrate ; *sori* at the base of the lobes, few, close to the costule ; “*invol.* membranaceous, fragile, soon breaking down and falling away.”—*Mett. in Miq. Ann. Mus. Bot. L. Bat. p. 57.*

Hab. Sumatra, *Korthals*.—My authentic specimen has the sori far advanced and imperfect. May it not rather be an *Alsophila* ?

43. *C. orientalis*, Moore (name only) ; *rachises* scarcely punctato-muricate ; *fr.* ample, coriaceous, black-green, paler beneath, glabrous, bi-tripinnate ; *prim. pinnæ* 2 ft. l. ; *pinnl.* 3-4 in. l., 6-7 lines w., sessile, oblong-lanceolate, suddenly caudato-acuminate (acumen serrated), deeply near to the costa pinnatifid ; *costæ* beneath ferrugineo-furfuraceous ; *lobes* linear-oblong, subfalcate, the margin serrated and recurved ; *sori* copious, close to the costule which they quite conceal ; *invol.* dark brown, firm-membranaceous, persistent, cupshaped, subglobose, rich chestnut-brown, the mouth a little contracted, perfectly orbicular and even at the edge.—*Mett. in Miq. Ann. Bot. L. Bat. 1. p. 38.* *C. arborea*  $\beta$  *pallida*, Hassk.

Hab. Java, *Zippel*, *Zollinger*, *De Vriese*, n. 98, 118, 130.—It is no wonder that Hasskarl was disposed to consider this a var. of *C. arborea*, of the W. Indies : the involucre forms an equally perfect cup, which seems to persist in that state without ever becoming fragmentary.

44. *C. arachnoidea*, Hk. ; all the *rachises* dark-coloured and opaque, muricated with short, black, sharp spines, and clothed with rusty tomentum ; *fr.* tripinnate firm-coriaceous, glabrous above, cobwebby beneath ; *second. pinnæ* 4-4½ in. l. ½ in. w., oblong, pinnate, pinnatifid only near the narrow acuminate apex ; *pinnl.*



scarcely 3 lines l., from a broad base linear, acute, subfalcate; *veins* sunk, inconspicuous; *sori* near the middle of the *pinnl.*, occupying the whole space between the costule and the recurved margin; *invol.* thin-membranaceous, white and delicate, breaking into variously lobed and lacinated segments.

Hab. Island of Ternate, *De Vriese & Teijsmann*, n. 1141.—Judging from the solitary but very perfect specimen in my possession, this is a very distinct species.

45. *C. Korthalsii*, Mett.; *fr.* bipinnate, subcoriaceo-membranaceous, dull green; *prim. pinnæ* 1 ft. l.; *pinnl.* sessile, 2-2½ in. l., ½ in. w., oblong, acuminate, sparingly bullato-paleaceous beneath; *lobes* narrow-oblong, obtuse, scarcely serrate, subfalcate; *sori* more or less copious, chiefly in the lower part of the lobe close to the costule; *invol.* firm-membranaceous, breaking firstly at the summit, at length falling away in fragments.—*Mett. in Miq. Ann. Mus. Bot. L. Bat. 1. p. 57.*

Hab. Sumatra, *Korthals*; Java (ex *Herb. Miquel.*).—My named specimens from Sumatra have old fructifications; those from Java (without name) have the involucre exactly as described by Mettenius. Perhaps too near his *Hemitelia* (not *Cyathea*) *crenulata*.

†† *Species of Australia, N. Zealand, and the Pacific Islands; these latter, of the N. Pacific, may be expected occasionally to extend to the Malay Archipelago and Peninsula.* Sp. 46-55.

46. *C. Lindsayana*, Hk.; *main* and *second. rachises* quite unarmed; *fr.* membranaceous, glabrous, except on the *costæ* and *costules* which are subvillous and have many scattered, small, bullate scales; *prim. pinnæ* 2 ft. l., pinnate nearly to the apex; *pinnl.* 3-4 in. l., oblong, acuminate, deeply pinnatifid; *lobes* oblong, subfalcate, serrated; *sori* on the lower half of the lobes on the forking of the veins; *invol.* globose, firm-membranaceous, brown, opening with a circular, rather small and jagged mouth.

Hab. N. E. Australia, *Mr. Lindsay, Walt. Hill.*—The first true *Cyathea* found in Australia. My specimens are very perfect as far as the primary pinnæ and fructifications are concerned. It might pass for a membranaceous form of *C. Javanica*; but the cup-formed involucre is much more permanent.

47. *C. medullaris*, Sw.; *caud.* lofty; *st.* glaucous-black, and the *rachises* muricated with short, spinous tubercles; *fr.* ample, bi-tripinnate, coriaceous; *second. pinnæ* 5-6 in. l., ¾-1 in. br., deeply pinnatifid or again pinnate; *pinnl.* or *segm.* oblong or linear-oblong, obtuse, coarsely serrated in the sterile specimens, lobato-pinnatifid in the fertile ones, with the margins revolute; *sori* one to each lobule of the *pinnl.* or lobe, intermediate between the subpaleaceous costule and the margin; *invol.* firm, membranaceous, brown, soon breaking open irregularly at the apex with an irregular, often 2-lobed, margin (young *fr.* densely-paleaceous, with soft, deciduous hairs).—*Hk. Sp. 1. p. 27, and Gard. Ferns, t. 25.*

Hab. N. Zealand.—A Fern similar to this, but differing chiefly in the ultimate pinnules or lobes bearing *sori*, is found in Norfolk and other of the Pacific Islands, which may possibly prove distinct: this is the *C. Mertensiana*, Bong., and perhaps the *C. extensa*, Sw. & Schk. *Fil. p. 127. t. 132.* In our dried native specimens of *C. medullaris*, the stipes and main rachises are often pale-brown.—See *C. affinis*, our n. 54.

48. *C. Cunninghamsi*, Hk. f.; *caud.* 12-15 ft. l.; *st.* and *main rachises* stramineous and asperous; *fr.* subcoriaceous, but flaccid ("soft, withering on the trunk"), tripinnate; *prim. pinnæ* 1½-2 ft. l.; *second. ones* 3-5 in. l., ¾-1 in. w., oblong, acuminate, pinnatifid only at the apex; *lobes* or *ultimate pinnl.* 4-6 in. l., linear, obtuse, pinnatifid some way down with great regularity; *lobules* entire; *veins* forked; *sori* one to each lobe, rather nearer the costule than the margin; *invol.* at first entire, globose, very thin, afterwards breaking down very irregularly, often leaving a large patent lobe or scale on the underside, as in *Hemitelia*; *costæ* and *costules* villous and sparingly narrow-paleaceous.—*Hk. fil. in Ic. Pl. t. 985.*

Hab. N. Zealand.—Perhaps too near *C. medullaris*. I possess it among Forster's plants from N. Zealand, as well as from Colenso and Allan Cunningham. It is well represented in the *Icones plant. l. c.*

49. *C. dealbata*, Sw. ; unarmed or slightly asperous ; *rachises* and *costæ* clothed with pale, ferruginous, deciduous tomentum ; *fr.* subcoriaceous, bi-tripinnate ; *pinnae* oblong, acuminate, pure white beneath from the presence of a *deciduous* powder, deeply pinnatifid or pinnate at the base ; *lobes* oblong, acute, falcate, serrated ; *sori* copious, sometimes confined to the lower half of the lobes ; *invol.* rather small, globose, membranaceous, fragile, soon breaking down in an irregular manner, the base often remaining an orbicular membrane.—*Hk. Sp.* 1. p. 27. *Rich. Fl. N. Zeal.* p. 77. t. 10.— $\beta$  subglaucous, but not white, beneath.

Hab. N. Zealand, where it seems generally to retain its pure white beneath. Penang, *Sir W. Norris*, sterile. Lord Howe's Island (along with *var. \beta*), *Milne & McGilvray*.—This latter island may be reckoned as in the N. Zealand groupe.

50. *C. Aneitense*, Hk. ; unarmed ; *main* and *second. rachises* ebeneous, purple-black, quite smooth ; *fr.* coriaceous-membranaceous ; *prim. pinnae* 1-1½ in. l., 4-5 in. w., sessile, or nearly so, oblong, shortly-acuminate, pinnatifid nearly to the rachis ; *lobes* rather distant, oblong, acute, subserrated ; *veins* forked ; *sori* copious intermediate between the costa and the margin ; *invol.* thin-membranaceous, persistent, soon breaking down, and generally opening at the back so as to form a large, lax, almost transparent, 2-lobed and ragged cup, often again irregularly lacerated ; *ult. rachises* and *costæ* villous, with narrow scales.

Hab. Isle of Aneiteum, N. Hebrides, *Milne, McGilvray*. Ternate, *Herb. Hort. Calc.*—This is quite new, and not known, apparently, to Brackenridge.

51. *C. nigricans*, Mett. ; “*fr.* coriaceous, opaque, green above, paler beneath, bipinnatisecto-pinnatifid ; *rachis* unarmed, purplish, glossy ; *prim. pinnae* subovato-lanceolate ; *second. ones* subsessile, elongato-oblong, acuminate, caudate at the apex and sharply serrated, subglabrous above, beneath squamulose at the costæ and costules, with imbricated, white, bullate, ciliated *scales* ; *lobes* subdistinct, contiguous by the dilated base, elongato-oblong, subfalcate, attenuated at the apex, obtuse or nearly so, serrated ; *veins* forked, rarely bifurcate ; *sori* 3-6 on each side the costule, the lowest ones distant from the costule, the rest near to it ; *recept.* hemispherical ; *paraphyses* few, filiform, curved, generally torulose, formed of cells tumid in the middle, the terminal cell subglobose, or more or less dilated.”—*Mett. in Miq. Ann. Mus. Bot. L. Bat.* 1. p. 36.

Hab. “Ualan, of the Caroline Islands, *Mertens*.”—Unknown to me.

52. *C. leucolepis*, Mett. ; unarmed, and hairy only on the *costæ* above ; *fr.* ample, firm-membranaceous, bipinnate, lurid-green, paler beneath ; *prim. pinnae* 1½ in. l. ; *pinnae* sessile or subpetiolate, paleaceous, with whitish bullate scales on the costæ and costules beneath, 3-4 in. l., from a broad base 1 in. w. (narrowest on the inferior side), oblong, suddenly acuminate, pinnatifid  $\frac{3}{4}$  of the way to the costule ; *lobes* oblong, obtuse, subfalcate, subentire ; *veins* all forked at the middle, distant ; *sori* copious, rather distant, and forming a line on each side between the costule and the margin ; *invol.* rather firm-membranaceous, of the same lurid-green as the frond, long-persistent, then breaking away at the summit, and eventually forming irregular lobes.—*Mett. in Miq. Ann. Mus. Bot. L. Bat.* 1, l. c., p. 56. *C. Brackenridgii*, *Mett.*, l. c.

Hab. Samoan Islands, *Powell*. Fiji, *Harvey, Powell*, n. 20 ; Aneiteum and Saloman's groupe (*Mettenius*), *Brackenridge*?, *Milne*.—Caudex 6 ft. high, 2 in. in diam. (*Powell*).—This appears to be a good species, or it may be the *C. affinis*, *Brack.*, if so, scarcely of Swartz.

53. *C. Milnei*, Hk. ; *caud.* 30 ft. l., 9 in. diam. ; *fr.* subcoriaceous, dark blackish-green above, paler beneath ; *rachises* palish-brown, asperous, woolly, as well as the under side of the *pinnae*, near their base, with copious, deciduous tomentum ; *pinnae* 1½-2 ft. l., 6-10 in. w. ; *pinnae* elongato-oblong, deeply to the costules pinnatifid ; *lobes* oblong, falcate, subobtuse, crenato-serrate, the margins a little recurved ; *sori* copious, moderately large, mostly situated at the base of the lobes, near the costule ; *invol.* membranaceous, rather firm, long-persistent



in a cup-like form, with very irregular margins, occupying most of the breadth of the lobes.

Hab. Sunday or Raoul Island (of the N. Zealand region), *Milne & McGilivray*.—I give this as a new species with considerable hesitation. It has the deciduous wool of *C. dealbata* (to which Mr. Moore is disposed to refer it), but the aspect rather of *C. affinis*, of which, however, it wants the decided prickles.

54. *C. affinis*, Sw. ; *st.* and *main rachis* brown, strongly tuberculato-muricate ; *fr.* amply firm-coriaceous, probably subcarnose in a recent state ; *prim. pinnæ*  $1\frac{1}{2}$ -2 ft. l., 6-10 in. w. ; *pinnl.* sessile,  $\frac{3}{4}$ - $1\frac{1}{4}$  in. br., oblong-lanceolate, deeply to the very costa pinnatifid, often towards the base again pinnate ; *segm.*  $\frac{1}{2}$ - $\frac{3}{4}$  in l., oblong, falcate, obtuse, entire ; the *ultimate pinnl.*, and generally the most fertile, subpinnatifido-serrate ; *veins* once or twice forked ; *sori* copious, rather nearer the costule than the margin, compact to the apex ; *invol.* membranaceous, fragile, breaking down from the apex in a very irregular manner ; *costules* beneath with few small deciduous scales.—*Sw. Syn. Fil. p.* 140 and 358 ; *Brack. Fil. p.* 283. ? Polypodium, *Forst. C. extensa*, *Sw. Schk. Fil. t.* 132. a-c. *C. propinqua*, *Mett. ?*

Hab. "Pacific Isles," *Forster*. Fiji, *Brackenridge*, *Milne*, *Seemann*. Lord Howe's Island, *Milne*. Pitcairn's Island, *Mathews*, *Cuming* (involucres rather more membranaceous). Cape Otway Roughs, Victoria, *Wilkinson*, (*Mueller*).—I possess a specimen of this plant from Forster's Herbarium, but unnamed, and I believe it to be the true *C. affinis* Sw., possibly the same as *C. medullaris* of N. Zealand.

55. *C. Vieillardii*, *Mett.* ; "unarmed ; *fr.* subcoriaceous, dark-green above, densely hairy, rusty on the *costæ* and *rachises*, bi-subtripinnate ; *prim. pinnæ* 1 ft. l. ; *second. ones* sessile, ovato-oblong or lanceolate, deeply pinnatifid, subpinnate at the base, acuminate and obtusely serrate at the apex ; *lobes* oblong, obtuse or acute, obtusely serrate ; *sori* at the forking of the veins, intermediate between the costule and the margin ; *invol.* membranaceous, gradually breaking down and disappearing (fatescens)."—*Mett. Fil. N. Caled. Ann. Sc. Nat. Bot.* 1861, p. 82.

Hab. Balade, N. Caledonia, *Vieillard*. "Near *D. Cunninghamsi* (Hk. f.), which differs in being muricated, the lobes sharply serrated, and in the sori being costular."—I have seen only a small specimen of this from M. Lenormand's collection.

#### GEN. 5. HEMITELIA, *Br.*

*Sori* globose, dorsal upon a vein or veinlet. *Recept.* elevated. *Invol.* a scale situated on the underside of the sorus, varying in size, and shape, and texture, often indistinct, and often very deciduous.—*Mostly tropical and arborescent, with the habit of Cyathea ; a connecting link, as it were, between the latter genus and Alsophila, consequently often difficult to recognize. Fronds ample, pinnate or decomposed. Veins pinnated, simple or branched, free, or, the costal ones especially, more or less anastomosing.* TAB. I. f. 5.

§ Euhemitelia. *Costal veins anastomosing.* TAB. I. f. 5. b. Sp. 1-5.

\* *Pinnate.* Sp. 1-5.

1. H. (Euhemit.) *Karsteniana*, *Kl.* ; *st.* muricated and scaly at the base ; *scales* white, dark-brown in the centre ; *fr.* ample, coriaceous-membranaceous, pinnate ; *pinnæ* sessile, a span to 1 ft. l.,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. w., from a truncated base, elliptical, short-acuminate, quite entire, or more or less lobed at the very margin ; *sori* (when perfect) in two oblique lines, meeting towards the rachis, and forming a series of the letter V between each pair of costules.—*Kl. Bot. Zeit.* 12. p. 439 ; *Mett. F. H. Lips. p.* 111. t. 29. f. 1-4.

Hab. Caracas, *Karsten*, *Fendler*, n. 386 *Funck*, n. 769.

2. H. (Euhemit.) *subincisa*, *Kze.* ; *st.* rough, but scarcely muricate ; *fr.* ample, pinnate ; *pinnæ* remote, subpetiolate, firm-membranaceous, from a cuneato-truncated base, oblong or elliptico-lanceolate, finely acuminate, 10-12 in. l. by 1-2 in. br., the margin inciso-lobate ; *lobes* 2-4 lines l., with generally an acute



apex pointing upwards; *sori* minute, in 2 irregular lines between each pair of costules.—*Kze. in B. Zeit.* 1844, p. 296; *Mett. Fil. Lechl.* p. 23.

Hab. Tropical America (Pacific side), Peru, *Poeppig*, n. 244 (pinnæ exactly lanceolate); Andes of Ecuador, *Spruce*, n. 5365 (pinnæ 2 in. br., elliptical, lanceolate, "caudex none"); Guatemala, Forest of Vera Paz, *Salvin* (pinnæ narrow, oblong, 1 in. w.).—This appears to be a very distinct species. My specimen under this name from *Lechler* (Peru, n. 2172), quite corresponds with my other specimens from *Spruce* and *Salvin*.

3. *H. (Euhemit.) grandifolia*, Spr.; arborescent; *st.* aculeated; *fr.* ample, subcoriaceous, pinnated; *pinnæ* sessile, 1-1½ ft. l., elongato-oblong, acuminate, 1-2 in. br., ½ or ¾ of the way to the costa pinnatifid; *lobes* broad-oblong, obtuse, serrated at the apex, slightly falcate; *sori* on the free veins in a continued line, intermediate between the costule and the margin, often nearer the latter.—*Hk. Sp.* p. 30. t. 14. A. *Cnemidaria Kohautiana*, Pr. C. *speciosa*, Pr.—β smaller pinnæ, *sori* submarginal. *H. obtusa*, *Klfs.*—*Hk. Sp.* 1. p. 29. t. 14. B.

Hab. W. Indies and N. Granada, Guiana; abundant. Ecuador, *Spruce*, n. 536.—Best distinguished from *H. horrida* by the smaller size, obtuse lobes, and non-marginal *sori*. The anastomosing of the veins is very variable, present on some pinnæ, absent on others.

4. *H. (Euhemit.) horrida*, Br.; arborescent; *st.* strongly aculeated, deciduously scaly, and often woolly near the base; *fr.* very large, 7-10 ft. l., pinnate; *pinnæ* sessile, 1-2 ft. l., broad oblong-lanceolate, deeply pinnatifid, lowest *segm.* sometimes free; *lobes* 3 in. l., oblong-lanceolate, acuminate, entire or lobato-pinnatifid; *veins* pinnated, subfascicled; *sori* on the free veinlets, forming a continued line just within the margin.—*Hk. Sp.* 1. p. 30. t. 15, and *Fil. Ex.* t. 69. *H. horrida*, et *Hookeri*, *Auct.*—β *Imrayana*; veins less branched, anastomosing at the costa. *H. Imrayana*, *Hk. Sp.* 1. p. 33, and  *Ic. Pl.* t. 669.

Hab. W. Indies, New Grenada.—β *Dominica*, Peru, *Lechler*, *Spruce*; Ecuador, *Jameson*.—I am satisfied that my *H. Imrayana* is only a small form of *H. horrida*.

\*\* *Bi-tripinnate.* Sp. 5.

5. *H. (Euhemit.) petiolata*, Hk.; *young fr.* and base of the aculeated *st.* clothed with large, glossy, castaneous scales, pale at the edge; *fr.* ample, bi-tripinnate, pinnatifid at the apex; *prim. pinnæ* and *pinnl.* petiolated, *ult. ones* from a truncated and usually broad base, 2-6 in. l., oblong-lanceolate, more or less acuminate, entire, or variously and more or less deeply pinnatifid, with rounded or broad-oblong lobes, entire or slightly lobulate; *pinnl.* with free venation, the deeply pinnatifid ones with the costal veins angularly anastomosing; *sori* forming a beautifully continuous border at the very margin, and following all the sinuosities of the lobes.—*Hook. Sp.* 1. p. 31. t. 16.

Hab. Isthmus of Panama, *Sinclair*, *Fendler*, n. 471 and 421, *Seemann*. Isle of Gorgone, *Barclay*.—This, in venation, is intermediate between the present and the following section (*Amphicosmia*).

§§ *Amphicosmia.* *Veins all free.* TAB. I. f. 5. a. Sp. 6-19.

\* *Pinnate.* Sp. 6-9.

6. *H. (Amphic.) speciosa*, Hk.; *caud.* 20-24 ft. high; *young fr.* clothed with glossy, castaneous scales which have a pale, very narrow fringe; *st.* tuberculato-submuricate; *fr.* ample, pinnate, very long, pinnatifid at the extremity; *pinnæ* firm, membranaceous, satiny, 8-12 in. l., 1-1½ in. w., elongato-ensiform, acuminate, entire or merely sinuato-sublobate; *veins* all pinnated; *veinlets* free; *sori* arranged in a sinuous continued chain or line just within the margin.—*Hk. Sp.* 1. p. 28. t. 13, and *F. Ex.* t. 66. *Cyathea*, *H. B. K.* (not *Cnemidaria speciosa* Pr., which is *H. grandifolia*, and, as I believe, *Grisebach's H. speciosa*). *H. integrifol.*, *Kl. Kze.* and others.

Hab. New Grenada, *Schlim*, n. 842; *Fendler*, n. 46.—German botanists do not seem

agreed as to what is the true *C. speciosa* of Humboldt. My specimens here characterized sufficiently accord with the description in Willd. & H. B. K.

7. H. (Amphic.) *Lindeni*, Hk.; *fr.* pinnate; *pinnæ* distant, thin-membranaceous, opaque, green above, subpetiolate, 6-12 in. l., 1-1½ in. br., from a cuneato-truncate base, elongato-ensiform, finely acuminate, the margin pinnatifid or incised, with rather acute, regular short lobes about 2 lines l., the apex directed upwards; *veins* all pinnate, the *branches* free; *sori* in 2-3 irregular lines or series at the margin.—*Hk. Ic. Pl. t. 706.*

Hab. Caraccas, *Linden*, n. 663.—Allied to *H. speciosa*, but much more freely and acutely lobed on the margins of the *pinnæ*, and with a very different arrangement of the *sori*.

8. H. (Amphic.) *bella*, Reichenb. f.; “*st.* aculeated at the base;” *fr.* ample, subcoriaceous, glabrous, pinnated; *pinnæ* distant, petiolate, 1-1½ ft. l., 1½ in. w., from a subcuneate base, elongato-oblong, obtusely acuminate, entire at the apex, the rest pinnatifid ½ way to the costa, with very blunt, broad, ovate, spreading, subserrated lobes; *veins* copiously pinnated, all free; *sori* quite marginal, and forming a continuous single line, following the sinuosities of the lobes to the apex of the *pinnæ*.—*Reichenbach, fil. in Mett. F. H. Lips. p. 110.*

Hab. Caraccas (*Mett.*).—Doubtless allied to our *H. speciosa* and *Lindeni*, but very different in the coriaceous fronds and the deeply-lobed pinnatifid margins of the *pinnæ*. I only possess a garden specimen from Mettenius.

9. H. (Amphic.) *apiculata*, Hk.; *fr.* glabrous, pinnate, pale-green, subcoriaceo-membranaceous; *pinnæ* sessile, 10-12 in. l., 1-1½ in. br., elongato-oblong, finely acuminate, deeply (beyond the middle) pinnatifid; lobes ¾ in. l., oblong, subfalcate, aristato-acuminate, subserrate; *sori* small, forming a single line or series much nearer the margin than the costule; *veins* all pinnated and free.

Hab. Mexico, *Jurgensen*, n. 273.—My specimen of 5 pairs of *pinnæ*, partially fertile, has very much the appearance of *H. (Euhemitelia) grandifolia*; but the lobes are submucronate and pungent at the apex, and the veins are everywhere quite free.

\*\* *Bi-tripinnate.* Sp. 10-19.

10. H. (Amphic.) *Copensis*, Br.; *caud.* 12-14 ft. high; *st.* unarmed, scaly at the base, and often bearing multifid anomalous *pinnæ* (which have been mistaken for some *Trichomanes*); *fr.* ample, submembranaceous, bi-tripinnate; *prim. pinnæ* petiolate, ovato-oblong; *pinnl.* subsessile, 2-3 in. l., 6-8 lines w., oblong-acuminate, deeply pinnatifid, or again pinnate; lobes linear-oblong, acute, strongly serrated; *veins* simple, 1 to each serrature; *sori* frequently solitary at the base of the lobe or *pinnl.*, rarely 3-4, with a lax, deciduous scale at the base; *costæ* and *costules* beneath with scattered, deciduous, bullate scales; *recept.* large, prominent.—*Hk. Sp. 1. p. 36.* Amphicosmia riparia, *Gardn. in L. J. Bot. 1. t. 12 (excellent).*

Hab. South Africa; Brazil; Java, *Bl. in Hb. nostr.*

(*Species of S. America.* Sp. 11-15.)

11. H. (Amphic.) *platylepis*, Hk.; *st.* stout, unarmed, clothed at the base with very large, dark-brown, glossy scales, having a pale fringe at the margin; *fr.* ample, subcoriaceous, villous on both sides, tripinnate; *prim. pinnæ* 12-14 in. l.; *second. ones* 2-3 in. l., ½ in. w., again pinnated except at the very apex, oblong-acuminate; *rachis* very hairy, slightly winged; *ult. pinnl.* 3-4 lines long, oblong, the margins recurved, inciso-serrate; *veins* forked; *sori* copious, 1 to each lobe or serrature; *invol.* large, hemispherical, quite inferior.—*Hk. 2nd Cent. F. t. 100.*

Hab. Rio Nigro, Brazil, *Spruce*, n. 3127.

12. A. (Amphic.) *calolepis*, Hk.; *st.* bright stramineous, tuberculated, the base clothed with copious, white, imbricated, satiny scales, 1 in. and more l., below



subulate, with a brown line down the centre, much broader upwards; *fr.* ample, membranaceous, bright-green, bipinnate, glabrous but mealy, with small, white, bullate scales on the costæ and costules beneath; *prim. pinnæ*  $1\frac{1}{2}$  ft. l., broad ovato-oblong; *pinnl.* approximate, 4-5 in. l., 1 in. w., deeply nearly to the costule pinnatifid; *lobes* copious (lowest ones free), linear-oblong, obtuse, coarsely serrated; *veins* all forked; *sori* (far advanced) small, at the forking of the veins, mostly towards the costa, subtended by a broken *invol.*, most conspicuous at the inferior side.—“*Hemitelia*,” *Eat.*

Hab. Cuba, *C. Wright*, n. 950.—Allied to *A. platylepis*, but very distinct.

13. H. (Amphic.) *Wilsoni*, Hk.; *caud.* 12-14 feet high, rather slender; *st.*  $2\frac{1}{2}$  ft. l.; *rachises* everywhere glabrous and smooth, stramineous-brown; *fr.* 12 ft. l.,  $4\frac{1}{2}$  ft. w., membranaceous, bright-green, glabrous, bipinnate; *prim. pinnæ*  $1\frac{1}{2}$  ft. l., 4-5 in. br., oblong, acuminate, deeply pinnatifid at the apex; *pinnl.* oblong-lanceolate, horizontal, acuminate, sessile and adnate, pinnatifid only in the middle (not deeply), regularly alternate; *superior ones* slightly decurrent; *lobes* of the pinnæ pinnatifid at the apex, quite entire, obtuse; *veins* fasciculato-pinnate, free; *sori* small, forming a line equidistant between the costa and the margin; *invol.* membranaceous, pale-brown, permanent, irregularly yet often 2-lobed, and these lobes often spreading.—“*Hemitelia Sp.*” *Wils. in Herb. nostr.*

Hab. Mansfield, near Bath, Jamaica, alt. 1,000 ft., *Wilson*, n. 731.—A very peculiar and distinct species.

14. H. (Amphic.) *Moricandiana*, Kze. mst.; *caud.* “7-8 ft. high;” *rachises* everywhere unarmed, dark-brown; *fr.* ample, glabrous, subcoriaceous, bipinnate; *prim. pinnæ* 12-14 in. and more l., 6 in. br., petiolate, pinnate, pinnatifid above; *pinnl.* distant, sessile or subpetiolate, 3-4 in. l., from a truncated or obliquely-cuneate base, oblong, acuminate, pinnatifid about half-way to the costa with triangular-ovate, obtuse, or acute, serrated lobes; *super. pinnl.* decurrent upon the rachis; *veins* free; *sori* copious, forming a single series, generally on the forking of a vein half-way between the margin and the costule; *invol.* a small scale at the base of the sorus.—*Cyathea Moricandi*, “*Kze. Fil. Fl. Braz. ined.*”

Hab. Bahia, *Bianchet*, n. 3227; Brit. Guiana, *Appun*, n. 193.—This does not appear to be hitherto anywhere described; yet, it is perhaps too near some of the many forms of *H. Guianensis*.

15. H. (Amphic.) *Guianensis*, Hk.; *st.* muricate or aculeate; *fr.* coriaceo-membranaceous, bi-tripinnate, glabrous or (beneath especially) subhispido-hirsute; *main rachises* deciduously subulate-paleaceous; *super. rachises* distinctly winged; *pinnl.* sessile or petiolate, 3-5 in. or more l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., oblong-lanceolate, ending in an entire more or less elongated acumen; *lobes* ovate, obtuse, entire; *veins* forked; *sori* few on each lobe in the forking of the veins, mostly nearer the costa than the margin; *invol.* variable, rather lax, often 2-3-lobed (rarely ciliated), the base often extending round the sorus.—*Hk. Sp. 1. p. 31*, and  *Ic. Pl. 648*. H. *Hostmanni*, *Hk. Sp. p. 31*, and  *Ic. Pl. t. 646*. H. *Servitensis*, *Karst. Fl. Columb. t. 95*.— $\beta$  *Parkeri*; *sori* more copious, extending higher up the lobes. H. *Parkeri*, *Hk. Sp. 1. p. 32*, and  *Ic. Pl. t. 643*. *Alshipila oblonga?*, *Kl. in Hb. Hook. (Schomb. n. 1125)*.

Hab. Guiana; Para, Brazil, *Spruce*, n. 612 and 72?, and Tarapota, E. Peru, n. 4249, 4331, 4323, 4656, 4712, 4715, and 4717, and Ecuador, n. 5741?.—It is with reluctance, and only after an examination of more perfect specimens, than I before possessed, that I come to the conclusion that the above supposed species are slight varieties of one and the same. *Spruce*’s very fine and copious specimens have very strong spines on the stipes, and very large, glossy, long-lanceolate scales, pale-coloured, but with a dark line down the centre. The species appears to abound in Guiana, Caraccas, and the whole valley of the Amazon, to Eastern Peru and Ecuador.

(*Species of Ceylon, Pacific, India. Sp. 16-19.*)

16. H. (Amphic.) *Walkeræ*, Hk.; *st.* unarmed or slightly muricated; *fr.* ample,



bi-tripinnate, thick, firm, very coriaceous; *prim. pinnae*  $1\frac{1}{2}$  ft. l., *second. pinnae* rather remote, 3-4 in. l., deeply nearly to the costa pinnatifid, or again pinnate, oblong, narrow-acuminate; *pinnl.* or *lobes* oblong, very obtuse, entire or slightly crenate, often deciduously scaly on the costule beneath; *veins* copious, sunk, forked once or twice; *sori* occupying the lowest fork close to the costules; *invol.* large, hemispherical, inferior, at first covering the lower half of the sorus, then more or less reflexed, and often 2-lobed.—*Cynthea*, *Hk. Sp.* 1. p. 24, and  *Ic. Pl. t.* 647; *Thu. En. Pl. Ceyl.* p. 396. *Amphicosmia*, *Moore*. *Alsophila comosa*  $\beta$ , *Hk. Sp.* 1. p. 53. not  $\alpha$ .— $\beta$  *tripinnata*; *ult. pinnl.* larger, lobulato-serrate.

Hab. Ceylon, to an alt. of 6,000 ft.—Our excellent friend Thwaites remarks that its indusium “is very variable, sometimes hardly to be detected;” and, indeed, while this is in press, he sends me specimens, some of which might be referred to *Hemitelia*, some to *Alsophila*, while others have the involucre nearly of *Cyathea*.

17. H. (Amphic.) *denticulata*, *Hk.*; *fr.* ample, submembranaceous, bi-tripinnate, glabrous; *prim. pinnae* 14-15 in. l., 4-6 in. br., petiolate, dilated, and smaller at the base of insertion on the main rachis, pinnate, pinnatifid at the acuminate apex; *pinnl.* 2-3 in. l.,  $\frac{1}{2}$  in. br., oblong, acuminate, pinnatifid about  $\frac{1}{2}$  way to the costa, sessile; *lobes* broad ovato-oblong, denticulato-serrate; *veins* pinnate, simple or forked, rather distant, about 4 on each side; *sori* small, on the back of the simple veins, or in the axil of the forked veins, nearer the margin than the costule.

Hab. Elizabeth Island, S. Pacific, *Cuming.*, n. 1360.—Readily distinguished in this group by the membranaceous but firm texture of the fronds, the distant veins, and the denticulato-serrated margins of the lobes.

18. H. (Amphic.) *Smithii*, *Hk.*; “arboreous, unarmed; *st.* below densely crinite, with rigid, elongated, serrulated *scales*; *rachis* and *costa* below sparsely pilose, with lax, rufous, deciduous *scales* above, strigoso-villous; *fr.* bipinnate; *prim. pinnae* linear-elongate, acute, subfalcate, serrated or crenate, very glabrous, the *costules* beneath paleaceous or pilose or glabrous; *sori* on the forking of the veins; *invol.* hemispherical.”—*Cyathea*, *Hk. f. Fl. N. Zeal.* 2. p. 8. t. 72.

Hab. N. Zealand, *Ralfs.*

19. H. (Amphic.) *Junghuniana*, *Mett.*; “unarmed; *fr.* chartaceous or membranaceous, above deep-green, subglossy, paler beneath, at the costæ sparingly clothed with minute, flattish, adpressed, broadly-ovate, pale, ferruginous, deciduous *scales*; *fr.* bipinnatisecto-pinnatifid; *prim. segm.* 2 ft. l., 6 in. w., sessile, elongato-acuminate; *second. ones*  $4\frac{1}{2}$  in. l., 8-10 lines w., elongato-oblong, crenulato-incised or serrulate at the apex; *veins* manifest, lax, 6-9 on each side, forked at the base; *sori* in the fork close to the costule, sometimes apart; *invol.* squamiform, minute; *recept.* depresso-globose, here and there bifid; *paraphyses* minute, partly piliform, partly subulate.”—*Mett. in Miq. Ann. Mus. Bot. L. Bat.* 1. p. 55. *Alsophila*, *Kze. A. lunulata*, *Bl.*, and *Hemitelia Javanica*, *Pr. (f. Mett.)*. *Amphicosmia*, *Moore*.

Hab. Java, *Blume*, in *Hb. nostr.*; *Sumatra*; *Antinanarivo*, *Madagascar*?, *Meller.*—My specimens from *Madagascar*, if belonging to this species, are less coriaceous, and of a paler, but livid, green colour, than those from the Malay Islands. Specimens named in my Herbarium, from *Blume* and *Miquel*, are no doubt the true plant; but I possess other specimens which I am disposed to consider the same species, under different names.

#### GEN. 6. ALSOPHILA, *Br.*

*Sori* globose, dorsal, on a vein or in the forking of a vein. *Recept.* mostly elevated, frequently villous. *Invol.* O.—*Arborescent, chiefly tropical*, Ferns, with the general habit of *Cyathea* and *Hemitelia*, but destitute of *invol.* Veins simple or forked, free. TAB. I. f. 6.

\* (*Species of S. America.* Sp. 1-37.)

*Pinnate or bipinnate, pinnl. entire or pinnatifid.* Sp. 1-6.

1. *A. blechnoides*, Hk. ; *fr.* pinnate ; *pinnæ* coriaceo-membranaceous, glossy, 6-12 in. l., lanceolate, suddenly acuminate and serrate at the apex ; *sori* (mixed with copious long hairs) scattered in very irregular lines near the costa, sometimes extending towards the margin.—*Hk. Sp.* 1. p. 35. *Metaxya*, *Pr.* Polypod, *Sw.* P. Parkeri, *Hk. & Gr. Ic. F. t.* 232.

Hab. W. Ind. and Trop. America.—Remarkable for the large nearly entire pinnæ.

2. *A. phegopteroides*, Hk. ; *caud.* 3 ft. l. ; *st.* unarmed, short, 3-4 in. l., clothed with large lanceolate, glossy, black scales having a pale margin ; *fr.* 1½-2 ft. l., subcoriaceous, black-green above, paler beneath, villous on both sides, especially beneath, with long spreading hairs, broad-lanceolate, acuminate, pinnatifid at the apex, lowest ones reflexed ; *pinnæ* sessile, 3-4 in. l., 8-9 lines w., oblong, shortly and bluntly acuminate, deeply nearly to the costa pinnatifid ; *lobes* oblong, very obtuse, entire, the margin a little recurved ; *veins* forked ; *sori* at the fork, in a line between the costule and the margin ; *rachis* and *costæ* beneath shaggy with whitish hairs, mixed with brownish, narrow scales.

Hab. Tarapota, E. Peru, *Spruce*, n. 4020.—A very peculiar species from the shortness of the stipes, the simply pinnato-pinnatifid frond (resembling some *Lastrea* or *Phegopteris*), and the hairy clothing, brown and shaggy beneath.

3. *A. paleolata*, Mart. ; “*fr.* bipinnato-partite, on both sides, but especially beneath, pubescent ; *veins* and *veinlets* beneath densely clothed with ovate, white scales ; *st.* and *rachis* aculeate ; *common* and *partial rachis*, and *veins* strigillose above ; *pinnæ* linear-oblong, shortly acuminate ; *pinnl.* linear, shortly acuminate, pinnatifid, the apex serrated ; *segm.* linear-oblong, subfalcate, toothed in the upper margin ; the *ult. ones* confluent, so as to form serrated pinnæ ; *sori* 4-8, in the lower part of the *segm.*, arranged in 2 rows.”—*Mart. Crypt. Bras. t.* 43. *Hk. Sp.* 1. p. 44. Als. Sellowiana, Kl. *Cyathea*, *Pr. Hk. Sp.* 1. p. 23. *A. ferox*, *γ Hk. Sp.* 1. p. 41.

Hab. Brazil ; N. Granada ; Peru, *Lechler*, n. 2190 ; *Spruce*, n. 4322.—Very faithfully represented by *Martius*, and equally faithfully described ; but in my specimens the scales (paleolæ) are tawny and copious only on the immature fronds.

4. *A. Tænitis*, Hk. ; *fr.* ample, coriaceo-membranaceous, bipinnate ; *pinnl.* distant, 3-5 in. l., lanceolate, acuminate, glabrous, subentire, petioled ; *petiole* articulated on the rachis ; *sori* in a single series, equidistant between the costa and the margin, mixed with long, copious hairs.—*Hk. Sp.* 1. p. 35. *A. excelsa*, *Mart. Cr. Braz. t.* 27 and 37. *Trichopteris*, *Pr.*

Hab. Brazil.

5. *A. elegans*, Mart. ; *st.* aculeated ; *fr.* bipinnate, carnosu-coriaceous ; *pinnl.* distant, 2-2½ in. l., linear-lanceolate, suddenly acute, obtuse at the base, petioled, slightly ferruginously woolly and subpaleaceous beneath ; *sori* in 2 or 3 series, forming an unequal, broad, and more or less interrupted series nearer the costa than the margin.—*Mert. Pl. Cr. Bras. p.* 63 and 38. *Hk. Sp.* 1. p. 36.

Hab. Brazil ; apparently rare.

6. *A. marginalis*, Kl. ; *fr.* ample, subcoriaceous, glabrous, bipinnate ; *prim. pinnæ* 12-14 in. l., 4½ in. w., pinnated, pinnatifid at the apex, oblong, acuminate ; *pinnl.* approximate, truncated at the base, quite sessile, oblong, subfalcato-obtuse, entire, subsinuate at the margin ; *sori* in a single line, forming a flexuose continuous series a little within the margin ; *prim. rachis* very paleaceous.—*Kl. in Linn.* 18. p. 542.

Hab. Brit. Guiana, *R. Schomburgk*, n. 1129.—A well-marked and very distinct species.

\*\* *Bi-tripinnate* or *decompound.* Sp. 6-63.

7. *A. Miersii*, Hk. ; *rachis* aculeate ; *fr.* firm-membranaceous, bipinnate, glabrous ; *prim. pinnæ* 2 ft. or more l., pinnated to the very apex ; *pinnl.*



remote, petiolate, 5-6 in. l., 5-6 lines w., spreading, linear-lanceolate, subflexuose, finely acuminate, subirregularly pinnatifid about half-way to the costa; lobes ovate, entire; veins pinnated; veinlets simple or rarely forked; sori rather copious, occupying the lower portion of the lobes half-way between the costule and the margin; recept. very hairy, very slightly elevated.—*Hk. Sp. 1. p. 38.*

Hab. Organ Mountains, Brazil.

8. *A. procera*, Klf.; *st.* aculeated and paleaceous below with very large and exceedingly glossy, dark brown scales; *fr.* submembranaceous, bipinnate, glabrous, pinnatifid at the apex; *prim. pinnæ* 1 ft. l. or more, the *rachis* winged above; *pinnl.* 2-3 in. l., from a truncated sessile base 4-5 lines w., oblong-acuminate or obtuse, pinnatifid half-way down to the costa; *costæ* and *costules* beneath bullato-squamulose; lobes short subrotundate, often acute, mostly entire; veins simple; sori small on all the lobes, between the costule and the margin.—*Mart. Cr. Bras. p. 64. t. 40 (very good).* *Hk. Sp. 1. p. 38.* *A. Hookeriana*, Kl. *Hk. Sp. 1. p. 39.* *A. armigera*, Kze. *Hk. Sp. 1. p. 39.*

Hab. Trop. America, frequent; Brazil, *Spruce*, n. 2115; Venezuela, *Fendler*, n. 344 and 491; E. Peru, *Spruce*, n. 4715.

9. *A. Schiedeana*, Pr.; "*fr.* ample submembranaceous, bipinnato-pinnatifid; *pinnæ* and *pinnl.* alternate, remote, subsessile, the latter lanceolate, unequal at the base, shortly acuminate, deeply pinnatifid; *segm.* oblong, falcate, sinuato-crenate, subdilatare and obtuse at the apex; sori arranged between the costule and the margin, small, somewhat apart; *costæ* and *costules* sparingly fusco-paleaceous; *part.* and *univ. rachises* sulcated, fusco-tomentose above, beneath aculeolate; *st.* aculeate; *caud.* arboreous."—*Kze. in Linn. 13. p. 149.* *Hk. Sp. 1. p. 48.* Polypod. *Schlecht.*; an Als. pungens, Klf.?

Hab. Mexico, *Schiede*, *Liebmann*, in *Hb. nostr.*; B. Guiana, *Rd. Schomburgk* ("Als. pungens," Kl. in *Hb. nostr.*); Amazon, *Spruce*, n. 2115.—Very near *A. procera*, but more deeply pinnatifid, and with blunter lobes.

10. *A. armata*, Pr.; "*fr.* bipinnato-partite; *st.* aculeate; *rachises* of the *pinnæ* aculeato-nodulose on both sides, together with the veins above hirsute; *pinnæ* and *pinnl.* linear-lanceolate, acuminate, beneath hairy and paleolate, subfalcate, rather obtuse, crenate; sori 12-20 on the lobes."—*Mart. Cr. Bras. p. 73. t. 49 (A. Swartziana).* *Hook. Sp. 1. p. 40.* Polypod. *Sw.*

Hab. S. America and W. Indies.—My numerous specimens sufficiently accord with Martius's figure; but neither that nor his description exhibits any marked feature by which it can be distinguished from some of its allies.

11. *A. Gardneri*, Hk.; aculeate; everywhere clothed with brownish woolly hairs; *pinnl.* lanceolate, acuminate, sessile, deeply pinnatifid nearly to the costa, paleaceous with numerous small, bullate scales beneath; lobes oblong, very obtuse, entire, covered with sori even to the acuminate apices of the pinnules.—*Hk. Sp. 1. p. 41.*— $\beta$  less hairy. *Cyathea nigrescens*, Kl. in *Hb. nostr.*

Hab. Brazil; Caraccas, *Birshell*.—Very hairy; but my specimens are unsatisfactory. It has some affinity with *A. Poeppigii*, and perhaps with *A. plagiopteris*: too hairy for *A. armata*.—It must be confessed the aculeated S. American *Alsophilæ* are in a state of great confusion.

12. *A. aspera*, Br.; *st.* and *rachis* strongly aculeated, *main* (sometimes strongly aculeated too) and *partial rachis* above strigillose, slightly scaly beneath and on the costa, the rest glabrous, often glossy; *fr.* bipinnate, coriaceous; *pinnl.* shortly petiolate, oblong with an acuminate point; pinnatifid  $\frac{1}{2}$  or  $\frac{2}{3}$  of the way to the costa; lobes oblong-ovate, often rather acutely serrulate; *costa* and simple or forked veins of the same colour and texture as the frond, bearing small, deciduous, bullate scales beneath; sori very deciduous, intermediate between the costa and margin; recept. elevated, with few hairs.—*Hk. and Gr. Ic. F. t. 213-215.*



*Sp. 1. p. 39. t. 19. B. Cyathea muricata, Sieb. Klf. ? Als. nitens, J. Sm. (fide Griseb.). A. gibbosa, Kl. (Moore).*

Hab. W. Indies ; Cuba, *C. Wright*, with large, glossy, lanceolate scales at the base of the stipes, 1 in. or more l.—I fear different authors have different species in view under the name of *Als. aspera* and *muricata*. See remarks in *Sp. Fil. (l. c.)*, and consult the W. Indian *Alsophila* in Grisebach, the species of which I cannot match with my specimens. It is necessary for an author, therefore, to be very cautious in quoting synonyms and localities. A reference to good figures is better than to the most laboured descriptions, often made from imperfect specimens.

13. *A. ferox*, Pr. ; more or less hirsute, especially on the veins ; *rachis* and *st.* sharply aculeated ; *fr.* bipinnate ; *pinnl.* sessile, broadly lanceolate, narrow-acuminate, deeply-pinnatifid almost to the costa ; *lobes* linear-oblong, falcate, serrate, having small bullate scales beneath ; *veins* forked ; *sori* copious, but not wholly covering the lobes.—*Hk. Sp. 1. p. 41. A. armata, Mart. Cr. Bras. p. 72. t. 48, and Mett. Polyp. aculeatum, Rad. Fil. Bras. t. 41. Alsoph. Klf.*

Hab. Brazil, Guiana ; Amazon, *Spruce*, n. 614.—Bordering too closely on more than one other supposed species of this group. Satisfactorily represented in the figures above quoted, if the species be truly distinct.

14. *A. leucolepis*, Mart. ; “*st.* aculeate ; *fr.* bipinnato-partite, slightly strigilloso-hirsute on the veins and veinlets above, beneath paleaceous with long and small white scales ; *part. rachis* unarmed ; *pinnae* linear-acuminate, pinnatifid ; *lobes* small, linear-lanceolate, subfalcate, sinuato-dentate ; *sori* on all the lobes 10-12.”—*Mart. Cr. Bras. p. 70. t. 46. Hk. Sp. 1. p. 41.*

Hab. Brazil, *Martius, Gardner*, n. 5329 and 5331 ; Venezuela, *Fendler*, n. 53 (young state).—Some of my specimens (which I am disposed to refer to *A. atrovirens*, Pr., *A. compta, Mart.*) are very little removed from *A. leucolepis*, judging from the figure, *l. c.*

15. *A. infesta*, Kze. ; “*fr.* bipinnate ; *pinnl.* unequal at the base, pinnatifid, acuminate ; *lobes* oblong-falcate, rather obtuse ; *sori* uniseriate, approaching the margin ; *rachis* puberulous, furrowed and paleaceous ; *st.* chaffy above, aculeate below.”—*Kze. Pl. Cr. Poepp. p. 98. Hk. Sp. 1. p. 42. A. phalerata, Mart. Cr. Bras. p. 67. t. 42. Hk. Sp. 1. p. 42. C. Caracasana, Kl.*

Hab. S. America and W. I. Islands ; Para, *Spruce*, n. 22 ; Peru, *Lechler, Spruce*, n. 5724 ; Venezuela, *Fendler*, n. 56.—On many of my specimens, bearing this name, the upper portion of the rachis of the primary *pinnae* is distinctly winged.

16. *A. atrovirens*, Pr. “*fr.* compound ; *pinnae* pinnate, subpetiolate ; *pinnl.* sessile, broadly lanceolate, coarsely and pinnatifidly dentato-serrate ; *sori* scattered, arising from an hemispherical *recept.* ; *st.* with short spines. (Arborescent?)”—*Polypod. atro-virens, Langsd. et Fisch. p. 12. t. 14. Hk. Sp. 1. p. 46. Als. senilis, Kl. in Hb. nostr. Als. compta, Mart. Cr. Bras. p. 66. t. 41.*

Hab. S. America, Brazil to Mexico.

17. *A. elongata*, Hk. ; sharply aculeated, glabrous, except on the *rachis* above ; *fr.* bipinnate ; *prim. pinnae* 2-3 ft. l., 8 in. w. ; *pinnl.* 6 in. and more l., lanceolate, much elongated, pinnatifid nearly to the rachis, terminating in a long, narrow, serrated, caudate acumen ; *lobes* 5-6 lines l., remote, linear, rather acute, rigid, much falcated, the margins recurved, serrated ; *veins* twice or thrice forked from near the base ; *sori* numerous, covering the entire segments except at the apex ; bullate scales none, or quickly deciduous ; *recept.* very hairy.—*Hk. Sp. 1. p. 43.*

Hab. Columbia, *Hartweg*, n. 1528 ; Central America, *Barclay, Seemann*.—Since first I published this, I have received specimens from other collectors, identically the same with our plant, and to one of which Mr. J. Smith had given the name of *Als. Tumacensis*.

18. *A. Poeppigii*, Hk. ; "glabrous except the rachis above ; *pinnæ* closely pinnated ; *pinnl.* elongated, sessile, oblong-lanceolate, much and suddenly acuminate, pinnatifid nearly to the costa ; *lobes* thick and coriaceous, crowded, narrow-oblong, falcate, very obtuse, densely clothed with sori to the very apex ; the margins slightly reflexed ; bullate *scales* none ; copious hairs among the capsules."—*Hk. Sp.* 1. p. 43. *A. villosa*, Kze. not *Pr.*

Hab. Peru, *Poeppig, Ruiz et Pav. in Herb. nostr.*—This appears to me quite distinct from the true *Als. villosa*, Kze. (which is the *Chnoophora Humboldtii*, Klf.), and more allied to our *Als. Gardneri*.

19. *A. villosa*, Pr. ; *st.* short, 1 ft. or more long, unarmed or only beset with small, elevated, tubercular points, at the base densely clothed with ferruginous, subulate, glossy *scales*  $1\frac{1}{2}$  in. l. ; *fr.* coriaceous, bi-subtripinnate, glabrous above, with a copious, lax, deciduous tomentum on both sides in the young state ; *pinnl.* 1-3 in. l., oblong-lanceolate, gradually but obtusely acuminate, more or less deeply pinnatifid ; *lobes* oblong, obtuse, entire or coarsely serrated ; *veins* pinnated ; *veinlets* forked ; *sori* occupying nearly the whole space between the costule and the margin ; *capsules* mixed with copious hairs.—*Hk. Sp.* 1. p. 44. *Cyathea*, *H. B. K. Nov. Gen.* 1. p. 24-7. t. 670. *A. rigidula*, *Mart. Cr. Bras.* t. 51. *A. Humboldtii*, Klf. *Chnoophora*, Klf.

Hab. Tropical America ; New Granada, Brazil ; Venezuela, *Fendler*, n. 47 and 492 ; S. Chili, *Cuming, Capt. King*.—Well figured by *H. B. K.* and by *Martius*.

20. *A. plagiopteris*, *Mart.* ; "*fr.* bipinnato-partite ; *st.* aculeate ; *partial rachis* and *veins* downy above ; *scales* on the veins few and deciduous ; *pinnæ* linear-oblong, acuminate ; *pinnl.* linear, much acuminate and pinnatifid ; *lobes* between the rather broad sinuses lanceolate, falcate, toothed at the apex ; the *fertile ones* nearly entire, the *sterile* serrated ; in each *pinnl.* the lowest and shortest lobe is obliquely adnate with the rachis ; *sori* upon all the segments 8-10."—*Mart. Cr. Bras.* p. 73. t. 50. *Hk. Sp.* 1. p. 44.

Hab. S. Brazil.—Moore alludes to its affinity with his *A. axillaris*, *Polypod. axillare*, *Rad. Fil. Bras.* t. 41, which is *A. hirta*, Klf., and which my specimens very much resemble.

21. *A. hirta*, Klf. ; "*fr.* trifido-tripartite ; slightly hairy on both sides, more so beneath and there minutely scaly ; *st.* and underside of the *rachis* aculeate, and, as well as the *partial rachis* rough with hairs ; *pinnæ* linear-oblong, shortly acuminate, deeply pinnatifid ; *lobes* broad-lanceolate, inciso-semipinnatifid, *ult. ones* obliquely ovate, acutely serrated above ; *sori* in each segment 8-16."—*Mart. Cr. Bras.* p. 69. t. 44. *Hk. Sp.* 1. p. 45. (*A. hirsuta*). *Polyp. arillare*, *Rad. Fil. Bras.* p. 2. t. 41.

Hab. Brazil.

22. *A. nigra*, *Mart.* ; *st.* rather slender, aculeated and as well as the *principal rachises* ebony-black ; *fr.* deep green, submembranaceous, sparsely hairy on the costæ and costules, rarely with a few deciduous *scales* beneath ; *prim. pinnæ* 12-14 in. l., 4-5 in. w. ; *pinnl.* 2-2½ in. l., ½ in. w., oblong, shortly acuminate, deeply  $\frac{2}{3}$  of the way to the costa pinnatifid, subpetiolate ; *lobes* oblong, obtuse, crenato-serrate ; *veins* simple or forked ; *sori* intermediate between the costule and the margin.—*Mart. Cr. Bras.* p. 71. t. 47. *Hk. Sp.* 1. p. 45.

Hab. Rio Negro, Brazil.—It were to be wished that many other S. American *Alsophila* were as readily distinguished as this.

23. *A. radens*, Klf. ; "*caud.* 3 ft. high, 3 in. diam. ; *st.* 2-3 ft. l., clothed with ovate, acuminate, pale brown *scales*, below together with the ramifications aculeate, above more densely paleaceo-subvillous ; *fr.* membranaceous, lanceolato-ovate, bipinnatisect ; *prim. segm.* at length deciduous, 1½ ft. l.,



elongato-oblong, acuminate, *second. ones* 2-3 in. l., not articulated, petiolulate, on both sides, and, more thickly at the costæ hispido-pilose, from a truncated or on the inferior side cuneate base (the superior rounded), linear-lanceolate, pinnati-partite; *segm.* oblong, the anterior side rotundato-obtuse, denticulate; *second. veins* of the *segm.* forked, soriferous at the fork, or, simple and soriferous and the *sori* dorsal; upper ones sterile; *sori* between the costule and the margin, 4-6 on each side the costule; *recept.* with copious hairs (paraphyses), scarcely longer than the capsules," *Mett.—Hk. Sp.* 1. p. 46. *Mett. F. H. Lips.* p. 109.

Hab. Brazil.—I only possess a garden (but authentic) specimen of this from Professor Mettenius.

24. *A. pycnocarpa*, Kze.; "*fr.* coriaceous, with elevated forked veins, ovate, bipinnate; *prim. pinnæ* petiolate, approximate at the base and apex of the frond, obliquely lanceolate; *st.* articulated and incrassated at its base; *pinnl.* subsessile, divergent from a broader base, subcuneately oblongo-lanceolate, crenate or incised at the base, obtuse at the apex; subfalcate, entire; *costæ* albo-squamose beneath; *sori* approximate, subcontiguous; *rachises* angulate, flexuose, aculeolate at their base; *partial ones* margined towards the apex and as well the aculeolate *st.* albedo-paleaceous; *caud.* short."—*Kze. in Schk. Fil. Suppl.* 1. p. 208. t. 86. *Hk. Sp.* 1. p. 46.

Hab. Peru.—A very peculiar-looking species, judging from the figure, for I have never seen a specimen.

25. *A. microphylla*, Kl.; "*fr.* 1½ ft. l., bipinnate; *rachis* semiterette, convex on the back, plane upwards, adpressedly hirsute; *pinnæ* 4-8 in. l., lanceolate, patent, thin; *pinnl.* 9-15 lines l. by 4 lines w., pinnatifid, remote, oblong, rather obtuse, sessile, glabrous above, subhirsute at the rachis beneath, especially below the middle, clothed at the costa with distant, ovate, acuminate, aureous *scales*; *lobes* oblong, subfalcate, obtuse; *veinlets* simple; *sori* small, whitish, inserted on the middle of the back of the veins, globose; *recept.* minute, glabrous."—*Kl. in Linn.* 18. p. 541. *A. squamata*, Kl. (*vide Moore*).

Hab. Caracas, *Moritz*, n. 110; *Funck & Schlim*, n. 976, 978, and 998.

26. *A. Salvini*, Hk.; *principal rachises* ¾ in. thick, glossy-ebeneous black, slightly rough to the touch, scarcely to the eye; *fr.* firm, subcoriaceous, glabrous, dark green, pale beneath, tripinnate, 3 ft. and more l., ovato-lanceolate, acuminate; *second. pinnæ* 4-5 in. l., oblong-acuminate, again pinnate with close-placed shortly petiolate *pinnl.*, ¾ in. l., subhastato-lanceolate, acute, or obtuse, pinnatifid, serrated at the apex, lowest pair of *lobules* frequently rounded and free (separate from the rest); *veins* pinnated; *sori* in a series nearer the costa than the margin; *recept.* often 2-lobed and shortly stipitate.

Hab. Chilasco, Guatemala, *Salvin & Godman*.—A very distinct and peculiar species.

27. *A. Godmani*, Hk.; *rachises* asperous, stramineous; *fr.* bipinnate, membranaceous, full green and more or less hairy on both sides with sparse, white, longish hairs; *prim. pinnæ* 16-18 in. l., 4-6 in. w., oblong, much acuminate; *pinnl.* approximate, sessile, 2½-3 in. l., 5-6 lines wide, narrow-oblong, horizontal, deeply to the costa pinnatifid, almost pinnate; *lobes* very compact and crowded, so that the space between them can scarcely be seen except when held between the eye and the light, pinnatifid about half-way down to the costa with small, acute, ovate *lobules*, upper ones rarely toothed; *veins* one to each lobule, once or twice forked, the lowest lobule (exactly square), only one veinlet on each side soriferous; *sori* small, of few *caps.*, receptacles hairy; *principal rachises* and *costæ* stramineous, pubescent and villous, and partially paleaceous with small ciliated *scales*.

Hab. Coban, Guatemala, *Salvin & Godman*.—A very elegant and very distinct species,



especially in the small, very close-spaced and strongly pinnatifid lobes, of which the lowest pairs are exactly square, adnate on two sides with the costa and costule.

23. *A. ? sagittifolia*, Hk. ; unarmed ? ; *fr.* hard-coriaceous, bipinnate, glabrous ; *prim. pinnae* 3-9 in. l.,  $1\frac{1}{2}$  in. w., petiolate ; *pinnl.* 1 in. l., 2-3 lines w., all free to the apex, shortly petiolate, oblong, acute, crenato-serrate, sagittate at the base, the lobes obtuse, the margin recurved ; *veins* indistinct ; *sori* (far advanced) often mixed with paleaceous *scales*, copious on the forking of the veins, nearer the costule than the margin ; *recept.* often 2-lobed.

Hab. Trinidad ? (possibly the opposite coast of Venezuela), *Cruger*.—A very peculiar species, and I regret my specimens are but imperfect.

29. *A. melanopus*, Hk. ; “ *caud.* 3-15 ft. high, 1 ft. diam., unarmed, ramentaceous ” (*Spruce*) ; *st.* 3 ft. l., 1 in. thick, intense ebony-black (as well as the *prim. rachises*), slightly tuberculate and at the base paleaceous with very long, narrow *scales* ; *fr.* coriaceous-membranaceous, glabrous ; *prim. pinnae* 5 ft. l., 12 pairs 3 ft., or nearly so l., 1 ft. w. in the broadest part ; *pinnl.* 6 in. l., 12-14 lines w., distinctly petiolate, from a broad base oblong, rather suddenly tapering into a serrated acumen, deeply pinnatifid to nearly the costa ; *lobes* oblong, falcate, 3 lines wide, obtuse, entire ; *veins* distinct, all forked, *sori* at the forking of each vein, much nearer the costule than to the margin ; *costae* and *costules* quite free from scales and mostly quite glabrous.—?  $\beta$  *caudex* slender, subflexuose, 3 ft. high ; *pinnl.* sessile ; *lobes* narrower and more acute.

Hab. In woods, Chimborazo, alt. 3,000 ft., *Spruce*, n. 5742.— $\beta$  Montana de Canelos, *Spruce*.—Habit and size of the pinnules very much as in *Cyathea divergens* (p. 17), but clearly an *Alsophila*, with intensely ebeneous prim. and second. rachises. I am doubtful about my var.  $\beta$ , which may prove a distinct species.

30. *A. Chimborazensis*, Hk. ; “ *caud.* 15 ft. high, 4 in. diam., aculeate (*Spruce*) ; *st.* very stout, 3-4 ft. l., furfuraceous-pubescent, dirty brown, aculeated with very sharp, strong *spines*, and paleaceous with large, dark, brown, glossy *scales* ; ” *fr.* 9-10 ft. l., ovato-lanceolate, subcoriaceous (“ subsacendant amongst neighbouring branches ”) ; *prim. pinnae*  $2\frac{1}{2}$  ft. l., by 1 ft. w. ; *pinnl.* rather distant, distinctly petiolate, 1-1 $\frac{1}{4}$  in. w., horizontal, from a broad base oblong, acuminate, deeply pinnatifid near to the costa ; *lobes* oblong, obtuse, subfalcate, entire, the margins a little recurved ; *veins* conspicuous, forked near the base ; *sori* at the forks and close to the costule ; *main rachis* thicker than a man’s thumb, and as well as the *second. ones* aculeate, having a dirty aspect from a clothing of furfuraceous-pubescence.

Hab. Chimborazo, alt. 3,000-4,000 ft., *Spruce*, n. 5743.—This has still more the aspect of *Cyathea divergens* than our *Als. melanopus* ; but here, again, the *sori* are clearly those of *Alsophila*. It is, however, the much more strongly aculeated of the two.

31. *A. conjugata*, *Spruce* ; “ *caud.* 40 ft. high, 1 ft. diam., aculeate, destitute of scales ” (*Spruce*) ; *st.* 3 ft. l., 1 in. and more thick, prickly with short, stout, not very sharp *spines* ; *fr.* 9 ft. l., ovato-lanceolate, coriaceous ; *prim. pinnae* 23 pairs, “ all exactly opposite, save at the very apex, ” 2-3 ft. l. ; *pinnl.* alternate, quite sessile, 4-5 in. l., 6-7 in. w., pinnatifid nearly to the costa ; *lobes* linear, from a broad base, acute, crenato-serrate at the slightly recurved margin ; *sori* rather small, close to the costule, one to each serrature ; *rachises* (all) and *costae* and *costules* rusty-pubescent and hairy.—*Spruce, mst. in Hb. nostr.*

Hab. Chimborazo, alt. 3,000-4,000 ft., *Spruce*, n. 4745.—Very remarkable for the exactly opposite prim. pinnae : the second. ones are alternate.

32. *A. Sprucei*, Hk. ; “ *caud.* none, reduced to a subglobose rhizome ” (*Spruce*) ; *st.* 4 ft. l., stout, strongly aculeate at the base, clothed with ferruginous *scales* of two kinds, long, very slender, dense, hair-like ones, and others large and lanceolate ; *fr.* subcoriaceous, glabrous, 4 ft. l. ; *prim. pinnae* 12-14 in. l. ; *pinnl.*

$2\frac{1}{2}$ -3 in. l.,  $\frac{1}{2}$  in. w., oblong-acuminate, deeply nearly to the costa pinnatifid; lobes oblong, falcate, acute, entire, margins slightly reflexed; sori copious, occupying the space between the costule and the margin; rachises and costæ beneath free from scales or pubescence.

Hab. Chimborazo, alt. 2,500 ft., Spruce, n. 5740.—“A pretty Fern when growing.” Spruce.

33. *A. aterrима*, Hk.; st. castaneous, copiously aculeate, and at the base shaggy with very long ( $1\frac{1}{2}$  in.), dense, ferruginous, flexuose scales and fine hairs; fr. ample, thick, carnosu-coriaceous; black above, a little paler and chocolate-coloured beneath, villous above; rachis shaggy; costæ and costules, especially beneath, clothed with deciduous, tawny, lanose hair; prim. pinnæ 1 ft. and more l., pinnl.  $2-2\frac{1}{2}$  in. l., 4 lines w., deeply to the costa pinnatifid; lobes oblong, very obtuse, entire; sori chiefly on the lower half of the lobes (about 6), close to the costa, ferruginous.

Hab. Near Tarapota, E. Peru, Spruce, n. 4713.—The blackest-looking species, when dry, I am acquainted with, and of a very firm and coriaceous texture.

34. *A. pruinata*, Klf.; unarmed; st. densely lanigerous at the base; fr. coriaceous, glaucous, bi-tripinnate; prim. pinnæ petiolate, 12-18 in. l., ovato-lanceolate; pinnl. 3-4 in. l., 1 in. w.; petiolulate, from a broad base oblong-acuminate, deeply pinnatifid, or again pinnate; lobes or ult. pinnl.  $\frac{1}{2}$  in. l., lanceolate, very acute, deeply or pinnatifidly and sharply serrated; sori solitary, near the costule, one to each lobule or serrature; costæ and costules beneath often very hairy, and hairs mixed with the capsules on a small recept.—Hk. Sp. 1. p. 47. Polyp. griseum, Schk. Fil. t. 25. Trichosorus glaucescens, densus et frigidus, Liebm. Lophosorus, Pr.

Hab. Tropical America and W. Ind., extending as far south as Chili; Juan Fernandez.

35. *A. frigida*, Karst.; “caud. not lofty; st. and rachises clothed sparingly with deciduous tomentum and, especially at the base, muricated; fr. ovato-lanceolate, tripinnate, coriaceous; prim. and second. pinnæ from a broad base gradually narrower and acuminate; pinnl.  $\frac{1}{2}$  in. l., oblong, more or less adnate at the base, densely squamose beneath, pinnatifid; the lobes falcate, obtuse, crenate, separated by a very narrow, acute sinus, penniveined; the margin revolute; veins simple or forked, the lower ones on the middle of the back or in the fork soriferous; recept. semiglobose, pilose.”—Karst. Fl. Columb. t. 30.

Hab. Andes of Bogota, alt. 15,300 ft., Karsten.

36. *A. Mexicana*, Mart.; “fr. tripinnatifido-partite, sparingly hirsute on both sides; st. and rachis rough with hairs and furnished with scales varying in size; pinnæ linear-oblong, acute; pinnl. linear-acuminate, deeply pinnatifid; ultimate lobes obliquely and broadly ovate, entire or emarginato-bidentate; sori on each lobe near the rachis 2-3.”—Mart. Cr. Bras. p. 70. t. 45. Hk. Sp. 1. p. 47.

Hab. Mexico.

37. *A. myosuroides*, Liebm.; “caud. 10-16 ft. l., 3-4 in. diam.; fr. ample; pinnæ patulous, petiolate, elongato-lanceol.  $1\frac{1}{2}$ -2 ft. l.; pinnl. divergent, 3-3 $\frac{1}{2}$  in. l.,  $\frac{1}{2}$  in. w., elongato-lanceolate, long-acuminate, acute, deeply pinnatifid; lobes from a dilated base linear-lanceolate, falcate, rather obtuse, crenulato-falcate; margins a little revolute, the sinuses angled; the apex of the pinnl. contracted,  $\frac{1}{2}$ -1 in. l., 1-2 lines w., crenated; costa on both sides appresso-pilose; sori numerous on each lobe, at length confluent; st. 1 ft. l., 1 in. thick, aculeolate with straight prickles.”—Liebm. F. Mex. p. 134.

Hab. Mexico, on mountains, alt. 2,400 ft., Liebmann.—The author seems to allude to an affinity with *Als. armata*, Pr. I possess copious specimens from Dr. Liebmann gathered



in Mexico, and from the Copenhagen Garden, where it is cultivated; but, save in the caudate apices of the pinnules, it possesses scarcely any distinguishing characters.

I may here mention, of S. American "*Alsophila*," *A. tenera*, J. Sm., from St. Vincents, alluded to at p. 18 of this vol. under *C. gracilis*, Gris.; a fine-looking species from Tarapota, E. Peru, *Spruce*, n. 472, with very long, dense, subulato-crinite scales; an *Alsophila* from Porto Alegre, S. Brazil, *Mr. Fox*, n. 247, of which the two lowest lobes of the pinnule are singularly reflexed upon the rachis; a Guatemala species from Messrs. *Salvin & Godman*, "n. 1;" a Cuban species, *C. Wright*, n. 1053, with oblong, falcate lobes, an inch long; and other Cuban species from the same collector, Nos. 1833, 1834, and 1834a. These, however, and some other dubious species, I dare not attempt to characterize.

\*\* *Species of the Pacific Isles, Australia, and N. Zealand.* Sp. 38-47.

38. *A. Samoensis*, Brack.; "arborescent, unarmed; *st.* and *common rachis* fulvo-tomentose above; *fr.* glabrous, nearly membranaceous, bipinnate; *pinnl.* elongato-lanceolate, scarcely acuminate, pinnatifid; *lobes* oblong, obtuse, subfalcate, serrated; *part. rachises* and *costa* and *veins* (which are slender, forked, setose above) beneath bullato-squamose; *sori* few, infra-axillary, nearer the costa than the margin; *recept.* columnar, with a lacerated *scale* beneath, and hairs among the capsules."—*Brack. Fil. p. 287. t. 40. f. 1.*

Hab. Samoan Isles, *Brackenridge*; Louisiade Archipelago, *McGillivray*.—I have seen no authentic specimen of this; but some of my specimens from the Louisiade sufficiently accord with the description and figure above quoted.

39. *A. decurrens*, Hk.; unarmed; *fr.* membranaceous, bipinnate above, the rest tripinnate, sparsely villous with long, white hairs on both sides, chiefly on the costules and veins, the former scurfy with small bullato-acuminated scales; *prim. pinnae* 1-1½ ft. l., 6 in. w., oblong-acuminate; *second. pinnae* 2-3 in. l., oblong-acuminate, pinnated; *ult. pinnl.* 4-6 lines l., 1½ line w., from an adnate and decurrent base oblong, obtuse, pinnatifid half-way down to the costule; *lobes* ovate, acute, entire or with 1 or 2 teeth; *sori* 1 to each lobe of few lax capsules.—*Hk. Sp. 1. p. 51.*

Hab. Pacific Islands; Aneiteum, Samoan Islands; N. Caledonia (*Vieillard*).—A species not likely to be confounded with any other.

40. *A. truncata*, Brack.; *main* and *second. rachises* dark purple, glossy, sharply muricate, deciduously furfuraceo-tomentose, as well as the costæ and costules beneath; *fr.* tripinnate, firm, coriaceous, bright green above, paler beneath; *prim. pinnae* 10-16 in. l., 4-5 in. w., oblong, acuminate; *second. ones* 2-3 in. l., ¼-½ in. w., oblong, sessile, pinnated to the very short pinnatifid acumination; *ult. pinnl.* very small, rather distant, from a truncated shortly petiolated free base, linear-oblong, acute, the margin recurved, sinuato-lobate; *costule* thick and prominent, bullato-squamulose; *veins* forked, almost from the base; *sori* small, dark orange, lax, near the costule.—*Brack. Fil. p. 288.*

Hab. Fiji and Samoan Islands, *Brackenridge*; Ngau, *Milne*.—A very distinct and peculiar species.

41. *A. Novæ Caledoniæ*, *Mett.*; *main* and *second. rachises* rufo-fuscous, muricate and, as well as the costæ beneath hirsuto-tomentose, and very minutely paleaceous; *fr.* coriaceous, dark blackish green above, glossy as if varnished (beneath in our specimen wholly covered with fructification), tripinnate; *prim. pinnae* 1½ ft. l., 6 in. w.; *second. ones* sessile, linear-oblong, 4-5 lines w., pinnated, except the acuminate serrated apex; *ult. pinnl.* rather distant 2-2½ lines l., less than 1 line w., linear-oblong, obtuse, sessile, and slightly decurrent at the base, the margins recurved subrenulate; *sori* copious, occupying the space between the costule and the margin.—*Mett. Fil. N. Caled. n. 100.*

Hab. N. Caledonia, *Vieillard*, n. 1633.—*Mettenius* compares this with *A. truncata*, Brack.; no doubt its nearest affinity, but it is truly distinct

42. *A. Tahitensis*, Brack.; "fr. bipinnate; *pinnl.* small, sessile, glabrous, oblong-lanceolate, deeply pinnatifid; *lobes* oblong-obtuse, crenulate; *general rachis* flexuose and, as well as the partial ones, rufo-tomentose; *costa* bullato-squamose beneath; *veins* simple or forked; *sori* near the costule with a semicalyciform *involucre*, lacerated at the inner base; *recept.* subglobose, with no hairs among the capsules."—*Brack. Fil. p.* 238. *t.* 40. *f.* 1.

Hab. Tahiti, *Brackenridge*.—Unknown to me. Lobes of pinnules 2 in. l., scarcely 1 in. w. An *Hemitelia*, § *Amphicosmia*?

43. *A. Macarthurii*, Hk.; *st.* jointed upon the caud.; *main* and *second. rachises* all dark ebeneous purple, deciduously pulverulent, mucronato-spinulose; *fr.* firm, cartilagineo-chartaceous, dark green above, subglaucous beneath, glabrous or nearly so and scaleless, tripinnate; *prim. pinnæ* 1½-2 ft. l., 8 in. w., oblong-lanceolate, acuminate; *second. pinnæ* oblong-acuminate, sessile, pinnatifid only at the apex; *costæ* beneath pubescenti-asperous; *ult. pinnl.* and *lobes* linear-oblong, acute, the margins slightly recurved, spinuloso-serrate; *sori* copious, close to the costa; *recept.* small, not hairy.

Hab. Woods near Sydney, *Sir Wm. McArthur*; Hastings and Marlony Rivers, *Beckler*; Illawara, *Shepperd*; Mt. Lindsay (*caud.* 20-25 ft. l., 9 in. w.). "Whip-stick Fern" of the colonists.—Allied to *A. australis*, but assuredly distinct.

44. *A. australis*, Br.; *st.* with very long, firm, subulate scales, 1½ ft. l., and as well as the *main rachises* muricato-asperous, stramineous; *fr.* ample, coriaceous-submembranaceous, subglaucous beneath, more or less villous on the costæ and costule above, and very minutely bullato-paleaceous beneath, often quite naked; *prim. pinnæ* 1½ ft. l., 6-10. in. w.; *pinnl.* 3-4 in. l., ½-¾ in. w., oblong, acuminate, deeply pinnatifid, or, towards the base even pinnate; *ult. pinnl.* or *lobes* oblong, acute, serrated, subfalcate; *sori* copious, rather small, intermediate between the costule and the margin; *recept.* villous.—*Hk. Sp.* 1. *p.* 50. *t.* 19. *A.*

Hab. Tasmania and Australia, especially in the South; Hastings and Clarence Rivers, *Beckler*; Louisiade Archip., *McGillivray*, n. 456.

45. *A. Colensoi*, Hk. f.; unarmed, *caud.* small, to 4-5 ft. l.; *st.* short, densely clothed with very long, white, silvery, subulate scales, 1 in. l., and with copious lesser dark brown ones on the rest of the *stipes*, *rachises*, and *costæ*, mixed with small bullate scales; *fr.* submembranaceous, subhirsute, 2-4 in. l., 10-12 in. or more w.; *prim. pinnæ* 12-14 in. l., oblong, acuminate; *pinnl.* 2 in. l., 4-5 in. w., rather distant, deeply nearly to the costa pinnatifid; *lobes* 2-3 lines l., ovato-oblong, strongly serrated; *veins* all simple; *sori* small, nearer the costule than the margin.—*Hk. f. Fl. N. Zeal.* 2. *p.* 8. *t.* 73.

Hab. New Zealand, Northern Island, *Colenso*; Otago, *Sinclair*.

46. *A. excelsa*, Br.; *st.* and *main rachises* muricated; *fr.* ample, coriaceous, dark green above, paler beneath, when young more or less ferrugineo-tomentose beneath, mixed with copious, small, bullate scales on the costæ and costules; *prim. pinn.* 1½-2 ft. l., 6-10 in. w.; *pinnl.* numerous, approximate, oblong-lanceolate, acuminate, deeply to the costule pinnatifid, often quite pinnate; *lobes* or *ult. pinnl.* ¼-¾ in. l., oblong or linear-oblong, acute or obtuse, falcate, the margins subrecurved, serrated; *veins* once or twice or more forked; *sori* copious near the costules.—*Hk. Sp.* 1. *p.* 49. *t.* 18. *A.* *Cooperi*, *Veitch's Cat.*

Hab. Norfolk Island; Illawara, *C. Moore*, and Hastings River, Australia, *Beckler*; Mount Lindsay, *Walter Hill*.—Said to have a trunk 60-80 ft. l. The segments of the sterile fronds are larger and broader than the more coriaceous fertile ones, and of a paler green. It appears to be a larger and stouter-growing plant than *A. australis*. A plant, in every respect resembling the *A. excelsa*, has been sent living to Mr. Veitch, and has been cultivated in gardens under the name of *A. Cooperi*, in compliment to Sir Daniel Cooper.



47. *A. lunulata*, Br. ? Brack. ; *st.* and *main rachises* mucronato-asperous, pale brown ; *fr.* ample, coriaceous, dark blackish-green, glabrous or very slightly villous and bullato-squamulose on the costules beneath ; bi-subtripinnate ; *prim. pinnae* 1½-2 ft. l., 6-9 in. w. ; *pinnl.* oblong, subcaudato-acuminate, deeply to the rachis pinnatifid ; *lobes* united or lower ones free ; *lobes* or *ult. pinnl.* closely placed, 4 lines l., 1-1¼ line w., oblong or linear-oblong, when fertile falcate, acute, the margins reflexed and obscurely serrated in the upper half ; *veins* forked below the middle ; *sori* copious, deep brown, nearer the costule than the margin.—*Hk. Sp. Fil.* 1. p. 51. *Brack. Fil.* 1. p. 286. t. 39 (*excellent*). Polypod. *Forst.* *Cyathea Mertensiana*, *Bong. in Hb. Nostr.* an *Hemitelia crenulata*, *Mett.* (who quotes *Alsophila extensa*, *Bl.*, not *Br.*) ? An etiam *Hemitelia Junghuniana*, *Mett.*, *Alsophila*, *Bl.*, *Als. intermedia*, *Metten.* ?

Hab. "Pacific Islands," *Forster* ; Samoan and Fiji Islands, *Brackenridge* ; Isle of Bonin, N. Caledonia, Aneiteum, *McGillivray* ; Java?, *Blume*. *Brackenridge* gives N. Zealand ; but I have never seen it from that country. This has much the habit of our *Cyathea affinis* ; but there is no trace of involucre. I think it is quite likely to be the *Polyp. lunulatum* of *Forster*, and we have now happily a faithful figure given by *Brackenridge*.

\*\*\* *Species of India, Ceylon, Malaya.* Sp. 48-63.

48. *A. alternans*, *Hk.* ; *rachis* much thicker than a swan's quill, glabrous, smooth, tawny-brown ; *fr.* ample, subcoriaceous, glabrous, subtripinnate ; *prim. pinnae* short-petiolate, very remote, 10-14 in. l., 2-3 in. w., oblong, acuminate, deeply pinnatifid, pinnated near the base ; *lobes* or *pinnl.* 1-1½ in. l., oblong, acute, subfalcate, entire or serrate, all horizontal, the extremity of the frond suddenly pinnated with oblong, undivided, sessile *pinnl.*, serrated at the margin ; *veins* approximate, once or twice forked, *sori* subbiseriate on each *pinnl.* or lobe, subglobose compact, mixed with rather copious jointed hairs.—Polypod. *Wall.* *Hemitelia* ? *Hk. Sp. F.* 1. p. 29.  *Ic. Pl.* t. 622 (*omitting f. 3*).

Hab. Penang, *Wallich*, *Sir W. Norris*.—In the figure above quoted, a depression formed by the sorus on the lobe was mistaken by the artist for an involucre.

49. *A. ? Celebica*, *Mett.* ; "*fr.* tripinnate, coriaceous, glauco-sericeous beneath ; *pinnl.* linear-lanceolate, acuminate ; *second. pinnl.* linear-subfalcate, rather obtuse, crenulate at the apex, truncate and sessile at the base ; *common rachis* furfuraceous, sparingly and slightly aculeated."—*Mett. in Miq. Ann. Mus. Bot. Lugd.* 1. p. 26. *Cyathea* ? *Bl.* *Hk. Sp.* 1. p. 26.

Hab. Celebes and Ternate, *Blume*.—A sterile fragment of this (and but little more seems to be known) I owe to Dr. *Blume*. Its characters, such as they are, depend on the adventitious clothing : the rachis muricated and furfuraceous ; the costa beneath is shortly villous and furfuraceous ; and the general frond beneath is "glauco-sericeous."

50. *A. comosa*, *Hk.* ; unarmed ; *st.* paleaceous with long linear-subulate scales, pale brown, as well as the *rachises*, which are tawny-villous on the upper side ; *fr.* herbaceous, yellow-green, glabrous, and scaleless ; *prim. pinnae* 14-16 in. l., 6-8 in w. ; *pinnl.* oblong-acuminate, from a rather broad and truncated sessile or shortly petioled base serrated ¾ of the way to the costule, pinnatifid with very narrow sinuses ; *lobes* close-placed, oblong-serrated ; *veins* rarely forked, *sori* orange-colour, rather distant, between the costule and the margin, nearer the latter, receptacle small, very slightly elevated.—*Hk. Sp.* 1. p. 53. t. 20. *A. (excl. var. β)*.

Hab. Sylhet and Sincapore.

51. *A. contaminans*, *Wall.* ; *st.* and *rachides* "paleaceous at the base," purplish-brown, glossy, aculeate with short prickles tipped with a gland ; *fr.* ample, coriaceous, glabrous, black-green above (when dry), glaucous beneath ; *prim.*

*pinnæ* 2 ft. and more l., oblong-ovate, acuminate; *pinnl.* sessile, 4-5 in. l.,  $\frac{1}{2}$  to nearly 1 in. w., deeply, near to the costule, pinnatifid, linear-oblong, subfalcate, entire, the fertile ones often more contracted with margins (when dry) revolute, obscurely crenate; *veins* once or twice forked; *sori* nearer the costule than the margin; a minute shallow-lobed and cut membrane surrounds the base of the receptacle after the capsules are fallen.—*Hk. Sp.* 1. p. 52. 13. B. *Mett. in Miq.* 1. p. 54 (Alsoph.). *Chnoophora glauca*, Bl. *A. Brunoniana*, Wall. *Hk. Sp.* 1. p. 53.

Hab. Java and Malay Islands; Sylhet; Cachar, near Assam, *Hk.* & *Thoms.*—Some of my specimens exhibit in a perfect state of the sori a thin membranous? covering, which breaks away from the top and gradually disappears. *A. Brunoniana* is probably identical with this, but scarcely known, except from the caudex and withered fronds alluded to in *Sp. Fil. l. c.*

52. *A. crinita*, *Hk.*; *st.* and *main rachis* stramineous, brown, hispidopaleaceous and strongly muricate; *spines* short, tipped with a black gland; *fr.* subcoriaceo-membranaceous; *rachises* pilose above, beneath and on the costæ densely paleaceous-crinite; *scales* sometimes short and minute, generally elongate and adpressed; *prim. pinnæ* 2 ft. l., 10 in. w.; *pinnl.* oblong, acuminate, sessile, pinnatifid nearly to the costuli; *lobes* narrow-oblong, subobtuse, falcate, the margins recurved, serrated; *costæ* and *veins* often pilose; *veins* forked; *sori* covering the whole underside of the lobes, mixed with ciliated scales.—*Hk. Sp. Fil.* 1. p. 54, and *l. c.* *Bedd. Fil.* t. 671. *Bedd. Fil.* p. 20. t. 59.

Hab. Ceylon, Nilghiris (*Beddome*); Java, *De Vriese* (excessively shaggy when young, with very long, fulvous, paleaceous hairs).—A very shaggy-looking species from the copious hairs and scales. Mettenius unites it with *A. tomentosa*, a species of Blume; but if what I receive under that name be the true plant, it is a very different species, the *A. lepifera* of J. Smith, our *A. tomentosa*.

53. *A. tomentosa*, *Hk.*; scarcely anywhere hairy or villous; *st.* and *main rachises* palish brown, strongly muricated with short spines tipped with a black gland; *fr.* coriaceous, blackish-green above, beneath in all my specimens copiously cobwebby with small white subtomentose ragged scales, which fill up all the interstices of the copious sori, which together cover the whole surface of the frond in all my specimens (the rest as in *A. crinita*).—*Hk. Sp.* 1. p. 55. *Mett. in Miq. Ann. Mus. Bot.* 1. p. 53. *Chnoophora*, Bl. *Als. lepifera*, J. Sm. & *Hk. Sp.* 1. c. p. 54.

Hab. Java; S. Comarines, *Cuming*; Formosa, *Wilford*.

54. *A. caudata*, J. Sm.; unarmed; *fr.* glabrous, firm, subcoriaceo-membranaceous; *pinnl.* sessile, oblongo-lanceolate, broadest at the base, the apex is suddenly contracted into a long, narrow-serrated, tail-like acumen; the *lobes* oblong, a little falcate, rather obtuse, serrated; *veins* simple or forked; bullate scales none; *sori* close to the costule on the lower half of the lobes.—*Hk. Sp.* 1. p. 52. t. 20. B.

Hab. Luzon, *Cuming*.—A very dubious species, having some affinity with *contaminans* and, as J. Smith thinks, with *lunulata*.

55. *A. ramispina*, *Hk.*; *st.* subasperous, ebeneous (as well as the *rachises* and *costæ*), a little paleaceous at the base and there bearing 3-5 subsecund, black *spines*  $1\frac{1}{2}$  in. l., with numerous sharp divaricating *branches*; *fr.* subcoriaceo-membranaceous, dark green above, paler beneath, where the costa is quite scurfy with small brown bullato-paleaceous *scales*; *prim. pinnæ* 1 ft. and more l., oblong, pinnatifid at the apex; *pinnl.*  $2\frac{1}{2}$ -3 in. l.,  $\frac{1}{2}$  in. w., oblong, subpetiolate, obtusely acuminate, pinnatifid  $\frac{2}{3}$  of the way to the costules; *lobes* oval-oblong, obtuse, serrated towards the apex; *veins* mostly simple (in the fertile pinnules); *sori* small, of few capsules, chiefly on the lower veins, and near the costule, which is very minutely bullato-squamulose; *recept.* minute.



Hab. Sarawak, Borneo; alt. 2,700, *T. Lobb*.—Its nearest affinity is perhaps with *A. squamulata*, from which the fronds differ in colour and texture; and it is remarkable for the large and curiously branched spines at the bases of the stipes.

56. *A. podophylla*, Hk.; *st.* generally sharply mucronato-aculeate and, as well as the *main rachises*, purple-brown; *fr.* subcoriaceo-membranaceous; *prim. pinnae* 1½-2 ft. and more long, pinnatifid at the apex; *pinn.* extremely variable in size and shape, petiolate, 4-8 in. l., ½-1 in. w., from a truncate, or subhastate, or cordate base sword-shaped, acuminate, entire, or serrated only towards the apex, or slightly lobed, or more or less pinnatifid, rarely deeply pinnatifid and even pinnate towards the base; *veins* pinnated; *veinlets* often united in the more entire pinnules towards the margin, bearing a *sorus* near their base, and consequently parallel with the primary vein.—*Hk. K. Gard. Misc.* 8. p. 334, and in *2nd Cent. of Ferns*, t. 66.

Hab. Chusan; Hong-Kong, frequent. Variable as is this handsome species, I cannot but consider it quite distinct from *A. glabra* of Bl.

57. *A. squamulata*, J. Sm.; *st.* paleaceous, at the base tuberculato-asperous, and, as well as the *rachises*, dark, ebeneous-purple, subulato-squamulose; *fr.* singularly firm and coriaceous, rich brown when dry; *prim. pinnae* 1½ ft. l., 6-8 in. w., stipitate; *pinn.* rather distant, all petiolate (*petiole* often 2 lines l.), oblong-acuminate, pinnatifid rather less than half-way to the thickened costule; *lobes* ovato or rotundato-serrated; *costule* with a few deciduous bullate *scales*; *sori* few, close to the costule.—*Hk. Sp.* 1. p. 51. *Mett. in Miq. Ann. Mus. Bot. Lugd. Bat.* 1. p. 52.? An *Gymnosphaera squamul. Bl.*?

Hab. Malacca, Mt. Ophir, *Griffith, Cuming*.—The fragment I possess of this plant from Java is, I think, only *Als. glabra*. Ours is, I believe, only from Mt. Ophir.

58. *A. glabra*, Hk.; *st.* asperous, paleaceous at the base, and, as well as the *main rachises*, purple-ebeneous, polished; *fr.* subcoriaceo-membranaceous; *prim. pinnae* 1½-2 and more ft. l., deeply pinnatifid at the apex; *pinn.*, *upper ones* sessile, *lower ones* petiolate, from a truncated base, oblong-acuminate, 3-6 in. l., 5-9 l. w., pinnatifid, ¼-½ way to the costule, rarely more; *lobes* triangular or rounded, rarely ovate, serrated; *veins* pinnated, *veinlets* all simple; *sori* on most of the lobes, generally arranged in the shape of a V inverted, not extending to the apex of the lobe.—*Hk. Sp.* 1. p. 51. *Bedd. Fil.* p. 20. t. 60 (*very good*). *Als. gigantea*, *Hk.* l. c. p. 53.

Hab. Java and Malay Islands, generally (Moulmein, n. 3. *Parish*); China and throughout India; Ceylon.

59. *A. latebrosa*, Hk.; *st.* aculeate at the base, muricated upwards, dark mahogany-brown in colour; *prim. pinnae* oblong-acuminate, 12-24 in. l., 6-8 in. br.; *pinn.* lanceolate-acuminate, 3-4 in. l., ½ in. br., cut down nearly to the rachis into numerous linear-oblong, blunt, slightly-toothed lobes on each side; texture herbaceous, upper surface dark-green, naked, lower surface naked, or slightly hairy and scaly; *veins* all once forked; *sori* elevated, conspicuous, occupying often the lower two-thirds of the segment.—*Hk. Sp.* 1. p. 37. *Bedd. Fil.* p. 19. t. 58. *Polypodium*, *Wall.* *Hemitelia*, *Mett. in Miq.* 1. p. 54.

Hab. Common almost throughout India proper and the Malay Islands, Formosa, &c.—There are plenty of *scales* amongst the fructifications, but none, I think, that can constitute a *Hemiteloid involucre*.

60. *A. lurida*, Hk.; *st.* smooth; *rachis* slightly scabrous and scaly below, densely tomentose and scaly above; *fr.* broadly lanceolate; *prim. pinnae* 1 ft. l.; *pinn.* more than 2 in. l., ½ in. br., cut down to the rachis into numerous linear-oblong nearly entire segments; texture subcoriaceous, upper surface dark-green, naked, lower densely scaly on the rachis and costæ.—*Chnoophora*, *Bl.* *Mett. in Miq. Ann. Mus. Bot. L. Bat.* 1. p. 53.

Hab. Java, *Bl.* in Herb. nostr. (but sterile), and Celebes.—I possess what I consider quite another plant, with membranaceous fronds, and quite free from scales beneath, except a few minute, widely scattered bullate ones, from Dr. Miquel, under the name, from Java, and what I believe to be the same also, but quite destitute of bullate scales, from Mr. Parish, Moulmein; both in too imperfect a state to merit further notice.

61. *A. crenulata*, Mett.; "*fr.* bipinnate (or 3-pinnatifid) submembranaceous, beneath bullato-squamulose on the costæ; *pinnl.* lanceolate, acuminate, deeply pinnatifid; *segm.* linear-oblong, obtuse, serrulate; *sori* (1-4) near the base of the costules; *rachises* tomentose above, asperulous beneath; *caud.* arboreous."—*Bl. En. Fil. Jav. p.* 246, under *Als. extensa*, excl. *Syn.* (Mett.).

Hab. Java, *Blume* in Hb. nostr.—Some *Indian Alsophila*, in my Herbarium, I am unable to refer to any known species, nor are the specimens sufficiently perfect to justify me in describing them.

62. *A. tristis*, Bl.; *st.* as thick as a goose-quill, 2 ft. l. and more, dark purple, glossy, and as well as the *main rachis* (of the same colour) tuberculato-asperous; *fr.* subcoriaceous, blackish-brown when dry, ovato-lanceolate, 3 ft. l. and more, tripinnate; *prim. pinnæ* distant (3-4 in. apart below), 1 ft. l., often 4 in. w., ovato-lanceolate, much acuminate; *secund. pinnæ* 2-3 in. l., oblong-acuminate; *ultimate pinnl.* sessile, 3-5 lines l., oblong-obtuse, inciso-pinnatifid about half-way to the costule; upper portion of the *main rachis*, the *secund. rachises*, and *costa* especially beneath, furfuraceous-hirsute; *veins* pinnated in the ultimate pinnules; *sori* large, one to each lobule; *capsules*, when young, apparently agglutinated, close-pressed; *receptacle* elevated. *Alsophila tristis*, *Bl. in Hb. nostr.* *Cystopteris*, *Metten. in Hb. nostr.*

Hab. Java, *Blume*, *Millett*, *De Vriese*.—A very remarkable Fern, with much of the general aspect of *Diacalpe*. I find no trace of an involucre; yet Mettenius has referred it to *Cystopteris*. I possess from Blume apparently a pinnule of another Java Fern, somewhat allied to this, under the name of *Alsophila tenuisecta*, which also I cannot find described: the fragment is 4 in. l. and 1½ in. w., bipinnate, dark olive-brown; *ultimate segm.* 2 lines l., oblong-obtuse, sessile, pinnatifido-serrate, laxly villous, as is the pale rachis; *veins* pinnated; one small *sorus* on the superior basal vein, of few capsules. It is probably a *Phegopteris*.

63. *A. subglandulosa*, Hance; *st.* densely clothed at the base with long flaccid linear light-brown scales; *fr.* ample, tripinnate; *lower pinnæ* 1 ft. l.; *pinnules* lanceolate pinnatifid, the lower segments cut down nearly to the rachis, ciliated at the edge with glandular hairs; the *lateral veins* once forked; *prim.* and *secund. rachises* densely clothed with small linear dark-coloured scales, texture herbaeous; *sori* copious.

Hab. Island of Formosa, gathered by the late Mr. Oldham. Our specimens have the fronds about 2 ft. l. by 1 ft. br.

\*\*\*\* (*Species of Tropical Africa.* Sp. 64, 65.)

64. *A. Ethiopica*, Welw. msc., Hk.; *caud.* 3-6 ft. l., 2-3 in. w., knotted with large tubercles, the cicatrices of the fallen stipites; *st.* thick as a goose-quill, a span and more long, asperous with small tubercles, nearly smooth on the main rachis, purplish on the upper side; *fronds* firm-membranaceous, dark green, 4 ft. and more l., broad-lanceolate, quite glabrous, except on the costæ and costules, which are hairy on both sides, pinnated; *pinnæ* 8-10 in. l., subsessile, oblong-acuminate, pinnated below, the rest deeply pinnatifid with *lobes* ¾ in. l., oblong-sublanceolate, scarcely falcate, acute, more or less coarsely serrated; *veins* forked; *sori* at the forks, copious, rather nearer the costule than the margin, orbicular compact.—*A. Curreri*, Hk., Met.

Hab. Tropical Africa, S. of the Line, *Dr. Currer*; Angola, Golungo alto, alt. 1,000-2,400 ft., *Welwitsch*, n. 116 and 116<sup>2</sup>.—A very peculiar and well-marked species.



65. *A. obtusiloba*, Hk. ; *st.* thicker than a swan's-quill, short, scarcely 4 in. l., tuberculato-muricate, dark glossy purple like the *rachis*, which is nearly smooth and quite glabrous ; *fr.* firm-membranaceous, black-green, scarcely paler beneath, 4 ft. and more long, pinnated, everywhere glabrous except on the *costæ* above, pinnated ; *pinnæ* 9-10 in. l. (3-4 of the lowest pair much dwarfed), shortly petioled, oblong, subacuminate, deeply pinnatifid nearly to the *costæ* below, less deeply upward ; *lobes* 5-7 lines l., broad-oblong, scarcely falcate, quite entire, very obtuse ; *veins* rather distant, forked, *sori* at the fork, copious, small, prominent, nearer the *costa* than the margin.

Hab. Sierra del Crystal, Trop. Africa, *Mann.*—Equally distinct as a species with the preceding. Somewhat allied to this, I possess a specimen of an *Alsophila*? (sterile), from Johanna Island, E. Trop. Afr., gathered by *Dr. Kirk* : the *pinnæ* are all petiolate, 3 in. l., oblong, shortly acuminate, deeply pinnatifid, especially towards the base, the lobes rotundato-obscurely serrated, lowest inferior one generally free, glabrous ; *costæ* subpubescent and, as well as the forked *veins*, with scattered bullate scales beneath ; *rachis* black-purple, below the apex winged between the superior *pinnæ*.

#### GEN. 7. DIACALPE, *Bl.*

*Sori* globose, the *receptacle* small, scarcely elevated. *Invol.* inferior, globose, hard-membranaceous, entire, at length bursting very irregularly at the summit. *Caps.* numerous, nearly sessile ; *ring* broad.—*Tab. I. f. 7.*

1. *D. aspidioides*, *Bl. Hk. Sp. 1. p. 59.* *D. pseudo-Cænopteris*, *Kze.?*

Hab. Malay Islands ; Sylhet and Assam ; Ceylon.—*Fr.* tripinnate, submembranaceous, often deciduously crinite ; *pinnl.* oblong-cuneate, lobed and more or less decurrent. This genus seems more appropriately placed with the *Cyatheæ* than with the *Dicksoniæ*. The fronds much resemble those of *Davallia nodosa*.—What is *D. Madagascariensis*, *Fée*, *Gen. Fil. p. 339.?*

#### GEN. 8. MATONIA, *Br.*

*Recept.* of the *sori* expanded into a firm-membranaceous, umbrella-shaped, obscurely 6-lobed, stipitate *invol.*, which covers and encloses 6 large sessile *caps.* *Not arborescent.* *Veins* forked, free, except those around the *sori*, which are closely reticulated. *Tab. I. f. 8.*

1. *M. pectinata*, *Br. in Wall. Pl. As. Rar. 1. t. 16. Hk. Sp. 5. p. 286.*

Hab. Summit of Mt. Ophir, Malacca.—One of the rarest and handsomest Ferns. *Fr.* ample, fan-shaped, 1½-2 ft. w., hard-coriaceous, each portion subscorpioideo-pinnate on one (the superior) side. *Pinnl.* consequently all secund pectinato-pinnatifid.

#### TRIBE II. DICKSONIÆ (excluding Hymenophyllæ).

*Sori* globose, situated on the back or apex of a vein. *Invol.* inferior subglobose, free, sometimes covering the whole sorus, closed, at length bursting irregularly ; more frequently cup-shaped, entire or with 2 lips.—*Caudex* rarely arborescent. *Venation* free or anastomosing. *Gen. 9-14.*

#### GEN. 9. ONOCLEA, *L. Sw., Mett., Hk.*

*Sori* dorsal, globose, on the veins of the changed and contracted *pinnæ* of the fertile *fr.* and quite concealed by their revolute margins. *Invol.* very thin, delicate-membranaceous, hemispherical or half-cupshaped, originating from the inferior side of the sorus, or wanting.—*Caud.* erect or creeping. *Fr.* stipitate dimorphous, pinnate or pinnatifid, with free or anastomosing veins. Large herbaceous Ferns of cold or temperate climates. *Tab. I. f. 9.*

§ *Euonoclea*. *Fert. fr. bipinnate; pinn. recurvato-globose; invol. a globose pellicle, bursting at the summit. Veins of the fertile fr. copiously anastomosing.*

1. *O. sensibilis*, L.—*Hk. Sp. Fil.* 4. p. 160.

Hab. N. Am., U. St., from Florida to Canada; N. Asia, Amur, Japan, and Manchuria.

§§ *Struthiopteris*, *W.* *Hk. G. Fil.* t. 69.—*Sp.* 2. 3. *Fert. fr. pinnate; pinnæ torulose or flattish. Veins all free pinnated; invol. subhemispherical, very fugacious.*

2. *O. Germanica*, *W.*; *fr.* broad-lanceolate, long-attenuated at the base; *fert. pinnæ* short, much contracted, linear-terete, torulose, lobed and torn at the margin; *invol.* cup-shaped, very fragile and soon obsolete.—*Hk. Sp.* 4. p. 161.

Hab. N. Europe, Scandinavia to Austria; N. Asia, Manchuria to Altai; N. America, Canada to Pennsylvania.

3. *O. orientalis*, *Hk.*; *fr.* ovato-oblong, not attenuated at the base; *fert. ones* oblong (often 2 ft. l.) contracted; *pinnæ* linear-oblong, flattened 2-edged, the broad refracted margins covering the whole back, dark purple-brown, glossy, at length spreading, torn at the margin, *inv. O.?*—*Hk. 2nd Cent. of F.* t. 4. *Sp.* 4. p. 161.

Hab. Sikkim, alt. 12,000 ft.; Assam; Hakodadi, Japan.—I think Mettenius has done well in uniting *Onoclea* and *Struthiopteris*; and also in placing the genus near *Woodsia*, on account of the involucre (when present) having its origin beneath the sorus.

#### GEN. 10. HYPODERRIS, *Br.*

*Sori* subglobose in lines or series parallel with the *second. veins*. *Invol.* calyciform, thin-membranaceous, fimbriated at the margin.—*Fronde simple, subcordato-hastate, costate, pinnately veined, membranaceous; veins alternato-flexuose. Veinlets copiously anastomosing.* TAB. I. f. 10.

1. *H. Brownii*, *J. Sm.*—*Hk. Sp.* p. 57.  *Ic. Pl.* t. 675, 676; and in *Gard. F.* t. 24. *Woodsia*, *Mett.*

Hab. Trinidad.—*Fr.* 10-12 in. l., often hastately 3-lobed.

#### GEN. 11. WOODSIA, *Br.*

*Sori* globose. *Invol.* inferior, soft-membranaceous, from the first calyciform or more or less globose, and sometimes enclosing the sorus, at length opening at the top, the margin or mouth irregular lobed or fringed.—*Small herbaceous Ferns of cold or temperate climates, much tufted: the stipes often jointed and separating at the joint.* TAB. I. f. 11.

§ *Euwoodsia*.—*Invol.* smaller than the sorus, but fringed with hairs which extend beyond it. TAB. I. f. 11. *Sp.* 1-3.

1. *W. Ilvensis*, *Br.*; slightly hairy above, *st., rachis, costules, and veins* below crinite, with copious, rufous, chaffy *scales*; *fr.* broad-lanceolate; *pinnæ* oblong, obtuse, broader at the base, sessile, deeply pinnatifid with many oblong, obscurely crenated lobes.—*Hk. Sp.* 1. p. 63, and *Brit. F.* t. 3.

Hab. Arctic regions and high mountains in the temperate zone, Europe, Asia, and America.

2. *W. hyperborea*, *Br.*; glabrous, or with the *st., rachis, and costæ* beneath slightly hairy, mixed with a few scattered *scales*; *fr.* linear-lanceolate, pinnated; *pinnæ* cordato-ovate, pinnatifid with few (5-7) broadly-obovate, entire lobes; the *inf. lobes* distant.—*Hk. Sp.* 1. p. 64, and *Brit. F.* t. 7.

Hab. Similar in its distribution to the preceding.



3. *W. glabella*, Br. ; quite glabrous ; *fr.* linear, tapering a little below, pinnated ; *pinnæ* very remote towards the short *st.*, all of them deltoid, very obtuse, cut into few (3-7) short-rounded or subcuneate, entire lobes.—*Br. Hk. Sp.* 1. p. 64, and in *Fl. B. Am.* 2. t. 237.

Hab. America, from the hills of New York northward to the Arctic regions ; Arak-amtchehene Island, Behring's Straits ; Norway, Tyrol, Carinthia.—Possibly a glabrous form of *W. hyperborea* ; and there is a subglabrous Arctic American plant which closely resembles *W. Ilvensis*.

4. *W. lanosa*, Hk. ; *fr.* oblong pinnated, quite shaggy with most copious, soft, long ferruginous hairs, mixed with very narrow, long, chaffy subulate *scales* ; *pinnæ* subcordate, dentate or lobato-dentate, scarcely pinnatifid (the rest as in *W. hyperborea*).

Hab. N. India ; Mountains of Kamaoun ; alt. 11-12,000', *Strachey* and *Winterbottom* ; Sikkim, alt. 14-16,000', *Hooker, fil.*—Specimens from 3 different localities are very uniform in the indument ; still, if *W. glabella* should prove a glabrous state of *W. hyperborea*, this may prove a var. in the opposite extreme, sericeo-tomentose in a very high degree.

§§ *Physematium.* *Involucre larger than the sorus, not ciliated.* Sp. 5-14.

5. *W. mollis*, J. Sm. ; *fr.* lanceolate pinnate, generally densely clothed, especially beneath, with soft jointed hairs, scarcely attenuated below ; *pinnæ* sessile, from a broader base, oblong, obtuse, pinnatifid ; *lobes* approximate, oval or subrotund, entire or crenate ; *sori* marginal ; *invol.* opening with jagged, circular mouth.—*Hk. Sp.* 1. p. 60. *Physematium, Kze. An. Pter. t.* 27. *W. fragilis, Liebm.*

Hab. Mexico ; Guatemala, *Salvin & Godman, n.* 123. Andes of Peru and Quito, *Jameson, McLean.*—Our now copious specimens quite resemble Kunze's figure ; but the involucre is rarely so perfect as he figures them.

6. *W. Guatemalensis*, Hk. ; *fr.* a span to 1½ ft. l., lanceolate, firm-membranaceous, much attenuated at the base with the lower *pinnæ* remote, glabrous or villous ; *pinnæ* from a broad base oblong, very obtuse, pinnatifid ; *ultimate lobes* oval, slightly crenato-serrate ; *sori* copious, submarginal ; *invol* whitish, pale, globose, opening irregularly at the summit and very permanent in that form.—*Hk. Sp.* 1. p. 61. t. 21. A.

Hab. Guatemala (*Salvin & Godman*), Mexico (*Liebm., Schaffner*).—What is *W. Cumingiana*, *Kze., Hk. Sp.* 1. p. 61, supposed to be from Chili ?

7. *W. Caucasica*, J. Sm. ; *fr.* lanceolate, a span long, glanduloso-hirsute on the *rachises* and *costæ*, firm-membranaceous, bipinnate ; *prim. pinnæ* sessile, nearly opposite, lanceolate, broadest at the base, acuminato-pinnatifid or again pinnate ; *lobes* or *ult. pinn.* oblong, acute, serrate ; *sori* large, 2 on each lobe or pinnule, one on each side near the margin ; *invol.* globose, membranaceous, lax, at first apparently entire with a central depression, at length opening with a contracted, depressed, irregular and somewhat 2-lobed mouth.—*Hk. Sp.* 1. p. 62. *Hymenocystis, C. A. Meyer.*

Hab. Rare ; rocky places in the Caucasus, alt. 1,000-6,000 ft.

8. *W. elongata*, Hk. ; glanduloso-pilose, especially above ; *fr.* a span to 1 ft. l., oblong, pinnated ; *pinnæ* rather distant, alternate, sessile, from a broadish base, oblong obtuse, pinnatifid not more than half-way down ; *lobes* short, rounded inciso-dentate, each bearing a *sorus* (rarely more) on the lower anterior veinlet, near the sinus ; *invol.* lax, very membranaceous, globose, soon bursting with an irregular opening at the apex.—*Hk. Sp.* 1. p. 62. t. 21. C.

Hab. N. W. India, alt. 10,000 ft. ; *Edgeworth, Strachey, & Thomson.*

9. *W. polystichoides*, Eat. ; *fr.* a span long, subcoriaceo-membranaceous, opaque, lanceolato-pinnate, sparsely subulato-squamulose ; *pinnæ* patent, approximate, sessile, 6-8 in. l., lanceolate, acute, cuneato-truncate at the base, acutely auricled at the superior base, entire or obsoletely crenate at the apex, indistinctly costate, veins immersed, simple or forked ; *sori* marginal in a distinct line or series ; *invol.* globose, of 4-5 concave, ciliated, incurved scales, strongly ciliated. —*Hk. 2nd Cent. of F. t.* 2.— $\beta$ . *Veitchii* ; *fr.* very villous. *Hk. Gard. F. t.* 32. *ff.* 1. 2. 4-6.— $\gamma$ . *sinuata* ; *pinnæ* broader, more obtuse, lobato-pinnatifid. *Hk. l. c. t.* 32. *f.* 3.

*Hab.*  $\alpha$ . and  $\beta$ . Japan, *Eaton & Wilford*.— $\gamma$ . Manchuria,  $\alpha$ . Ta-lien-kwan, Yellow Sea, China, *Birnie*.

10. *W. Manchuriensis*, *Hk.* ; *fr.* 6-8 in. l., thin, membranaceous, oblong-lanceolate, acuminate, pinnated ; *pinnæ* sessile, 1 in. or more l., rather remote, oblong-obtuse, pinnatifid ; *lobes* oblique, patent, ovate, obtuse, entire or slightly sinuate, unisorous ; *veins* pinnated in each lobe, lower superior vein soriferous ; *invol.* globose, thin, membranaceous, at length opening with a toothed edge to the contracted mouth.—*Hk. 2nd Cent. of F. t.* 98.

*Hab.* Manchuria, *Wilford*.

11. *W. Burgessiana*, *Gerr. mst.* ; *fr.* 6 in. l., 2 in. w., lanceolate, glandulose-pubescent, membranaceous, flaccid, pinnated ; *pinnæ* sessile, from a broad truncated base, oblong, pinnatifid ; *lobes* broad, subtruncated, toothed at the apex ; *sori* small, rather sparse, submarginal ; *invol.* thin, membranaceous, depressed-hemispherical, sublobate (apparently from the long capsules within), opening irregularly at the apex, persistent, at length breaking down into a very irregular margin.

*Hab.* Tugela R., Natal, *Gerrard, McKen*.

12. *W. obtusa*, *Hk.* ; *fr.* 6-10 in. l., broad-lanceolate, glabrous or minutely glanduloso-pilose, firm membranaceous, pinnate or bipinn. ; *prim. pinnæ* remote, subopposite, slightly petiolate, deltoideo-ovate, attenuated, obtuse, deeply pinnatifid, or the lower half again pinnate ; *lobes* or *pinnl.* oval-oblong, toothed or inciso-lobulate ; *sori* submarginal, one to each lobe or lobule ; *invol.* very thin and fragile, soon breaking down into irregular or lacinated *lobes*.—*Hk. Sp. 1. p.* 63, and *Gard. F. t.* 43.—*W. Perriniana*, *Hk. & Gr. Ic. Fil. t.* 63.— $\beta$ . *Lyallii* ; *pinnl.* and *lobes* smaller, bright green.— $\gamma$ . *andina* ; smaller and more coriaceous.

*Hab.* N. Mexico ; U. States, to the Rocky Mountains.  $\beta$ . Brit. N. W. Am., *Lyall*.  $\gamma$ . S. Am., especially on the Andes.—I am a little doubtful about some of the S. Am. specimens, which I refer here, and which are smaller and more robust, and rarely, if at all, bipinnate ; especially a "*W. crenata* and *W. canescens*," of *Mandon*, from Bolivia, alt. 2,700-3,800 mètres, "*Cistopteris vestita*, Pr.," from Brazil, and an unnamed plant from Venezuela, *Funck & Schlim, n.* 981 :—the peculiarities may, however, arise from great elevation or other circumstances.

13. *W. incisa*, *Gill.* ; *fr.* broad-lanceolate, minutely glanduloso-pilose pinnated ; *pinnæ* approximate, subopposite, sessile, oblong, obtusely attenuated, deeply pinnatifid, or sometimes again pinnate ; *lobes* or *pinnl.* pinnatifidly lobed and toothed or incised, with obtuse teeth ; *sorus* solitary on each lobule near the sinus ; *invol.* glabrous, very thin and fragile, soon breaking down into spreading lobes.—*Hk. & Gr. Ic. F. t.* 191. *Hk. Sp. F. 1. p.* 63. *Physematium*, *Kze.* *Cheilanthes crenata*, *Kze.* *Hk. Sp. F. 2. p.* 86.

*Hab.* Argentine Republic, Mendoza, San Luis Cordova, and Villavincenzia.

14. *W. Peruviana*, *Hk.* ; *fr.* oblong-lanceolate, piloso-glandulose, bipinnate ; *prim. pinnæ* nearly opposite, remote, sessile, ovato-acuminate ; *pinnl.* opposite or rarely alternate, oblong, obtuse, sessile and decurrent, so that the rachis is winged, somewhat pinnatifid with shallow bicuspidate *lobes* ; *sorus* solitary in



each lobe, subglobose, at first entire, soon bursting with an irregular mouth and breaking down into lobes and segments; *st.* and *main rachis* glabrous.—*Hk. Sp.* 1. p. 61. f. 21. B.

Hab. Andes of Peru.—Perhaps too near some of the Andine forms of *W. obtusa*.

#### GEN. 12. SPHÆROPTERIS, *Wall.*

*Sori* globose, on the back of a vein or veinlet. *Recept.* large. *Invol. inferior* globose, coriaceous, stipitate, at first enclosing the whole sorus, at length bursting vertically into 2 spreading lobes or lips. **TAB. I. f. 12.**

1. *S. barbata*, *Wall. Pl. Asiat. Rar.* 1. t. 18. *Hk. Sp.* 1. p. 58. *Peranema*, *Don.*

Hab. Nepal, Sikhim, Khasya (*Hk. f. and Thoms.*), Western Ghats of Nilghiri, *Beddome*.—*Fr.* 2-3 ft. l., tripinnate. *Pinnl.* oblong, deeply pinnatifid.

#### GEN. 13. DICKSONIA, *L'Hérit.*

*Sori* placed at the apex of a vein, intra-marginal. *Invol.* inferior, subglobose, coriaceous or membranaceous, cup-shaped and entire, or more or less distinctly 2-valved.—*About half the species are arborescent, with large decomposed coriaceous fronds; the others have creeping rhizomes, and, with two exceptions, are at least fully bipinnate. They principally inhabit Tropical America and Polynesia; but one species reaches as far north as Canada, and several others are scattered throughout the southern parts of the Temperate Zone. Veins in all free.* **TAB. II. f. 13.**

§ *Cibotium*, *Kaulf.*—*Involucre distinctly 2-valved, the outer valve coriaceous, distinct from the substance of the frond.* Sp. 1-5.

1. *D. (Cibotium) glauca*, *Smith*; arborescent; *fr.* bipinnate, ovate-lanceolate, 12-18 in. l., 6-9 in. br.; *pinnl.* linear-acuminate, cut quite down to the rachis in the lower part; *lobes* linear-oblong, subfalcate; texture subcoriaceous; surface naked on both sides, glaucous beneath; *veins* prominent; *lateral veins* of the segments once or twice forked; *sori* 2 to 12 to a lobe, inner valve oblong, narrower than the outer.—*Hk. Sp. Fil.* 1. p. 82. t. 29. A.

Hab. Oahu, Sandwich Islands, discovered by Menzies eighty years ago.

2. *D. (Cibotium) Barometz*, *Link*; arborescent; *fr.* bipinnate; *lower pinnae* ovate-lanceolate, 1-2 ft. l., 6-12 in. br.; *pinnl.* linear-acuminate, cut down within a short distance of the rachis above, and sometimes quite down to it at the base; *segm.* linear-oblong, acute, subfalcate; texture subcoriaceous; upper surface naked, shining, lower glaucous, sometimes furfuraceous; *veins* prominent; *lateral veins* of the segments rarely forked; *sori* 2 to 12 to a lobe, the *valves* nearly equal, transversely oblong.—*C. glaucescens*, *Hk. Sp. Fil.* 1. p. 82. *C. Assamicum*, *Hk. Sp. Fil.* 1. p. 83. t. 29. B.

Hab. Assam, S. China, Malayan Peninsula and Islands.

3. *D. (Cibotium) Menziesii*; arborescent; *fr.* bipinnate; *lower pinnae* 12-18 in. l., 6-9 br.; *pinnl.* linear-acuminate, cut down usually not more than half-way to the rachis; *lobes* rounded, blunt; texture subcoriaceous; surface naked on both sides, not glaucous beneath; *veins* prominent; *lateral veins* of the segments simple or forked; *sori* 2 to 8, rows with a broad space between them; inner *valve* narrower than the outer, oblong.—*Hk. Sp. Fil.* 1. p. 84. t. 29. C.

Hab. Oahu and Honolulu, Sandwich Islands.

4. *D. (Cibotium) Chamissoi*; arborescent; *fr.* bipinnate; *lower pinnae* ovate-lanceolate, 12-18 in. l., 6-9 in. br.; *pinnl.* linear-acuminate, cut down to the rachis below; *segm.* oblong, bluntish, scarcely falcate; texture coriaceous; under surface not glaucous, sometimes furfuraceous; *veins* immersed; *lateral veins* of the segments usually once forked; *sori* 2 to 12 to a lobe; *valves* unequal, outer one larger, suborbicular, inner one oblong.—*Hk. Sp. Fil.* 1. p. 83.

Hab. Oahu, Sandwich Islands.

5. *D. (Cibotium) Schiedeii*; arborescent; *fr.* bipinnate, ovate-lanceolate, 12-18 in. l., 6-9 in. br.; *pinnl.* linear, much acuminate, cut down nearly or quite to the rachis; *lobes* narrow, linear, acute, subfalcate; texture subcoriaceous; upper surface shining, dark-green, under side glaucous or arachnoid; *veins* not prominent; *lateral veins* of the segments usually once forked; *sori* 2 to 12 to a lobe, the *valves* short, hemispherical, nearly equal.—*Hk. Sp. Fil.* 1. p. 84. t. 30. A.

Hab. Mexico and Guatemala.—All the five species appear to resemble one another very closely. The caudex of this is said by Galeotti to attain a height of from 10-15 ft.

§§ Eudicksonia. *Involucre distinctly 2-valved, the outer valve formed by the apex of a segment.* Sp. 6-17.

6. *D. arborescens*, L'Hérit.; arborescent; *fr.* bipinnate; *lower pinnae* 12-18 in. l., 6-9 in. br.; *pinnl.* linear, cut down nearly or quite to the rachis; *segm.*  $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. br., oblong; *rachises* tomentose throughout, the main one densely clothed at the base with linear ferruginous scales; texture very coriaceous; *fertile pinnl.* often conspicuously contracted; *sori* 2 to 6 to a lobe, large, globose; *valves* transversely oblong, nearly equal.—*Hk. Sp. Fil.* 1. p. 66. t. 22. A.

Hab. St. Helena, near the summit of Diana's Peak; caudex about 10 ft. high.

7. *D. antarctica*, Labill.; arborescent; *fr.* bipinnate; *lower pinnae* 12-18 in. l., 6 in. br.; *pinnl.* linear-acuminate, cut down to the rachis except at the apex; *segm.* linear, acute, pinnatifid sometimes nearly to the rachis,  $\frac{1}{4}$ - $\frac{1}{2}$  in. l.,  $\frac{1}{8}$  in. br.; *rachises* naked or tomentose; texture coriaceous; upper surface naked, under naked or more or less hairy, not glaucous; *fertile pinnl.* slightly contracted; *sori* 2 to 12 to a lobe,  $\frac{1}{2}$  a line across; *valves* suborbicular.—*Hk. Sp. Fil.* 1. p. 66. D. fibrosa, Colenso, *Hk. Sp. Fil.* 1. p. 68. t. 33. B. D. lanata, Colenso, *Hk. Sp. Fil.* 1. p. 69. t. 33. C.

Hab. E. Australia, Van Diemen's Land, New Zealand, and New Caledonia.—Trunk attaining 30-35 ft.; *fr.* 2-3 yds. l., 2-2 $\frac{1}{2}$  ft. across; *stems* densely clothed at the base with silky yellowish-brown fibres; *segm.* often so narrow that the two rows of *sori* are quite contiguous.

8. *D. chrysotricha*, Moore; arborescent; *fr.* bipinnate; *lower pinnae* 12-18 in. l., 6-9 in. br.; *pinnl.* linear, quite cut down to the rachis except towards the apex; *segm.* linear-oblong, deeply toothed,  $\frac{1}{2}$  in. l., 2 lines br., bluntish; *main rachis* clothed with a thick coat of shining yellowish-brown hairs at the base; *rachis* of the pinnae and pinnules asperous and rather thickly tomentose; texture coriaceous; *fertile pinnl.* slightly contracted; *sori* 2 to 6 to a lobe,  $\frac{1}{2}$  a line across; *valves* suborbicular.—*Balanium chrysotrichum*, Hassk. *Cibotium speciosum*, Blume. D. Blumei, Mett. D. magnificum, De Vriese.

Hab. Java, ascending to 11,000 ft.—Probably this is *D. Javanica*, Blume (*Hk. Sp. Fil.* 1. p. 78), and if so, this is the oldest name.

9. *D. Sellowiana*, Hk.; arborescent; *fr.* 6-8 ft. l., 2-3 ft. br., lanceolate, bipinnate; *lower pinnae* 12-18 in. l., 6-9 in. br.; *pinnl.* linear, quite cut down to the rachis in the lower part; *segm.*  $\frac{1}{2}$  in. l., less than  $\frac{1}{4}$  in. br., linear-oblong, acute,



subfalcate; *main rachis* usually smooth above, densely tomentose and subasperous below; texture coriaceous; *fertile pinnl.* slightly contracted; *sori* 2 to 6 to a lobe,  $\frac{1}{2}$  a line across; *valves* suborbicular.—*Hk. Sp. Fil.* 1. p. 67. t. 22. B. B. Karstenianum, *Klotzsch.*

Hab. Tropical America, from Guatemala southward to Brazil and Peru.—Caudex 15-30 ft. high, 1 ft. thick; “stipes  $\frac{1}{2}$ -2 ft. l., so densely clad with long fulvous hairs, changing to brown or blackish, as to precisely resemble the thighs of the howling monkey.”—*Spruce.*

10. *D. squarrosa*, Swartz; arborescent; *fr.* bipinnate; *lower pinnæ* 12-18 in. l., 6-9 in. br.; *pinnl.* of the barren frond linear-acuminate, cut down within a short distance of the rachis above, quite to it below; *segm.*  $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. br., with close mucronate teeth reaching about half-way down; *rachis* rough with raised points, densely clothed below with long, shining, light-brown hairs; *second. rachis* also dark-brown and asperous; texture coriaceous; *fertile pinnl.* much contracted, cut down nearly to the rachis; *sori* 2 to 12 to a lobe,  $\frac{1}{2}$ - $\frac{3}{4}$  line across; *valves* suborbicular.—*Hk. Sp. Fil.* 1. p. 68.

Hab. New Zealand; Richmond River, N. S. Wales, *C. Moore* (*D. Youngiæ*, *C. Moore*, MSS.).—“Trunk attaining 10-12 ft., slender, never more than 4 in. in diameter” (*C. Moore*). Fronds about 1 yrd. l.,  $\frac{1}{2}$  yrd. across.

11. *D. Berteroana*, *Hk.*; arborescent; *fr.* bipinnate; *lower pinnæ* 1 ft. l., about 6 in. br.; *pinnl.* of the barren frond linear-acuminate, cut down to the rachis except at the very apex; *segm.*  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.,  $\frac{1}{4}$  in. br., subfalcate, nearly entire or broadly and bluntly toothed; texture coriaceous; *rachis* nearly naked, slightly asperous; *fertile segm.* consisting only of 2 to 8 stipitate *sori* with hardly any connecting membrane; *valves* of the *invol.* suborbicular, nearly equal.—*Hk. Sp. Fil.* 1. p. 67. t. 23. A. *D. thyrsopteroides*, *Mett.*

Hab. Juan Fernandez, Samoa, Fiji, and New Caledonia.—Trunk attaining a height of 15 ft. This and the five preceding form a well-marked natural group, to which *J. Smith* restricts the name *Dicksonia*; but the present is very distinct by the character of the fertile frond, connecting the others with *Thyrsopteris*; but here sometimes there are barren and fertile segments in the same pinnule.

12. *D. Culcita*, *L'Hérit.*; roots from a thick rhizome, densely clothed with shining ferruginous hairs; *fr.* 12-18 in. l., 1 ft. br., tripinnate; *lower pinnl.* deltoid, their divisions ovate, cut down to the rachis in the lower part, with oblong-rhomboidal unequal-sided deeply-toothed segments, which are cuneate at the base on the lower, truncate on the upper side; texture subcoriaceous; *rachises* nearly naked; both surfaces naked; *fertile fr.* so much contracted that there is very little membrane between the *sori*, which are 1 line across, with reniform subequal *valves*.—*Hk. Sp. Fil.* 1. p. 70. *Balantium*, *Kaulf., J. Sm.*

Hab. Madeira and the Azores; so abundant that the dense woolly covering of the rhizome has now become an article of commerce.

13. *D. conifolia*, *Hk.*; *fr.* tripinnate; *lower pinnæ* 12-18 in. l., 12 in. br.; lower divisions of the *pinnl.* deltoid-acuminate, their segments cut down nearly to the rachis, with ovate-rhomboidal, bluntish, deeply-toothed lobes; texture herbaceous; upper surface naked, lower and the *rachises* slightly hairy; *sori* 2 to 8 to a lobe, a line across; *valves* equal, reniform, several times broader than deep.—*Hk. Sp. Fil.* 1. p. 70. t. 24. A. *D. Martiana*, *Klot.* *Hk. Sp. Fil.* 1. p. 70. t. 24. B.

Hab. Jamaica and Columbia, southward to Brazil.—A much more divided plant than any of the preceding, with sharply-cut acute ultimate segments, not more than  $\frac{1}{4}$ - $\frac{3}{8}$  in. l.,  $\frac{1}{8}$  in. br.

14. *D. dubia*, *Gaud.*; *fr.* tri-quadripinnate; *lower pinnæ* 1-2 ft. l., 1 ft. br.;

lower divisions of the *pinnl.* deltoid-acuminate, their segments cut down to the rachis, except at the very apex, with ovate-rhomboidal, acute, sharply- and deeply-toothed lobes; texture coriaceous; upper surface naked, lower naked or somewhat hairy; *sori* 2 to 12 to a lobe, minute, orbicular; the *outer valve* large, cucullate, the *inner one* inconspicuous.—*Hk. Sp. Fil.* 1. p. 71. t. 24. C. D. straminea, *Labill.*, *Hk. Sp. Fil.* 1. p. 71. D. Torreyana, *Brack. t.* 33. f. 2.

Hab. S. Australia, Van Diemen's Land, New Caledonia, Aneiteum, Fiji group and other Polynesian islands.—Nearest to *D. conifolia*, but easily distinguishable by its coriaceous texture, minute sori, and very narrow and sharp ultimate segments.

15. D. *Plumieri*, *Hk.*; *fr.* bipinnate; *lower pinnæ* 12-18 in. l., 6-9 in. br.; *lower pinnl.* lanceolate-triangular, 6-8 in. l., 2-3 in. br., cut down at the lower part to the rachis, with linear-acuminate broadly-toothed segments; *upper pinnl.* linear only, slightly lobed; *rachis* and surface quite naked; texture herbaceous; *lateral veins* of the segments simple or once or twice forked; *sori* 2 to 20 to a segment; *invol.* small, membranaceous, suborbicular, deeply 2-valved, the *outer valve* at length cucullate.—*Hk. Sp. Fil.* 1. 72. D. *Lindeni*, *Hk. Sp. Fil.* 1. 72. t. 25. B. *Davallia adiantoides*, *Swartz*, *Grisebach*. *Cibotium*, *Presl.*

Hab. West Indian Islands and Columbia.—At first the involucre is that of a *Davallia* rather than a *Dicksonia*, but the outer valve is ultimately hooded. *Adiantoides* is the oldest specific name, but there is already a *D. adiantoides*, H. B. K.

16. D. *sorbifolia*, *Smith*; *fr.* bipinnate; *lower pinnæ* about 1 ft. l., 3-4 in. br.; *pinnl.* slightly stalked, linear, truncate or cordate at the base, undivided, with small sharp serrations towards the apex; *rachis* naked or slightly hairy; texture subcoriaceous; *lateral veins* of the segments usually once forked; *sori* very numerous to a pinnule; *invol.* subglobose, membranaceous; *outer valve* cucullate.—*Hk. Sp. Fil.* 1. p. 72. t. 25. A.

Hab. Moluccas and Isle of Henimœ, Hindostan.

17. D. *abrupta*, *Bory*; *fr.* simply pinnate, 12-18 in. l., 4-6 in. br.; *pinnæ* sessile, lanceolate, hardly toothed, the *lower* about 3 in. l., 1 in. br., the two halves rather unequal, the base of the *upper one* truncate, that of the *lower* slightly auriculate; *rachis* naked; texture coriaceous; *veins* close, fine, inconspicuous; *fertile pinnæ* narrow, acuminate; *sori* numerous, placed along both edges; *outer valve* reniform, nearly a line broad, *inner* smaller, suborbicular.—*Hk. Sp. Fil.* 1. p. 72. *Nephrolepis*, *Mett.* *Leptopleuria*, *Presl.*

Hab. Bourbon.—Very like *Nephrolepis davallioides* in habit and general appearance.

§§§ Patania, *Presl.* *Dennstædia*, *Bernh.*, *Moore*. — *Involucre* cup-shaped, not at all or only very indistinctly 2-valved. Sp. 18-29.

\* *Fronde ample*; *lower pinnæ* 9-24 in. in length. Sp. 18-25.

18. D. *adiantoides*, H. B. K.; *rhizome* creeping; *fr.* bipinnate; *lower pinnæ* 12-24 in. l., 6-12 in. br.; *pinnl.* linear, cut down in the lower part nearly to the rachis; the *segm.* oblong-rhomboidal, blunt, with 2 to 4 bluntish lobes in each side, which do not reach half-way to the rachis; texture herbaceous, under surface and *rachises* finely hairy; *sori* 2 to 8 to a segment, placed at the base of the sinuses, about  $\frac{1}{2}$  line across; *invol.* cup-shaped.—*Hk. Sp. Fil.* 1. p. 75. t. 26. B. D. *erosa*, *Hk. Sp. Fil.* 1. p. 75. D. *obtusa*, *Moritz*. D. *consanguinea*, *Klotzsch*. D. *dissecta*, *Grisebach*, non *Hooker*.

Hab. Tropical America, from the West Indies southward to Brazil.—Fronde often 12 ft. l.; segments of the lower pinnules  $\frac{3}{4}$ -1 in. l.,  $\frac{1}{4}$  in. br. D. *Sprucei*, *Moore*, seems closely allied to this; but our specimens are very imperfect.



19. *D. cicutaria*, Swartz; *rhizome* creeping; *fr.* bipinnate; *lower pinnæ* 12-18 in. l., 6 in. br.; *pinnl.* linear-acuminate, cut down in the lower part nearly or quite to the rachis; *segm.* oblong-deltoid, deeply inciso-pinnatifid; texture herbaceous; under surface and *rachises* naked or finely hairy; *sori* 2 to 12 to a segment, placed at the base of the sinuses, about  $\frac{1}{2}$  line across; *invol.* cup-shaped.—*Hk. Sp. Fil.* 1. p. 76. non Grisebach. *D. tenera*, Presl. *D. ordinata*, Kaulf. *Hk. Sp. Fil.* 1. p. 75. *D. cornuta*, Kaulf. *Hk. Sp. Fil.* 1. p. 76.

Hab. Tropical America, from Mexico and the West Indies southward to Rio Janeiro and Peru.—Segments of the lower pinnules about 1 in. l.,  $\frac{1}{2}$  in. br. Closely allied to the preceding, from which it differs by its sharper and more divided segments: these two are bipinnate only, all the other ample-fronded *Dennstedice* being tripinnate.

20. *D. apiifolia*, Swartz; *fr.* tripinnate; *lower pinnæ* 12-18 in. l., 6-9 in. br.; *pinnl.* linear, quite cut down to the rachis throughout; *lower segm.* deltoid or oblong-rhomboidal, cut down very nearly to the rachis in the lower half, with deeply- and sharply-toothed lobes; texture herbaceous; *rachis* and both surfaces naked or nearly so, shining; *sori* 2 to 12 to a segment, placed at the bottom of the sinuses of the lobes; *invol.* subglobose, cup-shaped,  $\frac{1}{3}$  line across.—*Hk. Sp. Fil.* 1. p. 77. t. 26. C.

Hab. Andes of Ecuador and Peru.—A fully tripinnate plant with shining bright-green subrigid fronds, the lowest segments 1 in. l.,  $\frac{1}{2}$  in. br. According to Grisebach, this is the *D. cicutaria* of Swartz; but I have not seen West Indian specimens. *Sitobium samoense* of Brackenridge, tab. 38, is described as closely allied to this species.

21. *D. rubiginosa*, Kaulf.; *fr.* tripinnate; *lower pinnæ* 12-18 in. l., 6-9 in. br.; *pinnl.* linear, quite cut down to the rachis throughout; *lower segm.* deltoid or oblong-rhomboidal, deeply inciso-pinnatifid; texture herbaceous; *rachis* and under surface finely tomentose; *sori* 2 to 12 to a segment, placed at the base of the sinuses; *invol.* cup-shaped, subglobose,  $\frac{1}{3}$  line across.—*Hk. Sp. Fil.* 1. p. 79. t. 27. A. *D. dissecta*, *Hk. Sp. Fil.* 1. p. 77.  $\beta$ . *D. anthriscifolia*, Kaulf.; *segm.* larger and more divided; *rachis* and under surface nearly naked.—*Hk. Sp. Fil.* 1. p. 79. t. 27. B.

Hab. Tropical America, from Mexico and the West Indies southward to Brazil and Peru (both varieties), Bourbon and Mauritius.—A less elegant plant than *D. apiifolia*, duller in colour, and with the under surface more or less hairy. *Rachises* slightly asperous; lower segments  $\frac{1}{2}$ -1 in. l.

22. *D. flaccida*, Swartz; *fr.* tripinnate; *lower pinnæ* 9-15 in. l., 6 in. br.; *pinnl.* lanceolate, quite cut down to the rachis throughout; *lower segm.* ovate-rhomboidal, bluntish, cut down nearly to the rachis three or four times on each side, and the lobes again toothed; texture herbaceous; *rachises* densely tomentose; *sori* 2 to 8 to a segment, placed at the base of the sinuses; *invol.* subglobose, cup-shaped,  $\frac{1}{4}$  line across.—*Hk. Sp. Fil.* 1. p. 77.

Hab. Aneiteum and New Hebrides, Milne.—Perhaps not distinct from *D. rubiginosa*, with which it quite corresponds in the size and division of the frond, but the habit is more rigid, and the *rachises* are densely tomentose throughout. The Cocos Island plant is *D. rubiginosa*.

23. *D. Moluccana*, Blume; *fr.* tripinnate; *lower pinnæ* 12-18 in. l., 6-9 in. br.; *pinnl.* linear-lanceolate, quite cut down to the rachis throughout; *lower segm.* oblong-rhomboidal, cut down to the rachis in the lower part, with blunt, oblong-deltoid lobes; texture subcoriaceous; *main* and *second. rachises* prickly; *sori* 2 to 12 to a segment; *invol.* subglobose,  $\frac{1}{4}$  line across.—*Hk. Sp. Fil.* 1. p. 78.

Hab. Java.—Resembling *D. rubiginosa* in habit, but more coriaceous in texture, and the stems thickly furnished with strong hooked prickles. Lower segments  $\frac{3}{4}$ -1 in. l.,  $\frac{1}{2}$  in. br. *D. scandens* of Blume, also from Java, which is probably *D. Zippeliana*, Kunze,

is said to differ from this by its more flaccid fronds, and in the larger teeth of the segments; and a plant (probably the same) was gathered in Tahiti by the American expedition under Captain Wilkes. (See Brackenridge, p. 275.)

24. *D. davallioides*, R. Brown; *fr.* tripinnate; *lower pinnae* 6-9 in. l., 3-4 in. br.; *pinnl.* linear-acuminate, cut quite down to the rachis; *segm.* oblong-rhomboidal, deeply inciso-pinnatifid; *rachis* shining, not prickly, glabrous or nearly so; texture herbaceous, under surface slightly hairy; *sori* 2 to 3 to a segment, placed at the base of the sinuses; *invol.* subglobose, cup-shaped,  $\frac{1}{4}$  of a line across.—*Hk. Sp. Fil.* 1. p. 71. *D. nitidula*, Kunze, *Mett. Fil. Lips. t.* 28.

Hab. Australia, both temperate and tropical.—Habit of growth lax, and texture of the frond thinner than in any of the other species. Fronds 2-4 ft. l.; lower segments under  $\frac{1}{2}$  in. l., 2-3 lines br., and finely cut. The Philippine Island *D. cuneata* (*Hk. Sp. Fil.* 1. p. 80. t. 28. C.) seems to be a form of this with broader segments than usual.

25. *D. Smithii*, Hk.; *fr.* tripinnate; *lower pinnae* 9-12 in. l., 3-4 in. br.; *pinnl.* linear-acuminate, cut down to the rachis throughout, with rather distant, narrow, acute segments; *lower segm.*  $\frac{1}{2}$  in. l., 2 lines br.; *rachises* slightly inciso-pinnatifid; and under surface densely tomentoso-glandular; texture subcoriaceous; *sori* 2 to 3 to a segment; *invol.* subglobose, cup-shaped,  $\frac{1}{4}$  line across.—*Hk. Sp. Fil.* 1. p. 80. t. 28. D.

Hab. Philippine Islands, *Cuming*.—Rachises similar to those of *D. flaccida*, but pinnules narrower and segments much smaller and less divided.

\*\* *Entire frond not more than 12-18 in. long.* Sp. 26-29.

26. *D. obtusifolia*, Willd.; *rhizome* creeping; *fr.* 12-18 in. l., 9 in. br. at the widest part, simply pinnate only, oblong-lanceolate; *pinnae* linear, 4-5 in. l., 1 in. br., cut in the lower part  $\frac{3}{4}$  down to the rachis into oblong-quadrangular blunt lobes, with 2 or 3 shallow blunt teeth on each side; texture membranaceous; *rachises* tomentose; *sori* 2 to 6 to a pinnule; *invol.* subglobose, cup-shaped, nearly  $\frac{1}{2}$  lin. across.—*D. Pavoni*, *Hk. Sp. Fil.* 1. p. 74. t. 26. A.

Hab. Andes of Peru, *Barclay*.—This coincides with *D. adiantoides* in the shape of the lobes, but is simply pinnate only, so that a single large pinna of *adiantoides* equals in size and division the whole frond here.

27. *D. scabra*, Wall.; *fr.* 9-15 in. l., 6-9 in. br., deltoid or lanceolate, bipinnate; *lower pinnae* 4-8 in. l., lanceolate; *pinnl.* quite distinct, 1-1 $\frac{1}{2}$  in. l.,  $\frac{1}{2}$  in. br., the *lower ones* cut down nearly to the rachis into numerous pinnatifid oblong deltoid segments on both sides; texture herbaceous or subcoriaceous; *rachis* and under surface more or less hairy; *sori* 2 to 6 to the lower segments; *invol.* cup-shaped, subglobose,  $\frac{1}{4}$  line across.—*Hk. Sp. Fil.* 1. p. 80. t. 27. B. *D. deltoidea*, *Hk. Sp. Fil.* 1. p. 80. t. 27. A. *Sitobium strigosum*, *J. Sm.*

Hab. India, from the Himalayas to Ceylon, Malayan Peninsula.—Stipe sometimes 1 ft. l., asperous, very hairy below; rhizome wide-creeping.

28. *D. punctiloba*, Hk.; *fr.* 12-18 in. l., 6-9 in. br., lanceolate, bipinnate; *lower pinnae* lanceolate, 4-6 in. l., cut quite down to the rachis except at the top; *pinnl.* ovate-rhomboidal, about  $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. br., deeply pinnatifid; texture thin herbaceous; *rachis* and under surface more or less glanduloso-pilose; *sori* 2 to 12 to a pinnule, placed at the base of the sinuses; *invol.* subglobose, cup-shaped,  $\frac{1}{4}$  line across.—*Hk. Sp. Fil.* 1. p. 79.

Hab. Temperate N. America, from Canada southward to Carolina and Tennessee.

29. *D. appendiculata*, Wallich; *fr.* 12-18 in. l., 6 in. br., lanceolate, bipinnate; *lower pinnae* linear-lanceolate, 3-4 in. l., cut down quite to the rachis unless at



the apex; *pinnl.* linear-oblong,  $\frac{1}{2}$  in. l., little more than 2 lines br., pinnatifid within a short distance of the rachis into numerous linear lobes; texture herbaceous; *rachis* and under surface glanduloso-pilose; *sori* 2 to 16 to a pinnule, placed at the base of the sinuses; *invol.* cup-shaped, globose,  $\frac{1}{4}$  line across.—*Hk. Sp. Fil.* 1. p. 79. t. 27. C.

Hab. Nepal and Kumaon.—This and the preceding resemble in habit *Athyrium filix-femina*. Species 13 to 29, except 17, fall under the genus *Sitobium* of J. Smith, and have creeping rhizomes.

GEN. 14. DEPARIA. *Hook. & Grev.*

*Sori* protruded from the margin of the frond, or even stipitate. *Invol.* shallowly-cupshaped, membranaceous, not 2-valved.—*Three very rare tropical species with broad, ample leafy segments, which differ from Dennstædia mainly by their extra-marginal sori. Veins anastomosing in one of the species (Cionidium, Moore).*

1. *D. prolifera*, *Hk.*; *fr.* once fully pinnate; *lower pinnæ* about 6-9 in. l., 1-1 $\frac{1}{2}$  in. br., pinnatifid down throughout within a short distance of the rachis; *lobes* oblong, slightly toothed, with often a space equalling their breadth between them; *lateral veins* of the lobes all simple; texture herbaceous; *sori* 4 to 12 to a lobe, extra-marginal, sessile or stipitate.—*Hk. Sp. Fil.* 1. p. 85; *Fil. Exot.* t. 82. *D. Macraei*, *H. & G. Ic. Fil.* t. 154.

Hab. Sandwich Islands.

2. *D. concinna*; *fr.* once fully pinnate; *lower pinnæ* more than 1 ft. l., nearly 2 in. br., cut down to the rachis in the lower part, but becoming nearly entire towards the apex; *lobes* blunt, entire, broadly oblong-rhomboidal, unequal-sided and decurrent downwards; *lateral veins* of the lobes once or twice branched; texture subcoriaceous; *sori* 2 to 6 to a lobe, placed round the outer edge.—*Davallia concinna*, *Presl. Hk. Sp. Fil.* 1. p. 74. *Deparia Matthewsii*, *Hk. Sp. Fil.* 1. p. 75. t. 30. B.

Hab. Peru, gathered by *Matthews* and *Spruce*.—This resembles closely *Dicksonia adiantoides* in habit. It has the lower part of the *sori* included within the margin, and is placed by *Moore* in *Dennstædia*.

3. *D. Moorei*, *Hk.*; *fr.* 12-18 in. l., 6-9 in. br., cordate-deltoid in general outline, pinnate below, pinnatifid only above; *lower pinnæ* 6-9 in. l., 4-6 in. br., cut down to the rachis below into deeply-pinnatifid broadly-toothed lobes; *veins* anastomosing; texture thinly herbaceous; *sori* copious, extra-marginal or stipitate.—*Hk. Exot. Ferns*, t. 28. *Cionidium*, *T. Moore*. *Trichocarpa*, *J. Smith*.

Hab. New Caledonia, gathered by *C. Moore* and *Lenormand*.—A much smaller plant than the others, with thin, broad, leafy fronds and anastomosing venation.

TRIBE III. HYMENOPHYLLÆ (including *Loxsona*).

*Sori* terminal or marginal from the apex of a vein. *Recept.* elongated, often filiform and long, and exerted more or less, especially below clothed with sessile orbicular imbricated subpelate compressed capsules, surrounded by a complete transverse ring, opening vertically. *Invol.* inferior, various in shape, generally of the same texture as the frond. Small often epiphytal Ferns, herbaceo-membranaceous, more or less laxly cellular, variously costate and veined. *Caudex* frequently long-creeping, and filiform. (In *Loxsona* the oblique ring of the subpedicellate capsule is incomplete; the fronds are coriaceous.) GEN. 15-17.

## GEN. 15. LOXSOMA, Br.

*Sori* marginal, in the sinus of the teeth or lobes, terminating a vein, declined. *Invol.* suburceolate, coriaceous, the mouth truncated, entire. *Recept.* elongated, much exserted, clothed to the apex with stipitate *caps.* (mixed with jointed hairs), which have a short broad incomplete oblique ring, opening vertically. *Caudex* long, stout, creeping, paleaceous. *Fr.* long-stipitate, coriaceous, decomposed, glaucous beneath. *Veins* simple or forked. TAB. II. f. 15.

1. *L. Cunninghami*, Br. *Sp. p.* 86. *Gard. F. t.* 31.

Hab. N. Zealand; Northern Island.—*Fr.* 1-1½ ft. high. A remarkable Fern, with the habit of a coriaceous *Dicksonia*; the fructification rather of *Trichomanes*, but with a very short and oblique ring to the capsule.

## GEN. 16. HYMENOPHYLLUM.

*Sori* marginal, more or less sunk in the frond or exserted, terminating a costa or vein. *Invol.* inferior, more or less deeply 2-lipped or 2-valved, of nearly the same texture as the frond, toothed, or fringed, or entire. *Recept.* elongated, columnar, exserted or included. *Caps.* mostly orbicular, depressed, attached by the centre, furnished with a broad transverse ring, opening irregularly at the apex. *Small, sometimes very minute Ferns, of tropical and temperate climates, frequenting trunks of trees and damp rocks, the fronds delicately membranaceous in texture, often of a lurid or olivaceous green, simple or compound, costate or with simple or branched (never anastomosing) veins.*† TAB. II. f. 16.

\* *Fronde glabrous, simple or slightly lobed, or once or twice dichotomous.* Sp. 1-5.

1. *H. cruentum*, Cav.; *st.* slender, naked, 3-6 in. l.; *fr.* ovate-lanceolate, slightly sinuated, 3-5 in. l., 1-1½ in. br. below; the *veins* simple, prominent, branching from the costa to the margin at regular intervals, erecto-patent; *sori* 6-12 on each side, placed at the apex of the sinuations, the cuneate base sunk in the frond, the lips divided about half-way down, free, entire.—*Hk. Sp. Fil.* 1. p. 87. t. 31. A. *Hymenoglossum, Presl.*

Hab. Chili, especially in the province of Valdivia.—Quite peculiar in its habit of growth.

2. *H. parvifolium*, Baker; *st.* not more than 1 line l.; *fr.* very minute, 2-3 lines l., 1 line br., linear-oblong, simple or cleft at the apex, sometimes half-way

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† The principal, or at any rate the most copious, recent writer on *Trichomanes* and *Hymenophyllum* is the late Dr. Van den Bosch, whose *magnum opus*, the “*Hymenophyllaceæ Javanicæ*,” contains engravings of many of the species, which, in point of beauty and delicacy of execution, have rarely been equalled. But his views, and their practical carrying out with regard to the limitation of genera and species, were the very opposite of those of Sir William Hooker, as may be judged from the fact that in his *Synopsis and Supplement*, 450 so-called species are given, and that out of what are here considered two genera, he makes twenty-four. Upon this point Sir William Hooker wrote: “This genus and the following one have had their species multiplied to an extent with which I cannot at all concur. The late learned Dr. Van den Bosch, in his widely-scattered publications, has no doubt described many new species, which it has not been in my power to identify; but having been favoured with his opinion on a large portion of my collection, I regret to be compelled to join with my friend Dr. Grisebach in the opinion expressed in his ‘*Flora of the British West-Indian Islands*,’ that many of the species are not well founded.”



down, furnished only with a central *costa* and a few faint irregular free spurious venules, the margin not thickened; *sori* solitary, terminal, the cuneate base sunk in the frond, divided about halfway down; *valves* rounded, entire.—*Baker, in Linn. Procecd. inedit. cum icone.*

Hab. Moulmeine, *Rev. C. S. Parish.*—The smallest and simplest species of the genus, rivalling in minuteness *Trichomanes Barklianum* and *Vitiense*.

3. *H. corticola*, Hk.; *st.* 2 to 4 lin. l.; *fr.* 1-1½ in. l., 1 lin. br., subcuneate in circumscription, two or three times dichotomously divided; *segm.* linear-oblong, emarginate, with only a single central *costa* in each; *sori* solitary, terminal, the cuneate base sunk in the frond, the semi-orbicular lips free.—*Hk. in Thwaites Enum. Pl. Ceyl. p. 397.*

Hab. Ceylon, on trees, *Gardner, Thwaites.*—Very like *H. marginatum* in habit, but thinner in substance, darker in colour, the pagina nearly flat, and the margin not thickened.

4. *H. marginatum*, Hk. & Gr.; *st.* 2-4 lin. l.; *fr.* linear, once or twice forked, about 1 in. l., 1 lin. br., furnished with a central *costa*; *texture* firm; *margin* bounded by a thickened line, the apex emarginate; *sori* terminal, solitary, sub-orbicular, divided down nearly to the base, with convex entire *valves*.—*Hk. & Gr. Ic. Fil. t. 34. Hk. Sp. 1. p. 87. Pachyloma, V. D. B.*

Hab. Port Jackson, Australia, rare.—Substance of the frond undulated.

5. *H. asplenioides*, Sw.; *st.* 1-2 in. l., slender; *fr.* 2-4 in. l., by ½-1 in. br., pendulous, oblong in general outline, pinnatifid to within a short distance of the rachis; *lower lobes* rhomboidal-cuneate, cleft on both sides or one only; *upper lobes* simple, linear-oblong; *sori* 1-4, terminal on the segments of the lobes; *invol.* orbicular, free, cleft nearly to the base.—*Hk. Sp. 1. p. 87. Ic. Pl. t. 957.*

Hab. Tropical America, from Cuba and Mexico southward to Brazil.—Easily recognizable by its peculiar habit of growth.

\*\* *Fronde glabrous, one to four times pinnatifid.*—Sp. 6-30.

6. *H. abruptum*, Hk.; *st.* about ¼ in. l., very slender; *fr.* ½-1 in. l., ¼-½ in. br., oblong, pinnatifid to within a short distance of the main rachis; *pinnæ* linear, erecto-patent, about ¼ in. l., 1 lin. br., sometimes dichotomously forked, only a central midrib in each division; *sori* 1 or 2 to a frond, terminal on the apex or upper segments; *invol.* not divided more than halfway down, the base cuneate, the *valves* rounded; *recept.* occasionally protruded.—*Hk. Sp. 1. p. 88. t. 31. B. H. brevifrons, Kunze.*

Hab. Jamaica, Cuba, Guatemala, Venezuela, and Brazil.—Allied to *H. rarum*, but the main rachis has a broader wing below, and the pinnæ are at most simply forked.

7. *H. mnioides*, Baker; *st.* not more than ½ in. l., very slender; *fr.* 1-2 in. l., ¼ in. br., linear, once pinnatifid; *rachis* winged throughout; the *segm.* all quite simple, linear, the lower ones slightly imbricated, erecto-patent, 2 lin. l., ½ lin. br, the upper ones pressed close to the rachis and much imbricated; *sori* solitary on three or four of the upper segments, large compared with the size of the plant, divided about halfway down, the base campanulate; *valves* more than half a circle, large, membranaceous.

Hab. New Caledonia, Pic du Mont Mu, *Deplanche.*—A minute moss-like plant, with the habit of *Mnium undulatum* or *serratum*, but dark-brown in colour. It is allied to the preceding and the following, but whilst the segments are quite simple, the main rachis is scarcely winged below.

8. *H. rarum*, R. Br.; *st.* very slender, 1-3 in. l.; *fr.* flaccid, pendent, 2-6 in. l. by 1-2 in. br., linear-oblong or oblong, bipinnatifid, the main *rachis* winged throughout; *pinnae* simple, linear, or forked or pinnatifid, with two or three deeply-cut segments on each side, which are  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., 1 lin. br.; *sori* large, terminal on the segments of the upper pinnae, often 1 lin. br., divided halfway down or more, the base cuneate, the *valves* rounded.—*Hk. Sp.* 1. p. 101. *H.* semibivalve, *Hk. & Gr. Ic. Fil. t.* 33. *H. Natalense* and *tabulare*, *V. D. B.*

*Hab.* New Zealand, Auckland Isles, Van Diemen's Land, Mauritius, Natal, and Cape Colony.—A plant from Chiloe, gathered by Cuming, must probably be referred here; and in the specimens to which I have access I cannot distinguish the Japanese *H. Wrightii*, *V. D. B.*, and the Fuegian *H. Darwinii*, *V. D. B.* The New Zealand *H. imbricatum* of Colenso differs by having the rachis much shortened, scarcely more than 1 in. l., and the pinnae imbricated and slightly crisped. This and the two preceding differ from the species that follow next by their much broader segments.

9. *H. capillaceum*, Roxb.; *st.* about 1 in. l., slender; *fr.* 2-4 in. l., by 1 in. or more br., oblong, pinnate, with distant segments; *main rachis* free throughout; *lower pinnae* alternate, about  $\frac{1}{2}$  in. distant from one another, broadly rhomboidal, cut down to the rachis in the lower part but winged above; *segm.*  $\frac{1}{4}$  in. l., 1 lin. br., simple or once forked; *sori* 2-6 to each pinna, terminal on the lateral segments; *invol.* divided down nearly to the base; the *valves* orbicular, strongly toothed.—*Hk. Sp.* 1. p. 109. *t.* 33. *B.*

*Hab.* Confined to the island of St. Helena, where it has been long known.—Much resembling in habit a slender form of *H. Tunbridgensis*.

10. *H. gracile*, Bory; *st.* 2-3 in. l., slender, wiry; *fr.* 2-6 in. l., 1-2 in. br., lanceolate or oblong-acuminate, tripinnatifid; *main rachis* nearly wingless throughout; *pinnae* distant, 1-3 in. l., broadly rhomboidal, erecto-patent, cut down within a very short distance of the rachis; *pinn.* sometimes simple, sometimes again pinnatifid, with simple or forked narrowly linear divisions; *sori* large, 2-4 to a pinna, terminal or axillary on the lateral segments; *invol.* not divided more than halfway down; *valves* rounded.—*Hk. Sp. Fil.* 1. p. 110. *Hk. & Gr. Ic. Fil. t.* 198.

*Hab.* Bourbon and Mauritius.—The Van Diemen's Land *H. Gunnii*, *V. D. B.*, is either the same plant or very near it; and a plant from Chiloe, gathered by Cuming, is probably the same. Intermediate in habit between the preceding and *H. polyanthos*.

11. *H. exsertum*, Wall.; *st.* 1-2 in. l., slender; *fr.* 2-6 in. l., 1-2 in. br., lanceolate-oblong, bipinnatifid; *main rachis* winged above or throughout, more or less densely clothed with deciduous ferruginous hairs; *lower pinnae* rhomboidal, lanceolate-acuminate, divided more than halfway down to the rachis into simple or forked linear pinnules, slightly hairy on the principal veins; *sori* 2-8 to a pinna, terminal or axillary on the segments on both sides; *invol.* divided down nearly to the base; *valves* oblong, bluntly denticulate at the apex.—*Hk. Sp.* 1. p. 109. *t.* 33. *A.* *H. macroglossum*, *V. D. B.*

*Hab.* Hills throughout India, from the Himalayas southward to Ceylon.—See remarks under *H. scabrum*. It is recognizable also by the large lanceolate pinnae, which have the central half entire.

12. *H. axillare*, Swartz; *st.* 1-2 in. l., very slender; *fr.* 3-8 in. l.,  $\frac{1}{2}$ -1 in. br., flaccid, pendent, linear-oblong, tripinnatifid; *main rachis* winged throughout or above only; *lower pinnae* varying from under  $\frac{1}{2}$  in. l., with simple segments, to  $1\frac{1}{2}$  in. l., divided down nearly to the rachis, with pinnatifid pinnules with several segments; *ult. segm.* not more than 1 lin. l.; *sori* 2-12 to a pinna, terminal on the lateral segments; *invol.* divided more than halfway down; *valves* rounded, entire.—*Hk. Sp.* 1. p. 111. *Hk. & Gr. Ic. Fil. t.* 124. *H. apicale*, *V. D. B. Griseb.*



Hab. West Indian Islands and Venezuela.—Both this and *H. myriocarpum* are sometimes slightly crisped.

13. *H. reniforme*, Hk. ; *st.* very slender, naked, 2-3 in. l. ; *fr.* 3-6 in. l., 1 in. or less br., flaccid, pendent, linear-oblong, fully bipinnate ; *main rachis* wingless throughout ; *pinnæ* usually under 1 in. l., divided quite down to the rachis ; *pinnl.* simple or forked, or slightly pinnatifid ; the ultimate *segm.* very narrowly linear ; *sori* 2-6 to a pinna, at least twice as broad as the lobes ; *invol.* divided down nearly to the base ; *valves* rounded and denticulate.—*Hk. Sp. 1. p. 110. t. 38. C.*

Hab. Andes of Ecuador and Peru.—Allied to *H. axillare* and *crispum* in habit, but readily distinguishable by its truly bipinnate frond and very narrow segments. The specific name applies here to the shape of the involucre, not, as in *Trichomanes*, to that of the frond.

14. *H. crispum*, H. B. K. ; *st.* very slender, 1-2 in. l., wingless ; *fr.* 3-6 in. l., 1 in. or less br., flaccid, pendent, linear-oblong, tripinnatifid ; *main rachis* only slightly or hardly at all winged above ; *pinnæ* 1 in. l. or less, rhomboidal-oblong, beautifully and delicately undulato-crisped throughout, divided down nearly to the costa into *pinnl.*, which are again pinnatifid ; *sori* numerous, very small, placed at the apex of the segments ; *invol.* rather wider than the lobes, rounded, crisped at the edge.—*Hk. Sp. 1. p. 106. H. amœnum, Sturm.*

Hab. Tropical America, from Mexico and Cuba southward to Peru and Brazil.—Closely allied to *H. axillare* in habit, but distinguished by its crisped fronds.

15. *H. undulatum*, Swartz ; *st.* 1-2 in. l., very slender ; *fr.* 3-6 in. l., scarcely more than 1 in. br., flaccid, pendent, ovate or linear-oblong, tripinnatifid ; *main rachis* winged ; *pinnæ* undulato-crisped, oblong-rhomboidal, divided down to a narrow central portion ; *pinnl.* crowded, the lower ones a little pinnatifid ; *sori* 2-6 to a pinna ; *invol.* divided down nearly to the base ; *valves* rounded, slightly crisped towards the margin, but not denticulate.—*Hk. Sp. 1. p. 105. Ic. Pl. 964.*

Hab. Mexico, Jamaica, Peru.—Both this species and *H. crispum* have the segments so much crisped that they bear the appearance of being toothed like a *Leptocionium*. This and the three preceding resemble one another in their small tender narrow flaccid fronds.

16. *H. myriocarpum*, Hk. ; *st.* 2-3 in. l., erect, slightly winged above ; *fr.* 3-12 in. l., 2-3 in. br., flaccid, pendent, ovate-lanceolate, tripinnatifid ; *rachis* furnished with a narrow wing throughout ; *lower pinnæ* 1-3 in. l., lanceolate-rhomboidal, divided down nearly to the rachis on both sides into several *pinnl.*, which are again pinnatifid with numerous membranous linear segments, not more than 1 lin. l. ; *sori* very numerous, terminal and lateral on the segments on both sides ; *invol.* divided down to the base ; *valves* ovate or rounded, entire or sinuated at the apex.—*Hk. Sp. 1. p. 106. t. 57. D.*

Hab. Mexico, southward to the Andes of Peru.—Closely allied to *H. axillare*, but rather stronger in habit, and the fronds broader below. Connects the four preceding species with *H. polyanthos*.

17. *H. microsorum*, V. D. B. ; *st.* 1-2 in. l., slender, naked ; *fr.* 2-3 in. l., about 1 in. br., flaccid, oblong-lanceolate, tripinnatifid ; *main rachis* naked, furnished with a narrow wing nearly or quite to the base ; *lower pinnæ* oblong-rhomboidal, about 1 in. l., erecto-patent, divided down to a narrowly-winged rachis into several *pinnl.*, the lower of which are obversely triangular in shape and flabellately cut ; *sori* 2-12, terminal on the segments of both sides of the upper *pinnæ*, very small ; *invol.* divided more than halfway down ; the *valves* rounded, entire.

Hab. Gathered by Dr. Hooker in the Sikkim Himalayas, at an elevation of 11,000 ft., and determined by Van den Bosch from his specimens.—Intermediate in habit between *H. exsertum* and *polyanthos*.

18. *H. polyanthos*, Swartz; *st.* 2-3 in. l., slender, wingless; *fr.* 2-8 in. l., 1-3 in. br., ovate-oblong, tripinnatifid; *main rachis* usually only narrowly winged above; *lower pinnae* triangular-rhomboidal, divided down to a narrow centre into several *pinnl.* on each side, the lowest of which are cuneate or rhomboidal, deeply pinnatifid; *ultimate segm.* linear, 1-1½ lin. l., less than ½ lin. br.; *sori* 2-12 to a pinna, terminal or axillary on the segments on both sides; *invol.* small, divided down nearly to the base; *valves* ovate or rounded, entire or slightly denticulate.—*Hk. Sp.* 1. p. 107. *H. protrusum*, *Hk. Sp.* 1. p. 104. *t.* 37. B.

Hab. Widely diffused throughout the Tropics, and extending a little beyond them both north and south; America, from Cuba and Jamaica southward to Brazil, S. Chili, and Juan Fernandez; Asia, Nepal and Sikkim to Ceylon, Tsus Sima, Malayan Peninsula, Java, and New Zealand; West Tropical Africa, Mauritius and Madagascar. This includes nearly, or quite, thirty of the species defined by Van den Bosch.—It is a plant of slender flaccid habit, as compared with species 19 to 28, with the segments sometimes decurved, and when dry slightly crisped. The New Zealand *H. villosum* of Colenso has the stipes and rachis very slightly hairy. The Malayan *H. Blumeianum*, Spr., has narrower and more elongated fronds than in the type, and *pinnae* sometimes simply pinnatifid only.

19. *H. Andinum*, V. D. B.; *st.* 3-6 in. l., slender; *fr.* 6-12 in. l., 1-2 in. br., flaccid, oblong, tripinnatifid; *main rachis* narrowly winged above; *pinnae* distant, the lower oblong-rhomboidal, divided down to a narrow centre, with 2-3 pairs of *pinnl.* which are flabellately or laterally cut into a few linear *segm.*; *sori* 2-12 to a pinna, terminal or axillary on the segments on both sides; *invol.* divided more than halfway down; *valves* rounded, with a blunt point, entire.

Hab. Andes of Ecuador, Jameson.—Closely allied to *H. polyanthos*, but elongated and flaccid in habit, with fewer, more distant and less divided segments.

20. *H. badium*, Hk. & Gr.; *st.* 2-3 in. l., slender, winged above; *fr.* 4-12 in. l., 2-3 in. br., oblong or ovate-lanceolate, acuminate, tripinnatifid; *main rachis* broadly winged throughout; *lower pinnae* lanceolate-rhomboidal, divided down to a broadly winged rachis into several *pinnl.* in each side, the lowest of which are a few times deeply incised, ultimate divisions broadly linear; *sori* 2-12 to a pinna, terminal and axillary on the segments on both sides; *invol.* nearly 1 lin. br., divided down nearly to the base; *valves* rounded, nearly twice as broad as deep, the outer edge denticulate.—*Hk. Sp.* 1. p. 102. *Hk. & Gr. Ic. Fil. t.* 76.

Hab. Malayan Peninsula, Sir W. Norris; East Indies (probably Nepal), Dr. Wallich.

21. *H. Javanicum*, Spreng.; *st.* 2-4 in. l., erect, margined above with a broad crisped wing; *fr.* 4-8 in. l., 3-4 in. br., triangular, tripinnatifid; *main rachis* bordered throughout with a broad crisped wing; *lower pinnae* 1½-2 in. l., triangular-rhomboidal, erecto-patent, divided down to a narrow crisped centre into several plane or slightly crisped *pinnl.* on both sides, the lower of which are several times deeply pinnatifid; *sori* 6-20 to a pinna, terminal and axillary on the segments on both sides; *invol.* about as broad as the segments, divided down nearly to the base; *valves* orbicular, entire or denticulate.—*Hk. Sp.* 1. p. 106. *H. fimbriatum*, J. Sm. *Hk. Sp.* 1. p. 102. *t.* 36. *H. flexuosum*, Cunningham. *Hk. Sp.* 1. p. 105. *Ic. Pl. t.* 962. *H. crispatum*, Wall. *Hk. & Gr. Ic. Fil. t.* 77. *H. daedaleum*, Blume. *H. micranthum*, V. D. B.—β, *H. atrovirens*, Colenso; *segm.* of the frond nearly plane; *invol.* smaller and narrower. *H. Tasmanicum*, V. D. B.



Hab. India, from Nepaul and Sikkim to Ceylon, the Malayan Peninsula, the Philippines, New Zealand, and Australia. *H. erosum* of Blume, and *H. Reinwardii*, V. D. B., also belong here.

22. *H. demissum*, Swartz; *st.* 4-6 in. l., erect, firm, wingless; *fr.* 4-12 in. l., 3-4 in. br., ovate-triangular, 3-4 times pinnatifid; *rachis* only slightly winged above; *lower pinnae* 2-3 in. l., triangular-rhomboidal, divided down very nearly to the rachis into numerous *pinnls.* on both sides, which are again divided down nearly into the rachis into pinnatifid *segm.*; *ult. lobes* 1-2 lin. l.,  $\frac{1}{2}$  lin. br.; *sori* very numerous (20-30) to a pinna, terminal and axillary on the segments on both sides; *invol.* divided down nearly to the base; *valves* ovate, entire, or denticulate.—*Hk. Sp.* 1. p. 109. *H. productum*, Kunze.

Hab. New Zealand, Fiji, Java, the Philippines, and adjacent Polynesian Islands.—A larger and stronger plant than *H. polyanthos*, with which Sir W. Hooker was disposed to join it, with ample glossy deeply-cut fronds and very numerous involucre.

23. *H. caudiculatum*, Mart.; *st.* 4-6 in. l., wiry, broadly winged above; *fr.* 6-12 in. l., 2-3 in. br., ovate-acuminate, tripinnatifid; *main rachis* furnished throughout with a broad slightly crisped wing; *lower pinnae* rhomboidal-lanceolate, erecto-patent, often 2 in. l., divided down to a broad central rachis, the *lower pinnl.* again pinnatifid, the *upper* forked or simple, broadly linear; *sori* 2-12 to a pinna, placed at the apex of the segments on both sides; *invol.* very large ( $\frac{1}{8}$  in. br.), divided down nearly to the base; *valves* twice as broad as deep, and bluntly toothed.—*Hk. Sp.* 1. p. 102.— $\beta$ , *H. caudatum*, V. D. B.; wing of the *main* and also of the *second. rachis* considerably crisped and undulated.

Hab. Brazil, Peru, and Chili.—Wing of the main rachis often 2 lines wide. *H. Fran-  
cavillei*, V. D. B., from Martinique, apparently belongs here.

24. *H. recurvum*, Gaud.; *st.* 2-4 in. l., winged above; *fr.* 4-12 in. l., 2-3 in. br., flaccid, pendent, oblong-acuminate, tripinnatifid; *main rachis* narrowly winged throughout; *pinnae* flaccid, erecto-patent, distant, elongated, divided down nearly to the rachis into long simple or forked or slightly compound *pinnls.*; *ult. segm.*  $\frac{1}{4}$ - $\frac{3}{8}$  in. l.,  $\frac{1}{2}$  in. br., *sori* 2-6 to a pinna, generally axillary; *invol.* divided about halfway down; *valves* rounded, slightly forked.—*Hk. Sp.* 1. p. 109. t. 37. C.

Hab. Sandwich Islands, frequent.

25. *H. flabellatum*, Labill.; *st.* 2-4 in. l., firm, erect; *fr.* 4-12 in. l., 2-4 in. br., ovate-acuminate, tripinnatifid, somewhat glossy and flaccid; *main rachis* winged above; *lower pinnae* 1-2 in. l., broadly rhomboidal-acuminate, erecto-patent, divided down to a broadly winged rachis into several cuneate-based *pinnls.*, which are furnished on both sides with several linear *segm.*; *sori* 6-20 to a pinna, terminal on the lateral segments; *invol.* divided more than halfway down; *valves* rounded, entire.—*Hk. Sp.* 1. p. 111. *H. nitens*, Br. *Hk. & Gr. Ic. Fil.* 197.

Hab. Australia, New Zealand, Lord Auckland Isles.—Very variable in the compactness, size, and degree of elongation of the fronds. *H. Hookeri*, Bory and V. D. B., is a small form with narrower involucre than in the type. A plant from Sumatra must probably be referred to this species.

26. *H. scabrum*, A. Rich.; *st.* 2-4 in. l., strong, wiry, ciliated; *fr.* 6-15 in. l., 2-5 in. br., ovate-acuminate, tripinnatifid; *main rachis* winged above, thickly ciliated with long brown bristly hairs; *lower pinnae* 2-3 in. l., erecto-patent, oblong-rhomboidal acuminate, divided down nearly to the rachis into several *pinnl.* on both sides, which are again pinnatifid with compound lower and simple linear upper *segm.*; *sori* 6-20 to a pinna, terminal on the lateral segments on both

sides; *invol.* small, divided down nearly to the base, denticulate at the apex.—*Hk. Sp. Fil.* 1, p. 110. *Sphærocionium glanduliferum, Presl.*

Hab. New Zealand.—By their hairy rachis, this species and *H. exsertum* form a link between the glabrous and truly hirsute species.

27. *H. dilatatum*, Swartz; *st.* 2-4 in. l., erect, wiry, slightly winged above; *fr.* 6-12 in. l., 4-6 in. br., ovate-lanceolate, tripinnatifid; *main rachis* winged throughout, the wing quite flat; *lower pinnæ* rhomboidal-lanceolate, divided down nearly to the rachis, the *lower pinnl.* again pinnatifid; *sori* 2-12 to a pinna, terminal or axillary on the segments on both sides, divided about halfway down; *valves* rounded, entire, clusters often exserted.—*Hk. Sp.* 1. p. 104. *Hk. & Gr. Ic. Fil.* t. 60. *H. formosum, Bracken.* *H. Junghuhnii & eximium, V. D. B.*

Hab. New Zealand, Java, Tahiti, Samoa, Aneiteum, Fiji and other Polynesian Islands.—Closely allied to *H. fuciforme*, but different in the involucre.

28. *H. fuciforme*, Swartz; *st.* strong, erect, 4-8 in. l., narrowly winged above; *fr.* 12-24 in. l., 4-6 in. br., triangular-lanceolate, tripinnatifid; *main rachis* winged throughout; *lower pinnæ* rhomboidal-lanceolate, cut down nearly to the rachis into numerous distant *pinnl.* on both sides, the lowest of which are triangular in outline and again pinnatifid, with 2-3 forked *lower segm.*; *sori* numerous, very small, placed principally in the axils of the segments; *valves* divided down nearly to the base, rounded, entire; *recept.* and even the cluster of *capsules* often exserted.—*Hk. Sp.* 1. p. 103. t. 36. D.

Hab. South Chili and Juan Fernandez.

29. *H. pulcherrimum*, Colenso; *st.* 3-4 in. l., wiry, erect, winged down to the base; *fr.* 6-12 in. l., 4-6 in. br., ovate-triangular, 3- or 4- pinnatifid; *main rachis* slightly winged throughout; *lower pinnæ* 2-3 in. l., lanceolate-rhomboidal, the secondary rachis flexuose, slightly waved, the pinnæ with several distant *pinnl.* on both sides, the *segm.* of which are again pinnatifid with cuneate flabellately pinnatifid lower divisions; *sori* numerous, axillary and terminal on the segments on both sides; *invol.* orbicular, divided down nearly to the base; *valves* entire.—*Hk. Sp.* 1. p. 103. t. 37. A. *Hk. fil. Fl. N. Z.* 232. t. 74.

Hab. New Zealand.—Species 20 to 29 much resemble one another in habit, and all have ample tripinnatifid firm glossy fronds, with comparatively broad erecto-patent segments.

30. *H. Zollingerianum*, Kunze; *st.* 2-4 in. l., wiry, deciduously hairy; *fr.* 4-8 in. l., 1½-2 in. br., lanceolate-acuminate, with a flaccid apex, tripinnatifid; *pinnæ* rather distant, the lower ones ovate-rhomboidal, cut down to a rather broad centre; *pinnl.* close, the lower ones again deeply pinnatifid; *main rachis* narrowly winged and often slightly hairy, a single central *vein* in each segment, the lower part of which is conspicuously winged on both sides; *sori* 2 to 8 to a pinnule, large, terminal or axillary; *invol.* divided about halfway down, the mouth roundish, entire.—*V. D. B. Hymen. Jav.* t. 50.

Hab. Java.—By its deciduously hairy rachis, this approaches the next section. The habit is something like that of *H. polyanthos*, with an elongated flaccid apex, and the curiously winged veins are very peculiar.

\*\*\* *Fronds more or less ciliated and hairy upon the surface.*—Sp. 31-51.

31. *H. Borneense*, Hk. MSS.; *st.* about 1 in. l., very slender; *fr.* square or fan-shaped in general outline, ½-¾ in. l., ½ in. br., divided down like a fan nearly



to the base, the divisions linear, dichotomously branched; *ult. segm.* 1-3 lin. l.,  $\frac{1}{2}$  lin. br., the surface hairy, and the margin ciliated with branched rufous hairs; *sori* terminal, solitary, orbicular, the cuneate base sunk in the frond; *valves* ciliated.

Hab. Borneo, on hills near Sarawak, at an alt. of 2,700 ft., *Lobb.*—Peculiar in the group by resembling in habit the species of the *Gonocormus* section of *Trichomanes*.

32. *H. hirsutum*, Swartz; *st.* 1-2 in. l., slender, naked or slightly winged and ciliated above; *fr.* linear-oblong, once pinnatifid, 2-6 in. l., about  $\frac{1}{2}$  in. br., slender, flaccid, often pendulous, hairy over the surface; *pinnæ* short, close, erecto-patent, simple, linear-oblong, or cuneato-flabellate, with 1 to 4 divisions; *ult. segm.* rather broad, closely ciliated; *sori* 1 to 4 on a pinna, terminal on the segments; *invol.* suborbicular, the cuneate base sunk in the frond; *valves* free, very hairy.—*Hk. Sp.* 1. p. 88. *Hk. & Gr. Ic. Fil. t.* 84. *H. venustum & angustum*, *V. D. B.* *H. Raddianum*, *Muller.*— $\beta$ , *H. latifrons*, *V. D. B.*; *fr.* larger and more dilated than in the type; *segm.*  $\frac{1}{2}$  in. br.

Hab. Tropical America, from Cuba and Jamaica southward to the Organ Mountains in Brazil.—*H. latifrons* bears the same relation to the type that *H. splendidum* does to *ciliatum*.

33. *H. Chilense*, *Hk.*; *st.* 1-2 in. l., not winged; *fr.* triangular or ovate-lanceolate, bipinnatifid, 1-2 in. l.,  $\frac{1}{2}$ -1 in. br. below; *main rachis* zigzag, ciliated, and broadly winged; *lower pinnæ* rhomboidal-oblong, with several rounded or linear *pinnl.* on both sides, the margin regularly ciliated, with short strong hairs and the under surface of the frond slightly hairy; *sori* placed singly at the base of the *pinnæ* on the upper side, divided about halfway down, the cuneate base free or sunk in the frond; *valves* semiorbicular, strongly ciliated.—*Hk. Sp.* 1. p. 90. *t.* 32. *A. Leptocionium dicranotrichum*, *Presl.*

Hab. S. Chili and island of Chiloe.—Placed by *Presl* and *Van den Bosch* in section 4; but its proper position is here.

34. *H. ciliatum*, Swartz; *st.* 1-2 in. l., ciliated and decurrently winged above; *fr.* oblong-acuminate, tripinnatifid, 2-6 in. l., 1-2 in. br. at the centre; *main rachis* broadly winged throughout and ciliated; *lower pinnæ* oblong or rhomboidal, with a broad central undivided portion, and numerous erecto-patent simple or forked ciliated linear *segm.* 2-3 lin. l.; *sori* 2 to 12 on a pinna, placed at the end of the lateral segments on both sides; *invol.* immersed, suborbicular; *valves* divided about halfway down, and conspicuously ciliated.—*Hk. Sp.* 1. p. 88. *Hk. & Gr. Ic. Fil. t.* 35. *H. Plumieri*, *Hk. & Gr. Ic. Fil. t.* 123. *H. Boryanum*, *Willd. Hk. Sp.* 1. p. 89. *t.* 31. C.

Hab. Common in Tropical America, from Cuba and Mexico southward to Chili and South Brazil; West Tropical Africa (Fernando Po, &c.), and in the East in the Zambesi district and the islands (Mauritius, Madagascar, Bourbon, Seychelles, and Johanna Island).—The African plant, well known under the name of *Boryanum*, seems quite to coincide with the American *ciliatum*. It has also been gathered in New Zealand lately by Mr. Travers. Eleven species, admitted by *Van den Bosch*, do not appear materially different; viz. those already mentioned, and *trapezoidale*, *Liebm.*; *vestitum*, *Presl*; *apterum*, *remotum*, *Surinamense*, *Presl*; *commutatum*, *Presl*; *Schiedianum*, *Presl*, and *splendidum*. The latter is a magnificent form, with fronds 1 ft. l., *pinnæ*  $\frac{1}{2}$  in. and *rachis*  $\frac{1}{2}$  in. br., which occurs in Guatemala, Ecuador, and West Tropical Africa.

35. *H. obtusum*, *Hk. & Arn.*; *st.* 2 in. l., slender, ciliated; *fr.* 2-4 in. l., 1-2 in. br., lanceolate or ovate-lanceolate, tripinnatifid; *main rachis* winged throughout; *lower pinnæ* lanceolate or triangular-rhomboidal, cleft nearly to the rachis into several linear simple or forked *pinnl.* on both sides, the surface and margin copiously clothed with pubescence; *sori* 2 to 6 to a pinna, terminal on the lateral

segments; *invol.* as broad as the segments, divided about halfway down; *valves* rounded, strongly ciliated.—*Hk. Sp. 1. p. 93. t. 33. D.*

Hab. Oahu, Sandwich Islands, and found recently in fine condition by Col. Blagrove, on Table Mountain, Cape of Good Hope.

36. *H. æruginosum*, Carm.; *st.* 1-2 in. l., slender, tomentose; *fr.* 2-3 in. l., 1 in. or less br., lanceolate or ovate-acuminate, tripinnatifid; *main rachis* winged above; *pinnæ* often much imbricated, the lower ones flabellate or broadly rhomboidal in outline, divided down nearly to the rachis into simple or slightly pinnatifid linear segments, the surface and margin clothed copiously with pubescence; *sori* 2 to 12, terminal on the segments; *invol.* small, divided nearly down to the base; *valves* rounded and densely ciliated.—*H. æruginosum, α, Hk. Sp. 1. p. 93.*

Hab. Island of Tristan d'Acunha.—First gathered and described by Capt. Carmichael.

37. *H. lanceolatum*, Hk. & Arn.; *st.* 2-3 in. l., slender, wiry, naked; *fr.* 3-6 in. l., 1-2 in. br., lanceolate or oblong tripinnatifid; *main rachis* slender, wavy, flexuose, winged only at the very top; *lower pinnæ* 1-2 in. l., rhomboidal-oblong, cut down nearly to the rachis into several simple or forked long linear *segm.* on both sides, hairs few, mostly confined to the midrib and margin; *sori* 2 to 8 to a pinna, placed at the side or top of the lateral segments; *invol.* divided more than halfway down; *valves* rounded and copiously ciliated.—*Hk. Sp. 1. p. 94. t. 34. B.*

Hab. Islands of the Sandwich group.

38. *H. Franklinianum*, Colenso; *st.* 1-3 in. l., wiry, erect, tomentose; *fr.* 3-8 in. l.,  $1\frac{1}{2}$ -2 in. br., ovate-lanceolate, tripinnatifid; *main rachis* slightly winged above; *lower pinnæ* spreading, divided down nearly to the rachis into numerous alternate *pinnl.*, which are again deeply divided into broad linear *segm.*, the surface and margin clothed copiously with tawny silky stellate pubescence; *sori* 2 to 12 to a pinna, terminal on the lateral segments; *invol.* divided down nearly to the base; *valves* rounded and copiously ciliated.—*H. æruginosum, β, Hk. Sp. 1. p. 93. t. 34. A. H. Berteroi, Hk. Sp. 1. p. 93. t. 33. C.*

Hab. New Zealand, Chili, Chiloe, and Juan Fernandez.

39. *H. hirtellum*, Sw.; *st.* 1-4 in. l., tomentose, not winged; *fr.* ovate-acuminate, tripinnatifid, 3-6 in. l., 2-3 in. br.; *main rachis* only slightly winged above, tomentose; *lower pinnæ* rhomboidal-lanceolate, with a narrow central undivided portion; *lower pinnl.* pinnatifid, with long narrow linear ciliated segments; *sori* 2 to 12 to a pinna, placed at the end of the lateral segments on both sides; *invol.* orbicular, sunk in the frond, divided about halfway down; *valves* strongly ciliated.—*Hk. Sp. Fil. 1. p. 90. t. 31. D.*

Hab. Mexico, Jamaica, and Guadeloupe.—Frond elastic in texture. This and the next four species closely resemble one another in the shape of the frond, and the extent to which it is divided.

40. *H. elasticum*, Bory; *st.* 2-4 in. l., wiry, erect, naked or slightly tomentose; *fr.* 6-12 in. l., 2-4 in. br., ovate-acuminate, tripinnatifid; *main rachis* winged above, tomentose; *lower pinnæ* rhomboidal-triangular, 1-3 in. l., divided down very nearly to the rachis into numerous alternate *pinnl.*, which again are cleft very nearly to the rachis into long linear simple or forked *segm.*; texture firm but elastic, moderately hairy both over the surface and at the margin; *sori* very numerous, terminal on the lateral segments; *invol.* small, the base sunk in the frond; *valves* rounded, free, very hairy.—*Hk. Sp. 1. 93. Hk. & Gr. Ic. Fil. t. 135.*



Hab. Confined to the Mauritius and Bourbon, where it is abundant.—It is questionable whether this is distinct from the preceding.

41. *H. Lindenii*, Hk.; *st.* 4-6 in. l., stout, erect, villose; *fr.* often recurved, 6-12 in. l., 4-6 in. br., ovate-acuminate, tripinnatifid; *main rachis* villose, winged in the upper part; *lower pinnæ* 2-4 in. l., elongate-lanceolate, with numerous deeply-divided *pinnl.* on both sides, both surfaces hairy; *sori* very numerous, terminal on the segments; *valves* short and broad, strongly ciliated.—*Hk. Sp.* 1. p. 94. t. 34. C. *H. spectabile*, Moritz.

Hab. Andes of Venezuela and Ecuador.

42. *H. microcarpum*, Desv.; *rhizome* clothed with woolly yellow hairs; *st.* 4-6 in. l., firm, tomentose, slightly winged above; *fr.* ovate-triangular, tripinnatifid, 6-12 in. l., 3-5 in. br.; *main rachis* furnished with a narrow wing throughout, and more or less tomentose, the frond slightly hairy, the margin subdenticulate and ciliated; *central pinnæ* rhomboidal-oblong, with several *pinnl.* on each side, which are deeply cut into narrow linear *segm.*; *sori* 2 to 12 to a pinna, placed at the apex of the lateral segments of the upper pinnæ; *invol.* ovate, free, divided down to the base; *valves* between toothed and ciliated.—*H. Organense*, *Hk. Sp.* 1. p. 90. t. 32. B. *H. Beyrichianum*, *Kunze. Hk. Sp.* 1. p. 91.

Hab. South America, Venezuela and Ecuador, southward to Peru and the South of Brazil.—*H. Lindigii*, Mert., and *H. Ruizianum*, Klotzsch, are allied to this species.

43. *H. valvatum*, Hk. & Gr.; *st.* 1-3 in. l., naked or slightly winged above; *fr.* ovate-triangular, acuminate, tripinnatifid, 4-6 in. l.,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. br. below; *main rachis* winged throughout; *pinnæ* slightly hairy and ciliated, the lower ones triangular, with deeply pinnatifid *pinnl.*; *ult. segm.* linear, with the limb (not the margin) on each side of the midrib considerably waved and undulated; *sori* 12 to 20 to a pinna, terminal on the segments of the upper ones on both sides; *invol.* ovate, divided down nearly to the base; *valves* glabrous or slightly ciliated.—*Hk. & Gr. Ic. Fil.* 219. *Hk. Sp.* 1. p. 90. *H. pteropodum* & *platylobum*, *V. D. B.*

Hab. Nicaragua, Guadeloupe, Martinique, Andes of Columbia and Peru, ascending to 6,000 ft.—Of *H. divaricatum* and *Orbignianum*, placed by Van den Bosch near *valvatum*, I have not seen specimens.

44. *H. Sprucei*, Baker; *st.* 1-2 in. l., slender, hairy; *fr.* 3-6 in. l., 1-2 in. br., lanceolate or oblong-acuminate, bipinnatifid; *rachis* winged throughout, or only in the upper half, pilose, the frond furnished with scattered stellate hairs on the midrib and margin; *lower pinnæ* spreading, rhomboidal-lanceolate, cut down nearly to the rachis into simple or once forked linear erecto-patent *pinnl.*, which are about  $\frac{1}{3}$  in. l., and somewhat crisped or undulated as well as furnished with rather distant strong stellate hairs along the edge; *sori* 2 to 6, terminal on the segments of the lateral pinnæ; *invol.* cut more than halfway down; *valves* rounded and ciliated with hairs like those of the segments.

Hab. Tarapota, E. Peru, *Spruce*.—This also, like *H. Chilense*, might easily be taken for a serrated species. It resembles in habit the small forms of *H. interruptum*, but the frond is much thinner, and the hairs are confined to the ribs and edges.

45. *H. interruptum*, *Kunze*; *st.* 1-2 in. l., wiry, naked or slightly ciliated; *fr.* pendent, varying from 6 in. to nearly a yard in length, 2-5 in. br., elongate-lanceolate or oblong in general outline, bipinnatifid; *rachis* winged nearly throughout, and like the frond, more or less densely clothed with soft shining ferruginous hairs; *lower pinnæ* rhomboidal-lanceolate, cleft on both sides into simple or bifid lobes, which reach about halfway down to the rachis; *sori* 6 to 12,

terminal on the segments of both sides of the upper pinnæ; *invol.* divided more than halfway down; *valves* rounded and very hairy.—*Hk. Sp. 1. p. 92. t. 33. B.* *H. æquabile*, Kunze.

Hab. Guadeloupe, and mainland of S. America, from Venezuela and New Granada southward to Peru.—Resembling *H. sericeum* in habit, but much thinner in texture, and the rachis winged.

46. *H. sericeum*, Sw.; *st.* 2-4 in. l., wiry, naked; *fr.* pendent, 6-24 in. l., 2-3 in. br., elongato-oblong, obtuse or acuminate, simply pinnatifid; *rachis* densely clothed with close tomentum, free throughout; *pinnæ* 1-2 in. l., very numerous, opposite, rhomboidal-lanceolate, with a cuneate base and much-acuminated apex, sometimes only just crenated, sometimes pinnatifid more than halfway down to the rachis, the substance almost coriaceous and soft, with a dense coating of tomentum; *veins* prominent, forked with nearly parallel branches, and often furnished with curious membranaceous wings or lamellæ; *sori* very numerous to a pinna, small, terminal on the apex of the pinnæ and lateral segments; *valves* rounded, shaggy, with strong reddish-brown hairs.—*Hk. Sp. 1. p. 92.*

Hab. Tropical America, from Cuba, Jamaica, and Mexico southward to Peru and Brazil.—A curious species, quite peculiar in habit and texture, which Van den Bosch divides into eight; viz. *sericeum*, *eriophorum*, *Cubense*, *Sturm*, *plumosum*, *Kaulf.*, *Karstenianum*, *speciosum*, *asterothrix*, Kunze, and *tomentosum*, Kunze.

47. *H. Malingii*, Metten., MSS.; *st.* 1-3 in. l., slender, naked; *fr.* pendent, 4-6 in. l., 1-1½ in. br., linear-oblong, bi- or tripinnatifid; *main rachis* densely clothed with close tomentum, free throughout; *pinnæ* ½-¾ in. l., oblong or ovato-rhomboidal, cut down to a rounded rachis; *pinnul.* deeply flabellately and subpinnatifidly cut; *ult. segm.* linear-filiform, 1-3 lin. l., the substance coriaceous and soft, with a dense coating of tomentum, a single *vein* only in each segment; *sori* 2 to 12 to a pinna, terminal on the segments; *invol.* divided about halfway down; *valves* denticulate at the apex, and shaggy like the frond.—*Trichomanes Malingii*, *Hk. Gard. Ferns, t. 64.*

Hab. New Zealand.—The connection of this curious novelty is certainly with *H. sericeum*, from which it differs principally in the total absence of a connecting membrane between the veins of the pinnæ, which, in one form of the South American plant, is partially deficient.

48. *H. lineare*, Swartz; *st.* about 1 in. l., slender, villose; *fr.* flaccid, pendulous, 3-8 in. l., 1-2 in. br., linear, elongated, fully pinnate; *rachis* slender, wavy, villose, free throughout; *pinnæ* spreading, ovato-rhomboidal, deeply cut into simple or forked linear lobes, the surface and margin densely hairy; *sori* 2 to 6, terminal on the lateral segments; *invol.* about as broad as the segments; *valves* rounded, strongly ciliated.—*H. elegans*, *Spr. Hk. Sp. 1. p. 91.* *H. trifidum*, *Hk. & Gr. Ic. Fil. t. 196.* *H. pendulum*, *Bory.*

Hab. Tropical America, from Jamaica and Mexico southward to Brazil and Peru, ascending on the Andes of Ecuador to 12,000 ft., and occurring also in the Mauritius, from which we have just received specimens from Dr. Meller.—This species is very flaccid in habit, and the long narrow fronds form densely interlaced masses on rocks and trees. Van den Bosch gives the three plants already named as distinct, and his *procerum*, *trichophyllum*, *Crugeri*, and *Moritzianum* are also included here.

49. *H. elegantulum*, V. D. B.; *st.* 1-4 in. l., slender, ciliated; *fr.* flaccid, pendulous, 6-18 in. l., 2-6 in. br., linear-oblong and pinnate, or broadly oblong and bipinnate; *rachis* wavy, villose, free throughout; *lower pinnæ* in the bipinnate form often with several pairs of pinnules; *pinnul.* 1-3 in. l., deeply pinnatifid principally on the upper side; *ult. segm.* 1-2 lin. l., 1 lin. br., the surface and margin densely hairy; *sori* 6 to 12, terminal on the lateral segments; *invol.* sunk



in the frond; *valves* rounded, strongly ciliated.—*H. pulchellum*, *Hk. Syn.* 1. p. 91, *in part*.

Hab. Andes of Ecuador and Columbia, ascending to 13,000 ft.—Closely allied to *H. lineare* in its manner of growth, but a much larger plant, with broader and shorter segments. The original *H. pulchellum* appears to be a small state of *sericeum*. This and the preceding are the only simply pinnate hairy species with divided pinnæ.

50. *H. Catherinæ*, *Hk.*, *MSS.*; *st.* 1-2 in. l., erect, wiry, slightly ciliated; *fr.* 2-3 in. l., 1-1½ in. br., oblong, fully bipinnate; *main rachis* free throughout, slightly ciliated; *lower pinnæ* broadly rhomboidal, cleft down to the rachis; the *lower pinn.* several times forked, with very narrow linear ciliated *segm.* about 2 lin. l.; *sori* 6 or more to each pinna, terminal on the segments of the upper pinnæ on both sides, considerably broader than the segments, the cuneate base sunk in the frond; the ciliated *valves* divided about halfway down.

Hab. St. Catherine's Peak, Jamaica, at an elevation of 5,000 ft., *Wilson*; Guadeloupe, *L'Herminier*.—A small, neat, deeply-cut plant with inconspicuous hairs. The Guadeloupe plant was distributed by M. Fée as *H. protrusum*, *Hook.*, which belongs to the glabrous section, and is a form of *H. polyanthos*.

51. *H. Pastoensis*, *Hk.*, *MSS.*; *st.* 4-6 in. l., stout, erect, densely villose; *fr.* 6-12 in. l., 4-6 in. br., ovate-acuminate, fully bipinnate; *rachis* strong, erect, densely clothed with ferruginous hairs; *pinnæ* ovate-lanceolate, recurved; *lower pinn.* 1 in. or more l., divided down nearly to the costa into very long narrow linear segments, hairy principally on the rachis and margin; *sori* 12 to 20, terminal on and broader than the segments; *invol.* orbicular, free, deeply 2-valved; the *valves* only ciliated.

Hab. Volcano of Pasto, Andes of N. Ecuador, *Jameson*.—This and the preceding (both new species) are interesting, as showing a much more divided type of form in the frond than was known previously in this section.

\*\*\*\* *Leptocionium*, *Presl, V. D. B.*; *margin of the frond spinuloso-dentate*. *All the species are more or less compound.* Sp. 52-71.

\* *Frond not crisped.* Sp. 52-66.

52. *H. Tunbridgense*, *Smith*; *st.* ½-1½ in. l.; *fr.* oblong-lanceolate, 1-3 in. l., ½-1 in. br., pinnate throughout; *pinnæ* distichous, flabellato-pinnatifid; the *lobes* linear, 1-3 lin. l., and, as well as the usually solitary axillary suborbicular compound *invol.*, conspicuously spinuloso-serrated; the *rachis* and upper part of the *main stem* winged.—*Hk. Sp.* 1. p. 95. *Brit. Ferns*, t. 43.—β, *H. Wilsoni*, *Hk.*—*Invol.* entire; *pinnæ* with fewer lobes, pinnatifid on the upper side only.—*Hk. Sp.* 1. p. 96. *Brit. Ferns*, t. 44.

Hab. Regarding these two as British plants alone, we should pronounce them readily separable by the characters given, which are taken from our two indigenous plants; but, looking abroad, we find them connected by every intermediate stage of gradation. Fourteen species admitted or proposed by Van den Bosch cannot be clearly separated. To our α belong his *Tunbridgense* (Britain, Normandy, Corsica, Tyrol, Italy); *Dregeanum*, *Presl* (S. Africa); *minimum*, *Richd.* (Auckland Islands); *antarcticum*, *Pr.* (N. S. Wales and V. D. Land); *asperulum*, *Kunze* (Chili); and *Zealandicum*, *V. D. B.* (New Zealand). Some of the Cape specimens are bipinnate, and have the lower pinnæ fully 2 in. l. A plant from the Falkland Islands has the pinnæ only once forked, or even simple; α grows also in the Mauritius, Madeira, the Azores, Jamaica, and Venezuela. To β belong *Wilsoni* (Britain, Ferøe, Norway); *megachilum*, *Pr.* (Brazil); *unilaterale*, *Bory* (Bourbon); *Meyeri*, *Pr.* (S. Africa); *affine*, *Brack.* (Fiji group); *cupressiforme*, *Lab.* (New Zealand and Australia); *Menziesii* (Falkland Islands, Staten Land, Cape Horn); and *Mettenii* (Chili): and it grows also in Guatemala and the Peruvian Andes.

53. *H. Serra*, Presl; *st.* slender, wiry, 1-2 in. l.; *fr.* narrowly oblong-acuminate, pinnate, 3-4 in. l., about 1 in. br.; *pinnæ* distichous, flabellato-pinnatifid, recurved; the *ult. segm.* 3-5 lin. l., very narrow, conspicuously spinuloso-dentate; *sori* placed 1 or 2 in the upper side near the base of the pinnæ; *invol.* divided two-thirds of the way down; *valves* oblong, entire, or slightly toothed.

Hab. Chiloe and Chili.—Very near the preceding, but the segments very narrow and remote, and almost confined to one side of the pinnæ.

54. *H. tenerrimum*, V. D. B.; *st.* very slender,  $\frac{1}{2}$ - $\frac{3}{4}$  in. l., naked; *fr.* 1-2 in. l., less than  $\frac{1}{2}$  in. br., pinnate, only the very summit winged; *pinnæ* distant, very small and slender, simple or once or twice forked, vaguely undulato-dentate; *sori* 1 or 2 together, terminal; *invol.* divided down nearly to the base; *valves* rounded and ciliated.—V. D. B. *Suppl.* p. 101.

Hab. Peru, Spruce, 4700 and 4702.—Much the most slender and diminutive species of the section.

55. *H. Jamesoni*, Hk.; *st.* 1-2 in l.; *fr.* flaccid, linear, 3-9 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br.; *rachis* only slightly winged towards the apex, fringed throughout with soft membranous *spines*; *pinnæ* forked at the apex, and with only 1 or 2 linear *segm.* on each side; *invol.* axillary, solitary; *valves* obovate, conspicuously spinose.—Hk. *Sp.* 1. p. 96. t. 35. A.

Hab. Andes of Columbia, Jameson.—Readily distinguishable by its long narrow frond and flaccid habit. The costa, like the rachis, is conspicuously fringed with membranous spines.

56. *H. barbatum*; *st.* slender, erect, naked, 1 in. or less l.; *fr.* oblong-triangular,  $1\frac{1}{2}$ -2 in. l., about  $\frac{3}{4}$  in. br., tripinnatifid; *rachis* winged throughout; *lower pinnæ* rhomboidal-oblong, with a broad winged *rachis* and short broadly linear spinuloso-dentate *segm.*; *sori* terminal on the segments of the upper pinnæ; *invol.* suborbicular or broadly oblong; *valves* divided more than halfway down, and deeply spinuloso-dentate.—Leptocionium barbatum, V. D. B. *Suppl.* p. 62.

Hab. Tsus Sima, near Japan, Wilford, 846.—A stouter plant than *H. Tunbridgense*, with rachis winged throughout, broader segments, and terminal sori.

57. *H. secundum*, Hk. & Gr.; *st.* 1-3 lin. l., wiry, naked; *fr.* pinnate, linear-oblong, 3-4 in. l., 1 in. br.; *pinnæ* recurved, flabellato-pinnatifid; *ult. segm.* narrowly linear, spinuloso-dentate, usually falcato-secund; *sori* usually solitary, placed on the upper side of the pinnæ near the base; *invol.* 2-valved about halfway down; *valves* oval-oblong, entire.—Hk. *Sp.* 1. p. 100. Hk. & Gr.  *Ic. Fil.* t. 133.

Hab. Staten-land and Cape Horn.—Near *H. Tunbridgense*, but a larger plant, with two or three times dichotomous flabellate pinnæ.

58. *H. Simonsianum*, Hk.; *st.* slender, wiry, naked, 1-2 in. l.; *fr.* linear-oblong, 2-3 in. l.,  $\frac{3}{4}$  in. br., once pinnatifid down to a broadly-winged rachis; *segm.* fan-shaped, with only shallow divisions directed from the apex towards the base; *veins* dichotomous, the margins spinuloso-dentate; *sori* 1 to 4, terminal on the divisions of the upper pinnæ; *invol.* broadly oblong, divided nearly to the base; *valves* spinuloso-dentate.—Hk. *2nd Cent.* t. 13.

Hab. Khasia Hills and Sikkim, Simons, Griffith, Dr. Hooker.—The least divided species of this section.

59. *H. pectinatum*, Cav.; *st.* 2-4 in. l., wiry, naked; *fr.* oblong, pinnate, 3-6 in. l.,  $1\frac{1}{2}$ -2 in. br.; *main rachis* only winged towards the apex; *pinnæ* with only



a slight wing to the rachis on the lower, but deeply pinnatifid on the upper side, with long, narrow, parallel, simple or slightly forked linear spinuloso-dentate *segm.*; *sori* often 6 to 8 to a pinna, terminal on the lower segments of the upper side; *invol.* divided nearly to the base with ovate entire *valves*.—*Hk. Sp.* 1. p. 96. t. 34. D.

Hab. Chili and Chiloe.—A beautiful species, easily recognized by its peculiar pectinate pinnae.

60. *H. multifidum*, Swartz; *st.* 2-4 in. l., wiry, naked; *fr.* broadly ovato-lanceolate, tripinnatifid, 2-6 in. l., 1-5 in. br.; *main rachis* winged above, wingless below; the *second. rachis* broadly winged throughout, wavy; *pinnæ* and *pinnl.* rhomboidal-lanceolate; *ult. segm.* linear, 2-3 lin. l., conspicuously spinuloso-dentate; *sori* 1 to 12 to a pinna, terminal on the lateral segments of the upper pinnae on both sides; *invol.* obovate, tubular below; *valves* divided not more than halfway down, entire; *recept.* sometimes exserted.—*Hk. Sp.* 1. p. 98. *Hk. & Gr. Ic. Fil.* t. 167. H. Feejeense, *Brack. t.* 37. f. 2.

Hab. New Zealand, and islands of the Pacific.—An elegant plant in the larger forms. In exposed situations the fronds are much drawn together, and the segments are recurved.

61. *H. triangulare*, Baker; *st.* 2-4 in. l., smooth, naked; *fr.* ovate-triangular, tripinnatifid, 4-6 in. l., 2-3 in. br. at the base; *main rachis* winged above; the *second. rachis* broadly winged throughout; *pinnæ* rhomboidal-lanceolate; *lowest pinnl.* deeply pinnatifid, with simple or forked conspicuously spinuloso-dentate linear *segm.*, 2-3 lin. l.; *sori* usually solitary, placed on the upper pinnae at the base of the anterior pinnule at the outer side; *invol.* large, ovate, fully a line deep, divided about halfway down; *valves* nearly entire.

Hab. Fernando Po, *Mann*, 333.—Much resembling *H. multifidum* and *bivalve* in habit, but the segments are broader, and the sori are much larger and usually solitary. It is the only *Leptocionium* which has yet been found in Tropical Africa.

62. *H. bivalve*, Swartz; *st.* 2-4 in. l., wiry, naked; *fr.* ovate-triangular, tripinnatifid, 3-8 in. l., 2-3 in. br.; *main rachis* slightly winged above; the *second. rachis* winged throughout; *lower pinnæ* triangular-acuminate; *ult. segm.* linear, 2-3 lin. l., spinuloso-dentate; *sori* very numerous, often 6 to 8 on a single pinnule; *invol.* suborbicular, entire, divided down nearly to the base; *recept.* always included.—*Hk. Sp. Fil.* 1. p. 98. t. 35. D. H. pyriforme, *V. D. B.*

Hab. New Zealand.—Best distinguished from *H. multifidum* by the shape of the involucre. The frond is broader below and the sori are more abundant.

63. *H. Smithii*, Hk.; *st.* 1-2 in. l., wiry, naked or slightly tomentose; *fr.* oblong-acuminate, 3-8 in. l., 2-3 in. br., bipinnatifid; *rachis* winged above, ciliated below; *pinnæ* oblong-triangular, with a winged *rachis* and simple or 1 to 4 times forked linear spinuloso-serrate *segm.*; *sori* 1 to 4, terminal on the segments of the pinnae on both sides; *invol.* oblong, small, divided about halfway down; *valves* entire.—*Hk. Sp.* 1. p. 97. t. 35. B. *L. serrulatum*, Preslii, affine and holochilum, *V. D. B.*

Hab. Philippine Islands, Java, and Malayan Peninsula.—*L. flaccidum*, *V. D. B.*, is a plant gathered by Drs. Hooker and Thomson in the Khasia Mountains, which resembles this in habit, but has a broad undulato-crispate wing to the main rachis and slightly crisped pinnae. Probably it is a distinct species; but I have not seen the fruit.

64. *H. fucoides*, Swartz; *st.* 2-4 in. l., wiry, ciliated; *fr.* oblong, tripinnatifid, 4-6 in. l., 1½-2 in. br.; *main rachis* winged above and ciliated; the *second. rachis* winged throughout; *pinnæ* rhomboidal-acuminate, with long narrow spinuloso-

dentate entire or forked linear *segm.*; *sori* few in number, not more than 4 to a pinna, and usually confined to the segments of the upper side, sessile or slightly stalked, a line each way; *valves* divided more than two-thirds of the way down, roundish or oblong, spinuloso-dentate or entire.—*Hk. Sp.* 1. p. 100.  *Ic. Fil.* t. 963. *H. spinulosum*, *H. B. K. Hk. Sp.* 1. p. 100. *H. pedicellatum*, *Kunze. H. blepharodes*, *Pr. H. cristatum*, *Hk. & Gr. Ic. Fil.* 148. *H. Peruvianum*, *Hk. & Gr. t.* 208.

*Hab.* Common in Tropical America, from Cuba and Mexico southward to Brazil, ascending in the Andes to 9,000 ft.—The six plants quoted as synonyms are considered as distinct by Van den Bosch. *H. torquescens* and *aculeatum*, *V. D. B.*, must probably be placed here also; but I have not seen specimens.

65. *H. Magellanicum*, *Willd.*; *st.* erect, wiry, rigid, 2-4 in. l., naked or margined with an undulato-crispate wing on each side; *fr.* oblong-triangular, 3-6 in. l., 2-3 in. br., tripinnatifid; *rachis* winged throughout; *lower pinnae* broadly triangular, with pinnatifid *pinnl.*, furnished with several linear spinuloso-dentate *segm.* on each side; *sori* 6 to 10, small, terminal on the segments of the upper pinnae; *invol.* oblong, with 2 short toothed *valves*.—*H. attenuatum*, *Hk. Sp.* 1. p. 99. t. 36. *B. L. Magellanicum*, *V. D. B. H. Bibraianum*, *Sturm, in Flora* 1853, p. 361.

*Hab.* Chili, Chiloe, and Organ Mountains.—*Rachis* and *stipe* with an undulato-crispate wing, but the frond plane.

66. *H. Bridgesii*, *Hk.*; *st.* 2-6 in. l., wiry, naked or tomentose; *fr.* broadly ovate-triangular, tripinnate, 4-6 in. l., 2-3 in. br. below; *main rachis* only very slightly winged near the apex; *pinnae* oblong-triangular, with the *pinnl.* of the lower ones pinnate quite to the rachis; *ult. segm.* very narrowly linear, rigid, 1-2 lin. l., erecto-patent; *sori* minute, often 6 to 8 to a pinna, placed 1 or 2 at the base of the pinnules; *invol.* divided about two-thirds of the way down, oblong, entire or very slightly toothed.—*Hk. Sp. Fil.* 1. p. 97. t. 35. C.

*Hab.* Chili and Chiloe.—The only species of this section that is fully tripinnate.

\*\* *Frond crisped.* *Sp.* 67-71.

67. *H. tortuosum*, *Hk. & Gr.*; *st.* 2-3 in. l., erect, wiry, furnished with a narrow crisped sinuated wing on both sides; *fr.* broadly ovate-triangular, tripinnatifid, 3-6 in. l., 2-3 in. br. below; *main rachis* winged throughout; *lowest pinnae* broadly rhomboidal-triangular; the *segm.* more or less crisped; the *ult. divisions* 2-3 lin. l., linear, irregularly toothed and undulated at the margin; *sori* sometimes 10 to 20 to a pinna, terminal on the ultimate segments, sessile; *invol.* broadly ovate, divided about halfway down; *valves* spinulose on the outer edge.—*Hk. Sp.* 1. p. 99. *Hk. & Gr. Ic. Fil.* t. 129.

*Hab.* Chili, Patagonia, and neighbouring islands.—*L. sceselifolium* and *L. dentatum*, placed by Van den Bosch near *H. tortuosum*, I have not seen.

68. *H. dichotomum*, *Cav.*; *st.* 2-3 in. l., naked or slightly margined with an undulato-crispate wing on both sides; *fr.* ovate-triangular, bi- or tripinnatifid, 4-6 in. l., 2-3 in. br.; *main rachis* winged like the *stipe* throughout; *lower pinnae* three times as long as broad; the *segm.* crisped, broadly linear, undulato-dentate at the margin; *sori* numerous, placed in the axils of the segments; *invol.* small, ovate; *valves* spinose on the back, divided about halfway down, nearly entire at the apex.—*Hk. Sp. Fil.* 1. p. 98. t. 36. A.

*Hab.* S. Chili and Juan Fernandez.—A closely allied plant grows in Peru (*Lechler*, 2563) with robust fronds 10 in. l., a tomentose rachis, and the lower pinnae with deeply



pinnatifid pinnules more than  $\frac{1}{2}$  in. l. Doubtless it is a distinct species ; but I have not seen the fruit.

69. *H. denticulatum*, Sw. ; *st.* 1-2 in. l., erect, naked ; *fr.* ovate-triangular, tripinnatifid, 2-3 in. l., 1 in. or more br. at the base ; *rachis* margined throughout, with a slightly undulated wing ; *pinnæ* slightly crisped, the *lower* ones rhomboidal, twice as broad as long, deeply cleft, with flabellate or pinnatifid linear *segm.* ; *sori* usually single, placed at the axils on the upper side of the *pinnæ*, sometimes recurved ; *invol.* ovate, divided about two-thirds of the way down, spinose on the back, with serrulated *valves*.—*Hk. Sp.* 1. p. 101. *V. D. B. Hym. Jav. t.* 29.

Hab. Moulmein, at 7,000 ft., and Java.—A larger and less crisped and more compound plant than *H. Neesii*. It is beautifully figured, as are the other Javanese forms, by Van den Bosch.

70. *H. Neesii*, *Hk.* ; *st.* 1-2 in. l., naked or slightly winged, with a crispate margin on both sides ; *fr.* ovate, about 2 in. l.,  $\frac{3}{4}$ -1 in. br., tripinnatifid ; *rachis* winged throughout, the wing and *pinnæ* much crisped ; *pinnæ* with distant narrow simple or 1-3 times deeply-forked deeply-toothed *segm.* ; *sori* small, usually single, supra-axillary on the upper *pinnæ* ; *invol.* subcylindrical below, divided more than halfway down, with 2 acute spinuloso-dentate *valves*.—*Hk. Sp.* 1. p. 99.

Hab. Malayan Peninsula, Java, Borneo, Fiji, and Philippines.—It is quite an open question whether this should be considered a *Trichomanes* or *Hymenophyllum*. The Philippine plant is *Leptocionium aculeatum* of Van den Bosch. Valves of the involucre spinose on the back. *L. acanthoides* and *Braunii* of Van den Bosch very closely approach this species.

71. *H. sabinæfolium*, Baker ; *st.* 1-2 in. l., naked or slightly winged ; *fr.* broadly ovate, triangular, deeply tripinnatifid, 1-2 in. l., more than 1 in. br. below ; *rachis* margined throughout with a wing which is thickly beset with aristate teeth ; *pinnæ* crisped, the *lower* ones flabellato-pinnatifid nearly down to the midrib ; the *ult. segm.* very narrow, 2-3 lin. l., and deeply cut up nearly to the midrib by numerous strong aristate teeth ; *sori* solitary, supra-axillary, spinose on the back, divided about halfway down with ovate spinoso-serrated *valves*.

Hab. Salak, Java, *Zollinger*.—Allied to *H. Neesii* and *aculeatum* ; but here the leafy part is so narrow, and so much cut up by the numerous strongly aristate teeth, that the ordinary appearance of a *Hymenophyllum* is quite lost, and a frond looks more like a miniature branch of *Juniperus Sabina*.

#### GEN. 17. TRICHOMANES, *Smith*.

*Sori* marginal, always terminating a vein, more or less sunk in the frond. *Invol.* monophyllous, tubular, closely corresponding with the frond in texture, the mouth truncated or winged, or slightly two-lipped. *Recept.* filiform elongated, often considerably exerted beyond the mouth of the involucre, capsuliferous principally at the base. *Caps.* sessile, depressed, surrounded by an entire, broad, nearly transverse ring, bursting vertically.—*The ferns of this genus agree with those of the last in habit of growth and delicacy of texture, the character furnished by the shape of the involucre dividing a very natural tribe into two nearly equal halves. The geographical range of the species is very similar, as is the range of variation in size and circumscription of frond.* TAB. II. f. 17.

§ *Feea*.—*Sterile and fertile fr. different, the latter consisting of a narrow distichous spike.* Sp. 1-4.

1. *T. elegans*, Rudge; *caud.* erect, tufted; *sterile fr.* 6-8 in. l., 2 in. br., on *st.* 2-3 in. l., pinnatifid nearly to the rachis, with finely-toothed linear-oblong segments, the veins anastomosing, the apex often rooting and proliferous; *fertile fr.* 6-12 in. l., about  $\frac{1}{2}$  in. br., on *st.* 4-8 in. l.; *sori* placed in close rows along both margins, the tube quite sunk, the mouth not at all dilated.—*Hk. Sp.* 1. p. 114. *Gard. F. t.* 2. Hymenostachys diversifrons, Bory. Feea Boryi, V. D. B.

Hab. Tropical America, from Trinidad and Guatemala southward to Peru.

2. *T. botryoides*, Kaulf.; *caud.* erect, tufted; *sterile fr.* 2-3 in. l., 1 in. or rather more br., on very short *st.*, pinnatifid to a slightly winged rachis, with linear-oblong deeply-toothed lobes, the apex rooting and copiously proliferous; *veins* free; *fertile fr.* on *st.* 1-2 in. l., narrowly linear, the lower *sori* stalked, usually free, the upper connected at the base, and the apex of the frond foliaceous.—*T. nanum*, Bory. *Hk. Sp.* 1. p. 115.

Hab. Tropical America; Guiana, Leprieur & Appun; Panama, Seemann.—Quite intermediate in the character of the fertile frond between *elegans* and *spicatum*, and more delicate in texture than either.

3. *T. spicatum*, Hedw.; *caud.* erect, tufted; *sterile fr.* 4-6 in. l., 1-1 $\frac{1}{2}$  in. br., on *st.* 1-2 in. l., pinnatifid nearly to the rachis, with inciso-crenate linear-oblong segments; *veins* free; the apex not rooting; *fertile fr.* composed of a rachis and two rows of *sori*, without any connecting membrane; *tube* obconico-cylindrical, firm in texture, mouth not dilated.—*Hk. Sp.* 1. p. 114. *Gard. F. t.* 60. Feea polypodina, Bory.

Hab. West-Indian Islands, frequent; Panama, Guiana, and Ecuador.—*Maschalosorus Mougeoti*, V. D. B., is an abnormal state, with the sterile and fertile frond combined.

4. *T. heterophyllum*, H. B. K.; *rhizome* creeping, widely ferrugineo-villose; *sterile fr.* 2-4 in. l., 1-1 $\frac{1}{2}$  in. br., on *st.* 1 in. or less l., pinnatifid to a narrowly winged rachis, with closely-placed imbricated sinuato-pinnatifid crisped oblong pinnæ; *veins* free; *fertile fr.* on villose wiry *st.* 6-8 in. l., the frond 2-3 in. l., about  $\frac{1}{2}$  in. br., subcoriaceous in texture, linear-oblong, pinnatifid down to a broadly-winged rachis; the lobes oblong, pinnatifid about halfway to the midrib; *sori* 4-6 to each pinna, terminal on the upper ultimate segments; the *tube* quite sunk in the frond, the mouth not dilated.—*T. Spruceana*, *Hk. Ic. Pl. t.* 981. Feea Humboldtii, V. D. B.

Hab. Tropical America; Essiquibo, Schomburghk; N. Brazil, Spruce.—Connects in habit this dimorphous-fronded group with *T. crispum*.

§§ Eutrichomanes. † *Sterile and fertile fronds uniform or nearly so. Sori not spiked.*

\* *Fronds entire or slightly lobed.* Sp. 5-20. See also No. 60 & 46.

† *Fronds without a distinct central midrib, but with veins radiating from the base as in a fan.* Sp. 5-13.

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‡ This includes numerous genera of Presl and Van den Bosch, founded primarily on the texture of the frond (whether it is composed of one or more than one layer of cellules); secondarily, upon whether the mouth of the involucre is entire or two-lipped, and afterwards in the degree to which the frond is divided, and the character of the venation.



5. *T. reniforme*, Forst.; *st.* 4-8 in. l., naked, wiry; *fr.* orbicular, reniform, entire, with a deep sinus at the base, 2-4 in. br.; spurious *venules* none; *sori* often encircling the whole of the outer margin; *recept.* much exserted, stout, and covered with capsules.—*Hk. Sp.* 1. p. 115. *Hk. & Gr. Ic. Fil. t.* 31. *Exot. Ferns, t.* 2. *Crepidomanes, Presl.*

Hab. New Zealand.—This is the only species in which the frond has four layers of cellules, and the habit is quite peculiar.

6. *T. lineolatum*, Hk.; *st.* none or short, tomentose; base of the *fr.* narrowed very gradually below; *fr.*  $\frac{1}{2}$ -1 in. l.,  $\frac{1}{2}$  in. br., suborbicular or obovate-cuneate, nearly entire or subpalmate, or rather deeply pinnatifid, with linear-oblong lobes, subopaque and prominently veined when dry; spurious *venules* none; *sori* few, subterminal; *invol.* sunk in the frond, the mouth distinctly two-lipped.—*Hemiphlebium, V. D. B.*

Hab. Cuba, Jamaica, and Merida.—Allied in habit to *T. reptans* and *punctatum*, but without spurious *venules*.

7. *T. peltatum*, Baker; *rhizome* wiry, slender, wide-creeping, tomentose; *fr.* quite sessile, attached to the rhizome near its centre or towards the base, suborbicular in general outline,  $\frac{1}{2}$ -1 in. each way, delicately membranaceous in texture, the margin undulated, not thickened, sometimes irregularly cleft rather deeply; *veins* close, regularly dichotomous at a small angle, with numerous interrupted spurious *venules* between them at the margin and towards the centre; *sori* 1 to 3, scattered, firm in texture, the tube more or less exserted, with a very much dilated spreading slightly two-lipped mouth.—*Baker in Linn. Proc. inedit. cum icone.*

Hab. Samoa, *Rev. T. Powell*; New Caledonia, *Vieillard*, 2166.—A very curious novelty, quite peculiar in habit. "The different branches of the caudex," writes the discoverer, "run upwards, but so closely together, that the margins of the fronds overlap each other. The fronds all lie flat upon the tree, so that the whole fern has much the appearance of a delicate foliaceous lichen or frondose *Jungermannia*."

8. *T. membranaceum*, L.; *fr.* subsessile, membranaceous in texture, suborbicular in general outline, 2-3 in. br., more or less deeply cut from the circumference towards the centre, with broad rounded or narrow lobes, the margin fringed with a double series of peltate scales; spurious *venules* copious; *invol.* numerous, placed round the edge of the frond, the tube sunk, the mouth two-lipped.—*Hk. Sp.* 1. t. 115. *Exot. Flora, t.* 76. *Lecanium, V. D. B.*

Hab. Tropical America, both the islands and continent.—Here, although the frond is so thin, there are two or three layers of cellules, and the curious peltate scales of the frond are unique. The habit is that of *Padina pavonia* amongst *Algae* or a broad-lobed *Flustra*.

9. *T. cuspidatum*, Willd.; *fr.* distinctly but very shortly stalked, about  $\frac{1}{2}$  in. br., the outer edge rounded and more or less lobed, the base truncate or more or less cuneate; spurious *veins* distinct; *invol.* 1 to 6, the tube sunk in the frond, the mouth dilated, but scarcely two-lipped.—*Hk. Sp.* 1. p. 119. *Microgonium, V. D. B.* *T. Bojeri, Hk. Sp.* 1. p. 116. *Hk. & Gr. Ic. Fil. t.* 155.

Hab. Mauritius and Bourbon.

10. *T. Motleyi*, V. D. B.; *fr.* copious, imbricated, sessile, about  $\frac{1}{4}$  in. br., cordate-orbicular, nearly entire; spurious *veins* indistinct, the solitary exserted; *sorus* placed in a deep apical sinus, the mouth spreading and much dilated, but entire.

Hab. Borneo, discovered by Messrs. Barber and Motley; New Caledonia, *Lenormand*.

11. *T. Godmani*, Hk. MSS. ; *fr.* tomentose, strong,  $\frac{1}{4}$ - $\frac{3}{4}$  in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., suborbicular or obovate, the margin entire or slightly lobed ; *venation* flabellate above, but the frond furnished with a distinct central costa through the lower half ; spurious *venules* indistinct ; *sori* 1 to 9, the tube quite sunk in the frond, the mouth dilated, entire.

Hab. Guatemala, *Salvin & Godman* ; Panama, *Hayes*.—Similar to *T. Motleyi* in habit, but quite different in the fruit.

12. *T. punctatum*, Poiret ; *fr.* stalked or sessile,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., suborbicular or obovate, undulated or slightly lobed at the margin ; *veins* closely placed, with thick prominent spurious *venules* between them ; *sori* 1 to 4, placed on the outer edge of the frond, and more or less exserted, the mouth distinctly two-lipped.—*Hk. Sp.* 1. p. 116. *Hk. & Gr. Ic. Fil. t.* 236. Hemiphlebium, *V. D. B.*

Hab. Tropical America, both the islands and mainland.

13. *T. reptans*, Swartz ; *st.*  $\frac{1}{4}$  in. l. ; *fr.*  $\frac{1}{4}$ - $\frac{1}{2}$  in. br. each way, obovate-cuneate, often with short blunt lobes ; *veins* close ; spurious *venules* conspicuous ; *sori* 1 to 4, placed on the outer margin, tube partially or quite exserted, the mouth distinctly two-lipped.—*Hk. Sp.* 1. p. 116. *Hk. & Gr. Ic. Fil. t.* 32. Hemiphlebium, *V. D. B.* *T. sphenoides*, *Kunze in Schk. F. t.* 88. *fig. 2. in greater part.*

Hab. Tropical America, both the islands and mainland.—There has been considerable confusion between this species and the preceding, which are very closely allied.

†† *Fronde with a distinct central costa from apex to base.* Sp. 14-20.

14. *T. Barklianum*, Baker ; *fr.* very shortly stalked, 2-3 lin. l., 1 lin. br., linear-oblong, entire, the margin undulated ; *veins* pinnate ; spurious *venules* none ; *sori* solitary, terminal, the tube partially exserted, with a large dilated entire mouth. *Baker in Linn. Proc. inedit. cum icone.*

Hab. Tamari Cascade, Mauritius.—A very interesting novelty, the discovery of which we owe to Sir Henry Barkly, the Governor of Mauritius, and Lady Barkly.

15. *T. Vitiense*, Baker ; *fr.* sessile or very shortly stalked, oblong, entire or rarely bifid, 2-4 lin. l., 1-2 lin. br., furnished with a midrib only ; *lat. veins* none ; spurious *venules* none ; *sori* solitary, terminal, the tube partially exserted, the mouth entire, slightly dilated.—*Baker in Linn. Proc. inedit. cum icone.*

Hab. Fiji Islands, *Milne*.—This species rivals in minuteness *Hymenophyllum parvifolium* and the preceding. From this latter it is readily distinguishable by the absence of lateral veins, and the two are the only pinnate-veined species that are without spurious venules.

16. *T. Neilgheriense*, Beddome ; *st.* 1-2 lin. l. ; *fr.*  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., 1-2 lin. br., oblong-lanceolate, not lobed, but sometimes bifid at the apex ; spurious *venules* numerous ; *sori* 1 to 2, the tube more or less sunk in the frond, the mouth exserted, with two large rounded lips.—*Bedd. Fil. S. Ind. t.* 6.

Hab. Western slopes of the Neilgherry range, S. Hindostan, discovered and figured by Captain Beddome.

17. *T. Petersii*, A. Gray ; *st.* 1-2 lin. l. ; *fr.*  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., 1-2 lin. br., varying in shape from linear to obovate-spathulate, crenate or slightly lobed ; spurious *venules* few, short and often unconnected ; *sori* solitary, terminal, the tube sunk in the frond, the mouth much dilated, but entire.—*A. Gray, in Sill. Am. Journ.*, 1853, p. 326. *Hk. Ic. Pl. t.* 986. Microgonium, *V. D. B.*

Hab. Near a waterfall in Winston co., Alabama, U. S. A.



18. *T. apodum*, Hk. & Gr.; *rhizome* strong, wide-creeping, tomentose, irregularly pinnate; *fr.* sessile,  $\frac{1}{4}$ - $\frac{1}{2}$  in. each way, orbicular-cordate, with broad deep lobes and scattered stellate tufts of ciliæ on the edge; *second. veins* distant and but little branched; *sori* solitary, terminal, quite exserted, the mouth dilated and distinctly two-lipped.—*Hk. Sp.* 1. p. 118. *Hk. & Gr. Ic. Fil. t.* 117. Didymoglossum, *V. D. B.*

Hab. Tropical America, both the islands and mainland.

19. *T. Henzaianum*, Parish; *st.* 1-2 lin. 1.; *fr.*  $\frac{1}{4}$ - $\frac{1}{2}$  in. each way, thin in texture, orbicular or obovate-cuneate, bluntly lobed or slightly tending towards palmate; *lat. veins* rather distant; spurious *venules* copious; *sori* 1 to 6, placed near the centre of the outer margin; *invol.* sunk in the frond, the mouth distinctly two-lipped.—*Parish in Hk. 2. Cent. Ferns, t.* 1.

Hab. On trees, Moulmein, Pegu, *Henzaï & Parish.*

20. *T. muscoides*, Swartz; *fr.* shortly stalked, 1-3 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., varying in shape from linear-oblong to suborbicular, nearly entire or bluntly lobed, especially above; spurious *venules* faint but copious; *sori* 1 to 8, terminal on the lobes, the tube sunk in the frond, the mouth free, dilated, but usually scarcely two-lipped.—*Hk. Sp.* 1. p. 117.

Hab. Tropical America, Asia, Polynesia, and Africa.—Sir W. Hooker was disposed to place here eight species of Van den Bosch, authentically represented in his collection; viz. *muscoides*, *sublimbatum*, *ærugineum*, *erosum*, *Hookeri*, *Lenormandi*, *bimarginatum*, and *Kapplerianum*. The first of these is considered by that author as a *Hemiphlebium* (mouth distinctly two-lipped), and the two next he separates from the other five by the character of "spurious venules free, joined together towards the margin." *T. Schaffneri*, Schl., *T. Pabstianum*, C. Mull., and *T. crispulum*, *V. D. B.*, are closely allied plants not represented by name in the Hookerian collection.

\*\* *Fronde entire below, palmate or digitate above.*—*Gonocormus, V. D. B.*  
Sp. 21-30.

21. *T. parvulum*, Poiret; *rhizome* wide-creeping, interlaced; *st.* 1 in. l., wiry, slender, tomentose below; *fr.*  $\frac{1}{4}$ - $\frac{1}{2}$  in. each way, orbicular in general outline, cuneate or truncate at the base, flabellately cut about halfway down from the outer edge in the direction of the base into narrow irregular segments; *veins* close, prominent, so that the frond when dry appears channelled, dichotomous at a very small angle; spurious *venules* numerous; *sori* 4 to 6, terminal on the central segments, the tube quite sunk in the frond, the mouth dilated at the sides.—*Hk. Sp.* p. 118. t. 39. A.

Hab. Japan, China, the Malaccas, Java, Polynesian Islands, Madagascar, and Johanna Island.

22. *T. saxifragoides*, Presl; *st.*  $\frac{1}{4}$  in. l., slender, tomentose below; *fr.* 2-3 lin. each way, flabellato-suborbicular in general outline, cut from the margin in the direction of the apex of the stipe into numerous linear-acute segments, the deepest divisions scarcely reaching halfway down; *veins* close, prominent, irregular; *sori* 2 to 4, the tube sunk in the frond, the mouth dilated, spreading, scarcely two-lipped.

Hab. Java, New Ireland, Fiji and Philippine Islands.—Very near *T. parvulum*, from which it differs by its smaller and less deeply cut fronds, and the dilated mouth of the involucre. Van den Bosch assigns to *T. minutum*, Blume, proliferous stipes; but I cannot distinguish from this his specimens thus marked in the Hookerian collection.

23. *T. Mannii*, Hk. MSS.; *rhizome* wide-creeping; *st.*  $\frac{1}{2}$ -1 in. l., slender, tomentose below; *fr.*  $\frac{1}{2}$ -1 in. each way, suborbicular in general outline, deeply

flabellately divided into narrow dichotomous linear segments; spurious *venules* few; *sori* 4 to 8, terminal on the central lobes, the mouth much dilated and spreading, but not two-lipped.

Hab. Fernando Po, *G. Mann*.—Closely allied to *T. parvulum*, but a larger and more deeply divided plant, with a broad plaited wing all round the mouth of the involucre.

24. *T. proliferum*, Blume; *rhizome* wide-creeping, densely interlaced; *st.* 1-2 in. l., slender, bearing 1 to 3 deeply divided fronds, which were not more than 1 in. br. either way, varying from ovate-lanceolate to roundish in general outline; *segm.* narrow, dichotomously branched, divided down nearly to the central rachis; *veins* numerous, irregular; *sori* 4 to 12, terminal, the tube quite sunk, the mouth obscurely two-lipped.—*Hk. Sp.* 1. p. 118. t. 39. B. *T. palmatum*, *Presl*.

Hab. Java, Philippine Islands, Ceylon, and western slope of the Neilgherries.—Usually easily recognizable by its peculiar proliferous habit, but the fronds are very variable in outline, and sometimes closely resemble the deeply-divided forms of section 3. *T. diffusum*, Blume, and *T. Teysmanni*, V. D. B., are closely allied Javan plants, which I have not seen. A plant collected by Barter at Sierra Leone is probably this species; but it is in a young state, and does not show the proliferous ramification. This species is cut more deeply than the three preceding, and the segments are narrower.

25. *T. flabellatum*, Bory (non V. D. B.); *st.* 1 in. l., slender; *fr.*  $\frac{1}{2}$  in. br., flabellate-orbicular, the principal divisions reaching more than halfway down from the circumference to the summit of the stipe, the ultimate divisions short, the segments close together, broadly linear, obtuse, not toothed or ciliated; spurious *venules* none; *sori* 2 to 4, terminal on the central segments; *invol.* turbinate, the mouth distinctly two-lipped, denticulate.—*Hymenophyllum flabellatum*, V. D. B.

Hab. Bourbon.—Our description is taken from specimens referred to the plant of Bory, on Dr. Van den Bosch's authority. Bory's plant came from the Falkland Islands, and he did not know the fruit. Dr. Van den Bosch considers this a *Hymenophyllum*, and uses the name for a plant we have placed under *T. digitatum*. There is an allied *T. Thouarsianum*, *Presl*, from Bourbon, which we have not seen.

26. *T. Powellii*, Baker; *rhizome* wide-creeping, tomentose; *fr.* quite sessile,  $\frac{1}{8}$  in. br.,  $\frac{1}{2}$ -1 in. l., simple or once or twice deeply forked, dark brown in colour, a single central costa only in each segment, the texture rather thickly membranaceous, the membrane on each side of the midrib slightly undulated, but the margin neither ciliated nor toothed; *sori* 1 to 4, terminal on the segments, nearly or quite sunk; *invol.* obconico-tubular, the mouth wide-spreading, two-lipped, naked, not toothed.

Hab. Samoa, *Rev. T. Powell*.—Allied to *T. digitatum*, but readily distinguishable by the characters given.

27. *T. digitatum*, Swartz; *st.* very slender, naked,  $\frac{1}{2}$  in. l.; *fr.* 1-2 in. l.,  $\frac{1}{2}$ -1 in. br., irregular in general outline, divided down nearly to the base or a broadly-winged rachis into long broadly linear dichotomous ciliated segments, with only a central costa in each; *sori* 2 to 6, terminal on the segments; *invol.* cup-shaped, quite sunk, the mouth broadly dilated, slightly two-lipped.—*Hk. Sp.* 1. p. 119. *T. lanceum*, Bory. *Hk. & Gr. Ic. Fil.* t. 33. *T. flabellatum* & *nitidulum*, V. D. B.— $\beta$ , *T. palmatifidum*, C. Muller; *fr.* ciliated more strongly and densely, and not on the edge only, but also on the costa and margin of the *invol.*

Hab. Mauritius, Bourbon, Java, and Polynesian Islands.—This is given as a Cape plant, on Dr. Brown's authority, and there is a scrap from E. India from amongst Mr. Griffith's plants in Herb. Hooker. The Polynesian is generally more branched than the African plant, and in the latter the ciliae are sometimes scarcely visible.



28. *T. calvescens*, V. D. B. ; *st.* 1-2 in l., filiform, naked ; *fr.* about  $\frac{1}{2}$  in. each way, inversely triangular or rhomboidal in general outline, flabellately divided down nearly to the rachis into slightly dichotomous denticulate broadly linear *segm.*, with only a central costa in each ; *sori* 2 to 4 terminal on the central segments ; *invol.* turbinate or obconical, sunk in the frond, with a free, broad dilated deeply and irregularly toothed naked two-lipped mouth.—*V. D. B. Suppl. 2. p. 115.*

Hab. N. S. Wales, *Major Vicary*.—This also would be quite as suitably ranked under *Hymenophyllum* in the section *Leptocionium* as here.

29. *T. Lyallii*, Hk. MSS. ; *st.* 1-2 in. l., slender, filiform ; *fr.*  $\frac{3}{4}$ -2 in. each way, suborbicular in general outline, flabellately divided down very nearly to the base into dichotomously-branched narrowly linear ciliated and minutely denticulate segments ; *sori* 3 or 4, terminal on the segments ; *invol.* obconical, quite sunk in the tube, the mouth ciliated, not dilated.—*Hymenophyllum, Hk. fil. Fl. N. Z. 2-16.*

Hab. Trees, south-west coast of the middle island, New Zealand, *Dr. Lyall*.—Quite intermediate between the typical *Hymenophylla* and *Trichomanes* in the shape of its involucre, the breadth of the orifice of which nearly equals the depth of the tube.

30. *T. nanum*, V. D. B. ; *rhizome* slender, wide-creeping ; *st.* very short ; *fr.* not more than  $\frac{1}{2}$  in. each way, cuneate below, the outer margin rounded, central portion not more than  $\frac{1}{2}$  in. broad, divisions simple or once branched ; *ult. segm.*  $1\frac{1}{2}$ -2 lin. l. by  $\frac{1}{4}$  lin. br. ; texture thick but not rigid, surface somewhat undulated, margin bounded by a thickened line ; a central vein only in each segment ; *sori* 1 to 2 to a frond, sub-terminal, tube turbinate, not at all exerted, the mouth dilated, undulated in irregular plications.—*V. D. B. 2. Suppl. p. 122. Crepidomanes, V. D. B.*

Hab. Assam, *Griffith*.—Closely resembling *T. intramarginale* in texture, but quite different in size, &c., and in division agreeing best with this section.

\*\*\* *Fronde more or less deeply pinnatifid, but not truly pinnate.* Sp. 31-57.

† *Main rachis distinctly winged throughout.* Sp. 31-47.

31. *T. pusillum*, Swartz ; *rhizome* wide-creeping, tomentose ; *fr.* nearly sessile, 2-3 in. l.,  $\frac{1}{2}$ -1 in. br., oblong or obovate, cuneate-attenuate below, once deeply pinnatifid down to a broadly-winged rachis ; lobes linear or oblong, toothed or deeply pinnatifid, texture membranaceous ; a central costa in each pinna, with numerous erecto-patent secondary veins and spurious venules ; *sori* 1 to 4, round the apex of the frond, tube exerted, mouth with two large rounded lobes.—*Hk. Sp. 1. p. 117. T. quercifolium, Hk. & Gr. Ic. Fil. t. 115. Hemiphlebium, V. D. B. T. Robinsoni, Hk. MSS.*

Hab. Tropical South America, from Mexico and the West Indies southward to Brazil and Peru. *Kranz-kop, Natal, Robinson ; Moulmein, Rev. C. S. Parish.*

32. *T. Krausii*, Hk. & Gr. ; *rhizome* wide-creeping, tomentose ; *fr.* sessile or nearly so, 1-3 in. l.,  $\frac{1}{2}$  in. br., oblong, attenuate or cuneate at the base, once deeply pinnatifid down to a broadly-winged rachis ; lobes linear-oblong, nearly entire, or toothed or sinuato-pinnatifid, texture membranaceous ; a central costa in each pinna, with distant pinnate secondary veins passing gradually into spurious venules ; *sori* 1 to 6, on the apex of the frond, tube more or less exerted, mouth with two large rounded lips.—*Hk. Sp. 1. p. 120. Hk. & Gr. Ic. Fil. t. 149. Hemiphlebium, V. D. B.—β, crispatum ; pinnae* deeply lobed or pinnatifid, broadly and conspicuously crisped, their secondary veins more numerous and divaricated than in the type, sometimes again branched.

Hab. West Indian islands and Mexico southward to Brazil and Peru ;  $\beta$ , Andes of Ecuador, *Spruce*, No. 5354.—Very near the preceding, but the undivided portion of the frond is broader, and the central costa more clearly marked.

33. *T. Kirki*, Hk. MSS. ; *st.* slender, 1 in. l., winged above ; *fr.* 1-2 in. l., 1 in. br., subquadrate or rhomboidal in general outline, cut down to a narrowly-winged rachis ; *segm.* 1-2 in. l., erecto-patent, linear, crenulate at the margin, with a considerable space between them ; a central *costa* and numerous short oblique veins and manifest spurious venules in each segment ; *sori* 2 to 12, the tube sunk in the frond, the mouth spreading, slightly two-lipped.

Hab. Johanna Island, West Africa, *Dr. Kirk, Sir F. Grey*.—Allied to the two preceding, from which it differs by its long narrow little-divided pinnæ and winged involucre.

34. *T. sinuosum*, Rich. ; *rhizome* wide-creeping, sinuous, rather strong ; *st.* varying from hardly any to 2 in. l. ; *fr.* 2-9 in. l., 1-1½ in. br., linear-lanceolate, very gradually decurrent below, pinnatifid down to a broadly-winged rachis ; colour bright green, texture delicately membranaceous ; *lobes* oblong, obtuse, crenate at the margin ; a central *costa* in each, with 2 to 4 pairs of erecto-patent branches ; spurious *venules* none, the margin ciliated ; *sori* 2 to 4 to each lobe, the tube sunk, the mouth dilated, slightly two-lipped ; *recept.* much exserted.—*Hk. Sp.* 1. p. 120. *Hk. & Gr. Ic. Fil. t.* 13. *T. incisum*, *Kaulf. Hk. Sp.* 1. p. 121.

Hab. Tropical America, from Mexico and Cuba southward to Peru and Brazil.

35. *T. pinnatifidum*, V. D. B. ; *st.* slender, 1-2 in. l., winged above ; *fr.* 2-4 in. l., 1-1½ in. br., ovate-lanceolate in general outline, cut down to within a short distance of the rachis ; *segm.* linear, erecto-patent, the lower 1 in. l., with deep rounded lobes ; substance thin ; central *veins* of the segments with 2 to 6 pairs of lateral veins ; spurious *venules* none, the margin ciliated ; *sori* 1 to 3, placed principally near the base of the segments on the upper side, the tube quite sunk, the mouth broadly dilated, two-lipped.—*V. D. B. Suppl.* 2. p. 118.

Hab. Jamaica.—Closely allied to *T. sinuosum*, but different in outline, and much more deeply divided.

36. *T. Bancroftii*, Hk. & Gr. ; *st.* 1-2 in. l., broadly winged down to the very base ; *fr.* 3-6 in. l., 1 in. br., ovate-oblong, pinnatifid down to a broadly-winged rachis, texture subcoriaceous ; *segm.* oblong, blunt, crenate, either imbricated or with a small space between them ; *lat. veins* of the segments branched ; spurious *venules* none ; *sori* 2 to 6 to a pinna, the tube sunk, the mouth rather dilated, but entire ; *recept.* long, filiform.—*Hk. Sp.* 1. p. 123. *Hk. & Gr. Ic. Fil. t.* 204. *Hk. Gard. Ferns, t.* 56. *T. coriaceum* & *holopteron*, *Kunze*.

Hab. Tropical America, from the West Indian islands southward to Brazil and Peru.]

37. *T. macilentum*, V. D. B. ; *rhizome* creeping, wiry ; *st.* 2-6 in. l., wiry, winged above ; *fr.* 2-6 in. l., 1-2 in. br., lanceolate or ovate-lanceolate, divided down within a short distance of the rachis ; *segm.* oblong or linear-oblong, nearly entire or divided more than halfway down into narrow linear lobes, texture subcoriaceous ; *veins* thick ; spurious *venules* none ; *sori* 2 to 6 to a segment, the tube sunk, the mouth slightly two-lipped ; *recept.* long, filiform.—*V. D. B. 1st Suppl.* p. 12.

Hab. Trinidad, Demerara, and northern provinces of Brazil.—Near *T. Bancroftii*, but distinguishable by its more divided fronds and creeping rhizome.

38. *T. superbum*, V. D. B. ; *rhizome* strong, wide-creeping ; *st.* 2-5 in. l., strong, winged nearly down to the base ; *fr.* 4-9 in. l., 2-4 in. br., broadly ovate, pinnatifid down to a narrowly-winged rachis, the substance subcoriaceous ; *lower pinnae* lanceolate, divided more than halfway down to the rachis, with oblong



crenate lobes; main and secondary midribs tomentose; *lat. veins* numerous; spurious *venules* none; *sori* 2 to 6 to each lobe; *invol.* sunk, the mouth scarcely dilated; *recept.* long, filiform.—*V. D. B. Suppl.* 2. p. 119.

Hab. Trinidad and British Guiana.—This and the two preceding are very closely allied.

39. *T. Kaulfussii*, Hk. & Gr.; *rhizome* wide-creeping, strong, tomentose; *st.* 2-4 in. l., strong, compressed, winged above; *fr.* 4-12 in. l., 1½-2 in. br., ovate-lanceolate-acuminate, once pinnatifid down to a broadly-winged rachis; *segm.* linear-oblong, rounded or acute, toothed, the largest 1 in. l., ¼ in. br.; *main rachis* densely and the surface slightly hairy; *lat. veins* of the segments 1 to 4 times forked; spurious *venules* none; *sori* 2 to 12 to a pinna, tube more or less exserted, mouth with two lateral projections; *recept.* long, filiform.—*Hk. Sp.* 1. p. 122. *T. lucens*, Hk. & Gr.  *Ic. Fil. t.* 10 (non Swartz).

Hab. West Indian islands, Guiana, and N. Brazil.

40. *T. alatum*, Swartz; *st.* tufted, 2-4 in. l., winged above; *fr.* 3-12 in. l., 1-4 in. br., lanceolate or ovate-lanceolate, bi-tripinnatifid; *main rachis* winged throughout; *pinnae* lanceolate acute, cut more than halfway down to the rachis; *lobes* often again sharply toothed; texture delicately membranaceous; *rachis* rather hairy; *ult. segm.* with several lateral veins; spurious *venules* none; *sori* 2 to 12 to a pinna, terminal on the segments, the tube sunk, the mouth spreading but scarcely two-lipped; *recept.* long, filiform.—*Hk. Sp.* 1. p. 123. *Hk. & Gr. Ic. Fil. t.* 21. *T. attenuatum*, *Hk. Sp.* 1. p. 122. *t.* 39. *C. T. ptilodes*, lineare, & delicatum, *V. D. B.*

Hab. West Indies, Venezuela, and Ecuador.—Very variable in robustness and hairiness. The large state is a very beautiful plant.

41. *T. bicorne*, Hk.; *rhizome* strong, scarcely creeping; *st.* 1-2 in. l., winged nearly or quite down to the base; *fr.* 2-3 in. l., 1-1½ in. br., bi- or tri-pinnatifid, ovate in general outline, divided down to a narrowly-winged rachis; *lower pinnae* ovate-triangular, cut down to a broadly-winged rachis, the lobes again deeply divided; *ult. segm.* linear; substance subcoriaceous; a central *costa* only in each segment; *sori* 2 to 4 to a pinna; *invol.* tubular, quite sunk in the frond, the mouth dilated into two lateral projections.—*Hk. Ic. Pl. t.* 982.

Hab. North of Brazil, *Spruce*.—This and the two preceding resemble one another closely in delicacy of texture, but differ in the extent to which the frond is divided.

42. *T. intramarginale*, Hk. & Gr.; *rhizome* slender, wide-creeping, tomentose; *st.* very short; *fr.* 1-2 in. l., ¼-½ in. br., oblong-rhomboidal, bipinnatifid, tapering gradually below, central portion 1 lin. br.; *segm.* few, erecto-patent, linear, simple or forked; substance subcoriaceous, opaque, somewhat crisped when dry; a central *costa* only in each segment, but the margin thickened; *sori* 1 to 4 to a frond, terminal or axillary on the upper segments, tube sunk, mouth not dilated.—*Hk. & Gr. Ic. Fil. t.* 211. *Hk. Sp.* 1. p. 120. *Crepidomanes*, *V. D. B.*

Hab. Ceylon, rediscovered recently by Mr. Thwaites.—This resembles in texture the next species and No. 31.

43. *T. latemarginale*, Eaton; *rhizome* slender, wide-creeping, tomentose; *st.* none or scarcely any; *fr.* about ½ in. l., ¼ in. br., suborbicular or oblong-rhomboidal, pinnatifid; *main rachis* with a wing about 1 lin. br.; *segm.* linear, close, simple, or once forked; substance membranaceous, surface naked; a central *costa* only in each segment, but the margin thickened; *sori* 1 to 3, terminal on the upper segments, tube sunk, mouth dilated, two-lipped.—*Eaton, Fil. Chin. & Japan*, p. 3.

Hab. Hongkong, *C. Wright*.—We owe the discovery of this species to the United States North Pacific Exploring Expedition of 1853-6, under Capts. Ringgold and Rodgers.

44. *T. humile*, Forster; *rhizome* creeping, deeply intermatted; *st.*  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., slender, winged above; *fr.* 1-2 in. l.,  $\frac{1}{2}$  in. br., bipinnatifid, lanceolate-oblong in general outline, cut down to a narrowly-winged rachis; *segm.* pinnatifid, with simple or once-forked linear lobes; substance membranaceous, surface and margin naked; a central *costa* only in each segment; no spurious *venules*; *sori* solitary, on the upper side of the pinnae, tube more or less exserted, the mouth spreading, two-lipped.—*Hk. Sp. 1. p. 123. Hk. Gr. Ic. Fil. t. 35.*— $\beta$ , *T. Endlicherianum*, Presl; *fr.* more elongated; *segm.* narrower and less branched. *T. erectum*, Brackenridge.

Hab. Java, New Zealand, and Pacific Islands.—*T. aureum*, V. D. B., differs from the type by its longer and broader slightly-cripsed segments.

45. *T. brachypus*, Kunze; *rhizome* long, wiry, wide-creeping, more or less tomentose; *fr.* 1-2 in. apart, nearly sessile, 3-6 in. l., 1-1 $\frac{1}{2}$  in. br., once pinnatifid, cut down to a broadly-winged rachis; *lower pinnae* oblong, blunt,  $\frac{1}{2}$ -1 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  br., varying from nearly entire to cut down to a broadly-winged rachis with linear lobes; texture membranaceous; surface nearly naked or ferrugineo-tomentose, especially on the veins; *veins* prominent; *lat. veins* of the pinnae parallel and erecto-patent; no spurious *venules*; *sori* 1 to 12 to a pinna, placed at the edge of the lower half on both sides, tube long, cylindrical, stalked, mouth scarcely spreading.—*Hk. Sp. 1. p. 121. T. Ankersii, Parker, in Hk. Gr. Ic. Fil. t. 201.*— $\beta$ , *T. Tanaiicum*, Hk.; *fr.* 6-9 in. l., linear, undivided; *sori* in long rows on both sides.

Hab. Tropical America, from the West Indian Islands southward to Peru and the South of Brazil.—A very distinct plant, which corresponds to the genus *Lacostea* of Van den Bosch, who makes nine species.

46. *T. pallidum*, Blume; *rhizome* wide-creeping, slender, tomentose; *st.* 1-3 in. l., slender but wiry; *fr.* 2-6 in. l., 1-1 $\frac{1}{2}$  in. br., ovate-lanceolate acuminate, bipinnatifid, just divided down to a narrowly-winged rachis; *lower pinnae* ovate-rhomboidal, divided more than halfway down, and the lobes again slightly cut; substance subcoriaceous, both surfaces, when dry, often decidedly coated with white, always more or less clothed with strong light-brown hairs; *veins* broad and few; *sori* 1 to 4 to a pinna, axillary on the segments on both sides, the tube nearly sunk, the mouth dilated, but scarcely two-lipped.—*Hk. Sp. 1. p. 139. T. glauco-fuscum, Hk. Sp. 1. p. 128. t. 40. A. T. album, Blume, Hk. Sp. 1. p. 129.*

Hab. Malayan Peninsula, Ceylon, Java, Sumatra, and Pacific Islands.—This corresponds to the genus *Craspedoneuron* of Van den Bosch, who makes four species. The pallid hue of the dry frond is very peculiar, and the coating of hairiness is sometimes very prominent, but is sometimes nearly deciduous.

47. *T. serratum*, Baker; *rhizome* slender, wide-creeping; *st.* slender, naked, about  $\frac{1}{4}$  in. l.; *fr.* under  $\frac{1}{2}$  in. l., about  $\frac{1}{4}$  in. br., oblong or subrhomboidal in general outline, pinnatifid down to a narrowly-winged rachis; *segm.* erecto-patent, in 2-6 pairs, linear, simple or forked,  $\frac{1}{4}$  in. l., under  $\frac{1}{2}$  lin. br., toothed at the margin, texture membranaceous; a central *costa* only in each segment; spurious *venules* none; *sori* 1 to 2, terminal on the upper segments, the tube exserted or even stipitate, the mouth slightly two-lipped, deeply ciliated with sharp linear teeth.

Hab. On trees, Lobong Peak, Borneo.—Resembling *T. calvescens*, *Iyallii*, and *denticulatum* in its toothed segments, but different in other respects, and a very distinct species.



†† *Main rachis hardly, if at all, winged in the lower part.* Sp. 48-57.

48. *T. Filicula*, Bory; *rhizome* wide-creeping, tomentose, rather slender; *st.* 1-2 in. l., naked, slightly winged above; *fr.* 1-4 in. l., 1½-2 in. br., ovate, tripinnatifid, main rachis with a very narrow wing or free below; *pinnæ* ovate-rhomboidal, pinnatifid down to a narrowly-winged rachis; the lower *pinnl.* again deeply pinnatifid; ultimate *segm.* linear; *texture* firm, membranaceous; a central *costa* in each segment, spurious venules none or indistinct; *sori* 1 to 4 to a pinna, axillary or terminal on the segments; *tube* sunk or somewhat exerted, the mouth very distinctly two-lipped, the lips subtriangular with a rounded apex.—*Hk. Syn.* 1. p. 124. *Didymoglossum*, *Desv.*—β, *T. late-alatum*, V. D. B.; ultimate segments very narrow and acute, wing of rachis somewhat crisped, spurious venules distinct.—*V. D. B. Suppl.* 1. p. 54. *D. plicatum*, V. D. B.

*Hab.* Mauritius, Bourbon, Madagascar, Natal, Cape Colony, and Fernando Po; Nepaul, Assam, Japan, N. Hindostan, Ceylon, Java, Borneo, and Polynesian Islands.—Very like *T. pyxidiferum* in habit, and principally distinguishable by the distinctly two-lipped involucre. It was formerly supposed that one of them was confined to the New, the other to the Old World; but *T. pyxidiferum* has now been found abundantly in Asia, Africa, and the Polynesian Islands; and I cannot distinguish from this, though labelled *pyxidiferum* on high authority, a Mexican plant from Liebmann. Here are included numerous species of Van den Bosch; amongst which are his *Didymoglossum Draytonianum*, *euphlebiun*, *Griffithii*, *racemulosum*, *insigne*, *capillatum*, and *dilatatum*.

49. *T. pyxidiferum*, L.; *rhizome* wide-creeping, tomentose, rather slender; *st.* 1-2 in. l., naked, winged above; *fr.* 1-6 in. l., 1-1½ in. br., ovate-oblong, tripinnatifid, main rachis with a very narrow wing; *pinnæ* ovate-rhomboidal, pinnatifid down to a narrowly-winged rachis, with the lower *pinnl.* again deeply pinnatifid; ultimate *segm.* linear, often emarginate at the apex; *texture* membranaceous; a central *costa* in each segment; spurious venules none or indistinct; *sori* 1 to 4 to a pinna, axillary, tube more or less winged, mouth broadly dilated but scarcely two-lipped; *recept.* filiform, exerted.—*Hk. Sp.* 1. p. 124. *Hk. & Gr. Ic. Fil. t.* 206.—β, *T. emarginatum*, Presl; more divided, the segments of the pinnules numerous and crowded. *T. cavifolium*, C. Muller.—γ, *T. olivaceum*, Kunze; segments broader, less divided, wing of rachis somewhat crisped, spurious venules distinct.

*Hab.* Tropical America, from Mexico and the West Indies southward to Brazil and Peru; Bourbon, Cape of Good Hope, Angola, Fernando Po, Hindostan as far north as Khasia, Moulmein, Borneo, and New Caledonia.—Our *a* corresponds to numerous species of Van den Bosch, including his *hymenophylloides*, *Lechleri*, *Brasilense*, *Borbonicum*, *Milnei*, *Viellardi*, *eximium*, and *Schmidtianum*.

50. *T. radicans*, Swartz; *rhizome* wiry, wide-creeping, tomentose; *st.* strong, wiry, ascending, 2-6 in. l., naked or nearly so, sometimes the upper part winged; *fr.* 4-12 in. l., 2-6 in. br., tripinnatifid, main rachis very narrowly winged, often free, except near the apex; lower *pinnæ* 1-4 in. l., ovate-rhomboidal, cut down to a narrowly-winged rachis; *pinnl.* again deeply pinnatifid, ovate-rhomboidal, with deeply toothed lower *segm.*; *texture* membranaceous but firm; a single *vein* only carried into each ultimate segment; *sori* lateral, 1 to 4 to a pinnule, the tube small, subcoriaceous, more or less decidedly exerted, the mouth very slightly two-lipped; *recept.* slender, elongated.—*Hk. Syn.* 1. p. 125, non *Hk. & Gr. Ic. Fil. t.* 218. *Hk. Brit. Ferns*, t. 42. *T. speciosum*, Willd.—β, *T. Kunzeanum*, Hk.; *fr.* 12-18 in. l., subcoriaceous, main and secondary rachises hardly at all winged; *pinnæ* distant stalked, pinnules deeply pinnatifid, the lowest lobes again pinnatifid, the segments very long and narrow.—*Hk. Syn.* 1. p. 127. t. 39. D. *T. Antillarum*, V. D. B. *T. umbrosum*, Wall.—γ, *T. Luschnatanum*, Presl; *fr.* lanceolate acuminate, quite sessile.—*Hymenophyllum rupestre*, Raddi.

Hab. Europe—Ireland, Wales, Spain; Africa—Canaries, Madeira, island of St. Thomas, Fernando Po, Angola, Johanna Island; Asia—Japan and Northern Hindostan, Polynesian Islands; America, from Alabama, Mexico, and the West Indian islands southward to Rio Janeiro.—A very widely-diffused and variable plant. The two striking varieties mentioned are both confined to the tropical zone. Van den Bosch refers *T. scandens*, Linn., to our  $\beta$ , but the plant of the Linnæan Herbarium is our species 69.

51. *T. auriculatum*, Blume; *rhizome* strong, wide-creeping, tomentose; *fr.* nearly sessile, 6-12 in. l.,  $1\frac{1}{2}$ -2 in. br., bipinnatifid, rachis wiry, very slightly winged throughout or above only; *pinnæ* shortly stalked, ovate-rhomboidal, obliquely cuneate at the base, irregularly pinnatifid halfway down or more, the lowest anterior lobe often considerably prolonged beyond the others; *texture* subcoriaceous; *venation* close, flabellate; *sori* 2-12 to a pinna, the tube nearly or quite exserted, the mouth truncate. *Hk. Syn.* 1. p. 133. *T. dissectum*, *J. Sm. Hk. Syn.* 1. p. 140. *Cephalomanes*, *V. D. B.*

Hab. Japan, Formosa, N. Hindostan, Philippines, Java, and Guiana.—Placed by Van den Bosch in the same genus as *T. javanicum*, on account of the agreement in venation.

52. *T. denticulatum*, Baker; *rhizome* slender, wide-creeping; *st.* slender, naked,  $\frac{1}{4}$ - $\frac{1}{2}$  in. l.; *fr.* 1-1 $\frac{1}{2}$  in. l.,  $\frac{1}{2}$  in. br., ovate or oblong, bipinnatifid, main rachis winged above, free below; *pinnæ* pinnatifid down to a narrowly-winged rachis; ultimate *segm.* linear, serrated, about  $\frac{1}{8}$  in. l.,  $\frac{1}{2}$  lin. br.; *texture* membranaceous; a costa only in each segment; *sori* 1 to a pinna, terminal on the lowest segment on the upper side, tube exserted, mouth with two bluntly triangular lips.

Hab. Borneo, discovered by the late Mr. Motley.—An interesting plant, combining the habit of *H. Tunbridgensis* with the fruit of a *Didymoglossum*.

53. *T. venosum*, R. Br.; *rhizome* slender, wide-creeping; *st.* 1-2 in. l., very slender, naked; *fr.* 2-5 in. l., 1-1 $\frac{1}{2}$  in. br., and pinnatifid, the main rachis free in the lower half, broadly winged above; lower *pinnæ* about 1 in. l., varying from linear and nearly simple to lanceolate deeply pinnatifid below; *texture* membranaceous; *costa* wavy, with numerous alternate once or twice dichotomous secondary veins; surface naked, shining; *sori* only 1 to a pinna, axillary on the upper margin, tube immersed, much dilated, slightly two-lipped.—*Hk. Sp.* 1. p. 132. *Hk. & Gr. Ic. Fil. t.* 78. *Phlebiophyllum*, *V. D. B.*

Hab. Australia and New Zealand.—A very distinct species.

54. *T. crispum*, L.; *rhizome* short or somewhat elongated, strong, tomentose; *fr.* scattered or tufted; *st.* 2-6 in. l., strong, wiry, tomentose; *fr.* 4-12 in. l.,  $1\frac{1}{2}$ -2 in. br., lanceolate, fully pinnate or pinnatifid nearly to the rachis; lower *pinnæ*  $\frac{3}{4}$ -1 in. l., 2 lin. br., oblong, obtuse, spreading or even deflexed; *texture* membranaceous and the *pinnæ* often incurved and crisped; *rachis* more or less clothed with reddish-brown hairs, the surface hairy, especially beneath, and the margin ciliated; lateral *veins* of the *pinnæ* usually once dichotomous; *sori* 1 to 3, placed round the apex of the *pinnæ*, tube quite sunk, mouth two-lipped; *recept.* long, exserted.—*Hk. Syn.* 1. p. 130. *Hk. & Gr. Ic. Fil. t.* 12.

Hab. Tropical America, from Cuba and Mexico southward to Peru and Brazil, and recently gathered in West Tropical Africa (banks of the Nun and Niger) by Barter and Mann.—Apparently we include here all the simply pinnatifid section of *Achomanes* of Van den Bosch, who enumerates eighteen species. The principal variation is in the vestiture of the frond and elongation of the rootstock, so that the fronds are either tufted or scattered. The extremes of the series in the former respect are *T. pellucens*, Kunze, which is nearly naked, and *T. Martinsii*, Presl, and *T. Plumula*, Presl, in which the rachis is densely clothed with long rust-coloured hairs, and the fronds also thickly coated, especially beneath.

55. *T. crinitum*, Swartz; *st.* tufted, 1-3 in. l., slender, villose; *fr.* 2-8 in. l.,



$\frac{1}{2}$ - $\frac{3}{4}$  in. br., ovate-lanceolate or linear-oblong, bipinnatifid; *pinnae* reaching down very nearly to the rachis, the lower ones ovate-oblong, cut about halfway down into broadly linear segments; substance membranaceous, the surface slightly hairy, margin ciliated; *veins* slender, the lateral veins of the *pinnae* usually once branched; *sori* 1 to 2 to a pinna, terminal, tube sunk, mouth ciliated, spreading, but scarcely two-lipped.—*Hk. Sp.* 1. p. 131.

Hab. West Indian Islands and Andes of Ecuador.—This constitutes the genus *Ragatelus* of Presl.

56. *T. lucens*, Swartz; *caud.* scarcely creeping; *st.* tufted, 2-4 in. l., stout, densely clothed with long, fine, ferruginous hairs; *fr.* 6-13 in. l., 2-4 in. br., oblong-lanceolate, fully pinnate; *pinnae* very close, often imbricated, transversely crisped, pinnatifid about halfway down to the costa, the lower ones linear-acuminate, 1-2 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br.; substance delicately membranaceous; *rachis* densely tomentose; *costa* and veins also rufo-villose; *sori* as many as 20 to a pinna, occupying the greater part of both edges, tube quite sunk, mouth with two lateral projections.—*Hk. Sp.* 1. p. 139. t. 41. A. *T. splendidum*, V. D. B.

Hab. Tropical America, from Guatemala and Jamaica southward to Peru.

57. *T. Lambertianum*, Hk.; *caud.* scarcely creeping, tomentose; *st.* stout, 4-5 in. l., densely clothed with long, fine, reddish-brown hairs; *fr.* 6-12 in. l., not more than 1 in. br., linear-oblong, acuminate, pinnate; *pinnae* densely crowded, imbricated, subsecund, oblong, obtuse, cut more than halfway down to the rachis; *pinnae* again pinnatifid with linear-oblong *segm.*; substance thin, but the frond much crisped, and especially the rachis, densely tomentose; *sori* 4 to 12 to a pinna, the tube quite sunk, the mouth with two lateral projections.—*Hk. Syn.* 1. p. 139. t. 41. B.

Hab. Peru.—A singular plant, with very closely-crowded *pinnae* and segments, the alliance of which is evidently with *T. lucens*.

\*\*\*\* *Main rachis of the frond quite free or only very slightly winged towards the apex.* Sp. 58-77.

† *Fronde simply pinnate, pinnules not divided.* Sp. 58-60.

58. *T. caespitosum*, Hk.; *rhizome* wide-creeping, densely interlaced; *fr.* sessile or nearly so, 1-2 in. l.,  $\frac{1}{4}$  in. br., simply pinnate; *pinnae* concave, linear-oblong, entire, about  $\frac{1}{4}$  in. l. by  $\frac{1}{2}$  lin. br., the under surface, or solitary *costa* only, clothed with strong brown hairs; texture rather rigid; *sori* 1 only to a pinna, terminal, the tube obovate-cuneate, quite immersed, the mouth spreading, with two rounded lips.—*Hk. Syn.* 1. p. 132. t. 40. B. *Serpyllopsis*, V. D. B.

Hab. S. Chili, Cape Horn, and Falkland Islands.—A very distinct plant, placed by Van den Bosch in a genus by itself near *Leptocionium*.

59. *T. Javanicum*, Blume; *caud.* tufted, with numerous strong wiry roots; *st.* 1-4 in. l., wiry, erect, naked or villose; *fr.* 2-8 in. l., 1-2 in. br., ovate-lanceolate, acuminate, once fully pinnate; lower *pinnae* often 1 in. l.,  $\frac{1}{4}$  in. br., oblong, obtuse or acute, obliquely cuneate at the base, finely toothed; texture subcoriaceous; *veins* numerous, close, central *costa* not clearly marked or continuous to the apex; *sori* 1 to 4, placed in the axils of linear segments on the upper side of the *pinnae*, tube free, the mouth broadly dilated but not two-lipped; *recept.* much exerted.—*Hk. Sp.* 1. p. 130. *Hk. & Gr. Ic. Fil.* t. 240. *Cephalomanes*, V. D. B.

Hab. Tropical Hindostan, Malayan Peninsula, Borneo, Java, Polynesian Islands, and

Madagascar.—This corresponds to the first section of the genus *Cephalomanes* of Van den Bosch, who makes nine species.

60. *T. pinnatum*, Swartz; *caud.* erect, tufted; *st.* strong, wiry, erect, naked, or slightly hairy, 3-12 in. l.; *fr.* simply pinnate in the typical state, 4-18 in. l., 3-12 in. br., the apex often rooting and proliferous; *pinnæ* in 2 to 10 opposite or alternate pairs, and a terminal one, 2-6 in. l.,  $\frac{1}{4}$  to  $\frac{3}{4}$  in br., linear-obtuse or acute, sharply and finely toothed, the upper edge usually free from the stem at the base, the under one attached and often furnished with a broad decurrent wing; *texture* subcoriaceous; central costa thick; lateral *veins* fine and very close, simple or forked, sometimes anastomosing; *sori* placed all round the pinnæ; *invol.* small, tubular, exserted or stipitate, the mouth slightly dilated; *recept.* long, filiform, exserted.—*T. floribundum*, *H. B. K. Hk. Sp. 1. p. 129. Hk. & Gr. Ic. Fil. t. 9.*— $\beta$ , *T. Vittaria*, D. C.; *fr.* 6-18 in. l., about 1 in br., linear-lanceolate, entire.—*Hk. in Lond. Journ. Bot. 1. p. 117. t. 5.*

Hab. Tropical America, from Mexico and Jamaica southward to Brazil and Peru.—This corresponds to the genus *Neurophyllum* of Presl, *Neuromanes* of Van den Bosch. The latter makes five species, of which *N. abruptum* is distinguished from the other four by the absence of spurious venules connecting the veins on each side of the central costa. It is figured in *Hk. G. F. t. 8*, and is *T. Hostmannianum*, Klotzch. Some of Dr. Burchell's specimens show the simple and pinnate-fronded forms from the same root.

†† *Fronde decompose, slender, flaccid, ultimate segments very narrowly linear or filiform.* Sp. 61-63.

61. *T. tenue*, Brack.; *st.* 1-2 in. l., slender, naked; *fr.* 2-3 in. l., 1-1 $\frac{1}{2}$  in. br., ovate-lanceolate, tripinnatifid, main rachis very narrowly winged in the upper half; *pinnæ* cut down to a narrowly-winged rachis; *pinnul.* again pinnatifid, with a few long, narrow, distant, erecto-patent linear *segm.*; both surfaces naked, a central *costa* only in each segment; *sori* 1 to 4 to a pinna, tube exserted, the mouth widely dilated, naked, two-lipped.—*Brack. t. 36. f. 2.*

Hab. Tahiti.—This and the next are not so flaccid in habit as the rest of the group, and have distinctly two-lipped involucre.

62. *T. brevipes*, Baker; *rhizome* tomentose, with numerous short-branched rootlets; *st.* very short; *fr.* 2-3 in. l., 1-1 $\frac{1}{2}$  in. br., ovate-deltoid, fully pinnate, or rachis very slightly winged at the apex; *pinnæ* spreading, ovate, cut down to a very narrowly-winged rachis; lowest *pinnul.* again deeply pinnatifid, with narrow linear *segm.*, 1 lin. l.,  $\frac{1}{4}$  lin. br.; *texture* membranaceous, a single *costa* only in each segment; *sori* 2 to 8 to a pinna, axillary, tube more or less exserted, mouth with two large rounded lips.—*Didymoglossum brevipes*, *Presl, Hym. p. 23. T. melanorhizon, Hk. Syn. 1. p. 140. Ic. Pl. t. 705.*

Hab. Leyte, Philippine Islands, *Cuming*, No. 316.—Distinguished from the preceding by its more numerous pinnules, each furnished with several comparatively short narrow linear segments on both sides.

63. *T. Smithii*, Hk.; *st.* tufted, 1-2 in. l., slender, erect, naked; *fr.* 4-8 in. l., 1-1 $\frac{1}{2}$  in. br., flaccid, lanceolate-oblong, tripinnatifid, main rachis only slightly winged towards the apex; *pinnæ* cut down to a narrowly-winged rachis, the divisions usually simple, occasionally forked, long, linear ( $\frac{1}{4}$  lin. br.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. l.); *texture* membranaceous, a central *costa* in each segment, the cells several times broader than deep, separated from one another by continuous oblique vein-like lines; *sori* 2 to 4 to a pinna, axillary, the tube narrowly winged, the mouth with two lateral projections.—*Hk. Sp. Fil. 1. p. 138. Hk. Ic. t. 704. Habrodictyon Cumingii, Presl, Hym. t. 7.*

Hab. Philippine Islands.—Resembling *T. tenerum* and *caudatum* in habit, but the venation is quite unique and very peculiar.



64. *T. caudatum*, Brack.; *rhizome* creeping; *st.* 1-2 in. l., naked; *fr.* 3-12 in. l., 1-3 in. br., lanceolate, tripinnatifid, main rachis only very slightly winged above; lower *pinnæ* ovate-rhomboidal, erecto-patent, pinnatifid down to a narrowly-winged rachis; *pinnl.* again pinnatifid; ultimate *segm.* about 1 lin. l.,  $\frac{1}{4}$  lin. br.; texture membranaceous, surface naked, a central *costa* only in each segment; *sori* 1 to 8 to a pinna, tube exerted, mouth spreading, not two-lipped.—Brackenridge, *t.* 36. *fig.* 5.

Hab. Fiji Islands, Tahiti, and N. S. Wales.—Very near *T. tenerum*, but stronger in habit, darker in colour, the erecto-patent *pinnæ* broader and more divided.

65. *T. tenerum*, Sprengel; *rhizome* creeping, tomentose, very slender; *st.* 1-2 in. l., slender, naked; *fr.* 3-8 in. l., 1-1 $\frac{1}{2}$  in br., pendent, flaccid, lanceolate, tripinnatifid, the main rachis only very slightly winged towards the apex; *pinnæ* distant, flaccid, cut down to a narrowly-winged rachis, with distant deeply incised or pinnatifid *pinnl.*; ultimate *segm.* 2-2 $\frac{1}{2}$  lin. l.,  $\frac{1}{4}$  lin. br., texture membranaceous, surface naked; a central *costa* only in each segment; *sori* 1 to 4 to a pinna, tube more or less exerted, mouth spreading, but not lipped.—*T. angustatum*, *Carm. Hk. Sp.* 1. *p.* 141. *Hk. & Gr. Ic. Fil. t.* 166.

Hab. Tropical America, from Mexico southward to Peru and Brazil and island of Tristan d'Acunha.

66. *T. exsectum*, Kunze; *rhizome* wide-creeping, slender, tomentose; *st.* slender, naked, 1-3 in. l.; *fr.* 6-12 in. l., 1-2 in. br., pendent, flaccid, lanceolate, tripinnatifid, the main rachis narrowly winged in the upper half; *pinnæ* distant, flaccid, the upper ones often 3-4 in. l., the lower ones ovate or lanceolate, divided down to a narrowly-winged rachis, with a few deeply toothed or pinnatifid *pinnl.*; texture membranaceous, surface naked; a central *costa* only in each segment; *sori* 1 to 4 to a pinna, tube sunk, the mouth truncate.—*Hk. Syn. Fil.* 1. *p.* 141.

Hab. S. Chili, Chiloe, and Juan Fernandez.—A much larger plant than *T. tenerum*, with less divided *pinnæ* and broader and more distant segments.

67. *T. Colensoi*, Hk. fil.; *rhizome* slender, naked, wide-creeping; *st.* about 1 in. l., slender, naked; *fr.* 2-4 in. l.,  $\frac{1}{2}$ -1 in br., oblong-lanceolate, acuminate, fully pinnate; *pinnæ* distant, ovate or lanceolate-rhomboidal, stalked, and cut nearly or quite down to a slender rachis; *segm.* linear-acute, very narrow; substance flaccid, a central *costa* only in each segment; *sori* solitary, supra-axillary, the tube stipitate, the mouth scarcely dilated; *recept.* very long and slender.—*Hk. 2. Cent. Ferns, t.* 79.

Hab. New Zealand, discovered by the Rev. W. Colenso.

68. *T. trichoides*, Sw.; *rhizome* creeping, slender; *st.* 1-2 in. l., very slender, naked; *fr.* 4-8 in. l., 1-2 in. br., pendent, flaccid, lanceolate, tripinnatifid, main rachis only very slightly winged at the apex; *pinnæ* flaccid, 1-2 in. l., the rachis only winged above; *pinnl.* deeply cut with distant linear-filiform *segm.* 1-2 lin. l.,  $\frac{1}{4}$ - $\frac{1}{6}$  lin. br.; texture membranaceous, a central *costa* only in each segment; *sori* 1 to 4 to a pinna, the tube exerted, sometimes stalked, the mouth spreading, not two-lipped.—*Hk. Sp.* 1. *p.* 141. *Hk. & Gr. Ic. Fil. t.* 199.

Hab. West Indian Islands and Mexico southward to Ecuador and Brazil.—Apparently this is the *T. capillaceum* of Linnæus.

††† *Fronde* decompose, main rachis rigid, ultimate segments subcoriaceous, except in No. 69. *Sp.* 69-78.

69. *T. scandens*, Linn. Herb.; *rhizome* wiry, wide-creeping; *st.* strong, erect,

naked, 2-4 in. l.; *fr.* 6-18 in. l., 3-6 in. br., fully pinnate, or the rachis very slightly winged above, ovate-acuminate in general outline, the rachis hairy; lower *pinnæ* ovate-lanceolate, nearly pinnate, 2-4 in. l.; *pinnl.* divided down to a narrow wing and *segm.* again pinnatifid about halfway down, margins finely hairy; substance finely membranaceous, several fine *veins* in each ultimate segment; *sori* 1 to 4 to a pinnule, tube quite sunk, mouth slightly spreading with two lateral projections. — *Hk. Sp.* 1. p. 140. *T. macroclados*, *Kunze*. *T. Lindenii*, *Presl.*

Hab. Cuba and Jamaica.—Differs from all the following species by its membranaceous segments.

70. *T. rigidum*, Swartz; *st.* tufted, erect, wiry, 2-8 in. l., naked or very slightly winged above; *fr.* 2-8 in. l., 2-6 in. br., deltoid or ovate-acuminate, tri- or quadri-pinnatifid, the main rachis usually only slightly winged towards the top; lower *pinnæ* 2-3 in. l., erecto-patent, ovate or lanceolate-rhomboidal, cut down to a rachis which is very narrowly winged throughout or free below; *pinnl.* deeply pinnatifid, with deeply toothed or even pinnatifid linear lobes; texture subcoriaceous, colour dark-green, nearly black when dry, nearly naked, often slightly crisped; *sori* 2 to 12 to a pinnule, small, axillary, the tube more or less exserted, the mouth slightly dilated.—*Hk. Sp. Fil.* 1. p. 133. *Beddome, Fil. Ind. t. 8. Sturm, Brasil. t. 18. f. 12.* *T. strictum*, *Hk. & Gr. Ic. Fil. t. 122.* — $\beta$ , *T. elongatum*, Cuning.; *fr.* deltoid, segments broader, *pinnæ* and pinnules often imbricated; *invol.* slightly two-lipped.—*Hk. Sp.* 1. p. 134. *Ic. Pl. t. 701.*

Hab. Tropical America, Cuba, and Mexico southward to Peru and Rio Janeiro; Polynesian Islands, New Zealand, Japan, Malayan Peninsula, S. China, S. Hindostan, Ceylon, Mascaren Isles, Natal, Cape Colony, Angola, Fernando Po.—Here belong numerous species of Van den Bosch, including *Mandioccanum*, *obscurum*, *Dregei*, *Boivini*, *achilleæ-folium*, *tamarisciforme*, *flavo-fuscescens*, *pumilum*, *dentatum*, and *longicollum*.

71. *T. meifolium*, Bory; *st.* tufted, 4-6 in. l., strong, erect, more or less fibrillose, and the tuft densely so at the crown; *fr.* 9-18 in. l., 4-8 in. br., ovate, quadri-pinnatifid, the main rachis only slightly winged towards the apex; lower *pinnæ* 4-6 in. l., 1-1½ in. br., lanceolate-acuminate; *pinnl.* with numerous *segm.*, which are again cut down into slightly flattened ultimate divisions, about 1 lin. l.; texture subrigid, surface naked, a single *costa* only in each segment; *sori* 2 to 12 to a pinnule, small, the involucre short, turbinate.—*Hk. Sp.* 1. p. 137. *T. apifolium*, *Presl.* *T. Bauerianum*, *Endl.* *T. exaltatum*, *Brack.* — $\beta$ , *T. polyanthos*, *Hk.*; *sori* larger; *invol.* ½ in. deep, 1 lin. br., cupshaped, two-lipped.—*Hk. Sp.* 1. p. 138. *Ic. Pl. t. 703.*

Hab. Philippine Islands, Java, Polynesian Islands, and Norfolk Island.—This resembles *T. maximum* in general outline, but the habit is more graceful, the texture more delicate, and the involucre is much smaller and shorter, verging upon those of *Hymenophyllum*.

72. *T. maximum*, Blume; *rhizome* stout, creeping; *st.* strong, erect, 3-6 in. l.; *fr.* 12-18 in. l., 6-9 in. br., ovate, quadri-pinnatifid; *pinnæ* erecto-patent, ovate-lanceolate, the largest 4-6 in. l., 2 in. br.; *pinnl.* lanceolate-deltoid, 1 in. or more l., cut down to the rachis into *segm.*, which are again deeply pinnatifid; ultimate *segm.* 1½-2 lin. l., slightly flattened, texture subrigid, surface naked, dark-green; a central *costa* only in each segment; *sori* 2 to 8 to a pinnule; *invol.* cylindrical, the mouth dilated, but not two-lipped.—*Hk. Sp.* 1. p. 137. *T. anceps*,  $\beta$ , *Hk. Sp.* 1. p. 135, t. 40. C. 3. *T. intermedium*, *V. D. B.*

Hab. Java, Borneo, and Polynesian Islands.—A larger plant than *T. rigidum*, with more divided *pinnæ* and narrower segments.

73. *T. Prieurii*, Kunze; *st.* stout, tufted (sometimes 2 lin. thick below), 4-8 in. l., naked or slightly tomentose, sometimes the upper part winged; *fr.*



12-18 in. l., 6-12 in. br., broadly ovate, tri- or quadri-pinnatifid; main *rachis* very narrowly winged throughout or above only; lower *pinnae* 4-6 in. l., ovate-rhomboidal, cut down to a narrowly-winged rachis; *pinnl.* again deeply pinnatifid, with rather distant, long, linear, sharply-toothed or pinnatifid *segm.*; texture subcoriaceous (three layers of cells), colour dark-green, nearly black when dry, surface a little hairy; *veins* close, often more than one in the ultimate segments; *sori* 2 to 12 to a pinnule, small, axillary, often recurved, tube free, much dilated, not two-lipped.—*T. anceps*, *a*, *Hk. Syn.* 1. p. 135. t. 40. C. (*non Wallich*). *T. Leprieurii*, *Hk. Gard. Ferns*, t. 11. Davalliopsis, *V. D. B.*

Hab. West Indian Islands southward to Peru and Brazil.—*T. Weddellii*, *elegans*, and *opacum*, *V. D. B.*, apparently must be referred here.

74. *T. giganteum*, Bory; *rhizome* wide-creeping, tomentose; *st.* 4-6 in. l., strong, erect; *fr.* 12-18 in. l., 6-9 in. br., ovate, quadri-pinnatifid; main *rachis* hardly at all winged above; lower *pinnae* ovate-lanceolate, 6-8 in. l., cut down to the rachis; *pinnl.* 1 in. l., cut down very nearly to the rachis, the divisions again deeply pinnatifid; ultimate *segm.* linear, distinctly flattened, 1 lin. l.,  $\frac{1}{4}$  lin. br., surface dark-green, naked, shining, texture between rigid and membranaceous; a central *vein* only in each segment; *sori* 2 to 20 to a pinnule, axillary; *tube* more or less exerted, mouth rather dilated, not two-lipped.—*Hk. Sp.* 1. p. 137.  *Ic. Pl.* t. 702. *T. elatum*, *V. D. B.*

Hab. Mauritius, Bourbon, Joanna Island, Malayan Archipelago and Fiji group.—A handsome plant, distinctly quadri-pinnatifid, the most ample and divided species of the genus, nearest *T. meifolium*, but neither so rigid or coriaceous, and with shorter ultimate segments.

75. *T. Sprucei*, Baker; *st.* nearly tufted, 1-3 in. l., wiry, erect, naked, slightly winged above; *fr.* 3-4 in. l.,  $1\frac{1}{2}$ -2 in. br., erect, ovate-deltoid, acuminate, tripinnatifid; main *rachis* very narrowly winged throughout; *pinnae* erecto-patent, cut down to a very narrowly-winged rachis; lower *pinnl.* deeply pinnatifid, with forked or even pinnatifid lower *segm.*; ultimate *segm.* flat, linear,  $1\frac{1}{2}$ -2 lin. l., texture sub-membranaceous, surface naked, dark olive-green when dry, a single *vein* only in each segment, cellules large; *sori* 2 to 12 to a pinna, tube small, nearly free, mouth slightly spreading.

Hab. North of Brazil, *Spruce*, 1399 and 2838.—A more deeply divided plant than *T. gemmatum*, with a subdeltoid outline, more numerous sori, less rigid habit, and distinctly flattened segments.

76. *T. gemmatum*, J Smith; *rhizome* strong, wiry, tomentose, beset with numerous long black wiry fibres; *st.* 1-3 in. l., naked, wiry, winged above; *fr.* 2-6 in. l., 1-2 in. br., erect, subrigid, ovate-oblong, bipinnatifid; main *rachis* narrowly winged; *pinnae* erecto-patent, cut down to a narrowly-winged rachis; lower *pinnl.* deeply forked with subrigid, linear-filiform *segm.*  $1\frac{1}{2}$ -2 lin. l., cellules large; *sori* 1 to 8 to a pinna, minute, axillary, the tube turbinate, stalked, the mouth nearly truncate.—*T. celluloseum*, *Sturm, Hk. 2nd Cent. Ferns*, t. 63. *T. filiforme*, *Sturm.* *T. longisetum*, *Brack.* *T. Asæ-Grayi*, *V. D. B.* *T. feniculaceum*, *Hk. Sp.* 1. p. 135. (*in part*).

Hab. Venezuela, north of Brazil, Polynesian Islands, Java, Philippines, and Malayan Peninsula.

77. *T. longisetum*, Bory; *rhizome* strong, wiry, tomentose; *st.* 1-4 in. l., erect, wiry, tomentose, not at all winged; *fr.* 3-8 in. l., 1-2 in. br., erect, subrigid, lanceolate or ovate-lanceolate; main *rachis* quite free; *pinnae* spreading or erecto-patent, 1-1 $\frac{1}{2}$  in. l., cut down to the rachis; *pinnl.* cut down into numerous filiform capillary *segm.*  $1\frac{1}{2}$ -2 lin. l., colour dark-brown or blackish; a central *costa* only in the segments, not visible except under a high magnifying power;

*sori* 1 to 6, minute, axillary, the tube stalked, the mouth truncate.—*V. D. B. Hym. Jav. t. 21. T. Pluma, Hk. Ic. Pl. t. 997.*

Hab. Borneo, Java, Samoa, Bourbon.—A very singular plant, with the segments spreading in all directions, and not at all flattened. *T. Pluma* of Hooker appears to be a long narrow form of this species, in habit singularly resembling a bottle-brush.

78. *T. fœniculaceum*, Bory; *st.* nearly tufted, erect, wiry, 2-4 in. l., naked or tomentose; *fr.* 4-8 in. l., 1½-3 in. br., erect, rigid, ovate-lanceolate; main *rachis* naked or slightly winged above; lower *pinnae* spreading or erecto-patent, 1-1½ in. l., cut down quite or very nearly to the rachis; *pinnae* regularly pinnatifid, with simple or forked linear-filiform *segm.*, 1-1½ lin. l., colour dark-green or brownish-black when dry, texture subcoriaceous; *sori* 2 to 12 to a pinna, minute, axillary, the mouth rather spreading but not two-lipped.—*Hk. Sp. 1. p. 135. (in part).*

Hab. Mauritius, Bourbon, Borneo, and Rockingham Bay, Australia (*T. setilobum*, F. Mueller, MSS.).—Intermediate between *rigidum* and *longisetum*, the segments rather flattened.

#### TRIBE 4. DAVALLIÆ.

*Sori* marginal or submarginal, roundish, covered by a reniform or suborbicular squamiform involucre, which is open at the apex, fastened broadly at the base, and open or free at the sides. GEN. 18-19.

#### GEN. 18. DAVALLIA, Smith.

*Sori* intra- or submarginal, globose or elongated either laterally or vertically. *Invol.* terminal on the veins, various in shape, united or free at the sides, the apex always free. *Caps.* stalked. *A large genus, which has its head-quarters in the Tropics of the Old World. Fronds various in size and division, herbaceous or coriaceous; veins always free; rhizome usually wide-creeping and scaly. There are four principal types in the shape of the involucre (see plate), of which Microlepia connects Eudavallia with Dicksonia and Odontoloma with Lindsaya. TAB. II. f. 18.*

§ *Humata, Cav. Invol. ample, coriaceous, suborbicular or reniform, attached by a broad base, the apex and sides free.*—*Sp. 1-11. Fronds in all coriaceous, usually deltoid, 3 to 6 inches long, more or less distinctly dimorphous, the barren ones hardly more than once pinnatifid. All plants of the Malayan islands, one reaching the Himalayas and the Mauritius. Sp. 12 is an anomalous simply pinnate S. American plant, which seems best placed here.*

\* *Barren fronds entire. Sp. 1-2.*

1. *D. (Hum.) heterophylla*, Smith; *rhizome* wide-creeping, scaly; *fr.* shortly stalked, 3-6 in. l., 1 in. br., glabrous; *texture* coriaceous, the sterile one ovate-lanceolate, entire or slightly lobed at the base, the fertile one narrower, deeply sinuato-pinnatifid; *sori* 2 to 10 to a lobe.—*Hk. Sp. 1. p. 152. Fil. Ex. t. 27. Hk. & Gr. Ic. Fil. t. 230.*

Hab. Malayan Peninsula and Polynesian Islands.

2. *D. (Hum.) angustata*, Wallich; *rhizome* wide-creeping, scaly; *fr.* subsessile or shortly stalked, 3-8 in. l., ¼-¾ in. br., linear, slightly and irregularly crenate at the margin, sometimes once forked; *texture* coriaceous, both surfaces naked; *sori* in a row along the edges.—*Hk. Sp. 1. p. 152. Hk. & Gr. Ic. Fil. t. 231.*

Hab. Malayan Peninsula and Islands.



\*\* *Barren fronds pinnatifid.* Sp. 3-11.

3. *D. (Hum.) parallela*, Wallich; *rhizome* creeping, scaly; *st.* 2-4 in. l., erect, more or less scaly; *fr.* 4-8 in. l.,  $1\frac{1}{2}$ -2 in. br., ovate-lanceolate, cut down nearly or quite to the rachis into long parallel linear-oblong entire bluntish or acute lobes, the lowest pair sometimes auricled; *texture* coriaceous; *sori* oblique, in two rows in the lobes, occupying the greater part of the space between the costa and margin.—*Hk. Sp. 1. p. 153. t. 42. A. Pteroneuron, Fée.*

Hab. Malayan Peninsula and Polynesian Islands.—Habit and size of *Polypodium vulgare*. Rachis sometimes densely scaly.

4. *D. (Hum.) pectinata*, Smith; *rhizome* creeping, scaly; *st.* 2-4 in. l., erect, more or less scaly; *fr.* 4-8 in. l., 2-3 in. br., ovate-lanceolate, cut down nearly or quite to the main rachis into long parallel linear-oblong, entire or inciso-pinnatifid *pinnae*, the lowest pair deeply pinnatifid on the lower side, with lobes sometimes  $\frac{1}{2}$  in. l.; *texture* coriaceous; *sori* obliquely placed in two submarginal rows.—*Hk. Sp. 1. p. 153. Hk. & Gr. Ic. Fil. t. 139.*

Hab. Tropical Polynesian Islands.—Quite similar to the preceding in size and texture.

5. *D. (Hum.) sessilifolia*, Blume; *rhizome* very long, wide-creeping, densely clothed with rigid filiform scales; *fr.* subsessile, 2-4 in. l.,  $1-1\frac{1}{2}$  in. br., ovate-lanceolate, cut down nearly to the rachis into parallel linear-oblong, entire or sinuated lobes, the lower side of the lower one sometimes deeply pinnatifid; *texture* subcoriaceous; *sori* in two rows in the lobes, occupying the greater part of the space between the costa and margin.—*Hk. Sp. 1. p. 154.—β, H. polypodioides*, Brack. *t. 32*; *fr.* stalked (*st.* 1-2 in. l.), rather larger and more acute.

Hab. Java, Celebes, and Fiji Islands.—Examples gathered by Milne in Fiji quite connect the plant figured by Brackenridge with Blume's specimens.

6. *D. (Hum.) pedata*, Smith; *rhizome* wide-creeping, scaly; *st.* 2-4 in. l., rather scaly; *fr.* 2-4 in. l.,  $1\frac{1}{2}$ -2 in. br. at the base, deltoid in general outline, cut down nearly to the rachis; upper *segm.* linear-oblong, acute, erecto-patent, inciso-dentate, the lower pair broader, deeply inciso-pinnatifid, especially on the lower side; *texture* coriaceous; *sori* placed in rows on the teeth on both sides of the lobes.—*Hk. Sp. 1. p. 54. t. 45. A. Gard. Ferns, t. 7.*

Hab. Hindostan, from 2,000 ft. in Khasia southward to Ceylon, Hongkong, Malayan Peninsula, Java, Borneo, Queensland, Mascaren Isles.

7. *D. (Hum.) alpina*, Blume; *rhizome* creeping, scaly; *st.* 2-4 in. l.; *fr.* 2-3 in. l.,  $1-1\frac{1}{2}$  in. br., deltoid in general outline, upper segments of barren frond slightly dentate, blunt at the apex of the fertile frond, distant, deeply and sharply toothed, the lower ones cut nearly to the rachis with sharply-toothed lobes; *texture* coriaceous, lower part of rachis winged narrowly; *sori* placed in the teeth on both sides.—*Hk. Sp. 1. p. 154. D. Belangeri, Bory. H. serrata, Brack.*

Hab. Mergui and Ledong, Java, Borneo, and Polynesian Islands.—Very near *D. pedata*, but smaller and rather more deeply cut. We have not seen the Javanese *D. longula*, Kunze (Bot. Zeit. 1848, p. 215), which is said to be very closely allied to this.

8. *D. (Hum.) pusilla*, Metten.; *rhizome* creeping, scaly; *st.* 1 in. or less l.; *fr.*  $1-1\frac{1}{2}$  in. l.,  $\frac{1}{2}-\frac{3}{4}$  in. br., cordato-deltoid in outline, cut down to a narrowly-winged rachis; upper *segm.* linear-oblong, cuneate at the base, deeply inciso-dentate, lower pair broader, deeply inciso-pinnatifid on the lower side, teeth very acute;

*texture* coriaceous; *veins* prominent; *sori* small, placed at the base of the small teeth.—*Mett. Fil. Nov. Cal. No. 73.*

Hab. Aneiteum and New Caledonia.—Near *D. alpina*, but the teeth of the fertile fronds much sharper.

9. *D. (Hum.) vestita*, Blume; *rhizome* wide-creeping, densely scaly; *st.* 3-4 in. l., rather scaly below; *fr.* 4-8 in. l., 3-4 in. br., deltoid in outline; all, except the upper *pinnæ*, cut down to a narrowly-winged rachis; barren frond with the *segm.* of all, except the lower *pinnæ*, blunt, scarcely toothed; lobes of the fertile *pinnæ* narrower, sharper toothed; of the lower ones deeply so; *texture* coriaceous; *sori* placed on the teeth of the segments.—*Hk. Sp. 1. p. 156. t. 41. C. D. bipinnatifida*, Blume, *Hk. l. c.*

Hab. Java and Ceylon.

10. *D. (Hum.) Cumingii*, Hk.; *rhizome* creeping, scaly; *st.* 3-4 in. l., both it and the rachis rather scaly; *sterile fr.* about 1 in. each way, deltoid-cordate, cut down nearly to the rachis; upper *pinnæ* blunt, slightly toothed, the lower pair deeply pinnatifid below; *texture* coriaceous; *fertile fr.* 4-5 in. l., 3 in. br., the same shape, but much more divided; lowest *pinnl.* deeply pinnatifid with sharply toothed lobes; *sori* placed in the teeth of the segments.—*Hk. Sp. 1. p. 155. t. 45. B.*

Hab. Philippine Islands.

11. *D. (Hum.) botrychioides*, Brack.; *rhizome* wide-creeping, scaly; *st.* 3-5 in. l., scaly below; *fr.* 6-8 in. l., 3-5 in. br., deltoid in general outline, decidedly dimorphous, the barren ones with a narrowly-winged rachis; lowest *pinnæ* cut down nearly to the rachis, with deep bluntly-toothed segments; *fertile pinnæ* much more finely divided; *pinnl.* of the lower *pinnæ* cut down to a narrow rachis with narrow sharply-toothed segments almost covered with *sori*.—*Brack. t. 32. fig. 1.*

Hab. Aneiteum and Fiji Islands.

12. *D. (Hum.) Imrayana*, Hk.; *rhizome* wide-creeping, paleaceous; *st.* 4-8 in. l., erect, brown or black, naked, polished; *fr.* 6-12 in. l., 4-6 in. br., ovate, once pinnate; *pinnæ* 7 to 15, the largest about 3 in. l., 1 in. br., lanceolate, with broad blunt teeth, somewhat unequal-sided and obliquely truncate at the base below; *texture* herbaceous, both surfaces naked; *sori* placed in the teeth at a short distance from the margin; *invol.* rounded, broader than deep, attached by the base only.—*Hk. Sp. 1. p. 171. t. 49. A.*

Hab. Dominica, Guadeloupe, and Guiana.

§§ Leucostegia. *Invol.* attached as in *Humata*, but smaller, narrower, and thinner. *Sp.* 13-24. *Pinnules* uniform on the lower and upper side. *Fronds* various in size and texture, with one exception tri- or quadripinnatifid or pinnate, mostly inhabiting Polynesia and tropical Asia, several extending to the Himalayas, some to New Zealand, but none either to Africa or America. *Acrophorus* of Moore includes this and *Odontoloma*.

13. *D. (Leucos.) Parishii*, Hk. MSS.; *rhizome* creeping, scarcely scaly; *st.* slender, 3-4 in. l.; *fr.* flaccid, 6-9 in. l., 4-6 in. br., deltoid, cut down to the rachis below, but not above; lower *pinnæ* distant, the lowest pair broadest and most deeply cut on the lower side; lowest *pinnl.* reaching down nearly to the rachis, toothed more than halfway down, with oblong blunt crenate lobes; *texture* membranous; *sori* few, marginal in the crenations.

Hab. Limestone rocks, Moulmein, *Rev. C. S. Parish*.—A very distinct species.



14. D. (Leucos.) *membranulosa*, Wallich; *rhizome* stout, wide-creeping, densely clothed with lanceolate pale-brown scales; *st.* 2-3 in. l.; *fr.* 6-9 in. l., 2-3 in br., lanceolate, once fully pinnate, but the main rachis slightly winged above; lower *pinnæ* lanceolate, 2-3 in. l.,  $\frac{1}{2}$ -in. br., cut down to a narrowly-winged rachis into numerous sharply-toothed oblong segments; *texture* thinly herbaceous; *sori* 2 to 8 to a segment, obliquely placed between the costa and margin.—*Hk. Sp.* 1. p. 159. t. 53. A.

Hab. Himalayas of Nepaul, Kumaon, and Bootan.

15. D. (Leucos.) *immersa*, Wallich; *rhizome* hypogæous, wide-creeping, stout, fibrillose; *st.* 4-8 in. l., strong, erect; *fr.* 12-18 in. l., 6-9 in. br., deltoid, tripinnate; lowest *pinnl.* lanceolate-deltoid, 2-3 in. l., 1 in. br., with broad *segm.*, which are obliquely truncate at the base below, and roundly lobed, with the lobes again crenate above; *texture* herbaceous; *sori* large (1 lin. br.), 1 to 6 to a segment, oblique.—*Hk. Sp.* 1. p. 156. *Fil. Ex.* t. 79. Cyst. dimidiata, *Dec.*

Hab. Hindostan, ascending on the Himalayas to 6-8,000 ft., Malayan Peninsula and Java.—By its subdimidiate segments this connects *Leucostegia* with *Odontoloma*; it is also peculiar in having the rhizome developed beneath the surface of the soil.

16. D. (Leucos.) *multidentata*, Hk. MSS.; *rhizome* stout, wide-creeping, scaly; *st.* 4-6 in. l., stout, clothed below with large ovate-lanceolate pale-brown scales; *fr.* 2-3 ft. l., 1 ft. br., ovate-deltoid, bipinnate; *pinnl.* of the lower *pinnæ* 2-3 in. l., 1 in. br., deltoid-lanceolate, acuminate, cut down to a narrow rachis with deeply inciso-pinnatifid ovate-oblong lower *segm.*; *texture* herbaceous; *sori* 2 to 12 to a segment, placed at the base of its teeth on the upper side of the central vein.—*Aspidium multidentatum*, *Wall. Cat.* 346. *Acro. Thomsoni*, *Moore.*

Hab. Himalayas of Nepaul, Sikkim (5-7,000 ft.), Assam, &c.

17. D. (Leucos.) *pulchra*, Don; *rhizome* thick, creeping, densely clothed with lanceolate bright-brown scales; *st.* 2-6 in. l., erect, scaly below; *fr.* 6-9 in. l., 2-4 in. br., lanceolate-deltoid, tri- or quadripinnate; lower *pinnl.* deltoid, their lobes cut down to the rachis into very narrowly linear sharp-pointed segments; *texture* subcoriaceous; *sori* copious, broader than the segments, placed at the ultimate forks.—*Hk. Sp.* 1. p. 160.

Hab. Himalayas of Khasia and Sikkim, up to 11-12,000 ft.—An elegant plant, with all the copious divisions very narrow.

18. D. (Leucos.) *falcinella*, Presl; *rhizome* creeping, thickly clothed with purplish-black rigid hairs; *st.* 2-3 in. l., erect; *fr.* 4-6 in. l., 3-4 in. br., deltoid, tri- or quadripinnatifid; main *rachis* slightly winged; lowest *pinnæ* unequal-sided, deltoid; *pinnl.* oblong, cut down nearly to the rachis with segments which are again deeply toothed, ultimate divisions of the fertile frond falcate mucronate, of the barren frond rather broader and not so sharp; *texture* subcoriaceous; *sori* 2 to 6 to a lobe, placed at the base of the teeth.—*Hk. Sp.* 1. p. 159.

Hab. Philippine Islands.—This would perhaps be better placed amongst the deltoid *Eudavalliæ*, with which it agrees in habit.

19. D. (Leucos.) *Novæ Zelandiæ*, Colenso; *rhizome* creeping, clothed with filiform scales; *st.* 4-8 in. l., firm, erect; *fr.* 12-18 in. l., 4-8 in. br., deltoid, tripinnate; lower *pinnl.* deltoid-lanceolate, cut down to the rachis, except towards the apex, into narrow deeply pinnatifid acute segments; *texture* subcoriaceous; *sori* numerous, placed on the teeth of the segments.—*Hk. Sp.* 1. p. 158. t. 51. B. *Gard. Ferns*, t. 51. *Acrophorus hispidus*, *Moore.*

Hab. New Zealand.—Allied to *D. pulchra*, but much larger in size, with broader more divided segments.

20. *D. (Leucos.) chærophylla*, Wallich; *rhizome* wide-creeping, clothed with broad obtuse adpressed scales; *st.* 4-6 in. l., naked; *fr.* 9-15 in. l., 4-8 in. br., lanceolate-deltoid, tri- or quadripinnatifid; lowest *pinnl.* 1-2 in. l., 1 in. br., cut down to a narrowly-winged rachis into deeply pinnatifid *segm.*, ultimate lobes narrow and acute in the fertile, rather broader in the barren frond; *texture* thinly herbaceous, rather flaccid; *sori* copious, placed at the base of the teeth of the segments, which they about equal in breadth.—*Hk. Sp. Fil.* 1. p. 157. t. 51. A. *Cystopteris squamata*, *Dec.*, *Hk. Sp. Fil.* 1. p. 201.

Hab. North of India, ascending in the Himalayas to 9-10,000 ft., Cashmere, Neilgherries, Ceylon, Malayan Peninsula.

21. *D. (Leucos.) parvula*, Wallich; *rhizome* wide-creeping, scaly; *st.* 1-2 in. l., or *fr.* subsessile,  $\frac{1}{2}$ - $\frac{3}{4}$  in. l. by  $\frac{1}{2}$  in. br., deltoid in outline, bi- or tripinnate, with all the divisions of the frond almost filiform and the ultimate *segm.* sharp at the point; *texture* coriaceous; *sori* placed at the sinuses of the ultimate forks; *invol.* broader than the segments.—*Hk. Sp.* 1. p. 160. *Hk. & Gr. Ic. Fil.* 133.

Hab. Singapore and Borneo.—Placed by Mettenius in *Humata*, with which it quite agrees in habit.

22. *D. (Leucos.) affinis*, Hk.; *rhizome* thick, densely clothed with sharp-pointed ferruginous scales; *st.* 4-9 in. l., erect, strong; *fr.* 12-24 in. l., 6-12 in. br., deltoid-lanceolate, tri- or quadripinnate; lower *pinnl.* with oblong rhomboidal lobes, the *segm.* of which are deeply and finely inciso-pinnatifid with sharp teeth; *texture* herbaceous; *sori* 2 to 6 to a segment, small, placed at the base of the teeth.—*Hk. Sp.* 1. p. 158. t. 52. B.

Hab. Neilgherries, Ceylon, Java, and Polynesian Islands, frequent.—Lowest pinnules often 2 in. l., 1 in. br. Very like *D. chærophylla* in texture and cutting, but much larger.

23. *D. (Leucos.) nodosa*, Hk.; *fr.* tufted; *st.* 12-24 in. l., strong, erect, scaly below; *fr.* 2-4 ft. l., broadly ovate, quadripinnate; lower *pinnæ* 12-18 in. l., 6-9 in. br.; lower *pinnl.* lanceolate, 4-6 in. l., 2 in. br., the *segm.* cut down to the rachis with distant, small, rather bluntly-toothed oblong-deltoid lobes; *texture* herbaceous; *sori* small, 1 to 4 to a lobe, placed between the costa and margin.—*Hk. Sp.* 1. p. 157. *Kew Gard. Misc.* 9. t. 10. *Acrophorus*, *Presl.*

Hab. North Hindostan, ascending in Sikkim to 7-10,000 ft., Malayan Peninsula, Java.—Fronds like those of an *Alsophila*, but habit not arborescent. It is the original *Acrophorus* of *Presl.*

24. *D. (Leucos.) trichomanoides*, Hk.; *st.* 6-9 in. l., erect, strong; *fr.* 9-18 in. l., 6-9 in. br., supra-decompound; *pinnl.* of the lower *pinnæ* 2-3 in. l., 1 in. br., deltoid, their segments cut down to the rachis, and the lobes again cut down into linear-filiform ultimate divisions, about  $\frac{1}{2}$  lin. l.; *texture* thinly herbaceous; *sori* placed at the dilated apices of the ultimate divisions; *invol.* oblong.—*Hk. 2nd Cent. Ferns*, t. 64. *D. ferulacea*, *Moore.*

Hab. Fiji Islands; gathered by Mr. Milne.

§§§ *Odontoloma*. *Invol.* as in *Leucostegia*, but with a tendency to become confluent, and the pinnules pellucido-herbaceous in texture and dimidiate (resembling a quarter of a circle) in shape. *Sp.* 25-30. A small natural group very near the dimidiate *Lindsaye*. All but one are inhabitants of S. E. Asia and Polynesia, one being S. American and one Mauritian.



\* *Fronde not branched.* Sp. 25-27.

25. D. (Odont.) *hymenophylloides*, Baker; *rhizome* wide-creeping, slender, scandent, paleaceous; *fr.* subsessile, simply pinnate, 4-6 in. l., about  $\frac{3}{4}$  in. br.; *pinnæ*  $1\frac{1}{2}$ -2 lin. deep, cut down into narrow simple or forked linear segments to a nearly straight rachis; *texture* thinly herbaceous, both surfaces naked; *sori* subrotund. —Lindsæa, *Blume, Enum. Fil. Jav. p.* 218.

Hab. Java. —This agrees with *O. triquetra*, except that the main rachis is not branched.

26. D. (Odont.) *pulchella*, Hk.; *rhizome* slender, wide-creeping, and much branched; *st.* slender, wiry, erect, naked, 2-3 in. l.; *fr.* 4-12 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br.; *pinnæ* slightly stalked, about  $\frac{1}{4}$  in. across,  $\frac{1}{8}$  in. deep, the lower margin more or less curved upwards, oblique at the base, the upper cut into 2 to 4 blunt lobes; *texture* herbaceous, rachis and both surfaces naked; *sori* small, placed in the lobes at a short distance from the edge; *veins* sometimes anastomosing at the apex, and then their sori become confluent. —*Hk. Sp. 1. p.* 177. *t.* 548. *Synaphlebium Pickeringii, Brack. p.* 223. *t.* 50.

Hab. Philippine Islands, Fiji, and Samoa. —The original Philippine *O. pulchella* quite corresponds with Dr. Seemann's smaller specimens of the Feejean plant.

27. D. (Odont.) *repens*, Desv.; *rhizome* wide-creeping, paleaceous, climbing; *fr.* simply pinnate, 8-18 in. l.,  $\frac{1}{2}$ - $1\frac{1}{2}$  in. br.; *pinnæ*  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., about half as broad as deep, the lower line slightly curved, oblique at the base, the upper rounded, nearly entire or crenately lobed; *texture* pellucido-herbaceous; *sori* marginal, large, about as broad as deep, often confluent in the not crenated form. —D. Boryana, *Presl, Hk. Sp. 1. p.* 175. D. hemiptera, *Bory, Hk. Sp. 1. p.* 176.

Hab. Assam, Neilgherries, Ceylon, Java, Sumatra, Polynesian Islands, and Mauritius. —Very variable in size. Quite doubtful between *Odontoloma* and *Lindsaya*, and perhaps not distinct from *L. oblongifolia*.

\*\* *Fronde more or less branched.* Sp. 28-30.

28. D. (Odont.) *Parkeri*, Hk.; *rhizome* slender, creeping; *st.* flexuose, wiry, naked, 2-6 in. l.; *fr.* simple or branched, with one or two pairs of lateral pinnæ; the main fr. 4-6 in. l., about  $\frac{3}{4}$  in. br.; *pinnl.* a quarter of a circle, about  $\frac{3}{8}$  in. br.,  $\frac{1}{4}$  in. deep, the outer edge slightly crenate; *texture* herbaceous, both surfaces naked; *sori* small, submarginal; *invol.* rather broader than deep. —*Hk. Sp. 1. p.* 176. *t.* 53.

Hab. British Guiana. —Like *O. pulchella*, but the rachis branched.

29. D. (Odont.) *triquetra*, Baker; *rhizome* creeping, fibrillose; *st.* strong, erect, 4-6 in. l.; *fr.* with 2 to 7 pairs of pinnæ and a terminal one; lateral *pinnæ* spreading with subrigid rachises, 3-4 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br.; *pinnl.* cut down on the upper side into narrow simple or forked linear segments to a nearly straight flattened leafy rachis; *texture* pellucido-herbaceous, both surfaces naked; *sori* small, terminal on the segments; *invol.* suborbicular. —Lindsaya *triquetra, Metten. O. tenuifolia, Brack. non J. Sm.*

Hab. Java, *Zollinger, 3714.* —Gathered in Samoa by the American Expedition under Captain Wilkes; and beautiful specimens have recently been forwarded from the same group by the Rev. T. Powell.

30. D. (Odont.) *Blumeana*, Hk.; *rhizome* creeping; *st.* strong, erect, 4-6 in. l.; *fr.* 8-12 in. l., 6-8 in. br., bipinnate; *pinnæ* rigid, erecto-patent, 4-6 in. l.,  $\frac{1}{2}$  in.

br. ; *pinnl.* thinly herbaceous, cut down on the upper side into very slender filiform simple or forked segments to a recurved filiform rachis ; *sori* small, nearly terminal on the dilated apices of the segments ; *invol.* suborbicular.—*Hk. Sp.* 1. p. 177. t. 54. *Lindsaya tenuifolia*, *Blume*.

Hab. Java and Philippine Islands.—A very distinct and beautiful species, easily recognizable by its slender filiform segments.

§§§§ *Eudavallia*. *Invol.* coriaceous, semicylindrical or half-cupshaped, attached at the sides as well as the base. *Sp.* 31–48.

† *Prosaptia*, Presl. *Habit of Lomaria Spicant.* *Invol.* quite homogeneous with the texture of the frond. *Sp.* 31–32.

31. D. (Prosap.) *Emersoni*, Hk. & Gr. ; *fr.* tufted, sessile, 6–12 in. l., nearly 1 in. br. at the widest part, linear-lanceolate, cut more than halfway down to the rachis into numerous linear-oblong, or at the lower part triangular, lobes ; *texture* coriaceous ; *sori* 1 to 6, placed round the edge of the lobes.—*Hk. Sp.* 1. p. 161. *Hk. & Gr. Ic. Fil.* t. 105.

Hab. Madras, Ceylon, Penang, Java, Borneo, and Philippine Islands.

32. D. (Prosap.) *contigua*, Swartz ; *fr.* tufted, sessile or nearly so, 12–18 in. l., 1–1½ in. br., linear-lanceolate, cut down nearly or quite to the rachis into numerous linear-acuminate or bluntish slightly-toothed lobes ; *texture* coriaceous ; *sori* 2 to 8 to a lobe, placed in the teeth on their upper part.—*Hk. Sp.* 1. p. 161. *Hk. & Gr. Ic. Fil.* t. 141. D. Preslii, *Hk. Sp.* 1. p. 161.

Hab. Ceylon, Java, and Polynesian Islands.

†† *Scyphularia*, Fée. *Fronde* once pinnate. *Segments* few, linear, 4–6 in. l., ½–¾ in. br., nearly entire. *Sp.* 33–34.

33. D. (Scyph.) *triphylla*, Hk. ; *rhizome* stout, creeping, densely fibrillose ; *st.* erect, strong, 2–4 in. l. ; *fr.* ternate, the central segment the largest, 4–6 in. l., ½–¾ in. br., linear, scarcely toothed, cuneate at the base ; *texture* coriaceous ; *sori* placed in close rows along the margin, edge to edge ; *invol.* semicylindrical.—*Hk. Sp.* 1. p. 162. t. 46. A.

Hab. Singapore ; discovered by Mr. Cuming.—Veins more prominent than in the next, of which it may be a reduced form.

34. D. (Scyph.) *pentaphylla*, Blume ; *rhizome* creeping, stout, densely fibrillose ; *st.* erect, strong, 2–4 in. l. ; *fr.* with a terminal segment and 2 to 3 pairs of lateral pinnæ ; terminal segment of fertile frond linear, 4–6 in. l., ½ in. br., of the barren frond broader and shorter ; lateral pinnæ similar, sessile or slightly stalked, lowest pair sometimes with one or a pair of similar smaller *pinnl.* at the base ; *texture* coriaceous ; *sori* in rows along the slightly-toothed margin ; *invol.* semicylindrical.—*Hk. Sp.* 1. p. 163. D. pycnocarpa, *Brack.* t. 35.

Hab. Java and Polynesian Islands.

††† *Fronde* ample, deltoid, tri- or quadripinnatifid, coriaceous in texture. *Sp.* 35–48. A well-marked group, all of the species of which closely resemble one another. It has its head-quarters in Polynesia and S. E. Asia, and is entirely absent from the New World.

35. D. *Lobbiana*, Moore ; *fr.* 12–18 in. l., 6–9 in. br., lanceolate-deltoid, bi- or tripinnatifid ; main rachis slightly winged above ; lower pinnæ 4–6 in. l., 2 in. br., lanceolate-deltoid, acuminate, cut down to the rachis in the lower part into linear- or deltoid-oblong blunt *segm.*, only the lowest of which are toothed deeply ;



*sori* copious, placed obliquely in two long rows in the pinnules near the edge; *invol.* broader than deep.—*Moore, Ind. Fil. p.* 296.

Hab. Borneo; discovered by Mr. Thos. Lobb.—A very distinct species, with the involucre resembling in shape that of *Humata*, but not free at the sides.

36. *D. micans*, Metten.; *rhizome* stout, wide-creeping, densely clothed with large lanceolate-acuminate silvery-brown scales; *st.* 1-2 in. l., erect; *fr.* 6-8 in. l., 2-3 in. br., lanceolate, bi- or tripinnatifid; lower *pinnæ* 1-1½ in. l., ½ in. br., lanceolate, spreading from the rachis at a right angle, cut down to the rachis at the base into oblong-rhomboidal deeply-toothed *pinnules*; *texture* subcoriaceous; *sori* 1 to 4 to a pinnule, large, suborbicular (½ lin. br.), placed at the base of the teeth at some distance from the margin.

Hab. Bootan, *Griffith*, 2790.

37. *D. Moorei*, Hk.; *rhizome* creeping, fibrillose; *st.* erect, strong, 4-8 in. l.; *fr.* 4-6 in. l., 3-4 in. br., bi- or tripinnatifid; main *rachis* slightly winged above; lowest *pinnl.* cut down nearly to the rachis below, the lobes oblong, bluntly toothed; *texture* coriaceous; *sori* 4 to 6 to a lobe, placed in the teeth at a little distance from the edge; *invol.* half-cupshaped.—*Hk. 2nd Cent. Ferns, t.* 53.

Hab. New Caledonia, discovered by Mr. C. Moore.

38. *D. decurrens*, Hk.; *rhizome* stout, creeping, densely fibrillose; *st.* 4-6 in. l., stout, erect; *fr.* 1-2 ft. l., 9-15 in. br., deltoid, tripinnatifid; main *rachis* hardly at all winged at the apex; *pinnl.* of the lower *pinnæ* lanceolate-acuminate, 3-4 in. l., about 1 in. br., cut down throughout within a short distance of the rachis, with broadly-toothed linear-oblong *segm.*; *texture* subcoriaceous; *veins* uniform; *sori* falling short of the margin; *invol.* half-cupshaped.—*Hk. Sp. Fil. 1. p.* 167. *t.* 44. B.

Hab. Philippine Islands.—Resembles *D. divaricata* in the shape and position of the *sori*, but the frond less divided.

39. *D. solida*, Swartz; *rhizome* stout, densely clothed with adpressed scales or fibres; *st.* strong, erect, 4-6 in. l.; *fr.* 1-2 ft. l., 12-15 in. br., deltoid, tripinnatifid; apex with a moderately broad undivided centre; *segm.* ovate-rhomboidal, deeply toothed, narrower and sharper in fertile frond; *veins* uniform; *texture* coriaceous; *sori* nearly or quite marginal; *invol.* semicylindrical.—*Hk. Sp. 1. p.* 164. *t.* 42. *Fil. Exot. t.* 57.—β, *D. caudata*, Cav.; pinnules more divided with narrower segments. *Hk. Sp. 1. p.* 164. *D. Lindleyi*, *Hk. Sp. 1. p.* 163. *t.* 48. B.

Hab. Malayan Peninsula, Java, and Polynesian Islands.—The reported station in New Zealand appears to be a mistake. *D. stenomera*, Kunze, from Java, which I have not seen, is said to differ from *D. solida* by its smaller size, obtuse or rounded pinnules, cuneate-oblong segments, and urceolate involucre. *D. ornata*, Wall., is a large handsome form, with broad slightly-cut segments.

40. *D. elegans*, Swartz; *rhizome* stout, creeping, densely clothed with woolly fibres; *st.* firm, erect, 4-8 in. l.; *fr.* 1-2 ft. l., 9-15 in. br., deltoid, tripinnatifid; main *rachis* slightly winged towards the apex; *pinnl.* of the lower *pinnæ* 2-3 in. l., 1 in. br., deltoid-lanceolate, cut down quite to the rachis in the lower part, with oblong-deltoid *segm.*, which are slightly toothed and obliquely truncate at the base on the lower side; *texture* coriaceous; *venation* close, prominent, irregular; *sori* several to a segment, marginal, but the sharp teeth projecting beyond them at the edges; *invol.* half-cupshaped.—*Hk. Sp. 1. p.* 164.—β, *D. elata*, Swartz; *fr.* larger and less coriaceous; *segm.* narrower, more deeply and sharply cut.—*Hk. Sp. 1. p.* 166. *t.* 55. A. *D. Vogelii*, *Hk. Sp. 1. p.* 168. *t.* 59. B.

Hab. Ceylon, Malayan Peninsula, China, Java, Borneo, Polynesian Islands, Tropical

Australia, Madagascar, Angola, Fernando Po, Johanna Island.—Very near *D. solida*. Both vary much in division, but they are universally regarded as distinct. The best character for this seems to be the presence of numerous intermediate spurious venules between the veins proper, as in various species of *Trichomanes*. *D. coniiifolia* is quite intermediate between *D. elata* and the type. *D. patens*, Swz. (*Hk. Sp. Fil.* 1. p. 167), must probably also be referred here, and *D. flaccida*, J. Smith, is a tender finely-cut form.

41. *D. epiphylla*, Blume, not Forster; *rhizome* thick, fibrillose; *st.* 4-6 in. l., erect, firm; *fr.* 12-15 in. l., 6-9 in. br., deltoid-lanceolate, tripinnatifid; main *rachis* hardly at all winged; *pinnl.* of the lowest pinnæ lanceolate,  $1\frac{1}{2}$  in. l.,  $\frac{1}{2}$  in. br.; *segm.* narrow, mucronate, sharply toothed; *texture* coriaceous; *veins* not immersed, one or two carried into each tooth; *sori* small, submarginal, half-cup-shaped, with the sharp mucro of the tooth extending beyond them.—*D. elegans*,  $\beta$ , pulchra, *Hk. Sp.* 1. p. 165. t. 43. A. *D. corniculata*, Moore, *Ind. Fil.* 2. p. 292.

Hab. Java and Malayan Peninsula.—Still more coriaceous than *D. elegans*, with more finely-divided segments, very small sori, and sharp teeth protruded considerably beyond them.

42. *D. divaricata*, Blume; *rhizome* creeping, stout, clothed with linear ferruginous scales; *st.* firm, erect, 6-12 in. l.; *fr.* 2-3 ft. l., tripinnatifid; lower *pinnæ* often 12 in. l., by 6 in. br.; *segm.* deltoid, cut down to the rachis in the lower part, with linear-oblong sharply-toothed lobes; *texture* coriaceous; *veins* uniform, not conspicuous; *sori* half-cup-shaped, placed obliquely as regards the central veins in the teeth at some distance from the edge.—*Hk. Sp.* 1. p. 167. *D. polyantha*, *Hk. Sp.* 1. p. 168. t. 59. A.

Hab. Khasya and Mishmee, N. India, Malayan Peninsula, Hongkong, and Java.—Best distinguished from *solida* and *elegans* by the position of the sori.

43. *D. Mauritiana*, Hk.; *rhizome* stout, wide-creeping, densely fibrillose; *st.* 6-8 in. l., stout, erect; *fr.* 1-2 ft. l., 12-15 in. br., deltoid, quadripinnatifid; main *rachis* very slightly winged above; ultimate *pinnl.* 3-4 in. l., 2 in. br., lanceolate-deltoid, cut down to the rachis in the lower part, with deeply incisopinnatifid lobes; *texture* coriaceous; *sori* copious, marginal, placed in the teeth of the ultimate segments; *invol.* semicylindrical.—*Hk. Sp.* 1. p. 164. t. 55. B.

Hab. Mauritius.—Sir William Hooker was latterly disposed to consider this an extreme form of *D. solida*.

44. *D. Griffithiana*, Hk.; *rhizome* stout, clothed densely with pale-brown or whitish linear scales; *st.* erect, wiry, 4-6 in. l.; *fr.* 9-12 in. l., 4-8 in. br., deltoid, tri- or quadripinnatifid; *pinnl.* of the lower pinnæ lanceolate-deltoid, 2-3 in. l., 1 in. or more br.; lower *segm.* toothed on the barren frond, cut down nearly to the rachis in the fertile one; *texture* coriaceous; *sori* very large (1 lin. br.), cup-shaped, submarginal or marginal, with the teeth projecting beyond them.—*Hk. Sp.* 1. p. 168. t. 49. B.

Hab. Himalayas of Khasya, Assam, Bootan, &c., Malayan Peninsula and China (Amoy, Chusan, Formosa).—Distinguishable from all the other species of the group by its large broadly-cup-shaped sori.

45. *D. pyxidata*, Cav.; *rhizome* stout, creeping, densely clothed with pale-brown linear scales; *st.* strong, erect, 4-6 in. l.; *fr.* 9-18 in. l., 6-9 in. br., deltoid, tri- or quadripinnatifid; *pinnl.* of the lower pinnæ lanceolate, 2-3 in. l., 1 in. br., with deltoid or oblong *segm.*, the lowest of which are cut down nearly to the rachis; *texture* coriaceous; *sori* deeply half-cup-shaped in the teeth, with a broad space outside them, which projects like a horn beyond them.—*Hk. Sp. Fil.* 1. p. 170. t. 55. C.

Hab. New South Wales.—Very near *D. canariensis* in habit and texture, but somewhat more finely cut and veined.



46. *D. Canariensis*, Smith; *rhizome* stout, creeping, densely clothed with pale-brown linear scales; *st.* strong, erect, 4-6 in. l.; *fr.* 12-18 in. l., 9-12 in. br., deltoid, quadripinnatifid; *pinnl.* of the lower pinnæ lanceolate-deltoid, 2-3 in. l., more than 1 in. br., with ovate-rhomboidal deeply inciso-pinnatifid *segm.*; *texture* coriaceous; *sori* occupying a whole ultimate division or with a horn beyond them; *invol.* half-cupshaped.—*Hk. Sp.* 1. p. 169. t. 56. A.

Hab. Spain, Portugal, N. Africa, the Canaries, and Madeira.

47. *D. bullata*, Wallich; *rhizome* creeping, stout, densely clothed with light-brown or whitish fibrillose scales; *st.* strong, erect, 3-4 in. l.; *fr.* 8-12 in. l., 4-8 in. br., deltoid, quadripinnatifid; *pinnl.* of the lower pinnæ lanceolate, 2-3 in. l., 1 in. br., with deeply inciso-pinnatifid oblong-rhomboidal *segm.*; *texture* coriaceous; *sori* deeply half-cupshaped, occupying the greater part of the tooth in which they are placed, marginal, with usually a horn on the outside.—*Hk. Sp. Fil.* 1. p. 169. t. 50. B.

Hab. Hindostan, ascending in the north to 3-4,000 ft., Japan, Java, and Malayan Peninsula.—Very near *D. Canariensis* and *pyxidata*, but smaller, and somewhat thinner in texture, and the scales of the rhizome different.

48. *D. nitidula*, Kunze; *rhizome* stout, creeping, fibrillose; *st.* 6-8 in. l., firm, but rather slender; *fr.* 12-24 in. l., 9-15 in. br., deltoid, quadripinnatifid; *pinnl.* of the lower pinnæ deltoid, cut down to the rachis into rather distant deltoid *segm.*, the lobes of which are again deeply pinnatifid; *texture* between herbaceous and coriaceous; *sori* half-cupshaped, two-horned, occupying the whole of the end of the ultimate teeth.—*Hk. Sp. Fil.* 1. p. 165. t. 44. A.

Hab. Natal, *Dr. Pappe*; and fine specimens have recently been gathered by Dr. Welwitsch in Angola at 1-2,000 ft. Frond rather flaccid, rachises slender and flexuose.

49. *D. Fijiensis*, Hk.; *rhizome* creeping, stout, densely fibrillose; *st.* 6-9 in. l., erect, strong; *fr.* 12-18 in. l., 6-12 in. br., deltoid, quadripinnatifid; *pinnl.* of the lower pinnæ deltoid-lanceolate, the lobes of the segment cut down nearly to the rachis into narrow linear divisions,  $\frac{1}{8}$ - $\frac{1}{4}$  in. l.; *texture* coriaceous; *sori* half-cylindrical, terminal on the dilated apices of the segments, sometimes with a slight wing, but no horn.—*Hk. Sp.* 1. p. 166. t. 55. D.

Hab. Fiji Islands, plentiful.—The most finely-divided species of the series.

§§§§§ Microlepia. *Invol. membranaceous, shallowly half-cupshaped, attached at the sides as well as the base.* Sp. 50-65. *Fronde very various in size, texture, and cutting. This sub-genus has its head-quarters in S. E. Asia and Polynesia. Four species are American and one African. Differing also from Humata, Eudavallia, and Leucostegia, in having the stems, except in D. ciliata, continuous with the caudex, and consequently falling under a different primary division (Desmobrya) of J. Smith's classification.*

50. *D. (Micro.) Hookeriana*, Wallich; *rhizome* creeping, both it and the lower part of stem pubescent-fibrillose; *st.* stout, erect, 4-6 in. l.; *fr.* 12-18 in. l., 6-8 in. br., simply pinnate; largest *pinnæ* 4 in. l.,  $\frac{3}{4}$  in. br., linear-acuminate, truncate and auricled at the base above, slightly undulated below, and toothed towards the point; *texture* subcoriaceous; *rachis* and *veins* beneath villose; *sori* in continuous rows along the edges; *invol.* small, about as broad as deep.—*Hk. Sp.* 1. p. 172. t. 47. B.

Hab. Sylhet, Kamoun, and Assam, Hongkong.

51. *D. (Micro.) Saccoloma*, Spreng.; *rhizome* wide-creeping, often climbing; *fr.* 4-6 ft. l., simply pinnate; lower *pinnæ* 1 ft. l., rather over 1 in. br., linear-acuminate, sharply but not deeply toothed towards the point, undulated

below; *texture* subcoriaceous, but thin; *sori* in long continuous rows along the edges; *invol.* thin, twice as broad as deep.—*Hk. Sp.* 1. p. 171. *Saccoloma elegans*, *Kaulf., J. Smith.*

Hab. Tropical America, from Guatemala and W. Indies southward to Rio Janeiro.

52. *D. (Micro.) pinnata*, Cav.; *rhizome* creeping, fibrillose; *st.* strong, erect, 6-12 in. l.; *fr.* 9-15 in. l., 4-8 in. br., with distant linear slightly toothed *pinnæ* 6 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br.; *texture* coriaceous; *sori* one to each tooth, small, submarginal.—*Hk. Sp.* 1. p. 173. t. 60. f. 1. and 4. *D. serrata*, *Blume.*— $\beta$ , *D. gracilis*, *Blume*; lower *pinnæ* cut down nearly to the rachis into narrow, linear, oblong lobes.—*D. Luzonica*, *Hk. Sp.* 1. p. 174. t. 60. f. 2. 3. and 5.

Hab. Malayan Peninsula, Java, and Polynesian Islands.—This and the two preceding are very distinct species, easily distinguishable from the rest by their simply pinnate habit and long narrow *pinnæ*.

53. *D. (Micro.) Wilfordii*, Baker; *rhizome* creeping; *st.* 4-6 in. l., slender, naked, flexuose; *fr.* 6-9 in. l., 2-3 in. br.; lanceolate, tripinnatifid; lower *pinnæ* deltoid, stalked, about 1 in. l.,  $\frac{1}{2}$  in. br., cut down to the rachis below with broadly ovate-rhomboidal sharply toothed *pinnules*; *texture* herbaceous; *rachis* and both surfaces naked; *sori* 2 to 6 to a *pinnule*, apical in the teeth.—*D. rhomboidea*, *Hk. 2nd Cent.* t. 48. not *Wallich.* *Microlepia Wilfordii*, *Moore.*

Hab. Japan; gathered both by Messrs. Wilford and Oldham.—This and the next, it will be seen, are very diminutive compared with all the species that follow.

54. *D. (Micro.) pilosella*, *Hk.*; *rhizome* creeping, slender, pubescent; *st.* slender, erect, 3-4 in. l., pubescent; *fr.* 6-9 in. l., 2 in. br., lanceolate, tripinnatifid; lower *pinnæ* deltoid-lanceolate, about 1 in. l., cut down to a broadly-winged rachis with oblong, rather sharply toothed, lobes; *texture* herbaceous; *rachises* and both surfaces softly hairy; *sori* 2 to 6 to a *pinnule*, marginal in the teeth.—*Hk. 2nd Cent.* t. 96.

Hab. Japan and Tsus Sima; gathered by Messrs. Wilford and Oldham.

55. *D. (Micro.) ciliata*, *Hk.*; *rhizome* creeping, covered with soft brown hairs; *st.* 3-4 in. l., firm, erect, pubescent; *fr.* 12-18 in. l., 6-9 in. br., ovate-lanceolate, tripinnatifid; *pinnæ* spreading, lanceolate, the central ones the largest, 3-5 in. l.,  $1\frac{1}{2}$  in. br., cut down to a broadly-winged rachis, with oblong *pinn.* cut about halfway down with falcate, mucronate teeth; *texture* thinly herbaceous, flaccid; *rachises* and under surface softly hairy; *sori* 2 to 12 to a *pinnule*, very small, placed near the centre of the teeth near the base.—*Hk. Sp. Fil.* 1. p. 184. t. 60. A. *Leucostegia hirsuta*, *J. Smith.*

Hab. Philippine Islands.

56. *D. (Micro.) villosa*, *Wallich*; *rhizome* strong, creeping, villose; *st.* 1-2 ft. l., erect, strong; *fr.* 18-24 in. l., 9-15 in. br., once pinnate; *pinnæ* 4-8 in. l., about 1 in. br., linear, cut down about halfway to the rachis, or less, into bluntish oblong lobes, the base above parallel with the stem, that of the lower side obliquely truncate; *texture* subcoriaceous; *rachises* densely villose and under surface also hairy; *sori* 2 to 8 to a lobe, submarginal.—*Hk. Sp.* 1. p. 172. t. 48. A. *D. calvescens*, *Wallich.* *Hk. Sp.* 1. p. 172. t. 48. B.

Hab. Ceylon, and flank of the Himalayas, Japan, China.

57. *D. (Micro.) strigosa*, *Swartz*; *rhizome* stout, creeping, pubescent; *st.* erect, strong, 6-12 in. l., both it and the rachis pubescent throughout; *fr.* 1-3 ft. l., 6-12 in. br., lanceolate, bipinnatifid; lower *pinnæ* 4-8 in. l.,  $\frac{3}{4}$ -1 in. br., linear-lanceolate, much acuminate, cut down to the rachis with unequal-sided, broadly



and rather bluntly toothed, oblong, rhomboidal *pinnl.*; *texture* subcoriaceous; *veins* beneath prominently raised and, like the rachises, more or less hairy; *sori* 2 to 12 to a pinnule, small, placed at the base of the sinuses.—*D. Khasiyana*, *Hk. Sp. 1. p. 173. t. 47. A. and 57. A.*— $\beta$  *D. rhomboidea*, Wall.; similar to *a* in texture and hairiness, but rather larger in all its parts, lower *pinnl.* lanceolate-deltoid,  $1\frac{1}{2}$  in. l., cut down nearly to the rachis into oblong lobes.—*D. poly-podioides*  $\gamma$  and  $\delta$ , *Hk. Sp. Fil. 1. p. 182.*

Hab. North of India, ascending in the Himalayas to 3-5,000 ft., Ceylon, Japan, Malayan Peninsula and Isles, S. E. China, Sandwich and Fiji Islands.—This is very similar to the last in habit, but is at least bipinnatifid.

58. *D. (Micro.) platyphylla*, Don.; *rhizome* creeping, stout, scaly; *st.* 2-3 ft. l., firm, erect; *fr.* 3-4 ft. l., tripinnatifid; lower *pinnæ* 12-15 in. l., 6-9 in. br., lanceolate, with distant linear lanceolate *pinnl.*, which are cut nearly to the rachis below into broad bluntish, toothed, oblong-deltoid lobes; *texture* subcoriaceous, both surfaces naked; *sori* 2 to 12 to a segment, placed one in each tooth a short distance from the edge, about a line across.—*D. lonchitidea*, Wall. *Hk. Sp. 1. p. 173. t. 46. B. Exot. F. t. 19.*

Hab. Throughout Hindostan from Ceylon to the Himalayas.

59. *D. (Micro.) urophylla*, Hk.; *st.* strong, erect, 2-3 ft. l.; *fr.* 2-3 ft. l., tripinnatifid; lower *pinnæ* 9-12 in. l., 6-8 in. br., lanceolate with distant lanceolate lower *pinnl.*, which are cut down to the rachis below into ovate-deltoid, acuminate, unequal-sided, broadly-toothed lobes; *texture* coriaceous, both surfaces naked; *sori* submarginal, one to each of the lower sinuses of the lobes.—*Hk. Fil. Exot. t. 19. note.*

Hab. Bootan, Griffith.

60. *D. (Micro.) Thwaitesii*, Baker; *rhizome* creeping, tomentose; *st.* 6-12 in. l., erect, naked; *fr.* 2-3 ft. l., lanceolate-deltoid, tripinnatifid; lower *pinnæ* 9-12 in. l., 3-4 in. br., lanceolate; *pinnl.* lanceolate-acuminate, cut down nearly or quite to the rachis into blunt slightly crenated oblong lobes; *rachis* and both surfaces slightly hairy, the upper bright-green, shining; *texture* subcoriaceous; *sori* small, submarginal, 2 to 12 to a segment.—*D. proxima*, Thwaites *Enum. Pl. Zeyl. p. 238. non Blume.*

Hab. Ceylon.—This comes nearest to *urophylla*, but the segments are shorter and blunter and the *sori* are smaller. An authenticated specimen of Blume's plant is probably *D. hirta*.

61. *D. (Micro.) inæqualis*, Kunze; *rhizome* creeping; *st.* stout, 2-3 ft. l.; *fr.* 2-3 ft. l., 12-18 in. br.; ovate-lanceolate, quadripinnatifid; lower *pinnæ* 9-12 in. l., 4-8 in. br., with lanceolate *pinnl.* 3-5 in. l., 1-2 in. br.; lower *segm.* cut down nearly to the rachis with oblong toothed lower lobes; *texture* herbaceous, both surfaces naked; *sori* 2 to 12 to a segment, small, placed in the teeth at a short distance from the margin.—*Hk. Sp. 1. p. 180. excl. var.  $\gamma$ . t. 57. B.*

Hab. Tropical America from Jamaica and Guadeloupe, southward to Peru and Rio Janeiro, Aneiteum, and Philippine Islands.—The var. *nigrescens*, Kunze, is a large form which turns nearly black when dried. A plant from Burchell, No. 3549, marked by Professor Mettenius *Saccoloma Brasiliensis*, Mett. (*Davallia*, Hook.), has the lower pinnules only cut down to the rachis at the very base.

62. *D. (Micro.) campyleura*, Kunze; *st.* strong, erect, about 1 foot high; *fr.* 2-3 ft. l., 9-18 in. br., deltoid, quadripinnatifid; lower *pinnæ* lanceolate, 9-12 in. l., 4-6 in. br., the *segm.* of the pinnules cut down to the rachis into broadly-toothed, oblong lobes in the lower part; *texture* subcoriaceous, both surfaces naked; *sori* 1 to 6 in a lobe, placed in the teeth, small, submarginal.—*D. inæqualis*,  $\gamma$  minor, *Hk. Sp. Fil. 1. p. 180. t. 58. A.*

Hab. Polynesian Islands.—*M. papillosa* of Brackenridge seems to belong here. *D. Amboynensis*, Hk. Sp. 1. p. 178. t. 56. C., is apparently a reduced form of this, with only the lowest pinnules cut down to the rachis.

63. *D.* (Micro.) *Denhami*, Hk.; *rhizome* creeping; *st.* 4-8 in. l., slender, erect; *fr.* 12-24 in. l., 6-12 in. br., ovate, quadripinnatifid; *pinnl.* of the lower pinnæ lanceolate,  $1\frac{1}{2}$ -3 in. l., 1 in. br., cut down to the rachis into oblong toothed *segm.*, the lower ones  $\frac{1}{4}$  in. l.,  $\frac{1}{8}$  in. br.; *texture* herbaceous, both surfaces naked; *sori* numerous, very small, terminal in the teeth; *invol.* half-cupshaped.—*Hk. 2nd Cent. t. 47. Brack. p. 236.*

Hab. Fiji and Samoa.—Near *D. campyleura*, but much more finely cut and thinner in texture.

64. *D.* (Micro.) *hirta*, Kaulf.; *st.* strong, 12-24 in. l.; *fr.* 3-6 ft. l., 12-24 in. br., deltoid, tri- or quadripinnatifid; lower pinnæ 6-12 in. l., 3-4 in. br., ovate-lanceolate; *pinnl.* lanceolate, cut down to the rachis into oblong broadly-toothed lobes; *texture* coriaceous; *rachis* and especially the under surface pubescent; *veins* beneath prominently raised; *sori* 2 to 20 to a segment, placed one or more together at the base of the teeth.—*Hk. Sp. 1. p. 181. D. proxima, Blume?*

Hab. North of India, Ceylon, Malayan and Polynesian Islands.—This has the stature and habit of *D. Spelunca* combined with the coriaceous texture and prominent venation of *D. strigosa*.

65. *D.* (Micro.) *Spelunca*, Baker; *st.* strong, 12-18 in. l.; *fr.* 3-6 ft. l., 12-24 in. br., deltoid, tri- or quadripinnatifid; lower pinnæ 6-12 in. l., 3-4 in. br., ovate-lanceolate; *pinnl.* lanceolate, cut down to the rachis below into oblong deeply-toothed lobes; *texture* herbaceous; *rachis* and under surface hairy; *veins* beneath neither prominent nor rigid; *sori* 2 to 20 to a segment, placed one or more together at the base of the lobes.—Polyp., *L. D. polypodioides, a* and *β, Hk. Sp. 1. p. 181. D. Jamaicensis, Hk. Sp. 1. p. 183. D. trichosticha, Hk. Sp. 1. p. 183. D. Madagascariensis, Kunze.*

Hab. Hindostan, ascending in the Himalayas to 1-7,000 ft., S. E. China, Ceylon, and Polynesian Islands, southward to Norfolk Island, and Queensland, Madagascar, Bourbon, West Tropical Africa, and Macalisberg mountains, west of Natal. West Indian Islands, southward to Brazil.—This is much more tender in texture than *D. strigosa* and *hirta*, so much so, that the pinnæ are liable to shrivel up when the plant is gathered in a hot country. It resembles *Dicksonia rubiginosa* considerably in general appearance, and has a wide geographical range.

§§§§§ *Loxoscaphe*, Moore. *Invol. forming a compressed suborbicular or cup-shaped pouch at the side of the segments, which is open only at the top. All decomposed with linear ultimate segments. Sp. 66-69. A very natural group, allied in habit to Darea, but quite different in the fructification.*

66. *D.* (Lox.) *concinna*, Schrad.; *st.* tufted, 3-4 in. l., erect, naked; *fr.* 6-9 in. l., 2-3 in. br., oblong-acuminate, bipinnate; lower pinnæ erecto-patent,  $1\frac{1}{2}$ -2 in. l.,  $\frac{1}{2}$  in. br., with simple or forked branches equalling the rachis in breadth, 2-3 lin. l.,  $\frac{1}{2}$  lin. br.; *texture* stoutly herbaceous, surfaces naked; *sori* half-cupshaped, 1 lin. br., sunk in the dilated apices of the segments.—*Hk. Sp. 1. p. 193. D. Schimperii, Hk. Sp. 1. p. 193. t. 50. B. D. thecifera, H. B. K. Hk. Sp. Fil. 1. p. 189. D. Lindeni, Hk. Sp. 1. p. 193. t. 56. B.*

Hab. Andes of Colombia and Ecuador, Brazil, Cape Colony, Natal, Bourbon, Abyssinia, Angola, and Fernando Po.

67. *D.* (Lox.) *gibberosa*, Swartz; *st.* tufted, 6-12 in. l., erect, naked; *fr.* 12-18 in. l., 6-9 in. br., lanceolate-deltoid, quadripinnatifid; *pinnl.* of lower pinnæ lanceolate-deltoid, 2-3 in. l., 1 in. br.; *segm.* cut down to the rachis with



linear or forked ultimate divisions, 1-2 lin. l., equalling the rachis in breadth; *texture* stoutly herbaceous, surfaces naked; *sori* terminal in the ultimate divisions or with a horn beyond; *invol.* half-cupshaped,  $\frac{1}{2}$  lin. across.—*Hk. Sp.* 1. p. 192.

Hab. Polynesian Islands.—Like *D. concinna* in habit, several times multiplied.

68. *D. (Lox.) nigrescens*, Hk.; *st.* 6-9 in. l., stout, erect, paleaceous below; *fr.* 12-24 in. l., 9-15 in. br., ovate-lanceolate, quadripinnatifid; lower *pinnæ* 4-8 in. l.,  $1\frac{1}{2}$ -2 in. br., lanceolate, acuminate; *pinnl.* deltoid, unequal-sided, cut down to the rachis throughout; *segm.*, especially on the upper side, deeply incise-pinnatifid, ultimate divisions linear, about  $\frac{1}{8}$  in. l.,  $\frac{1}{2}$  lin. br.; *texture* herbaceous; *sori* 2 to 6 to a pinnule, lateral on the upper side of the divisions; *invol.* half-cupshaped.—*Hk. 2nd Cent. Ferns*, t. 93.

Hab. Fernando Po, at an elevation of 3,000 ft., *G. Mann.*—Nearest *L. gibberosa*, but the pinnules shorter and more divided, with flatter segments and pubescent rachises.

69. *D. (Lox.) foeniculacea*, Hk.; *st.* erect, firm, 6-8 in. l.; *fr.* 9-18 in. l., 6-12 in. br., lanceolate-deltoid, quadripinnate; lower *pinnl.* lanceolate-acuminate, 2-3 in. l., 1 in. br.; *segm.* cut down to the rachis into simple or forked linear filiform ultimate divisions, 1-2 lin. l., equalling the rachis in breadth; *texture* herbaceous; *sori* 2-6 to a segment, lateral, deeply half-cupshaped, under  $\frac{1}{2}$  lin. br.—*Hk. 2nd Cent. Ferns*, t. 54.

Hab. Fiji group; gathered by Mr. Milne.—A very distinct and finely-cut species. Habit of *D. trichomanoides*, but *sori* quite different.

§§§§§§ *Stenoloma*, Fée. *Invol.* as in *Loxoscaphe*, but terminal on the segments. *Sp.* 70-79. *Fronde* very various in size, but the ultimate segments always cuneate, growing gradually wider from the base to the apex. Scattered throughout the tropics. *Odontosoria*, *J. Smith.* This goes with *Microlepia* into *J. Smith's Desmobra*.

\* *Fronde* 6-18 in. l., not climbing.

70. *D. (Steno.) Goudotiana*, Kunze; *rhizome* creeping, slender, fibrillose; *st.* not more than 1 in. l.; *fr.* 4-6 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., linear-oblong; main *rachis* not branched; largest *pinnæ* deltoid,  $\frac{1}{2}$  in. l., more than  $\frac{1}{4}$  in. br., cut down to a slender subfiliform rachis into simple or forked linear-cuneate thinly herbaceous segments; *sori* terminal, suborbicular, 1 to each segment.—*Hk. Sp.* 1. p. 189. t. 50. C., 2 *Cent. t.* 23.

Hab. Madagascar.

71. *D. (Steno.) bifida*, Kaulf.; *rhizome* short; *st.* 4-8 in. l., wiry, naked, flexuose; *fr.* 4-8 in. l., 2-4 in. br., ovate-deltoid, quadripinnatifid; *pinnæ* flaccid, 2-4 in. l., lanceolate-deltoid, the lower *pinnl.* cut down to a filiform rachis, with deeply-cut pinnatifid or flabellate *segm.*, ultimate divisions linear-cuneate, thinly herbaceous,  $1\frac{1}{2}$ -2 $\frac{1}{2}$  lin. l., less than  $\frac{1}{3}$  lin. br. at the point; *sori* small, terminal, suborbicular.—*Hk. Sp.* 1. p. 188. *Hk. & Gr. Ic.* t. 238.

Hab. Minas Geraes and Organ Mountains, Brazil.

72. *D. (Steno.) scoparia*, Hk. MSS.; *rhizome* strong, creeping; *st.* strong, erect, 6-12 in. l.; *fr.* 6-9 in. l., 4-6 in. br., deltoid, tri- or quadripinnatifid; *pinnæ* lanceolate, erecto-patent; *pinnl.* again pinnatifid with forked or pinnatifid lower *segm.*, ultimate divisions subcoriaceous, linear-cuneate,  $\frac{1}{4}$  in. l.,  $\frac{1}{2}$  lin. br. at the point; *sori* small, suborbicular, often not occupying the whole apex of the segment.—*Lindsaya, Mett. Fil. N. Caled.* p. 64.

Hab. New Caledonia, *Viellard*, No. 1550.—Very near *D. clavata*, but the pinnæ and segments are rather stouter and more rigid in texture.

73. *D. (Steno.) clavata*, Swartz; *rhizome* stout, creeping, densely villose; *st.* strong, erect, 6-9 in. l.; *fr.* 6-9 in. l., 3-4 in. br., ovate-lanceolate, tri- or quadripinnatifid; *pinnæ* distant, with distant *pinnl.*, the latter cut down to a filiform rachis; *segm.* again pinnatifid, ultimate divisions herbaceous in texture, linear-cuneate,  $\frac{1}{4}$ - $\frac{2}{3}$  in. l.,  $\frac{1}{2}$  lin. br. at the top; *sori* terminal, suborbicular or reniform, sometimes confluent.—*Hk. Sp. 1. p. 187.*

Hab. West Indian Islands.

74. *D. (Steno.) tenuifolia*, Swartz; *rhizome* stout, creeping, densely fibrillose; *st.* strong, erect, polished, naked, dark-brown, 6-12 in. l.; *fr.* 12-18 in. l., 6-9 in. br.; ovate, quadripinnatifid; lower *pinnæ* ovate-lanceolate, 4-6 in. l., 2-3 in. br.; *pinnl.* lanceolate, their segments cut down to the rachis below with toothed cuneate lobes, 1-1 $\frac{1}{2}$  lin. across at the apex; *texture* subcoriaceous, both surfaces naked, the upper shining; *sori* terminal, usually solitary, often rather broader than deep.—*Hk. Sp. Fil. 1. p. 186.*— $\beta$ , *D. Chineseis*, Smith; *fr.* smaller; *segm.* broader; *sori* 1 to 4 in a lobe.—*Hk. Sp. 1. p. 187.*

Hab. Common in tropical Asia and Polynesia, ascending northward to Japan, and 5,000 ft. in the Himalayas, Madagascar, Bourbon, and Mauritius.

\*\* *Fronde several feet long, usually climbing.*

75. *D. (Steno.) uncinella*, Kunze; *st.* 6-8 ft. l., wide-climbing, flexuose, prickly; *fr.* tripinnate; lower *pinnæ* 1-2 ft. l., with a long unbranched terminal segment and a few lateral ones, the lowest of which are also long and flexuose; *segm.*  $\frac{1}{4}$  in. br. and deep, obliquely truncate below, blunt at the point, broadly and bluntly lobed above; *veins* not prominent; *texture* thick, subcoriaceous; *sori* small, cupshaped, marginal.—*Kunze in Schk. Suppl. 2. p. 96. t. 140.*

Hab. Cuba and Porto Rico.

76. *D. (Steno.) aculeata*, Swartz; *rhizome* creeping, stout, fibrillose; *st.* (including rachis) 4-6 ft. l., strong, scandent, spinoso-flexuose; *fr.* tripinnatifid; lower *pinnæ* 12-18 in. l., 4-6 in. br., ovate-lanceolate; *pinnl.* lanceolate, 2-3 in. l., 1 in. br.; *segm.*  $\frac{1}{4}$  in. br., cuneate, deeply 2 to 4 lobed, lobes with 2 or 4 veins; *texture* herbaceous; *veins* prominent beneath, once or twice flabellately forked; *sori* small, cupshaped, terminal.—*Hk. Sp. 1. p. 191. t. 54. B.*

Hab. West Indian Islands, common.

77. *D. (Steno.) Melleri*, Hk. MSS.; *st.* wide-creeping, scandent, not prickly; *fr.* quadripinnatifid; *pinnl.* of lower *pinnæ* 2-3 in. l., 1 $\frac{1}{2}$  in. br., ovate; *segm.* 1 in. l.,  $\frac{2}{3}$  in. br., cut down to the rachis below, lobes  $\frac{1}{4}$ - $\frac{2}{3}$  in. br., cuneate at the base, both deeply toothed and shallowly crenate; *texture* herbaceous; *veins* not prominent; *sori* small, marginal, shallow, usually cupshaped, sometimes but not always as broad as the lobe in which they are placed, sometimes two confluent.

Hab. Madagascar; gathered by Meller and Lyall.—Intermediate between *D. aculeata* and *Lindsaya retusa*, and according to our definitions, with as good a right to be placed in one genus as the other.

78. *D. (Steno.) fumarioides*, Swartz; habit of *D. aculeata* and the stem and rachises similarly prickly, but *segm.* smaller and more deeply cut, the lobes but slightly broader at the apex than the base, usually only one-veined; *sori* cupshaped, as broad as the segment.—*Hk. Sp. 1. p. 191.*

Hab. West Indian Islands.



79. D. (Steno.) *Schlechtendalii*, Presl ; *fr.* 2-3 ft. l., 1-2 ft. br. ; main *rachis* strong, straight, naked ; lower *pinnæ* 9-12 in. l., 4-6 in. br., ovate-lanceolate, spreading or deflexed, with a zigzag rachis ; *pinnl.* 2-3 in. l., about 1 in. br., cut down to a narrowly-winged strong rachis ; *segm.* cut down to a centre which equals in breadth the narrow linear forked or flabellate ultimate divisions ; *texture* herbaceous ; *sori* small, terminal, suborbicular.—*Hk. Sp.* 1. p. 189. t. 54. C.

Hab. Mexico and Guatemala, ascending to 3,500 feet.

#### GEN. 19. CYSTOPTERIS, Bernh.

*Sori* globose, placed on the back of the veins. *Invol.* membranaceous, suborbicular, inserted by its broad base under the sorus, which at the beginning it covers like a hood.—Fronds *small*, two or three times divided, thin in *texture*, veins *free*. Allied to *Woodsia* and *Microlepia*, and exceptional amongst the ferns in its geography, having its head-quarters in the Temperate Zones of both hemispheres.  
TAB. II. f. 19.

1. C. *fragilis*, Bernh. ; *st.* 2-4 in. l. ; *fr.* 4-8 in. l., 1½-2 in. br., ovate-lanceolate, tripinnatifid ; main *rachis* slightly winged above ; largest *pinnæ* 1-1½ in. l., ½-¾ in. br., lanceolate-deltoid ; *pinnl.* oblong-rhomboidal, cut down to a broad central space into bluntly- or sharply-toothed lobes ; *texture* herbaceous ; *sori* 2 to 12 to a pinnule. *Hk. Sp.* 1. p. 197. *Brit. Ferns*, t. 23.

Hab. Europe and Asia, everywhere from Iceland to Kamschatka, from the Arctic regions to Madeira, and the Himalayas, where it ascends to 15,000 ft. ; mountains of Abyssinia and Fernando Po ; South Africa ; Van Diemen's Land, New Zealand, Sandwich Islands ; Temperate N. and S. America, and mountains in the intermediate Tropical Zone. *C. Tasmanica*, *Sandwicensis*, and *Douglasii*, do not appear to be safely separable.

2. C. *alpina*, Desv. ; *st.* 2-4 in. l. ; *fr.* 4-8 in. l., 1-2 in. br., oblong-lanceolate, tripinnatifid ; main *rachis* more or less winged above ; largest *pinnæ* deltoid, lanceolate, 1-1½ in. l., ½-¾ in. br. ; *pinnl.* ovate-rhomboidal, cut down to the rachis below into slightly toothed *segm.* ; *texture* herbaceous ; *sori* small, 2 to 12 to a pinnule.—*Hk. Sp.* 1. p. 199. *Brit. Ferns*, t. 24. *Aspid. Taygetense*, *Bory and Chaub.*

Hab. Mountains of Europe from Sweden to Greece and Spain, and Asia Minor.—In England naturalized on a wall at Low Leyton, Essex. A more tender and usually more finely-divided plant than the last, but often difficult to distinguish.

3. C. *bulbifera*, Bernh. ; *st.* 4-6 in. l. ; *fr.* 6-12 in. l., 3-4 in. br. at the widest part, ovate-lanceolate, often much elongated upwards, bi- or tripinnatifid ; lower *pinnl.* lanceolate or ovate-lanceolate, 2-3 in. l., 1 in. br. ; *segm.* linear-oblong, cut down to the rachis below, very slightly toothed ; *sori* 2 to 12 to a pinnule, usually in two rows, one in each segment.—*Hk. Sp.* 1. p. 199. *C. atomaria*, Presl.

Hab. N. America from Canada southward to Virginia and N. Carolina.—A very distinct plant, which takes its name from the large fleshy bulblets which are formed in the axils of the upper pinnæ. These often fall to the ground and become new plants, which, Prof. Eaton says, are about two years in coming to maturity.

4. C. *sudetica*, A. Br. & Milde ; *rhizome* wide-creeping ; *st.* slender, 6-9 in. l. ; *fr.* 6-8 in. each way, deltoid, tri- or quadripinnatifid ; lowest *pinnl.* deltoid-lanceolate, 1-1½ in. l., less than ½ in. br. ; lower *segm.* ¼ in. l., 2 lin. br., ovate-rhomboidal, deeply toothed ; *texture* herbaceous ; *sori* much larger than in *C. montana*, only 2 to 6 to the lower segments.—*Nov. Act.* vol. 26. P. 2. p. 554. t. 44.

Hab. Silesia, Sudetes of Moravia, and the Carpathians.—This species combines the habit of *C. montana* with the texture of *C. fragilis*.

5. *C. montana*, Link ; *rhizome* wide-creeping ; *st.* slender, erect, 6-9 in. l. ; *fr.* about 6 in. each way, deltoid, quadripinnatifid ; lowest *pinnl.* deltoid-lanceolate, 1-1½ in. l., ½-¾ in. br. ; *segm.* cut down to the rachis below, the lobes oblong, 2 lin. l., 1 lin. br., deeply and sharply toothed ; *texture* thinly herbaceous ; *sori* small, 18 to 24 to the lower segments.—*Hk. Sp.* 1. p. 200. *Brit. Ferns*, t. 25.

Hab. Mountains of Scandinavia, Scotland (very rare), and Central Europe ; Kam-schatka, east side of the Rocky Mountains, N. America.

#### TRIBE 5. LINDSAYEÆ.

*Sori* placed in a line at or very near the edge of the frond, covered with an involucre, the inner valve of which is membranaceous, the outer (obsolete in *Dictyoxiphium*) formed of the margin of the frond. GEN. 20-20\*.

#### GEN. 20. LINDSAYA, *Dryand.*

*Sori* marginal or submarginal, placed at the apex of and uniting two or more veins. *Invol.* double, opening outwardly, the inner valve membranaceous, the outer formed of the more or less changed (scarcely changed in *Diellia* and some other species) margin of the frond. *A moderately extensive genus, only a few species of which pass outside the tropics, most, but not all, the species of which have one-sided pellucido-herbaceous or coriaceous pinnæ, approximating in shape to a quarter of a circle.* TAB. II. f. 20.

§ *Eulindsaya*. *Pinnæ unilateral, veins free.* Sp. 1-25. *A well-marked section, which has its head-quarters in Tropical America, Asia, and Polynesia, but reaches the Mauritius, Japan, and Australia, with the habit of Adiantum, with fronds often pellucid.*

† *Main rachis unbranched.* Sp. 1-12.

1. *L. linearis*, Swartz ; *rhizome* wiry, creeping ; *st.* wiry, flexuose, black, shining, 4-8 in. l. ; *fr.* 6-12 in. l., ½ in. br., simply pinnate ; *pinnæ* 3 lin. l., 2 lin. deep, the upper edge very slightly toothed, the lower ones with often a considerable space between them ; *texture* thickly pellucido-herbaceous ; *sori* in a continuous line along the upper edge.—*Hk. Sp.* 1. p. 206.

Hab. Australia, Van Diemen's Land, New Caledonia, and New Zealand.—Pinnules often distinctly flabellate in shape, readily curling up when dry. It has much the smallest pinnæ of the unbranched group.

2. *L. falciformis*, Hk. ; *rhizome* short-creeping ; *st.* very short, close together ; *fr.* 3-4 in. l., ½-¾ in. br., simply pinnate ; *pinnæ* 4 lin. l., ½ in. deep, distinctly falcate towards the outside, both margins entire, close together, but not imbricated ; *texture* pellucido-herbaceous ; the costal vein parallel with the lower edge at a short distance from it ; *sori* in a continuous marginal line.—*Hk. Sp.* 1. p. 208. t. 64. B.

Hab. British Guiana ; gathered by Sir R. Schomburgk.—A very doubtful plant, perhaps young, unbranched *L. trapeziformis*.

3. *L. adiantoides*, J. Sm. ; *st.* nearly tufted, black, polished, wiry, 1-2 in. l. ; *fr.* 4-6 in. l., about 1 in. br., simply pinnate ; *pinnæ* ½ in. l., ¼ in. deep, the upper imbricated, the lower edge straight or slightly curved, the upper rounded and broadly lobed about one-third of the way down ; *texture* pellucido-herbaceous ; *sori* marginal in the lobes.—*Hk. Sp.* 1. p. 204. t. 61. C.



Hab. S. Camarines, Malay Archipelago; gathered by Cuming.—Much resembling small unbranched forms of *L. nitens*, but recognizable by its simple venation.

4. *L. ovata*, J. Sm.; *rhizome* short-creeping; *st.* 2-3 in. l., wiry, flexuose, black; *fr.* 4-6 in. l.,  $\frac{3}{4}$  in. br., simply pinnate; *pinnæ* 4 lin. l., 2 lin. deep, not imbricated, the lower ones with their own breadth between them, horizontally oblong, the point very blunt, the lower side obliquely truncate at the base, the upper slightly auricled; *texture* subcoriaceous; *sori* in a continuous marginal line.—*Hk. Sp.* 1. p. 205. t. 64. A.

Hab. Same station as *L. adiantoides*; gathered also by Cuming.

5. *L. concinna*, J. Sm.; *rhizome* short-creeping; *st.* 2-4 in. l., wiry, erect; *fr.* 6-12 in. l.,  $\frac{3}{4}$  in. br., simply pinnate; *pinnæ* 4 lin. l., 2 lin. deep, very blunt on the outer edge, the upper edge very slightly crenate, the upper ones close together, but scarcely imbricated; *texture* pellucido-herbaceous; *sori* in a continuous or slightly interrupted line along the upper edge.—*Hk. Sp.* 1. p. 205. t. 61. B.

Hab. Philippine Islands and Borneo.

6. *L. Seemanni*, J. Sm.; *rhizome* short-creeping; *st.* wiry, flexuose, 3-6 in. l.; *fr.* 6-12 in. l., about 1 in. br., simply pinnate; largest *pinnæ*  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.,  $\frac{1}{4}$  in. deep, the same shape as those of *L. cultrata*, but the teeth, especially the lower one, deeper and the texture thinner.—*J. Smith in Bot. Herald*, p. 239.

Hab. Bay of Choco, Panama, discovered by Dr. Seemann.—Perhaps an American form of *L. cultrata*.

7. *L. cultrata*, Swartz; *rhizome* short-creeping; *st.* wiry, flexuose, 3-6 in. l.; *fr.* 6-12 in. l., about 1 in. br., simply pinnate; largest *pinnæ*  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.,  $\frac{1}{4}$  in. deep, not imbricated, the lower margin straight or slightly curved, usually upwards, the upper edge slightly lobed, so that the continuity of the line of the fructification is broken, sometimes nearly entire, lower *pinnæ* stalked; *texture* coriaceo-membranaceous.—*Hk. Sp.* 1. p. 203. *Hk. & Gr. Ic.* t. 144. *Hk. Fil. Exot.* t. 67. *L. Lobbiana*, *Hk. Sp.* 1. p. 205. t. 62. C. *L. gracilis*, Blume, *Hk. E. C.*— $\beta$ , *japonica*; *fr.* 2-3 in. l.; *pinnæ* nearly triangular, with the point at the base, upper edge nearly entire.

Hab. North of India, ascending in the Himalayas to 4,000 ft.; Neilgherries, Malayan Peninsula and Islands, Bourbon; and gathered lately by Mr. Hill in Queensland, by Dr. Meller in Madagascar.  $\beta$  is a remarkable variety discovered by Mr. Oldham in Japan.

8. *L. botrychioides*, St. Hil.; *st.* 4-6 in. l., wiry, erect, polished, dark chestnut-brown; *fr.* 9-12 in. l., 1-1 $\frac{1}{2}$  in. br., simply pinnate; *pinnæ*  $\frac{1}{2}$  in. each way, with only the inner third of the lower half cut away, the lower line more or less decurved, the upper line broadly rounded, scarcely lobed, and the outer margin broad and blunt; *texture* herbaceous; *rachis* naked, polished; *sori* in a continuous line round the upper and outer edge and the inner half of the lower one, the outer valve projecting beyond the inner.

Hab. Brazil. Burchell, 4402.—Probably this is only an unbranched form of *L. flabellulata*, which, however, is not known to occur in the New World. Our description is taken entirely from Burchell's specimens named by Mettenius.

9. *L. dubia*, Spreng.; *rhizome* short-creeping; *st.* close together, wiry, 3-6 in. l.; *fr.* 4-8 in. l., 1 $\frac{1}{2}$ -2 in. br., simply pinnate; *pinnæ*  $\frac{3}{4}$ -1 in. l., not more than  $\frac{1}{8}$  in. br., the upper edge crenated towards the gradually narrowing point, even the upper ones with usually  $\frac{1}{4}$ - $\frac{1}{2}$  in. between them, often not truly dimidiate, but with the costa becoming central towards the point; *texture* pellucido-herbaceous; line of the *sori* not interrupted till it reaches the crenations of the outer third of the upper margin.—*Hk. Sp.* 1. p. 209. t. 64. C.

Hab. Venezuela, Guiana, and valley of Amazon.—A very distinct species and interesting as showing a transition from *Eulindsaya* to *Isoloma*.

10. *L. pectinata*, Blume; *rhizome* stout, wide-creeping, scandent, paleaceous; *st.* erect, very short; *fr.* 12-18 in. l., 1-2 in. br., simply pinnate; *pinnæ*  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.,  $\frac{1}{4}$  in. deep, the lower line nearly straight, the upper margin round, slightly crenate, the point not very blunt, close together, but not imbricated; *texture* pellucido-herbaceous; *sori* in an interrupted line along the upper edge.—*Hk. Sp.* 1. p. 287. *L. oblongifolia*, Reinw. *Hk. Sp.* 1. p. 206. t. 61. D.

Hab. Assam and Malayan Peninsula and Islands.—Habit of *Odontoloma repens*, which see. *L. Calomelanos*, Kunze, from Java, is said to be closely allied.

11. *L. scandens*, Hk.; *rhizome* stout, wide-creeping, scandent, paleaceous; *fr.* 9-12 in. l.,  $1\frac{1}{2}$ - $1\frac{3}{4}$  in. br., simply pinnate; *pinnæ*  $\frac{3}{4}$  in. l.,  $\frac{1}{2}$  in. br., the lower line slightly decurved, the upper rounded, entire, the point broadly rounded, placed in a long row close together, but not imbricated; *texture* pellucido-herbaceous; *costa* marginal; *sori* in a continuous marginal line.—*Hk. Sp.* 1. p. 205. t. 63. B.

Hab. Malayan Peninsula and Philippine Islands; gathered by Sir W. Norris, Lady Dalhousie, and Mr. Cuming.—Said to be sometimes bipinnate, but very doubtfully distinct from *L. pectinata*. The two may readily be known from the rest of the group by the stout scandent rhizome.

12. *L. Lapeyrousii*, Baker; *st.* tufted, very short; *fr.* 9-15 in. l., about  $1\frac{1}{2}$  in. br. at the widest part, not branched; *pinnæ* very numerous, about  $\frac{3}{4}$  in. l., with 4-8 spatulate-cuneate second segments cut down to a narrow rachis; *texture* herbaceous, both surfaces naked; *sori* subterminal on the segments; *invol.* shallow, nearly as broad as the segments, which measure a line or more across at the apex.—*Davallia*, *Hk. 2nd Cent.* t. 56.

Hab. Vanekolla and Fiji; gathered by Messrs. C. Moore and Milne.—Readily distinguishable from all the preceding by the *pinnæ* being cut down to the rachis into narrow linear-cuneate segments.

†† *Main rachis more or less branched when the plant attains its full development.*  
*Sp.* 13-25.

13. *L. filiformis*, Hk.; *st.* slender, wiry, very flexuose, brownish-black, polished, 2-4 in. l.; *fr.* 4-6 in. l., with a long simply pinnate apex, and below several pairs of short, spreading, flexuose branches; *pinnl.* 2 lin. br., 1 lin. deep, the lower line curved upwards or downwards, the upper nearly entire, placed near together but not imbricated, obliquely truncate on the side towards the rachis; *texture* pellucido-herbaceous; *sori* in a continuous line along the upper edge.—*Hk. Sp.* 1. p. 212. t. 63. D.

Hab. British Guiana; gathered by Sir R. Schomburgk.—The smallest and most slender of the branched species.

14. *L. Catherinæ*, Hk.; *rhizome* short-creeping; *st.* slender, erect, wiry, polished, 6-9 in. l.; *fr.* 6-9 in. l., with a pinnate summit, and below several spreading branches, the lowest of which are sometimes again branched at the base; *pinnl.*  $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. deep, cut down nearly to the costa into two or three cleft obversely triangular lobes; *texture* thinly pellucido-herbaceous; *sori* not quite as broad as the lobes, the outer valve considerably broader than the inner, and finely toothed.—*Hk. Sp.* 1. p. 212. t. 65. B.

Hab. St. Catherine's, Brazil; gathered by Captain Beechey.—The most divided plant in the pinnules of the branched, as *L. Lapeyrousii* is of the unbranched group.

15. *L. virescens*, Swartz; *rhizome* short-creeping; *st.* 6-9 in. l., slender, flexuose, polished, dark-coloured; *fr.* 6-9 in. l., 4-6 in. br., deltoid in general outline, with



a simply pinnate point, and several pairs of erecto-patent branches, some of which are again a little branched below; *pinnl.* 4 lin. br., 3 lin. deep, nearly entire or once or twice cleft from the upper margin, placed close together, but not imbricated; *texture* thickly pellucido-herbaceous; *sori* in a continuous line except when interrupted by the lobes.—*L. Gardneri*, *Hk. Sp.* 1. p. 213. t. 65. B.

Hab. Organ Mountains, Brazil; gathered by Burchell and Gardner.—Allied in habit to *L. flabellulata*, but the pinnules are smaller and more divided.

16. *L. flabellulata*, Dry.; *rhizome* short-creeping; *st.* wiry, erect, brownish-black, polished, 4-12 in. l.; *fr.* 6-12 in. l., simple or with one or several pairs of lateral branches; *pinnl.*  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., about  $\frac{1}{4}$  in. deep, the lower line nearly straight or decurved, the upper rounded, entire, or lobed, the point broadly rounded; *texture* pellucido-herbaceous; *rachis* naked; *venation* flabellate; *sori* in a continuous line except when interrupted by the lobes.—*Hk. Sp.* 1. p. 211. t. 63. C. *Hk. & Gr. Ic.* 75.

Hab. N. Hindostan, S. E. China, Malayan Peninsula and Islands, Ceylon, N. Australia.—Very variable in the size of the pinnæ and in ramification. Var. *gigantea* of Hooker is an abnormal state, with some of the pinnæ of the central rachis 1-2 in. l., and lengthened out to a narrow point. *L. tenera*, Dryander, *Hk. Sp.* 1. p. 211. (*L. striata*, Blume), only differs by its thinner texture. In this and the preceding the lower pinnæ are often nearly as deep as broad.

17. *L. trapeziformis*, Dry.; *rhizome* short-creeping; *st.* strong, erect, 6-12 in. l.; *fr.* 6-15 in. l., with a long entire point and 1 to 4 pairs of rather rigidly erecto-patent branches, which are often 6-12 in. l.; *pinnæ*  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. deep, the lower line nearly straight or curved upwards or downwards, the upper rounded, entire, closely placed, but scarcely imbricated; *texture* pellucido-herbaceous; *sori* in a continuous line round the upper margin.—*Hk. Sp.* 1. p. 214. *L. quadrangularis*, *Raddi*, *Hk. Sp.* 1. p. 214. *L. horizontalis*, *Hk. Sp.* 1. p. 214. t. 62. B. *L. arcuata*, *Kunze*, *Hk. Sp.* 1. p. 215. *L. caudata*, *Hk. Ic. Pl.* t. 958. *Sp.* 1. p. 215.— $\beta$ , *L. laxa*, *Kunze*, upper margin broadly lobed, so that the line of the fruit is more or less interrupted. *L. Klotzschiana*, *Moritz*.— $\gamma$ , *L. falcata*, *Willd.*; *fr.* not branched; *pinnæ* often very large. *L. Leprieurii*, *Hk. Sp.* 1. p. 208. t. 62. D.

Hab. Tropical America, from Cuba and Guatemala southward to Rio Janeiro; Ceylon, Malayan Peninsula and Islands.—*L. caudata* is a large handsome Ceylonese form, with more branches than usual; *L. arcuata*, a form with long narrow falcate pinnules; and *L. L'Herminieri*, *Fée*, a plant from Guadeloupe, with the pinnules broadest at the outer edge and the upper margin concave.

18. *L. Borneensis*, *Hk. MSS.*; *rhizome* short-creeping, paleaceous; *st.* strong, erect, polished, 9-15 in. l.; *fr.* 12-18 in. l., 9-12 in. br., with a long unbranched apex, and 6 to 9 erecto-patent branches on each side, which are 6-9 in. l.; *pinnl.* 3-4 lin. l., 1 $\frac{1}{2}$ -2 lin. deep, closely placed or even imbricated, quite entire, the outer edge blunt; *texture* pellucido-herbaceous; *veins* prominent; *sori* in a continuous marginal line.

Hab. Forests of Borneo; gathered by Messrs. Lobb and Barber.—This comes very near *L. Guianensis* in habit, but the sori are quite marginal.

19. *L. Guianensis*, Dry.; *rhizome* short-creeping; *st.* 6-12 in. l., rigid, erect, polished; *fr.* 1-2 ft. l., with an entire point and 1 to 6 pairs of lateral erecto-patent branches, 6-9 in. l., which are sometimes again branched; *pinnl.*  $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. br., not lobed and the outer edge bluntly rounded, closely placed and sometimes imbricated; *texture* subcoriaceous; *veins* prominent beneath; *sori* in a continuous line, with the outer valve produced, but altered in texture.—*Hk. Sp.* 1. p. 172. t. 62. A.

Hab. Tropical America from Jamaica southward to Rio Janeiro.—This is inter-

mediate between *trapeziformis* and *stricta*, and is sometimes distinguishable from the former only with difficulty.

20. *L. stricta*, Dry.; *rhizome* short-creeping, fibrillose; *st.* rigid, erect, 12-24 in. l., polished, often chesnut-brown; *fr.* simply pinnate, 12-24 in. l.,  $\frac{1}{2}$  in. br., or with 1 or 2 pairs of erect rigid lateral branches; *pinnl.*  $\frac{1}{2}$  in. br., less deep, the lower line often considerably decurved, the upper rounded, nearly entire, closely placed but imbricated; colour bright-green, but *texture* coriaceous; *sori* in a continuous line round the upper edge.—*Hk. Sp.* 1. p. 216. *L. elegans*, *Hk. Ic. Pl. t.* 98. (*an unbranched form*).

Hab. Tropical America from Mexico and the West Indian Islands southward to Rio Janeiro.—The plant well deserves its name. The pinnules and stems are so rigid, that specimens can be only made to adhere to paper with great difficulty. It is occasionally even tripinnatifid.

21. *L. rigida*, J. Sm.; *rhizome* wide-creeping; *st.* 4-6 in. l., rigid, erect, prickly towards the base; *fr.* with a long unbranched central point and 1 to 4 pairs of flexuose lateral branches, 4-8 in. l.; *pinnl.* 3-4 lin. br., 2 lin. deep, the lower edge often falcate, the upper 3 or 4 times bluntly, not deeply lobed, placed close together but not imbricated; *texture* very thick and coriaceous; *veins* prominent; *sori* in a marginal line on the lobes.—*Hk. Sp.* 1. p. 217. *t.* 63. A.

Hab. Malayan Peninsula, on Mount Ophir.—Much resembling *L. stricta*, but the texture is thicker, the veins more conspicuous, and the upper margin of the pinnules is conspicuously crenate. The colour of the mature frond is sepia-brown, and the pale veins stand out from the groundwork in relief.

22. *L. Kirkii*, Hk. MSS.; *st.* 1-2 ft. l., stout, suberect; *fr.* 1-2 ft. l., 6-9 in. br., with a long unbranched point and numerous (6-9) erecto-patent branches on each side, 6-9 in. l.; *pinnl.* about  $\frac{1}{2}$  in. br.,  $\frac{1}{4}$  in. deep, much decurved at the base, the outer edge rounded, the upper crenate, that nearest the rachis frequently overlapping it, and the pinnules placed so close that one overlaps the base of the next above it; *texture* thinly herbaceous; *veins* prominently channelled; *sori* numerous round the upper edge, not more than twice as broad as deep, protruded from the margin, terminating only one or two of the veins.

Hab. Seychelles Islands; gathered by M. Bouton, Dr. Kirk, and R. W. Rawson, Esq.—A very distinct and handsome species. The veins occasionally anastomose.

23. *L. pendula*, Klotzsch; *rhizome* wide-creeping, densely clothed with dark chesnut-brown fibrils; *st.* erect, 6-9 in. l., naked except below, polished; *fr.* 9-12 in. l., 3-4 in. br., oblong in general outline, the main rachis without pinnae except above the branches, which are  $1\frac{1}{2}$ -2 in. l., and spread from the stem at right angles, or even curved slightly downwards; *pinnl.* nearly 2 lin. br., hardly over 1 lin. deep, almost obversely triangular in shape, placed close together, but not imbricated, those of the upper side of the branches often deflexed and pendulous; *texture* subcoriaceous; *sori* in a continuous line along the upper edge of the pinnae.—*Hk. Sp.* 1. p. 213.

Hab. British Guiana; gathered by Schomburgk, and again recently by Appun.

24. *L. Sprucei*, Hk. MSS.; *rhizome* short-creeping; *st.* erect, wiry, 6-15 in. l.; *fr.* 3-6 in. l., about  $1\frac{1}{2}$  in. br., ovate, bi- or tripinnatifid, branches  $\frac{3}{4}$ -1 in. l., rigid, filiform, spreading or decurved towards the point; *pinnl.* about 1 lin. deep, flabellate, cut down to the rachis into narrow linear mucronate segments,  $\frac{1}{2}$ -1 lin. l., those of the upper side of the branches often deflexed and pendulous; *texture* coriaceous; fertile *segm.* broader at the apex ( $\frac{1}{2}$  lin. br.); *sori* not quite occupying the whole point.

Hab. San Carlos, on the Rio Negro, N. Brazil, *Spruce*, 2988.—A very curious plant,



resembling *L. pendula* in its subsecund fertile pinnules, but with the ultimate divisions so narrow, that the sorus is usually as deep as broad ; so that we place the plant here rather from analogy than because it fulfils the technical character of the genus.

25. *L. ? Parishii*, Baker ; *rhizome* slender, wiry, wide-creeping ; *fr.* 1 ft. l., 3-4 in. br., tripinnatifid, the rachis flexuose, and rooting at its extremity ; *pinnæ* 15 to 20 on each side, 1-2 in. l., flexuose, spreading from the stem at about a right angle ; *pinnl.* oblong, blunt, the largest about 4 lin. l., 2 lin. br., cut down to a narrow flattened rachis into 3 or 4 *segm.* on each side, which are rather broader at the point than below, placed only on the lower side of the main rachis of the pinnæ, except one at its base, and often, but not always, a few towards its extremity ; *texture* herbaceous ; fruit unknown.

Hab. Banks of Packchang river, the southern boundary of the province of Tenasserim, *Rev. C. S. Parish*.—The fruit is quite unknown, but I was unwilling to leave this very curious fern unnoticed. In habit it comes nearest *L. Sprucei* ; but the pinnules here are larger and different in texture, and confined principally to the under side of the rachis. The general aspect is very like that of a large leaf of a bipinnate *Acacia*, but with compound and subsecund leaflets.

§§ *Isoloma*, *J. Smith*. *Pinnæ* equilateral ; *veins* free. Sp. 26-35. *This section in habit and texture resembles Pteris rather than Adiantum, and the cuneate species approximate very closely to Stenoloma.*

\* *Fronde* simple. Sp. 26-27.

26. *L. (Iso.) reniformis*, Dry. ; *st.* wiry, flexuose, 4-6 in. l., black, polished ; *fr.* 2-2½ in. across, orbicular-reniform, with a deep basal sinus ; *texture* coriaceo-membranaceous, not pellucid ; *sori* continuous all round the edge, except in the sinus.—*Hk. Sp. 1. p. 203.*

Hab. Guiana and the Amazon valley.

27. *L. (Iso.) sagittata*, Dry. ; *st.* wiry, flexuose, 4-6 in. l., black, polished ; *fr.* sagittate-acuminate, with a deep basal sinus, 2-4 in. across, sometimes lobed ; *texture* as in the preceding, and the *sori* similarly continuous.—*Hk. Sp. 1. p. 203. Hk. & Gr. Ic. t. 87.*

Hab. Guadeloupe and French Guiana.

\*\* *Fronde* simply pinnate, with linear pinnæ. Sp. 28-30.

28. *L. (Iso.) Walkeræ*, Hk. ; *rhizome* creeping, paleaceous ; *st.* wiry, erect, black, polished, 6-12 in. l. ; *fr.* 6-12 in. l., 2-4 in. br., simply pinnate ; *pinnæ* 1½-2 in. l., ¼ in. br., entire, equilateral, erecto-patent, with several times their breadth between them ; *texture* coriaceous ; *rachis* naked, shining, brownish-black ; *sori* in a continuous line along both edges.—*Hk. Sp. 1. p. 209. t. 69. A.*

Hab. Ceylon and island of Banca, east of Sumatra.

29. *L. (Iso.) divergens*, Wall. ; *rhizome* creeping, wiry, fibrillose ; *st.* wiry, erect, black, polished, 4-6 in. l. ; *fr.* 6-12 in. l., 1½-2 in. br., simply pinnate ; *pinnæ* ¾-1 in. l., 2-3 lin. br., obliquely truncate at the base below, auricled at the base above, the margin entire, the point bluntish ; *texture* coriaceous ; *rachis* naked and polished ; *sori* in a continuous line along both edges.—*Hk. Sp. 1. p. 210. Hk. & Gr. Ic. t. 226.*

Hab. Malayan Peninsula and Borneo.—Here the pinnæ are placed close together, and spread from the rachis at a right angle.

30. *L. (Iso.) lanuginosa*, Wall. ; *rhizome* stout, creeping, clothed with fibrillose

scales ; *st.* stout, erect, 4-6 in. l. ; *fr.* 12-24 in. l., 3-4 in. br., simply pinnate ; *pinnæ*  $1\frac{1}{2}$ -2 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., linear, entire or very slightly toothed towards the point, which is acute in the fertile, bluntly rounded in the barren frond ; *texture* coriaceous ; *rachis* pubescent ; *sori* in a continuous line along both edges.—*Hk. Sp.* 1. p. 210. t. 69. B.

Hab. Malayan Peninsula, southward to Tropical Australia, Mauritius, and gathered by the Livingstone Expedition at the mouth of the Kongone river.—This has quite the habit of *Nephrolepis acuta*, and similar white cretaceous dots on the upper side of the very deciduous pinnæ.

\*\*\* *Fronde bi- or tripinnatifid, ultimate divisions cuneate.* Sp. 31-36.

31. L. (Iso.) *alutacea*, Metten. ; *st.* strong, erect, 4-6 in. l. ; *fr.* 4-6 in. l.,  $1\frac{1}{2}$ -2 in. br., bipinnatifid, lower branches wiry, flexuose, 2-3 in. l., erecto-patent, furnished with 6 to 8 stalked obversely-triangular *pinnl.*, which are about 3 lin. br., 4 lin. deep, 2- to 3-lobed, and the lobes again crenate at the apex ; *texture* coriaceous ; *venation* flabellate ; *sori* in a line across the point of the pinnules.—*Metten. Fil. Nov. Cal.* p. 63.

Hab. New Caledonia ; gathered by M. Deplanche.

32. L. (Iso.) *trichomanoides*, Dry. ; *rhizome* creeping, fibrillose ; *st.* 4-6 in. l., slender, wiry, polished, chesnut-brown ; *fr.* 4-9 in. l., 2-3 in. br., ovate-oblong, bipinnatifid ; *pinnæ* 2-3 in. l., lanceolate, erecto-patent, cut down quite to the rachis below into cuneate *pinnl.*, which are again broadly lobed on the upper edge ; *texture* herbaceous ; *venation* obscure, flabellate ; *sori* in a continuous marginal line.—*Hk. Sp.* 1. p. 218.— $\beta$ , *L. Lessonii*, Bory ; simply pinnate, with broadly-lobed linear-lanceolate *pinnæ*.—*Hk. Sp.* 1. p. 217.

Hab. New Zealand, Van Diemen's Land, and N. S. Wales ; gathered also lately in Fiji by Mr. Cairns.

33. L. (Iso.) *microphylla*, Swartz ; *rhizome* creeping, fibrillose ; *st.* flexuose, wiry, 3-6 in. l. ; *fr.* 6-18 in. l., 2-4 in. br., bi- or tripinnatifid ; primary *pinnæ* distant, flexuose, 1-4 in. l. ; *pinnl.* entire, or cut down to the rachis into several obversely triangular lobes, which when fertile are often not more than 1 lin. br. ; *texture* herbaceous ; *venation* flabellate ; *sori* in a continuous marginal line.—*Hk. Sp.* 1. p. 218. *Hk. & Gr. t.* 194.

Hab. New Zealand and Temperate Australia.

34. L. (Iso.) *elongata*, Lab. ; *rhizome* stout, creeping, densely fibrillose ; *st.* 6-9 in. l., stout, erect, naked, chesnut-brown, polished ; *fr.* 12-18 in. l., 6-9 in. br., ovate-deltoid, tripinnatifid ; lower *pinnl.* lanceolate-acuminate, 2-3 in. l.,  $\frac{3}{4}$  in. br., cut down nearly to the rachis, but only slightly above into lobes which are broader at the apex than the base, and sometimes quite obversely triangular ; *texture* coriaceous ; *veins* prominently raised on the under side ; *sori* occupying nearly or quite the whole margin of the lobes.—*Hk. Sp.* 1. p. 213.

Hab. New Hebrides, New Caledonia, Isle of Pines.

35. L. (Iso.) *retusa*, Metten. ; *st.* strong, erect, not prickly or climbing ; *fr.* tripinnatifid ; lower *pinnæ* 12-15 in. l., 6-8 in. br. ; *pinnl.* lanceolate-deltoid, the lower *segm.* the same shape,  $1-1\frac{1}{2}$  in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., cut down to the rachis below, the lobes 2-3 lin. br., cuneate ; *texture* herbaceous ; *sori* narrow, marginal, occupying the whole breadth of the lobes.—*Davallia, Cav. Hk. Sp.* 1. p. 188. t. 52. A.

Hab. Philippine Islands, Amboyna, Solomon's Isles, New Caledonia. — This species and No. 31 in particular in texture and habit approximate to *Stenoloma* very closely.



§§§ Synaphlebiium, *J. Smith*. *Pinnæ unilateral; veins more or less anastomosing*. Sp. 36-38. *Habit and texture of Eulindsaya, from which it differs only by its anastomosing veins.*

36. *L. (Syn.) media*, R. Br.; *st.* 6-12 in. l., wiry, flexuose, shining, pale; *fr.* 6-12 in. l., deltoid in general outline, bi- or tripinnate; *pinnæ* 3-4 lin. l., 2-3 lin. deep, the lower line nearly straight, the upper one rounded; *texture* subcoriaceous; *veins* flabellate, free or anastomosing; *sori* in a continuous marginal line.—*Hk. Sp. 1. p. 112. Ic. Pl. t. 957.*

Hab. Tropical Australia and adjacent islands.—Habit of *L. flabellulata*, but thicker in texture, and different in venation. The tertiary divisions, when present, are very short.

37. *L. (Syn.) nitens*, Blume; *rhizome* short-creeping; *st.* 6-9 in. l., firm, erect; *fr.* simple or with a long unbranched apex, and 1 to 6 pairs of erecto-patent branches, 3-6 in. l.; *pinnl.* about  $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. br., the lower decurved principally at the base, the outer margin rounded, the upper three or four times broadly not deeply lobed, close placed, but not imbricated; *texture* thinly pellucido-herbaceous; *veins* anastomosing in the upper half of the lobes; *sori* marginal in the lobes, the inner valve of the *invol.* narrow and membranous, the edge of the frond produced beyond it and scarcely altered.—*L. recurvata*, *Wall.* *L. propinqua* and *L. obtusa*, *Hk. Sp. 1. p. 222-4. t. 68. A. 66. B. and 70. A. Syn. pulchrum, Brack. p. 223.*

Hab. Neilgherries and Ceylon (up to 5,000 ft.), westward to Queensland and the Polynesian Islands.—Much resembling *L. davallioides* in size and general appearance, but the pinnules are deeper and not so much lobed, and the nervation and position of the fruit differ. *L. intermedia* (*Hk. t. 67. B.*) appears to be a curious state of this species, in which the pinnule shows a strong tendency towards the equilateral type of form. Only the basal half of the lower moiety of the pagina is deficient, and the fruit is continued round the edge of the rest. *S. pulchrum* of Brackenridge is a small simple unbranched form.

38. *L. (Syn.) davallioides*, Blume; *rhizome* short-creeping; *st.* 6-12 in. l., firm, erect; *fr.* with a long central point and 2 or 3 pairs of erecto-patent curved branches, 4-8 in. l.; *pinnæ* 4-6 lin. l., 2-3 lin. br., the lower margin straight or slightly curved, the upper with 4 to 6 regular rounded but not deep lobes, placed close together but not imbricated; *texture* pellucido-herbaceous; *veins* anastomosing at the base of the lobes; *sori* marginal in the lobes.—*Hk. Sp. 1. p. 224. t. 68. A. Davallia Kunzeana, Hk. Sp. 1. p. 177.*

Hab. Malayan peninsula and islands.

§§§§ Schizoloma, *Gaud.* *Pinnæ equilateral; veins more or less anastomosing*. Sp. 39-48. *Fronde entire or simply pinnate, not pellucid.*

\* *Fruit in a continuous line along both margins.* Sp. 39-44.

39. *L. (Schiz.) cordata*, *Gaud.*; *rhizome* short-creeping; *st.* 3-6 in. l., slender, erect, wiry; barren *frond* 2-3 in. l., 1-1 $\frac{1}{2}$  in. br., cordate-oblong, quite entire, fertile one 3-6 in. l., linear, entire or forked; *texture* coriaceous; *sori* in a continuous marginal line.—*Hk. Sp. 1. p. 219. t. 66. A.*

Hab. Malayan peninsula, rare.

40. *L. (Schiz.) Gueriniana*, *Gaud.*; *rhizome* creeping, paleaceous; *st.* 4-6 in. l.; *fr.* 6-9 in. l., oblong-lanceolate, simply pinnate; *pinnæ*  $\frac{1}{2}$ - $\frac{3}{4}$  in. l., ovate or oblong, nearly entire, horizontal or falcate, slightly auricled at the base on the upper edge; *texture* subcoriaceous; *sori* in a continuous line along both margins.—*Hk. Sp. 1. p. 221.*

Hab. Malayan islands.—There is no specimen of this in the Hookerian Herbarium. The pinnæ are said to be very deciduous.

41. *L. (Schiz.) ensifolia*, Swartz; *rhizome* creeping, stout, paleaceous; *st.* 6-9 in. l., wiry, flexuose; *fr.* 6-12 in. l., 3-4 in. br., with a linear-lanceolate simple or pinnatifid point, simply pinnate below; *pinnæ* usually in numerous pairs, all stalked,  $1\frac{1}{2}$ -6 in. l.,  $\frac{1}{4}$ -1 in. br., varying from linear-acuminate to lanceolate in shape, only the sterile ones, which are broader than the others, a little toothed; *texture* herbaceous; *veins* copiously anastomosing; *sori* in a continuous marginal line.—*Hk. Sp.* 1. p. 220. *Gard. F. t.* 62. *Hk. & Gr. t.* 3. *S. Agatii, Brack. t.* 30. *L. Griffithiana, Hk. Sp.* 1. p. 219. *t.* 68. *B. L. pentaphylla, Hk. Sp.* 1. p. 219. *t.* 67. *A.*

Hab. Hongkong, and 4,000 ft. in the Himalayas, southward to Queensland, and eastward to the Polynesian Islands, Mauritius, Madagascar, Natal, Cape Colony, and Guinea coast.—This has quite the general habit of *Pteris cretica*, and is very variable in size and the number of pinnæ. *L. Griffithiana* is an unbranched form.

42. *L. (Schiz.) macrophylla*, Kaulf.; *st.* 12-18 in. l., strong, erect, polished; *fr.* about 12 in. l., with an entire ovate undivided apex, about 6 in. l., 2 in. br.; *pinnæ* about as long but rather narrower, ovate-lanceolate, oblique at the base, decurrent on a short petiole, not toothed; *texture* between herbaceous and coriaceous; *sori* in continuous submarginal lines.—*Hk. Sp.* 1. p. 220.

Hab. Brazil and Guiana.—The inner valve of the involucre is a membranous line, and the edge of the frond is produced beyond the line of the sorus, and cannot be said to be altered in texture.

43. *L. (Schiz.) Fraseri*, Hk.; *rhizome* slender, creeping, fibrillose; *st.* 2-3 in. l., slender, erect; *fr.* 9-12 in. l., 1 in. br., simply pinnate; *pinnæ* in distant pairs, the largest  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., cordate-ovate, toothed above and sometimes deeply lobed at the base, the upper ones almost as broad as long; *texture* thinly herbaceous; *sori* in a continuous marginal line.—*Hk. Sp.* 1. p. 221. *t.* 70. *B.*

Hab. Queensland.—It is not at all unlikely that this is a small delicate variety of *L. heterophylla*.

44. *L. (Schiz.) heterophylla*, Dry.; *rhizome* short-creeping; *st.* 4-8 in. l., firm, naked, erect; *fr.* 6-12 in. l., 3-6 in. br., lanceolate or oblong-deltoid, varying from simply pinnate, with large linear-lanceolate entire *pinnæ*, to bipinnate, with erecto-patent branches, 3-4 in. l., with oblong lanceolate blunt *pinnæ*.  $\frac{1}{2}$ -1 in. l.,  $\frac{1}{4}$  in. br.; *texture* herbaceous; *sori* in continuous marginal lines.—*Hk. Sp.* 1. p. 223.

Hab. Neilgherries, Ceylon, Hongkong, Malayan peninsula and islands.—The pinnæ or pinnules of the barren frond are slightly toothed. *L. cuneata*, Willd., is this species from the Mauritius.

\*\* *Diellia, Brack.* *Sori* not quite marginal, transversely oblong or linear, the outer valve of the involucre membranaceous, similar in shape to the sorus, but the frond on the other side usually produced beyond them and not altered in texture. *Sp.* 45-48.

45. *L. (Diellia) pumila*, Hk. MSS. (*non Klotzsch*); *st.* tufted, 1-2 in. l., wiry, blackish, polished; *fr.* 4-9 in. l.,  $\frac{3}{4}$ -1 in. br., simply pinnate; *pinnæ* 4-6 lin. l.,  $1\frac{1}{2}$ -2 lin. br., ovate-rhomboidal, rounded at the point, slightly undulated, auricled at the base on the upper side; *texture* subcoriaceous; *veins* immersed; *sori* transversely oblong, submarginal.—*Diellia pumila, Brack. p.* 219.

Hab. Sandwich Islands.—A very distinct plant, with the habit of a large form of *Asplenium Trichomanes*.



46. *L. (Diellia) erecta*, Hk. MSS. ; *st.* 6-9 in. l., strong, erect, polished, chestnut-brown ; *fr.* 9-12 in. l., 3-4 in. br., lanceolate, simply pinnate ; *pinnæ* 1-2 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., linear-lanceolate, slightly undulated at the margin, the upper half rather the broadest and auricled at the base, the lower ones shorter and broader ; *texture* herbaceous ; *sori* 2 to 3 times as long as broad, falling short of the margin.—*Diellia erecta*, *Brack. t.* 31. *f.* 2.

Hab. Sandwich Islands.

47. *L. (Diellia) falcata*, Hk. MSS. ; *st.* 3-4 in. l., strong, erect, densely paleaceous ; *fr.* 12-18 in. l., 2-4 in. br., lanceolate, simply pinnate ; *pinnæ* 1-2 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., linear-lanceolate, falcate, acuminate, slightly undulated at the margin, the upper half rather broadest and auricled at the base, the lower ones very short and blunt ; *texture* herbaceous ; *sori* marginal, transversely oblong.—*Diellia falcata*, *Brack. t.* 31. *f.* 1.

Hab. Sandwich Islands.—Distinguished from *D. erecta* by its short paleaceous stem and marginal sori.

48. *L. (Diellia) Michleriana*, Eaton ; *st.* slender, elongated, slightly paleaceous ; *fr.* 12-15 in. l., ovate-lanceolate in general outline, pinnate below with *pinnæ* 3-5 in. l., 1 in. br., the upper half linear, undulated at the margin ; *texture* papyraceo-herbaceous ; *veins* forming hexagonal areolæ with free included veinlets ; *sori* nearly marginal, transversely oblong or linear, the outer valve of the involucre the same shape as the sorus, but the margin of the frond produced beyond it and unaltered.—*Eaton, Fil. Wright & Fendl. p.* 213.

Hab. Cataract of Truando, New Granada, *Schott*, No. 8.—A very curious plant, with the venation of *Dictyoxiphium*, but quite different in the fruit, which agrees very well with that of the three species for which *Diellia* was proposed as a genus.

#### GEN. 20\*. DICTYOXIPHIMUM, Hook.

*Sori* marginal, continuous. *Invol.* like that of *Lindsaya*, but the outer valve obsolete.—*A single species with anastomosing areolar venation and free included veinlets.* TAB. 2. *f.* 20. B. erroneously represents the inner instead of the outer valve of the involucre as suppressed.

1. *D. Panamense*, Hk. ; *fr.* tufted, sessile, 2-3 ft. l., the barren one 2-3 in., the fertile  $\frac{1}{2}$ -1 in. br., narrowed from the middle gradually downwards, quite entire ; *texture* subcoriaceous, the midrib strong and prominent ; *sori* in a continuous marginal line.—*Hk. Sp.* 1. *p.* 224.

Hab. Tropical America, from Guatemala to New Granada.—When the involucre is rolled over the sorus, the latter appears to be placed on the upper surface of the frond.

#### TRIBE 6. PTERIDÆ.

*Sori* marginal, oblong or linear. *Invol.* of the same shape as the sorus, formed of a more or less changed and reflexed portion of the frond, opening inwardly. GEN. 21-33.

#### GEN. 21. ADIANTUM, L.

*Sori* marginal, varying in shape from globose to linear, usually numerous and distinct, sometimes confluent and continuous. *Invol.* the same shape as the sorus, formed of the reflexed margin of the fronds bearing the capsules on its under side. *A large genus, which has its head-quarters in Tropical America, most of the species of which are recognizable from all other Ferns but the typical Lindsayæ*

by the texture and one-sidedness of their segments. One group has flabellato-cuneate segments, but still without any distinct midrib, whilst a few species have equilateral segments, and approach in habit *Pteris* and *Schizoloma*. The veins only anastomose in four species out of sixty. TAB. II. f. 21.

§ Euadiantum. Veins not anastomosing.† Sp. 1-57.

\* Frond simple.—Sp. 1-2.

1. *A. reniforme*, L.; *st.* tufted, polished, chesnut-brown, 4-6 in. l.; *fr.* orbicular-reniform,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. across, with usually a broad open sinus; *texture* subcoriaceous; *sori* all round the edge,  $1\frac{1}{2}$ -3 lin. br.—*Hk. Sp. 2. p. 2. t. 71. A. Fil. Exot. t. 8.*— $\beta$ , *A. asarifolium*, Willd.; *st.* stronger, 6-12 in. l.; *fr.* 2-4 in. br., thicker in texture, with a deep narrow sinus, the basal lobes sometimes even overlapping.—*Hk. Sp. 2. p. 2. t. 71. B. Fil. Exot. t. 11.*

Hab.  $\alpha$ , Madeira and Teneriffe;  $\beta$ , Mauritius and Bourbon.

2. *A. Parishii*, Hk.; *st.* tufted, slender, naked, dark-brown, polished,  $\frac{1}{4}$ - $\frac{1}{2}$  in. l.; *fr.*  $\frac{1}{2}$ -1 in. each way, suborbicular, slightly undulated, cuneate at the base; *texture* papyraceo-herbaceous; *veins* not prominent; *sori* few, placed in crenations of the frond,  $\frac{1}{8}$  in. br.—*Hk. Sp. 2. p. 237. v. 3. t. 142. A. Fil. Exot. t. 51.*

Hab. Moulmein, Malayan Peninsula; discovered by the Rev. C. S. Parish.

\*\* *Radicantes-group*.—Frond essentially simply pinnate, the rachis often elongated and taking root at the apex. Sp. 3-6.

3. *A. lunulatum*, Burm.; *st.* 4-6 in. l., tufted, wiry, naked, polished, dark chesnut-brown; *fr.* 6-12 in. l., 2-3 in. br., simply pinnate, often elongated and rooting at the extremity; *pinnæ*  $\frac{3}{4}$ - $1\frac{1}{2}$  in. br.,  $\frac{1}{2}$ -1 in. deep, subdimidiate, the lower edge nearly in a line or oblique with the petiole, the upper edge rounded and, like the bluntly-rounded sides, usually more or less lobed; petioles of the lower ones spreading,  $\frac{1}{4}$ - $\frac{1}{2}$  in. l.; *texture* papyraceo-herbaceous, the rachis and both surfaces naked; *sori* in continuous lines along the edge.—*Hk. Sp. 2. p. 11. Hk. & Gr. t. 104.* *A. dolabriforme*, *Hk. Ic. Pl. t. 191.* *A. deflectens*, *Mart. Hk. Sp. 2. p. 12.*— $\beta$ , *A. tremulum*, Kunze; whole plant more slender, the pinnules smaller and more membranaceous.—*A. filiforme*, *Gardn. Hk. Ic. Pl. t. 503. Sp. 2. p. 15.*

Hab. Hongkong, Cochin China, Himalayas (4,000 ft.), southward to Polynesian Islands and Tropical Australia, Madagascar, Zambesi Land, Angola, Guinea, Cape Verde Islands, Tropical America, from Mexico southward to the Organ Mountains.—An easily-recognizable and widely-diffused species. The two varieties are evidently connected together by gradual intermediate stages. When the upper edge of the pinnæ is much lobed, the sori appear transversely oblong, but in some of the specimens the line is quite continuous. *A. Philippense*, Linn., adopted from Petiver, though described by Linnæus as simple, is figured by Petiver as pinnate, and is doubtless this species.

4. *A. Cantonense*, Hance; *st.* slender, naked, polished, blackish, 2-3 in. l.; *fr.* 4-6 in. l.,  $\frac{3}{4}$  in. br., simply pinnate with a terminal pinna, or prolonged and rooting at the extremity; *pinnæ* in 3 to 5 distant opposite pairs,  $\frac{1}{2}$  in. br.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. deep, suborbicular, nearly entire or slightly lobed, shortly stalked; *texture* pellucido-herbaceous; *rachis* and surfaces naked; *sori* few round the outer edge, not contiguous, roundish or transversely oblong.

† Except casually in *A. macrophyllum*, *lucidum*, and perhaps some other species.



Hab. Ramparts of Canton, *Hance*, 7542.—This much resembles *A. tremulum*; but the petioles are shorter, and the lower pinnæ opposite and round, not dimidiate.

5. *A. caudatum*, Linn.; *st.* 2-4 in. l., tufted, wiry, spreading, dark chestnut-brown, tomentose; *fr.* 6-12 in. l., simply pinnate, often elongated and rooting at the extremity; *pinnæ*  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.,  $\frac{1}{4}$  in. deep, dimidiate, nearly sessile, the lower line straight and horizontal, the upper rounded, more or less cut, often deeply and repeatedly, the point usually blunt, the lower ones slightly stalked; *texture* coriaceous, the *veins* prominent, the rachis and both surfaces of the frond villose; *sori* roundish or transversely oblong on the edge of the lobes.—*Hk. Sp.* 2. p. 13. *Ex. Fl. t.* 104.— $\beta$ , *A. rhizophorum*, Swartz; *pinnæ* and rachis nearly or quite glabrous.—*A. Edgeworthii*, *Hk. Sp.* 2. p. 14. t. 81. B.

Hab. Arabia Felix, Himalayas (3,000 ft.), and Hongkong, southward to Ceylon and Java, Madagascar, Mauritius, Zambesi Land, Angola, banks of the Niger, and Cape Verde Islands.—*A. soboliferum*, Wallich (*Hk. Sp. v.* 2. t. 74. A.), appears to be a form of this with winged petioles and stipes. A similar form of *A. lunulatum* has been gathered by Drs. Kirk and Welwitsch in South Africa.

6. *A. calcareum*, Gard.; *st.* slender, filiform, 2-3 in. l., polished, blackish, naked; *fr.* 4-6 in. l., or prolonged and rooting at the extremity; *pinnæ*  $\frac{1}{4}$ - $\frac{1}{2}$  in. br.,  $\frac{1}{4}$  in. deep, varying in shape from a quarter to nearly half a circle, lobed from the circumference towards the centre 2 or 3 times half the way down, and the main lobes again cleft less deeply; *texture* thinly herbaceous; *rachis* and both surfaces naked; *sori* roundish or transversely oblong, placed in small depressions at the apex of the lobes.—*Hk. Sp.* 2. p. 15.  *Ic. Pl. t.* 467.

Hab. Province of Goyaz, Brazil; gathered by Mr. Gardner.—A more tender plant than *A. caudatum*, which is not known in America, but not clearly distinct. *A. rhizophyllum*, Schrad., also from Brazil, is closely allied, or may be the same.

\*\*\* *Polysorous group*.—*Fronde* once or more pinnate, the fruit in numerous roundish or oblong or transversely reniform marginal patches. *Sp.* 7-31.

† *Ultimate segments not dimidiate, but having two more or less distinctly opposite rows of sori.* *Sp.* 7-12.

7. *A. Kaulfussii*, Kunze; *st.* 4-9 in. l., wiry, erect, naked, polished, blackish; *fr.* 6-12 in. l., 3-4 in. br., with a large terminal lobe and 1 to 12 alternate *pinnæ* on each side, the lowest 2-3 in. l.,  $\frac{1}{2}$ -1 in. br., cordate and auricled broadly at the base above, roundly cut away on the lower side, slightly stalked, and those of the barren frond slightly toothed; *texture* coriaceous; *rachis* pubescent; *sori* in interrupted marginal lines.—*Hk. Sp.* 2. p. 7. *Hk. & Gr. t.* 190.

Hab. Mexico and West Indies, southward to Brazil and Peru.—This and the next are the only species of the group with a clearly-defined midrib.

8. *A. obliquum*, Willd.; *st.* 3-6 in. l., erect, wiry, polished, blackish, slightly pubescent; *fr.* 6-12 in. l., 2-4 in. br., with a terminal lobe and 3 to 12 pairs of alternate *pinnæ*, the lowest 1-2 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., costate nearly to the apex, the upper half the largest, rounded at the base, the lower half obliquely truncate at the base, shortly stalked, those of the barren frond slightly toothed; *texture* coriaceous; *rachis* pubescent; *sori* in numerous interrupted marginal patches 1-2 lin. br.—*Hk. Sp.* 2. p. 8. t. 79. A.

Hab. West Indian Islands, Columbia, and Guiana.—Very doubtfully distinct from *A. Kaulfussii*. The characters relied upon are the thicker texture of this, its more continuous sori, and the absence of a glaucous tinge on the under side of the leaves. Grisebach refers the obscure *A. denticulatum*, Swartz, to this species.

9. *A. Galeottianum*, Hk.; *st.* 3-4 in. l., naked, erect, dark chesnut-brown, wiry, polished; *fr.* 6-9 in. l., simply pinnate, or branched at the base; *pinnae* in numerous opposite pairs,  $\frac{3}{4}$  in. each way, suborbicular, nearly entire, slightly stalked; *texture* coriaceous; *veins* very close and fine but prominent; *sori* obversely reniform, about 1 lin. across, placed in shallow sinuses all round the frond.—*Hk. Sp. 2. p. 10. t. 80. B.*

*Hab.* Mexico, province of Oaxaca, at an elevation of 3,000 ft., *Galeotti*, 6561.—A very distinct species, easily recognized by its large round equal-sided pinnules. The venation is very clearly marked on the under side of the frond, but is quite flabellate, and there is no central rib which is stronger than the others.

10. *A. Peruvianum*, Klotzsch; *st.* 6-9 in. l., strong, erect, nearly black, polished, naked; *fr.* simply pinnate, or with 1-3 branches at the base, or even with some of the latter again slightly branched; *pinnules* 2 in. or more br.,  $1\frac{1}{2}$  in. deep, unequally ovate, cuneate at the base, sometimes with an acuminate point, finely toothed and lobed round the upper and outer edge, the lowest on stalks  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.; *texture* papyraceo-herbaceous; *rachis* and both surfaces naked; *sori* in interrupted patches round the sides of the pinnules.—*Hk. Sp. 2. p. 35. t. 81. C.*

*Hab.* Peru; gathered by Mathews, and lately again by Spruce.—A very fine and well-marked species, which the size and shape of its pinnules will readily distinguish in the group.

11. *A. subcordatum*, Swartz; *st.* 6-12 in. l., strong, erect, blackish, naked, polished; *fr.* 1-2 ft. l., 1 ft. br., deltoid, tripinnate; *lower pinnae* deltoid, 1 ft. l., 6-9 in. br.; *segm.* about 2 in. l., 1 in. br., ovate-acuminate, equal at the base, or the lower side obliquely truncate, slightly lobed, on stalks  $\frac{1}{4}$ - $\frac{1}{2}$  in. l.; *texture* papyraceo-herbaceous; *rachis* and both sides naked; *sori* in roundish or transversely oblong patches along both sides.—*Hk. Sp. 2. p. 34. A. betulinum, Kaulf.*

*Hab.* Guiana and Brazil.—This resembles in general habit *A. trapeziforme*, but differs in the shape of the pinnules, which are equilateral or slightly oblique at the base on the lower side.

12. *A. intermedium*, Swartz; *st.* 6-12 in. l., erect, strong, polished, but somewhat tomentose; *fr.* with a terminal *pinna* 6-9 in. l., 2-3 in. br., and 1 to 3 small spreading lateral ones on each side; *pinnl.* 1-1 $\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., unequal-sided, but not dimidiate, the lower half being the smallest, about the inner third being cut off, the point bluntish or acute, the inner edge nearly parallel with the stem, the upper nearly straight, scarcely toothed; *texture* subcoriaceous; *rachis* tomentose; *sori* in interrupted marginal patches, 1-2 lin. across, placed round the upper edge and outer two-thirds of the lower one.—*Hk. Sp. 2. p. 25. A. fovearum, Raddi. A. triangulatum, Kaulf.*

*Hab.* Tropical America, from Mexico and the West Indies southward to Peru and Rio Janeiro.—A widely-diffused and well-known species, distinguished from *A. tetraphyllum* by the outer edge being often brought down so as to be parallel with the upper edge, so that we have two opposite rows of *sori* instead of one at an acute angle with the other.

†† *Ultimate segments dimidiate, the stems naked and polished. Sp. 13-20.*

13. *A. Shepherdii*, Hk.; *st.* 3-4 in. l., naked, polished, blackish; *fr.* 6-12 in. l., simply pinnate; *pinnae*  $\frac{3}{4}$  in. br.,  $\frac{1}{4}$ - $\frac{3}{8}$  deep, dimidiate, the lower line nearly straight, the upper rounded and, like the two bluntly rounded sides, broadly lobed, quite sessile and usually reflexed, so that the pinnules of the opposite sides of the rachis are brought face to face, the inner quarter of the blade being imbricated over the stem; *texture* subcoriaceous; *rachis* and both surfaces naked;



*sori* numerous, obversely reniform, as deep as broad, placed in distinct hollows round the outer edge.—*Hk. Sp. 2. p. 9. t. 73. B.*

Hab. Mexico, gathered originally by Mr. Bates in 1834; and fine specimens have been received lately from Morelia from Mr. Glennie.—In the texture of the frond and form of the *sori* this curious plant closely resembles *A. Galeottianum*, but the stem is quite simple, so far as we know, the form of the pinnules quite different, and the habit is very peculiar.

14. *A. sinuosum*, Gard.; *st.* 4-8 in. l., erect, naked, polished, nearly black; *fr.* with a long terminal central *pinna*, 2-3 in. br., and 1 or 2 pairs of erecto-patent branches at the base; *pinnl.*  $1\frac{1}{2}$ -in. br.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. deep, the lower line obliquely decurved, the upper irregularly rounded and deeply lobed, the lobes again crenate, the lower ones on stalks  $\frac{1}{4}$ - $\frac{1}{2}$  in. l.; *texture* papyraceo-herbaceous; *rachis* and surfaces naked; *sori* obreniform, placed in rounded sinuses of the crenations of the lobes.—*Hk. Sp. 2. p. 35. Ic. Pl. t. 504.*

Hab. Brazil, *Gardner, 3552, Burchell, 6752*; and a similar plant has been gathered by Prof. Jameson near Guyaquil.—This resembles most *A. Capillus-veneris* in the segments. They come generally about halfway between the flabellato-cuneate and truly dimidiate types of form, so that its position may be said to be about midway between that species and *A. trapeziforme*.

15. *A. diaphanum*, Blume; *st.* 4-8 in. l., slender, erect, blackish, polished; *fr.* 4-8 in. l., 1 in. br., simply pinnate or with 1 to 3 branches at the base, which are sometimes nearly as large as the terminal one; *pinnl.*  $\frac{1}{2}$  in. br.,  $\frac{1}{4}$  in. deep, the lower line rather decurved, the upper nearly parallel with it, crenate like the blunt outer edge; *texture* thin; *rachis* naked, surfaces nearly so; *sori* obversely reniform, numerous, but not contiguous, placed in the sinuses of the upper and outer edge.—*Hk. Sp. 2. p. 11. t. 80. C.* *A. affine, Hk. Sp. 2. p. 32. non Willd.* *A. setulosum, J. Sm.*

Hab. S. E. China, Aneiteum, Java, Fiji, New Caledonia, Norfolk Island, N. Zealand, N. S. Wales.—This is nearest the next species, but is much less branched, and the pinnules are thinner in texture. In habit it shows an approximation towards the pedate group. It is not unlikely that *A. erectum*, Kunze (*Bot. Zeit.* 1848, p. 211), is the same.

16. *A. affine*, Willd.; *st.* 6-9 in. l., erect, polished, blackish, glossy; *fr.* with a terminal central *pinna* 4-6 in. l., 1-1 $\frac{1}{2}$  in. br., and several smaller erecto-patent lateral ones, the lowest of which are again branched; *pinnl.*  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.,  $\frac{1}{4}$  in. deep, dimidiate, the lower edge straight, the upper nearly parallel with it, crenate like the oblique or bluntly rounded outer edge; *texture* subcoriaceous; *rachis* and surfaces quite naked, the latter very glaucous; *sori* numerous, roundish, placed in small hollows round the upper and outer edge.—*A. Cunninghami, Hk. Sp. 2. p. 52. t. 86. A. (not A. affine, Hk., which is A. diaphanum, Blume).*

Hab. New Zealand.—A somewhat variable plant in branching and the size of the segments, but not likely to be confused with any other, especially as it is known only in New Zealand.

17. *A. nigrescens*, Fée; *st.* 6-12 in. l., strong, erect, naked, blackish, polished; *fr.* 6-9 in. l., 4-6 in. br., with a terminal *pinna* and several lateral ones on each side, the lowest of which are again branched; *segm.* about  $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. br., dimidiate, the upper and lower margins nearly parallel, the point bluntly rounded, the upper and outer edges finely toothed; *texture* coriaceous; *rachis* nearly naked, polished, surfaces naked; *sori* in transversely oblong patches along the upper edge.—*Fée, Icon. t. 11. f. 2.*

Hab. Guadeloupe, *L'Herminier*.—Probably this should be regarded as a subglabrous state of *A. cristatum*. From all the species placed near, it may be known by its coriaceous and much smaller segments.

18. *A. trapeziforme*, L.; *st.* 6-12 in. l., firm, erect, naked, polished, blackish; *fr.* with a central *pinna* 4-8. in. l., 2-3 in. br., and 2 to 4 large spreading ones on each side, the lowest of which are often branched again; *segm.*  $1\frac{1}{2}$ -2 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., dimidiate, the sides nearly parallel, the outer edge oblique, both it and the upper one bluntly, not deeply lobed, the lowest on stalks  $\frac{1}{4}$ - $\frac{1}{2}$  in. l.; *texture* papyraceo-herbaceous; *rachis* and both surfaces naked; *sori* numerous, contiguous, transversely oblong, placed round the upper and outer edge.—*Hk. Sp.* 2. p. 33. *Hk. & Gr. t.* 98.— $\beta$ , *A. pentadactylon*, L. & F.; lower margin of the segments somewhat decurved obliquely from the petiole.— $\gamma$ , *A. cultratum*, J. Sm.; outer edge of the segment bluntly rounded.—*Hk. Sp.* 2. p. 34.

Hab. Tropical America, from Mexico and the West Indies southward to Brazil.—A well-known plant, readily distinguished from its neighbours by its ample trapezoid segments. *A. Catherinae* of the gardens appears not to differ materially.

19. *A. polyphyllum*, Willd.; *st.* 12-18 in. l., strong, erect, blackish, polished, rather scabrous; *fr.* 2-3 ft. l., 12-18 in. br., the upper part simply pinnate; lower *pinnae* sometimes 1 ft. l., 6 in. br., with a long terminal and numerous erecto-patent lateral pinnulés; *segm.*  $\frac{3}{4}$ -1 in. l.,  $\frac{1}{4}$  in. deep, dimidiate, the upper and lower edge nearly parallel, the point bluntly rounded, the upper edge sharply but not deeply toothed; *texture* coriaceous, veins prominent; *rachis* and surfaces naked; *sori* in numerous suborbicular patches placed in hollows in lobes along the upper edge.—*Hk. Sp.* 2. p. 49. *A. cardiochlæna*, Kunze, *Hk. Sp.* 2. p. 50. *t.* 83. *A. Matthewsianum*, *Hk. Sp.* 2. p. 35. *t.* 84. *A. a. macrocladum*, Klotzsch, *Hk. Sp.* 2. p. 49. *t.* 83. B.

Hab. Columbia and Peru.—A large copiously-branched plant, with very numerous (sometimes fifty to a pinna) closely-placed subsessile segments. *A. tomentosum*, Klotzsch (*A. Klotzschianum*, Hk.), and *A. urophyllum*, Hk., seem forms of this with slightly pubescent rachises.

20. *A. glaucescens*, Klotzsch; *st.* 6-9 in. l., slender, erect, naked, polished; *fr.* 1 ft. each way, with a terminal *pinna* and several loosely-spreading ones on each side; *pinnl.*  $\frac{3}{4}$ -1 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. deep, dimidiate, the lower border nearly straight, the upper nearly parallel with it, almost entire, the outer margin bluntly rounded, the lowest on short stalks; *texture* papyraceo-herbaceous; *rachises* naked, under surface glaucous; *sori* in numerous patches, 1- $1\frac{1}{2}$  lin. br., with a space between them, placed round the upper and outer edge.—*Hk. Sp.* 2. p. 26.

Hab. Ecuador, Guiana, and north of Brazil.—Perhaps this also is not distinct from *A. polyphyllum*, but it is less copiously branched, and the segments are fewer and thinner in texture.

\*\*\* *Ultimate segments dimidiate, the stems pubescent.* Sp. 21-31.

21. *A. Henslovianum*, Hk. fil.; *st.* 6-12 in. l., erect, dark chesnut-brown, naked, glossy; *fr.* 12-18 in. l., 6-9 in. br., ovate tripinnate, furnished with numerous distant *pinnae* on each side, the upper of which are simple, but the lowest slightly branched; *segm.*  $\frac{1}{2}$ - $\frac{3}{4}$  in. br.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. deep, dimidiate, the lower line nearly straight, the upper rather rounded, a good deal lobed, the point bluntly rounded; *texture* papyraceo-herbaceous; *rachis* and under surface hairy; *sori* obversely reniform, placed in the hollows of the lobes of the upper and outer edge.—*Hk. Sp.* 2. p. 43. *A. sessilifolium*, *Hk. p.* 44. *A. Reichenbachii*, Moritz.

Hab. Columbia, Peru, Galapagos group.—This is well-marked amongst its neighbours by the shape of its segments, the inner edge of which is often imbricated over the rachis, as in *A. Shepherdi* and *concinnum*, and by the reniform sori which encircle a very distinct hollow.

22. *A. cristatum*, L.; *st.* 6-12 in. l., strong, erect, tomentose; *fr.*  $1\frac{1}{2}$ -3 ft. l.,



9-12 in. br., with a terminal central *pinna* 6-9 in. l., 1-1½ in. br., and numerous rather distant lateral ones on each side, the lowest of which are sometimes again branched; *segm.* ½-¾ in. l., ¼-⅓ in. br., dimidiate, the lower line nearly straight, the upper nearly parallel or rounded, the point blunt, texture coriaceous; *rachis* tomentose; *sori* in several oblong or linear patches round the upper and outer edge.—*Hk. Sp. 2. p. 46.* A. Kunzeanum, *Klotzsch. Hk. Sp. 2. p. 47.*

Hab. West Indies and Venezuela.—This species and the two next are distinguished from their neighbours by their smaller and more rigid segments. They bear the same relation to *A. tetraphyllum* that *Lindsaya stricta* bears to *L. Guianensis* and *trapeziformis*.

23. *A. obtusum*, Desv.; *st.* 6-12 in. l., wiry, erect, polished, blackish, slightly tomentose; *fr.* with a terminal and several pairs of erecto-patent lateral *pinnae*; *pinnl.* ¼-½ in. br., 1½-2 lin. deep, subdimidiate, the lower line nearly straight, without sori, the upper bluntly rounded, nearly entire, placed close, and the lower slightly stalked; *texture* coriaceous, venation flabellate; *rachis* often densely tomentose; *sori* in numerous close transversely oblong patches round the upper and outer edge.—*Hk. Sp. 2. p. 19. Hk. & Gr. t. 188.*—β, *A. Kunzei*, Miquel; *pinnules* larger, sometimes ½-¾ in. br., ¼ in. deep.

Hab. West Indian Islands and Panama southward to Peru and Rio Janeiro.—This comes very near in habit and texture to *A. cristatum*, from which it may be best known by its closer, more numerous, and shorter sori. A plant gathered by Barter in the Niger Expedition appears to agree with the copious American specimens.

24. *A. hirtum*, Klotzsch; *st.* 6-9 in. l., wiry, erect, polished, dark chestnut-brown, tomentose; *fr.* with a terminal and several pairs of erecto-patent lateral *pinnae*; *pinnl.* ¼-½ in. br., 1½-2 lin. deep, dimidiate, the lower line straight and barren, the upper bluntly rounded, finely toothed, placed close, and the lower slightly stalked; *texture* subcoriaceous; *venation* fine, prominent, under surface slightly and *rachis* very tomentose; *sori* transversely oblong, placed in small lobes of the upper and outer margin.—*Hk. Sp. 2. p. 20. t. 82.* A.

Hab. Tropical America, from Panama and Guiana southward to Peru and Brazil.—This is more closely and regularly branched than the two preceding, with the segments longer in proportion to their breadth, and the sori very close, small, and numerous. *A. gracile*, Fée, which I have not seen, seems near this.

25. *A. formosum*, R. Br.; *st.* 12-18 in. l., strong, erect, scabrous; *fr.* 18-24 in. l., 12-18 in. br., tri- or even quadripinnate; lower *pinnae* 12-15 in. l., 6-9 in. br., deltoid; *pinnl.* deltoid; *ult. segm.* ¼-⅓ in. br., 1½-2 lin. deep, dimidiate, the lower edge straight, the upper rather rounded and deeply lobed, the outer also oblique and lobed, the lower ones distinctly stalked; *texture* subcoriaceous; *rachis* glossy, scabrous; *sori* numerous, between obreniform and transversely oblong, placed at the edge of the lobes along the upper and outer margin.—*Hk. Sp. 2. p. 51. t. 86.* B.

Hab. Temperate Australia and New Zealand.—This has *pinnules* as small but not nearly so thick and rigid as in the three preceding. It comes from a different part of the world, and the ample compound *pinnae* will at once distinguish it from all its allies.

26. *A. Cubense*, Hk.; *st.* 4-6 in. l., polished, blackish, naked, erect; *fr.* 6-9 in. l., 1-1½ in. br., simply pinnate, or with a single pair of short erecto-patent branches; *pinnl.* ¾ in. br., ⅓ in. deep, unilateral, the lower line slightly recurved, the upper rounded and broadly lobed, the outer edge blunt, lowest short-stalked; *texture* pellucido-herbaceous; *rachis* slightly pubescent; *sori* in shallow hollows of the lobes, 1-1½ lin. br.—*Hk. Sp. 2. p. 28. t. 73.* A.

Hab. Jamaica and Cuba.—This species is marked by the simple or slightly-branched stem and character of the sori, which are not more than five or six in number, and placed in the centre of distinct hollows along the upper and outer edge.

27. *A. fulvum*, Raoul; *st.* 6-9 in. l., strong, erect, polished, dark chesnut-brown, rough below, with strong hairs; *fr.* 9-12 in. l., 6-8 in. br., deltoid in general outline, with a terminal *pinna* 4-6 in. l., about  $1\frac{1}{2}$  in. br., and several erecto-patent branches, the lower of which are branched again; *pinnl.* about  $\frac{3}{4}$  in. l.,  $\frac{1}{4}$  in. deep, dimidiate, the lower edge nearly straight, the upper almost parallel, with sharply-toothed lobes like the oblique outer edge; *texture* papyraceo-herbaceous; *rachis* glossy, but scabrous and rather hairy; *sori* large, numerous, obversely reniform, placed in small depressions round the upper and outer edge.—*Hk. Sp. 2. p. 52. t. 85. A.*

Hab. New Zealand, Norfolk Island, N. S. Wales, and Fiji.—Very variable in the shape of its pinnules. It is much less compound than *A. formosum*, and the pinnules are larger.

28. *A. pulchellum*, Blume; *st.* 6-12 in. l., erect, naked, polished, nearly black; *fr.* a foot or more each way, with a terminal central *pinna* 6-9 in. l.,  $1\frac{1}{2}$  in. br., and a few large spreading lateral ones on each side, the lower ones branched again with 2 to 4 erecto-patent branches; *segm.*  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. deep, dimidiate, the lower line upcurved, the upper nearly straight, slightly toothed; *texture* coriaceous; *rachis* tomentose; *sori* small, numerous, roundish, placed on the upper edge.—*Hk. Sp. 2. p. 38. A. Lobbianum, Hk. Sp. 2. p. 51. t. 86. C.*

Hab. Java, and gathered also by Milne in Aneiteum.—This comes very near *A. fulvum* in the shape, size, and texture of the segments, but is a larger plant with a more hairy rachis.

29. *A. crenatum*, Willd.; *st.* 6-9 in. l., polished, blackish, naked or nearly so; *fr.* with a terminal central *pinna* 6-9 in. l., and several large erecto-patent lateral ones on each side, the lowest of which are branched again; *segm.*  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.,  $\frac{1}{4}$  in. deep, dimidiate, the lower line upcurved, the upper nearly straight, slightly crenate; *texture* subcoriaceous; *rachis* slightly tomentose; *sori* numerous, round, placed on the upper and sometimes the outer edge.—*A. Wilesianum, Hk. Sp. 2. p. 50. t. 83. C.*

Hab. Mexico and West Indian Islands.—This also comes very near *A. tetraphyllum*, but the rachis is only very slightly tomentose, and the main stem is glossy and polished, and the segments are perhaps more papyraceous in texture. *A. politum*, H. B. K., is referred here by Sprengel.

30. *A. pectinatum*, Kunze; *st.*  $1\frac{1}{2}$ -2 ft. l., strong, erect, nearly black, scabrous; *fr.* 3-6 ft. l., 2-3 ft. br., tri- or quadripinnate; lower *pinnæ* 12-18 in. l., 6-9 in. br., their lower branches with a long terminal pinnule and several erecto-patent lateral ones, the lowest of which are sometimes branched again; *segm.*  $\frac{1}{2}$  in. br., less than  $\frac{1}{4}$  in. deep, dimidiate, the lower line straight, the upper slightly rounded, the point not very blunt; *rachis* tomentose; surfaces naked; *sori* suborbicular, numerous, placed round the upper and outer edge.

Hab. Brazil, *Burchell*, No. 7416; Eastern Peru, *Spruce*, 4781.—A very fine plant, which size and habit at once clearly characterize. *A. velutinum* and *Lindenii*, described by Mr. Moore in *Gard. Chron.* 1866, p. 777, seem to be allied to this species.

31. *A. tetraphyllum*, Willd.; *st.* 6-12 in. l., strong, erect, tomentose; *fr.* with a long terminal *pinna* 6-9 in. l.,  $1-1\frac{1}{2}$  in. br., and numerous erecto-patent or spreading lateral ones nearly as large on both sides, so that the frond is not unfrequently half a yard long by nearly as much broad; *segm.*  $\frac{1}{2}$ - $\frac{3}{4}$  in. br.,  $\frac{1}{4}$  in. deep, subdimidiate, the lower line straight or somewhat decurved, the upper nearly parallel, finely toothed, the outer edge very oblique; *texture* coriaceous; *rachis* and under surface tomentose; *sori* interrupted, marginal, usually transversely oblong or transversely reniform, placed round the upper and outer edge.—*A. prionophyllum, H. B. K. Hk. Sp. 2. p. 21. A. fructuosum, Spr. Hk. 2. p. 24.*



Hab. Tropical America, from Mexico and the West Indies southward to Brazil; gathered also in West Tropical Africa by Barter, Vogel, and Mann.—I am not prepared to point out any good character by which *A. Cayennense*, Willd., and *A. Brasiliense*, Raddi, may be distinguished from this widely-diffused and variable species.

\*\*\*\* *Oligosorous group*.—*Fronde once or more pinnate, the fruit in continuous or slightly interrupted marginal lines.* Sp. 32-40.

+ *Segments with a line of fruit on both sides, therefore not dimidiate.* Sp. 32-36.

32. *A. lucidum*, Swartz; *st.* 6-9 in. l., strong, erect, scabrous, tomentose; *fr.* 9-15 in. l., 4-8 in. br., simply pinnate, with a large terminal *pinna* and 6 to 10 lateral ones on each side, or the lowest very slightly branched, 3-4 in. l.,  $\frac{1}{2}$ -1 in. br., nearly equal-sided, but obliquely truncate at the base below, lanceolate-acuminate, slightly serrated towards the point; *texture* coriaceous; *rachis* densely tomentose; *veins* free or anastomosing casually towards the edge, midrib distinct; *sori* in a continuous row along each side.—*Hk. Sp. 2. p. 4. t. 79. C.*

Hab. West Indian Islands and Panama southward to Brazil.—This comes so near the polysorous *A. obliquum* in everything but the fruit, that Dr. Grisebach unites them. *A. platyphyllum*, Swartz, is a little-known plant allied to this species.

33. *A. Phyllitidis*, J. Smith; *st.* strong, erect, naked, nearly black, polished, 6-12 in. l.; *fr.* 6-12 in. l., 3-6 in. br., simply pinnate, with a large terminal lobe, and 1 to 6 *pinnæ* on each side, or the lower pair again branched below; *pinnæ* 3-4 in. l.,  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. br., ovate or lanceolate-acuminate, very nearly entire, narrowed or rather rounded and stalked at the base; *texture* coriaceous; *sori* in a continuous line along both margins.—*Hk. Sp. 2. p. 5. t. 72. B.*

Hab. Guiana and Eastern Peru; gathered by Schomburgk, Spruce, and Appun.—This comes very near *A. lucidum*, but the *pinnæ* are fewer in number and broader, and the texture is thicker, and the venation consequently less distinct. They are the only polysorous species with a distinct midrib, and the shape of the *pinnæ* also characterizes them clearly.

34. *A. macrophyllum*, Swartz; *st.* 6-12 in. l., strong, erect, polished, naked, nearly black; *fr.* 9-15 in. l., 4-8 in. br., simply pinnate (4 to 6 pairs of *pinnæ*); lower ones of the barren frond 3-4 in. l., 2 in. br., ovate, so broad at the base that the opposite ones frequently overlap, the margin rather deeply lobed, fertile ones narrower; *texture* membranaceo-herbaceous; *sori* in long continuous or slightly interrupted marginal lines.—*Hk. Sp. 2. p. 3. Hk. & Gr. Ic. t. 132. Hk. F. Ec. t. 55.*

Hab. Mexico and West Indian Islands southward to Brazil and Ecuador.—Occasionally this fine and well-known species becomes bipinnate in the lower part. The young fronds are often beautifully tinged with red. Its large equal-sided sessile *pinnæ* mark it clearly.

35. *A. Seemanni*, Hk.; *st.* 6-9 in. l., erect, blackish, polished; *fr.* 6-12 in. l., simply pinnate or the lower branches compound; *pinnæ* 3-4 in. l., 1 $\frac{1}{2}$ -2 in. br., ovate-acuminate, but rather unequal-sided, the barren ones finely serrated, one side usually cordate at the base, the other obliquely truncate, petioles of the lowest nearly an inch long; *texture* subcoriaceous; *veins* prominent and the under surface glaucous; *rachis* naked, polished; *sori* in long continuous marginal lines.—*Hk. Sp. 2. p. 5. t. 81. A.*

Hab. Veraguas and Guatemala; gathered by Dr. Seemann and Messrs. Salvin and Godman.—This also is a very fine plant. It comes very near the polysorous *A. Peruvianum* in habit, but is less branched. The *pinnæ* are larger even than those of *A. macrophyllum*, and have black polished stalks often an inch long.

36. *A. deltoideum*, Swartz; *st.* densely tufted, 3-4 in. l., wiry, erect, polished,

naked, dark chesnut-brown; *fr.* 4-6 in. l.,  $\frac{3}{4}$  in. br., with a terminal lobe and numerous subopposite pairs of *pinnae*, the lower ones distant, distinctly stalked,  $\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., hastate-deltoid, cordate or cuneate at the base; *texture* pellucido-herbaceous; *venation* flabellate; *sori* in interrupted lines along the sides of the *pinnae*, not reaching the rounded apex.—*Hk. Sp. 2. p. 9.*

Hab. West Indian Islands.—Stem casually once branched below. A very clearly-marked species. The *pinnae* resemble an ivy-leaf in miniature, but there is no clearly-defined central midrib.

†† *Segments dimidiate, with the line of fruit absent altogether from the lower margin.* *Sp. 37-40.*

37. *A. villosum*, Linn.; *st.* 9-12 in. l., strong, erect, blackish, polished, tomentose; *fr.* with a terminal central and several erecto-patent *pinnae* on each side, 6-12 in. l.,  $1\frac{1}{2}$ -2 in. br.; *pinnae* dimidiate, about 1 in. l.,  $\frac{1}{2}$  in. br., the lower line nearly straight, the upper nearly parallel with it, but considerably larger, slightly toothed and the outer edge auricled at the base; *texture* coriaceous; *rachises* tomentose, both surfaces naked; *sori* in a continuous line round the upper and outer edge.—*Hk. Sp. 2. p. 18.* *A. falcatum*, Sw. *S. F. p. 19.*

Hab. West Indies and Panama southward to Brazil.—Easily recognizable by having the line of fructification continued all along the upper and then usually down the oblique outer edge. *A. oblique-truncatum*, Fée, seems to be the ordinary form of this species.

38. *A. pulverulentum*, L.; *st.* 6-12 in. l., strong, erect, blackish, tomentose; *fr.* with a terminal *pinna* and several spreading lateral ones on each side, which are 4-8 in. l., 1 in. br.; *pinnae*  $\frac{1}{2}$  in. l.,  $1\frac{1}{2}$ -2 in. deep, dimidiate, the lower line nearly straight, the upper one nearly parallel, both it and the outer edge finely toothed; *texture* subcoriaceous; *rachises* tomentose, surfaces naked; *sori* in a continuous line along the lower two-thirds of the upper edge.—*Hk. Sp. 2. p. 17.*

Hab. West Indies southward to Brazil.—Here the line of fruit does not usually extend beyond the inner half or two-thirds of the upper margin.

39. *A. incisum*, Presl; *st.* 4-6 in. l., wiry, polished, naked, nearly black; *fr.* 6-12 in. l., 3-4 in. br., simply pinnate or with one or two pairs of short spreading branches at the base; *pinnae* 1-2 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. deep, subdimidiate, the lower line often considerably curved upwards and toothed in its outer half, the upper one also more or less falcate and not deeply lobed; *texture* subcoriaceous; *rachis* nearly naked; *sori* in a continuous marginal line on the edge of the lower two-thirds of the upper margin.—*Hk. Sp. 2. p. 16.* *A. alarconianum*, Gaud.

Hab. West of Mexico and Columbia, Galapagos Island.—Very near *A. pulverulentum*, with which it quite agrees in the fruit. The frond is less branched, and the *pinnae* are larger and more toothed.

40. *A. microphyllum*, Kaulf.; *st.* 6-9 in. l., strong, erect, tomentose; *fr.* with a terminal *pinna* 6-9 in. l., and several erecto-patent lateral ones on each side, the lowest of which are branched again; *segm.*  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.,  $\frac{1}{4}$  in. br., unequal-sided, with a midrib, the lower at first at a right angle with the stem and afterwards decidedly upcurved, the upper nearly entire, upcurved, so that the segment is falcate and narrowed to an acute point; *texture* coriaceous; *rachis* tomentose or nearly naked; *sori* in a few elongated patches along the upper edge.—*Hk. Sp. 2. p. 47.*

Hab. West Indies, rare.—Very doubtfully distinct from *A. pulverulentum*. In habit and general appearance they are identical, but this has the line of fructification slightly interrupted. Grisebach suggests that this is probably *A. pyramidale*, Willd.





which seems strikingly different from the normal form in habit, but resembles it closely in other respects. In the shape and size of the pinnules this species is not strikingly different from *A. Capillus-Veneris*, but is pinnately branched very regularly and copiously, and even when the pinnæ are furnished with long pinnules, there is an almost sessile single segment at the base addressed to the main rachis.

45. *A. colpodes*, Moore; *st.* 4-6 in. l.; slender, glossy, dark chesnut-brown, polished, slightly fibrillose; *fr.* 9-12 in. l., 4-6 in. br., deltoid in general outline, tripinnate; lower *pinnæ* spreading at right angles from the rachis, 2-3 in. l.,  $1\frac{1}{2}$  in. br., only slightly branched below; ultimate *segm.* about  $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. br., the lower line often straight for some distance, the upper irregularly rounded, lobed, and toothed, all nearly or quite sessile; *texture* pellucido-herbaceous; *rachises* and both surfaces naked; *sori* placed in distinct teeth of the outer edge, the *invol.* obversely reniform.—*Gardn. Chron.* 1865.

Hab. Ecuador and Peru.—This has much of the regularly-pinnate habit of *A. concinnum*, with which it also agrees in its nearly sessile segments, which in shape resemble more nearly those of *A. Ethiopicum*, showing, however, more of a tendency to the truncato-dimidiata type of form.

46. *A. tenerum*, Swartz; *st.* 1 ft. high, erect, naked, glossy; *fr.* 1-3 ft. l., 9-18 in. br., deltoid, tri- or quadripinnate; *segm.*  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., cuneate or tending towards rhomboidal-dimidiata in shape, the upper edge rounded or somewhat angular, broadly and often rather deeply lobed, all stalked; *texture* very thin; *rachis* naked and glossy, surfaces naked; *sori* placed in numerous roundish or transversely oblong patches in the lobes of upper half.—*Hk. Sp.* 2. p. 45.

Hab. Mexico and West Indian Islands southward to Juan Fernandez and Peru.—Resembling *A. Capillus-Veneris*, but a larger and more branched plant, the segments smaller, more delicate, and less lobed, easily falling from the apex of the petiole when dry. The ramification is much more straggling and confused than in *A. concinnum*, and the lower segments have stalks half as long as themselves. *A. Farleyense*, Moore, appears to be an abnormal form of this species of garden origin.

47. *A. cuneatum*, Langs. & Fisch.; *st.* 6-9 in. l., slender, erect, blackish, naked, polished; *fr.* 9-18 in. l., 6-9 in. br., deltoid, tri- or quadripinnate; lower *pinnæ* 4-6 in. l., 2-3 in. br.; *segm.* numerous,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., cuneate at the base, the upper edge deeply lobed; *texture* thin; *rachis* naked; *sori* 4 to 6, obversely reniform, placed in distinct hollows in the lobes of the outer edge.—*Hk. Sp.* 2. p. 39. *Hk. & Gr. t.* 30.

Hab. Brazil.—This also comes near *A. Ethiopicum*, but is a larger and more branched plant, with numerous pinnæ, pinnules, and segments, the latter usually distinctly cuneate in the lower half.

48. *A. glaucophyllum*, Hk.; *st.* 6-9 in. l., blackish, glossy, erect, naked; *fr.* 12-24 in. l., 9-15 in. br., deltoid, quadripinnate; lower *pinnæ* 6-9 in. l., 3-6 in. br., deltoid, erecto-patent; *segm.*  $\frac{1}{4}$  in. br., cuneate at the base, the upper edge irregularly rounded, more or less lobed; *texture* papyraceo-herbaceous; *rachises* glossy; *veins* prominent, under side glaucous; *sori* 4 to 6, obversely reniform, placed in distinct hollows in the apex of the lobes of the upper edge.—*Hk. Sp.* 2. p. 40. *Cent.* 61.

Hab. Mexico and Guatemala.—Very near *A. cuneatum*. The principal difference is in the more rigid texture and more prominent venation, and this is only known in North, the other in South America.

49. *A. fragile*, Swartz; *st.* tufted, very short, polished, glabrous, blackish; *fr.* 6-12 in. l., 3-6 in. br., with numerous pinnæ, the lowest of which are branched again; *segm.* articulated at the base, very deciduous,  $\frac{1}{4}$  in. br., cuneate in the lower half, the upper edge rounded, broadly lobed; *texture* papyraceo-herbaceous; *rachis* naked; *sori* obversely reniform, 2 to 4, placed in distinct



hollows in the lobes of the upper edge.—*Hk. Sp. 2. p. 41. Ic. Pl. t. 965. A. parvifolium, Fée.*

Hab. West Indian Islands.—The segments are so deciduous that they have entirely fallen from nearly all the specimens in the Hookerian Herbarium, so that nothing remains but a dense tuft of rigid stems with numerous slender glossy branches. In shape the segments most resemble those of *cuneatum*, but they are smaller and less lobed.

50. *A. venustum*, Don; *st.* 6-9 in. l., slender, erect, wiry, naked, polished; *fr.* 6-12 in. l., 4-8 in. br., deltoid, tri- or quadripinnate; *pinnæ* erecto-patent, the lower ones deltoid; *segm.*  $\frac{1}{4}$  in. across, cuneate at the base, the upper edge irregularly rounded, sometimes broadly lobed, finely toothed; *texture* subcoriaceous; *rachis* naked; *sori* 1 to 3, large, roundish, placed in distinct hollows of the upper edge.—*Hk. Sp. 2. p. 40. t. 96. B. A. microphyllum, Roxb.*

Hab. Afghanistan and Himalayas up to 7-8,000 ft.—The more rigid texture, the small numerous scarcely lobed segments and few large sori, will clearly distinguish this from the preceding.

51. *A. monochlamys*, Eaton; *st.* 6-9 in. l., wiry, erect, glossy, dark chestnut-brown, naked; *fr.* 6-12 in. l., 4-6 in. br., ovate-deltoid, tripinnate; *pinnæ* rather distant, rigid, erecto-patent; *segm.*  $\frac{1}{4}$  in. br., cuneate at the base, the upper edge rounded, slightly toothed; *texture* coriaceous; *rachis* naked; *sori* single or very rarely two, placed in a decided hollow of the upper edge.—*Hk. 2nd Cent. F. t. 50. A. Veitchii, Hance, Ann. Sc. Nat. Ser. 4. v. 15. p. 238.*

Hab. Discovered by the American Exploring Expedition under Capts. Ringgold and Rogers in Japan, and since gathered there by Mr. J. G. Veitch and by Mr. Wilford in Tsus-Sima.—It comes near *A. venustum*, but seems to be truly distinct.

\*\*\*\*\* *Scandentes group. Stems scandent, several feet long, tri- or quadripinnate. Sp. 52-53.*

52. *A. digitatum*, Presl; *st.* 12-18 in. l., erect, blackish, glossy, nearly naked; *fr.* 2-3 ft. l., 1 ft. br., furnished with numerous distant spreading or erecto-patent branches, which grow gradually shorter upwards, the lowest of which are branched again, the *pinnæ* being 6-9 in. l., 3-4 in. br.; *segm.*  $\frac{3}{4}$ -1 in. each way, varying from deflexed to cuneate at the base, the upper edge rounded, deeply cut from the circumference towards the centre, and the lobes again less deeply cut, the lower ones distinctly stalked; *texture* papyraceo-herbaceous; *rachises* naked, glossy; *sori* in lines along the edge of the lobes all round, except the base.—*Hk. Sp. 2. p. 39. A. speciosum, Hk. Sp. 2. p. 45. t. 85. C.*

Hab. Brazil, Peru, Bolivia, and Ecuador.

53. *A. Feei*, Moore; *st.* 12-18 in. l., strong, scandent, brownish-black, tomentose; *fr.* 1-2 ft. l., 1 ft. or more br., tripinnate, the main and secondary rachises zigzag, all the branches firm and spreading at a right angle; lower *pinnæ* 6-9 in. l., 3-4 in. br.; *pinnl.* 1-2 in. l.,  $\frac{1}{2}$  in. br., consisting of a terminal segment and several distant stalked suborbicular-cuneate lateral ones; *texture* subcoriaceous; *rachises* densely brown-tomentose; *sori* marginal, roundish or transversely oblong, more than half a line deep.—*A. flexuosum, Hk. 2nd Cent. t. 61.*

Hab. Mexico and Guatemala.

\*\*\*\*\* *Pedatum group. Fronds not pinnately branched, but dichotomously forked, with numerous pinnæ springing from the upper side of each of the two branches. Sp. 54-56.*

54. *A. pedatum*, Linn.; *st.* 6-12 in. l., polished, dark chestnut-brown, glabrous; *fr.* dichotomous, with the main divisions flabellately branched; central *pinnæ*

6-9 in. l., 1-1½ in. br.; *pinnl.* ½-¾ in. l., ¼ in. deep, dimidiate, broadest on the side nearest the stem, the upper and outer margin lobed, sometimes one-third down, the lowest on short slender stalks; *texture* pellucido-herbaceous; *rachises* and surface naked; *sori* roundish or transversely oblong, 1-2 lin. br.—*Hk. Sp.* 2. p. 55.

Hab. North Hindostan, ascending to 7-9,000 ft., Japan, Manchuria, Unalashka, and Canada southward to Virginia and California. — In this the main forks curve gracefully, and have from 4 to 6 branches, each springing from the upper side, the central ones of which are most developed.

55. *A. tetragonum*, Schrad.; *st.* 6-12 in. l., polished, blackish, glabrous; *fr.* dichotomous, with main divisions again once or twice forked; *pinnæ* 8-12 in. l., 2-3 in. br.; *pinnl.* 1¼-1½ in. l., ⅜-½ in. deep, not truly dimidiate, but only the lower two-thirds of the under half cut away, the upper margin rounded and broadly lobed, with the lobes finely toothed and point often lengthened out; *texture* papyraceo-herbaceous; *rachis* and surfaces naked; *sori* linear or transversely oblong, placed round the upper edge, and sometimes also the outer third of the lower one.—*Hk. Sp.* 2. p. 28. *A. curvatum*, *Kaulf. Hk. Sp.* 2. p. 29. t. 84. C.

Hab. Brazil.—Easily recognizable from the preceding by the difference in the branching and by the pinnules not being quite unilateral. *A. Lindswæa*, Cav., *A. humile*, Kunze, and *A. angustatum*, Kaulf., are little-known pedate plants.

56. *A. patens*, Willd.; *st.* 6-9 in. l., erect, dark chesnut-brown, polished, but slightly tomentose; *fr.* dichotomously branched, and the branches once or twice branched again; *central pinnæ* 6-9 in. l., 1½ in. br.; *pinnl.* ½-¾ in. l., ¼ in. deep, dimidiate, the two sides nearly parallel, the upper one broadly and bluntly lobed, and the outer blunt and lobed also; *texture* papyraceo-herbaceous; *rachises* slightly tomentose, under surface slightly hairy; *sori* placed round the upper and outer edge, obversely reniform, and placed in distinct small rounded hollows. *Hk. Sp.* 2. p. 29. t. 87. A.

Hab. Mexico, southward to Ecuador and Galapagos Islands.—The large horny suborbicular involucres, sometimes ½ in. br. and nearly as deep, distinguish this readily from the other plants of the group.

57. *A. hispidulum*, Swartz; *st.* 6-15 in. l., strong, erect, polished, dark chesnut-brown, scabrous; *fr.* dichotomous, with the main divisions flabellately branched; *central pinnæ* 6-9 in. l., ½-1 in. br.; *pinnl.* ⅜-¾ in. l., 2-4 lin. br., dimidiate, subrhomboidal, rather broader on the side nearest the stem, the outer edge bluntly rounded or oblique, upper and outer margin finely toothed, lower ones slightly stalked; *texture* subcoriaceous; *rachises* and both surfaces hispid; *sori* roundish, numerous, contiguous round the upper and outer edge.—*Hk. Sp.* 2. p. 31. *A. pubescens*, *Schk.*

Hab. Asia—Neilgherries and Ceylon eastward to Fiji, southward to N. S. Wales and New Zealand; Africa—Bourbon, Mauritius, Zambesi Land, banks of the Niger.—Easily distinguished from the other species by its densely pubescent segments and rachises.

58. *A. flabellulatum*, Linn.; *st.* erect, strong, polished, blackish, naked; *fr.* dichotomously branched and the branches once or twice branched again; *central pinnæ* 4-8 in. l., ¾ in. br.; *pinnl.* about 4 lin. br., 3 lin. deep, dimidiate, the lower edge nearly straight, the upper rounded, the outer blunt, both entire or slightly toothed; *texture* coriaceous, *rachises* and surfaces naked; *sori* in several transversely oblong patches round the upper and outer edge.—*Hk. Sp.* 2. p. 30. *A. amœnum*, *Hk. & Gr. t.* 103.

Hab. Hindostan from the Himalayas to Ceylon, Japan, S. China, Malayan Peninsula and Islands.—The pinnules are larger and broader than those of *A. hispidulum*, and only the rachis is finely pubescent.



§§ *Hewardia*, J. Smith.—*Veins anastomosing*. Sp. 59–62.

59. A. (Hew.) *Hewardia*, Kunze; *st.* 6-9 in. l., erect, blackish, glossy, naked; *fr.* simply pinnate or bipinnate, with a terminal pinna and 2 to 4 lateral ones on each side, the lowest pair of branches sometimes with 2 to 4 pinnules each; *pinnl.* 3-4 in. l.,  $\frac{3}{4}$ -1 in. br., nearly equal-sided except at the base, ovate-lanceolate, very nearly entire; *texture* papyraceo-herbaceous; *rachis* polished, naked; *veins* copiously anastomosing, midrib distinct, blackish; *sori* in continuous lines along both edges.—*Hk. Sp. 2. p. 7.* *Hewardia adiantoides*, J. Smith.

Hab. Guiana.—The texture of the frond is thinner than in the next species, and the veins are more distinct and copiously and conspicuously reticulated.

60. A. (Hew.) *dolosum*, Kunze; *st.* 6-12 in. l., erect, polished, blackish, slightly hairy; *fr.* 9-12 in. l., 6-12 in. br., simply pinnate, with a large terminal pinna and 2 to 6 sessile lateral ones on each side, which are 4-6 in. l., 1-2 in. br., ovate or ovate-lanceolate, acuminate, nearly entire; *texture* subcoriaceous; *rachis* hairy, veins inconspicuous and only uniting towards the edge, midrib black, distinct; *sori* in continuous lines along both edges.—*Hk. Sp. 2. p. 6. t. 79.*  
B. A. *Wilsoni*, *Hk. Sp. 2. p. 6. t. 72. A.*

Hab. Jamaica, Guatemala, Panama, Granada, Guiana, and Brazil.—Scarcely deserving a place in *Hewardia*, and, except in venation, the resemblance of the plant is altogether to *A. lucidum* and *Phyllitidis*.

61. A. (Hew.) *olivaceum*, Baker; *st.* 6-9 in. l., erect, glossy, blackish, naked; *fr.* about 1 ft. each way, with a terminal central pinna and one nearly equalling it on each side; *pinnæ* with a large terminal pinnule and several stalked lateral ones on each side, which are 4-5 in. l., about  $\frac{3}{4}$  in. br., lanceolate-acuminate, equal-sided, but obliquely truncate at the base below, broadly lobed throughout; *texture* papyraceo-herbaceous, the rachis slightly tomentose; *veins* conspicuous and copiously anastomosing, the midrib distinct, black, glossy; *sori* in linear patches  $\frac{1}{4}$  in. br. in the lobes on each side.

Hab. British Guiana, *Appun*, No. 646.—This resembles *A. Hewardia* in texture and venation, differing in the branching and sori.

62. A. (Hew.) *Leprieurii*, Hk.; *st.* 6-9 in. l., erect, naked, blackish, glossy; *fr.* 9-15 in. l., 6-9 in. br., deltoid tripinnate, with a terminal pinna 6-9 in. l., 2 in. br., and 2 or 3 branches on each side, the lowest of which are branched again; *pinnl.* 1-1 $\frac{1}{2}$  in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., subdimidiate, the lower line curved so that the inner part of the lower half is cut away, the upper edge rounded, the point bluntish or acuminate; *texture* papyraceo-herbaceous; *rachis* tomentose; *veins* anastomosing but not copiously, no distinct midrib; *sori* in linear patches  $\frac{1}{8}$ - $\frac{1}{4}$  in. across on the broad lobes of the upper edge and outer part of the lower edge.—*Hk. Sp. 2. p. 31. t. 82. B.*

Hab. Guiana; gathered by Leprieur, Schomburgk, and Appun.—Easily distinguished from the other three by the subdimidiate pinnules without any distinctly-defined midrib.

## GEN. 22. OCHROPTERIS, J. Sm.

*Sori* marginal, transversely oblong, occupying the apices of the lobes of the segments. *Invol.* the same shape as the sorus, formed of the reflexed margin of the frond, with which it coincides in texture and covering the sorus. *A single Mauritian species with free veins, and the texture and habit of an ample decomposed Davallia.* TAB. II. f. 22.

1. *O. pallens*, J. Smith; *st.* 2 ft. l., pale straw-coloured, naked; *fr.* about the same length, about 1 ft. br., deltoid, quadripiinnatifid; lower *pinnl.* 3-4 in. l.,

2 in. br., their *segm.* cut down to the rachis below, with oblong toothed lower lobes; *texture* coriaceous.—*Hk. Sp. 2. p. 54. t. 77. B.*

Hab. Mauritius.

GEN. 23. LONCHITIS, *Linn.*

*Sori* marginal, placed in the sinuses of the frond, more or less distinctly reniform but often considerably elongated. *Invol.* the same shape as the sorus and covering it, membranous in texture, formed from the reflexed margin. **TAB. II. f. 23.** *United by Mettenius with Pteris, from which it differs only by the position of the sori.*

1. *L. pubescens*, Willd.; *st.* 1-2 ft. l., strong, erect, densely clothed with woolly pubescence; *fr.* 2-4 ft. l., deltoid, tripinnatifid, cut down to the rachis except towards the apex; *lower pinnæ* sometimes 12-18 in. l., 9-12 in. br.; *pinnl.* lanceolate, cut down nearly to the rachis below, with blunt, oblong, sinuated *segm.*; *rachis* and under surface, especially the midrib, tomentose; *veins* copiously anastomosing into irregular hexagonal areolæ; *sori* placed round the main sinuses of the pinnules and in two or three of the hollows of the segments on each side.—*Hk. Sp. 2. p. 56.*— $\beta$ , *L. glabra*, Bory; *fr.* thinner in texture and less hairy.—*Hk. Sp. 2. p. 57.* *L. Natalensis*, *Hk. Sp. 2. p. 57. t. 89. B.*

Hab. Mauritius, Bourbon, Johanna Island, Seychelles, Natal, Cape Colony, and in West Tropical Africa on the Cameroon Mountains and the islands of Fernando Po and St. Thomas.—I cannot point out any character by which the South American plant, gathered in the Caraccas by Linden (*L. Lindeniana*, Hook.), may be distinguished; and that from Madagascar (*L. Madagascariensis*, Hook.) only differs by having the lower segments of the pinnules distinctly separated, or even stalked, bluntly rounded at the point, and scarcely at all lobed. The venation is identical in all the forms. *L. aurita*, L., taken up from Plumier, is no doubt this, figured with a muricated stem by mistake.

2. *L. occidentalis*, Baker; *st.* 1-2 ft. l., strong, erect, naked; *fr.* 2-4 ft. l., deltoid, tripinnatifid, cut down to the rachis except very near the apex; *lower pinnæ* 12-18 in. l., 9 in. br., lanceolate-deltoid; *pinnl.* lanceolate, cut down below about three-quarters of the way to the rachis into blunt oblong lobes; *rachis* and both surfaces naked; main *veins* forked at a broad angle towards the apex, but only anastomosing rarely, and the lowest vein from the midribs of the lobes sometimes meeting so as to form a costal arch; *sori* reniform, placed in the sinuses at the base or along the margin of the ultimate lobes.

Hab. Gathered by Dr. Welwitsch in Angola (No. 132), by Barter at Fernando Po, and by Gustave Mann, at an elevation of 4,000 ft., on the Cameroon Mountains. The naked surfaces and rachis and only casually anastomosing venation will distinguish this clearly from the preceding, and the lateral sinuses of the lobes in which the *sori* are placed are not nearly so distinct, and in the lower lobes of the pinnule there is often no sorus at the base.

GEN. 24. HYPOLEPIS, *Bernh.*

*Sori* marginal, placed usually in the sinuses of the frond, small, subglobose, uniform, distinct. *Invol.* the same shape as the sorus and covering it, membranous in texture, formed out of the reflexed margin. *This genus seems only intelligible as distinct when restricted to those species which have equal roundish sori placed in the sinuses of the ultimate divisions of the frond. In this sense it is employed here, which excludes several plants placed under it in the Species Filicum.* **TAB. II. f. 24.**



§ Euhypolepis. *Rhizome wide-creeping, fronds ample, tri- or quadripinnatifid.*  
Sp. 1-10.

1. *H. tenuifolia*, Bernh.; *rhizome wide-creeping, puberulous; st.* 1 ft. l., strong, erect, slightly asperous, naked or pubescent; *fr.* 4-5 ft. l., quadripinnatifid; lower *pinnæ* ovate-acuminate, 12-18 in. l., 6-9 in. br.; *pinnl.* lanceolate; *segm.* rather distant, 1-1½ in. l., ½ in. br., lanceolate, cut down to the rachis into numerous linear-oblong toothed ultimate divisions; *texture* herbaceous; *rachises* tomentose, the costa and sometimes the surface beneath slightly hairy and glandular; *sori* 2 to 6 to an ultimate division, placed at the sinuses of the teeth.—*Hk. Sp. 2. p.* 60. *t.* 89. C. and 90. A. *H. dicksonioides*, *Hk. Sp. 1. c.* *H. pallida*, *Hk. Sp. 2. p.* 64.

Hab. Java, Polynesian Islands, New Zealand, Australia, Norfolk Island.—Closely allied to this are a number of Javan forms, described as species by Blume and Kunze, for which I cannot give distinctive characteristics; viz., *C. setigera*, *alpina*, *resinifera*, *polypodioides*, *javanica*, and *pallida* of the former, *rudis* and *stenophylla* of the latter author. For an account of these, reference may be made to Blume's "Flora," Hooker's "Species Filicum," and the volume of the "Linnæa" for 1848. *H. resistens* and *amaurorachis* of Kunze are referred by Mettenius to *Polypodium rugulosum*.

2. *H. distans*, Hk.; *st.* 6 in. high, slender, flexuose, chestnut-brown, naked, slightly asperous; *fr.* about 1 ft. l., 4-5 in. br., ovate-lanceolate, bipinnate; *pinnæ* spreading at right angles with the rachis, distant, especially the lower ones, lanceolate, 2-3 in. l., ½ in. br.; *pinnl.* oblong, the lower ones approaching to deltoid, cut about halfway down; *texture* herbaceous; *rachis* scabrous but not tomentose; *sori* small, 2 to 4 to a pinnule, placed in the lower sinuses.—*Hk. Sp. 2. p.* 70. *t.* 95. C.

Hab. New Zealand.—Habit of a slender form of *Athyrium flix-femina*.

3. *H. anthriscifolia*, Presl; *st.* 1-2 ft. l., strong, erect, straw-coloured, naked but rather rough, with small raised points; *fr.* ample, quadripinnatifid; lower *pinnæ* deltoid-lanceolate, 1 ft. or more l., 4-6 in. br.; *pinnl.* lanceolate, rather distantly placed, the *segm.* cut down to the rachis into small oblong deeply pinnatifid ultimate divisions 2 lin. l., ½ lin. br.; *texture* thinly herbaceous; *rachis* and under surface slightly hairy; *sori* 2 or 4 to each of the ultimate divisions, placed in the lower sinuses.—*Hk. Sp. 2. p.* 66. *t.* 95. A.

Hab. Bourbon, Mauritius, Cape Colony, Fernando Po.—The fronds are said by Bojer, who called it *Adiantum elatum*, to be from 10 to 18 feet in length. *H. elata*, Presl, and *H. aspera*, Presl, appear to be forms of this species. This is generally a more flaccid and more finely-cut plant than *H. repens* and *tenuifolia*; but some of the Fernando Po specimens have the rachis brown and very rough.

4. *H. repens*, Presl; *st.* 1-2 ft. l., strong, erect, naked or puberulous, straw-coloured, more or less densely prickly; *fr.* 3-4 ft. l., quadripinnatifid; lower *pinnæ* 1-2 ft. l., 6-12 in. br., ovate-acuminate; *pinnl.* about 6 in. l., 1½-2 in. br., lanceolate; *segm.* oblong-lanceolate, blunt, cut down nearly to the rachis into numerous bluntish lobes; *texture* herbaceous; *rachises* like the main stem; *sori* 2 to 6 to a *segm.*, placed at the sinuses.—*Hk. Sp. 2. p.* 64. *t.* 90. C.—β, *inermis*, Hk.; *st.* and *rachis* not at all prickly.

Hab. Tropical America, from the West Indies southward to Brazil and Peru.

5. *H. nigrescens*, Hk.; *st.* 12-18 in. l., strong, erect, glabrous, rather thickly armed with strong prickles; *fr.* ample, quadripinnatifid; *pinnæ* numerous, spreading from the main rachis at right angles, the lowest 1 ft. l., 6 in. br.; *pinnl.* 3-4 in. l., 1-1½ in. br., lanceolate, spreading or even deflexed; *segm.* ovate-oblong, cut down to the rachis below; *texture* herbaceous; *rachises* like the main

stem; under surface nearly naked; *sori* small, placed at the base of the sinuses. *Hk. Sp. 2. p. 66. t. 90. C.*

Hab. Jamaica, Martinique, Venezuela, and banks of the Amazon.—Cuming's Philippine plant, referred here in "Species Filicum," is *Dicksonia Moluccana*.

6. *H. hostilis*, Presl; *st.* 1-2 ft. l., erect, tomentose, scabrous; *fr.* ample, quadripinnatifid; lower *pinnæ* 6-12 in. l., 4-6 in. br., ovate-lanceolate; *pinnl.* lanceolate; *segm.*  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.;  $\frac{1}{4}$  in. br., cut down nearly to the rachis throughout into numerous linear-oblong toothed ultimate divisions; *texture* thinly herbaceous; *rachises* tomentose; *sori* very small, placed against the sinuses of the ultimate divisions.—*Hk. Sp. 2. p. 69.*

Hab. Jamaica, Cocos Island, and Peru.—A more delicate plant than *H. repens*, with smaller and more deeply divided ultimate lobes, in which respect, as well as in general habit, it very closely resembles the South African *H. anthriscifolia*.

7. *H. Purdieana*, Hk.; *st.* 6-9 in. l., erect, strong, bright-brown, scabrous; *fr.* 9-12 in. l., 3-4 in. br., lanceolate, tripinnatifid; largest *pinnæ* 2 in. l., 1 in. br., lanceolate-deltoid, cut down below to a narrowly-winged rachis, into numerous linear-oblong deeply crenato-pinnatifid *pinnules*; *texture* herbaceous; *rachis* scabrous and densely clothed with brown filiform scales; *costa* also paleaceous; *sori* nearly a line across, roundish, placed against the sinuses of the pinnules.—*Hk. Sp. 2. p. 69. t. 91. B.*

Hab. New Granada; gathered by Mr. Purdie.—I give this and the six preceding species with great doubt as to how far they are distinct from one another, and with a suspicion that some of them at least, like other plants which have been placed in *Hypolepis*, will prove not really distinct from *Polypodium rugulosum*. With regard to the present one, for instance, Dr. Grisebach writes (Flora Brit. West Indies, p. 67), "Not to be distinguished from *P. rugulosum* but by the specially transformed involucreal appendages, and probably passing into that widely-ranging species." Sir W. Hooker has expressed the same doubt with regard to *H. distans*; and reference may be made also, in connection with the same point, to Dr. Hooker's remarks in the Floras of New Zealand and Tasmania.

8. *H. parallelogramma*, Hk.; *st.* 2-4 ft. l., strong, scabrous and prickly, but scarcely pubescent; *fr.* 10-20 ft. l., deltoid; *pinnæ* 1-3 ft. l., ovate-lanceolate; *pinnl.* 6-9 in. l., not much over 1 in. br., linear-lanceolate, with numerous linear-oblong *segm.* about 9 lin. l., 3 lin. br., which are sinuato-dentate and have about their own breadth between them; *texture* subcoriaceous; *rachises* like the stipes; *sori* sometimes 12 to a *segm.*, placed at the sinuses.—*Hk. Sp. 2. p. 65. t. 98. A.* *Cheilanthes scabra*, Karst. *C. Radula*, Kunze.

Hab. Tropical America, from Guatemala southward to Brazil and Peru.—The segments are much larger than in any of the preceding, more coriaceous in texture, with the sides parallel for some distance and the point blunt, the veins beneath prominent.

9. *H. millefolium*, Hk.; *rhizome* stout, wide-creeping; *st.* about 6 in. l., erect, pale-brown, glossy, scarcely scabrous; *fr.* 1 ft. or more l., 4-6 in. br., ovate-triangular, quadripinnatifid; lower *pinnæ* erecto-patent, 4-6 in. l., 1-2 in. br.; *pinnl.* ovate-deltoid, their *segm.* cut down nearly to the rachis into several small sharply-toothed lobes; *texture* herbaceous, under surface of the frond slightly hairy; *rachises* of the pinnæ winged; *sori* small, roundish, placed in the lower sinuses.—*Hk. Sp. 2. p. 68. t. 95. B.*

Hab. New Zealand.—A much smaller plant than *H. tenuifolia*, with the ultimate segments more frequently and sharply toothed.

10. *H. Bergiana*, Hk.; *st.* tufted, 2 ft. l., strong, erect, dark chesnut-brown, tomentose; *fr.* 12-18 in. l., 6-9 in. br., deltoid, quadripinnatifid; *pinnæ* deltoid; *pinnl.* ovate-deltoid; *segm.* ovate,  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., cut down to the rachis



into oblong blunt-toothed ultimate divisions; *texture* thinly herbaceous; *rachis* rigid, zigzag, dark-brown, tomentose, and the under surface of the frond hairy; *sori* very small, placed in the sides of the lobes of the segments or ultimate divisions.—*Hk. Sp. 2. p. 67.*

Hab. Cape Colony, Kaffraria, Natal, and Zambesi Land.—A well-marked plant.

§§ *Aspidotis*, *Nuttall.* *Fronde small, densely tufted.* Sp. 11.

11. H. (Aspid.) *Californica*, *Hk.*; *st.* densely tufted, about 6 in. l., strong, erect, brown, glossy; *fr.* about 3 in. each way, deltoid, quadripinnatifid; lower *pinnæ* deltoid, the *pinnl.* of the lower side much larger than the others, cut down to the rachis into numerous *segm.*, which are again very sharply cut nearly to the centre; *texture* subcoriaceous; *rachises* naked, glossy, dark-brown; *sori* roundish, 2 to 6 to a *segm.*, placed at the base of the sinuses.—*Hk. Sp. 2. p. 71. t. 88. A.*

Hab. California.—This has quite the habit of the more finely-divided coriaceous species of *Eucheilanthes* (*C. tenuifolia*, &c.).

#### GEN. 25. CHEILANTHES, *Swartz.*

*Sori* terminal or nearly so on the veins, at first small, subglobose, afterwards more or less confluent. *Invol.* formed from the changed reflexed margin, roundish and distinct, or more or less confluent, but not quite continuous. TAB. III. f. 25. *A considerable genus, with many species extending beyond the tropics, the fronds mostly under a foot long, often under six inches, tri- or quadripinnatifid, subcoriaceous in texture. Veins free in all the species. Adiantopsis differs from Hypolepis in habit and the position of the sori, and Eucheilanthes from Pellaea and Pteris, by its more or less interrupted involucre. It is very difficult to draw the line between Cheilanthes and Nothochlæna, which is the corresponding non-indusiate genus.*

§ *Adiantopsis*, *Fée.* *Involucre distinct, roundish, confined to the apex of a single veinlet.* Sp. 1-13.

1. C. (Adiant.) *monticola*, *Gardn.*; *st.* densely tufted, under 1 in. l., naked, wiry, polished, blackish; *fr.* 3-4 in. l.,  $\frac{1}{2}$  in. br., linear-lanceolate, simply pinnate; *pinnæ*  $\frac{1}{4}$ - $\frac{3}{8}$  in. l.,  $\frac{1}{8}$  in. br., oblong, obtuse, auricled at the base on the upper side; *texture* herbaceous; *rachis* naked; *sori* small, numerous, roundish.—*Gard. in Hk. Ic. Pl. t. 477.* *Hypolepis Gardneri*, *Hk. Sp. 2. p. 74. t. 92. B.*

Hab. Brazil, province of Goyaz; discovered by Mr. Gardner.—The only simply pinnate species of the subgenus.

2. C. (Adiant.) *pteroides*, *Swz.*; *st.* 6-12 in. l., strong, erect, polished, dark chesnut-brown, naked; *fr.* 12-18 in. l., 6-9 in. br., deltoid, tripinnate, upper part simply pinnate, lower with several opposite pairs of wiry erecto-patent branches growing gradually larger downwards, the lowest often again branched; *segm.*  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., oblong, entire, broadly rounded at both ends, sessile; *texture* subcoriaceous; *rachis* polished, naked, both surfaces naked; *sori* small, roundish, distinct but contiguous.—*Hk. Sp. 2. p. 80. t. 101. A.*

Hab. Cape Colony, on mountains from 1-3,000 ft., and found also in Java.—Closely resembles in habit some of the *Platylomæ*.

3. C. (Adiant.) *regularis*, *Mett.*; *st.* 6-9 in. l., densely clothed with ferruginous hairs; *fr.* 6-8 in. l., lanceolate-oblong, bipinnate; *pinnæ* spreading from the rachis at right angles, the lowest 2 in. l., oblong-obtuse; *pinnl.* 4-5 lin. l., stalked, oblong-rhomboidal, cuneate at the base below, truncate or auricled

above, slightly crenate; *texture* subcoriaceous; *rachis* pubescent like the stipe; *sori* roundish, placed at intervals round the edge of the pinnules.—*Adiantum*, Kunze.

Hab. Brazil; gathered by Beyrich and Bongard.—We have not seen this, and our description is an abstract of that of Prof. Mettenius.

4. C. (*Adiant.*) *paupercula*, Mett.; *st.* tufted, wiry, slender, erect, 4-6 in. l., dark chestnut-brown, glossy, naked; *fr.* 4-6 in. l., 3-4 in. br., triangular-acuminate in general outline, simply pinnate half or one-third of the way down, with 2 to 4 erecto-patent *pinnæ* on each side of the lower half; *pinnl.* 3 lin. l., 1½ lin. br., oblong, scarcely toothed; *texture* subcoriaceous; *rachis* like the stipe; *sori* 1 to 3 to a segment, small, roundish.—*Hypolepis*, *Hk. Sp. 2. p. 73. t. 83. C.*

Hab. Cuba; gathered by Linden and Wright.

5. C. (*Adiant.*) *radiata*, R. Br.; *st.* tufted, 12-18 in. l., strong, erect, wiry, glossy, blackish, polished; *pinnæ* 6 to 9, all radiating from a common centre like the spokes of a wheel, with a whorl of bract-like segments at the axis, the longest 6-9 in. l., ¾-1 in. br.; *pinnl.* numerous, close, ½ in. l., 1-1½ lin. br., unequal-sided, truncate at the base below, auricled at the base above; *texture* subcoriaceous; *rachis* glossy, naked; *sori* small, very numerous, placed along both margins of the entire pinnules.—*Hypolepis radiata*, *Hk. Sp. 2. p. 72. t. 91. A.*

Hab. Tropical America, from the West Indies and Mexico southward to Peru and Rio Janeiro.

6. C. (*Adiant.*) *Capensis*, Swz.; *st.* tufted, erect, 4-6 in. l., naked, dark chestnut-brown; *fr.* 4-6 in. l., 3-4 in. br., ovate-deltoid, bipinnatifid; *lower pinnæ* much the largest; *pinnl.* on the lower side larger than the others, ovate, bluntish, 1 in. l., ½ in. br., cut down below to a narrowly-winged *rachis* into oblong blunt nearly entire *segm.* 3-4 l. lin., 2 lin. br.; *texture* herbaceous; *rachis* polished, chestnut-brown; under surface naked, bright-green; *sori* small, placed all round the edge of the segments; *invol.* ciliated.—*Hypolepis*, *Hk. Sp. 2. p. 72. t. 77. C.*

Hab. Cape Colony.—This and the next differ from all the others by their more herbaceous texture.

7. C. (*Adiant.*) *Kirkii*, Hk.; *st.* densely tufted, 6-9 in. l., erect, chestnut-brown, polished, naked, but fibrillose towards the base; *fr.* 4-6 in. each way, deltoid, bipinnatifid, the upper pairs of *pinnæ* narrowly decurrent, the lower pair much the largest and the *pinnl.* of the lower side much larger than those of the upper, 1-1½ in. l., lanceolate-oblong, acuminate, cut down nearly to the *rachis* into several linear-oblong *segm.*, with about their own breadth between them; *texture* herbaceous; *rachis* dark chestnut-brown, both surfaces nearly naked; *sori* numerous, small, roundish, marginal, contiguous but not confluent.—*Hk. 2nd Cent. F. t. 81.*

Hab. Gathered by Dr. Kirk in Zambesi Land on rocks in the Moramballa Mountains at an elevation of from 2-3,500 ft., and by Dr. Welwitsch in Angola.—This has entirely the habit and other characters of *Pellæa geraniifolia*, but the fructification is that of this section of *Cheilanthes*.

8. C. (*Adiant.*) *pedata*, A. Br.; *st.* tufted, 6-12 in. l., wiry, erect, naked, dark chestnut-brown, glossy; *fr.* about 6 in. each way, ternately divided, the central portion triangular-acuminate, with numerous linear-lanceolate *pinnl.*, growing gradually larger downwards, the lateral portions lanceolate, with the lowest *pinnl.* on each side 1-2 in. l., pinnate; *segm.* 3-4 lin. l., 1-1½ lin. br., oblong, narrowed suddenly to a point, auricled at the base above; *texture* subcoriaceous; *rachis* dark-coloured and polished like the stipe; *sori* numerous, placed round



both edges of the segments, small, roundish.—*Hypolepis*, *Hk. Sp. 2. p. 73, t. 92. A.*

Hab. Jamaica ; discovered by Mr. Purdie.

9. C. (Adiant.) *dichotoma*, Swartz ; *st.* densely tufted, slender, 4-6 in. l., polished, naked, dark chesnut-brown ; *fr.* 12-18 in. l., 4-6 in. br., oblong, tri- or quadripinnate, the main rachis very slender, zigzag, the secondary ones the same, spreading at right angles ; *pinnæ* 2-3 in. l., deltoid ; *pinnl.* lanceolate-oblong, cut down to the rachis into a few ternately-divided roundish or oblong *segm.* or even again slightly branched at the base ; *ult. divisions*  $\frac{1}{2}$  in. each way ; *rachis* naked and polished, both surfaces naked ; *sori* small, roundish, marginal, distinct.—*Hk. Sp. 2. p. 104. t. 102. B.*

Hab. Quito, Brazil, and Uruguay.—Very different from all the others in manner of growth, &c.

10. C. (Adiant.) *Seemanni*, Hk. ; *st.* tufted, 3-6 in. l., strong, wiry, erect, dark chesnut-brown, fibrillose below ; *fr.* 4-9 in. l., 2-3 in. br., ovate-lanceolate, tripinnatifid ; *pinnæ* in numerous nearly opposite pairs, the lowest  $1\frac{1}{2}$ -2 in. l.,  $\frac{3}{4}$  in. br., lanceolate ; the *pinnl.* oblong-lanceolate, cut down to the rachis below ; *texture* subcoriaceous ; *rachis* and both surfaces nearly naked ; *sori* roundish, 1 to 4 to the segments, lateral, not confluent ; *invol.* pale-brown.—*Hk. Sp. Fil. 2. p. 85. t. 97. A.*

Hab. Sierra Madre, N.W. Mexico ; discovered by Dr. Seemann.—This may be a form of *C. microphylla*, from which it differs only in its distinct involucre.

11. C. (Adiant.) *Schimperi*, Hk. ; *st.* tufted, 3-6 in. l., erect, wiry, naked, chesnut-brown, glossy ; *fr.* 3-4 in. l., nearly as broad, deltoid, quadripinnatifid ; *lower pinnæ* much the largest ; *pinnl.* lanceolate-deltoid, *ult. divisions* linear, acute, entire or toothed, 2 lin. l., less than  $\frac{1}{2}$  lin. br. ; *texture* subcoriaceous ; *rachis* glossy, naked ; *sori* numerous, small, placed along both margins of the *ult. divisions*.—*Hk. Sp. 2. p. 70.*

Hab. Abyssinia ; discovered by Schimper.—Habit of *Hypolepis Californica* and *Cheilanthes tenuifolia*.

12. C. (Adiant.) *incisa*, Kunze ; *st.* 1-2 in. l., erect, polished, naked, dark-brown ; *fr.* 2 in. l., 1 in. br., ovate-deltoid, tripinnatifid ; *lower pinnæ* 1 in. l., cut down to the rachis into several oblong *pinnl.* ; *segm.* narrow, linear, sharp-pointed ; *texture* subcoriaceous ; *sori* few, distant, marginal, roundish or transversely oblong.—*Mett. Cheil. No. 65. t. 3. f. 28-31.*

Hab. South of Brazil, fide *Mettenius*.—There is no specimen of this in the Hookerian Herbarium, but it is carefully figured and described by Prof. Mettenius, and seems a very distinct plant.

13. C. (Adiant.) *chlorophylla*, Swz. ; *rhizome* stout, paleaceous ; *st.* contiguous, 12-18 in. l., strong, erect, polished, naked, dark chesnut-brown ; *fr.* 12-18 in. l., 4-8 in. br., ovate-lanceolate tripinnatifid ; *pinnæ* 3-5 in. l.,  $\frac{3}{4}$  to  $1\frac{1}{2}$  in. br., distant, lanceolate ; *pinnl.* lanceolate, cut down to the rachis into numerous entire linear-oblong *segm.* ; *texture* herbaceous ; *rachis* like the stipe ; *sori* numerous, small, roundish, placed on both edges.—*Hypolepis spectabilis*, *Link, Hk. Sp. 2. p. 73. t. 88. B.*

Hab. South America, from New Granada southward to Monte Video.

§§ *Eucheilanthes*. *Involucres more or less confluent, fronds not powdered beneath, segments larger and flatter than in Physapteris*. Sp. 14-35.

\* *Stipe scaly throughout, or more or less tomentose*. Sp. 14-24.

14. *C. micropteris*, Swartz; *st.* densely cæspitose, wiry, erect, tomentose, densely clothed with fibrillose light-brown scales at the base; *fr.* 3-4 in. l., 2-3 lin. br., simply pinnate; *pinnæ* 1-1½ lin. br., ovate or roundish, crenate at the base, deeply lobed, the outer surface convex, pubescent; *texture* subcoriaceous; *rachis* wiry, tomentose like the stipe; *sori* roundish, 3 to 5 to each pinna.—*Hk. Sp. 2. p. 76*.

Hab. Tropical America, from Ecuador southward to Peru and the Argentine territory.—The extreme forms of this and *C. Matthewsii* look very different; but upon view of the set of the Hookerian specimens, it seems doubtful whether they are really distinct.

15. *C. Matthewsii*, Kunze; *rhizome* stout, creeping, densely clothed with linear-lanceolate dark-brown scales; *st.* numerous, almost tufted, strong, erect, wiry, densely pubescent; *fr.* 4-12 in. l., 1-2 in. br., linear-lanceolate, bi- or tripinnatifid; *pinnæ* ½-1 in. l., numerous, deltoid, much upcurled and incurved, cut down to the rachis below into linear-oblong, crenate or pinnatifid *pinn.*; *rachis* stout, rigid, densely tomentose; *texture* subcoriaceous; *sori* numerous; *invol.* roundish, slightly confluent.—*Hk. Sp. 2. p. 91*. *C. fasciculata*, *Goldm.*

Hab. Andes of Bolivia and Peru.—*C. pruinata*, Kaulf., appears to be the oldest name, but the plant is not at all pruinata. The pinnales have the margins so much incurved, that it gives them the beaded habit of those of *Eugleichenia*.

16. *C. fragrans*, Webb & Berth. (non Swartz); *st.* cæspitose, wiry, 1-3 in. l., densely clothed with reddish-brown linear scales; *fr.* 2-3 in. l., about 1 in. br., ovate-acuminate, bi- or tripinnatifid; *pinnæ* opposite, ½-¾ in. l., ¼-⅓ in. br., deltoid, cut down to the rachis below into several sinuato-pinnatifid linear-oblong lobes; *texture* subcoriaceous; *rachis* polished but slightly scaly, both surfaces green and naked; *sori* small, copious; *invol.* light-brown, membranous, toothed.—*Hk. Sp. 2. p. 81*. *Polypodium fragrans*, *Linn. Mant.* *C. odora* and *saaveolens*, *Swartz*. *C. maderensis*, *Lowe*.

Hab. South of France, Spain, Italy, Greece, Turkey, Canaries, Madeira, Algeria, Syria, Afghanistan, and N. W. Himalayas at 5,000 ft.; and I cannot point out any good distinctive character for the South American *C. andina* (*Hk. Sp. 2. p. 115*), gathered by Mr. Maclean on the Peruvian Andes. Mettenius retains *C. maderensis* as distinct from the common S. European form.

17. *C. arabica*, Decaisne; *st.* tufted, 1-3 in. l., wiry, erect, dark chesnut-brown, fibrillose and tomentose; *fr.* 2-3 in. l., 1-1½ in. br., lanceolate-deltoid, bi- or tripinnatifid; *pinnæ* opposite, the lowest ½-¾ in. l., cut down to the rachis into numerous linear-oblong *segm.*, or slightly again branched at the base; *texture* subcoriaceous; *rachis* chesnut-brown, fibrillose, upper surface naked, lower slightly hairy; *sori* copious.—*Kunze, Linnæa*, 23. p. 207. *Mett. Cheil. p. 50*.

Hab. Abyssinia, *Schimper*, 1431.—*C. coriacea*, Dec. (*Hk. Sp. 2. p. 109*), from Arabia, appears to be either this or very closely allied. This comes very near *C. pulchella*, but is smaller in size, with a distinctly tomentose stipe and rachis. The ultimate segments are longer and narrower, and the involucre more continuous than in *C. fragrans*.

18. *C. vestita*, Swartz (non Hook.); *st.* tufted, 2-4 in. l., wiry, polished, chesnut-brown, slightly tomentose, fibrillose; *fr.* 4-8 in. l., 1½-2 in. br., ovate-lanceolate, tripinnatifid; *lower pinnæ* distant, opposite, ½-¾ in. l., ¼-⅓ in. br. lanceolate-deltoid, cut down to the rachis into several oblong *pinn.* on each side the largest of which are quite ¼ in. l., ⅓ in. br., cut down nearly or quite to the



rachis below; *texture* subcoriaceous, upper surface nearly naked, lower only slightly hairy, not densely matted; *rachis* thinly tomentose; *sori* copious.—*Gray, Manual, p. 592.*

Hab. Delaware and Pennsylvania southward to New Carolina.—This is not described in the "Species Filicum," the *C. vestita* there given being our *C. lanuginosa*. We owe the unravelling of the synonymy to Prof. Eaton, who has ascertained, through the intervention of M. Naudin, that this is the *Nephrodium lanosum* of Michaux's Herbarium.

19. *C. pilosa*, Goldm.; *st.* tufted, 2-4 in. l., flexuose, dark chesnut-brown, pilose, brittle; *fr.* 6-12 in. l.,  $1\frac{1}{2}$ -2 in. br., linear-oblong, tripinnatifid; *lower pinnae* distant,  $\frac{3}{4}$ -1 in. l., deltoid, cut down to the rachis below into oblong *pinnl.*, 3-4 lin. l., 2 lin. br., deeply lobato-pinnatifid; *texture* herbaceous; *rachises* and both surfaces glandulose-pilose; *sori* copious, slightly confluent.—*C. MacLeanii, Hk. Sp. 2. p. 93. t. 110. B.*

Hab. Andes of Peru.—This comes nearest the true *C. vestita*, but is very flaccid in habit, larger, and more hairy.

20. *C. microphylla*, Swartz; *rhizome* slightly creeping; *st.* 2-6 in. l., wiry, flexuose, polished, dark chesnut-brown, tomentose below when young; *fr.* 3-9 in. l., 2-3 in. br., ovate-lanceolate, bi- or tripinnatifid; *pinnae* in numerous nearly opposite pairs, the lowest 1-2 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., lanceolate or tending towards deltoid; *pinnl.* linear-oblong, entire or subdeltoid, and cut down to the rachis below; *texture* subcoriaceous; *rachis* usually naked; both surfaces green and glabrous; *sori* roundish or elongated; *invol.* narrow, pale.—*Hk. Sp. 2. p. 84. t. 98. A.* *C. elongata, Willd. Hk. l. c. p. 86.* *C. pygmaea, Klotzsch, Hk. l. c. p. 88.*— $\beta$ , *C. pubescens*, H. B. K.; *rachis* tomentose, both surfaces of the frond pubescent. *Hk. Sp. 2. p. 93.*— $\gamma$ , *C. micromera*, Link; *pinnae* numerous, close, spreading, pinnules ovate-oblong, entire or nearly so; *invol.* subcontinuous. *C. aspidioides, Fée.*— $\delta$ , *C. Moritziana*, Kunze; whole plant larger; *pinnl.* often  $\frac{1}{2}$  in. l., cut down nearly to the rachis for the lower two-thirds into oblong *segm.*—*Hk. Sp. 2. p. 85. t. 99. B.*

Hab. Tropical America, from Mexico and the West Indies southward to Peru.—A very variable plant, and it is to be feared that *C. Tweediana*, Hook., *C. obtusata*, Presl, and *C. cucullans*, Fée, must also rank here.

21. *C. Mysurensis*, Wallich; *st.* densely tufted, very short, wiry, dark chesnut-brown, polished, fibrillose below when young; *fr.* 3-12 in. l.,  $1\frac{1}{2}$ -3 in. br., ovate-lanceolate, tripinnatifid; *pinnae* numerous, the lowest opposite,  $\frac{3}{4}$ - $1\frac{1}{2}$  in. l., lanceolate-deltoid, cut down to the rachis into numerous linear-oblong incispinnatifid *pinnl.*; *texture* herbaceous when young, subcoriaceous when mature; *rachis* polished, chesnut-brown, slightly fibrillose, both surfaces naked; *sori* small, roundish, distinct or slightly confluent.—*Hk. Sp. 2. p. 94. t. 100. A.* *C. Chusana, Hk. Sp. 2. p. 95. t. 106. B.*

Hab. Abundant in Tropical Hindostan, but not known in the Himalayas. Found also in Ceylon, West China, and at Canton and Chusan, and gathered lately by Mr. Oldham in Japan.—It resembles *C. microphylla* very closely, but the stipe is shorter and more scaly.

22. *C. fragilis*, Hk.; *st.* densely tufted, not more than 1-2 in. l., strong, erect, tomentose and fibrillose; *fr.* 6-12 in. l., 2-4 in. br., ovate-lanceolate, bipinnatifid; *pinnae* numerous, alternate, the lowest 1-2 in. apart, 1-2 in. l.,  $\frac{1}{2}$  in. br., oblong-lanceolate, cut down to the rachis below into numerous linear-oblong, blunt, sinuato-crenated lobes; *texture* herbaceous; *rachises* bright-brown, tomentose, both surfaces green and naked except the midrib beneath; *sori* small, roundish or subcontinuous; *invol.* pale-brown, membranaceous.—*Hk. Fil. Exot. t. 96.*

Hab. Limestone rocks near Moulmein, Malayan Peninsula; discovered by the Rev. C. S. Parish.—A larger plant than *C. Mysurensis*, but very doubtfully distinct.—From the Ceylonese *C. laxa*, Moore, it differs mainly by its tomentose rachis.

23. *C. hirta*, Swartz; *st.* tufted, 2-4 in. l., strong, erect, densely coated with spreading bright reddish-brown woolly hairs; *fr.* 4-12 in. l., 2-5 in. br., ovate-lanceolate, tripinnatifid; *pinnæ* opposite, spreading from the main rachis at right angles, lanceolate, 1-3 in. l., cut down to the rachis into numerous oblong *pinnl.* which are scarcely more than  $\frac{1}{2}$  in. l., and again inciso-pinnatifid; *texture* subcoriaceous; *rachis* and both surfaces more or less tomentose; margin of the *segm.* much incurved; *sori* copious.—*Hk. Sp. 2. p. 92. t. 101. B.* — $\beta$ , *C. parviloba*, Swz.; *rachis* and surfaces less tomentose; *pinnæ* shorter, with the *segm.* and apex slightly divided and convolute.—*Hk. Sp. l. c.*

Hab. Cape Colony northward on the east to Natal, on the west to Angola.—There is a specimen from Java from Dr. Blume in the Hookerian Herbarium, and Mr. Moore gives it as Chinese. Our *a* varies more in size and hairiness, and includes three species of Fée; viz., his *Cheilanthes olivacea* (a large form, with the margin of the *segm.* less incurved) and his *Myriopteris contracta* and *intermedia*. It might as suitably be placed in *Physapteris* as here. *C. glandulosa*, Pappe and Rawson, is said to be closely allied.

24. *C. viscosa*, Kaulf.; *st.* tufted, 4-6 in. l., strong, erect, wiry, dark chesnut-brown, polished, pubescent; *fr.* 4-6 in. each way, deltoid, tri- or quadripinnatifid; *pinnæ* in pairs, the lowest much the largest; *pinnl.* of the lower side larger than the others, sometimes  $1\frac{1}{2}$ -2 in. l., lanceolate, with narrow linear-oblong *segm.*, which are again cut down to the rachis into small beaded ultimate divisions; *texture* herbaceous in the barren frond, subcoriaceous in the fertile one when mature; *rachises* pubescent, like the stipe, both surfaces pilose; *sori* more or less confluent.—*Hk. Sp. 2. p. 105. t. 93. B.*

Hab. New Mexico southward to Venezuela.—Easily distinguished from its allies by the deltoid outline of the frond. *C. leucopoda*, Link, is an allied Mexican plant, said to have a straw-coloured stipe and smaller fronds, and *C. tenuis*, Presl, another allied Mexican plant which I have not seen. From *Allosorus hirsutus*, Presl, this differs by its hairy stipes and rachis and Cheilantheid involuere.

\*\* *Stipe not hairy and slightly scaly only towards the base. Sp. 25-35.*

25. *C. hispanica*, Metten.; *st.* cæspitose, wiry, naked, dark chesnut-brown, polished, 2-3 in. l., with a dense tuft of wiry linear-filiform dark chesnut-brown scales at the base; *fr.* 1-1 $\frac{1}{2}$  in. l.,  $\frac{3}{4}$  in. br., deltoid, bi- or tripinnatifid; *pinnæ* in opposite pairs, the lowest the largest, oblong or again branched on the lower side; *segm.* roundish-oblong, crenate; *texture* coriaceous; *rachis* polished, upper surface green, naked, under brown, tomentose; *sori* small, copious.—*Metten. Cheil. p. 30.*

Hab. Rocks on the banks of the Mondego, near Coimbra, Portugal, *Welwitsch*; Spain, *fide Mettenius*.

26. *C. pulchella*, Bory; *st.* densely tufted, 3-9 in. l., strong, erect, dark chesnut-brown, polished, slightly fibrillose below; *fr.* 3-12 in. l., 2-4 in. br., ovate-lanceolate or deltoid, tripinnate; *lower pinnæ* opposite, subdeltoid, 2-3 in. l., 1-1 $\frac{1}{2}$  in. br.; *pinnl.* lanceolate, cut down to the rachis into numerous linear-oblong *segm.*; *texture* subcoriaceous; *rachis* and both surfaces naked; *sori* copious.—*Hk. Sp. 2. p. 109. t. 94. A.*

Hab. Madeira and the Canaries.—The Abyssinian plant placed here in "Species Filicum" is *C. coriacea*.

27. *C. varians*, Hk.; *st.* densely tufted, 2-6 in. l., chesnut-brown, polished but rather slender and brittle, fibrillose below; *fr.* 6-9 in. l.,  $1\frac{1}{2}$ -2 in. br., lan-



ceolate, bipinnatifid; *pinnæ* in numerous pairs, the lower ones opposite, often  $1\frac{1}{2}$ -2 in. apart,  $1-1\frac{1}{2}$  in. l.,  $\frac{3}{4}$  in. br., deltoid acuminate, cut down to the rachis in the lower part into oblong or linear-oblong entire or slightly toothed lobes; *texture* herbaceous; *rachis* like the stipe, both surfaces naked; *sori* copious, continuous; *invol.* narrow, membranaceous.—*Hk. Sp. 2. p. 89. t. 93. A. C. Malaccensis, Fée.*

Hab. Himalayas, ascending to 2-3,000 ft., Malayan Peninsula, Luzon, S. China.

28. *C. subvillosa*, Hk.; *st.* densely tufted, 2-4 in. l., polished, naked, bright chesnut-brown, rather brittle, clothed with lanceolate acuminate scales below; *fr.* 6-12 in. l., 2-3 in. br., ovate-lanceolate, tripinnatifid; *pinnæ* in numerous pairs, the lower ones distant,  $1\frac{1}{2}$  in. l., more than 1 in. br., deltoid; *pinnl.* on the lower side the largest, sometimes 1 in. l., oblong-lanceolate, cut down to the rachis below into oblong lobes; *texture* herbaceous; *rachis* bright chesnut-brown, slightly pubescent, upper surface naked, lower villose, especially on the costa; *sori* copious; *invol.* greenish.—*Hk. Sp. 2. p. 87. t. 98. B.*

Hab. Pabur Valley and Simla, Himalayas; gathered by Mr. Edgeworth.—This species and *C. Dalhousiæ* differ from all the rest of the subgenus in their broader segments and more herbaceous texture, in which they agree with *Adiantopsis Capensis* and *Kirkii*.

29. *C. Dalhousiæ*, Hk.; *st.* densely tufted, 3-6 in. l., wiry, polished, dark chesnut-brown, when young clothed with linear scales; *fr.* 6-12 in. l., 3-4 in. br., ovate-lanceolate or subdeltoid, tripinnatifid; *pinnæ* in numerous opposite pairs, the lowest 2-3 in. l.,  $1-1\frac{1}{2}$  in. br.; *pinnl.* on the lowest side the largest, sometimes 1 in. l., linear-oblong, blunt, deeply sinuato-pinnatifid; *texture* herbaceous; *rachis* and costa naked and glossy like the stipe, both surfaces naked; *sori* numerous, roundish, small.—*Hk. Sp. 2. p. 80.*

Hab. North of Hindostan, ascending in the Himalayas to 10,000 ft.—This occasionally shows a tendency to become farinose beneath. The involucre, though often crowded, are very slightly confluent.

30. *C. allosuroides*, Metten.; *st.* tufted, densely fibrillose at the base, 2-3 in. l., wiry, erect, chesnut-brown, polished; *fr.* 4-6 in. l., 2 in. br., ovate-lanceolate, bipinnatifid; *pinnæ* alternate, about 1 in. l.,  $\frac{1}{2}$  in. br., lanceolate, cut down to the rachis into several ovate-acute *pinnl.*, which are cuneate at the base and slightly lobed below; *texture* subcoriaceous; *rachis* like the stipe, slightly hairy above when young, glabrous when mature; *invol.* narrow, greenish, nearly continuous.—*Mett. Cheil. p. 32.*

Hab. Mexico.—Our description is taken from specimens gathered by Schaffner. It comes nearest *C. Sieberi* in habit, but is less rigid, and the involucre is more continuous.

31. *C. Sieberi*, Kunze; *st.* densely tufted, 3-6 in. l., strong, wiry, polished, dark chesnut-brown, fibrillose towards the base; *fr.* 3-6 in. l.,  $1-1\frac{1}{2}$  in. br., oblong-acuminate, tripinnatifid; *pinnæ* in pairs, the lowest often distant,  $\frac{3}{4}-1\frac{1}{2}$  in. l.,  $\frac{3}{4}-\frac{1}{2}$  in. br., deltoid, with several opposite oblong-deltoid *pinnl.*, which are cut down to the rachis in the lower part; *texture* subcoriaceous; *rachis* wiry, naked, polished, both surfaces naked; *invol.* small, narrow, pale-brown, roundish and separate, or combined.—*Hk. Sp. 2. p. 83. t. 97. B. C. Preissiana, Kunze. Hk. Sp. 2. p. 83.*

Hab. Australia, New Zealand, New Caledonia, Isle of Pines.—Species 31 to 35 form a group of very closely allied plants.

32. *C. bullata*, Kunze; *st.* densely tufted, 4-8 in. l., dark chesnut-brown, polished, wiry, slightly tomentose below, and clothed with lanceolate scales; *fr.* 6-9 in. l., 2-3 in. br., ovate-lanceolate, tripinnatifid; *pinnæ* in numerous opposite pairs, the lower ones  $1-1\frac{1}{2}$  in. apart,  $1\frac{1}{2}$  in. l.,  $\frac{3}{4}-1$  in. br., lanceolate or sub-

deltoid; *pinnl.* of the lower side the largest, cut down nearly to the rachis into numerous linear-oblong *segm.*; *texture* subcoriaceous; *rachis* like the stipe, upper surface naked, lower glandular; *sori* copious; *invol.* pale-brown.—*Hk. Sp.* 2. p. 88. t. 96. A.

Hab. Neilgherry Hills, S. Hindostan.—Very near *C. Sieberi*, of which it is not unlikely only a larger and more robust variety, and both have a close connection with *C. multifida*.

33. *C. multifida*, Swartz; *st.* tufted, 3-9 in. l., strong, erect, dark chesnut-brown, polished, slightly scaly towards the base; *fr.* 3-12 in. l., 2-8 in. br., ovate-lanceolate or deltoid, tri- or quadripinnatifid; *lower pinnl.* opposite, remote, erect-patent, deltoid, 2-6 in. l.; *ult. divisions* linear-oblong, deeply lobed and the margin in the fertile plant much recurved; *texture* subcoriaceous; *rachis* dark chesnut-brown, naked and polished, both surfaces naked; *sori* terminal on the lobes, small, roundish, slightly confluent; *invol.* membranaceous.—*Hk. Sp.* 2. p. 90. t. 100. B. *Gard. F.* t. 39.

Hab. Cape Colony northward to Zambesi Land and St. Helena, and sent also from Java by Dr. Blume.—Dr. Kirk's tropical specimens are larger and more compound than those from further south, but appear to be the same plant.

34. *C. Wrightii*, Hk.; *st.* 2-4 in. l., strong, wiry, chesnut-brown, polished, finely fibrillose below when young; *fr.* 2-3 in. l., 1-1½ in. br., ovate-lanceolate, tripinnatifid; *pinnæ* in several opposite pairs, the lowest about 1 in. l., ½ in. br., deltoid; *pinnl.* cut about halfway down into oblong-acute lobes; *texture* subcoriaceous; *rachis* like the stipe, both surfaces naked; *sori* copious, the margin of the fertile fronds much incurved.—*Hk. Sp.* 2. p. 87. t. 90. A.

Hab. Gathered by Mr. Wright in 1849 in an expedition from Texas to New Mexico, U. S. A.—In habit it comes very near the small forms of *C. tenuifolia*, but the involucre are less confluent.

35. *C. tenuifolia*, Swartz; *st.* not tufted, 4-8 in. l., wiry, flexuose, naked, dark chesnut-brown, polished, slightly fibrillose towards the base; *fr.* 4-8 in. l., 3-4 in. br., deltoid, tripinnatifid; *pinnæ* in numerous opposite pairs, the lowest 2-4 in. l., 1-2 in. br., deltoid; *pinnl.* on the lowest side the largest, the lowest 1 in. l., cut down to the rachis into oblong entire or sinuato-pinnatifid *segm.*; *texture* subcoriaceous; *rachis* polished like the stipe, both surfaces green and naked; *sori* roundish or subcontinuous; *invol.* narrow, brownish, more or less toothed.—*Hk. Sp.* 2. p. 82. t. 87. C.

Hab. Himalayas (sub-tropical region), Madras, Ceylon, Malayan Peninsula and Islands, S. E. China, Polynesian Islands, New Zealand, Australia, and southward to Van Diemen's Land.

§§§ *Physapteris*, *Presl* (*Myriopteris*, *Fée*). *Involucres confluent, ultimate segments very small, beadlike.* *Sp.* 36-48.

36. *C. flexuosa*, Kunze; *st.* about 2 in. l., erect, wiry, dark chesnut-brown, naked, polished; *fr.* 2-3 in. l., rather more than 1 in. br., ovate-lanceolate, bipinnate; *pinnæ* numerous, close, spreading at right angles from the rachis, with 8-10 small beadlike nearly sessile *pinnl.* on each side, which are hardly more than ½ lin. each way and rolled up like a ball; *rachis* rigid, chesnut-brown, glandular; *texture* coriaceous; *sori* hidden.—*Hk. Sp. Fil.* p. 104.

Hab. Brazil.—Our description is taken from Brazilian specimens gathered by Lindberg, which are marked by Mettenius as Kunze's var. *minor*. The typical plant is described as tri- or quadripinnate.

37. *C. induta*, Kunze; *st.* 3-6 in. l., naked, polished, chesnut-brown, clothed thinly with linear-lanceolate scales when young; *fr.* 3-6 in. l., 1½-2 in. br.,



ovate-lanceolate, tripinnatifid; *lower pinnæ* rather remote, deltoid; *pinnl.*  $\frac{1}{2}$ - $\frac{3}{4}$  in. l., cut down to the rachis into oblong lobed *segm.*; *rachis* polished like the stipe, but more or less tomentose; *texture* subcoriaceous, upper surface naked, very convex in the mature fertile frond, under surface tomentose like the *rachis*; *sori* marginal.—*Hk. Sp. 2. p. 92. t. 102. A.*

Hab. Cape Colony; discovered by M. Drège.—It resembles *C. lanuginosa* and *Szovitzii* in size and general appearance, but is naked on the upper surface, and not at all matted beneath.

38. *C. lanuginosa*, Nuttall; *st.* densely tufted, erect, wiry, polished, dark chesnut-brown, thinly clothed with spreading woolly hairs; *fr.* 4-8 in. l., 1-1 $\frac{1}{2}$  in. br., ovate-lanceolate, bipinnatifid; *pinnæ* in opposite pairs, the lower ones deltoid; *pinnl.* linear-oblong, contiguous, cut down to the rachis into numerous small roundish or oblong *segm.*; *rachis* tomentose; *texture* subcoriaceous; *upper surface* grass-green, slightly tomentose; lower surface densely matted with a coat of pale-brown woolly tomentum, the margin of the *segm.* much incurved; *sori* copious, marginal.—*C. lanosa*, Moore. *C. vestita*, *Hk. Sp. 2. p. 99.* *C. gracilis*, *Riehl.*

Hab. Illinois and Wisconsin westward and southward to the Rocky Mountains, California, and New Mexico.

39. *C. Szovitzii*, Fisch. & Meyer; *st.* densely tufted, erect, wiry, polished, chesnut-brown, thinly coated with spreading woolly hairs, mixed with linear scales; *fr.* 3-6 in. l., 1-1 $\frac{1}{2}$  in. br., ovate-lanceolate, bipinnatifid; *pinnæ* in opposite pairs, the lower ones deltoid; *pinnl.* linear-oblong, contiguous, cut down to the rachis below into small roundish beaded *segm.*; *rachis* scaly and tomentose like the stipe; *texture* subcoriaceous, upper surface green, slightly tomentose, lower surface densely matted with a coat of pale-brown woolly hairs, the margin of the *segm.* much incurved; *sori* copious, marginal.—*Hk. Sp. 2. p. 98. t. 98.* *C. fimbriata*, *Visiani.*

Hab. Asia Minor and Persia southward to N. Hindostan, ascending in the Himalayas to 8,500 ft., Italy and Dalmatia.—Very near *C. lanuginosa*, from which it only differs by having distinct scales mixed with the tomentum upon the stipes and rachis. *Notholæna persica*, Bory, is apparently this species.

40. *C. gracillima*, Eaton; *st.* densely tufted, 2-6 in. l., wiry, slender, dark chesnut-brown, polished, only slightly scaly towards the base; *fr.* 3-4 in. l., 1 in. br., narrowly ovate-lanceolate, bi- or tripinnatifid; *lower pinnæ* opposite, lanceolate-deltoid, about  $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. br., cut down to the rachis into several linear-oblong *segm.* on each side, the largest of which are  $\frac{1}{2}$  in. l., and the lowest again slightly divided; *texture* subcoriaceous; *rachis* slightly fibrillose, upper surface naked, the lower densely matted with pale-brown woolly tomentum, the margin of the *segm.* much incurved; *sori* copious, marginal.—*Eaton in Report Mex. Bound. Survey, vol. 2. p. 234.* *C. Féei*, Moore.

Hab. British Columbia, Oregon, California, Missouri, New Mexico, Guatemala.—A much less hairy and less divided plant than *C. lanuginosa*, with larger and less distinctly beaded segments.

41. *C. Fendleri*, Hk.; *st.* scattered, 2-4 in. l., wiry, chesnut-brown, polished, slightly scaly; *fr.* 3-4 in. l., 1-1 $\frac{1}{2}$  in. br., ovate-lanceolate, tripinnatifid; *pinnæ* lanceolate-deltoid, about  $\frac{3}{4}$  in. l.,  $\frac{3}{8}$  in. br.; *pinnl.* linear-oblong, cut down to the rachis into numerous small oblong beaded *segm.*; *rachis* densely clothed above with lanceolate acuminate entire scales, which are bright reddish-brown in the centre, silvery-white towards the edge; *upper surface* quite naked, under surface scaly only, not matted; *texture* subcoriaceous, margin much incurved; *sori* copious, marginal.—*Hk. Sp. 2. p. 103. t. 107. B.*

Hab. Rocky Mountains southward to California and New Mexico.

42. *C. Lindheimeri*, Hk.; *st.* scattered, 3-6 in. l., wiry, dark chesnut-brown, polished, thinly clothed with linear-lanceolate scales, scarcely tomentose; *fr.* 3-6 in. l.,  $1\frac{1}{2}$ -2 in. br., ovate-lanceolate, tripinnatifid; *pinnæ* numerous, contiguous, the lowest about 1 in. l.,  $\frac{3}{8}$  in. br., lanceolate; *pinnl.* numerous, linear-oblong; *ult. segm.* numerous, minute, roundish; *rachis* densely scaly above; *upper surface* woolly, the lower densely matted with wool and ovate-acuminate bright reddish-brown scales, margin of the segments much incurved; *sori* copious, marginal.—*Hk. Sp. 2. p. 101. t. 107. A.*

*Hab.* Texas and New Mexico.—This quite agrees with *C. myriophylla* in habit and texture, differing only in its wide-creeping rhizome and stipes without woolly tomentum.

43. *C. myriophylla*, Desv.; *st.* densely tufted, 3-6 in. l., strong, wiry, erect, densely clothed with pale woolly tomentum; *fr.* 4-6 in. l.,  $1\frac{1}{2}$ -2 in. br., ovate-lanceolate, tri- or quadripinnatifid; *lower pinnæ* about 1 in. l.,  $\frac{1}{2}$  in. br., lanceolate-deltoid, cut down to the rachis into numerous linear-oblong *pinnl.* on both sides, which are again slightly branched at the base; *ult. segm.* very small, roundish, beadlike; *texture* subcoriaceous; *rachis* clothed with tomentum like the stipe and also with distinct lanceolate-acuminate entire scales; *upper surface* green and pilose, lower densely matted and scaly, the margin of the segments much incurved; *sori* copious, marginal.—*Hk. Sp. 2. p. 100. t. 105. A.*— $\beta$ , *C. elegans*, Desv.; *ult. segm.* obovate-pyriform, usually tapering into a distinct stalk.—*Hk. Sp. t. 105. B. C. paleacea, Mart. & Gal. M. marsupianthes, Fée.*

*Hab.* Tropical America, especially in the west side, from Mexico southward to Peru and Chili, and discovered lately by Capt. Beddome in the Neilgherries. Of *M. cheilogyplus* and *rufa* of Fée, both Mexican plants gathered by Schaffner, I have not seen specimens.

44. *C. scariosa*, Kaulf.; *st.* densely tufted, not more than 1-2 in. l., densely coated with large lanceolate whitish-brown scales; *fr.* 6-8 in. l., 1 in. br., narrowly ovate-lanceolate, bipinnate; *pinnæ* numerous, contiguous, linear-oblong,  $\frac{1}{2}$ - $\frac{3}{4}$  in. l., cut down to the rachis into numerous linear-oblong *pinnl.*; *rachis* and both surfaces densely coated with lanceolate-acuminate scales, which are about 2 lin. l.,  $\frac{1}{2}$  lin. br., bright-brown in the centre, silvery-white towards the ciliated and villous margin; *edge* of the segments much incurved.—*Hk. Sp. 2. p. 99. t. 104. A.*

*Hab.* Andes of Peru, and said to have been also gathered in Mexico.—The only species of the group with a dense coating of large scales.

45. *C. Eatoni*, Baker; *st.* tufted, 3-6 in. l., wiry, erect, densely clothed with pale-brown linear-subulate scales; *fr.* 3-8 in. l.,  $1\frac{1}{2}$ -2 in. br., ovate-lanceolate, tripinnatifid; *lower pinn.* distant, alternate or opposite, deltoid; *pinnl.* linear-oblong, pinnatifid; *rachis* rigid, covered with scales like the stipe, which also cover thickly the midrib of the *pinnæ* beneath; *texture* coriaceous; *upper surface* densely clothed with white woolly tomentum, lower also densely matted, the margin of the segments incurved.—*C. tomentosa, Hk. Sp. 2. p. 96. (in part), t. 109. A. non Link.*

*Hab.* Gathered in an expedition from Western Texas to El Paso, New Mexico, October 1849, *C. Wright*, No. 816.—This differs from *C. tomentosa* by being coated with distinct scales instead of mere woolly hairs on the stipe, rachis, and midrib of the *pinnæ* beneath, and by being matted with tomentum on the upper surface. Gordon's Colorado plant is perhaps the same, but is more slender and less distinctly scaly. We are indebted to Prof. Eaton for the elucidation of the United States species of the genus.

46. *C. tomentosa*, Link; *st.* tufted, 4-6 in. l., strong, erect, densely matted with pale-brown woolly tomentum; *fr.* 6-12 in. l., 2-3 in. br., ovate-lanceolate, tripinnatifid; *lower pinn.* distant, opposite, 1- $1\frac{1}{2}$  in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., deltoid; *pinnl.* linear-oblong, cut down to the rachis into numerous small oblong bead-



like *segm.*; *texture* subcoriaceous; *rachis* densely woolly like the stipe; *upper surface* grey-green, pubescent, lower densely matted, the margin of the *segm.* incurved; *invol.* pale, membranaceous.—*C. Bradburii*, *Hk. Sp. 2. p. 97. t. 109. B.* and *C. tomentosa*, *Hk.* (in part).

Hab. North Carolina and Tennessee southward to Mexico.—The American botanists have the authority of Prof. Kunze for referring the common *Physapteris* of the Southern States to *C. tomentosa*. There is a specimen, said to be from Jamaica, from Mr. A. B. Lambert, in the Hookerian Herbarium. The Afghanistan plant mentioned in "Species Filicum" is *C. Szovitzii*.

47. *C. lendigera*, Swartz; *st.* 3-12 in. l., strong, erect, polished, chestnut-brown, clothed with copious rusty-brown tomentum; *fr.* 4-12 in. l., 2-4 in. br., lanceolate, tri- or quadripinnatifid; *pinnæ* numerous, the lowest opposite, erecto-patent, 2-3 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., lanceolate; *pinnl.* numerous, linear-oblong, cut down to the rachis into numerous distinct convex small *segm.*  $\frac{1}{2}$  lin. or less each way; *rachis* densely tomentose; *texture* subcoriaceous; *upper surface* naked, lower villose; *sori* subcontinuous; *invol.* membranaceous, whitish.—*Hk. Sp. 2. p. 95. t. 104. B.*— $\beta$ , *C. minor*, Mart. & Gal.; hairs of the rachis less copious and more chaffy.—*Hk. l. c. t. 106. A.*

Hab. Mexico (ascending to 9-11,000 ft.), southward to the Andes of New Granada and Ecuador.—*C. frigida* of Linden and Moore we have not seen.

48. *C. speciosissima*, A. Br.; *st.* 3-6 in. l., stout, erect, densely clothed with large (1-1 $\frac{1}{2}$  in. l.,  $\frac{1}{2}$ - $\frac{1}{4}$  in. br.) linear-lanceolate ferruginous scales; *fr.* 12-24 in. l., 4-6 in. br., ovate-lanceolate, tripinnate; *pinnæ* numerous, contiguous, 2-3 in. l.,  $\frac{1}{2}$  in. br., spreading, lanceolate; *pinnl.* numerous, close, linear-oblong, cut down to the rachis into numerous small beaded *segm.*; *texture* subcoriaceous; *rachis* densely palaceous below like the stipe, the upper part of the rachis of the *pinnæ* densely clothed with long rusty woolly hairs; *upper surface* nearly naked, under side tomentose; *sori* not quite marginal, the edge of the segments much incurved, membranaceous and toothed at the border so as to form a subconfluent involucre.—*Hk. Sp. Fil. 2. p. 103.* *Plecosorus mexicanus*, *Fée.*

Hab. Mexico (ascending to 12,000 ft.) and Guatemala.—The genus *Plecosorus* of Fée is characterized by distinctly intramarginal sori.

§§§§ Aleuritopteris, *Fée.* *Involucre*s more or less confluent, fronds coated beneath with white or yellow powder. *Sp.* 49-53.

49. *C. rufa*, Desv.; *st.* tufted, 1-2 in. l., densely clothed with rusty-brown woolly tomentum; *fr.* 6-9 in. l., 2-3 in. br., ovate-lanceolate, bipinnatifid; *pinnæ* opposite, the lower ones with 1-2 in. between them, oblong; *pinnl.*—on the lower side the largest,  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., linear-oblong, sinuato-dentate; *texture* herbaceous; *rachis* densely tomentose like the stipe; *upper surface* tomentose, under surface more or less coated with white powder; *sori* copious, marginal, roundish, small; *invol.* brown, ciliated.—*Hk. Sp. 2. p. 79. t. 99. A.*

Hab. North of Hindostan, ascending to 4,000 ft.—The only tomentose plant of the group.

50. *C. aurantiaca*, Moore; *st.* tufted, 1-2 in. l., chestnut-brown, polished, fibrillose below; *fr.* 4-8 in. l., 2-3 in. br., bipinnate; *pinnæ* opposite, the lower ones spreading, lanceolate, 1-1 $\frac{1}{2}$  in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., cut down nearly to the rachis into numerous linear-oblong entire or slightly crenated *pinnl.*; *rachis* and *upper surface* naked, lower densely coated with bright orange meal; *texture* herbaceous; *sori* maginal, copious.—*Allosorus*, *Presl.* *Pteris*, *Cav. C. ochracea*, *Hk. Sp. 2. p. 114. Ic. Pl. t. 904.*

Hab. Mexico.

51. *C. Welwitschii*, Hk. MSS.; *st.* densely tufted, 4-6 in. l., wiry, naked, dark chesnut-brown, polished; *fr.* 6-12 in. l., 2-3 in. br., lanceolate, bipinnatifid; *pinnæ* with  $1\frac{1}{2}$ -2 in. between the lowest, in opposite pairs, the lowest deltoid,  $1\frac{1}{2}$  in. l., 1 in. br., cut down to the rachis below into long linear-oblong sinuato-dentate *pinnl.*; *texture* subcoriaceous; *lower surface* densely coated with bright-yellow meal, the costæ and rachis polished like the stipe; *sori* numerous, small, subcontinuous, marginal.

Hab. Angola, frequent, 2,400-3,800 ft., *Dr. Welwitsch*, 148 & 198.—This comes near *C. aurantiaca*, but is much more lengthened out in the stipe and frond.

52. *C. argentea*, Hk.; *st.* densely tufted, 3-6 in. l., wiry, polished, dark chesnut-brown, clothed at the base with linear scales when young; *fr.* 3-4 in. l., 2 in. br., deltoid, bi- or tri-pinnatifid, upper part not cut down to the rachis; *lower pinnæ* much the largest, cut down nearly to the rachis; *lowest pinnl.* sometimes  $\frac{1}{2}$  in. l., sinuato-pinnatifid; *rachis* and *costa* polished like the stipe; upper *surface* naked, green, lower thickly covered with white ceraceous powder; *sori* numerous, very small, brownish, united at the base, marginal.—*Hk. Sp. 2. p. 97.*— $\beta$ , *C. chrysophylla*, *Hk. Sp. 2. p. 113*; *pinnl.* more nearly equal, in numerous opposite pairs, the frond narrower and longer, densely coated with yellow, not white, powder on the under side.

Hab. *a*, Siberia, from the Altai to Kamschatka, Japan, China, Malayan Peninsula, and Khasya; *\beta*, Khasya, ascending to 5,500 ft.—There is a wide range of forms, as may be well seen in the large quarto figure in *Fil. Exot. t. 95*, in the shape of the frond and thickness and colour of the ceraceous coating.

53. *C. farinosa*, Kaulf.; *st.* densely tufted, 3-6 in. l., wiry, polished, dark chesnut-brown, clothed with linear scales when young; *fr.* 3-12 in. l., 3-6 in. br., lanceolate or deltoid, bi-tripinnatifid; *pinnæ* in numerous opposite pairs, the lower ones often much the largest, with the lowest *pinnules* longer than the others (1-2 in. l.) and deeply sinuato-pinnatifid, most of the others with a broad entire central space; *texture* subcoriaceous; *rachis* and *costa* naked and polished like the stipe; under *surface* densely coated with pure white powder; *sori* small, brown, placed in a continuous line along the edges.—*Hk. Sp. 2. p. 77. Hk. & Gr. Ic. 134. Bot. Mag. t. 4765.*

Hab. Africa—Cameroon Mountains, Angola, Zambesi Land, Bourbon, Abyssinia. Asia—Arabia, Himalayas (up to 7,000 ft.), Bombay, Neilgherries, Ceylon, Malayan Peninsula, Java, Philippine Islands. America—Mexico (up to 8,000 ft.), Guatemala, New Granada.—Very variable in size. The coriaceous coating is occasionally thin, and sometimes yellowish. M. Fée makes two species; one, *A. farinosa*, with more distinct, the other, *A. dealbata*, with more confluent sori.

#### GEN. 26. CASSEBEERA, Kaulf.

*Sori* terminal on the veins, subglobose or oblong, not reaching beyond the branches of a single vein. *Invol.* inserted distinctly within the margin and separate from it, of the same shape as the sori and pressed down upon it. **TAB. III. f. 26.** *Three local Brazilian species.*

1. *C. triphylla*, Kaulf.; *st.* slender, wiry, 2-3 in. l., naked, blackish, polished; *fr.* digitate,  $\frac{3}{4}$  in. each way, formed of 3 to 5 nearly equal linear-oblong segments; *texture* coriaceous; *both surfaces* naked; *sori* in close rows along the margin of the segments.—*Hk. Sp. 2. p. 118.*

Hab. S. Brazil and Monte Video.

2. *C. pinnata*, Kaulf.; *st.* 6-12 in. l., stout, erect, polished, dark-brown, naked; *fr.* about 6 in. each way, simply pinnate with crenate linear-oblong



*pinnæ* 2-3 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br. when flat, or somewhat compound below, the margins of the segments much incurved in the mature plant; *texture* coriaceous, both surfaces naked; *sori* in close rows along the margins.—*Hk. Sp. 2. p. 119.*

Hab. South Brazil.—*C. petiolata* (Fée, Mem. p. 30. t. 12), which we have not seen, is perhaps a small form of this species.

3. *C. gleichenioides*, Gardn.; *st.* 6 in. l., stout, erect, naked, polished; *fr.* 6-9 in. l., bipinnate, with stalked linear *pinnæ* 1-2 in. l., cut down to the rachis into numerous quadrangular *pinnl.* 1 lin. br., which are incurved and rolled over the rachis, sometimes the lower branches again branched; *texture* coriaceous; *sori* occupying the whole margin of the segments on which they are placed.—*Hk. Sp. 2. p. 119. Ic. Pl. t. 507.*

Hab. Diamond district, Brazil, Gardner, 5295.—A very distinct and peculiar plant, with the habit of *Eugleichenia*.

### GEN. 27. ONYCHIUM, Kaulf.

*Sori* placed upon a continuous linear receptacle, which connects the apices of several veins. *Invol.* parallel with the margin of the segments, linear, opposite, pressed down over the sori, the edge nearly or quite reaching the midrib. TAB. III. f. 27. *United by Mettenius with Pteris, from which the four closely allied species differ rather in the cutting of the frond and the smallness and narrowness of the ultimate segments than essentially in fructification.*

1. *O. melanolepis*, Decaisne; *st.* tufted, 4-6 in. l., slender, naked, straw-coloured; *fr.* 3-4 in. l., 2 in. br., ovate, quadripinnatifid; *lower pinnæ* 1-1 $\frac{1}{2}$  in. l., deltoid; *pinnl.* deltoid, distant; *ult. divisions* linear-oblong when barren, not more than 1-1 $\frac{1}{2}$  lin. l.; *texture* thinly herbaceous, both surfaces naked; *invol.* pale, membranaceous.—*Hk. Sp. 2. p. 124. Ic. Pl. t. 902.*

Hab. Persia and Abyssinia.

2. *O. strictum*, Kunze; *st.* tufted, slender, 6-12 in. l., naked, polished, straw-coloured; *fr.* 6-9 in. l., 3-4 in. br., ovate, quadripinnatifid; *pinnæ* deltoid; *pinnl.* with a few distant *segm.*, which are very narrow and acute, entire or once or twice cleft at the apex or slightly again branched; *ult. divisions* sharp-pointed and very narrow; *texture* herbaceous; *rachis* and both surfaces naked, the fertile segments larger than the others; *invol.* often considerably shorter than the segments on which they are placed, pale, membranaceous.—*Hk. Sp. 2. p. 123. 2nd Cent. t. 32.*

Hab. Cuba; gathered by Linden and Wright.

3. *O. auratum*, Kaulf.; *st.* 6-12 in. l., stout, erect, naked, straw-coloured or pale-brown; *fr.* 1 ft. or more l., 6 in. br., ovate, quadripinnatifid; *lower pinnæ* 4-6 in. l., subdeltoid, erecto-patent; *pinnl.* and *segm.* numerous, usually deltoid; *ult. divisions* of the sterile frond often obovate-cuneate, trifid at the apex, not more than 1 lin. l.,  $\frac{1}{3}$ - $\frac{1}{4}$  lin. br. when entire, coriaceous in texture, of the fertile frond podlike,  $\frac{1}{2}$ -1 in. l.,  $\frac{1}{8}$  in. br.; *rachis* and both surfaces naked, the membranous involucre and copious sori a rich golden-yellow.—*Hk. Sp. 2. p. 121. Hk. & Gr. t. 121.*

Hab. Himalayas, ascending 5,000 ft., and Malayan Peninsula and Islands.

4. *O. japonicum*, Kunze; *st.* 6-12 in. l., stout, erect, naked, straw-coloured or pale-brown; *fr.* 1 ft. or more l., 6 in. br., ovate, quadripinnatifid; *lower pinnæ* 4-6 in. l., lanceolate-deltoid; *pinnl.* and *segm.* numerous, usually deltoid, the copious linear-mucronate *ult. divisions* 1 $\frac{1}{2}$ -2 lin. l., nearly uniform in the barren

and fertile frond; *texture* herbaceous or, when mature, subcoriaceous; *rachis* and both surfaces naked; *invol.* pale, membranaceous; *sori* brown.—*Hk. Sp. 2. p. 122.* *O. lucidum, Spreng. Hk. Sp. 2. p. 121.*

Hab. Japan, China, North of India (ascending in Sikkim to 9-10,000 ft.), Java.—The plant common in Japan does not differ from the ordinary Himalayan form. *O. Capense, Kunze*, seems to be this reported from South Africa by mistake.

#### GEN. 28. LLAVEA, *Lagas.*

*Sori* linear, occupying the whole length of the changed pod-like segments of the upper part of the frond. *Invol.* the same shape, rolled over and quite concealing them. **TAB. III. f. 28.**

1. *L. cordifolia, Lagasca; st.* 1 ft. l., strong, erect, naked, straw-coloured, fibrillose towards the base; *fr.* 1-2 ft. l., 6-12 in. br., tripinnate, the lower part sterile with stalked ovate segm.  $1\frac{1}{2}$ -2 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., the fertile segments of the upper part pod-like,  $1\frac{1}{2}$ -3 in. l.; *texture* subcoriaceous; *both surfaces* naked; *veins* prominent.—*Hk. Sp. 2. p. 125. Ic. Pl. t. 387-8. Ceratodactylis, J. Sm. Mett.*

Hab. Mexico, ascending to 7,500 ft.

#### GEN. 29.—CRYPTOGRAMME, *R. Br.*

Sterile and fertile fronds usually different from the same root; *sori* terminal on the veins, at first separate, subglobose, afterwards confluent, the continuous *invol.* formed of the changed margin of the frond, rolled over them till full maturity. **TAB. III. f. 29.** *This and Llavea differ from Pellæa § Allosorus rather in the dimorphic fronds than in anything else.*

1. *C. crispa, R. Br.; st.* tufted, straw-coloured, polished, brownish, and slightly scaly towards the base; *fr.* 2-4 in. l.,  $1\frac{1}{2}$ -2 in. br., oblong, tri- or quadripinnatifid; *ult. segm.* of the barren frond obovate-cuneate, deeply pinnatifid, those of the fertile frond pod-shaped,  $\frac{1}{4}$ - $\frac{3}{8}$  in. l.; *texture* thickly herbaceous, both surfaces naked.— $\beta$ , *C. Brunoniana, Wall.*; habit of  $\alpha$ , but the fertile segments oblong, about 3 lin. l., 1 lin. br., with the *invol.* spreading in the mature plant and a space left free from fruit in the centre.—*Hk. & Gr. t. 153.*— $\gamma$ , *C. acrostichoides, R. Br.*; habit larger and stronger, barren segments thicker in texture and more prominently veined and not so deeply cut, the fertile ones  $\frac{3}{8}$  in. or even  $\frac{1}{2}$  in. l., 1 lin. br., the *invol.* spreading when mature.—*Hk. & Gr. t. 29. Hk. Sp. 2. p. 130.*

Hab.  $\alpha$ , Arctic Europe to Lake Baikal, Mount Olympus in Bithynia, Etruria and Sierra Nevada;  $\beta$ , Himalayas, at 10-15,000 ft.;  $\gamma$ , N. W. America, from Sitka and the Arctic regions southward to Lake Superior, Oregon, and California.

#### GENUS 30. PELLÆA. *Link. Hooker.*

*Sori* intramarginal, terminal on the veins, at first dotlike or decurrent on the veins, but soon running into a line. *Invol.* formed of the more or less changed edge of the frond, quite continuous, sometimes very narrow. *Allied to Cheilanthes in habit of growth and geographical distribution, differing by the continuous involucre. Veins free in all the species except the last two.* **TAB. III. f. 30.**



§ Cheiloplecton, *Fée extens.* *Texture herbaceous or subcoriaceous, and veins clearly visible, the involucre broad, and in most of the species rolled over the sorus till full maturity.* Sp. 1-11.

\* *Fronds lanceolate or ovate-lanceolate.* Sp. 1-4.

1. *P. auriculata*, Link; *st.* tufted, 2-3 in. l., flaccid, bright chesnut-brown, slightly scaly; *fr.* 3-9 in. l., 1-1½ in. br., linear-lanceolate, with 12 to 18 rather distant *pinnæ* on each side, which are slightly stalked and broader in the barren than in the fertile frond, and vary in shape from lanceolate-oblong and entire, to auricled at one or both sides at the base, or cut down nearly to the rachis in the lower part into oblong lobes; *texture* herbaceous; *rachis* and both surfaces naked; *invol.* similar in colour and texture to the frond, broad and much wrinkled.—*Hk. Sp. 2. p. 140. Hk. & Gr. Ic. t. 116.*

Hab. Cape Colony.

2. *P. Breweri*, Eaton; *st.* tufted, densely fibrillose at the base, 2-3 in. l., wiry, polished, chesnut-brown, nearly naked; *fr.* 2-3 in. l., under 1 in. br., linear-oblong, simply pinnate; *pinnæ* opposite, 6 to 8 on each side, the upper ones ovate, undivided, sessile, the lower ones cleft down the centre nearly to the base into two unequal halves, of which the lowest is the smallest, each the same shape as the upper *pinnæ*, and not toothed or further divided, the largest half about ½ in. l., ¼ in. br.; *texture* thick, but scarcely coriaceous; *rachis* naked, polished like the stipe; *both surfaces* pale-green, naked; *sori* in continuous marginal lines; *invol.* broad, pale, membranous.—*Eaton, Proc. Am. Ac. Art. & Sc. vol. 6. p. 555.*

Hab. California; gathered by Messrs. Brewer and Hillebrand.—Very near *P. auriculata*, but the cutting of the *pinnæ* is different, and also the venation.

3. *P. Seemanni*, Hk.; *st.* tufted, 1-2 in. l., slender, wiry, naked, slightly scaly at the base; *fr.* 3-4 in. l., 1-2 in. br., deltoid-oblong, bipinnatifid; *lower pinnæ* not more than 1 in. l., lanceolate-deltoid, cut down to the rachis below into a few broad oblong blunt slightly-lobed *pinnæ*; *rachis* and both surfaces naked; *texture* herbaceous, but the venation scarcely visible; *invol.* narrow, membranous.—*Hk. Sp. 2. p. 141. t. 117. B.*

Hab. Mazatlan, Mexico; gathered by Dr. Seemann.—Very like *P. auriculata* in habit, differing by its finer venation and narrower involucre.

4. *P. gracilis*, Hk.; *st.* scattered, slender, 2-3 in. l., naked, straw-coloured or pale-brown, polished; *fr.* 2-4 in. l., 1-2 in. br., ovate, bi- or tripinnatifid; *pinnæ* lanceolate-deltoid, 1-2 in. l., cut down to the rachis; *lower pinnæ* sometimes again slightly divided; *ult. segm.* of the barren frond obovate, slightly crenate, of the fertile one linear-oblong, terminal one much larger than the others; *texture* thinly herbaceous and flaccid; *rachis* and both surfaces naked; *veins* visible; *invol.* broad, continuous, membranous.—*Hk. Sp. 2. p. 138. t. 133. B.*

Hab. Canada to Wisconsin, rare; Himalayas of Tibet and N. India at 9-10,000 ft.—This has been confounded with *Cryptogramme crispa*, but is not tufted, and is much more delicate in texture.

\*\* *Frond deltoid.* Sp. 5-11.

5. *P. pilosa*, Hk.; *st.* 6-9 in. l., strong, wiry, brownish-black, more or less clothed with small linear scales throughout; *barren* and *fertile fr.* different, the former deltoid, 1½ in. each way, cut down to within ¼ in. of the rachis; *lowest pinnæ* much the largest, deeply lobed, with the lobes again broadly crenate on the under side, the lower surface densely pilose, and the midrib scaly like the stipe;

*fertile fr.* larger and quite cut down to the rachis, with narrower, larger, and more deeply-divided pinnæ; *texture* subcoriaceous; *invol.* membranous, incurved.—*Hk. Sp. 2. p. 132. t. 114. B.*

Hab. Bourbon.

6. *P. columbina*, Hk.; *barren fr.* with slender, wiry, naked, polished, brownish-black stems 6 in. l., the frond not much over 1 in. each way, deltoid, cut down to a broadly-winged rachis into two lobes on each side, the lowest of which is much the largest and again deeply lobed and sinuated on the lower side; *fertile fr.* on longer and stronger stems, 2-3 in. each way, cut down nearly to the rachis into about four lobes on each side, the upper of which are linear and entire, the lowest again deeply lobed below with a compound lower and simple upper linear segments; *texture* subcoriaceous, both surfaces naked; *veins* inconspicuous; *sori* soon hiding the narrow spreading membranous *invol.*—*P. lomariacea*, β, *Hk. Sp. 2. p. 133. t. 112.*—β, *vestita*; *st.* shorter, clothed throughout with brown fibrillose scales.

Hab. Brazil, summit of the Organ Mountains; gathered by Mr. Gardner.—The alliance of this seems to be with *P. pilosa* and *geraniifolia*. The barren fronds in size and cutting much resemble those of the former.

7. *P. geraniifolia*, Fée; *st.* 6-9 in. l., naked, erect, wiry, brownish-black, polished, slightly scaly towards the base; *fr.* 2-4 in. each way, deltoid, cut down nearly to the rachis into 3 or 4 pinnæ on each side, of which the lowest pair is much the largest, with the *pinnl.* on the lower side much larger than the others and deeply lobed with linear-oblong *segm.*; *rachis* and *costa* dark-coloured and polished like the stipe; *texture* herbaceous, lateral veins once forked; *sori* in broad marginal lines.—*Hk. Sp. 2. p. 132. Ic. Pl. t. 915.*

Hab. Tropical America, from Guatemala southward to Brazil and Peru; Polynesian Islands from New Caledonia northward to the Neilgherries, N. China, and Subtropical Australia, Mascaren Isles, Zambesi Land, Angola, and Cape Colony.—This and the two preceding agree in habit with *Pteris pedata* and *Cheilanthes Kirkii*. From the former their simple veins furnish the readiest mark of distinction. The plant from Australia, sent by Dr. Mueller, gathered at Rockhampton by Messrs. Thozet and Dallachy, is not unlikely distinct. It has fronds not more than 1 in. each way, resembling closely in cutting and texture the barren fronds of the preceding.

8. *P. Tamburii*, Hk.; *st.* 6-9 in. l., erect, naked, chesnut-brown, polished; *fr.* about 6 in. each way, deltoid, with three principal pinnæ, the terminal one cut down nearly to the rachis into several broad, opposite, lanceolate lobes, of which the upper ones are entire and the lower ones larger and sinuated; *lateral pinnæ* with the lobes on the upper side nearly entire, but those on the lower side prolonged and again deeply lobed, the largest entire divisions about 1 in. deep,  $\frac{1}{2}$  in. br. at the base; *texture* subcoriaceous; *rachis* polished, brown like the stipe; *under surface* thinly coated with white farina; *invol.* brownish, continuous but regularly crenated along the outer edge.—*Hk. Sp. 2. p. 134. t. 129. A.*

Hab. Tambur Valley, East Nepal; gathered by Dr. Hooker.—A very distinct species.

9. *P. deltoidea*, Baker; *st.* tufted,  $1\frac{1}{2}$ -2 in. l., erect, wiry, dark chesnut-brown, naked, polished; *fr.*  $1\frac{1}{2}$ -2 in. each way, deltoid, bipinnate; *lower pinnæ* much the largest, lanceolate-deltoid; lowest *pinnl.* cut down to the rachis below into oblong lobes; *ult. segm.* oblong, or obovate obtuse, about 2 lin. l., 1 lin. br.; *texture* herbaceous or, when mature, subcoriaceous; *rachis* and both surfaces naked; *veins* immersed; *sori* in continuous lines; *invol.* membranous, crenate.—*Cheil., Kunze, Hk. Sp. 2. p. 107.*

Hab. Cape Colony, *Burchell*, 2033. Namaqua Land; gathered by Drége, and latterly by the Rev. Mr. Whitehead.



10. *P. Skinneri*, Hk.; *st.* 6-9 in. l., stout, erect, straw-colour or pale-brown, naked or slightly fibrillose; *fr.* 6-12 in. l., 4-8 in. br., deltoid, tripinnatifid; *lower pinnae* deltoid; *lowest pinnl.* 1-2 in. l., 1 in. br., deltoid-acuminate, cut down nearly to the rachis into broad oblong acuminate lobes; *rachis* slightly tomentose, both surfaces naked; *texture* scarcely coriaceous; *veins* fine, inconspicuous; *invol.* narrow, membranous.—*Hk. Sp. 2. p. 141. t. 118. B.*

Hab. Guatemala; discovered by Mr. Skinner; and much finer specimens have recently been gathered by Messrs. Salvin and Godman.

11. *P. rigida*, Hk.; *st.* 4-6 in. l., stout, erect, dark chesnut-brown, naked or slightly scaly; *fr.* 4-9 in. l., 3-6 in. br., deltoid, bi- or tripinnate; *lowest pinnae* the largest, erect, patent, 3-4 in. l., subdeltoid; *pinnl.* of the lower side larger than the others; *ult. segm.* linear-oblong, obtuse, decurrent at the base,  $\frac{1}{4}$ - $\frac{1}{2}$  in. l. in the barren frond,  $1\frac{1}{2}$ -2 lin. br.; *rachis* naked or slightly scaly, both surfaces naked or slightly hairy; *texture* subcoriaceous; *veins* close and fine; *sori* in a continuous marginal line, the broad pale wrinkled *invol.* rolled down tightly over it.—*Hk. Sp. 2. p. 144. Cheiloplecton, Fée.*

Hab. Mexico, Guatemala, and said to have been also found by M. Nee in Peru.

§§ *Allosorus, Presl. Texture coriaceous; the veins not perceptible; the ultimate segments of the frond at least twice as long as broad, often revolute at the margin; invol. broad, conspicuous. Sp. 12-32.*

\* *Frond not more than bipinnately cut. Sp. 12-21.*

12. *P. (Allo.) ambigua*, Baker; *st.* 6-9 in. l., wiry, erect, polished, dark chesnut-brown, naked; *fr.* 4-6 in. l., 2-3 in. br., oblong, simply pinnate, or bipinnate at the base; *pinnae*  $1\frac{1}{2}$ -2 in. l., 1 lin. br., linear, erecto-patent, flexuose; *texture* subcoriaceous, brittle; *rachis* and both surfaces naked, margin incurved; *invol.* distinct from it, papyraceous, brown, continuous, mapped out into a series of roundish depressions, the two opposite edges interlacing by a marginal fringe, and sometimes concealing the dark-coloured polished midrib.—*Cheil., Metten. Cheil. p. 49. Synochlamys ambigua, Fée, 8. Mem. t. 20.*

Hab. New Granada; discovered by M. Schlim in 1852.

13. *P. (Allo.) atropurpurea*, Link; *st.* tufted, 3-4 in. l., rigid, erect, more or less tomentose; *fr.* 4-12 in. l., 2-6 in. br., varying from lanceolate and simply pinnate to ovate-lanceolate, with deltoid *pinnae* 2-3 in. l., with several *pinnl.* on each side, the latter nearly sessile, 1-2 in. l., at most  $\frac{1}{4}$  in. br., entire or sharply auricled at one or both sides at the base; *texture* coriaceous; *rachis* tomentose like the stipe; *both surfaces* naked, except the costa beneath; *veins* hidden; *invol.* formed of the slightly altered incurved edge of the pinnae, at length nearly hidden by the broad line of the fruit.—*Hk. Sp. 2. p. 139.*

Hab. N. America, from sub-arctic latitudes southward to Texas, the Rocky Mountains, and British Columbia; and Prof. Eaton informs us it has also been gathered in the South of Mexico.

14. *P. (Allo.) dura*, Hk.; *st.* strong, erect, 6-12 in. l., naked, dark chesnut-brown, polished; *fr.* 6-12 in. l., 2-4 in. br., linear-oblong and simply pinnate, or branched at the base with short deltoid *pinnae*; *segm.* quite sessile, 1- $1\frac{1}{2}$  in. l.,  $\frac{1}{8}$ - $\frac{1}{4}$  in. br.; *texture* coriaceous; *rachis* naked or slightly pubescent; *veins* hidden; *both surfaces* pale-green, naked; *sori* broad, soon hiding the narrow membranous involucre.—*Hk. Sp. 2. p. 139. t. 113. A.*

Hab. Mauritius, Madagascar, and discovered recently by Dr. Welwitsch in Angola at 3,800-5,500 ft.—This and *P. atropurpurea* differ from all that follow by having the lower *pinnae* pinnate.

15. *P. (Allo.) ternifolia*, Fée; *st.* tufted, densely fibrillose at the base, 2-4 in. l., strong, erect, dark chesnut-brown, naked, polished; *fr.* 6-12 in. l., 1-1½ in. br., linear-lanceolate, with 6 to 12 opposite pairs of pinnæ, which are cleft down nearly to the base into three linear mucronate rigid segments with enrolled edges; *texture* coriaceous; *rachis* dark-coloured and polished like the stipe; *both surfaces* pale glaucous-green, naked; *invol.* formed out of the edge of the frond, rolled over the sori till they attain full maturity.—*Hk. Sp. 2. p. 142. Fil. Exot. t. 15.*

Hab. Tropical America, especially in the Andes, from Mexico southward to Peru and Chili; Sandwich Islands.—Easily recognizable by its claw-like pinnæ.

16. *P. (Allo.) mucronata*, Eaton; *st.* tufted, 2-4 in. l., strong, erect, naked, dark-brown, polished; *fr.* 3-6 in. l., 1-3 in. br., deltoid, bipinnate; *pinnæ* spreading or erecto-patent, rigid, 1 in. or more l., with several distant linear-oblong *pinnl.* on each side, about ¼ in. l., with enrolled edges and a sharp mucronate point; *rachis* chesnut-brown, polished like the stipe; *texture* coriaceous; *both surfaces* naked, pale glaucous-green; *invol.* broad, coriaceous, rolled permanently over the sori.—*A. mucronatus*, Eaton in *Sill. Journ. July 1856.* P. Wrightiana, *Hk. Sp. 2. p. 142. t. 115.* B. *P. longimucronata*, *Hk. Sp. 2. p. 143. t. 115. A.*

Hab. California, New Mexico, and valley of the Rio Grande.

17. *P. (Allo.) profusa*, J. Sm.; *st.* tufted, 2-3 in. l., wiry, erect, blackish, polished, more or less fibrillose throughout; *fr.* 3-4 in. l., 1-1½ in. br., oblong-lanceolate, tripinnatifid; *lower pinnæ* opposite, lanceolate-deltoid, cut down to the rachis into several deltoid *pinnl.*, the upper of which are ternately lobed, the lower cut down to the rachis below; *texture* coriaceous; *rachis* blackish, naked, polished; *both surfaces* green and naked; *sori* continuous; *invol.* distinct and pale membranous.—Cheil., *Kunze. Hk. Sp. 2. p. 108.*

Hab. Namaqua Land and Cape Colony.—*C. cornuta*, from Zeyher and Drège, appears to be safely referable here; but whether Ecklon's plant, described by Mettenius (Cheil. No. 33), be the same, is doubtful.

18. *P. (Allo.) aspera*, Baker; *st.* densely tufted, 2-3 in. l., wiry, blackish, more or less densely clothed with narrow scales and pale-brown tomentum; *fr.* 4-6 in. l., about 1 in. br., narrowly ovate-lanceolate, bipinnate; *lower pinnæ* distant, deltoid, ½-¾ in. l., ¼ in. or more br., cut down to the rachis into a few linear or ovate-oblong nearly entire *pinnl.*; *texture* subcoriaceous; *rachis* scaly and tomentose like the stipe; *both surfaces* pale-green and scabrous, with short white bristly hairs; *sori* copious, marginal, confluent.—Cheil., *Hk. Sp. 2. p. 111. t. 108. A.*

Hab. New Mexico; gathered by Mr. C. Wright.—Very like *P. profusa* in size and habit, but easily recognizable by its scabrous hairy surface.

19. *P. (Allo.) Alabamensis*, Baker; *st.* subtufted, 2-4 in. l., wiry, polished, blackish, fibrillose below, and at the base with copious fine woolly reddish-brown scales; *fr.* 4-8 in. l., 1½-2 in. br., ovate-lanceolate, bi- or tripinnatifid; *pinnæ* numerous, the lower ones opposite, about ¾ in. l., ¼ in. br., lanceolate, cut down to the rachis into numerous linear-oblong *segm.*, most of which are entire, but the lowest often again pinnatifid; *texture* subcoriaceous; *rachis* blackish, polished; *both surfaces* naked; *sori* continuous along both edges of the pinnules; *invol.* pale-green, membranous.—Cheil., *Kunze. Hk. Sp. 2. p. 89. t. 103. B. Ex. F. t. 90.*

Hab. Alabama, Georgia, and Tennessee.

20. *P. (Allo.) intramarginalis*, J. Sm.; *st.* tufted, 3-6 in. l., erect, dark chesnut-brown, polished, slightly fibrillose below; *fr.* 6-12 in. l., 2-4 in. br., ovate-lanceolate, bipinnatifid; *pinnæ* opposite, lanceolate, 2-3 in. l., 1 in. br., cut down nearly to the rachis into long linear-oblong *pinnl.*; *rachis* polished like the stipe;



both surfaces naked; veins beneath prominent, the lateral ones forked; sori copious, confluent, marginal; invol. broad, membranaceous, fringed.—Cheil., *Hk. Sp. 2. p. 112.*— $\beta$ , *serratifolia* (*Hk. 2nd Cent. t. 72*); pinnules distinctly toothed. *Pteris fallax*, *Mart. & Galeotti*.

Hab. Mexico and Guatemala.

21. *P. (Allo.) ornithopus*, *Hk.*; st. tufted, 3-6 in. l., rigid, erect, polished, dark chesnut-brown, naked; fr. 4-6 in. l., 2-3 in. br., deltoid, bipinnatifid; pinnæ rigid, spreading, 1-1½ in. l., ¼-⅜ in. br., with numerous distantly-placed sessile pinnæ on each side, which are cut to the base into three linear mucronate segm., of which the central one is the largest, but is not more than 1½-2 lin. l.; rachis polished like the stipe; texture coriaceous; both surfaces naked, very pale glaucous-green; invol. broad, coriaceous, crenate, rolled permanently over the sori.—*Hk. Sp. 2. p. 144. t. 116. A.*

Hab. California.—The pinnules here are clawed like the pinnæ of *P. ternifolia*.

\*\* Frond at least tripinnatifid. Sp. 22-32.

22. *P. (Allo.) nitidula*, *Baker*; st. densely tufted, slender, dark chesnut-brown, polished, 3-6 in. l., fibrillose below; fr. 3-4 in. l., 1-1½ in. br., bi-tripinnatifid; pinnæ opposite, the lower ones deltoid, cut down to the rachis into a few pinnl., the upper ones linear-oblong, entire, the lower ones again pinnatifid; rachis and both surfaces naked; sori copious, confluent; invol. broad, membranous, toothed.—*Cheil., Hk. Sp. 2. p. 113. Ic. Pl. 10. t. 912. Allosorus, Presl.*

Hab. Himalayas, ascending to 6,000 ft.

23. *P. (Allo.) densa*, *Hk.*; st. tufted, 4-6 in. l., slender but wiry, polished, chesnut-brown, naked; fr. 2-3 in. l., 1-1½ in. br., oblong-deltoid, tripinnate; pinnæ and pinnl. crowded, deltoid or lanceolate; segm. numerous, linear, with enrolled edges, sessile or shortly stalked, sharp-pointed or mucronate, the terminal ones the largest, sometimes ¼ in. l.; texture coriaceous; rachis and both surfaces naked; invol. broad, rigid, rolled permanently over the sori.—*Hk. Sp. 2. p. 150. t. 125. B. Onychium, Brack.*

Hab. Oregon, Washington territory, and California.

24. *P. (Allo.) robusta*, *Hk.*; st. 1-2 in. l., erect, wiry, bright-brown, naked, polished; fr. 2-3 in. l., 1 in. or less br., oblong, obtuse, tripinnatifid; pinnæ ½-¾ in. l., deltoid, cut down to the rachis into several pinnl. on each side, with a few thick linear-oblong simple or forked segm. not more than 1½ lin. l., ½ lin. br.; texture subcoriaceous; rachis and both surfaces light-green, naked; sori in a continuous line along both edges; invol. similar in substance to the frond, and rolled over the fruit till full maturity.—*Hk. Sp. 2. p. 147.*

Hab. Namaqua Land, S. Africa.—This and *P. densa* are very like *Cryptogramme crispata* in size and habit, but the barren and fertile fronds are similar, the segments smaller and more crowded, and the involucre thicker in texture.

25. *P. (Allo.) Boivini*, *Hk.*; st. 4-8 in. l., strong, erect, naked, dark-brown, polished; fr. 6-9 in. l., 4-6 in. br., subdeltoid, bi- or tripinnate; pinnæ erectopate or spreading, growing gradually smaller upwards, the lowest broadly lanceolate, simply pinnate, or occasionally bipinnate; ult. segm. ovate, bluntish or acute, ¾-1 in. l., ¼-⅜ in. br., shortly stalked, cordate or rounded at the base; texture coriaceous; rachis tomentose; both surfaces naked; veins sunk in the frond; sori in a continuous line all round the segments; invol. membranous, nearly half a line broad.—*Hk. Sp. 2. p. 147. t. 118. A.*

Hab. Madagascar, Mauritius, Macalisberg, Ceylon, Neilgherries (3-5,000 ft.).—This comes near *P. hastata* in size and habit, but the segments are narrower, and the involucre is that of this section.

26. *P.* (Allo.) *andromedæfolia*, Fée; *st.* 6-9 in. l., strong, erect, pale-brown, naked, densely clothed at the base with linear subulate reddish-brown scales; *fr.* 6-12 in. l., 3-6 in. br., ovate, tri- or quadripinnate; *pinnæ* rigid, erecto-patent, lanceolate-deltoid, the lowest with several linear oblong *pinnl.*, the *lower segm.* of which are sometimes slightly branched; *ult. divisions*  $1\frac{1}{2}$ -2 lin. l., linear-oblong, blunt with enrolled edges; *texture* coriaceous; *rachis* and both surfaces naked, the wrinkled *invol.* scarcely changed from the substance of the frond, and sometimes nearly meeting edge to edge.—*Hk. Sp. 2. p. 149.*— $\beta$ , *C. pubescens*, Nutt.; *rachis* and *pinnules* pubescent.

Hab. California, southward along the Andes to Chili; Cape Colony.

27. *P.* (Allo.) *pulchella*, Fée; *st.* densely tufted, 2-3 in. l., wiry, erect, polished, dark chesnut-brown, naked; *fr.* 3-6 in. l., 1-3 in. br., oblong, tripinnate; *lower pinnæ* deltoid; *pinnl.* lanceolate, the very deciduous *ult. segm.* oblong, blunt, scarcely more than  $\frac{1}{3}$  in. l. by half as broad; *rachis* rigid and polished like the stipe; *texture* coriaceous, both surfaces green, naked, the edges of the fertile segments much enrolled, and the broad *invol.* permanently rolled over the sori.—*Hk. Sp. 2. p. 150.*

Hab. Andes, from New Mexico southward to Peru.

28. *P.* (Allo.) *consobrina*, Hk.; *st.* strong, erect, 6-12 in. l., naked, dark-brown, polished; *fr.* 6-12 in. l., 4-9 in. br., deltoid, tri- or quadripinnatifid; *lowest pinnæ* deltoid, with the *pinnl.* of the lower side larger than the others, these latter usually cut down into several lanceolate or deltoid pinnatifid *segm.*; simple *ult. divisions* linear-oblong, sometimes  $\frac{1}{4}$  in. l.; *texture* coriaceous; *rachis* and both surfaces naked; *sori* in a continuous line along the margins; *invol.* moderately broad, membranous, the edge of the segments often enrolled.—*Hk. Sp. 2. p. 145. t. 117. A. P. Bojeri, Hk. Sp. 2. p. 146. t. 119. A. Cheil. Atherstonii, Hk. Sp. 2. p. 107.*

Hab. Cape Colony, Kaffraria, Natal, Madagascar, and Cameron Mountains.—*P. Bojeri* appears to be a slender form with a slightly fibrillose rachis. Mettenius refers here *C. triangula*, Kunze, but Drège's specimens are in part *C. multifida*.

29. *P.* (Allo.) *angustifolia*, Baker; *st.* tufted, 6-12 in. l., strong, erect, naked, dark chesnut-brown, polished; *fr.* 6-12 in. l., 3-6 in. br., deltoid-oblong, quadripinnatifid; *pinnæ* 2-4 in. l., lanceolate-deltoid; *pinnl.* often cut down to the rachis into numerous linear *segm.* with enrolled edges, the terminal ones much the largest ( $\frac{1}{2}$  in. or more l.); *rachis* polished; *texture* subcoriaceous, both surfaces pale-green, the upper slightly hairy; *invol.* broad, membranous, rolled over the sori.—Cheil., *H. B. K. P. decomposita, Hk. Sp. 2. p. 151. t. 119. B.*— $\beta$ , *P. cuneata*, J. Sm.; ultimate segments oblong-acute,  $\frac{1}{4}$  in. l.,  $\frac{1}{8}$  in. br., cuneate at the base.—*Cheilanthes cuneata, Link. Hk. Sp. 2. p. 107.*

Hab. North of Mexico southward to Venezuela.—*C. chærophylla*, Kunze, seems to be also a broad-leaved form of this.

30. *P.* (Allo.) *glauca*, J. Sm.; *st.* tufted, 4-8 in. l., strong, erect, polished, dark chesnut-brown, naked; *fr.* 3-4 in. each way, deltoid, quadripinnatifid; *lowest pinnæ* much the largest and the *pinnl.* on the lower side larger than the others, lanceolate-deltoid, cut down to the rachis into *segm.* which are again cut down to the rachis below; *ult. divisions* about  $\frac{1}{8}$  in. l., linear-oblong, with enrolled edges, more or less crenate; *texture* coriaceous, upper surface green and naked, lower surface and the rachis tomentose; *invol.* coriaceous, rolled



down over the sori.—*Pteris*, Cav. *Swartz.* Cheil., *Mett.* *P. hirsuta*, *Hk. Sp. 2.* p. 153.

Hab. Chili and Mexico.

31. *P.* (Allo.) *marginata*, Baker; *st.* tufted, 3-9 in. l., strong, erect, polished, chesnut-brown, naked, slightly fibrillose towards the base; *fr.* 4-8 in. l., 3-6 in. br., subdeltoid, tri- or quadripinnatifid; *lower pinnæ* usually much the largest; *pinnl.* on the lower larger than those of the upper side, the latter 1-2 in. l., lanceolate-deltoid; *ult. divisions* linear-oblong with revolute edges, 1½-2 lin. l., ½ lin. br.; *texture* subcoriaceous; *rachises* and both surfaces naked; *sori* confluent.—*Cheilanthes*, *Hk. Sp. 2.* p. 105.—β, *C. pyramidalis*, Fée, 8. *Mem. t. 25*; *fr.* lanceolate; *pinnæ* secund, with long (sometimes ¼ in.) pendent slightly compound pinnules.

Hab. Tropical America, from Mexico and Jamaica southward to Peru and the Argentine territory.—The finest examples in the Hookerian Herbarium are from Salvin and Godman's Guatemalan collections, with the lowest pinnules more than 2 in. l., 1½ in. br.; but usually it is much smaller. *C. pyramidalis* looks very different to the ordinary form, but appears connected with it by intermediate stages.

32. *P.* (Allo.) *Barklyæ*, Baker; *st.* 12-18 in. l., strong, erect, naked, dark-brown, polished; *fr.* 1 ft. or more l., 9 in. br., deltoid, quadripinnatifid; *lowest pinnæ* 6-8 in. l., subdeltoid; *pinnl.* on the lowest side the largest, with numerous *segm.* on each side, which are cut down to the rachis into numerous linear *ult. divisions*, 3 lin. l., 1 lin. br.; *texture* coriaceous; *rachis* and both surfaces naked; *sori* running along the opposite edges of the gradually narrowing segments, so that the broad pale-brown membranous *invol.* usually touch near the top.—Cheil. *Barklyæ*, *Hk. MSS.*

Hab. Seychelles; sent by Lady Barkly and Dr. Kirk.—This comes nearest to the broad-leaved form of *P. angustifolia*, but is much larger in size.

§§§ *Platyloma*, *J. Smith.* *Texture coriaceous, the veins usually hidden, the ultimate segments broad and flat, the involucre so narrow that it is soon hidden by the fruit.* Sp. 33-40.

33. *P.* (Platy.) *Bridgesii*, Hk.; *st.* 2-4 in. l., wiry, erect, naked, bright chesnut-brown, polished; *fr.* 4-6 in. l., 1 in. or less br., linear, simply pinnate; *pinnæ* 6 to 8 on each side, sessile, oblong, entire, obtuse, rounded or cordate at the base; *texture* coriaceous; *rachis* naked and polished like the stipe, both surfaces naked, glaucous-green; *veins* hidden; *sori* in a broad marginal line with the much-wrinkled membranous edge of the frond protruding beyond it till full maturity.—*Hk. Sp. 2.* p. 238. t. 142. B.

Hab. California.

34. *P.* (Platy.) *rotundifolia*, Hk.; *rhizome* stout, creeping, scaly; *st.* 6-12 in. l., stout, erect, more or less pubescent and clothed throughout with linear chaffy scales; *fr.* 6-12 in. l., 1-1½ in. br., linear, simply pinnate; *pinnæ* 10 to 20 on each side, short-stalked, oblong or roundish, entire, obtuse or mucronate at the point; *texture* coriaceous; *rachis* densely scaly and tomentose, both surfaces naked; *veins* beneath hidden; *sori* in a broad marginal line soon hiding the involucre.—*Hk. Sp. 2.* p. 136. *Fil. Ex. t. 48.*

Hab. New Zealand and Norfolk Island.

35. *P.* (Platy.) *falcata*, Fée; *rhizome* wide-creeping; *st.* 3-6 in. l., strong, erect, more or less pubescent and scaly; *fr.* 6-18 in. l., 1-2 in. br., linear-oblong, simply pinnate; *pinnæ* 10 to 20 on each side, nearly sessile, ½-1 in. l., ¼-½ in. br., lanceolate or lanceolate-oblong, usually mucronate, often slightly falcate,

cuneate or dilated and cordate at the base; *texture* coriaceous; *rachis* densely scaly and tomentose, both surfaces nearly naked; *veins* not visible; *sori* in broad marginal lines, soon hiding the narrow *invol.*—*Hk. Sp. 2. p. 136. t. 11. B. (a small form).*

Hab. Tropical Hindostan, Malayan Peninsula, Australia, Van Diemen's Land, New Zealand, Kermadec Isles.—*P. seticaulis*, Hook. (*P. alternifolia*, Wallich), is a form with densely hirsute stipe and rachis and subhirsute papillose pinnæ.

36. *P. (Platy.) paradoxa*, Hk.; *st.* 6-9 in. l., strong, erect, dark-brown, naked or slightly tomentose; *fr.* 6-9 in. l., 4-6 in. br., oblong, simply pinnate; *pinnæ* 4 to 6 on each side, short-stalked, with a considerable space between them,  $1\frac{1}{2}$ -2 in. l.,  $\frac{1}{4}$ -1 in. br., lanceolate, entire, acute or bluntish, cordate or rounded at the base; *texture* coriaceous; *veins* hidden, midrib inconspicuous; *rachis* tomentose, both surfaces naked; *sori* in a marginal line often  $\frac{1}{8}$  in. br., soon hiding the *invol.*—*Hk. Sp. 2. p. 135. t. 111. A. Fil. Ex. t. 21. Platyloma Brownii, J. Sm.*

Hab. Queensland and N. S. Wales.

37. *P. (Platy.) Doniana*, Hk.; *st.* 4-8 in. l., strong, erect, dark-brown, polished, slightly tomentose and clothed with linear scales towards the base; *fr.* 6-12 in. l., 2-4 in. br., oblong-lanceolate, simply pinnate or casually slightly branched towards the base; *pinnæ* short-stalked, 6 to 15 on each side, 2-4 in. l.,  $\frac{1}{2}$ -1 in. br., lanceolate or ovate-lanceolate, entire or very slightly serrated towards the point, the base rounded or cordate; *texture* coriaceous; *rachis* slightly tomentose; both surfaces naked, midrib nearly black in the lower part; *sori* in a narrow marginal line soon hiding the involucre.—*Hk. Sp. 2. p. 137. t. 125.*

Hab. Tropical Africa, the Niger country, Angola, and Zambesi Land.—This is very like *P. paradoxa* in size and habit, and is perhaps best distinguishable by the lower part of the midrib of the leaves being black and polished like the rachis.

38. *P. (Platy.) hastata*, Link; *st.* 6-12 in. l., wiry, erect, dark chesnut-brown, polished, naked; *fr.* 6-24 in. l., 6-12 in. br., oblong bi- or tripinnate; *pinnæ* erecto-patent, varying from simply pinnate to copiously bipinnate; *ult. divisions* ovate or lanceolate, not toothed, 1-2 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., or more, sessile or very nearly so; *texture* subcoriaceous; *veins* fine but plainly visible, once or twice forked; *rachis* and both surfaces naked; *sori* in a narrow continuous marginal line; *invol.* rather narrow, membranaceous, nearly or quite hidden when the fruit is mature.—*Hk. Sp. 2. p. 145. Fil. Ex. t. 50.*

Hab. Cape Colony northward to Natal, Zambesi Land, Mascaren Isles, Seychelles, and Angola.—There is a wide range in the size and branching of the frond and size and shape of the segments. Kunze makes three species, *C. hastata*, *macrophylla*, and *hastæfolia*.

39. *P. (Platy.) calomelanos*, Link; *st.* tufted, strong, erect, 4-6 in. l., naked, dark-brown, polished, slightly fibrillose towards the base; *fr.* 4-8 in. l., 3-6 in. br., subdeltoid, bi- or tripinnate; *lower pinnæ* rigid, spreading or erecto-patent, linear-oblong and simply pinnate or deltoid and bipinnate; *ult. segm.* on rigid black stalks, the lateral ones  $\frac{1}{2}$ - $\frac{3}{4}$  in. each way, varying in shape from cordate-oblong-obtuse to hastate-triangular, about as broad as long, the two sides at the base often unequal; *rachis* shining, naked, blackish; *texture* coriaceous, both surfaces naked, glaucous-green; *veins* not perceptible; *sori* in a broad marginal line soon hiding the narrow membranous involucre.—*Hk. Sp. 2. p. 140. Bot. Mag. t. 4769.*

Hab. Cape Colony, ascending to 4,000 ft., northward to Zambesi Land, Angola, and Natal; Bourbon; Himalayas, ascending to 6,000 ft.

40. *P. (Platy.) cordata*, J. Smith; *st.* 6-9 in. l., strong, erect, straw-coloured, polished, clothed below with small pale lanceolate scales when young; *fr.* 1 ft.



or more l., 4-6 in. br., lanceolate-deltoid; *pinnæ* lanceolate-deltoid, erecto-patent, with a straight rachis, the lower ones slightly branched at the base; *segm.* on short stalks, oblong or ovate, rounded or cordate at the base,  $\frac{1}{2}$ -1 in. l., half as broad, the point blunt; *texture* subcoriaceous; *rachis* pubescent and both surfaces slightly so; *veins* not visible; *sori* in broad marginal lines which soon hide the *invol.*—*Hk. Sp. 2. p. 148.* Allosorus, *Hk. Bot. Mag. t. 4692.*— $\beta$ , *P. flexuosa*, Link; rachises zigzag, the *pinnæ* and *pinnl.* spreading at right angles or even deflexed.—*Hk. Sp. 2. p. 148.* Pteris, *Hk. Ic. Pl. 2. t. 119.*

Hab. Mexico and New Mexico southward along the Andes to Peru.—The two varieties seem often very different in habit but, it is impossible to draw the line between them. Mr. J. Smith also admits as distinct *Pteris sagittata*, Cav., in which the segments are somewhat narrowed towards the point.

§§§§ *Holcochlæna*, Baker. *Texture and involucre of Platyloma, from which they differ only by the reticulated venation.* Sp. 41-42.

41. P. (Holco.) *Burkeana*, Baker; *st.* tufted, 4-6 in. l., naked, flexuose, polished, nearly black; *fr.* 3-4 in. l., 2 in. br., with several pairs of simple, entire, short-stalked upper *pinnæ*, which are  $1-1\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. or more br., quite entire, rounded at the base, blunt at the point; lower *pinnæ* slightly compound; *rachis* and both surfaces naked; *costæ* black and polished in the lower part; *texture* coriaceous; *veins* copiously anastomosing; *sori* quite continuous round the margin of the *pinnl.*, broad and ultimately hiding the reflexed involucre.—Pteris, *Hk. Sp. 2. p. 213. t. 126. B.*

Hab. Macalisberg, Natal, S. Africa, discovered by Mr. Burke.

42. P. (Holco.) *articulata*, Baker; *st.* 6-12 in. l., strong, erect, naked, polished, dark chesnut-brown; *fr.* 6-12 in. each way, subdeltoid, bi- or tripinnate; upper *pinnæ* stalked, simple, cordate-ovate,  $1-1\frac{1}{2}$  in. l.,  $\frac{1}{2}-\frac{3}{4}$  in. br., the margin not toothed but sometimes undulated; lower *pinnæ* lanceolate-deltoid with several similar *pinnl.*  $\frac{1}{2}$  in. or more apart, sometimes again compound below; *texture* coriaceous; *rachis* hairy; both surfaces naked; *veins* copiously reticulated; *sori* continuous to the apex of the segments, ultimately concealing the reflexed involucre.—Pteris, *Kaulf. Hk. Sp. 2. p. 214. t. 126. A.*

Hab. Mauritius, Bourbon, and Madagascar.

### GEN. 31. PTERIS, Linn.

*Sori* marginal, linear, continuous, occupying a slender filiform receptacle in the axis of the involucre. *Invol.* the same shape as the sorus, usually membranous, at first quite covering it, at length more or less spreading. *A large cosmopolitan genus, including plants of almost every kind of division and venation.* TAB. III. f. 31.

§ Eupteris. *Veins all free. Stems cæspitose, involucre single.* Sp. 1-39. TAB. III. f. 31. a. b.

\* *Integrifoliae.* Lower *pinnæ* linear, undivided. Sp. 1-3.

1. P. *longifolia*, L.; *st.* 6-12 in. l., stout, erect, pale, more or less clothed below with pale-brown linear scales; *fr.* 1-2 ft. l., 4-9 in. br., oblong-lanceolate, attenuated below; *pinnæ* sessile, often 20 to 30 on each side, 3-6 in. l.,  $\frac{1}{8}-\frac{3}{8}$  in. br., linear, entire, truncate or cordate or sometimes slightly auricled at the base; *texture* subcoriaceous; *rachis* naked or slightly scaly below or throughout, both surfaces naked; *veins* close and fine, usually once branched; *invol.* membranous, yellowish-brown.—*Hk. Sp. 2. p. 157.*

Hab. Tropical and warm temperate regions all round the world; Spain, Dalmatia, Sicily, Algiers, Abyssinia, Canaries, and Cape Verde Islands southward through Tropical Africa to Angola, Macalisberg, Mauritius, and Bourbon; Lebanon, Himalayas (up to 4,000 ft.), Chusan and Loo-choo southward to S. Australia; West Indies, Mexico, and Venezuela.

2. *P. moluccana*, Blume; *st.* strong, erect, naked, polished, dark-brown; *fr.* 2-3 ft. l., oblong, simply pinnate; *pinnæ* in numerous nearly opposite pairs, linear, cuneate at the base, spinuloso-serrated towards the point, the largest 12-18 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br.; *rachis* naked, like the stipe, both surfaces bright-green and shining; *texture* subcoriaceous; *veins* conspicuous, fine, close (about 6 to a line), usually simple; *invol.* narrow, membranous.—*Hk. Sp. 2. p.* 158. *t.* 112. B.

Hab. Malayan Islands.—*P. venusta*, Kunze (Bot. Zeit. 6. p. 195), is said to be allied to this, but to have the *pinnæ* subauriculate at the base, and occasionally forked.

3. *P. opaca*, J. Sm.; *st.* strong, erect, pale, finely pubescent; *fr.* 2-3 ft. l., oblong, simply pinnate; *pinnæ* in numerous opposite pairs, linear, cuneate at the base, quite entire towards the point, the largest about 1 ft. l.,  $\frac{1}{2}$  in. br.; *rachis* pubescent, like the stipe; *texture* coriaceous, both surfaces naked except the midrib beneath; *veins* sunk in the frond and only visible as faint striations; *invol.* narrow, brownish.—*Hk. Sp. 2. p.* 159. *t.* 114. A. *Pycnodoria*, Presl.

Hab. Island of Samar, one of the Philippines, *Cuming*, 342.—A well-marked species, out of which Presl made a new genus upon a mistaken view of the involucre, which is that of typical *Pteris*.

\*\* *Furcatae*. Lower *pinnæ* forked or slightly pinnate below, with a long linear entire point. *Sp.* 4-11.

4. *P. cretica*, L.; *st.* 6-12 in. l., erect, wiry, naked, straw-coloured, or pale-brown, polished; *fr.* 6-12 in. l., 4-8 in. br.; *lateral pinnæ* usually in 2 to 6 opposite sessile pairs, of which the upper one is sometimes a little decurrent, 3-6 in. l.,  $\frac{1}{3}$ - $\frac{3}{4}$  in. br., the sterile ones considerably the broadest and spinuloso-serrated, the lower pairs often cleft down nearly to the base into two or three linear *pinnæ*; *rachis* and both surfaces naked; *texture* coriaceous; *veins* fine, close, parallel, simple or once forked; *invol.* pale, membranous.—*Hk. Sp. 2. p.* 159.— $\beta$ , *P. stenophylla*, *Hk. & Gr. Ic. t.* 130; *pinnæ* 3 to 5 only, clustered at the apex of the stipe. *P. digitata*, *Wallich*.— $\gamma$ , *P. melanocaulon*, *Fée*; *stipe* dark-coloured; *veins* sometimes scarcely visible.—*P. scabripes*, *Wall.*

Hab. Italy, Crete, Corsica, Abyssinia, Bourbon, Natal, Cape Colony, Ural, Caucasus, Arabia, Persia, Japan, Himalayas (up to 8-9,000 ft.), Neilgherries, Philippine Islands, Fiji and Sandwich Islands, Florida, Mexico, and Guatemala.—A variegated form (*albo-lineata*, Hort.) is figured in Bot. Mag. t. 5194. The Brazilian station given in *Sp. Fil.* is a mistake.

5. *P. pellucida*, Presl; *st.* 1 ft. or more l., erect, naked, straw-coloured or brown; *fr.* 12-18 in. l., ovate-lanceolate, simply pinnate; *pinnæ* usually in 3 to 6 sessile pairs, linear, entire or serrated towards the point, the upper ones slightly decurrent, the lower ones often 8 in. l., 1 in. br., usually all simple, but occasionally the lowest forked; *rachis* naked; *texture* coriaceous, both surfaces bright-green, often glossy; *veins* conspicuous, fine, close (about three to a line), simple or once forked; *invol.* membranous, brownish.—*Hk. Sp. 2. p.* 161. *t.* 129. B. (*a simple-fronded state*).

Hab. Himalayas, Neilgherries, Ceylon, Malayan Peninsula, Philippines, Guinea Coast.—Different in the typical state from *P. cretica*, but not satisfactorily distinct. *Pinnæ* of the sterile frond not much broader than the others, scarcely toothed, but sometimes crisped at the edge.



6. *P. Hookeriana*, Agardh ; *st.* 6-12 in. l., naked, erect, pale ; *fr.* 9-12 in. l., 6-9 in. br., with a long, linear, entire terminal *pinna*, and two to six pairs of sessile opposite entire lateral ones, the largest of which is about 6 in. l.,  $\frac{3}{4}$  in. br., and the lowest of which is forked at the base on one or both sides ; *texture* coriaceous ; *rachis* and both surfaces naked, opaque ; *veins* nearly 1 lin. apart at the base, simple or once forked, conspicuous above, but scarcely visible beneath ; *invol.* narrow, brownish.—*Hk. Sp. 2. p.* 165.

Hab. Adam's Peak, Ceylon, at about 2,000 ft.—Regarded by Mr. Thwaites as a variety of *P. cretica*.

7. *P. dactylina*, Hk. ; *st.* 6-9 in. l., slender, wiry, naked, straw-coloured ; *fr.* consisting of 3 to 5 linear slightly serrated *pinnae*, 2-6 in. l.,  $1\frac{1}{2}$ -2 lin. br., which issue from at or near the same point, sometimes the two outer ones from a little below the others ; *texture* coriaceous, both surfaces naked ; *veins* conspicuous, simple or forked, usually about 1 lin. distant from one another at the base ; *invol.* broad, pale.—*Hk. Sp. 2. p.* 160. *t.* 130. A.

Hab. Nepal, Sikkim, and Khasya, ascending to 9,000 ft.—In habit this comes near *P. cretica*  $\beta$ , but the venation is different.

8. *P. umbrosa*, R. Br. ; *st.* 12-18 in. l., strong, erect, bright reddish-brown, scabrous ; *fr.* 12-24 in. l., 6-12 in. br., with a terminal *pinna* and usually 6 to 9 lateral ones, all of which run down the stipe at the base so as to form a broad wing which reaches nearly or quite to the next node, the upper ones linear, 3-6 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., finely serrated in the sterile portions, the lower ones forked or with 2 or 4 erecto-patent linear pinnules ; *rachis* and both surfaces naked ; *texture* coriaceous ; *veins* fine but conspicuous, simple or once forked.—*Hk. Sp. 2. p.* 162. *t.* 130. B.

Hab. Tropical and Temperate Australia.—A larger plant than *P. cretica*, with a conspicuously winged rachis and several compound pinnæ.

9. *P. serrulata*, L. fil. ; *st.* 6-9 in. l., erect, wiry, naked, pale or brownish ; *fr.* 9-18 in. l., 6-9 in. br., ovate, bipinnatifid, the main rachis margined with a wing which is  $1\frac{1}{2}$ -2 lin. br. at the top, and grows gradually narrower downwards ; *pinnae* in six or more distant opposite pairs, the upper ones simple, often 4-6 in. l.,  $\frac{1}{2}$ - $\frac{1}{4}$  in. br., the lower ones with several long linear erecto-patent pinnules on each side, the edge of the barren ones spinuloso-serrulate ; *texture* scarcely coriaceous ; *rachis* and both surfaces naked ; *veins* clearly visible, simple or once forked, about 1 lin. apart at the base ; *invol.* narrow, membranous.—*Hk. Sp. 2. p.* 167.

Hab. A well-known plant in gardens, common in China, and received lately from Japan from Dr. Hance, and from Natal from R. W. Rawson, Esq.—*P. luxuriosa*, Kunze, a garden plant, supposed to be a native of Manilla, is said to differ by its longer and narrower frond, less branched and more equal lower pinnæ, and winged petioles.

10. *P. crenata*, Swartz ; *st.* 3-6 in. l., slender, erect, naked, straw-coloured ; *fr.* 6-12 in. l., 3-6 in. br., with a long terminal *pinna* and 2 to 4 pairs of lateral ones, those of the fertile frond slightly compound, the central portion 2-4 in. l.,  $\frac{1}{4}$  in. or less br., entire, the upper ones of the sterile frond decurrent, the lower ones subdeltoid, cut down to the rachis below into 2 to 6 ovate-oblong sharply-toothed pinnules, which are often  $\frac{3}{8}$  or even  $\frac{1}{2}$  in. br. ; *texture* subcoriaceous ; *rachis* and both surfaces naked ; *veins* not very conspicuous, usually once or twice forked.—*Hk. Sp. 2. p.* 163. *t.* 127. A.

Hab. Hindostan, from the Himalayas to Ceylon, Chusan, and Loo-choo Islands southward to Tropical Australia, eastward to Samoa and Fiji.—This has the fertile fronds of the present, with barren ones more like those of the next group.

11. *P. distans*, J. Sm.; *st.* about 6 in. l., slender, erect, naked, pale; *fr.* about 1 ft. l., 4-6 in. br., terminated by a *pinna* with a long, narrow, sharply serrated linear apex, below which are 12 to 20 pairs of closely-placed short lobes  $\frac{1}{2}$  in. or less l.,  $\frac{1}{8}$  in. br., the lower two-thirds of the frond with 6 to 9 opposite pairs of distantly-placed *pinnae* with a long linear point, and at the base a few spreading pinnules; *rachis* scabrous; *texture* coriaceous; *veins* conspicuous, simple or once-forked, about 1 lin. apart at the base; the barren lobes sharply and finely spinuloso-serrated; *invol.* membranous.—*Hk. Sp. 2. p.* 169. *t.* 124. B.

Hab. Luzon, Philippine Islands; gathered by Mr. Cuming.

\*\*\* *Pinnatae.* Lowest *pinnae* simply *pinnate.* Sp. 12-18.

12. *P. heteromorpha*, Fée; *st.* 6-12 in. l., naked, erect, pale; *fr.* 12-18 in. l., 6-9 in. br., ovate-lanceolate, with the apex of the long terminal point entire, but the lower half sinuated and furnished with a few short linear lobes; *pinnae* in several opposite pairs, the lowest of which are 3-4 in. apart, the upper ones entire or slightly compound at the base, the lowest pair cut down nearly to the rachis with several spreading linear pinnules on each side, 1 in. or more l.,  $\frac{3}{8}$  in. br.; *texture* subcoriaceous; *rachis* and both surfaces naked, the margins slightly crisped; *veins* conspicuous, usually once forked, their bases about 1 lin. apart; *invol.* narrow, membranous. *Hk. Sp. 2. p.* 166. *t.* 127. B.

Hab. Philippine Islands; gathered by Mr. Cuming.—This may be one of the aberrant forms of *P. semipinnata*, which it resembles in general habit.

13. *P. Griffithii*, Hk.; *st.* 6-8 in. l., slender, erect, wiry, naked, straw-coloured; *fr.* 6-8 in. l., 2-3 in. br., ovate-lanceolate, the terminal *pinna* linear, entire, about 2 in. l.,  $\frac{1}{8}$  in. br.; upper lateral ones simple, not more than  $\frac{1}{4}$  in. apart, and the base decurrent down to the next, the lower ones lanceolate-deltoid, with a linear entire point and several short erecto-patent linear entire *pinnul.* on each side; *texture* subcoriaceous; *rachis* and both surfaces naked; *veins* obscure, about  $\frac{1}{8}$  in. apart at the base, usually once forked; *invol.* narrow, membranous.—*Hk. Sp. 2. p.* 170. *t.* 123. A.

Hab. Mishmee, N. Hindostan; gathered by Griffith.

14. *P. madagascariensis*, Ag.; *fr.* ample, bipinnate; terminal *pinna* linear, the upper lateral ones small, linear, sessile, those next in order larger and stalked, the lower ones 2 in. apart at the base, deflexed, oblong-lanceolate, about 6 in. l., 4 in. br., with an entire terminal lobe and several stalked lateral *pinnul.* on each side, which are about 2 in. l., 2 lin. br., deeply serrated towards the point, and spreading from the scabrous rachis at right angles; *texture* coriaceous; *veins* conspicuous, about 1 lin. apart at the base and usually once forked near the base; *invol.* narrow, firm.—*Hk. Sp. 2. p.* 171. *t.* 122. A. *P. subserrata*, Bojer.

Hab. Madagascar; gathered by M. Bojer.

15. *P. mutilata*, Linn.; *st.* slender, erect, naked, polished, straw-coloured or bright-brown, those of the fertile frond the largest (9-12 in.) and strongest; *fr.* about 6 in. each way, deltoid, with a linear entire point, several entire *pinnae*, but the lowest pair lanceolate-deltoid, 4-6 in. l., 3-4 in. br., with several linear, erecto-patent *pinnules* on each side, the divisions of the barren frond shorter and broader than those of the fertile one, not serrated, but mucronate at the point, and furnished with a crisped white cartilaginous border; *rachis* and both surfaces naked and shining; *veins* about 1 lin. apart at the base, simple or once forked; *invol.* narrow, membranous.—*Hk. Sp. 2. p.* 164. *t.* 131. A.

Hab. West-Indian Islands.—*P. concinna*, Heward, is a more compound form than usual.



16. *P. semipinnata*, Linn.; *st.* 1 ft. or more l., strong, erect, naked, bright chestnut-brown; *fr.* 12-18 in. l., 6-9 in. br., ovate-lanceolate, the upper part cut down nearly to the rachis into numerous close entire linear lobes, the largest of which are  $1\frac{1}{2}$ -3 n. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., the lower two-thirds with 6 or 8 pairs of opposite distantly-placed *pinnæ*, the largest of which are 3-6 in. l., with a long linear entire point, and a broad entire wing on the upper side of the rachis, but the lower side with several linear *pinnl.* 1-2 in. l.,  $\frac{1}{4}$  in. br.; *texture* scarcely coriaceous, barren segm. finely serrated; *rachis* and both surfaces naked; *veins* simple or once forked,  $\frac{1}{8}$  in. apart at the base; *invol.* membranous.—*Hk. Sp. 2. p.* 169. *Gard. F. t.* 59.— $\beta$ , *P. dispar*, Kunze; *pinnæ* more or less pinnate on the upper side also.

Hab. Himalayas (ascending to 3-4,000 ft.), to Ceylon, S. E. China, Japan, the Philippines, and Borneo.—The two forms look very different when typical, but are connected by intermediates.

17. *P. paucinervata*, Fée; *st.* about 1 ft. l., erect, naked, reddish-brown; *fr.* (in our specimen) with a terminal *pinna* and a single unbranched lateral one on each side, the former broadly lanceolate, 9 in. l., 4 in. br. below, cut down nearly to the rachis into linear oblong slightly falcate lobes, which are decurrent at the base and bluntly crenate towards the point, the largest 2 in. l.,  $\frac{1}{2}$  in. br.; *lat. pinnæ* similar but smaller; *rachis* and both surfaces naked; *texture* subcoriaceous; *veins* fine, once or occasionally twice forked, the lower ones  $\frac{1}{8}$  in. to 2 lin. apart at the base; *sori* continued nearly to the apex of the lobes.—*Hk. Sp. 2. p.* 194.

Hab. Mexico.—This and the next species have quite the habit of *quadriaurita*, but the venation seems to distinguish them.

18. *P. litobrochioides*, Klotzsch; *st.* strong, erect, naked, bright chestnut-brown; *fr.* 2 ft. l., 18 in. br., the terminal *pinna* 1 ft. or more l., 2-3 in. br., cut down within a short distance of the rachis into numerous spreading linear entire lobes, 1-1 $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. or more br., the lower sinuses rounded; lateral *pinnæ* 3 or 4 on each side, similar to the terminal one, erecto-patent, the lowest 3 to 4 in. distant at the base, all unbranched in our specimens; *texture* coriaceous; *rachis* and both surfaces naked; *veins* conspicuous, once forked, 1 lin. apart at the base; *sori* reaching nearly to the apex of the lobes.—*Hk. Sp. 2. p.* 173.

Hab. Gathered by Sir R. Schomburgk in British Guiana, and Dr. Spruce in the Amazon Valley.

\*\*\*\* *Bipinnatæ. Lowest pinnæ at least bipinnatifid. Sp.* 19-35.

19. *P. marattiæfolia*, Hk.; *st.* stout, erect, quadrangular, deeply sulcate, glossy, straw-coloured; *fr.* ample, bipinnate, the upper part simply pinnate, with several linear lobes which are slightly decurrent at the base, prominently serrated towards the point, the longest 4 in. l.,  $\frac{1}{2}$  in. br.; *lower pinnæ* 6-12 in. l., pinnate, with numerous similar lobes on both sides and again compound with smaller *pinnl.* on both sides at the base; *texture* scarcely coriaceous; *rachis* and both surfaces naked; *veins* usually once forked,  $\frac{1}{8}$  in. apart at the base; *sori* not reaching to the apex of the lobes.—*Hk. Sp. 2. p.* 177. *t.* 122. B. *P. flexuosa*, Mett. *P. semiadnata*, Philippi.

Hab. Chili and Chiloe.—A very distinct species, easily recognizable by its large distinct pinnules, of which only the lowest of the basal *pinnæ* are again compound.

20. *P. Dalhousiæ*, Hk.; *st.* strong, erect, about 1 ft. high, polished, naked, light-brown; *fr.* 2-3 ft. l., 12-18 in. br., tri- or quadripinnatifid; *upper pinnæ* linear, unbranched, decurrent down to the next pair, lower ones sometimes 1 ft. l., deltoid; *pinnl.* with simple or occasionally with branched linear *segm.*,

the longest undivided ones 6 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., those of the pinnae with usually about 1 in. between them, the margins very slightly serrated; *texture* subcoriaceous; *rachis* and both surfaces naked; *veins* fine, simple or once forked, about 3 to a line; *invol.* narrow, membranous.—*Hk. Sp. 2. p. 170. t. 121. A.*

Hab. Gathered at Penang by Lady Dalhousie, and in Java by Mr. Lobb.—Very different from any other species of the group. It is most like *P. umbrosa*, but much more compound.

21. *P. irregularis*, Kaulf.; *st.* 1-2 ft. l., strong, angular, naked, polished, brownish; *fr.* 12-24 in. l., often 1 ft. br.; main *rachis* with a wing throughout which is  $\frac{3}{8}$ - $\frac{1}{2}$  in. br.; *upper pinnae* linear, simple, lower ones 2-3 in. apart at the base, with several long, linear, erecto-patent *pinnae* on each side, which are sometimes again slightly compound; longest simple *segm.* 3 or 4 in. l.,  $\frac{3}{8}$ - $\frac{1}{2}$  in. br.; *rachis* and both surfaces naked; *texture* subcoriaceous; *veins* about 1 lin. apart at the base, usually once forked; *invol.* narrow, membranous.—*Hk. Sp. 2. p. 173.*

Hab. Sandwich Islands; and a fragment of what is probably this species is in the Herbarium from Sumatra. This again is very distinct. It is more like *P. Dalhousiae* than any other species, but the pinnules are regularly pinnate instead of mostly forked.

22. *P. quadriaurita*, Retz.; *st.* 1-2 ft. l., strong, erect, naked or slightly scabrous, straw-coloured or brownish; *fr.* 6 in. to 2 or 3 ft. l., 4 in. to 1 ft. or more br., with a terminal central pinna cut down nearly to the rachis into numerous close parallel linear-oblong lobes  $\frac{1}{2}$ -1 in. l., 2-3 lin. br., the barren ones entire or slightly serrated, and below this several similar *pinnae* on both sides, which are 6-12 in. or more l., 1-2 in. br., the lowest 1-2 in. apart at the base, usually again compound, with one or two similar but smaller *pinnae* branching from them at the base on the lower side; *texture* subcoriaceous; *rachis* and both surfaces naked; *veins* conspicuous, usually once forked, 1 lin. to  $\frac{1}{8}$  in. apart at the base; *sori* often continuous along the whole margin of the segments.—*Hk. Sp. 2. p. 179. t. 134. B.*

Hab. All round the world within the Tropics, and a little beyond them. West Tropical Africa—Angola, Natal, Zambesi Land, Madagascar. Hindostan (ascending in the Himalayas to 11,000 ft.), S. China and Japan southward to Ceylon and the Malayan and Polynesian Islands and Rockingham Bay in Trop. Australia. America, from Cuba and Mexico southward to Brazil.—Varies much, especially in size. *P. asperula*, J. Smith, is a form with the rachises and costae furnished with slender spines; *P. subquinata*, Wallich and Agardh, an Indian form with fewer *pinnae* than usual; *P. argyræa*, Moore, a form with a more or less distinctly marked band of white down the centre of the frond; *P. tricolor*, Linden, the same, with a tinge of red added (see Bot. Mag. t. 5183): and I cannot distinguish by any clear character the West-Indian *P. Swartziana*, Agardh, and *P. felosma*, J. Smith; the Brazilian *P. sulcata*, Link; the Malayan *P. pyrophylla*, Blume, and *P. deltea*, Agardh, and the South-African *P. catoptera*, Kunze. All our specimens of the Polynesian plant have dark-brown naked stipes and rachis. Mr. Thwaites sends from Ceylon a series of remarkable abnormal forms passing down gradually into a plant with narrow linear *pinnae*, the lowest with only two smaller similar pinnules on the lower side. Down to No. 28 the species are osely allied to this and one another.

23. *P. longipinnula*, Wallich; *st.* erect, naked, 2-3 ft. l., yellowish-green; *fr.* 1-3 ft. l., 12-18 in. br., the terminal *pinna* 1 ft. or more l., 2-3 in. br., with numerous spreading, entire, blunt, linear lobes on each side, which are  $1\frac{1}{2}$ -2 in. l., and reach down nearly to the rachis at the base, the point caudate; *lateral pinnae* several on each side, similar to the terminal one, the lowest 2 in. apart, sometimes forked; *texture* subcoriaceous; *rachis* and both surfaces naked; *veins* once forked,  $\frac{1}{8}$  in. apart at the base; *sori* continued nearly to the apex of the segments.—*Hk. Sp. 2. p. 179, t. 134. A.*



Hab. Hindostan (ascending in the Himalayas to 2-4,000 ft.), Malayan Peninsula, Borneo, and Japan.—Very doubtfully distinct from the preceding.

24. *P. excelsa*, Gaud. ; *st.* stout ( $\frac{1}{4}$ - $\frac{3}{8}$  in. thick), erect, naked, glossy, pale-brown ; *fr.* 5-6 ft. l. ; *terminal pinna* 1 ft. or more l., 3 in. br., with numerous closely-placed falcate linear lobes on each side, which are sometimes more than 2 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., narrowly obliquely decurrent and slightly serrated on the barren part ; *lateral pinnæ* several, similar to the terminal one, the lowest several inches apart at the base, sometimes bipartite ; *texture* subcoriaceous ; *rachis* and both surfaces naked ; *veins* once forked,  $\frac{1}{8}$  in. apart at the base ; *sori* not reaching the apex of the segments.—*Hk. Sp. 2. p. 183. t. 136.*

Hab. Hindostan (ascending in the Himalayas to 7-8,000 ft.), Ava, Philippine and Sandwich Islands.—Like *P. quadriaurita* on a larger scale.

25. *P. pungens*, Willd. ; *st.* 1 ft. or more l., naked, distinctly prickly, glossy, pale or brownish ; *fr.* 1-2 ft. l., 12-18 in. br. ; *terminal pinna* sometimes 1 ft. l., more than 2 in. br., with a long entire point and numerous close, parallel, linear-oblong lobes, which extend down nearly to the rachis (1-1 $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. br.), and are finely toothed towards the point when barren ; *pinnæ* several on each side, similar to the terminal one, the lowest 2-3 in. below the next above it, once forked, with a smaller similar pinnule ; *texture* subcoriaceous ; *rachis* and both surfaces naked ; *veins* conspicuous, once forked,  $\frac{1}{8}$  in. distant at the base ; *sori* not reaching the apex of the segments.—*Hk. Sp. 2. p. 182.*

Hab. West-Indian Islands.—If the muricated stipe be not of a permanent character, this cannot be regarded as distinct from *P. quadriaurita*. Poppig's Peruvian plant, called *P. edentula*, Kunze, has a smooth stipe, and is normal *quadriaurita*.

26. *P. scabra*, Bory ; *st.* 1-2 ft. l., strong, erect, glossy, dark chesnut-brown ; *fr.* 2 ft. l. or more, 12-18 in. br. ; *terminal pinna* 6-12 in. l., 1 $\frac{1}{2}$ -2 in. br., made up of numerous linear erecto-patent lobes, which are often 1 in. l.,  $\frac{1}{4}$  in. br., cut down regularly within about  $\frac{1}{8}$  in. of the rachis, and suddenly dilated to the wing within a short distance of the base ; *lateral pinnæ* several in number on each side, similar to the terminal one, the lowest 2 in. apart at the base, with 1 or 2 similar smaller *pinnl.* on the lower side ; *texture* very coriaceous ; *rachises* rigid and glossy like the stipe ; both surfaces naked ; *veins* conspicuous on both sides, simple or once forked, 1 line apart at the base ; *sori* narrow, continuous along nearly the whole length of the segment.—*Hk. Sp. 2. p. 187. t. 138. A.*

Hab. Mauritius and Bourbon.—The texture is so coriaceous that the specimens can scarcely be fastened down on paper. Capt. Carmichael's Bourbon plant with a stramineous stipe, mentioned in "Species Filicum," is evidently *P. flabellata*. *P. angusta* of Bory seems to be a smaller form of this, which resembles *P. quadriaurita* in outline, but differs in texture.

27. *P. paleacea*, Roxb. ; *st.* 2-4 ft. l., strong, erect, straw-coloured or reddish-brown, clothed throughout with large lanceolate brown scales, which fall off and leave it densely muricated with hard raised points ; *fr.* 1 ft. or more each way ; *terminal pinna* 6-9 in. l., 1 $\frac{1}{2}$  in. br., made up of numerous contiguous falcate linear lobes, which are 1 in. or more l., 2 lin. br., blunt at the point, and not at all serrated ; *pinnæ* several in number on each side, similar to the terminal one, closely placed (not 1 in. apart at the base) and imbricated, the lowest with several large similar *pinnl.* from its under side ; *texture* coriaceous ; *rachises* scaly and asperous like the stipe ; *veins* faint, full  $\frac{1}{8}$  in. apart at the base, usually once forked ; *sori* extending along the whole length of the edge.—*Hk. Sp. 2. p. 186.*

Hab. St. Helena, in the upper exposed part of Diana's Peak.

28. *P. Novæ-Caledoniæ*, Hk. ; *st.* 1 ft. or more l., erect, polished, naked, bright claret-brown ; *fr.* ample ; *terminal pinna* 6-9 in. l., 1 $\frac{1}{2}$  in. br., made up of numerous

linear erecto-patent contiguous lobes, which are  $\frac{3}{4}$ -1 in. l.,  $\frac{1}{8}$  in. br., and serrated when barren; *lateral pinnæ* numerous, contiguous, similar to the terminal one, the lower ones much larger, deltoid, and again compound; *texture* herbaceous; *rachises* bright-coloured like the stipe, both surfaces naked; *veins* not conspicuous, simple or once forked, about 1 lin. apart at the base; *sori* absent from the upper part of the segm.; *invol.* membranous, conspicuous,  $\frac{1}{3}$  lin. br.—*Hk. Sp. 2. p. 189.*

Hab. New Caledonia; discovered by Mr. C. Moore of Sydney, and since gathered by MM. Vieillard and Deplanche.—Mr. Moore says that the fronds are sometimes 10 feet in height. One of M. Deplanche's specimens shows the lower pinnæ, which measure nearly 1 ft. l., 9 in. br., and have five large pinnules on each side.

29. *P. heterophylla*, L.; *st.* wiry, slender, erect, naked, straw-coloured; *fr.* 6-12 in. l., 3-6 in. br., ovate-deltoid, tripinnate; *pinnæ* all, except two or three of the highest, compound, the lowest deltoid, with the *pinnl.* again pinnatifid; *ult. segm.* of the barren frond ovate, sharply and deeply toothed, cuneate and entire at the base, about  $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. br., of the fertile frond about  $\frac{3}{8}$  in. l.,  $\frac{1}{8}$  in. br., the tip sterile and toothed; *texture* herbaceous, both surfaces naked, bright-green; *veins* obscure; *invol.* broad, pale, membranous.—*Hk. Sp. 2. p. 166.*

Hab. West-Indian Islands and Brazil.

30. *P. gracilis*, Fée; *st.* 6-9 in. l., slender, erect, wiry, naked, polished, pale; *fr.* 9-12 in. l., 6-9 in. br., deltoid, tri- or even quadripinnate; only the very uppermost *pinnæ* simple, the lower ones hardly more than 1 in. apart, erecto-patent, with numerous closely-placed *pinnl.* on each side, the lower ones sometimes with the *segm.* again compound; the *ult. divisions* linear, when simple not much over  $\frac{1}{2}$  in. l., less than 1 lin. br., those of the barren frond sharply and deeply spinuloso-serrated; *texture* herbaceous; *rachis* and both surfaces naked; *veins* about  $\frac{1}{8}$  in. apart, simple or once forked; *invol.* pale, membranous.—*Hk. Sp. 2. p. 172. t. 128. A. P. semidentata, Fée, Hk. l. c.*

Hab. New Granada and South Brazil.—In some of the specimens with most of the veins simple they anastomose casually in the broader segments, so that it is probable that this is a free-veined form of *P. leptophylla*, with which in general habit it coincides.

31. *P. laciniata*, Willd.; *st.* 1 ft. or more l., stout, erect, very hairy; *fr.* 2-4 ft. l., 1-2 ft. br., deltoid, tripinnatifid, the upper part not cut down to the rachis, with oblong entire lobes  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.,  $\frac{3}{8}$  in. br.; *lower pinnæ* 12-18 in. l., 6-9 in. br., with numerous lanceolate *pinnl.* on each side, which are cut down to a broadly-winged rachis into lobes which are about  $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. br.; *texture* herbaceous; *rachis* and both surfaces hairy; *veins* few, often  $\frac{1}{4}$  in. apart at the base, usually once forked; *sori* lateral in the ultimate lobes, but not reaching the apex.—*Hk. Sp. 2. p. 176. t. 132. B. Lonchitis hirsuta, Linn.*

Hab. Mexico and West Indies southward to Peru.—Though in technical character a *Pteris*, this is far more like the two species of *Lonchitis* in habit. *Lonchitis Ghiesbreghtii* of Linden (*Pteris*, J. Smith) is a less hairy form than usual.

32. *P. arguta*, Aiton; *st.* 1 ft. or more l., strong, erect, naked, glossy, bright straw-coloured or reddish-brown; *fr.* 1-3 ft. l., 1 ft. or more br.; terminal *pinna* 6-9 in. l.,  $1\frac{1}{2}$ -2 in. br., made up of numerous contiguous erecto-patent linear lobes about 1 in. l., 2 lin. br., which reach down nearly to the rachis, and are slightly toothed when barren; *pinnæ* several in number on each side, similar to the terminal one, the lowest forked or with one or two similar smaller *pinnl.* from the base on the lower side; *texture* herbaceous; *rachis* and both surfaces naked; *veins* once forked, about 1 lin. distant at the base; *sori* nearly  $\frac{1}{2}$  lin. br., not usually extending beyond the lower half of the lobes.—*Hk. Sp. 2. p. 184.*

Hab. Portugal, Azores, Madeira, Canaries.



33. *P. flabellata*, Thunb. ; *st.* 1 ft. or more l., strong, erect, naked, glossy, straw-coloured ; *fr.* 1-3 ft. l., 1 ft. or more br. ; *terminal pinna* 6-12 in. l., 2-3 in. br., made up of numerous almost contiguous erecto-patent linear lobes 1-2 in. l., 2-3 lin. br., which reach down nearly to the rachis, and are finely serrated when barren ; *pinnæ* several on each side, similar to the terminal one, the lowest with 1 to 3 similar smaller *pinnl.* from the base on the lower side ; *texture* herbaceous ; *rachis* and both surfaces naked ; *veins*  $\frac{1}{2}$  in. apart at the base, usually once forked ; *sori* narrow, continuing along nearly the whole length of the segments.— $\beta$ , *P. Ascensionis*, Swartz ; much smaller, the lower *pinnæ* sometimes with several small compound pinnules on both sides.—*Hk. Sp. 2. p.* 185.

Hab. Cape Colony northward to Bourbon, Abyssinia, and Fernando Po.—This comes very near *P. arguta*. The best character is in the sori, which here are longer and narrower. The Ascension plant grows in a very exposed situation, and has more or less horizontal fronds with ascending or nearly vertical *pinnæ*.

34. *P. tremula*, R. Br. ; *st.* 1 ft. l. or more, strong, erect, naked, polished, bright chestnut-brown ; *fr.* 2-4 ft. l., 6 in. to 2 ft. br., the apex with a few closely-placed linear entire lobes, which are decurrent obliquely at the base, the largest hardly more than 1 in. l., 1 lin. br. ; *upper pinnæ* simply pinnate, with numerous similar lobes on both sides, the largest about 6 in. l., more than 1 in. br. ; *lower pinnæ* often very compound, sometimes 1 ft. l. and bipinnate ; *texture* herbaceous ; *rachis* and both surfaces naked ; *veins* sunk,  $\frac{1}{2}$  in. apart at the base, usually once forked ; *sori* copious, sometimes filling up the whole segment except the midrib.—*Hk. Sp. 2. p.* 174. *t.* 120. B.— $\beta$ , *P. Kingiana*, Endl. ; *ult. segm.* larger, sometimes  $1\frac{1}{2}$  in. l., nearly  $\frac{1}{2}$  in. br., without being toothed.—*Hk. Sp. 2. p.* 188.

Hab. Australia, Van Diemen's Land, and New Zealand.— $\beta$  was originally published from Norfolk Island, but some of the New Zealand specimens agree with it.

35. *P. Chilensis*, Desv. ; *st.* 6-12 in. l., erect, naked, pale or brownish ; *fr.* 1-2 ft. l., 9-18 in. br., deltoid, only the very uppermost lobes simple ; *upper pinnæ* lanceolate, cut down nearly or quite to the rachis into short linear-oblong *pinnl.*, which are finely serrated in the barren frond ; *lowest pinnæ* sometimes 1 ft. l., deltoid, with several bipinnatifid *pinnl.* on each side, the largest undivided *segm.* not more than  $\frac{1}{2}$  in. l.,  $\frac{1}{3}$  in. br. ; *texture* herbaceous, or slightly coriaceous ; *rachis* and both surfaces naked ; *veins* sunk, oblique, about 1 lin. apart at the base, usually once forked ; *sori* extending from the base to the apex of the segments.—*Hk. Sp. 2. p.* 175. *t.* 120. A.

Hab. Chili and Juan Fernandez.—Agardh gives also Peru, and a plant gathered by Mann on the banks of the Gaboon river in West Tropical Africa I believe to be the same. It is near *P. tremula*, but the segments are broader and shorter, and in the barren frond finely toothed.

\*\*\*\*\* Tripartitæ. *Lowest pinnæ much larger than the others, often nearly equalling the central portion of the frond.* Sp. 36-39.

36. *P. pellucens*, Agardh ; *st.* 1-2 ft. l., erect, naked, straw-coloured ; *terminal pinna* about 6 in. l., 1 in. br., with numerous erecto-patent linear-oblong lobes on each side, which are cut down very nearly to the rachis, about  $\frac{1}{2}$  in. l., 2 lin. br., bluntly toothed towards the point when barren ; *lateral pinnæ* numerous on each side (often 20), not more than 1 in. apart, the longest simple one about 6 in. l., the lowest large, compound, sometimes nearly as large as the central portion of the frond, 1 ft. l., 6 in. br. ; *texture* herbaceous ; *rachis* and both surfaces naked ; *veins* not prominent, once forked, about  $\frac{1}{2}$  in. apart at the base ; *sori* falling short of the apex of the segments.—*Hk. Sp. 2. p.* 191.

Hab. South flank of the Himalayas, and a similar plant, with more caudate pinnules, and segments not so close, and decurrent at the base, gathered by Mr. Cuming in the

Philippine Islands. In some of the specimens, but not all, the costa of the pinnules is spinulose on the upper side.

37. *P. deflexa*, Link ; *st.* 2 ft. or more l., strong, erect, naked or slightly asperous below, straw-coloured or reddish-brown ; *fr.* ample, 2-4 ft. l. ; *terminal pinna* 6-9 in. l., about 1 in. br., with a long point and numerous linear-oblong lobes on each side, which are nearly cut down to the rachis, about  $\frac{1}{2}$  in. l.,  $\frac{1}{2}$  in. br., the barren ones sharply spinuloso-serrated ; *lateral pinnae* numerous, similar, the lower ones stalked, the lowest pair much larger than the others, often more than 1 ft. l., 6-9 in. br., with numerous pinnate *pinnl.* on each side ; *rachises* smooth ; *texture* coriaceous ; *veins* once forked,  $\frac{1}{3}$  in. apart at the base ; *sori* reaching nearly to the apex of the segments.—*Hk. Sp. 2. p. 190.* *P. stridens*, *Ag. Hk. Sp. 2. p. 192.*

*Hab.* Tropical America, from the West Indies southward to Brazil and Peru.—*P. Gaudichaudii*, *Ag.*, is either this species or closely allied. In general aspect this species comes between *quadriaurita* and *aquilina*.

38. *P. coriacea*, Desv. ; *st.* 1-2 ft. l., erect, straw-coloured, asperous ; *fr.* 2 ft. l. or more, deltoid ; *terminal pinna* lanceolate, 6-9 in. l.,  $\frac{3}{4}$  in. br., with numerous linear-lanceolate falcate lobes on each side, which are  $\frac{1}{2}$ - $\frac{3}{4}$  in. l., 1-1 $\frac{1}{2}$  lin. br., sharply spinuloso-serrated when barren ; *lateral pinnae* a dozen or more on each side, similar, the lower ones slightly compound below, the lowest pair nearly as large as the central portion of the frond ; *pinnl.* again bipinnate ; *texture* coriaceous ; *partial rachises* densely muricated with small prickles, which also run along the midribs of the ultimate divisions beneath ; *veins* usually once forked, about  $\frac{1}{3}$  in. apart at the base ; *sori* reaching nearly to the apex of the segments.—*Hk. Sp. 2. p. 192. t. 124. A.—β, P. Jamesoni*, *Hk.* ; lowest ultimate divisions 1 in. l.,  $\frac{1}{4}$  in. br., sometimes decurrent at the base ; *texture* very coriaceous ; *rachis* beneath scarcely muricated.—*Hk. Sp. 2. p. 194. t. 193.*

*Hab.* Tropical America, from Venezuela along the Andes to Peru.—*P. muricata*, *Hk.*, differs from  $\beta$  principally by its lower pinnae being conspicuously stalked at the base. This species much resembles *P. deflexa* in general appearance, but may be known readily by its muricated rachises. A muricated plant, gathered by Dr. Spruce in the Central Andes (Nos. 5707 and 5665), is probably distinct. The stipe is strong and distinctly prickly, and is marked in one of the numbers as 5, and in the other as 12 feet in length. One of the pinnae is 2 feet long, the largest pinnule 10 inches, and the largest ultimate segment 1 inch long, 2 lines broad. The venation is fainter than in *P. coriacea*, and both surfaces are bright-green. What appears to be the same plant is in the Herbarium from New Granada from Linden and Lieut. Norton, and these latter are the *P. coriacea*  $\beta$  of the *Sp. Fil. p. 192.*

39. *P. brerisora*, Baker ; *st.* 2-4 ft. l., strong, erect, quite smooth ; *fr.* with a central *pinna* 1-2 ft. l., 6-9 in. br., and two opposite lateral ones which are nearly as large ; *pinnl.* 4-6 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., lanceolate acuminate, the lowest 1-2 in. apart ; *segm.* numerous,  $\frac{1}{2}$  in. l.,  $\frac{1}{8}$  in. br., linear-oblong, blunt, very slightly toothed ; *texture* herbaceous ; *rachis* naked ; *sori* in a continuous line along the border of each segment.—*Hypolepis pteridioides*, *Hk. 2nd Cent. t. 59.*

*Hab.* Cameroon Mountains and Fernando Po, at an elevation of 4-7,000 ft. ; discovered by Mr. Mann.

§§ Pæsia, *St. Hilaire. Veins free, rhizome creeping, stems sub-distant, involucre more or less distinctly double.* *Ornithopteris, Agarikh. Sp. 40-43. According to strict technical characters, this group of species, which differs from the rest of the genus also in habit of growth, has as good a claim to be placed in Lindsayæ as Pteridææ.* *TAB. III. f. 31, d, e, f.*

40. *P. (Pæsia) aquilina*, L. ; *rhizome* stout, wide-creeping, subterraneous ; *st.* ft. or more l., strong, erect, naked, straw-coloured or pale-chesnut ; *fr.* 2-4 ft.



or more l., 12-24 in. br., subdeltoid in general outline, only the uppermost *pinnæ* simple, those next in order lanceolate, cut down nearly or quite to the rachis into short triangular or linear *pinnl.*, the lowest long-stalked, 1 ft. or more l., with ample lanceolate *pinnl.*, which are cut down to the rachis into numerous lanceolate *segm.*, which are again fully pinnate; largest entire ult. divisions 1 in. l., 2 lin. br.; *texture* subcoriaceous; *rachis* and both surfaces naked or pubescent; *veins* close, conspicuous, often twice forked, involucre double or the inner one obsolete.— $\beta$ , *P. caudata*, L.; *pinnl.* sometimes linear and entire or with less crowded *segm.* than in  $\alpha$ , and the terminal lobe linear entire, 1-2 in. l.— $\gamma$ , *P. esculenta*, Forst.; ult. divisions narrower and not contiguous, suddenly decurrent at the base, so that the bases are connected by a narrow lobe.—*Hk. Sp. 2. p. 196. P. arachnoidea, Kaulf.*

Hab. All round the world both within the Tropics and in the North and South Temperate Zones, unless it be absent from South Temperate America, from which there are no specimens in the Herbarium. In Lapland it just passes within the Arctic circle, ascending in Scotland to 2,000 ft., in the Cameroon Mountains to 7,000 ft., in Abyssinia to 8,000 or 9,000 ft., in the Himalayas to about 8,000 ft.;  $\gamma$  inhabits principally New Zealand, Australia, the Polynesian Islands, and Tropical South America.—Dr. Spruce has seen it in the Andes 14 ft. in height.

41. *P. (Pæsia) viscosa*, Baker; *rhizome* wide-creeping, subsucculent, densely clothed with dark-brown fibrillose scales; *st.* 1 ft. or more l., flexuose, dark-brown, glanduloso-villose; *fr.* ample, decomposed; *upper pinnæ* small, lanceolate, pinnatifid, the lower ones 1-2 ft. l., 6-9 in. br., spreading, with numerous lanceolate *pinnl.* on each side, which are cut down into deeply lobed lanceolate-deltoid spreading *segm.*, about  $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. br.; *texture* scarcely coriaceous; *rachises* very wavy, like both surfaces, densely clothed with brown viscid glands; *invol.* double, membranous, the inner one sometimes obsolete. *Pæsia viscosa, St. Hilaire. P. scalaris, Moritz. Hk. Sp. 2. p. 200. t. 121. B. & 3. t. 141. C.*

Hab. Jamaica, Venezuela, and Peru.—Dr. Spruce's Peruvian specimens have the largest pinnules not more than  $1\frac{1}{2}$  in. l.,  $\frac{1}{2}$  in. br., their segments cut down to the rachis into small oblong-cuneate lobes about  $\frac{1}{2}$  lin. br.; and with these a plant gathered by M. Deplanche in New Caledonia quite agrees.

42. *P. (Pæsia) scaberula*, Richard; *rhizome* wide-creeping; *st.* 6-12 in. l., strong, flexuose, bright reddish-brown, scabrous; *fr.* 12-18 in. l., 6-9 in. br., lanceolate or ovate-lanceolate, tri- or quadripinnatifid; *lower pinnæ* lanceolate-deltoid, 4-9 in. l., cut down to the rachis into numerous lanceolate *pinnl.* on each side, which are again cut down into oblong toothed *segm.* 2-3 lin. l., 1 lin. br.; *texture* subcoriaceous; *rachis* flexuose and scabrous like the stipe, upper surface asperous; *sori* copious, occupying when mature nearly the whole segment except the midrib.—*Hk. Sp. 2. p. 174. t. 93. A.*

Hab. New Zealand.

43. *P. (Pæsia) rugulosa*, Labill.; *st.* erect, strong, glossy, nearly smooth, pale-brown; *fr.* ample, quadripinnatifid; *lower pinnæ* 12-18 in. l., 4-6 in. br.; *pinnl.* lanceolate, distant, spreading at right angles; *lower segm.* deltoid, cut down to the rachis into numerous oblong deeply toothed ult. divisions; *texture* herbaceous; *rachis* rigid, zigzag, glossy, scarcely asperous, both surfaces of the frond naked; *sori* 1 lin. l., placed along the sides of the ult. divisions.—*Hypolepis, Hk. Sp. 2. p. 68.*

Hab. Society Islands.—This is clearly a *Pteris*, not a *Hypolepis*; and both this and *P. scaberula* show occasionally a narrow membrane on the inner side of the receptacle, as in *aquilina* and *viscosa*.

§§§ Heterophlebium, *Fée*. *Veins free below, anastomosing towards the margin.*  
*Sp.* 44-45. *TAB. III. f. 31. c.*

44. *P.* (Hetero.) *lomariacea*, *Kze.*; *st.* 6-12 in. l., wiry, flexuose, dark chesnut-brown, naked; *fr.* deltoid, about 4 in. each way, with a terminal linear lobe and cut down below to a broadly-winged rachis into 2 or 4 *pinnæ* on each side, the lowest of which are much the largest and again deeply lobed on the lower side; primary and secondary *lobes* of the barren frond  $\frac{1}{2}$ - $\frac{3}{8}$  in. br., of the fertile, longer, narrower, and more divided; *texture* subcoriaceous, both surfaces naked; *veins* very inconspicuous, close, fine, anastomosing slightly towards the margin; *costæ* dark-coloured and polished like the stipe; *invol.* rather broad, membranous, ultimately spreading.—*Pellæa*, *Hk. Sp. 2. p. 133.*

*Hab.* Gathered by Sir R. Schomburgk and Appun in British Guiana, and by Messrs. Gardner and Lindberg in the South of Brazil. This resembles very closely *P. palmata* in habit, but the venation is quite different. The veins are very close, and nearly parallel, simple or once forked, and the branches of the same veins or of two contiguous ones occasionally join near the edge. The three plants brought together under this name in "Species Filicum" must be separated, one to be placed near *Pellæa geraniæfolia*, and the other near *P. palmata*.

45. *P.* (Hetero.) *grandifolia*, *Linn.*; *st.* 6-12 in. l., erect, naked, straw-coloured, clothed below with rusty woolly scales; *fr.* 1-2 ft. l., simply pinnate; *pinnæ* linear, erecto-patent, entire, sessile, or the lower ones stalked, the lower ones 6-12 in. l.,  $\frac{3}{4}$ -1 in. br.; *texture* coriaceous; *rachis* and both surfaces naked; *veins* fine, less than  $\frac{1}{8}$  in. apart at the apex, anastomosing only in the outer third of the space between the rachis and edge; *sori* often continuous along the whole length of the *pinnæ*.—*Hk. Sp. 2. p. 201. t. 113. B.*

*Hab.* Tropical America, from Mexico and the West Indies southward to Peru.—*P. vitata*, *Schk.*, is a form with nearly free veins. Sir H. Barkly sends from Jamaica a form with the *pinnæ* curiously sinuated, and some of them branched.

§§§§ *Campteria*, *Presl.* *Veins all free, except that those of the last divisions but one are more or less connected by arching veins at the very base.* *Sp.* 46-50. *TAB. III. f. 31. g.*

46. *P.* (Camp.) *biaurita*, *L.*; *st.* 1-2 ft. l., strong, erect, naked, straw-coloured; *fr.* with a terminal *pinna* 6-12 in. l.,  $1\frac{1}{2}$ -2 in. br., cut down within from  $\frac{1}{8}$ - $\frac{1}{4}$  in. of the rachis into numerous spreading linear-oblong lobes on each side, which are 1 in. or more l.,  $\frac{1}{4}$  in. or less br.; *lateral pinnæ* several on each side, similar to the terminal one, the lower ones 2 in. apart and usually once forked; *texture* subcoriaceous; *rachis* and both surfaces naked; *veins* prominent, those of the ult. segm. quite free, usually once forked,  $\frac{1}{8}$  in. apart at the base, but the midrib of the segments connected by an arching vein which passes from base to base; *sori* continued to the apex.—*Hk. Sp. 2. p. 204.*

*Hab.* West Tropical Africa, Mauritius, Bourbon, Hindostan (ascending in the Himalayas to 4,000 ft.), Ceylon, Java, S. China, Malayan Peninsula, and Tropical America from the West Indies southward to Brazil.—This differs only from *P. quadriaurita* in the *pinnæ* being less deeply pinnatifid, and the bases of the midribs of the segments being connected by an arching vein. This arch springs normally from the bases of the midribs, but sometimes begins and ends at points between them. It is sometimes triangular, but sometimes very low, and in what Agardh considers as *P. nemoralis*, Willd., we have the venation considered as characteristic of *biaurita* combined with the entirely free venation considered as characteristic of *quadriaurita* in one and the same frond, so that they must be regarded as very doubtfully distinct. *P. Galeotti*, *Fée*; *P. amœna*, Blume; *P. atrovirens*, Willd.; and *P. armata*, Presl, are apparently allied plants; and *C. Kleini-ana*, Presl, and *C. Anamallayensis*, Beddome, I cannot distinguish clearly.



47. *P. (Camp.) patens*, Hk. ; *st.* 1 ft. or more l., erect, naked, glossy, chestnut-brown ; *fr.* ample, 3-4 ft. l., 2 ft. or more br. ; *terminal pinna* 6-9 in. l.,  $1\frac{1}{2}$ -2 in. br., with several narrow linear lobes on each side, which are widened suddenly on both sides within a short distance of the base, the barren ones slightly serrated ; *lateral pinnae* numerous, similar but larger, sometimes 18 in. l., 2 in. br., the lowest forked ; *texture* scarcely coriaceous ; *rachis* and both surfaces naked ; *veins* oblique, not conspicuous, usually once-forked, 1 line apart at the base ; *sori* continued nearly to the end of the segment.—*Hk. Sp. 2. p. 120. A. P. decussata, J. Sm.*

Hab. Ceylon, Borneo, Philippines, Society Islands.—By looking on the upper surface towards the top of the frond, shallow costal arches may clearly be seen, so that Mr. Thwaites is doubtless quite correct in his suggestion of the identity of *Litobrochia Gardneri*, Fée, with our plant. The sudden widening of the base of the often nearly opposite lobes (which suggested J. Smith's name) is more conspicuous here than in any other of the quadriaurita series.

48. *P. (Camp.) triplicata*, Ag. ; *st.* strong, erect, smooth, naked ; *fr.* 1-2 ft. l., 9-12 in. br., the terminal pinna 6-9 in. l.,  $1-1\frac{1}{4}$  in. br., cut down within  $\frac{1}{2}$  in. of the rachis into numerous spreading contiguous entire linear-oblong lobes, which are  $\frac{3}{4}$  in. l.,  $\frac{1}{4}$  in. br., and blunt at the point ; *lateral pinnae* few and distant (4 to 6 on each side and the lowest 3 in. apart) with a stalk about 1 in. l., an apex like the terminal pinna with a long entire caudate point and two smaller stalked spreading *pinnl.* ; *texture* scarcely coriaceous ; *rachis* and both surfaces naked ; *veins* all free except the basal arch ; *sori* continuous along the whole edge of the segments.—*Hk. Sp. 2. p. 205.*

Hab. Mozambique ; gathered by Forbes, and said by Agardh to be also a plant of Madagascar.

49. *P. (Camp.) Melleri*, Baker ; *st.* 6-12 in. l., firm, erect, naked, brownish ; *fr.* 18 in. l., 9 in. br., the terminal pinna 4 in. l., the upper two-thirds linear, the apex sharply toothed, the rest broadly undulated at the margin, the lower part with two linear lobes on each side ; *pinnae* numerous, the upper pair linear and sessile, 3 in. l.,  $\frac{1}{4}$  in. br., all the lower ones more or less compound, on petioles  $\frac{1}{2}$  in. or more l., the point and often the pinnules linear entire ; *lobes* not reaching down to the rachis, linear, bluntish, deeply serrated, the longest about  $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. br., sometimes present on one side of the pinna or pinnule and not on the other ; *lowest pinna* with 5 pinnules, which are again slightly compound at the base ; *texture* subcoriaceous ; *veins* united only by costal arches, which are sometimes present, sometimes not when the pinnae and pinnules are not pinnatifid ; *rachis* and both surfaces naked.

Hab. Cascades of the Anevoa Valley, Madagascar. *Dr. Meller.*—This may be a very abnormal form of the preceding. We have a single specimen only.

50. *P. (Camp.) Wallichiana*, Agardh ; *st.* 5-6 ft. l., strong, bright chestnut-brown, naked, glossy ; *fr.* tripartite with lateral divisions again forked, the central one often 2 ft. l., 1 ft. br., with numerous lanceolate sessile opposite *pinnl.* on each side, the largest of which are 6 in. l., under 1 in. br., cut down within about 1 lin. of the rachis into numerous contiguous linear-oblong lobes,  $\frac{3}{8}$ - $\frac{1}{2}$  in. l.,  $\frac{1}{8}$  in. br., nearly entire when barren ; *lateral pinnae* nearly as large as the terminal one ; *texture* herbaceous ; *rachis* and both surfaces naked ; *veins* not conspicuous, usually once forked near the base, 1 lin. apart ; *sori* continuous along nearly the whole length of the edge.—*Hk. Sp. 2. p. 206.*

Hab. Himalayas (ascending to 8,000 ft.), Japan, and Philippine Islands.—Occasionally an areole may be seen at the base of the segments near the arch, and it may be doubted

whether this be not a Campteroid form of *P. tripartita*, which it resembles closely in all respects except venation.

§§§§§ Doryopteris, *J. Smith*. *Fronds small, sagittate or subpedate, veins copiously anastomosing, without free included veinlets.* Sp. 51-59.

51. *P. (Dory.) lonchophora*, Metten.; *st.* 1-1½ in. l., naked, polished, dark chesnut-brown; *fr.* 1-3 in. l., linear or linear-oblong from a cordate base, entire or furnished at the base with two short spreading lobes with rounded basal auricles, when undivided ⅓-¼ in. br.; *texture* coriaceous; *rachis* and both surfaces naked; *veins* anastomosing, immersed; *sori* subcontinuous; *invol.* crisped, subscariose.—*Mett. Cheil. p. 5. t. 3.*

Hab. Rio Janeiro.

52. *P. (Dory.) sagittifolia*, Raddi; *st.* 4-6 in. l., erect, naked, blackish, polished; *fr.* 4-6 in. l. from the top of the stipe to the apex, 2-3 in. br. opposite the former point, hastate-lanceolate or subtriangular, the basal lobes triangular acuminate, directed downwards, the margin entire; *texture* coriaceous; *both surfaces* naked; *midrib* blackish like the stipe; *veins* inconspicuous, copiously anastomosing; *sori* continued all round the margin.—*Ex. F. t. 39.*— $\beta$ , *P. hastata*, Raddi; with two large lateral lobes spreading horizontally in addition to the deflexed basal ones.—*Hk. Sp. 2. p. 207.*

Hab. Venezuela southward to Brazil.

53. *P. (Dory.) ludens*, Wallich; *st.* naked, or below pubescent, polished, nearly black, that of the barren frond 3-4 in. l.; *barren fr.* varying in shape from triangular with two slightly deflexed basal lobes to hastate, with two basal and two large spreading lateral lobes, the margin entire; *fertile fr.* with a stalk often 1 ft. l., 4-6 in. each way, cut down into five linear-lanceolate or lanceolate lobes, one erect, two spreading, and two deflexed, of which all, except the last, are sometimes again forked; *texture* coriaceous; *costa* polished like the stipe; *veins* hidden; *sori* continuous all round the margin.—*Hk. Sp. 2. p. 210.*

Hab. Malayan Peninsula and Philippine Islands.

54. *P. (Dory.) ornithopus*, Metten.; *st.* 6-12 in. l., strong, wiry, flexuose, polished, dark brownish-black, naked; *barren fr.* 3 in. deep, 4 in. br., palmately lobed, the central segment deep, triangular, the three lateral ones on each side not so deep and blunter; *fertile fr.* cut down within ½ in. of the base into seven entire linear lobes 2-3 in. l., ¼ in. br., the outer ones each with a smaller linear lobe at the base, each with a broad thick central costa; *texture* very leathery; *both surfaces* naked; *veins* inconspicuous, anastomosing copiously; *invol.* broad, leathery.—*P. lomariacea*  $\gamma$ , *Hk. Sp. Fil. p. 133.*

Hab. South of Brazil, *Burchell*, *Gardner*, and *Lindberg*.—This agrees with *P. palmata* in texture and venation, differing in having on the fertile frond several narrow segments like the claws of a bird radiating from an undivided centre.

55. *P. (Dory.) palmata*, Willd.; *st.* 1 ft. or more l., erect, nearly naked, polished, chesnut-brown; *fr.* 4-9 in. each way, the barren ones with a broad undivided centre and five or more triangular lobes, of which the terminal one is the largest, the lowest deflexed and the sinuses rounded; *fertile fr.* cut down to a broadly winged centre into linear lobes, of which the upper ones are entire and the lower ones again cut on the lower side, the longest entire ones 3-4 in. l., ¼-⅓ in. br; *texture* thick and coriaceous; *rachis* and both surfaces naked; *costae* black and polished; *veins* anastomosing copiously; *sori* continued to the apex of the segments.—*Hk. Gard. F. t. 22.* *P. pedata*, *Hk. Syn. Fil. 2. p. 208. in part.* *P. collina*, *Raddi*. *Dory. euchlora*, *Klotzsch*. *D. nobilis*, *Hort.*



Hab. Tropical America, from West Indies and Columbia southward to Peru and Rio Janeiro; and there is a specimen from Wallich marked *P. Mysurensis*, Heyne, from Dindighul in Hindostan, in Herb. Hooker.

56. *P.* (Dory.) *pedata*, Linn.; *st.* blackish, naked, polished, those of the barren *fr.* 3-4 in. l.; *barren fr.* 1-2 in. each way, with an almost entire triangular apex, and a bluntly divided lateral lobe on each side; *fertile fr.* 4-6 in. each way, cut down nearly to the rachis into several *pinnæ* on each side, of which the upper ones are linear and entire (1-1½ in. l., ¼-⅔ in. br.), the lowest pair much larger than the others, and with several pinnules on the under side, the lowest of which are again pinnatifid; *texture* scarcely more than herbaceous; *rachis* and both surfaces naked; *costæ* dark-coloured and polished; *sori* reaching to the point of the segments.—*Hk. Ex. F. p.* 34. *Sp. 2. p.* 208. *in part.*

Hab. Tropical America, from the West Indies southward to Brazil.

57. *P.* (Dory.) *decipiens*, Hk.; *st.* 6 in. l., erect, naked, polished, nearly black; *fr.* 3-6 in. each way, nearly or quite cut down to the rachis above the lower pair of *pinnæ*; *upper divisions* entire, falcate; the *central ones* deeply cut, the lower pair much larger than the others; lowest *pinnl.* 1½-2 in. l., cut down nearly to the rachis into 3-6 deep linear-oblong lobes; *texture* coriaceous, *rachis* and both surfaces naked; *costæ* black, polished; *veins* hidden, anastomosing copiously; *sori* reaching the tip of the segments.—*Hk. Sp. 2. p.* 209.

Hab. Sandwich Isles.—Precisely resembling *Pellæa geraniifolia* in size and outline, differing by its Pteroid sori and anastomosing venation.

58. *P.* (Dory.) *Feliciennæ*, F. Muell.; *st.* slender, smooth, 6 in. l., stramineous above, ebeneous at the base; *fr.* cordate-deltoid in general outline, with a terminal lobe and 3 to 5 deeply pinnatifid lanceolate oblong *pinnæ*, the lowest pair distant from the others, slightly stalked, 3 in. l., the upper ones sessile or decurrent; *lateral lobes* of the *pinnæ* ovate or oblong crenulate; *texture* membranous; *rachis* slender, naked, stramineous; *veins* reticulated.—*F. Muell, Frag.* 36. p. 124.

Hab. Rockingham Bay, Australia, *Dallachy*.—This we have not seen.

59. *P.* (Dory.) *decora*, Bracken.; *st.* 6-8 in. l., erect, naked, dark chesnut-brown; *fr.* 3-4 in each way, with a narrow linear terminal lobe decurrent down to 2 or 3 pairs of similar lateral ones, and below these two pairs of compound *pinnæ*, the lowest cut down to the base into three principal divisions, each again pinnate, their lowest *segm.* nearly 2 in. l., less than 1 lin. br.; *texture* coriaceous; *rachis* and both surfaces naked; *veins* quite hidden; *sori* reaching to the apex of the segments.—*Hk. Sp. 2. p.* 210. *Brack. t.* 13.

Hab. Sandwich Islands; discovered by the American Exploring Expedition; and very fine specimens have since been gathered by Dr. Hillebrand.—Although the pagina is so narrow, the veins clearly anastomose.

§§§§§ *Litobrochia*, Presl. *Habit of Eupteris, veins copiously anastomosing, without free included veinlets.* *Sp.* 60-87. *TAB. III. f.* 31. h.

\* *Integrifoliæ.* *Sp.* 60-63.

60. *P.* (Lito.) *Vieillardii*, Metten.; *st.* 6-12 in. l., erect, wiry, naked, chesnut-brown, that of the barren *fr.* shorter than that of the fertile one, both (in our specimens) with a long linear central lobe, which is 6 in. l., in the barren one 1 in., and in the fertile one ⅔ in. br., quite entire, and two smaller lateral ones; *texture* coriaceous, both surfaces naked; *veins* anastomosing copiously; *sori* continuous to the apex of the *pinnæ*.—*Metten. Fil. Nov. Cal. p.* 12.

Hab. New Caledonia; discovered by M. Vieillard.—A very distinct species, the least divided of the subgenus.

61. *P.* (Lito.) *lanceæfolia*, Agardh; *st.* erect, naked, pale, glossy; *fr.* simply pinnate, 12-18 in. l., 6-9 in. br.; *pinnae* linear, entire, slightly stalked, 4-6 in. l.,  $\frac{1}{2}$  in. br., erecto-patent, the lowest about 1 in. apart; *texture* subcoriaceous; *rachis* and both surfaces naked; *veins* copiously anastomosing; *sori* very narrow; falling short of the apex of the *pinnae*.—*Hk. Sp. 2. p. 212.* *P. alternifolia*, Bojer.

Hab. Madagascar; discovered by M. Bojer.

62. *P.* (Lito.) *splendens*, Kaulf.; *st.* erect, naked, dull, slightly scabrous; *fr.* ample, simply pinnate, with numerous pairs of nearly sessile linear *pinnae*, the largest of which are 1 ft. l., more than 1 in. br., spinuloso-serrated towards the acuminate point; *texture* coriaceous; *rachis* and both surfaces naked; *veins* conspicuous, copiously anastomosing; *sori* falling rather short of the apex of the *pinnae*, ultimately hiding the narrow *invol.*—*Hk. Sp. 2. p. 211.*

Hab. Brazil.—*P. chrysodioides* and *papyracea* of Fée appear to be closely allied. Frond sometimes quite entire.

63. *P.* (Lito.) *Mannii*, Baker; *st.* 3 ft. l., slender, flexuose, downy; *fr.* 12-18 in. l., 6-9 in. br., the terminal pinna subhastate with two erecto-patent, broad-lanceolate lobes; *lateral pinnae* in 5 to 7 nearly opposite pairs, 1 $\frac{1}{2}$ -3 in. apart, the lowest pair but one the largest, 6 in. l., under 1 in. br., linear, the point acute, the margin only slightly sinuated, the base deeply cordate, and the upper side slightly auricled; *texture* herbaceous; *rachis* rather thickly clothed with fine spreading hairs, and both surfaces, especially the midrib, also hairy; *veins* fine, anastomosing copiously; *sori* continuous along the undulated edge nearly to the point.

Hab. Fernando Po; discovered by Gustave Mann.

\*\* *Pinnatae.* Sp. 64-71.

64. *P.* (Lito.) *laurea*, Desv.; *st.* 1 ft. l., erect, naked, polished, straw-coloured or pale bright-brown; *fr.* 12-18 in. l., 9 in. br., oblong, the terminal pinna linear, entire, deeply serrated towards the point, 6 in. or more l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br.; *lateral pinnae* numerous, 1-2 in. apart at the base, even the upper ones slightly compound, the lower ones branched, with a long entire point and one or two small stalked linear *pinnae* on each side, which are occasionally again compound; *texture* subcoriaceous; *rachis* and both surfaces naked; *veins* 1-1 $\frac{1}{2}$  lin. apart at the base, and the bases sometimes connected by a transverse veinlet, often twice branched before they reach the edge; *invol.* narrow, membranous.—*Hk. Sp. 2. p. 166.* *P. triphylla*, Agardh. *Hk. Fil. 2. p. 171. t. 131. B.*

Hab. Madagascar; gathered originally by Dr. Lyall, and much finer specimens have been sent recently by Dr. Meller.

65. *P.* (Lito.) *Curreri*, Hk.; *st.* stout, erect, naked, straw-coloured; *fr.* ample, several ft. l., 2 ft. or more br., the terminal pinna subhastate, deeply lobed; *lateral pinnae* numerous, the upper ones 4-6 in. l., 1 in. br., the margin deeply and broadly sinuated, the lowest (in our specimens) in opposite sessile pairs 2-3 in. distant from the next pair, 16 in. l., 5 in. br., cut down within a very short distance of the rachis in the lower part into lanceolate sinuated lobes 3 in. deep,  $\frac{3}{4}$  in. br.; *texture* scarcely more than herbaceous; *rachis* and both surfaces slightly hairy; *veins* fine, copiously anastomosing; *sori* in numerous patches, which are sometimes interrupted and very short.—*Hk. Sp. 2. p. 232. t. 140.*— $\beta$ , *P. Barteri*; *rachis* hairy; *costa* beneath and whole under surface clothed with long, fine spreading hairs; *veins* stronger and more prominent.



Hab. Discovered at or near Elephants' Bay, West Tropical Africa, by the late Dr. Curror, and fine specimens were procured on the mountains of Fernando Po at 3-500 ft., by Gustave Mann.— $\beta$ , which is not unlikely a distinct species, was gathered on the Niger expedition by Barter, who describes the rhizome as creeping. This comes very near *Lonchitis* in texture, and the *sori* are often only reniform, and show a decided preference for the sinuses.

66. P. (Lito.) *denticulata*, Swartz; *st.* about 1 ft. l., slender, wiry, naked; *fr.* 12-24 in. l., 8-12 in. br.; *upper pinnae* simple, linear, 4-6 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., united at the base, finely spinuloso-serrated when barren, those next in order quite cut down to the rachis and forked, the lower ones often pinnatifid with several linear *pinnul.*, especially on the lower side; *texture* subcoriaceous; *veins* fine, anastomosing copiously; *rachis* and both surfaces naked; *sori* not quite reaching the point of the pinnules.—*Hk. Sp. 2. p. 215. Hk. & Gr. t. 28.*— $\beta$ , *P. Brasiliensis*, Raddi; *pinnæ* broader, 6-9 in. l., 1 in. br., more compound.—*Hk. Sp. 2. p. 214.*

Hab. Tropical America, from the West Indies southward to Brazil.—The typical form much resembles *cretica* in general aspect.

67. P. (Lito.) *Haenkeana*, Presl; *st.* 1-3 ft. l., pale, firm, naked; *fr.* several ft. l., the upper part with numerous, simple, linear *pinnæ* on both sides, which are 6-9 in. l., 1-1 $\frac{1}{2}$  in. br., acuminate at the point, narrowed gradually towards the base, the lower ones slightly stalked and about 2 in. apart, the barren ones finely spinuloso-serrated, the lower pinnæ often 1 ft. or more l., spreading with numerous similar *pinnul.*; *texture* coriaceous; *rachis* and both surfaces naked; *veins* fine, clearly visible, anastomosing copiously; *sori* not quite reaching the point of the pinnules.—*Hk. Sp. 2. p. 213.*

Hab. Tropical America, from Guatemala and New Granada southward to Peru.

68. P. (Lito.) *pulchra*, Schlecht.; *st.* strong, erect, naked, polished, straw-coloured; *fr.* ample, simply pinnate above, with numerous sessile linear, acuminate *pinnæ* on each side, which are 4-6 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., slightly serrated towards the point, lower pinnæ simply pinnate, 1 ft. or more l., 6-9 in. br., nearly opposite, 1 in. or more apart; *texture* coriaceous; *rachis* and both surfaces naked; *veins* fine and numerous; *sori* not extending to the apex of the pinnules, ultimately concealing the *invol.*—*Hk. Sp. 2. p. 213.*

Hab. Mexico, ascending to 5,000 feet.

69. P. (Lito.) *macroptera*, Link; *st.* 1 ft. or more l., erect, naked, polished, straw-coloured or brownish; *fr.* 2 ft. or more l., 12-18 in. br., cut down very nearly to the rachis in the upper part into numerous linear lobes, the lowest of which are 6-9 in. l.,  $\frac{1}{2}$  in. br., with about 1 in. between them at the base, the point narrowed very gradually and very faintly toothed when barren; *lat. pinnæ* few, often a single pair only, like the terminal one, but smaller; *texture* papyraceo-herbaceous; *rachis* and both surfaces naked; *veins* fine but conspicuous; *sori* not reaching the apex of the segments.

Hab. Brazil, Burchell, &c.

70. P. (Lito.) *vestita*, Baker; *st.* slender, erect, 1 ft. or more l., villose when young, straw-coloured or brownish; *fr.* 18-24 in. l.; *terminal pinna* 12-15 in. l., 2 $\frac{1}{2}$  in. br., cut down to a broadly-winged rachis into numerous lobes on both sides, the upper ones close, the lower ones 1 $\frac{1}{4}$  in. l.,  $\frac{3}{8}$  in. br., falcate with a space between them; *lateral pinnæ* two on each side (in our specimens), spreading, like the terminal one but smaller, caudate at the point; *main rachis* and those of the pinnæ densely villose; both surfaces hairy; *veins* fine, anastomosing copiously; *sori* confined to the inner two-thirds of the segments; *invol.* consisting principally of a dense fringe of strong hairs.

Hab. Peru, Spruce, 4063.—Habit most like the next, but the pinnæ much larger and fewer.

71. *P.* (Lito.) *Junghunhii*, Baker; *st.* firm, erect, polished, nearly straw-coloured; *fr.* 2 ft. l., with numerous *pinnæ* on each side, which are cut down two-thirds of the way to the rachis into linear-oblong falcate lobes  $\frac{1}{2}$  in. br. at the base, the lowest (in our specimens) simple, 9 in. l., 1 in. br.; *texture* subcoriaceous; *rachis* and both surfaces naked; *veins* fine, anastomosing principally in costal arches and in the space between the sinuses and midrib; *sori* reaching nearly to the point of the segments.—Campteria, *Reinw.*

Hab. Java, *De Vriese*.—Habit of *quadriaurita*, but texture firm, and *pinnæ* with an undivided central space more than  $\frac{1}{4}$  in. br.

\*\*\* *Bipinnatæ*. Sp. 72–81.

72. *P.* (Lito.) *ciliaris*, Eaton; *st.* about 1 ft. l., naked, polished, straw-coloured or bright-brown; *fr.* 9–12 in. l., 6–9 in. br., subdeltoid, tripinnate; *terminal pinna* linear, 2 in. l.,  $\frac{1}{3}$  in. br., serrated when barren, uppermost pair simple, the next forked at the base, the lowest about 2 in. apart, deltoid, 2–3 in. each way; *lowest pinnl.* also deltoid, with two *segm.* on each side, the lowest forked, upper *segm.* decurrent; *texture* herbaceous; *rachis* and both surfaces naked; *veins* fine, distant, anastomosing into irregular costal arches in the lower half of the segments; *sori* falling short of the point.—Eaton, *Fil. Wright & Fendl.* p. 203.

Hab. Cuba, *Wright*, 868.

73. *P.* (Lito.) *spinulifera*, Schum.; *st.* 1 ft. l., polished, more or less prickly; *fr.* 1–2 ft. l.; *terminal pinna* 6–9 in. l., 2–3 in. br., cut down within a short distance of the rachis into numerous linear lobes 1–1 $\frac{1}{2}$  in. l.,  $\frac{1}{4}$ – $\frac{3}{8}$  in. br., which are slightly toothed when barren; *lateral pinnæ* in numerous opposite pairs, the lowest sometimes 1 ft. l., the lobes similar to those of the terminal one, the lowest pair forked, with a similar smaller *pinnl.* on the under side; both surfaces naked; *rachis* of the *pinnl.* beneath sometimes, but not always, furnished with a row of weak prickles; *texture* herbaceous; *veins* fine and inconspicuous; *sori* not reaching to the point of the segments.—*Hk. Sp.* 2. p. 221.

Hab. Guinea Coast and Angola.—Habit of *P. quadriaurita*, but with prickly stems and anastomosing venation.

74. *P.* (Lito.) *woodwardioides*, Bory; *st.* 6–12 in. l., naked, erect, straw-coloured; *fr.* 12–18 in. l.; *terminal pinna* 6–9 in. l., 2 in. br., cut down to a broadly-winged rachis into numerous spreading linear lobes on both sides, the barren ones blunt and not toothed; *lateral pinnæ* in a few approximated pairs, the lowest as large as the terminal one, the lowest bipartite; *longest segm.* 1 $\frac{1}{2}$  in. l.,  $\frac{3}{8}$  in. br.; *texture* thinly herbaceous; *rachis* and both surfaces naked; *veins* fine, anastomosing principally in costal arches; *sori* falling rather short of the point of the segments.—*Hk. Sp.* 2. p. 220.

Hab. Mauritius. Habit of large *quadriaurita*, thinly herbaceous in texture. M. Fée has two Bourbon species of this group, *L. borbonica* and *Montbrisonis*, which I cannot separate by the descriptions alone. Is not *P. pseudo-lonchitis*, Bory, a Campteroïd form of this species?

75. *P.* (Lito.) *Milneana*, Baker; *st.* strong, erect, polished, yellowish-brown; *fr.* 2–3 ft. l., with numerous *pinnæ* on each side, cut down throughout nearly to the rachis into linear-oblong falcate lobes  $\frac{1}{2}$ – $\frac{3}{4}$  in. l., 2 lin. br., the lowest 6–9 in. l., 1–1 $\frac{1}{2}$  in. br., with a single similar but smaller *pinnl.* at the base on the lower side; *texture* herbaceous; *rachis* and both surfaces naked; *veins* anastomosing copiously; *sori* falling short of the subentire tips.—*P. tripartita*  $\gamma$ , *Hk. Sp.* 2. p. 226. t. 138. B.

Hab. Solomon Isles, *Milne*, 511; Fiji, *Milne*, *Harvey*, and a plant from Queensland with simple lower *pinnæ* from Mr. Hill is probably the same.—Habit of *P. quadriaurita*.



76. *P.* (Lito.) *decurrens*, Presl; *st.* 1 ft. l., strong, erect, naked, straw-coloured; *fr.*  $1\frac{1}{2}$ -3 ft. l., 12-18 in. br., the terminal pinna 6-9 in. l.,  $1\frac{1}{2}$ -2 in. br., cut down to a broadly-winged rachis into numerous linear slightly toothed and slightly falcate lobes,  $1-1\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. br.; *lateral pinnæ* numerous, the upper ones narrowly decurrent at the base, the lower pair about 2 in. below the next, and bipartite; *texture* herbaceous; *rachis* and both surfaces hairy; *veins* fine, inconspicuous, anastomosing copiously; *sori* reaching nearly to the tip of the segments.—*Hk. Sp. 2. p.* 221.

Hab. South of Brazil.—Habit of *quadriaurita*, with decurrent upper pinnæ and both surfaces conspicuously hairy.

77. *P.* (Lito.) *macilentia*, Cunning.; *st.* 6-12 in. l., naked, straw-coloured, brownish and scabrous below; *fr.* 1-3 ft. l.; *terminal pinna* 4-8 in. l., cut down nearly to the rachis into several deeply sinuated and toothed oblong lobes on each side; *lat. pinnæ* numerous, the upper ones 2 in. apart at the base, cut down quite to the rachis below into deeply lobed deltoid *pinnl.*, the lower ones 1 ft. l. and very compound; *texture* thinly herbaceous; *rachis* naked, straw-coloured, slender, flexuose; *veins* fine, not anastomosing much except the costal arches; *sori* not reaching the point of the segments.—*Hk. Sp. 2. p.* 219.

Hab. New Zealand.—The largest ultimate segments not cut down to the rachis are about  $1\frac{1}{2}$  in. l.,  $\frac{3}{4}$  in. br. A well-marked species.

78. *P.* (Lito.) *comans*, Forst.; *st.* 1 ft. or more l., naked, erect, glossy; *terminal pinna* 1 ft. or more l., cut down nearly to the rachis into long linear lobes, which are sometimes 4 in. l.,  $\frac{1}{2}$  in. br., suddenly decurrent at the base, bluntly toothed when barren; *lateral pinnæ* in a few opposite pairs, sometimes 18 in. l., 6 in. br., the lowest sometimes slightly compound at the base; *rachis* and both surfaces naked; *texture* thinly herbaceous; *veins* fine, anastomosing copiously; *sori* falling short of the apex of the segments.—*Hk. Sp. 2. p.* 219.— $\beta$ , *P. Endlicheriana*, Ag.; *fr.* much larger; lobes smaller with sinuated margins; *lower pinnæ* very compound, their *pinnl.* 6-9 in. l., deltoid, with numerous deeply pinnatifid lanceolate *segm.* on both sides.—*Hk. l. c. Ic. Pl. t.* 973.

Hab. Polynesian Islands, Juan Fernandez, Norfolk Island, New Zealand, Van Diemen's Land.—Though *P. comans* and *Endlicheriana* are very different in the extreme states, they appear to be quite connected by intermediate stages. The Juan Fernandez plant (*P. Berteroana*, Ag.) corresponds very nearly with the former. The allied *P. lewis*, Metten., from New Caledonia, we do not possess.

79. *P.* (Lito.) *aculeata*, Swartz; *st.* 2 ft. l. or more, smooth or rough with raised points, naked; *fr.* ample; *terminal pinna* 6-12 in. l., cut down nearly to the rachis throughout into lobes  $1\frac{1}{2}$ -2 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., the point acuminate, sterile parts finely serrated; *lateral pinnæ* numerous, upper ones simple, lower compound, sometimes 18 in. l., 9 in. br., with numerous pinnatifid *pinnl.* on both sides; *rachis* and surfaces naked; *texture* herbaceous; *veins* fine, anastomosing copiously; *sori* not reaching the points.—*Hk. Sp. 2. p.* 224.

Hab. West Indies and Mexico southward to Brazil and Peru.—*P. propinqua*, Ag., and *P. polita*, Link, appear to be forms of this, differing, the former by its more coriaceous texture, the latter by its less compound lower pinnæ. *P. Beecheyana*, Ag., agrees with the latter. *L. Tussaci* and *grandis*, Fée, are allied plants unknown to us.

80. *P.* (Lito.) *leptophylla*, Swartz; *st.* erect, firm, straw-coloured, 6-9 in. l.; *fr.* 9-12 in. each way, deltoid; a few of the *upper pinnæ* simple, the largest of these under 1 in. l.,  $\frac{1}{8}$  in. br., decurrent at the base, strongly spinuloso-serrated when barren, the central ones lanceolate pinnatifid with numerous similar *pinnl.* and caudate, the lowest deltoid, with pinnules often 2 in. l., and again pinnatifid; *texture* herbaceous; *rachis* and both surfaces naked; *veins* fine, usually anasto-

mosing once only between the midrib and margin; *sori* not reaching the tip of the *segm.* *Hk. Sp. 2. p. 216. Gard. Ferns, t. 23.*

Hab. Brazil.

81. *P. (Lito.) incisa*, Thunbg.; *st.* stout, erect, polished, straw-coloured or bright-brown, sometimes slightly muricated towards the base; *fr.* often several ft. l., bi- or tripinnate, only the uppermost *pinnæ* simply pinnate with entire linear-oblong *pinn.*, those next in order with numerous pinnatifid pinnules 2-3 in. l., about  $\frac{3}{4}$  in. br., in opposite pairs, the lowest often quite close to the stem, reduced in size and their segments dilated, the lowest *pinnæ* often very large and compound; *texture* herbaceous or subcoriaceous; under *surface* often glaucous; *veins* free or more or less anastomosing; *sori* interrupted or continuous, often reaching the point of the segments.—*Hk. Sp. 2. p. 230.* *P. Vestertilionis*, *Labill.* *P. sinuata*, *Brock. Hk. Sp. 2. p. 232.*  $\beta$ , *P. aurita*, Blume; lowest pair of pinnules quite simple and closely adpressed to the stem at the base of the *pinnæ*.—*Hk. Sp. 2. p. 231.*

Hab. Tropical America from West Indies and Columbia southward to Chili, Juan Fernandez, and Brazil; Polynesia; Himalayas, and Formosa, southward to New Zealand, Van Diemen's Land, and Ceylon; Mascaren Isles, Cape Colony, West Tropical Africa.—A very variable plant in size, cutting, texture, and venation. It is often scandent, with long spreading rigid branches, and is said to attain a length of 10 yards. In a form gathered by Capt. Carmichael in the island of Tristan d'Acunha, the veins do not anastomose at all; often there is only a single arch on each side of the costa at the base of a segment, and in specimens, otherwise quite similar, there is copious joining towards the edge. Sometimes the *sori* are confined to the sinuses, as in *Lonchitis*.

\*\*\*\* *Tripartita.* Sp. 82-87.

82. *P. (Lito.) tripartita*, Swartz; *st.* 1 ft. or more l., strong, erect, naked, polished, straw-coloured or brownish; *fr.* tripartite, the central portion 2 ft. l. or more; *terminal pinna* 6-9 in. l.,  $\frac{1}{2}$ -1 in. br., cut down nearly to the rachis into numerous closely-placed linear lobes on each side, which are very slightly toothed when barren; *lateral pinnæ* very numerous, closely placed, all unbranched; lateral divisions similar to the central one but smaller, sometimes forked again; *rachis* and both surfaces naked; *texture* usually herbaceous; *veins* fine, anastomosing principally in arches against the midrib; *sori* falling rather short of the point of the segments.—*Hk. Sp. 2. p. 225. excl.  $\beta$  and  $\gamma$ .*

Hab. Polynesian and Malayan Islands from the Philippines southward to the Isle of Pines, Erromanga, Queensland; Malayan Peninsula, Ceylon, Sylhet, Seychelles, Mauritius, Bourbon, and West Tropical Africa.—*P. heterophlebia*, Kunze, Bot. Zeit. 6. p. 197, is probably a form of this with the veins usually only anastomosing once between the midrib and edge of the segments.

83. *P. (Lito.) Luschnathiana*, Baker; *st.* 2 ft. l., strong, erect, naked, straw-coloured; *fr.* tripartite, with the three divisions nearly equal; *terminal pinna* 6-9 in. l.,  $1\frac{1}{2}$  in. br., cut down to a broadly-winged rachis, into numerous narrow falcate linear lobes with a broad sinus between them, which are finely spinuloso-serrated when barren; *lateral pinnæ* numerous, similar, the lowest 2 in. below the next, not forked; *rachis* and both surfaces naked; *veins* fine, scarcely anastomosing in the ultimate segments except in costal arches in the lower half; *sori* falling short of the point.—Campteria, *Klotzsch.*

Hab. Brazil, *Luschnath.*

84. *P. (Lito.) podophylla*, Swartz; *st.* 4 ft. l. or more,  $\frac{1}{2}$ - $\frac{3}{4}$  in. thick at the base, muricated below, straw-coloured, glossy; *fr.* ample, ternately divided; *terminal pinna* 6 in. l. or more, 1-1 $\frac{1}{2}$  in. br., cut down two-thirds of the way to the rachis into numerous linear-oblong falcate lobes, which are finely spinuloso-



serrated when barren; *lateral pinnæ* in numerous closely-placed nearly opposite pairs, 6-9 in. l., 1-1½ in. br., with numerous lobes similar to those of the terminal one; *lateral divisions* of the *fr.* like the terminal one, but smaller; *texture* thick, coriaceous, both surfaces and the glossy straw-coloured rachis naked, or nearly so; *veins* fine, inconspicuous; *sori* continuous, falling short of the apex of the *segm.*—*Hk. Sp. 2. p. 227. Gard. F. t. 55. L. camptocarpa, Fée. Hk. Sp. 2. p. 229.*—β, *P. setifera, Fée*; *pinnæ* smaller; *segm.* narrower and sharper.—*Hk. Sp. 2. p. 224.*

Hab. Mexico and West Indies southward to the Andes of Ecuador.—In texture this is most like *P. deflexa* and *coriacea*, with which it agrees in its tripartite habit. A plant from Java, sent by De Vriese without name, may be identical with *P. setifera*.

85. *P. (Lito.) Kunzeana, Agardh*; *st.* 3 ft. l., strong, erect, naked, polished, straw-coloured or reddish-brown, muricated below; *fr.* ample; *terminal pinna* 1 ft. l., 3 in. br., cut down two-thirds of the way to the rachis into numerous linear sharp-pointed falcate lobes, which are slightly spinuloso-serrated when barren; *lateral pinnæ* in numerous nearly opposite pairs, the lower ones stalked, equalling or exceeding the terminal one in size and similarly pinnatifid, the lowest pair large, deltoid, compound below, with smaller similar *pinnl.*; *texture* coriaceous; *rachis* and both surfaces naked; *veins* anastomosing copiously; *sori* falling short of the apex of the *segm.*—*Hk. Sp. 2. p. 221. t. 139.*

Hab. Tropical America, from West Indies and Ecuador southward to Peru.—This is united by Dr. Grisebach with *podophylla*, but seems satisfactorily distinct. The *pinnæ* are very much larger, so that there is sometimes a space of fully ½ in. between their sinuses and the rachis. I gather from one of Dr. Spruce's notes, that this also is tripartite in habit, and cannot from the descriptions and authenticated specimens distinguish *P. longibracteata, Ag.*, which has equally large *pinnæ* and segments.

86. *P. (Lito.) elata, Agardh*; *st.* 2-3 ft. l., erect, naked, glossy, straw-coloured; *fr.* ample, tripartite; *terminal pinna* 12-18 in. l., cut down nearly or quite to the rachis into numerous linear lobes on both sides, which are 3-5 in. l., ½ in. or more br., spinuloso-serrated when barren; *upper lat. pinnæ* 6 in. l., not cut down to the rachis; lower ones equalling in size and cutting the terminal one, the lateral divisions of the frond deltoid, 2-3 ft. l.; *texture* subcoriaceous; *rachis* and both surfaces naked; *veins* fine, anastomosing copiously; *sori* falling short of the points of the segments.—*Hk. Sp. 2. p. 223.*

Hab. Tropical America from Panama southward to Ecuador.

87. *P. (Lito.) gigantea, Willd.*; *st.* 2-3 ft. l., stout, erect, naked, polished; *fr.* tripartite; *terminal pinna* 1 ft. l., 3 in. br., cut down to a broadly-winged rachis into numerous linear falcate lobes, which are a little bluntly toothed when barren; *lat. pinnæ* numerous, the largest often 18 in. l., 4 in. br., the largest *pinnl.* nearly 2 in. l., more than ½ in. br.; *lat. divisions* 2 ft. l., deltoid; *texture* subcoriaceous; *rachis* and both surfaces naked; *veins* fine, anastomosing copiously; *sori* falling short of the apex of the segments.—*Hk. Sp. 2. p. 217. P. crassipes, Ag. Hk. l. c.*

Hab. West Indies and Columbia southward to Peru.

§§§§§§§§ Amphiblestra, *Presl. Veins copiously anastomosing, with free included veinlets.* *Sp. 84. TAB. III. f. 31. i.*

88. *P. (Amphi.) latifolia, H. B. K.*; *fr.* 1-2 ft. l., with a large terminal and a pair of lateral *pinnæ*, the former with an oblong-triangular sinuated acuminate apex and two spreading lanceolate lateral lobes, the lateral ones sometimes 1 ft. l., 2 in. br., nearly entire; *texture* herbaceous; principal *veins* nearly parallel, about 1 in. apart.—*Hk. Sp. 2. p. 233.*

Hab. Venezuela; gathered first by Humboldt and Bonpland.

## GEN. 32. CERATOPTERIS, Brong.

*Sori* placed on two or three veins which run down the frond longitudinally, and are nearly parallel both with the edge and midrib. *Caps.* scattered on the receptacles, sessile, subglobose, with a ring which is either complete, or more or less partial or obsolete. *Invol.* formed of the reflexed margin of the frond, those of the two sides meeting against the midrib. *A very anomalous genus, regarded by some as a distinct suborder and placed by others in Polypodiæ.* TAB. III. f. 32.

1. *C. thalictroides*, Brong.; *st.* tufted, thick, inflated, filled with large air-cells; *fr.* succulent in texture, the barren ones floating, simple or slightly divided when young, bi- or tripinnate, with narrow linear *segm.* when mature, fertile ones bi- or tripinnate; *ult. segm.* podlike.—*Hk. Sp. 2. p. 236.*

Hab. Throughout the Tropics in quiet waters; Mexico and W. Indies southward to Brazil; Punjaub southward to Tropical Australia, Madagascar, Angola, West Tropical Africa.—*Parkeria pteroides*, Hk. Gr. Ic. t. 97, is the form without a ring to the capsule.

## GEN. 33. LOMARIA, Willd.

*Sori* linear, continuous, parallel with the midrib and occupying the whole or nearly the whole of the space between it and the edge. *Invol.* membranous, formed of the revolute edge of the frond. *Fronde dimorphous, usually once pinnatifid or pinnate, rarely simple or bipinnate. Veins free, except casually in one species. A considerable genus, closely connected with Blechnum, most of the species of which resemble one another closely in habit and cutting, which has its head-quarters in the South Temperate Zone, with outliers all over the world.* TAB. IV. f. 33.

§ Eulomaria. *Base of the stipe not suddenly dilated and glandular. Ring of capsule vertical.* Sp. 1-33.

\* *Frond simple or central and lower pinnæ of the sterile frond more or less distinctly dilated and connected at the base.* Sp. 1-20.

† *Fronde simple or pinnæ few.* Sp. 1-2.

1. *L. Patersoni*, Spreng.; *rhizome* short-creeping; *st.* 2-3 in. l., wiry, erect, rather scaly below; *sterile fr.* about 1 ft. l., under 1 in. br., broadest one-third of the distance from the top, narrowed very gradually downwards, the point acuminate, the margin cartilaginous and wavy; *texture* coriaceous, veins inconspicuous; *fertile fr.* as long but only  $\frac{1}{2}$  in. br.; *sori* occupying the whole space between the midrib and margin.—*Hk. Sp. 3. p. 3. F. Ex. t. 49.* *L. Cumingiana*, *Hk. Sp. 3. t. 143.*— $\beta$ , *L. elongata*, Blume; both sterile and fertile *fr.* pinnatifid, 2 ft. l. or more, the former cut down nearly to the rachis into 6 to 9 *pinnæ* on each side, which are often 6-9 in. l., nearly 1 in. br., and suddenly decurrent at the base, the fertile *pinnæ* often numerous on each side, erecto-patent, 6 in. l.,  $\frac{1}{8}$  in. br.—*L. Colensoi*, *Hk. fl.* *L. punctata*, Blume.

Hab.  $\alpha$ , S. Australia, Van Diemen's Land, and Philippines.— $\beta$ , Neilgherries and Ceylon eastward and southward to Fiji and New Zealand.—The two supposed species were at first believed—*Patersoni* to be always simple, and *elongata* to be always pinnate; but the Australian one has now been traced into a pinnate form, and the Polynesian into a simple form in the fertile state, and in each case I cannot find any character to distinguish these from the other supposed species. As in most of others, the fronds are occasionally in part sterile and in part fertile. The *pinnæ* are fewer and more distant from one another than in any of the species that follow, and their decurrent base is broader and more conspicuous.



2. *L. Viellardii*, Baker; *caudex* stout, erect, woody; *st.* 3-4 in. l., clothed below with large dark-brown lanceolate scales; *sterile fr.* 1 ft. or more l., 1-3 in. br., varying in shape from linear and entire to oblong, with a long, linear, entire point and cut down within  $\frac{1}{2}$  in. of the rachis into several *pinnæ* on each side, which are  $1\frac{1}{2}$ -2 in. l.,  $\frac{1}{2}$  in. br., furnished with a distinct wavy cartilaginous border and subdentate towards the apex; the base gradually narrowed into an undulated wing to the rachis, with sometimes a few distinct auriculate lobes; *texture* coriaceous; *veins* fine, rather distant; *fertile fr.* quite simple or pinnate, with several narrow distinct linear *pinnæ* on each side, which are 3-4 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. apart at the base.—*Blechnum*, *Metten. Annales*, series 4. vol. 15. p. 70.

Hab. New Caledonia, *Viellard*, 48.

†† *Attenuata* group. *Fronde ample, ovate; pinnæ numerous, 2 in. or more long.*  
Sp. 3-10.

3. *L. ciliata*, Moore; *caudex* a span high,  $1\frac{1}{2}$  in. thick; *st.* blackish, slightly scaly below; *fr.* not numerous, 8-12 in. l., ovato-oblong, simply pinnate; barren *pinnæ* linear-oblong, the lower ones distant and narrowed below; the upper ones more approximate, adnato-decurrent, with a broad rounded auricle at the base on the lower side, bluntish, frequently emarginate or bifid, the margins lobed and spinuloso-ciliated; *texture* firm but thin; *veins* usually once forked; *fertile pinnæ* narrow, linear, decurrent, sometimes slightly pinnatifid; *rachis* dark-coloured like the stipe, slightly scaly below.—*Moore, Gard. Chron.* 1866. p. 290.

Hab. New Caledonia; imported by Mr. Veitch.—This I have not seen, and rely entirely upon Mr. Moore for its characters. "Allied to *L. gibba* in the swollen decurrent bases of the pinnæ, but differing in its less numerous fronds, and in the much less crowded series of pinnæ as well as in their very apparent fringe of spinulose teeth."

4. *L. gibba*, Labill.; *caud.* 2-3 ft. high; *st.* short, strong, erect, densely clothed below with long, linear-subulate black scales; *fr.* 2-3 ft. l., 6 in. br., both barren and fertile with very numerous erecto-patent *pinnæ* on each side, those of the former 4-6 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., cut down nearly to the rachis, dilated and connected at the base, the lower ones growing shorter very gradually, the margin nearly entire; *texture* coriaceous; *veins* once forked, fine, subparallel; *fertile pinnæ* 4-6 in. l.,  $\frac{1}{8}$  in. br., the *sori* occupying the whole space between the edge and midrib; *rachis* stout, the lower half fibrillose like the stipe.—*Hk. Sp.* 3. p. 5.

Hab. New Caledonia, Aneiteum, Isle of Pines.—A large stout plant much resembling *L. attenuata* in the shape of the pinnæ and the gradual way in which they decrease downwards, but differing by its dark bristly scales, which extend considerably up the rachis. A specimen from Erromanga, from R. Brown's herbarium, has the *sori* not quite marginal.

5. *L. discolor*, Willd.; *caud.* stout, ascending; *st.* 3-6 in. l., strong, black, glossy, densely clothed at the base with long, dark, linear-subulate scales; *fr.* 1-3 ft. l., the barren one 4-6 in. br., narrowed gradually at the base; *pinnæ* numerous, spreading, contiguous, linear, 2-3 in. l.,  $\frac{3}{8}$  in. br., cut down very nearly to the rachis, narrowed suddenly towards the point, the margin wavy; *texture* coriaceous; *veins* prominent, close, subparallel; *fertile pinnæ* as numerous but narrower and shorter; *rachis* naked, usually reddish-black in the fertile frond.—*Hk. Sp.* 3. p. 5.

Hab. Australia, Van Diemen's Land, and New Zealand; abundant.—Dr. Mueller sends a curious bipinnatifid form. "Very similar to *L. attenuata*, but usually larger, the fronds forming an elegant crown, red-brown below, the pinnules narrower, those of the fertile frond often leafy at the base."—*Dr. Hooker.*

6. *L. attenuata*, Willd.; *caud.* long, horizontal, stout, densely clothed at the apex with linear-subulate, bright-brown scales; *st.* 4-6 in. l., erect, naked or slightly scaly below; *fr.* 1-3 ft. l., 6-9 in. br., ovate, narrowed very gradually downwards; *barren pinnæ* numerous, contiguous, spreading, linear, 3-4 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., narrowing gradually towards the point, which is sometimes bluntly serrated, dilated on both sides at the base; *texture* coriaceous; *veins* strong; *fertile pinnæ* as numerous but very narrow ( $\frac{1}{2}$ -1 lin. br.); *rachis* naked.—*Hk. Sp.* 3. p. 6. *L. gigantea*, *Kaulf. Hk. Sp.* 3. p. 10.

Hab. America from the West Indies and Guatemala southward to Brazil and Juan Fernandez; Polynesian Islands, Norfolk Island, Mauritius, Bourbon, Fernando Po, and Cape Colony.—*L. pteropus*, Kunze, is evidently a form with the lower pinnæ confluent. Occasionally all the pinnæ are obliterated, and we have an entire lanceolate frond like that of *L. Patersoni*.

7. *L. L'Herminieri*, Bory; *caud.* ultimately elongated, densely clothed with linear dark-brown scales; *st.* 4-6 in. l., strong, erect, dark-brown, paleaceous; *barren fr.* ovate-lanceolate, 9-15 in. l., 3-4 in. br.; the *pinnæ* dilated at the base, slightly falcate, 2 in. or rather more l.,  $\frac{1}{2}$  in. br., the point bluntish, a few of the lower ones cut down suddenly into mere auricles; *texture* coriaceous; *colour* dark-green, both surfaces naked; *veins* not conspicuous; *fertile pinnæ* 2-3 in. l.,  $\frac{1}{8}$  in. br., the lower ones  $\frac{1}{2}$ -1 in. apart at the base.—*Hk. Sp.* 3. p. 9. *Gard. Ferns*, t. 40.

Hab. America from the West Indies and Columbia southward to Chili.—A smaller plant than *L. attenuata*, narrowed more suddenly below, with shorter, broader, and blunter pinnæ.

8. *L. divergens*, Kunze; *caud.* thick, creeping or suberect, densely scaly at the crown; *st.* 6-12 in. l., stout, erect, dark-coloured, naked; *fr.* 2-3 ft. l., 9-12 in. br., oblong-lanceolate, abruptly terminated at the base; *pinnæ* very numerous on each side, spreading, those of the barren frond 4-6 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., cut down very nearly to the base, the edges flat, entire, contiguous, the point acuminate; *texture* subcoriaceous; *veins* obscure, subparallel, nearly  $\frac{1}{8}$  in. apart at the base; *fertile pinnæ* 4-6 in. l.,  $\frac{1}{8}$  in. br., often variously curved, dilated at the base, rachis naked.—*L. Plumieri*, *Desv. Hk. Sp.* 3. p. 7.

Hab. Tropical America from the West Indies and Columbia southward to Rio Janeiro and Peru.—In some of the forms the pinnæ are nearly equal at the base, in others few in number and conspicuously dilated. This and the next may be known from all the preceding by the abrupt termination of the frond in a downward direction, the lowest pair of pinnæ being usually not much shorter than the others.

9. *L. vulcanica*, Blume; *caud.* thick, erect or subprostrate, densely clothed at the crown with subulate blackish scales; *st.* 4-6 in. l., pale, erect, paleaceous below; *fr.* 6-18 in. l., 3-6 in. br., the barren one ovate-lanceolate, not narrowed at the base or the lower pinnæ abbreviated; *pinnæ* spreading, lanceolate, 2-4 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., the base slightly dilated, the point acute or bluntish, the lowest pair deflexed; *texture* coriaceous, the margin cartilaginous and undulated; *veins* fine and prominent beneath, the surface and margin often slightly hairy; *fertile pinnæ* linear, distant, dilated suddenly at the base, 2-4 in. l.,  $\frac{1}{8}$  in. br.—*Hk. Sp.* 3. p. 13.  *Ic. t.* 969. *L. pilosa*, *Brack.*

Hab. Java, Polynesian Islands, New Zealand, and Van Diemen's Land.

10. *L. opaca*, Baker; *caud.* ascending, clothed at the crown with numerous linear dark-brown scales; *barren fr.* ovate, narrowed very gradually below, 6-12 in. l., 4-6 in. br.; *pinnæ* numerous, close, spreading horizontally, linear-oblong, 1-2 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., dilated and connected at the base, the margin undulato-dentate, and the apex bluntly rounded and emarginate; *texture* thick and coriaceous; *veins* fine, at least twice branched, sometimes anastomosing



before they reach the margin; *rachis* pubescent and the lower surface slightly so, colour deep-green; *fertile fr.* with numerous distant, spreading, narrow, linear pinnæ.—*Blechnum*, *Metten. Annales*, 4 ser. part 15. p. 69.

Hab. Gathered by Milne in Aneiteum, and Vieillard in New Caledonia.—This is a very curious plant which Sir W. Hooker thought might be an abnormal form of *L. attenuata*, under which it is mentioned in Sp. Fil. It is only the New Caledonian examples which show the anastomosing venation, but Milne's plant is evidently the same. The apex of the frond is not cut down within a considerable distance of the rachis. Mettenius compares it in habit to *L. nigra*.

†† *Spicant group.* *Fronde smaller, lanceolate, pinnæ not more than 1-1½ in. l.*  
Sp. 11-20.

11. *L. lanceolata*, Spreng.; *caud.* elongated and densely clothed with dark-brown linear scales; *st.* 4-6 in. l., firm, erect, dark-brown, paleaceous; *fr.* 6-12 in. l., 2-4 in. br., the barren ones lanceolate, narrowed very gradually below; *pinnæ* close, slightly falcate, 1-1½ in. l., ¼-⅓ in. br., gradually narrowed to a point or bluntish, slightly toothed, both surfaces naked; *texture* coriaceous, colour bright-green, the veins strong and prominent; *fertile pinnæ* linear, spreading or falcate, about ⅓ in. apart at the base; *rachis* pale, naked.—*Hk. Ic. t.* 429. *Sp.* 3. p. 11.

Hab. Australia, Van Diemen's Land, New Zealand, and Polynesian Islands.

12. *L. blechnoides*, Bory; *caud.* creeping; barren *fr.* short-stalked, lanceolate, about 6 in. l., 1-1½ in. br.; *upper pinnæ* ¾ in. l., ⅓ in. br., dilated at the base, rather falcate, the point blunt, the lower ones narrowed gradually into mere auricles; *texture* coriaceous, veins not conspicuous; *fertile fr.* 12-18 in. l., 3 in. br.; *st.* 6 in. l., strong, erect, dark chesnut-brown; *pinnæ* 1½-2 in. l., ⅓ in. br., dilated suddenly at the base, the upper ones ¼-⅓ in. apart, and the bases nearly or quite decurrent from one to another.—*Hk. Sp.* 3. p. 12.

Hab. Chili.—Probably this should be joined with *L. lanceolata*, from which it only differs by its larger fertile frond, with pinnæ widened suddenly at the base on both sides.

13. *L. dura*, Moore; *caud.* erect, subarborescent; *st.* 1 in. l., thick, erect, with ovate-lanceolate scales at the base; *fr.* 1 ft. or more l., lanceolate, cut down to the rachis below; *barren pinnæ*, the lower ones dwarfed into rounded lobes, the middle ones oblong subfalcate, the upper ones narrower and more acuminate; *fertile pinnæ* shorter, crowded, broadish, very blunt, decurrent at the base above; *texture* coriaceous, veins forked; *invol.* transversely wrinkled, the margin fimbriated.—*Moore, Gard. Chron.* 1866, p. 290. *L. rigida*, *J. Sm. Ferns Brit. & For.* p. 290.

Hab. Chatham Islands.—“Allied to *L. lanceolata* and *blechnoides*, but differing by its thick leathery texture when fresh, and in the entire somewhat cartilaginous margin. Fertile fronds remarkable for their stout densely-fruited very blunt crowded pinnæ and fringed indusia.”—*Moore, l. c.*

14. *L. aspera*, Klotzsch; *caud.* stout, ultimately elongated, clothed with linear chesnut-brown scales; *st.* scarcely any; *barren fr.* 6 in. l., 2 in. br., ovate-lanceolate, narrowed very gradually below; *pinnæ* close, the largest ¾ in. l., ⅓ in. br., slightly dilated at the base and auricled on the upper side, the point bluntish; *texture* coriaceous; *veins* inconspicuous; *fertile fr.* much smaller (3 in. l., ¾ in. br.), on a longer stem; *pinnæ* crowded, ½ in. l., ⅓ in. br., blunt, the *invol.* broad, and involute.—*Hk. Sp.* 3. p. 14. t. 144.

Hab. Chili and Chiloe.—The fronds take root at the extremity and produce new plants. The habit of the barren frond is just that of *L. lanceolata*, but the fertile one is very different.

15. *L. onocleoides*, Spreng.; *rhizome* long, scandent, densely clothed with linear chesnut-brown scales; *barren fr.* on *st.* 3-4 in. l., lanceolate, 12-18 in. l., 1-2 in. br., narrowed very gradually below; *pinnæ* 1 in. l. or less,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., lanceolate, dilated at the base, narrowed gradually towards the point; *texture* very coriaceous, the surface shining and the veins beneath prominently channelled; *fertile fr.* on *st.* 4-6 in. l.; *pinnæ* linear, 1-1 $\frac{1}{2}$  in. l., central ones  $\frac{1}{4}$  in. apart at the base; *invol.* broad, involute.—*Hk. Sp.* 3. p. 10. t. 146.

Hab. West Indies and Ecuador.—A more rigid plant than the four preceding, with a different caudex. The *pinnæ* recall those of *attenuata*, but are much shorter.

16. *L. obtusata*, Labill.; *caud.* stout, suberect, clothed with dark-brown linear scales; *st.* 2-3 in. l., strong, erect, scaly below; *barren fr.* linear-lanceolate, narrowed very gradually towards both ends; *pinnæ* close, erecto-patent, linear, slightly falcate, bluntish,  $\frac{1}{2}$  in. l.,  $\frac{1}{8}$  in. br., the lower ones reduced down to mere auricles; *texture* coriaceous; *veins* inconspicuous; *fertile fr.* rather longer and on longer stalks; *pinnæ* narrowly linear, falcate,  $\frac{1}{4}$  in. apart, decurrent at the base.—*Lab. Sert.* t. 6.

Hab. New Caledonia.—Very like *L. Spicant* in general outline, but much more rigid, with an elongated caudex.

17. *L. Spicant*, Desv.; *rhizome* stout, short-creeping; *barren fr.* on stalks 2-3 in. l., lanceolate, 6-9 in. l., 1-1 $\frac{1}{2}$  in. br., narrowed gradually below; *pinnæ* linear,  $\frac{3}{4}$ - $\frac{3}{2}$  in. l.,  $\frac{1}{8}$  in. br., bluntish or mucronate, slightly dilated at the base; *texture* herbaceous; *veins* inconspicuous; *fertile fr.* on *st.* 1 ft. l., 2 in. br., on *st.* 6-9 in. l., chesnut-coloured and polished; narrowly linear *pinnæ*  $\frac{1}{4}$ - $\frac{3}{8}$  in. apart, dilated at the base, the line of fructification at first slightly intramarginal.—*Hk. Sp.* 3. p. 14. *Brit. F.* t. 40.

Hab. Throughout Europe from the Arctic regions to Madeira and Crete, Caucasus, Kamtschatka, Japan, N. W. America.—In this and the next the fertile fronds are erect, and the barren ones more or less spreading. It seems probable that *Blechnum doodioides*, Hook. Sp. Fil. 3. p. 60. t. 153. which has not been refound, is a Doodioid form of this, analogous to the one which occurs in *L. punctulata*.

18. *L. alpina*, Spreng.; *rhizome* slender, wide-creeping, clothed with lanceolate-ferruginous scales at the crown; *barren fr.* 4-8 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., linear-lanceolate, with spreading close-placed linear-oblong, obtuse *pinnæ*  $\frac{1}{2}$  in. l.,  $\frac{1}{8}$  in. or rather more br.; *texture* subcoriaceous; *rachis* naked; *fertile fr.* on *st.* 4-12 in. l.; *pinnæ* narrower and more distant; *invol.* slightly intramarginal.—*Hk. Sp.* 3. p. 16. *Fil. Exot.* t. 32.

Hab. S. Brazil; plentiful in Temperate S. America, New Zealand, Van Diemen's Land, Alps of S. Australia.—A smaller plant than *L. Spicant*, with a slender wide-creeping rhizome, and the *pinnæ*, especially of the fertile frond, broader and shorter.

19. *L. Banksii*, Hk. fil.; *caud.* stout, woody, elongated, clothed upwards with lanceolate ferruginous scales; *st.* 3-4 in. l., erect, dark-coloured, scaly below; *barren fr.* lanceolate, 6-9 in. l., about 1 in. br.; *pinnæ* spreading, oblong, obtuse,  $\frac{3}{8}$ - $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. br., close-placed, passing gradually downwards into a sinuated decurrent wing to the stem; *fertile fr.* smaller and more slender; *pinnæ* narrower and more distant; *texture* subcoriaceous; *rachis* naked.—*Hk. Sp.* 3. p. 17. *Hk. fil. Fl. N. Z.* t. 76.

Hab. New Zealand.—Easily distinguished from all its allies by its oblong obtuse *pinnæ*, even the upper ones more than half as broad as long.

20. *L. pumila*, Raoul; *rhizome* slender, creeping, clothed with bluntish ferruginous scales at the apex; *barren fr.* lanceolate, 3-4 in. l.,  $\frac{1}{2}$  in. br.; *pinnæ* spreading, linear-oblong, obtuse, crenated,  $\frac{1}{4}$  in. l.,  $\frac{1}{8}$  in. br., the stem about 1 in. l.; *fertile fr.* on *st.* 3-4 in. l.; the *pinnæ* linear-oblong with a considerable space



between them; *texture* herbaceous; *veins* inconspicuous; *rachis* naked.—*Hk. Sp. 3. p. 18.*

Hab. New Zealand.—Most like *L. alpina*, but much more delicate in texture, with the pinnæ distinctly crenated.

\*\* *Central and lower pinnæ of the sterile frond narrowed at the base and always distinctly separated from one another.* Sp. 21-30.

21. *L. punctulata*, Kunze; *caud.* stout, densely paleaceous at the crown; *st.* 3-6 in. l., strong, erect; *barren fr.* oblong-lanceolate, 1-2 ft. l., 4-6 in. br.; *pinnæ* very numerous, contiguous, linear, subfalcate, 2-3 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., rounded or cordate and auricled at the base, the lower ones deflexed and the lowest reduced down to auricles; *texture* coriaceous; *veins* inconspicuous; *fertile fr.* similar, but the pinnæ often not more than  $\frac{1}{8}$  in. br.; *invol.* often more or less intramarginal; *rachis* stout, erect, straw-coloured, naked.—*Hk. Sp. 3. p. 31.*

Hab. S. Africa from Natal southward and Java.—This has sometimes the fruit of *Lomaria* and sometimes of *Blechnum*, but the most surprising abnormal form is the *Scolopendrium Krebsii* of Kunze (Bot. Mag. t. 4768), in which every pinna has a large number of parallel rows of fruit directed from the midrib towards the edge at an acute angle with the former, as is usual in the *Aspleniceæ*, and there is a form differing only from *Blechnum* in the line of fructification being interrupted, and thus agreeing with *Doodia*. It is the representative of *L. attenuata* in the pinnate-fronded series, and may be best known from *procera* by the lower pinnæ being gradually reduced down to auricles.

22. *L. procera*, Spreng.; *caud.* stout, woody, elongated, clothed with large ovate or lanceolate acuminate ferruginous scales; *st.* 6-12 in. l., stout, erect, scaly below; *barren fr.* ovate, 1-3 ft. l., 6-12 in. br.; *pinnæ* linear, 3-12 in. l.,  $\frac{1}{2}$ -1 in. br., the lower ones stalked, the base rounded or even cordate, sometimes auricled, the point narrowed gradually, sometimes slightly toothed; *texture* coriaceous; *veins* fine and parallel, midrib beneath more or less chaffy; *fertile pinnæ* narrowly linear, distant, 4-6 in. l.,  $\frac{1}{4}$  in. br.; *rachis* stout, erect, more or less scaly; *invol.* broad, membranaceous, ciliated, sometimes slightly intramarginal.—*Hk. Sp. 3. p. 23. Ic. t. 127, 128. Gard. Ferns, t. 53. L. Gilliesii, H. & G. Ic. t. 207.*

Hab. Mexico and W. Indies southward to Chili; Malayan and Polynesian Islands, N. Zealand, S. Australia, Van Diemen's Land, and S. Africa.—Often the same frond is partially barren and partially fertile, and there is a form that has the barren pinnæ slightly pinnatifid. We include here, from inability to separate them clearly, a large number of plants which have been regarded as distinct, ranging from *L. daneacea*, Kunze, which has only two or three pinnæ on each side nearly an inch broad, up to *L. ornifolia*, Presl (*L. spectabilis*, Liebm., *L. tuberculata*, J. Sm., and *L. longifolia*, Schlecht), which has fronds 3 ft. long with as many as forty pinnæ, the lower ones distinctly stalked and often furnished with glands like those of *Plagiogyria* at the base of the petiole. *L. chilensis*, Kaulf., *L. Capensis*, Willd., and *Blechnum Lechleri*, Mett., are similar large-growing forms; *L. vestita*, Blume, and *L. squamulosa*, Desv., have densely paleaceous rachises. Dr. Hooker, in the New Zealand Flora, defines four varieties, which keep their characters under cultivation.

23. *L. caudata*, Baker; *caud.* elongated, densely clothed at the apex with lanceolate dark-brown scales; *st.* 2-3 in. l., strong, erect, scaly below; *barren fr.* 2 ft. l. or more, 4 in. br., gradually narrowed below and elongated and rooting at the apex; *pinnæ* numerous, all quite distinct, narrowed suddenly to the midrib, but not stalked at the base, the largest at and a little below the centre of the stem, linear-oblong,  $1\frac{1}{2}$ -2 in. l.,  $\frac{1}{2}$  in. br., spreading horizontally, narrowed suddenly at the base, slightly auricled on the lower side, narrowed suddenly at the point; the lower ones blunt, passing gradually down into mere auricles; those above the centre of the stem growing gradually smaller and blunter to where it takes root; *texture* coriaceous; *colour* bright-green; *veins* beneath

prominent; *rachis* and midrib more or less chaffy; *fertile fr.* with narrow linear pinnæ 3-4 in. l.

Hab. Andes of Ecuador, *Spruce*, 5329.—Most like *L. procera*, of which it may be an abnormal form. Pinnæ at least  $\frac{1}{2}$  in. distant at the base.

24. *L. Boryana*, Willd.; *caud.* stout, erect, 1-2 ft. high, woody, densely clothed with dark-coloured, firm linear-subulate scales; *st.* stout, erect, 4-6 in. l.; *barren fr.* ovate, 1-2 ft. l., 6-8 in. br.; *pinnæ* close-placed, erecto-patent, lanceolate, narrowed gradually to the point, narrowed and sometimes auricled at the base, 3-6 in. l.,  $\frac{1}{2}$  in. or rather more br.; *texture* coriaceous; *veins* inconspicuous; *fertile pinnæ* narrow, linear, rather close; *invol.* brown, membranaceous, fimbriated, sometimes slightly intramarginal.—*L. Magellanica*, *Desv. Hk. Sp. 2. p. 27. Gard. Ferns, t. 52.*

Hab. W. Indies southward to Falkland Islands and Straits of Magellan; Mauritius, Bourbon, Madagascar, Angola, and S. Africa.—Very near *L. procera*, but a stouter-growing plant, with narrower and more spreading pinnæ. Perhaps the best distinction is in the scales, which here are very dense, long, and fibre-like. Usually the *rachis* is quite naked, but in a stout-growing form from Tristan d'Acunha (*L. robusta*, *Carm.*), it is densely scaly throughout.

25. *L. acuta*, *Desv.*; *caud.* stout, elongated, densely scaly at the crown; *st.* strong, erect, 4-6 in. l., dark-coloured, paleaceous below; *fr.* stout, erect, ovate, 2-3 ft. l., 1 ft. br., with numerous pinnæ on each side, which are quite distinct and 1 in. or more distant at the base, linear, 4-6 in. l., nearly 1 in. br., entire at the edge, and narrowed gradually towards both ends; *texture* coriaceous; *veins* inconspicuous, both surfaces naked; *fertile pinnæ* 1 in. distant, narrowly linear, 4-6 in. l.; *rachis* stout, erect, naked.—*L. cuspidata*, *Kze. Hk. Sp. 3. p. 30. t. 151.*

Hab. Peru and New Granada.—Most like *L. procera*, but the pinnæ are much more distantly placed and are gradually narrowed to a slightly adnate base from two-thirds of the way down.

26. *L. filiformis*, *Cunning.*; *rhizome* scandent, stout, paleaceous; *st.* distant, 1-4 in. l.; *sterile fr.* ovate-lanceolate, 1-2 ft. l., 3-4 in. br.; *pinnæ* numerous, spreading, linear, 2-3 in. l.,  $\frac{1}{2}$  in. br., distinctly stalked, narrowed gradually towards the point and regularly crenato-dentate throughout; *fr.* of the lower part of the caudex often much smaller, linear in general outline, 3-4 in. l., 1 in. br., with oblong obtuse sharply-toothed pinnæ; *fertile fr.* ovate, with numerous narrowly linear pinnæ 3-4 in. l.; *rachis* naked.—*Hk. Sp. 3. p. 33. Stenochlæna heteromorpha, J. Smith.*

Hab. New Zealand and Fiji.—A very distinct species, easily recognizable by its trimorphic fronds. Species 21-26 in size and habit recall 3-10, but are more distinctly pinnate.

27. *L. Germainii*, *Hk.*; *caud.* elongated, clothed at the apex with lanceolate pale-brown scales; *st.* 1-2 in. l., erect, firm, scaly; *barren fr.* 2-3 in. l.,  $\frac{3}{4}$ -1 in. br., oblong-lanceolate, with imbricated spreading linear obtuse crenate pinnæ, the largest  $\frac{3}{8}$  in. l.,  $\frac{1}{8}$  in. br., the lower ones distant and narrowing down gradually to mere auricles; *texture* stout, coriaceous; *veins* inconspicuous; *fertile fr.* on longer stalks, with pinnæ nearly as broad and close as the others; *rachis* naked.—*Hk. Sp. 3. p. 32. t. 152.*

Hab. Chili; gathered by M. Germain.—Most like *L. alpina* in size and habit, but the lower pinnæ distinctly separated. We have a garden specimen of what looks like the same, but is more slender and elongated, marked "*L. crenulata*, Moore, MSS. Japan, *Veitch.*"



28. *L. nigra*, Col.; *caud.* stout, clothed at the crown with linear scales; *st.* slender, erect, densely scaly, 2-3 in. l.; *barren fr.* 4-6 in. l., 1-1½ in. br., linear-oblong, with a large bluntish sinuated point, cut down below to the rachis into numerous roundish-oblong sinuated *pinnæ* on each side, which are ½-¾ in. l., ¼-⅓ in. br., the lower ones quite distinct and a short distance from one another; *texture* herbaceous; *colour* dark-green; *veins* fine; *fertile fr.* with longer stalks, the terminal pinna long, linear, the lateral ones linear, erecto-patent.—*Hk. Sp. 3. t. 35. Ic. t. 960.*

Hab. New Zealand. A very distinct species of herbaceous texture, with the lower *pinnæ* quite distinct, but a large terminal portion of the frond lobed only.

29. *L. fluviatilis*, Spreng.; *caud.* 3-4 in. l., stout, clothed towards the crown with linear bright-brown scales; *st.* 3-4 in. l., erect, densely scaly; *barren fr.* linear, 6-18 in. l., 1-2 in. br.; *pinnæ* oblong, obtuse, spreading, not decurrent, ½-¾ in. l., ¼-⅓ in. br., the upper ones nearly contiguous, the lower ones shorter and more distant; *texture* herbaceous; *veins* conspicuous; *fertile pinnæ* linear obtuse, ½-¾ in. l., ⅓ in. br., erecto-patent, the lower ones with more than their own length between their bases; *rachis* paleaceous throughout.—*Hk. Sp. 2. p. 34.*

Hab. New Zealand, Van Diemen's Land, South Australia.—Easily recognizable from all the others by the shape of its *pinnæ*.

30. *L. membranacea*, Col.; *caud.* short, the scales linear, dark-brown; *st.* very short; *barren fr.* linear-oblong, 6-9 in. l., 1-1½ in. br.; *pinnæ* spreading or erecto-patent, linear-oblong, obtuse, crenated, the largest ¾ in. l., ¼ in. br., the lower ones quite distinct at the base, but contiguous, the lowest gradually reduced to mere auricles; *texture* coriaceous; *veins* often conspicuous; *fertile fr.* on a *st.* several in. l.; *pinnæ* subdistant, linear, erecto-patent; *rachis* naked.—*Hk. Sp. 3. p. 34. t. 145.*

Hab. New Zealand.—Intermediate in habit between the last and *L. lanceolata*.

\*\*\* *Sterile fronds bipinnatifid or bipinnate.*—Sp. 31-34.

31. *L. diversifolia*, Baker; *caud.* stout, oblique, densely clothed with linear-subulate dark-brown scales; *sterile fr.* ovate, 6-8 in. l., 3-4 in. br., its stem stout, erect, 4-6 in. l., dark chesnut-brown, paleaceous below; *pinnæ* linear, spreading horizontally, the largest 1½ in. l., ⅓ in. br., cut down throughout halfway to the rachis into ovate-mucronate lobes, not at all adnate at the base; *texture* coriaceous, both surfaces naked; *veins* strong and prominent, the lateral ones in each of the lobes of the *pinnæ* usually once branched; *fertile fr.* on a *st.* 1 ft. l.; *pinnæ* distant, narrowly linear, 3-4 in. l.; *rachis* naked and dark chesnut-brown like the stipe.—*Blechnum, Metten. Annales, 4 ser. vol. 15. p. 71.*

Hab. New Caledonia, *Viellard*, 1532.—By their bipinnatifid barren fronds, this and the next connect *L. Fraseri* with the rest of the genus, but the fertile frond is just that of a typical *Lomaria*.

32. *L. Lenormandi*, Baker; *st.* 4-6 in. l., strong, erect, densely clothed with long brown fibrillæ; *sterile fr.* oblong-lanceolate, 12-18 in. l., 6-8 in. br., with numerous quite distinct linear *pinnæ* on each side, which are 3-4 in. l., rather more than ½ in. br., cut down very nearly to the rachis throughout into finely-toothed linear falcate *pinnæ*, the lower ones growing shorter very gradually; *texture* herbaceous; *rachis* fibrillose throughout; *veinlets* of the *pinnules* inconspicuous; *fert. pinnæ* very numerous, narrowly linear, quite entire, 2-3 in. l., ¼ in. apart.

Hab. New Caledonia, *Viellard*.—This is sent as *B. contiguum*, Mett., but this latter from the description is a simply pinnate plant near *L. procera*. Here the barren frond resembles that of *L. Fraseri* in cutting, but the rachis is fibrillose, not winged, whilst the fertile frond is not materially different from a large number of the foregoing.

33. *L. Fraseri*, Cuning.; *caud.* elongated, stout, suberect, densely clothed with linear dark-brown scales at the crown; *st.* 4-6 in. l., strong, erect, scaly; *fr.* ovate-acuminate, bipinnatifid, 12-18 in. l., 4-6 in. br.; *pinnæ* linear-lanceolate, the lower ones 2-3 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., cut down very nearly to the rachis into linear-oblong mucronate slightly-toothed pinnl., their bases decurrent into a pinnatifid wing to the main rachis with triangular lobes; *texture* herbaceous; *veins* fine, the lateral ones of the pinnules usually once forked; *fertile fr.* similar in size and cutting.—*Hk. Sp.* 3. p. 40.  *Ic. Pl. t.* 185.

Hab. New Zealand.—Very dissimilar in habit to all the other species, combining a frond like one of our common *Lastreeæ* with the fructification of a *Lomaria*.

34. *L. volubilis*, Hk.; *fr.* 20 ft. l., scandent and twining; *pinnæ* distantly placed, deltoid-ovate, 1 ft. or more l., by nearly as broad, with a terminal pinnl. and several opposite pairs, which are oblong, the largest 4-5 in. l.,  $1\frac{1}{4}$ - $1\frac{1}{2}$  in. br., narrowed suddenly to a long acuminate point, the upper part slightly toothed and rounded at the base to a short petiole; *texture* subcoriaceous; *veins* fine, close-placed, usually simple; *rachis* and both surfaces naked; *fertile pinnl.* narrowly linear, 4-6 in. l., 1 in. or more apart at the base, with a broad continuous *invol.* springing from the edge of the leafy rib not more than a line wide.—*Hk. Sp.* 3. p. 39.  *t.* 150.

Hab. Banks of the Rio Negro, *Spruce*, 1263; and since gathered by Dr. Spruce at Napes (2,800), and by Appun in British Guiana (995).—This remarkable plant appears quite to agree in habit with *Blechnum volubile*, of which it is probable it will ultimately be shown to be an abnormal Lomarioid form.

§§ Plagiogyria, *Kunze*. *Base of the stipe suddenly dilated, fleshy, triquetrous, furnished with large spongy glands. Capsules with an oblique ring. Sp.* 35-39.

35. *L. (Plag.) semicordata*, Baker; *caud.* short, erect; *st.* dilated at the base, winged below, erect, naked, 3-6 in. l.; *fr.* ovate-lanceolate, 1-2 ft. l., 4-6 in. br.; *pinnæ* numerous, spreading, linear, 3-4 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., finely serrated throughout, the lower ones deflexed, the point narrowed gradually; *texture* subcoriaceous; *veins* fine; *fertile fr.* similar, but the *pinnæ* more distant and narrowly linear; *rachis* strong, erect, naked.—*Lomariidium, Presl. L. biserrata, M. & L. Hk. Sp.* 3. p. 19.

Hab. Tropical America from Columbia to Peru.

36. *L. (Plag.) adnata*, Blume; *caud.* short, stout; *st.* 6-18 in. l., firm, erect, naked, dilated at the base; *fr.* ovate-lanceolate, 12-18 in. l., 4-6 in. br.; *pinnæ* linear, falcate, the largest 3 in. l.,  $\frac{3}{8}$  in. br., the lowest equal to those next in order, the lower ones narrowed at the base below,  $\frac{1}{2}$  in. apart, the point narrowed very gradually and finely toothed; *texture* subcoriaceous; *veins* conspicuous; *fertile fr.* similar, but the *pinnæ* more distant and narrowly linear; *rachis* naked, erect.—*Hk. Sp.* 3. p. 19.  *t.* 147.

Hab. Java and Khasia at 1-4,000 ft.—This and the preceding have the central *pinnæ* of the barren frond dilated, but the other three have them narrowed at the base and distinct from one another, as in species 21-30.

37. *L. (Plag.) glauca*, Blume; *st.* 1 ft. l., naked, erect; *fr.* ovate, 12-24 in. l., 6-9 in. br.; *pinnæ* contiguous, erecto-patent, linear, 3-5 in. l.,  $\frac{1}{2}$  in. or more br., narrowed gradually and sharply toothed towards the point, narrowed on both sides at the base; *texture* coriaceous; *veins* fine, subparallel, under surface glaucous; *fertile fr.* similar, but the *pinnæ* distant and narrowly linear; *rachis* stout, erect, naked.—*Hk. Sp.* 3. p. 22.

Hab. Java and Khasia at 6,000 ft.; gathered by Drs. Hooker and Thomson.—Readily distinguishable by the silvery whiteness of the under side of the frond.



38. *L.* (Plag.) *pyncnophylla*, Kunze; *caud.* stout, erect, woody; *st.* stout, erect, naked, 6-9 in. l.; *fr.* ovate-lanceolate, 2-3 ft. l., 6-9 in. br.; *pinnæ* very numerous, linear, spreading, 4-6 in. l.,  $\frac{1}{2}$  in. br., contiguous, narrowed on both sides at the base, the point narrowed very gradually and finely toothed; *texture* coriaceous; *veins* inconspicuous; *fertile fr.* similar, but the *pinnæ* distant and narrowly linear; *rachis* strong, erect, naked.—*Hk. Sp. 3. p. 21. t. 148.*

Hab. Java, Malayan Peninsula, and N. Hindostan, ascending to 10,000 ft.—The *pinnæ* of both the barren and fertile fronds are often but not always furnished with a large gland at the base.

39. *L.* (Plag.) *euphlebica*, Kunze; *caud.* stout, woody, elongated; *st.* 1 ft. or more l., naked, erect, triquetrous below; *fr.* ovate-lanceolate, 1-2 ft. l., 6-12 in. br.; *pinnæ* 1 in. or more apart at the base, erecto-patent, linear, 4-6 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., narrowed at the base on both sides and narrowed very gradually and toothed towards the point; *texture* subcoriaceous; *veins* prominent; *fertile fr.* similar, but the *pinnæ* more distant and narrowly linear; *rachis* erect, naked.—*Hk. Sp. 3. p. 20. 2nd Cent. t. 89. L. articulata, F. Muell. Frag. 5. p. 174.*

Hab. Japan and Tsus Sima; gathered lately by Messrs. Oldham and Wilford, by Dallachy at the source of the Mackay River, Australia, and N. Hindostan, ascending to 6,000 ft.—*Pinnæ* much less numerous and more distant than in *L. pyncnophylla*, and venation not so fine.

#### TRIBE 7. BLECHNEÆ.

*Sori* linear or oblong, dorsal, parallel with the midrib and edge of the segments, not close to the latter. *Invol.* the same shape as the sorus, superior, opening towards the midrib. GEN. 34-37.

#### GEN. 34. BLECHNUM, *L.*

*Sori* linear, continuous, or nearly so, parallel with and usually contiguous to the midrib. *Invol.* membranaceous, distinct from the edge of the frond. *Fronde* uniform or slightly dimorphous, generally pinnate or pinnatifid, in one species simple and in one bipinnate. *Veins* usually free. A not large genus of closely resembling species, diffused widely throughout Tropical and South Temperate regions. TAB. IV. f. 34.

§ Eublechnum. *Stem* straight, frond not more than simply pinnate. Sp. 1-17.

\* *Frond* usually simple. Sp. 1.

1. *B. lanceola*, Swartz; *rhizome* slender, creeping, stoloniferous; *st.* slender, erect, 2-4 in. l.; *fr.* lanceolate, undivided, 4-6 in. l.,  $\frac{3}{8}$ - $\frac{1}{2}$  in. br., narrowed gradually from the centre in both directions, especially upwards; *texture* subcoriaceous; *sori* in a continuous line close to the midrib.— $\beta$ , *B. trifoliatum*, Kaulf.; *fr.* furnished with 1 or 2 pairs of small oblong obtuse lateral *pinnæ* at the base of the large terminal one.—*Hk. Sp. 3. p. 47. Ic. p. 970.*

Hab. Tropical America from Panama southward to Brazil and Peru.—The little-known *B. plantagineum*, Presl, is said to be like the type, but with a space between the line of fructification and midrib.

\*\* *Frond* pinnatifid. Sp. 2-6.

2. *B. asplenioides*, Swartz; *caud.* ultimately elongated, clothed at the crown with small linear scales; *st.* none or short; *fr.* linear-lanceolate, narrowed at both ends, 6-8 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br.; *pinnæ* numerous, the central ones spreading, lanceolate-deltoid,  $\frac{1}{4}$ - $\frac{3}{8}$  in. l.,  $\frac{1}{8}$  in. br., the point acute or blunt, all connected at the base, the lower ones dwindling in size very gradually; *texture* subcoriaceous;

*rachis* and both surfaces naked; *veins* inconspicuous; *sori* in a short line close to the midrib, often on one side only.—*Hk. Sp. 3. p. 45.* *B. polypodioides, Kze. & Mett. non Raddi.*

Hab. Tropical America from Panama and N. Granada to Brazil and Peru.—A more slender and narrower plant than *B. unilaterale*, with even the lowest pinnæ connected and much less copious sori.

3. *B. unilaterale, Willd.*; *caud.* elongated, densely clothed at the crown with linear pale-brown scales; *st.* slender, erect, 1-4 in. l., slightly scaly below; *fr.* lanceolate, 6-12 in. l., 1½-2 in. br.; *pinnæ* numerous, spreading horizontally, linear, ¾-1 in. l., the central ones ¼-¾ in. br., the point usually mucronate, the edge entire or nearly so, the lower part dilated to a broad base, the lower ones broader, blunter, and short; *texture* herbaceous, both surfaces and *rachis* naked or slightly hairy; *veins* inconspicuous; *sori* in a line close to the midrib.—*B. polypodioides, Raddi. Hk. Sp. 3. p. 45.*

Hab. Tropical America from Mexico and the W. Indies southward to Peru and S. Brazil.—This comes very near the small forms of *B. occidentale*, and we cannot, from the description alone, distinguish *B. triangulare, Link.*

4. *B. cartilagineum, Swartz*; *caud.* oblique, densely clothed at the crown with blackish fibrillose scales; *st.* strong, erect, 4-6 in. l., scaly and muricated in the lower part; *fr.* ovate-oblong, 1-2 ft. l., 6-9 in. br.; *pinnæ* numerous, erecto-patent, linear, 4-6 in. l., ¼-½ in. br., narrowed gradually towards the point, the margin finely toothed, dilated and connected at the base, the lower ones not conspicuously smaller than the others; *texture* coriaceous; *rachis* and both surfaces naked; *veins* fine; *sori* in a broad line close to the midrib.—*Hk. Sp. 2. p. 43.*

Hab. Temperate Australia. Very like *B. nitidum*, from which it is best distinguished by its muricated stipe.

5. *B. nitidum, Presl*; *st.* stout, erect, naked, 3-4 in. l.; *fr.* oblong-lanceolate, 1 ft. or more l., 4-6 in. br.; *pinnæ* numerous, erecto-patent, subfalcate, linear, 3-4 in. l., ¼-¾ in. br., narrowed gradually towards the point, dilated and connected at the base, the edge undulato-dentate, the lower ones linear acute and not much smaller than the rest; *texture* coriaceous, both surfaces and *rachis* naked; *veins* fine; *sori* in a continuous line close to the midrib; *invol.* conspicuous.—*Hk. Sp. 3. p. 44. t. 55.*

Hab. S. Brazil, Philippines, Marianne Islands, Isle of Gaudalcomar and Mishmee, N. Hindostan.—Near *B. brasiliense*, but a smaller plant, terminating abruptly below, and the involucre more conspicuous. In some of the specimens (*var. contractum, Hook.*) the pinnæ are contracted and the edge is much undulated. It seems probable that the *B. vittatum*, figured by Brackenridge from Fiji, is the same abnormal form, which in some of M. Vieillard's New Caledonian examples named by Mettenius, has completely Lomarioid sori.

6. *B. brasiliense, Desv.*; *caud.* erect, stout, subarborescent, 1 ft. or more l., densely clothed at the crown with dark-brown fibrillose scales; *st.* short, stout, densely scaly; *fr.* oblong-lanceolate, 2-3 ft. l., 1 ft. or more br., narrowing downwards very gradually; *pinnæ* close, erecto-patent, linear, 4-6 in. l., ½ in. br., narrowed gradually towards the point, very finely toothed, connected at the base, the lower ones short and blunt; *texture* coriaceous, both surfaces naked; *veins* fine; *rachis* naked; *sori* in a continuous line close to the midrib; *invol.* narrow.—*Hk. Sp. 3. p. 43. t. 157.* *B. Corcovadense, Raddi.*

Hab. Brazil and Peru.



\*\*\* *Fronds pinnate.* Sp. 7-17.

7. *B. longifolium*, H. B. K.; *rhizome* slender, creeping; *st.* firm, erect, nearly naked, 6-12 in. l.; *fr.* with a terminal pinna and 3-6 lateral ones on each side, which are 3-5 in. l.,  $\frac{1}{2}$  in. br., narrowed gradually towards the point, narrowed or even slightly stalked and then cordate at the base, the lower ones about 1 in. apart; *texture* coriaceous; *rachis* and both surfaces naked; *veins* inconspicuous; *sori* in broad lines close to the midrib.—*Hk. Sp. 3. p. 49. t. 94.*— $\beta$ , *B. fraxineum*, Willd.; *habitus* more robust; *pinnae* 6-8 on a side, sometimes 1 in. br.—*B. Schlimense, Fée.*

*Hab.* Tropical America from Mexico and the West Indies southward to Brazil and Peru.—*B. gracile*, Kaulf., appears to differ from the type only by its rather more slender habit, and *B. intermedium*, Link, is more slender still, and may possibly belong to species 1. The veins occasionally form costal arches, as is the case also in *B. unilaterale* and *australe*.

8. *B. Fendleri*, Hk.; *rhizome* slender, wide-creeping; *st.* 9 in. l., slender, pale straw-coloured, slightly villose above; *fr.* subdeltoid, 4-6 in. l., 3 in. br., with a linear terminal pinna and 3-4 pair of spreading subfalcate lateral ones, which are 2-3 in. l.,  $\frac{1}{4}$  in. or rather more br., with an acute point, the lower ones auricled at the base, quite adnate but not connected with one another; *texture* herbaceous; *rachis* villose and both surfaces slightly so; *veins* fine, forming a series of costal arches halfway up the pinnae; *sori* in continuous lines close to the midrib, with a pale broad membranous slightly villose involucre.—*Hk. Sp. 3. p. 48. t. 158.*

*Hab.* Venezuela, *Fendler*, 116. Brazil, *Burchell*, 6460.—This has quite the general habit of the preceding, of which it is not unlikely a form with more slender habit and more anastomosing venation.

9. *B. occidentale*, Linn.; *caud.* stout, erect, clothed at the crown with lanceolate acuminate scales; *st.* 6-12 in. l., erect, scaly below; *fr.* ovate-acuminate, 9-18 in. l., 4-8 in. br., with 12-24 linear pinnae on each side, which are 3-6 in. l.,  $\frac{3}{8}$ - $\frac{1}{2}$  in. br., narrowed gradually to a point, truncate or cordate or even auricled at the base, the lower ones often 1 in. apart, and the lowest pair deflexed and not much less than the rest; *texture* coriaceous; *rachis* and both surfaces naked or slightly pubescent; *veins* inconspicuous; *sori* in a broad continuous line close to the midrib.—*Hk. Sp. 3. p. 50.*

*Hab.* America, common from Mexico and W. Indies southward to Chili and S. Brazil.—*B. pectinatum*, Hk. Ic. Pl. t. 95, is a form with narrow pinnae dilated, and most of them connected, at the base, and *L. campylois*, Kunze, a form with a distinct acute auricle at the base of the pinnae on the upper side.

10. *B. arcuatum*, C. Gay; *caud.* stout, suberect, densely clothed at the crown with lanceolate acuminate dark-brown scales; *st.* 6-12 in. l., strong, erect, scaly at the base; *fr.* 12-18 in. l.,  $1\frac{1}{2}$ -2 in. br., linear-lanceolate, with very numerous contiguous linear-lanceolate falcate pinnae on each side, which are  $\frac{3}{4}$  in. l., by under  $\frac{1}{4}$  in. br. below, gradually narrowed upwards, hastately auricled on the upper side, quite distinct at the base, but sometimes imbricated, gradually diminishing downwards to mere auricles; *texture* rigid and very coriaceous; *rachis* and both surfaces naked; *veins* immersed; *sori* in a continuous line close to the midrib.—*Hk. Sp. 3. p. 59.* *B. acuminatum, Sturm, non Fée.*

*Hab.* Chili and Chiloe.—A more rigid plant than the last, with a narrower frond narrowing gradually downwards.

11. *B. hastatum*, Kaulf.; *caud.* short, stout, scaly; *st.* erect, 4-6 in. l., nearly naked; *fr.* 12-18 in. l., 2-4 in. br., lanceolate, with 20-40 pinnae on each side, the sterile ones 1-1 $\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., lanceolate, falcate, narrowed gradually to

a point, the lower side truncate and slightly auricled, the upper side cordate with a large hastate auricle, the lower ones broader and shorter; *texture* coriaceous; *rachis* and both surfaces naked or slightly pubescent; *veins* fine, the lateral ones often twice forked; *fertile pinnæ* narrower; *sori* midway between the midrib and edge, in a continuous or interrupted line.—*Hk. Sp. 3. p. 57.*

Hab. Temperate S. America.—*M. remotum*, Presl, is a small pubescent form, and *Tenitis sagittifera*, Bory, a form with pinnatifid pinnæ. Very near *B. australe*, but the sori more interrupted and not so near the midrib.

12. *B. australe*, Linn.; *caud.* stout, creeping, scaly; *st.* erect, 4-6 in. l.; *fr.* 9-18 in. l., 2-3 in. br., lanceolate, narrowed towards both ends; *pinnæ* numerous, spreading, the sterile ones  $1\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., linear, narrowed to a sharp point, hastate-cordate or auricled at the base, especially on the upper side, quite distinct, the lower ones passing down into mere auricles; *texture* rigid and coriaceous; *veins* hidden; *rachis* and both surfaces naked; *fertile pinnæ* narrower; *sori* in a continuous or slightly interrupted line not quite contiguous to the midrib, sometimes reaching the edge.—*Hk. Sp. 3. p. 57.*

Hab. S. Africa, northward to Bourbon, Madagascar, and Natal.—This and the preceding may be known from all the others by having a space between the sori and midrib, which characterizes Presl's genus *Mesothema*.

13. *B. levigatum*, Cav.; *caud.* stout, ascending, clothed at the crown with large lanceolate pale-brown scales; *st.* erect, 6-9 in. l., pale, naked or scaly below; *barren fr.* oblong-deltoid, 9-15 in. l., 6-9 in. br., with a large lanceolate terminal pinna, and numerous spreading oblong-lanceolate lateral ones on each side, the largest of which are 3-4 in. l., 1 in. br., narrowed suddenly to an acuminate point, the margin slightly serrated, quite distinct and cordate at the base; *texture* coriaceous; *rachis* and both surfaces naked, or the former slightly scaly; *veins* inconspicuous and nearly 1 lin. apart; *fertile fr.* smaller and the pinnæ narrower and more distant, the line of *sori* contiguous to the midrib,  $1\frac{1}{2}$ -2 lin. br., with a large brown membranous invol.—*Hk. Sp. 3. p. 56.*

Hab. N. S. Wales.

14. *B. serrulatum*, Rich.; *caud.* elongated, stout, ascending; *st.* 6-12 in. l., strong, erect, smooth, nearly naked; *fr.* oblong-acuminate, 1-2 ft. l., 6-9 in. br., with 12-24 pairs of quite distinct articulated linear-oblong *pinnæ* on each side, the largest of which are 4-5 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., narrowed gradually towards the point and downwards to a narrow base, the margin finely incised; *texture* coriaceous; *rachis* rigid, naked; *veins* very fine and close, not conspicuous; *fertile pinnæ* narrower; *sori* in a continuous line close to the midrib.—*Hk. Sp. 3. p. 54.*  
*B. striatum*, Br. *Hk. Sp. 3. p. 55. t. 159.*

Hab. Florida, W. Indies, Guiana, and Brazil; Australia, New Caledonia, Borneo, Malacca, and Mishmee.

15. *B. orientale*, Linn.; *caud.* stout, erect, clothed at the crown with fibrillose dark-brown scales; *st.* 4-8 in. l., strong, erect, scaly below; *fr.* 1-3 ft. l., 6-12 in. br., ovate, with very numerous nearly contiguous linear *pinnæ* on each side, which are 4-8 in. l.,  $\frac{3}{8}$ - $\frac{3}{4}$  in. br., narrowed to a long point, the bases quite distinct, the upper ones decurrent, a few of the lowest mere auricles; *texture* subcoriaceous; *rachis* and both surfaces naked; *veins* fine and close; *sori* in a long continuous line close to the midrib.—*Hk. Sp. 3. p. 52. F. Ex. t. 77.*

Hab. Australia and Polynesian Islands northward to S. China and the Himalayas.—Presl places this with species 4, 5, 6, 14, and 17, in his genus *Blechnopsis*, characterized by having a cartilaginous border to the pinnæ which unites the tips of the veins.

16. *B. melanopus*, Hk.; *st.* erect, 6 in. l., naked, dark chesnut-brown; *fr.*



ovate-lanceolate, 8-9 in. l., 3 in. br., with numerous contiguous linear falcate *pinnæ* on each side, which are  $1-1\frac{1}{2}$  in. l.,  $\frac{1}{4}-\frac{3}{8}$  in. br., narrowed gradually towards the point, the edge entire, the upper ones adnate and dilated at the base, but those below the centre distinct, the lowest ones growing gradually shorter and blunter; *texture* coriaceous; *rachis* and both surfaces naked; *veins* forming large arched areoles; *sori* in a continuous line near the midrib.—*Hk. Sp. 3. p. 64. t. 161. Blechnidium, Moore.*

Hab. Khasia Hills, Bengal, *Simons, 78.*—Most like some of the forms of *B. occidentale* in habit, with the cuticle of the under side of the frond loose and wrinkled.

17. *B. Finlaysonianum*, Wall.; *caud.* short; *st.* 1 ft. l., strong, erect, dark-brown, polished; *fr.* 3-4 ft. l., with a large terminal pinna and numerous erecto-patent lateral ones on each side, the largest 9-12 in. l., 1 in. or more br., narrowed gradually to a point and below to a narrow base, the margin entire, the lowest reduced to mere auricles; *texture* coriaceous, both surfaces naked; *veins* close, inconspicuous; *sori* in a continuous line close to the midrib.—*Hk. Sp. 3. p. 53. Hk. & Gr. Ic. t. 225.*

Hab. Malayan Peninsula and Borneo.—This is glossy, with the largest *pinnæ* in the genus, resembling in habit *B. orientale*, some of the large forms of which come very near it.

§§ *Salpichlæna, J. Sm. Stem twining, frond bipinnate. Sp. 13.*

18. *B. (Salpi.) volubile*, Kaulf.; *st.* wide-climbing; *pinnæ* in distant opposite pairs; *pinnl.* usually 4-6 on each side, stalked, linear-lanceolate, 6-12 in. l.,  $\frac{1}{2}-2$  in. br., with an undulated cartilaginous border; *texture* coriaceous; *rachis* and both surfaces naked; *invol.* broad, membranous, at first wrapped over the fruit, afterwards breaking up into short pieces.—*Hk. Sp. 3. p. 63. Gard. F. t. 15. S. scandens, Presl.*

Hab. Tropical America from the West Indies and Columbia southward to Brazil and Peru.

### GEN. 35. SADLERIA, Kaulf.

*Sori* in a continuous line close to the midrib on both sides, placed on an elevated receptacle. *Invol.* narrow, subcoriaceous, at first wrapped over the sorus, afterwards spreading. *Veins forming a series of costal arches. Caudex 3-4 feet high, arborescent. TAB. 4. f. 35.*

1. *S. cyatheoides*, Kaulf.; *st.* strong, erect, 6-18 in. l., naked except at the base, where it is densely clothed with long linear scales; *fr.* 4-6 ft. l., 9-18 in. br.; *pinnæ* 8-12 in. l.,  $\frac{1}{2}-\frac{3}{4}$  in. br., cut down to the rachis into very numerous connected linear *pinnl.*  $\frac{3}{8}-\frac{1}{2}$  in. l.,  $\frac{1}{8}$  in. br., acute or bluntish; *texture* coriaceous; *veins* immersed and inconspicuous; *rachis* stout, naked.—*Hk. Sp. 3. p. 65. B. Kaulfussianum, Gaud. Atlas, p. 78.*

Hab. Sandwich Islands and Sumatra.—A fine plant, which combines the habit of a small *Cyathea* with the fructification of a *Blechnum*. The original *S. pallida*, H. & A., is a mere form with a paler rachis; but a plant thus named by Mettenius, gathered by Dr. Hillebrand, is less rigid in texture, with flatter, broader, and blunter pinnules, and quite conspicuous venation. Probably this is Brackenridge's *pallida*, which is said to have a somewhat paleaceous rachis; and we have also another plant from Dr. Hillebrand like the type in texture, but the largest *pinnæ* 21 in. l., 3 in. br., which agrees with Gaudichaud's figure of *B. Souleytianum*.

2. *S. squarrosa*, Gaud.; *st.* 6-8 in. l., erect, reddish-brown, scaly and asperous; *fr.* 12-18 in. l., 6 in. br.; *pinnæ* in 12-18 pairs on each side, linear-lanceolate, 3-4 in. l.,  $\frac{1}{2}-\frac{3}{4}$  in. br., cut down to the rachis into quite distinct oblong

subfalcate *pinnl.*  $\frac{1}{4}$ - $\frac{3}{8}$  in. l.,  $\frac{1}{4}$  in. br.; *texture* coriaceous; *veins* immersed; *main rachis* and that of the *pinnæ* densely clothed throughout with ovate-acuminate dark-brown scales.—*Gaud. Voy. Bonit. Atlas, t. 2.* *Blechnum polystichoides, Brack. Fil. U.S. Exp. p. 135.*

Hab. Sandwich Islands; gathered lately by Dr. Hillebrand.—Very different in habit from No. 1, and the rows of fruit are shorter and not quite close to the inconspicuous midrib.

GEN. 36. WOODWARDIA, Sm.

*Sori* linear or linear-oblong, sunk in cavities of the frond, placed in single rows parallel with and contiguous to the midribs of the *pinnæ* and *pinnules*. *Invol.* subcoriaceous, the same shape as the sorus, closing over the cavity like a lid. *Veins forming always a series of costal arches, for the rest free or anastomosing.* *A small genus with fronds usually ample and bipinnatifid, which belts the world in the North Temperate Zone, extending very slightly within the Tropic.* TAB. IV. f. 36.

§ *Euwoodwardia.* *Fronde uniform, the veins forming at least one series of areolations between the sori and the margin.* Sp. 1-2.

1. *W. radicans*, Smith; *st.* strong, erect, naked, scaly at the base; *fr.* 3-6 ft. l., 12-18 in. br.; *pinnæ* lanceolate, the lower ones often 1 ft. l., cut down below within a short distance of the rachis into finely-toothed lanceolate *pinnl.* 1-1 $\frac{1}{2}$  in. l., those of the under side the shortest; *veins* anastomosing once outside the line of fruit; *gemmæ* few and large, placed at the base of the upper *pinnæ*.—*Hk. Sp. 3. p. 67.*

Hab. Madeira and the Canaries, Spain, Italy, Sicily, Northern India, Java, California, Mexico, and Guatemala.

2. *W. orientalis*, Swartz; *st.* erect, densely clothed at the base with large linear-lanceolate scales; *fr.* 4-8 ft. l., 12-18 in. br.; *pinnæ* lanceolate, sometimes more than 1 ft. l., cut down below nearly to the rachis into sinuated or pinnatifid *pinnl.*, sometimes 4 in. l., those of the under side shorter and none at the base of the *pinnæ*; *veins* anastomosing copiously outside the sori, upper surface of the frond often producing copious gemmiferous buds.—*Hk. Sp. 3. p. 68.*

Hab. Japan southward to Formosa.—Probably this ought to be joined with the preceding.

§§ *Anchistea, Presl.* *Fronde uniform, the veins all free between the sori and the margin.* Sp. 3-4.

3. *W. Virginica*, Smith; *st.* strong, erect, 12-18 in. l.; *fr.* oblong-lanceolate, 12-18 in. l., 6-9 in. br.; *pinnæ* linear-lanceolate, 4-6 in. l.,  $\frac{3}{4}$ -1 in. br., cut down within 1 lin. or less of the rachis into linear-oblong lobes which are 2-3 lin. br. at the base, the lines of *sori* which margin the midrib of the *pinnæ* often reaching low down in the lower ones.—*Hk. Sp. 3. p. 69.*

Hab. United States from Vermont to Florida.

4. *W. Japonica*, Swartz; *st.* 6-12 in. l., erect, scaly below; *fr.* broadly ovate, 12-18 in. l., 9-12 in. br.; *pinnæ* lanceolate, often 6 in. l., 1-1 $\frac{1}{4}$  in. br., pinnatifid, with lobes  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., which reach half or two-thirds of the distance down to the rachis, the lines of *sori* which margin the midrib of the *pinnæ* confined to the upper part of the upper ones.—*Hk. Sp. 3. p. 69.*

Hab. China and Japan.



§§§ Lorinseria, Presl. *Fronde dimorphous, veins everywhere anastomosing.*  
Sp. 5-6.

5. *W. areolata*, Moore; *sterile fr.* with a slender st., 9-12 in. l., 6-8 in. br., deltoid-ovate, with numerous oblong-lanceolate sinuated *pinnæ* on each side, the lower ones 3-4 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., reaching down to the rachis, which above has a broad wing; *texture* herbaceous, both surfaces naked; *fertile fr.* with an elongated, strong, erect, chesnut-brown, naked stem; *pinnæ* 3-4 in. l., narrowly linear,  $\frac{1}{2}$ -1 in. apart.—*Hk. Sp. 3. p. 70. Gard. F. t. 61. W. angustifolia, Sm.*

Hab. United States, from Massachusetts to Florida.

6. *W. Harlandii*, Hk.; *st.* 6-18 in. l., erect, nearly naked; *barren fr.* varying in shape from linear-lanceolate, undivided, to broadly ovate, with 1 or 2 spreading linear-lanceolate lobes 3-4 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., reaching down to a broadly-winged rachis; *texture* coriaceous, both surfaces naked; *fertile fr.* with more numerous and narrower lobes, the lowest pair often quite free from the others; *sori* in broad lines close to the midrib of the lobes, with short lines branching from these in an erecto-patent direction.—*Hk. Sp. 3. p. 70. Fil. Ex. t. 7.*

Hab. Hong-Kong.

#### GEN. 37. DOODIA, R. Br.

*Sori* oblong or slightly curved, superficial, placed in one or more rows parallel with and between the midribs and margins of the *pinnæ*. *Invol.* membranous, the same shape as the sorus. *Veins forming one or two series of arches between the midrib and edge, on which the sori are placed. Fronds 6-18 in. l., pinnate or pinnatifid. A small genus, confined to the islands from Ceylon eastward to Fiji, New Zealand, and Australia. TAB. IV. f. 37.*

#### \* *Pinnatifid.* Sp. 1-3.

1. *D. aspera*, R. Br.; *st.* 2-4 in. l., erect, dark-coloured, asperous; *fr.* 6-18 in. l., 2-4 in. br., oblong-lanceolate, with numerous spreading linear *pinnæ* on each side, which are 1-2 in. l.,  $\frac{1}{4}$  in. br., the margin strongly serrated, the base dilated, the lower ones dwindling down gradually to mere auricles; *texture* coriaceous; *sori* oblong, about their own length apart, in one or two rows, the innermost a short distance from the midrib.—*Hk. Sp. 3. p. 71.*

Hab. Temperate Australia.

2. *D. blechnoides*, Cunning.; *st.* 3-4 in. l., erect, slightly scabrous below; *fr.* 15 in. l., 6 in. br., oblong-lanceolate, with numerous spreading linear *pinnæ* on each side, the largest of which are 3 in. l., by rather more than  $\frac{1}{4}$  in. br., the margin sharply serrated, the base dilated, the upper ones connected, the lower ones shorter and free, not dwindling down to auricles; *texture* coriaceous; *sori* oblong, in a rather irregular row contiguous to the midrib.—*Hk. Sp. 3. p. 72.*

Hab. N. S. Wales.—Our description is taken from a wild specimen gathered by Mr. Fraser. The plant cultivated under this name has the *pinnæ* reduced very gradually below, as in the last.

3. *D. dives*, Kunze; *st.* 6-12 in. l., slender, erect, smooth, clothed towards the base with dark-coloured linear scales; *sterile fr.* 1 ft. l., 3-5 in. br., oblong-lanceolate, with numerous spreading linear-oblong *pinnæ* on each side, which are 2-3 in. l.,  $\frac{1}{2}$  in. br., the point blunt, the margin undulated and serrated, the base suddenly dilated, and all except the lowest connected; *texture* coriaceous; *fertile fr.* longer, with narrow linear *pinnæ*, the central ones 1 in. apart, connected by a

broad decurrent wing to the rachis, the two or three lowest pairs free; *sori* linear-oblong, in two irregular rows, nearer the midrib than the edge.—*Hk. Sp. 3. p. 74.*

Hab. Ceylon.—Kunze's original Javan plant has the fertile pinnæ closer.

\*\* *Pinnate in lower half.* Sp. 4-5.

4. *D. media*, R. Br.; *st.* 4-6 in. l., erect, smooth, usually nearly black; *fr.* 12-18 in. l., 1½-4 in. br., lanceolate, with numerous spreading linear pinnæ on each side, which are 1-2 in. l., ¼-⅜ in. br., acute or bluntish at the point, the margin toothed, the upper ones dilated and connected at the base, those below the middle free and cordate or even auricled on the upper side, the lower ones gradually diminishing; *texture* coriaceous or subcoriaceous; *sori* short, oblong, distant, in one or two rows, with a considerable space between the inner one and the midrib.—*Hk. Sp. 3. p. 74.*—β, *D. connexa*, Kunze; *fr.* larger, more herbaceous in texture; pinnæ sometimes 3 in. or more l.—*Hk. Sp. 3. p. 75.*

Hab. Polynesian Islands, Australia, and New Zealand.

5. *D. caudata*, R. Br.; *st.* 4-6 in. l., slender, smooth; *fr.* 6-12 in. l., 1½-2 in. br., lanceolate, with numerous spreading linear pinnæ on each side, which are often 1 in. or more l., the sterile ones oblong, blunt, sharply serrated, only the uppermost connected at the base, the frond often terminated by a long entire point; *texture* subcoriaceous; *rachis* slender, often pubescent; *fertile pinnæ* narrower and shorter.—*Hk. Sp. 3. p. 75.*

Hab. Australia, Van Diemen's Land, and New Zealand.—“Very closely allied to *D. media*, and probably a variety of it, but more flaccid, the fronds often prostrate, pinnate nearly to the top, fertile more distinct from the barren and longer.”—*Dr. Hooker, Fl. N. Z. p. 370.* A curious form (*D. linearis*, J. Smith) from New Caledonia and Australia, has a long narrow linear frond, the upper part undivided, only the lower third sinuato-pinnatifid, with short rounded lobes, the lowest of which are distinct.

### TRIBE 3. ASPLENIEÆ.

*Sori attached to the veins, oblique with regard to the costa or occasionally subparallel with it, linear or oblong. Invol. the same shape as the sorus, when single opening towards the midrib, sometimes double.* GEN. 38-40.

### GEN. 38. ASPLENIUM, Linn.

*Sori dorsal or submarginal, linear or oblong. Invol. similar in shape, straight, or occasionally curved, single or double, plane or tumid, bursting along the outer edge. The second in extent of our genera, including plants from all parts of the world where ferns grow, of every variety in size, texture, and cutting. Veins free in a large proportion of the species. Euasplenium is connected with Davalliæ by Darea and Loxoscaphe, with Aspidiæ through Athyrium, with Pteridæ through Acropteris and Actiniopteris, and with Grammitidæ by Ceterach.* TAB. IV. f. 38.

§ *Thamnopteris, Presl. Veins connected at the apex by a transverse intramarginal line. Fronds undivided.* Sp. 1-3. *Neottopteris, J. Sm.*

1. *A. (Thamn.) Nidus*, L.; *fr.* 2-4 ft. l., 3-8 in. br., lanceolate, acute or acuminate at the apex, tapering gradually below into a short stem, the edge entire, the midrib rounded on the back; *texture* coriaceous; *veins* fine and parallel, about ½ lin. apart; *sori* reaching about halfway towards the margin.—*Hk. Sp. 3. p. 77. Bot. Mag. t. 3101.*—β, *A. musæfolium*, Mett.; *fr.* larger, sometimes 6 ft. l., 1 ft. br., with *sori* extending nearly to the edge.—*Hk. Sp. Fil.*



3. p. 78.—*γ*, *A. Australasicum*, Hk. ; midrib keeled on the back, often black.—*Hk. F. Ex. t.* 83.

Hab. Mauritius, Johanna Island, Seychelles, Himalayas, Japan, Bonin, and Chusan, westward to the Society Islands ; southward to New Caledonia, Queensland, Norfolk Island, and Lord Howe's Island. The Himalayan and Malayan *A. Phyllitidis*, Don, seems to differ from the type only by its smaller size. The sori in some of the specimens are quite as close as in any of the above. *A. pachyphyllum* and *teniosum*, Kunze, we have not seen. A plant from Malacca and Java has the veins  $\frac{1}{2}$  in. apart and much broader sori.

2. *A.* (Thamn.) *Grevillei*, Wall. ; *fr.* 12-18 in. l., 2-3 in. br., lanceolate-spathulate, narrowed to an acute apex and suddenly below to a broad wing to the stipe, which grows very gradually narrower downwards, the margin entire ; *texture* coriaceous ; *midrib* keeled below ; *veins* nearly horizontal, those in the body of the *fr.* about  $\frac{1}{2}$  lin. apart ; *sori* on most of them extending within a short distance of the edge.—*Hk. Sp.* 3. p. 80. *Hk. & Gr. Ic. t.* 123.

Hab. Gathered in Tavoy by Dr. Wallich and Mishmee by Helfer.

3. *A.* (Thamn.) *Simonsianum*, Hk. ; *fr.* 12-18 in. l., 1-1 $\frac{1}{2}$  in. br., tapering above into an acuminate point and very gradually below into a short stem, the margin nearly entire ; *midrib* only rounded and prominent below ; *texture* coriaceous ; *veins* erecto-patent, about  $\frac{1}{2}$  lin. apart ; *sori* copious, reaching from the midrib to within a short distance of the edge.—*Hk. Sp.* 3. p. 81. *Ic. Pl. t.* 925.

Hab. Khasia and Unker Hills, Bengal, *Simons*, 232.—This and the preceding are two little-known plants, perhaps not really distinct from No. 1.

§§ *Euasplenium*. *Veins* free, simple or branched ; *sori* linear or linear-oblong, straight, discoidal. *Sp.* 4-154. *Fig.* 38. a.

\* *Fronde* quite entire. *Sp.* 4-17. *Phyllitis*. J. Sm.

4. *A. ensiforme*, Wall. ; *st.* tufted, 1-3 in. l., firm, erect, scaly below ; *fr.* 12-18 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., much acuminate towards the point, edge nearly entire, lower part narrowed into the stem very gradually ; *texture* coriaceous ; *veins* immersed, inconspicuous, erecto-patent, usually once forked ; *sori* broad, reaching nearly to both midrib and margin.—*Hk. Sp.* 3. p. 90. *Hk. & Gr. Ic. t.* 71.

Hab. Himalayas (ascending to 10,000 ft.) to Ceylon ; Moulmein.—The Mexican *A. coriaceum*, Fée, seems from the description to agree with this.

5. *A. angustum*, Swartz ; *st.* tufted, short, firm, greyish, erect ; *fr.* 1-2 ft. l., 1-1 $\frac{1}{2}$  in. br., linear-lanceolate, the point much acuminate, the margin nearly entire, or the point a little serrated, the lower part narrowed very gradually to the stem from two-thirds of the way down ; *texture* subcoriaceous ; *veins* erecto-patent, usually simple ; *sori* rather distant, reaching from the midrib nearly to the edge.—*Hk. Sp.* 3. p. 89. *A. loriforme*, *Hk. Ic.* 926.

Hab. Brazil and Guiana.

6. *A. concolor*, Hk. ; *st.* tufted, 1-2 in. l., firm, greenish, clothed with scales in the lower part ; *fr.* 6-8 in. l., 1 in. or more br., lanceolate, the point acute, the edge slightly crenato-serrate upwards, the lower part narrowed into the stem very gradually ; *texture* herbaceous ; *veins* usually simple ; *sori* numerous, narrow, extending from the midrib to the edge.—*Hk. Sp.* 3. p. 88. *t.* 164. A.

Hab. Java ; and a very similar plant, but with a longer stem and frond, has been gathered on the Guinea coast by Messrs. Currer, Barter, and Mann.

7. *A. sinuatum*, Beauv.; *st.* tufted, grooved in front, short, erect; *fr.* lanceolate, 1-2 ft. l., 1-2½ in. br., narrowed to an acuminate apex and very gradually below, the margin slightly undulated but not toothed; *texture* coriaceous; *veins* 1 lin. apart, usually simple; *sori* narrow, often on every vein, reaching from near the rachis nearly to the margin.—*Hk. Sp. 3. p. 82. Fil. Ex. t. 61.*

Hab. Guinea Coast southward to Angola.—*A. venosum*, Hk., does not seem safely separable.

8. *A. Currori*, Hk.; *st.* scarcely any; *fr.* lanceolate, 12-18 in. l., 1½ in. br., narrowed gradually to an acuminate apex, but suddenly at the base, the margin slightly undulated; *texture* subcoriaceous; *veins* fine, usually once branched, about ½ in. apart; *sori* not reaching by a space either midrib or margin.—*Hk. Sp. 3. p. 82.*

Hab. Guinea Coast; gathered by Curror, Barter, and Mann.—Distinguished from the last by its more distant and usually branched veins and broader sori.

9. *A. coriaceum*, Baker; *st.* tufted, 2-3 in. l., firm, compressed, winged; *fr.* 9-12 in. l., 1½ in. br., much acuminate at the apex, the edge very nearly entire, narrowed below gradually into the winged stem; *texture* very coriaceous; *veins* oblique and curved, branched at the base and again at or above the middle, so that at the edge the veins that originate from one are ¼-⅓ in. apart; *sori* distant, very oblique, generally ½ in. l.

Hab. Cameroon Mountains, *G. Mann.*

10. *A. squamulatum*, Blume; *st.* tufted, 2-4 in. l., strong, erect, scaly below; *fr.* lanceolate, 12-18 in. l., 2-3 in. br., narrowed to an acuminate apex and very gradually below into the stem, the margin entire; *texture* very coriaceous; *veins* inconspicuous, 1 lin. apart, usually simple; *sori* reaching from near the midrib to ¼-½ in. of the margin; *rachis* stout, pale, the lower part furfuraceous.—*Hk. Sp. 3. p. 82.*

Hab. Java, Borneo, Philippines.—Habit of *A. Nidus*, but the veins falling short of the edge.

11. *A. scolopendrioides*, J. Sm.; *st.* short, erect, scaly; *fr.* lanceolate, nearly 1 ft. l., 1¼-1½ in. br., narrowed suddenly above to a long caudate apex, very gradually into the stem below, the margin entire; *texture* subcoriaceous; *veins* oblique, usually simple, 1 lin. apart; *sori* reaching from the midrib to within ¼ in. of the margin; *invol.* leaving a distinct elevated ridge on the frond when it separates.—*Hk. Sp. 3. p. 84. Ic. Pl. t. 930.*

Hab. Philippines, *Cuming*, 318.—A fragment from Borneo exhibits the same raised line where the involucre bursts, but the stem is much longer. Doubtfully distinct from *Sp. 13*, with which it corresponds in texture and venation.

12. *A. Sundense*, Blume; *rhizome* creeping, naked; *st.* short, erect, naked; *fr.* lanceolate, 12-18 in. l., 1½-3 in. br., narrowed to an acute point and very gradually into the stem below, the margin obscurely toothed; *texture* coriaceous; *veins* simple, close, nearly horizontal, the copious *sori* often reaching from the midrib nearly to the edge.—*Hk. Sp. 3. p. 85. A. vittæforme*, J. Sm.

Hab. Java, Philippines, Fiji.—An authentic example of Brackenridge's *A. amboinense* agrees with this. If Willdenow's plant be the same, that name has priority. This belongs to the genus *Micropodium* of Mettenius, which includes the *Aspleniceæ* with the mode of growth of *Eupolypodium* (*Eremobrya*, J. Smith).

13. *A. Fejeense*, Brack.; *rhizome* wide-climbing; *st.* 6 in. l., scaly below; *fr.* lanceolate, 18-24 in. l., 1½-2 in. br., caudate or acuminate, often proliferous at



the apex, narrowed below to a subtruncate base, the margin nearly entire; *texture* subcoriaceous; *veins* oblique, occasionally branched,  $\frac{1}{8}$  in. apart; *sori* reaching from the midrib nearly to the edge.—*Hk. Sp. 3. p. 87.*

Hab. Fiji, Samoa, and Aneiteum. Differs from the last by its more oblique and more distant veins and longer and scaly stems.

14. *A. simplicifrons*, F. Muell.; *rhizome* scaly; *fr.* sessile, narrowed gradually towards both ends, 12-18 in. l.,  $\frac{3}{4}$ -1 in. br., the edge entire or very slightly undulated, the point acuminate; *texture* subcoriaceous; *veins* almost horizontal, parallel, simple, or forked, 1 lin. apart; *sori* not touching by a space either edge or midrib.—*Fragm. 5. p. 74.*

Hab. Rockingham Bay, Australia.—*Dallachy, Hill.*

15. *A. Griffithianum*, Hk.; *st.* tufted, short, erect; *fr.* lanceolate, 6-9 in. l.,  $\frac{3}{4}$ -1 in. br., the point acuminate, narrowing below very gradually, the margin crenato-serrate; *texture* subcoriaceous; *veins* distant, obscure, usually once forked; *sori* reaching from the midrib two-thirds of the way to the edge.—*Hk. Sp. 3. p. 87. t. 928.*

Hab. Assam and Sikkim, ascending to 4,000 ft.—Recognizable at once in the group by its distinctly crenated margin. A plant from Penang, gathered by Mactier, agrees with this except that it has a slender stem 6-9 in. l.

16. *A. Gautieri*, Hk.; *st.* tufted, 1-3 in. l.; *fr.* oblong-lanceolate, 3-4 in. l.,  $\frac{3}{4}$ -1 in. br., the point acute, the upper part slightly crenato-dentate, the base narrowed rather suddenly to a wing which narrows very gradually into the stem, sometimes with one or a pair of small oblong blunt lobes at the base; *texture* herbaceous; *veins*  $\frac{1}{8}$  in. apart, usually once forked about the middle; *sori* small, distant, not reaching either edge or midrib.—*Hk. Sp. 3. p. 88. t. 184.*

Hab. Island of Nissobe, near Madagascar, *Gautier*.—The smallest and most delicate of the group.

17. *A. serratum*, Linn.; *st.* short, stout, erect; *fr.*  $1\frac{1}{2}$ -3 ft. l., 2-3 in. br., acute at the apex, narrowed below gradually, the margin undulato-dentate or crenate, especially towards the apex; *texture* coriaceous; *midrib* prominent below; *veins* about  $\frac{1}{2}$  lin. apart; *sori* often on each, reaching about two-thirds of the distance to the edge.—*Hk. Sp. 3. p. 81. F. Ex. t. 70.*

Hab. West Indies and Guatemala, southward to Society Islands, Peru, and S. Brazil.—We include three species of Fée,—his *integrum*, *serratum*, and *crenulatum*.

\*\* *Fronde lobed or pinnatifid. Sp. 18-24.*

18. *A. subhastatum*, Hk.; *st.* tufted, 3-4 in. l., firm, erect, naked; *fr.* 4-9 in. l.,  $1\frac{1}{2}$  in. br. at the base, lanceolate, with two short rounded lobes at the base, the apex acute, the margin entire, the base rounded suddenly into the petiole; *texture* coriaceous; *veins* immersed, inconspicuous, erecto-patent, distant, once or twice forked; *sori* not reaching either edge or midrib.—*Hk. Sp. 3. p. 91. Ic. Pl. t. 929.*

Hab. Caraccas, and gathered lately in Peru by Dr. Spruce.—Basal lobes not always obvious. Veins casually anastomosing.

19. *A. trilobum*, Cav.; *st.* tufted, scaly below, 2-3 in. l., firm, erect; *fr.* 1-1 $\frac{1}{2}$  in. l., 1 in. br., rhomboidal, the apex acute, the base cuneate, entire, the margin undulato-crenate, or the lower part deeply lobed with broad inciso-crenate divisions; *texture* coriaceous; *sori* broad and short.—*Hk. Sp. 3. p. 90. 2nd Cent. F. t. 11.*

Hab. Chili and S. Brazil.—*A. parvulum*, Hk. *Ic. t. 222*, is a small undeveloped form.

20. *A. Hemionitis*, Linn.; *st.* tufted, naked, firm, dark-coloured, 4-8 in. l.; *fr.* 4-6 in. each way, hastate, with a triangular, acute terminal lobe and two large cordate, acute lateral ones, again bluntly or acutely lobed at the base, the basal sinus rounded, 1 in. or more deep, and the lobes on each side imbricated over one another and the petiole; *texture* herbaceous; *veins* close, usually simple, with often a narrow line of fruit on each, the longest  $1\frac{1}{2}$  in. l.—*Hk. Sp.* 3. p. 91. *A. palmatum*, Lam.

Hab. Spain, Portugal, Barbary States, Azores, Canaries, Madeira, and Cape Verde Islands.

21. *A. attenuatum*, R. Br.; *st.* tufted, 3-4 in. l., firm, more or less scaly throughout; *fr.* linear-lanceolate, sometimes 1 ft. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., narrowed upwards very gradually, sometimes proliferous at the point, the margin toothed, the lower third also lobed; the lowest lobes, which are oblong or roundish, reaching down nearly or quite to the rachis; *texture* subcoriaceous; *veins* ascending, the midrib beneath hispid like the stem; *sori* reaching nearly to the edge.—*Hk. Sp.* 3. p. 92. *Hk. & Gr. Ic. t.* 200. *Ic. Pl. t.* 914.

Hab. Queensland and N. S. Wales.

22. *A. variabile*, Hk.; *rhizome* wide-creeping; *fr.* 3-6 in. l.,  $\frac{1}{2}$  in. br., lanceolate or oblong-lanceolate, the apex acuminate or bluntish, narrowed below very gradually into a short stem, the margin varying from crenate to rather deeply lobed, especially below; *texture* thinly herbaceous, both surfaces naked; *veins* often  $\frac{1}{8}$  in. apart at the base, simple or once forked; *sori* falling short of the margin.—*Hk. Sp.* 3. p. 93. t. 185.

Heb. Fernando Po, Barter, Mann.

23. *A. pinnatifidum*, Nutt.; *st.* tufted, 2-4 in. l., naked, polished, chesnut-brown; *fr.* 3-6 in. l., 1 in. or more br. at the base, lanceolate-deltoid, with a long gradually narrowing point which is sinuated only, the lobes below this  $\frac{1}{4}$ - $\frac{1}{2}$  in. deep, the lowest ovate-oblong or subspathulate,  $\frac{1}{2}$  in. deep by nearly as br., sinuated and reaching down nearly to the rachis; *texture* herbaceous; lowest lateral *veins* of the pinnæ often twice forked; *sori* copious.—*Hk. Sp.* 3. p. 91. *Ic. t.* 927.

Hab. Pennsylvania southward to Alabama.

24. *A. alternans*, Wall.; *st.* tufted, 1-2 in. l., clothed with linear scales; *fr.* 6-8 in. l., 1- $1\frac{1}{2}$  in. br., lanceolate-oblong, cut down into numerous bluntly-rounded lobes on each side, which reach very nearly down to the rachis, the lower growing smaller gradually and sometimes distinct; *texture* subcoriaceous, both surfaces an opaque greyish-green; *veins* free, subflabellate; *sori* copious.—*Hk. Sp.* 3. p. 92. *A. Dalhousiæ*, *Hk. Ic. t.* 105.

Hab. N. W. Himalayas, ascending to 6,000 ft., and gathered also by Schimper in Abyssinia.—This has entirely the habit and cutting of *A. Ceterach*.

\*\*\* *Fronde* once pinnate. *Sp.* 25-103.

† *Pinnæ*  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., blunt, in most of the species nearly as broad as long. *Sp.* 25-44.

*A. Group of A. viride. Rachis green, slender. Sp.* 25-34.

25. *A. projectum*, Kunze; *st.* scattered, very slender; *fr.* 2-3 in. l., 2 lin. br., procumbent, with 12 to 16 *pinnæ* on each side, in slightly-stalked pairs, the largest of which are not more than 1 lin. each way, roundish and nearly entire; *texture* membranaceous; *rachis* taking root and the apex gemmiferous; *sori* 1 to 2 to a pinna, oblique.—*Hk. Sp.* 3. p. 148. t. 181. A.



Hab. Peru; gathered by by Poeppig.—Habit of *Anagallis tenella*, but much more slender.

26. *A. viride*, Huds.; *st.* densely tufted, 2-4 in. l., naked, the lower part chesnut-brown; *fr.* 4-6 in. l.,  $\frac{1}{2}$  in. br., with 12 to 20 subsessile *pinnæ* on each side, which are between ovate and rhomboidal in general outline, the upper edge narrowed suddenly at the base, the lower one obliquely truncate, the outer part deeply crenated; *texture* herbaceous; *rachis* green, naked; *veins* subflabellate; *sori* copious, linear-oblong, oblique.—*Hk. Sp. 3. p. 144. Brit. F. t. 30.*

Hab. Arctic Europe to the Pyrenees, Dalmatia, Sitcha, and the Himalayas (12,000 ft.); N. America, Rocky Mountains, British Columbia, New Brunswick.

27. *A. Kraussii*, Moore; *st.* tufted, slender, green,  $\frac{1}{2}$  in. l.; *fr.* 3-4 in. l.,  $\frac{3}{8}$  in. br., linear, with about 12 pairs of sessile *pinnæ* on each side, which are under  $\frac{1}{4}$  in. each way, cuneato-flabellate or subrhomboidal in general outline, the upper and outer edge sharply toothed, the lower straight and entire; *texture* herbaceous; *rachis* green; *veins* flabellate; *sori* linear-oblong, 1-3 to a pinna, oblique.—*Hk. Sp. 3. p. 147. t. 180. A.*

Hab. Natal, *Krauss*, 25.—Very near *A. viride*, of which it may be a form, but the *pinnæ* are more dimidiate and more sharply toothed.

28. *A. fragile*, Presl; *st.* tufted, 2-4 in. l., slender, flexuose, green or brownish, sometimes gemmiferous; *fr.* 6-9 in. l.,  $\frac{3}{8}$ - $\frac{1}{2}$  in. br., with 12 to 20 sessile *pinnæ* on each side, which are  $\frac{1}{4}$  in. br., nearly as deep, subrhomboidal in outline, the upper and outer edge toothed, the former narrowed suddenly at the base, the lower edge entire, nearly straight from the base; *texture* herbaceous; *rachis* green, naked; *veins* pinnate; *sori* short oblique.—*Hk. Sp. 3. p. 145. Ic. t. 932.*

Hab. Along the Andes from Mexico and Peru.—*A. rhomboideum*, Brack., which grows also in the Sandwich Islands, has fronds 12-18 in. l., with *pinnæ* not so dimidiate and often deeply lobed on the upper side near the base. This also comes very near *A. viride* in habit and texture.

29. *A. Gilliesianum*, Hk.; *st.* tufted, very slender, 1-2 in. l., green; *fr.* 4-8 in. l.,  $\frac{1}{2}$  in. or rather more br., with 10 to 20 distant subsessile *pinnæ* on each side, which are  $\frac{1}{4}$ - $\frac{3}{8}$  in. br.,  $\frac{1}{4}$  in. deep, rhomboidal in general outline, the upper and outer edge deeply and sharply toothed, the lower truncate in a straight or decurved line; *texture* thinly herbaceous; *veins* fine and copious, subflabellate; *sori* irregular, not reaching the edge.—*Hk. Sp. 3. p. 146. Hk. & Gr. Ic. t. 63.*

Hab. Andes of Peru and Bolivia.—This comes very near *A. fragile*, but is a more slender plant, with the *pinnæ* sharply and irregularly cut.

30. *A. vagans*, Baker; *st.* tufted, 1-2 in. l., firm, naked, pale-green; *fr.* 3-4 in. l.,  $\frac{1}{2}$ - $\frac{5}{8}$  in. br., wide-straggling, elongated and rooting at the apex, with 8-12 sessile *pinnæ* on each side, which are  $\frac{1}{4}$  in. br. by less deep, subrhomboidal in general outline, the upper and outer edge deeply crenated, the base narrowed suddenly, the lower edge straight and entire; *texture* coriaceous; *rachis* stout, compressed, and slightly winged upwards; *veins* immersed; *sori* 2-3 to a pinna, short, linear-oblong, placed near the margin.

Hab. Island of St. Thomas, West Tropical Africa, *G. Mann*; Madagascar, *Dr. Meller*.—This seems a very distinct species, nearest *flabellifolium* in habit, but very different in size, texture, and shape of the *pinnæ*.

31. *A. flabellifolium*, Cav.; *st.* tufted, 3-6 in. l., slender, green or chesnut-brown, flexuose; *fr.* procumbent, wide-straggling, elongated, and rooting at the apex, 6-12 in. l.,  $\frac{3}{4}$ -1 in. br., with 10 to 15 sessile flabellate *pinnæ* on each side, which are  $\frac{1}{4}$ - $\frac{1}{2}$  in. each way, broadly lobed and the lobes sharply toothed, the

base cut away in a curve on the lower side; *texture* herbaceous; *veins* flabellate; *sori* oblique, irregular, copious.—*Hk. Sp. 3. p. 146. Ex. Fil. t. 208.*

Hab. Temperate Australia, Tasmania, and New Zealand.

32. *A. Quitense*, Hk.; *st.* slightly tufted, slender, green, 1 in. or less l.; *fr.* 2-3 in. l.,  $\frac{3}{4}$  in. br., with 6-12 conspicuously stalked horizontal pinnae on each side, which are oblong-deltoid in general outline, but half the lower side cut away, the rest broadly and bluntly lobed; *texture* herbaceous; *rachis* green, compressed and slightly winged; *veins* distant, pinnate; *sori* 2-4 to a pinna, principally on the upper side.—*Hk. Sp. 3. p. 145. 2nd Cent. t. 20.*

Hab. Andes of Ecuador, *Jameson*, 707; *Spruce*, 5334.—Recedes from *A. viride* by its more distant, more deeply lobed and distinctly stalked pinnae.

33. *A. Sandersoni*, Hk.; *st.* tufted, 1-2 in. l., green, slightly fibrillose; *fr.* 6-9 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., linear, often gemmiferous at the apex, with 12 to 20 horizontal dimidiate pinnae on each side, which are deeply crenate on the upper edge, and at the base narrowed suddenly into a winged petiole, the lower one nearly straight and quite entire; *texture* herbaceous; *rachis* green, flaccid; only the lowest side vein forked; *sori* 1-3, oblong.—*Hk. Sp. 3. p. 147. t. 179.*

Hab. Natal, Zambesi Land, and Johanna Island.—Nearest *A. Quitense*, but the pinnae quite dimidiate and the teeth of the upper side closer and vertical.

34. *A. dentatum*, Linn.; *st.* tufted, 2-6 in. l., slender, naked, polished, ebeneous below; *fertile fr.* 2-3 in. l., 1 in. br., with 6 to 8 pairs of stalked subopposite pinnae, which are  $\frac{1}{2}$  in. br.,  $\frac{3}{8}$  in. deep, oblong-rhomboidal, the lower side at the base truncate in a curve, the outer edge irregularly crenate; *sterile fr.* smaller, on shorter stalks; *texture* herbaceous; *rachis* slender, naked, green; *veins* subflabellate; *sori* copious, in two parallel rows.—*Hk. Sp. 3. p. 130.*

Hab. West Indies, Mexico, and Guatemala.—Pinnae much further apart than in the rest of the group, the lower pair sometimes 1 in. from the others.

B. Group of *A. Trichomanes*. *Rachis* wiry, chesnut-brown or blackish. Sp. 35-44.

35. *A. pygmaeum*, Hk.; *st.* tufted,  $\frac{1}{2}$  in. l., slender, densely clothed with long horizontal fibrillose scales; *fr.* 1-1 $\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., linear, with a pinnatifid point and 3 to 4 sessile pinnae on each side, which are  $\frac{1}{8}$  in. each way, oblong, rhomboidal, between cuneato-flabellate and dimidiate, the apex deeply crenated; *texture* herbaceous; *rachis* scaly like the stem; *sori* unknown.—*Hk. Sp. 3. p. 147. t. 180. B.*

Hab. Madagascar, *Dr. Lyall*.

36. *A. Heuffleri*, Reichardt; *st.* densely tufted, 2-3 in. l., wiry, slender, polished, dark chesnut-brown; *fr.* 1 $\frac{1}{2}$ -2 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., with 3 or 4 pairs of opposite distant pinnae, the lowest of which is  $\frac{1}{4}$  in. each way, rhomboidal-cuneate, inciso-dentate, and sometimes deeply lobed, uniformly narrowed on both sides below to a distinct petiole; *texture* herbaceous; *rachis* naked, dark-coloured and polished like the stem; *veins* flabellate; *sori* irregular, linear-oblong.—*Verh. Zool. Bot. Ges. Wien. 1859. p. 95. t. 4.*

Hab. Tyrol, *Heuffler*.—Some of the German botanists have regarded this as a hybrid of *Trichomanes* and *germanicum*, between which it is quite intermediate.

37. *A. Trichomanes*, L.; *st.* densely tufted, 1-4 in. l., naked, glossy, chesnut-brown, polished; *fr.* 6-12 in. l.,  $\frac{1}{2}$  in. or rather more br., with 15-30 opposite pairs of sessile horizontal pinnae, which are  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., 1 $\frac{1}{2}$ -2 lin. deep, the edge



slightly crenate, the two sides unequal, the upper one the broadest, and narrowed suddenly at the base; *texture* subcoriaceous; *veins* pinnate, inconspicuous; *rachis* polished like the stem; *sori* linear-oblong, 3-6 on each side of the midrib.—*Hk. Sp. 3. p. 136. Brit. F. t. 29.*

Hab. Temperate regions of the Old World, from Britain and the Azores eastward to Japan and the Himalayas, where it ascends to 6-8,000 ft.; S. Africa; South Australia, Van Diemen's Land, New Zealand, Sandwich Islands; N. America, and southward along the Andes to Peru.—The Madeiran *A. anceps*, Sol., and S. American *A. castaneum*, Cham. & Schl., seem to be luxuriant forms. The latter has the frond sometimes 18 in. and the pinnæ  $\frac{1}{2}$  in. l.: *A. densum*, Brack., is a reduced alpine form from the Andes.

38. *A. arcuatum*, Liebm.; *st.* tufted, very short, polished, blackish; *fr.* arcuate, 6-9 in. l.,  $\frac{1}{2}$  in. br., linear, with 20-30 very close-placed horizontal subdimidiate sessile pinnæ on each side, which are  $\frac{1}{4}$  in. or rather less br.,  $\frac{1}{2}$  in. deep, blunt at the point, the upper side slightly crenate, slightly auricled, and narrowed suddenly at the base, lower line entire, nearly straight or decurved in the lower ones; *texture* subcoriaceous; *rachis* black, and polished like the stem; *veins* pinnate; *sori* short, only 1 or 2, parallel with the lower edge of the pinnæ.—*Hk. Sp. 3. p. 142. t. 139.*

Hab. Mexico.—Probably this ought to be joined with *A. monanthemum*.

39. *A. extensum*, Fée; *st.* tufted, 4-6 in. l., polished, blackish; *fr.* 12-24 in. l.,  $\frac{3}{4}$ -1 in. br., with 20-40 sessile pinnæ on each side, which are  $\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. deep, blunt and entire, the upper side rather the broadest, and often cordate, whilst the lower is merely rounded at the base; *texture* coriaceous; *veins* inconspicuous; *rachis* polished like the stem, with 2 hairy lines running up it, sometimes bearing gemmæ, and throwing out branches from the axils of the pinnæ; *sori* linear-oblong, 2 or 3 on each side of the midrib.—*Hk. Sp. 3. p. 142.*

Hab. Andes of Columbia and Peru.—A larger plant than *A. Trichomanes*, with pinnæ very blunt, sometimes nearly round.

40. *A. Petrarchæ*, D. C.; *st.* densely tufted, 1-2 in. l., wiry, nearly black, densely glandular when young; *fr.* 2-3 in. l.,  $\frac{1}{2}$  in. br., linear-lanceolate, with 6-10 horizontal sessile pinnæ on each side, which are  $\frac{1}{4}$  in. l., rather less br., cordate-ovate, the point blunt, the edge sinuated or pinnatifid, the base unequal, slightly truncate on the lower side; *texture* subcoriaceous; *veins* obliquely pinnate, ebeneous; *rachis* and young fronds glandular; *sori* oblong, very short, 4-6 on each side of the midrib.—*Hk. Sp. 3. p. 138. Hk. & Gr. Ic. t. 152. A. pilosum, Guss.*

Hab. France, Spain, Italy.—Distinguished from *A. Trichomanes* by its glandulosity and more deeply-cut pinnæ.

41. *A. monanthemum*, Linn.; *st.* densely tufted, 3-6 in. l., naked, polished, chestnut-brown; *fr.* 12-18 in. l.,  $\frac{3}{4}$ -1 in. br., with 20-40 horizontal sessile subdimidiate pinnæ on each side, which are  $\frac{3}{8}$ - $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. deep, the upper side crenate, suddenly narrowed at the base, often distinctly auricled, the lower more or less distinctly cut away in a straight or, in the lower pinnæ, decurved line; *texture* subcoriaceous; *veins* flabellate; *sori* linear-oblong, usually 1 or 2, parallel with the lower edge of the pinnæ.—*Hk. Sp. 3. p. 140.*

Hab. Madeira, Azores, Abyssinia, Cape Colony, Sandwich Islands and Mexico along the Andes to Chili.—A larger plant than *A. Trichomanes*, with the sori typically one or two to a pinna; but in some of the forms,—for instance, *A. Galeottii*, Fée, and *A. Menziesii*, Hk. & Gr. Ic. t. 100,—more numerous.

42. *A. normale*, Don; *st.* 4-6 in. l., tufted, wiry, blackish, polished; *fr.* 8-12

in. l.,  $1\frac{1}{2}$  in. br., with very numerous close-placed pinnæ, the lower ones, which are  $\frac{3}{4}$  in. l.,  $\frac{1}{4}$  in. br., deflexed, the point obtuse, the edge inciso-crenate, the upper side auricled and narrowed suddenly at the base, the lower truncate in a straight line; *texture* subcoriaceous; *rachis* glossy, nearly black; *veins* mostly once forked; *sori* in 2 unequal parallel rows.—*A. multijugum*, Wall. *Hk. Sp. 3. p. 139. t. 188.*

Hab. Himalayas to Ceylon.—*A. opacum*, Kunze, is a large form, with herbaceous pinnæ 1 in. l. Very doubtfully distinct from *A. monanthemum*, but constantly plurisorous.

43. *A. subavenium*, Hk.; *st.* tufted, 2-3 in. l., wiry, blackish, densely fibrillose; *fr.* 9-12 in. l.,  $1\frac{1}{2}$  in. br., with very numerous close-placed horizontal pinnæ on each side, which are  $\frac{3}{4}$ -1 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., blunt at the point, the edge slightly inciso-crenate, the upper side distinctly auricled, and narrowed suddenly at the base, the lower narrower below, but nearly equal upwards; *texture* coriaceous; *veins* faint, and a distinct midrib only in the lower part of the pinnæ; *rachis* densely fibrillose, especially below; *sori* 2-4 on each side, oblique.—*Hk. Sp. 3. p. 143. t. 181. B.*

Hab. Penang, *Mactier*.—Bojer's Madagascar specimen, figured in "Species Filicum," seems to be an example of this, which differs from the rest of the group by its densely fibrillose rachis, and is not unlikely *A. setosum*, Desv.

44. *A. ebenenum*, Ait.; *st.* tufted, 3-6 in. l., chesnut-brown, polished, nearly naked; *fr.* 12-18 in. l., 2-3 in. br., linear-lanceolate, with 20-40 sessile horizontal or subfalcate pinnæ on each side, which are 1 in. or more l.,  $\frac{1}{2}$  in. or rather more br., the point acute or bluntish, the edge inciso-serrate, but sometimes very faintly so, the base hastately auricled on one or both sides, often cordate; *texture* herbaceous; *veins* fine and close, once or twice forked; *rachis* chesnut-brown and bright polished; *sori* often 10-12 on each side, oblong, short.—*Hk. Sp. 3. p. 138.*

Hab. Canada to the West Indies, and Ecuador; Cape Colony.—*A. ebenoides*, Scott, of which a single root was found on the banks of the Schuykill above Philadelphia, looks most like this; but the pinnæ are not cut down to the rachis, and the frond has an elongated point which is only sinuated with a single row of sori on each side. Probably, as suggested by Professor Eaton, this is *A. Hendersoni* of Houlston, figured by Lowe, vol. 5, t. 12. This species recedes from the *Trichomanes* group towards *A. formosum*.

†† Pinnæ 1 or 2, linear-cuneate. Sp. 45-46. *Acropteris*, Link.

45. *A. septentrionale*, Hoffm.; *st.* densely tufted, 3-4 in. l., slender, erect, naked, ebenous towards the base; *fr.* simple or cleft from the apex into two or three cuneate divisions, 1- $1\frac{1}{2}$  in. l., 1 lin. br., with a few sharp lateral and terminal teeth; *texture* coriaceous; *veins* forked, subparallel; *sori* elongated, copious, often at last hiding the whole under surface.—*Hk. Sp. 3. p. 174. Brit. F. t. 26.*

Hab. Norway and Britain, to Spain, Italy, Siberia, and the Himalayas, Rocky Mountains and New Mexico.—This and the following connect *Asplenium* with *Actiniopteris*.

46. *A. Seelosii*, Siebold; *st.* densely tufted, 1-2 in. l., slender, wiry, green, ebenous below; *fr.*  $\frac{1}{2}$ - $\frac{3}{4}$  in. l., palmately cleft, usually into 3 nearly equal forks, which are about 1 lin. br., the edge slightly inciso-serrate; *texture* coriaceous; *upper surface* pale-green, hairy; *veins* obscure; *sori* copious, when mature occupying the whole surface.—*Hk. Sp. 3. p. 175. 2nd Cent. t. 82.*

Hab. Tyrol and Carinthia.



+++ *Pinnæ* numerous, linear or linear-oblong, usually ample, acute or acuminate. Sp. 47-103.

A. Group of *A. salicifolium*. *Pinnæ* equal or nearly so on both sides at the base. Sp. 47-60.

47. *A. angustifolium*, Mich. ; *st.* tufted, 1 ft. or more l., erect, brownish, slightly scaly below ; *fr.* 18-24 in. l., 4-6 in. br., lanceolate-oblong, flaccid, with 20-30 subsessile horizontal *pinnæ* on each side, the sterile ones the largest, 3-4 in. l.,  $\frac{1}{2}$  in. br., acuminate at the point, the edge obscurely crenate, the base rounded and equal on both sides ; *fertile pinnæ* narrower and more distant ; *texture* thinly herbaceous ; *veins* sometimes twice forked ; *sori* very close and regular, extending from the midrib nearly to the edge.—*Hk. Sp. 3. p. 115.*

Hab. Canada, southward to the Southern United States.—A very distinct species.

48. *A. multilineatum*, Hk. ; *st.* 6 in. l., firm, erect, naked, greyish-green ; *fr.* 12-18 in. l., 6-8 in. br., oblong-lanceolate, with a long linear-lanceolate terminal *pinna* and 9-18 lateral ones on each side, which are 4-6 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., the point acuminate, the edge faintly toothed, but the point more deeply, the base cuneato-truncate with a short petiole ; *texture* herbaceous ; *colour* dark-green ; *rachis* naked ; *veins* mostly simple, with *sori* on each reaching from the midrib to the edge.—*Hk. Sp. 3. p. 102.* *A. distans*, Brack.

Hab. Samoa and Fiji.—Characterized by its simple veins, which branch from the midrib at an angle of from 70 to 80, and close regular rows of *sori*.

49. *A. longissimum*, Blume ; *st.* tufted, 3-12 in. l., strong, erect, blackish, nearly naked ; *fr.* 2-3 ft. l., 4-6 in. br., lanceolate elongate, proliferous and rooting at the apex, with very numerous horizontal *pinnæ* on each side, which are 2-3 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., the point acuminate, the two sides nearly equal, with a distinct central midrib, the edge slightly toothed, the base on both sides often auricled ; *texture* herbaceous ; *rachis* dark-coloured, strong, slightly villose ; *veins* forked, oblique ; *sori* numerous, in 2 regular rows on each side the midrib and reaching nearly to the edge.—*Hk. Sp. 3. p. 149. t. 190.*

Hab. Java, Borneo, Malacca, Mauritius.

50. *A. Wightianum*, Wall. ; *st.* tufted, 6-9 in. l., greenish, naked ; *fr.* 12-18 in. l., 6-8 in. br., oblong-lanceolate, with 6-9 *pinnæ* on each side, which are distinctly stalked, and the lowest 2 in. apart, 5-6 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., the point acuminate, the edge irregularly crenate, the base gradually truncato-cuneate, equal on both sides ; *texture* coriaceous ; *colour* pale-green ; *veins* inconspicuous, distant, often forked ; *sori* distant, falling short of the edge.—*Hk. Sp. 3. p. 105. t. 167.* *A. longipes*, Fée, *Hk. Sp. 3. p. 106.*

Hab. Madras and Ceylon.

51. *A. Sumatranum*, Hk. ; *st.* 6-9 in. l., firm, erect, grey, naked ; *fr.* 18 in. l., 6 in. br., with a long narrow linear terminal *pinna* and 6 erecto-patent ones on each side, which are 6 in. l.,  $\frac{3}{4}$  in. br., the point acuminate, the lower part obscurely undulated, the upper part crenate, the base equally truncato-cuneate on both sides, decurrent so as to form a distinctly-marked wing to the rachis in the upper part ; *texture* very coriaceous ; *veins* very oblique, usually once forked ; *sori* long, reaching nearly from the midrib to the edge.—*Hk. Sp. 3. p. 110. t. 168.*

Hab. Sumatra, *Teschemacher* ; Fiji, *Daernel*.

52. *A. salignum*, Blume ; *st.* 4-6 in. l., slender, naked ; *fr.* 6 in. l., about 6 in.

br., ovate in general outline, with a long, linear, terminal *pinna* and 2-3 opposite pairs, which are 3-4 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., with an acuminate point, the margin faintly crenated, the base cordate, the nodes thickened; *texture* coriaceous; *rachis* and both surfaces naked; *veins* distant, obscure; *sori* falling short of the margin.—*Hk. Sp. 3. p. 95. t. 165. A. diversifolium, Blume.*

Hab. Java.—This and the two preceding agree in texture, but may be recognized by the base of the *pinnae*.

53. *A. alatum*, H. B. K.; *st.* 4-6 in. l., rather slender, naked, the upper part winged, and the *rachis* furnished throughout with a distinct wing; *fr.* 1-1 $\frac{1}{2}$  ft. l., 3-4 in. br., with 12-20 horizontal sessile *pinnae* on each side, which are 1-1 $\frac{1}{2}$  in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., bluntish at the point, the edge uniformly inciso-crenate, the base nearly equal on both sides, but the upper one slightly more dilated; *texture* herbaceous; *veins* usually once forked; *sori* distant, not reaching either the midrib or edge.—*Hk. Sp. 3. p. 121.*

Hab. West Indies and Columbia southward to Peru and S. Brazil.

54. *A. Vieillardii*, Mett.; *st.* tufted, 4-6 in. l., firm, erect, nearly naked; *fr.* 6-9 in. l., 6 in. br., with a large linear-lanceolate terminal *pinna*, lengthened out at the point and deeply serrated, and 3-4 pairs of erecto-patent similar lateral ones, which are 4 in. l., upwards of  $\frac{1}{2}$  in. br., equally truncato-cuneate, and the lower ones slightly stalked at the base; *texture* herbaceous; *rachis* firm, grey, naked; *veins* oblique, once or twice forked; *sori* distant, falling short of both edge and margin.—*Mett. Annales, 4 ser. v. 15. p. 72.*

Hab. New Caledonia, *Vieillard, 1645-6.*

55. *A. salicifolium*, Linn.; *st.* tufted, strong, naked, erect, 6-12 in. l.; *fr.* 12-18 in. l., 6-9 in. br., oblong, with a terminal *pinna* and 4-10 distinctly stalked often horizontal ones on each side, which are 4-6 in. l.,  $\frac{3}{4}$ -1 in. or more br., the point acuminate, the edge nearly entire or occasionally lobed below, the base equally truncato-cuneate on both sides; *texture* herbaceous; *veins* erecto-patent, rather close, once or twice forked; *sori* falling short both of the edge and midrib.—*Hk. Sp. 3. p. 112.*

Hab. West Indies and Panama southward to Rio Janeiro and Peru.—According to Mettenius, *A. juglandifolium*, Lam. (*A. integerrimum*, Spr.), is a distinct species, allied to this, with entire *pinnae*; and *A. neogranatense*, Fée, a form of the same with few *pinnae*, the terminal one elongated.

56. *A. longicauda*, Hk.; *st.* 6-12 in. l., firm, erect, brownish, nearly naked; *fr.* 12-18 in. l., 6-9 in. br., with a large oblong-acuminate terminal *pinna* 6-8 in. l., 1-1 $\frac{1}{2}$  in. br., which is often elongated and proliferous; *lateral pinnae* 3-9 on each side, similar in shape to the terminal one, but usually smaller, the margin obscurely undulated, the base nearly equal, and the lower ones slightly stalked; *texture* herbaceous; *colour* deep-green; *veins*  $\frac{1}{8}$  in. apart, simple or forked; *sori* broad and distant, not reaching either the edge or midrib.—*Hk. 2nd Cent. F. t. 69.*

Hab. Cameroon Mountains and Fernando Po.—In one of Dr. Curror's specimens the terminal *pinna* is a foot long, considerably sinuated upwards, and gemmiferous at the apex; the lateral *pinnae* are also often proliferous at the point.

57. *A. emarginatum*, Beauv.; *st.* 6-12 in. l., firm, erect, brownish, nearly naked; *fr.* 12-18 in. l., 6-9 in. br., with a large lanceolate-oblong terminal *pinna* 6-8 in. l., 1-1 $\frac{1}{2}$  in. br., and 3-6 pairs of distant slightly-stalked lateral ones, the lowest of which are rather smaller than the terminal one, the apex of each



emarginate, with a small bud in the open sinus, the edge slightly crenate, the base equal on both sides, rounded into a short stalk; *texture* thinly herbaceous; *colour* bright-green; *veins* usually forked; *sori* irregular, close, reaching from the midrib nearly to the edge.—*Hk. 2nd Cent. F. t. 80.*

Hab. Guinea coast and Angola.

58. *A. virens*, Presl; *st.* 6-12 in. l., rather slender, greyish, naked; *fr.* 9-12 in. l., 6-8 in. br., ovate, with a terminal *pinna* and 3-5 lateral ones on each side, which are  $\frac{1}{2}$ - $1\frac{1}{2}$  in. apart at the base, the lowest only distinctly stalked, 3-4 in. l.,  $\frac{3}{4}$ -1 in. br., the point acuminate, the margin deeply crenato-dentate, the base truncato-cuneate; *texture* herbaceous; *colour* bright-green; *rachis* green, subflaccid, naked; *veins* distant; *sori* reaching from the midrib to the edge.—*Hk. Sp. 3. p. 101.*

Hab. Gorgona Island and Guyaquil, West Tropical America.—Closely allied to *A. salicifolium* and *oligophyllum*.

59. *A. vulcanicum*, Blume; *st.* 6-9 in. l., firm, erect, grey, naked; *fr.* 1-2 ft. l., 4-8 in. br., oblong-lanceolate, with a linear-terminal *pinna*, or gemmiferous at the apex, and 6-12 lateral ones on each side, the lower ones distinctly stalked, 4-6 in. l.,  $\frac{3}{4}$ -1 in. br., the point acuminate, the edge slightly crenato-dentate, the base truncato-cuneate into a petiole sometimes  $\frac{1}{2}$  in. l.; *rachis* naked; *texture* herbaceous or subcoriaceous; *veins* simple or forked; *sori* very regular and parallel, falling short of the edge; *invol.* broad, pale.—*Hk. Sp. 3. p. 102.* *A. heterodon*, *Mett., Hk. Sp. 3. p. 107.*

Hab. Java and Fiji.—The Ceylonese *A. Walkeræ*, *Hk. Sp. 3. p. 108. t. 163.*, does not seem to be safely separable; and Mr. Thwaites says that this last and *A. Wightianum* pass into one another gradually. *A. heterodon*, Blume, is said to differ by its stouter habit, broader pinnæ, and fewer sori.

60. *A. oligophyllum*, Kaulf.; *st.* tufted, 6-12 in. l., firm, erect, scaly below; *fr.* 1-2 ft. l., 6-9 in. br., oblong, with a large terminal *pinna* and 3-8 erecto-patent lateral ones on each side, which are 6-8 in. l., 1- $1\frac{1}{2}$  in. br., the point acuminate, the edge obscurely sinuated, the base nearly equal, narrowed or rounded on both sides into a short winged petiole, the upper ones decurrent on the rachis; *texture* herbaceous; *veins* faint, distant, usually once forked; *sori* not reaching the edge by a considerable space.—*Hk. Sp. 3. p. 107.*

Hab. Columbia and Brazil; and I cannot distinguish a plant gathered at Penang by Mactier.

*B. Pinnæ narrowed suddenly at the base on the upper side, the inner edge nearly parallel with the main rachis, the lower side obliquely truncate.*—*Sp. 61-98.*

*a. Group of A. erectum. Texture of the frond herbaceous, the colour dark-green, the veins clearly visible.* *Sp. 61-75.*

61. *A. tenerum*, Forst.; *st.* tufted, firm, erect, greyish, naked, 4-6 in. l.; *fr.* 8-15 in. l., 3-4 in. br., oblong-lanceolate, with 10-20 stalked horizontal *pinnæ* on each side, which are 1- $1\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., bluntly rounded at the point, the edge deeply toothed throughout, the two sides unequal, the upper one narrowed almost at a right angle, sometimes slightly auricled, the lower one very obliquely truncate, lower *pinnæ* deflexed; *texture* herbaceous; *rachis* compressed; *veins* usually simple; *sori* numerous, regular, parallel, not reaching either edge or midrib.—*Hk. Sp. 3. p. 117.* *A. elongatum*, *Sw. Hk. l. c.*

Hab. Ceylon and Malayan Peninsula and islands eastward to Samoa and Fiji, and gathered lately by Mann at Fernando Po.—*A. Doreyi*, *Kze.*, seems to be a form of this

with pinnæ more narrowly pointed. This and the two next are distinguished from the rest of the group by their very close and regular sori.

62. *A. lineatum*, Swartz ; *st.* tufted, 6-9 in. l., firm, erect, more or less scaly ; *fr.* 1-2 ft. l., 4-6 in. br., oblong-lanceolate, with 20-30 *pinnæ* on each side, which are 3-4 in. l., about  $\frac{1}{2}$  in. br., acuminate at the point, dentate throughout, all sessile or nearly so, the base cuneate, but the lower side narrower and more cut away than the upper ; *texture* herbaceous ; *colour* dark-green ; *rachis* brownish-grey, and slightly paleaceous ; *veins* close, often forked ; *sori* very regular, reaching from the midrib nearly to the edge.—*Hk. Sp. 3. p. 104.*

Hab. Mauritius and Bourbon.—A very puzzling plant, from the fact that it runs gradually into forms with the pinnæ again pinnate, which have either small narrow linear-cuneate pinnules (*Darea inæqualis*, Willd., and *D. bifida*, Kaulf.), or even these latter again deeply bifid or pinnatifid (*D. bifida* and *violascens*, Bory).

63. *A. prionurus*, J. Sm. ; *st.* tufted, 6-9 in. l., firm, erect, slightly scaly below ; *fr.* 12-18 in. l., 6-9 in. br., oblong, with 9-18 *pinnæ* on each side, which are 4-6 in. l., rather over  $\frac{1}{2}$  in. br., very much acuminate at the point, deeply and regularly toothed throughout, the base rather unequal, more truncato-cuneate on the lower side, with a short distinct petiole on the lower ones ; *texture* herbaceous ; *veins* usually simple, with *sori* on each reaching nearly to the edge.—*Hk. Sp. 3. p. 103.*

Hab. Philippines, *Cuming*, 197.—Probably this should be united with *A. lineatum*.

64. *A. erectum*, Bory ; *st.* tufted, 2-4 in. l., firm, nearly naked, grey or ebeneous ; *fr.* 6-18 in. l.,  $1\frac{1}{2}$ -2 in. br., narrowly lanceolate-oblong, with 12-20 horizontal *pinnæ* on each side, which are 1-1 $\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., bluntish or acute at the point, more or less deeply inciso-crenate throughout, the two sides unequal, the upper one at the base narrowed suddenly at about a right angle, the lower one obliquely truncate ; lower pinnæ often deflexed ; *texture* herbaceous ; *rachis* firm, greyish ; *veins* simple or once forked ; *sori* falling short of both edge and midrib.—*Hk. Sp. 3. p. 127.*

Hab. Universally distributed throughout the Tropics ; America, from Cuba to Rio Janeiro and Juan Fernandez ; Sandwich Islands, Indian and Malayan Peninsula, Ceylon, Cape Colony, Tristan d'Acunha northward to Bourbon, St. Helena, Ascension, and the Guinea coast.—*A. harpeodes*, Kunze, *Hk. Sp. Fil. t. 178*, is a large form with acuminate pinnæ ; *A. Fernandesianum*, Kunze, a form from Juan Fernandez, with a more rigid rachis and subcoriaceous pinnæ ; *A. tenellum*, Roxb. (*A. reclinatatum*, Houlst., *Hk. Fil. Exot. t. 72*), a form with wide-spreading, dark-green fronds copiously proliferous at the apex ; *A. Barteri*, *Hk. 2nd Cent. t. 75*, a slender flaccid plant, also proliferous ; *A. pteropus*, Kaulf., and *A. camptorachis*, Kze., forms with the rachis compressed and slightly winged ; and the pinnæ are sometimes more or less distinctly pinnatifid, as in the S. African *A. lobatum* and *A. gracile* of Pappe and Rawson, and the Polynesian *A. Macraei*, *Hk. & Gr. t. 217*. Kunze and Mettenius consider this to be the *A. lunulatum* of Swartz, which is an older name than *erectum*.

65. *A. persicifolium*, J. Sm. ; *st.* tufted, 6-9 in. l., firm, erect, nearly naked ; *fr.* 18-24 in. l., 6-8 in. br., oblong-lanceolate, often gemmiferous at the apex, with 10-20 horizontal subsessile *pinnæ* on each side, which are 4-6 in. l.,  $\frac{3}{4}$ -1 in. br., acuminate at the point, the margin nearly entire or inciso-crenate, especially upwards, the two sides unequal, the upper one broader and less obliquely truncate than the lower one ; *texture* herbaceous ; *veins* usually once-forked ; *sori* distant, falling short of both midrib and edge.—*Hk. Sp. 3. p. 109.*

Hab. Neilgherries, Ceylon, Philippines and Solomon's Islands.—*A. salicinum*, J. Sm., is a form with narrow pinnæ 6 in. l.,  $\frac{1}{2}$  in. br., serrated throughout. *A. Zenkerianum*, Kze., is the oldest name with a description.

66. *A. obtusifolium*, L. ; *st.* almost tufted, 6-9 in. l., firm, erect, dark-green,



naked ; *fr.* 12-18 in. l., 4-6 in. br., with 12-20 stalked horizontal *pinnæ* on each side, which are 2-3 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., the point acute, the edge slightly undulato-crenate, the upper side with a distinct auricle at the base, and then narrowed suddenly, the lower side obliquely truncate ; *texture* thinly herbaceous ; *colour* deep-green ; *rachis* naked, green, compressed, flaccid ; *veins* fine, distant, usually once forked ; *sori* distant, in 2 regular rows, falling short of the edge.—*A. riparium*, *Liebm.* *Hk. Sp.* 3. p. 119. t. 169.

*Hab.* Tropical America, from Mexico and the West Indies to S. Brazil.—*A. obtusifolium*, L., appears to be founded on a dwarfed form of this, with blunt and somewhat lacinated *pinnæ*.

67. *A. fuliginosum*, Hk. ; *st.* tufted, very short, densely clothed with blackish fibrillose scales ; *fr.* 6-12 in. l., 2-3 in. br., with 12-24 broadly-adnate horizontal subfalcate *pinnæ* on each side, which are 1-1 $\frac{1}{2}$  in. l.,  $\frac{3}{8}$ - $\frac{1}{2}$  in. br., the point acute, the edge slightly toothed, the base a little narrowed on both sides in the lower ones, which are gradually reduced in size downwards ; *texture* papyraceo-herbaceous ; *colour* nearly black when dry ; *rachis* densely fibrillose throughout ; *veins* usually once forked ; *sori* in 2 regular rows near the point of the *pinnæ*.—*Hk. Sp.* 3. p. 120. *2nd Cent. F. t.* 3.

*Hab.* Borneo ; gathered by Mr. Low.—A very well-marked plant.

68. *A. Borneense*, Hk. ; *st.* 3-4 in. l., stout, greyish, arcuate, fibrillose ; *fr.* 3 ft. l., 2 $\frac{1}{2}$  in. br., with very numerous sessile *pinnæ*, the lower ones growing smaller very gradually, the central ones 1 $\frac{1}{4}$  in. l.,  $\frac{1}{4}$  in. deep, the point bluntly rounded, the upper edge inciso-lobate, auricled inwards, and narrowed suddenly at the base, the rest and the outer part of the lower edge, which is very obliquely truncated at the base, distantly toothed ; *texture* herbaceous ; *rachis* firm, nearly naked ; *veins* subflabellate in the outer half of the *pinnæ* ; *sori* few, almost in parallel rows.—*Hk. Sp.* 3. p. 135. t. 186.

*Hab.* Borneo, *H. Low, Jr.*—This comes near *A. cultrifolium*, but is a stronger plant, with blunter and more unequal-sided *pinnæ* dwindling downwards very gradually.

69. *A. firmum*, Kunze ; *st.* tufted, 4-8 in. l., firm, erect, greyish, naked ; *fr.* 6-12 in. l., 3-4 in. br., sometimes proliferous at the apex, with 12-20 sessile horizontal *pinnæ* on each side, which are 1 $\frac{1}{2}$ -2 in. l.,  $\frac{1}{2}$ - $\frac{3}{8}$  in. br., the point bluntish, the edge inciso-crenate, the upper one narrowed suddenly at the base, the lower one obliquely truncate ; *texture* herbaceous ; *rachis* firm, naked, slightly winged ; *veins* distant, once forked ; *sori* short, in 2 regular rows, falling short of both midrib and edge.—*Hk. Sp.* 3. p. 134. t. 174. *A. abscissum*, *Auct.*

*Hab.* Tropical America, from Cuba and Guatemala to Peru and S. Brazil.—Very doubtfully distinct from *A. cultrifolium*, from which it differs mainly by its shorter and blunter *pinnæ*.

70. *A. cultrifolium*, Linn. ; *st.* 4-6 in. l., naked, greyish, firm ; *fr.* 6-12 in. l., 4-6 in. br., deltoid-ovate, with a lobed terminal point and 6-10 *pinnæ* on each side, which are 3-4 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., the point acute, the edge broadly toothed, sometimes lobed below nearly or quite to the rachis, the base nearly at a right angle on the upper, but obliquely truncate on the lower side ; *texture* herbaceous ; *veins* fine, distant, usually once forked ; *sori* falling short both of the edge and midrib.—*Hk. Sp.* 3. p. 110. *Diplazium*, *Kunze*.

*Hab.* West Indies and Guatemala southward to Guyaquil.—The diplazioid character of the *sori* is sometimes clearly marked.

71. *A. auriculatum*, Swartz ; *st.* tufted, 4-8 in. l., firm, erect, nearly naked ; *fr.* 12-18 in. l., 4-6 in. br., lanceolate-oblong, with 10-20 stalked horizontal *pinnæ* on each side, which are 2-4 in. l.,  $\frac{3}{4}$ -1 in. br., lanceolate, often subfal-

cate, the edge deeply crenate, the two sides unequal, the upper one with a cordate auricle, the lower one obliquely truncate; *texture* herbaceous; lower *veins* twice forked, oblique; *sori* distant, not reaching either the midrib or edge.—*Hk. Sp. 3. p. 118. t. 171. A. falx, Desv.*

Hab. Tropical America, from Mexico and the West Indies southward to Brazil and Peru.—This also comes very near *A. cultrifolium* in habit and texture. The best character is the distinctly cordate base of the upper half of the pinna.

72. *A. Prionitis*, Kunze; *st.* tufted, 6-12 in. l., strong, erect, greyish; *fr.* 1-2 ft. l., 6-9 in. br., with 8-12 stalked *pinnae* on each side, which are 4-6 in. l., 1-1½ in. br., the point acute or acuminate, the edge sharply toothed throughout, the upper side narrowed suddenly, and the lower obliquely truncate at the base; *texture* herbaceous; *rachis* strong, erect, naked; *veins* usually once forked; *sori* copious, linear, reaching nearly to the edge.—*Hk. Sp. 3. p. 102.*

Hab. Natal and Angola.—A stronger plant than species 68 to 71, with larger *pinnae*.

73. *A. anisophyllum*, Kunze; *st.* tufted, 6-12 in. l., firm, erect, scaly below; *fr.* 1-2 ft. l., 6-9 in. br., oblong-lanceolate, with 10-16 subsessile almost horizontal *pinnae* on each side, which are 3-5 in. l., ¾-1 in. br., acuminate at the point, crenate or crenato-dentate, the two sides unequal, the upper one narrowed suddenly but not auricled, the lower one obliquely truncate at the base; *texture* herbaceous; *veins* usually once forked; *sori* distant, elliptical, not reaching more than halfway from the edge to the margin.—*Hk. Sp. 3. p. 111. t. 166.*

Hab. Cape Colony, northward to Bourbon, Zambesi Land, and the Cameroon Mountains; Galapagos Isles, Brazil, and Cuba.—Allied to species 68 to 72, and best recognized by its short regular *sori*, with large tumid involucre. *A. sanguinolentum*, Kze., *Hk. Sp. 3. p. 114*, is the American form of this species. The original plant of Kunze has nearly entire *pinnae*. The Natal *A. Boltoni*, *Hk. MSS.* (figured *Sp. Fil. t. 166*), has them uniformly rather deeply inciso-crenate, and with this Mr. Randall puts *A. discolor* of Pappe and Rawson as a more divided form.

74. *A. Wrightii*, Eaton; *st.* 1 ft. l., tufted, stout, scaly below; *fr.* 18-24 in. l., 6-9 in. br., ovate-oblong, the upper half of the rachis with a narrow wing, 12-20 *pinnae* on each side, the lower ones 4-6 in. l., ¾-1 in. br., lanceolate, subfalcate, the point acuminate, the upper part sharply and distantly toothed, the lower also cut down into roundish-spathulate lobes, which reach down nearly to the rachis, the base unequal, the lower side only obliquely truncate; *texture* herbaceous; *veins* dichotomously forked in each lobe; *sori* few, not reaching either midrib or edge.—*Hk. Sp. 3. p. 114. t. 183.*

Hab. Japan; gathered by Wright, and lately by Oldham.

*b. Texture of the frond coriaceous or subcoriaceous, colour pale-green, veins comparatively obscure. Sp. 75-98.*

*b\*. Group of A. marinum. Sori nearly equal, in two regular pinnate rows on the two sides of the distinct midrib. Sp. 75-89.*

75. *A. rhizophorum*, Linn.; *st.* tufted, firm, erect, 4-8 in. l., naked, polished, chesnut-brown; *fr.* 1-2 ft. l., 4-6 in. br., elongated, and taking root at the apex; *pinnae* 12-30 on each side, the lower ones spreading horizontally, subsessile, 1½-2 in. l., about ½ in. br., inciso-dentate throughout, the two sides unequal, the upper one auricled, and narrowed at about a right angle, the lower one obliquely cuneate; *texture* herbaceous; *veins* usually once forked; *sori* not reaching either the edge or midrib.—*Hk. Sp. 3. p. 122. t. 187. A.*

Hab. Tropical America, from Mexico and W. Indies southward to Peru, and gathered also by Milne in the Solomon's Islands, S. Pacific.—This is exceedingly variable in cutting, and may be best recognized by its elongated proliferous rachis. We have



described the form with simple pinnæ. *A. cyrtopteron* and *flabellatum* of Kunze have them deeply lobed and pinnatifid, especially in the lower half, whilst the plant called *rhizophorum* by Swartz is fully bipinnate, and *A. rachirhizon*, Raddi, and *A. amabile*, Liebm., have distinctly separated oblong-rhomboidal pinnules again deeply cut into narrow segments.

76. *A. anisodontum*, Presl; *st.* tufted, firm, erect, grey, naked or slightly fibrillose; *fr.* 12-18 in. l., 4-6 in. br., with numerous horizontal or subfalcate sessile pinnæ on each side, which are 2-3 in. l.,  $\frac{1}{2}$  in. br., the point acuminate, the edge inciso-crenate, the base on the upper side auricled and narrowed rather obliquely, on the lower side obliquely truncate; *texture* subcoriaceous; *rachis* firm, erect; *veins* oblique, mostly once branched; *sori* parallel, in 2 regular rows, reaching nearly from the midrib to the edge.—*Hk. Sp. 3. p. 153.*

Hab. Java and Philippines.

77. *A. contiguum*, Kaulf.; *st.* tufted, 6-9 in. l., firm, erect, chesnut-brown, naked; *fr.* 12-18 in. l., 4-6 in. br., with 20-30 horizontal subfalcate pinnæ on each side, which are acuminate at the apex, the edge more or less sometimes deeply inciso-serrated and slightly lobed, the base narrowed suddenly, and sometimes auricled on the upper, obliquely truncate in a curve on the lower side; *texture* subcoriaceous; *rachis* firm, naked or slightly villose, chesnut-coloured; *veins* oblique, obscure; *sori* close, copious, falling considerably short of the margin.—*Hk. Sp. 3. p. 156. t. 194.*

Hab. Sandwich Islands, Philippines, Neilgherries.—The alliance of this and the preceding is with *A. falcatum*, but the fronds are narrower, and the sori more uniform.

78. *A. hirtum*, Kaulf.; *st.* tufted, 2-4 in. l., strong, erect, brownish, decidedly fibrillose; *fr.* 12-24 in. l., 4-8 in. br., with very numerous horizontal pinnæ on each side, which are 2-3 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., the point acuminate, the edge broadly not deeply toothed, the base on the upper side conspicuously auricled, on the lower side rather suddenly but obliquely narrowed; *texture* coriaceous; *rachis* dark-coloured, strong, more or less fibrillose; *veins* oblique, inconspicuous; *sori* in 2 regular rows, which fall considerably short of the edge.—*Hk. Sp. 3. p. 149. t. 191.*

Hab. Mauritius, Madagascar, Seychelles, Malayan Peninsula and Islands, Hong-Kong, the Philippines, Ladrões and Solomon Islands.—This has the simple veins and regular sori of *A. lineatum* and *longissimum*, but the pinnæ are unequal-sided. *A. induratum*, Hk. 2nd Cent. F. t. 61, from Fiji, seems to be only a small form of this with blunter pinnæ. *A. pellucidum*, Lam., is apparently this species; and if so, that name (a very inappropriate one) is the oldest.

79. *A. hastatum*, Klotzsch; *st.* tufted, 4-6 in. l., firm, erect, greyish, scaly below; *fr.* 6-12 in. l., 3-4 in. br., oblong-lanceolate, with 8-12 horizontal sub-sessile pinnæ on each side, which are  $1\frac{1}{2}$ -2 in. l., about  $\frac{1}{2}$  in. br., the point acuminate, the edge deeply crenato-dentate throughout, the two sides unequal, the upper one narrowed at nearly a right angle, the lower one very oblique; *texture* subcoriaceous; *rachis* compressed; *veins* obscure, very oblique; *sori* distant, falling short of both edge and midrib.—*Hk. Sp. 3. p. 116. t. 172.*

Hab. Columbia and Ecuador.—*A. fragrans*, Hk. Ic. t. 88, is a small Andine form with a winged rachis. This is very near *A. firmum* and *auriculatum*, but is thicker in texture. The Chinese *A. crinicaule*, Hance, is said to be like this, but to have a wingless rachis clothed like the stem with long lanceolate vinose scales with a filiform point.

80. *A. enatum*, Brack.; *st.* tufted, 6-8 in. l., firm, erect, naked; *fr.* about 1 ft. l., 4-5 in. br., with 9-15 pinnæ on each side, which are 2-3 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., the point acute, the upper part bluntly crenated, the two sides very unequal, the upper rounded or narrowed suddenly at the base, the lower

obliquely truncate; *texture* subcoriaceous; *rachis* firm, compressed and winged above; central *veins* once forked; *sori* in 2 regular rows, falling short of the edge.—*Hk. Sp. 3. p. 106.*

Hab. Sandwich Islands.—Very near *A. compressum*, but less robust.

81. *A. compressum*, Swartz; *st.* tufted, stout, erect, 6-8 in. l., clothed with scales in the lower part; *fr.* 2-3 ft. l., 8-12 in. br., lanceolate-oblong, with 10-20 sessile *pinnae* on each side, which are 6-8 in. l., 1 in. or more br., acute or bluntish at the point, the edge slightly crenato-dentate, the upper ones decurrent at the base upon the stout fleshy compressed *rachis*, the upper side narrowed suddenly at about a right angle, the lower one obliquely truncate; *texture* herbaceous; *veins* distant, often twice forked; *sori* broad, distant, not reaching either the midrib or edge.—*Hk. Sp. 3. p. 121. Fil. Exot. t. 76.*

Hab. St. Helena.—*Pinnae* often proliferous from the upper surface (*A. fecundum*, Kunze):

82. *A. vomeriforme*, Hk.; *st.* 1 ft. l., naked, firm, erect; *fr.* 18 in. l., 6 in. br., lanceolate, with about a dozen stalked horizontal *pinnae* on each side, which are 3 in. l., 1 in. br., acute at the point, the edge nearly entire, the base cordate on the upper, slightly truncate or rounded on the lower side; *texture* subcoriaceous; *veins* immersed, inconspicuous, oblique, often twice forked; *sori* long, but falling considerably short of the edge.—*Hk. Sp. 3. p. 109. t. 162.*

Hab. Peru, Matthews, 1851.—The alliance of this is with the two preceding, but the *pinnae* are cordate on the upper, rounded on the lower side at the base.

83. *A. macrosorum*, Bert.; *st.* tufted, 4-6 in. l., scaly at the base, naked and polished and nearly black upwards; *fr.* 6-12 in. l., 3-4 in. br., cordate-acuminate, with a large *terminal pinna*, which is 4-6 in. l., 1-1½ in. br., deeply crenate and cuneate at the base, and 2 or 3 pairs of similar lateral ones, which are slightly stalked, and the lowest subdeltoid; *texture* subcoriaceous; *rachis* and midrib dark-coloured and polished like the stem; *veins* distant; *sori* broad, not reaching either the midrib or the edge.—*Hk. Sp. 3. p. 93. t. 176.*

Hab. Juan Fernandez; gathered by Bertero and Philippi.

84. *A. nitens*, Swartz; *st.* scattered, 6-9 in. l., firm, erect, chesnut-brown, polished, naked; *fr.* 1½-2 ft. l., 6-9 in. br., with 12-20 ascending or subfalcate *pinnae* on each side, which are 4-6 in. l., ½-1 in. br., the point much acuminate, the edge finely toothed, the base broadly rounded on the upper, truncate in a curve on the lower side; *texture* subcoriaceous; *rachis* naked, shining; *veins* oblique, often twice forked; *sori* in close regular rows, not extending more than halfway from the midrib to the edge.—*Hk. Sp. 3. p. 157. t. 195.*

Hab. Mauritius and Bourbon.—This and the two next, like species 76 and 77, resemble the *falcatum* group in habit and texture.

85. *A. platybasis*, Kunze; *st.* scattered, 4-8 in. l., strong, erect, channelled, the lower part scaly; *fr.* 12-18 in. l., 6-9 in. br., with 12-20 erecto-patent *pinnae* on each side, which are 4-6 in. l., ¾-1 in. br., acuminate at the apex, the edge serrated, the two sides unequal, the upper one narrowed suddenly at the base, the lower one obliquely truncate; *rachis* strong, erect, nearly naked; *veins* close, oblique; *sori* copious, touching the midrib, but falling short of the edge.—*A. falcatum* var. *Hk. Sp. 3. p. 160. A. firmum, Fée, non Kunze.*

Hab. St. Helena.—Differs from *A. Serra* mainly by its more copious *sori*.

86. *A. Serra*, Langs. & Fisch.; *st.* distant, 6-12 in. l., firm, erect, chesnut-coloured, polished, the lower part scaly; *fr.* 2-4 ft. l., 6-12 in. br., with 12-20



spreading *pinnæ* on each side, which are 4-8 in. l.,  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. br., the point acuminate, the edge sharply inciso-serrate, the upper base rounded, the lower cuneate; *texture* coriaceous; *rachis* strong, erect, brown, sometimes polished; *veins* very oblique; *sori* mostly in 2 parallel rows, close to the midrib.—*Hk. Sp. 3. p. 154.*

Hab. Tropical America, from Cuba and Guatemala southward to Organ Mountains and Peru, and gathered also by Mann on the Cameroon Mountains and at Fernando Po.—Var. *Imrayanum*, Hk., is a large form with the *pinnæ* often deeply lobed.

87. *A. marinum*, Linn.; *st.* tufted, 3-6 in. l., naked, except at the base, polished, chesnut-brown, the scales linear, nearly black; *fr.* 6-12 in. l., 2-3 in. br., oblong-lanceolate, the apex pinnatifid; *pinnæ* of the lower half quite distinct, spreading horizontally, 1 in. or more l.,  $\frac{1}{2}$  in. br., oblong or lanceolate-deltoid, the point acute or obtuse, the margin crenato-dentate, sometimes deeply sinuated, the base slightly truncate below, and often auricled above; *texture* subcoriaceous; *veins* usually once forked; *sori* broad, falling short of the edge.—*Hk. Sp. 3. p. 95. Brit. F. t. 31.*

Hab. Coast of W. Europe, from the Orkneys to the Canaries and Azores; and there are specimens also in the Kew Herbarium from Nova Scotia, the island of St. Vincent, and S. Brazil.

88. *A. obtusatum*, Forst.; *st.* tufted, 3-6 in. l., firm, greyish, densely clothed at the base with large, thin, grey, lanceolate scales; *fr.* 6-12 in. l., 3-4 in. br., oblong or ovate-deltoid, with a terminal *pinna* not much larger than the others, and 2-6 pairs on each side, which are 1-2 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., obtuse at the point, the edge crenate, the base truncato-cuneate, especially on the lower side, and shortly stalked; *texture* cartilaginous; *rachis* firm, broad, often compressed and channelled, both surfaces naked; *colour* pale-green; *veins* immersed and inconspicuous; *sori* copious, broad, linear-oblong, falling short of the edge.—*Hk. Sp. Fil. 3. p. 96. Fil. Ex. t. 46.*— $\beta$ , *A. obliquum*, Forst.; *fr.* often more than 1 ft. l., 6 in. br.; *pinnæ* more numerous, often 4 in. l., 1 in. br., narrowed gradually to an acute point, with the lines of fruit  $\frac{1}{2}$ - $\frac{3}{4}$  in. l. and closer; *texture* still cartilaginous.— $\gamma$ , *A. lucidum*, Forst.; *fr.* sometimes 2 ft. l., with 15-20 pairs of *pinnæ* on each side, which are more herbaceous in texture, darker green in colour, the lowest 6 in. l., 1-1 $\frac{1}{2}$  in. br., narrowed gradually to a long acuminate point, the edge more deeply toothed, the rachis often dark-coloured.—*Hk. Sp. 3. p. 99.*

Hab. Peru and Chili, Polynesian Islands, and plentiful in New Zealand and Australia.—The three well-known plants here united appear to glide into one another by the most gradual intermediate stages of transition; and what complicates the matter still more is the occurrence of forms with the *pinnæ* pinnatifid or even fully pinnate, which cannot be separated clearly. Of these *A. scleropium*, Hömbr. & Jacq., is most like  $\beta$  in texture, with the *pinnæ* regularly and closely toothed throughout to a depth of two lines or more; *A. difforme*, R. Br., has an ovate-deltoid frond of coriaceous texture, with *pinnæ* quite cut down to a narrow-winged rachis in the lower part into distinctly separated roundish or oblong sinuated pinnules; and *A. Lyallii*, Moore (*A. lucidum*, var. *Lyallii*, Hk. fil. Fl. N. Z. t. 77), has a herbaceous frond nearly 18 in. l., 9 in. br., with lanceolate deltoid lower *pinnæ* 6 in. l., 3 in. br.; in the extreme form cut down into deeply-toothed pinnules, which are cuneate at the base and distinctly stalked.

89. *A. gemmiferum*, Schrad.; *st.* tufted, 3-6 in. l., firm, greyish, the base and lower part scaly; *fr.* 1-2 ft. l., 4-8 in. br., oblong, generally proliferous at the apex, with 6-12 erecto-patent distinctly-stalked *pinnæ* on each side, the lowest of which are 4-6 in. l.,  $\frac{3}{4}$ -1 in. br., narrowed gradually to an acute point; the edge crenato-dentate, the base truncato-cuneate; *texture* herbaceous or subcoriaceous; *rachis* firm, naked, compressed below; *veins* immersed and inconspicuous; *sori* copious, broad, falling short of both edge and midrib.—*Hk. Sp. 3. p. 100.*

Hab. Cape Colony, northward to Angola, Zambesi Land, Bourbon, Mauritius, and Madagascar.—Very near *A. obtusatum*, of which it may be an African form. Schlechtendahl referred it to Forster's *lucidum*. The pinnæ vary considerably in texture, and here also there is a divided form (*A. flexuosum*, Schrad.) which has the pinnæ cut down into narrow lobes about halfway down to the rachis in the upper part, and sometimes quite down to it near the base.

*b\*\**. Group of *A. falcatum*. Sori and veins long, irregular, subflabellate, very oblique. Sp. 90-98.

90. *A. auritum*, Swartz; *st.* tufted, 4-8 in. l., firm, erect, grey, naked; *fr.* 6-12 in. l., 2-4 in. br., with 10-15 distinctly stalked horizontal pinnæ on each side, which are 2-3 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., the point acute or bluntish, the edge sharply toothed or often lobed, especially on the upper side towards the base, which, if not lobed, is distinctly auricled and narrowed suddenly, whilst the lower edge at the base is obliquely truncate; *texture* coriaceous; *rachis* firm, erect, grey, naked; *veins* close, oblique, inconspicuous; *sori* in 2 broad rather oblique rows.— $\beta$ , *A. macilentum*, Kze.; *rachis* broadly winged; *pinnæ* blunt.— $\gamma$ , *A. rigidum*, Sw.; *pinnæ* deeply pinnatifid throughout.—*Hk. Sp.* 3. p. 179.

Hab. Common in Tropical America, from Cuba and Mexico to Peru and S. Brazil; Neilgherries, Bourbon.

91. *A. paleaceum*, R. Br.; *st.* densely tufted, 1-3 in. l., spreading, densely scaly; *fr.* 6-9 in. l.,  $1\frac{1}{2}$ -2 in. br., sometimes rooting and proliferous at the apex, with 12-20 sessile pinnæ on each side, which are 1 in. l.,  $\frac{3}{8}$ - $\frac{1}{2}$  in. br., the point bluntish, the edge irregularly inciso-dentate, the upper base auricled and narrowed suddenly, the lower obliquely truncate, the lower ones stalked, and nearly as broad as long; *texture* subcoriaceous; *rachis* densely clothed throughout; *veins* flabellate, deep channelled, conspicuous on the upper surface; *sori* linear, extending nearly to the edge.—*Hk. Sp.* 3. p. 162. *t.* 199.

Hab. Tropical Australia.—A very distinct species.

92. *A. Hancei*, Baker; *st.* densely tufted, 3-4 in. l., erect, dark-brown, slightly fibrillose; *fr.* 6-9 in. l.,  $1\frac{1}{2}$  in. br., with 9-15 horizontal pinnæ on each side, which are  $\frac{5}{8}$ - $\frac{3}{4}$  in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., the point bluntish, the edges irregularly inciso-crenate, the upper side narrowed suddenly, sometimes auricled at the base, the lower obliquely truncate; *texture* subcoriaceous; *rachis* firm, slightly fibrillose, no distinct midrib; *veins* subflabellate; *sori* few, linear, very oblique.

Hab. S. E. China, *Dr. Hance*, *Col. Dunlop*.—Intermediate between *A. paleaceum* and *planicaule*.

93. *A. erosum*, Linn.; *st.* tufted, 6-9 in. l., firm, erect, nearly naked; *fr.* 6-12 in. l., 4-8 in. br., with 9-15 pinnæ on each side, which are 3-4 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., the edge slightly lobed and crenato-dentate, the point acuminate, the two sides unequal, the upper one narrowed suddenly, the lower one obliquely truncate at the base; *texture* subcoriaceous; *rachis* firm, erect, greyish; *veins* very oblique; *sori* falling short of the edge.—*Hk. Sp.* 3. p. 198.

Hab. West Indies.—Probably an American form of *falcatum*.

94. *A. falcatum*, Lam.; *st.* tufted, 6-9 in. l., firm, erect, greyish, nearly naked; *fr.* 6-18 in. l., 4-6 in. br., with 6-20 stalked nearly horizontal pinnæ on each side, which are 2-3 in. l.,  $\frac{1}{2}$ -1 in. br., the point acuminate, the edges lobed often one-third of the way down, and the lobes sharply toothed, the two sides unequal, and the lower one at the base obliquely truncate; *texture* coriaceous; *rachis* naked or slightly fibrillose; *veins* very oblique; *sori* in long irregular lines reaching nearly to the edge.—*Hk. Sp.* 3. p. 160.



Hab. Polynesian Islands, Australia, N. Zealand, Malaccas, Ceylon, Indian Peninsula, Mascaren Isles, Zambesi Land.

95. *A. caudatum*, Forst. ; *st.* tufted, 4-6 in. l., firm, erect, densely clothed with fine brown fibrillose scales ; *fr.* 12-18 in. l., 4-8 in. br., with 20-30 *pinnæ* on each side, which are 3-4 in. l.,  $\frac{1}{2}$ -1 in. br., the point acuminate, the edge deeply toothed, sometimes lobed more than halfway down to the rachis in the lower part, the two sides unequal, the upper auricled and narrowed suddenly, the lower very obliquely truncate at the base ; *texture* coriaceous ; *rachis* deciduously villose ; *veins* very oblique ; *sori* subflabellate.—*Hk. Sp. 3. p. 152.*

Hab. Polynesian and Malayan Islands, Australia, Hindostan, Johanna Island, Angola.—Doubtfully distinct from *A. falcatum*. The best character is in the sori, which are more confined to the centre of the pinnæ, being often restricted to two parallel rows close to the rachis.

96. *A. dimidiatum*, Swz. ; *st.* tufted, 6-12 in. l., blackish, slightly paleaceous, firm, erect ; *fr.* 6-15 in. l., 4-6 in. br., with 6-9 opposite pairs of *pinnæ*, which are 2-3 in. l.,  $\frac{3}{4}$ -1 in. br., the point acuminate, especially the outer and upper edge sharply inciso-serrated, the latter rounded or cuneate at the base, the lower edge very obliquely truncate ; *texture* coriaceous ; *rachis* dark-coloured, firm, slightly scaly ; *veins* close, flabellate, and no distinct midrib ; *sori* radiant, narrow, long, linear.—*Hk. Sp. 3. p. 159.*

Hab. Tropical America, from Cuba to Peru ; Guinea Coast.—Resembles *A. falcatum* in sori and texture, but the pinnæ are broader below.

97. *A. macrophyllum*, Swartz ; *st.* tufted, 6-12 in. l., stout, erect, brownish, nearly naked ; *fr.* 6-18 in. l., 6-12 in. br., with 6-12 opposite pairs of stalked nearly horizontal *pinnæ*, which are 4-8 in. l., 1-3 in. br., the point acuminate, the edge sharply serrated, the two sides nearly equal, but the lower one narrowed rather more obliquely ; *texture* subcoriaceous ; *rachis* naked, firm, erect ; *veins* very oblique ; *sori* in close long parallel lines reaching from the midrib nearly to the edge.—*Hk. Sp. 3. p. 158. t. 196-7.*

Hab. Polynesia, Malayan Peninsula and Islands, Hong-Kong, Hindostan, Ceylon, Mauritius, Johanna Island.—Very near the preceding ; indeed, all the species from 93 to 98 are very close to one another.

98. *A. paradoxum*, Blume ; *st.* firm, erect, grey, slightly scaly ; *fr.* 1-2 ft. l., 6-9 in. br., with a large oblong-rhomboidal terminal *pinna*, and 8-12 lateral ones on each side, the lowest of which are 5-6 in. l., 1-1 $\frac{1}{2}$  in. br., the point acuminate and slightly toothed, the two sides unequal, the upper one narrowed suddenly almost at a right angle, the lower obliquely cuneate ; *texture* coriaceous ; *rachis* firm, erect, compressed, rather scaly ; *veins* obscure, very oblique, usually once forked ; *sori* reaching nearly from the midrib to the edge.—*Hk. Sp. 3. p. 98. A. zamioides, Hk. Sp. 3. p. 114. t. 170.*

Hab. Java, Sumatra, and Penang.—This occurs sometimes with Scolopendrioid sori. (See Mett. Fil. Ind. 2. p. 234.)

99. *A. obesum*, Baker ; *st.* tufted, 4-8 in. l., firm, erect, naked, dark chestnut-brown, polished ; *fr.* 6-9 in. l., 3 in. br., with a deltoid terminal *pinna* 1 $\frac{1}{4}$ -1 $\frac{1}{2}$  in. each way, and 4-6 opposite pairs of sessile lateral ones, 1 $\frac{1}{4}$ -1 $\frac{1}{2}$  in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., all entire or very slightly crenate, the upper ones acute, narrowed suddenly on the upper side at the base, obliquely truncate on the lower one ; the lower ones blunt, as broad as long, nearly semicircular ; *texture* coriaceous ; *rachis* polished like the stem, with a raised line on each side ; no distinct midrib, the venation flabellate ; *sori* large, linear-oblong, principally in two rows in the upper part of the pinna.

Hab. Guatemala, *Salvin & Godman*, 119.—Very different from the rest of the group in the shape of its pinnæ.

C. Group of *A. resectum*. Pinnæ with from half to the whole of the lower side cut away. Sp. 100-104.

100. *A. formosum*, Willd. ; *st.* tufted, very short, naked, polished, chesnut-brown ; *fr.* 12-18 in. l., 1 in. br., with 20-30 sessile horizontal pinnæ on each side, which are  $\frac{1}{2}$  in. l.,  $1\frac{1}{2}$ -2 lin. deep, the upper edge deeply cut, the point rather obtuse, the lower edge truncate in a straight line, so that about half the lower side is cut away ; *texture* herbaceous ; *colour* bright-green ; *veins* obscure, simple or forked ; *sori* linear-oblong, short, oblique, placed 1 to 4 on each side of the midrib.—*Hk. Sp.* 3. p. 143. *Fil. Ex. t.* 16.

Hab. Tropical America, from Cuba and Mexico southward to Brazil and Peru ; Ceylon and the Neilgherries, Angola and Congo.—By its wiry polished rachis this approaches the *Trichomanes* group.

101. *A. pulchellum*, Raddi ; *st.* tufted, 1-2 in. l., slender, erect, naked, greenish ; *fr.* 3-6 in. l., 1-1 $\frac{1}{2}$  in. br., with 12-18 pinnæ in each side, which are  $\frac{1}{2}$ - $\frac{3}{4}$  in. l., 2-3 lin. br., bluntish at the point, almost dimidiate, the upper edge inciso-crenate, and narrowed suddenly at the base ; *texture* thinly herbaceous ; *rachis* slender, green, compressed ; *veins* distant, once forked ; *sori* linear, oblique, falling short of the edge, sometimes 1 or 2 almost parallel with the midrib on the lower side of it.—*Hk. Sp.* 3. p. 129.

Hab. Tropical America, from Columbia to Peru and Rio Janeiro.—*A. Otites*, Link, is a form with broad blunt scarcely-cut pinnæ. Intermediate between *firmum* and *resectum*.

102. *A. resectum*, Smith ; *st.* scattered, slender, naked, dark chesnut-brown, polished, or grey and opaque, 4-8 in. l. ; *fr.* 6-15 in. l., 2-4 in. br., lanceolate-oblong, with 10-30 subsessile horizontal pinnæ on each side, which are 1-3 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., in shape almost dimidiate, two-thirds of the lower side being entirely cut away, the point bluntish, all except the truncate part inciso-crenate, the upper half at the base narrowed nearly at a right angle ; *texture* thinly herbaceous ; *rachis* usually polished like the stem, sometimes green and opaque ; *veins* once or twice forked ; *sori* not reaching either the midrib or edge.—*Hk. Sp.* 3. p. 130. *Hk. & Gr. Ic. t.* 114.

Hab. Japan and Himalayas (ascending to 8,000 ft.) southward to Ceylon, Oahu, and Fiji ; Mauritius, Seychelles, Bourbon, Angola, and Guinea Coast.—Sometimes the lower side of the pinna is entirely cut away. *A. serriforme*, Mett., is a form with a straw-coloured stem and abbreviated sori, and *A. cristatum*, Wall., a tall form with a strong green stem and falcate deeply-toothed pinnæ, cut away for about one-third of the lower side only.

103. *A. latum*, Swartz ; *st.* tufted, 4-6 in. l., firm, erect, brownish, naked ; *fr.* 6-12 in. l., 3 in. br., with 16-24 sessile pinnæ on each side, which are  $1\frac{1}{2}$  in. l.,  $\frac{1}{2}$  in. br., acute at the point, the edge irregularly inciso-crenate, the upper side narrowed suddenly at the base, the lower truncate in a broad curve ; *texture* herbaceous ; *rachis* naked, polished ; *veins* fine, distant, the lower ones twice forked ; *sori* in two unequal rows falling short of both edge and midrib.—*Hk. Sp.* 3. p. 133. *t.* 173.

Hab. Tropical America, from Mexico and Cuba southward to the Amazon.—Probably this should be joined with the preceding, but the texture is usually firmer, and the pagina is more developed on the lower side of the midrib, as in the *cristatum* form just mentioned.

104. *A. heterocarpum*, Wall. ; *st.* scattered, 4-9 in. l., firm, erect, chesnut-brown, polished ; *fr.* 6-15 in. l.,  $1\frac{1}{2}$ -2 in. br., with very numerous close-placed dimidiate pinnæ on each side, which are  $\frac{3}{4}$ -1 in. br.,  $\frac{1}{4}$  in. deep, the lower edge



quite entire, the upper broadest towards the base, where it is narrowed suddenly, deeply incised throughout; *texture* pellucido-herbaceous; *rachis* glossy, chesnut-brown; *sori* 1 or rarely 2 together in the teeth.—*Hk. Sp. 3. p. 132. t. 175.*

Hab. Himalayas to Ceylon, Malayan Peninsula, S. E. China, Borneo.—A very well-marked plant, resembling in habit a dimidiate *Adiantum*.

\*\*\* *Pinnæ cut down at any rate in the lower part nearly or quite to the rachis.*  
Sp. 105-113. See also 95.

105. *A. planicaule*, Wall.; *st.* tufted, 3-6 in. l., firm, erect, greyish, nearly naked; *fr.* 6-12 in. l., 2-3 in. br., with 12-20 stalked horizontal *pinnæ* on each side, which are 1-1½ in. l., ¼-⅜ in. br., the point acute, the edge lobed often halfway down or more and deeply inciso-serrated, the upper side narrowed and the lower one very obliquely truncate at the base; *texture* coriaceous; *rachis* firm, compressed, greyish; *veins* very oblique; *sori* copious, reaching nearly to the edge.—*Hk. Sp. 3. p. 163. t. 200. B.*

Hab. Himalayas (ascending to 6,000 ft.), Neilgherries, Ceylon.

106. *A. laciniatum*, Don; *st.* tufted, 4-8 in. l., firm, erect, greyish, often scaly; *fr.* 6-12 in. l., 2-3 in. br., with 12-20 stalked horizontal *pinnæ* on each side, which are 1½-2 in. l., ½-¾ in. br., the point acute, the edge cut down nearly or quite to the rachis in the lower part into stalked ovate-rhomboidal lobes, which are deeply toothed round the outer edge, the lower side very much truncated at the base; *texture* subcoriaceous; *rachis* firm, compressed, greyish; *veins* very oblique; *sori* falling short of the edge.—*Hk. Sp. 3. p. 164. t. 200. A.*

Hab. Himalayas (temperate region) and Japan.—A more herbaceous and more deeply-cut plant than the preceding, with which Mettenius unites it.

107. *A. bissectum*, Swartz; *st.* tufted, 4-6 in. l., firm, erect, chesnut-brown, nearly naked; *fr.* 12-18 in. l., 4-6 in. br., with 20-30 horizontal *pinnæ* on each side, which are 2-3 in. l., ¼ in. br., with a very long, narrow, deeply inciso-pinnatifid upper portion, the base on the upper side narrowed suddenly, on the lower obliquely truncate; *texture* subcoriaceous; *rachis* chesnut-brown and villose like the stem; *sori* almost all in two parallel rows close to the midrib.—*Hk. Sp. 3. p. 152. t. 192.*

Hab. West Indies and Ecuador.—In texture this agrees with the *falcatum* group.

108. *A. horridum*, Kaulf.; *st.* strong, erect, brownish, fibrillose; *fr.* 2-3 ft. l., 8-12 in. br., with very numerous spreading *pinnæ* on each side, which are 4-6 in. l., ¾ in. br. at the base, narrowed gradually to an acuminate point, cut down throughout more than halfway to the rachis into nearly uniform rhomboidal lobes, cordate or broadly rounded at the base on the upper, truncate in a broad curve on the lower side; *texture* subcoriaceous; *rachis* stout, clothed with reddish-brown woolly fibres; *veins* oblique, usually once forked; *sori* in two nearly parallel lines close to the midrib, and a few also on the disk of the lobes.—*Hk. Sp. 3. p. 153. t. 193.*

Hab. Sandwich Islands, Samoa, and Java.—A well-marked plant.

109. *A. protensum*, Schrad.; *st.* tufted, 3-6 in. l., erect, brownish, villose; *fr.* 1-2 ft. l., 4-6 in. br., with 12-30 horizontal *pinnæ* on each side, which are 2-3 in. l., ½ in. br., the point acuminate, the edge sharply cut halfway down to the rachis, the two sides unequal at the base, the upper one auricled and narrowed suddenly, the lower one obliquely truncate in a curve; *texture* herbaceous; *rachis* firm, erect, brownish, villose; *veins* inconspicuous; *sori* in

two oblique rows, almost confined to the undivided part of the pinnæ.—*Hk. Sp. 3. p. 150.*

Hab. Cape Colony to Natal, Mauritius, Abyssinia, and Fernando Po.

110. *A. Hallii*, Hk.; *st.* tufted, 1-2 in. l., glossy, chesnut-brown; *fr.* 6-12 in. l.,  $1\frac{1}{2}$ -2 in. br., elongated and rooting at the point; *pinnæ* numerous, horizontal, the lower ones deflexed, 1 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., the point bluntly rounded, the upper two-thirds cut only halfway down to the rib with linear erecto-patent teeth, but the lower third cut down nearly or quite to the centre; *texture* herbaceous; *rachis* polished like the stem; *veins* simple, oblique; *sori* in two rows.—*Hk. Sp. 3. p. 202. 2nd Cent. F. t. 30.*

Hab. Ecuador and the Amazon Valley.—The alliance of this is with *A. protensum*, of which it may be an American form, and both closely resemble the very variable *A. erectum* in many points.

111. *A. mucronatum*, Presl; *st.* tufted, slender, naked, polished, 1-2 in. l.; *fr.* 1 ft. or more l., 1 in. or less br., very flaccid in habit, with very numerous pairs of deflexed sessile pinnæ, which are  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., deeply pinnatifid on both sides, the lobes mucronate, in the lower part reaching down nearly to the rachis, the base on both sides cordate; *texture* membranous; *colour* bright-green; *upper veins* simple, distant; *sori* linear-oblong, short.—*Hk. Sp. 3. p. 128. Ic. Fil. t. 917.*

Hab. Brazil.—A very delicate and well-marked plant.

112. *A. bipartitum*, Bory; *st.* tufted, 3-6 in. l., firm, slender, greyish, naked; *fr.* 6-8 in. l., 2-3 in. br., with about 10-15 conspicuously stalked *pinnæ* on each side, which are 1-1 $\frac{1}{2}$  in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., bluntish at the point, cut down at the base on the upper side into one distinctly-stalked cuneate *pinnl.*, sometimes into two or three, the outer edge inciso-crenate, the base on the lower side obliquely truncate; *texture* herbaceous; *rachis* compressed, winged upwards, naked; *veins* mostly simple; *sori* in two regular rows, which reach nearly to the edge.—*Hk. Sp. 3. p. 178. t. 208.*

Hab. Mascaren Isles.—This comes nearest some of the divided forms of *auritum*, but is less rigid.

113. *A. pumilum*, Sw.; *st.* tufted, 3-4 in. l., erect, naked, polished, ebeneous below; *fr.* 4-6 in. each way, deltoid, the upper part sinuated only, the lower cut down to the rachis into distinct *pinnæ*, of which the lowest pair is much the largest, the *pinnl.* on the lower side sometimes 2 in. l., reaching down to a slightly-winged rachis, acuminate and deeply lobed; *texture* herbaceous; *rachis* green, flaccid, compressed; *sori* very oblique, the lower ones sometimes  $\frac{3}{4}$ -1 in. l.—*Hk. Sp. 3. p. 174.*

Hab. W. Indies and Mexico to Columbia; and a small tender form (*A. tenerrimum*, Hochst.) has been gathered by Schimper in Abyssinia, and Dr. Kirk in Zambesi Land.—A very distinct species.

\*\*\*\* *Fronds bi- to quadripinnate.* Sp. 114-155. See also Sp. 64, 75, 88-90.

*Group of A. cuneatum. Texture coriaceous. Ultimate divisions of the frond linear- or ovate-cuneate, often shining on the upper surface. Venation subflabellate.* Sp. 114-132.

114. *A. germanicum*, Weiss; *st.* densely tufted, 2-4 in. l., naked, slender, ebeneous; *fr.* 2-3 in. l.,  $\frac{3}{4}$ -1 in. br., lanceolate, cut down to the rachis into a few distinct narrow flabellato-cuneate *pinnæ* on each side, the lowest of which are again deeply cleft and also slightly inciso-serrate towards the point; *texture*



coriaceous; *veins* obscure, subparallel; *sori* linear, when mature covering the whole breadth, but falling short of the point of the pinnæ.—*Hk. Sp. 3. p. 175. Brit. F. t. 27.*

Hab. Scotland and Norway to Hungary and Dalmatia.—Intermediate between *Ruta-muraria* and *septentrionale*.

115. *A. Ruta-muraria*, Linn.; *st.* tufted, 2-4 in. l., slender, wiry, naked, ebeneous towards the base; *fr.* 1-2 in. l., about 1 in. br., deltoid, cut down to the rachis into a few pinnæ on each side, the lower ones again cut down into spathulato-cuneate pinnl., which are serrated round the outer edge; *texture* coriaceous; *rachis* firm, green, naked; *veins* flabellate; *sori* copious.—*Hk. Sp. 3. p. 176. Brit. F. t. 28.*

Hab. Arctic Europe to Spain, Algiers, Cashmere, Tibet, and Siberia; Cape Colony, United States.

116. *A. Hookerianum*, Col.; *st.* tufted, 1-3 in. l., slender, greenish, deciduously scaly; *fr.* 3-8 in. l.,  $1\frac{1}{2}$ -4 in. br., ovate-deltoid, with several distinctly stalked erecto-patent pinnæ on each side, which are sometimes 1-2 in. l., with several stalked pinnl.  $\frac{1}{4}$  in. each way, the lower half cuneate, the upper rounded and crenate; *texture* herbaceous; *rachis* greenish; *veins* subflabellate; *sori* 3-5 to a pinnl.—*Hk. Sp. 3. p. 194. A. adiantoides*, var. *minus*, *Hk. Fil. Ic. Pl. t. 983.*

Hab. New Zealand.—The pinnæ and pinnules in shape resemble those of *Ruta-muraria*, but the petioles of the former are terete, not flattened, and the texture is thinner. A plant which resembles this (var. *Mairii*, *Hk. fil.*) has pinnate pinnules and Dareoid sori.

117. *A. Magellanicum*, Kaulf.; *st.* tufted, 3-4 in. l., wiry, naked, ebeneous below; *fr.* 2-3 in. l.,  $1-1\frac{1}{2}$  in. br., deltoid with several pinnæ on each side, the lower ones often 1 in. l.,  $\frac{3}{4}$  in. br., cut down to the rachis into several distinct pinnl. on each side, which are again cut down below into cuneato-spathulate segm.  $1-1\frac{1}{2}$  lin. br., which are slightly inciso-serrate round the outer edge; *texture* coriaceous; *rachis* green, naked, compressed; *veins* obscure, flabellate; *sori* oblong, copious, at length covering the whole surface.—*Hk. Sp. 3. p. 177. Hk. & Gr. Ic. t. 180.*

Hab. Temperate S. America.—Divisions like those of *Ruta-muraria*, but the frond more compound.

118. *A. fissum*, Kit.; *st.* tufted, 2-6 in. l., slender, naked, ebeneous below; *fr.* 2-5 in. l., 1-2 in. br., oblong-deltoid, with a few distant pinnæ on each side, with distinct flabellato-cuneate pinnl. which are again deeply pinnatifid; *ult. segm.* under  $\frac{1}{2}$  lin. br.; *texture* herbaceous; *rachis* green, naked, slender; *veins* solitary; *sori* linear-oblong, when mature occupying the whole breadth of the segments.—*Hk. Sp. 3. p. 177.*

Hab. Scattered from Gothland to Turkey and Naples.—A well-marked species.

119. *A. sepulchrale*, *Hk., MSS.*; *st.* densely tufted, 1-2 in. l., firm, greenish, nearly naked, ebeneous below; *fr.* 4-6 in. l.,  $1-1\frac{1}{2}$  in. br., with several lanceolate-deltoid pinnæ on each side, which are cut down to a compressed rachis into several ovate-rhomboidal pinnl. on each side, which are again deeply pinnatifid; *ult. segm.* linear-cuneate; *texture* subcoriaceous; *upper surface* shining; *rachis* compressed, green, naked; *veins* and *sori* one to a segm.

Hab. Japan, *Oldham*, 83, 304, 462; China, *Blakiston, Maingay, Robinson.*—This comes nearest to *A. varians*, but the texture is thicker, and the segments are narrower.

120. *A. montanum*, Willd.; *st.* tufted, 2-3 in. l., wiry, naked, ebeneous below;

*fr.* 2-3 in. l., 1 in. br., lanceolate-deltoid, with several *pinnæ* on each side, the lowest of which are distinctly stalked, deltoid, about  $\frac{1}{2}$  in. each way, cut down to the rachis in the lower part into spatulato-cuneate *pinnl.*, sharply serrated round the outer edge; *texture* coriaceous; *rachis* naked, green, compressed, winged upwards; *veins* obscure; *sori* short, copious.—*Hk. Sp.* 3. p. 177.

Hab. United States.—Intermediate between *Ruta-muraria* and *Adiantum-nigrum*.

121. *A. Adiantum-nigrum*, Linn.; *st.* tufted, 6-9 in. l., nearly naked, polished, chesnut-brown; *fr.* 6-12 in. l., 4-6 in. br., sub-deltoid, with numerous *pinnæ* on each side, the lower ones deltoid, 2-3 in. l.,  $1\frac{1}{2}$ -2 in. br., cut down to a compressed winged rachis into numerous lanceolate-deltoid *pinnl.*, truncate on the lower side, cut down nearly or quite to the rachis into oblong or spatulate segm., sharply toothed round the outer edge; *texture* coriaceous; *rachis* polished and chesnut-coloured below, upwards winged and compressed; *veins* obscure, oblique; *sori* copious, at last often occupying the whole under surface of the segm.— $\beta$ , *A. acutum*, Bory; habit more graceful, *fr.* more finely cut; *ult. div.* linear-spatulate with mucronate teeth.— $\gamma$ , *A. obtusum*, Willd.; *ult. segm.* short, flabellate-cuneate, often  $\frac{1}{8}$  in. br., habit more slender. *A. Serpentina*, Tausch.— $\delta$ , *A. Gaudichaudianum*, Hk.; *texture* very thick; *pinnl.* distant, lanceolate, with small distant oblong-spatulate *ult. segm.*—*Hk. Sp.* 3. p. 187. *Brit. F.* t. 33.

Hab. Norway and Britain to the Cape Verdes, Azores, Canaries, Cameroon Mountains, Algiers, Abyssinia, Himalayas, and Siberia; Cape Colony, Sandwich Islands. Reported also from Java, Virginia, Porto Rico, St. Helena, and Mascaren Isles.

122. *A. solidum*, Kunze; *st.* tufted, 4-6 in. l., dark chesnut-brown, naked, polished; *fr.* oblong-deltoid, 6-12 in. l., 4-6 in. br., with 8-12 *pinnæ* on each side, which decrease gradually upwards, the lowest lanceolate-deltoid, 4 in. l., 2 in. br., cut down to the rachis into several quite distinct deltoid *pinnl.*, which are again cut down below to the rachis into sharply serrated rhomboidal *segm.*; *texture* subcoriaceous; *rachis* chesnut-brown and polished like the stem; *veins* flabellate, channelled; *sori* linear-oblong, when mature sometimes filling up nearly the whole width of the segments.—*Hk. Sp.* 3. p. 167. t. 201.

Hab. Cape Colony; and a plant which appears to be the same has been gathered by Oldham in Japan.—Very near the preceding, with which it probably should be joined.

123. *A. dissectum*, Brack.; *st.* 6-9 in. l., firm, erect, greyish, naked; *fr.* 12-18 in. l., 4-6 in. br., cut down to the rachis into numerous lanceolate-deltoid *pinnæ* on each side, the lowest of which are 4-6 in. l.,  $1\frac{1}{2}$ -2 in. br.; *pinnl.* and *segm.* distant, subdeltoid, the latter cut into narrow linear *ult. divisions*, 1-2 lin. l.,  $\frac{1}{2}$  lin. br., acute or acutely toothed at the apex; *texture* subcoriaceous; *rachis* firm, greyish; *veins* one in each *ult. division*; *sori* usually solitary.—*Brack. Fil. U.S. Expl. Exp.* t. 24.

Hab. Sandwich Islands; gathered by Douglas and Brackenridge.

124. *A. cuneatum*, Lam.; *st.* tufted, 6-9 in. l., firm, erect, naked; *fr.* 6-15 in. l., 6-9 in. br., with numerous spreading *pinnæ* on each side, the lower ones 3-4 in. l.,  $1-1\frac{1}{2}$  in. br., lanceolate-deltoid, cut down to the rachis into several distinct ovate-cuneate *pinnl.*, which are inciso-dentate and cut down in the lower part nearly or quite to the rachis; *texture* subcoriaceous; *rachis* firm, greyish, nearly naked; *veins* fine, conspicuous on the upper surface; *sori* linear, subflabellate.—*Hk. Sp.* 3. p. 163.

Hab. Tropical America, West Indies to Brazil; Polynesian Islands to Java and Hong-Kong; Cape Colony to Mozambique, Johanna Island, and Seychelles.—*A. splendens*, Kze. *Hk. Sp.* 3. p. 163, does not seem to be safely separable.

125. *A. furcatum*, Thunb.; *st.* tufted, 4-8 in. l., firm, erect, clothed with



deciduous woolly hairs; *fr.* 6-18 in. l., 4-6 in. br., with 12-20 pinnæ on each side, which are lanceolate-deltoid in general outline, 2-3 in. l.,  $\frac{3}{4}$ -1 in. br., cut down throughout nearly or quite to the rachis into linear-cuneate pinnl., which are sharply serrated on the outer edge; *texture* coriaceous; *rachis* firm, erect, more or less fibrillose like the stem; *veins* deep-channelled, flabellate; *sori* linear, radiant.—*Hk. Sp.* 3. p. 165. *A. præmorsum*, *Sw.*

Hab. Tropical America, from Mexico and the West Indies to Peru; Polynesian Islands and Australia northward to Tsus-Sima and the Himalayas; Cape Colony to Mascaren Isles, Abyssinia, and the Canaries.—Distinguished from the preceding by its fibrillose rachis and longer and narrower divisions.

126. *A. affine*, Swartz; *st.* 6-12 in. l., firm, erect, grey, nearly naked; *fr.* 12-18 in. l., 6-12 in. br., with numerous pinnæ on each side, the lower ones lanceolate-rhomboidal, cut down to the rachis into numerous distinct rhomboidal pinnl. 4-6 in. l.,  $1\frac{1}{2}$ -2 in. br., which are again inciso-serrate or deeply lobed; *texture* subcoriaceous; *rachis* firm, naked; *veins* subflabellate; *sori* copious, linear.—*Hk. Sp.* 3. p. 170. t. 202. *A. spatulinum*, *J. Sm. Hk. Sp.* 3. p. 170.

Hab. Mascaren Isles, Ceylon, Philippines, Borneo, Fiji, Sandwich Islands.—Very near *A. cuneatum*, but a more robust plant, with often 10-15 distinct pinnules to the lower pinnæ.

127. *A. nitidum*, Swz.; *st.* 1 ft. l., firm, erect, greyish, naked; *fr.* 2-3 ft. l., 1 ft. br., with numerous lanceolate-deltoid pinnæ on each side, the lowest of which are 6-9 in. l., 2-3 in. br., cut down to the rachis into numerous stalked subdeltoid pinnl., which are again cut down to the rachis into broad flabellato-cuneate *segm.*, inciso-serrate round the outer edge; *texture* subcoriaceous; *rachis* firm, grey, naked; *veins* channelled, flabellate; *sori* short, radiant.—*Hk. Sp.* 3. p. 172.

Hab. North of India, Ceylon, Malayan Peninsula and Isles.—Very near the last, but a still larger plant, with ample shining rhomboidal acuminate pinnules, sometimes again pinnatifid.

128. *A. laserpitiifolium*, Lam.; *st.* tufted, 6-12 in. l., firm, erect, greyish, naked; *fr.* 2-4 ft. l., 6-18 in. br., with numerous pinnæ on each side, the lowest deltoid-lanceolate, 6-9 in. l., 4-6 in. br., cut down to the rachis into numerous distinct pinnl., the lowest with rhomboidal-cuneate *segm.* again deeply pinnatifid; *texture* herbaceous; *rachis* slender, naked; *veins* fine and deeply channelled; *sori* short, linear-oblong, irregular.—*Hk. Sp.* 3. p. 171. t. 203.

Hab. Polynesian Islands and N. Australia northward to Chusan and Assam; and gathered also by Gerrard in Natal.—Like the two preceding, closely allied to *A. cuneatum*.

129. *A. nigritianum*, Hk.; *st.* tufted, strong, erect, 4-6 in. l., nearly black and densely villose; *fr.* 12-18 in. l., 4-6 in. br., with numerous horizontal or slightly deflexed pinnæ on each side, which are 2-3 in. l.,  $\frac{1}{2}$ - $\frac{5}{8}$  in. br., cut down to the rachis into numerous subdimidiate rhomboidal pinnl., the lower ones once deeply lobed and also inciso-crenate, the lowest imbricated over the main rachis; *texture* subcoriaceous; *rachis* firm, erect; *veins* subflabellate; *sori* oblong.—*Hk. Sp.* 3. p. 223. *2nd Cent. t.* 44.

Hab. Prince's Island and St. Thomas, Guinea Coast; gathered by Barter and Mann.—A very distinct species, of which our dried specimens are nearly black.

130. *A. scandicinum*, Kaulf.; *st.* tufted, 6-9 in. l., firm, erect, grey, naked; *fr.* 9-18 in. l., 4-8 in. br., with numerous rather distant pinnæ on each side, the lower ones subdeltoid, 3-6 in. l.,  $1-1\frac{1}{2}$  in. br., cut down to the rachis into numerous stalked subdistant pinnl., which are again cut down into cuneato-

flabellate segm., 1-2 lin. br., sharply toothed on the outer edge; *texture* coriaceous; *rachis* firm, grey, naked; *veins* subflabellate; *sori* oblong, usually one only to a segm.—*Hk. Sp. 3. p. 183. t. 204.*

Hab. Brazil and Ecuador.—Mettenius makes here two species; one, *A. divergens*, Mett. (*Burchell*, 2374, 4671), a foot or more long, with pinnules toothed only; the other smaller (*Burchell*, 3508), with pinnatifid and flaccid decurved main rachis and pinnæ; but our figure is midway between them.

131. *A. fragrans*, Swartz; *st.* tufted, 4-8 in. l., firm, naked, erect, brownish below; *fr.* 6-9 in. l., 3-4 in. br., subdeltoid, tripinnate, with numerous close-placed deltoid *pinnæ* on each side, the lowest 3 in. l., 1½ in. br.; *pinnl.* lanceolate-deltoid; *segm.* subspathulate, 1 lin. br., dentate round the outer edge; *texture* subcoriaceous; *rachis* firm, naked; *veins* fine, obscure, one in each tooth of the segm.; *sori* copious, at last often covering the whole under surface of the segm.—β, *A. foeniculaceum*, H. B. K.; *ult. segm.* narrowly linear.—*Hk. Sp. 3. p. 181.*

Hab. Tropical America, from Mexico and the West Indies to Peru and Brazil.—The two varieties seem to be quite connected by gradual intermediate gradations.

132. *A. Blakistoni*, Baker; *st.* tufted, 3-4 in. l., firm, erect, greenish, nearly naked; *fr.* 4-5 in. l., 3 in. br., ovate-deltoid, with numerous imbricated *pinnæ*, the lowest deltoid, 2 in. l., 1-1¼ in. br.; *pinnl.* lanceolate, cut down to the rachis into distant linear-cuneate sharply-toothed *segm.*; *texture* subcoriaceous; *rachis* firm, naked; *veins* obscure, one in each segment; *sori* copious.

Hab. Province of Szechuan, West China, *Capt. Blakiston*.—This comes nearest to some of the more finely divided forms of the preceding.

*Group of A. lanceolatum. Texture herbaceous or slightly coriaceous. Venation pinnate. Fronds 4-8 in. long, lanceolate. Sp. 133-136.*

133. *A. fontanum*, Bernh.; *st.* tufted, 2-4 in. l., wiry, slender, naked, greenish; *fr.* 3-6 in. l., 1-1½ in. br., oblong-lanceolate, with numerous *pinnæ* on each side, the lower ones short and reflexed, the central ones horizontal, ½-⅝ in. l., ¼-⅜ in. br., cut down to the rachis into several stalked *pinnl.* on each side, the lower ones oblong, deeply inciso-pinnatifid; *texture* herbaceous; *rachis* and upper surface bright-green; *veins* oblique; *sori* copious, covering nearly the whole under surface of the *pinnl.*—*Hk. Sp. 3. p. 193. Brit. F. t. 34.*—β, *A. Bourgei*, Boiss; *pinnæ* oblong, blunt, ⅜ in. l., ⅓ in. br., cut down about halfway to the rachis into oblong sharply-toothed lobes, most of them somewhat decurved.

Hab. England to Spain, Naples, and Greece; Lycia; Himalayas.—*A. refractum*, Moore (*Nat. Brit. F. t. 35*), only known in cultivation, comes very near var. β, but has a chesnut-coloured rachis, and larger, closer, and more distinctly reflexed *pinnæ*. *A. exiguum*, Beddome, from the Neilgherries, seems to be a less-divided form of this, with narrow fronds and an ebeneous rachis. A similar plant has been gathered in Mexico by Mr. Glennie, and a long narrow-fronded form, but with broader and more divided *pinnæ*, in Japan by Mr. Wright.

134. *A. varians*, Hk. & Gr.; *st.* tufted, 1-3 in. l., slender, naked, greenish; *fr.* 4-6 in. l., 1 in. br., oblong-lanceolate, with 8-12 *pinnæ* on each side, the lower ones subdeltoid, ½-¾ in. l., ¼-⅜ in. br., cut down to the rachis into a few cuneato-flabellate *pinnl.*, the lowest 2 lin. across, sharply toothed on the outer edge; *texture* herbaceous; *rachis* slender, naked, green; *veins* one carried into each tooth; *sori* copious, when mature covering nearly the whole under surface of the *pinnl.*—*Hk. Sp. 3. p. 192. Hk. & Gr. Ic. t. 172.*

Hab. Himalayas, Neilgherries, Ceylon, Cape Colony, Caffraria, Natal.



135. *A. incisum*, Thunb.; *st.* tufted, 1-3 in. l., polished, chesnut-brown; *fr.* 6-12 in. l.,  $1\frac{1}{2}$ -2 in. br., with numerous *pinnæ* on each side, the lower distant and blunt, the central ones lanceolate-deltoid, 1 in. l.,  $\frac{1}{2}$  in. br., cut down to the rachis into numerous ovate-rhomboidal *pinnl.*, much truncated at the base on the lower side and deeply inciso-pinnatifid; *texture* thinly herbaceous; *rachis* greenish above, compressed, flaccid; *veins* one to each tooth; *sori* linear-oblong, one to each vein.—*A. elegantulum*, *Hk. Sp. 3. p. 178. 2nd Cent. F. t. 28.*

Hab. Japan (common), Tsus-Sima, Chusan, W. China.—Very near *A. lanceolatum*, but narrower in outline, and thinner in texture.

136. *A. lanceolatum*, Huds.; *st.* tufted, 3-4 in. l., naked, glossy, chesnut-coloured; *fr.* 6-9 in. l., 2-4 in. br., with numerous *pinnæ* on each side, the lower ones distant, 1- $1\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., cut down to the rachis into numerous oblong-rhomboidal *pinnl.*, which are truncate on the lower side, sharply toothed and often broadly lobed below; *texture* herbaceous; *rachis* firm, erect, green or tinged with chesnut; *veins* fine; the lateral ones usually once forked; *sori* copious, when mature covering nearly the whole under surface.—*Hk. Sp. 3. p. 190. Brit. F. t. 32.*

Hab. South-west of Europe; England to Greece, Algiers, Madeira, Azores, St. Helena. *A. obovatum*, Viv. (*Hk. & Gr. t. 147*), is a less divided southern form with obovate pinnules.

*Group of A. bulbiferum. Venation pinnate. Fronds 1 ft. or more long. Ultimate divisions ample, herbaceous. Sp. 137-144.*

137. *A. angustatum*, Presl; *st.* 6-12 in. l., naked, greyish or ebeneous below; *fr.* 6-12 in. l., 4-6 in. br., with numerous *pinnæ* on each side, the lower ones deltoid, 2-4 in. l.,  $1\frac{1}{2}$ -2 in. br., lobed and pinnatifid on the upper, cut down below into distinct inciso-crenate ovate-rhomboidal or spatulate *pinnl.*  $\frac{1}{4}$ - $\frac{3}{8}$  in. br.; *texture* herbaceous; *rachis* naked, compressed and winged upwards; *veins* pinnate; *sori* linear, falling considerably short of the edge.—*Mett. Aspl. 177. non Desv. & Bl.*

Hab. Brazil.—This is nearest *A. adiantoides*, but considerably less compound, with blunt sessile subspathulate pinnules.

138. *A. adiantoides*, Raddi; *st.* tufted, 6-12 in. l., naked, grey, firm; *fr.* 12-24 in. l., 8-15 in. br., deltoid, quadripinnate; lower *pinnæ* distant, deltoid, 6-9 in. l., 4-6 in. br., with numerous stalked deltoid *pinnl.* on each side; *segm.* deltoid, cut down nearly or quite to the rachis; *ult. divisions* cuneate-spathulate, deeply flabellately cut; *texture* herbaceous; *rachis* firm, naked; *veins* one to each *ult. division*; *sori* copious, linear.—*Hk. Sp. 3. p. 186.*

Hab. Jamaica and Brazil.—Distinguished in the group by its distant long-stalked *pinnæ* and pinnules.

139. *A. Wardii*, Hk.; *st.* 6-9 in. l., erect, slender, polished, greyish, scaly towards the base; *fr.* 12-15 in. l., 10 in. br., deltoid, with numerous lanceolate *pinnæ* on each side, the lowest 5 in. l.,  $1\frac{1}{4}$  in. br., cut down to the rachis into numerous ovate-rhomboidal *pinnl.*, which are  $\frac{3}{8}$  in. l.,  $\frac{1}{4}$  in. br., the point blunt, the two sides unequal, the upper one auricled, the lower one obliquely truncate at the base, the edge very slightly crenate; *texture* thinly herbaceous; *rachis* slender, polished, greyish; *veins* conspicuous, the central lateral ones twice forked; *sori* in two regular oblique rows near the midrib.—*Hk. Sp. 3. p. 189. 2nd Cent. F. t. 33.*

Hab. Island of Tsus-Sima, Wilford, 717.—A very distinct species.

140. *A. pseudo-nitidum*, Raddi; *st.* 1 ft. l., polished, glossy, purplish-black;

*fr.* 12-18 in. l., 6-9 in. br., ovate-deltoid, bipinnate, with 9-12 *pinnæ* on each side, the lower ones subdeltoid, 4-6 in. l., 2 in. br.; *lower pinnl.* stalked, ovate-rhomboidal, with the outer edge toothed and the base on the lower side truncate in a curve, sometimes lobed in the lower part; *texture* herbaceous; *rachis* firm, naked; *veins* rather close, once or twice forked; *sori* in two nearly regular rows.— $\beta$ , *crenatifolium*, Hk.; *pinnæ* cut down in the lower part into spathulate *pinnl.*—Hk. *Sp.* 3. p. 184. A. Lindenii, Hk. *Sp.* 3. p. 185. t. 209.

Hab. Brazil, Venezuela, Ecuador.

141. A. *Jamesoni*, Hk.; *st.* 6-12 in. l., firm, erect, angular, the lower part clothed with large brown deciduous scales; *fr.* 1-2 ft. or more l., 9-12 in. br., with numerous *pinnæ* on each side, the lower ones 6-9 in. l., 3-4 in. br., cut down to a broadly-winged rachis into deltoid *pinnl.*, which are again deeply pinnatifid; *ult. segm.* oblong or spathulate; *texture* herbaceous; *main rachis* firm, compressed and winged upwards; *veins* distant; *sori* large, oblong, principally in two lines close to the midrib and nearly parallel with it.—Hk. *Sp.* 3. p. 184. t. 205.

Hab. Andes of Ecuador, *Jameson*, *Spruce*, 5627.

142. A. *acuminatum*, Hk. & Arn.; *st.* subtufted, 6-9 in. l., strong, erect, greyish, deciduously paleaceous; *fr.* 1-2 ft. l., 9-12 in. br., with very numerous close-placed lanceolate-oblong *pinnæ* on both sides, which are 4-6 in. l.,  $1\frac{1}{2}$ -2 in. br., cut down to the rachis into numerous unequal-sided lanceolate *pinnl.*, which are acuminate at the apex, with the edges sharply toothed or even lobed below, the lower base obliquely truncate; *texture* coriaceous; *rachis* strong, erect, greyish; *veins* fine, close, deep-channelled; *sori* in two rows in the upper part of the *pinnl.*, often diplazoid.—Hk. *Sp.* 3. p. 183. t. 206.

Hab. Sandwich Islands.—Intermediate between *A. bulbiferum* and *cuneatum*.

143. A. *squamosum*, Linn.; *st.* stout, erect, 12-18 in. l., clothed with large brown scales below; *fr.* 3-6 ft. l., 12-18 in. br., with numerous *pinnæ* on each side, the lower ones 3-4 in. apart and horizontal, 6-9 in. l., 4-6 in. br., cut down to a compressed and winged rachis into numerous stalked *pinnl.* on each side, which are ovate-rhomboidal, 2-3 in. l.,  $1-1\frac{1}{2}$  in. br., the apex acuminate, the edge crenate, the base on the lower side truncate in a curve; *texture* rather thinly herbaceous; *main rachis* compressed and channelled; *veins* oblique, the lateral ones usually twice forked; *sori* few, principally near the midrib.—Hk. *Sp.* 3. p. 186. t. 210.

Hab. West Indies, Venezuela, and Ecuador.—Easily recognized by its large size and ample pinnules.

144. A. *bulbiferum*, Forst.; *st.* tufted, 6-12 in. l., firm, erect, greyish, scaly at the base; *fr.* 1-2 ft. l., 8-12 in. br., oblong-deltoid, with numerous horizontal *pinnæ* on each side, which are often proliferous from the upper surface, the largest 4-8 in. l.,  $1\frac{1}{2}$ -2 in. br., cut down to a compressed winged rachis into numerous lanceolate-deltoid *pinnl.*, which are again cut down into slightly-toothed linear-oblong *segm.*  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., 1 lin. br.; *texture* herbaceous; *rachis* firm, sometimes pendulous; *veins* fine, pinnate; *sori* oblong, when mature often filling the whole breadth of the *segm.*—Hk.  *Ic.* t. 423.— $\beta$ , *A. laxum*, R. Br.; habit more slender; *segm.* narrow, so that the *sori* are often as if marginal.— $\gamma$ , *A. Fabianum*, Homb. and Jacq.; *lower segm.* deeply pinnatifid, with narrow divisions and submarginal *sori.*—Hk. *Sp. Fil.* 3. p. 196.

Hab. New Zealand, Australia, New Caledonia, Penang, Samoa, N. India, Mexico, Guatemala, Bourbon, Seychelles, Johanna Island, Natal.—*A. Mertensianum*, Kze., from Bonin, and *A. Shuttleworthianum*, Kze., are both apparently large quadripinnatifid forms of this with quite marginal *sori.*



*Group of A. cicutarium. Venation pinnate. Fronds various in size, texture thinly herbaceous, colour bright-green, ultimate divisions finely cut. Sp. 145-155.*

145. *A. triphyllum*, Presl; *st.* tufted, 1-2 in. l., slender, spreading; *fr.* 6-9 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., with numerous *pinnæ* on each side, cut down into 3 or 5 stalked linear or oblong-spathulate *pinnl.*  $\frac{1}{8}$  in. l.; *texture* herbaceous; *rachis* slender, wide-rambling, often gemmiferous; *veins* one in each *pinnl.*; *sori* 1-2 on the disk of each.—*A. herbaceum*, *Fée.*— $\beta$ , *A. sessilifolium*, Desv.; *rachis* stronger; *pinnæ* distant, with usually three spathulate *pinnl.*, the terminal one  $\frac{1}{2}$  in. br.—*A. imbricatum*, *Hk. & Gr. t.* 165. *A. ternatum*, *Presl.*— $\gamma$ , *compactum*, *Hk.*; *texture* subcoriaceous; *rachis* firm, erect; *pinnæ* close; *pinnl.* more numerous; *sori* copious.—*Hk. Sp. 3. p.* 203.

*Hab.* Andes of Ecuador and Peru.—*Pinnæ* usually consisting of three, or at most of five, nearly equal divisions.

146. *A. repens*, *Hk.*; *st.* wide-scattered, very slender, very short; *fr.* 1-2 in. l.,  $\frac{1}{2}$  in. br., ovate-lanceolate, bi- or tripinnatifid; *pinnæ* horizontal, 3-4 on each side, cut down to the *rachis* into broad cuneate *pinnl.*, which are sharply toothed on the outer edge and sometimes deeply cleft; *texture* thinly herbaceous; *rachis* naked; *veins* simple or forked in each *pinnl.*; *sori* oblong, solitary.—*Hk. Sp. 3. p.* 194. *2nd Cent. t.* 31.

*Hab.* Andes of Ecuador, *Jameson* and *Spruce*.

147. *A. delicatulum*, *Presl*; *st.* tufted, 1-2 in. l., slender, ebeneous; *fr.* 3-4 in. l., 2-3 in. br., subdeltoid, tripartite, with several deltoid *pinnæ* on each side, the lowest of which are 1 in. or more l.,  $\frac{3}{4}$  in. br.; *pinnl.* deltoid; *ult. segm.* linear, 1 lin. l.,  $\frac{1}{4}$  lin. br.; *texture* thinly herbaceous; *rachis* compressed, flaccid; a *vein* to each *segm.*; *sori* few, scattered, short.—*Hk. Sp. 3. p.* 182. *Ic. Pl. t.* 915.

*Hab.* Peru, Venezuela, N. Granada, Brazil.

148. *A. divaricatum*, *Kunze*; *st.* tufted, very short; *fr.* 4-6 in. l.,  $1\frac{1}{2}$ -2 in. br., oblong-lanceolate, with numerous close-placed *pinnæ* on each side, which are  $\frac{1}{2}$ -1 in. l.,  $\frac{1}{4}$  in. br., cut down to the *rachis* into numerous *pinnl.* not more than 1 lin. br.; *segm.* linear-oblong, not toothed; *texture* membranaceous; *rachis* very slender, ebeneous; *veins* one to each *segm.*; *sori* solitary.—*Hk. Sp. 3. p.* 204.

*Hab.* Chili and Peru.—Very doubtfully distinct from *A. myriophyllum*.

149. *A. Gibertianum*, *Hk.*; *st.* tufted, very short, compressed; *fr.* 6-8 in. l., 1 in. br., caudate at the apex, with numerous close-placed *pinnæ* on each side, the largest  $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. br., ovate-rhomboidal, broadest on the upper side, cut down to the *rachis* into simple linear sharp-pointed or broader flabellately incised *pinnl.*; *texture* herbaceous; *rachis* green, much compressed and with a broad wing on each side all the way down; *veins* one to each *segm.*; *sori* one at the base of each *segm.*—*Hk. Sp. 3. p.* 199. *2nd Cent. t.* 22.

*Hab.* Paraguay; gathered by *M. Gibert.*—A stronger and more regular-growing plant than the rest of the group, with a very peculiar *rachis*.

150. *A. Colensoi*, *Hk. fil.*; *st.* tufted, 3-4 in. l., firm, erect, clothed throughout with small scales; *fr.* 4-5 in. l., 2 in. br., with numerous rather rigid erectopatient *pinnæ*, the lower on stalks  $\frac{1}{4}$ - $\frac{1}{2}$  in. l.; lower *pinnl.* spreading, deeply incispinnatifid, with linear *segm.*; *texture* herbaceous; *rachis* slightly scaly; one *vein* to each *segm.*; *sori* oblong, solitary.—*Ic. Pl. t.* 984.

*Hab.* New Zealand.—This is somewhat more rigid in texture than the rest of the group, but seems on the whole best placed here.

151. *A. Fadyeni*, Hk. ; *st.* scattered, 3-4 in. l., slender, scaly below ; *fr.* 6-8 in. l., 2 in. br., with several distant horizontal lanceolate *pinnæ* on each side, which are only lobed in the upper third, but cut down below into spathulate *pinnl.* 2 lin. l.,  $\frac{1}{8}$  in. br. ; *texture* herbaceous ; *rachis* naked, flaccid ; *veins* pinnate ; *sori* few, small, linear-oblong.—*Hk. Sp. 3. p. 192. 2nd Cent. t. 27.*

*Hab.* Jamaica, *McFadyen*.—This is a feebler plant than the less cut forms of *A. rhizophyllum*, with fewer and more distant *pinnæ* and *pinnules*.

152. *A. tenuifolium*, Don ; *st.* tufted, 3-6 in. l., slender, naked, slightly ebeneous ; *fr.* 6-12 in. l., 3-5 in. br., oblong-lanceolate, with numerous *pinnæ* on each side, the lower ones 2-3 in. l.,  $\frac{3}{4}$  in. br. ; lower *pinnl.* subdeltoid, cut down to a narrowly-winged rachis into spathulate *segm.*  $\frac{1}{8}$  in. br., sharply incised on the outer edge ; *texture* thinly herbaceous ; *rachis* green, naked, slender ; *veins* solitary ; *sori* 1 or 2 to each *segm.* placed on the disk.—*Hk. Sp. 3. p. 193. 2nd Cent. F. t. 29. A. concinnum, Wall.*

*Hab.* Himalayas, Neilgherries, Ceylon, Malayan Peninsula.

153. *A. rhizophyllum*, Kunze ; *st.* tufted, 2-6 in. l., greyish, naked ; *fr.* 6-12 in. l.,  $1\frac{1}{2}$ -2 in. br., cut down into numerous close-placed horizontal *pinnæ* on each side, the central ones 1 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., cut down throughout nearly to the centre into simple or forked erecto-patent *pinnl.*, the lowest on the under side suppressed ; *texture* herbaceous ; *rachis* compressed, winged ; *veins* one to each *segm.* ; *sori* solitary, submarginal.—*A. dubium, Brack. β, A. myriophyllum, Presl ; fr.* broader ; central *pinnæ*  $1\frac{1}{2}$  in. l., with lower *pinnl.* cut down into several simple or forked linear *segm.*—*Hk. Sp. 3. p. 200.*

*Hab.* Wisconsin, Florida, and W. Indies, to Peru, Sandwich Islands, and Fiji ; and gathered lately by Mr. Sanderson in Natal.—*A. strictum, Brack. t. 23,* differs from the typical plant by its stronger rachis, and *pinnules* of the upper half of the *pinnæ* linear-falcate and simple ; *A. bifissum, Fée,* is a slender form, with pinnatifid *pinnules* with distant linear segments ; and *A. cladolepton, Fée,* has cuneato-flabellate lower *pinnules* deeply 2- to 3-cleft at the apex.

154. *A. rutaceum*, Mett. ; *st.* tufted, 1-4 in. l., naked, polished, chesnut-brown ; *fr.* 6-12 in. l., 3-4 in. br., oblong-lanceolate, elongated and radicate at the apex ; *pinnæ* numerous, close-placed, horizontal, the central ones 1- $1\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., cut down to the rachis into numerous rhomboidal *pinnl.*  $\frac{2}{2}$  lines each way ; lowest *segm.* spathulate, stalked ; *texture* thinly herbaceous ; *rachis* polished and chesnut-brown like the stem ; *veins* one to each *segm.* ; *sori* solitary, central.—*Hk. Sp. 3. p. 203. 2nd Cent. F. t. 34.*

*Hab.* Venezuela, New Granada, Ecuador, Galapagos Island.—This differs from the preceding by its radicate habit and distinctly obovate-spathulate *pinnules*. It comes near *A. rachirhizon, Raddi.*

155. *A. cicutarium*, Swartz ; *st.* tufted, 4-8 in. l., firm, greenish, naked ; *fr.* 6-15 in. l., 4-6 in. br., with 10-15 horizontal *pinnæ* on each side, the lower ones 2-3 in. l., 1 in. br., cut down to the rachis into numerous ovate-rhomboidal *pinnl.*, which are  $\frac{3}{8}$ - $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. br., obliquely truncate on the lower side, and cut down to the rachis throughout into linear or oblong *segm.*, the latter once or twice cleft at the apex ; *texture* thinly herbaceous ; *colour* bright-green ; *rachis* compressed and often winged ; *sori* principally in two rows along the *pinnl.*—*Hk. Sp. 3. p. 198.*— $\beta$ , *A. Abyssinicum, Fée ; fr.* flaccid ; *texture* thin ; *pinnl.* and *segm.* fewer and broader.—*Hk. Sp. 3. p. 191.*

*Hab.* Tropical America, from Cuba and Mexico to Peru ; Abyssinia, Macalisberg, Guinea Coast.—*A. montverdense, Hk. 2nd Cent. t. 41,* appears to be a reduced form of this.



§§§ *Darea*, Juss. (*Cœnopteris*, Bory). *Veins simple, ultimate divisions of the frond narrowly linear; sori linear or linear-oblong, marginal or submarginal.* Sp. 156-177. See also Sp. 62, 144. Fig. 38. b. c.

\* *Fronde 6-9 in. l., lanceolate or subdeltoid.* Sp. 156-164.

156. A. (*Darea*) *Mannii*, Hk.; *st.* tufted, 1 in. or more l., slender, naked; *fr.* 1-2 in. l., 1 in. br., lanceolate-deltoid, the upper branches simple, the lower ones once or twice forked dichotomously; *primary* or *secondary* branches  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., not more than  $\frac{1}{4}$  lin. br.; *texture* thinly herbaceous, a single vein in each branch; *sori* oblong, solitary, marginal.—*Hk. 2nd Cent. t. 60.*

Hab. Cameroon Mountains and Fernando Po; discovered by Gustave Mann, and gathered also lately in Zambesi Land by Dr. Kirk.

157. A. (*Darea*) *brachypterum*, Kunze; *st.* tufted, 2-4 in. l., wiry, naked; *fr.* 4-6 in. l., 1-1 $\frac{1}{2}$  in. br., with 12-24 horizontal *pinnæ* on each side, of which from half to nearly the whole of the lower side is cut away, the largest  $\frac{1}{2}$ - $\frac{5}{8}$  in. l., cut down to the rachis into simple or forked linear *pinnl.* 1-1 $\frac{1}{2}$  lin. l.; *texture* herbaceous; *rachis* slender, naked; *sori* solitary, often quite marginal.—*Hk. Fil. Ex. t. 14.*

Hab. Madagascar, Natal, Angola, and Guinea Coast.

158. A. (*Darea*) *Dregeanum*, Kunze; *st.* 2-4 in. l., grey, naked; *fr.* 6-9 in. l., 2-3 in. br., flaccid and rooting at the point, with numerous flaccid *pinnæ* on each side, some of which have half the lower side cut away; the largest 1-1 $\frac{1}{4}$  in. l., cut down into simple or slightly-forked linear *pinnl.*  $\frac{1}{4}$ - $\frac{3}{8}$  in. l.; *texture* herbaceous; *rachis* naked; *sori* solitary, submarginal.—*Hk. Sp. 3. p. 214.*

Hab. Natal.—Very doubtfully distinct from *A. brachypterum*, with which it is joined by Mettenius.

159. A. (*Darea*) *obtusilobum*, Hk.; *st.* tufted, 2-4 in. l., naked, greenish; *fr.* 6 in. l., 2 in. br., with 9-12 subdeltoid *pinnæ* on each side, of which only the inner third on the lower side is cut away, the largest 1 in. l.,  $\frac{3}{4}$  in. br.; lowest *pinnl.*  $\frac{3}{8}$  in. deep, flabellately cut into 3-5 linear lobes; *texture* herbaceous; *rachis* green, naked; *veins* one in each fork; *sori* submarginal.—*Hk. Ic. t. 1000.*

Hab. Tanna and Aneiteum; and a less-divided plant gathered by Dr. Seemann in Fiji is probably the same.—Closely allied to the two preceding.

160. A. (*Darea*) *dichotomum*, Hk.; *st.* tufted, 1 in. l., firm, erect, greenish; *fr.* 3-4 in. l., 1-1 $\frac{1}{4}$  in. br., oblong, acute, tripinnate, with 8-12 *pinnæ* on each side, which are truncate on the lower side, cut down to a narrow compressed rachis, only the lower *pinnl.* again pinnatifid; *ult. segm.* 1 $\frac{1}{2}$ -2 lin. l.,  $\frac{1}{4}$  in. br.; *texture* herbaceous; *main rachis* compressed, greenish, naked; *one vein* to each segm.; *sori* solitary, linear, quite marginal.—*Hk. Sp. 3. p. 210. 2nd Cent. t. 39.*

Hab. Borneo.

161. A. (*Darea*) *bipinnatifidum*, Brack.; *st.* tufted, 2-4 in. l., naked, wiry, slender; *fr.* 6-8 in. l., 1-1 $\frac{1}{2}$  in. br., with 12-20 close-placed erecto-patent *pinnæ* on each side, the largest  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.,  $\frac{3}{8}$  in. br., cut down to the rachis into linear slightly-flattened *pinnl.*,  $\frac{1}{4}$  in. deep, the lowest again pinnatifid; *texture* subcoriaceous; *rachis* firm, erect, naked; *veins* one in each segm.; *sori* small, solitary, marginal.—*D. furcata, Brack. p. 170.*

Hab. Fiji; gathered by Brackenridge, Seemann, and Milne.

162. A. (*Darea davallioides*, Hk.; *st.* tufted, 3-4 in. l., firm, naked; *fr.* 4-6 in. l., 2-3 in. br., deltoid, quadripinnate, with 6-9 *pinnæ* on each side, the lowest much the largest, 2-3 in. l., 1-1½ in. br., deltoid; *pinnl.* deltoid, with a broadly-winged rachis and lower *segm.* again pinnatifid, with curved divaricate lateral divisions, 1-1½ lin. l., ½ lin. br.; *texture* thick, coriaceous; *colour* bright-green; *rachis* compressed; *veins* one to each division; *sori* copious, quite lateral, oblong, often occupying the whole upper side of the ult. divisions.—*Hk. Sp. 3. p. 212. 2nd Cent. F. t. 40.* Humata dareoidea, *Mett.*

Hab. Japan, Tsus-Sima, Loo Choo, Hong-Kong, Formosa.—The species of all the group that comes nearest to *Davallia*.

163. A. (*Darea irregulare*, Baker; *st.* scattered, 2-4 in. l., naked, firm, erect, pale-green; *fr.* 6-8 in. l., 2-3 in. br., with numerous *pinnæ* on each side, the uppermost simple, ¼-⅓ in. l., linear-falcate, those next in order dichotomously forked, the lowest regularly pinnate, with a prolonged simple point and several distant *pinnl.* ¼-⅓ in. l., ½ lin. br.; *texture* subcoriaceous; *rachis* flaccid, naked, compressed; *veins* one to each *pinnl.*; *sori* sometimes ¼ in. l., with very narrow involucre.

Hab. Sierra del Crystal, Guinea Coast, *Mann*, 1636.

164. A. (*Darea Richardi*, Hk. fil.; *st.* tufted, 3-6 in. l., firm, erect, greenish, scaly throughout; *fr.* 5-6 in. l., 2 in. br., with 12 or more close-placed lanceolate erecto-patent *pinnæ* on each side, which are cut down to a winged rachis into numerous ovate-rhomboidal *pinnl.*, which are again deeply pinnatifid with linear-mucronate *segm.* 1 lin. or less l.; *texture* coriaceous; *rachis* firm, compressed; one vein in each *segm.*; *sori* oblong.—*Hk. Sp. 3. p. 197. Ic. Pl. t. 977.*

Hab. New Zealand.—This seems to be nearest some of the dwarf tripinnatifid forms of *flaccidum*.

*Fronde ample*, 1-3 ft. l. Sp. 165-177.

165. A. (*Darea flaccidum*, Forst.; *st.* tufted, 4-8 in. l., stout, greenish, naked; *fr.* 1-3 ft. l., 4-8 in. br., often pendent, with numerous close or distant lanceolate *pinnæ*, which are 4-8 in. l., ½-¾ in. br., sometimes rather rigid and recurved, sometimes quite flaccid and drooping like the main rachis, sometimes deeply pinnatifid but more often cut down to the thick rachis in oblique or subfalcate narrow linear lobes; *texture* thick, subcoriaceous; *rachis* naked, pale-green like the frond, compressed upwards; *veins* obscure, one in each lobe; *sori* in the divided form quite marginal.—*Hk. Sp. 3. p. 205.*

Hab. New Zealand, Australia, Van Diemen's Land; and gathered lately also by Dr. Hillebrand in the Sandwich Islands, and Mr. Sanderson in Natal.—A very variable species.

166. A. (*Darea rutæfolium*, Kunze; *st.* tufted, 6-9 in. l., compressed, greenish, naked; *fr.* 6-15 in. l., 2-3 in. br., with 12-20 *pinnæ* on each side, the lowest subdeltoid, 2 in. or more l., cut down to the rachis into numerous erecto-patent distant *pinnl.* on each side, the lowest on the upper side again cut down into erecto-patent linear *segm.*, the lowest on the under side suppressed; *texture* coriaceous; *rachis* compressed; *colour* pale-green; *sori* small, marginal.—*Hk. Sp. 3. p. 206.* A. *stans*, *Kze.* A. *prolongatum*, *Hk. Sp. 3. p. 205. 2nd Cent. t. 42.*

Hab. Cape Colony northward to Natal and Zambesi Land; Himalayas, Ceylon, Japan, and Fiji.

167. A. (*Darea Borbonicum*, Hk.; *st.* tufted, 4-6 in. l., firm, erect, greyish; *fr.* 6-15 in. l., 3-4 in. br., with 12-20 distant erecto-patent *pinnæ* on each side,



which are  $1\frac{1}{2}$ -2 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., truncate at the base on the lower side, regularly cut down throughout into distant, linear, curved *pinnl.*  $\frac{1}{2}$  lin. br., the lowest on the upper side larger and again pinnatifid or palmate; *texture* coriaceous; *colour* pale-green; *rachis* thick, flaccid, compressed upwards; one *vein* and *sorus* to each segm., the latter marginal.—*Hk. Sp.* 3. p. 207.

Hab. Mauritius and Bourbon.—Very near the preceding.

168. A. (*Darea*) *Belangeri*, Kunze; *st.* tufted, 4-8 in. l., firm, erect, greenish, naked; *fr.* 12-18 in. l., 2-3 in. br., with numerous horizontal *pinnæ* on each side,  $1-1\frac{1}{2}$  in. l.,  $\frac{3}{8}$  in. br., rounded at the point, truncate at the base on the lower side, regularly cut down throughout to a broadly-winged rachis into linear erecto-patent *pinnl.*  $\frac{1}{2}$  lin. br., with their own breadth between them, the lowest usually once forked; *texture* coriaceous; *colour* pale-green; *rachis* compressed; one *vein* and *sorus* to each segm., the latter marginal.—*Hk. Sp.* 3. p. 209. A. Veitchianum, Moore.

Hab. Malayan Peninsula, Java, Sumatra, Borneo.—*A. Sampsoni*, Hance, gathered by Mr. Sampson about 100 miles west of Canton, of which our only specimen has lanceolate fronds not more than 4 in. l., under 1 in. br., and ovate-oblong *pinnæ* only cut down to the rachis at the base, is probably a reduced form. It has been suggested that this bears the same relation to *tenerum* that *inæquale* does to *lineatum*, *A. decorum*, Kunze, being a connecting link.

169. A. (*Darea*) *Thunbergii*, Kunze; *st.* tufted, 3-4 in. l., firm, naked, greyish; *fr.* 9-15 in. l., 3-4 in. br., oblong-lanceolate, acuminate, with numerous *pinnæ* on each side, the largest 2 in. l., 1 in. br., bluntish at the point, truncate at the base on the lower side, regularly cut down throughout to a broadly-winged rachis into blunt *pinnls.* 1 line br., the lowest larger and often again pinnatifid; *texture* herbaceous; *rachis* compressed and flaccid upwards; *veins* and *sori* one in each segm.—*Hk. Sp.* 3. p. 208.

Hab. Natal; and a similar plant, with longer stems and narrower *pinnæ* and *pinnules*, was gathered by G. Mann at Fernando Po.—Habit of the two preceding, but texture different. Perhaps a *Dareoid* form of *A. erectum*.

170. A. (*Darea*) *viviparum*, Presl; *st.* tufted, 6-9 in. l., firm, erect, greenish, deciduously fibrillose; *fr.* 1-2 ft. l., 6-8 in. br., with numerous close-placed erecto-patent *pinnæ* on each side, which are 4-6 in. l.,  $1\frac{1}{2}$ -2 in. br., cut down to a compressed rachis into numerous pinnatifid *pinnl.*, the lower *segm.* of which are again forked; *ult. divisions*  $\frac{1}{4}$ - $\frac{3}{8}$  in. l.,  $\frac{1}{4}$  lin. br.; *texture* herbaceous; *rachis* firm, erect, often viviparous; one *vein* to each division; *sori* solitary, marginal.—*Hk. Sp. Fil.* 3. p. 215.

Hab. Mauritius and Bourbon.

171. A. (*Darea*) *Novæ-Caledoniæ*, Hk.; *st.* tufted, 6-12 in. l., firm, erect, naked; *fr.* 9-12 in. l., 6-9 in. br., subdeltoid, tripinnate; *lower pinnæ* and *pinnl.* deltoid; *segm.* rigid, scarcely flattened,  $\frac{1}{2}$  in. or more l., distantly placed and erecto-patent; *texture* coriaceous; *rachis* firm, erect; *veins* solitary in each segm.; *sori* long, linear, marginal.—*Hk. Sp.* 3. p. 213.  *Ic. Pl. t.* 911.

Hab. New Caledonia; gathered by C. Moore, Vieillard, and Deplanche.

172. A. (*Darea*) *dimorphum*, Kunze; *st.* 6-12 in. l., firm, erect, naked; *fr.* 2-3 ft. l., 12-15 in. br., ovate-deltoid, sterile and fertile ones different or combined; *lower pinnæ* ovate-deltoid, 6-8 in. l., 2 in. br.; *sterile pinnl.* ovate-rhomboidal, 1 in. or more l.,  $\frac{1}{2}$  in. br., bluntly toothed and the base on the lower side obliquely truncate; *fertile* ones the same size, but cut down to the rachis into

very narrow simple or forked linear *pinnl.*; *texture* herbaceous; *rachis* firm, erect; *sori* linear, solitary, marginal.—*Hk. Sp. 3. p. 213. 2nd Cent. t. 37.*

Hab. Norfolk Island.—Easily recognized by its dimorphous fronds.

173. A. (*Darea*) *scandens*, J. Sm.; *st.* scattered on a stout creeping rhizome, very short; *fr.* 1-2 ft. l., 6-12 in. br., with numerous horizontal *pinnæ* on each side, which are 4-6 in. l.,  $1\frac{1}{2}$  in. br., cut down to a distinctly winged rachis into numerous subdistant ovate-rhomboidal *pinnl.*, which are cut down to the rachis throughout; lower *segm.* again pinnatifid; *ult. divisions* narrowly linear; *texture* thinly herbaceous; *rachis* firm, erect; one *vein* in each division; *sori* marginal.—*Hk. Sp. 3. p. 216. 2nd Cent. t. 37.*

Hab. New Guinea and the Philippines; and a similar plant, with simply pinnate *pinnæ* and a stem about 1 in. l., from Fiji and Celebes.

174. A. (*Darea*) *multifidum*, Brack.; *st.* stout, erect, grey, naked, slightly paleaceous, 12-18 in. l.; *fr.* 2-3 ft. l., 12-18 in. br., subdeltoid, quadripinnatifid, with numerous *pinnæ* on each side, the lowest 6-9 in. l., 4 in. br.; *pinnl.* lanceolate-deltoid, truncate at the base on the lower side; *segm.*  $\frac{3}{4}$ - $\frac{3}{4}$  in. l.,  $\frac{1}{4}$  in. br., the lowest cut down nearly to the rachis below into close oblong-spathulate bluntly-toothed divisions,  $\frac{1}{3}$  in. br.; *texture* subcoriaceous; *rachis* grey, firm, rather scaly; *veins* and *sori* one to each division, the latter very small, quite marginal.—*Hk. Sp. 3. p. 212.*

Hab. Tahiti, Society Isles, and Fiji.

175. A. (*Darea*) *Powellii*, Baker; *st.* naked, greyish, firm, erect; *fr.* 2-3 ft. l., 12-18 in. br., subdeltoid, 5-pinnatifid, with numerous imbricated erecto-patent *pinnæ* on each side, the lowest 9-12 in. l., 3-4 in. br.; *pinnl.* deltoid, 3 in. l.,  $1\frac{1}{2}$  in. br.; lower *segm.* deltoid, their lower divisions again pinnatifid; *ult. divisions* linear,  $1\frac{1}{2}$ -2 lin. l.,  $\frac{1}{3}$  lin. br., all the divisions erecto-patent; *texture* herbaceous; *colour* bright-green; *rachis* firm, compressed upwards; *veins* and *sori* solitary, the latter small (under 1 lin. l.), linear-oblong, submarginal.

Hab. Samoa, *Rev. T. Powell.*—This comes nearest to the preceding, but is considerably more divided.

176. A. (*Darea*) *ferulaceum*, Moore; *st.* 6-12 in. l., firm, erect, naked, greyish; *fr.* 1-2 ft. l., 9-12 in. br., ovate-deltoid, with several *pinnæ* decreasing gradually upwards, the lowest horizontal or deflexed, 6-9 in. l., 3-5 in. br.; *pinnl.* lanceolate-deltoid; *segm.*  $\frac{3}{4}$ -1 in. l., their divisions again pinnatifid; *ult. lobes* linear, blunt, 1 lin. l.,  $\frac{1}{4}$  lin. br.; *texture* thinly herbaceous; *colour* bright-green; *main rachis* firm, naked; *veins* solitary; *sori* lateral, very small.—*Hk. Sp. 3. p. 216. 2nd Cent. t. 33.*

Hab. Andes of Ecuador and New Granada.

§§§§ *Athyrium*, Roth. *Veins* free, *sori* more or less curved, sometimes horse-shoe-shaped. *Sp. 177-199. Fig. 38. e.*

\* *Fronds* deltoid. *Sp. 177-180.*

177. A. (*Athyr.*) *crenulatum*, Fries; *st.* 6-12 in. l., scattered, firm, erect, naked, straw-coloured, clothed towards the base with large ovate dark-brown scales; *fr.* 9-15 in. each way, deltoid, tri- or quadripinnatifid, with 9-12 *pinnæ* on each side, the lowest much the largest, 6-9 in. l.,  $1\frac{1}{2}$ -2 in. br.; *pinnl.* lanceolate, cut down to the rachis except towards the point on each side into 4-6 blunt oblong *segm.* 2 lin. l., 1 lin. br., which are bluntly toothed; *texture* herbaceous; *rachis* straw-coloured; *both surfaces* hairy or nearly naked; *sori*



2-6 to a segm., oblong, usually nearly straight, often double.—*Hk. Sp. 3. p. 226.*

Hab. Scandinavia by way of Siberia to Japan.

178. A. (*Athyr.*) *spinulosum*, Baker; *st.* 6-12 in. l., scattered, firm, erect, naked, straw-coloured, more or less clothed throughout with lanceolate pale-brown scales; *fr.* 9-12 in. each way, deltoid, tri- or quadripinnatifid, with 9-12 *pinnæ* on each side, the lowest much the largest, 6-9 in. l.,  $2\frac{1}{2}$ -3 in. br., ovate-lanceolate; *pinnl.* lanceolate, cut down to the rachis on each side into 6-9 oblong-rhomboidal mucronate *segm.*, 2 lin. l., 1 lin. br., which are sharply toothed; *texture* herbaceous; *rachis* firm, naked, or nearly so; *sori* 2-10 to a segm., usually round and the invol. ovate, but occasionally oblong, and the *invol.* slightly curved.—*Cystopteris spinulosa*, *Max. Fl. Amur. p. 340.*

Hab. Amur-land, *Maximowicz*; Manchuria, *Wilford*, 1163; Korea, *Wilford*, 908.

179. A. (*Athyr.*) *subtriangulare*, Hk. MSS.; *st.* 6-12 in. l., firm, erect, naked, clothed towards the base with lanceolate pale-brown scales; *fr.* 1 ft. each way, deltoid, quadripinnatifid, with 12-18 *pinnæ* on each side, the lowest much the largest, 6-9 in. l., 2 in. br., lanceolate; *pinnl.* lanceolate, cut down to the rachis on each side into 9-12 close elliptic-rhomboidal *segm.*, 2 lin. l., 1 lin. br., which are inciso-serrated, sometimes halfway down; *texture* herbaceous; *rachis* firm, naked; *sori* 2-12 to a segm., roundish, but the lower *invol.* quite horseshoe-shaped.—*Athy. Hookerianum*, *Moore.*

Hab. Sikkim, 10-12,000 ft.; gathered by Dr. Hooker.—*Pinnæ* more numerous than in the preceding, the segments narrower, more abundantly but not so sharply toothed, the *sori* more copious, and the involucre different.

180. A. (*Athyr.*) *medium*, Hk.; *st.* tufted, 4-6 in. l., firm, erect, densely clothed throughout with crisped linear reddish-brown scales; *fr.* 6-9 in. l., 4-6 in. br., subdeltoid, tripinnate, with numerous spreading *pinnæ* on each side, the lowest 3-4 in. l.,  $1-1\frac{1}{2}$  in. br.; *pinnl.* numerous, lanceolate-rhomboidal, the lobes ovate-acuminate, in the lower part reaching down nearly or quite to the rachis; *texture* herbaceous; *rachis* firm, erect, fibrillose; *veins* pinnate, conspicuous; *sori* copious, often 6-8 to a segm.; *invol.* roundish, reniform.—*Hk. Sp. 3. p. 227. Ic. t. 43.*

Hab. Tristan d'Acunha.—A well-marked species, which was placed by Carmichael in *Aspidium*.

\*\* *Fronde lanceolate or ovate-lanceolate. Sp. 181-199.*

181. A. (*Athyr.*) *cystopteroides*, Hk.; *st.* 4-6 in. l., scattered, slender, pale, naked; *fr.* 4-6 in. l.,  $1\frac{1}{2}$ -2 in. br., oblong-lanceolate, with numerous *pinnæ* on each side, the lower ones lanceolate,  $1-1\frac{1}{2}$  in. l.,  $\frac{1}{2}-\frac{3}{4}$  in. br., pinnatifid above, cut down to the rachis below into blunt ovate-rhomboidal *pinnl.*, which are broadly lobed about halfway down to the midrib; *texture* herbaceous; *both surfaces* slightly hairy and glandular; *sori* 2-6 to a *pinnl.*, placed near the base of the teeth; *invol.* hispid, lunulate.—*Hk. Sp. 3. p. 220. Athyrium, Eaton.*

Hab. Loo-Choo Islands.—A small plant with the habit of *Cystopteris fragilis*, and a slender wide-creeping rhizome.

182. A. (*Athyr.*) *Hohenackerianum*, Kunze; *st.* tufted, 2-4 in. l., firm, erect, clothed throughout rather closely with linear-subulate scales; *fr.* 6-9 in. l.,  $1\frac{1}{2}$ -3 in. br., ovate-lanceolate, with numerous lanceolate *pinnæ* on each side, which are cut down below nearly or quite to the rachis into ovate inciso-serrated *pinnl.*; *texture* herbaceous; *rachis* naked or scaly below; *sori* copious, oblong; *invol.* conspicuous, some distinctly curved.—*Hk. Sp. 3. p. 220.*

Hab. Scinde, Peninsular India, Ceylon.—Habit of a small form of *Filix-femina*, but with more sausage-like sori and a fibrillose stem.

183. A. (Athy.) *grammitoides*, Hk.; *st.* subtufted, 3-4 in. l., firm, erect, copiously scaly; *fr.* 6-8 in. l.,  $1\frac{1}{2}$ -2 in. br., lanceolate, with numerous lanceolate-falcate *pinnæ* on each side, which are  $1-1\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., the two sides unequal, the point bluntish, the edge irregularly inciso-crenate, the upper side distinctly auricled at the base; *texture* herbaceous; *rachis* chaffy, winged upwards; *veins* pinnate; *sori* linear-oblong in two regular rows placed obliquely, the lower ones slightly curved, often diplazioid.—*Hk. Sp. 3. p. 228. Ic. t. 913.*

Hab. Peninsular India, Java, Philippines, Sandwich Islands.—The Indian plant is almost destitute of scales upon the stem and rachis.

184. A. (Athy.) *thelypteroides*, Michx.; *st.* 1 ft. l., erect, polished, straw-coloured; *fr.* 1-2 ft. l., 6-12 in. br., lanceolate, with numerous spreading *pinnæ*, the lower ones 4-6 in. l., 1 in. br., cut down to a broadly-winged rachis into numerous nearly entire elliptical spreading *pinnl.*; *texture* herbaceous; *rachis* sometimes slightly hairy; *sori* in close regular rows reaching nearly from the midrib to the edge, slightly curved, the lower ones often double.—*Hk. Sp. 3. p. 229.*

Hab. Canada, United States, Amur-land, Himalayas (ascending to 10,000 ft.), Penang.—Easily distinguished by its long sori in very regular rows.

185. A. (Athy.) *decurtatum*, Link; *st.* 1 ft. or more l., erect, straw-coloured above, deciduously scaly below; *fr.* 2-3 ft. l., 9-12 in. br., with very numerous close-placed spreading *pinnæ* 4-6 in. l., 1 in. br., cut down nearly to the rachis throughout into blunt entire lobes with parallel sides, 2 lin. br.; *texture* herbaceous; *both surfaces* pubescent; *veinlets* simple, regularly pinnated; *sori* oblong, falling short of both edge and midrib, the lower ones curved.—*Hk. Sp. 3. p. 226.*

Hab. Brazil, *Lindberg*, 620.—Very like the preceding in habit and cutting, but the sori much shorter.

186. A. (Athy.) *deparioides*, Brack.; *st.* 12-18 in. l., firm, erect, smooth, greyish; *fr.* 3 ft. l., 1 ft. br., lanceolate, with numerous *pinnæ* on each side, the lower ones 6-8 in. l., 1 in. br., cut down nearly to the rachis throughout into rather distant oblong-obtuse *pinnl.*, which are slightly inciso-crenate; *texture* subcoriaceous; *rachis* firm, naked, proliferous; *veins* conspicuous, once pinnate in each *pinnl.*, the veinlets simple, distant; *sori* oblong, one to each veinlet touching the edge, the lower ones very slightly curved.—*Brack. p. 172.*

Hab. Oahu; and we have a single pinna of a plant from Sumatra, gathered by *Teschemacher*, with similar marginal sori, but with considerably broader pinnules not reaching more than two-thirds of the way down to the midrib.

187. A. (Athy.) *Skinneri*, Baker; *st.* 6-9 in. l., erect, greyish, slightly scaly below; *fr.* 9-15 in. l., 6-9 in. br., ovate-lanceolate, with numerous *pinnæ* on each side, the lower ones  $1-1\frac{1}{2}$  in. apart, 3-5 in. l., 1 in. br., cut in the upper part halfway down and below nearly to the rachis into oblong-rhomboidal blunt inciso-crenate *pinnl.*, often  $\frac{1}{4}$  in. br.; *texture* herbaceous; *rachis* naked, slender; *veinlets* of the *pinnl.* sometimes forked; *sori* small, linear-oblong, 2 to 12 to a *pinnl.*—*Athyrium, Moore.*

Hab. Guatemala.—Perhaps this should be joined with the next, but the *pinnæ* and *pinnules* are much less deeply cut, and the latter so broad that they are slightly imbricated.



188. *A. (Athyr.) achilleæfolium*, Liebm.; *st.* 6-9 in. l., erect, grey, scaly below; *fr.* 12-18 in. l., 6-9 in. br., ovate-lanceolate, with numerous *pinnæ* on each side, the lower ones 1-1½ in. apart, lanceolate-acuminate, 4-6 in. l., 1 in. br., cut throughout to a rachis ½ in. br., into regular erecto-patent, oblong, bluntly-toothed *pinnl.* ½ in. l., ⅙ in. br.; *texture* herbaceous; *rachis* naked, colour dark-green; *veinlets* of the *pinnl.* simple; *sori* oblong, often 1 to each lobe of the pinnules.—*Hk. Sp. 3. p. 230.*

*Hab.* Mexico.—Remarkable for the regularity of the broad wing of the midrib of its pinnæ.

189. *A. (Athyr.) macrocarpum*, Blume; *st.* 6-9 in. l., firm, erect, straw-coloured, scaly below; *fr.* 12-24 in. l., 6-9 in. br., ovate-lanceolate, with numerous *pinnæ* on each side, the lowest 3-6 in. l., 1-1½ in. br., lanceolate, cut down to the rachis into numerous oblong-rhomboidal *pinnl.*, which are incise-crenate or pinnatifid; *texture* herbaceous; *rachis* naked; *lateral veins* of segm. forked; *sori* copious, large; *invol.* oblong-reniform, ¾-1 lin. br.—*Hk. Sp. 3. p. 222.* *A. foliolosum*, *Wall.* (in part). *A. decipiens*, *fallax*, and *puncticaule*, *Mett.*

*Hab.* Himalayas (up to 6,000 ft.), Ceylon, Java, and gathered lately by Dr. Maingay in the province of Shantung, N. China; and the Japanese *A. Goringianum*, *Mett.*, is probably the same plant with rather sharper teeth.—This has a general habit not unlike that of *Nephrodium spinulosum*, with the involucre so nearly reniform that Mr. Moore places it in *Lastrea*.

190. *A. (Athyr.) nigripes*, Blume; *st.* tufted, 6-12 in. l., straw-coloured, erect, scaly below; *fr.* 12-24 in. l., 8-12 in. br., ovate-lanceolate, with numerous *pinnæ* on each side, the lowest lanceolate, 6-9 in. l., 1½-2 in. br., cut down to the rachis into numerous elliptico-rhomboidal *pinnl.*, which are broadly lobed about halfway down and the lobes slightly toothed; *texture* herbaceous; *rachis* naked, straw-coloured; *lateral veins* of the segm. forked; *sori* linear-oblong, often curved, 1-1½ lin. l., principally in two parallel rows close to the midrib of the *pinnl.*—*A. gymnogrammoides*, *Klotzsch.* *Hk. Sp. 3. p. 227.* *A. costale*, *Blume*, non *Swartz.*

*Hab.* Himalayas (ascending to 10,000 ft.), Neilgherries, Ceylon, Java, and Japan.—Very like *A. macrocarpum* in general habit, but quite different in fruit. *A. solenopteris*, *Mett.*, is a form of this, with the pinnules more sharply toothed, and cut down in the lower part nearly or quite to the rachis; and there is another plant (var. *dissectum*, Moore) with much smaller sori, and the habit of the more finely divided forms of *Filix-femina*.

191. *A. (Athyr.) niponicum*, *Mett.*; *rhizome* creeping, the scales lanceolate, reddish; *st.* 6-12 in. l., glossy, stramineous; *fr.* 1 ft. or more l., 6-8 in. br.; *pinnæ* lanceolate, distinctly stalked, cut down nearly or quite to the rachis below into oblong-lanceolate unequal-sided *pinnl.*, which vary from subentire to deeply pinnatifid; *texture* herbaceous; *rachis* and both sides naked, often tinged with purple; *sori* copious, the lower ones often quite horseshoe-shaped.—*Mett. Fil. Ind. 2. p. 240.*

*Hab.* Japan and China.

192. *A. (Athyr.) Filix-femina*, *Bernh.*; *st.* tufted, 6-12 in. l., firm, erect, straw-coloured or brownish, scaly below; *fr.* 1-3 ft. l., 6-12 in. br., oblong-lanceolate, with numerous *pinnæ*, the lower ones spreading, lanceolate, 3-6 in. l., 1-1½ in. br., cut down to a compressed winged rachis into lanceolate or ovate-rhomboidal *pinnl.*, which are again deeply incise-pinnatifid; *texture* thinly herbaceous; *rachis* naked, slender; *veins* pinnate in the lobes; *sori* linear-oblong, the lower ones often curved.—*Hk. Sp. 3. p. 217. Brit. F. t. 35.*

Hab. Arctic Europe to Madeira, the Canaries, Algiers, Crete, Himalayas (10-12,000 ft.), Kamschatka, and Japan : Africa—Abyssinia, Natal, Cameroon Mountains (7,000 ft.) : America—Sitka and Labrador to Cuba, Caraccas, and Venezuela. Of the common European forms *A. Filix-femina* is a large plant with narrow lanceolate deeply pinnatifid pinnules ; *A. rheticum*, Roth, is smaller, with the pinnules broader, and not so deeply cut ; *A. molle*, Roth, thinner in texture, with oblong rhomboidal pinnules  $\frac{1}{4}$  in. broad ; and *A. latifolium*, Bab. (non Presl), a form with the pinnules so broad that they are considerably imbricated. The N. American *A. Martensi*, Kunze, and *A. Galeottii*, Fée, do not seem safely separable. The E. Indian *A. pectinatum*, Wall., is very thin in texture, and has deeply-cut pinnules, with narrow spreading segments. *A. tenuifrons*, Wall., is like *A. molle*, but with the midrib of the pinnae and pinnules beset with firm yellow spines or strigillae ; as is also the case with various Indian, Ceylonese, and Javan forms, with narrower, more slender, and more straggling pinnae and pinnules,—as *A. gracile*, Don ; *A. stramineum*, J. Sm. ; *A. tenellum*, Wall. ; *A. proliferum*, Moore ; and the S. American *A. Dombeyi*, Desv. The Abyssinian *A. Schimperii*, Moug. and Fée, has a creeping rhizome, firmer texture, and a bright stramineous rachis. The Natal *A. lacum*, Pappe and Rawson, is like *A. rheticum*, but firmer in texture. Plants from Vancouver's Island and the Rocky Mountains have round sori, with slightly-developed ovate involucre ; and a plant found by Mr. Stansfield in Yorkshire, very delicate in texture and bright-green in colour, with pinnules quite cut down to the rachis into linear-lanceolate segments, which are again deeply incised, produces involucre only very rarely, and is the *Phegopteris plumosa* of J. Smith (B. and F. Ferns, p. 269).

193. *A. (Athyr.) oxyphyllum*, Hk. ; *st.* firm, erect, 6-12 in. l., straw-coloured, clothed at the base with large lanceolate-acuminate reddish-brown scales ; *fr.* 1-2 ft. l., 6-12 in. br., lanceolate, with several distant pinnæ on each side, which are 4-8 in. l., 1-2 in. br. ; *pinnl.* lanceolate, sometimes auricled on the upper side, in the larger forms again pinnatifid, teeth mucronate ; *texture* subcoriaceous ; *rachis* firm, naked, straw-coloured ; *veins* regularly pinnated ; *sori* in two rows on the pinnae or pinnl. midway between the midrib and edge ; *invol.* oblong-reniform.—*Hk. Sp. 3. p. 221.* *A. drepanopteron*, *A. Br.* *Lastrea eburnea*, *J. Sm.*

Hab. Himalayas (ascending to 7,000 ft.), Java, and Japan.—The midrib of the pinnae on the upper side is often spinulose. This is as variable as *A. Filix-femina* in size and cutting, but the texture is rigid, and the involucre much more like that of *Lastrea*.

194. *A. (Athyr.) aspidioides*, Schlecht. ; *st.* tufted, 6-12 in. l., stramineous, slender, naked, except at the base ; *fr.* 1-2 ft. l., 8-12 in. br., ovate-deltoid, tripinnatifid ; *lower pinnæ* 6-8 in. l., lanceolate-deltoid ; *pinnl.* lanceolate, cut down below nearly to the rachis into inciso-pinnatifid ovate *segm.* 2 lin. br. ; *texture* herbaceous ; *colour* dark-green ; both surfaces naked ; *rachis* stramineous, slender ; *sori* copious, oblong, the lower ones curved.— $\beta$ , *A. scandicinum*, Presl ; *fr.* larger and more finely cut ; *segm.* deeply pinnatifid, with narrow linear divisions, the whole breadth of which the sori sometimes occupy.—*A. multi-sectum*, *Brack. Hk. Sp. 3. p. 223.*

Hab. Ecuador, Sandwich Isles, Neilgherries, Madagascar, Fernando Po, Cape Colony.—The extremes differ widely, but some of Dr. Spruce's American examples quite correspond with the Cape and E. Indian plant.

195. *A. (Athyr.) brevisorum*, Wall. ; *st.* 12-18 in. l., erect, slender, naked, greyish ; *fr.* 2-3 ft. l., 9-18 in. br. ; *lower pinnæ* 1 ft. or more l. ; *pinnl.* lanceolate, distant, 2-3 in. l., 1-1 $\frac{1}{2}$  in. br. ; *segm.* lanceolate,  $\frac{3}{4}$  in. l., 2 lin. br., deeply and sharply toothed ; *texture* herbaceous ; *rachis* naked ; *lateral veins* of the segments forked ; *sori* small, 6-12 to a *segm.*, in two rows near the midrib, the lower ones curved, often double.—*Hk. Sp. 3. p. 229.*

Hab. Ava and Mishmee, and gathered lately in the Sandwich Islands by Dr. Hillebrand.—Like *A. achilleæfolium* in cutting, but much larger and more compound.

196. *A. (Athyr.) conchatum*, Moore ; *st.* 2 ft. or more l., stout, erect ; *fr.* 3-4



ft. l., 12-18 in. br.; *lower pinnae* lanceolate, 9-12 in. l., 2-3 in. br., with numerous lanceolate *pinnl.* on each side, which are cut down to a winged rachis into linear-oblong spreading inciso-crenate segm.  $\frac{3}{4}$ -1 in. l.,  $\frac{1}{4}$  in. br.; *texture* herbaceous; *veins* one to each tooth; *sori* short, oblong, in two oblique rows near the midrib; *invol.* brown, subcoriaceous, persistent.—*Hk. Sp. 3. p. 231.*

Hab. West Indies.—We include here four species of Fée—his *Athyr. conchatum* and *Hypochlamys pectinata*, *Tussaci*, and *squamulosa*. His genus *Hypochlamys* is characterized by having the sori on the lower side of the vein and the involucre opening towards it.

197. A. (*Athyr.*) *fimbriatum*, *Hk.*; *st.* 1 ft. or more l., firm, erect, clothed below with dark-brown scales; *fr.* 2-4 ft. l., 12-18 in. br.; *lower pinnae* 6-12 in. l., 2-3 in. br.; *pinnl.* lanceolate; *segm.* subdeltoid, distinctly stalked, deeply and sharply inciso-pinnatifid, with mucronate teeth; *texture* herbaceous but firm; *rachis* strong, naked; *sori* close, copious, broadly oblong; *invol.* oblong or subreniform, convex.—*Hk. Sp. 3. p. 234.*

Hab. Himalayas, ascending to 8-9,000 ft.—Distinguished by its large compound habit, firm texture, and subreniform involucre.

198. A. (*Athyr.*) *umbrosum*, *J. Sm.*; *st.* 1 ft. or more l., strong, erect, brownish, clothed below with dark scales; *fr.* 3-5 ft. l., 12-18 in. br.; *pinnae* ovate-lanceolate, 12-18 in. l., 3-6 in. br.; *pinnl.* lanceolate, close, cut down to the rachis into numerous unequal-sided elliptico-rhomboidal lobes,  $\frac{3}{8}$ - $\frac{1}{2}$  in. l., 2 lin. br., which are deeply inciso-crenate; *texture* herbaceous; *colour* bright-green; *veins* pinnate; *sori* close, copious, oblong; *invol.* large, tumid, membranous.—*Allantodia, R. Br. A. australe, Brack. Hk. Sp. 3. p. 232.*

Hab. Madeira, Canaries, Azores, Guinea Coast, Himalayas (ascending to 6-8,000 ft.), to Ceylon, Java, Australia, Tasmania, and New Zealand.—I cannot point out any character to distinguish the Australian from the Madeiran plant. The Javan *A. muricatum*, *Mett.*, has a muricated stem. This differs from the species retained in *Allantodia* by the involucre bursting not in the middle, but along the edge, as in the other species of *Asplenium*.

199. A. (*Athyr.*) *woodwardioides*, *Baker*; *st.* firm, erect, naked, dark chesnut-brown; *fr.* 2-3 ft. l., 1 ft. or more br.; *lower pinnae* 6-9 in. l., 3 in. br., *pinnl.* lanceolate, slightly stalked,  $1\frac{1}{2}$  in. l.,  $\frac{1}{2}$  in. br., cut down two-thirds of the way to the rachis into linear-oblong subfalcate finely-toothed lobes; *texture* herbaceous; *rachis* and both sides naked; *veins* pinnate in the lobes, with 4-5 veinlets on a side, the upper ones forked; *sori* oblong, confined to the lower lobes close to the midrib and not reaching more than halfway to the edge.—*Brachysorus, Presl. Allantodia sylvatica, Blume. Athyr. basilare, Fée. Dipl. brevisorum, J. Sm.*

Hab. Philippines, *Cuming*, 153; Java, *Blume*.—Resembles in habit *A. polypodoides*.

§§§§§ *Diplazium, Swartz. Veins free, the sori and involucre extending to both sides of some of them. Sp. 200-263. Fig. 38. f.*

\* *Fronde simple, entire or very nearly so. Sp. 200-202.*

200. A. (*Dipl.*) *lanceum*, *Thunb.*; *st.* scattered, 4-6 in. l., slightly fibrillose; *fr.* 6-9 in. l.,  $\frac{3}{4}$ -1 in. br., attenuated gradually upwards and downwards, the edge entire or slightly undulated; *texture* coriaceous; *veins* pinnate, all reaching the edge; *sori* linear, irregular, reaching nearly to the edge, but not to the midrib.—*Hk. Sp. 3. p. 235. A. subsinuatum, Hk. & Gr. Ic. t. 27. Triblemma, J. Smith.*

Hab. Himalayas, Ceylon, China, and Japan.

201. A. (Dipl.) *subserratum*, Blume ; *st.* scattered, 1-2 in. l., firm, erect ; *fr.* 12-18 in. l.,  $1\frac{1}{2}$  in. br., narrowed gradually towards each end, sometimes rounded at the base, the edge towards the point bluntly crenated ; *texture* thinly herbaceous, satiny ; *veins* pinnated ; *sori* linear, reaching the midrib, but not the edge.—*Hk. Sp. 3. p. 236. t. 164. B.*

Hab. Java and Penang.

202. A. (Dipl.) *plantagineum*, L. ; *st.* tufted, firm, erect, 6-9 in. l. ; *fr.* 6-9 in. l., 2-3 in. br., the point acuminate, the base rounded, the edge slightly undulato-dentate upwards, sometimes lobed towards the base ; *texture* coriaceous ; *veins* pinnated ; *sori* slender, linear, sometimes nearly touching both edge and midrib.—*Hk. Sp. 3. p. 237.*

Hab. Mexico and W. Indies southward to Brazil.

\*\* *Fronde linear-lanceolate, cut down to the rachis at the base.* Sp. 203.

203. A. (Dipl.) *zeylanicum*, Hk. ; *st.* scattered, 4-8 in. l., firm, erect, scaly throughout ; *fr.* 6-12 in. l., 1-2 in. br., the point acuminate, the apex slightly lobed, the lower two-thirds more deeply so, and the base quite down to the rachis ; *lobes* blunt,  $\frac{1}{4}$ - $\frac{1}{2}$  in. across ; *texture* herbaceous ; *veins* pinnate ; *sori* linear, 2-3 lin. l.—*Hk. Sp. 3. p. 237. 2nd Cent. t. 16.*

Hab. Ceylon, Gardner, Thwaites.

\*\*\* *Fronde with the lower half or three-quarters pinnate.* Sp. 204-235.

† *Pinnæ entire, or very slightly lobed.* Sp. 204-217.

204. A. (Dipl.) *humile*, Baker ; *st.* 6-8 in. l., firm, erect, dark-brown, and rather scaly at the base ; *fr.* 6-9 in. l., 4-5 in. br., ovate-deltoid, with numerous close-placed *pinnæ* on each side, which are 2-3 in. l.,  $\frac{3}{8}$  in. br., the point much acuminate, the edge slightly inciso-serrate, the two sides rather unequal, the upper one slightly auricled, and both subcuneate at the base ; *rachis* naked, firm ; *texture* subcoriaceous ; *veins* fine, close, 4-5 in a group ; *sori* beginning at the midrib, but not reaching the edge.—*D. humile, Bojer.*

Hab. Mauritius.—In habit not unlike *A. cultrifolium*, but different in texture and venation.

205. A. (Dipl.) *pallidum*, Blume ; *st.* 6-12 in. l., firm, erect, naked ; *fr.* 1-2 ft. l., 6-12 in. br., with numerous horizontal *pinnæ* on each side, the lower ones stalked, 1-1 $\frac{1}{2}$  in. apart, 3-6 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., linear-lanceolate, the apex acuminate, the base rounded, especially on the upper side, the edge often sharply toothed ; *texture* subcoriaceous ; *veins* once or twice forked ; *sori* in regular lines from the midrib very nearly to the edge.—*Hk. Sp. 3. p. 238.*

Hab. Philippines, and Malayan Peninsula and Isles.—A plant gathered by Cuming, herbaceous in texture, with very broad involucre, is perhaps distinct.

206. A. (Dipl.) *porrectum*, Wall. ; *st.* 1 ft. l., firm, erect, brownish ; *fr.* 9-18 in. l., 6-9 in. br., subdeltoid, with numerous horizontal *pinnæ* on each side, the lower ones stalked, 3-4 in. l.,  $\frac{3}{4}$  in. br., the point rather blunt, the upper ones subentire, except that the base on both sides is distinctly auricled, the edge in the lower ones bluntly lobed, sometimes one-third to halfway down, the base narrowed suddenly ; *texture* subcoriaceous ; *rachis* naked ; *lateral veins* simple or once forked ; *sori* in regular parallel rows extending from the midrib to the edge.—*Hk. Sp. 3. p. 250.*

Hab. Malayan Peninsula and Isles—This comes very near to the last in texture, and is probably *A. crenato-serratum*, Blume.



207. A. (Dipl.) *cultratum*, Mett. ; *st.* tufted, 4-6 in. l., grey, naked ; *fr.* 6-9 in. l., 3-4 in. br., the apex pinnatifid, the lower two-thirds pinnate, with 3-5 *pinnæ* on each side, the lower ones distinctly stalked, 2 in. l.,  $\frac{3}{4}$  in. br., the point acute, rather falcate, the edge nearly entire, both sides narrowed suddenly, and the upper one auricled at the base ; *texture* subcoriaceous ; *veins* twice forked ; *sori* linear, slender, reaching the edge but not the midrib.—*Hk. Sp.* 3. p. 247.

Hab. Luzon, *Cuming*, 199.

208. A. (Dipl.) *pinnatifido-pinnatum*, Hk. ; *st.* 6-12 in. l., firm, erect, naked ; *fr.* 9-12 in. l., 6-9 in. br., with a deltoid apex deeply lobed below, and 3-4 *pinnæ* on each side, which are 3-4 in. l., 1 in. br., the point acute, the edge sharply but not deeply toothed, the base cuneate on both sides ; *texture* coriaceous ; *veins* obscure, copiously pinnated ; *sori* irregular, beginning at the midrib, but falling far short of the edge.—*Hk. Sp.* 3. p. 238.

Hab. Mishmee, *Griffith*.—In texture and dulness of colour this resembles the last species and *A. Brackenridgii*.

209. A. (Dipl.) *Seemannii*, Baker ; *st.* 6-12 in. l., firm, erect, dark-brown, naked ; *fr.* 9-15 in. l., 4 in. br., lanceolate, with 12-20 *pinnæ* on each side, the lower ones horizontal, subsessile, 2 in. l.,  $\frac{1}{2}$ - $\frac{5}{8}$  in. br., the point acute, the edge slightly lobed below, the base slightly cordate on both sides, the upper side auricled ; *texture* herbaceous ; *veins* dark-green, 2-3 to a group ; *sori* reaching from the midrib quite to the edge. *Diplazium, Moore, Ind. Fil.* p. 337.

Hab. Darien, *Seemann*.—This has the texture and pellucid venation of *A. grandifolium*, but the whole plant and *pinnæ* are much smaller, with veins only twice forked, and *sori* running up on the unbranched fork to the edge.

210. A. (Dipl.) *bantamense*, Baker ; *st.* 6-12 in. l., firm, erect, nearly naked ; *fr.* 9-18 in. l., with a large terminal *pinna* and 1 to 4 pairs of lateral ones, which are 6-8 in. l., 1-1 $\frac{1}{2}$  in. br., both ends narrowed, the edge very nearly entire ; *texture* coriaceous ; *veins* 3-5 to a group ; *sori* slender, irregular, nearly touching both edge and midrib.—*Diplazium, Bl. A. fraxinifolium, Wall., Hk. Sp.* 3. p. 240. *2nd Cent. t.* 19.— $\beta$ , *A. alternifolium*, Mett. ; *pinnæ* broader, rounded at the base ; lower *veins* not reaching the edge.—*Hk. Sp.* 3. p. 239.

Hab. Himalayas, Hong-Kong, Malaccas, Borneo, Aneiteum.—Probably a free-veined form of *A. lineolatum*.

211. A. (Dipl.) *Lechleri*, Mett. ; *st.* 2-3 ft. l., stout, erect, slightly scaly towards the base ; *fr.* 3 ft. l., with numerous *pinnæ* 1 ft. or more l., 2 $\frac{1}{2}$ -3 in. br., the point acuminate, the edge slightly toothed towards the point, the base rounded equally on both sides ; *texture* very coriaceous ; *rachis* strong, erect ; *veins* simple, close, parallel ; *sori* beginning at the midrib, but falling short of the edge.—*Hk. Sp.* 3. p. 244 (*in part*).

Hab. Peru, *Lechler*, 2269 ; Rio Negro, *Spruce*, 3832 ; Essequibo, *Appun*, 186.

212. A. (Dipl.) *Callipteris*, Baker ; *st.* 1 ft. or more l., strong, erect, brownish ; *fr.* 2-3 ft. l., with numerous *pinnæ* 9-12 in. l., 2-2 $\frac{1}{2}$  in. br., the point acuminate, the margin toothed only towards the point, the base rounded equally on both sides, the lower ones stalked ; *texture* coriaceous ; *colour* bright-green ; *veins* 5-6 to a group ; *sori* beginning at the midrib, and reaching nearly to the edge.—*Diplazium, Fée, Gen. Fil.* 214.

Hab. Cuba, *Linden* ; Guadeloupe, *L'Herminier* ; Tarapota, Peru, *Spruce*, 4760.—This rivals *Lechleri* in size and texture, differing totally in venation.

213. A. (Dipl.) *grandifolium*, Sw. ; *st.* 1 ft. or more l., firm, erect, naked or

scaly below, ebeneous ; *fr.* 2-3 ft. l., 9-12 in. br., the point pinnatifid, with 12-20 *pinnæ* on each side, the lower ones 2 in. or more apart, distinctly stalked, 4-6 in. l., 1-1½ in. br., the point acuminate, the edge slightly toothed, and sometimes broadly lobed below, the base equally rounded on both sides ; *texture* thinly herbaceous ; *colour* deep-green ; *rachis* firm, erect, naked ; *veins* pinnated, pellucid, about 5 at the edge to a group ; *sori* irregular, falling slightly short of both midrib and edge.—*Hk. Sp. 3. p. 241.*

Hab. Cuba to Ecuador and Brazil, and we cannot distinguish a plant from the *Ladrones* gathered by Capt. Carmichael.—The *sori* are sometimes scarcely at all double, and then this comes near *A. oligophyllum*.

214. *A. (Dipl.) flavescens*, Mett. ; *st.* 1 ft. or more l., firm, erect, brownish, nearly naked ; *fr.* 2-3 ft. l., 9-18 in. br., with a large terminal and 10-15 lateral *pinnæ*, the lower ones sessile or slightly stalked, 4-8 in. l., 1½-2 in. br., the point acuminate, the edge subentire or slightly toothed, the base narrowed or rounded equally on both sides ; *texture* papyraceous or subcoriaceous ; *colour* bright-green ; *rachis* firm, erect, naked ; *veinlets* dark-green, 3-4 in a group ; *sori* falling slightly short of both edge and margin.—*A. juglandifolium*, *Hk. Sp. 3. p. 242. Fil. Ex. t. 242 (not Lam.)*.

Hab. Cuba southward to Peru.—A larger and usually more coriaceous plant than the last, with a sub-arborescent caudex. *A. Roemerianum*, Kze., and *A. crassidens*, Fée, do not seem clearly separable. *A. nicotianæfolium*, Mett., differs by having the *rachis* and *veins* beneath coated with short ferruginous down.

215. *A. (Dipl.) rhoifolium*, Mett. ; *st.* firm, erect, 1 ft. l., naked ; *fr.* 2-3 ft. l., 12-15 in. br., with a pinnatifid apex and 10-20 *pinnæ* on each side, the lowest on stalks ½ in. l., the pinna 6-8 in. l., ¾-1 in. br., the apex acuminate, the edge subentire, the base on both sides rounded ; *texture* subcoriaceous ; *rachis* and both sides naked ; *veins* 5-6 in a cluster, the *sori* reaching nearly to the edge ; *invol.* narrow, thin.—*Mett. Aspl. p. 178.*

Hab. New Granada.—*A. Trianae*, Mett. *Fil. N. G. p. 233*, is said to differ from this by its opposite *pinnæ* with a cordate base and toothed involucre. This has the texture of *A. celtidifolium*, but the *pinnæ* are more numerous and narrower, with the fruit prolonged almost to the edge.

216. *A. (Dipl.) celtidifolium*, Kunze ; *st.* strong, erect, 1 ft. or more l., brownish, paleaceous below ; *fr.* 2-4 ft. l., 9-18 in. br., with a pinnatifid apex and numerous *pinnæ* on each side, the lower ones distinctly stalked, 6-9 in. l., 1½-2 in. br., the point acuminate, the edge subentire or slightly toothed, sometimes with short blunt lobes ½ in. deep, the base rounded or cordate on both sides ; *texture* subcoriaceous ; *rachis* firm, often slightly fibrillose ; *veins* pinnated, the same colour as the frond, 4-6 in a group ; *sori* beginning at the midrib, but falling short of the edge.—*Hk. Sp. 3. p. 240.*

Hab. Cuba and Columbia to Ecuador and Brazil.—*D. crenulans*, Fée, from Guadeloupe, is probably a form. Our specimen has coriaceous *pinnæ* bluntly lobed throughout to a depth of ½ in., and 8-10 *veins* in a group. The Javan and Philippine *A. Lobbianum* (*Hk. Sp. 3. p. 244* ; 2nd Cent. t. 17) agrees with this very nearly ; and a specimen from Mettenius of *A. neglectum*, Karst., differs only by the *pinnæ* being subcuneate at the base.

217. *A. (Dipl.) sylvaticum*, Presl ; *caud.* decumbent ; *st.* 1 ft. l., firm, erect, brownish, naked, scaly at the base ; *fr.* 1-2 ft. l., 4-8 in. br., ovate-lanceolate, with numerous spreading *pinnæ*, the largest 3-4 in. l., ½-¾ in. br., the point acuminate, the edge broadly lobed to a depth of ½-1 lin., and the base narrowed suddenly on both sides ; *texture* thin, herbaceous ; *rachis* firm, erect, naked ; *veins* fine, pinnated in the lobes, 5-7 to a group ; *sori* in long slender lines reaching nearly to the edge.—*Hk. Sp. 3. p. 248. (in part) Beddome, t. 161.*



Hab. Mauritius, Fernando Po, Neilgherries, Ceylon, Malayan Peninsula, Java, Borneo, Samoa.—Of forms included here differing slightly from the type, the Malayau *A. Prescottianum*, Wall., has the pinnæ rather more deeply lobed towards the base in the lower part of the frond; the Ceylonese *A. elatum*, Mett. (C. P. 1349), and a similar plant from the Sandwich Islands and Borneo, have them lobed throughout to a depth of  $\frac{1}{4}$  in., the lobes subangular and toothed; *D. proliferum*, Brack., from Tahiti, is said to have oblong-lanceolate bluntly-serrated pinnæ, auricled on the upper and truncate on the lower side at the base; and we cannot separate clearly the American *A. Ottonis* and *mutilum*.

\*\* *Pinnæ more deeply lobed, generally from half to two-thirds of the way down to the rachis in the lower part.* Sp. 218-235.

218. A. (Dipl.) *Wichuræ*, Mett.; *rhizome* firm, wide-creeping; *st.*  $\frac{1}{4}$ - $\frac{1}{2}$  in. apart, 6-12 in. l., stramineous, slightly scaly at the base; *fr.* 1 ft. or more l., 6-8 in. br., with numerous *pinnæ* on each side, the lower ones stalked, 3-4 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., the point acuminate, the edge toothed, sometimes lobed, auricled near the base on the upper side, obliquely truncate on the lower side; *texture* herbaceous; *veins* pinnate in the lobes; *sori* not reaching the edge.—*Mett. Fil. Ind.* 2. p. 237.

Hab. Japan.—Very near the next in size and cutting, but the rhizome decumbent and elongated.

219. A. (Dipl.) *arboreum*, Willd.; *st.* tufted, 6-9 in. l., firm, erect, greyish, scaly below; *fr.* 12-18 in. l., 6-8 in. br., with numerous *pinnæ* on each side, the lower ones stalked, 3-4 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., the point acute or acuminate, the edge bluntly but not deeply lobed, except at the base on the upper side, where there is either a distinct auricle or a lobe, which sometimes reaches down to the rachis, the lower side narrower than the upper, and very obliquely truncate at the base; *texture* herbaceous; *veins* pinnate in the lobes; *sori* falling considerably short of the edge.—*Hk. Sp.* 3. p. 246. *D. auriculatum*, *Kaulf.*

Hab. West Indies and Venezuela.—Willdenow named this under a wrong impression as to the habit, which is not arboreous. It comes very near the next, but is less deeply lobed and more distinctly auriculate.

220. A. (Dipl.) *Shepherdii*, Spreng.; *st.* tufted, 1 ft. l., firm, erect, greenish, scaly below; *fr.* 12-18 in. l., 6-9 in. br., with numerous *pinnæ* on each side, the lower ones stalked, 4-6 in. l., 1-1 $\frac{1}{2}$  in. br., the point acuminate, the edge lobed above, the lobes at the base sometimes reaching down to the rachis,  $\frac{1}{4}$  in. br., and somewhat toothed; *texture* herbaceous; *colour* bright-green; *rachis* rather slender, greenish, naked; *veins* pinnate in the lobes; *sori* long, linear, not reaching the edge.—*A. striatum*, *Linn. Herb.*, *Hk. Sp.* 3. p. 245.— $\beta$ , *A. inæquilaterum*, Mett.; *texture* firm, colour duller; *pinnæ* much acuminate; the lobes deeper, more uniform and falcate, the two sides unequal, the lower one unequally truncate at the base. *A. Schiedei*, Mett.— $\gamma$ , *A. caracasenum*, Willd.; habit slender; *texture* herbaceous; lobes deep, narrow, bluntly toothed; *sori* in rows distant from the midrib, touching the edge. *D. chlororachis*, *Kze.*

Hab. Cuba and Mexico to Peru and S. Brazil.—The application of the name *striatum*, founded on two vague figures of Plumier, is so various, that it seems best to discontinue it. *D. coarctatum*, Link, from Brazil, differs only from our typical plant by its less deeply lobed pinnæ, the upper ones being subentire, with some of the sori reaching from the midrib nearly to the edge.

221. A. (Dipl.) *semihastatum*, Kze.; *st.* 6-9 in. l., slender, naked, greenish; *fr.* 6-9 in. l., 3-4 in. br., the apex pinnatifid, only the lower part pinnate; most of the *pinnæ* simple, oblong, and auricled, the lowest stalked, and 1 in. below the next, 2 in. l., 1 in. br., the point blunt, the edge toothed and cut down nearly or quite to the rachis into spatulate *pinnæ*; *texture* herbaceous; *rachis* slender,

naked; *sori* reaching from the midrib nearly to the edge.—*A. cubense*, *Hk. Sp. 3. p. 253. t. 207.*

Hab. Cuba, *Wright*, 1032-3.—This comes nearest *A. arboreum*, but is smaller and more delicate, with the lowest pinnules subdeltoïd, and often reaching quite down to the rachis below on both sides.

222. *A. (Dipl.) longifolium*, Don; *st.* 6-9 in. l., slender, erect, scaly below; *fr.* 12-18 in. l., 4-6 in. br., the apex pinnatifid, below this 12-18 pairs of falcate *pinnæ*, the lower ones stalked, 2-3 in. l.,  $\frac{3}{4}$  in. br., the point acuminate, the edge lobed, and the lobes sharply and finely serrated, the two sides unequal, the upper distinctly auricled, and the lower obliquely truncate at the base; *texture* herbaceous; *veins* fine, 6 or more in a group; *sori* falling considerably short of the edge.—*A. lobulosum*, *Wall., Hk. Sp. 3. p. 252.*

Hab. Himalayas.

223. *A. (Dipl.) Brackenridgii*, Baker; *st.* 6-9 in. l., firm, greyish, naked; *fr.* 12-18 in. l., 6-9 in. br., the apex pinnatifid, below this 6-9 *pinnæ* on each side, the lower ones 1-2 in. apart, and distinctly stalked, 4-5 in. l., nearly 1 in. br., the point acuminate, sharply serrated, the edge cut down one-third of the way to the rachis into blunt incised lobes  $\frac{1}{4}$  in. br.; *texture* subcoriaceous; *rachis* firm, grey, naked; *veins* pinnate in the lobes; *sori* in long lines reaching to the edge.—*D. bulbiferum*, *Brack. t. 18.* *D. extensum*, *J. Sm. (in part).*

Hab. Philippines, *Cuming*, 333, 388; Fiji, *Seemann*, 825, *Milne*, 69, 306.—This differs from *sylvaticum* by its broader and distinctly stalked *pinnæ* of firm texture, which are often proliferous from the axils.

224. *A. (Dipl.) tomentosum*, *Hk. (not Mett.)*; *st.* 6-9 in. l., firm, erect, grey, decidedly coated with fine short brown tomentum; *fr.* 6-12 in. l., 3-4 in. br., ovate-lanceolate, with numerous close-placed lanceolate *pinnæ*, the lower pair deflexed, those next in order horizontal, 2-3 in. l.,  $\frac{1}{2}$  in. br., the point acute, the edge cut down regularly throughout into oblong-falcate lobes  $\frac{1}{2}$  in. br., which reach one-half or two-thirds of the way down to the rachis, the base narrowed suddenly; *texture* subcoriaceous; *rachis* finely tomentose; both surfaces naked except the veins beneath; *veins* 3-4 on each side in the lobes; *sori* linear, touching the edge but not the midrib.—*Hk. Sp. 3. p. 249.*

Hab. Khasia and Malayan Peninsula and Isles.—In size and texture this corresponds with *porrectum*. It is the original *D. tomentosum* of Blume, according to an authentic specimen, but not the much more hairy *A. tomentosum* of Mettenius, which is our *A. lasiopteris*.

225. *A. (Dipl.) Sprucei*, Baker; *st.* tufted, 6-9 in. l., dark-brown, firm, erect, nearly naked; *fr.* 9-15 in. l., 3 in. br., narrowly ovate-lanceolate, the apex pinnatifid, below this 15-20 pairs of spreading *pinnæ* 1-1 $\frac{1}{2}$  in. l.,  $\frac{3}{4}$ - $\frac{1}{2}$  in. br., the point rather blunt, the edge lobed in the lower part halfway down to the rachis, the lobes 2-3 lin. br., inciso-crenate, the base narrowed suddenly on both sides; *texture* papyraceo-herbaceous; *colour* very dark-green; *rachis* angular, channelled and slightly winged; *veins* distantly pinnate, only 2-3 simple veinlets on each side in the lower lobes; *sori* reaching from the midrib nearly to the edge.

Hab. Andes of Ecuador, *Jameson, Spruce*, 5346.—A well-marked plant, which from its colour and texture evidently grows in very damp places.

226. *A. (Dipl.) japonicum*, Thunb.; *rhizome* slender, wide-creeping; *st.* 6-12 in. l., straw-coloured or brownish, slightly scaly towards the base; *fr.* 9-15 in. l., 4-6 in. br., ovate-lanceolate, with 8-10 rather distant *pinnæ* below the pinnatifid apex, the lower ones sessile, 3-4 in. l.,  $\frac{3}{4}$ -1 in. br., cut down in the lower parts two-thirds of the way to the rachis into close oblong slightly-toothed lobes



$\frac{1}{4}$  in. br. ; *texture* herbaceous, both surfaces bright-green, nearly naked ; *rachis* slender, straw-coloured, nearly naked ; *veins* about 6 on each side in the lower lobes, with sori on each reaching two-thirds of the way to the edge, the lowest  $\frac{1}{8}$  in. l. ; *invol.* broad, brown, tumid.—A. Schkuhrii, *Hk. Sp. 3. p. 251.*— $\beta$ , *Oldhami* ; *fr.* smaller, lanceolate, 4-6 in. l., 2-3 in. br. ; *rachis* straw-coloured, polished, naked ; *pinnæ* 1-1 $\frac{1}{2}$  in. l., blunt ; *lobes* blunt, only 3 veins on a side in each.— $\gamma$ , *coreanum* ; *fr.* the same size as in  $\beta$ , but only the lower half pinnate, the rachis and stem rather chaffy and villose.

Hab. Japan, China, Formosa, Himalayas.—The Samoan and Fijian *D. congruum*, Brack. t. 18, comes very near to this. In a specimen from Mr. Powell, the substance is very thin, the rachis naked, the lobes  $\frac{1}{2}$  in. deep,  $\frac{1}{4}$  in. br., veinlets 5-6 on each side, most of them again forked ; and a similar plant grows in the Sandwich Islands.

227. A. (Dipl.) *Thwaitesii*, A. Br. ; *rhizome* wide-creeping ; *st.* 6 in. l., slender, green, densely clothed with strong white woolly hairs ; *fr.* 1 ft. l., 4 in. br., with 8-10 distant *pinnæ* beneath the pinnatifid apex, the largest 2 in. l.,  $\frac{5}{8}$  in. br., cut down two-thirds of the way to the rachis in oblong crenulated lobes  $\frac{1}{2}$  in. deep, 2 lin. across ; *rachis* flaccid, villose like the stem ; *texture* herbaceous ; *colour* pale-green, and both surfaces also villose ; *veins* 4 on each side in a lobe, simple ; *sori* reaching halfway to the edge, the lowest about a line long.—*Hk. Sp. 3. p. 250. 2nd Cent. t. 45.*

Hab. Ceylon.—Intermediate between the preceding and following.

228. A. (Dipl.) *lasiopteris*, Mett. ; *rhizome* wide-creeping ; *st.* 6-9 in. l., firm, erect, dark-coloured, villose ; *fr.* 15-18 in. l., 6-8 in. br., with 8-10 *pinnæ* on each side below the pinnatifid apex, the largest 3-4 in. l., 1-1 $\frac{1}{4}$  in. br., the lower lobes cut down nearly or quite to the rachis,  $\frac{3}{8}$ - $\frac{1}{2}$  in. deep,  $\frac{3}{8}$  in. br., the point obtuse, the edge distinctly crenate ; *texture* herbaceous, the dark-coloured *rachis* and dark-green *frond* villose on both sides ; *veinlets* 5-6 on each side, simple ; lower *sori*  $\frac{1}{2}$  in. l.—*Diplazium, Kunze, Linnæa, vol. 17. p. 563. A. tomentosum, Mett. (non Hk.)*.

Hab. Canton, Java, and the Neilgherries, well figured by Beddome, t. 160.—This is the *D. decussatum* of English gardens ; but our original specimen from Wallich is *A. japonicum*. It comes near the two preceding, and the three are well marked by the character of the rhizome.

229. A. (Dipl.) *speciosum*, Mett. ; *st.* tufted, 1 ft. or more l., firm, erect, straw-coloured or brownish, nearly naked ; *fr.* 1-2 ft. l., 8-12 in. br., with 10-20 pairs of *pinnæ* below the pinnatifid apex, the lower ones often stalked, 4-6 in. l., 1-1 $\frac{1}{4}$  in. br., the apex much acuminate, the edge lobed, the lobes reaching down two-thirds of the way to the rachis or more, close,  $\frac{1}{4}$  in. br., slightly toothed, the base truncate or slightly cuneate ; *texture* herbaceous but firm ; *rachis* erect, naked ; *veins* pinnate in the lobes ; *sori* slender, reaching nearly to the edge.—*Diplazium, Blume. A. acuminatum, Wall., Mett. (non H. & A.)*.

Hab. Malayan Peninsula and Philippines, Java, Hong-Kong.—This is nearest *A. sorzogonense*, but the lobes are broader and not so deep, more herbaceous in texture, and distinctly toothed. A plant from Fiji comes very near this, but the *pinnæ* are fewer, thinner, the lower ones distinctly stalked, and the lobes broader ; and one from Richmond River, Australia, sent by Dr. Mueller, only differs by the lobes being rather broader and shallower. A specimen of Blume's plant from Miquel quite agrees with Wallich's examples of *acuminatum*.

230. A. (Dipl.) *Wclwitschii*, Hk. MSS. ; *st.* 1 ft. or more l., firm, erect, straw-coloured, naked ; *fr.* 18 in. l., 9 in. br., the lower *pinnæ* 6-7 in. l., 1-1 $\frac{1}{2}$  in. br., the point acuminate, the edge slightly lobed above, cut down in the lower part half or two-thirds of the way to the rachis ; the *lobes* not quite contiguous,  $\frac{3}{8}$  in. br., nearly entire, the base sessile, truncate ; *texture* herbaceous ; *veins* distantly pin-

nate in the lobes, with the lower veinlets branched; *sori* short, slender, distant from both edge and midrib.

Hab. Angola, *Welwitsch*, 100.—This comes nearest the preceding in habit, but the lobes are broader and the *sori* remarkably short.

231. A. (Dipl.) *crenulatum*, Baker; *caud.* erect, subarborescent; *st.* tufted, 12-18 in. l., firm, erect, hardly at all scaly below, but slightly furfuraceous; *fr.* 2-3 ft. l., 9-15 in. br., with 15-20 *pinnae* on each side below the pinnatifid apex, the largest 6-8 in. l., 1-1½ in. br., the point acuminate, the edge cut down in the lower part half or two-thirds of the distance to the rachis; *lobes* oblong, ½ in. l., 4 lin. br., slightly toothed; *texture* herbaceous; *rachis* firm, nearly naked; *veins* 6-8 on a side in each lobe; lowest *sori* ⅙ in. l.—*D. crenulatum*, *Liebm.* A. *striatum*, *Mett. Aspl. p.* 186. and *Griseb. (non Hk.)*. A. *dubium*, *Hk. (in part)*.

Hab. Cuba and Mexico to Brazil and Ecuador.—We take our description here from a plant grown at Kew, with which Liebman's specimens and the description of Mettenius quite correspond. In the typical plant the *pinnae* are not more than pinnatifid, but in *Grisebach's striatum β* and Liebman's *D. amplum*, the lower segments are distinctly separated, 1½-2 in. l., ½ in. br., and broadly inciso-crenate, and the lower *sori* 2 lin. l. The W. Indian *D. grammitoides*, *Fée*, resembles this in habit, but the involucre is thin and very evanescent.

232. A. (Dipl.) *Lindbergii*, *Mett.*; *st.* tufted, 1-1½ ft. l., dark reddish-brown, firm, erect, scaly at the base; *fr.* 18-24 in. l., 9-12 in. br., the apex pinnatifid, below this about 12 *pinnae* on each side, the lowest 6-8 in. l., 1-1½ in. br., the point acuminate, the edge cut about halfway down into close subimbricated blunt inciso-crenated *lobes* ½ in. br.; *texture* herbaceous; *rachis* reddish-brown, naked; *veins* copiously pinnated, veinlets 6-8 on each side; *sori* slender, confined to the inner half of the lobes, and not touching the midrib; *invol.* very narrow and tender, almost abortive.—*Mett. Fil. Nov. Gran. p.* 236.

Hab. Mexico to Brazil.—Not unlike the preceding in habit, but *sori* and involucre peculiar.

233. A. (Dipl.) *sorzogonense*, *Presl*; *st.* tufted, 4-6 in. l., densely fibrillose below; *fr.* 1-2 ft. l., 8-12 in. br., with numerous *pinnae* on each side, the lower ones sessile, 4-6 in. l., 1 in. br., cut down regularly throughout two-thirds of the way down to the rachis into spreading blunt subentire *lobes* about 2 lin. br.; *texture* herbaceous; *rachis* slightly fibrillose; *veinlets* of the lobes simple, with *sori* in regular rows reaching from the midrib to the edge.—*Hk. Sp. 3. p.* 252. *Hypochlamys*, *Fée*.

Hab. Himalayas (to 8-10,000 ft.), Philippines, and Malacca.—Nearest *A. speciosum*, but the lobes narrower and deeper, with parallel edges and a space between them. A plant from Borneo has a very fibrillose rachis, and the lobes of the lower *pinnae* quite distinct, 1½ in. l., ¼ in. br.

234. A. (Dipl.) *costale*, *Swartz*; *st.* 1 ft. or more l., tufted, stout, erect; *fr.* ample, the apex pinnatifid, with oblong entire lobes, the lower part copiously pinnate, with *pinnae* often 1 ft. l., 3 in. br., cut down half or two-thirds of the way down to the rachis into blunt slightly inciso-serrated lobes ⅔-½ in. br.; *texture* subcoriaceous; *veinlets* of the lobes usually once forked, with broad copious *sori* which fall considerably short of the edge.—β, *A. Desvauzii*, *Mett.*; *lobes* of the *pinnae* acute, sometimes reaching down nearly to the rachis, 2 in. l., 1 in. br.—*Hk. Sp. 3. p.* 254.

Hab. West Indies southward to Peru.—This differs from all the preceding by its very large *pinnae* and lobes. The extremes of the two forms look very different, but are connected by intermediate stages. *D. apollinaris* and *Tussaci*, *Fée*, are allied.

235. A. (Dipl.) *Franconis*, *Mett.*; *st.* 1 ft. l., firm, tufted, erect, greyish, scaly below; *fr.* 1-2 ft. l., 9-15 in. br., with numerous *pinnae* on each side, the lower



ones 6-8 in. l., much acuminate at the apex, cut down in the lower half into distinct *pinnl.*  $1\frac{1}{2}$ -2 in. l.,  $\frac{1}{2}$  in. br., lanceolate, unequal-sided, falcate, the edge cut halfway down below into oblong sharply-toothed lobes, the lower side obliquely truncate; *texture* herbaceous but firm; *colour* bright-green; *rachis* naked; lateral *veins* of the *pinnl.* pinnate in the lower lobes; *sori* in parallel rows in the *pinnl.*, not reaching the edge.—*Hk. Sp. 3. p. 261.*

Hab. Mexico, Guatemala, and Ecuador.—The West Indian plant is larger (2-3 ft. l.) and more compound, with lower *pinnæ* 6-9 in. l., 4-5 in. br., with numerous distinct stalked sub-distant lanceolate *pinnl.*, cut down below into crenated oblong lobes nearly to the *rachis*.

\*\*\*\* *Fronde copiously bipinnate.* Sp. 236-259.

236. A. (Dipl.) *deltoideum*, Presl; *st.* 6 in. l., slender, erect, ebeneous below, naked; *fr.* 1 ft. l., 9 in. br., deltoid, with a few distant *pinnæ* on each side, the lowest ovate-deltoid, 5 in. l., 2-3 in. br., cut down in the lower half into distinct stalked *pinnl.*  $1-1\frac{1}{2}$  in. l.,  $\frac{1}{2}$  in. br., which are bluntly lobed below two-thirds of the way down; *texture* herbaceous; *rachises* naked, those of the *pinnæ* ebeneous; *veins* pinnate in the lower lobes; *sori* reaching the edge.—*Hk. Sp. 3. p. 256.*

Hab. Luzon, *Cuming*, 29.—Caudex unknown.

237. A. (Dipl.) *virescens*, Mett.; *rhizome* creeping; *scales* blackish, lanceolate-subulate; *st.* 6 in. l., straw-coloured; *fr.* 1 ft. l., deltoid, bipinnate below the middle; lower *pinnæ* 3 in. l., 3 in. br., pinnate below the centre; *pinnl.*  $1\frac{1}{2}$  in. l.,  $\frac{1}{2}$  in. br., the apex acuminate, the edge crenato-lobate, the base narrowed suddenly; *rachis* slender; *texture* thin; *colour* pale-green; *veins* pinnate in the lower lobes, with 1-3 veinlets on each side; *sori* oblong, small, nearer to the midrib than the edge.—*Hk. Sp. 3. p. 261.*

Hab. Japan, *Goring*, *Buerger*.

238. A. (Dipl.) *squamigerum*, Mett.; *st.* 6 in. or more l., straw-coloured, slender, with small scattered nearly black lanceolate scales throughout; *fr.* 12-15 in. l., by nearly as broad, deltoid; lower *pinnæ* 6-9 in. l., 2-2 $\frac{1}{2}$  in. br., pinnate except at the apex; *pinnl.*  $1\frac{1}{2}$  in. l.,  $\frac{3}{4}$  in. br., the point blunt, the edge broadly lobed, the lower lobes  $\frac{1}{4}$  in. br., entire; *texture* herbaceous; *rachis* slender, stramineous, chaffy below; *veins* subflabellate, the lower veinlets of the lobes with one or two lateral curved forks on each side; *sori* linear, curved, falling far short of the edge, the lowest 2 lin. l.—*Mett. Fil. Ind. 2. p. 239.*

Hab. Japan, *Oldham*, *Siebold*, *Robinson*.

239. A. (Dipl.) *chinense*, Baker; *st.* 1 ft. l., slender, greyish, nearly naked; *fr.* 12-15 in. l., nearly as br., deltoid, bipinnate except at the very apex; lower *pinnæ* long-stalked, 3-5 in. l., 2-2 $\frac{1}{2}$  in. br., with numerous close lanceolate *pinnl.* on each side, the lower ones  $1-1\frac{1}{2}$  in. l.,  $\frac{1}{2}-\frac{3}{8}$  in. br., the point acute, the edge cut down to a winged *rachis* below into deeply-toothed oblong *segm.* 4 lin. l., 2 lin. br.; *texture* herbaceous; *rachis* slender, naked, substramineous; *veins* pinnate, 4-5 lateral simple veinlets on each side in the lower *segm.*; *sori* linear, not reaching the edge.

Hab. Shanghai, China, *Dr. Maingay*, 475.

240. A. (Dipl.) *nervosum*, Mett.; *fr.* ample, bipinnate; lower *pinnæ* stalked, 12-18 in. l., 6 in. br., lanceolate-acuminate; *pinnl.* close, patent, 3-4 in. l.,  $\frac{1}{2}-\frac{3}{4}$  in. br., lanceolate-oblong, obtuse or acuminate, only toothed, the base truncate; *texture* subcoriaceous; *rachises* densely scaly, the scales of the main one  $\frac{1}{2}$  in. l., lingulate-acuminate, the edge subciliated; lower surface clothed with dense adpressed hairs; *veinlets* forked in the upper, subpinnate in the

lower lobes; *sori* reaching from midrib more than halfway to the edge.—*Mett. Fil. Nov. Gran. p. 235.*

Hab. New Granada, *Lindig*, 293, 1015.—Distinguished by its vestiture and large scarcely-toothed pinnules.

241. A. (Dipl.) *venulosum*, Baker; *caud.* erect, subarborescent; *st.* tufted, strong, 4 ft. l., the base clothed with linear dark-brown scales nearly 1 in. l.; *fr.* 4-5 ft. l., 2-3 ft. br., with about 20 pairs of *pinnæ*, the lowest 12-18 in. l., 4-6 in. br.; *lower pinnl.* 3 in. l.,  $\frac{1}{2}$  in. br., with their own breadth between them, the edge only slightly inciso-serrate; *texture* subcoriaceous; *rachis* and both sides naked; *veins* very distinct, the upper ones of the *pinnl.* forked, the lower ones subpinnate; *sori* reaching from the midrib nearly to the edge.

Hab. Andes of Ecuador, *Spruce*, 5343.—This agrees with the preceding in its large subtire pinnules, differing in vestiture.

242. A. (Dipl.) *cyatheafolium*, Bory; *caud.* erect, subarborescent; *st.* firm, erect, dark-brown, nearly naked; *fr.* 18-24 in. l., 12-18 in. br.; *lower pinnæ* 9 in. l., 3 in. br., cut down to the rachis in the lower two-thirds into numerous *pinnl.* on each side, the lower ones  $1\frac{1}{2}$  in. l.,  $\frac{1}{2}$  in. br., the upper ones inciscrenate, the lower ones cut down one-third of the distance to the rachis into oblong, falcate, sharply-toothed lobes; *texture* herbaceous; *rachis* dark-brown, naked, like the stem; *veins* pinnate, with 3-4 veinlets on each side in the lower lobes; *sori* falling considerably short of the edge.—D. *caudatum*, *J. Sm. fide Mettenius.*

Hab. Luzon, *Cuming*, 158, and, according to Mettenius, a plant also of Ualan and New Guinea.—A somewhat doubtful species, of which our description is taken from *Cuming's* specimens.

243. A. (Dipl.) *Meyenianum*, *Mett.*; *fr.* ample, tripinnatifid; *lower pinnæ* lanceolate-oblong, 15 in. l., 9 in. br.; *lower pinnl.*  $4\frac{1}{2}$  in. l.,  $1\frac{1}{4}$  in. br., stalked, oblong-acuminate, cut down below into crenate oblong-obtuse *segm.*,  $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. br., the lower ones subcordate at the base, the upper ones decurrent with a narrow wing; *texture* herbaceous, under surface glossy; *veins* 4-5 on each side, the lower one branched; *sori* copious, reaching from the midrib nearly to the edge.—*Mett. Aspl. p. 189.*

Hab. Manila, *Meyen.*—Our single specimen of this is very imperfect, and our description is taken in part from Mettenius. The alliance of both this and the preceding is with *polypodioides*.

244. A. (Dipl.) *polypodioides*, *Mett.*; *caud.* erect, subarborescent, densely clothed at the crown with long brown fibrillose scales 1 in. l.; *st.* densely tufted, stout, green, 1 ft. or more l., rather densely muricated, not scaly, but slightly furfuraceous; *fr.* 3-4 ft. l.,  $1\frac{1}{2}$ -2 ft. br., with 8-9 *pinnæ* on each side below the simple ones at the apex, the lower ones 4-5 in. apart, 9-12 in. l., 6 in. br.; *pinnl.* numerous, spreading, 2-3 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., cut down nearly to the rachis into linear-oblong slightly-toothed lobes; *texture* herbaceous; *both surfaces* naked; *colour* bright-green; *rachis* green, stout, nearly naked; *veinlets* about 6 on each side in the lobes; *sori* falling distinctly short of the edge.—*Hk. Sp. 3. p. 257.*

Hab. Himalayas (up to 8,000 ft.), Ceylon, Malayan Peninsula and Isles.—Our description is taken from the plant in cultivation at Kew, no doubt identical with the common Indian and Malayan species thus named, which is *A. frondosum*, Wall. An authentic example of *D. asperum*, Blume, is rather more coriaceous in texture, with lower *pinnæ* 15 in. l.; even the secondary rachises asperous; the lobes  $\frac{1}{2}$  in. l., with 8-10 veinlets on each side. *D. ebenum*, *J. Sm.*, from the Philippines (*Cuming*, 159), has a slender naked ebenous rachis and erecto-patent lobes, with only 4 distant veinlets in each; and we



have closely allied plants from Queensland, Fiji, and the Seychelles, which need further investigation.

245. A. (Dipl.) *Griffithii*, Baker; *st.* 1 ft. l., naked, firm, erect; *fr.* 12-18 in. l., nearly as broad; *lower pinnæ* 9-12 in. l., 6 in. br., on stalks 1 in. l.; *pinnl.* numerous, the longest 3 in. l.,  $\frac{3}{4}$  in. br., cut down nearly to the rachis below; *lobes* erecto-patent,  $\frac{1}{2}$  in. deep,  $\frac{1}{8}$  in. br., deeply toothed, not contiguous; *rachis* smooth, flexuose, substramineous; *texture* subcoriaceous, both surfaces naked; *veins* about 6 on a side in each lobe, with an oblong *sorus* on each, which is less than 1 lin. l., touches the *costa* and scarcely reaches halfway to the edge.—*Diplazium*, *Moore Ind. Fil.* p. 330.

Hab. Assam, *Griffith*.—This differs from the preceding mainly in the sori, and comes near *A. woodwardioides*.

246. A. (Dipl.) *maximum*, Don; *caud.* erect; *st.* 2 ft. or more l., firm, erect, scaly only at the base; *fr.* several ft. l., 2-3 ft. br., with numerous *pinnæ* on each side, the lowest 9-18 in. l., 4-8 in. br., with numerous distinct sessile *pinnl.* 2-4 in. l.,  $\frac{3}{4}$  in. br., the edge more or less lobed, sometimes halfway down; *texture* herbaceous; *rachises* and both sides nearly naked; *veins* pinnate in the lobes, 4-6 on a side; *sori* medial, the lowest 2 lin. l.—*A. diversifolium*, *Wall., J. Sm.* *D. decurrens*, *Beddome, t.* 220.

Hab. N. India to Ceylon.—A common Indian plant, like *A. sylvaticum* in texture, a single lower pinna of this resembling a whole frond of that. We cannot in any way distinguish the New Caledonian *A. sororium*, Mett., of which the trunk is not known, from the less deeply lobed form of this, and have what appears to be the same from the Society Islands.

247. A. (Dipl.) *melanochlamys*, Hk.; *st.* strong, erect, 2 ft. or more l., smooth; *fr.* 3-4 ft. l., 2 ft. br., with numerous *pinnæ* on each side, the lower ones 9-12 in. l., 4-6 in. br., with numerous distinct sessile *pinnl.* 2-3 in. l., 1 in. br., cut down within a short distance of the rachis throughout into incisorate linear-oblong segm.,  $\frac{1}{4}$  in. br.; *texture* herbaceous but firm; *colour* bright-green; *veins* 4-5 on a side in the lobes; lower *sori*  $1\frac{1}{2}$ -2 lin. l.; *invol.* narrow, glossy, quite black.—*Hk. Sp.* 3. p. 260.

Hab. Lord Howe's Island, S. Pacific, *Macgillivray*, 702, *Milne*, 36.—Trunk unknown.

248. A. (Dipl.) *vestitum*, Presl; *st.* stout, erect, brownish, tomentose throughout; *fr.* 2-3 ft. l., 9-18 in. br., with numerous *pinnæ* on each side, the lower ones 9 in. l., 4 in. br., with numerous distinct sessile *pinnl.*, which are 2 in. l., 1 in. br., blunt at the point, and bluntly-lobed to a depth of  $\frac{1}{2}$ - $\frac{1}{4}$  in., the base narrowed suddenly or even cordate; *texture* thinly herbaceous; *rachis* chaffy like the stem; *veins* pinnate in the lobes; *veinlets* 4-5 on each side; lower *sori* of the lobes 3-4 lin. l., not reaching the edge.—*Hk. Sp.* 3. p. 260. *2nd Cent. t.* 46.

Hab. Philippines, *Cuming*, 336.—Trunk unknown. For the rest this resembles *A. maximum*, differing by its tomentose rachises.

249. A. (Dipl.) *latifolium*, Don; *caud.* erect, subarborescent; *st.* tufted, strong, erect, 1 ft. or more l., livid, smooth, clothed towards the base with linear-cripsed dark-brown scales; *fr.* 3-4 ft. l., 12-18 in. br., subdeltoid, with about 12 *pinnæ* on each side, the largest 1 ft. l., 4 in. br.; *pinnl.* numerous, the largest 2 in. l.,  $\frac{5}{8}$  in. br. at the base, the point acuminate, the edge slightly toothed, the base abruptly truncate on both sides; *texture* subcoriaceous; *rachis* naked, livid; *veins* about 6 in a group; *sori* linear, the lowest often 2 lin. l.—*A. dilatatum*, *Hk. Sp.* 3. p. 258 (*in part*).

Hab. Ceylon, Neilgherries, S. China, Philippines.—Here again we fall back upon the living collection at Kew for a description. Our plant is the *D. diversifolium* of J. Smith, but scarcely of Wallich. Blume's original specimen of *dilatatum*, and a plant sent by Miquel as *A. latifolium*, Don, are like this in texture, but the pinnules are  $1\frac{1}{2}$  in. apart, the lower ones distinctly stalked, 3 in. l., and bluntly lobed to a depth of  $\frac{1}{2}$  in. below; and we have similar examples from China, Java, and Moulmein.

250. A. (Dipl.) *nigro-paleaceum*, Baker; *caudex* decumbent; *st.* not tufted, sub-erect,  $\frac{1}{2}$  in. thick, 12-18 in. l., greenish, deeply channelled in front, thickly clothed with lanceolate nearly black scales; *fr.* 2-3 ft. l., nearly as br.; *lower pinnæ* 12-18 in. l., 6-8 in. br., with numerous spreading *pinnl.* 3-4 in. l., 1 in. br., cut down half or two-thirds to the rachis into inciso-crenate linear-oblong lobes,  $\frac{1}{4}$  in. br.; *texture* thick, subcoriaceous; *colour* bright-green; *rachis* thick, naked, slightly zigzag, with a winged line on each side in front, the lower lobes imbricated over it; *veins* 6-8 on each side, the lower ones forked; *lower sori*  $\frac{1}{4}$  in. l.—Diplazium, Kunze, *Linn.* 24, 270. *D. Loddigesii*, *J. Sm.*

Hab. St. Helena.—Our description is drawn up from the copious living specimens at Kew. Perhaps not distinct from *D. arborescens*, but a much stronger and more coriaceous plant, with a densely scaly stem.

251. A. (Dipl.) *arborescens*, Mett.; *caud.* oblique; *st.* 1-2 ft. l., strong, erect, smooth, nearly naked; *fr.* 3-4 ft. l., 2-3 ft. br., with numerous *pinnæ*, the lower ones 12-18 in. l., 4-6 in. br.; *pinnl.* 3 in. l.,  $\frac{3}{8}$ - $\frac{3}{4}$  in. br., the point acuminate, the edge cut down two-thirds of the way to the rachis into nearly entire lobes  $\frac{1}{4}$  in. deep,  $\frac{1}{8}$  in. br.; *rachis* polished, stramineous; *texture* herbaceous; *veinlets* 6-8 on each side, mostly simple; *lower sori*  $\frac{1}{8}$  in. l.—*Hk. Sp.* 3. p. 256 (*in part*).

Hab. Mauritius, Bourbon, Polynesian Islands.—*D. comorensis*, Bojer, from Johanna Island, has broader lobes, not cut more than halfway down to the rachis, 4-5 simple veinlets on each side, and lower sori  $\frac{1}{4}$  in. l. There are two totally different modes of growth amongst these large compound species, and there is much to be done in studying the living plants before we can understand them clearly.

252. A. (Dipl.) *melanocaulon*, Baker; *st.* 1-2 ft. l., firm, erect, naked, ebeneous; *fr.* 2-3 ft. l., 9-18 in. br., with numerous *pinnæ*, the lower ones 6-12 in. l., 4-6 in. br.; *pinnl.* lanceolate, 2-3 in. l.,  $\frac{3}{4}$  in. br., cut down two-thirds of the way to the rachis into linear-oblong falcate inciso-crenate lobes,  $\frac{1}{4}$ - $\frac{3}{8}$  in. deep; *texture* subcoriaceous; *rachises* slender, ebeneous like the stem; *veins* pinnate in the lobes, 4-5 on each side; *sori* short, oblong, not touching either midrib or edge.—Diplazium, *Brack. p.* 144.

Hab. Fiji and Aneiteum.—Apparently this agrees with *arborescens* in mode of growth. It differs by its more coriaceous texture, distant veins, ebeneous rachis, and short sori.

253. A. (Dipl.) *Arnottii*, Baker; *st.* smooth, angular, brownish; *fr.* ample; *lower pinnæ* 9-12 in. l., 4-6 in. br.; *pinnl.* 3-4 in. l., 1 in. or more br.; cut down below to a distinctly winged rachis into deeply crenate, blunt, oblong lobes  $\frac{1}{2}$  in. deep,  $\frac{1}{4}$  in. br., with a space between them; *texture* herbaceous; *rachis* slender, naked; *veinlets* 5-6 on a side, nearly all branched, the lower ones subpinnate; *sori* copious, nearly all diplazioid and filling up when mature nearly the whole surface of the lobes.—Diplazium, *Brack. p.* 144. A. diplazioides, *Hk. & Arn.*

Hab. Sandwich Islands, frequent.—Caudex probably of *A. arborescens*.

254. A. (Dipl.) *pulicosum*, Hk.; *st.* firm, erect, naked, straw-coloured; *fr.*  $1\frac{1}{2}$  2 ft. l., 1 ft. br., with numerous *pinnæ* on each side, the lower ones 6-8 in. l., 4 in. br.; *lowest pinnl.* 2 in. l.,  $\frac{3}{4}$  in. br., cut down nearly to the rachis into spreading, crenated linear-oblong lobes 2 lin. br.; *texture* coriaceous; *colour*



pale-green; *rachis* firm, naked; *veins* 5 on each side in the lobes; *sori* in regular parallel rows not reaching more than halfway from the midrib to the edge; *invol.* rigid, nearly black.—*Hk. Sp. 3. p. 262.*

Hab. Ecuador, *Jameson*.—Caudex unknown.

255. A. (Dipl.) *Klotzschii*, Mett.; *caud.* erect, subarborescent; *st.* 1-2 ft. l., strong, erect, dark-brown, and scaly below; *fr.* 3-5 ft. l., 9-18 in. br.; *lower pinnæ* 6-9 in. l., 3-4 in. br.; *lower pinnl.* 2-3 in. l.,  $\frac{3}{4}$  in. br., cut down nearly to the rachis into blunt spreading slightly-toothed linear-oblong lobes 2 lin. br.; *texture* herbaceous; *colour* deep-green; *rachis* firm, naked; *veins* distant, pinnate, 4-6 on each side in the lobes; *sori* linear-oblong, falling short of the edge; *invol.* tumid, brown, fimbriated.—*Hk. Sp. 3. p. 263.* *Lotzea diplazioides, Klotzsch.*

Hab. Columbia and Venezuela.

256. A. (Dipl.) *flexuosum*, Presl; *st.* firm, naked, brownish; *fr.* ample; *pinnæ* with a very flexuose zigzag rachis and pinnl. deflexed and then curved upwards; *lower pinnæ* 12-18 in. l., 6-9 in. br.; *pinnl.* stalked, 3-5 in. l., 1-2 in. br., the apex serrated only, the upper part lobed, the lower cut down nearly or quite to the rachis into blunt subentire oblong lobes  $\frac{3}{8}$  in. br.; *texture* subcoriaceous; *veinlets* of the lobes forked, 7-8 on a side; *sori* long, linear, in regular rows not reaching the edge.—*Hk. Sp. 3. p. 263.*

Hab. Peru.—Caudex unknown.

257. A. (Dipl.) *vastum*, Mett.; *fr.* ample, bipinnatifid; *lower pinnæ* 2 ft. l., 7 in. br., ovate-lanceolate, acuminate; *pinnl.* close, patent,  $3\frac{1}{2}$  in. l., 1 in. br., oblong-acuminate, cut down nearly or below quite to the rachis into toothed linear-oblong lobes; *texture* subcoriaceous; *rachis* stramineous, slightly downy upwards; both sides quite naked; *veins* pinnate in the lobes, with 6-8 mostly simple veinlets on a side; *sori* reaching from the midrib to the base of the teeth.—*Mett. Fil. Nov. Gran. p. 237.*

Hab. New Granada, *Lindig*, 349.—Trunk unknown.

258. A. (Dipl.) *hians*, Kunze; *caud.* erect; *st.* 12-18 in. l., tufted, slightly scaly; *fr.* 3-4 ft. l., 2-3 ft. br.; *lower pinnæ* 1 ft. or more l., 4-6 in. br.; *pinnl.* numerous, lanceolate, 2-3 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., with blunt subentire lobes  $1\frac{1}{2}$ -2 lin. br., reaching nearly down to the rachis; *texture* herbaceous; *colour* dark-green; *rachis* and both sides naked; *veinlets* 3-4 on each side; *sori* short, oblong, only the lower ones double; *invol.* tumid.—*Hk. Sp. 3. p. 233.*

Hab. West Indies to Ecuador.—Grisebach unites this with *A. umbrosum*, J. Sm. It differs from the next by its narrower pinnæ and lobes, much shorter sori, and tumid involucre.

259. A. (Dipl.) *radicans*, Schk.; *caud.* erect, subarborescent; *st.* 1-2 ft. l., tufted, strong, erect, scaly below; *fr.* 3-5 ft. l., 2-3 ft. br.; *lower pinnæ* 12-18 in. l., 6-8 in. br.; *pinnl.* numerous, lanceolate, sessile, the upper ones entire, lower ones 3-4 in. l.,  $\frac{3}{4}$ -1 in. br., with broad blunt lobes  $\frac{1}{2}$  in. br., reaching  $\frac{1}{2}$  or  $\frac{3}{4}$  of the way down to the rachis; *texture* herbaceous; *rachis* naked or slightly pubescent; *veins* 4-6 on each side in a lobe; *lower sori* sometimes  $\frac{1}{4}$  in. l.—*A. dubium, Mett. Hk. Sp. 3. p. 261 (in part).*  $\beta$ , *A. expansum*, Presl; *rachis* pubescent; *pinnæ* and lobes narrower; *sori* shorter.—*Diplazium, Willd. D. umbrosum, Willd. D. Haenkeanum, Presl.*

Hab. Tropical America, from Cuba and Columbia to Brazil and Peru.—The universally-distributed S. American large-growing tripinnatifid species. *D. ambiguum*, Raddi, is probably essentially the same, but the figure represents the pinnæ as only slightly lobed, with which Brazilian and Peruvian examples from Sellow and Spruce coincide.

*Fronde fully tripinnate.* Sp. 260-263.

260. A. (Dipl.) *gracilescens*, Mett.; *st.* straw-coloured, slender, but firm, naked, polished; *fr.* 3-4 ft. l., 2-3 ft. br., tripinnate; *lower pinnae* 12-18 in. l., 6 in. br.; lanceolate-acuminate; *pinnl.* close, short-stalked, 2-3 in. l., nearly 1 in. br., lanceolate-acuminate, with oblong unequal-sided pinnatifid *segm.*; *texture* herbaceous; *rachis* stramineous and both sides naked; two *veinlets* in the upper, four in the lower lobes; *sori* only one in each, except the lowest, 1 lin. l.; *invol.* membranous.—*Mett. Fil. Nov. Gran. p.* 237. Diplazium, Moore.

Hab. Venezuela, *Schlim*, 69.

261. A. (Dipl.) *Sandwichianum*, Mett.; *st.* 2 ft. l., firm, dark-brown, tomentose, furnished at the base with ovate-lanceolate scales, dark-brown in the centre, and a broad margin suddenly scariose; *fr.* 2-3 ft. l., 1½-2 ft. br.; *lower pinnae* 9-15 in. l., 6 in. br., with numerous spreading *pinnl.* 3 in. l., 1 in. br., with distinct oblong *segm.* ½ in. l., ¼ in. br., the lower ones cut down nearly to the rachis into blunt lobes; *texture* herbaceous; *colour* dark-green; *rachises* brown and very tomentose, those of the pinnules distinctly winged; *veins* distant, pinnate; *sori* copious, in regular rows not reaching the edge.—*Hk. Sp. 3. p.* 225. Athyrium, *Presl. A. alienum, Mett. p.* 169. A. fuscopubescens, *Hk. Sp. 3. p.* 264.

Hab. Sandwich Islands; Peru, *Lechler, Spruce*, 4759, 5416a.—Spruce's specimens quite agree with those from Mr. Lambert, mentioned in "Species Filicum."

262. A. (Dipl.) *Wilsoni*, Baker; *st.* slender, brownish, naked; *fr.* 3-4 ft. l., 2 ft. br.; *lower pinnae* 10-12 in. l., 2-2½ in. br., with numerous imbricated *pinnl.* 1¼-1½ in. l., ½ in. br., the point blunt, cut down to the rachis, except at the apex, into oblong-rhomboidal lobes, the lower ones ¼ in. l., 1½-2 lin. br., broadly but not deeply lobed; *texture* herbaceous; both *surfaces* and *rachis* quite naked; *colour* deep-green; *veins* four on a side in the lower lobes, the lower ones forked; *sori* linear, 1 lin. l., rarely diplazioid; *invol.* tumid.

Hab. Jamaica, *Wilson*, 929; *March*, 206, 377.—In habit and cutting this resembles the preceding closely.

263. A. (Dipl.) *divisissimum*, Baker; *st.* 1-2 ft. l., firm, angular, polished, reddish-brown, shaggy below, with nearly black dense fibrillæ; *fr.* 3-4 ft. l., 2 ft. br., with numerous *pinnae* on each side, the lower ones 3-4 in. apart, 1 ft. l., 6 in. br., with very numerous close-placed lanceolate *pinnl.* 3 in. l., ¾ in. br., cut down into very numerous oblong *segm.* ⅔ in. l., 2 lin. br., which are again cut down to the rachis into obovate ult. divisions 1 lin. br.; *texture* herbaceous; *rachis* dark-coloured, naked; *colour* dark-green; two *veinlets* on each side in the lower ult. divisions; *sori* linear, sometimes 1 lin. l., only the lowest occasionally diplazioid.

Hab. Foot of M. Chimborazo, *Spruce*, 5695.—This comes nearest to the two preceding, but is much more compound. We have an incomplete specimen of a very similar plant from Celebes.

§§§§§§ Anisogonium, *Presl. Sori as in Diplazium, but veins anastomosing.* Sp. 264-276. *Callipteris*, *Bory.* Fig. 38, g.

\* *Fronde simple or simply pinnate.* Sp. 264-273.

264. A. (Aniso.) *ternatum*, Hk.; *st.* slender, 3-6 in. l.; *fr.* ternate, with an oblong-lanceolate terminal *pinna* 3-4 in. l., 1½ in. br., the point acuminate, the edge serrated, the base narrowed gradually, and a pair of similar smaller lateral



ones; *texture* coriaceous; *veins* in pinnate groups, the outer upper vein of the group joining the others before they reach the edge, but the separate groups free from one another.—*Hk. Sp. 3. p. 265.*

Hab. Mexico, *Liebm.*

265. A. (Aniso.) *Kunzei*, Mett.; *st.* 6-15 in. l., firm, erect, furfuraceous; *fr.* varying in shape from spatulato-elliptical, 9 in. l., 2 in. br., slightly lobed below, to 18 in. l., 6-9 in. br., the upper half deeply pinnatifid, with deltoid or lanceolate-acuminate lobes, the lower half with distant oblong-acuminate entire *pinnæ* 3-4 in. l., 1½-2 in. br.; *texture* coriaceous; *veins* in pinnated groups which unite very near the midrib, with slender lines of sori on each extending to the edge.—*Hk. Sp. 3. p. 266.*

Hab. Ecuador and Peru.

266. A. (Aniso.) *cordifolium*, Mett.; *st.* 6-12 in. l., firm, erect, scaly below; *fr.* 8-12 in. l., 3-4 in. br., entire, cordate at the base, the point acuminate; *texture* coriaceous; *veins* in close groups of about four, anastomosing copiously in the outer half of the pagina; *sori* reaching from the midrib to the edge.—β, *D. integrifolium*, Blume; *fr.* 12-18 in. l., subdeltoid, with a large terminal and one or two pairs of smaller but similar spreading lateral *pinnæ*.—*Hk. Sp. 3. p. 267. Ic. t. 936.*

Hab. Philippines and Malayan Peninsula and Isles.

267. A. (Aniso.) *alismæfolium*, Hk.; *st.* 2-6 in. l., firm, erect, scaly throughout; *fr.* varying in shape from simple, oblong-lanceolate, 6-9 in. l., 2-3 in. br., the edges entire, the apex acuminate, to ternate or pinnate, with a large terminal and three pairs of lateral *pinnæ*, each like the entire frond of the simple state; *texture* coriaceous; *veins* about three to a group in the inner half, but anastomosing copiously with hexagonal areolæ towards the edge.—*Hk. Sp. 3. p. 267.*

Hab. Luzon, *Cuming*, 116.

268. A. (Aniso.) *lineolatum*, Mett.; *st.* 6-9 in. l., firm, erect, grey, scaly below; *fr.* occasionally simple, usually with a terminal *pinna* and 3-6 pairs of lateral ones, which are 6-12 in. l., 2 in. or more br., entire, often suddenly acuminate; *texture* coriaceous; *rachis* naked; *veins* 4-8 to a cluster, uniting slightly towards the edge.—*Diplazium*, Bl. A. elegans, Mett. *Hk. Sp. 3. p. 268. Ic. Pl. t. 939.*

Hab. Philippines and Malayan Peninsula and Islands.

269. A. (Aniso.) *heterophlebium*, Mett. MSS.; *st.* 1 ft. l., grey, scaly throughout; *fr.* 12-18 in. l., 8-9 in. br., with 6-8 opposite pairs of *pinnæ* below the pinnatifid apex; the lowest 2 in. or more apart, 3-4 in. l., 1-1¼ in. br., the edge undulated, the point acute, the base cordate on both sides; *texture* thinly herbaceous; *colour* dark-green; *rachis* villose and fibrillose throughout; both *surfaces* naked; *veins* pinnate, the groups joining one-third of the way from the midrib to the edge, and the veins of the same and different groups anastomosing; *sori* not reaching the edge, copiously diplazioid.

Hab. Mishmee and Assam, *Griffith*.

270. A. (Aniso.) *decussatum*, Sw.; *st.* 1-2 ft. l., strong, erect, often muricated; *fr.* 2-4 ft. l., with numerous *pinnæ* on each side, which are 6-12 in. l., 1-2 in. br., often proliferous in the axils, the edge nearly entire or slightly lobed; *texture* herbaceous or subcoriaceous; *veins* in copiously pinnated groups, with a distinct barren vein in the centre, uniting one-third of the distance from the

midrib to the edge, but only those of different groups joining one another; *sori* reaching nearly to the edge and copiously double.— $\beta$ , *D. robusta*, Fée; *pinnæ* 12-18 in. l., deeply lobed in the upper part, in the lower cut down to the rachis into distinct *pinnl.* 2 in. l.,  $\frac{3}{4}$  in. br.—*Hk. Sp.* 3. p. 270.

Hab. Polynesian and Malayan Islands, and sent lately by Dr. Ferd. Mueller from Queensland; Mascaren Isles, Angola, and Guinea Coast.—The Assam station given in "Species Filicum" is a mistake.

271. A. (Aniso.) *Chimborazense*, Spruce, MSS.; *st.* 3 ft. l.,  $\frac{3}{8}$  in. thick at the base, brown, angular, densely clothed below with large linear-lanceolate brown scales; *fr.* 6 ft. l., the apex pinnatifid, with lanceolate lobes towards the base of the pinnatifid portion 4-6 in. l., below this about 16 pairs of *pinnæ*, the lowest 15 in. l.,  $2\frac{1}{2}$  in. br., the point suddenly acuminate, the edge slightly undulated, the base narrowed suddenly on both sides; *texture* thin but subcoriaceous; *rachis* strong, naked, brown; *veins* in groups of about six, not uniting till beyond half the way from the midrib to the rachis, the veins of the same and separate clusters anastomosing copiously beyond this; *sori* in slender lines reaching two-thirds of the way to the edge.

Hab. Foot of Chimborazo (alt. 3-4,000 ft.), *Spruce*, 5703.

272. A. (Aniso.) *rivale*, Spruce, MSS.; *st.* 18 in. l., strong, erect, brownish, scaly towards the base; *fr.* 4-5 ft. l., the apex pinnatifid; below this about 15 pairs of *pinnæ*, the largest 8-9 in. l., 2 in. br., the point acuminate, the edge slightly repand, the base subcuneate on both sides; *texture* papyraceous, only the veins beneath slightly hairy; *veins* pinnate, with a distinct barren vein in the centre of each group and 6-8 lateral veinlets, all of which except the upper one or two unite with those of the next group, beginning to do so within  $\frac{1}{4}$  in. of the costa; *sori* linear, medial, rarely double.

Hab. Foot of Chimborazo (alt. 3-4,000 ft.), *Spruce*, 5700.

273. A. (Aniso.) *stenocarpum*, Mett.; *fr.* 5-8 ft. l.,  $1\frac{1}{2}$  ft. br.; *pinnæ* numerous, close, the lower ones short-stalked, 9-10 in. l., 2 in. br., the point acuminate, sharply toothed, the edge broadly lobed to a depth of 1-3 lin., the base truncate; *texture* herbaceous; only the *rachis* and *veins* beneath slightly hairy; main *veins* 3-4 lin. apart; *veinlets* 6-8 on a side, the lower ones ceasing before they reach the edge, free or uniting with those of the next group, the upper ones free; *sori* reaching from the main vein more than halfway along the veinlets.—*Mett. Fil. Nov. Gran.* p. 232.

Hab. New Granada, *Lindig* and *Triana*.—The imperfectly-known *A. chocoense*, Triana, resembles this, but the under surface is clothed, especially on the veins, with ferruginous hairs, and the lower three or four veinlets of each group unite with those of the adjoining one.

\*\* *Fronde bipinnate.* Sp. 274-276.

274. A. (Aniso.) *esculentum*, Presl; *caud.* subarborescent, erect; *st.* 1-2 ft. l., strong, erect, tufted; *fr.* 4-6 ft. l., occasionally simply pinnate only, but usually bipinnate; *lower pinnæ* 12-18 in. l., 6-8 in. br.; *pinnl.* 3-6 in. l.,  $\frac{3}{4}$ -1 in. or more br., the point acuminate, the edge more or less deeply lobed, the base narrowed suddenly, often auricled; *texture* subcoriaceous; *rachis* often pubescent; *veins* fine, copiously pinnated, 6-10 on each side in each lobe, with a distinct barren central midrib, the veinlets of the different clusters beginning to unite a short distance from the midrib, with lines of *sori* often on all the lateral veinlets.—*Hk. Sp.* 3. p. 268. *Digrammaria*, *Presl.*

Hab. Himalayas to Ceylon, Hong-Kong, Formosa, Malayan Peninsula and Isles.—*D. serampurensis*, Spreng., is a pubescent simply pinnate form.



275. A. (Aniso.) *Smithianum*, Baker; *caudex* oblique, decumbent; *st.* thick, 1 ft. l., slightly scaly below, furfuraceous throughout, and rather densely muricated; *fr.* 18-24 in. l., by nearly as broad, with 4-5 pinnate *pinnæ* and 4-5 that are only pinnatifid below the point on each side, the lowest 3 in. apart, about 9 in. l., 4 in. br.; *pinnl.* sessile, 2-3 in. l.,  $\frac{3}{8}$ - $\frac{3}{4}$  in. br., the edge subentire, the point slightly toothed, acuminate, the base rounded on both sides; *texture* subcoriaceous; both *surfaces* and *rachis* naked, the latter muricated in the lower part; *veins* in groups of 2-3 on a side, the groups usually joining halfway across to the edge; *sori* often  $\frac{1}{4}$  in. l.—A. dilatatum, *J. Sm.* (non Blume).

Hab. Ceylon, *Gardner*, 1351.—Our description here is taken from the living cultivated plant. It differs from *latifolium* by its oblique caudex and anastomosing venation and asperous stipe.

276. A. (Aniso.) *vitiense*, Baker; *fr.* ample; lower *pinnæ* 1 ft. l., 6 in. br., with numerous close distinctly-stalked lanceolate *pinnl.* on each side, which are 2-3 in. l.,  $\frac{3}{4}$  in. br., narrowed gradually from the truncate base to an acuminate point, and bluntly lobed about one-third of the way down to the midrib; *texture* herbaceous; *rachis* finely pubescent, both sides nearly naked; *veins* pinnate in the lobes with 6-9 veinlets on a side, the lowest of contiguous groups joining midway between the midrib and sinus; *sori* copious, medial; *invol.* membranous.

Hab. Fiji, *Daernel*; communicated by Prof. Reichenbach.—This bears the same relation to *A. decurrens* that the preceding does to *A. latifolium*.

§§§§§§§§ Hemidictyum, *Presl.* *Veins anastomosing towards the margin. Sori single.* Fig. 38, h. Sp. 277-280.

277. A. (Hemi.) *Ceterach*, L.; *st.* densely tufted, 1-3 in. l., wiry, ebeneous, chaffy; *fr.* 4-6 in. l., 1 in. or less br., cut down nearly or quite to the rachis into alternate, blunt subentire broadly-oblong or roundish lobes,  $\frac{3}{8}$ - $\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., with a rounded sinus between them; *texture* subcoriaceous; *upper surface* naked; *lower* densely coated with small pale reddish-brown ovate membranous scales; *sori* linear, oblique; *invol.* very rudimentary.—*Brit. F. t.* 36. *Ceterach officinarum*, *Willd.*— $\beta$ , *C. aureum*, Link; *fr.* 6-12 in. l.,  $1\frac{1}{2}$ -2 in. br., lobes oblong, scales toothed.—*Hk. Sp. 3.* p. 273.

Hab. Britain and Gothland to Spain, Greece, Himalayas, and the Caucasus;  $\beta$ , Canaries and Madeira.—The involucre is so very nearly absent, that this is placed by most authors in *Grammitideæ*.

278. A. (Hemi.) *Purdieanum*, Hk.; *st.* 6-9 in. l., clothed copiously with greyish-brown lanceolate-acuminate scales; *fr.* 6-9 in. each way, deltoid, cordate, with a terminal and 2-3 pairs of opposite lateral *pinnæ*, the largest 4-5 in. l.,  $1\frac{1}{2}$ -2 in. br., acute at the point, narrowed at the base, the edge entire; *texture* subcoriaceous; both *surfaces* naked; *veins* fine, the primary ones very oblique, anastomosing copiously halfway from the midrib to the edge, connected by a vague line within the margin; *lower sori* sometimes 1 in. l.—*Hk. Sp. 3.* p. 273.  *Ic. t.* 938.

Hab. Discovered by Mr. Purdie in Venezuela (not Jamaica), and since gathered by Dr. Spruce in Peru.

279. A. (Hemi.) *Finlaysonianum*, Wall.; *st.* 6-9 in. l., green, subcompressed, nearly naked; *fr.* 12-18 in. l., 6-8 in. br., simply pinnate, with 2-6 opposite pairs of lateral *pinnæ*, the lower ones 4-8 in. l.,  $1\frac{1}{2}$ -2 in. br., the point very acuminate, the base narrowed very gradually on both sides to a distinct petiole, the edge entire, the two sides often unequal; *texture* coriaceous; *veins* subflabellate, very oblique, anastomosing slightly towards the edge, sometimes bounded by an

irregular intramarginal line; *sori* often  $1\frac{1}{2}$ -2 in. l.—*Hk. Sp.* 3. p. 271. *Ic. t.* 937. *Asplenidictyon*, *J. Sm.*

Hab. Himalayas and Malayan Peninsula.—This has the same close relation to *A. macrophyllum* that *elegans* has to *fraxinifolium*.

280. *A. (Hemi.) marginatum*, Linn.; *st.* 2-3 ft. l., strong, erect, woody, sometimes  $\frac{1}{2}$  in. thick at the base; *fr.* simply pinnate, 4-6 ft. l.; *pinnæ* in several opposite pairs, the lowest 1-2 ft. l., 3-4 in. br., the edge entire, the base often cordate; *texture* papyraceo-herbaceous; *rachis* naked, polished; *veins* anastomosing copiously in the outer third of the space between the midrib and edge, bounded by a distinct intramarginal line; *sori* long, linear, confined to the free veins.—*Hk. Sp.* 3. p. 271. *Fil. Ex. t.* 63.

Hab. Tropical America, from Cuba and Venezuela to Peru and Brazil.

#### GEN. 39. ALLANTODIA, Wall. (in part).

*Sori* dorsal, linear-oblong, attached to the primary veins. *Invol.* the same shape as the sorus and quite enclosing it, bursting in an irregular line down to the centre. *A single simply pinnate species with thin ample pinnæ, differing from Asplenium in the dehiscence of the involucre.* TAB. IV. f. 39.

1. *A. Brunoniana*, Wall.; *fr.* often 2 ft. l., 1 ft. br.; *pinnæ* 4-6 in. l., 1 in. br., entire; *veins* forked near the midrib, two rows of hexagonal areolæ occupying the outer half of the space between the midrib and the edge, bounded by an intramarginal line; *sori* confined to the anterior vein of the first fork.—*Hk. Sp.* 3. p. 275.

Hab. Himalayas (up to 6,000 ft.), Ceylon, Java, Tahiti.—*Asplen. javanicum*, Blume, is the oldest name.

#### GEN. 40. ACTINIOPTERIS, Link.

*Sori* linear-elongated, submarginal. *Invol.* the same shape as the sorus, folded over it, placed one on each side of the narrow segments of the frond opening towards the midrib. *A single species, at once recognizable by its flabellate habit, like a palm-tree (Chamærops) in miniature, with fruit in character intermediate between Asplenicæ and Pteridæ.* TAB. IV. f. 40.

1. *A. radiata*, Link; *st.* densely tufted, 2-6 in. l.; *fr.* like a fan, 1-1 $\frac{1}{2}$  in. deep, composed of numerous dichotomous segments which are rush-like in texture, not more than  $\frac{1}{2}$  lin. br., the veins few and subparallel with the indistinct midrib, the segments of the fertile frond longer than those of the barren one.—*Ic. Fil. t.* 975.— $\beta$ , *A. australis*, Link; *segm.* fewer, longer, subulate at the point.—*Ic. Fil. t.* 976. *Hk. Sp.* 3. p. 276.

Hab. Throughout India, especially in the Peninsula, Ava, Ceylon, Arabia, Upper Egypt, Abyssinia, Mascaren Isles, Zambesi-land, Macalisberg, Angola.

#### TRIBE 9. SCOLOPENDRIÆ.

*Sori* as in *Asplenicæ*, except that the involucre are arranged in pairs and open towards each other. GEN. 41.

#### GEN. 41. SCOLOPENDRIUM, Sm.

Characters of the tribe. TAB. IV. f. 41.

§ *Euscolopendrium.* *Veins* free or anastomosing only casually. Sp. 1-4.

1. *S. vulgare*, Sm.; *st.* 4-8 in. l., fibrillose below; *fr.* 6-18 in. l., 1 $\frac{1}{2}$ -3 in. br., ligulate-oblong, entire, the base cordate; *texture* subcoriaceous; *veins* in groups



of 2-4, rarely anastomosing.—*Hk. Sp. 4. p. 1. Brit. F. t. 87. S. Lindeni, Hk. Ic. Pl. t. 488.*

Hab. Britain and Gothland to Spain, Madeira, the Azores, the Caucasus and Japan; United States and Mexico, rare.—A very large number of curious varieties and monstrosities are in cultivation, of which the most remarkable has non-indusiate sori on the edge and upper surface of the frond and anastomosing venation.

2. *S. Hemionitis*, Sw.; *st.* 4-6 in. l., slender, slightly fibrillose; *fr.* 4-6 in. l., oblong-lanceolate, the base hastato-cordate, with short and rounded or prominent and almost acute lobes; *texture* thinner than in the last; *sori* shorter; *veins* more branched.—*Hk. Sp. 4. p. 2.*

Hab. Spain, S. France, Italy, and the Mediterranean Islands.

3. *S. pinnatum*, J. Sm.; *st.* compressed, greyish; *fr.* 2-4 ft. l., with an entire terminal *pinna* 4-6 in. l., 1½-2 in. br., proliferous at the point and 1-6 pairs of similar lateral ones; *texture* subcoriaceous; *veins* usually once forked; *sori* oblique, ½-¾ in. l., 1 lin. br.—*Hk. Sp. 4. p. 2.*

Hab. Philippines, *Cuming*, 187, 311.—*S. longifolium*, Presl (*Micropodium*, Mett.), gathered at Luzon by Haenke, has a simple undivided frond, and the limit between the edges of the contiguous involucre marked by a thin line, whilst in *S. pinnatum* it is an evident lamelliform crest. See Mett. Fil. Ind. 2. p. 233.

4. *S. Durvillei*, Bory; *rhizome* firm, wide-scandent; *st.* 2-3 in. l., firm, erect, naked; *fr.* varying from simple lanceolate-oblong, 6 in. l., 1 in. br., the edge crenate, the base auricled (these alone fertile), to subdeltoid bipinnatifid, with several *pinnae* on each side, the lowest 1½ in. l., ¾ in. br., cut down nearly to the rachis into narrow toothed or pinnatifid lobes; *texture* subcoriaceous, both sides naked; *veins* of entire frond subparallel, simple or forked; *sori* reaching from the midrib two-thirds of the space to the edge without any raised line between them.—*Kunze, Suppl. Schk. p. 9. t. 5. Micropodium, Mett.*

Hab. Ualan; gathered first by Durville.

§§ Antigramme, Presl. *Frond with a distinct midrib, veins anastomosing towards the edge. Sp. 5-6.*

5. *S. (Anti.) Brasiliense*, Kunze; *st.* short, fibrillose; *fr.* 6-12 in. l., 1-1½ in. br., subentire, tapering towards both ends; *texture* coriaceous; *veins* anastomosing about two-thirds of the distance from the midrib to the edge; *sori* linear, confined to the free veins.—*Hk. Sp. 4. p. 3.*

Hab. Brazil.—*A. subsessilis*, Fée, is a sessile form, with a longer and narrower frond than usual.

6. *S. (Anti.) plantagineum*, Schrad.; *st.* 6-9 in. l., firm, grey, naked; *fr.* 6-10 in. l., 3-5 in. br., ovate, the base rounded or truncate or cordate, the edge entire; *texture* coriaceous; *veins* anastomosing within about ½ in. of the edge; *forks* of the free veins ⅓ in. apart; *sori* confined to the free veins.—*S. Douglasii, Hk. Sp. 4. p. 3. Asplenium, Hk. & Gr. Ic. t. 150.*

Hab. Brazil.

§§§ Schaffneria, Fée. *No distinct midrib, but the veins flabellate, uniting towards the edge. Sp. 7.*

7. *S. (Schaff.) nigripes*, Hk.; *st.* 1-2 in. l., black, polished, naked, jointed at the apex; *fr.* obovate or roundish, 1-1½ in. br.; *texture* thick, coriaceous; *sori* in

irregularly linear or oblong patches.—*Schaffneria*, *Fée*. *Asplenium*, *Hk. Kew Gard. Misc.* 9. t. 9.

Hab. Mexico and Guatemala.

§§§§ *Camptosorus*, *Link*. *Veins anastomosing near the midrib but free outwards. Sori usually in opposite pairs, but more or less divaricating.* Sp. 8-9.

8. S. (Campt.) *rhizophyllum*, *Hk.*; *st.* 1-4 in. l., naked, compressed, below chesnut-brown; *fr.* 4-9 in. l., lanceolate, from an auricled cordate base, the point tapering out and often rooting; *texture* coriaceous; *sori* short, irregular, linear-oblong.—*Hk. Sp.* 4. p. 4.

Hab. British America to the Southern United States.

9. S. (Campt.) *sibiricum*, *Hk.*; *barren fr.* ovate-acuminate, 1 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br.; *fertile fr.* 6 in. or more l.,  $\frac{1}{4}$  in. br., the apex elongated and rooting, the base not auricled and narrowed gradually; *st.* 2-3 in. l., naked, green upwards, ebeneous below; *texture* subcoriaceous; *sori* linear or oblong.—*Hk. Sp.* 4. p. 4. *2nd Cent.* t. 35.

Hab. W. Siberia, Kamschatka, Tsus-Sima, Japan.

#### TRIBE 10. ASPIDIEÆ.

*Sori dorsal, subglobose, rarely elliptical. Involucre superior, similar in shape to the sorus, fixed either by the centre or a sinus.* GEN. 42-47.

#### GEN. 42. DIDYMOCHLÆNA, *Desv.*

*Sori* elliptical, terminal on a veinlet, but distinctly intramarginal. *Invol.* elliptical, emarginate at the base, attached to the linear receptacle, free all round the edge. TAB. 4. f. 42.

1. *D. lunulata*, *Desv.*; *caud.* erect, subarborescent; *fr.* densely tufted, 4-6 ft. l., bipinnate; *pinnl.*  $\frac{3}{4}$ -1 in. br., dimidiate, subquadrangular, entire or slightly sinuated; *texture* subcoriaceous; *venation* subflabellate; *sori* 2-6 to a pinnule.—*Hk. Sp.* 4. p. 5. *G. F. t.* 17. *Aspid. truncatulum*, *Sw., Willd.*

Hab. Tropical America, from Cuba and Guatemala to Peru and Brazil; Fiji, Malayan Peninsula and Isles, Madagascar, Johanna Island, Natal, Fernando Po.—The pinnules in shape and texture correspond with those of the dimidiate *Adiantum* and *Lindsaya*.

2. *D. polycarpa*, *Baker*; *caud.* erect; *st.* tufted, short; *fr.* 2-3 ft. l., 12-18 in. br., simply pinnate; *pinnæ* close, very numerous, spreading, dwindling down below to mere auricles, the largest 6-9 in. l.,  $\frac{1}{2}$  in. br., cut down halfway or more to the rachis into close linear-oblong lobes; *rachis* and lower surface villose; *veins* very close, pinnated, 12 or more on each side in a lobe; *sori* small, close, ultimately confluent.—*Aspid. Bl., Mett.* *Nephrodium javanicum*, *Hk. Sp.* 4. p. 67. *Fil. Ex. t.* 61. *Mesochlæna*, *R. Br. MSS.* *Sphaerostephanos*, *J. Sm.*

Hab. Malayan Peninsula and Islands.—Habit and venation of *Eunephrodium*, but the involucre in structure resembles the preceding. *M. asplenioides*, *J. Smith*, is a villose variety, with narrower pinnæ than usual, with short oblong-deltoid lobes.

#### GEN. 43. ASPIDIUM, *Sw. (in part), R. Br.*

*Sori* subglobose, dorsal or terminal on the veinlets. *Invol.* orbicular, fixed by the centre. *A cosmopolitan genus, the species of which vary much in size, texture, cutting, and venation.* TAB. 5. f. 43.



Polystichum, Roth. Veins all free. Sp. 1-42. Texture more or less coriaceous in all except species 1, 4, 38, 39, and 41, and teeth usually awned.

\* Frond pinnatifid only. Sp. 1-2.

1. A. (Polyst.) *glandulosum*, Hk. & Gr.; st. tufted, very short; fr. 6-8 in. l., 1-1½ in. br., oblong-lanceolate, tapering to both ends, cut down nearly to the rachis above and quite below into bluntly sinuated linear-oblong lobes, emarginate on the upper, decurrent on the lower side at the base; texture herbaceous; rachis and both surfaces finely glanduloso-pilose; veins pinnate, the veinlets in groups of three; sori 2-8 to a pinna, midway between the midrib and edge.—Hk. Sp. 4. p. 6. Hk. & Gr. t. 140. (not Blume).

Hab. Cuba and Jamaica.

2. A. (Polyst.) *Plaschnichianum*, Kunze; st. tufted, 3-4 in. l., slender, fibrillose below; fr. 4-6 in. l., ½-¾ in. br., lanceolate, rooting at the point, subentire or slightly or deeply lobed at the base; texture coriaceous; both surfaces slightly fibrillose; lower veins in groups of four; sori copious, scattered.—Hk. Sp. 4. p. 7. t. 211.

Hab. Jamaica.—According to Grisebach, a less cut form of species 3.

\*\* Fronds once pinnate, the lower pinnae entire or pinnatifid below. Sp. 3-17.

3. A. (Polyst.) *rhizophyllum*, Swz.; st. tufted, 1-2 in. l., fibrillose, slender; fr. 2-6 in. l., ¾ in. br., with the long, narrow, upper half of the frond lengthened out and rooting, the lower half cut down to a flattened fibrillose rachis into oblong rhomboidal subentire lobes, ¾-1½ in. br., ¼ in. deep; texture subcoriaceous; veins copiously pinnate in the lobes; sori scattered.—Hk. Sp. 4. p. 7. Hk. & Gr. Ic. t. 59.

Hab. Jamaica and Cuba.

4. A. (Polyst.) *semicordatum*, Swz.; st. scattered, 6-12 in. l., fibrillose at the base; fr. 2-3 ft. l., 8-12 in. br., simply pinnate; pinnae spreading, 4-6 in. l., ½-¾ in. br., nearly entire, acuminate, cordate or truncate at the base; texture papyraceo-herbaceous or subcoriaceous, both sides naked and rachis nearly so; veins pinnate, the lower ones ending short of the edge; sori in 1-3 rows on each side, the inner one the most constant and regular, close to the midrib.—Hk. Sp. 4. p. 16. Cyclopetis, J. Sm.

Hab. Tropical America, from Cuba and Panama to Brazil and Peru; Philippines, Amboyna, Malayan Peninsula and Isles.—This corresponds to the genus *Hemicardium* of Fée, who makes five species. *A. Kingii*, Hance (Ann. Sc. Nat. 4. ser. 18. p. 237), from the Caroline Isles, is said to have blunt repand pinnae 1½ in. l., under ½ in. br.; veins less branched, and fruit in a single line.

5. A. (Polyst.) *munitum*, Kaulf.; st. tufted, 4-9 in. l., strong, straw-coloured, densely clothed, especially below, with large glossy lanceolate scales; fr. 1-2 ft. l., 4-8 in. br.; pinnae close, 3-4 in. l., ¾-1 in. br., the apex acuminate, the edge finely spinuloso-serrated throughout, the upper side auricled and the lower obliquely truncate at the base; texture subcoriaceous; rachis generally scaly; veinlets fine, close; sori in two rows near the edge.—Hk. Sp. 4. p. 10. t. 219.

Hab. Western N. America, from Nootka to California.

6. A. (Polyst.) *falcinellum*, Swz.; st. tufted, 4-8 in. l., densely clothed, especially below, with blackish-brown lanceolate scales; fr. 12-18 in. l., 4-6 in. br.; central pinnae with about their own space between them, 3 in. l., ¼ in. br., the

point acute, the edge finely not spinosely serrated, the upper side bluntly auricled, the lower obliquely truncate at the base; *texture* very coriaceous; *rachis* usually scaly; *veins* inconspicuous; *sori* in two long rows. *Hk. Sp. 4. p. 10. Fil. Ex. t. 53.*

Hab. Madeira.—*P. maderense*, Johnst. (Ann. N. H. April, 1866), is said to be intermediate between this and *P. angulare*.

7. A. (Polyst.) *acrostichoides*, Swz.; *st.* 6-8 in. l., densely clothed below with pale-brown lanceolate scales; *fr.*  $1\frac{1}{2}$ -2 ft. l., 3-5 in. br., the *pinnæ* of the lower half barren, 2-3 in. l.,  $\frac{1}{4}$  in. br., spinoso-serrated throughout, auricled at the base above, the *pinnæ* of the upper half fertile, much smaller; *texture* subcoriaceous; *rachis* straw-coloured, usually rather scaly; *veinlets* in groups of four; *sori* occupying the whole under side of the fertile *pinnæ*.—*Hk. Sp. 4. p. 9.*

Hab. Canada to Florida and the Mississippi.—*A. Schweinitzii*, Beck, is a form with lobed *pinnæ*.

8. A. (Polyst.) *lepidocaulon*, Hk.; *st.* tufted, 6-9 in. l., weak, densely clothed with large cordate brown scales; *fr.* 1 ft. or more l., 4-6 in. br., sometimes elongated and radicate at the point; *pinnæ* 2-3 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., lanceolate-falcate, not toothed, the two sides unequal, the upper ones with a triangular auricle at the base; *texture* subcoriaceous; *rachis* densely scaly like the stipe, lower surface with scattered scales; *veins* obscure, sometimes slightly connected; *sori* principally in two rows a short space from the midrib.—*Hk. Sp. 4. p. 12. t. 217.*

Hab. Japan and Tsus-Sima.—Habit and texture of *A. falcatum*, but the veins only casually joined, and the rachis densely scaly.

9. A. (Polyst.) *Lonchitis*, Swz.; *st.* densely tufted, 1-4 in. l., ebeneous and clothed with large lanceolate pale-brown scales at the base; *fr.* 12-18 in. l., 1-2 in. br., pinnate throughout; *pinnæ*  $\frac{1}{2}$ -1 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., ovate-rhomboidal, subfalcate, the two sides unequal, the point mucronate, the edge spinulosely serrated, the upper side sharply auricled at the base, the lower obliquely truncate; *rachis* nearly naked; *texture* coriaceous; *sori* usually in two rows.—*Hk. Sp. 4. p. 8. Brit. F. t. 9.*

Hab. Arctic Europe to Portugal, Naples, Greece, Himalayas, and Davuria; Greenland, and mountains of the N. United States, and British America.

10. A. (Polyst.) *mucronatum*, Swz.; *st.* tufted, 2-4 in. l., stout, erect, densely clothed with large reddish-brown lanceolate scales; *fr.* 12-18 in. l.,  $1\frac{1}{2}$ -2 in. br., pinnate throughout; *pinnæ* very numerous, often imbricated,  $\frac{3}{4}$ -1 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., subrhomboidal, unequal-sided, the point mucronate, the edge subentire or slightly lobed, distinctly auricled at the base on the upper side; *texture* very coriaceous; *rachis* stiff and densely scaly; *sori* in a long row on each side the midrib.—*Hk. Sp. 4. p. 9. t. 216.*

Hab. West Indies.—Very like the preceding in appearance and texture.

11. A. (Polyst.) *Lachenense*, Hk.; *st.* densely tufted, 2-4 in. l., stout, ebeneous, and clothed with large lanceolate scales below; *fr.* 4-8 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., pinnate throughout; *pinnæ*  $\frac{1}{4}$ - $\frac{3}{8}$  in. l., 2-3 lin. br., ovate-deltoid, the two sides equal, the point bluntish, the edge spinoso-serrated, bluntly lobed below halfway down; *texture* coriaceous; *rachis* stramineous, fibrillose; *sori* often covering the whole under side of the *pinnæ*.—*Hk. Sp. 4. p. 8. t. 212.*

Hab. Sikkim, Himalayas (13-16,000 ft.); gathered by Drs. Hooker, Thomson, and Anderson.

12. A. (Polyst.) *triangulum*, Swz.; *st.* tufted, 2-6 in. l., with large dark-



brown scales at the base; *fr.* 1 ft. or more l.,  $1\frac{1}{2}$ -2 in. br.; *pinnæ* numerous, sessile, the lower ones distant, the central ones  $\frac{3}{4}$ -1 in. l.,  $\frac{3}{8}$ - $\frac{5}{8}$  in. br., subdeltoid, but the lower side obliquely truncate, apex mucronate, edge subentire or slightly lobed with blunt or spinose teeth, one or both sides auricled at the base; *texture* coriaceous; *rachis* slightly scaly; *veins* flabellate; *sori* principally in two rows near the edge.—*Hk. Sp.* 4. p. 14.

Hab. West Indies.—*P. ilicifolium*, Fée, appears to be a form with elongated fronds rooting at the point.

13. *A. (Polyst.) auriculatum*, Sw.; *st.* tufted, 4-6 in. l., scaly below or throughout; *fr.* 12-18 in. l., 2-4 in. br.; *pinnæ* numerous, subsessile, usually close,  $1-1\frac{1}{2}$  in. l.,  $\frac{3}{8}$ - $\frac{1}{2}$  in. br., ovate-rhomboidal, falcate, the point acute, the edge spinoso-serrated, not lobed, the upper one with a prominent auricle, the lower one truncate in a horizontal line at the base; *texture* subcoriaceous; *rachis* stramineous, slightly scaly; lower *veinlets* in groups of three; *sori* in two rows.— $\beta$ , *A. marginatum*, Wall.; *texture* more coriaceous, upper edge of the *pinnæ* slightly lobed.— $\gamma$ , *A. lentum*, Don; *pinnæ* cut into oblong mucronate lobes about halfway down to the *rachis*, the auricle sometimes quite free.—*A. ocellatum*, Wall. *Hk. Sp.* 4. p. 11.

Hab. Throughout India and Ceylon, ascending in the Himalayas to 9,000 ft., Formosa.—*A. obliquum*, Don (*cæspitosum*, Wall.), agrees very nearly with *a*. The typical plant looks distinct, but is connected by gradual intermediates with  $\gamma$ , which is barely distinguishable from *A. lobatum*.

14. *A. (Polyst.) ilicifolium*, Don; *st.* densely tufted, 2-4 in. l., slender, clothed with large scales throughout; *fr.* 6-9 in. l., 1-2 in. br.; *pinnæ* subdeltoid or lanceolate,  $\frac{1}{2}$ -1 in. l., the apex mucronate, cut down below to the *rachis* into lanceolate or ovate-mucronate lobes; *texture* coriaceous; both *surfaces* naked; *rachis* slender, fibrillose; *veins* immersed; *sori* principally in two rows near the midrib.—*A. stimulans*, Kze. *Hk. Sp.* 4. p. 12. *t.* 214.

Hab. N. India, ascending to 9,000 ft.—Quite doubtfully distinct from some of the forms of *auriculatum* and *aculeatum*.

15. *A. (Polyst.) Thomsoni*, Hk.; *st.* tufted, 2-4 in. l., slender, straw-coloured, fibrillose; *fr.* 6-8 in. l.,  $\frac{3}{4}$ -1 in. br., lanceolate-acuminate, narrowed gradually below, pinnate throughout; *pinnæ*  $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. br., ovate-deltoid, unequal-sided, the lower side the smallest and obliquely truncate at the base, the edge pinnatifid halfway down or more, the lobes with sharp mucronate teeth; *texture* subcoriaceous; *rachis* naked or fibrillose; *veins* pinnate in the lower lobes; *sori* mostly one to each lobe.—*Hk. Sp.* 4. p. 7. *2nd Cent. t.* 25.

Hab. Himalayas, 7-13,000 ft.

16. *A. (Polyst.) viviparum*, Fée; *st.* tufted, 4-6 in. l., with large lanceolate scales at the base, the lower ones nearly black in the centre; *fr.* 12-18 in. l., 4-6 in. br.; *pinnæ* numerous, nearly lanceolate, the central ones 2 in. l.,  $\frac{1}{2}$ - $\frac{3}{8}$  in. br., the point mucronate, sometimes gemmiparous, the edge more or less deeply lobed, in the lower part sometimes quite down to the *rachis*, the upper side auricled, the lower obliquely truncate at the base; *texture* very coriaceous; *sori* in two or four rows.—*Hk. Sp.* 4. p. 15.

Hab. West Indies.—*P. heterolepis*, Fée, is a form with long narrow *pinnæ*, the pinules of the lower half distinct, the lowest slightly stalked. This may be the *A. trapezoides* of Swartz, with which Moore joins it.

17. *A. (Polyst.) tridens*, Hk.; *st.* tufted, 2-4 in. l., wiry, clothed with blackish lanceolate scales below; *fr.* 6-9 in. l.,  $1-1\frac{1}{4}$  in. br.; *pinnæ* numerous, close,  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., deeply tripartite, all the three lobes linear-lanceolate,

mucronate, the central one the largest, and all sometimes a little toothed, the base cuneate, nearly equal on both sides, the lower ones distinctly stalked; texture very coriaceous; veins obscure; sori in two close rows.—*Hk. Sp. 4. p. 15. t. 215.*

Hab. Jamaica; gathered by Purdie and Wilson.—This and the preceding are both united by Grisebach with *triangulum*.

\*\*\* Lower pinnæ once pinnate. Sp. 18–29.

18. A. (Polyst.) *aculeatum*, Sw.; st. tufted, 6-12 in. l., more or less clothed with ovate-lanceolate and fibrillose pale brown-scales; fr. 1-2 ft. l., 8-12 in. br., ovate-lanceolate; lower pinnæ close, lanceolate, 4-6 in. l.,  $\frac{1}{2}$ – $\frac{3}{4}$  in. br.; pinnl. ovate-rhomboidal, unequal-sided, auricled on the upper side at the base; teeth aristate; texture subcoriaceous; rachis straw-coloured, more or less scaly; under surface slightly fibrillose; sori principally in two rows nearer the midrib than the edge.— $\alpha$ , *A. lobatum*, Sw.; texture coriaceous; pinnl. confluent at the base.— $\beta$ , *A. aculeatum*, Sw.; texture less rigid; pinnl. sessile, the lower ones free.— $\gamma$ , *A. angulare*, Willd.; texture less rigid, lower pinnl. stalked, sometimes deeply pinnatifid.—*Hk. Sp. 4. p. 18.*

Hab. Throughout the world; rare in the Arctic regions and Eastern N. America.—*A. squarrosum*, Don (*rufo-barbatum*, Wall.) has the rachis densely clothed with reddish-brown fibrillose scales; *A. proliferum*, Br., is a proliferous Australian form; *A. vestitum*, Sw., has the rachis densely clothed to the point both with reddish-brown fibrillose and large lanceolate dark-brown scales; *A. biaristatum*, Blume, has the frond narrowed suddenly upwards, and large rhomboidal pinnules, aristate principally at the point and auricle; the Cape *A. luctuosum*, Kunze, has the scales of the rachis fibrillose and nearly black; *A. Tsus-Simense*, Hk., is probably a slender form; and *A. ordinatum* and *Moritzianum*, Kunze, and *Polyp. muricatum*, L., are luxuriant forms from S. America. We have non indusiate forms from New Zealand (*Polyp. sylvaticum*, Colenso), Britain (var. *plumosum*, Moore); and there is a wide range of forms in S. America included under *Polyp. rigidum* (Sp. Fil. 4. p. 246; Ic. Fil. t. 163), which correspond to the various forms of this species, differing only by the want of an involucre.

19. A. (Polyst.) *pungens*, Kaulf.; rhizome stout, wide-creeping; st. scattered, 1 ft. l., stramineous, scaly only below; fr. 2-3 ft. l., 9-12 in. br.; lower pinnæ 6-12 in. l., 1-2 in. br.; pinnl. ovate-rhomboidal, unequal-sided, often deeply pinnatifid, the teeth awned; texture subcoriaceous; both surfaces naked; sori principally in two rows nearer the midrib than the edge.—*Schlecht. Adumb. p. 21. t. 10.*

Hab. Cape Colony and Natal.—Best distinguished from *aculeatum* by its creeping rhizome.

20. A. (Polyst.) *mohrioides*, Bory; st. tufted, 2-6 in. l., stout, more or less densely clothed with lanceolate dark-brown scales; fr. 6-12 in. l., 2-3 in. br., with numerous dense, often imbricated, lanceolate pinnæ, which are cut down below into slightly-toothed oblong-rhomboidal pinnl.; teeth blunt or mucronate; texture coriaceous; both surfaces naked; rachis stout, compressed, scaly; veins close, immersed; sori copious.—*Hk. Sp. 4. p. 26.*

Hab. Patagonia and the Cordilleras of Chili.—Like a stout reduced form of *lobatum*; but teeth in the typical specimens not at all spinulose; and a specimen from Bourbon quite agrees with the Patagonian plant.

21. A. (Polyst.) *obtusum*, Mett.; st. tufted, 4-6 in. l., densely clothed with large, ovate-acuminate, bright-brown scales; fr. 1 ft. or more l., 4-6 in. br., lanceolate, with numerous distant linear-lanceolate pinnæ, the lower ones 3-4 in. l.,  $\frac{1}{2}$  in. br.; pinnl. distinct, oblong-rhomboidal, the obscure teeth blunt or



mucronate; *texture* subcoriaceous; *surfaces* naked; *rachis* densely fibrillose; *sori* in two rows midway between edge and midrib.—*Hk. Sp. 4. p. 24. t. 221.*

Hab. Luzon, *Cuming, 234, Lobb.*—Probably should be joined to *aculeatum*.

22. *A. (Polyst.) californicum*, Eaton; *st.* 4-6 in. l., straw-coloured, slightly scaly; *fr.* 12-15 in. l., 4 in. br., with numerous close-placed lanceolate *pinnae*, the largest 2 in. l.,  $\frac{1}{2}$  in. br., the upper part with a broad, entire centre, the lower cut down nearly or quite to the rachis; *pinnl.* ovate-deltoid, unequal-sided, the teeth very mucronate; *texture* coriaceous; *rachis* clothed throughout with small pale-brown scales; under surface fibrillose, especially on the midrib; *sori* almost confined to the outer half of the *pinnae*.—*Proc. Am. Ac. vol. 6. p. 555.*

Hab. California, *Hillebrand.*—Very near *A. lobatum*.

23. *A. (Polyst.) Richardi*, Hk.; *st.* tufted, 6-12 in. l., stout, erect, scaly throughout; *fr.* 9-18 in. l., 6-9 in. br., ovate-deltoid, with numerous close-placed lanceolate *pinnae* 3-6 in. l., 1-1 $\frac{1}{2}$  in. br., cut down below into distinct lanceolate sharply-toothed deeply-lobed *pinnl.*; *texture* coriaceous; *rachis* slightly scaly; *both surfaces* nearly naked; *veins* immersed; *sori* in two rows midway between the midrib and edge.—*Hk. Sp. 4. p. 23. t. 222.*

Hab. New Zealand and Fiji.—Differs from *aculeatum* by its more rigid texture, shorter teeth, and lower *pinnae* not reduced.

24. *A. (Polyst.) oculatum*, Hk.; *st.* tufted, 1 ft. l., firm, straw-coloured, clothed throughout with dark-brown lanceolate scales; *fr.* 1 ft. or more l., 4-6 in. br., ovate-deltoid, with numerous *pinnae* on each side, the lower ones lanceolate-deltoid, 3-4 in. l., 1 $\frac{1}{4}$ -1 $\frac{1}{2}$  in. br., with lanceolate *pinnl.* cut down nearly to the rachis into oblong-rhomboidal *segm.*; *texture* coriaceous; *rachis* scaly throughout; lower surface furfuraceous; *veins* immersed; *sori* in two rows near the midrib.—*Hk. Sp. 4. p. 24. t. 223.*

Hab. New Zealand.—Very near the last, but the under surface downy, and segments shorter and blunter. Species 19-24 are all very near to 18.

25. *A. (Polyst.) cystostegia*, Hk.; *st.* tufted, 2-4 in. l., brown, shining, clothed with large lanceolate pale-brown scales; *fr.* 6-9 in. l., 1 $\frac{1}{2}$ -2 in. br., oblong-lanceolate; central *pinnae* close, ovate-deltoid, the lower ones distant and reduced; lower *pinnl.* oblong-lanceolate, deeply lobed, the teeth blunt; *texture* subcoriaceous; *colour* bright-green; *surfaces* naked; *rachis* densely clothed with linear pale-brown scales; *sori* in two rows in the lower *pinnl.*; *invol.* large, very convex.—*Hk. Sp. 4. p. 26. t. 227.*

Hab. Mountains of N. Zealand.—A well-marked plant, scarcely more than herbaceous in texture.

26. *A. (Polyst.) Prescottianum*, Hk.; *st.* tufted, 1-4 in. l., clothed with large lanceolate pale-brown scales; *fr.* 12-18 in. l., 2-3 in. br., narrowly ovate-lanceolate, with numerous spreading *pinnae*, 1-1 $\frac{1}{2}$  in. l.,  $\frac{1}{2}$ - $\frac{3}{8}$  in. br., cut down to the rachis into several oblong-rhomboidal *pinnl.* with aristate teeth; *texture* subcoriaceous; *rachis* weak, stramineous, densely scaly throughout; *veins* immersed; *sori* filling up nearly the whole breadth between edge and midrib.—*Hk. Sp. 4. p. 22. t. 223.*

Hab. N. India, ascending to 12,000 ft.—Distinguishable from the other Himalayan forms by its long narrow finely-cut flaccid frond.

27. *A. (Polyst.) anomalum*, Hk. & Arn.; *st.* tufted, 1-2 ft. l., stout, erect,

densely clothed, especially below, with large lanceolate pale-brown scales; *fr.* 2-3 ft. l., 1 ft. or more br.; lower *pinnæ* 6-9 in. l., 2-3 in. br.; *pinnl.* lanceolate, cut down in the lower part into oblong *segm.*; *teeth* blunt or slightly mucronate; *texture* subcoriaceous; *rachis* more or less scaly; both *surfaces* naked; *veins* obscure; *sori* placed near the sinuses of the *pinnl.*—*Hk. Sp. 4. p. 27. Kew Gard. Misc. 8. t. 11.*

*Hab.* Ceylon.—A very curious plant, perhaps an abnormal form of 18. The *sori* are often upon the upper surface, and sometimes quite destitute of involucre.

28. A. (Polyst.) *amabile*, Blume; *st.* scattered, 6-12 in. l., slender, polished, slightly scaly below; *fr.* 1 ft. or more l., 6-9 in. br., with a lanceolate terminal *pinna* and 3-6 lateral ones on each side, which are 6-8 in. l., 1-1½ in. br., the lowest sometimes slightly compound at the base; *segm.* subrhomboidal, with at least half the lower side cut away, ½-¾ in. l., ¼-⅜ in. br., the upper side and outer part of the lower lobed and sharply spinuloso-serrated; *texture* subcoriaceous; *rachis* and both *surfaces* naked; lower *veinlets* in groups of 3-5; *sori* submarginal.—*Hk. Sp. 4. p. 25. t. 225.*

*Hab.* Nepaul, Ceylon, Malaccas, Formosa, Japan.—This is nearest the simpler forms of *aristatum*, but has a long terminal *pinna*, with subuniform large rhomboidal segments.

29. A. (Polyst.) *tripteron*, Kunze; *st.* 6-9 in. l., densely clothed at the base with large ovate dark-brown scales; *fr.* 12-18 in. l., with a large terminal and two small spreading lateral *pinnæ* at the base of it, the former 2½-3 in. br., with very numerous spreading *pinnl.* on each side, 1½ in. l., ⅜-½ in. br., very unequal-sided, the point acute, the edge deeply inciso-pinnatifid, the lower lobes again toothed, the upper side abruptly narrowed and the lower obliquely truncate at the base; *lat. pinnæ* 3-5 in. l., 1½-2 in. br., with numerous similar *pinnl.*; *texture* herbaceous; *rachis* nearly naked, stramineous; *sori* principally in two rows midway between midrib and edge.—*Hk. Sp. 4. p. 15. 2nd Cent. t. 56.*

*Hab.* Japan and Tsus-Sima.—A very distinct plant.

\*\*\*\* *Lower pinnæ more than once pinnate. Sp. 30-41.*

30. A. (Polyst.) *laserpitiifolium*, Mett.; *st.* 4 in. l., stramineous, scaly at the base; *fr.* 12-18 in. l., 6-9 in. br., ovate-deltoid, tripinnate; lower *pinnæ* the largest, with *pinnl.* on the lower side prolonged, lanceolate, imbricated with small, distinct, bluntly, not deeply lobed *segm.*; *texture* subcoriaceous; *colour* light-green; both *sides* and *rachis* glabrous; *sori* in two rows occupying nearly the whole space between the edge and midrib.—*Mett. Fil. Ind. p. 227. t. 6. f. 2.*

*Hab.* Japan.—Differs from *A. amabile* by being more compound, with smaller, cuneate, oblong, less-toothed segments and larger *sori*.

31. A. (Polyst.) *varium*, Sw.; *rhizome* subrepent; *st.* 6-12 in. l., densely fibrillose below; *fr.* 12-18 in. l., 9-12 in. br., lanceolate-deltoid; lower *pinnæ* much the largest, subdeltoid, unequal-sided, 4-6 in. l., 3-4 in. br.; *pinnl.* lanceolate, imbricated, the lowest one on the under side much larger than the others; *segm.* oblong, blunt, faintly toothed, the teeth not awned; *texture* subcoriaceous; both *surfaces* naked; *rachis* slightly fibrillose; *sori* principally in two rows near the midrib; *invol.* peltate or reniform.—*Hk. Sp. 4. p. 30. t. 226. Lastrea, Hk. olim.*

*Hab.* Japan, southward to Hong-Kong.—Habit intermediate between that of a *Lastrea* and typical *Polystichum*.

32. A. (Polyst.) *capense*, Willd.; *st.* scattered, 1-2 ft. l., firm, erect, greyish,



densely scaly below; *fr.* 1-3 ft. l., 12-18 in. br., subdeltoid; lowest *pinnæ* the largest, 6-12 in. l., 3-4 in. br.; *pinnl.* and *segm.* lanceolate, the latter bluntly lobed, the teeth not mucronate; *texture* very coriaceous; *rachis* strong, polished; both *surfaces* naked; *veins* immersed, pinnate; *sori* 1 lin. br., in two rows filling nearly the space between midrib and edge.—Polyp. *L.* A. coriaceum, *Sw. Hk. Sp.* 4. p. 32.

Hab. America, from Cuba to Patagonia; Polynesian Islands, New Zealand, and Australia; Cape Colony, Natal, Mascaren Isles.

33. A. (Polyst.) *flexum*, Kunze; *rhizome* stout, wide-creeping; *st.* scattered, 1 ft. l., deciduously scaly; *fr.* 2-3 ft. l., 9-12 in. br.; lower *pinnæ* lanceolate-deltoid, 6-9 in. l., 4-6 in. br.; *pinnl.* lanceolate-deltoid, cut down to the rachis below into oblong bluntly-lobed *segm.*  $\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br.; *texture* coriaceous; *teeth* not awned; *veins* beneath prominent; under *surface* and *rachises* scaly; *sori* large, in two rows, occupying nearly the space between edge and midrib.—A. Berteroanum, *Colla. Hk. Sp.* 4. p. 33. t. 229.

Hab. Juan Fernandez.—Closely allied to the preceding, from which it is distinguished by its furfuraceous rachis and under surface.

34. A. (Polyst.) *Seemanni*, Hk.,; *st.* stout, erect, the upper part naked; *fr.* 18-24 in. l., 1 ft. br.; *pinnæ* lanceolate, 6-8 in. l., 2-2 $\frac{1}{2}$  in. br.; *pinnl.* distant, sublanceolate, unequal-sided, 1-1 $\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., bluntly lobed, the lower lobes reaching down nearly to the rachis; *texture* coriaceous; *rachises* and both *surfaces* nearly naked; *midrib* of the lobes prominent; *sori* 4-6 in each.—*Hk. Sp.* 4. p. 34. t. 230.

Hab. Panama, *Seemann.*—Very near the two preceding.

35. A. (Polyst.) *ascendens*, Hew.; *rhizome* wide-climbing; *st.* 1 ft. l., straw-coloured, polished, nearly naked; *fr.* 2-3 ft. l., 1 ft. br., dimorphous; lower *pinnæ* of barren *fr.* subdeltoid, 6-9 in. l., 3-4 in. br.; *pinnl.* lanceolate-deltoid; *segm.* stalked, ovate-rhomboidal, cut down to the rachis in the lower part and lobes acutely, not deeply toothed; *texture* coriaceous; *rachis* and both *surfaces* glossy, naked; *fertile segm.* distant,  $\frac{1}{2}$  in. l.,  $\frac{1}{8}$  in. br., the edge undulated; *sori* in two rows, which are close to the midrib and fill up the lobes.—*Hk. Sp.* 4. p. 32. t. 224.

Hab. Jamaica.—In habit this differs entirely from the other species, and coincides with *Dicksonia conifolia*, of which Dr. Grisebach supposes it to be a dimorphic form.

36. A. (Polyst.) *frondosum*, Lowe; *st.* scattered, 1-2 ft. l., strong, straw-coloured or pale-brown, polished, densely scaly below; *fr.* 18-24 in. l., 1 ft. or more br., subdeltoid, the lower *pinnæ* much the largest, 6-12 in. l., 3-4 in. br., long-stalked; *pinnl.* lanceolate, erecto-patent; *segm.* very unequal-sided, pinnatifid, with rounded mucronate lobes, obliquely truncate at the base below; *texture* subcoriaceous; *rachis* glossy, stramineous; both *surfaces* naked; lateral *veins* of lobes often forked; *sori* large, copious, principally in two rows near the midrib.—*Hk. Sp.* 4. p. 31.

Hab. Madeira, Zambesi-land, Natal.

37. A. (Polyst.) *aristatum*, Sw.; *rhizome* creeping; *st.* scattered, 12-18 in. l., clothed, especially below, with linear or fibrillose scales; *fr.* 1-2 ft. l., 9-12 in. br., ovate-deltoid, tri- or quadripinnatifid; lower *pinnæ* largest, 6-9 in. l., 3-4 in. br., subdeltoid; lowest *pinnl.* much the largest, lanceolate-deltoid, 2-4 in. l., with subdeltoid lower *segm.*; *teeth* copious, aristate; *texture* subcoriaceous, glossy; both *surfaces* naked, rachis nearly so; *sori* small, principally in two rows near the midrib; *invol.* sometimes reniform.—*B.* A. *conii-*

*folium*, Wall. ; more finely divided ; *segms.* copiously toothed, with lower lobes distinct.— $\gamma$ , *A. Hamiltonii*, Spr. ; *texture* more coriaceous ; lower *pinnl.* 3-4 in. l., with large ovate-deltoid slightly lobed segments.—*Hk. Sp.* 4. p. 27.

Hab. Japan and Himalayas to Ceylon, Norfolk Island, Fiji, Samoa, N. S. Wales, and Natal.—*A. Cornu-Cervi*, Don, is a deformed state of  $\gamma$ , which differs from *capense* principally by its aristate teeth, whilst the other varieties more resemble *amabile* and *frondosum*. Dr. Thwaites assigns to  $\beta$  an erect caudex, and regards it as a good species. *Arachniodes aspidioides*, Bl., is this, with the involucre fallen away.

38. *A. (Polyst.) melanostictum*, Kze. ; *st.* scaly below, 6-12 in. l., greyish ; *fr.* 18-24 in. l., 1 ft. br. ; lower *pinnæ* 6-9 in. l., 2-3 in. br. ; *pinnl.* close, lanceolate,  $1\frac{1}{2}$  in. l.,  $\frac{1}{2}$  in. br., regularly cut down to the rachis into close, linear-oblong nearly entire slightly falcate *segm.* ; *texture* herbaceous ; *colour* dark-green ; both *surfaces* and *rachis* nearly naked ; *sori* 6-8 to a *segm.*, placed in two rows filling up nearly the whole space between midrib and edge ; *invol.* peltate, black in the centre.—*Hk. Sp.* 4. p. 34. t. 233. B.

Hab. Mexico.

39. *A. (Polyst.) melanochlams*, Fée ; *st.* tufted, 6-12 in. l., erect, densely clothed, especially below, with dark-brown fibrillose scales ; *fr.* 18-24 in. l., 9-12 in. br. ; *pinnæ* subdistant, erecto-patent, lanceolate, the lower ones 4-6 in. l.,  $1\frac{1}{2}$ -2 in. br. ; *pinnl.* distant,  $\frac{3}{4}$ -1 in. l.,  $\frac{1}{4}$  in. br., cut down to the rachis into close, oblong-falcate, entire lobes ; *texture* herbaceous ; *colour* dark-green ; both *surfaces* naked ; *rachises* fibrillose ; *sori* at the base of the lobes, principally in the lower ones ; *invol.* peltate, black in the centre, the edge ciliated.—*Hk. Sp.* 4. p. 35. t. 233. A. *Lastrea*, Moore.

Hab. Cuba, *Linden*, 1865, *Wright*, 830.—This and the preceding have the habit of *Lastrea*, but peltate involucre.

40. *A. (Polyst.) multifidum*, Mett. ; *st.* scattered, 6-12 in. l., densely clothed with large, ovate, nearly black scales ; *fr.* 18-24 in. l., 6-9 in. br., ovate-lanceolate ; *pinnæ* close, spreading, the lower ones deflexed, 3-4 in. l.,  $\frac{3}{4}$ -1 in. br. ; *pinnl.* subdeltoid, close, unequal-sided, with ovate or spatulate *segm.*, the lower ones deeply pinnatifid, teeth not awned ; *texture* subcoriaceous ; *rachises* densely fibrillose ; *sori* small, scattered.—*Hk. Sp.* 4. p. 35.

Hab. Chili, *Lechler*, 3060.

41. *A. (Polyst.) Sikkimense*, Baker ; *st.* 12-18 in. l., stout, striated, with dark-brown ovate scales throughout ; *fr.* 2-3 ft. l., 12-15 in. br., subdeltoid ; *pinnæ* close, lanceolate, spreading, the lowest 6-8 in. l., 2 in. br. ; *pinnl.* close, lanceolate, unequal-sided, cut down nearly to the rachis into oblong deeply pinnatifid lobes with mucronate teeth ; *texture* herbaceous ; *rachis* slightly scaly ; both *sides* naked ; *sori* usually one on the base of each ult. lobe.—*Polyst. Sikkimense*, *Beddome*, *F. Brit. Ind.* t. 127. *Neph. Thomsoni*, *Hk. MSS.*

Hab. Mon-Lepcha, Nepaul, 10-11,000 ft., *Dr. Thomson.*

42. *A. (Polyst.) faeniculaceum*, Hk. ; *rhizome* creeping ; *st.* scattered, 6-12 in. l., densely clothed below with lanceolate reddish-brown scales ; *fr.* 1-2 ft. l., 9-12 in. br., lanceolate-deltoid, 4-5-pinnatifid ; lower *pinnæ* 6-8 in. l., 3-4 in. br. ; *pinnl.* subdeltoid, 2-3 in. l. ; *segm.* close, cut down to the rachis, their lower divisions sometimes again pinnatifid ; *ult. divisions* linear, 1 lin. l., awned ; *texture* subcoriaceous ; *surfaces* glossy ; *rachis* nearly naked ; *sori* solitary.—*Hk. Sp.* 4. p. 36. t. 237.

Hab. Sikkim, 7-10,000 ft., *Hk. fil.* and *Thomson*, 274.



§§ *Cyrtomium*, Presl. *Veins sometimes, but not invariably, uniting slightly towards the edge.* Sp. 43-46.

43. A. (Cyrt.) *abbreviatum*, Schrad.; *st.* scattered, 1 ft. or more l., glossy, smooth; *fr.* 1-2 ft. l., 6-9 in. br., simply pinnate; *pinnæ* 4-6 in. l.,  $\frac{3}{4}$  in. br., linear-lanceolate acuminate, slightly stalked, the edge bluntly lobed; *texture* subcoriaceous; *rachis* and both *surfaces* nearly naked; *sori* in two irregular rows between the primary veins.—*Hk. Sp. 4. p. 38. t. 234.*

Hab. W. Indies to S. Brazil.—A. *Guianense*, Klotzsch, is a form with free venation.

44. A. (Cyrt.) *caducum*, Wall.; *st.* tufted, 1 ft. l., firm, erect, stramineous, scaly below; *fr.* 1-2 ft. l., 6-9 in. br., simply pinnate, with numerous stalked subdistant lanceolate *pinnæ* on each side, 4-6 in. l., 1-1 $\frac{1}{2}$  in. br., the apex acuminate, the edge subentire, or more or less deeply lobed, sometimes down to the rachis below; *texture* coriaceous; *midrib* below often fibrillose; *veins* in pinnate groups which are free or anastomose slightly towards the edge; *sori* large, in one or two rows on each side.—*Hk. Sp. 4. p. 39. Hk. & Gr. Ic. t. 171.*

Hab. Himalayas, ascending to 7,000 ft.

45. A. (Cyrt.) *juglandifolium*, Kze.; *st.* tufted, 1 ft. or more l., clothed below with large ovate scales; *fr.* 2-3 ft. l., 9-12 in. br., simply pinnate; *pinnæ* in 2 to 12 pairs, linear-lanceolate, the lower ones stalked, 4-6 in. l.,  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. br., the apex acuminate, the edge entire or slightly toothed; *texture* coriaceous; both *surfaces* naked; *veins* close, pinnated, the lowest anterior branch free, the groups free or anastomosing towards the edge; *sori* copious, scattered.—*Hk. Sp. 4. p. 38.*

Hab. Mexico to Venezuela.—This corresponds to the genera *Amblia* and *Phanerophlebia*, Presl, the latter founded on a plant from which the involucre had fallen.

46. A. (Cyrt.) *falcatum*, Sw.; *st.* tufted, 6-12 in. l., densely clothed below with large dark scales; *fr.* 1-2 ft. l., 6-9 in. br., simply pinnate; *pinnæ* numerous, the lower ones stalked, ovate-acuminate, falcate, 4-6 in. l., 1-2 in. br., the edge entire or slightly undulated, the upper side narrowed suddenly, sometimes auricled, the lower rounded or obliquely truncate at the base; *texture* coriaceous; both *surfaces* naked, the upper one glossy; *sori* small, copious, scattered.—*Hk. Sp. 4. p. 40. Fil. Ex. t. 92.*— $\beta$ , *A. caryotideum*, Wall.; *pinnæ* sometimes larger, sharply toothed, slightly lobed, sometimes auricled on both sides at the base; upper *surface* opaque.—*Hk. Sp. 4. l. c. G. F. t. 13.*

Hab. Japan, China, Himalayas (up to 8,000 ft.), Neilgherries, Sandwich Isles, Kaffraria, Natal.—It is impossible to separate our two varieties satisfactorily. The Japanese *C. Fortunei*, J. Sm., is like *a*, but the *pinnæ* are narrower and opaque.

§§§ *Cyclodium*, Presl. *Veins pinnated, the opposite veinlets of contiguous groups joining.* Sp. 47-49.

47. A. (Cyclo.) *meniscioides*, Willd.; *st.* 1-2 ft. l., scaly below; *fr.* 2-3 ft. l., 1 ft. or more br., simply pinnated; *barren pinnæ* sessile, 6-9 in. l., 1 $\frac{1}{2}$ -2 in. br., oblong-acuminate, nearly entire; *texture* coriaceous, both *surfaces* naked; *fertile pinnæ* much smaller; *sori* in two close rows between the primary veins.—*Hk. Sp. 4. p. 36. Hk. & Gr. Ic. 121.*

Hab. West Indies to Brazil and Peru.

48. A. (Cyclo.) *Hookeri*, Baker; *st.* 1 ft. or more l., naked, erect; *fr.* 2-3 ft. l., 1 ft. br.; *pinnæ* 6-8 in. l., 1 in. br., cut down to a broadly-winged rachis into nearly, close, spreading, entire, linear-oblong lobes  $\frac{1}{2}$  in. br.; *texture* herbaceous;

*rachis* naked, substramineous; *veinlets* slightly hairy, about 10 on a side, the lowest pairs uniting; *sori* nearer the edge than the midrib; *invol.* orbicular, membranous, reddish in the centre, scariose in the outer half.—*A. nephrodioides*, *Hk. Sp. 4. p. 42. t. 235. (non Klotzsch)*.

Hab. Malay Archipelago, *Seemann*.—This has entirely the habit and texture of an ordinary *Eunephrodium*, but the involucre is aspidioid.

§§§§ *Euaspidium*. *Veins anastomosing copiously*. Sp. 49–55. *A large number of species placed here in Sp. Fil. which have the involucre of Nephrodium are transferred to that genus. Aspidium, Schott.*

49. *A. plantagineum*, Griseb.; *st.* subtufted, 3-12 in. l., often scaly throughout; *fr.* 6-12 in. l., 2-4 in. br., oblong, narrowed rather suddenly at both ends, entire or slightly sinuated; *texture* papyraceo-herbaceous; both *sides* naked; *midrib* below sometimes rather scaly; *primary veins* distinct nearly to the edge, connected by irregular fine areolæ with free included veinlets; *sori* in two rows between each primary vein; *invol.* often abortive.—*Hk. Sp. 4. p. 43. Polypodium, Jacq. Sw. A. sinuatum, Moore.*

Hab. West Indies, southward to Brazil and Peru.—This belongs to the genus *Bathmium* of Fée, who makes three species, and *Dryomenis* and *Melanopteris* of J. Smith. Till lately it has always been placed in *Polypodiææ*.

50. *A. platanifolium*, Mett.; *st.* 6-12 in. l., naked, glossy, ebeneous; *fr.* 6-9 in. each way, never compound, cordate, palmately 3- or 5-lobed, terminal division subdeltoid, acuminate, lateral ones similar but smaller, basal ones sometimes blunt; *texture* papyraceo-herbaceous; *midrib* glossy like the stem; *principal veins* distinct to the edge, connected by copious small areolæ with free included veinlets; *sori* small, scattered, very abundant; *invol.* often absent.—*A. angulatum, Hk. Sp. 4. p. 44. (not J. Sm.)*

Hab. Malayan Islands.

51. *A. angulatum*, J. Sm. (not Hk.); *st.* 1-2 ft. l., glossy, ebeneous, scaly below; *fr.* 1-2 ft. l., sometimes simple, usually with a large cordate-oblong entire terminal pinna and 1-2 lateral ones on each side, the lowest 6-12 in. l., 2-4 in. br., often forked at the base; *texture* papyraceo-herbaceous; *midrib* glossy, ebeneous; *primary veins* distinct to the edge; *areolæ* fine, copious, with free included veinlets; *sori* small, scattered, very abundant; *invol.* minute, fugacious.—*Polypodium, Willd.*

Hab. Malayan Islands.

52. *A. trifoliatum*, Swz.; *st.* tufted, 1 ft. or more l., brownish, scaly only at the base; *fr.* 12-18 in. l., 6-12 in. br., with a large ovate-acuminate terminal pinna narrowed or forked at the base, and 1 or 2 lateral ones on each side, the lowest mostly forked; *texture* papyraceo-herbaceous; *primary veins* distinct to the edge; *areolæ* fine, copious, with free included veinlets; *sori* in rows near the main veins; *invol.* 1 lin. br., orbicular, peltate.—*Hk. Sp. 4. p. 45.*

Hab. Tropical America, from Cuba and Mexico to Brazil and Peru.—A variable plant. *A. heracleifolium*, Willd., is a form with pinnæ pinnatifid on both sides at the base, and *A. fimbriatum*, Willd. (*A. Plumieri*, Presl), a large form, with more copious and more scattered sori, and a less distinctly peltate involucre.

53. *A. repandum*, Willd.; *st.* 1-2 ft. l., naked, greyish-brown; *fr.* 2 ft. or more l., 12-18 in. br., the apex deeply pinnatifid, with linear-oblong, slightly sinuated lobes; below this 4-8 pinnæ on each side, 6-8 in. l., 1¼-1½ in. br., acuminate at the point, narrowed below, the edge bluntly sinuated, the lowest stalked and forked; *texture* subcoriaceous; *main veins* distinct to the edge; *areolæ* copious,



with free veinlets; *sori* in two distinct rows near the main vein; *invol.* orbicular, peltate,  $\frac{1}{2}$  lin. br.—*Mett. Aspid.* 226.

Hab. Philippines, *Cuming*, 340.—In habit this is near *Sagenia pachyphylla* and *polymorpha*, but it differs from both by its distinctly peltate involucre.

54. *A. calcareum*, Presl; *st.* tufted, naked, 4-6 in. l.; *fr.* 1 ft. or more l., 6-9 in. br., with 4-6 stalked distant *pinnæ* on each side below the pinnatifid apex, the lowest deltoid, 6 in. l., 3-4 in. br., cut down to the rachis below into stalked lanceolate-acuminate deeply and blunt-lobed *pinnl.*; *texture* subcoriaceous; *areolæ* not very abundant and mainly costular; *invol.* orbicular.—*Hk. Sp.* 4. p. 46.

Hab. Philippines, *Cuming*, 310.

55. *A. membranaceum*, Hk.; *st.* tufted, about 1 ft. l., nearly naked, with a few spreading linear scales below; *fr.*  $1\frac{1}{2}$ -2 ft. l., 1 ft. br.; lower *pinnæ* much the largest, subdeltoid, 6-8 in. l., 3-4 in. br.; *pinnl.* on lowest side much larger than the others, with lanceolate-pinnatifid segm. with small oblong, sinuated lobes; *texture* thinly herbaceous; *colour* pale-green; *veins* anastomosing principally in costal arches; *sori* copious, principally marginal in the lobes.—*Hk. Sp.* 5. p. 105. *A. giganteum*, var. *minor*, *Hk. Sp.* 4. p. 50.

Hab. Ceylon, Java, Philippines, W. China, Formosa.—Our description is taken from living specimens sent by Dr. Thwaites. The involucre is truly peltate.

#### GEN. 44. NEPHRODIUM, *Rich.*

*Sori* subglobose, dorsal or terminal on the veinlets. *Invol.* cordato-reniform, attached by the sinus. *A cosmopolitan genus, the species of which vary widely in size, texture, cutting, and venation.*† TAB. V. f. 44.

§ *Lastrea*, Presl. *Veins all free.* Sp. 1-153.

\* *Fronds not cut down to the main rachis.* Sp. 1-3.

1. *N. decursivo-pinnatum*, Baker; *st.* tufted, 3-4 in. l., with linear scales throughout; *fr.* 1 ft. or more l., 3-4 in. br.; *pinnæ* linear, 1-2 in. l.,  $\frac{1}{4}$  in. br., the edge more or less deeply pinnatifid, the bases connected by a broad lobed wing, the lower ones gradually reduced and sometimes distinct; *texture* herbaceous; *rachis* scaly; *under side* slightly hairy; lower *veinlets* subpinnate; *sori* copious, scattered; *invol.* minute, fugacious.—Polyp. *Van Hall*, *Hk. Sp.* 4. p. 231. *2nd Cent. t.* 49. *Aspid. Kze.* *L. decurrens*, *J. Sm.*

Hab. Japan, China, Formosa.

2. *N. (Last.) pedatum*, Hk.; *st.* tufted, 4-6 in. l., glossy, ebeneous; *fr.* 3-4 in. each way, cordate-deltoid, deeply pinnatifid; upper *lobes* broad, blunt, subentire, lower deeply lobed on the lower side; *texture* coriaceous; both *sides*

† The character furnished by the shape of the involucre divides the original *Aspidium* into two unequal halves. The two genera thus obtained have a closely similar range of variation in cutting and venation, and it is by no means clear in which of the two several species should be placed. It is perhaps scarcely needful to warn the young student to bear constantly in mind that an *Aspidium* with an abortive or obliterated involucre is not distinguishable from a Desmobyroid *Polypodium*. The number of species which have been originally described as non-indusiate, in which a more or less (often very slightly) developed involucre has been afterwards found to exist, is very considerable, and no doubt more will be added to the list.

naked; *veins* in pinnated groups, casually anastomosing; *sori* large, in rows near the main veins.—*Hk. Sp. 4. p. 84.* *Camptodium, Fee. Pachyderis, J. Sm.*

Hab. West Indies.—Habit of *Sagenia*, with most but not all the *sori* terminal on free veinlets.

3. N. (Last.) *Braunianum*, Hk.; *st.* 1 ft. or more l., naked, ebeneous; *fr.* 12-15 in. l., 9 in. br., subdeltoid, cut down to a rachis with a broad lobed wing into pinnatifid *pinnæ*, of which the lowest pair is much the largest, with the *pinnl.* of the lower side much developed, the lowest 2-3 in. l., again deeply pinnatifid, with toothed oblong lobes  $\frac{1}{4}$  in. br.; *texture* papyraceo-herbaceous; *rachis* and under side pilose on the veins; *veinlets* of the ult. lobes forked; *sori* small, copious, terminal on the veins.—*Hk. Sp. 4. p. 84.*

Hab. Columbia.—This also, like the last, has the general habit of *Sagenia*.

\*\* *Pinnæ* entire or lobed less than one-third of the way down to the midrib. *Sp. 4-13.*

4. N. (Last.) *pusillum*, Baker; *st.* tufted, 4-12 in. l., stramineous, pubescent; *fr.* 3-12 in. l., 1 in. br., linear, proliferous from the axils of the upper *pinnæ*; *pinnæ* numerous,  $\frac{1}{4}$ - $\frac{1}{2}$  in. l.,  $\frac{1}{8}$  in. br., oblong, obtuse, the edge slightly crenate, the base truncate; *texture* subcoriaceous; *rachis* and under surface pubescent; *veins* simple or the lower ones forked; *sori* medial; *invol.* membranous, densely pilose.—*Aspid. Mett. Fil. Nov. Gran. p. 216.*

Hab. New Granada, *Lindig, 92.*

5. N. (Last.) *semihastatum*, Hk.; *st.* tufted, 3-4 in. l., slender, villose; *fr.* 6-8 in. l.,  $1\frac{1}{2}$  in. br., oblong-lanceolate; *pinnæ* close,  $\frac{3}{4}$  in. l.,  $\frac{1}{4}$  in. br., blunt, the edge slightly sinuated, bluntly auricled at the base, the lower ones growing smaller gradually, lowest pair deflexed; *texture* papyraceo-herbaceous; *rachis* and under surface villose; upper *veins* forked, lower slightly pinnated; *sori* small, scattered.—*Hk. Sp. 4. p. 87.*

Hab. Peru, *Poeppig.*

6. N. (Last.) *decepiens*, Hk.; *st.* wiry, substramineous; *fr.* 8-10 in. l., 4-5 in. br., lanceolate-deltoid; *pinnæ* spreading, 2-3 in. l.,  $\frac{3}{8}$  in. br., the edge very slightly and broadly toothed; lower pair stalked, about equalling the next; *texture* subcoriaceous; *rachis* slightly fibrillose; both *surfaces* naked; *veins* pinnated, inconspicuous; *sori* in two rows near the midrib.—*Hk. Sp. 4. p. 86. t. 243.*

Hab. China, *Alexander.*

7. N. (Last.) *cuspidatum*, Baker; *st.* 1 ft. or more l., naked, densely scaly at the base; *fr.* 2-3 ft. l., 8-12 in. br.; *pinnæ* 4-6 in. l.,  $\frac{1}{2}$  in. br., the edge sharply inciso-serrated to depth of  $\frac{1}{2}$ -1 lin.; *texture* papyraceo-herbaceous or subcoriaceous; *rachis* and both sides naked; *veins* in pinnated groups with 3-4 veinlets on a side; *invol.* fugacious.—*Aspid. Mett. Polyp. elongatum, Wall. Hk. Sp. 4. p. 234.*

Hab. N. India, Ceylon.—Specimens recently received show the involucre clearly.

8. N. (Last.) *podophyllum*, Hk.; *st.* tufted, 1 ft. l., naked upwards, scales at the base black and fibrillose; *fr.* 12-18 in. l., 8-12 in. br.; *pinnæ* 4-8 on each side, erecto-patent, 4-6 in. l.,  $\frac{1}{2}$ - $\frac{3}{8}$  in. br., the edge nearly entire or with shallow, broad, blunt lobes; *texture* subcoriaceous; *rachis* and both surfaces naked; *veins* pinnate in the lobes, with 2-4 veinlets on a side, with sometimes a sorus on each distant from the main vein.—*Hk. Sp. 4. p. 87.*



Hab. Chusan and Hong-Kong.—This and the next differ from the rest of the group by having a distinct terminal pinna similar to the lateral ones. In the others the apex of the frond is pinnatifid.

9. N. (Last.) *Sieboldii*, Hk.; *caud.* tufted, with large brown lanceolate scales; *st.* 6-12 in. l., scaly below; *fr.* with an entire or slightly toothed lanceolate-oblong terminal *pinna* 8-12 in. l.,  $1\frac{1}{2}$ -2 in. br., and 2-4 similar ones on each side, the lowest shortly stalked; *texture* coriaceous; *rachis* and both surfaces naked; *veins* in pinnated groups; *sori* large, copious, scattered.—*Hk. Sp.* 4. *p.* 87. *Fil. Ex. t.* 31. *Pycnopteris*, *Moore*.

Hab. Japan.—Pinnæ larger and fewer than in the last, and scales different.

10. N. (Last.) *hirtipes*, Hk.; *st.* tufted, 1 ft. or more l., densely clothed with long, blackish, fibrillose scales; *fr.* 2-3 ft. l., 8-16 in. br.; *pinnæ* 4-8 in. l.,  $\frac{3}{4}$ - $\frac{7}{8}$  in. br., with broad blunt lobes reaching from a quarter to a third down, lower ones not reduced; *texture* herbaceous; *rachises* fibrillose like the stem; both surfaces naked; *veinlets* 4-5 on a side; *sori* medial.—*Hk. Sp.* 4. *p.* 115. *t.* 249. *A. atratum*, *Wall.*

Hab. Himalayas (up to 6,000 ft.) to Ceylon, Malayan Peninsula and Isles.—This considerably resembles *N. Filix-mas* in general habit.

11. N. (Last.) *subbiauratum*, Hk.; *st.* 4-6 in. l., jointed about halfway down, firm, nearly naked; *fr.* 12-15 in. l., 4 in. br.; *pinnæ* close, spreading, the longest 2 in. l.,  $\frac{1}{2}$  in. br., the edge with shallow, blunt lobes, those on both sides at the base larger than the others; *texture* herbaceous; *rachis* and under side pubescent; *veins* pinnate in the lobes, with 3-5 veinlets on a side; *sori* terminal on the veinlets.—*Hk. Sp.* 4. *p.* 85.

Hab. Bourbon.—This comes nearest *N. albopunctatum*, and has similar white cretaceous dots above, and a jointed stem, so that it belongs to *Arthropteris* of J. Smith.

12. N. (Last.) *punctulatum*, Baker; *rhizome* wide-creeping; *st.* 6-9 in. l., dark chesnut-brown, naked; *fr.* 1 ft. or more l., 4 in. br.; *pinnæ* 2-2 $\frac{1}{2}$  in. l.,  $\frac{5}{8}$ - $\frac{3}{4}$  in. br., bluntly lobed about a quarter of the way down in the lower part; *texture* coriaceous; *rachis* and both surfaces naked, the upper marked with white cretaceous dots; *veins* in pinnated groups with 4-5 veinlets on a side; *sori* terminating lateral veinlets; *invol.* distinctly stalked, persistent.

Hab. Cameroon Mountains (4,500 ft.), *G. Mann.*—This has very distinct white dots above, but the stem does not appear to be jointed.

13. N. (Last.) *macrotis*, Hk.; *st.* tufted, 12-18 in. l., slender, pubescent; *fr.* 18-24 in. l., 8-10 in. br.; *pinnæ* 4-5 in. l.,  $\frac{5}{8}$ - $\frac{3}{4}$  in. br., cut about a quarter of the way down into blunt lobes, the apex acuminate, entire, the base with a large auricle ( $\frac{1}{4}$ - $\frac{1}{2}$  in. l.) on the upper side, all falcate, and the lower ones much deflexed; *texture* herbaceous; *rachis* and under side pubescent; *veinlets* 3-4 on each side; *sori* in rows near the main veins.—*Hk. Sp.* 4. *p.* 86. *t.* 242. B.

Hab. E. Peru, *Spruce*, 3979.—In habit this is most like *N. refractum*, but different in colour and clothing. The groups of veins join not unfrequently.

\*\*\* *Pinnæ* cut more than halfway down to the rachis into close, regular, entire, or nearly entire lobes. *Sp.* 14-73.

† *Veinlets* simple. *Sp.* 14-65. *Involucre* in many, but not all the species, thin and fugacious.

A. Group of *N. patens*. Lower *pinnæ* hardly, if at all, reduced. *Sp.* 14-43.

14. N. (Last.) *subobliquatum*, Baker; *st.* 12-18 in. l., firm, erect, naked; *fr.*  $1\frac{1}{2}$ -2 ft. l., 6-10 in. br.; *pinnæ* 3-5 in. l.,  $\frac{3}{4}$ -1 in. br., unequal-sided below, the

inner edge of the upper side parallel with the rachis, of the under side oblique, the margin cut about halfway down or at the base quite to the midrib into close blunt lobes, the lower pinnæ distinctly stalked; *texture* coriaceous; *rachis* and both surfaces naked; *veinlets* 4-6 on a side; *sori* medial; *invol.* firm, naked.—Polyp. *Hk. Sp.* 4. p. 240.

Hab. Guiana and the Amazon Valley.—Specimens recently received from Appun show the involucre clearly. It is not unlikely to be Willdenow's *A. emarginatum*.

15. *N. (Last.) insigne*, Baker; *fr.* 1 ft. l., 9 in. br.; *pinnæ* opposite, subdistant, sessile, 5 in. l., 1½ in. br., cut down two-thirds of the way to the rachis into close, oblong, obtuse lobes, the lower ones deflexed; *texture* thin, both sides naked; *rachis* smooth, stramineous; *veins* 12-16 on a side; *sori* medial; *invol.* minute, slightly hairy.—Aspid. *Mett. Fil. Nov. Gran.* p. 247.

Hab. New Granada, *Triana*.—Approaches *N. brachyodon* in habit.

16. *N. (Last.) gracilescens*, Hk.; *rhizome* wide-creeping; *st.* 6-9 in. l., slender, naked; *fr.* 1 ft. or more l., 6 in. br.; *pinnæ* 2-3 in. l.,  $\frac{3}{8}$ - $\frac{1}{2}$  in. br., cut down within a short distance of the rachis into close, linear-oblong entire lobes  $\frac{1}{8}$  in. br., the lowest pair deflexed; *rachis* and both sides nearly naked; *veinlets* 4-6 on a side; *sori* nearly terminal; *invol.* naked.—*Hk. Sp.* 4. p. 93.— $\beta$ , *N. glanduligerum*, Kze. (sub Aspid.); *rachis* hairy; under *surface* slightly glandular; *invol.* ciliated.

Hab. Java;  $\beta$ , Japan, China, N. India.—Habit of *N. Thelypteris*, but a smaller plant, with veinlets always simple.

17. *N. (Last.) chrysolobum*, Fée; *st.* tufted, 4-6 in. l., slender, villose, scaly below; *fr.* 6-9 in. l., 3-4 in. br.; *pinnæ* 1½-2 in. l.,  $\frac{5}{8}$  in. br., cut down nearly to the rachis into close, blunt, entire lobes  $\frac{1}{8}$  in. br., the lowest pair deflexed and slightly stalked; *texture* herbaceous; *rachis* and under surface slightly villose and glandular; *veinlets* 6-8 on a side, with the *sori* near their apex.—*Mett. Lips.* p. 90.

Hab. Brazil and Columbia.—*A. Schottianum*, Kze., is a form with slightly toothed lobes. Most like *N. falciculatum*, but much smaller and less glandular.

18. *N. (Last.) macrourum*, Baker; *st.* 1 ft. or more l., substramineous, nearly naked; *fr.* 3-4 ft. l., 18-24 in. br.; *pinnæ* 8-12 in. l., 1¼ in. br., cut down nearly to the rachis into subfalcate entire lobes 2 lin. br., with a space between them, the basal lobes enlarged and pinnatifid; *texture* herbaceous; *rachis* and under side finely villose; *veinlets* 10-15 on a side, the *sori* about midway between the edge and midrib.—Aspid. *Kaulf. N. schizotis*, *Hk. Sp.* 4. p. 107.

Hab. Brazil, *Burchell*, 752; E. Peru, *Spruce*, 4030; Caraccas, *Birschell*.—Doubtfully distinct from *N. patens*. The lobes are not so deep, and very falcate, and the lowest lobe on one or both sides is dilated and pinnatifid. Probably this is *A. stipulare*, Willd., but none of our specimens have the dilated lobes nearly so large as in Plumier's t. 23.

19. *N. (Last.) patens*, Desv.; *rhizome* oblique; *st.* 1 ft. or more l., naked or slightly pubescent; *fr.* 2-3 ft. l., 8-12 in. br.; *pinnæ* 4-9 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., cut down about three-quarters of the space to the rachis into linear-oblong subfalcate lobes, the lowest lobes not diminished; *texture* herbaceous; *rachis* and surfaces more or less villose; *veinlets* 6-12 on a side; *sori* nearer the edge than the midrib; *invol.* persistent.—*Hk. Sp.* 4. p. 95.

Hab. Florida and Texas to Rio and Chili; Polynesia, Japan, Zambesi-land, Angola, St. Helena. This has the general habit and soft herbaceous texture of *molle*, and it is not always easy to separate them. *N. patens*, J. Sm., is intermediate between the two, having an erect caudex, with the lowest pair of veins joining. *A. albicaule*, Fée, seems to belong here, and *N. pilosulum* (*Hk. Sp.* 4. p. 102) to be a more hairy form than usual.



*A. Brackenridgii*, Mett., from Polynesia, is said to differ by its reduced lower lobes, and the presence of a small black gland at the base of the midrib of the pinnæ.

20. *N.* (Last.) *attenuatum*, Baker; *st.* 1 ft. or more l., firm, glossy, naked; *fr.* 3-4 ft. l., 2 ft. br.; *pinnæ* 9-12 in. l.,  $\frac{3}{4}$ - $\frac{7}{8}$  in. br., very acuminate at the point, the edge cut three-quarters of the way down into entire, spreading, blunt lobes 1 lin. br., the basal lobes much reduced, lower pinnæ slightly stalked; *texture* subcoriaceous; *rachis* naked; under surface glandular; *veinlets* 12-16 on a side; *sori* in a close row near the midrib.—Lastrea, *J. Sm.* (not *Brack.*)

Hab. Philippines, *Cuming*, 327.—Habit of *Didymochlæna polycarpa*.

21. *N.* (Last.) *abruptum*, Baker; *st.* 1½ ft. l., angular, slightly villose above; *fr.* 2-3 ft. l., 1 ft. or more br.; *pinnæ* 6-8 in. l., 1 in. br., cut down to a broadly-winged rachis into close, acute, falcate, entire lobes  $\frac{1}{5}$  in. br., the basal lobes rather reduced, and the pinnæ on the upper side cut off in a slight curve; *texture* subcoriaceous, rigid; *rachis* and both surfaces nearly naked; *veinlets* prominent, 12-16 on a side, with the sori near the apex.—Aspid. *Kze. Mett.* (non *Blume*).

Hab. Peru.—General habit and texture of *N. invisum*.

22. *N.* (Last.) *invisum*, Baker; *rhizome* stout, wide-creeping, scaly; *st.* 1-2 ft. l., smooth; *fr.* 3-4 ft. l., 1-2 ft. br.; *pinnæ* 6-12 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., cut down nearly to the rachis into entire, linear-subfalcate lobes 1 lin. br., the basal ones the largest; *texture* subcoriaceous, rigid; *rachis* and under surface naked or finely villose; *veinlets* 10-15 on a side, with the sori midway between the edge and midrib.—Polyp. *Swz.* *N. macrourum* and *Serra*, *Hk. Sp.* 4. p. 96-8.

Hab. Mexico and Cuba, southward to Brazil and Peru.—A larger and more rigid plant than *N. patens*, with narrower and more acute lobes, and closer and more prominent veinlets.

23. *N.* (Last.) *immersum*, Hk.; *st.* tufted, 2 ft. l., or more, naked, substramineous; *fr.* 3-4 ft. l., 1-2 ft. br.; *pinnæ* often 1 ft. l., 1-1½ in. br., cut down very nearly to the rachis into spreading linear lobes 1 lin. br., with more than their own space between them; *texture* papyraceo-herbaceous; *rachis* and under surface naked or slightly pubescent and glandular; *veinlets* 10-20 on a side; *sori* submarginal, immersed so as to project on the upper surface; *invol.* subpeltate.—*Hk. Sp.* 4. p. 112.

Hab. Assam, Philippines, Malaccas.—Perhaps the shape of the involucre would justify our placing this in *Aspidium*, but in other respects it comes near the following four species. *L. caudiculata*, Presl, is said to differ from this by its medial sori.

24. *N.* (Last.) *Spekei*, Baker; *st.* 1 ft. l., stramineous, slender, fibrillose; *fr.* 18-24 in. l., 9-12 in. br.; *pinnæ* 4-6 in. l., 1 in. br., cut down very nearly to the rachis, entire, those of the fertile frond 1 lin. br., those of the barren frond wider; *texture* papyraceo-herbaceous; main *rachis* and that of the pinnæ slightly fibrillose; under side naked; *veinlets* 8-12 on a side; *sori* midway between the edge and midrib; *invol.* subpeltate.

Hab. Johanna Island, *Capt. Speke, Dr. Kirk*; Angola, *Welwitsch.*—This comes near the last, but the texture is thinner, the veinlets are fewer, and the sori medial, and not immersed. A plant from the Cameroon Mountains differs only by its more scaly rachises.

25. *N.* (Last.) *crinibulbon*, Hk.; *st.* 9-12 in. l., tufted, slender, glanduloso-pilose, and fibrillose, especially below; *st.* 1 ft. l., 6 in. br.; *pinnæ* spreading, 3 in. l.,  $\frac{5}{8}$ - $\frac{3}{4}$  in. br., cut down very nearly to the rachis into linear-oblong entire lobes  $\frac{1}{8}$  in. br.; *texture* herbaceous; *rachis* fibrillose and viscose, and midrib beneath slightly so; *veinlets* 5-6 on each side, with the sori nearly terminal.—*Hk. Sp.* 4. p. 92. t. 244.

Hab. Island of St. Thomas, W. Africa, *G. Mann.*—Very near *N. Spekei*, but smaller in size, the veinlets fewer, and the rachises densely fibrillose and glandular, and sori submarginal.

26. *N.* (Last.) *ligulatum*, Hk.; *st.* grey, glossy, naked; *fr.* 3-4 ft. l., 12-18 in. br.; *pinnæ* 6-9 in. l., 1 in. br., cut down very nearly to the rachis into linear, blunt, entire, erecto-patent lobes 1 lin. br., with more than their own space between them, lower ones slightly reduced; *texture* subcoriaceous; *rachis* and under side finely pubescent; *veinlets* 10-12 on a side; *sori* quite marginal.—*Hk. Sp.* 4. p. 112.

Hab. Philippines, *Cuming*, 94, 343.—Allied to the three preceding.

27. *N.* (Last.) *obliquatum*, Baker; *rhizome* creeping; *st.* 8 in. l., reddish, densely pubescent; *fr.* 1 ft. l., 6-8 in. br., ovate-acuminate; *pinnæ* lanceolate, cut down to a narrowly-winged rachis into close linear-oblong entire lobes; *texture* papyraceo-herbaceous; under *surface* and *rachis* densely villose; *veinlets* 6-8 on a side, bearing the *sori* near the apex.—*Aspid. Mett. Fil. Nov. Cal.* p. 76.

Hab. New Caledonia, *Vieillard*, 1628.—Allied to species 23-27, but recognizable by its villose stems and frond.

28. *N.* (Last.) *albo-punctatum*, Desv.; *rhizome* wide-creeping, scandent, scaly or naked; *st.* naked, greyish or ebeneous, jointed; *fr.* 9-12 in. l., 4-6 in. br.; *pinnæ* spreading, 2-3 in. l.,  $\frac{1}{2}$  in. br., cut half down to the rachis or more into oblong, blunt, entire lobes; *texture* herbaceous; *rachis* pubescent and under side slightly so; *veins* pinnate in the lobes, with 3-4 veinlets on each side; *sori* terminal on the veinlets near the edge.—*Hk. Sp.* 4. p. 85. *Fil. Ex. t.* 89. *Arthropteris*, *J. Sm.*

Hab. Guinea Coast, Angola, Mascaren Isles, Fiji.—The *pinnæ* have white cretaceous dots on the upper surface, as in *Nephrolepis*. *N. Webbianum*, Hk., from Amboyna, appears to be a form of this, with a glabrous rachis and *pinnæ* less deeply lobed than the type.

29. *N.* (Last.) *calcaratum*, Hk.; *st.* densely tufted, stramineous, villose above; *st.* 1 ft. l., 3-6 in. br.; *pinnæ* spreading, 2-4 in. l.,  $\frac{3}{8}$ - $\frac{3}{4}$  in. br., cut down two-thirds or more to the rachis into oblique, subfalcate, linear-oblong, acute or blunt lobes; *colour* dark-green; *rachis* villose; *texture* herbaceous or subcoriaceous; under *side* more or less villose; *veinlets* 3-6 on each side; *sori* medial; *invol.* glabrous, persistent.—*Hk. Sp.* 4. p. 93. *N. falcilobum*, *Hk. Sp.* 4. p. 108.

Hab. N. India to Ceylon, Hong-Kong, Philippines, Malaccas.—A well-marked plant, with a considerable range of variation in cutting and texture. The lower *pinnæ* are sometimes but not usually reduced. *N. falcilobum* is a form with broader *pinnæ* and deeper and more spreading lobes than usual.

30. *N.* (Last.) *viscosum*, Baker; *st.* 6 in. or more l., firm, erect, reddish-brown, slightly scaly, finely villose; *fr.* 9-12 in. l., 4-5 in. br., oblong-lanceolate; *pinnæ* close, 2-3 in. l.,  $\frac{3}{8}$ - $\frac{1}{2}$  in. br., cut nearly to the rachis into close, spreading linear-oblong lobes under 1 lin. br.; *texture* herbaceous; *colour* dark-green; *rachises* villose; under *surface* densely glandular; *veinlets* 5-6 on a side; *sori* medial.—*Lastrea*, *J. Sm.*

Hab. Malacca, *Cuming*, 401; Philippines and Borneo, *T. Lobb*.

31. *N.* (Last.) *falciculatum*, Desv.; *st.* tufted, 6-12 in. l., clothed below with dark-brown linear scales; *fr.* 12-18 in. l., 8-10 in. br., oblong-deltoid; *pinnæ* 4-5 in. l., 1 in. br., cut down very nearly to the rachis into linear-oblong entire falcate lobes  $1\frac{1}{2}$ -2 lin. br., the lower ones not reduced; *texture* herbaceous;



*rachises* slightly fibrillose, and both sides densely pubescent and glandular; *veinlets* 8-10 on a side; *sori* large, submarginal.—*Hk. Sp.* 4. p. 102.

Hab. Mexico to Brazil and Peru.

32. N. (Last.) *vestitum*, Baker; *st.* 6-12 in. l., stout, densely coated with woolly lanceolate scales; *fr.* 1-2 ft. l., 6-10 in. br.; *pinnæ* 3-5 in. l.,  $\frac{3}{4}$ -1 in. br., cut down to a narrowly-winged rachis into blunt, entire, falcate lobes 2 lin. br.; *texture* herbaceous; *rachis* of the *pinnæ* densely clothed with broad furfuraceous scales; *veinlets* 6-8 on a side, the *sori* close to the midrib.—*Polyp. Raddi.* N. Raddianum, *Hk. Sp.* 4. p. 98. t. 245.

Hab. S. Brazil.—The Mauritian *A. nitidum*, Bory, is like this, except that the scales are narrower and finer, and with this a Brazilian plant, marked "*A. squamigerum*" by Mettenius, agrees.

33. N. (Last.) *crinitum*, Desv.; *st.* 6-12 in. l., stout, densely clothed with long, purplish-brown, fibrillose scales; *fr.* 12-24 in. l., 8-12 in. br., ovate-deltoid; *pinnæ* 4-6 in. l., 1 in. br., cut down nearly to the rachis into slightly falcate, linear-oblong lobes 2 lin. br.; lower *pinnæ* deflexed; *texture* herbaceous; *rachis* and midrib more or less fibrillose; *veinlets* 9-12 on a side; *sori* medial.—*Hk. Sp.* 4. p. 111. (*in part*). *A. sulcatum*, *Klf.*

Hab. Mauritius and Bourbon.—This and the two preceding resemble one another closely in habit, texture, and shape of the lobes, and in all three the involucre is thin and fugacious. In *A. pauciflorum*, Kaulf., the scales are fewer, and not so distinctly subulate, but they do not seem clearly separable.

34. N. (Last.) *Otenitis*, Baker; *st.* more than 1 ft. l., clothed throughout with black and ferruginous scales; *fr.* 2 ft. l., 1 ft. or more br.; *pinnæ* 8-9 in. l.,  $1\frac{1}{4}$ - $1\frac{1}{2}$  in. br., cut down nearly to the rachis into obtusely-toothed lobes, the lower ones with a space between them, the lower *pinnæ* stalked; *texture* subcoriaceous; upper *surface* with scattered short ferruginous hairs, lower with dark scales on the midrib; *veinlets* about 15 on a side; *sori* near the main veins; *invol.* persistent, glabrous.—*Aspid. Kze. Mett. Asp.* p. 91.

Hab. Brazil.

35. N. (Last.) *vellem*, Baker; *st.* 6 in. l., densely clothed, especially at the base, with long linear scales; *fr.*  $1\frac{1}{2}$ -2 ft. l., 6-9 in. br.; *pinnæ* 3-4 in. l.,  $\frac{3}{4}$ -1 in. br., cut down to the rachis into linear-oblong lobes  $1\frac{1}{2}$ -2 lin. br.; *texture* herbaceous; *under side* naked; *rachises* densely clothed with long, pale, bright-brown fibrillose scales; *veinlets* 7-8 on a side, the *sori* close to the midrib.—*Aspid. Willd.* N. aureo-vestitum, *Hk. Sp.* 4. p. 101. t. 246.

Hab. West Indies.—This most resembles the three preceding, but the frond is narrower and more elongated, and the clothing of the rachis is quite peculiar.

36. N. (Last.) *Caripense*, Hk.; *st.* 1 ft. or more l., firm, clothed principally at the base with long, dense, linear scales; *fr.*  $1\frac{1}{2}$ -2 ft. l., 8-12 in. br.; *pinnæ* 4-6 in. l., 1 in. br., cut down to a broadly-winged rachis into close, blunt, entire lobes 2 lin. br., the lower lobes reduced and lower *pinnæ* slightly stalked; *texture* firm; *rachis* nearly and both sides quite naked; *veinlets* 12-15 on a side; *sori* medial; *invol.* small, fugacious.—*Hk. Sp.* 4. p. 99. N. Tarapotense, *Hk. Sp.* 4. p. 107.

Hab. Guatemala to Brazil and Peru.—*A. alsophilaceum* of Kunze and Mettenius is said to differ by its more rigid texture, and lobes not reaching more than halfway down to the midrib, with 9-10 veinlets on a side.

37. N. (Last.) *trichophorum*, Baker; *rhizome* creeping; *st.* 6-9 in. l., firm, pubescent upwards; *fr.* 12-18 in. l., 8-9 in. br.; *pinnæ* 4-5 in. l.,  $\frac{3}{4}$ - $\frac{7}{8}$  in. br.,

gradually narrowed from the base to the acuminate apex, all sessile, cut down very nearly to the rachis into erecto-patent, blunt, entire lobes 2 lin. br.; texture coriaceous; rachis and veins beneath densely villose; veinlets 6-8 on a side; sori marginal; invol. large, persistent, villose.—Aspid. *Fée, Fil. Ant. t. 23.*

Hab. Guadeloupe, *L'Herminier*.—*A. Capitainei* and *Germani*, Fée, are very closely allied, but in both the veinlets are 9-10 in number, and in the latter the caudex is said to be erect. *A. asperulum*, Fée, has narrower pinnæ and a decumbent caudex. All four are from the same island.

38. N. (Last.) *triste*, Hk.; st. 1 ft. or more l., naked or slightly villose; fr. 2-4 ft. l., 8-18 in. br.; pinnæ 4-9 in. l., 1-1½ in. br., cut down two-thirds of the distance to the rachis into entire, bluntish or acute, subfalcate lobes 2-3 lin. br., the lower ones with a distinct stalk and the lowest lobe narrowed out into a decurrent cuneate wing to it; texture subcoriaceous; rachis and veins beneath finely villose; veinlets 12-15 on a side; sori medial; invol. small, fugacious.—*Hk. Sp. 4. p. 104.*

Hab. Columbia to Peru and Brazil.—Distinguished by its rigid texture and the distinct stalk of the lower pinnæ, the pagina of which is narrowed down gradually into it. A plant authenticated by Mettenius as *A. monostichum*, Kze., seems to differ from this only by the sori being confined to one at each side of each lobe at the base.

39. N. (Last.) *tetragonum*, Hk.; st. tufted, 1 ft. or more l., finely pubescent; fr. 1-2 ft. l., 8-12 in. br., oblong-deltoid; pinnæ 4-6 in. l., ¾-1 in. br., cut halfway down to the rachis or more into close entire lobes 1½-2 lin. br., the lower lobes gradually reduced and lower pinnæ distinctly stalked; texture papyraceo-herbaceous; rachis and veins beneath pubescent; veinlets 8-12 on a side; sori medial; invol. small, setose.—*Hk. Sp. 4. p. 103.*

Hab. Columbia to Peru and Brazil.—This agrees with the last in the character of the lower pinnæ, but the lobes are shorter and blunter, and the texture is more herbaceous. We cannot clearly distinguish *A. lugubre*, Mett., although favoured with an authentic specimen.

40. N. (Last.) *crassifolium*, Hk.; st. tufted, 1 ft. or more l., glossy, slightly villose; fr. 1½-2 ft. l., 8-12 in. br.; pinnæ 4-6 in. l., 1-1½ in. br.; lobes blunt, falcate, 2-3 lin. br., reaching from half to two-thirds down to the rachis, the lower ones distinctly stalked; texture subcoriaceous; both sides glossy, but the rachises finely villose; veinlets 10-12 on a side, with the sori close to the midrib.—*Hk. Sp. 4. p. 114.*

Hab. Philippines and Malaccas.—A closely-allied plant from Borneo (*N. Motleyanum*, Hk. MSS.) has the pinnæ not cut more than halfway down, with medial sori, with the groups of veinlets free in the fertile, but invariably anastomosing in the barren frond.

41. N. (Last.) *echinatum*, Baker; st. 1 ft. l., clothed with long, spreading, brown, lanceolate-subulate scales, scabrous when they fall; fr. 1 ft. l., 8-9 in. br., lanceolate-deltoid; lowest pinnæ stalked, 5 in. l., 7 lin. br., cut down to a narrowly-winged rachis into close, linear-oblong, entire lobes; texture coriaceous; rachis scaly like the stem; under surface thinly pubescent and glandular; veinlets 7-8 on a side; sori nearer the midrib than the edge.—Aspid. *Mett. Fil. Ind. p. 230.*

Hab. Borneo, *Korthals*.—In this, as in the three preceding, the lowest veinlets sometimes join.

42. N. (Last.) *Leprieurii*, Hk.; st. 1-2 ft. l., grey, deciduously villose; fr. 2-3 ft. l., 12-15 in. br.; pinnæ 6-8 in. l., 1½ in. br., cut down within a short distance of the rachis into entire subfalcate lobes 2 lin. br., furnished with a prominent gland at the base, the lower ones sessile and lower lobes scarcely reduced;



texture coriaceous; *rachis* and under side finely villose; *veinlets* prominent, about 12 on a side; *sori* medial; *invol.* firm, villose.—*Hk. Sp.* 4. p. 106.

Hab. Guiana, *Leprieur*; Andes of N. E. Peru, *Spruce*.

43. *N. (Last.) subfuscum*, Baker; *st.* 1 ft. or more l., greyish, villose; *fr.* 2-3 ft. l., 1 ft. or more br.; *pinnæ* 6-8 in. l., 1 in. or more br., cut down to a broadly-winged rachis into spreading, blunt, entire lobes 2 lin. br., with a large acute gland at the base, the lower ones sessile and lower lobes not reduced; texture herbaceous; *rachis* and under side finely villose; *veinlets* immersed, about 8 on a side; *sori* medial; *invol.* small, fugacious.

Hab. Cayenne, *Leprieur*.

B. Group of *N. conterminum*. Lower *pinnæ* conspicuously reduced. *Sp.* 44-65.

44. *N. (Last.) sanctum*, Baker; *st.* densely tufted, slender, 2-3 in. l., naked upwards; *fr.* 6-9 in. l., 1-2 in. br., lanceolate; *pinnæ* distant,  $\frac{1}{2}$ -1 in. l.,  $1\frac{1}{2}$ -3 lin. br., the point bluntish, the edge more or less deeply pinnatifid, the lobes sometimes close and linear-oblong, sometimes distinct, linear, or spatulate; texture papyraceo-herbaceous; *rachis* naked; under side slightly glandular; *veinlets* simple; *sori* minute; *invol.* very fugacious.—*Polyp. Sw. Hk. Sp.* 4. p. 252.

Hab. West Indies and Guatemala.

45. *N. (Last.) exiguum*, *Hk.*; *st.* tufted, 6-9 in. l., slender, grey, naked; *fr.* 8-10 in. l.,  $1\frac{1}{2}$ -2 in. br.; *pinnæ* 1 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., blunt, cut down halfway to the rachis or more into close blunt lobes; texture papyraceo-herbaceous; *rachis* villose; *veinlets* obscure, 2-3 on each side; *sori* near the midrib.—*Hk. Sp.* 4. p. 92.

Hab. Philippines, *Cuming*, 251, 272.—An obscure plant.

46. *N. (Last.) canum*, Baker; *st.* densely tufted, 6-8 in. l., slender, finely villose; *fr.* 8-12 in. l., 3-4 in. br.; central *pinnæ* 2 in. l.,  $\frac{1}{2}$  in. br., gradually narrowed from the base to the point, cut down nearly to the rachis into close, slightly crenated lobes  $\frac{1}{2}$  in. br.; lower *pinnæ* distant and dwindling down gradually; texture herbaceous; *rachis* slender, finely villose, and both sides slightly so; *veinlets* 6-8 on a side; *sori* submarginal; *invol.* thin, fugacious.—*Lastrea, J. Sm.*

Hab. Himalayas.—Habit of *N. molle*, but a more slender plant, with gradually-reduced lower *pinnæ* and free veins. If it is Wallich's *canum* at all, it is so in part only, as some of the specimens clearly belong to *N. molle*.

47. *N. (Last.) Beddomei*, Baker; *rhizome* slender, wide-creeping; *st.* 6-9 in. l., slender, glossy; *fr.* 6-12 in. l., 3-4 in. br., oblong-lanceolate; central *pinnæ* the largest,  $1\frac{1}{2}$ -2 in. l.,  $\frac{3}{8}$  in. br., cut down to the rachis into close, rather acute, entire lobes under 1 lin. br.; lower *pinnæ* distant and dwindling down very gradually; texture firm; veins beneath villose; *veinlets* 4-5 on a side, the *sori* close to the incurved margin.—*A. gracilescens, Thwaites (non Blume)*. *L. gracilescens, Beddome, t.* 110.

Hab. Neilgherries, Ceylon (C. P. 1287), and Java.—This comes nearest the next species, but is smaller and more slender, with much fewer veins, and the texture is firmer.

48. *N. (Last.) Novboracense*, Desv.; *rhizome* slender, wide-creeping; *st.* about 1 ft. l., slender, stramineous; *fr.* 1-2 ft. l., 4-6 in. br.; *pinnæ* spreading, 2-3 in. l.,  $\frac{3}{8}$  in. br., cut down very nearly to the rachis into linear-oblong lobes,

those of the barren frond the broadest; lower *pinnæ* small, deflexed; *veinlets* rarely forked, 6-10 on a side; *texture* herbaceous; *rachis* and both sides naked; *sori* soon confluent, in rows near the flat edge.—*Hk. Sp.* 4. p. 89.

Hab. Canada and United States.—Habit of *N. Thelypteris*, from which it may be known by its simple veins and reduced lower *pinnæ*.

49. *N. (Last.) conterminum*, Desv.; *st.* densely tufted, 6-9 in. l., naked or villose; *fr.* 12-18 in. l., 4-8 in. br., oblong-lanceolate; central *pinnæ* the longest, 2-4 in. l.,  $\frac{1}{8}$  in. br., cut down to the rachis into entire lobes about 1 lin. br., the lowest lobes often enlarged, the lower *pinnæ* decreasing gradually; *texture* herbaceous or subcoriaceous; *rachis* naked or pubescent; under *surface* often slightly villose and glandular; *veinlets* 6-8 on a side; *sori* submarginal; *invol.* minute, fugacious.—*Hk. Sp.* 4. p. 91.

Hab. W. Indies and Mexico, southward to Brazil, Chili, and Bourbon.—This, which appears to be abundant throughout Central America, has the general habit of *N. Thelypteris* and *Noveboracense*, with an erect caudex. We cannot distinguish clearly *A. oligocarpum*, Kth., *A. Funckii*, Mett., and *A. pilosulum*, Klotzsch. Fée makes of this a genus *Oochlamys*, characterized by an involucre receding from that of typical *Nephrodium* towards *Aspidium*, and enumerates seven West-Indian species.

50. *N. (Last.) Kaulfussii*, Hk.; *st.* tufted, 4-6 in. l., slender, slightly pubescent; *fr.*  $1\frac{1}{2}$ -2 ft. l., 6-8 in. br., oblong-lanceolate; *pinnæ* 3-4 in. l.,  $\frac{1}{2}$ - $\frac{3}{8}$  in. br., cut down nearly to the rachis into spreading, entire blunt lobes 2 lin. br., the lower lobes not enlarged and lower *pinnæ* dwindling down gradually; *texture* herbaceous or subcoriaceous; *rachis* and under *surface* finely pubescent; *veinlets* about 6 on a side; *sori* medial; *invol.* fugacious.—*Hk. Sp.* 4. p. 97.

Hab. West Indies to Brazil.—This differs from the last by its broader lobes and medial sori. Both Mettenius and Grisebach unite it with *oligocarpum*.

51. *N. (Last.) concinnum*, Baker; *rhizome* wide-creeping; *st.* 6-12 in. l., naked or slightly pubescent; *fr.* 1-2 ft. l., 6-8 in. br., oblong-lanceolate; *pinnæ* 3-4 in. l.,  $\frac{3}{4}$ -1 in. br., cut down nearly to the rachis into spreading or falcate entire lobes  $\frac{1}{8}$  in. br.; *texture* subcoriaceous; *rachis* and under *surface* slightly villose; *veinlets* 6-8 on a side; *sori* submarginal; *invol.* minute, ciliated, fugacious.—Polyp. *Willd.*

Hab. Mexico to Chili.—This may be best known from the two preceding by its creeping rhizome. *A. rivulorum*, Link, is said to differ by its medial sori, and the presence of a gland at the base of the *pinnæ* beneath; and *Pheg. adenchrysa*, Fée, may be this without an involucre.

52. *N. (Last.) Sprengelii*, Hk.; *st.* 6-12 in. l., stramineous, naked or slightly pubescent; *fr.* 2-4 ft. l., often 1 ft. br.; *pinnæ* 6-8 in. l., 1 in. br., cut down nearly to the rachis into entire lobes 1-1 $\frac{1}{2}$  lin. br., the lower ones with a gland at the base beneath; *texture* herbaceous or subcoriaceous; under *surface* naked or slightly villose and glandular; *veinlets* 8-12 on a side; *sori* submarginal.—*Hk. Sp.* 4. p. 94.

Hab. West Indies and Guatemala.—A much larger plant than *N. conterminum*, with a basal gland, and nearly twice as many veinlets.

53. *N. (Last.) prolixum*, Baker; *st.* 1-2 ft. l., firm, glossy, substramineous, naked or nearly so; *fr.* 2-4 ft. l., 8-12 in. br.; *pinnæ* 4-8 in. l.,  $\frac{3}{4}$ -1 in. br., cut down nearly to the rachis into entire or bluntish, often falcate lobes 1-1 $\frac{1}{2}$  lin. br., with a prominent gland at the base beneath, the lower ones gradually reduced; *texture* subcoriaceous; *rachis* and under side more or less villose; *veinlets* prominent, 10-15 on a side; *sori* submarginal.—*Aspid. Willd. N. ochthodes*, *Hk. Sv.* 4. v. 109. *N. appendiculatum*, *Hk. l. c.*— $\beta$ , *N. tylodes* (*Kze.*



*sub Asp.*); *sori* in a line close to the midrib; *rachis* and under side nearly naked; lower *pinnæ* reduced suddenly.

Hab. N. India to Ceylon, Mauritius, and Bourbon.—The Mascaren plant (*A. stipulaceum*, Mett.) has the lowest lobes sometimes dilated and pinnatifid, like those of *N. macrourum*. Dr. Thwaites regards *tylodes* and *ochthodes* as probably distinct species. The two are figured by Beddome, t. 106-7.

54. N. (Last.) *limbatum*, Desv.; *st.* 4-6 in. l., naked, glossy; *fr.* 2-3 ft. l., 6-12 in. br.; *pinnæ* 3-6 in. l.,  $\frac{5}{8}$ - $\frac{3}{4}$  in. br., with a gland at the base beneath, cut down very nearly to the rachis into slightly falcate, entire, linear-oblong lobes 1-1 $\frac{1}{2}$  lin. br.; *texture* papyraceo-herbaceous; *rachis* stramineous and both surfaces nearly naked; *veinlets* 6-10 on a side, the prominent persistent involucre protruding beyond the edge.—*Hk. Sp.* 4. p. 94. *Amauropelta*, Kze.

Hab. West Indies.—Easily recognizable by the character of the involucre, on account of which Kunze made for it a new genus.

55. N. (Last.) *resino-foetidum*, Hk.; *st.* 1-2 ft. l., naked, scaly below; *fr.* 3-4 ft. l., 12-18 in. br.; *pinnæ* 6-9 in. l., 1 in. br., cut down nearly to the rachis into close, linear, acute, entire lobes  $\frac{1}{8}$  in. br., with a space between them, furnished with a gland at the base, the lower ones reduced to mere auricles; *texture* coriaceous; *rachis* and under side naked or finely villose; *veinlets* 10-15 on a side; *sori* submarginal; *edge* reflexed.—*Hk. Sp.* 4. p. 105. (*in part*).

Hab. Andes of Ecuador, *Spruce*; Bolivia, *Mandon*.—This is nearest *N. Sprengelii*, but is a larger and more rigid plant, with very numerous lobes and veinlets. It is said to have an unpleasant resinous scent when growing.

56. N. (Last.) *Sprucei*, Baker; *st.* 1 ft. or more l., nearly naked; *fr.* 2-3 ft. l., 8-12 in. br.; *pinnæ* 4-6 in. l., 1 in. br., cut down nearly to the rachis into entire, spreading lobes 2 lin. br., with a considerable space between them, furnished with a gland at the base, the lower ones dwindling down gradually; *texture* papyraceo-herbaceous; *rachis* slightly villose; *under side* naked; *veinlets* 8-10 on a side; *sori* nearer the midrib than the edge; *invol.* large, distinct.

Hab. Andes of Ecuador, *Spruce*.—Distinguished from the last by its more herbaceous texture, broader lobes, fewer veinlets, and medial *sori*.

57. N. (Last.) *Bergianum*, Baker; *st.* 6-12 in. l., naked or finely villose; *fr.* 1 $\frac{1}{2}$ -2 ft. l., 6-10 in. br.; *pinnæ* 3-5 in. l.,  $\frac{3}{4}$  in. br., cut down nearly to the rachis into close, entire lobes  $\frac{1}{8}$  in. br.; *texture* herbaceous; *rachis* and under side more or less villose; *veinlets* 6-8 on a side; *sori* medial; *invol.* small, fugacious.—Polyp. *Schlecht*.

Hab. Cape Colony and Natal.—Perhaps a variety of *N. patens*, but the lower *pinnæ* reduced gradually. *A. Gueintzianum*, Mett., differs by the presence of a gland at the base of the *pinnæ* beneath.

58. N. (Last.) *tomentosum*, Baker; *st.* densely tufted, 3-4 in. l., finely villose; *fr.* 1-2 ft. l., 6-10 in. br.; *pinnæ* 3-5 in. l.,  $\frac{1}{2}$ -1 in. br., with a gland at the base beneath, cut down nearly to the rachis into linear-oblong lobes, the lowest of which are often larger than the others; *texture* herbaceous; lower *pinnæ* distant, and dwarfed down to mere auricles; *rachis* and under surface villose; *veinlets* 8-12 on a side; *sori* nearly terminal.—Polyp. *Thouars*. *N. thelypteroides*, *Hk. Sp.* 4. p. 95. (*non Michx.*).

Hab. Mauritius, Bourbon, Tristan d'Acunha.—This may be a luxuriant villose variety of *conterminum*.

59. N. (Last.) *globuliferum*, Hk.; *st.* tufted, smooth, naked, glossy; *fr.* 1 $\frac{1}{2}$ -2 ft. l., 1 ft. br.; *pinnæ* 4-6 in. l.,  $\frac{1}{4}$  in. br., cut down to a broadly-winged rachis

into close, distinctly-crenated lobes  $1\frac{1}{2}$ -2 lin. br.; *texture* subcoriaceous; *rachis* and under surface not hairy, but densely coated with golden viscose glands; *veinlets* 6-8 on a side; *sori* marginal; *invol.* persistent, gland-ciliated.—*Hk. Sp. 4. p. 96.*

Hab. Sandwich Isles, *Brackenridge, Hillebrand.*

60. N. (Last.) *velatum*, Hk.; *st.* 3-4 in. l., densely clothed with large, ovate, pale-brown scales; *fr.*  $1\frac{1}{2}$ -2 ft. l., 4-6 in. br., lanceolate-oblong; *pinnæ* 2-3 in. l.,  $\frac{1}{2}$  in. br., cut down nearly to the rachis into blunt, oblong, slightly-crenated lobes  $\frac{1}{3}$  in. br.; *texture* subcoriaceous; *rachis* densely scaly, like the stem; *veins* 5-6 on a side; *sori* marginal.—*Hk. Sp. 4. p. 101. t. 247.*

Hab. Cuba, *Linden, 1901.*—Well marked in the group by its very scaly rachis.

61. N. (Last.) *palustre*, Baker; *st.* 1 ft. or more l., naked, stramineous; *fr.* 2-3 ft. l., 8-12 in. br.; *pinnæ* close, erecto-patent, 4-6 in. l.,  $\frac{3}{4}$  in. br., cut down nearly to the rachis into linear-oblong, entire, slightly-falcate lobes  $\frac{1}{8}$  in. br.; *texture* herbaceous; *rachis* and both sides quite naked; *veinlets* 6-8 on a side; *sori* filling up the greater part of the space between midrib and edge; *invol.* small, ciliated.—*Aspid. Mett.*

Hab. Brazil, *Lindberg, 633.*—In general habit most like *N. montanum*, but the lobes narrower, and veinlets simple.

62. N. (Last.) *diplozioides*, Hk.; *st.* tufted, 6 in. or more l., densely clothed with linear-spreading dark-brown scales; *fr.* 2-3 ft. l., 8-12 in. br.; *pinnæ* 4-6 in. l.,  $1-1\frac{1}{2}$  in. br., with a gland at the base beneath, cut down to a broadly-winged rachis into nearly entire, linear-oblong subfalcate lobes 2 lin. br.; *texture* herbaceous; *rachis* fibrillose, under side naked; *veinlets* 8-9 on a side; *sori* near the midrib; *invol.* small, setose.—*Hk. Sp. 4. p. 99.*

Hab. Columbia, *Moritz, 408, Fendler, 159.*—Distinguished by its herbaceous texture and broad lobes, not reaching much more than halfway down to the midrib.

63. N. (Last.) *pachyrachis*, Hk.; *st.* 6 in. or more l., nearly naked; *fr.* 2-3 ft. l., 8-12 in. br.; *pinnæ* 4-6 in. l.,  $\frac{3}{4}$ -1 in. br., with a gland at the base beneath, cut down to a broadly-winged rachis into spreading entire blunt lobes 2 lin. br.; *lower pinnæ* dwindling down gradually to mere auricles; *texture* herbaceous, under side naked; *veinlets* 8-9 on a side; *sori* near the midrib; *invol.* prominent, glandular.—*Hk. Sp. 4. p. 100.*

Hab. Venezuela, *Moritz, 409, Fendler, 472.*—Deeper cut than the last, and nearly naked, with a more prominent and persistent involucre. *A. decrescens* and *cheilanthoides*, Kze., are allied plants, with which we are not acquainted.

64. N. (Last.) *lonchodes*, Hk.; *rhizome* creeping; *st.* 12-18 in. l., glossy, naked; *fr.* 1-2 ft. l., 6-10 in. br.; *pinnæ* 4-5 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., the lower ones with close entire lobes 2 lin. br., reaching two-thirds of the way down; *texture* coriaceous; *rachis* and under surface finely pubescent; *veinlets* 4-5 on each side; *sori* about midway between the edge and margin.—*Hk. Sp. 4. p. 99.*

Hab. Cuba, *Wright, 1007-8.*

65. N. (Last.) *deltoideum*, Desv.; *st.* tufted, 3-6 in. l., densely clothed with deciduous linear scales; *fr.* 1-2 ft. l., 4-8 in. br.; *pinnæ* of the lower third or quarter suddenly dwarfed, the larger ones 2-4 in. l.,  $\frac{3}{4}$ -1 in. br., cut two-thirds of the way down into close entire lobes 2 lin. br.; *texture* coriaceous; *rachis* villose, under side nearly naked; *veinlets* prominent, 8-10 on a side; *sori* nearer the edge than the midrib; *invol.* very fugacious.—*Hk. Sp. 4. p. 103. Polyp. Sw.*

Hab. West Indies.—Groups of veins not unfrequently slightly united. Easily recognizable by the abrupt dwarfing of the pinnæ below the centre of the frond.



†† *Veinlets forked.* Sp. 66-73.

66. N. (Last.) *Thelypteris*, Desv.; *rhizome* slender, wide-creeping; *st.* about 1 ft. l., slender, stramineous; *fr.* 1-2 ft. l., 4-6 in. br.; *pinnæ* spreading, 2-3 in. l.,  $\frac{1}{2}$  in. br., cut down very nearly to the rachis into entire spreading linear-oblong lobes, those of the barren frond the broadest; *lower pinnæ* equalling the others; upper *veinlets* simple, lower ones forked; *texture* herbaceous; *rachis* and both sides naked; *sori* small, not confluent, in rows near the recurved edge.—*Brit. F. t.* 13.— $\beta$ , *N. squamulosum*, Hk.; *rachis* of the *pinnæ* slightly scaly.—*Hk. Sp. 4. p.* 88. Hemestheum, *Neum.*

Hab. Norway to Spain, Italy, Cashmere (5-6,000 ft.), and Amur-land; Cape Colony, Natal, Angola, New Zealand; United States.

67. N. (Last.) *montanum*, Baker; *st.* short, tufted; *fr.*  $1\frac{1}{2}$ -2 ft. l., 6-8 in. br.; *pinnæ* 3-4 in. l., 1 in. br. at the base, cut down to a broadly-winged rachis into close, blunt, oblong lobes; *lower pinnæ* distant, and gradually dwarfed down to mere auricles; *texture* herbaceous; *rachis* naked, or slightly scaly below, under surface glandular; *lower veins* forked; *sori* in rows near the edge.—*Polyp. Vogler. N. Oreopteris, Desv.*—*Hk. Sp. 4. p.* 90; *Brit. F. t.* 14. Hemestheum, *Neum.*

Hab. Lapland to Spain, Greece, and Georgia.

68. N. (Last.) *apiciflorum*, Hk.; *st.* tufted, 6-12 in. l., clothed throughout with linear spreading scales; *fr.* 2-3 ft. l., 8-12 in. br.; *pinnæ* close, lanceolate, the largest 4-6 in. l.,  $\frac{3}{4}$ - $\frac{7}{8}$  in. br., cut down to the rachis into uniform, close, blunt, subentire lobes  $\frac{1}{2}$  in. br.; *rachis* more or less scaly; *texture* herbaceous, under side naked; *sori* 6-8 to a lobe, confined to the upper third; *invol.* firm, prominent.—*Hk. Sp. 4. p.* 112. *t.* 248.

Hab. N. India up to 9,000 ft.—Like *N. Filix-mas* in general habit, but remarkable in the *sori* being restricted to the tip of the lobes.

69. N. (Last.) *microsorium*, Hk.; *st.* 1 ft. or more l., fibrillose, especially below; *fr.* 2 ft. l., 1 ft. br.; *pinnæ* 6 in. l.,  $1\frac{1}{2}$ - $1\frac{1}{2}$  in. br., cut down to the rachis below into close, blunt, entire lobes  $\frac{1}{2}$  in. br., lower ones not reduced; *texture* herbaceous; *rachis* fibrillose, those of the *pinnæ* and lobes villose, under surface naked; *veinlets* 8-9 on a side, most of them forked; *sori* midway between the edge and midrib.—*Hk. Sp. 4. p.* 106.

Hab. Foot of Mount Chimborazo, *Spruce.*

70. N. (Last.) *griseum*, Baker; *st.* firm, erect, grey, villose upwards; *fr.*  $1\frac{1}{2}$  2 ft. l., 8-9 in. br., oblong-lanceolate; *pinnæ* close, 3-4 in. l.,  $\frac{3}{4}$ - $\frac{7}{8}$  in. br., narrowed gradually from the base to the apex, cut down nearly to the rachis into blunt, entire lobes 2 lin. br., with recurved edges; *texture* subcoriaceous; *rachis* villose, and veins beneath slightly so; *veinlets* about 10 on a side, mostly forked; *sori* small, submarginal; *invol.* ciliated.

Hab. Cochin, S. Hindostan, *Rev. Mr. Johnstone.*

71. N. (Last.) *sagenioides*, Baker; *st.* tufted, slender, 6-12 in. l., dark chestnut-brown, scaly below; *fr.* 12-24 in. l., 6-12 in. br., oblong-lanceolate; *pinnæ* 3-6 in. l., 1 in. br., the lowest pair rather shorter than the others, and deflexed; *lobes* cut down to a broadly-winged centre, linear-oblong, blunt, entire or slightly crenate; *texture* papyraceo-herbaceous; *rachis* polished, like the stem; *veinlets* 6-8 on a side, the lower ones forked; *sori* in rows near the edge; *invol.* fugacious.—*Aspid. Mett. N. melanopus, Hk. Sp. 4. p.* 110.

Hab. Malayan Peninsula and Isles.—A very distinct plant, resembling some of the

*Sagenia*, not in general habit, but by its polished, dark-coloured stem, and by the sori being usually terminal on branch veins. *A. zeylanicum*, Fée, is probably this species.

72. *N.* (Last.) *syriaticum*, Baker; *st.* tufted, 1-2 ft. l., naked, stramineous; *fr.* 3-4 ft. l., 12-18 in. br.; *pinnæ* 6-9 in. l.,  $1\frac{1}{2}$ - $1\frac{3}{4}$  in. br., cut down to a broadly-winged rachis into slightly-toothed lobes 2-3 lin. br., the lower ones stalked, the lowest not much reduced; *texture* subcoriaceous; *rachis* and both surfaces naked; *veinlets* 12-15 on a side, nearly all forked; *sori* nearer the edge than the midrib.—*Aspid. Willd.* *N. spectabile*, *Hk. Sp.* 4. p. 115.

Hab. *N.* India to Ceylon, Philippines, and Malaccas.—There is a form with medial sori, and more distant and fewer (6-8) veinlets. This also has the sori often terminal on the branch veinlets, and not unfrequently the groups join at the sinus. Willdenow supposed it to be a South American plant, doubtless by mistake.

73. *N.* (Last.) *Filix-mas*, Rich.; *st.* tufted, 6 in. or more l., more or less densely clothed with lanceolate scales; *fr.* 2-3 ft. l., 8-12 in. br.; *pinnæ* lanceolate, 4-6 in. l.,  $\frac{3}{4}$ - $1\frac{1}{4}$  in. br., cut down very nearly to the rachis into close, blunt, regular subentire lobes  $1\frac{1}{2}$ -2 lin. br., lower ones rather shorter than the others; *texture* herbaceous; *rachis* more or less scaly, under surface naked; lower veinlets subpinnate; *invol.* large, convex.—*Hk. Brit. F. t.* 15.— $\beta$ , *N. affine* (*F. & M. sub Aspid.*); *pinnæ* not so blunt and with a space between them, narrower and the edge more or less deeply toothed.— $\gamma$ , *N. elongatum*, *Hk. & Gr.*; *fr.* sometimes 3-4 ft. l., 2 ft. br., subdeltoid, quadripinnatifid; lower *pinnæ* 1 ft. or more l., 4-6 in. br.; *pinn.* close, lanceolate, cut down nearly to the rachis into oblong crenated lobes; *invol.*  $\frac{1}{3}$ - $\frac{1}{2}$  lin. br.— *Ic. Fil. t.* 234.— $\delta$ , *N. cochlearium*, Don; sterile and fertile *fr.* different, the pinn. of the former broad-leafy, the lower ones deeply lobed, those of the latter much contracted, the two rows of large sori with prominent convex *invol.* often 1 lin. br., occupying their whole surface.—*Arthropotrys, Wall. Hk. Sp.* 4. p. 116. *Dryopteris, Schott.*

Hab.  $\alpha$  and  $\beta$  throughout Europe and Asia, from Lapland to Japan and the Malay Isles, ascending to the Himalayas to 15,000 ft.; Madeira, Sandwich Isles; America, from Greenland along the Rocky Mountains and Andes to Peru.  $\gamma$ , Azores, Madeira, Guinea Coast, Cape Colony, Mascaren Isles, Abyssinia, E. Indies, S. United States.  $\delta$ , Hindostan and Malaccas.—The extremes as described differ widely, but we cannot draw any clear line between them. *A. Schimperianum, Canariense, Ludovicianum, and marginatum*, none of them seem clearly separable from  $\gamma$ , which might be looked for in group 7.

\*\*\*\* *Pinnæ* cut nearly or quite down to the rachis into toothed or pinnatifid lobes. *Sp.* 74-87.

74. *N.* (Last.) *Preslii*, Baker; *st.* 6-9 in. l., slender, deciduously fibrillose; *fr.* 6-9 in. l., 4-5 in. br., lanceolate-deltoid; upper *pinnæ* lanceolate, close, lowest pair deltoid, the upper *pinn.* 2 lin. br., blunt, entire, the lower ones pinnatifid, with similar lobes and broad uncut centre; *texture* subcoriaceous; *rachis* fibrillose, both surfaces naked; *sori* about 6 to the lower lobes, dorsal on the veins, nearer the midrib than the edge.—*L. propinqua, Presl & J. Sm. (in part).*

Hab. Philippines, *Cuming*, 255.—This agrees in cutting with the small forms of *N. membranifolium*, but the texture is thicker, and the sori are dorsal, not far from the base of the obscure veinlets.

75. *N.* (Last.) *Goldieanum*, *Hk.*; *st.* tufted, 1 ft. l., clothed with large dark scales below; *fr.* 2-3 ft. l., 1 ft. or more br., ovate-deltoid; lower *pinnæ* 6-9 in. l., 2 in. br., cut down nearly to the rachis into linear-lanceolate subfalcate, slightly-toothed lobes; *rachis* and both surfaces naked; *texture* herbaceous; *veinlets* obscure, forked; *sori* in rows near the midrib.—*Hk. Sp.* 4. p. 121. *Hk. & Gr. Ic. t.* 102.

Hab. Canada to Kentucky.—This comes nearest *N. Filix-mas*, which is not found in the Northern United States.



76. *N. (Last.) marginale*, Mich.; *st.* tufted, 6-12 in. l., clothed principally at the base with large lanceolate concolorous scales; *fr.* 18-24 in. l., 6-8 in. br., oblong-lanceolate, bipinnate; *pinnæ* 3-4 in. l., 1-1½ in. br.; *pinnl.* ovate-oblong, blunt, nearly entire; *rachis* and both sides nearly naked; *texture* herbaceous; lower *veinlets* of the *pinnl.* pinnate; *sori* marginal.—*Hk. Sp.* 4. p. 122.

Hab. Canada and United States.—About midway between the typical form of *Filix-mas* and *cristatum* in general habit.

77. *N. (Last.) lacerum*, Baker; *st.* 4-8 in. l., densely clothed below with large ovate-lanceolate scales; *fr.* 12-18 in. l., 6-10 in. br., ovate-deltoid; *pinnæ* 4-5 in. l., 1½-2 in. br., lanceolate; upper *pinnl.* confluent, lowest free, lanceolate, acute, subfalcate, nearly entire, but the lower ones auricled on both sides of the base; *texture* subcoriaceous; *rachises* rather scaly; both *sides* naked; *sori* confined to the upper third of the frond, occupying nearly the whole of the contracted *pinnl.*; *invol.* ½ lin. br.—*Polyp. Thunb.* Lastrea, Eaton.

Hab. Japan and Tsus-Sima.—Very near some of the Indian forms of *Filix-mas*, but admitted as distinct by Eaton and Mettenius.

78. *N. (Last.) erythrosorum*, Hk.; *st.* tufted, 6-9 in. l., more or less densely clothed with long lanceolate and linear scales; *fr.* 12-18 in. l., 8-12 in. br., ovate-lanceolate; *pinnæ* lanceolate, the lowest the largest, 5-6 in. l., 1½ in. br., cut quite down to the rachis below into oblong-bluntish *pinnl.* 2-3 in. br., the edge slightly, sometimes spinosely, toothed; *texture* firm but herbaceous; both sides naked; *rachis* slightly scaly; *sori* in rows of 6-9 to a *pinnl.* near the midrib; *invol.* ½ lin. br., flat, bright-red when young.—*Hk. Sp.* 4. p. 120. t. 253.

Hab. Japan and China.—Intermediate in appearance between *Aspid. varium* and *N. Filix-mas*.

79. *N. (Last.) Floridanum*, Hk.; *st.* 6 in. or more l., with a few ovate concolorous scales; *fr.* 1½-2 ft. l., 6-8 in. br., oblong-lanceolate; fertile *pinnæ* confined to the upper half, close, lanceolate, 3-4 in. l., 1-1½ in. br., cut down to a narrowly-winged rachis into oblong, slightly crenated, blunt *pinnl.*, with their own breadth between them and two rows of *sori* reaching from the midrib nearly to the edge; barren *pinnæ* broader, the lower ones rather reduced and subdeltoid, all not so deeply cut and the *pinnl.* close; *texture* herbaceous, both sides naked.—*Hk. Fil. Ex. t.* 99.

Hab. Louisiana and Florida.—Perhaps a form of *N. cristatum*, with which it agrees in its barren *pinnæ*, differing in its dimorphous fertile ones.

80. *N. (Last.) cristatum*, Mich.; *st.* tufted, 6 in. or more l., sparingly clothed with ovate concolorous scales; *fr.* 12-18 in. l., 3-5 in. br., narrowly oblong-lanceolate; lower *pinnæ* deltoid, 2 in. l., 1 in. or more br., the lowest pair about equal to the next, cut down nearly, or quite, to the base below into broad, blunt, oblong, slightly pinnatifid *pinnl.*; *teeth* not aristate; *texture* herbaceous; stramineous *rachis* and both sides nearly naked; *invol.* naked.—*Hk. Sp.* 4. p. 121.—β, *N. uliginosum* (*Newm. sub Lastrea*); *fr.* broader; *pinnl.* more acute and more deeply cut, *teeth* mucronate.—*Brit. F. t.* 17. A. spinuloso-cristatum, Lasch.

Hab. Scandinavia to N. Italy and Greece; Hudson's Bay territory, Canada, United States.—Our β is a connecting link between *cristatum* and *spinulosum*, the barren fronds resembling most the former, and the fertile ones the latter.

81. *N. (Last.) Borneense*, Hk.; *rhizome* stout, wide-creeping, densely fibrillose; *st.* 6 in. l., firm, erect, brown, naked; *fr.* 12-18 in. l., 4-6 in. br., lanceolate; *pinnæ* 2-3 in. l., ¾ to 1 in. br., cut down to a broadly-winged rachis into linear-oblong deeply pinnatifid lobes; *texture* subcoriaceous; *rachis* and veins

beneath finely villose; *veinlets* about 6 on a side, with a sorus on each midway between midrib and edge; *invol.* coriaceous, persistent.—*Hk. Sp.* 4. p. 111. *2nd Cent. t.* 93.

Hab. Borneo.—Habit of *N. flaccidum*, but quite different in texture and mode of growth, in which it approximates towards *Eudavallia*, in which it is placed by J. Smith.

82. *N.* (Last.) *Salvini*, Baker; *st.* tufted with a tuft of long brown linear scales at the base, and a few upwards, 6-9 in. l.; *fr.* 12-18 in. l., 3-4 in. br., lanceolate; *pinnae* close, lanceolate,  $1\frac{1}{2}$ -2 in. l.,  $\frac{3}{4}$  in. br., cut down to the rachis below into imbricated oblong *pinnae* with blunt lobes reaching about halfway down; *texture* herbaceous, firm; *rachis* and midrib of the *pinnae* slightly scaly; *veinlets* forked; *sori* at the base of the lobes often 1 to each; *invol.* naked, firm.

Hab. Guatemala, *Salvin* and *Godman*.—Most like *N. flaccidum* in cutting, but quite different in other respects.

83. *N.* (Last.) *flaccidum*, Hk.; *st.* tufted, 1 ft. or more l., slender, stramineous, naked; *fr.* 12-18 in. l., 6-8 in. br.; *pinnae* 3-4 in. l., 1 in. br., cut down to a rachis with a narrow distinct wing into oblong lobes 2 lin. br. cut about halfway down; lower *pinnae* distant, shorter than the others and deflexed; *texture* herbaceous; the stramineous *rachis* and under side villose; *veinlets* forked or in the lower lobes subpinnate; *sori* about midway between the edge and midrib.—*Hk. Sp.* 4. p. 133. *t.* 263.

Hab. Himalayas (up to 6,000 ft.) to Ceylon and Java.—General habit of some of the least-cut forms of *A. Filix-fœmina*.

84. *N.* (Last.) *Brunonianum*, Hk.; *st.* tufted, 4-6 in. l., black, densely clothed with large dark-brown lanceolate scales; *fr.* 12-18 in. l., 2-4 in. br., with numerous, close, subequal, oblong-lanceolate, blunt *pinnae*, the lower ones reduced, the largest  $1\frac{1}{2}$ -2 in. l.,  $\frac{3}{4}$  in. br., cut down nearly to the rachis into sharply-toothed blunt lobes  $1\frac{1}{2}$ -2 lin. br.; *texture* herbaceous; *rachises* ebeneous and more or less clothed with long fibrillose scales; under *surface* naked; *sori* copious, about midway between the edge and midrib.—*Hk. Sp.* 4. p. 113. *t.* 251.

Hab. Himalayas, 12-15,000 ft.

85. *N.* (Last.) *barbigerum*, Hk.; *st.* tufted, 6-12 in. l., densely clothed with large bright-brown scales and soft silky hairs; *fr.* 2-3 ft. l., 6-12 in. br.; *pinnae* close, lanceolate, 4-6 in. l., 1-1 $\frac{1}{2}$  in. br.; *pinnae* close, oblong, blunt, the lower ones pinnatifid, the lobes with copious aristate teeth, the edge often incurved; *texture* herbaceous; *rachises* clothed like the stem; *midrib* beneath rather scaly; *sori* in rows close to the midrib of the pinnules.—*Hk. Sp.* 4. p. 113.

Hab. Himalayas, 11-13,000 ft.—This and the preceding are closely allied to one another, but not likely to be confused with anything else.

86. *N.* (Last.) *setosum*, Baker; *st.* tufted, 4-6 in. l., densely clothed with fibrillose scales; *fr.* 12-18 in. l., 6-9 in. br.; lowest *pinnae* the largest, deltoid, 4-5 in. l., 2-3 in. br.; *pinnae* lanceolate,  $1\frac{1}{2}$ -2 in. l., cut down to the rachis below into erecto-patent, entire, linear *segm.*; *texture* herbaceous; *rachises* densely fibrillose; both *surfaces* naked; *veinlets* of the segments 5-6 on a side, the lower ones forked; *sori* in a line close to the midrib.—*A. setosum*, *Blume!* (*non Swartz*).

Hab. Java, *Blume*, *Millett*.

87. *N.* (Last.) *Welwitzschii*, Baker; *st.* 6-12 in. l., pubescent and fibrillose; *fr.* 18 in. l., 1 ft. br.; lower *pinnae* ovate-lanceolate, 6-8 in. l., 2 in. br., cut down nearly or quite to the rachis into linear-oblong *pinnae*.  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., of which the



central ones are the largest, and cut into close lobes more than halfway down to the rachis, but the upper and lower ones nearly entire; *texture* herbaceous; *rachises* finely fibrillose, under side opaque, and scattered over with short, stiff, shining hairs; *veinlets* forked or subpinnate in the lobes; *sori* in rows a short distance from the midvein of the latter; *invol.* small, hairy.

Hab. Angola, *Welwitsch.*—This seems a very distinct plant.

\*\*\*\* *Group of N. spinulosum; caudex erect, fronds small or middle-sized, tri- or quadripinnatifid; involucre firm, persistent.* Sp. 88-117. *Lophodium, Newm.*

† *Fronds oblong-lanceolate or oblong-deltoid.* Sp. 88-101.

88. N. (Last.) *viridescens*, Baker; *st.* tufted, 12-18 in. l., naked, polished, brownish, glossy, with a few lanceolate scales near the base; *fr.* 1½-2 ft. l., 1 ft. br.; lower *pinnæ* the largest; *pinnl.* oblong-lanceolate, pinnatifid, with broad, blunt lobes with a few sharp teeth, the lowest 2-3 in. l., and cut down nearly to the rachis; *texture* herbaceous; *colour* bright green; *rachis* polished; both *sides* naked; *sori* in rows near the midribs of the *pinnl.*; *invol.* ½ lin. br., naked.

Hab. Japan, *Oldham*, 89, 377.—A connecting link between this group and the last.

89. N. (Last.) *fragrans*, Rich.; *st.* densely tufted, very short, clothed with large ovate concolorous scales; *fr.* 6-9 in. l., 1½-2 in. br., oblong-lanceolate; *pinnæ* ¾-1 in. l., ¼-⅓ in. br., cut down nearly to the rachis below into oblong lobes, which are again toothed or pinnatifid; lower *pinnæ* reduced gradually; *texture* coriaceous; *rachises* densely scaly; *veins* subpinnate in the lower lobes of the *pinnules*, the lower part of which is often quite covered with the *sori*; *invol.* very large and membranous.—*Hk. Sp.* 4. p. 122. *Hk. & Gr. t.* 70.

Hab. Caucasus to Kamschatka, and Arctic America to Wisconsin.

90. N. (Last.) *rigidum*, Desv.; *st.* tufted, 6 in. l., densely clothed below with large lanceolate or ovate concolorous scales; *fr.* 12-18 in. l., 4-6 in. br., oblong-lanceolate; largest *pinnæ* 2-3 in. l., 1-1½ in. br., the *pinnl.* of the lower half free, ovate-rhomboidal, cut down nearly to the rachis below; *teeth* mucronate; *texture* herbaceous; *rachises* usually scaly; under *side* slightly glandular; *veinlets* subpinnate in the lower lobes of the *pinnules*; *sori* close to the midrib; *invol.* firm, prominent, fringed with glands.—*Hk. Sp.* 4. p. 160. *B. F. t.* 16.

Hab. Britain to Spain, Greece, Syria, and Asia Minor; California, N. W. Mexico.—The S. European and American forms (*A. pallidum*, Link, and *A. argutum*, Kaulf.) have the lower *pinnules* often 1-1½ in. l., with the *veins* copiously pinnate in the lower lobes.

91. N. (Last.) *spinulosum*, Desv.; *st.* tufted, about 1 ft. l., sparingly clothed with ovate concolorous scales; *fr.* 12-18 in. l., 6-8 in. br., oblong-lanceolate; lower *pinnæ* subdeltoid, 3-4 in. l., 1½-2 in. br., the lowest pair about equal to the next; *pinnl.* ovate-lanceolate, the largest about 1 in. l., ½ in. br., cut down to the rachis below into close oblong lobes with copious aristate teeth; *texture* herbaceous; *rachis* stramineous, scarcely scaly; under *surface* not glandular; *colour* pale-green; *invol.* not gland-ciliated.—*Hk. Brit. F. t.* 20.—β, *N. dilatatum*, Desv.; *scales* denser and narrower, dark-brown in the centre; *fr.* ovate-lanceolate or subdeltoid, larger and more deeply cut, the *colour* a darker and brighter green, the *pinnæ* closer, the under *surface* often finely glandular, the *invol.* gland-ciliated.—*Hk. B. F. t.* 19.—γ, *N. remotum* (A. Br. sub *Aspid.*); *scales* lanceolate, concolorous, extending to the rachis; *fr.* oblong-lanceolate, about 2 ft. l., 6 in. br.; *pinnæ* lanceolate, close; *pinnl.* ovate-oblong, only the lowest free, the largest about 1 in. l., ½ in. br., cut halfway down to the rachis or more, spinulose teeth few; under *side* and *invol.* not glandular.—*Hk. Brit. F. t.* 22.—δ, *N. Boottii* (Tucker, sub *Aspid.*); habit and scales of α; *pinnæ* distant,

lanceolate; lowest *pinnl.* scarcely free, the largest about  $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. br., cut from one-third to halfway down to the rachis below.—*L. collina*, Newm.— $\epsilon$ , *lepidota*, Moore; *rachises* chesnut-brown, scaly; *fr.* subdeltoid; lower *pinnæ* deltoid, 5-6 in. each way; lowest *pinnl.* much the largest, often 3 in. l., 2 in. br., its *segm.* cut down to the rachis below and with lobes again deeply pinnatifid.—*Hk. Sp. 4. p. 127.*

Hab. Arctic Europe and America southward to Madeira, the Mediterranean, W. Himalayas, and Carolina, and found also sparingly in Bourbon and Cape Colony.—A very variable plant. Var.  $\gamma$  is the most distinct form, and from this  $\alpha$  recedes in the direction of *N. cristatum*, and  $\gamma$  towards *Filix-mas*. The common N. American form (*A. intermedium*, Muhl.) has an oblong-lanceolate frond and pale scales, but is generally larger and more finely cut than our typical plant. *L. glandulosa*, Newm., is most like  $\beta$ , but the scales are few and pale, and the frond is narrower, with the under side more distinctly glandular.

92. *N. (Last.) Eatoni*, Baker; *st.* 1 ft. l., stramineous, clothed copiously with squarrose purplish fibrillose scales; *fr.* 12-18 in. l., 6-9 in. br., ovate-lanceolate; upper *pinnæ* lanceolate, lowest pair subdeltoid, 4-5 in. l., 2-3 in. br.; *pinnl.* lanceolate, close, cut down nearly or quite to the rachis into close, blunt, subentire, linear-oblong lobes; *texture* herbaceous; *rachis* stramineous and fibrillose like the stem; under *side* slightly villose and glandular; *sori* small, copious; *invol.* gland-ciliated.

Hab. Kakeah and Loo Choo Isles, E. Asia, *C. Wright*.—Habit and cutting of *N. dilatatum*, from which it differs by its dense fine spreading hair-like scales and slightly villose rachises and under surface.

93. *N. (Last.) mexicanum*, Hk.; *st.* tufted, 12-18 in. l., stramineous, scaly towards the base; *fr.* 1-2 ft. l., 6-12 in. br., ovate-lanceolate; *pinnæ* lanceolate, 3-6 in. l.,  $1\frac{1}{2}$ -2 in. br., the divisions sometimes spatulate, not cut down quite to the rachis and nearly entire, but more usually the lower ones free, subdeltoid, and deeply pinnatifid; *texture* firm, herbaceous; *colour* pale-green; *rachis* and both surfaces naked; *sori* in rows about midway between the edge and midrib; *invol.* naked, conspicuous.—*Hk. Sp. 4. p. 138. t. 267.* *A. leptorachis*, Kze.— $\beta$ , *A. chærophyllodes*, Moritz.; more compound, lower *pinnæ* sometimes 9-12 in. l., 3-4 in. br.; *pinnl.* lanceolate, cut down nearly to the rachis into oblong crenated lobes.

Hab. West Indies and Mexico to Brazil and Ecuador.—The involucre are sometimes orbicular and peltate. There is a wide range in cutting between the extremes,  $\beta$  resembling the larger forms of *Filix-mas*.

94. *N. (Last.) sparsum*, Don; *st.* tufted, 6-12 in. l., scaly only towards the base, stramineous and glossy upwards; *fr.* 1-2 ft. l., 8-12 in. br., ovate-lanceolate; lowest *pinnæ* the largest, 4-6 in. l.,  $1\frac{1}{2}$ -2 in. br.; lowest *pinnl.* sometimes compound, the others lanceolate, unequal-sided, pinnatifid, with oblong, blunt lobes; *texture* firm, herbaceous; *rachis* naked or slightly scaly, both sides naked; *colour* pale-green; *sori* usually one to each lobe near the midrib; *invol.* naked, flat, 1 lin. br.—*N. purpurascens*, *Hk. Sp. 4. p. 132. t. 262.*

Hab. N. India to N. China, Ceylon, and Malay Isles; Mauritius.—This species resembles the last, and rivals it in range of size and cutting. Mettenius regards *A. purpurascens*, Blume, as distinct, characterized by being more rigid in texture, with divisions not so unequal-sided and the frond larger and more divided. *L. deltoidea*, Beddome, *t. 248*, from Ceylon, has subdeltoid fronds and pinnules  $\frac{1}{4}$ - $\frac{3}{8}$  in. br.

95. *N. (Last.) undulatum*, Baker; *st.* tufted, 6-12 in. l., scaly towards the base, glossy, and stramineous upwards; *fr.* 1 ft. or more l., 6-8 in. br., ovate-deltoid, the main *rachis* very distinctly zigzag, the *pinnæ* deflexed and then curved upwards, imbricated, subdeltoid, the lowest pair the largest, 4-6 in. l.,



2-3 in. br.; secondary and tertiary rachises also zigzag; lower *pinnl.* subdeltoid; *segm.* 2-3 lin. br., ovate-rhomboidal or pinnatifid; both *sides* naked; *colour* pale-green; *sori* large, 3-4 to the lower *segm.* near the midrib.—Aspid. *Thwaites*. *Lastrea*, *Beddome*, t. 271.

Hab. Ceylon, *C. P.* 3858.—Perhaps not distinct from the last, with which it agrees, except in the peculiar zigzag rachises.

96. *N.* (Last.) *deparioides*, Hk.; *st.* 1 ft. or more l., firm, slightly scaly below; *fr.* 1½-2 ft. l., 8-10 in. br., oblong-lanceolate; lower *pinnæ* 4-6 in. l., 2 in. br., lanceolate, cut down to the rachis below into unequal-sided, stalked, deltoid *pinnl.* with broad, blunt subquadrangular lower lobes and prominent teeth; *texture* herbaceous; *rachis* and both surfaces naked; *sori* terminal in the teeth, which the convex involucre quite conceal.—*Hk. Sp.* 4. p. 139. *Fil. Ex.* t. 3. *Diclosodon*, *Moore*.

Hab. Ceylon and S. India.—Teeth very distinct and *sori* quite terminal, so the plant resembles *Déparia*, a character quite unique in the genus.

97. *N.* (Last.) *Thwaitesii*, Baker; *st.* 1 ft. or more l., slender, stramineous, slightly scaly below; *fr.* 12-18 in. l., 6-8 in. br., lanceolate-deltoid; *pinnæ* lanceolate, 3-4 in. l., 1½ in. br.; *pinnl.* distant, subdeltoid, unequal-sided, slightly bluntly lobed below, obliquely truncate at the base on the lower side; *colour* pale-green; *texture* herbaceous; *rachis* and both sides quite naked; *sori* small, quite marginal; *invol.* naked.—A. *concinnum*, *Thwaites* (*non Mett.*).

Hab. Ceylon.—Very like the last in outline, but quite different in fruit.

98. *N.* (Last.) *sphaerocarpum*, Hk.; *st.* 6 in. l., slender, stramineous, clothed below with a few lanceolate scales; *fr.* 12-18 in. l., 6-8 in. br., ovate-lanceolate; lower *pinnæ* 3-4 in. l., 2 in. br., lanceolate-deltoid; *pinnl.* lanceolate, cut down to the rachis below into small oblong toothed lobes; *texture* herbaceous; *rachis* stramineous, slightly scaly; both *surfaces* naked; *sori* mostly solitary at the base of the lobes; *invol.* large, reniform, membranous.—*Hk. Sp.* 4. p. 139. *Athyrium*, *Fée*.

Hab. Mexico.—Thinner in texture than *N. mexicanum*, and the fruit different.

99. *N.* (Last.) *athamanticum*, Hk.; *st.* tufted, stout, stramineous, 1 ft. l., clothed at the base with large concolorous linear scales; *fr.* 1-2 ft. l., 6-9 in. br., oblong-lanceolate; *pinnæ* imbricated, the lower ones 4-6 in. l., 2-3 in. br., the *pinnl.* cut down to the rachis below into blunt oblong-rhomboidal lobes; *texture* subcoriaceous; *colour* pale-green, the stramineous rachis and both sides naked; *veinlets* immersed, copiously pinnate in the lower lobes; *sori* close to the midrib; *invol.* large, persistent.—*Hk. Sp.* 4. p. 125. t. 258.

Hab. Cape Colony to Natal and Angola.—Most like *N. sparsum* in texture, but more divided.

100. *N.* (Last.) *inæquale*, Hk.; *st.* 1 ft. or more l., with a dense tuft of reddish-brown lanceolate scales at the base and a few upwards; *fr.* 1-2 ft. l., 8-12 in. br., ovate-deltoid; lower *pinnæ* rather shorter and broader than the next, which are 6-8 in. l., 2-3 in. br.; *pinnl.* lanceolate, cut down nearly to the rachis into oblong spinoso-serrated *segm.*; *texture* herbaceous; *colour* dark-green; *rachises* and both surfaces nearly naked; *sori* in two rows near the midribs; *invol.* firm, naked.—*Hk. Sp.* 4. p. 125.

Hab. Cape Colony and Natal.—Intermediate in habit between *N. spinulosum* and the large forms of *Filix-mas*.

101. *N.* (Last.) *Falconeri*, Hk.; *st.* 1 ft. l., densely clothed throughout with concolorous scales, varying from ovate to subulate; *fr.* 1½-2 ft. l., 8-10 in. br.,

oblong-lanceolate; *pinnæ* 4-5 in. l.,  $1\frac{1}{2}$ -2 in. br., largest *pinnl.* 1 in. l.,  $\frac{1}{4}$  in. br., cut down nearly to the rachis into oblong, blunt lobes with revolute edges; *texture* herbaceous; *rachises* densely fibrillose; *sori* in rows close to the midrib of the *pinnl.*—*Hk. Sp. 4. p. 123. t. 254.*

Hab. Cashmere, *Falconer*.—Seems a well-marked species, most like *N. fragrans* on a large scale.

†† *Fronds subdeltoid.* Sp. 102-117.

102. *N. (Last.) stipitatum*, Baker; *st.* 8-9 in. l., flexuose, densely scaly at the base; *fr.* 3-4 in. each way, deltoid; *pinnæ* 6-9, the lowest  $1\frac{1}{2}$  in. l., unequal-sided, ovate-lanceolate, cut down to a narrowly-winged rachis into oblong, obtuse lobes, the lowest subpinnate; *veinlets* of the lobes 4-6 on a side, the lower ones forked; *texture* subcoriaceous; *rachis* and both sides naked; *sori* close to the midrib; *invol.* coriaceous, glabrous, persistent.—*Aspid. Mett. p. 60.*

Hab. Ladrões, *Mertens*.—With this we are not acquainted.

103. *N. (Last.) hirtum*, Hk.; *st.* tufted, 4-8 in. l., wiry, brown, densely fibrillose; *fr.* 4-6 in. l., 3-4 in. br., subdeltoid; lower *pinnæ* much the largest and lowest *pinnl.* larger than the others, which are  $\frac{1}{2}$ -1 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., cut down to the rachis below into spatulate, usually entire, blunt lobes; *texture* herbaceous; *colour* bright-green; *rachises* fibrillose; under *surface* glandular; *veinlets* pinnate in the lower lobes; *sori* small, distant from the midrib.—*Hk. Sp. 4. p. 123. Cystopteris, Klotzsch.*

Hab. West Indies, and gathered also by Mr. Curror in West Tropical Africa.

104. *N. (Last.) squamisatum*, Hk.; *st.* tufted, 1 ft. l., densely clothed with linear and upwards with fibrillose scales; *fr.* 1 ft. or more l., 8-9 in. br., subdeltoid; lower *pinnæ* the largest, subdeltoid, 4-6 in. l.; 2-3 in. br.; *pinnl.* lanceolate-deltoid, cut down to the rachis below into pinnatifid, blunt, oblong-deltoid lobes; *texture* firm, herbaceous; *rachises* fibrillose; both *sides* naked; *sori* in rows near the midrib.—*Hk. Sp. 4. p. 140. t. 263.*

Hab. Fernando Po (4000 ft.) *G. Mann*.—Most like *sparsum* and *mexicanum* in cutting and texture.

105. *N. (Last.) chinense*, Baker; *caud.* decumbent; *st.* about 6 in. l., slender, substramineous, clothed throughout with linear dark-brown scales; *fr.* 12-15 in. l., 6-9 in. br., subdeltoid; *pinnæ* few, the lowest much the largest, 5-6 in. l., 3-4 in. br.; lowest *pinnl.* much longer than the others, which are lanceolate, with distinct, oblong-deltoid, deeply pinnatifid lower *segm.*; *texture* herbaceous; *rachises* naked or slightly scaly; under *surface* almost naked; *sori* copious,  $\frac{1}{3}$  lin. br., distant from the midrib.

Hab. N. China, *Col. Urquhart*; Korea, *Wilford*; Japan, *Dickens*.

106. *N. (Last.) glabrum*, Baker; *st.* 6-9 in. l., naked, stramineous above, clothed towards the base with lanceolate concolorous scales; *fr.* 1 ft. or more l., 6-9 in. br.; lowest *pinnæ* the largest, subdeltoid, 4-5 in. l., 2-3 in. br.; *pinnl.* close, lanceolate, cut down to the rachis below into small, oblong, pinnatifid *segm.* with mucronate teeth; *texture* herbaceous; *rachis* and both sides naked; *sori* copious, submarginal; *invol.* naked.—*Lastrea, Brack.*

Hab. Sandwich Islands.—Very near the preceding.

107. *N. (Last.) tenuifolium*, Hk.; *st.* about 1 ft. l., slender, clothed throughout with small, grey, lanceolate scales; *fr.* 12-18 in. each way, deltoid; lower *pinnæ* much the largest, unequal-sided, deltoid; lowest *pinnl.* 3-4 in. l.,  $1-1\frac{1}{2}$  in. br., the rest lanceolate, cut down to the rachis below into oblong, bluntly-toothed lobes; *texture* herbaceous; *rachises* and midribs scaly and villose; both *sides*



glandular and grey, with short stiff hairs; *sori* small, medial.—*Hk. Sp.* 4. p. 144.

Hab. Fiji, Brackenridge, Milne.

108. N. (Last.) *edentulum*, Baker; *st.* stramineous; *fr.* upwards of 1 ft. l. and nearly as br.; lower *pinnæ* 5-6 in. l., more than 2 in. br., lanceolate-acuminate; *pinnl.* distant, spreading, connected at the base, oblong, obtuse,  $1\frac{1}{4}$  in. l., with oblong, obtuse, entire lobes; *texture* thinly herbaceous; *colour* deep-green; under *surface* fibrillose on the midribs, the rest naked; *veins* 1 to each lobe; *sori* close to the midrib, 1 or 2 to a lobe; *invol.* thin, glabrous, persistent.—*Aspid. Kze.*

Hab. Java.—Our description is from Mettenius.

109. N. (Last.) *cemulum*, Baker; *st.* tufted, 1 ft. l.; *scales* linear-lanceolate, concolorous, dense below; *fr.* lanceolate-deltoid, 12-18 in. l., 6-10 in. br., the lowest *pinnæ* much the largest; lowest *pinnl.* larger than the others, which are ovate-lanceolate, cut down to the rachis below into deeply pinnatifid lobes with aristate teeth; *texture* herbaceous; *rachis* slightly scaly; under *surface* glandular; *invol.* not gland-ciliated.—*Polyp. Sol. N. spinulosum*  $\gamma$ , *Hk. Sp.* 4. p. 127. *Brit. F. t.* 20. N. *Fæniseccii*, Lowe. L. *recurva*, Newm.

Hab. Britain, Madeira, Azores.—Smelling like hay when dried, the *pinnæ* and *pinnules* with the edge turned upwards in the growing plant.

110. N. (Last.) *Karwinskyanum*, Baker; *st.* 6-9 in. l., slender, stramineous, with a few small concolorous scales; *fr.* 12-15 in. l., 8-12 in. br., deltoid; lower *pinnæ* much the largest, oblong-deltoid; *pinnl.* close, lanceolate,  $1-1\frac{1}{2}$  in. l., cut down below nearly to the rachis into oblong bluntly-toothed lobes; *texture* herbaceous; *rachis* slender, slightly scaly; under *surface* mealy, with fine glands; *sori* at the base of the lobes; *invol.* prominent, ciliated.—*Aspid. Mett.* p. 59.

Hab. Mexico and Guatemala.—Differs from *sphaerocarpum* by its glandular fronds and deltoid outline.

111. N. (Last.) *Napoleonis*, Bory; *st.* 6-12 in. l., densely scaly at the base, naked upwards; *fr.* 12-18 in. l., 8-12 in. br., subdeltoid; lower *pinnæ* much the largest; *pinnl.* of the under side the longest,  $\frac{1}{2}$  in. br., linear-lanceolate, close, cut down nearly to the rachis into slightly-toothed, broad, blunt lobes; *texture* subcoriaceous; *rachis* and both sides naked; *sori* close to the midrib; *invol.* naked.—*Hk. Sp.* 4. p. 123. t. 255.

Hab. St. Helena.

112. N. (Last.) *Ascensionis*, Hk.; *st.* tufted, stout, densely clothed with dark-brown linear scales; *fr.* 8-12 in. l., 4-6 in. br., subdeltoid; *pinnæ* imbricated, the lower ones 3-4 in. l., 2 in. br.; *pinnl.* linear-lanceolate,  $\frac{1}{4}$  in. br., cut down to the rachis into subentire, oblong lobes; *texture* subcoriaceous; *rachises* scaly; *sori* one at the base of each lobe.—*Hk. Sp.* 4. p. 124. t. 257.

Hab. Island of Ascension.

113. N. (Last.) *cognatum*, Hk.; *st.* tufted, stout, 1 ft. l., densely clothed with large ovate scales; *fr.* 2-3 ft. l., 12-18 in. br., ovate-deltoid; *pinnæ* close, lanceolate, 6-9 in. l.,  $1\frac{1}{2}$  in. br., the lowest pair broadest; *lobes* oblong, bluntish, 3-4 lin. br., broadly toothed; *texture* subcoriaceous; *rachises* scaly; *sori* in rows midway between the edge and midrib.—*Hk. Sp.* 4. p. 123. t. 256.

Hab. St. Helena.

114. *N. (Last.) rubiginosum*, Hk.; *st.* 1 ft. l., densely clothed with large linear scales at the base, and upwards with spreading smaller ones; *fr.* 12-18 in. l., 1 ft. br., subdeltoid; *pinnae* lanceolate, the lowest the largest, deltoid, 6-8 in. l., 3-4 in. br.; *pinnl.* close, lanceolate, cut down to the rachis into slightly-toothed, oblong, blunt *segm.*; *texture* herbaceous, both *sides* naked; *rachises* fibrillose; *sori* close to the midrib.—*Hk. Sp. 4. p. 143.*

Hab. Sandwich Islands, *Brackenridge*.—The scales of the rachis are quite subulate, with alternate coloured and colourless cells. *N. Figiense*, Hk. 2nd Cent. t. 67, is probably distinct; the frond is larger and less deltoid, the rachises are less scaly, and the lower segments are pinnatifid, with small blunt lobes, with a sorus filling up more than half of them. It was gathered by Milne in Fiji.

115. *N. (Last.) squamigerum*, Hk. & Arn.; *st.* tufted, 1 ft. l., clothed throughout with lanceolate scales; *fr.* 12-18 in. l., 6-9 in. br., ovate-deltoid; *pinnae* close, lanceolate, the lowest pair subdeltoid, 6-9 in. l., 3-4 in. br.; *pinnl.* lanceolate, close, more or less deeply pinnatifid, with broad blunt lobes; *texture* herbaceous; *rachises* and midribs of the pinnules beneath scaly; *sori* in rows near the midrib.—*Hk. Sp. 4. p. 144. t. 280.*

Hab. Sandwich Islands.—Unique in the group in the dense scaly clothing of its rachises.

116. *N. (Last.) Bojeri*, Baker; *st.* 6-9 in. l., naked, stramineous, the scales lanceolate, concolorous, confined to the base; *fr.* 1½-2 ft. l., nearly as br., deltoid; *pinnae* imbricated, the lowest the largest, lanceolate, sometimes 1 ft. l., 4 in. br.; *pinnl.* lanceolate, cut down to the rachis below into oblong-ligulate subentire lobes; *texture* herbaceous; *rachis* and both surfaces naked; *veinlets* forked; *sori* distant from the midrib; *invol.* firm, naked.—*N. Boryanum*, *Hk. Sp. 4. p. 126.*

Hab. Mauritius and Bourbon.—Mettenius has shown another quite different plant to be Willdenow's *Boryanum*. The alliance of this is *N. Napoleonis*, but the frond is more compound.

117. *N. (Last.) odoratum*, Baker; *st.* 12-18 in. l., stramineous, glossy, densely clothed at the base with a tuft of lanceolate bright-brown scales; *fr.* 9-18 in. l., deltoid; lowest *pinnae* much the largest, deltoid, 6-9 in. l., 3-4 in. br.; *pinnl.* lanceolate, often imbricated, with ovate or oblong pinnatifid *segm.* with blunt rounded lobes; *texture* herbaceous; *colour* pale-green; *rachis* and under side more or less pubescent; *sori* copious; *invol.* large, pale, villose.—*Aspid. Bory. N. hirsutum*, *Don. N. eriocarpum*, *Dec. Hk. Sp. 4. p. 141.* *Hypodematum*, *Kunze.*

Hab. *N. India* (up to 7-8000 ft.), *S. China*, *Malayan Peninsula*, *Mauritius*, *Cape Verdes*.—A well-marked species, which specimens from Bojer show is *A. odoratum* of Willdenow.

\*\*\*\*\* *Rhizome wide-creeping. Fronds small or middle-sized, deltoid, tri- or quadripinnatifid. Sp. 118-125.*

118. *N. (Last.) pubescens*, Desv.; *st.* 6-18 in. l., slender, deciduously villose; *fr.* 6-18 in. l., deltoid; lower *pinnae* much the largest; *pinnl.* lanceolate; lower *segm.* usually free, oblong-rhomboidal, unequal-sided; *teeth* mucronate; *texture* subcoriaceous; *rachises* often densely villose and under side more or less pubescent; *colour* pale-green; *sori* small, distant from the midrib.—*Hk. Sp. 4. p. 146. Hk. & Gr. Ic. t. 102.*

Hab. *West Indies*.—Veins sometimes anastomosing. *Phegopteris Portoricensis*, *Fée*, and *Polyp. sericeum*, *Hk. Sp. 4. p. 258*, are non-involucrate forms.

119. *N. (Last.) Parishii*, Hk.; *st.* 6-9 in. l., slender, naked, ebeneous; *fr.* 6-8



in. each way, deltoid, the lower *pinnæ* much the largest; lower *pinnl.* larger than the others, which are oblong-lanceolate, acuminate,  $1\frac{1}{2}$ -2 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., cut down nearly to the rachis into close, oblong lanceolate, crenated lobes; *texture* membranous; *rachises* and under surface pubescent; *veinlets* pinnate in the lobes; *sori* in rows not far from the midrib.—*Hk. Sp. 4. p. 131. t. 260.*

Hab. Moulmein, *Rev. C. S. Parish.*—Very different in texture from the rest of the group, and like species 71-2, approximating to some *Sagenie* in the sori being usually terminal on branch veins.

120. N. (Last.) *subquinquefidum*, Hk.; *st.* 1 ft. or more l., brownish, firm, naked or villose upwards; *fr.* 6-18 in. each way; lower *pinnæ* much the largest, with the *pinnl.* on the lower side much larger than the others, which are 1-3 in. l.,  $\frac{3}{4}$ -1 in. br., often cut down nearly to the rachis below into broad, oblong lobes; *texture* herbaceous; *colour* dark-green; *rachis* more or less villose; *sori* medial.—*Hk. Sp. 4. p. 130.* N. *Vogelii*, *Hk. 2nd Cent. t. 21.* N. *funestum*, *Hk. Sp. 4. p. 129. t. 259.*— $\beta$ , N. *variable*, Hk.; more compound; lower *pinnæ* sometimes 1 ft. l., quadripinnatifid, with lowest *segm.* 1 in. l.,  $\frac{1}{2}$  in. br.—*Hk. Sp. 4. p. 140.* L. *pilosissima*, *J. Sm.*

Hab. West Indies to Brazil, island of Nissobè, Angola, Guinea Coast, Senegambia.—The extremes differ widely in cutting, but pass into one another very gradually. *A. acrocarpon*, Fée, belongs here.

121. N. (Last.) *subsericeum*, Baker; *rhizome* clothed with lanceolate, ferruginous scales; *st.* 7 in. l.; *fr.* 8 in. l., deltoid, tripinnatifid; lowest *pinnæ* ovate-lanceolate, unequal-sided; *pinnl.* ovate-rhomboidal, obtuse, cut down to a narrow wing into toothed or pinnatifid *segm.*; *texture* thin, flaccid; both *sides* slightly and the midrib above densely clothed with soft spreading hairs; *sori* 1 to each lobe.—*Aspid. Mett. Fil. Nov. Cal. p. 74.*

Hab. New Caledonia, *Vicillard.*

122. N. (Last.) *decompositum*, R. Br.; *rhizome* wide-creeping; *st.* 12-18 in. l., scaly only at the base, firm, villose; *fr.* 1-2 ft. l., 1 ft. or more br., ovate-lanceolate or deltoid; lower *pinnæ* much the largest, deltoid, 4-9 in. l., 2-4 in. br.; *pinnl.* lanceolate, more or less deeply pinnatifid; *segm.* unequal-sided, ovate-rhomboidal, deeply pinnatifid, with toothed lobes; *rachis* and under side more or less villose; *sori* rather large, placed midway between the midrib and edge.— $\beta$ , N. *glabellum*, A. Cunn.; *rhizome* abbreviated; *fr.* more finely cut, with more copious spinulose teeth, villose only on the rachis above, the surfaces glossy, and lobes not imbricated.—*Hk. Sp. 4. p. 146.*

Hab. Australia, Van Diemen's Land, and New Zealand to Tahiti and Fiji.—Very variable in size, texture, and cutting. Dr. Mueller sends a form with suppressed involucres. *A. Shepherdii*, Kze. (*L. acuminata*, Moore) is most like *a* in cutting, but the rhizome is abbreviated and the frond narrower.

123. N. (Last.) *velutinum*, Hk. fil.; *st.* 1 ft. or more l., bright-brown, villose upwards, scaly only at the base; *fr.* 12-18 in. l., by nearly as broad, deltoid; lower *pinnæ* much the largest, deltoid; lowest *pinnl.* larger than the others, which are close, lanceolate, cut down to the rachis below into pinnatifid, oblong lobes; *texture* herbaceous; *rachises* densely villose, and both sides softly pubescent; *sori* small, copious; *invol.* gland-ciliated.—*Hk. Sp. 4. p. 145.*

Hab. New Zealand.—Principally distinguished from the preceding by its more flaccid habit and densely villose surface and rachises. We have similar but not quite identical plants from Queensland and Fiji.

124. N. (Last.) *recedens*, Hk.; *st.* about 1 ft. l., erect, villose, soft, clothed at the base with squarrose linear scales; *fr.*  $1\frac{1}{2}$ -2 ft. l., 1 ft. or more br., deltoid;

lower *pinnæ* much the largest, 6-12 in. l., 3-6 in. br.; *pinnl.* of the lowest side the largest, often 6 in. l., 2 in. br., with distinct, one-sided, lanceolate *segm.* with close slightly-toothed linear-oblong lobes; *texture* firm; *rachises* villose; *under side* nearly naked; *sori* small, 6-8 round the edge of the larger lobes.—*Hk. Sp. 4. p. 135. t. 265.*

Hab. Philippines, Neilgherries, and Ceylon.—In its mode of growth this agrees with the two preceding. Our description is taken from living specimens sent by Dr. Thwaites.

125. N. (Last.) *Vieillardii*, Baker; *st.* strong, erect, slightly fibrillose towards the base; *fr.* 12-18 in. l., 1 ft. or more br., deltoid; lowest *pinnæ* 6-8 in. l., 3-5 in. br., the lowest *pinnl.* the largest, the others lanceolate, cut down nearly to the rachis at the base into entire or toothed linear-oblong lobes; *texture* subcoriaceous; *rachis* and both sides naked; *sori* small, medial.—*Aspid. Mett. Fil. Nov. Cal. p. 75.*

Hab. New Caledonia, *Vieillard*, 1604, 1610.—Largest uncut ultimate lobes 2 lin. br., 3 lin. deep, and texture like that of *Polystichum*.

\*\*\*\*\* *Fronde ample (more than 1½-2 ft. l., 1 ft. br.), decomposed. Sp. 126-153. Involucre often small and fugacious.*

† *Texture herbaceous. Sp. 126-146.*

126. N. (Last.) *membranifolium*, Presl; *st.* tufted, 1 ft. or more l., rather slender, glossy, clothed with linear dark-brown scales towards the base; *fr.* 1-3 ft. l., 9-18 in. br., deltoid; lower *pinnæ* varying from simply pinnatifid, with broad blunt lobes, to 1 ft. l., with similar pinnatifid *pinnl.*, the centre usually uncut for a breadth of  $\frac{1}{4}$ - $\frac{1}{2}$  in., and the uncut bluntish or acute ult. divisions as broad; *colour* bright-green; *texture* papyraceo-herbaceous; *rachis* and both surfaces nearly naked; *sori* copious, generally submarginal; *invol.* flat,  $\frac{1}{2}$ - $\frac{3}{4}$  lin. br.—*Hk. Sp. 4. p. 131. Polyp. Milne, Hk. Sp. 4. p. 254.*

Hab. N. India and Philippines to Samoa, New Caledonia, Ceylon, S. W. Australia, and Madagascar.—Habit of *N. cicutarium*, and similarly variable in size, but the veins only casually uniting. *A. Gardnerianum*, Mett., is doubtless the same, and *P. Milnei* is evidently a compound non-indusiate form. Probably it is *A. sinuatum*, Labill., but the figure represents the stem as too scaly and the involucre as orbicular.

127. N. (Last.) *Milnei*, Hk.; *st.* 1 ft. or more l., naked, polished, ebeneous; *fr.*  $1\frac{1}{2}$ -2 ft. l., 1 ft. or more br., subdeltoid; lower *pinnæ* much the largest, 6-9 in. l., 4-5 in. br.; *pinnl.* close, lanceolate, cut down throughout to a narrowly-winged rachis into narrowly-oblong, crenated or pinnatifid lobes; *texture* subcoriaceous; *rachises* ebeneous; both *surfaces* naked; *colour* deep green; *veinlets* immersed, the *sori* terminal on short lateral branches.—*Hk. Sp. 4. p. 143. 2nd Cent. t. 62.*

Hab. Fiji, *Milne*.—Somewhat doubtfully distinct from the preceding, but the texture is firmer and the stem ebeneous.

128. N. (Last.) *splendens*, Hk.; *st.* 2-3 ft. l., stout, polished, chesnut-brown or nearly black, deciduously scaly; *fr.* 3-4 ft. l.,  $1\frac{1}{2}$ -2 ft. br.; lower *pinnæ* often 1 ft. l., 2 in. br., close, lanceolate; *pinnl.* lanceolate-oblong, unequal-sided, blunt, a broad central portion uncut; *texture* subcoriaceous; *rachis* naked, chesnut-brown; both *sides* naked; *veinlets* forked; *sori* in rows near the midrib.—*Hk. Sp. 4. p. 126.*

Hab. Sikkim, Bootan, Malaccas.—In habit this comes nearest the large compound forms of *Filix-mas*, but the dark-coloured polished rachis will at once distinguish it.

129. N. (Last.) *latifrons*, Hk.; *caud.* oblique; *st.* about 1 ft. l., strong, densely clothed with deciduous scales; *fr.* 2-3 ft. l., subdeltoid; lower *pinnæ*



the largest, often 1 ft. l., 6 in. br.; *pinnl.*  $\frac{1}{2}$  in. br., close, lanceolate-acuminate, cut down about halfway to the rachis into blunt, entire lobes  $\frac{1}{4}$  in. or more br.; *texture* herbaceous; under *surface* mealy, with fine glands; *rachises* slightly scaly; *veinlets* of the lobes simple; *sori* large; *invol.*  $\frac{3}{4}$  lin. br.—*Hk. Sp.* 4. p. 138.

Hab. Sandwich Isles.—This also has a habit not unlike that of the large forms of *Filix-mas*. Our description is taken from living plants sent by Dr. Hillebrand.

130. N. (Last.) *ferrugineum*, Baker; *st.* 12-18 in. l., densely clothed throughout with spreading broad ovate concolorous scales; *fr.* 2 ft. l. or more, 12-18 in. br., subdeltoid, the main rachis flexuose and *pinnæ* spreading at a right angle, the lowest 6-9 in. l., 3-5 in. br.; *pinnl.* of the under side the largest, close, lanceolate, bluntish, cut down to the rachis into broad ovate *segm.* with close subentire lobes  $\frac{1}{2}$  in. br.; *rachises* finely pubescent; both *sides* nearly naked; *sori* large, submarginal, 2-3 in a lobe, confined to the upper half.—*Lastrea*, *Beddome, Fil. Ind. t.* 100.

Hab. Neilgherries, *Capt. Beddome*.—This has altogether the habit and cutting of *Sphaopteris barbata*.

131. N. (Last.) *scabrosum*, Baker; *st.* 12-18 in. l., slender, stramineous, furnished throughout with small, ovate, concolorous scales; *fr.*  $1\frac{1}{2}$ -2 ft. l., 12-18 in. br.; lowest *pinnæ* deltoid, 6-9 in. l., 3-5 in. br.; *pinnl.* of the lower side the largest, with free lanceolate *segm.*  $\frac{1}{2}$ -1 in. l., cut down nearly to the rachis into toothed ligulate lobes under 1 lin. br.; *texture* herbaceous; *rachises* viscous-pubescent, the hairs sometimes dense and ferruginous; both *sides* nearly naked; *sori* small, usually 1 at the base of each ult. division; *invol.* small, fugacious.—*Aspid. Kze.*

Hab. Neilgherries, *Schmidt, McIvor, Sir F. Adam*.—*Polyp. nigrocarpum*, *Bedd. t.* 169, is probably this. We have a closely allied plant from Sikkim and Mouleim with tufted fronds, larger and more delicate in texture, which will probably prove distinct.

132. N. (Last.) *angustifrons*, Baker; *rhizome* wide-creeping; *st.* 1-2 ft. l., ebeneous, deciduously scaly; *fr.* 2 ft. l., 6-8 in. br.; *pinnæ* distant, erectopatent, flexuose, lanceolate, 4-6 in. l., 2 in. br.; *pinnl.* distant, lanceolate, cut down to the rachis below into subquadrangular toothed lobes  $\frac{1}{8}$  in. br.; *texture* subcoriaceous; *rachises* and both sides naked; *veinlets* of the lobes forked; *sori* in rows close to the midribs of the pinnules.—*Lastrea*, *Moore*.

Hab. Nepal, *Wallich*.—This seems a well-marked plant, perhaps nearest on the whole to *N. sparsum*.

133. N. (Last.) *oppositum*, *Hk.*; *st.* 1 ft. or more l., densely clothed with spreading, linear, dark-brown scales; *fr.*  $1\frac{1}{2}$ -2 ft. l., 12-18 in. br., subdeltoid; lower *pinnæ* 6-9 in. l., 3-4 in. br.; *pinnl.* close, linear-lanceolate, cut down nearly to the rachis into close, entire, slightly falcate, linear-oblong lobes  $\frac{1}{8}$  in. br.; *texture* herbaceous; *rachises* scaly; *veinlets* of the lobes simple; *sori* small, submarginal; *invol.* thin.—*Hk. Sp.* 4. p. 136. t. 266.

Hab. Mauritius and Bourbon.—This closely resembles the next in cutting, but the spreading scales of the rachis are  $\frac{1}{4}$  in. l., and the sori are more regular and nearer the edge.

134. N. (Last.) *intermedium*, Baker; *st.* 1-2 ft. l., stout, erect, densely clothed at the base with long bright-brown silky fibrils; *fr.* 2-3 ft. l., 12-18 in. br., subdeltoid; lower *pinnæ* lanceolate, often 1 ft. l., 4-5 in. br.; *pinnl.* close, lanceolate, with distinct, oblong-lanceolate *segm.* with ligulate subentire lobes about 1 lin. br.; *texture* herbaceous, firm; *rachises* slightly fibrillose like the stem; under *surface* naked or slightly scaly on the midribs; *sori* small, copious,

nearer the midrib than the edge; *invol.* thin, fugacious.—Aspid. *Blume!* (non *Muhl.*); *N. Blumei*, *Hk.* (in part).

Hab. N. India to Ceylon, Philippines, Malaccas, and Japan.

135. *N.* (Last.) *lepigerum*, Baker; *st.* 12-18 in. l., angular, clothed only at the base with long, linear-subulate scales; *fr.* 2-3 ft. l., 1½-2 ft. br.; lower *pinnæ* often 1 ft. l., 6 in. br.; lowest *pinnl.* much the largest, sometimes compound, the others lanceolate, cut down to the rachis into broadly-toothed or entire, blunt, linear-oblong *segm.*, the latter 2 lin. br.; *rachises* and costæ beneath rather densely clothed with linear scales; *texture* herbaceous, the rest of the surface naked; *sori* small, copious, nearer the edge than the midrib; *invol.* thin.

Hab. Isle of Bonin; received from the Imperial Academy of St. Petersburg, and the U. S. Expedition of 1853-6.—Differs from the preceding by its larger lobes, distinct linear basal scales, and scaly under surface.

136. *N.* (Last.) *obtusilobum*, Baker; *st.* 1-2 ft. l., firm, erect, densely clothed with large, ovate, concolorous scales; *fr.* 3-4 ft. l., 1½-2 ft. br.; lower *pinnæ* often 1 ft. l., 6 in. br.; *pinnl.* lanceolate, most of the *segm.* of the lower ones distinct, ovate-oblong, cut down to the rachis into oblong-rhomboidal entire lobes, the largest ¼ in. deep, ⅓ in. br.; *texture* herbaceous, turning blackish when dried; *rachises* slightly scaly, the upper ones, and especially the under surface, more or less glandular; lower *veinlets* of the entire lobes forked; *sori* medial.

Hab. Ceylon, *Dr. Thwaites*, *C. P.* 3142.—Most like *N. intermedium* in size and cutting, but the scales different, the under side very glandular, and the texture thinner.

137. *N.* (Last.) *Boryanum*, Baker (non *Hk.*); *st.* 2-3 ft. l., stramineous or brownish, deciduously scaly; *fr.* ample, 6-8 ft. l., 2-3 ft. br.; lower *pinnæ* 12-13 in. l., 6 in. br.; *pinnl.* lanceolate, 3-4 in. l., cut down to a winged rachis into blunt, spreading, more or less toothed lobes 2-3 lin. br.; *texture* herbaceous; *rachises* and under side naked; *veinlets* simple or forked; *sori* in rows near the midrib.—*N. divisum*, *Hk. Sp.* 4. p. 133.

Hab. Himalayas (up to 7,000 ft.), Madras, Moulmein, Java, Bourbon. See remarks under *N. Bojeri*.—This is a well-marked plant, and our Mascaren examples quite agree with those from India.

138. *N.* (Last.) *catopteron*, *Hk.*; *st.* 3-4 ft. l., pubescent; *fr.* 4-6 ft. l., 2-3 ft. br., lower *pinnæ* 12-13 in. l., oblong-lanceolate, with close lanceolate *pinnl.* or subdeltoid, with some of the *pinnl.* of the lower side compound; *segm.* oblong, bluntnish, about ½ in. l., ¼ in. br., more or less deeply pinnatifid; *texture* herbaceous; *rachises* and both surfaces villose; *veinlets* forked; *sori* copious; *invol.* firm.—*Hk. Sp.* 4. p. 137. *A. odoratum*, *Mett.* (non *Willd.*)

Hab. Cape Colony to Natal, Mascaren Isles, and Guinea Coast. Specimens from Fernando Po are quite naked on both sides, and have a very distinctly marked wing to the rachis of the pinnules.

139. *N.* (Last.) *setigerum*, Baker; *rhizome* creeping; *st.* 1-2 ft. l., naked upwards or scaly throughout; *fr.* 1-3 ft. l.; lowest *pinnæ* the largest, often 8-12 in. l., 4-6 in. br.; *pinnl.* close, linear-lanceolate, 1-3 in. l., ¼-½ in. br., cut down to the rachis into close pinnatifid lobes not more than 1 lin. br. in the broadest form; *texture* herbaceous; main *rachis* straw-coloured, naked, or more or less fibrillose; *rachises* of the *pinnl.* and under side finely villose; *sori* minute, copious, often 8-12 to a lobe; *invol.* very fugacious.—*Cheilanthes*, *Blume*.—*N. tenericaule*, *Hk. Sp.* 4. p. 142. t. 269. *Aspid. uliginosum*, *Kze. Mett.*

Hab. Japan, China, and N. India to Ceylon and Malay, and Polynesia as far east as the Society Isles.—A common plant within its range, very variable in size and vesti-



ture. It has received many names, of which Blume's is the oldest. *Polypodium pallidum* and *memorale*, Brack. Hk. Sp. 4. p. 266, are apparently only the ordinary form, with suppressed or undeveloped involucre; but Capt. Beddome considers *P. ornatum*, Wallich, as a distinct plant, distinguishable from this by its erect caudex and the constant absence of an involucre.

140. N. (Last.) *subglandulosum*, Baker; *st.* 1 ft. l., stout, polished, reddish-brown, deciduously scaly throughout; *fr.* 2-3 ft. l., 1 ft. br.; lowest *pinnae* much reduced, the largest lanceolate, 6-9 in. l.,  $1\frac{1}{2}$ -2 in. br.; *pinnl.* spreading, close, 1 in. l.,  $\frac{3}{8}$  in. br., cut down nearly to the rachis into close, entire, blunt lobes; *texture* herbaceous; *rachises* of the *pinnae* and under side villose and the latter glandular; *sori* small, about 6 to the larger lobes, placed midway between the midrib and edge.—*Aspidium*, *Mett.*

Hab. Bourbon, *Viellard* and *Deplanche*.—The alliance of this is close with the preceding.

141. N. (Last.) *Grisebachii*, Baker; *st.* 2-3 ft. l., densely clothed at the base with lanceolate scales 1 in. or more l., 1- $1\frac{1}{2}$  lin. br., which leave distinct tubercles when they fall; *fr.* 3-4 ft. l., 2 ft. or more br.; lower *pinnae* often 1 ft. l., 6 in. br.; *pinnl.* close, lanceolate, cut down nearly or quite to the rachis into oblong-toothed *segm.*  $\frac{1}{4}$  in. br.; *texture* herbaceous; *colour* bright-green; *rachis* very slightly fibrillose and under side naked; *sori* small, copious, medial; *invol.* fugacious.—A. amplum, *Griseb.* (*in part*, not *H. B. K.*). N. amplum, *Hk. Sp.* 4. p. 264.

Hab. Cuba, *C. Wright*, 1055.—This differs from the next principally in the scales.

142. N. (Last.) *amplum*, Baker; *st.* 2-3 ft. l., densely clothed at the base with an entangled mass of soft, bright, silky scales; *fr.* 3-4 ft. l., 2 ft. or more br.; lower *pinnae* often 1 ft. l., 6 in. br.; *pinnl.* close, lanceolate, cut down nearly or quite to the rachis into oblong, crenated or pinnatifid lobes 2-3 lin. br.; *texture* herbaceous; *rachises* clothed with soft furfuraceous scales; under *surface* naked or slightly glandular, the rachis often scaly; *sori* copious, small, medial; *invol.* very fugacious.—*Aspid.* *H. B. K.* Polyp. Sloanei, *Kze. Hk. Sp.* 4. p. 263. N. Palatanganum, *Hk. Sp.* 4. p. 260.

Hab. West Indies southward to Ecuador, and a plant from Pitcairn's Island is probably the same.—*Asp. lutescens*, Willd. (Plum. 34), is most likely this species.

143. N. (Last.) *catocarpum*, Hk.; *st.*  $1\frac{1}{2}$ -2 ft. l., densely clothed at the base with long, linear, pale-brown scales; *fr.* 2-3 ft. l.,  $1\frac{1}{2}$ -2 ft. br., subdeltoid; *pinnae* lanceolate-deltoid, 8-12 in. l., 4-6 in. br.; *pinnl.* close, oblong-lanceolate, obtuse, 2-3 in. l.,  $\frac{1}{2}$ - $\frac{5}{8}$  in. br., cut down to the rachis below into close, blunt, nearly entire lobes  $\frac{1}{3}$  in. br.; *texture* herbaceous; *rachises* slightly scaly; *under side* naked; *sori* small, in rows midway between the edge and midrib.—*Hk. Sp.* 4. p. 259.

Hab. Venezuela.—A less compound plant than the last, with larger divisions and different scales.

144. N. (Last.) *furcatum*, Hk.; *st.* 2-3 ft. l., densely clothed with a mass of very narrow intertangled ferruginous scales; *fr.* 3-6 ft. l., 2 ft. or more br.; lower *pinnae* 12-18 in. l., 6-9 in. br., lanceolate or deltoid; *pinnl.* lanceolate; *segm.* oblong obtuse, cut down nearly to the rachis into close, entire lobes  $1\frac{1}{2}$ -2 lin. br.; *texture* herbaceous; all the *rachises* densely clothed with small furfuraceous scales; *costae* beneath slightly scaly; *sori* copious, medial.—*Hk. Sp.* 4. p. 36.

Hab. Columbia to Peru.—This has as large divisions as the last, but is much more compound and scaly, with the basal scales different. The Galapagos *Polyp. paleaceum*, *Hk. Sp.* 4. p. 261, probably belongs here.

145. *N. (Last.) villosum*, Presl; *st.* tufted, 2-3 ft. or more l., stout, usually villose and densely clothed with spreading scales; *fr.* 4-6 ft. or more l., 2-3 ft. or more br.; *pinnæ* often 2 ft. l., 1 ft. br.; *pinnl.* lanceolate, cut down to the rachis into close, oblong, pinnatifid *segm.*; largest entire lobes  $\frac{3}{4}$  in. l.,  $\frac{1}{8}$  in. br.; *texture* herbaceous; *rachises* densely villose and both sides also more or less pubescent; *sori* copious; *invol.* flat,  $\frac{1}{2}$  lin. br., often suppressed.—*Hk. Sp. 4. p. 134. t. 264.*

Hab. West Indies southward to Peru and Chili.—A very fine plant, said to attain sometimes a height of 18 ft. The involucre is as often suppressed as developed. *P. subincisum*, *Karstenianum*, *Berteroanum*, and *vestitum* of the Species Filicum appear to be all villose forms of this without an involucre, and *P. spectabile* a subglabrous form. See Grisebach's West Indian Flora, p. 691.

146. *N. arborescens*, Baker; *caud.* 10-12 ft. high; *fr.* ample; lower *pinnæ* 12-18 in. l., 6-8 in. br.; *pinnl.* lanceolate, distinctly stalked, 3-4 in. l., 1-1 $\frac{1}{4}$  in. br., cut down to the rachis, except at the point, into lanceolate deeply pinnatifid *segm.*  $\frac{3}{8}$ - $\frac{1}{2}$  in. br., which are obliquely truncate on the lower side at the base; *rachis* slightly scaly; *texture* herbaceous; both *surfaces* naked; *veinlets* pinnate in the lobes of the *segms.*; *sori* small, medial; *invol.* naked, firm, persistent, very distinctly reniform.

Hab. Samoa, *Rev. T. Powell.*

†† *Texture coriaceous.* Sp. 147-153.

147. *N. (Last.) Trianae*, Baker; *st.* smooth, stramineous or reddish; *fr.* 1 $\frac{1}{2}$ -2 ft. l., 9-10 in. br., broadly oblong, acuminate, tripinnatifid; *pinnæ* distant, 7 in. l., 2-2 $\frac{1}{2}$  in. br., sublanceolate; *pinnl.* numerous, 1 $\frac{1}{2}$  in. l.,  $\frac{1}{2}$  in. br., unequal-sided, cuneate on both sides at the base, pinnatifid or subpinnatifid, with close, oblong, usually entire lobes; *texture* subcoriaceous; *rachis* and both sides naked; ultimate *veins* simple, the lower ones on the upper side of the midrib falling short of the edge; *sori* dorsal or submarginal; *invol.* large, membranous.—*Aspid. Mett. Fil. Nov. Gran. p. 243.*

Hab. New Granada, *Triana*.—Distinguished by the shape of its pinnules and lower veins not reaching the edge.

148. *N. (Last.) acutum*, Hk.; *st.* 2 ft. or more l., firm, smooth, polished; *fr.* 2 ft. or more l., 12-18 in. br.; lower *pinnæ* oblong-lanceolate, 6-9 in. l., 3-4 in. br.; *pinnl.* linear-lanceolate,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., cut about one-third down to the rachis into blunt falcate lobes; *texture* subcoriaceous; *rachis* and both sides naked; *sori* copious, principally in rows close to the midrib.—*Hk. Sp. 4. p. 147. t. 271.*

Hab. Brazil and Peru.—In outline this comes nearest to *N. furcatum*, but it is quite naked, and more rigid in texture.

149. *N. (Last.) platypus*, Hk.; *st.* 1-3 ft. or more l., smooth, glossy, with a dense tuft of bright-coloured scales at the base; *fr.* 1 $\frac{1}{2}$ -2 ft. l., 1 ft. and more br., deltoid; lower *pinnæ* 6-9 in. l., 3-4 in. br.; *pinnl.* deltoid, obliquely truncate on the lower side at the base; lower *segm.* often free,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., ovate-oblong; *teeth* mucronate; *texture* subcoriaceous; *rachis* and both sides naked and glossy; *sori* large, copious, in rows close to the midrib.—*Hk. Sp. 4. p. 149.*

Hab. Java, Moulmein, Khasia.—A doubtful plant, some of the specimens of which are very like some of the forms of *Aspid. aristatum*, but with a large, distinctly-reniform involucre.

150. *N. (Last.) hispidum*, Hk.; *rhizome* stout, creeping; *st.* 12-18 in. l., brown, densely clothed with squarrose, fibrillose, nearly black scales; *fr.* 12-18 in. l., 8-12 in. br., subdeltoid; *pinnæ* lanceolate, the lowest deltoid; lowest *pinnl.* larger than the others, which are lanceolate, with lanceolate *segm.* cut down



to a winged rachis into small, oblong, or linear, sharply-toothed lobes; *texture* coriaceous; *rachises* fibrillose; both *surfaces* glossy; *sori* copious.—*Hk. Sp. 4. p. 150.*

Hab. New Zealand, Australia (very rare), Mauritius, *Bouton*.—A well-marked plant.

151. *N. (Last.) denticulatum*, *Hk.*; *st.* tufted, 1 ft. or more l., densely clothed with linear scales at the base, naked above; *fr.* 1-2 ft. l., 8-12 in. br., deltoid; lower *pinnæ* much the largest; lowest *pinnl.* larger than the others, which are lanceolate or subdeltoid, with segm. which are again pinnate, with spathulate or subrhomboidal lobes with spinose teeth; *texture* coriaceous; *rachis* and both sides naked, glossy; *sori* scattered, copious.—*Hk. Sp. 4. p. 147.* A. Klotzschii, *Hk. 2nd Cent. t. 23.*

Hab. W. Indies and Guatemala to S. Brazil.—There is a very rigid variety (*A. dissectum*, *Fée*) with linear, mucronate alternate divisions.

152. *N. (Last.) davallioides*, *Baker*; *rhizome* stout, wide-creeping; *st.* strong, 1½-2 ft. l., brownish, naked, the dense fibrillose scales confined to the base; *fr.* 3-4 ft. l., 2 ft. or more br., deltoid; lower *pinnæ* often 1 ft. l. by nearly as broad; *pinnl.* deltoid, with lanceolate or deltoid *segm.*, the lobes of which are again deeply pinnatifid; all the divisions unequal-sided, the ultimate ones small, sublinear, mucronate; *texture* subcoriaceous; *rachis* and both sides nearly naked; *sori* small, copious; *invol.* firm, reniform.—*Lastrea, Brack. p. 202.*

Hab. Fiji, Tahiti, and Samoa.—The alliance of this is with the next species, but it is much more finely cut.

153. *N. (Last.) effusum*, *Baker*; *rhizome* short-creeping; *st.* 2 ft. l. or more, polished, slightly scaly below; *fr.* 3-4 ft. l., 2 ft. or more br., 4-5 pinnatifid; lower *pinnæ* 12-18 in. l., often 1 ft. br.; *pinnl.* close, lanceolate, acuminate; *segm.* lanceolate or subdeltoid, unequal-sided, the lower ones cut down to the rachis into oblong, pinnatifid, bluntish lobes, often ¼ in. br.; *texture* subcoriaceous; *rachises* usually scaly; both sides pale-green, glossy, naked; *sori* copious, scattered; *invol.* generally absent.—*Polyp. divergens, Hk. Sp. 4. p. 265.* *N. amplissimum, Hk. Sp. 4. p. 145.*—β, *N. excultum, Hk.*; *fr.* often tripinnatifid only, the ult. divisions always broader and less deeply cut.—*Hk. Sp. 4. p. 149.*

Hab. Cuba and Mexico to Brazil and Peru.—*P. effusum* and *excultum* appear to be less, and *P. divergens* more divided forms of the same plant. *P. dilatatum, Liebm. Hk. Sp. 4. p. 264,* does not differ materially. *N. macrostegium, Hk. Sp. 4. p. 148,* is apparently a coriaceous variety, with firm, distinctly-developed reniform involucre. We have a single specimen of a plant from West Tropical Africa, gathered by Dr. Curror, which may be this species.

§§ Eunephrodium. *Lower veinlets of contiguous groups united.* Sp. 154-196.

\* *Fronds ligulate, not cut down to the rachis unless at the very base.* Sp. 154-158.

154. *N. Cumingianum, J. Sm.*; *st.* tufted, slender, naked, 2-4 in. l.; *fr.* 3-4 in. l., ½-¾ in. br., lanceolate-oblong, narrowed gradually at both ends, entire or slightly sinuated; *texture* subcoriaceous; both *surfaces* naked; *veins* pinnate, in groups of 2-3 on a side.—*Hk. Sp. 4. p. 63.*

Hab. Panama.

155. *N. Skinneri, Hk.*; *st.* tufted, slender, villose, 2-3 in. l.; *fr.* 6-8 in. l., ¾-1 in. br., lanceolate-acuminate, terminating abruptly below, with oblong-falcate subentire lobes reaching halfway down in the centre, and often quite to the rachis at the base; *texture* papyraceo-herbaceous; lower *side,* especially the

midrib, villose; *veins* in groups of 8-10 on a side, which are slightly united or quite free.—*Hk. Sp. 4. p. 64. 2nd Cent. t. 25.*

Hab. Guatemala, *Skinner*; Andes of Ecuador, *Spruce*, 5293.

156. *N. Wrightii*, *Hk.*; *rhizome* creeping; *st.* 4-6 in. l., firm, erect, greyish; *fr.* 6-9 in. l., 1-1½ in. br., lanceolate-oblong, cut down nearly to the rachis above and quite below into close, oblong, entire, or auricled, spreading lobes ⅓-¼ in. br.; *texture* coriaceous; *rachis* and under surface villose; *veinlets* in groups of 10-18 on a side, sometimes forked; *sori* submarginal.—*Hk. Sp. 4. p. 64. t. 239.*

Hab. Cuba, *Wright*, 824.

157. *N. scolopendrioides*, *Hk.*; *st.* tufted, 2-4 in. l., scaly; *fr.* 1 ft. or more l., 1-2 in. br., oblong-lanceolate, the point acute, central lobes reaching nearly down to the rachis, oblong, nearly entire, close or with a space between them, lower ones quite free and gradually smaller; *texture* papyraceo-herbaceous; *rachis* and under side finely hairy; *veinlets* of the lobes forked or sometimes slightly pinnate and the groups joining; *invol.* very fugacious.—*Hk. Sp. 4. p. 65. Fil. Ex. t. 18. Polypod. L.*

Hab. West Indies.—We include here *Goniopt. strigosa*, *ferax*, *affinis*, and *domingensis* of *Fée*.

158. *N. incisum*, *Baker*; *st.* tufted, 2-6 in. l., stramineous, scaly below; *fr.* 1 ft. or more l., ¾-1½ in. br., linear-oblong, lobes triangular or lanceolate, often not reaching more than one-third down to the rachis, the frond narrowed very gradually below so as to form a scarcely cut wing to the stem; *texture* subcoriaceous; under surface finely villose; *veins* in simply pinnated groups of 6-12 on a side; *invol.* very fugacious.—*Polypod. Sw. N. stenopteris, Hk. Sp. 4. p. 65.*

Hab. West Indies and New Granada.

\*\* *Fronde large, pinnate; rhizome wide-creeping. Sp. 159-176.*

† *Lower pinnæ hardly, if at all, reduced. Sp. 159-170.*

159. *N. Otaria*, *Baker*; *st.* 6-12 in. l., substramineous; *fr.* 1 ft. or more l., with a linear-oblong terminal *pinna* 4-6 in. l., 1-1½ in. br., the apex acuminate, the margin with finely serrated lanceolate lobes reaching ¼-½ of the way down, and 3-6 distant spreading similar lateral ones on each side, the lower ones stalked; *texture* thinly herbaceous; *rachis* and both surfaces naked; *veins* pinnate in each lobe, the groups united from about midway from the midrib to the edge; *veinlets* 6-8 on each side, with sometimes a *sorus* on each.—*N. aristatum, Hk. Sp. 4. p. 62. t. 238. Anisocampium, Presl.*

Hab. Philippines, Neilgherries, Ceylon.

160. *N. distans*, *Hk.*; *st.* 1 ft. or more l., firm, erect, brownish, slightly villose; *fr.* 1½-2 ft. l., 8-10 in. br.; *pinnæ* spreading, 3-4 in. l., ¾ in. br., very slightly lobed, the lower ones rather smaller than the others; *texture* papyraceo-herbaceous; *rachis* and midrib beneath villose and veins slightly so; *veins* pinnate in the lobes, with 5-6 veinlets on a side; rows of *sori* filling up nearly the whole space between the midrib and the next row; *caps.* naked.—*Hk. Sp. 4. p. 76.*

Hab. Madagascar, *Boivin*; Johanna Island, *Dr. Kirk*.—This in venation and *pinnæ* comes under *Abacopteris*, *Fée*; and *Dr. Kirk's* specimens show that it differs distinctly from *N. glandulosum* by its strong wide-creeping rhizome.

161. *N. varians*, *Fée*; *st.* 1 ft. l., smooth, with linear, blackish scales at the



base; *fr.* 1 ft. l., 10 in. br., with 13-15 *pinnæ* on each side, the lower ones 5 in. l.,  $\frac{5}{8}$  in. br., the point acuminate and toothed, the edge lower down bluntly lobed  $\frac{1}{4}$  of the way to the rachis, the base subcuneate; *rachis* and both sides naked; *veins* pinnate in the lobes, with 3-4 veinlets on a side; *sori* medial.—*Fée, Fil. Ant. t.* 24.

Hab. Trinidad, *Germain*.

162. *N. unitum*, R. Br. (non Sieb.); *st.* 12-18 in. l., brownish, naked; *fr.* 2 ft. or more l., 6-8 in. br.; *pinnæ* 4-5 in. l.,  $\frac{1}{2}$  in. br., the edge cut from a third to halfway down into spreading, triangular, sharp-pointed lobes; lower *pinnæ* not dwindling down; *texture* coriaceous; *veins* pinnate in the broad lobes, with 6-8 veinlets on each side, with *sori* near the extremity principally in the lobes; *caps.* naked.—Polyp. *L. fide Mett. Aspid. Mett. Fil. Ind. p.* 230.— $\alpha$ , *A. gongyloides*, Schk.; *rachis* and under side naked.— $\beta$ , *A. propinquum*, R. Br.; *rachis* and under side villose.—*Hk. Sp.* 4. *p.* 79.

Hab. Mexico and West Indies to Brazil and Peru; Polynesian Isles; Hong-Kong and Himalayas to Australia and New Zealand; Mascaren Isles, Natal, Cape Colony, Angola, Guinea Coast, Algiers.—We follow Mettenius in nomenclature, but the *unitum* of the Linnæan herbarium is Sieber's plant, our *cucullatum*.

163. *N. sophoroides*, Desv.; *st.* 1 ft. or more l., slender, stramineous, pubescent; *fr.* 1-2 ft. l., 6-9 in. br.; *pinnæ* spreading, 4-6 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., the apex acuminate, the edge cut about one-third of the way down into oblong-triangular subfalcate lobes; *texture* papyraceo-herbaceous; *rachis* and under surface finely villose; *veins* pinnate in groups, with 8-10 veinlets on a side, with *sori* distant from the midrib; *caps.* naked.—Polyp. *Thunb. A. molle, Hk. Sp.* 4. *p.* 68 (*in part*).

Hab. Japan to Hong-Kong and Formosa.—Very near the preceding in the shape of its *pinnæ* and lobes, but smaller and thinner in texture, and less rigid.

164. *N. pteroides*, J. Sm.; *st.* 1-2 ft. l., slender, stramineous or greyish, slightly scaly below; *fr.* 2-4 ft. l., 1 ft. or more br.; *pinnæ* spreading, 4-8 in. l.,  $\frac{3}{4}$  in. br., the apex acuminate, the edge cut one-third or halfway down into oblong or subtriangular lobes; *texture* papyraceo-herbaceous; *rachis* and both sides nearly naked; *veins* pinnate in the lobes, with 8-10 veinlets on each side; *sori* quite marginal and confined to the lobes.—Polyp. *Retz. N. terminans, Hk. Sp.* 4. *p.* 73. (*in part*).

Hab. Himalayas, Neilgherries, Ceylon (*Gardner*, 1106), Malaccas, Philippines (*Cuming*, 48, 293), S. China, Queensland, Samoa.—This has, like the two preceding, oblong-triangular lobes  $1\frac{1}{2}$ -2 lin. br., not reaching more than one-third down, and differs from them by having the *sori* quite confined to the lobes.

165. *N. extensum*, Hk.; *st.* 1-2 ft. l., naked or slightly pubescent, brownish; *fr.* 2-4 ft. l., 12-18 in. br.; *pinnæ* 6-9 in. l.,  $\frac{5}{8}$ - $\frac{3}{4}$  in. br., cut about two-thirds down to the rachis into linear-oblong lobes; lower *pinnæ* scarcely shorter than the rest; *texture* papyraceo-herbaceous; under *surface* naked or slightly villose; *veinlets* 6-8 on a side, often only the lowest pair united; *sori* in rows, nearly terminal in the veins, and not confined to the lobes.—*Hk. Sp.* 4. *p.* 72. *t.* 240. *A. (in part)*. *Aspid. Bl.!* *A. conioneuron, Mett.*

Hab. Ceylon (*Gardner*, 1362), N. India, Malaccas, Neilgherries (*Beddome*, t. 85), Philippines (*Cuming*, 391).—This is joined to the preceding by Mettenius. The texture is more herbaceous, and the lobes are much narrower and deeper, with a considerable space between them.

166. *N. Serra*, Desv.; *st.* 1 ft. or more l., firm, glossy, stramineous; *fr.* 2-3 ft. l., 1 ft. or more br.; *pinnæ* spreading, 6-12 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., cut down

about halfway to the midrib into subtriangular, falcate, acute lobes, the lowest not smaller than the next pair; *texture* subcoriaceous; *rachis* and both surfaces naked; *veins* pinnate in the lobes, with 6-10 veinlets on a side; *sori* in rows apart from the midrib.—*N. augescens*, *Fée. Hk. Sp. 4. p. 79.*

Hab. West Indies.—According to Grisebach, this is the *Serra* of Swartz. It is distinguished by its very narrow rigid pinnæ, with deep sharp lobes.

167. *N. pallidivenium*, Baker; *st.* 1 ft. or more l., stramineous, naked or nearly so; *fr.* 2-3 ft. l., 8-12 in. br.; *pinnæ* 4-6 in. l.,  $\frac{3}{4}$ -1 in. br., cut two-thirds of the way down to the rachis into linear-oblong, slightly falcate lobes; lower *pinnæ* not much smaller than the rest; *texture* coriaceous; under *surfaces* naked or villose; *veinlets* close, prominent, 12-16 on a side, the small *sori* in close rows about midway between the midrib and edge.—Polyp. *Hk. Sp. 5. p. 8.*

Hab. Guinea Coast, *Vogel, Barter, Mann*; and gathered in the Livingstone Expedition on the shores of Lake Nyassa.—Characterized in the group by its rigid texture, deep, close lobes, and very numerous veinlets.

168. *N. dissectum*, Desv.; *rhizome* stout, wide-creeping; *st.* 1 ft. or more l., stout, brownish, villose; *fr.* 1 $\frac{1}{2}$ -2 ft. l., 8-12 in. br.; *pinnæ* numerous, 4-5 in. l.,  $\frac{1}{2}$  in. br., cut about one-third down into sharp, triangular, falcate lobes; lower *pinnæ* distant and dwarfed; *texture* subcoriaceous; *rachis* and under surface villose; *veins* pinnate in the lobes, with 6-8 veinlets on a side; *sori* in rows close to the midrib; *caps.* setose.—Polyp. *Forst. Asp. Mett. Fil. Ind. p. 232. A. attenuatum, Sw.*

Hab. Common in the Polynesian Islands.—Very like *N. cucullatum*, from which it is distinguished by its setose capsules and lower pinnæ not dwarfed.

169. *N. procurrens*, Baker; *st.* 2 ft. l., villose above; *fr.* 18 in. l., 10 in. br.; *pinnæ* 5-6 in. l., cut down to a narrow wing into oblong, obtuse lobes, the lowest not much shorter than the others and deflexed; *rachis* and both surfaces more or less villose; *texture* herbaceous; *veinlets* 5-6 on a side, with *sori* midway between the midrib and edge.—*Asp. Mett. Fil. Ind. p. 231.*

Hab. Java.—Very like *N. molle*, but distinguished by its creeping rhizome.

170. *N. longipes*, Moore; *st.* 3-4 ft. l., livid; *fr.* 3 ft. l., 9-10 in. br.; *pinnæ* 5-6 in. l.,  $\frac{3}{4}$  in. br., cut two-thirds of the way down into oblique, rather acute, oblong lobes, with a distinct sinus between them; *texture* subcoriaceous; upper *surface* densely hairy on the veins, lower less so; *veins* 8-10 on a side; *sori* placed midway between the midrib and edge.—*Aspid. Bl. Mett. Fil. Ind. p. 231.*

Hab. Java.—With this we are not acquainted.

\*\* *Lower pinnæ conspicuously reduced.* Sp. 171-176.

171. *N. cucullatum*, Baker; *st.* 1 ft. l., strong, erect, brownish, nearly naked; *fr.* 18-24 in. l., 8-12 in. br.; *pinnæ* close, 4-6 in. l.,  $\frac{1}{2}$  in. br., cut down one-third of the way to the rachis into triangular, acute, subfalcate lobes; lower *pinnæ* dwindling down suddenly into mere auricles; *texture* coriaceous; *rachis* and lower surface densely pubescent; *veins* pinnate in the lobes, 8-10 veinlets on a side; *sori* subterminal; *caps.* naked.—*Aspid. Bl. Mett. Fil. Ind. p. 232. N. unitum, Sieb. Hk. Sp. 4. p. 81. (in part). N. canescens, Presl.*

Hab. N. India, Ceylon, Malaccas, Mascaren Isles, Fiji.

172. *N. Haenkeanum*, Presl; *st.* 1-2 ft. l., strong, erect, slightly pubescent; *fr.* 3-4 ft. l., 12-15 in. br.; *pinnæ* 6-8 in. l.,  $\frac{3}{4}$  in. br.; cut from one-third to



halfway down into acute subfalcate lobes; *texture* subcoriaceous; *rachis* and under surface finely pubescent; *veinlets* 10-12 on a side; *sori* subterminal.—*A. multilineatum*, *Mett. Fil. Ind. p. 232. (non Wall.)*

Hab. Ceylon, Malaya, Fiji.—Much larger and less hairy than the last, with more numerous veins, and a very fugacious involucre. A plant sent from Mauritius by Lady Barkly as *N. elatum*, Bojer, is probably distinct. It has medial sori, 14-16 veinlets on a side and fronds sometimes 2 feet broad.

173. *N. multijugum*, Baker; *st.* 1-2 ft. l., strong, erect, subglabrous; *fr.* 3-4 ft. l., 12-15 in. br.; *pinnæ* 6-8 in. l.,  $\frac{3}{4}$ - $\frac{7}{8}$  in. br., cut two-thirds of the way down to the rachis into close, acute, subfalcate lobes  $\frac{1}{8}$  in. br.; *texture* subcoriaceous; *rachis* and both sides nearly naked; *veinlets* 10-12 on a side; *sori* near the midrib.—*Aspidium*, *Wallich.*

Hab. Malayan Peninsula.—This comes very near the last, but is nearly naked and more deeply cut, with the sori in a different position.

174. *N. hirsutum*, J. Sm.; *st.* 1 ft. or more l., grey, villose; *fr.* 3-4 ft. l.,  $1\frac{1}{2}$  ft. br.; *pinnæ* very close and numerous, spreading, the largest 10 in. l.,  $\frac{3}{4}$  in. br., cut down halfway to the rachis into entire, linear-oblong, subfalcate lobes; the lower ones with a gland beneath at the base; *texture* subcoriaceous; *rachis* densely clothed with soft spreading hairs; under surface glandular; *veins* 6-8 on each side; *sori* medial.—*Hk. Sp. 4. p. 70. t. 240. B. (not Don).*

Hab. Philippines, *Cuming*, 82.—Habit of the two last, but the veins much fewer, sori medial, and lower pinnæ with a large gland at the base.

175. *N. aridum*, Baker; *st.* 1 ft. or more l., erect, naked; *fr.* 3-4 ft. l., 12-18 in. br.; *pinnæ* 6-9 in. l.,  $\frac{3}{4}$ -1 in. br., cut about one-third of the way down into subtriangular sharp-pointed lobes; *texture* coriaceous; *rachis* and lower surface naked or slightly hairy; *veinlets* 8-10 on a side; *sori* in rows about midway between the midrib and edge; *caps.* naked.—*Aspid.* *Don Prod. Fl. Nep. p. 4. A. venulosum, Wall. A. obscurum, Bl.*

Hab. N. India, Philippines, Malayan Peninsula.—This differs from the three preceding by the under side being nearly or quite naked, and in the position of the sori. *A. callosum*, Blume, quite agrees with this, except that there is a large prickle-like gland at the base of the pinnæ, and sometimes also of the veins.

176. *N. venulosum*, Hk.; *st.*  $1\frac{1}{2}$  ft. l., naked, greyish, sharply angled; *fr.* 4 ft. l., 12-18 in. br.; *pinnæ* numerous, the lowest short and very distant, the largest 8-9 in. l., 1 in. br., cut down halfway to the rachis into slightly-toothed oblong lobes; *texture* subcoriaceous; both surfaces naked; colour bright-green; *veins* about 9 on each side, conspicuous above, with a sorus on each midway to the edge.—*Hk. Sp. 4. p. 71.*

Hab. Fernando Po.—A large plant, most like *N. truncatum* in habit and texture, but the rhizome creeping.

\*\*\* *Fronds large, pinnate; caudex erect or suberect. Sp. 177-196.*

† *Pinnæ entire or slightly lobed, so that most of the veinlets unite. Sp. 177-184.*

177. *N. glandulosum*, J. Sm.; *st.* tufted, 1 ft. or more l., naked or slightly villose; *fr.* 1 foot or more l., 4-6 in. br., with 8-12 spreading pinnæ on each side, those of the barren fr. the largest and closest, 2-3 in. l.,  $\frac{3}{4}$ -1 in. br., the margin entire or slightly lobed, the base abruptly truncate and sometimes auricled; *texture* papyraceo-herbaceous; *rachis* and under surface naked or slightly villose, sometimes glandular; fertile pinnæ contracted, the main veins not more than 1 lin. apart; *veinlets* 4-8 on a side, with the sori close to the midrib.—*Hk. Sp. 4. p. 76. Abacopteris, Fée.*

Hab. Assam, Philippines, and Malayan Isles.—This includes three species of Mettenius,—his *glandulosum*, *asperum*, and *lineatum*, which we cannot separate clearly.

178. *N. amboinense*, Presl; *st.* tufted, 6-8 in. l., greyish, nearly naked; *fr.* 2 ft. or more l., 8-12 in. br.; *pinnæ* spreading, 3-4 in. l.,  $\frac{1}{2}$ - $\frac{2}{3}$  in. br., cut about a quarter down into bluntish slightly falcate lobes; lower *pinnæ* shorter and deflexed; *texture* papyraceo-herbaceous; *rachis* and under surface slightly pubescent; *veins* pinnate in the lobes, with 4-6 veinlets on a side; *sori* in rows close to the midrib; *caps.* naked.—*Hk. Sp.* 4. *p.* 75.

Hab. Philippines, *Cuming*, 83, 317; N. India, Malayan Isles; Ceylon, *Thwaites*, 3390.—Very near *N. molle*, but more papyraceous in texture, and not so hairy or so deeply lobed.

179. *N. Arbuscula*, Desv.; *st.* tufted, 4-8 in. l., naked or slightly pubescent; *fr.* 12-18 in. l., 6-8 in. br.; *pinnæ* close, numerous, 3-4 in. l.,  $\frac{3}{8}$ - $\frac{1}{2}$  in. br., cut a quarter or less down into blunt lobes, several of the lower pairs short and distant; *texture* herbaceous; *rachis* and lower side finely villose; *veinlets* distant, 3-4 on a side; *sori* in close rows.—*Hk. Sp.* 4. *p.* 74. A. Hookeri, *Wall. Hk. 2nd Cent. t.* 22.

Hab. Mascaren Isles, Ceylon, Neilgherries, Amboyna, Philippines, Solomon Isles.

180. *N. abortivum*, J. Sm.; *st.* tufted, 6-12 in. l., firm, erect, quite naked; *fr.* 1-2 ft. l., 6-8 in. br.; *central pinnæ* 3-4 in. l.,  $\frac{5}{8}$ - $\frac{7}{8}$  in. br., cut about one-third of the way down into close, entire, truncate lobes  $\frac{1}{3}$  in. br.; lower *pinnæ* distant and reduced suddenly to mere auricles; *texture* firm, herbaceous; *rachis* and both sides quite naked; *veinlets* 6-8 on a side; *sori* medial.—*Aspid. Blume. A. decurtatum, Kze.*

Hab. Penang, Java, Ceylon.—Allied to *glandulosum*, but the *pinnæ* lobed, and the veins more distant.

181. *N. refractum*, Hk.; *st.* tufted, 1 ft. l., naked, glossy; *fr.* 12-18 in. l., 6-9 in. br.; *pinnæ* growing gradually less from near the bottom to the top, the lower ones deflexed, 4-5 in. l.,  $\frac{3}{4}$  in. br., the lowest pairs very much so, the lobes broad and blunt, reaching about a quarter of the way down to the midrib; *texture* herbaceous; *colour* bright-green; *rachis* and surfaces glabrous; *veinlets* 6-8 on a side; *sori* medial; *invol.* minute, fugacious.—*Hk. Sp.* 4. *p.* 162. *t.* 252.

Hab. Brazil.—Well marked by its bright-green colour and peculiar habit. A Fern gathered in Trinidad by Aldridge, *N. deflexum*, J. Sm. MSS., has similarly deflected lower *pinnæ*, but they are narrower, and the lobes reach halfway down to the midrib. It is not unlikely that this is *Polyp. retroflexum*, Linn., founded on Plumier's t. 68.

182. *N. latipinna*, Hk. MSS.; *st.* tufted, 4-6 in. l., slender, naked; *fr.* 8-12 in. l., 3-5 in. br., the upper half or third lanceolate, pinnatifid, with broad, oblong lobes; below this several *pinnæ* on each side, the largest 2-3 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., cut about one-quarter of the way down into broad, oblong, subfalcate lobes; lower *pinnæ* much reduced and distant; *texture* papyraceo-herbaceous; *rachis* and both sides naked; *veins* pinnate in the lobes, with 3-5 distant veinlets on each side, with a sorus about the centre of each.—*N. molle, β, Benth. Fl. Hong. p.* 455.

Hab. Hong-Kong and Java.—Very doubtfully distinct from *N. molle*.

183. *N. pennigerum*, Hk.; *st.* tufted, stout, 8-12 in. l., finely villose; *fr.* 2-4 ft. l., 12-18 in. br.; *pinnæ* numerous, spreading, 6-9 in. l., 1-1 $\frac{1}{2}$  in. br., the apex acuminate, the edge cut about a quarter of the way down to the midrib into oblong falcate lobes, the lower *pinnæ* dwarfed and distant; *texture* herbaceous or subcoriaceous; *rachis* and under surface finely villose; *veinlets* 6-9 on a side; *sori* medial; *caps.* setose.—*Hk. Sp.* 4. *p.* 82. *Aspid. pennigerum, Bl. (non Sw.). A. multilineatum, Wall. N. articulatum, Moore, J. Sm. A. megaphyllum, Mett.*

Hab. Himalayas, Ceylon, Malaccas, Johanna Island, Angola, Guinea Coast.



184. *N. cyatheoides*, Kaulf.; *st.* 1-2 ft. l., strong, naked, glossy, greyish; *fr.* 2-3 ft. l., 1 ft. or more br.; *pinnæ* close, spreading, 4-6 in. l.,  $\frac{3}{4}$ -1 in. br., the apex acuminate, the edge irregular, furnished with acute forward-pointing teeth to a depth of 1-2 lin., the lowest pair not shorter than the next; *texture* papyraceo-herbaceous or subcoriaceous; *rachis* and both surfaces naked; *veins* in pinnatifid groups of 10-12 veinlets on a side, with often a *sorus* on each close to the main vein.—*Hk. Sp.* 4. p. 76. t. 241. A.

Hab. Sandwich Islands and Sumatra.—Allied to *N. ferox*, but less deeply cut, and the stem not fibrillose.

†† *Pinnæ* cut from one-third to two-thirds down to the midrib. *Sp.* 185-196.

185. *N. asplenoides*, Baker; *st.* 6-9 in. l., greyish, villose; *fr.* 12-18 in. l., 4-5 in. br., oblong, the lower half pinnate; upper *pinnæ* close, oblong, entire, blunt, those next in order connected by a wing to the rachis and bluntly lobed, the longest 2-3 in. l.,  $\frac{1}{2}$  in. br., bluntly lobed one-third of the way to the midrib, the lowest distant and growing gradually shorter; *texture* subcoriaceous; *rachis* and under surface finely hairy; *veins* pinnate in the lobes, with 6-8 veinlets on each side; *sori* minute, in rows near the midrib.—*Polyp. Sw.* *N. sclerophyllum*, *Presl. Hk. Sp.* 4. p. 65.

Hab. West Indies.

186. *N. hispidulum*, Baker; *st.* tufted, slender, 12-18 in. l., greyish, villose; *fr.* 12-18 in. l., 6 in. br.; *pinnæ* distant, spreading, 3-4 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., the apex acuminate, the edge cut about halfway down into oblong, slightly falcate lobes, the lower ones suddenly dwarfed down to mere auricles; *rachis* slender and under surface finely villose; *veins* pinnate in the lobes, with 3-4 veinlets on each side, with a large *sorus* on each near the edge; *caps.* naked.—*Asp. Decaisn.* *N. angustifolium*, *Presl. Hk. Sp.* 4. p. 69.

Hab. Philippines and Malay Isles.—This is nearest *N. Arbuscula*, but the *pinnæ* are much narrower and more deeply lobed.

187. *N. molle*, Desv.; *st.* tufted, 1 ft. or more l., rather slender, deciduously hairy; *fr.* 1-2 ft. l., 8-12 in. br.; *pinnæ* spreading, 4-6 in. l.,  $\frac{3}{4}$  in. br., cut about halfway down to the midrib into scarcely falcate, blunt lobes, the lower *pinnæ* distant and rather shorter than the others; *texture* herbaceous; *rachis* and surfaces finely villose; *veins* pinnate in the lobes, with 6-8 veinlets on a side; *sori* distant from the midrib; *caps.* naked.—*Hk. Sp.* 4. p. 67. (*in part*).

Hab. Cuba and Mexico to Peru and Brazil; Himalayas and Hong-Kong to New Zealand and N. S. Wales; Mascaren Isles, Cape Colony, Guinea Coast, Azores, Cape Verdes, Madeira.—A variable plant. Of forms not safely separable *A. violascens*, Link, has an often rather bright-coloured purplish rachis; the E. Indian *P. molliusculum*, Wall, and Mauritian *N. Hülsenbergii*, *Presl*, have the lobes deeper and narrower than in the type; the S. American *N. Jamesoni*, *Hk.*, is a less cut reduced form; the Javan *A. pilosiusculum*, *Mett.*, has setose capsules; the Antillean *A. pellitum*, *Willd.*, *J. Sm.*, blunt *pinnæ* only  $\frac{3}{8}$  in. br.; and the Philippine *N. diversilobum*, *Presl*, some of the lobes irregularly dilated and pinnatifid. There seems no reason to doubt this is the Linnæan *Polyp. parasiticum*; but the name *molle* is so thoroughly well established for the species, that it seems a pity to drop it.

188. *N. heterocarpon*, Moore; *st.* tufted, 1-2 ft. l., slender, villose; *fr.* 2-3 ft. l., 8-12 in. br.; *pinnæ* 5-6 in. l.,  $\frac{3}{4}$  in. br., cut down halfway or more to the rachis into linear-oblong subfalcate lobes; *lower pinnæ* abruptly dwarfed; *texture* herbaceous; *rachis* and under surface villose, and the latter glandular; *veins* pinnate in the lobes, with 8-10 veinlets on a side; *sori* in rows close to the main vein; *caps.* naked.—*Aspid. Bl. Mett. Fil. Ind.* p. 233. *N. molle*, *Hk. Sp.* 4. p. 67. (*in part*).

Hab. Hong-Kong and Malaccas.—Very near some of the forms of *N. molle*, but less

hairy, and densely glandular beneath, with the lower pinnæ suddenly dwarfed. *A. dimorphum*, Kze., is said to differ from this by the presence of a gland at the base of the pinnæ.

189. *N. stipellatum*, Hk.; *st.* tufted, 1 ft. l., grey, naked; *fr.* 2 ft. l., 8-10 in. br.; *pinnæ* 4-5 in. l.,  $\frac{3}{4}$  in. br., the apex acuminate, the edge cut about one-third down into oblong-falcate lobes, the base with a large scale-like gland beneath the midrib; *texture* subcoriaceous; *rachis* and midrib beneath villose; *veins* pinnate in the lobes, with 6 veinlets on a side, with *sori* in rows near the main vein.—*Hk. Sp.* 4. p. 70.

Hab. Java.—A more coriaceous plant than *A. molle*, with broader lobes, the under surface nearly naked. *A. latebresum*, Kze., is said to differ from this by being more deeply lobed, with the under surface glandular, and the basal gland bluntly tubercular, not scale-like.

190. *N. crinipes*, Hk.; *st.* 12-18 in. l., stout, erect, densely clothed with brown linear scales; *fr.* 2-3 ft. l., 8-12 in. br.; *pinnæ* horizontal, 4-6 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., cut about halfway down into close linear-oblong lobes; *rachis* scaly in the lower part; *texture* herbaceous, both sides naked; *veinlets* 6-8 on a side; *sori* medial.—*Hk. Sp.* 4. p. 71.

Hab. Sikkim (subtropical region), *Hk. fil.* and *Thomson*; Malacca, *Griffith*.—Best distinguished from *truncatum* by its scaly stem and rachis.

191. *N. venustum*, J. Sm.; *st.* tufted, 1 ft. or more l., naked, greyish, glossy; *fr.* 2 ft. or more l., 1 ft. br.; *pinnæ* numerous, spreading, 6 in. l., 1 in. br., with blunt oblong lobes reaching halfway down; *texture* herbaceous; *rachis* and both surfaces naked, glossy; *veins* about 8 on each side, with *sori* principally in the lobes close to the edge.—*Hk. Sp.* 4. p. 71.

Hab. Jamaica.—About midway between *molle* and *brachyodon*. A Mexican specimen, sent by Professor Reichenbach as *A. paludosum*, Liebm., may be the same plant, but the veinlets are closer and more numerous (10-12 on a side).

192. *N. ferox*, Moore; *st.* 1-2 ft. l., strong, densely fibrillose, the hairs black and leaving the stem rough when they fall; *fr.* 3-4 ft. l., sometimes 2 ft. br.; *pinnæ* rather close, spreading, 6-12 in. l.,  $\frac{3}{4}$ -1 in. br., apex very acuminate, edge cut about a third down into lanceolate-falcate lobes; *texture* subcoriaceous; both *surfaces* glossy; *veins* in pinnated groups of 10-12 veinlets on a side, with often a *sorus* on each close to the main vein.—*Hk. Sp.* 4. p. 77. *Phegopteris*, *Mett.* Polyp. *barbatum*, *Hk. Sp.* 5. p. 11. *Goniopt.* *Lobbiana*, *Fée.*

Hab. Kumaon, Philippines, Java.—A well-marked species.

193. *N. sagittæfolium*, Moore; *st.* 1-2 ft. l., tufted, stout, erect, villose; *fr.* 3-4 ft. l., 1 ft. or more br.; *pinnæ* numerous, spreading, 6-8 in. l.,  $\frac{3}{4}$  in. br., the apex acuminate, the edge cut from one-third to halfway down into oblong-falcate lobes, the lower pinnæ suddenly dwarfed and deflexed; *texture* subcoriaceous; *rachis* and under surface densely villose; *veins* pinnate in the lobes, with 8-10 veinlets on a side, with a *sorus* midway on each; *caps.* setose.—*Hk. Sp.* 4. p. 78.

Hab. Java.

194. *N. truncatum*, Presl; *st.* tufted, stout, erect, 2 ft. l., greyish, naked or slightly villose; *fr.* 2-4 ft. l., 12-18 in. br.; *pinnæ* 6-9 in. l., 1 in. br., cut down one-third or more of the distance to the rachis into blunt, spreading, oblong lobes; *texture* papyraceo-herbaceous; *lower pinnæ* distant, small; *under surface* nearly or quite naked; *rachis* slightly villose; *veins* pinnate in the lobes, with 6-8 veinlets on a side, with a *sorus* on each near the main vein.—*Aspid. Mett. Fil. Ind. t.* 234. *N. abruptum*, *Presl. Hk. Sp.* 4. p. 77. *t.* 241. *B. N. Hudsonianum*, *Brack.* *N. eusorum*, *Thwaites.*



Hab. N. India to Ceylon, Malaccas, Australia, and Polynesian Isles.—A much larger and less herbaceous plant than *A. molle*, with close, blunt lobes, and the rachis and under surface nearly or quite naked. The Mauritian *N. caudiculatum*, Sieb., is either the same or closely allied. J. Smith distinguishes the Indian from the Polynesian plant, calling the former *abruptum*, the latter *truncatum*.

195. *N. brachyodon*, Hk.; *st.* tufted, 1-2 ft. l., greyish, naked; *fr.* 2-3 ft. l., 12-18 in. br.; *pinnæ* 6-9 in. l.,  $1\frac{1}{2}$ - $1\frac{3}{4}$  in. br., cut from one-third to half the way down into blunt, oblong, slightly falcate lobes; *lower pinnæ* not much smaller than the others; *texture* coriaceous; *rachis* and both surfaces naked; *veins* pinnate in the lobes, with 10-15 veinlets on a side, with a sorus on each about midway between the midrib and edge; *invol.* small, fugacious.—*Hk. Sp. 4. p. 83.* Phegopteris Seemanni, *J. Sm.*

Hab. W. Indies and Panama southward to Peru and the Galapagos group; Malayan Peninsula and Isles.

196. *N. Fendleri*, Hk., *st.* tufted, 1-2 ft. l., greyish, naked; *fr.* 2-3 ft. l., 12-15 in. br.; *pinnæ* 6-8 in. l.,  $1\frac{1}{2}$  in. br., cut about a third of the way down into oblong blunt lobes; *lower pinnæ* not much smaller than the others; *texture* coriaceous; *rachis* and both surfaces naked; *veins* pinnate in the lobes, with 10-12 veinlets on a side; *sori* marginal and almost confined to the lobes; *invol.* firm, persistent.—*Hk. Sp. 4. p. 82.*

Hab. Venezuela, *Fendler*, 372; Guiana, *Appun*, 1035.—Very like the last in texture and cutting.

§§§ Pleocnemia, *Presl.* *Lower veinlets of contiguous groups united, and those of the same group slightly so.* *Sp.* 197-200.

197. *N. (Pleo.) dissidens*, Hk.; *st.* 5 in. l., villose; *fr.* 3 in. l., 4-5 in. br., oblong-lanceolate; *pinnæ*  $2\frac{1}{4}$  in. l.,  $\frac{3}{4}$  in. br., with oblong-acute lobes; *texture* thin and flaccid; *rachis* and frond pubescent; *veins* pinnate in the lobes, with 8-9 veinlets on a side, the lower ones forming costal arches; *sori* 4-6 in each side near the margin of the lobes; *invol.* small, ciliated.—*Hk. Sp. 4. p. 66.*

Hab. Porto Rico.—We have not seen this, and take the description from Mettenius.

198. *N. (Pleo.) heterophyllum*, Hk.; *rhizome* creeping; *st.* 2-4 in. l., densely villose; *fr.* 5-6 in. l., 1 in. br., simple, with blunt, oblong, slightly falcate lobes reaching a quarter of the distance to the midrib; *texture* coriaceous; both *surfaces* villose, especially the edge and midrib beneath; *veins* pinnate in the lobes, those of the sterile frond anastomosing towards the edge; *veinlets* 5-6 on each side, with a *sorus* on each.—*Hk. Sp. 4. p. 62.* *2nd Cent. t. 20.* Haplo-dictyum, *Presl.*

Hab. Philippines, *Cuming*, 322.

199. *N. (Pleo.) excellens*, Bl.; *st.* naked, greyish; *fr.* ample, bipinnatifid; *lower pinnæ* 1 ft. l., 3-4 in. br., cut down nearly to the rachis into entire, lanceolate lobes; *texture* subcoriaceous; *rachis* and both surfaces nearly naked; *veinlets* of the lobes slightly pinnate and mostly forming costal arches; *sori* small, copious, principally in two irregular rows near the midrib of the lobes.—*Hk. Sp. 4. p. 63.* Proferea, *Presl.*

Hab. Java, *Blume*.

200. *N. (Pleo.) Leuzeanum*, Hk.; *caud.* subarborescent, densely scaly at the crown; *st.* 2-3 ft. l., stout, striated; *fr.* 4-6 ft. l., subdeltoïd; *pinnæ* 12-18 in. l., 6-8 in. br., simple, or the lowest with 2-3 large pinnated *pinnl.* from the lower side; *segm.* 3-4 in. l.,  $\frac{3}{4}$ - $1\frac{1}{4}$  in. br., with oblong, subfalcate, entire, or sinuated lobes

reaching down a broadly-winged rachis; *veins* pinnated in the lobes; *sori* copious, usually in close single rows in the lobes.—*Hk. Sp.* 4. p. 61.

Hab. N. India, Hong-Kong, Philippines, Malaccas, Fiji, Samoa.—A variable plant, of which Presl and others make several species. Sometimes the venation is quite free, and sometimes only the veinlets of contiguous groups are joined, and the lobes vary from as broad as deep, when they are blunt and entire, to four times as broad as deep, and deeply crenated. The involucre is very fugacious.

§§§§ Sagenia, *Presl. Veins anastomosing copiously, usually with free included veinlets. Pinnæ and segments ample. Sp.* 201-224.

\* *Sori copious, scattered irregularly. Sp.* 201-212.

201. N. (Sagen.) *Singaporianum*, Baker; *rhizome* creeping; *st.* subtufted, those of the fertile fronds 6-12 in. l.; *fr.* 1 ft. or more l., 2-4 in. br., oblong, entire, acuminate at the apex, narrowed rather suddenly and then decurrent gradually at the base; *texture* papyraceo-herbaceous or subcoriaceous; primary *veins* distinct nearly to the edge; *areolæ* copious, with free included veinlets; *sori* numerous, close, 4-6 in a line between the main veins.—*Asp. Wall. Hk. Sp.* 4. p. 42. *Hk. & Gr. Ic. t.* 26. *Podopeltis, Fée.*

Hab. Malayan Peninsula and Isles.

202. N. (Sagen.) *ternatum*, Baker; *rhizome* wide-creeping; *st.* 6-9 in. l., slender, stramineous; *fr.* sometimes simple, 8-10 in. l., 2-3 in. br., oblong, entire, narrowed gradually to the apex and base, but more usually trifoliate, the lateral *pinnæ* like the terminal one but smaller; *texture* papyraceo-herbaceous; main *veins* distinct nearly to the edge; *areolæ* copious, but rather large, with a few free veinlets; *sori* distant, in two distinct rows, and a few others between; *invol.* distinct, persistent.

Hab. Borneo, *Lobb, Wallace, Motley.*

203. N. (Sagen.) *vastum*, Baker; *rhizome* creeping; *st.* scattered, narrowly winged, often nearly or quite to the base; *fr.* 2-4 ft. l., 1 ft. or more br., cut down to a broadly-winged rachis into entire linear-oblong *pinnæ* 6-12 in. l., 1-2 in. br.; *texture* papyraceo-herbaceous or subcoriaceous; main *veins* distinct  $\frac{2}{3}$  of the way to the edge, connected by copious *areolæ* with free included veinlets; *sori* small, scattered.—*Aspidium, Blume. A. alatum, Wall. Hk. Sp.* 4. p. 47. *Hk. & Gr. Ic. t.* 184.

Hab. Himalayas and Malayan Peninsula and Isles.

204. N. (Sagen.) *melanocaulon*, Baker; *rhizome* ascending; *st.* 1 ft. or more l., ebeneous, glossy, scaly at the base; *fr.* 1-2 ft. l., 9-15 in. br., ovate-deltoid, with a large, deeply pinnatifid, terminal *pinna*, and 1 to 4 lateral ones on each side, the central one deeply pinnatifid, with ovate-acuminate lobes, the lowest stalked, 6-12 in. l., 4-6 in. br., often again pinnate at the base; *texture* papyraceo-herbaceous; *rachis* ebeneous; main *veins* reaching the edge, with numerous fine *areolæ* with free included veinlets between them; *sori* numerous, minute, scattered; *invol.* small, fimbriated, fugacious.—*Aspid. Blume. Hk. Sp.* 4. p. 53. (*in part*).

Hab. Philippines and Malayan Isles.

205. N. (Sagen.) *subtriphyllum*, Baker; *rhizome* creeping; *st.* 1 ft. or more l., substramineous or brownish; *fr.* 12-18 in. l., 8-12 in. br., subdeltoid, with a large, deeply pinnatifid apex with lanceolate lobes; below this 1 or 2 *pinnæ* on each side, the lowest stalked, distant, forked at the base or pinnatifid, the point lanceolate; *texture* herbaceous; main *veins* distinct to the edge; *areolæ* fine, with



copious free veins; *sori* rather large but scattered, confined to the connected veinlets.—Aspid. *Hk. Sp.* 4. p. 52.

Hab. Panama, Ecuador, Polynesia, China, Malaya, Ceylon, Mascaren Isles.

206. N. (Sagen.) *latifolium*, Baker; *st.* 1-2 ft. l., glossy, naked, brownish; *fr.* 2-3 ft. l., 12-24 in. br., the apex ample, deeply pinnatifid, with large, lanceolate, sinuated lobes, below this 3-4 *pinnae* on each side, the lowest 9-18 in. l., deltoid, long-stalked, cut down below into distinct pinnatifid *pinnae*; primary veins distinct to the edge; *areolae* fine, close, with free included veinlets; *sori* rather large but scattered, confined to the united veinlets; *invol.* thin, fugacious.—Polypodium, *Forst. A. Forsteri, Kze. & Mett. (in part)*.

Hab. Panama, Ecuador, Polynesian Islands, Guinea Coast.—This agrees with the preceding in venation and the position of the *sori*, but is much larger and more compound. *A. latifolium*, Presl, *Hk. Syn.* 4. p. 51. is *apifolium*.

207. N. (Sagen.) *Lobbii*, Baker; *st.* 6 in. or more l., naked, substramineous; *fr.* about 1 ft. each way, subdeltoid, with an entire terminal *pinna* 4-6 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., tapering gradually from the middle to each end, and 2 similar lateral ones on each side, the lowest long-stalked and tripartite; *texture* subcoriaceous; *veins* obscure, the primary ones close and very oblique; *areolae* without free veinlets; *sori* copious, scattered.—Aspid. *Hk. Sp.* 4. p. 59. t. 232.

Hab. Borneo.

208. N. (Sagen.) *semibipinnatum*, Baker; *st.* 1 ft. or more l., pale-brown, naked; *fr.* 12-18 in. l., 6-9 in. br., with a linear-oblong terminal *pinna* 6-9 in. l., 1 in. br., entire and narrowed towards both ends, and 4-6 smaller lateral ones on each side, the lowest 1 or 2 pairs tripartite; *texture* papyraceo-herbaceous; *veins* inconspicuous, the primary ones lost before they reach the edge, with fine, close *areolae* between them, with free included veinlets; *sori* minute, scattered, confined to the connected veinlets.—Aspid. *Hk. Sp.* 4. p. 59. t. 231.

Hab. Penang and Borneo.

209. N. (Sagen.) *Meyanthis*, Baker; *rhizome* creeping; *st.* 6-12 in. l., naked, brownish; *fr.* 1-2 ft. l., 1 ft. or more br., with an acuminate, oblong-lanceolate, sinuated, terminal *pinna* 6-12 in. l., 1-1 $\frac{1}{2}$  in. br., and 2-4 similar ones on each side, the lowest stalked, sometimes forked; *texture* subcoriaceous; primary veins close, conspicuous, prolonged to the edge; *areolae* fine, with copious free veinlets; *sori* small, scattered, all on the connected veinlets.—Asp. *Presl. Hk. Sp.* 4. p. 57.

Hab. Philippines, Solomon Islands, New Guinea.—In habit and texture this most resembles *N. pachyphyllum*, differing by its small irregular *sori* and *pinnae* narrowed gradually to the base.

210. N. (Sagen.) *irriguum*, Baker; *st.* tufted, 4-6 in. l., greyish, finely villose; *fr.* 6-9 in. l., 4-6 in. br., subdeltoid, with a large oblong terminal *pinna* with a pair of deep lanceolate lobes at the base, and below 1-2 pairs of slightly sinuated lateral *pinnae*, the lowest forked at the base; *texture* papyraceo-herbaceous; main veins flexuose; *areolae* fine, copious, with free included veinlets; *sori* small, scattered, often confluent; *invol.* small, fugacious.—Aspid. *J. Sm. Mett. Fil. Ind.* p. 239. Poly. menisciocarpon, *Hk. Sp.* 5. p. 86. (*in part*). *Microsorium trifidum*, *Fée*.

Hab. Philippines, *Cuming*, 31.—This may be a form of the next species, but the irregular confluent *sori* are peculiar. *Sagenia heterocarpa*, Beddome (*Ferns Brit. Ind.* t. 47), from Khasya, has similar *sori*, but agrees with typical *polymorphum* in general habit.

211. N. (Sagen.) *polymorphum*, Baker; *rhizome* creeping; *st.* 1 ft. or more l.,

naked, brownish; *fr.* 2-4 ft. l., 12-18 in. br., with a large, oblong, entire terminal *pinnæ* 6-12 in. l., 1-2 in. br., and 2-6 similar lateral ones on each side, the lower ones often forked; *texture* subcoriaceous; principal *veins* distinct to the edge; *areolæ* fine, close, with copious free veinlets; *sori* small, scattered, abundant, all on the connected veinlets.—*Asp. Wall. Hk. Sp. 4. p. 54.* *A. grandifolium*, *Mett.*

Hab. Himalayas (up to 4,000 ft.) to Ceylon, Malayan Peninsula and Isles.—There is a form with an ebeneous stipe.

212. *N. (Sagen.) elatum*, Baker; *st.* 3-4 ft. l., stout, erect, dull-brown, scaly at the base; *fr.* 3-3½ ft. l., the apex nearly 2 ft. l., 5-partite, the central lobe 5 in. br. at the base, the lowest reaching nearly down to the rachis, below this 3-4 *pinnæ* on each side, the lowest stalked, 18 in. l., 4-5 in. br., narrowed towards both ends, slightly sinuated below; *texture* papyraceo-herbaceous; main *veins* distinct to the edge, ½-¾ in. apart; *areolæ* fine, copious, with free included veinlets; *sori* close, large, copious, scattered irregularly, principally on the connected veinlets.

Hab. Foot of Mt. Chimborazo, *Spruce*, 5725.

\*\* *Sori large, confined to a distinct row on each side of the principal veins.* *Sp. 213-224.*

213. *N. (Sagen.) Pica*, Baker; *st.* 6-12 in. l., black, glossy; *fr.* 1-2 ft. l., 1 ft. or more br., pedato-pinnatifid, or more usually pinnate, with 1 or 2 pairs of *pinnæ*, which are 6-12 in. l., 2 in. or more br., the edge broadly undulated, the lowest sometimes with 1 or 2 large *pinnæ* on the lower side at the base; *texture* papyraceo-herbaceous; main *veins* distinct to the edge; *areolæ* copious, with free included veinlets; *sori* in two rows between the primary veins.—*Aspid. Desv. Hk. Sp. 4. p. 46.* *A. trifoliatum*, *Auct. (in part).*

Hab. Mauritius and Bourbon.—Differs from *A. trifoliatum* by its ebeneous stems and cordate involucre. *A. puberulum*, *Desv.*, is a slightly-pubescent form.

214. *N. (Sagen.) Zollingerianum*, Baker; *st.* 9-12 in. l., naked; *fr.* 8-12 in. l., 6-8 in. br., subdeltoid, the apex deeply pinnatifid, below this 3-4 *pinnæ* on each side, the lowest 3-4 in. l., long-stalked, deltoid, cut down below into distinctly separated, deeply pinnatifid *pinnæ* with blunt linear-oblong lobes; *texture* subcoriaceous; *veins* beneath prominent, anastomosing principally in large costular arches; *areolæ* large, with free included veinlets, depressed so as to form a cavity, in which on the end of the free vein the large copious *sori* are placed.—*Asp. Kze. A. immersum, Hk. Sp. 4. p. 58.* *Phlebigonium, Fée.*

Hab. Java, *Zollinger*; and we have received copious specimens in Dr. Helfer's Tenasserim collections.

215. *N. (Sagen.) variolosum*, Baker; *rhizome* creeping; *st.* 1 ft. or more l., naked, brownish; *fr.* 12-18 in. l., 8-12 in. br., subdeltoid, the apex deeply pinnatifid, with lanceolate, acuminate, entire or sinuated lobes; below this 1-3 pairs of lateral *pinnæ*, the lowest much the largest, sometimes cut down to the rachis at the base with a deeply pinnatifid *pinnæ*; *texture* papyraceo-herbaceous; primary *veins* distinct; *areolæ* rather large, with free veinlets; *sori* large, in rows near the veins, terminating free veinlets.—*Asp. Wall. Hk. Sp. 4. p. 51.*

Hab. N. India and Malaya.—This has quite the habit and texture of *N. subtriphyllosum*, differing in *sori* and venation.

216. *N. (Sagen.) irregulare*, Baker; *st.* 1 ft. or more l., glossy, ebeneous; *fr.* 2-3 ft. l., 12-18 in. br., the apex deeply pinnatifid, with lanceolate-acuminate lobes, the lower ones sinuated, below this 3-5 *pinnæ* on each side, the lowest much



the largest, 8-12 in. l., 6-8 in. br., deeply pinnatifid above, pinnated at the base, lobes acute; *texture* papyraceo-herbaceous; *rachis* glossy like the stipe; main *veins* distinct to the edge; *areolæ* fine, with copious free included veinlets; *sori* in rows near the main veins, mainly or entirely on the connected veinlets.—Aspid. *Brack.* p. 180.

Hab. Polynesian Islands.—Doubtfully distinct from *N. latifolium*, from which it differs by its more regular sori and ebeneous stem.

217. *N.* (Sagen.) *decurrens*, Baker; *rhizome* creeping; *st.* narrowly winged, often nearly or quite to the base; *fr.* 2-4 ft. l., 1 ft. or more br., cut down to a winged rachis into 4-8 pairs of sinuated linear-oblong *pinnae* 6-12 in. l., 1-2 in. br., the lowest sometimes forked; *texture* subcoriaceous; principal *veins* distinct to the edge, connected by copious *areolæ* with free included veinlets; *sori* large, in two regular rows between the principal veins.—Aspid. *Presl.* A. pteropus, *Kze. Hk. Sp.* 4. p. 47.

Hab. N. India, Ceylon, Philippines, Malacca, Formosa, Aneiteum, Fiji, Samoa.—Habit of *N. vastum*, from which it is well distinguished by the biserial sori. A dwarf form, with fronds under 1 ft. l., and the fertile ones much contracted, is figured from Ceylon by Capt. Beddome, t. 245.

218. *N.* (Sagen.) *sifolium*, Baker; *st.* 1 ft. or more l., naked, brownish; *fr.* 1 ft. or more l., 6-8 in. br., with a broad, oblong, acuminate, terminal *pinna*, and 3-4 lateral ones on each side, the lowest stalked, 3-4 in. l., 2 in. br., forked at the base, the margin rather deeply lobed; *texture* subcoriaceous; primary *veins* close, distinct to the edge; *areolæ* fine, copious, with free included veinlets; *sori* large, copious, in two close rows, often confluent.—Polypod. *Willd.* Aspid. *Mett. Fil. Ind.* p. 237. A. Teysmannianum, *Hk. Sp.* 4. p. 41. t. 236. Polyp. menisciocarpon, *Hk. Sp.* 5. p. 86. (*in part*).

Hab. Philippines, *Cuming*, 4. Java and Sumatra.

219. *N.* (Sagen.) *pachyphyllum*, Baker; *st.* 1 ft. or more l., naked, brownish; *fr.* 2-3 ft. l., 12-18 in. br., with an oblong-lanceolate, entire, or sinuated terminal *pinna* 6-12 in. l.,  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. br., and 4-8 similar erecto-patent lateral ones on each side, the lower ones forked at the base; *texture* subcoriaceous; primary *veins* straight and distinct nearly to the edge; *areolæ* fine, with copious free included veinlets; *sori* large, in two regular rows.—Asp. *Kze. Hk. Sp.* 4. p. 56. A. grande, *J. Sm. Hk. Sp.* 4. p. 55.

Hab. Philippines and Malay Isles, Solomon Isles, Fiji.

220. *N.* (Sagen.) *Barteri*, Baker; *st.* 1 ft. or more l., naked, substramineous; *fr.* 2-3 ft. l., 12-18 in. br., with an oblong, entire terminal *pinna* 9-12 in. l., 3-4 in. br., acuminate at the apex and narrowed gradually to the base, and 3-4 similar ones on each side, all simple, the lowest slightly stalked; *texture* papyraceo-herbaceous or subcoriaceous; main *veins* distinct to the edge,  $\frac{1}{4}$  in. apart; *areolæ* fine, copious, with free included veinlets; *sori* rather small, placed in two regular rows near the main veins; *invol.* minute, fugacious.—Aspid. *J. Sm. Ferns, B. & F.* p. 286.

Hab. Fernando Po, *Barter* and *Mann*.—Most like *N. polymorphum* in habit and texture.

221. *N.* (Sagen.) *cicutarium*, Baker; *st.* 1 ft. or more l., brownish or ebeneous; *fr.* 1-2 ft. l., subdeltoid, the apex deeply pinnated, with sinuated lanceolate lobes; below this 3-6 *pinnae* on each side, the lowest subdeltoid, deeply pinnatifid or pinnate below; *texture* papyraceo-herbaceous or subcoriaceous; main *veins* distinct to the edge; *areolæ* with few or no included free veinlets; *sori* rather large, in two rows near the main veins on connected or free veinlets.—

Polyp. *Linn. Aspid. Sw. Hk. Sp. 4. p. 48.*— $\beta$ , *N. apiifolium*, Hk. & Arn.; larger and more compound; lower *pinnae* deltoid, 1 ft. or more l.; *rachis* broad-winged above, often free below; *sori* sometimes immersed.—*A. latifolium*, *Presl. Hk. Sp. 4. p. 51.* *A. dilaceratum*, *Kze.*

Hab. Cuba and Mexico southward to Brazil and Peru, Polynesian and Malayan Islands, Himalayas (up to 4,000 ft.), Neilgherries, Ceylon, Mascaren Isles, Zambesi-land, Angola, Guinea Coast.—This includes all the *Eusagenia* (six species) of Moore's Index. The extremes differ in size very much, but all the forms appear to agree in sori and venation.

222. *N.* (Sagen.) *Griffithii*, Baker; *st.* 1-2 ft. l., brownish, not glossy; *fr.* 3-4 ft. l., with a large terminal *pinna* cut down nearly to the rachis in the lower part into lanceolate divisions, with deep lanceolate-acuminate lobes, below this several *pinnae* on each side, the lowest deltoid, 1 ft. or more l., by nearly as broad, deeply pinnatifid above, pinnate below; *texture* papyraceo-herbaceous; main *veins* distinct to the edge, with copious free included veinlets; *sori* rather large, in two rows, nearly all terminating free veinlets.

Hab. Burmah, *Griffith.*—This comes nearest the largest forms of the preceding, but the venation is closer, and it has copious free veins, and sori not on the connected veinlets.

223. *N.* (Sagen.) *giganteum*, Baker; *st.* 1-2 ft. l., glossy, chesnut-brown; *fr.* 2-3 ft. l., 12-18 in. br., deeply pinnatifid at the apex, with lanceolate sinuated lobes; below this 4-6 *pinnae* on each side, the lowest much the largest, often 1 ft. l., pinnate at the base, with deeply pinnatifid pinnl.; *texture* papyraceo-herbaceous; *rachis* and both surfaces naked; *veins* anastomosing principally in costal arches; *sori* large, terminating free veins, principally in rows on the lobes on both sides the main veins.—*Aspid. Blume. Hk. Sp. 4. p. 50.*

Hab. Ceylon, Philippines, Malaya.—Resembles *N. cicutarium* in habit, but the texture is thicker, and the venation much less compound.

224. *N.* (Sagen.) *macrophyllum*, Baker; *st.* tufted, 1-2 ft. l., dull brownish, scaly below; *fr.* 2-3 ft. l., 1 ft. or more br., with a large terminal *pinna*, often forked at the base, and 4-8 lanceolate-oblong lateral ones on each side, 6-12 in. l., 1-3 in. br., entire or slightly lobed, the lowest pair forked at the base; *texture* papyraceo-herbaceous; *rachis* and both surfaces usually naked; primary *veins* continued nearly to the edge, with numerous fine areolæ with free included veinlets between them; *sori* in 2 rows between each primary vein.—*Aspid. Swz. Hk. Sp. 4. p. 56.*

Hab. Tropical America, from Cuba and Mexico to Brazil and Peru.—The Malayan *A. Haenkei*, *Presl.* is either a form of this or very near it.

#### GEN. 45. NEPHROLEPIS, *Schott.*

*Sori* round, arising from the apex of the upper branch of a vein, generally near the edge. *Invol.* reniform or roundish. *Veins* in all free, the fronds simply pinnate, with the *pinnae* articulated at the base and often very deciduous in the dried plant, with white cretaceous dots on the upper surface. Belts the world in the Tropics, passing a little beyond them both north and south. TAB. V. f. 46.

1. *N. cordifolia*, Baker; *caud.* suberect or oblique, the wiry fibres often bearing tubers; *st.* tufted, wiry, 1-4 in. l., slightly scaly; *fr.* 1-2 ft. l., 1½-2 in. br.; *pinnae* close, often imbricated, about 1 in. l., ½-¾ in. br., usually blunt, the edge entire or slightly crenate, the under side rounded or cordate, the upper distinctly auricled at the base; *texture* subcoriaceous; *rachis* slightly scaly; both sides nearly naked; *sori* in a row about midway between the midrib and edge; *invol.* firm, distinctly reniform, oblique or opening towards the outer edge.—



Polypod. *Linn.* *N. tuberosa*, *Hk. Sp. 4. p. 151.*— $\beta$ , *N. pectinata*, Schott; no tubers, stem and rachis naked, pinnæ less distinctly auricled at the base on the upper, obliquely truncate on the lower side.

Hab. Cuba and Mexico to Brazil and Peru; Japan and N. India southward to Australia and New Zealand; Mascaren Isles, Zambesi-land, Guinea Coast.  $\beta$  restricted to the New World.—Distinguished from the two next by its narrower frond, close blunt pinnæ, and submedial sori. Here belong *N. occidentalis*, Kunze, *N. imbricata*, Kaulf., *N. obtusifolia*, Presl, and *N. delicatula*, Decaisne; the latter a small delicate N. Indian form.

2. *N. exaltata*, Schott; st. tufted, 4-6 in. l., firm, naked, or slightly scaly; fr. 1-2 ft. or more l., 3-6 in. br.; pinnæ close,  $1\frac{1}{2}$ -3 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., usually acute, the edge entire or slightly crenate, the upper side auricled, the lower rounded at the base; texture subcoriaceous; rachis and both sides nearly naked; sori submarginal; invol. firm, distinctly reniform.—*Hk. Sp. 4. p. 152.*— $\beta$ , *N. hirsutula*, Presl; rachis densely and both surfaces more or less coated with ferruginous down.—Polyp. *Forst.*

Hab. Cuba, the Bahamas, and Mexico to Peru and Brazil; Polynesia; N. India and Chusan to Queensland and Ceylon; Mauritius, Angola, Zambesi-land, Guinea Coast.—To this appear to belong *N. volubilis*, J. Sm., a straggling flexuose form, and the American *A. pendulum*, Raddi, and *A. pilosum*, L. and F., the former a large pendulous, and the latter a more delicate pilose plant. The typical form differs from the next species by its smaller size and firmer distinctly reniform involucre; but in some of the forms which agree with this in habit, as the New World *A. sesquipedale*, Willd., *N. valida*, Kze., *N. neglecta*, Kze., and Old World *N. biserrata*, Schott, the involucre resembles that of *N. acuta*.

3. *N. acuta*, Presl; st. tufted, 4-8 in. l., firm, naked or slightly scaly; fr. 2-4 ft. l., 8-12 in. br.; pinnæ 4-8 in. l.,  $\frac{1}{2}$ -1 in. br., acute, the edge entire or slightly crenate, the upper side auricled, the lower rounded at the base; texture subcoriaceous; rachis and both sides nearly naked; sori submarginal; invol. suborbicular, subpeltate.—*Hk. Sp. 4. p. 153.* *N. punctulata*, Presl. *N. ensifolia*, Presl. *N. splendens*, Presl.

Hab. Cuba and Guatemala to Peru and Brazil; Polynesia, Hong-Kong, and Loo Choo to Queensland; Mascaren Isles, Zambesi-land, Natal, Angola, Guinea Coast.—As will be seen, this is almost identical with the preceding in its distribution. There is also a ferrugineo-tomentose variety of this, which appears to be *N. rufescens*, Presl. *N. platyotis*, Kunze, is a form with the auricle sometimes 1 in. l.

4. *N. ramosa*, Baker; st. very short, scattered, on a slender, wiry, wide-creeping rhizome; fr. 6-12 in. l., 1-3 in. br.; pinnæ  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., slightly crenate, the upper edge auricled and truncate, parallel with the stem, the lower oblique; texture papyraceous; rachis and both sides slightly villose, the whole plant turning blackish when dried; invol. roundish, very fugacious.—*Aspidium*, Beauv. *N. obliterated*, *Hk. Sp. 4. p. 154.* *N. trichomanoides*, J. Sm.

Hab. West Tropical Africa, Johanna Island, Ceylon, Philippines, Malaccas, Australia, Samoa, Fiji.—Beauvois' is the oldest name, and he has given a characteristic figure in the Flore d'Oware. Polypodium? Beckleri, *Hk. Sp. 4. p. 224.* is this in a small barren state.

5. *N. altescandens*, Baker; st. very short, distant, on a slender, wiry, wide-creeping rhizome; fr. 6-12 in. l., 1-3 in. br.; pinnæ  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., distinctly crenato-pinnatifid, the upper edge auricled and truncate, parallel with the stem, the lower oblique; texture papyraceous; rachis and both sides more or less villose, the plant keeping green when dried; invol. very fugacious.—Polyp. *Colla*, *Hk. Sp. 4. p. 218.* *P. procurrens*, Kze.

Hab. Juan Fernandez, Samoa, Queensland, N. S. Wales.—This differs from the preceding by its firmer texture, crenate pinnæ, and by not turning at all black when dried.

Both have the stem usually jointed a short distance above the base, as in *J. Smith's Arthropteris*. *N. tenuis*, Moore, is a small form, and *N. repens* of Brackenridge apparently belongs in part to this, and in part to *N. ramosa*.

6. *N. floccigera*, Moore; *st.* furfuraceous; *fr.* 2-3 ft. l., 8-12 in. br.; *pinnæ* 4-6 in. l.,  $\frac{3}{8}$ - $\frac{3}{4}$  in. br., the apex acuminate, the edge crenated to a depth of 1 lin., the base slightly unequal; *texture* subcoriaceous; *rachis* and under surface furfuraceous; *sori* in the crenations; *invol.* firm, reniform.—*Hk. Sp. 4. p. 155.*

Hab. Java and Celebes.—Resembles *exaltata* in habit, but the *pinnæ* are distinctly crenated, and the *sori* placed at the tip of the lobes.

7. *N. davallioides*, Kze.; *caud.* short, stoloniferous; *st.* tufted, 1 ft. or more l., scaly towards the base; *fr.* drooping, 2-3 ft. l., 1 ft. or more br.; lower *pinnæ* barren, 4-8 in. l.,  $\frac{1}{2}$ -1 in. br., the apex acuminate, the edge inciso-crenate to a depth of 1 lin. or less, fertile *pinnæ* narrower, the lobes deeper and bearing each a single *sorus* at the point; *texture* subcoriaceous; *rachis* furfuraceous, both sides nearly naked; *invol.* reniform.—*Hk. Sp. 4. p. 155. Fil. Ex. t. 60.*

Hab. Java.—Clearly distinguished by its pinnatifid fertile *pinnæ*, with the *sori* at the tip of the lobes. *Ophioglossum acuminatum*, Hout., is the oldest name.

#### GEN. 46. OLEANDRA, Cav.

*Sori* round, inserted in a row near the base or below the centre of the compact free veinlets. *Invol.* reniform. *A small genus, almost restricted to the Tropics, distinguished from Nephrodium mainly by habit, with wide-creeping scandent shoots, jointed stems, and entire lanceolate-elliptical fronds.* TAB. V. f. 46.

1. *O. neriiformis*, Cav.; *shoots* woody, suberect, clothed with adpressed scales; *st.*  $\frac{1}{2}$ -1 in. l., with the joint below the middle; *fr.* 6-18 in. l.,  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. br., scattered, or in opposite pairs, or often in terminal whorls, narrowed gradually towards both ends; *texture* generally subcoriaceous and both sides naked; *sori* in two rather irregular rows near the midrib; *invol.* oblique.—*Hk. Sp. 4. p. 156. (in part). Fil. Ex. t. 58.*

Hab. America—N. Granada and Guiana to Brazil and Peru; Fiji, N. Guinea, Samoa, Aneiteum, N. India (up to 6,000 ft.), Philippines, Malaccas, Guinea Coast.—A variable plant, but we cannot distinguish clearly more than one species with firm suberect shoots. *O. phyllarthron*, Kze., is a form with small, rigid, sessile fronds; *O. micans*, Kze.; *O. hirta*, Brack.; *O. mollis*, Presl; *O. Trujulensis*, Karst.; *O. hirtella*, Miquel; and *O. pilosa*, Hk., are S. American plants, with thinner and more or less pilose fronds, and with the *sori* often in an irregular wavy line not close to the midrib, as in *O. articulata*.

2. *O. musæfolia*, Kunze; *shoots* firm, wide-climbing, clothed with adpressed scales, curving upwards to where it bears the fronds singly or in tufts of 2 to 5, and then downwards; *st.*  $\frac{1}{2}$ -1 in. l., jointed close to the base; *fr.* 6-12 in. l., 1-1 $\frac{1}{2}$  in. br., narrowed gradually towards both ends; *texture* subcoriaceous, naked or the midrib slightly pilose; *sori* in two irregular rows near the midrib; *invol.* oblique.—*Mett. Fil. Ind. p. 240.*

Hab. Ceylon and Malay Isles.—Well distinguished from the preceding by its different mode of growth. *O. Moritzii*, Kunze, is a form with more scattered fronds and subquarrose scales.

3. *O. articulata*, Cav.; *shoots* firm, suberect, wide-climbing, clothed with linear-subulate adpressed scales; *st.* scattered, sometimes opposite but not whorled, 1-2 in. l., with the joint close to the base; *fr.* 6-12 in. l., 1 $\frac{1}{2}$ -2 in. br.; *texture* subcoriaceous; *midrib* beneath slightly scaly; *sori* in two irregular rows, often some distance from the midrib.—*O. neriiformis*, *Hk. Sp. 4. p. 156.*



(in part).— $\beta$ , *O. Welwitschii*, Baker; shoots weaker, wide-trailing; scales linear-subulate, squarrose.

Hab. Natal, Mascaren Isles, Seychelles, Guinea Coast;  $\beta$ , Angola, *Dr. Welwitsch.*—The typical plant is about midway in mode of growth between species 1 and 4;  $\beta$  has the trailing shoots and spreading scales of *nodosa*, but in other respects agrees with this.

4. *O. nodosa*, Presl; shoots trailing horizontally, densely clothed with linear-subulate spreading scales; *st.* scattered, 2-6 in. l., often ebeneous, articulated not far from the base; *fr.* 6-12 in. l.,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. br., the apex acuminate, the edge entire; *texture* subcoriaceous, both sides glossy; *sori* scattered, placed nearly all in the inner half of the frond; *invol.*  $\frac{1}{3}$  lin. br.—*Hk. Sp.* 4. p. 157.

Hab. West Indies and Guiana.—Distinguished from all the other species by its trailing shoots, satiny gloss, and copious irregularly-scattered sori.

5. *O. Wallichii*, Hk.; shoots trailing horizontally, the scales fibrillose, spreading, ferruginous; *st.* close or scattered,  $\frac{1}{2}$ -2 in. l., jointed close to the base; *fr.* 6-12 in. l.,  $\frac{3}{4}$ - $1\frac{1}{2}$  in. br., the apex acuminate; *texture* papyraceo-herbaceous or subcoriaceous; *rachis* naked or scaly; both *sides* naked; *sori* in single rows close to the midrib; *invol.*  $\frac{1}{3}$  lin. br., ciliated, opening towards the edge.—*Hk. Sp.* 4. p. 158.

Hab. N. India, up to 7,000 ft.

6. *O. Cumingii*, J. Sm.; shoots trailing horizontally, clothed with adpressed linear scales; *st.* close or scattered, 2-3 in. l., articulated near the base; *fr.* 12-18 in. l.,  $1\frac{1}{2}$  in. br., narrowed gradually towards both ends; *texture* herbaceous; *rachis* and both sides slightly pubescent; *sori* in two irregular rows near, but not close to, the midrib; *invol.* firm, oblique.—*Hk. Sp.* 4. p. 155. *O. chinensis*, *Hance.*— $\beta$ , *O. Sibbaldi*, Grev.; *texture* thinner; *surfaces* more hairy; *sori* in very irregular wavy lines not so near the midrib.—*Ann. Nat. Hist.* 2 ser. 1. p. 327.

Hab. Canton, Assam, Philippines, Neilgherries, and Malaya.—Var. *longipes*, Hk., from Moulmein, has stems 4-5 in l., articulated near the middle.  $\beta$ , Tahiti; gathered by Sibbald and Bidwell. Probably this occurs in Tropical Australia, as there are specimens amongst Leichhardt's plants.

#### GEN. 47. FADYENIA, Hook.

*Sori* oblong, in two series near the midrib, terminating free veinlets. *Invol.* large, subreniform, attached by the centre, free all round the edge. *A single West Indian species.* TAB. V. f. 47.

1. *F. prolifera*, Hk.; *fr.* entire, dimorphous, the sterile ones  $\frac{3}{4}$ -1 in. br., elongated and rooting at the apex, the fertile one ligulate, narrowed below, 6-9 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br.; *veins* anastomosing copiously; *texture* subcoriaceous; *sori* filling up nearly the whole space between midrib and edge.—*Hk. Sp.* 4. p. 160. *Fil. Ex. t.* 36.

Hab. Cuba and Jamaica.

B. Exinvolucratæ. *Sori without an involucre.* TRIBES 11-13. GEN. 48-61.

TRIBE 11. POLYPODIEÆ.

*Sori on the back of the lobes, round or rarely oblong, not more than twice as long as broad.* GEN. 48.

GEN. 48. POLYPODIUM, L.

Characters of the Tribe.

*The largest genus, including plants of two different modes of growth, each series including a number of species of each of the different kinds of venation and from all climates.* TAB. V. f. 48.

\* *Desmobyroid series.* *Habit and mode of growth of Aspidicæ, i. e. stems continuous with the caudex, and sori always medial on the veins.* *Phegopteris*, *Mett.* Sp. 1-90.

§ *Euphegopteris.* *Venation of Lastrea, i. e. veins free.* Sp. 1-55. TAB. 48. Fig. C.

\* *Pinnæ entire or lobed less than halfway down to the midrib.* Sp. 1-7.

1. *P. (Pheg.) cordatum*, Hk. ; *st.* very short, slender, stramineous, pubescent ; *fr.* 3-4 in. l., 1 in. br., oblong-lanceolate ; *pinnæ* oblong, entire, blunt, 2 lin. br., rounded at the base and stalked, the lower ones reduced ; *texture* subcoriaceous ; *rachis* and under side finely pubescent ; *veinlets* of the *pinnæ* usually simple, with medial *sori*.—*Hk. Sp.* 4. p. 233.

*Hab.* Cuba.—Probably a free-veined form of *P. reptans*, with which Mettenius unites it.

2. *P. (Pheg.) hastæfolium*, Sw. ; *st.* tufted, 1-2 in. l., wiry, deciduously scaly ; *fr.* 6-9 in. l.,  $1\frac{1}{2}$ -2 in. br. ; *pinnæ* blunt, entire,  $\frac{1}{8}$  in. br., with a sharp distinct auricle on both sides at the base, those of the lower half of the frond reduced gradually ; *texture* subcoriaceous ; *rachis* villose ; under side nearly naked ; *veinlets* forked, with the *sori* below the middle.—*Hk. Sp.* 4. p. 232.

*Hab.* West Indies.

3. *P. (Pheg.) flavo-punctatum*, Kaulf. ; *st.*  $1\frac{1}{2}$ -2 ft. l., slightly scaly towards the base ; *fr.* 2-3 ft. or more l., 12-18 in. br. ; *pinnæ* 6-9 in. l.,  $1-1\frac{1}{4}$  in. br., the apex acuminate, the edge crenate or inciso-dentate, the lower ones slightly stalked, 2 in. apart, the lowest not reduced ; *texture* papyraceo-herbaceous ; *rachis* naked or slightly scaly, both sides naked ; main *veins* only about 2 lin. apart, with 3-4 *veinlets* on each side, all except the upper ones uniting ; *sori* medial.— $\beta$ , *P. Prionitis*, Kunze ; *pinnæ* lobed from a quarter to a third of the way down to the midrib.—*Hk. Sp.* 4. p. 239.

*Hab.* W. Indies and Mexico to Peru and Brazil.—*Neph. Imrayanum*, Hk. Sp. 4. p. 86. t. 242. A., is evidently the same plant, and I cannot see an involucre. The name is derived from minute pellucid yellow dots, which are scattered over the frond. It may be *P. rotundifolium*, Willd. (*Plumier*, t. 38).

4. *P. (Pheg.) Sancta-Gabrieli*, Hk. ; *st.* 18 in. l., firm, erect, brownish, glossy, scaly only at the base ; *fr.* 2 ft. l., nearly 1 ft. br. ; *pinnæ* spreading, the lowest stalked, 5-6 in. l.,  $\frac{1}{2}$ - $\frac{5}{8}$  in. br., the apex acuminate, the edge bluntly lobed to a depth of a line, the base on the upper side with a distinct rhomboidal auricle ; *texture* herbaceous ; *rachis* and both sides naked ; *veinlets* 2-3 on a side ; *sori* copious.—*Hk. Sp.* 4. p. 233.



Hab. St. Gabriel, Amazon Valley, *Spruce*, 2153.—Very near the last, of which it may be a form.

5. P. (Pheg.) *alloeopterum*, Kunze; *st.* 1½ ft. l.; *fr.* 1½ ft. l., 1 ft. br., ovate-oblong, slightly narrowed below; *pinnæ* 6 in. l., 1½ in. br., the edge inciscrenate, with subfalcate acute or obtuse lobes, the base unequal, the lower *pinnæ* stalked; *texture* papyraceo-herbaceous; *rachis* and both sides naked; *veinlets* 2-5 on a side; *sori* large, close to the main veins.—*Mett. Pheg. p.* 19.

Hab. Columbia.

6. P. (Pheg.) *Tijuccanum*, Raddi; *st.* 1-1½ ft. l., stout, erect, densely clothed with fibrillose brown scales; *fr.* 2-3 ft. l., 12-18 in. br.; lower *pinnæ* stalked, 6-9 in. l., 1-1½ in. br., cut about halfway down to the rachis into blunt entire lobes ½ in. br., lower ones not reduced; *texture* papyraceo-herbaceous; *rachises* glossy; *under side* naked; *veinlets* 6-9 on a side, simple, with the *sori* below the middle.—*Hk. Sp.* 4. p. 239.

Hab. Guiana, Brazil, and Peru.

7. P. (Pheg.) *Walkeræ*, Hk.; *st.* 12-18 in. l., strong, erect, substramineous, deciduously scaly; *fr.* 2-3 ft. l., 1 ft. or more br.; lower *pinnæ* distinctly stalked, 6-12 in. l., 1 in. br., acuminate, the edge crenated or slightly or deeply lobed; *texture* coriaceous; *rachis* slightly scaly; *under surface* quite naked, glossy; *veins* immersed, in free pinnated groups, with 5-6 very oblique veinlets on a side; the *sori* distant from the midrib of each.—*Hk. Sp.* 4. p. 234.— $\beta$ , *bipinnatum*; lower *pinnæ* 1 ft. l., with distinct unequal-sided pinnatifid *pinnæ* cuneate at the base.

Hab. Ceylon.—A doubtful plant;  $\alpha$  is probably a form of *Aspidium caducum*, without an involucre; whilst  $\beta$  comes near to *A. aristatum*  $\gamma$ , but is without spinose teeth. The various forms are figured by Capt. Beddome, t. 234-5.

\*\* *Pinnæ* cut more than halfway down to the rachis into close, regular, subentire lobes. *Sp.* 8-24. *Veinlets* all simple except in 20-24.

8. P. (Pheg.) *pauciflorum*, Hk.; *st.* tufted, 6-8 in. l., firm, polished, brownish, naked; *fr.* 8-10 in. l., 4-5 in. br., lanceolate; lower *pinnæ* distinctly stalked, 2-3 in. l., ¾ in. br., cut halfway down or more into close, broad, blunt lobes, lowest not reduced; *texture* papyraceo-herbaceous; *rachis* and under side a little hairy; *veinlets* simple, 4-5 on a side, with a few *sori* near their apex.—*Hk. Sp.* 4. p. 242.

Hab. Surinam, *Hostmann*, 64.

9. P. (Pheg.) *deflexum*, Baker; *caud.* erect, the scales ovate, dull-brown; *st.* 2-3 in. l., slender, naked, stramineous; *fr.* 8-12 in. l., 2 in. br.; *pinnæ* 1 in. l., ¼ in. br.; lanceolate-acuminate, cut down to the rachis into pointed linear-oblong lobes ¾ lin. br., the lower *pinnæ* deflexed, very distant and dwindling down gradually to mere auricles; *texture* herbaceous; *rachis* naked, stramineous; both *sides* slightly hairy; *veins* 4-6 on each side; *sori* nearer the midrib than the edge.—*Phegop. Mett. Fil. Nov. Gran.* 241. *Nephrodium*, *Presl.*

Hab. New Granada, *Lindig*, 321.—Habit of *N. Beddomei*.

10. P. (Pheg.) *obtusilobum*, Desv.; *st.* densely tufted, about 1 ft. l., slender, nearly naked; *fr.* 2 ft. or more l., 8-10 in. br.; *pinnæ* 4-6 in. l., ¾-7/8 in. br., narrowed gradually from the base to the point, cut down nearly to the rachis into entire slightly falcate lobes ½ in. br.; lower *pinnæ* reduced gradually; *texture* herbaceous; *rachises* naked or slightly pubescent; *veinlets* 8-9 on a side; *sori* small, medial.

Hab. Mauritius and Madagascar, *Bojer*; Cameroon Mountains and Fernando Po, *Mann*.—Habit of *Neph. conterminum*.

11. *P. (Pheg.) Sieberianum*, Kaulf.; *st.* 12-18 in. l., firm, naked, stramineous; *fr.* 1½-2 ft. l., 1 ft. or more br.; *pinnae* 6-9 in. l., 2 in. or more br., cut down to a broadly-winged rachis into falcate entire lobes, ¼-⅜ in. br., lowest pair rather smaller and deflexed; *texture* papyraceo-herbaceous or subcoriaceous; *veinlets* 8-9 on a side, with the *sori* about the centre.—*Hk. Sp. 4. p. 235*.

Hab. Mauritius and Bourbon.—Occasionally the lowest veinlets join those above them in the same group, and in the barren frond they fork copiously, and join towards the edge. Resembles most *Neph. brachyodon*.

12. *P. (Pheg.) erubescens*, Wall.; *st.* 2 ft. or more l., tetragonous, glossy, stramineous, naked; *fr.* 3-4 ft. l., 1-2 ft. br.; lower *pinnae* sometimes 1 ft. l., 1½ in. br., cut down nearly to the rachis into close acute or bluntish entire lobes 2 lin. br.; *texture* rigid, subcoriaceous; *rachis* and both sides naked; *veinlets* simple, often 20 on a side, the *sori* close to the raised midrib.—β, *Amboynensis*; lower *pinnae* on stalks 1 in. l. and narrowed conspicuously at the base; *sori* not close to the midrib.—*Hk. Sp. 4. p. 236*.

Hab. N. India (up to 2,000 ft.), Malayan Peninsula and Isles.—Habit of *N. prolixum*, but lower *pinnae* not reduced.

13. *P. (Pheg.) appendiculatum*, Wall.; *st.* tufted, about 1 ft. l., deciduously villose; *fr.* 1½-2 ft. l., 8-10 in. br., ovate-lanceolate; *pinnae* 3-5 in. l., ⅔-⅞ in. br., narrowed from the base to an acuminate point, cut down nearly to the rachis into linear-oblong falcate lobes ½ in. br.; lower *pinnae* with a small gland at the base, slightly reduced; *texture* herbaceous; *rachis* and lower surface villose; *veinlets* 8-12 on a side; *sori* close to the midrib.—*Wall. Cat. 349*.

Hab. East Himalayas and Penang.—Intermediate between the preceding and following.

14. *P. (Pheg.) auriculatum*, Wall.; *st.* tufted, 1½-2 ft. l., deciduously villose; *fr.* 3-4 ft. l., 1 ft. or more br.; *pinnae* 6-8 in. l., 1 in. br., cut down nearly to the rachis into close spreading entire blunt lobes 2-3 lin. br.; lower *pinnae* reduced down to mere auricles, furnished with a prominent gland at the base beneath; *texture* herbaceous; *rachis* densely villose; *under side* nearly naked; *veinlets* simple, 10-12 on a side, bearing the *sori* about the middle.—*Hk. Sp. 4. p. 238*.

Hab. Himalayas, up to 6,000 ft.

15. *P. (Pheg.) Germanianum*, Baker; *st.* 6-9 in. l., tufted, firm, erect, nearly naked; *fr.* 2 ft. l., 1 ft. br.; central *pinnae* 6 in. l., 1½ in. br., cut three-quarters of the way down to the rachis into linear-oblong blunt entire lobes 2 lin. br., with a space between them, the lower *pinnae* sessile, much reduced; *texture* herbaceous; *rachis* and veins beneath slightly pubescent; *veins* pinnate in the lobes, with 8-10 veinlets on a side; *sori* medial.—*Pheg. Fée, Mem. 11-12. t. 13*.

Hab. Guadeloupe, *L'Herminier*.—*P. ctenoides*, *macrotheca*, and *hydrophila*, *Fée*, are allied plants from the same island; all of them closely resembling *Gymnogramme davalloides* in general habit, but the *sori* are roundish.

16. *P. (Pheg.) rusticum*, Baker; *st.* tufted, 4-6 in. l., strong, densely clothed with lanceolate spreading scales; *fr.* 1½-2 ft. l., 8-10 in. br.; central *pinnae* 4-5 in. l., ¾ in. br., cut three-quarters of the way down to the rachis into close blunt entire lobes 2 lin. br.; lower *pinnae* distant and dwindling down very gradually; *texture* herbaceous; *rachis* scaly in the lower part, villose throughout like the costæ; *veins* pinnate in the lobes, with 6-8 simple veinlets on a side; *sori* medial.—*Phegopteris, Fée, Mem. 11-12. t. 13*.



Hab. Guadeloupe, *L'Herminier*.—Habit not unlike that of the least-divided forms of *N. Filix-mas*.

17. *P. (Pheg.) refulgens*, Klotzsch; *st.* 1 ft. l., clothed with bright-brown scales throughout; *fr.* 1½ ft. l., 1 ft. br.; *pinnæ* 6-8 in. l., 1-1¼ in. br., cut down to the centre into close oblong obtuse slightly-toothed lobes ¼ in. br., the lower pinnæ stalked and rather narrowed at the base; *texture* herbaceous; *rachis* and main veins above densely downy, the veins beneath with yellowish glandular hairs and reddish setaceous scales; *veinlets* simple, 7-12 on each side; *sori* medial.—*Phegop. Mett. Fil. Nov. Gran. p.* 240.

Hab. Panama, Columbia, and Guiana.—Habit of *Neph. caripense*.

18. *P. (Pheg.) rude*, Kze.; *st.* 1½-2 ft. l., scaly towards the base, villose upwards; *fr.* 3-4 ft. or more l., 12-18 in. br.; *pinnæ* 8-12 in. l., 1½ in. br., cut down nearly to the rachis into subfalcate entire lobes ⅓ in. br., the lower pinnæ not reduced, but with a gland at the base and the lower lobes small; *texture* subcoriaceous; *rachis* conspicuously villose and under side less so; *veinlets* simple, 12-16 on a side; *sori* submarginal.—*Hk. Sp. 4. p.* 243. *Glaphyopteris, Presl.*

Hab. Mexico to Peru.—*Neph. piloso-hispidum*, *Hk. Sp. 4. p.* 105, seems to belong here, and I cannot distinguish an involucre.

19. *P. (Pheg.) decussatum*, L.; *st.* 2-3 ft. l., stout, erect, scaly towards the base, polished upwards, sometimes slightly muricated; *fr.* 3-4 ft. or more l., 12-18 in. br.; *pinnæ* 8-12 in. l., 1-1½ in. br., cut down nearly or quite to the rachis into close spreading entire blunt lobes 1-1½ lin. br., with a large subulate gland at the base beneath; *texture* subcoriaceous, rigid; *rachis* and both sides nearly naked; *veinlets* simple, close, 20 or more on a side; *sori* in rows near the midrib.—*Hk. Sp. 4. p.* 244. *Glaphyopteris, Presl.*

Hab. West Indies and Panama southward to Peru and Brazil.

20. *P. (Pheg.) unisorum*, Baker; *st.* tufted, slender, 1 in. l., dark purplish-brown, clothed throughout with linear scales; *fr.* 2-3 in. l., 1 in. br., oblong-lanceolate; *pinnæ* horizontal, with a roundish terminal lobe 1½-2 lin. each way, and 1-2 smaller sessile ones on each side; *texture* coriaceous; *rachis* densely scaly like the stem; both sides naked; *veins* immersed, flabellate; one large *sorus* at the base of each lobe.

Hab. Mount Rauai, Sandwich Isles, *Hillebrand*.—A very curious and distinct little plant.

21. *P. (Pheg.) platylobum*, Baker; *st.* 12-18 in. l., firm, erect, scaly towards the base, finely villose upwards; *fr.* 2-3 ft. l., 1 ft. or more br.; central *pinnæ* 6-8 in. l., 1-1¼ in. br., cut down to the rachis in the lower part into blunt oblong nearly entire subfalcate lobes ¼ in. br.; lower *pinnæ* slightly reduced; *rachises* densely villose; under surface nearly naked; *texture* herbaceous; *veinlets* about 6 on a side, the lower ones forked; *sori* almost marginal.—*P. rotundatum, Hk. Sp. 4. p.* 233. (*non Willd.*)

Hab. Tarapota, N. E. Peru, *Spruce, 4656.*

22. *P. (Pheg.) fibrillosum*, Baker; *st.* 1 ft. or more l., densely clothed throughout with spreading fibrillose scales; *fr.* 1½-2 ft. l., 1 ft. br.; lower *pinnæ* the largest, sessile, 6 in. l., 1½ in. br., cut down within 1 lin. of the rachis into close, blunt, nearly entire falcate lobes 3-4 lin. br.; *texture* herbaceous; *rachis* fibrillose and upwards villose; both sides nearly naked; *veinlets* forked, 6-8 on a side, with the *sori* close to the midrib.

Hab. Andes of N. E. Peru, *Spruce, 4742.*

23. *P. (Pheg.) macrophyllum*, Hk.; *st.*  $\frac{1}{2}$  in. thick, 4 ft. l., clothed with scattered lanceolate scales; *fr.* ample, 5-6 ft. l., 2-3 ft. br.; lowest *pinnæ* 16 in. l.,  $2\frac{1}{2}$  in. br., cut down to a broadly-winged rachis into close slightly-toothed subfalcate lobes  $\frac{3}{8}$  in. br.; *texture* papyraceo-herbaceous, firm; *colour* dark-green; both *sides* naked; *veinlets* simple, 12 or more on a side, bearing *sori* about the centre.—*Hk. Sp. 4. p. 241.*

*Hab.* Andes of N. E. Peru, *Spruce*, 4270.—This also has pellucid dots, and is a very fine plant.

24. *P. (Pheg.) pteroides*, Klotzsch; *st.* 2-4 ft. l., scaly at the base, naked and stramineous upwards; *fr.* 3-6 ft. or more l., 2-3 ft. br.; lower *pinnæ* 12-18 in. l., 3-4 in. br.; *pinnl.* linear, acute, entire,  $\frac{1}{4}$  in. br., the lower ones deflexed, the lowest reduced; *texture* subcoriaceous; *rachis* and both sides naked; *veinlets* forked; *sori* quite marginal.—*Hk. Sp. 4. p. 255. t. 280.*

*Hab.* Columbia and Ecuador.—Well distinguished from all the preceding by two-thirds of the pinnules of the lower *pinnæ* being quite distinct. It attains a height of 15 feet.

\*\*\* *Pinnæ* cut nearly or quite down to the rachis into toothed or pinnatifid lobes. *Sp. 25-30.*

25. *P. (Pheg.) Phegopteris*, L.; *rhizome* slender, wide-creeping; *st.* 6-9 in. l., slender, naked, except towards the base; *fr.* 6-9 in. l., 4-6 in. br., subdeltoid; lower *pinnæ* 2-3 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., cut down three-quarters of the way to the *rachis* into close, blunt, entire or slightly toothed lobes,  $1\frac{1}{2}$ -2 lin. br., the lowest pair deflexed; *texture* thinly herbaceous; *under side* slightly hairy; *veinlets* 6-8 on a side, the lower ones forked; *sori* nearer the edge than the midrib.—*Hk. Sp. 4. p. 245. B. F. t. 3.*

*Hab.* Lapland to Japan, Etruria, and Greece; Greenland, Iceland, and Russian America, southward to the United States.

26. *P. (Pheg.) distans*, Don; *st.*  $1\frac{1}{2}$ -2 ft. l., slender, glossy, stramineous or chestnut-brown; *fr.*  $1\frac{1}{2}$ -3 ft. l., 8-12 in. or more br.; lower *pinnæ* 6-8 in. l.,  $1\frac{1}{2}$  in. br., cut down nearly or quite to the rachis into deeply pinnatifid *pinnl.*  $\frac{1}{4}$  in. br., with blunt or acute toothed or subentire lobes, the base dilated; *texture* herbaceous; *rachis* naked, glossy, straw-coloured or brown; *under side* slightly hairy; *veinlets* slightly pinnate in the lower lobes, pellucid; *sori* scattered, copious.—*P. paludosum, Blume. Hk. Sp. 4. p. 244.*

*Hab.* N. India (up to 9-10,000 ft.) to Ceylon, Java.—A variable plant. *P. Griffithii*, *Hk. Sp. 4. p. 236*, appears to be a form with subentire lobes; and *N. microstegium*, *Hk. Sp. 4. p. 119. t. 250*, a large form, with distinctly-pinnatifid lobes, and a stramineous rachis.

27. *P. (Pheg.) obscurum*, Hk.; *st.* tufted, 1 ft. l., black, glossy, naked; *fr.* 12-18 in. l., 8-10 in. br.; *pinnæ* not close, 4-5 in. l., 1 in. br., cut three-quarters down to the rachis into close blunt lobes 2 lin. br., lowest pair the largest, those of the fertile frond contracted; *rachis* ebeneous; *texture* papyraceo-herbaceous; *veinlets* fine, 6-8 on a side, the lower ones forked; *sori* copious, submarginal.—*Hk. Sp. 4. p. 237.*

*Hab.* Philippines, *Cuming*, 302; Tavoy, *Rev. C. S. Parish*.—Very likely a non-involucrate form of *Neph. sagenioides*.

28. *P. (Pheg.) molle*, Roxb.; *st.* 1 ft. or more l., stout, deciduously scaly; *fr.* 2-3 ft. l., 12-18 in. br.; lower *pinnæ* not reduced, 6-9 in. l.,  $1\frac{1}{4}$ -2 in. br., cut down to a broadly-winged rachis into oblong entire or crenated blunt lobes  $\frac{1}{4}$ - $\frac{3}{8}$  in. br.; *texture* subcoriaceous; *rachis* densely scaly; *under surface* finely



villose all over; *veinlets* forked; *sori* small, copious, distant from the midrib.—*P. Dianæ*, *Hk. Sp. 4. p. 234.*

Hab. St. Helena.

29. *P. (Pheg.) caudatum*, Kaulf.; *st.* 12-18 in. l., firm, angular, brownish, slightly scaly; *fr.* 2-3 ft. l., 12-15 in. br.; *pinnae* 6-9 in. l., 1-2 in. br., cut down to a distinctly-winged rachis into oblong falcate distinctly-toothed lobes 2-3 lin. br., lower ones not reduced; *texture* herbaceous; *rachis* more or less scaly; both *surfaces* naked; *veinlets* simple, 1 to each tooth, 6-8 on a side; *sori* near the midrib.—*Hk. Sp. 4. p. 241.*

Hab. Cuba to Brazil.

30. *P. (Pheg.) biseriale*, Baker; *st.* 1-2 ft. l., slightly scaly; *fr.* 2-3 ft. l., 1 ft. or more br.; lower *pinnae* the largest, 6-8 in. l., 2-3 in. br., cut down to the rachis below into distinct oblong-lanceolate *pinnae* 1-2 in. l., with the *veinlets* pinnate in the lower lobes; *texture* herbaceous; *rachises* villose and slightly scaly; *lower side* nearly naked; *sori* in pairs on the lower lobes.

Hab. Andes of Peru and Ecuador, *Spruce.*

\*\*\*\* *Fronds small or middle-sided, tri- or quadripinnatifid.* Sp. 31-43.

31. *P. (Pheg.) hexagonopterum*, Michx.; *rhizome* wide-creeping; *st.* 12-18 in. l., slender, stramineous, naked, glossy; *fr.* 8-12 in. l., nearly as broad, deltoid; lower *pinnae* 4-6 in. l., the lowest pair deflexed, often 2 in. br., the *pinnae* reaching down nearly to the rachis, those of the lower side 1-1½ in. l., pinnatifid halfway down, with broad blunt lobes; *texture* thinly herbaceous; *under side* slightly villose; *veinlets* pinnate in the lobes; *sori* marginal.—*Hk. Sp. 4. p. 245.*

Hab. Canada, southward to Florida.—General habit of *P. Phegopteris.*

32. *P. (Pheg.) Hasseltii*, Blume; *st.* 9 in. l., slightly scaly; *fr.* about 1 ft. each way, deltoid, quadripinnatifid; lowest *pinnae* 6 in. l., 3-5 in. br.; *pinnae* stalked, ovate, the lowest much the largest, with ovate-oblong obtuse lobes, the lower ones deeply pinnatifid; *texture* coriaceous; *rachis* and both sides naked; *veins* pinnate in the lobes; *sori* medial.—*Hk. Sp. 4. p. 217.*

Hab. Java.

33. *P. (Pheg.) rufescens*, Blume; *rhizome* short-creeping; *st.* 12-18 in. l., firm, erect, naked; *fr.* 12-18 in. l., 9-12 in. br., subdeltoid; lower *pinnae* much the largest, deltoid, 6-8 in. l., 3-4 in. br.; *pinnae* lanceolate, unequal-sided, bluntly lobed, the lowest nearly down to the rachis; *texture* subcoriaceous; *rachis* and both sides naked or slightly pubescent; *veinlets* pinnate in the lower lobes, 3-4 on a side; *sori* medial.—*Hk. Sp. 4. p. 257.*

Hab. Java, Ceylon, New Caledonia, Queensland.—*P. Barterianum*, *Hk. Sp. 4. p. 254.* from Fernando Po, is evidently the same.

34. *P. (Pheg.) Dryopteris*, L.; *rhizome* slender, wide-creeping; *fr.* 6-12 in. l., slender, stramineous, naked upwards, slightly scaly below; *fr.* 6-10 in. each way, deltoid; lower *pinnae* much the largest; *pinnae* lanceolate, only the lowest free, oblong, slightly crenate; *texture* thinly herbaceous; *rachis* and both sides glabrous; *sori* submarginal.—*Hk. Sp. 4. p. 250.* *B. F. t. 4.—β, P. Robertianum*, Hoffm.; *rhizome* thicker, the whole plant more rigid and finely glandular.—*B. F. t. 5.*

Hab. Lapland to the Pyrenees, N. Italy, N. India (5-8,000 ft.), Manchuria, Japan; America—Greenland and Sitka to the Rocky Mountains and Northern United States.

$\beta$  has nearly as wide a range as the type in Europe, and occurs also in the United States.

35. P. (Pheg.) *glanduliferum*, Liebm.; *st.* tufted, 3-4 in. l., slender, stramineous; *fr.* 6-8 in. l., 3-4 in. br., lanceolate-deltoid; lower *pinnæ* the largest, about 2 in. l., 1 in. br., cut down to the rachis below into distinct unequal-sided deeply-pinnatifid *pinnl.*, with erecto-patent, linear-oblong, entire or slightly-toothed lobes; *texture* herbaceous; *rachis* and both sides finely glandular; *veinlets* immersed; *sori* 1 at the base of each lobe.—*Hk. Sp. 4. p. 252.*

Hab. Mexico, *Liebmann.*

36. P. (Pheg.) *drepanum*, Hk.; *st.* tufted, 12-18 in. l., with dark-coloured ovate scales below; *fr.*  $1\frac{1}{2}$ -3 ft. l., 8-12 in. br.; lowest *pinnæ* the largest, 6-8 in. l.,  $1\frac{1}{2}$ -2 in. br.; *pinnl.* lanceolate, unequal-sided, auricled on the upper, truncate on the lower side at the base, with a broad uncut centre and copious spinose teeth, the lowest stalked; *texture* coriaceous; *veins* distinct; *both sides* nearly naked; *sori* medial.—*Hk. Sp. 4. p. 249.*

Hab. Madeira.—This and the two next have entirely the habit of *Polystichum.*

37. P. (Pheg.) *platyphyllum*, Hk.; *st.* tufted, 12-18 in. l., clothed towards the base with ovate scales; *fr.* 1-2 ft. l., 4-12 in. br.; lower *pinnæ* the largest, 3-6 in. l.,  $1\frac{1}{2}$ -2 in. br., with distinct close unequal-sided, subrhomboidal *pinnl.*, very obliquely truncate on the lower side at the base, the upper side auricled, with the inner edge parallel with the stem, the central part uncut, the teeth spinose; *texture* subcoriaceous; *rachises* fibrillose; *both sides* nearly naked; *venation* subflabellate; *sori* small, principally in rows near the midrib.—*Hk. Sp. 4. p. 248.*

Hab. Cuba and Guatemala to Brazil and Peru.

38. P. (Pheg.) *rigidum*, Hk. & Gr.; *st.* tufted, 6-18 in. l., more or less scaly; *fr.* 1-3 ft. l., 4-18 in. br.; *pinnæ* 2-9 in. l.,  $\frac{3}{4}$ - $1\frac{1}{4}$  in. br., with close unequal-sided subrhomboidal *pinnl.* with copious aristate teeth; *texture* coriaceous; *rachises* usually scaly; *venation* subflabellate; *sori* principally in rows near the midrib.—P. *rigidum* and *pycnolepis*, *Hk. Sp. 4. p. 246.*

Hab. Guatemala, along the Andes to Peru.—Very variable, the forms differing only by the want of an involucre from the forms of *Aspid. aculeatum*, to which it should probably be joined. There is a detailed account of the various forms in the "Species Filicum." We include here three species of Mettenius,—his *rigida*, *cochleata*, and *pycnolepis*.

39. P. (Pheg.) *Mannianum*, Hk.; *st.* tufted, 6-9 in. l., glossy, stramineous, with scattered lanceolate scales; *fr.* nearly 1 ft. l., 4-5 in. br., lanceolate; lowest *pinnæ* the largest, 2-3 in. l., 1- $1\frac{1}{4}$  in. br., cut down to the rachis below into ovate-deltoid *pinnl.* with deep blunt entire lobes; *texture* herbaceous; *rachis* stramineous; under *surface* naked; *veinlets* pinnate in the lower lobes; *sori* 2-3 to a pinnule.—*Hk. Sp. 4. p. 253.*

Hab. Fernando Po, *G. Mann.*—Habit of the less-divided forms of *N. spinulosum.*

40. P. (Pheg.) *unidentatum*, Hk. & Arn.; *st.* tufted, 1 ft. l., clothed with squarrose dark-brown linear scales towards the base; *fr.* 2-3 ft. l., 1 ft. or more br., deltoid; lower *pinnæ* the largest, deltoid, 6-9 in. l., 4-5 in. br.; *pinnl.* lanceolate, the lower *segm.* distinct, ovate-oblong, deeply pinnatifid, with slightly-toothed lobes; *texture* herbaceous; *rachis* and both sides naked; *ult. veinlets* forked; *sori* submarginal.—*Hk. Sp. 4. p. 267.*

Hab. Sandwich Isles.—This also, which is now in cultivation at Kew, is like a *Nephrodium* of the *Lophodium* group.



41. *P.* (Pheg.) *Oldhami*, Baker; *st.* tufted, 12-18 in. l., clothed at the base with long dense linear-subulate bright-brown scales, and throughout with small adpressed scales; *fr.* 1½-2 ft. l., 1 ft. or more br., deltoid; lower *pinnæ* much the largest; *pinnl.* of the lower side 2-3 in. l., with distinct lanceolate deeply-pinnatifid *segm.*; largest *ult. lobes* ¼ in. l., ⅓ in. br.; *texture* herbaceous; *rachis* densely furfuraceous like the stem; *under side* rather glossy; *sori* very dense and numerous, close to the midrib.

Hab. Formosa, *Oldham*.

42. *P.* (Pheg.) *alpestre*, Hoppe; *st.* tufted, 4-6 in. l., scaly below; *fr.* 1-2 ft. l., 6-8 in. br., oblong-lanceolate; *pinnæ* lanceolate, 3-4 in. l., 1-1¼ in. br.; *pinnl.* lanceolate, deeply pinnatifid, with toothed lobes; *texture* herbaceous; *rachises* and both sides nearly naked; *veinlets* pinnate in the lobes; *sori* small, 1-4 to each lobe.—*Brit. F. t.* 6.—β, *P. flexile*, Moore; habit more flaccid; *pinnl.* oblong, with fewer lobes and a broad uncut centre.—*Hk. Sp.* 4. p. 251. Pseudathyrium, *Newm.*

Hab. Lapland and Scotland to the Pyrenees, Alps, and Central Russia; Sitka, Oregon, California.—Habit of *Athyrium filix-femina*, which see.

43. *P.* (Pheg.) *Bojeri*, Hk.; *st.* firm, erect, polished, stramineous; *fr.* 2 ft. or more l., 12-18 in. br.; lower *pinnæ* the largest, 6-10 in. l., 2 in. or more br., lanceolate; *pinnl.* lanceolate, ¼-½ in. br., cut down nearly to the rachis below into close entire blunt lobes; *texture* herbaceous; *rachis* and under surface slightly pubescent; *veinlets* of the lobes simple; *sori* small, copious.—*P. sessilifolium*, *Hk. Sp.* 4. p. 251. *P. ammifolium*, *Bojer (non Lam.)*.

Hab. Mauritius and Bourbon.

\*\*\*\*\* *Fronde ample, decomposee.* Sp. 44-55.

44. *P.* (Pheg.) *crinale*, H. & A.; *st.* tufted, stout, densely clothed with squarrose fibrillose scales; *fr.* 2-3 ft. l., 1 ft. or more br.; *pinnæ* ovate-lanceolate or subdeltoid; *pinnl.* lanceolate, blunt, 1½-2 in. l., with rounded blunt lobes 1½-2 lin. br., the lower ones reaching down to the midrib; *texture* coriaceous; *rachises* densely fibrillose; both *surfaces* naked; *ultimate veinlets* forked; *sori* (in our specimens) 1 to each lobe near the upper edge.—*Hk. Sp.* 4. p. 266.

Hab. Sandwich Isles.

45. *P.* (Pheg.) *asperulum*, J. Sm.; *st.* firm, terete, brownish, pubescent; *fr.* 1½-2 ft. l., 1 ft. or more br.; lower *pinnæ* 6-9 in. l., 2-3 in. br.; *pinnl.* lanceolate, ½ in. br., unequal-sided, cut down to the rachis below into oblong-pinnatifid unequal-sided *segm.*; *texture* subcoriaceous; *rachis* and both surfaces villose; *veinlets* immersed; *sori* copious, one to each *ult. lobe*.—*Hk. Sp.* 4. p. 257.

Hab. Philippines, *Cuming*, 63.

46. *P.* (Pheg.) *aquilinum*, Thouars; *rhizome* creeping; *st.* 1-2 ft. l., stout, erect, brown, pubescent, densely scaly at the base; *fr.* 2-4 ft. l., 12-18 in. br.; *pinnæ* much imbricated, the lowest 6-9 in. l., 4-5 in. br.; *pinnl.* lanceolate or oblong-lanceolate, with linear-oblong, entire or sinuato-pinnatifid *segm.*; *texture* coriaceous; *rachis* and under side villose; *veins* immersed; *sori* minute, copious, the margins recurved.—*Hk. Sp.* 4. p. 270.

Hab. Tristan d'Acunha.—General habit of *Pteris aquilina*, and all the aspect of a plant grown in a very exposed situation.

47. *P.* (Pheg.) *Hillebrandi*, Hk.; *st.* 2 ft. or more l., stout, clothed below

with deciduous fibrillose scales; *fr.* 3-4 ft. or more l., 2-3 ft. br.; lower *pinnæ* 12-18 in. l., with the *pinnl.* of the lower side the largest, sometimes again compound, with lanceolate deeply pinnatifid *segm.* 3-4 in. l.,  $\frac{3}{4}$  in. br.; *ult.* entire lobes  $\frac{1}{4}$  in. br., blunt; *texture* papyraceo-herbaceous; *colour* dark-green; under *surface* sprinkled over with pellucid glands; *veinlets* of the lobes 6-8 on a side, mostly forked; *sori* large, submarginal.—*Hk. Sp.* 4. p. 254.

Hab. Sandwich Isles, *Hillebrand*, 42.—Most like *N. latifrons* in general habit.

48. *P. (Pheg.) punctatum*, Thunb.; *rhizome* firm, wide-creeping, villose; *st.* scattered, 1-2 ft. l., firm, erect, stramineous, polished, naked or hairy, and viscid; *fr.* 1-4 ft. l., 6-24 in. br.; lower *pinnæ* sometimes 1-2 ft. l., deltoid; *pinnl.* and *segm.* close, lanceolate; *ult. lobes* oblong, crenate or pinnatifid, with the edge often more or less reflexed; *texture* herbaceous; *rachises* naked or viscid; *under side* slightly hairy; *sori* copious, marginal.— $\beta$ , *P. rugulosum*, Labill.; *fr.* less compound and more coriaceous; *rachis* deep purplish-brown and densely viscid.—*Hk. Sp.* 4. p. 272.

Hab. Columbia to Chili, Sandwich Isles, New Zealand, New Caledonia, Australia, Japan, Philippines, Malaccas; N. India to Ceylon, Bourbon, Tristan d'Acunha, St. Helena.—Very closely related to *Euhypolepis*, see page 130. Mettenius regards our two varieties as distinct species.

49. *P. (Pheg.) prasinum*, Baker; *st.* 2 ft. or more l., densely clothed below with long, squarrose, linear-subulate scales, naked and glossy upwards; *fr.* 5-6 ft. l., 2 ft. or more br.; lower *pinnæ* often 1 ft. l., 4-6 in. br.; *pinnl.* distinct, lanceolate, cut halfway down to the rachis into close blunt lobes; *texture* herbaceous; *colour* bright-green; *rachis* slightly scaly, both sides naked; *veinlets* about 4 on a side in the lobes; *sori* close to the midrib.—*P. punctatum*, *Spruce. Hk. Sp.* 4. p. 262. (*non Thunb.*).

Hab. Andes of Peru and Ecuador.

50. *P. (Pheg.) Sandvicense*, Hk. & Arn.; *st.* 2 ft. l., stout, glossy, naked; *fr.* 3-4 ft. or more l., 2 ft. or more br.; lowest *pinnæ* 12-18 in. l., 6-8 in. br.; *pinnl.* lanceolate, spreading, 3-4 in. l.,  $1\frac{1}{2}$  in. br.; *segm.* with a space between them, ovate-lanceolate, truncate on the lower side, deeply pinnatifid, with erecto-patent linear-oblong entire or toothed lobes; *rachis* glossy, castaneous; both *sides* naked; *veinlets* forked; *sori* usually 1 near the base of each lobe.—*Hk. Sp.* 4. p. 267.

Hab. Sandwich and Society Isles.—The New Hebridean *P. Aneitense*, Hk. *Sp.* 4. p. 268, is apparently the same species.

51. *P. (Pheg.) connexum*, Kaulf.; *st.* 3-4 ft. l., firm, naked; *fr.* deltoid, tripinnatifid, 3-4 ft. or more l., 2 ft. or more br.; lower *pinnæ* lanceolate-deltoid, 8-12 in. l.; *pinnl.* 3-4 in. l.,  $\frac{3}{4}$  in. br., cut down nearly to the rachis into oblong, entire or slightly crenate lobes  $\frac{1}{4}$  in. br.; *texture* herbaceous; *rachis* and both sides naked; *veinlets* of the lobes 5-6 on a side, the lower ones often forked; *sori* medial.—*Hk. Sp.* 4. p. 261.

Hab. Brazil.

52. *P. (Pheg.) splendidum*, Kaulf.; *trunk* subarborescent; *st.* 2 ft. or more l., strong, glabrous, angular; *fr.* 4-6 ft. or more l., 2-3 ft. br.; lower *pinnæ* 12-18 in. l., 6-8 in. br., with distinct lanceolate *pinnl.* with close, blunt, entire lobes  $\frac{1}{4}$  in. br.; *texture* herbaceous; *rachis* and midrib beneath slightly villose; *veinlets* of the lobes simple, often obscure.— $\beta$ , *P. macropterum*, Kaulf.; *pinnæ* lanceolate, 6-9 in. l., 2 in. br., with entire oblong-falcate lobes  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., reaching down three-quarters of the way to the midrib.—*Hk. Sp.* 4. p. 258.

Hab. Brazil, frequent.



53. *P. (Pheg.) Vogelii*, Hk.; *st.* 1½-2 ft. l., naked, substramineous, with long linear scales at the base; *fr.* ample, probably 4 ft. or more l., 2 ft. br.; lowest *pinnæ* 1 ft. l., the *pinnl.* of the lower side much the largest, and the lowest larger than the others, which are lanceolate, 4-5 in. l., 1½ in. br., cut down nearly to the rachis into oblong toothed lobes ¾-½ in. br.; *texture* subcoriaceous; *rachis* naked; *under side* only slightly hairy on the main veins; *veinlets* of the lobes forked; *sori* medial.—*Hk. Sp. 4. p. 721. (in part).*

Hab. Fernando Po, *Vogel*.—This comes near *P. connexum*, but the sori are larger, and the texture is thicker. The Cape Verde plant is a large form of *N. Filix-mas*. *Gymnogramma subsimilis*, Hk. *Sp. 5. p. 142. t. 293*, is apparently this species, with the sori not fully developed.

54. *P. (Pheg.) nigritionum*, Baker; *st.* 1½-2 ft. l., naked, or upwards subvillose; *fr.* 3-4 ft. l., 2 ft. or more br.; lower *pinnæ* 1 ft. l., the *pinnl.* of the lower side lanceolate, 4-8 in. l., 1½-2 in. br., cut down to the rachis below into distinct oblong unequal-sided *segm.* with deep close entire lobes; *texture* herbaceous; *rachises* of the *pinnl.* densely villose and under side less so; *veinlets* pinnate in the lower lobes; *sori* submarginal.

Hab. Gathered by Barter in the Niger Expedition, and by Mann at Fernando Po.

55. *P. (Pheg.) Keraudrenianum*, Gaud.; *st.* ¼ in. thick or more, stramineous or brownish, polished; *fr.* 12-15 ft. l., subscaudent; *pinnæ* distant, the lower ones 1-3 ft. l., 6-15 in. br.; *pinnl.* lanceolate, often deflexed, cut down nearly or quite to the rachis into lanceolate or linear-oblong entire or pinnatifid *segm.*; *texture* herbaceous; *rachises* stramineous; *both sides* naked or the under one villose; *veinlets* pellucid, forked; *sori* submarginal.—*Hk. Sp. 4. p. 268.*

Hab. Sandwich Isles and Java.—*P. procerum*, Brack., is evidently a form of this, which varies much in cutting, and resembles *P. distans* on a large scale.

§§ *Cyrtomiphlebium*. *Venation of Cyrtomium, i. e., with the contiguous groups uniting irregularly.* TAB. 48. Fig. f. Sp. 56.

56. *P. (Cyrt.) dubium*, Hk.; *st.* tufted, 12-18 in. l., densely clothed at the base with large firm scales, and upwards with smaller ones; *fr.* 2-3 ft. l., 6-12 in. br.; lower *pinnæ* 3-6 in. l., ¾-1½ in. br., unequal-sided, the apex acuminate, the edge finely toothed, the inner edge on the upper side nearly parallel with the stem, on the lower side oblique; *texture* coriaceous; *rachis* and both sides nearly naked; *sori* copious, roundish or oblong.—*Hk. Sp. 5. p. 15.*

Hab. Andes of Ecuador and Peru.—Exceedingly like some of the forms of *Aspidium falcatum* in habit and texture. The bipinnatifid plant placed here in "Species Filicum" appears to be a form of *P. platyphyllum*, with slightly anastomosing venation.

§§§ *Goniopteris*, *Presl. Venation of Eunephrodium, i. e., veins pinnate, with the lower veinlets of contiguous groups joining.* Sp. 57-80. TAB. 48. f. e.

\* *Pinnæ entire or the edge slightly crenate.* Sp. 57-64.

57. *P. (Goniopt.) simplicifolium*, Hk.; *st.* tufted, strong, 2-4 in. l., villose upwards; *fr.* 6-12 in. l., with a lanceolate-acuminate entire apex 1-1½ in. br., and at the base 1-6 small blunt spreading entire distinct *pinnæ*; *texture* subcoriaceous; *midrib* beneath hispid, and the prominent veins slightly so; main *veins* 2 lin. apart, all the veinlets joining; *sori* minute.—*Hk. Sp. 5. p. 2. Nephrodium, Hk. 2nd Cent. t. 19. Abacopteris, Fée.*

Hab. Philippines, *Cuming*, 315; Fiji, *Seemann*, 736.

58. *P. (Goniopt.) debile*, Baker; *st.* slender, slightly hairy; *fr.* 6-12 in. l.,

2 in. br., oblong-lanceolate; *pinnæ* close, the central ones 1-1 $\frac{1}{4}$  in. l.,  $\frac{1}{4}$  in. br., the point bluntish, the edge slightly crenate, the base truncate, with a distinct broad blunt auricle on the upper side, the lower ones gradually reduced; *texture* papyraceo-herbaceous; *rachis* villose and under side slightly so; *veinlets* 2-3 on a side; *sori* small, medial.—Phegop. *Mett. Fil. Ind. p. 223.*

Hab. Amboyna, *Zippelius.*

59. P. (Goniopt.) *Borneense*, Hk.; *st.* 6 in. l., naked, slender, stramineous; *fr.* 6-8 in. l., 3 in. br., with an acuminate terminal *pinna* 1 in. br., with shallow blunt lobes and 4 smaller *pinnæ* on each side 1 $\frac{1}{2}$  in. l.,  $\frac{3}{4}$  in. br., truncate at the base and auricled on the upper side; *texture* subcoriaceous; *rachis* and both sides naked; *veinlets* fine, 4-5 on a side; *sori* small, in two rows.—*Hk. Sp. 5. p. 11.*

Hab. Borneo, *T. Lobb.*

60. P. (Goniopt.) *diversifolium*, Swz.; *st.* 1-2 ft. l., tufted, slender, naked; *fr.* 1-2 ft. l., 6-9 in. br.; *pinnæ* 3-5 in. l.,  $\frac{3}{4}$ -1 in. br., the apex acuminate, the lower ones narrowed at the base, the edge nearly entire; *texture* subcoriaceous; *rachis* and both sides naked; *veins* fine, close, about 4 veinlets on a side, the rows of *sori* contiguous.—*P. fraxinifolium*, Jacq. *Hk. Sp. 5. p. 4.*

Hab. S. Brazil, Caraccas, Ecuador.

61. P. (Goniopt.) *rubidum*, Hk.; *st.* firm, erect, glossy, naked, reddish-brown; *fr.* 12-18 in. l., 1 ft. or more br.; *pinnæ* numerous, the lowest stalked, 6-8 in. l.,  $\frac{3}{4}$ - $\frac{7}{8}$  in. br., the apex acuminate, the edge nearly entire; *texture* subcoriaceous; *rachis* and both sides naked; *veinlets* obscure, 8-10 on a side; *sori* close to the main veins.—*Hk. Sp. 5. p. 12.*

Hab. Philippines, *Cuming*, 145.—Professor De Vriese sends from Borneo a more coriaceous plant that may be distinct.

62. P. (Goniopt.) *pœcilocephalum*, Hk.; *st.* 6-9 in. l., erect, slender, naked; *fr.* about 1 ft. l., nearly as broad, with a terminal *pinna* and 2-3 lateral ones on each side, which are 6-8 in. l., 1 $\frac{1}{2}$ -2 in. br., narrowed gradually towards both ends, slightly crenate, especially towards the point; *texture* subcoriaceous; *rachis* and both sides naked; *main veins* 2 lin. apart; *veinlets* fine, very oblique, 4-5 on a side; *sori* minute, medial.—*Hk. Sp. 5. p. 14.*

Hab. N. E. Australia and Queensland.

63. P. (Goniopt.) *Kennedyi*, F. Muell.; *st.* 3-4 ft. l., nearly naked; *pinnæ* 6-12 in. l., 1 $\frac{1}{2}$ -2 in. br., sessile, acuminate, the lower part subentire, the upper slightly crenate; *texture* papyraceo-herbaceous; *rachis* and under surface slightly downy; *veinlets* 10-15 on a side; *sori* medial.—*Meniscium*, *Muell. Frag. 4. p. 165.*

Hab. Queensland.

64. P. (Goniopt.) *meniscioides*, Liebm.; *st.* 1-2 ft. l., strong, erect, quite naked; *fr.* 2-4 ft. l., 12-24 in. br., with a terminal *pinna* and 6-12 lateral ones on each side, the lowest stalked, 1 ft. l., 1 $\frac{1}{2}$  in. br., the apex acuminate, the edge nearly entire; *texture* rigid; *rachis* and both sides quite naked; *veins* prominent, the main ones  $\frac{1}{8}$  in. apart; *veinlets* 15-20 on a side; *sori* in single or double rows between them.

Hab. Mexico.—Most like *P. lineatum* in texture, but less distinctly toothed.



\*\* *Pinnæ pinnatifid or distinctly crenate.* Sp. 65-80.

65. P. (Goniopt.) *urophyllum*, Wall.; *rhizome* creeping; *st.* 2 ft. or more l., stout, erect; *fr.* 2-4 ft. or more l., 12-18 in. br., with a terminal *pinna* and usually several on each side, which are sometimes 1 ft. l. and more than 2 in. br., the edge entire or very slightly lobed, the apex acuminate, the base truncate or narrowed; *texture* subcoriaceous; *rachis* and both sides naked; *veins* prominent, the veinlets 15-20 on a side, with the *sori* in two close rows, or sometimes one row only.—*Hk. Sp. 5. p. 9.*

Hab. N. India to Ceylon, Malaccas, Chusan, Aneiteum, and Queensland.—Fée has three East-Indian species,—*G. repanda*, *crenato-dentata*, and *Dalhousiana*, which we have not seen. This resembles on the one hand *Nephrodium glandulosum*, and on the other *Meniscium cuspidatum*, and is very doubtfully distinct from the latter.

66. P. (Goniopt.) *crenatum*, Swz.; *st.* 1-2 ft. l., erect, naked or pubescent; *fr.* 1-2 ft. l., 1 ft. or more br., with an oblong-lanceolate terminal *pinna* 6-8 in. l., 1½-2 in. br., the edge nearly entire or a little bluntly lobed, and 2-4 opposite pairs of similar lateral ones; *texture* papyraceo-herbaceous; *veins* fine, the main veins 1½-2 lin. apart, and *veinlets* 6-9 on a side; *rachis* and under side naked or finely villose; *sori* in rows near the main veins.—*Hk. Sp. 4. p. 2.*

Hab. Cuba and Mexico to Ecuador and Brazil.—*G. Rivoirei*, Fée, *Fil. Ant. t. 18*, appears to belong here.

67. P. (Goniopt.) *Gheisbreghtii*, Linden; *st.* 1 ft. or more l., firm, erect, densely villose; *fr.* 12-18 in. l., with a terminal *pinna* 6-9 in. l., 1½-2 in. br., the edge slightly lobed, and 3-6 similar ones on each side; *texture* papyraceous; *rachises* and under surface densely villose, the upper surface slightly so; *veinlets* about 12 on a side, the *sori* in dense rows close to the main vein.—*P. crenatum*, *Hk. Fil. Ex. t. 84. (not Sw.)*. Goniopt. mollis, Fée, *Fil. Ant. t. 24.*

Hab. Tabasco, S. Mexico, Linden, 1499.—We have a single specimen of a closely allied densely villose *Goniopteris* from Queensland from Mr. Hill, which is probably a new species.

68. P. (Goniopt.) *faucium*, Liebm.; *st.* 1 ft. or more l., firm, erect, naked; *fr.* 12-18 in. l., 1 ft. or more br., with an oblong-lanceolate terminal *pinna* 6-8 in. l., 1½ in. br., pinnatifid about one-third of the way down, and several similar but narrower and less deeply lobed ones on each side; *texture* coriaceous; *rachis* and under surface naked; *veins* prominent, 9-12 on a side; *sori* in rows close to the main vein.

Hab. Mexico.

69. P. (Goniopt.) *proliferum*, Presl; *rhizome* stout, creeping; *st.* spreading, naked, 2-8 in. l.; *fr.* 1-2 ft. l. or more, 6-12 in. br., erect or decumbent, often elongated and rooting at the point and branched copiously from the axils; *pinnæ* 4-6 in. l., ½-¾ in. br., broadest at the base, truncate or cordate, the edge bluntly lobed more than 1 lin. deep, the point often blunt; *texture* subcoriaceous; *rachis* and under side naked or slightly pubescent; *veinlets* fine, 6-10 on a side; *sori* medial, oval, sometimes confluent.—*Hk. Sp. 5. p. 13.* Ampelopteris, Kze.

Hab. N. India to S. China, Philippines, New Caledonia, N. Australia, Angola, Zambesi-land, and South Africa.

70. P. (Goniopt.) *arthrothrix*, Hk.; *st.* erect, rather slender, densely villose; *fr.* about 1 ft. l., 6-9 in. br.; lowest *pinnæ* the largest, distinctly stalked, 3-4 in. l., ⅝-¾ in. br., the edge nearly entire or with slight blunt lobes, the base truncate; *texture* herbaceous, rather thick; *rachis* and both sides clothed with soft brown

hairs; *veins* fine; *veinlets* 3-4 on each side, immersed; *sori* small, scattered.—*Hk. Sp. 5. p. 14.*

Hab. Madagascar, *Bojer, Lyall.*

71. *P. (Goniopt.) lineatum*, *Coleb.*; *st.* 1-2 ft. l., firm, naked, reddish; *fr.* 2-3 ft. l., 1 ft. or more br.; *pinnæ* numerous, 6-8 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., the apex acuminate, the edge with acute falcate lobes under 1 lin. deep; *texture* subcoriaceous or papyraceo-herbaceous; *veinlets* about 8 on a side; *sori* in rows close to the main veins.—*Hk. Sp. 5. p. 12.* *P. Penangianum*, *Hk. Sp. 5. p. 13.*

Hab. N. India, Ceylon, Malaccas.

72. *P. (Goniopt.) multilineatum*, *Wall.*; *st.* firm, erect, naked, 2 ft. or more l.; *fr.* 3-4 ft. l.,  $1\frac{1}{2}$ -2 ft. br.; *pinnæ* numerous, sometimes 1 ft. l.,  $1\frac{1}{4}$  in. br., the apex acuminate, the edge with falcate acute lobes reaching about 1 lin. deep; *texture* coriaceous; *rachis* and both sides naked; *veinlets* prominent, 15-20 on a side; *sori* in two rows.—*Hk. Sp. 5. p. 11.*

Hab. N. India, up to 3,000 ft.; and we have what is probably the same from Fiji, gathered by Dr. Seemann.

73. *P. (Goniopt.) stramineum*, *Baker*; *st.* 1 ft. l., angular, stramineous, naked; *fr.* 12-15 in. l., 8-10 in. br.; lower *pinnæ* 1 in. apart, 6-8 in. l.,  $\frac{3}{4}$  in. br., acuminate, the edge with broad blunt lobes reaching about a quarter down; *texture* subcoriaceous; stramineous *rachis* and both sides naked; *veins* in pinnated groups of 5-6 on a side, usually joining before they reach the edge; *sori* near the midrib.—*P. salicifolium*, *Hk. Sp. 4. p. 242. (non Willd.).*

Hab. Venezuela, *Fendler, 474.*

74. *P. (Goniopt.) reptans*, *Swz.*; *st.* tufted, slender, wiry, naked, 1-8 in. l.; *fr.* spreading, or often decumbent and rooting, 4-12 in. l., 1-3 in. br.; *pinnæ*  $\frac{1}{2}$ - $1\frac{1}{2}$  in. l.,  $\frac{3}{8}$ - $\frac{1}{2}$  in. br., varying from nearly entire to bluntly lobed one-third down, often auricled at the base, the lower ones stalked; *texture* herbaceous or subcoriaceous; *rachis* and under side naked or slightly hairy; *veins* in pinnate groups, 2-4 veinlets on a side.—*Hk. Sp. 5. p. 6.*

Hab. West Indies and Guatemala to Brazil.—A very variable plant. In seedlings the veins are often simple or once forked, and quite free, *P. reptans* of authors is the loose straggling, and *P. asplenioides* the more erect larger form. *P. asterothrix*, *Hk.*, is probably another form, with broad deeply-lobed *pinnæ* and 4-6 veinlets on a side, and a more villose *rachis*; and *G. gracilis*, *Moore*, apparently also belongs here.

75. *P. (Goniopt.) costatum*, *Hk.*; *st.* 1 ft. or more l., strong, brownish, glossy; *fr.* 3-4 ft. l., 1 ft. or more br.; *pinnæ* very numerous, 8-10 in. l.,  $1\frac{1}{4}$ - $1\frac{1}{2}$  in. br., cut down two-thirds of the way to the *rachis* into nearly entire bluntish lobes  $1\frac{1}{2}$ -2 lin. br., with a space between them; *texture* subcoriaceous; *rachis* and both sides naked; *veinlets* prominent, 20-25 on a side; *sori* close to the main vein.—*Hk. Sp. 5. p. 7.*

Hab. Society Isles and Fiji.—*G. longissima*, *Brack.*, *Hk. l. c.*, from Tahiti, is probably a larger form of the same plant; but in our specimens from the author, which have *pinnæ* 18 in. l., the *rachis* is mucronated. *G. glandulifera*, *Brack.*, from Samoa, which we have not seen, appears to be closely allied; and we have a similar plant from the New Hebrides from Mr. C. Moore.

76. *P. (Goniopt.) oppositifolium*, *Hk.*; *st.* 2-2 $\frac{1}{2}$  ft. l., erect, pubescent upwards; *fr.* 3-5 ft. l., 12-18 in. br.; *pinnæ* opposite, 6-9 in. l.,  $\frac{3}{4}$ -1 in. br., gradually narrowed from the base to the acuminate apex, the edge cut into rather sharp falcate lobes 2 lin. br.,  $1\frac{1}{2}$  lin. deep, lower *pinnæ* reduced; *texture* subcoriaceous;



*rachis* and veins beneath pubescent; main *veins* 2 lin. apart; *veinlets* raised, 6-7 on a side; *sori* small, medial.—*Hk. Sp. 5. p. 3.*

Hab. Island of St. Thomas, W. Africa, *Mann.*

77. *P.* (Goniopt.) *stegogrammoides*, Baker; *caud.* subarborescent; *st.* 1½-2 ft. l., firm, erect, pubescent upwards; *fr.* 2-3 ft. l., 1 ft. or more br.; *pinnæ* 6-9 in. l., 1½ in. br., the apex acuminate, the edge bluntly lobed about a quarter of the way down; *texture* subcoriaceous; *rachis* and veins beneath a little hairy; *veinlets* prominent, 8-9 on a side; *sori* in rows near the midrib.—*P. sandvicense, Hk. Sp. 5. p. 5. (not Sp. 4. p. 267).* *Stegogramma, Brack.*

Hab. Sandwich Isles.

78. *P.* (Goniopt.) *pennigerum*, Forst.; *st.* tufted, 6-12 in. l., glabrous, slightly scaly; *fr.* 1½-2 ft. l., 8-12 in. br.; *pinnæ* 4-6 in. l., ¾-1 in. br., cut about halfway down into blunt, falcate, slightly crenated lobes about 2 lin. br.; *lower pinnæ* gradually reduced; *texture* firm-herbaceous; *rachis* and both sides naked; *veinlets* 6-8 on a side; *sori* in rows near the midrib.—*Hk. Sp. 5. p. 7.* G. Forsteri, *Moore.*

Hab. New Zealand.—Very near *P. tetragonum*, from which it differs principally by the lower *pinnæ* being gradually reduced.

79. *P.* (Goniopt.) *unitum*, Hk.; *st.* 1-1½ ft. l., slender, naked; *fr.* 2-3 ft. l., 1 ft. br.; *pinnæ* 4-6 in. l., ¾-7/8 in. br., the apex acuminate, the edge bluntly lobed about a quarter of the way down, the base truncate; *texture* firm-herbaceous; *rachis* and both sides naked; *veinlets* 5-6 on a side; *sori* close to the main veins.—*Hk. Sp. 5. p. 5.*

Hab. Natal, Cameroon Mountains.—Barely, if at all, distinguishable from some of the forms of *P. tetragonum*.

80. *P.* (Goniopt.) *tetragonum*, Sw.; *st.* erect, 1-2 ft. l., naked or slightly villose; *fr.* 1-3 ft. l., 1 ft. or more br.; *pinnæ* numerous, spreading, 6-8 in. l., ½-1 in. br., the lowest narrowed at the base and sometimes stalked, cut from a quarter to halfway down into blunt lobes; *texture* thinly herbaceous; *rachis* and under side naked or slightly hairy; *veinlets* 6-10 on a side; *sori* in rows near the midrib.—β, *P. megalodus*, Schk.; *pinnæ* 1½ in. br., lobes ¼ in. br., subfalcate; *veinlets* 12-15 on a side.—*Hk. Sp. 5. p. 3.*

Hab. Cuba and Panama, southward to Brazil and Peru.—Judging from the figures quoted, this is *P. androgynum* of Lamarck; and if so, that name has priority. It varies greatly in the breadth of the *pinnæ* and depth of the lobes. A full account of the forms will be found in Fée's Ferns of the Antilles; and our *α* apparently includes his *tenera*, *leptocladia*, *pyramidata*, *Féei*, *tetragona* (five varieties), *quadrangularis*, *Guadalupensis*, and *hastata*. Our β is placed by Mettenius in his latest publication in *Aspidium*.

§§§§ Dictyopteris, *Presl. Venation of Sagenia, i.e., veins anastomosing copiously.* TAB. 48. f. o. Sp. 81-90.

\* *Sori biserial.* Sp. 81-86.

81. *P.* (Dicty.) *Barberi*, Hk.; *st.* tufted, 6-12 in. l., slightly scaly at the base; *fr.* palmately 5-lobed or more usually pinnate, with a large terminal segment and 1-4 pairs of *pinnæ*, the upper ones oblong-lanceolate, 4-6 in. l., 1 in. br., nearly entire, the lowest pair with a deep lanceolate lobe at the base on the lower side; *texture* subcoriaceous; *both sides* naked; *areolæ* rather large and regular, with copious free veinlets; *sori* copious, principally in two rows near the main veins.—*Hk. Sp. 5. p. 100.*

Hab. Malay Peninsula and Isles.

82. *P. (Dicty.) megalocarpum*, Hk.; *fr.* 2-3 ft. l., 1 ft. or more br., the upper part deeply pinnatifid, with lanceolate pinnatifid lobes, below this 6 pairs of distinct *pinnæ*, the lowest 6-9 in. l., 3 in. br., with entire blunt oblong lobes  $\frac{1}{4}$  in. br., reaching more than halfway down; *texture* subcoriaceous; under *surface* glossy; *areolæ* copious, without free veinlets; *sori* large, in two distinct rows.—*Hk. Sp. 5. p. 102.*

Hab. Java, *T. Lobb.*—This has a good deal the general habit of *difforme*, but the ultimate lobes are longer and narrower, and the *sori* very different.

83. *P. (Dicty.) ferrugineum*, Baker; *st.*  $1\frac{1}{2}$  ft. l., clothed densely below, and less so above, with ferruginous down and large lanceolate ferruginous scales; *fr.* 12-15 in. l., 8 in. br., the lowest *pinnæ* much the largest, deltoid, with distinct lanceolate *pinnl.*, those of the lower side cut down to the rachis into oblong sinuated or pinnatifid lobes; *texture* thinly herbaceous; under *surface* sprinkled with ferruginous hairs; *areolæ* confined to a single costal series without free veinlets; *sori* biserial.—Phegop. *Mett. Fil. Ind. p. 224.*

Hab. New Guinea, *Zippelius.*

84. *P. (Dicty.) tenerifrons*, Hk.; *rhizome* creeping, fragile; *st.* very slender, 8-12 in. l.; *fr.* 6-12 in. each way, deltoid, the upper part pinnatifid, below this 1-3 distinct *pinnæ*, the lowest much the largest, deltoid, the lowest side produced with deeply pinnatifid lanceolate lobes 2-3 in. l.; *texture* very thin, colour bright-green; *areolæ* copious, without free veinlets; *sori* in rows near the main veins.—*Hk. Sp. 5. p. 104.*

Hab. Moulmein, *Parish, 92.*

85. *P. (Dicty.) macrodon*, Reinw.; *rhizome* decumbent; *st.* 1 ft. or more l., slightly scaly below; *fr.* 2-3 ft. l., 12-18 in. br., the apex deeply pinnatifid, below this numerous lanceolate *pinnæ*, the lowest sometimes 1 ft. l., 6-8 in. br., cut down to a narrow wing on the rachis into pinnatifid, close, lanceolate *pinnl.*; *texture* thin; *both sides* naked; *areolæ* copious, without free veinlets; *sori* small, in rows near the main veins.—*P. Cumingianum, Hk. Sp. 5. p. 103.*

Hab. Philippines, Malaccas, Solomon Isles, Fiji.

86. *P. (Dicty.) Cameroonianum*, Hk.; *st.* 4 ft. l., glossy; *fr.* 3-4 ft. l., 2 ft. br., the upper part pinnatifid, with deep lanceolate lobes; *lower pinnæ* deltoid, more than 1 ft. l., 6-8 in. br., cut down below nearly to the rachis into pinnatifid lanceolate lobes; *texture* herbaceous, both sides naked; *areolæ* copious, with free veinlets; *sori* in rows near the main veins.—*Hk. Sp. 5. p. 104.*

Hab. Cameroon Mountains, *Mann, 1362.*—It is by no means clear that this and the two preceding are distinct from one another, and from *Neph. cicutarium*.

\*\* *Sori* copious, scattered irregularly. *Sp. 87-90.*

87. *P. (Dicty.) Brongniartii*, Bory; *fr.* 2-3 ft. l., 12-18 in. br., the apex pinnatifid, with deep, lanceolate, repand lobes; below this numerous distinct *pinnæ*, the lowest 6-9 in. l., lanceolate, cut three-quarters of the way down throughout into acute, subentire, lanceolate lobes  $\frac{1}{2}$ - $1\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br.; *texture* subcoriaceous; *areolæ* copious, with a few free veinlets; *sori* rather small and quite confined to the margin of the lobes.—*Hk. Sp. 5. p. 103.*

Hab. Malay Isles and Philippines.—Habit of *P. difforme*, but well distinguished by its marginal *sori*.

88. *P. (Dicty.) difforme*, Blume; *st.* tufted, erect, 1 ft. or more l., the lower part scaly; *fr.* 3-4 ft. l., the *upper pinnæ* lanceolate, entire, or with broad blunt or falcate lobes reaching halfway or more down to the rachis, the lower ones



often deltoid, with the lobes of the lower side prolonged, several inches long, and pinnatifid; *texture* subcoriaceous; *both sides* naked; *areolæ* copious, with a few free veinlets; *sori* scattered, very copious.—*P. irregulare*, *Presl. Hk. Sp. 5. p. 106.*

Hab. Malay Peninsula and Isles.—*P. petrophyum*, Blume, is said to differ by its longer ultimate lobes and copious free veinlets.

89. *P. (Dicty.) sparsiflorum*, Hk.; *rhizome* thick, knotted; *st.* 18 in. l., scaly towards the base; *fr.* 2-3 ft. l., 1 ft. or more br.; *pinnæ* distant, 7-8 in. l., 1½-2 in. br., the apex acuminate, the edge slightly repand, the base narrowed, the lower ones stalked; *texture* herbaceous; *both sides* naked; no distinct main veins; *areolæ* rather large, without free veinlets; *sori* small, scattered irregularly.—*Hk. Sp. 5. p. 92.*

Hab. Sierra de Crystal and Old Calabar, West Tropical Africa, *Mann.*

90. *P. (Dicty.) draconopterum*, Hk.; *rhizome* woody, the scales lanceolate, dull-brown; *st.* 2-3 ft. l., firm, erect, scaly below; *fr.* 3-4 ft. l., 2 ft. or more br., with a large oblong-acuminate terminal lobe, and several lateral ones on each side, which do not reach down to the rachis, the lowest sometimes 1½ ft. l., 4 in. br., and forked; *texture* papyraeous; *both sides* naked; *main veins* distinct to the edge, connected by distinct transverse veinlets with copious areolæ with free veinlets between; *sori* minute, copious, scattered, often confluent.—*Hk. Sp. 5. p. 86.*

Hab. New Granada to Ecuador.

\*\*\* *Eremobryoid series.* *Stems articulated at the point of junction with the rhizome, and sori generally, but not always, terminal on the veins. Polypodium, Mett. Sp. 91-389.*

§§§§§ *Eupolypodium. Veins free. Sp. 91-224. TAB. 48. Fig. a, b.*

\* *Fronde entire. Sp. 91-111.*

† *Sori round. Sp. 91-103.*

91. *P. Sprucei*, Hk.; *st.* tufted, very short, clothed with soft spreading hairs; *fr.* 1 in. l., 1-1½ lin. br., blunt, narrowed gradually downwards, the edge entire; *texture* subcoriaceous; *both sides* rather densely clothed with long soft hairs; *veins* simple; *sori* few, round.—*Hk. Sp. 4. p. 172. 2nd Cent. t. 10.*

Hab. E. Peru, *Spruce, 4746.*

92. *P. parasiticum*, Mett.; *fr.* tufted, subsessile, 2-3 in. l., 1½-2 lin. br., narrowed very gradually below, the point bluntish, the edge entire or slightly undulated; *texture* coriaceous; *both sides* when young rather thickly clothed with long soft hairs; *veins* immersed, forked; *sori* roundish, in two rows, ultimately confluent.—*Hk. Sp. 4. p. 167.*

Hab. Neilgherries and Ceylon.—Probably this is the Javan *P. pilosiusculum*, Hk. (*Grammitis*, Blume); and *G. adspersa*, Blume, which we have not seen, is apparently very near it.

93. *P. Hookeri*, Brack.; *st.* tufted, 1 in. or less l., clothed with soft spreading hairs; *fr.* 3-5 in. l., ¼-¾ in. br., the point acute or bluntish, the edge entire, the lower part narrowed gradually; *texture* subcoriaceous; *both sides* thinly clothed with soft hairs; *veins* simple or forked; *sori* round, in long rows close to the midrib.—*Hk. Sp. 4. p. 171. P. setigerum, Hk. & Arn. (non Blume).*

Hab. Sandwich Isles, Fiji, Queensland, Philippines.—The Bourbon *P. Beaumontii*, Leperv., is evidently the same. An authentic example of *P. conforme*, Brack., does not

differ essentially. *P. subspathulatum*, Brack., from the Society Isles, is said to have partially-immersed sori placed as near the edge as the midrib, and small subspathulate sterile fronds.

94. *P. pseudo-grammitis*, Gaud. ; *rhizome* wide-creeping ; *fr.* 4-6 in. l., about 1 lin. br., the point bluntish, the lower part tapering gradually into the short stem, the edge slightly undulated ; *texture* subcoriaceous ; *both sides* naked ; *veins* simple, immersed ; *sori* large, subglobose, scattered, close to the midrib, but often projecting over the edge.—*Hk. Sp. 4. p.* 165.

Hab. Sandwich Islands.

95. *P. ligulatum*, Baker ; *st.* short, slender, naked, tufted ; *fr.* 5-6 in. l.,  $\frac{1}{8}$  in. br., ligulate, narrowed gradually towards both ends, the edge very slightly repand ; *texture* subcoriaceous ; *both sides* naked ; *veins* forked ; *sori* round, distant, close to the midrib.

Hab. Fiji, *Brackenridge*.—Like the preceding, but the texture thinner, the veins forked, and sori a space from the margin.

96. *P. subevenosum*, Baker ; *st.* tufted, very short, black, wiry ; *fr.* 3-4 in. l.,  $\frac{1}{8}$  in. br., ligulate, the point bluntish, the lower part narrowed very gradually, the edge slightly repand ; *texture* subcoriaceous ; *colour* bright-green, the rachis black, slightly furfuraceous below ; *veins* simple, very short and indistinct ; *sori* round, tending slightly towards oblong, in a long row on each side close to the midrib.

Hab. Penang, *Mactier*.—Like the last in general habit, but quite different in the veins.

97. *P. jungermannioides*, Klotzsch ; *st.* densely tufted, short, slender, ebeneous ; *fr.* 2-3 in. l.,  $1\frac{1}{2}$ -2 lin. br., ligulate, the point blunt, the lower part narrowed gradually and the edge slightly repand ; *texture* subcoriaceous ; *both sides* thinly clothed with soft spreading hairs ; *veins* forked ; *sori* round, distant from one another in a line close to the midrib.—*Hk. Sp. 4. p.* 166.

Hab. Guatemala to Peru and Chili.

98. *P. hirtellum*, Bl. ; *rhizome* short-creeping, scaly ; *fr.* 2-3 in. l., 2-3 lin. br., the point bluntish, the edge entire, the lower part tapering gradually into the short stem ; *texture* subcoriaceous ; *both surfaces* thinly clothed with long, soft, brown hairs ; *veins* hidden ; *sori* in two close rows nearer the midrib than the edge.—*Hk. Sp. 4. p.* 166.

Hab. Java.—*P. lasiosorum*, Hk., is probably a form of the same plant, with a smaller frond and longer stem.

99. *P. hirtum*, Hk. ; *st.* tufted, 1-2 in. l., densely clothed with soft spreading hairs ; *fr.* 4-5 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., narrowed gradually downwards, the point bluntish, the edge entire ; *texture* subcoriaceous, the surface, especially the edge and midrib, ciliated like the stem ; *veins* with one short fork near the base ; *sori* round, in long rows close to the midrib.—*Hk. Sp. 4. p.* 170. *t.* 273. A. *P. Reinwardtii*, *Mett.*

Hab. Luzon, *Cuming*, 222 ; Java, *Zollinger*, 1791.—*P. adpersum*, Blume, judging from the figure, is like this, but quite naked.

100. *P. setigerum*, Blume ; *st.* densely tufted, 2-3 in. l., densely clothed with long soft spreading ferruginous hairs ; *fr.* 8-12 in. l.,  $\frac{5}{8}$ - $\frac{3}{4}$  in. br., the point acute, the lower part narrowed rather suddenly, the edge entire ; *texture* subcoriaceous ; *both sides* thinly clothed with long soft hairs like the stem ; *veins* pinnate ; *sori* round, in long rows close to the midrib.—*Hk. Sp. 4. p.* 171. *2nd Cent. t.* 41.

Hab. Java.



101. *P. zeylanicum*, Mett.; *rhizome* strong, wide-creeping, clothed with broad grey scales; *st.* 1 in. or more l., clothed with soft spreading hairs; *fr.* 8-12 in. l.,  $\frac{1}{2}$ - $\frac{3}{8}$  in. br., the point acuminate, the base narrowed very gradually, the edge slightly undulated; *texture* coriaceous, both sides naked; *veins* forked, oblique; *sori* round, in long rows midway between the midrib and edge.—*Hk. Sp.* 4. p. 169. *t.* 272. B.

Hab. Ceylon.

102. *P. samoense*, Baker; *st.* tufted, 1 in. or less l., slender, brown, clothed with soft spreading brown hairs; *fr.* 3-6 in. l., 2-3 lin. br., the point bluntish, the edge nearly entire, the lower part narrowed very gradually; *texture* subcoriaceous; the *rachis* green, the surfaces very nearly naked; *veins* once or even twice forked; the *sori* small and sometimes on the point of both veinlets, forming an irregular wavy line near the edge.

Hab. Samoa, Powell, 111.

103. *P. chrysolepis*, Hk.; *rhizome* wide-creeping, densely clothed with reddish-brown squarrose scales; *st.* 1 in. or more apart, 1 in. or more l., scaly; *fr.* 2-3 in. l.,  $\frac{1}{5}$  in. br., the point acute, the edge entire, the lower part narrowed very gradually; *texture* thick, coriaceous; *both surfaces* clothed with small, pale, ovate-acuminate deciduous scales attached by the centre of the disk; *veins* forked; *sori* large, round, in rows nearer the midrib than the edge.—*Hk. Sp.* 4. p. 173. *l. Pl. t.* 721.

Hab. Andes of Quito, Jameson, 37.—Scales like those of *Lepicystis*.

†† *Sori oblong.* Sp. 104-111. *Grammitis*, Auct.

104. *P.* (Gram.) *bisulcatum*, Hk.; *rhizome* wide-creeping, scaly; *fr.* resembling the stem of a rush, 6-9 in. l., less than 1 lin. thick, with 5 furrows, of which the two deepest bear the close prominent oval *sori*; *veins* invisible.—*Hk. Sp.* 4. p. 164. *2nd Cent. t.* 98. *Holcosorus pentagonus*, Moore.

Hab. Borneo; discovered by Mr. T. Lobb.

105. *P.* (Gram.) *gramineum*, Sw.; *rhizome* short-creeping, scaly; *st.* subtufted, slender, 1-2 in. l., finely villose; *fr.* 2-4 in. l.,  $\frac{1}{8}$  in. br., ligulate, narrowed rather suddenly into the stem, the edge entire; *texture* coriaceous; *both sides* nearly naked; *veins* oblique, forked; *sori* oval or oblong, placed nearly end to end, with a space between them, in two rows, which reach from the midrib nearly to the edge.—*Hk. Sp.* 4. p. 165.

Hab. West Indies, Guiana.—The Javan *G. caespitosa*, Blume, is said to differ by its immersed *sori* and setigerous capsules, and is considered a distinct species by Mettenius.

106. *P.* (Gram.) *Poppigianum*, Mett.; *st.* tufted, clothed at the base with lanceolate scales; *fr.* 1 in. l.,  $\frac{1}{4}$  in. br., lanceolate-spathulate, obtuse, entire; *texture* coriaceous; *both sides* naked; *veins* immersed, forked; *sori* oblong, close to the midrib.—*Hk. Sp.* 4. p. 163.

Hab. Cape Colony, Poppig, fide Mettenius.

107. *P.* (Gram.) *marginellum*, Sw.; *st.* densely tufted; *fr.* 3-6 in. l., 1 $\frac{1}{2}$ -2 lin. br., ligulate, blunt at the point, tapering gradually downwards into the short stem; *texture* coriaceous; *both surfaces* naked or slightly hairy, the frond margined with a distinct black line; *veins* oblique, simple; *sori* close, copious, oval or oblong, in rows nearer the midrib than the edge.—*Hk. Sp.* 4. p. 164.

Hab. West Indies and Guatemala to Guiana and Peru; St. Helena, Cape Verdes.

108. *P.* (Gram.) *australe*, Mett.; *rhizome* creeping, forming a dense mass; *fr.* 1-6 in. l., 2-6 lin. br., the small ones spatulate, the larger ligulate, bluntish at the point, tapering gradually downwards into the short stem; *texture* coriaceous; *st.* and *both sides* naked or slightly ciliated, the edge not bordered; *veins* oblique, often forked; *sori* close, copious, oval or oblong, in rows nearer the midrib than the edge.—*Hk. Sp.* 4. p. 167.

Hab. Southern extremity of America and adjacent islands; Tristan d'Acunha, New Zealand, Australia, as far north as Queensland and New Caledonia.

109. *P.* (Gram.) *sessilifolium*, Hk.; *fr.* tufted, 3-9 in. l., 2-3 lin. br., narrowed gradually below the point, bluntish, the edge entire or slightly undulated; *texture* subcoriaceous; *both sides* naked; *veins* forked; *sori* oblong, placed end to end in two long rows close to the midrib.—*Hk. Sp.* 4. p. 168. *t.* 272. A.

Hab. Philippines and Malaya.

110. *P.* (Gram.) *fasciatum*, Mett.; *rhizome* strong, wide-creeping, clothed with broad grey scales; *st.* 1-2 in. l., rigid, deciduously ciliated; *fr.* 1 ft. or more l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., narrowed gradually towards both ends, the edge entire; *texture* coriaceous, the surface naked, midrib very prominent; *veins* immersed, forked; *sori* oblong, in two long rows end to end close to the midrib.—*Hk. Sp.* 4. p. 169.

Hab. Malaya.

111. *P.* (Gram.) *Deplanchei*, Baker; *rhizome* stout, densely coated with stiff spreading dark-brown fibrillose scales; *fr.* sessile, 6-9 in. l.,  $\frac{3}{8}$ - $\frac{1}{2}$  in. br., narrowed gradually to both ends, the edge entire or with a few conspicuous blunt teeth about the middle; *texture* very coriaceous; *both sides* naked; *veins* oblique, once forked; *sori* oblong, oblique, immersed, in close rows in the upper half of the frond near the edge.

Hab. New Caledonia, *Deplanche*, 5.

\*\* *Fronde lobed or dichotomously forked.* Sp. 112-114.

112. *P.* *flabellivenium*, Baker; *rhizome* wiry, slender, wide-creeping, hardly at all scaly; *st.* 1-2 in. l., wiry, naked, very slender; *fr.*  $\frac{1}{4}$ - $\frac{5}{8}$  in. l., nearly as br., roundish or broadly oblong, the edge very distinctly thickened, subentire or with a few shallow rounded lobes; *texture* thick and rigid; *veins* flabellate, three or four times dichotomously forked, distinctly visible when the frond is held up to the light, sometimes the ultimate forks uniting before they reach the broad thickened border; *sori* distinctly immersed, 1-6 to a frond, all in the upper half, not far from the edge, on the back of the veins.

Hab. Borneo; gathered by Signor Beccari, communicated by Mrs. Lyell.—A very distinct and interesting novelty; more like *Drymoglossum rigidum* in texture than anything else.

113. *P.* *multifidum*, Bory; *st.* tufted, very short, slender, naked; *fr.* 2-3 in. l.,  $1\frac{1}{2}$ -2 lin. br., entire or forked, tapering downwards gradually; *texture* coriaceous; *both sides* naked; *veins* immersed, simple, oblique; *sori* large, roundish, prominent, close, when mature projecting over the edge.—*Hk. Sp.* 4. p. 174.

Hab. Bourbon and Mauritius.—The forking is probably abnormal; and if so, this should be placed next to *P. parasiticum*. Bojer's "*Grammitis obtusa*, Willd.," is evidently the same plant.

114. *P.* *furcatum*, Mett.; *st.* densely tufted, short, naked; *fr.* 3-4 in. l., 1 lin. br., once or twice dichotomously forked, gradually attenuated below, the edge



entire or subsinuated; *texture* subcoriaceous; *sori* oblong, distant, oblique, terminal on the principal veins.—*Hk. Sp.* 4. p. 174. *Grammitis, Hk. & Gr.* t. 62.

Hab. Guiana and the Amazon valley.

\*\*\* *Fronds pinnatifid.* Sp. 115–131.

† *Lobes not reaching more than halfway down to the rachis.* Sp. 115–118.

115. *P. barbatulum*, Baker; *st.* tufted, slender,  $\frac{1}{4}$ – $\frac{1}{2}$  in. l., clothed with soft brown spreading hairs; *fr.* 1–1 $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. br., the edge entire or broadly lobed to a depth of  $\frac{1}{2}$  line; *texture* subcoriaceous; *both sides* more or less densely clothed with long soft hairs; *veins* pinnate in the lobes; *sori* medial, uniserial.—*P. ciliatum*, Bojer, *Hort. Maur.* p. 416. (*non Willd.*).

Hab. Bourbon.

116. *P. andinum*, Hk.; *fr.* tufted, sessile, 4–6 in. l.,  $\frac{1}{4}$ – $\frac{3}{8}$  in. br., regularly bluntly lobed about a quarter or third of the way down, the point acute or bluntish, the lower part narrowed very gradually; *texture* subcoriaceous; *both sides* thinly clothed with soft spreading hairs; *veins* once forked; *sori* large, round, one to each lobe.—*Hk. Sp.* 4. p. 179. *2nd Cent. t.* 6.

Hab. Andes of Ecuador and Peru.—May possibly be *P. crispatum*, L. (*Plum. t.* 102. B.).

117. *P. trichosorum*, Hk.; *rhizome* creeping; *st.* 1–2 in. l., slender, densely clothed with soft spreading hairs; *fr.* 3–4 in. l.,  $\frac{1}{2}$ – $\frac{3}{8}$  in. br., the point bluntish, the edge crenato-sinuate to a depth of 1 lin., the lower part narrowed from the middle; *texture* coriaceous; *both sides*, and especially the edge, clothed with hairs, like those of the stem; *veins* in pinnated groups; *sori* in 2–3 rows on each side.—*Hk. Sp.* 4. p. 178. *2nd Cent. t.* 12.

Hab. Andes of Quito, Jameson, 349.

118. *P. trifurcatum*, L.; *rhizome* stout, creeping, densely clothed with linear scales; *st.* close, 3–5 in. l., more or less villose, often bent; *fr.* 6–9 in. l., 1 in. or more br., with broad blunt entire lobes reaching from a third to halfway down; *texture* coriaceous; *both sides* nearly naked; *veins* in copiously pinnated groups, with the lower veinlets forked, sometimes anastomosing; *sori* copious, principally in two rows in each lobe, immersed.—*P. comptoniaefolium*, Desv. *Hk. Sp.* 4. p. 192. *P. scolopendrioides*, *Hk. & Gr.* p. 42.

Hab. West Indies to Peru.—The Linnæan name was founded on a forked form figured by Plumier.

\*\*\*\* *Lobes reaching nearly down to the main rachis.* Sp. 119–131.

119. *P. serrulatum*, Mett.; *rhizome* wide-creeping, fibrillose; *st.* tufted, short, slender, naked; *fr.* 3–6 in. l., 2–3 lin. br., the upper part, sometimes the whole, subentire, but more usually pectinato-pinnatifid, with rigid erecto-patent lobes; *rachis* subrigid, flexuose; *texture* coriaceous; *both sides* nearly naked; *sori* oblong, confluent.—*Hk. Sp.* 4. p. 174. *Xiphopteris*, *Kaulf. Hk. Gard. F. t.* 44.

Hab. West Indies and Mexico to Brazil, Peru, and Juan Fernandez; Sandwich Isles, Madagascar, Mauritius, Guinea Coast.—*X. extensa*, Fée, is a narrow elongated form; *X. Jamesoni*, Hk. *2nd Cent. t.* 14, a form with a distinct uncut upper part, the lower two-thirds pectinato-pinnate, and the texture so rigid that the threadlike midrib remains after the pinnæ fall; *Grammitis myosuroides*, Schk. (*P. setosum*, Mett. *Hk. Sp.* 4. p. 175), is apparently a form of this pinnatifid throughout; and *P. ? binerve*, Hk. *Sp.* 4. t. 273. B. one of the curious abnormal conditions of *Acrostichum sorbifolium*.

120. *P. subpinnatifidum*, Bl.; *fr.* tufted, sessile, 4-6 in. l., 2 lin. br., attenuated at the base, cut down nearly to the rachis into lobes, the upper edge of which is nearly straight and horizontal and the lower very oblique; *texture* subcoriaceous; *both sides* naked; *veins* forked, the upper branch bearing a solitary *sorus* in each lobe.—*Hk. Sp. 4. p. 177.*

*Hab.* Java, Sandwich Isles.—Very like the next in habit and cutting, but the fertile lobes quite flat.

121. *P. cucullatum*, Nees; *st.* densely tufted, very short, naked; *fr.* 3-5 in. l., 2-3 lin. br., flaccid, pinnatifid throughout; *lobes* linear-oblong, blunt, entire,  $\frac{1}{2}$ - $\frac{3}{4}$  lin. br., the fertile ones confined to the upper part, broader and with the edges upcurved so as to clasp the large solitary *sorus*; *texture* thick, subcoriaceous; *rachis* naked or ciliated; *both sides* naked.—*Hk. Sp. 4. p. 176.* Calymmodon, *Presl.*

*Hab.* Philippines, Malaya, Ceylon, Samoa, New Caledonia.

122. *P. subdimidiatum*, Baker; *st.* densely tufted, very short, wiry, naked; *fr.* flaccid, 4-12 in. l.,  $\frac{3}{8}$ - $\frac{1}{2}$  in. br., cut down nearly to the rachis into lobes nearly as broad as deep, which are irregular in shape, the upper edge crenate, cut away close against the rachis, the lower edge subdimidiate, entire, and very much decurrent; *texture* subcoriaceous; *colour* pale-green; *both sides* naked; *main vein* not produced to the point of the pinnæ, with usually a short branch below and a large one above; *sori* large, 1-3 in the centre of the lobes.

*Hab.* Venezuela, *Fendler*, 207; Andes of Ecuador, *Jameson*, 2122; British Guiana, *Appun*, 1130.

123. *P. organense*, Mett.; *st.* tufted, 1 in. or more l., naked; *fr.* 6-8 in. l., 3-4 lin. br., cut down about halfway to the rachis into close oblong entire blunt lobes, the lower part narrowed very gradually; *texture* subcoriaceous; *both surfaces* naked; *sori* oblong, one at the base of each lobe, ultimately confluent and forming two long rows close to the midrib.—*Hk. Sp. 4. p. 177. Ic. Pl. t. 509.*

*Hab.* Organ Mountains, Brazil, *Gardner*, 5913.

124. *P. leucosorum*, Bojer; *rhizome* short-creeping, densely clothed with dark-brown fibrillose scales; *st.* 4-6 in. l., rigid, dark-brown, glossy; *fr.* 1 ft. or more l.,  $1\frac{1}{2}$ -2 in. br., cut down within a short distance of the rachis into blunt entire lanceolate lobes, those of the barren *fr.* broader and shorter; *texture* coriaceous; *both sides* naked; *veins* obscure, mostly twice forked; *sori* large, prominent, in two rows, appearing when young as white chalky dots.—*Hk. Sp. 4. p. 198. Ic. t. 942-3.*

*Hab.* Mauritius and Bourbon.

125. *P. villosissimum*, Hk.; *rhizome* stout, creeping, densely scaly; *st.* subtufted, 2-4 in. l., clothed with fine soft spreading hairs, sometimes geniculate; *fr.* 6-9 in. l.,  $\frac{3}{4}$ - $1\frac{1}{2}$  in. br., cut down within a short distance of the rachis into close entire lobes 2-3 lin. br., the lower ones reduced; *texture* coriaceous; *rachis* and under side densely clothed with long soft brown hairs; *veinlets* obscure, twice forked or subpinnate; *sori* in two rows near the midrib.—*Hk. Sp. 4. p. 197.*

*Hab.* Sierra Leone and Fernando Po; gathered by Barter and Mann.

126. *P. solidum*, Mett.; *rhizome* stout, the scales lanceolate, bright-ferruginous; *st.* 1 in. l., firm, erect, naked; *fr.* 6-8 in. l.,  $\frac{3}{4}$  in. br., cut down nearly to the rachis into close, distinctly toothed bluntish lobes  $\frac{1}{2}$  in. br.; *texture*



coriaceous; *both sides* quite naked; *veinlets* forked; *sori* medial.—*Hk. Sp. 4. p. 193.*

Hab. Java, *Zollinger*, 165.

127. *P. discolor*, *Hk.*; *fr.* tufted, subsessile, 4-6 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., cut down within a short distance of the rachis into close, blunt, entire, linear-oblong lobes  $1\frac{1}{2}$ -2 lin. br.; *texture* coriaceous; *upper surface* with small white dots, the lower clothed with white chalky meal; *veins* obscure; *sori* in rows of 3-4 on each side close to the edge.—*Hk. Sp. 4. p. 189. Ic. Pl. t. 4.*

Hab. British Guiana, *Schomburgk*, 1031.

128. *P. crassifrons*, *Baker*; *rhizome* stout, the scales spreading, fibrillose, dark-brown; *st.* tufted, firm, very short, densely clothed with short dark-brown hairs; *fr.* 5-6 in. l.,  $\frac{1}{2}$  in. br., narrowed very gradually downwards, cut down nearly to the rachis into close entire blunt lobes 1 lin. br.; *texture* very thick; *under surface*, especially the midrib, clothed with short brown tomentum; *veins* hidden; *sori* in close rows of 6-8 each, close to the edge of the lobes.

Hab. New Caledonia, *Deplanche*.—The alliance of this is with the preceding.

129. *P. subserratum*, *Hk.*; *rhizome* creeping; *st.* 4-5 in. l., erect, rigid, slender, nearly black, clothed above with short stout black hairs; *fr.* 8 in. l., 2 in. br., cut down nearly to the rachis into close blunt entire lobes  $\frac{1}{4}$  in. br.; *texture* papyraceo-herbaceous; *rachis* black, erect, hispid, like the stem; *both sides* naked; *veins* close, black, distinct, once forked; *sori* not known.—*Hk. Sp. 4. p. 202.*

Hab. Borneo; gathered by Mr. Wallace.

130. *P. Khasyanum*, *Hk.*; *st.* tufted, very short, fringed with soft hairs; *fr.* 1 ft. or more l.,  $1\frac{1}{2}$  in. br., flaccid, cut down within a short distance of the rachis into linear-oblong entire or slightly undulated blunt lobes 2-3 lin. br.; *texture* thick, subcoriaceous; *rachis* and *both sides* ciliated; *veinlets* simple; *sori* sunk, in rows of 4-6 on each side the midrib.—*Hk. Sp. 4. p. 191. 2nd Cent. t. 49.*

Hab. Khasya and Assam (3-4,000 ft.).

131. *P. inæquale*, *Fée*; *st.* tufted, very short; *fr.* 18 in. l., 3-4 in. br., cut down within  $\frac{1}{8}$  in. of the rachis throughout into linear-oblong bluntnish or acute subentire lobes, those of the lower part  $1\frac{1}{2}$ -2 in. l., 2 lin. br., the lowest much reduced; *texture* subcoriaceous; *both sides* naked; *veins* nearly all forked; *sori* nearer the edge than the midrib.—*Fée, Fil. Ant. t. 12.*

Hab. Guadeloupe.

\*\*\*\*\* *Fronds pinnate.* Sp. 132-207.

† *Pinnæ* close, dilated and casually confluent at the base. Sp. 132-186.

A. *Fronds half an inch or less broad.*—Sp. 132-143.

132. *P. moniliforme*, *Lag.*; *rhizome* stout, creeping, densely clothed with dull-brown linear or lanceolate scales; *st.* 1-3 in. l., erect, rigid, slightly villose; *fr.* 6-9 in. l.,  $\frac{1}{4}$  in. br., cut down to the rachis into close entire rounded *pinnæ*  $\frac{1}{8}$  in. each way; *texture* very coriaceous; *rachis* black; *both sides* naked; *veins* hidden; *sori* 1-4 to each pinna.—*Hk. Sp. 4. p. 182. P. subcrenatum, Hk. Ic. t. 719. Jamesonia adnata, Kze.*

Hab. Along the Andes from Mexico to Peru.—Distinguished in the group by its very rigid habit and short broad often decurved *pinnæ*. *P. humile*, *Mett.*, appears to be a variety with the *sori* nearer the edge than usual.

133. *P. exiguum*, Griseb.; *st.* tufted, thread-like, very short, naked; *fr.* pendulous, 6-24 in. l., 2 lin. br.; *pinnae*  $\frac{1}{2}$ -1 lin. l.,  $\frac{1}{2}$  lin. br., half-ovate, blunt, entire or with a single crenation on the upper side, distant, but the base broadly dilated on both sides; *texture* subcoriaceous; *both sides* naked; *veins* and *sori* 1 to each pinna, the former forked.—*Griseb. Fl. Brit. W. Ind. p.* 701.

Hab. Jamaica, *Purdie*.

134. *P. trichomanoides*, Swz.; *st.* densely tufted, short, clothed with soft spreading deciduous hairs; *fr.* 3-6 in. l., 2-4 lin. br., cut down to the rachis into close linear-oblong blunt *pinnae* under 1 lin. br.; *rachis* wiry, ebeneous; *texture* subcoriaceous, the surfaces naked or slightly clothed with soft hairs; *veins* and *sori* 1 in each pinna, the former forked, the latter near the base.—*Hk. Sp.* 4. p. 178.— $\beta$ , *P. truncicola*, Klotzsch; *lobes* not reaching quite down to the rachis, soft hairs more copious.—*Hk. Sp.* 4. l. c.

Hab. Cuba to Brazil and Ecuador; Juan Fernandez, Ascension Island, Malacca, Sikkim.

135. *P. flabelliforme*, Lam.; *st.* tufted, short, fringed with long soft hairs; *fr.* flaccid, 4-12 in. l.,  $\frac{3}{8}$ - $\frac{1}{2}$  in. br., cut down throughout nearly or quite to the rachis into entire or slightly crenate blunt *pinnae* 1-1 $\frac{1}{2}$  lin. br., which are decurrent at the base; *texture* papyraceo-herbaceous; *rachis* and *both sides* naked or with a few long soft hairs; *sori* large, 1-3 to a pinna, terminal on the short simple veinlets.—*Hk. Sp.* 4. p. 187.

Hab. Columbia to Peru.—Distinguished in the group by its flaccid habit, slender black filiform rachis, and few sori.

136. *P. subtile*, Kunze; *st.* tufted, slender, very short; *fr.* flaccid, 3-4 in. l., 2-4 lin. br., ligulate, narrowed gradually towards both ends, cut down to the rachis throughout into close entire blunt *pinnae*  $\frac{1}{2}$ - $\frac{3}{4}$  lin. br.; *texture* papyraceo-herbaceous; *rachis* black, like both sides thinly clothed with long soft hairs; *sori* 3-6 to a pinna, terminating the short veinlets.—*Hk. Sp.* 4. p. 187. t. 275. A.

Hab. Venezuela to Peru.—Lobes narrower and closer than in the last, and texture almost that of a thin *Adiantum*. *P. subscabrum*, *Hk. Sp.* 4. p. 183. t. 274. A. is apparently this; but it is not the plant of Klotzsch.

137. *P. delicatulum*, M. & G.; *rhizome* wide-creeping, slender; *st.* tufted, wiry, 1-2 in. l., densely clothed with long soft hairs; *fr.* 4-6 in. l.,  $\frac{1}{2}$  in. br., cut down to the rachis into close blunt entire *pinnae* 1-1 $\frac{1}{2}$  lin. br., the lower ones broader and shorter; *texture* subcoriaceous; *veinlets* simple; *both sides* thinly clothed with long soft hairs; *sori* copious, subimmersed, 6-8 to a pinna.—*Hk. Sp.* 4. p. 184.

Hab. Mexico to Ecuador.

138. *P. peruvianum*, Desv.; *rhizome* creeping, fibrillose; *st.* 1-2 in. l., slender, erect, clothed with soft spreading hairs; *fr.* 3-4 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., cut down to the rachis into oblong-triangular blunt entire *pinnae*  $\frac{1}{8}$  in. br.; *texture* subcoriaceous; *both sides* nearly naked; *veinlets* immersed, simple; *sori* rather large, 2-4 to a pinna.—*Hk. Sp.* 4. p. 186. *P. anfractuosum*, *Kze.*

Hab. Venezuela and Peru.—This comes very near the next species. *P. monticola*, Klotzsch, is probably a reduced form. It is described as caespitose; but in our specimen the rhizome is slender and greatly elongated, with the fronds 2-3 in. distant from one another.

139. *P. parvulum*, Bory; *rhizome* stout, short-creeping, clothed with linear scales; *fr.* 4-6 in. l.,  $\frac{1}{2}$  in. br., tapering gradually downwards into a very short



stem, cut down to the rachis into entire erecto-patent *pinnae* 1 lin. br.; *texture* subcoriaceous; *rachis* and *both sides* naked or deciduously hairy; *veinlets* immersed, simple; *sori* 2-6 to a pinna, medial.—*Hk. Sp. 4. p. 184. t. 274. B.*

Hab. N. India (up to 8,500 ft.), Ceylon, Mascaren Isles, Zambesi-land.—The Javan plant, *P. inconspicuum*, Blume, is said to differ by its firmer texture and costular sori.

140. *P. glandulosum*, Hk.; *st.* tufted, very short; *fr.* 2-4 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., cut down nearly or quite to the rachis into close, rather deeply-toothed, decurrent oblong *pinnae*, the lower ones gradually reduced; *texture* papyraceo-herbaceous; *colour* dull-green; *both sides* densely glandular but not hairy; *veinlets* simple; *sori* 1-3 to each pinna.—*Hk. Sp. 4. p. 193. t. 276. A.*

Hab. Ceylon.—Perhaps a form of *P. parvulum*, with which it agrees in general habit.

141. *P. jubæforme*, Kaulf.; *st.* tufted, slender, 1-2 in. l., wiry, naked; *fr.* 6-12 in. l.,  $\frac{1}{2}$  in. br., cut down to the rachis into close, entire, decurrent blunt lobes 1 lin. br.; *texture* subcoriaceous; the black threadlike *rachis* and both sides naked; *veinlets* simple; *sori* medial, 2-6 on a side, conspicuously immersed.—*Hk. Sp. 4. p. 186.*

Hab. West Indies and Panama.

142. *P. pilosissimum*, M. & G.; *st.* tufted, 1-2 in. l., rigid, clothed with soft spreading hairs; *fr.* 4-8 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., cut down nearly or quite to the rachis into close, blunt, entire lobes 1-1 $\frac{1}{2}$  lin. br., the lower ones growing gradually shorter and broader; *texture* coriaceous; *rachis* rigid, ebeneous; *both sides* naked or the lower one pilose; *sori* in rows of 4-5 on each side of the midrib of the *pinnae*, distinctly immersed.—*Hk. Sp. 4. p. 181.*

Hab. Mexico to Ecuador and South Brazil.—The most rigid of the group except *P. moniliforme*.

143. *P. lasiostipes*, Mett.; *st.* tufted, very short, clothed with short stiff spreading blackish hairs; *fr.* 2-4 in. l.,  $\frac{1}{2}$  in. br., cut down to the rachis into erecto-patent blunt entire *pinnae* 1 lin. br.; *texture* subcoriaceous; *rachis* beneath densely and the surface slightly hispid like the stem; *veinlets* simple, 4-6 on each side; *sori* submarginal.—*Mett. Fil. Nov. Cal. p. 76.*

Hab. New Caledonia, Vieillard, 1601-2.

B. *Fronde* more than half an inch broad, flaccid, pendulous. Sp. 144-163.

144. *P. cultratum*, Willd.; *st.* tufted, short, slender, clothed with soft spreading brown hairs; *fr.* 6-18 in. l.,  $\frac{1}{2}$ -1 in. br., cut down to the rachis into close horizontal or decurved blunt *pinnae* 1 $\frac{1}{2}$ -2 lin. br.; *texture* papyraceo-herbaceous; the black threadlike *rachis* and both sides clothed with hairs like those of the stem; *veinlets* simple, 4-6 on each side; *sori* medial.— $\beta$ , *P. elasticum*, Bory,—smaller, *Hk. Sp. 5. p. 190.* *P. senile*, Fée.

Hab. Cuba and Guatemala to Brazil and Peru; Mauritius, Fernando Po.

145. *P. grammitidis*, R. Br.; *st.* tufted, 1-2 in. l., wiry, naked; *fr.* 4-12 in. l., 2 in. or more br.; *pinnae* erecto-patent, sometimes linear, blunt, usually  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., more or less deeply pinnatifid, the base abruptly decurrent; *texture* coriaceous; *rachis* and *both surfaces* naked; *veinlets* immersed, simple or forked; *sori* oblong, copious, usually 1 to each lobe at the base.—*Hk. Sp. 4. p. 230.*

Hab. New Zealand and Van Diemen's Land.

146. *P. sarmentosum*, Brack.; *st.* subtufted, 1 in. or less l.; *fr.* 3-6 in. l., 1-2 in. br., the point caudate, cut down nearly to the rachis into erecto-patent blunt

entire or slightly crenated *pinnæ*  $\frac{1}{2}$  in. br., dilated at the base, the lower ones narrowed down gradually to a wing to the rachis; *texture* subcoriaceous; *rachis* and both sides naked or slightly villose; *veinlets* oblique, simple or forked; *sori* few, scattered.—*Hk. Sp.* 4. p. 195.

Hab. Sandwich Isles and Sumatra.—Very near the next.

147. *P. Adenophorus*, Hk. & Arn.; *fr.* subsessile, flaccid, pendulous, 6-12 in. l.,  $\frac{3}{4}$ -1 in. br., cut down nearly or quite to the rachis into acute slightly sinuated horizontal or even rather decurved *pinnæ*  $\frac{1}{2}$  in. br., which are dilated at the base, the lower ones shorter and broader; *texture* subcoriaceous; *rachis* and both sides nearly naked; *veinlets* simple or forked; *sori* in rows close to the midrib.—*Hk. Sp.* 4. p. 195.

Hab. Sumatra, Sandwich Isles, Peru.—The alliance of this is with the two preceding.

148. *P. obliquatum*, Blume; *st.* tufted, 1 in. or more l., rigid, naked or villose; *fr.* 8-12 in. l.,  $1\frac{1}{2}$ -2 in. br., cut down to the rachis throughout into entire close subhorizontal linear *pinnæ* 1- $1\frac{1}{2}$  lin. br., dilated at the base, the lower ones short and blunt; *texture* subcoriaceous; *rachis* naked or hispid; both *sides* naked; *veinlets* simple; *sori* sunk in a cavity, 4 to 6 on each side, the edge of the fertile *pinnæ* sometimes undulated.—*Hk. Sp.* 4. p. 190 (*in part*). *Cryptosorus*, *Fée*.

Hab. South India, Ceylon, Malaya, Philippines.—Forms the genus *Cœlopteris*, A. Br., and with *P. papillosum*, *Thylacopteris* of Kunze.

149. *P. repandulum*, Mett.; *st.* tufted, very short, naked; *fr.* 4-6 in. l., 1- $1\frac{1}{2}$  in. br., cut down to the rachis throughout into erecto-patent blunt crenated *pinnæ*  $\frac{1}{2}$ - $\frac{3}{4}$  lin. br.; *texture* subcoriaceous; *rachis* and both sides naked; *veinlets* simple; *sori* slightly immersed, filling nearly the whole space between the midrib and edge.—*P. obliquatum*, *Hk. Sp.* 4. p. 190 (*in part*). *P. Thwaitesii*, *Beddome*, *Fil. Brit. Ind.* t. 188.

Hab. Ceylon, *Gardner*, 1147, 1290; *Thwaites*, 3900.—A smaller and less coriaceous plant than the last, with the *sori* indistinctly immersed.

150. *P. subsecundo-dissectum*, Zollinger; *st.* tufted,  $\frac{1}{4}$ - $\frac{1}{2}$  in. l.; *fr.* 4-8 in. l.,  $\frac{3}{4}$ -1 in. br., cut down nearly to the rachis into numerous close subdimidiate oblong *pinnæ*, which are quite entire or only slightly toothed towards the point on the outer side, but cut down nearly to the rachis on the inner side into 4 to 6 oblong lobes; *texture* papyraceo-herbaceous; both *sides* clothed with soft spreading yellowish hairs; *veins* abbreviated; *sori* close to the midrib.—*Mett. Fil. Ind.* 2. p. 220.

Hab. Java, *Zollinger*, 1578.—Characterized in the group by its subdimidiate *pinnæ*.

151. *P. minutum*, Blume; *st.* tufted, 2-3 in. l., clothed with soft yellowish hairs; *fr.* 4-6 in. l.,  $\frac{5}{8}$ - $\frac{3}{4}$  in. br.; *pinnæ* 1- $1\frac{1}{2}$  lin. br., close, erecto-patent, blunt, slightly crenated, the lower ones reduced; *texture* papyraceo-herbaceous; both *sides* clothed with soft yellowish hairs; *veins* simple, very short; *sori* 1 to 3 on each side, close to the midrib.—*Hk. Sp.* 4. p. 188.

Hab. Ceylon, Malay Isles, and Philippines.

152. *P. subfalcatum*, Blume; *st.* densely tufted, under 1 in. l., thinly clothed with soft spreading hairs; *fr.* 6-9 in. l., 1- $1\frac{1}{2}$  in. br.; *pinnæ* close, spreading, rather sharply toothed from one-third to halfway down, decurrent at the base, the lower ones gradually reduced; *texture* papyraceo-herbaceous; both *sides* slightly villose; *veinlets* simple; *sori* in rows, 1 to each tooth.—*Hk. Sp.* 4. p. 193 (*in part*).

Hab. Malay Isles.—The Javan *P. lividum*, Mett., is said to differ by its firmer texture, shorter hairs, and immersed *sori*.



153. *P. decipiens*, Hk. ; *st.* tufted, slender, wiry, short, naked or villose ; *fr.* flaccid, pendent, 1 ft. l., 2 in. or more br. ; *pinnæ* 1-2 in. l., distinct, entire, 1 lin. br., pinnatifid ; *texture* papyraceo-herbaceous ; ebeneous *rachis* and both surfaces naked ; *veinlets* 1 to each lobe ; *sori* copious.—*Hk. Sp. 4. p. 231. t. 279. B. P. pilipes, Mett. non Hk.*

*Hab.* West Indies to Peru.—The alliance of this is with the preceding species rather than with *P. pilipes*, which is much more coriaceous in texture, with an indistinct rachis.

154. *P. subsessile*, Baker ; *st.* scarcely any ; *fr.* 6-18 in. l., 1½-2 in. br., the *pinnæ* distant, linear, bluntish, about 1 lin. br., entire or slightly crenate, dilated suddenly at the base so as to be almost or quite connected, the lower ones reduced to a mere zigzag wing to the rachis ; *texture* papyraceo-herbaceous ; *rachis* black ; both *sides* naked or even glossy ; *veinlets* simple ; *sori* in 2 long rows.—*P. pteropus, Hk. Sp. 4. p. 192. t. 275 B. non Blume.*

*Hab.* Columbia, Guiana, and Ecuador.

155. *P. farinosum*, Hk. ; *st.* 1 in. or less l., wiry, flexuose ; *fr.* pendent, 4-5 in. l., 1½-2 in. br. ; *pinnæ* close, 1 in. or more l., 2-3 lin. br., the point blunt, the edge obscurely undulated, the base dilated and then narrowed ; *texture* subcoriaceous ; both *sides* with white meal ; *veinlets* immersed, forked ; *sori* copious.—*Hk. Sp. 4. p. 223. 2nd Cent. t. 47.*

*Hab.* Andes of Ecuador, Jameson.

156. *P. curvatum*, Sw. ; *rhizome* stout, scaly ; *st.* 3-4 in. l., naked, glossy, dark-brown ; *fr.* 12-18 in. l., 2-3 in. br., pendent, cut down to the curved and flexuose rachis into close linear crenated *pinnæ* 1½-2 lin. br., which are decurrent at the base ; *texture* subcoriaceous ; *rachis* finely pubescent ; both *sides* naked ; *veinlets* obscure, 1- or 2-forked ; *sori* bright-yellow, in 2 long rows.—*Hk. Sp. 4. p. 201. P. curvans, Mett.*

*Hab.* Jamaica to Ecuador and Peru.—This has a good deal the appearance and texture of *P. pectinatum*, but is pendent and remarkably flexuose.

157. *P. pendulum*, Sw. ; *caud.* suberect, scaly ; *fr.* flaccid, pendulous, 6-12 in. or more l., 1-2 in. br., subsessile or short-stalked, cut down nearly or quite to the rachis into blunt entire *pinnæ* 1½-2 lin. br., which are dilated at the base, the lower part narrowed into a mere decurrent wing to the rachis ; *texture* subcoriaceous ; *rachis* naked or villose ; both *sides* naked ; *veinlets* forked ; *sori* slightly immersed, forming a row on each side close to the midrib.—*Hk. Sp. 4. p. 194.*

*Hab.* West Indies to Brazil and Peru.

158. *P. suspensum*, L. ; *st.* tufted, 4-8 in. l., dark chesnut-brown, clothed with soft spreading hairs ; *fr.* 12-18 in. l., 1½-3 in. br., cut down to the rachis into horizontal entire acute or bluntish *pinnæ* 1½-3 lin. br., dilated at the base, the lower ones not gradually reduced ; *texture* papyraceo-herbaceous or subcoriaceous ; *rachis* and under side more or less clothed with ferruginous hairs ; *veinlets* forked ; *sori* in long rows close to the midrib.—*Hk. Sp. 4. p. 196.*

*Hab.* Mexico and Cuba to South Brazil and Ecuador.—This has often an erect stem, with a very decided curve at the top (*Plum. t. 102*). *P. asplenifolium*, L., is larger in size, densely clothed with long rough reddish hairs, the *pinnæ* broader, and the lower ones reduced. *P. mollissimum*, Fée, is like the type in habit, but very soft, with the veins simple, and the lower *pinnæ* much reduced.

159. *P. melanopus*, Gr. & Hk. ; *st.* 3-4 in. l., slender, black, naked, bent so that the frond hangs down ; *fr.* 7-8 in. l., 2-3 in. br., cut down to the rachis into linear bluntish faintly crenated *pinnæ* ½ in. br., the lower ones slightly reduced ; *texture*

subcoriaceous ; *rachis* and both sides naked ; *veinlets* very distinct, once forked ; *sori* in 2 long rows.—*Hk. Sp. 4. p. 200.*

Hab. Andes of Ecuador, *Jameson*.—This may be a form of the last, but the pinnæ are longer and closer.

160. *P. celebicum*, Blume ; *st.* 3-5 in. l., tufted, villose ; *fr.* 12-15 in. l., 2 in. br., cut down to the rachis throughout into close nearly horizontal entire bluntish pinnæ  $1\frac{1}{2}$ -2 lin. br. ; *texture* coriaceous ; *rachis* ciliated, the rest nearly naked ; *veinlets* simple ; *sori* deeply sunk, 8 to 12 in a row on each side the midrib.—*Hk. Sp. 4. p. 191.*

Hab. Borneo and Celebes.

161. *P. griseum*, Liebm. ; *rhizome* stout, wide-creeping, scaly ; *st.* 4-6 in. l., pale-brown, polished, villose ; *fr.* flaccid, 1-2 ft. or more l., 3-4 in. br., cut down to the rachis into entire acute or bluntish lanceolate pinnæ  $\frac{1}{4}$ - $\frac{3}{8}$  in. br. ; *texture* herbaceous ; *rachis* densely villose, and both sides finely pubescent ; *veins* fine, close, 2- or 3-forked, the groups sometimes joining ; *sori* in 2 long rows midway between the midrib and edge.—*Hk. Sp. 4. p. 202.*

Hab. Mexico and Guatemala.

162. *P. sublanosum*, Hk. ; *st.* 4-6 in. l., firm, erect, greyish, villose throughout ; *fr.* 12-15 in. l., 3 in. br. ; pinnæ close, alternate,  $1\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., bluntish, entire, dilated at the base, only the lowest, which are shorter and deflexed, quite free ; *texture* papyraceo-herbaceous ; weak *rachis* and both sides villose ; *veinlets* twice forked, very fine and inconspicuous ; *sori* in medial rows.—*Hk. Sp. 4. p. 221.*

Hab. Organ Mountains, *Gardner*, 122.

163. *P. pilipes*, Hk. ; *st.* tufted, flexuose, 3-4 in. l., densely clothed with soft spreading hairs ; *fr.* pendent, 6-9 in. l., 2-4 in. br., cut down nearly to the rachis into close linear lobes, which are often deeply pinnatifid ; *texture* coriaceous ; *rachis* and both sides naked ; *veinlets* 1 to each lobe ; *sori* copious.—*Hk. Sp. 4. p. 230. Ic. t. 221.*

Hab. Peru, *Matthews*.

C. *Fronde* more than half an inch broad, erect or suberect. Sp. 164-186.

164. *P. macrocarpum*, Presl ; *rhizome* stout, wide-creeping, densely clothed with lanceolate adpressed scales ; *st.* 1-3 in. l., wiry, often flexuose, deciduously scaly ; *fr.* 3-4 in. l., 1 in. or more br., lanceolate, cut down nearly to the rachis into blunt entire or obscurely toothed pinnæ  $\frac{1}{8}$  in. br., dilated at the base, and with a rounded sinus between them ; *texture* coriaceous ; *veins* hidden, forked ; upper surface naked, lower densely coated with scales ; *sori* large, copious.—*Hk. Sp. 4. p. 215.* *P. Tweedianum*, *Hk. Ic. t. 86.*

Hab. Bolivia to Chili.—Habit and scales like those of *P. incanum*.

165. *P. madrense*, J. Sm. ; *rhizome* stout, wide-creeping, densely clothed with minute scales ; *st.* 2-4 in. l., firm, erect, naked or slightly scaly ; *fr.* 3-5 in. l.,  $1\frac{1}{2}$ -2 in. br., cut down very nearly to the rachis into horizontal blunt entire pinnæ  $\frac{1}{8}$  in. br., with a rounded sinus between them ; *texture* coriaceous ; ebeneous *rachis* and under side thinly coated with minute scales ; *veinlets* 2-forked, obscure ; *sori* large, copious.—*Hk. Sp. 4. p. 214.*

Hab. Sierra Madre, N. W. Mexico, *Seemann*, 1941.—About midway between the last and *P. pectinatum*.



166. *P. rigescens*, Bory ; *rhizome* stout, creeping, densely clothed with dull-brown linear scales ; *st.* 1-3 in. l., wiry or slightly villose, naked ; *fr.* 6-12 in. l.,  $\frac{3}{4}$  in. or more br., cut down to the rachis into close entire blunt linear-oblong *pinnæ*  $\frac{1}{8}$  in. br., the lower ones reduced ; *rachis* black, wiry ; both *surfaces* naked, the under one sometimes glaucous ; *veinlets* hidden ; *sori* in rows of 4 to 5 on each side.—*Hk. & Gr. Ic. t.* 216.

Hab. Cuba to Chili and Brazil ; Bourbon, Fernando Po.—A plant from Dr. Spruce has a rigid rhizome 2 ft. l., clothed with large ovate-lanceolate scales, and the fronds are quite sessile ; and another has fronds 18 in. l., 2 in. br., with 6-9 sori in a row.

167. *P. fuscatum*, Blume ; *st.* tufted, 1-3 in. l., densely clothed with soft spreading hairs ; *fr.* 3-6 in. l.,  $\frac{1}{2}$ -1 in. br., cut down nearly or quite to the rachis throughout into close entire obtuse *pinnæ*  $\frac{1}{2}$  lin. br., the lower ones shorter and broader ; *texture* subcoriaceous ; *rachis* and both sides thinly clothed with soft hairs ; *veins* obscure, simple ; *sori* forming a close row on each side the midrib, at last filling nearly the whole surface.—*Hk. Sp. 4. p.* 181.

Hab. Java and Ceylon.

168. *P. decorum*, Brack. ; *rhizome* creeping, densely clothed with linear scales ; *st.* 1 in. or less l., rigid, naked ; *fr.* 6-12 in. l.,  $\frac{1}{2}$ -1 in. br., cut down nearly or quite to the rachis into entire linear blunt *pinnæ* about 1 lin. br., the lower ones growing gradually shorter and blunter ; *texture* coriaceous ; both *sides* naked, or the rachis hispid ; *veins* obscure ; *sori* immersed, in 2 rows of 4 to 6 each, filling up the whole space between the midrib and edge.—*Hk. Sp. 4. p.* 179.

Hab. Ceylon, Malaya, and Philippines to Tahiti and Sandwich Isles.—This is referred to *P. nutans* (Blume) by Mettenius, but the figure and description do not quite agree with it.

169. *P. blechnoides*, Hk. ; *rhizome* stout, clothed with dense linear scales ; *st.* 2-3 in. l., rigid, erect, naked ; *fr.* 8-12 in. l., 1-1 $\frac{1}{2}$  in. br., cut down very nearly to the rachis throughout ; fertile *pinnæ* confined to the upper half of the frond, longer and narrower than the barren ones, which are bluntish, about  $\frac{1}{8}$  in. br., growing gradually shorter and broader downwards ; *texture* coriaceous ; *rachis* and both sides naked ; *sori* oblong, immersed, in rows near the midrib.—*Hk. Sp. 4. p.* 180. *Cryptosorus* Seemanni, *J. Sm.*

Hab. Polynesian Islands and Queensland.

170. *P. Lobbianum*, Hk. ; *rhizome* short-creeping, stout, densely scaly ; *fr.* subsessile, 4-6 in. l.,  $\frac{3}{4}$ -1 $\frac{1}{4}$  in. br. ; *pinnæ* numerous, close,  $\frac{1}{2}$  lin. br., the edge with distinct rounded crenations, lower ones gradually reduced ; *texture* coriaceous ; *rachis* wiry, ebeneous ; both *sides* quite naked ; *veinlets* simple, indistinct, 1 to each lobe ; *sori* immersed, small, copious.—*Hk. Sp. 4. p.* 226. *t.* 273. B.

Hab. Borneo, *T. Lobb.*—This and the three last are the most rigid in texture of the group.

171. *P. argyratum*, Bory ; *rhizome* stout, the scales linear, ferruginous ; *st.* 2-3 in. l., wiry, naked ; *fr.* 4-6 in. l., 1 $\frac{1}{2}$ -2 in. br., cut down to the rachis into close horizontal nearly entire *pinnæ*  $\frac{1}{8}$  in. br., narrowed gradually upwards ; *texture* subcoriaceous ; under *surface* coated when young with white meal, which disappears as the plant grows older, for the rest naked ; *veinlets* immersed ; *sori* marginal, 4 to 8 on each side.—*Hk. Sp. 5. p.* 193.

Hab. Bourbon and Mauritius.

172. *P. Skinneri*, Hk. ; *rhizome* wide-creeping, clothed with broad pale adpressed scales ; *st.* 2 in. l., rigid, deciduously scaly ; *fr.* 6-9 in. l., 1 $\frac{1}{2}$ -2 in. br., cut down nearly or quite to the rachis into numerous close horizontal linear slightly crenated *pinnæ* not more than 1 lin. br., with a rounded sinus between them ;

*texture* subcoriaceous ; *rachis* and under surface thinly clothed with minute ovate toothed scales ; *veinlets* obscure, simple ; *sori* in 2 long rows.—*Hk. Sp. 4. p. 276. B.*

Hab. Guatemala ; gathered by Mr. Skinner.

173. *P. furfuraceum*, Schlecht. ; *rhizome* strong, densely clothed with brown woolly fibrils ; *st.* 3-4 in. l., rigid, erect, scaly and villose ; *fr.* 12-18 in. l., 2-4 in. br., cut down to the rachis into linear acute or bluntish entire *pinnæ* 2 lin. br., dilated on both sides at the base ; *texture* coriaceous ; *rachis* and under side clothed with dense scales and soft spreading hairs ; *veinlets* forked ; *sori* in 2 long rows.—*Hk. Sp. 4. p. 213.*

Hab. Mexico.—Rigid habit and dense scales of *Lepicystis*, but the veins free.

174. *P. papillosum*, Blume ; *rhizome* stout, wide-creeping, scaly ; *st.* 4-6 in. l., erect, slender, rigid, naked ; *fr.* 1 ft. or more l., 2 in. br., cut down to the rachis into close horizontal blunt entire or faintly crenated *pinnæ* 2-3 lin. br. ; *texture* papyraceo-herbaceous ; *rachis* and both surfaces naked ; *veins* black, distinct, once forked ; *sori* in rows near the edge, deeply immersed, the cavity prominent on the upper side.—*Hk. Sp. 4. p. 198. 2nd Cent. t. 46.*

Hab. Java and Philippines, and, according to Mettenius, Japan.

175. *P. radiale*, Moritz ; *st.* 6-8 in. l., tufted, ebeneous, rigid, clothed with soft spreading hairs ; *fr.* 8-12 in. l., 2-3 in. br., cut down to the rachis into spreading entire blunt *pinnæ*  $\frac{1}{8}$  in. br., dilated at the base, the lower ones not reduced ; *texture* coriaceous ; *both surfaces* naked ; *veinlets* hidden ; *sori* large, in marginal rows.

Hab. S. Brazil, *Gardner*, 128 ; Venezuela, *Fendler*, 216.—Most like *P. suspensum* in cutting, but suberect, and the texture so rigid that the frond will scarcely adhere to paper.

176. *P. pulchrum*, M. & G. ; *rhizome* stout, shortly scaly ; *st.* subtufted, 3-4 in. l., rigid, erect, blackish, glossy ; *fr.* 12-18 in. l., 2-3 in. br., cut down into close horizontal entire blunt *pinnæ* 1-1 $\frac{1}{2}$  lin. br., dilated at the base ; *texture* papyraceo-herbaceous ; *rachis* rigid, black, scaly throughout on the lower side ; *midrib* black ; *veinlets* obscure ; *sori* small, in 2 long rows.—*Hk. Sp. 4. p. 199.*

Hab. Cuba and Mexico to Brazil.—Very near *P. taxifolium*, but a coarser plant, with less distinct venation.

177. *P. taxifolium*, L. ; *rhizome* stout, scaly ; *st.* subtufted, 2-4 in. l., erect, rigid, clothed with soft spreading hairs ; *fr.* 6-12 in. or more l., 1 $\frac{1}{2}$ -3 in. br., cut down to the rachis into close entire or slightly crenated blunt horizontal *pinnæ* 1 $\frac{1}{2}$ -2 lin. br., the lower ones distant and much reduced ; *texture* papyraceo-herbaceous or subcoriaceous ; *rachis* naked or villose ; *both sides* naked ; *veinlets* simple, very distinct, with the *sori* terminal upon them.—*P. Plumula, H. B. K. Hk. Sp. 4. p. 200.*

Hab. Mexico and West Indies to Peru and South Brazil.—Well distinguished by its finely-cut pectinate habit and simple oblique usually distinctly-marked veinlets, with the *sori* terminal upon them. *P. ferrugineum* (M. & G.), *Hk. Sp. 4. p. 182.* and *P. apiculatum* (Kze.), *Hk. l. c. p. 185.* both seem small forms of this, rather thicker in texture than usual. *P. L'Herminieri*, Fée, *Fil. Ant. t. 12.* belongs here.

178. *P. recurvatum*, Kaulf. ; *rhizome* creeping, the scales ovate-lanceolate, bright-ferruginous ; *st.* 3-6 in. l., firm, erect ; *fr.* 1-3 ft. l., 4-6 in. br., cut down to the rachis into close entire acuminate *pinnæ*  $\frac{1}{8}$ - $\frac{1}{4}$  in. br., the lower ones quite distinct, not smaller than the others ; *texture* subcoriaceous ; *rachis* finely pubescent ; *veins* obscure, forked ; *sori* in a single medial line.—*Mett. Polyp. p. 60.*



Hab. Brazil, *Burchell*, 1977, 2020.—This comes near some of the forms of *P. pectinatum*, but the scales are different, and the lower pinnæ not reduced.

179. *P. pectinatum*, L.; *rhizome* stout, fibrillose; *st.* rigid, erect, 2-6 in. l., naked or finely villose; *fr.* 1-2 ft. l., 2-6 in. br., cut down to the rachis into close blunt horizontal entire or slightly-toothed *pinnæ*  $1\frac{1}{2}$ -3 lin. br., the lower ones much reduced; *texture* papyraceo-herbaceous; *colour* deep-green; *rachis* and *both sides* naked or finely villose; *veinlets* pellucid, once or twice forked; *sori* in long rows.—*Hk. Sp.* 4. p. 203. *G. F. t.* 10. *P. lomariæforme*, *Kze. Hk. l. c.*  $\beta$ , *P. Schkuhrii*, Raddi; *fr.* smaller, nearly naked, the veins black.—*Hk. Sp.* 4. p. 204.

Hab. Mexico and W. Indies to Peru and Brazil; common.—Similar in habit to the two last, but larger, with the veinlets pellucid in the living, and consequently inconspicuous in the dried plant, usually twice forked, and producing the sorus from the tip of the lowest branch.

180. *P. meridense*, Klotzsch; *rhizome* creeping, the scales fibrillose, dark-brown; *st.* 3-6 in. l., wiry, black, scarcely at all villose; *fr.* 6-9 in. l., 3 in. br., lanceolate, cut down to the rachis into close bluntish slightly crenate *pinnæ* 2 lin. br., which are dilated at the base, the lowest not reduced; *texture* coriaceous; *rachis* villose; *both surfaces* nearly naked; *veins* hidden, once forked; *sori* submarginal.—*Klotzsch, Linn.* 20. p. 380. *P. Spixianum*, *Mart.*

Hab. Columbia, *Moritz*, 335, *Lindig*; Brazil, *Burchell*, 2268.

181. *P. Abitaguæ*, *Hk.*; *rhizome* clothed with linear bright-ferruginous scales; *st.* 6-9 in. l., firm, erect, ebeneous, finely villose; *fr.* 1 ft. or more l., 3-4 in. br., cut down to the rachis into obscurely undulated subacute horizontal *pinnæ*  $\frac{1}{4}$  in. br., dilated at the base, the lowest not reduced; *texture* coriaceous; *rachis* and *both sides* finely villose; *veins* immersed, once forked; *sori* in two rows midway between the edge and midrib.—*Hk. Sp.* 4. p. 206.

Hab. Andes of Ecuador, *Spruce*, 5281.—Very near the last, from which it differs by its finely-villose stem and surface and medial sori. The two are much more coriaceous than *pectinatum*, with the veins hidden, and lower pinnæ not reduced.

182. *P. Moritzianum*, *Link*; *rhizome* stout, creeping; *scales* lanceolate-subulate, ferruginous; *st.* 4-6 in. l., naked, glossy, erect; *fr.* erect, 12-18 in. l., 3-4 in. br., cut down nearly or quite to the rachis into close bluntish nearly horizontal obscurely undulated *pinnæ*  $\frac{1}{4}$ - $\frac{3}{8}$  in. br.; *texture* papyraceo-herbaceous; *rachis* and *both surfaces* naked; *veinlets* distinct, once forked; *sori* in two long rows.—*Hk. Sp.* 4. p. 202.

Hab. Venezuela, *Moritz*, 217, *Fendler*, *Steetz*.

183. *P. ellipsoideum*, *Fée*; *rhizome* stout, wide-creeping, the scales long, spreading, lanceolate-acuminate, dark-brown; *st.* 3-4 in. l., slender, erect; *fr.* 6-9 in. l.,  $1\frac{1}{2}$ -2 in. br., cut down to the rachis into close spreading *pinnæ*  $1\frac{1}{2}$ -2 lin. br., which are slightly dilated at the base and then narrowed gradually to an acute point; *texture* thin; *rachis* and *both sides* finely villose; *veinlets* pellucid, the lower ones subpinnate; *sori* oblong, in a close row near the edge.

Hab. Mexico, *Schaffner*.

184. *P. Martensii*, *Mett.*; *rhizome* stout, wide-creeping, clothed with large bright-ferruginous lanceolate membranous scales; *st.* 1-2 in. l., firm, erect; *fr.* 8-12 in. l., 3-4 in. br., cut down to the rachis into numerous entire horizontal *pinnæ* 2 lin. br., with their own breadth between them; *texture* papyraceo-herbaceous; *rachis* and *both sides* finely villose; *veins* subpinnate; *sori* medial, 12 or more on each side.—*Hk. Sp.* 4. p. 207.

Hab. Mexico.—Judging from the description, *P. Ehrenbergianum*, Klotzsch, may be a form of this with broader pinnæ.

185. *P. pellucidum*, Kaulf.; *rhizome* stout, wide-creeping, densely scaly; *st.* 3-6 in. l., rigid, erect, naked, glossy; *fr.* 6-12 in. l., 3-5 in. br., cut down nearly or quite to the rachis into close blunt entire or subacute pinnæ  $\frac{1}{4}$ - $\frac{3}{8}$  in. br.; *texture* coriaceous; *rachis* and both sides naked; *veinlets* pellucid, subpinnate; *sori* large, prominent.—*Hk. Sp.* 4. p. 206. *2nd Cent. t.* 44.

Hab. Sandwich Isles.—*P. myriocarpum*, Hk. Ic. t. 84. is a form with pinnatifid pinnæ. Very like *P. vulgare* in habit, but the veins beautifully pellucid, distinct even in dried specimens.

186. *P. vulgare*, Linn.; *rhizome* stout, the scales bright-ferruginous; *st.* 2-4 in. l., firm, erect, stramineous; *fr.* 6-12 in. l., 3-6 in. br., cut down nearly or quite to the rachis into close entire or slightly toothed usually blunt pinnæ  $\frac{1}{4}$ - $\frac{1}{2}$  in. br.; *texture* herbaceous or subcoriaceous; *both sides* naked; *veinlets* pinnate; *sori* large, uniserial. *Hk. Sp.* 5. p. 205. *Brit. F. t.* 22.

Hab. Lapland, throughout Europe to the Azores, Madeira, Barbary States, Turkey in Asia, and Japan; Cape Colony. N. America—Sitka, southward to California and the north of Mexico.—*P. australe*, Fée, is a large southern form; *P. cambricum*, L., a form with often deeply pinnatifid pinnæ; and *P. falcatum*, Kellogg (*P. glycyrhiza*, Eaton), a Californian variety, with the pinnæ finely toothed, and narrowed very gradually to an acute point.

†† *Most of the pinnæ distinctly separated at the base.* Sp. 187-207.

187. *P. clavifer*, Hk.; *st.* densely tufted, very short; *fr.* 4-5 in. l.,  $\frac{1}{2}$  in. br., pinnate throughout; pinnæ distant, linear-subulate, rigid, curved, the fertile ones dilated at the point, which bears a large solitary sorus and is tipped with a bristle; *rachis* rigid, ciliated with deciduous bristly hairs; *texture* coriaceous.—*Hk. Sp.* 4. p. 176. *Grammitis, Hk. 2nd Cent. t.* 5.

Hab. Borneo, *H. Low.*—A very distinct plant, with the dilated apex of the pinnæ holding the solitary sorus like a spoon, thus falling under *Calymmodon* of Presl.

188. *P. tenuifolium*, H. B. K.; *rhizome* stout, clothed with reddish-brown fibrillose scales; *st.* 2-3 in. l., slender, naked, erect; *fr.* 8-12 in. l.,  $1\frac{1}{2}$ -2 in. br., cut down to the rachis into distant linear blunt entire or slightly crenated pinnæ 1 lin. br.; *texture* papyraceo-herbaceous; *rachis* and both sides naked; *veinlets* simple or rarely forked; *sori* slightly immersed, in two rows of 6-10 each to a pinna.—*Hk. Sp.* 4. p. 192.

Hab. West Indies and Columbia.—Grisebach considers this *P. Otites*, Sw., but the plant of Linnæus is in part *P. pectinatum*.

189. *P. venulosum*, Blume; *st.* tufted, rigid, wiry, 1-3 in. l., deciduously villose; *fr.* 12-18 in. l.,  $1-1\frac{1}{2}$  in. br., cut down to the rachis throughout into close entire horizontal pinnæ 1 lin. br.; *texture* subcoriaceous; *colour* dark-green; *rachis* villose; *both sides* naked; *midrib* and simple veinlets raised; *sori* copious, immersed.—*Hk. Sp.* 4. p. 223. *Cryptosorus, Fée.*

Hab. Malay Isles and Japan.—This and the preceding resemble *P. pectinatum* in habit, but the pinnæ are more distinctly separated.

190. *P. heteromorphum*, Hk. & Gr.; *st.* tufted, slender, wiry, naked; *fr.* very flaccid, pendent, simple or dichotomously forked or pinnate, with close irregular pinn. 12-18 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br.; pinnæ close, obovate or oblong,  $\frac{1}{4}$ - $\frac{3}{8}$  in. l.,  $1\frac{1}{2}$ -2 lin. br., entire or pinnatifid with short blunt lobes; *texture* papyraceo-herbaceous; *rachis* and both sides densely clothed with soft spreading hairs; *veinlets* of the



pinnl. simple; *sori* copious, 1-6 to a pinna.—*Hk. Sp. 4. p. 229. Hk. & Gr. Ic. t. 103.*

Hab. Mexico along the Andes to Ecuador.—Resembles *P. trichomanoides* in texture.

191. *P. reclinatum*, Brack.; *st.* subtufted, slender, very short, villose; *fr.* pendent, very flaccid, 1-2 ft. l., 1-1½ in. br.; *pinnæ* close, ovate-oblong, blunt, entire, ¼-⅔ in. br.; *texture* papyraceo-herbaceous; *rachis* and under side clothed with fine soft hairs; *veinlets* simple; *sori* 2-5 in a row.—*P. semiadnatum*, *Hk. Sp. 4. p. 222. (in part).*

Hab. South Brazil, *Gardner, 112; Brackenridge.*

192. *P. semiadnatum*, *Hk.*; *st.* 4-6 in. l., slender, flexuose, slightly villose; *fr.* flaccid, pendent, 1-2 ft. l., ¾-1¼ in. br.; *pinnæ* very numerous, close, oblong, ½-⅝ in. l., 2 lin. br., blunt, distinctly crenated, the lower ones reduced and distant; *texture* subcoriaceous; *rachis* and under side with a few long soft hairs; *veinlets* forked; *sori* copious.—*Hk. Sp. 4. p. 222. (in part). 2nd Cent. t. 43.*

Hab. Andes of Ecuador, *Jameson.*

193. *P. dependens*, Baker; *st.* tufted, short, thread-like, clothed with soft spreading hairs; *fr.* pendent, very flaccid, 2 ft. or more l., ¾ in. br.; *pinnæ* alternate, ¼-⅔ in. l., ⅓ in. br., ovate-oblong, blunt, entire, the central ones on the same side ¼ in. apart; *texture* papyraceo-herbaceous; slender black *rachis* and both sides clothed with soft spreading hairs; *veinlets* simple; *sori* close to the midrib.

Hab. Andes of Ecuador, *Spruce, 563.*—Like the next species on a smaller scale.

194. *P. alternifolium*, *Hk.*; *st.* very short, tufted, slender, flexuose, clothed with soft spreading hairs; *fr.* pendent, very flaccid, 2-10 ft. l., 2 in. br.; *pinnæ* distinct, alternate, lanceolate, entire, 3-4 lin. br. at the base; *texture* papyraceo-herbaceous; slender *rachis* and both sides thinly clothed with soft spreading hairs; *midrib* ebeneous, slender, flexuose; *veinlets* simple; *sori* copious.—*Hk. Sp. 4. p. 222. t. 277. A.*

Hab. Andes of Ecuador.

195. *P. sericeo-lanatum*, *Hk.*; *st.* 1-4 in. l., slender, densely clothed with soft spreading grey hairs; *fr.* flaccid, pendent, 1-2 ft. l., 1½-3 in. br.; *pinnæ* close, ¾-1½ in. l., 2-3 lin. br., blunt, entire, spreading; *texture* thick; *rachis* and both sides densely matted with soft silky hairs; *veins* simple; *sori* in 2 long rows.—*Hk. Sp. 4. p. 221.*

Hab. Andes of Columbia and Ecuador.—This and the five preceding in their flaccid pendent mode of growth correspond with the *cultratum* group.

196. *P. firmum*, Klotzsch; *rhizome* creeping, the scales large, linear, dull-brown; *st.* 1-2 in. l., wiry, naked; *fr.* loosely spreading, 8-12 in. l., 2 in. br.; *pinnæ* distant, 1 in. l., ⅓ in. br., blunt, upcurved, dilated at the base, the lower ones reduced; *texture* firm; *rachis* slender, black, wiry, clothed with short stiff black hairs; *both sides* nearly naked; *midrib* black; *veins* simple; *sori* in two long rows.—*Hk. Sp. 4. p. 135. (in part).*

Hab. Guiana, *Richard Schomburgk, 1170; New Granada, Lindig, 300.*—Habit of *P. pectinatum*, but more rigid, and the *pinnæ* distinctly separated.

197. *P. lanigerum*, Eaton; *st.* tufted, 1-2 in. l., densely clothed with soft spreading reddish-brown hairs; *fr.* flaccid, pendent, 6-9 in. l., 1½-2 in. br., cut down to the *rachis* into erecto-patent blunt entire *pinnæ* 2-3 lin. br., the lower ones reduced; *texture* herbaceous; *both sides* thinly coated with soft hairs;

*veinlets* fine, simple; *sori* 6-9 in a row, on each side near the midrib.—*Hk. Sp. 4. p. 189.*

Hab. Venezuela, *Fendler*, 212.—Desvaux's plant thus named appears to be *P. cultratum*, from which this differs by its distinctly separated pinnæ, the largest more than an inch long, narrowed gradually from the base to the point.

198. *P. sporadolepis*, Kze.; *rhizome* stout, wide-creeping, clothed with grey adpressed scales; *st.* 4-6 in. l., wiry, slightly scaly; *fr.* 6-12 in. l., 2-3 in. br.; *pinnæ* horizontal, bluntish, entire or slightly crenate, 2-3 lin. br., narrowed towards both ends, the lowest not reduced; *texture* subcoriaceous; *rachis* wiry, nearly naked; *under side* with minute scattered scales; *veinlets* obscure, forked; *sori* copious.—*Hk. Sp. 4. p. 212.*

Hab. Columbia and Ecuador.—This comes near the next species, but is more slender, with narrower distant pinnæ and an ebeneous rachis.

199. *P. plebeium*, Schlecht.; *rhizome* stout, wide-creeping, clothed with small grey scales; *st.* 4-8 in. l., strong, erect, castaneous, nearly naked; *fr.* 6-12 in. l., 3-6 in. br., ovate-deltoid; cut down nearly or quite to the rachis into spreading entire or obscurely crenated *pinnæ*  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., the lowest not reduced; *texture* subcoriaceous; *rachis* and under side with small scattered scales; *veins* obscure; *sori* copious.—*Hk. Sp. 4. p. 213.*

Hab. Mexico to Peru.—Intermediate, as are the following species, in general habit between *pectinatum* and *vulgare*.

200. *P. Hartwegianum*, Hk.; *rhizome* stout, wide-creeping, the scales linear, dark-brown; *st.* 4 in. l., erect, naked; *fr.* 1 ft. l., 3 $\frac{1}{2}$  in. br., cut down to the rachis into linear-lanceolate obscurely crenated *pinnæ*,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., dilated at the base, the lower ones distinct from the others, the lowest pair deflexed; *texture* papyraceo-herbaceous; *rachis* slender, villose; *both sides* slightly hairy; *veinlets* distinct, twice forked; *sori* bright-yellow, oval, in two long rows.—*Hk. Sp. 4. p. 207.—Ic. t. 380.*

Hab. Mexico, *Hartweg*, 415.

201. *P. biauriculatum*, Hk.; *st.* 4-6 in. l., stout, erect, villose upwards; *fr.* 12-18 in. l., 4-6 in. br.; *pinnæ* horizontal, 2 in. l.,  $\frac{1}{4}$  in. br., the edge entire, both sides distinctly auricled at the base; *texture* subcoriaceous; *rachis* and both surfaces densely pubescent; *veins* immersed, indistinct; *sori* filling up nearly the whole space between edge and midrib.—*Hk. Ic. t. 121.*

Hab. Peru, *Matthews*.—Placed by Moore in *Goniophlebium*.

202. *P. puberulum*, Schlecht.; *rhizome* wide-creeping, scaly; *st.* 6-8 in. l., firm, naked, polished; *fr.* 12-18 in. l., 6-8 in. br.; *lower pinnæ* 3 in. l.,  $\frac{1}{2}$  in. br., the edge irregularly crenate, the base distinctly auricled on both sides; *texture* papyraceo-herbaceous; *rachis* and veins beneath pubescent; *veins* in slightly pinnated groups, the main vein prominent; *sori* in rows nearer the edge than midrib.—*Hk. Sp. 4. p. 220. (in part).*

Hab. Mexico and Guatemala.—Very near the last, but the position of the sori different.

203. *P. subpetiolatum*, Hk.; *rhizome* stout, wide-creeping, densely clothed with ferruginous lanceolate scales; *st.* 4-6 in. l., firm, stramineous; *fr.* 1 ft. or more l., 6-8 in. br.; *pinnæ* 3-4 in. l.,  $\frac{1}{2}$  in. br., the point bluntish, the edge inconspicuously crenate, the lower ones rounded at the base, subpetiolate; *texture* papyraceo-herbaceous; *rachis* and both sides finely villose; *veins* subpinnate; *sori* in rows nearer the midrib than the edge.—*Hk. Sp. 4. p. 220.*



Hab. Mexico, Guatemala, and Cuba.—The Mexican *P. subserratum*, M. & G., is probably the same, but in our specimens from Mettenius the fronds are much more elongated, and the pinnae more numerous.

204. *P. sororium*, H. B. K. ; *rhizome* stout, wide-creeping, densely clothed with small pale-brown scales ; *st.* 6-12 in. l., firm, erect, naked ; *fr.* 1-2 ft. l., 6-9 in. br. ; *lower pinnae* the largest, sessile, 4-6 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., the apex acuminate, the edge entire or obscurely undulated ; *texture* papyraceo-herbaceous ; *rachis* and both sides naked ; *veins* fine, very distinct, pinnate ; *sori* in distinct rows nearer the midrib than the edge.—*Hk. Sp.* 4. p. 219.

Hab. Cuba and Mexico southward to Peru.—According to Mettenius, *Goniophlebium elatum*, Fée, is a form of this with the veins sometimes united.

205. *P. fraternum*, C. & S. ; *rhizome* wide-creeping, the scales ovate-acuminate, bright ferruginous ; *st.* 4-8 in. l., firm, erect, naked ; *fr.* 12-18 in. l., 6-9 in. br., *lower pinnae* 1 in. apart, 4-5 in. l., narrowed at both ends, the edge obscurely crenate ; *texture* subcoriaceous ; both *sides* naked ; *veins* close, pinnate ; *sori* medial, uniserial, slightly immersed.—*Mett. Pol.* p. 63. *P. Henchmanni*, J. Sm.

Hab. Mexico.—Mettenius describes a closely allied *P. harpophyllum*, Zenk., from the Neilgherries, with which we are not acquainted. *Goniophl. revertens*, Fée, appears to be a form with the groups of veins sometimes joined.

206. *P. legionarium*, Baker ; *st.* 6 in. or more l., firm, erect, glossy, naked ; *fr.* 1 $\frac{1}{2}$ -2 ft. l., 1 ft. or more br. ; *lower pinnae* the largest, sessile, 6-8 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., broadly crenate, the base rounded ; *texture* herbaceous ; both *sides* finely villose ; *veinlets* in pinnate groups of 2-3 on a side ; *sori* large, in long distinct rows nearer the midrib than the edge.—*P. macrodon*, *Hk. Sp.* 4. p. 218. (*non Reinw.*.)

Hab. Guatemala, *Salvin*.

207. *P. tenellum*, Forst. ; *rhizome* wide-climbing, woody, scaly when young ; *st.* 2-3 in. l., firm, nearly naked, jointed near the base ; *fr.* pendent, 1-2 ft. or more l., 2-4 in. br. ; *pinnae* 2-3 in. l.,  $\frac{1}{2}$  in. br., narrowed to both ends, entire or obscurely crenate ; *texture* papyraceo-herbaceous ; *rachis* and both sides naked ; *veins* 2-3 forked ; *sori* in rows near the edge.—*Hk. Sp.* 4. p. 217. *Arthropteris*, J. Sm.

Hab. Australia, New Zealand, and adjacent islands.—A very distinct species.

\*\*\*\*\* *Fronds bipinnatifid or bipinnate.* Sp. 208-219.

208. *P. hymenophylloides*, Kaulf. ; *rhizome* fibrous, very slender ; *st.* 1 in. or less l., densely tufted, very slender ; *fr.* 2-4 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br. ; *pinnae* close, usually dimidiate, cut down to a broadly-winged rachis into a few small oblong lobes ; *texture* pellucido-herbaceous ; *rachis* and both sides finely glandular ; *veinlets* 1 to each lobe ; *sori* terminal.—*Hk. Sp.* 4. p. 228. *Adenophorus*, *Hk. & Gr. Ic. t.* 176.

Hab. Sandwich Isles and Sumatra.—A very distinct species, resembling a *Hymenophyllum* in habit and texture.

209. *P. fallax*, Schlecht ; *rhizome* slender, wide-creeping, much-branched, clothed with fine brown tomentum ; *st.* distant, slender,  $\frac{1}{2}$ -1 in. l., nearly naked ; *fr.* 1-1 $\frac{1}{2}$  in. l.,  $\frac{1}{2}$  in. br., with a few distinct *pinnae* on each side, the lowest the largest and deeply pinnatifid with linear lobes ; *texture* coriaceous ; *under surface* with minute scattered scales ; *sori* large, prominent, often 1 only to a pinna.—*Hk. Sp.* 4. p. 215.

Hab. Mexico.—Fronds often more than an inch apart on a long thread-like rhizome.

210. *P. tenuisectum*, Blume; *st.* tufted, short, wiry, 1-2 in. l., clothed with soft spreading hairs; *fr.* 6-9 in. l.,  $1\frac{1}{2}$ -2 in. br.; *pinnæ* close, 2 lin. br., cut down to a narrow rachis into linear very regular erecto-patent lobes; *texture* subcoriaceous; *rachis* erect, straight, villose; both *sides* naked; *veinlets* simple, immersed, 1 to each lobe; *sori* much broader than the lobes, placed at their base.—*Hk. Sp. 4. p. 227. (in part).*

Hab. Java.

211. *P. myriophyllum*, Mett.; *st.* flexuose, wiry, 4-6 in. l., densely clothed with long soft spreading brown hairs; *fr.* flaccid, pendent, 1 ft. l., 3 in. br.; *pinnæ* close, flexuose,  $\frac{1}{4}$  in. br., cut down to a narrow rachis into linear-subulate lobes, the lower ones distant and shorter; *texture* subcoriaceous; *rachis* and under side slightly villose; *veinlets* simple, immersed, 1 to each lobe; *sori* broader than the lobes, placed at their base. *P. tenuisectum*, *Hk. Sp. 4. p. 227. (in part). 2nd Cent. t. 21.*

Hab. Peru, *Lechler*, 2567.—Very near the last, but different in habit, with the lobes of the *pinnæ* twice as long and not nearly so close and regular.

212. *P. achilleæfolium*, Kaulf.; *st.* tufted, wiry, 1 in. or less l., clothed with short soft spreading hairs; *fr.* 4-5 in. l.,  $1-1\frac{1}{2}$  in. br., oblong-lanceolate; *pinnæ* close, erecto-patent, deeply pinnatifid with linear lobes, lower *pinnæ* gradually reduced; *texture* coriaceous; *rachis* and under surface slightly villose; *veinlets* immersed, forked, 1 to each lobe; *sori* copious.—*Hk. Sp. 4. p. 225.*

Hab. Ecuador and Brazil.

213. *P. longisetosum*, Hk.; *st.* 2-3 in. l., slender, deciduously villose; *fr.* flaccid, pendent, 6-8 in. l., 2 in. br., oblong-lanceolate, the *pinnæ* close, erecto-patent, linear, about 1 in. l., 2 lin. br., deeply pinnatifid, with blunt rounded lobes, the base decurrent; *texture* papyraceo-herbaceous; both *sides* and *rachis* thinly clothed with long spreading hairs; *veinlets* simple, one to each lobe; *sori* copious.—*Hk. Sp. 4. p. 225. t. 278. A.*

Hab. Andes of Ecuador, *Jameson*, 97.

214. *P. funiculum*, Fée; *rhizome* wide-creeping, wiry, slender, naked; *st.* tufted, 1-2 in. l., wiry, naked; *fr.* 3-5 in. l.,  $1\frac{1}{2}$ -2 in. br., oblong-lanceolate; *pinnæ*  $\frac{1}{8}$  in. br., deeply pinnatifid, with blunt oblong lobes, the lowest very small; *texture* papyraceo-herbaceous; *rachis* and both sides naked; *veinlets* simple, 1 to each lobe; *sori* small, yellowish.—*Hk. Sp. 4. p. 226.*

Hab. Cuba, *Linden*, *Wright*.

215. *P. gracile*, Hk.; *st.* 3-4 in. l., tufted, slender, wiry, naked; *fr.* flaccid, pendent, 6-9 in. l.,  $\frac{1}{2}$ -1 in. br.; *pinnæ* distinct,  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., 1 lin. or rather more br., deeply pinnatifid, with broad blunt lobes; *texture* subcoriaceous; *rachis* and both sides naked; *veins* immersed, obscure; *sori* 1 to each lobe.—*Hk. Sp. 4. p. 224. Hk. & Gr. t. 222.*

Hab. Andes of Peru, *Cruckshanks*.

216. *P. tamariscinum*, Kaulf.; *rhizome* stout, creeping, scaly; *st.* 2-3 in. l., naked, wiry, flexuose; *fr.* 4-8 in. l.,  $1\frac{1}{2}$ -3 in. br., ovate-lanceolate; *pinnæ* close, erecto-patent,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., cut down to the rachis into simple or forked linear or oblong lobes; *texture* subcoriaceous; both *surfaces* naked; *veinlets* 1 to each lobe; *sori* copious, placed near the apex of the lobes.—*Hk. Sp. 4. p. 228. Adenophorus, Hk. & Gr. Ic. t. 175.*

Hab. Sandwich Isles, Tahiti, Malay Isles.—*A. tripinnatifidus*, *Gaud.*, is a form with



forked or subpinnatifid lobes; *P. Hillebrandii*, Hk. Sp. 4. p. 228, is probably a luxuriant form of this species; the pinnæ are 3 in. l., and the sori sometimes 2 to a lobe, and not quite terminal.

217. *P. athyrioides*, Hk.; *st.* 2-3 in. l., firm, wiry, slightly hairy; *fr.* 8-12 in. l., 2 in. br.; *pinnæ* close, linear-lanceolate,  $\frac{1}{4}$  in. br., cut halfway down to the rachis into close oblong lobes; lower pinnæ reduced very gradually; *texture* subcoriaceous; *rachis* firm, slightly villose; both *sides* nearly naked; *veinlets* simple, 1 to each lobe; *sori* oblong, copious.—*Hk. Sp. 4. p. 224. t. 277. B.*

Hab. Peru, *Matthews*, 1103.

218. *P. murorum*, Hk.; *rhizome* stout, wide-creeping, densely clothed with linear scales; *st.* 4-8 in. l., wiry, glossy, naked; *fr.* 4-8 in. l., 2-3 in. br., ovate-lanceolate; *pinnæ* quite distinct, the lower ones varying from linear and nearly entire to lanceolate ( $\frac{3}{8}$  in. br.) and deeply pinnatifid; *texture* coriaceous; *veins* hidden; under *surface* thinly coated with scales; *sori* large, in two long rows.—*Hk. Sp. 4. p. 216. Ic. t. 70.*

Hab. Andes of Columbia and Ecuador.

219. *P. microphyllum*, Mett.; *st.* 3-4 in. l., slender, flexuose, naked; *fr.* pendent, 3-4 in. l.,  $\frac{3}{4}$ -1 in. br.; *pinnæ* erecto-patent, flexuose,  $\frac{1}{8}$  in. br., cut down to the rachis into close regular obovate lobes  $\frac{1}{2}$  lin. br.; *texture* subcoriaceous; *rachis* and under side slightly villose; *veinlets* immersed, 1 to each lobe; *sori* 1 to each lobe.

Hab. Peru, *Lechler*.

\*\*\*\*\* *Fronde tri-quadripinnatifid.* Sp. 220-224.

220. *P. millefolium*, Blume; *st.* 1-3 in. l., clothed with spreading ferruginous hairs; *fr.* 8 in. l.,  $1\frac{1}{2}$  in. br.; *pinnæ*  $\frac{3}{4}$  in. l., ovate-lanceolate, cut down to the rachis into linear-oblong or spatulate toothed or pinnatifid pinnl.  $\frac{1}{4}$  in. l.; *texture* firm, subcoriaceous; under *surface* slightly hairy; *veinlets* simple or forked; *sori* terminal.—*Mett. Poly. p. 54.*

Hab. Java, *Zollinger*, 1723, *sic* Mettenius.

221. *P. onustum*, Hk.; *rhizome* stout, wide-creeping, densely clothed with grey adpressed scales; *st.* 4-6 in. l., wiry, erect, naked or slightly scaly; *fr.* 6-12 in. l., 3-5 in. br., ovate; lower *pinnæ* lanceolate or subdeltoid, cut down to a winged rachis into pinnatifid rhomboidal lobes; *texture* thick, coriaceous; under *surface* with scattered scales; *sori* large, prominent, often 1 to each lobe.—*Hk. Sp. 4. p. 216. Ic. t. 749.*

Hab. Andes of Columbia and Ecuador.

222. *P. Friedrichsthalianum*, Kze.; *rhizome* stout, wide-creeping, clothed with grey adpressed scales; *st.* 3-4 in. l., wiry, erect, deciduously scaly; *fr.* flaccid, 12-18 in. l., 3-4 in. br.; *pinnæ* very numerous, imbricated, deltoid, the largest 2 in. l., 1 in. br., cut down to the rachis into deeply pinnatifid blunt linear pinnl. with short blunt lobes; *rachis* and under side densely scaly; *sori* small, 1 to each lobe.—*Hk. Sp. 4. p. 217.*

Hab. Mexico and Guatemala.

223. *P. darceiforme*, Hk.; *rhizome* stout, wide-creeping, clothed with dense linear pale-brown scales; *st.* 6-9 in. l., naked, glossy; *fr.* 12-18 in. l., 8-12 in. br., subdeltoid; lower *pinnæ* 4-6 in. l.,  $1\frac{1}{2}$ -2 in. br., lanceolate-deltoid; *pinnl.* oblong-lanceolate, the *segm.* with forked or entire linear distant ult. divisions; *texture*

herbaceous; *rachis* glossy, both sides naked; *veins* 1 to each division, not reaching the edge, but bearing the *sori* beneath the thickened apex.—*Hk. Sp.* 4. p. 256. 2nd Cent. t. 24.

Hab. Sikkim, Khasia, Moulmein.

224. *P. subdigitatum*, Blume; *st.* tufted, firm, 1 ft. or more l., stramineous, naked or furfuraceous; *fr.* 2 ft. or more l., 12-18 in. br.; lower *pinnæ* the largest, 6-9 in. l., 3-4 in. br.; *pinnl.* lanceolate, often 2 in. l.,  $\frac{3}{4}$  in. br., with close spreading ovate-lanceolate or rhomboidal *segm.*, with blunt lobes or even again pinnate, obliquely truncate on the lower side; *texture* pellucido-herbaceous; *colour* dark-green; *veinlets* 1 to each ult. lobe, not reaching the edge, and the copious *sori* terminal upon them.—*P. davallioides*, *Mett. Hk. Sp.* 4. p. 256. *Monachosorum*, *Kunze*.

Hab. N. India (up to 7-8,000 ft.), Malay Peninsula and Isles.—A beautiful and well-marked species.

§§§§§ *Goniophlebium*, *Blume*. *Veins forming ample regular areolæ, each with a single distinct free included veinlet, the sori terminal on the latter, often in the costal areolæ only, but sometimes also in the second or even third row.* TAB. 43. f. h. i. *Sp.* 225-263.

\* *Under surface not at all or slightly scaly.* *Sp.* 225-260.

† *Fronde simple.* *Sp.* 225-228.

225. *P.* (*Gonioph.*) *vacciniifolium*, F. & L.; *rhizome* slender, very wide-creeping, densely clothed with grey or ferruginous fibrillose scales; *fr.* sessile, dimorphous, entire, coriaceous, quite naked, the barren ones roundish or elliptical, obtuse, 1-2 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., the fertile ones linear or ligulate, with large uniserial *sori*.—*Hk. Sp.* 5. p. 35. *Craspedaria*, *Link.* *Lopholepis*, *J. Sm.*

Hab. Jamaica to Paraguay.

226. *P.* (*Gonioph.*) *piloselloides*, L.; *rhizome* very wide-creeping, slender, scandent, clothed with squarrose fibrillose scales; *fr.* dimorphous, the barren ones oblong, entire, 1-3 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., the fertile ones narrower and longer, both on short ciliated stems; *texture* coriaceous; both *sides* naked or more or less scaly and hairy; *sori* large, uniserial, confined to the large costal areolæ.—*Hk. G. F. t.* 18.— $\beta$ , *P. ciliatum*, Willd.; *fertile fr.* so narrow that the *sori* project beyond the edge.— $\gamma$ , *P. aurisetum*, Raddi; *fr.* small, sometimes nearly round, scaly, and especially the fertile ones on the back densely fulvo-villose. *Hk. Sp.* 5. p. 33. *Craspedaria*, *Fée.* *Lopholepis*, *J. Sm.*

Hab. Common throughout Tropical America, including the West Indies.—*Lopholepis*, *J. Sm.*, has the venation of *Goniophlebium*, with dimorphous fronds and a wide-trailing rhizome.

227. *P.* (*Gonioph.*) *nummularium*, *Mett.*; *rhizome* wide-creeping, slender, the scales linear-subulate, ferruginous; *fr.* distant, the barren ones suborbicular,  $\frac{1}{2}$ - $\frac{3}{4}$  in. l., nearly as broad, on short slender stems; *texture* coriaceous; both *sides* naked; *veins* immersed, very obscure; sterile *fr.* 3-4 in. l.,  $\frac{1}{3}$  in. br., on stalks nearly as long.—*Hk. Sp.* 5. p. 39. *Crypsinus*, *Presl.*

Hab. Philippines, *Cuming*, 121.

228. *P.* (*Gonioph.*) *glaucophyllum*, Kze.; *rhizome* firm, wide-creeping, deciduously scaly; *st.* scattered, 2-6 in. l., firm, erect, glossy; *fr.* uniform, oblong-lanceolate, entire, 4-10 in. l., 1-2 in. br., the point acuminate, the base rounded; *texture* coriaceous; both *sides* naked; main *veins*  $1\frac{1}{2}$ -2 lines apart, with 4-6



areolæ in a series between the midrib and edge, with one *sorus* in each.—*Hk. Sp.* 4. p. 18.

Hab. West Indies and Columbia to Ecuador; Guinea Coast.—*P. semipinnatifidum*, Mett., is a variety with larger sori, and the frond not at all glaucous, and sometimes deeply lobed.

\*\* *Fronde pinnatifid.* Sp. 229-231.

229. *P.* (Gonioph.) *Matthewsii*, Mett.; *st.* 4-6 in. l., clothed with deciduous soft spreading brown hairs; *fr.* pendent, 6-18 in. l., 2-5 in. br., cut down nearly to the rachis into numerous entire *pinnae* 1-3 in. l., 2-3 lin. br., with generally a broad rounded sinus between them; *texture* coriaceous; under *surface* clothed with hairs like those of the stem; *veins* obscure; *areolæ* and *sori* in a single series.—*Hk. Sp.* 5. p. 20.

Hab. Andes, from Columbia to Peru.—A well-marked species, characterized by its very pendulous habit and coriaceous texture.

230. *P.* (Gonioph.) *niponicum*, Mett.; *st.* stramineous; *fr.* 5 in. l., 1½ in. br., sublanceolate, cut down nearly to the rachis into about 20 pairs of spreading linear-oblong entire obtuse *pinnae*, of which the lowest are free, slightly reduced and deflexed; *texture* papyraceous; both *sides* densely pubescent; *areolæ* in a single series; *sori* unknown.—*Mett. Fil. Ind.* 2. p. 222.

Hab. Japan, *Siebold, Buerger.*

231. *P.* (Gonioph.) *amcenum*, Wall.; *rhizome* stout, densely clothed with spreading fibrillose dull-brown scales; *st.* 6-12 in. l., firm, erect, naked; *fr.* 1-2 ft. l., 6-12 in. br., cut down nearly to the rachis into numerous entire or slightly-toothed *pinnae* 3-6 in. l., ¼-¾ in. br., narrowed gradually from the base to an acute point, the lowest pair deflexed; *texture* firm, herbaceous; both *sides* naked, or the rachis beneath rather scaly; *areolæ* and *sori* in a single series.—*Hk. Sp.* 5. p. 24.

Hab. N. India (up to 10,000 ft.) and Formosa.

\*\*\* *Fronde pinnate.* Sp. 232-260.

A. *Pinnae close, dilated and casually confluent at the base.* Sp. 232-244.

232. *P.* (Gonioph.) *trilobum*, Cav.; *rhizome* stout, the scales ovate-acuminate, reddish; *st.* 4-6 in. l., firm, erect, glossy; *fr.* 6-12 in. l., subdeltoid, with a linear entire or slightly toothed terminal *pinna*, and 1-3 similar distant ones on each side, the lowest 3-4 in. l., ⅔-¾ in. br., sometimes forked; *texture* subcoriaceous; *rachis* and both *sides* naked; *sori* and *areolæ* uniserial, the former oblong, quite immersed.—*Hk. Sp.* 5. p. 22.

Hab. Chili.

233. *P.* (Gonioph.) *ensiforme*, Thunb.; *rhizome* stout, the scales linear, ferruginous, fimbriated; *st.* 4-6 in. l., stout, erect, naked; *fr.* 6-12 in. l., 4-6 in. br., with a ligulate terminal *pinna* 3-4 in. l., ¼ in. br., and several distant similar erecto-patent ones on each side, which are decurrent at the base; *texture* very thick; both *sides* naked; *veins* immersed; *areolæ* uniserial, the *sori* large, distinctly immersed.—*Hk. Sp.* 5. p. 23.

Hab. Cape Colony and Natal.

234. *P.* (Gonioph.) *californicum*, Kaulf.; *rhizome* wide-creeping, the scales spreading, lanceolate, ferruginous; *st.* 3-6 in. l., firm, erect, naked; *fr.* 6-9 in. l., 3-5 in. br., oblong-deltoid, cut down nearly or quite to the rachis into entire or finely-toothed *pinnae* 1½-2½ in. l., ⅓-½ in. br., lowest not reduced; *texture* papyraceous.

herbaceous; groups of *veins* usually joining once; *sori* large, in single rows near the midrib.—*Hk. Sp. 5. p. 18. (not Mett.)*

Hab. California.—*P. intermedium*, H. & A., is a form with the groups of veins uniting but rarely. This and the next are very like *P. vulgare* in general habit.

235. *P. (Gonioph.) Scouleri*, Hk. & Gr.; *rhizome* stout, wide-creeping, the scales lanceolate, spreading, dull-brown; *st.* 3-4 in. l., firm, erect, naked; *fr.* 6-12 in. l., 4-8 in. br., cut down to the rachis into close blunt subventire *pinnae*  $\frac{1}{2}$ - $\frac{3}{4}$  in. br.; *texture* very coriaceous; both *sides* naked; groups of *veins* uniting once; *sori* very large, in a single row close to the midrib.—*Hk. Sp. 5. p. 19. H. & Gr. t. 56. P. pachyphyllum, Eaton.*

Hab. Vancouver's Island, Oregon, British Columbia.—The specimens figured are very small compared with those of Professor Eaton.

236. *P. (Gonioph.) patens*, J. Sm.; *rhizome* stout, the scales fibrillose, bright-ferruginous, crisped; *st.* 2-4 in. l., firm, stramineous, naked; *fr.* 6-12 in. l., subdeltoid, with a linear entire terminal *pinna* and 3-4 similar ones on each side, which are 3-5 in. l.,  $\frac{3}{8}$ - $\frac{1}{2}$  in. br., narrowed gradually from the base to the apex; *texture* subcoriaceous; both *sides* naked; *areolæ* and *sori* in a single series.—*Hk. Sp. 5. p. 23.*

Hab. Panama, Seemann, 25.

237. *P. (Gonioph.) translucens*, Kunze; *rhizome* stout, the scales large, lanceolate, ferruginous; *st.* 4-6 in. l., firm, erect, glossy; *fr.* 8-12 in. l., 6-8 in. br., subdeltoid, with an irregularly crenated terminal *pinna* 3-4 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., and several close similar ones on each side which are sometimes connected at the base; *texture* papyraceo-herbaceous; *rachis* and both sides naked; *veins* distinct, the *areolæ* in one principal row, with the *sori* some distance from the midrib.—*Hk. Sp. 5. p. 22.*

Hab. Juan Fernandez.

238. *P. (Gonioph.) lachnopus*, Wall.; *rhizome* wide-creeping, densely clothed with spreading black bristly scales; *st.* 2-4 in. l., slender, naked; *fr.* flaccid, 12-18 in. l., 3-4 in. br., cut down nearly or quite to the rachis into spreading slightly-toothed *pinnae*  $1\frac{1}{2}$ -2 in. l.,  $\frac{1}{4}$  in. br.; *texture* papyraceo-herbaceous; both *sides* naked or the rachis beneath slightly scaly; *areolæ* and *sori* in a single series.—*Hk. Sp. 5. p. 25. 2nd Cent. t. 52.*

Hab. N. India, up to 11,000 ft.

239. *P. (Gonioph.) pubescens*, Hk. & Gr.; *rhizome* wide-creeping, the scales lanceolate, spreading; *st.* 4-8 in. l., naked, stramineous; *fr.* 6-12 in. l., 3-4 in. br., cut down to the rachis into numerous spreading nearly entire *pinnae*  $1\frac{1}{2}$ -2 in. l.,  $\frac{3}{8}$ - $\frac{1}{2}$  in. br., the lowest pair deflexed, rather reduced; *texture* subcoriaceous; *rachis* and under side slightly glandular and hairy; *veins* fine; *areolæ* and *sori* generally in a single series.—*Hk. Sp. 5. p. 19. Hk. & Gr. t. 182.*

Hab. Andes of Peru.

240. *P. (Gonioph.) plesiosorum*, Kunze; *rhizome* stout, the scales ovate or lanceolate, dense, reddish; *st.* 2-4 in. l., firm, erect, glossy; *fr.* 6-12 in. l., 4-6 in. br., cut down to the rachis into close entire *pinnae*  $\frac{3}{8}$ - $\frac{1}{2}$  in. br., narrowed gradually upwards, dilated slightly on both sides at the base; *texture* herbaceous; *areolæ* usually in two rows, the prominent *sori* in a single row close to the midrib.—*P. loriceum, Hk. Sp. 5. p. 21. (in part). P. rhodopleuron, gonatodes and colpodes, Kze.*

Hab. Mexico to Venezuela.—Differs from *P. loriceum* by its shorter and broader frond,



more herbaceous texture, and larger almost constantly uniserial sori. The Mexican *P. appendiculatum*, Klotzsch (Hk. Fil. Ex. t. 87), non Wallich, is apparently a form of this more delicate in texture, with the veins and rachis tinged with bright-red.

241. *P.* (Gonioph.) *lasiopus*, Klotzsch; *rhizome* stout, the scales dense, squarrose, ovate-acuminate, dark-brown; *st.* 4-6 in. l., firm, erect, stramineous; *fr.* 8-12 in. l., 4-5 in. br., cut down to the rachis into close bluntish entire *pinnæ*  $\frac{1}{2}$ -in. br., slightly dilated at the base; *texture* herbaceous; both *sides* finely villose; *sori* prominent, uniserial.—*Hk. Sp.* 5. p. 21.

Hab. Venezuela.—Very near the preceding.

242. *P.* (Gonioph.) *Catharinæ*, F. & L.; *rhizome* wide-creeping, the scales spreading, dark-brown, ovate-acuminate; *st.* 4-6 in. l., erect, naked, glossy; *fr.* 6-12 in. l., 3-5 in. br., cut down to the rachis into close blunt spreading subentire *pinnæ*  $1\frac{1}{2}$ -3 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., the lowest pair shorter and deflexed; *texture* subcoriaceous, colour dark-green; both *sides* naked; main *veins*  $\frac{1}{8}$  in. apart, with generally two areolæ between the edge and midrib; *sori* large, in single rows close to the midrib.—*Hk. Sp.* 5. p. 20. (not *J. Sm.*).

Hab. Brazil.—*P. Wageri*, Mett., from Columbia, is said to differ from this by its linear frond and very numerous pinnæ.

243. *P.* (Gonioph.) *loriceum*, L.; *rhizome* stout, wide-creeping, the scales black in the centre, with a scariose border; *st.* 4-6 in. l., sometimes ebeneous; *fr.* 12-18 in. l., 4-6 in. br.; *pinnæ* close, 2-3 in. l.,  $\frac{3}{8}$ - $\frac{1}{2}$  in. br., subentire, sometimes falcate, dilated at the base on the upper side; *texture* subcoriaceous; *rachis* and both sides usually naked; *veins* very distinct, the areolæ generally in two distinct rows, with the small *sori* often in both.—*Hk. Sp.* 5. p. 21.— $\beta$ , *P. latipes*, L. & F. t. 10; larger, as coriaceous but less rigid; *pinnæ* much dilated on both sides at the base; *veins* less distinct; *scales* ovate, dense, dull-brown.—*P. Catherinæ*, *J. Sm.* (not *L. & F.*) *P. harpeodes* and *vacillans*, *Link* (*vide Moore*).

Hab. Mexico and West Indies to Brazil and Chili.—From this we cannot distinguish clearly *P. dasypleuron* and *Falcaria* (Kze.) and *letum* (Raddi). *P. pectinatum* (*J. Sm.*) is smaller and more delicate, with close narrow acute pinnæ, densely fibrillose bright ferruginous scales and constantly uniserial sori. *P. punctulatum*, Hk. Ic. t. 720 (*P. Calaguala*, Fée), resembles this in its slender pectinate habit and uniserial sori, but is more rigid in texture.

244. *P.* (Gonioph.) *eleutherophlebium*, Mett.; *rhizome* creeping, the scales dense, ovate-lanceolate, brown; *st.* 4 in. l.; *fr.* 7 in. l., 4 in. br., ovate-deltoid, cut down nearly to the rachis above, quite below, into linear-oblong obtuse crenate or irregularly pinnatifid *pinnæ* 2 in. l.,  $\frac{1}{4}$  in. br., with blunt rounded lobes; *texture* coriaceous; *sori* large, uniserial.—*Mett. Polyp.* p. 75.

Hab. Venezuela, *Funck* and *Schlim*, 1102.—We have not seen this, and are indebted to Mettenius for the description.

B. *Most of the pinnæ distinctly separated at the base.* Sp. 245-260.

245. *P.* (Gonioph.) *chacapoyense*, Hk.; *st.* 6-8 in. l., firm, naked, reddish; *fr.* 1 ft. l., 2-3 in. br., with a linear entire terminal *pinnæ* 2-3 in. l.,  $\frac{1}{4}$  in. br., and several smaller blunt close erecto-patent similar ones on each side; *texture* subcoriaceous; *rachis* and under side slightly villose; *areolæ* and veins in a single row.—*Hk. Sp.* 5. p. 29. t. 281.

Hab. Peru, *Matthews*, 3279.

246. *P.* (Gonioph.) *surrucuchense*, Hk.; *rhizome* stout, densely clothed with spreading grey lanceolate scales; *st.* 6-12 in. l., firm, naked, glossy; *fr.* 1-2 ft.

l., 8-12 in. br.; *pinnæ* numerous, erecto-patent, 4-6 in. l.,  $\frac{1}{4}$ - $\frac{3}{4}$  in. br., the edge entire, the base subcuneate; *texture* coriaceous; *rachis* and both sides naked; *areolæ* and prominent *sori* in a single series.—*Hk. Sp. 5. p. 30. Ic. t. 69.*

Hab. West Indies to Ecuador.

247. *P. (Gonioph.) plectolepis*, Hk.; *rhizome* stout, the scales squarrose, lanceolate, ferruginous; *st.* 6-12 in. l., firm, stramineous, glossy; *fr.* 1-2 ft. l., 1 ft. br.; *pinnæ* numerous, spreading, 4-6 in. l.,  $\frac{1}{2}$ - $\frac{5}{8}$  in. br., narrowed gradually from the base to the point, the edge distinctly crenate; *texture* papyraceo-herbaceous; *rachis* and both sides finely pubescent; *areolæ* and *sori* in a single series.—*Hk. Sp. 5. p. 30.*

Hab. Mexico and Guatemala.

248. *P. (Gonioph.) chnoodes*, Spreng.; *rhizome* stout, densely clothed with soft spreading dull-brown subulate scales; *st.* 4-6 in. l., erect, slender, naked; *fr.* drooping, 1-2 ft. l., 4-9 in. br., cut down to the rachis into distinct entire falcate opposite *pinnæ* 2-4 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., cordate at the base; *texture* papyraceo-herbaceous; *rachis* and both sides glandular and pubescent; *areolæ* and *sori* in 2-3 series.—*P. dissimile*, *Hk. Sp. 5. p. 25.*

Hab. West Indies and Venezuela.—The synonym of *P. dissimile*, Linn., is doubtful; Schkuhr and Grisebach refer it to our *P. sororium*.

249. *P. (Gonioph.) persicæfolium*, Desv.; *rhizome* wide-creeping, the scales small, linear, dull-brown; *st.* 6-12 in. l., firm, naked, subebeneous; *fr.* 2-3 ft. l., 8-12 in. br., decurved; *pinnæ* distant, 4-6 in. l.,  $\frac{3}{4}$ -1 in. br., the apex acuminate, the edge slightly toothed, the base narrowed gradually and the lower ones distinctly stalked; *texture* subcoriaceous; *rachis* and both sides naked; *areolæ* in about 3 rows, the *sori* uniserial, distinctly immersed. *P. cuspidatum*, *Blume. Hk. Sp. 5. p. 32.*

Hab. Java.—Very near to *P. subauriculatum*, from which it may be best known by the *pinnæ* being narrowed at the base, and the lower ones distinctly stalked. *P. grandidens*, Kze., appears to be a more deeply toothed form.

250. *P. (Gonioph.) puberulum*, Baker; *rhizome* wide-creeping, the scales dense, subulate, reddish-brown; *fr.* 18 in. l., 7-8 in. br.; *pinnæ* 3-4 in. l.,  $\frac{1}{2}$  in. br., the edge deeply crenate, sometimes auricled at the base on the upper side, all sessile, the upper ones more or less adnate; *texture* herbaceous; *rachis* and both sides rather densely clothed with soft whitish hairs; *areolæ* in 2-3 rows, the *sori* uniserial.—*Gonioph. molle*, *Beddome, Fil. Brit. Ind. t. 206.*

Hab. Burmah, *Rev. C. S. Parish.*

251. *P. (Gonioph.) subauriculatum*, Blume; *rhizome* wide-creeping, clothed with small dull-brown linear scales; *st.* 6-12 in. l., firm, erect, naked, glossy; *fr.* 2-3 ft. l., 8-12 in. br., oblong-lanceolate, decurved; *pinnæ* 4-6 in. l.,  $\frac{1}{2}$ -1 in. br., the edge entire or slightly toothed, sessile, the base rounded or even auricled; *texture* herbaceous or subcoriaceous; *rachis* and both sides naked; *areolæ* in 2-3 rows, the *sori* uniserial, distinctly immersed.—*Hk. Sp. 5. p. 32. P. argutum*, *Wall, Hk. l. c.*

Hab. N. India (up to 8,000 ft.), Malaccas, Philippines, Fiji, Samoa, N. Caledonia, Queensland.—*G. serratifolium*, Brack., is a deeply-toothed herbaceous form, and *P. Reinwardtii*, Kunze, is crenate instead of dentate.

252. *P. (Gonioph.) verrucosum*, Wall.; *st.* 1 $\frac{1}{2}$ -2 ft. l., firm, erect, terete, naked; *fr.* 3-4 ft. l., 1 ft. br.; *pinnæ* numerous, distant, 6-8 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., quite entire; *texture* coriaceous; *rachis* and both sides naked or slightly hairy; *areolæ* in



several rows; *sori* confined to the inner one, firm, immersed, so as to form very distinct papillæ on the upper side.—*Hk. Sp. 5. p. 31.*—*G. F. t. 41.*

Hab. Philippines and Malaccas.—This and the two preceding form the genus *Schellolepis* of J. Smith.

253. P. (Gonioph.) *Korthalsii*, Mett.; *rhizome* wide-creeping, the scales small, reddish-brown, subulate, ciliated; *st.* 5-6 in. l., smooth, reddish-brown; *fr.* 12-15 in. l., 1 ft. br.; *pinnae* lax, spreading, sessile, 5-7 in. l., 1-1½ in. br., lanceolate-acuminate, the base cuneate, the edge slightly crenate; *texture* subcoriaceous; *rachis* and both sides quite naked; *areolæ* in 3-4 and the *sori* in 1-3 rows.—*Mett. Fil. Ind. 2. p. 223.*

Hab. Sumatra, *Korthals.*—Differs from the three preceding by its multiseriate *sori*. *P. Lampongense*, Zoll., may be the same, but the *pinnae* are said to be cordate or even subauriculate at the base.

254. P. (Gonioph.) *attenuatum*, H. B. K.; *rhizome* stout, the scales grey, ovate-acuminate, spreading; *st.* firm, erect, 6-12 in. l., glossy, naked; *fr.* 1-2 ft. l., often 1 ft. br., cut down to the rachis into numerous erecto-patent entire *pinnae* 4-6 in. l., ¾-¾ in. br., which are dilated at the base; *texture* subcoriaceous; *rachis* and both sides naked; *areolæ* in 3 or 4 rows; *sori* slightly immersed in 1 or 2 rows.—*Hk. Sp. 5. p. 24. (non R. Br.)*. *P. xiphophoron* and *gladium*, *Kze.*

Hab. West Indies to Brazil and Ecuador.—Very near the next, with which Grisebach unites it. The *pinnae* are closer, narrower, and dilated, sometimes confluent at the base, and the *sori* mostly uniserial.

255. P. (Gonioph.) *neriifolium*, Schk.; *rhizome* stout, the scales grey, lanceolate, spreading; *st.* 6-12 in. l., firm, glossy; *fr.* 1-3 ft. l., 1 ft. or more br., with an entire or slightly sinuated terminal *pinna* 4-8 in. l., ½-1½ in. br., and numerous similar ones on each side, which are narrowed at the base, the lowest sometimes stalked; *texture* coriaceous; *rachis* and both sides naked; *veins* beneath prominent; *areolæ* in 2-6 rows between the midrib and edge, the immersed *sori* 1-3 serial.—*Hk. Sp. 5. p. 28.*

Hab. West Indies and Mexico to Brazil and Peru.—*G. intermedium* and *acuminatum*, Fée, *Fil. Ant. t. 18-19*, appear to belong here. Apparently this is *P. brasiliense*, Lam., and if so, that name has priority.

256. P. (Gonioph.) *guatemalense*, Hk.; *st.* 6-12 in. l., naked, stramineous; *fr.* 2-3 ft. l., 1 ft. or more br., with an entire terminal *pinna* 6-8 in. l., 1-1½ in. br., and several similar ones on each side, the upper ones narrowed but adnate at the base; *texture* subcoriaceous; *rachis* and both sides naked; *areolæ* in series of 3-4, the large uniserial *sori* in the first or second row.—*Hk. Sp. 5. p. 29.* *Phlebodium inæquale*, *Moore.*

Hab. Guatemala, *Skinner.*—In this there is occasionally a costal areole inside the one that contains the sorus, but the free veinlet which bears the latter is always simple.

257. P. (Gonioph.) *cordatum*, *Kze.*; *rhizome* stout, clothed with spreading linear scales; *st.* 1 ft. or more l., strong, quite naked; *fr.* 1½-2 ft. l., 8-10 in. br.; *pinnae* in numerous opposite pairs, 4-5 in. l., ¾-1 in. br., the edge entire, the point acute, the base very cordate; *texture* coriaceous; *rachis* and both sides naked; *areolæ* irregular except the inner series; *sori* in 1-2 rows, immersed.—*Mett. Polyp. p. 85.*

Hab. Peru.

258. P. (Gonioph.) *adnatum*, Kunze; *st.* 6-12 in. l., glossy, naked; *fr.* 1½-3 ft. l., 1 ft. br., with an entire oblong-lanceolate terminal *pinna* 6-9 in. l., 1½-2 in.

br., and several similar lateral ones on each side, the upper ones broadly adnate to the rachis at the base; *texture* subcoriaceous; *rachis* and both sides naked; main *veins*  $\frac{1}{2}$  in. apart; *areolæ* and *sori* in rows of 4-6 between the midrib and edge.—*Hk. Sp. 5. p. 27.*

Hab. Guatemala to Guiana and Galapagos.—Differs from the next by its more herbaceous texture and adnate upper pinnæ. *P. Richardi*, Klotzsch, is a pubescent form.

259. *P. (Gonioph.) fraxinifolium*, Jacq.; *rhizome* stout, clothed with deciduous, spreading, dark-brown, linear-subulate scales; *st.* 1-2 ft. l., firm, erect, naked; *fr.* 2-4 ft. l., 12-18 in. br., with numerous distinct *pinnæ* on each side, which are 4-9 in. l., 1-2 in. br., the apex acuminate, the edge entire, the base narrowed; *texture* subcoriaceous; both *sides* naked; main *veins*  $\frac{1}{2}$  in. apart; *areolæ* and *sori* in series of 6-8.—*Hk. Sp. 5. p. 26.*

Hab. Columbia to Brazil and Peru.—*P. rhizocaulon*, Willd., is a wide-scandent variety, thinner in texture than the ordinary form, and thus intermediate between it and the preceding. This includes several species of cultivators.

260. *P. (Gonioph.) menisciifolium*, L. & F.; *st.* 1-2 ft. l., firm, erect, naked; *fr.* 2-3 ft. l., 1 ft. or more br., with an entire terminal *pinna* 6-9 in. l.,  $1\frac{1}{2}$ -2 in. br., and numerous similar ones on each side, all narrowed to the base; *texture* subcoriaceous; *rachis* and both sides naked; main *veins*  $\frac{1}{2}$  in. apart; *areolæ* and *sori* in rows of about 4, the latter immersed and prominent on the upper side.—*Hk. Sp. 5. p. 27.*

Hab. Panama, Trinidad, Brazil.

\*\* *Under surface densely clothed with small scales. Lepicystis, J. Sm.*  
Sp. 261—263.

261. *P. (Gonioph.) incanum*, Sw.; *rhizome* woody, wide-creeping, the scales small, dense, dull-brown, fibrillose; *st.* 1-4 in. l., firm, erect, furfuraceous; *fr.* 2-4 in. l., 1-1 $\frac{1}{2}$  in. br., cut down to the rachis into subdistant spreading entire blunt *pinnæ* 1-1 $\frac{1}{2}$  lin. br., dilated at the base; *texture* coriaceous; under *side* densely scaly; *veins* united or frequently free; *sori* uniserial.—*Hk. Sp. 5. p. 209.* *P. Eckloni*, *Kze. Hk. l. c.*

Hab. Ohio to Uruguay and Chili; Cape Colony, Natal, Zambesi-land.

262. *P. (Gonioph.) lepidopteris*, Kze.; *rhizome* stout, wide-creeping, densely clothed with grey or reddish scales; *st.* 1-4 in. l., rigid, erect, densely scaly; *fr.* 6-18 in. l.,  $1\frac{1}{2}$ -3 in. br., cut down to the rachis into horizontal entire *pinnæ* 2-3 lin. br., the lower reduced very gradually; *texture* very thick; both *sides* clothed, the lower very thickly, with ferruginous or white hairs and scales; *veins* hidden; *sori* copious.—*Hk. Sp. 4. p. 212.*— $\beta$ , *P. sepultum*, Kaulf.; *fr.* ovate-lanceolate; lower *pinnæ* scarcely reduced.— $\gamma$ , *P. rufulum*, Presl; *scales* of *rhizome* bright reddish-brown; *pinnæ*  $\frac{3}{8}$  in. br., blunt, much twisted.

Hab. Mexico to Galapagos, Peru, and Rio Janeiro.

263. *P. (Gonioph.) squamatum*, L.; *rhizome* stout, wide-creeping, clothed with adpressed lanceolate scales; *st.* 6-12 in. l., rigid, erect, scaly; *fr.* 6-12 in. l., 2-4 in. br., cut down nearly or quite to the rachis into entire blunty *pinnæ* 1-2 in. l.,  $1\frac{1}{2}$ -3 lin. br., with a considerable space between them, dilated and often united at the base; *rachis* and under surface densely coated with minute membranous ovate-acuminate squarrose scales; *veinlets* obscure; *sori* large, copious.—*Hk. Sp. 4. p. 209.*

Hab. West Indies and Mexico to Peru.—*P. tridens*, Kze., from the Galapagos, appears to be a luxuriant state of this with forked pinnæ.



§§§§§§§§ *Phlebodium*, *R. Br.* Veins forming ample regular areolæ, each with two or more distinct free included veinlets, which bear the sori on their united points, the costal series of areolæ being always destitute of sori. TAB. 48. fig. g. Sp. 264-266.

264. *P.* (Phleb.) *nigripes*, *Hk.*; rhizome stout, the scales black and rigid, with a deciduous membranous ferruginous edge; *st.* nearly 1 ft. l., firm, erect, slightly scaly; *fr.* 1 ft. l., 6-7 in. br., cut down nearly or below quite to the rachis into pinnæ  $\frac{1}{2}$ - $\frac{5}{8}$  in. br., which are slightly renate towards the bluntish point; texture subcoriaceous; under surface furfuraceous; sori in single rows on each side the midrib.—*Hk. Sp.* 5. p. 17.

Hab. Venezuela, *Fendler*, 247.

265. *P.* (Phleb.) *aureum*, *L.*; rhizome stout, wide-creeping, densely clothed with bright ferruginous linear-subulate soft scales; *st.* 1-2 ft. l., stout, erect, naked, glossy; *fr.* 3-5 ft. l., 9-18 in. br., with a long linear-lanceolate terminal lobe, and cut throughout within  $\frac{1}{4}$ - $\frac{3}{4}$  in. of the rachis into numerous horizontal entire or slightly undulated lateral pinnæ 4-9 in. l., about 1 in. br., with a rounded sinus between; texture subcoriaceous; both sides naked, slightly glaucous; areolæ copious, both the fertile and barren ones with free veinlets; sori irregularly 1-3 serial.— $\beta$ , *P. areolatum*, *H. B. K.*; *fr.* smaller, more coriaceous, very glaucous, the lobes closer, the sori uniserial and barren areolæ with no free veinlets.—*P. sporadocarpum*, *Willd.*— $\gamma$ , *P. pulvinatum*, *Link*; like  $\beta$  in sori and venation, but the frond hardly at all glaucous and the terminal lobe very small.—*Hk. Sp.* 5. p. 16.

Hab. Florida and Mexico southward to Brazil, and reported by *Dr. Mueller* from Australia.—*C. trilobata*, *Fée*, is a dwarf form with only three lobes. A plant from *Spruce* (Andes of Ecuador, 5240), agreeing with the small forms of this with uniserial sori in habit and texture, has the sori usually terminal on a free veinlet in the costal areolæ, as in typical *Goniophlebium*, but occasionally a short veinlet is carried from the centre of the one that bears the sorus to the next above it, which springs from the midrib, as in *P. guatemalense*, and as represented in the figure by *Mettenius* of *P. pleurosorum*, *Kze.*; so that we have then a venation midway between that of *Goniophlebium* and *Phlebodium* proper.

266. *P.* (Phleb.) *decumanum*, *Willd.*; rhizome stout, the scales bright-ferruginous, soft; *st.* 1-2 ft. l., stout, erect, glossy; *fr.* 1-3 ft. l., 1-2 ft. br., cut down nearly, or below quite, to the rachis into nearly entire ligulate-oblong pinnæ often 1 ft. l., 2-3 in. br.; texture papyraceous or subcoriaceous; rachis and both sides naked; main veins parallel, 2-3 lines apart, with two sets of areolæ about 6 deep between them, each containing a sorus terminating 2 or 3 free veinlets.—*Hk. Sp.* 5. p. 17. *C. dictyocallis*, *Fée*.

Hab. New Granada and Guiana to Brazil and Peru.

§§§§§§§§§§ *Campyloneuron*, *Presl.* Primary veins distinct from the midrib to the edge, connected by parallel straight or curved transverse veinlets, the areolæ similar, containing 2 or more sori, the free veinlets all directed towards the edge. TAB. 48. f. j. Sp. 267-296.

\* Surfaces naked. Sp. 267-275.

† Fronds simple. Sp. 267-273.

267. *P.* (Camp.) *angustifolium*, *Sw.*; rhizome stout, epigæous, clothed with deciduous brown lanceolate scales; *fr.* 12-18 in. l.,  $\frac{1}{4}$  in. br., quite entire, the point acute, the lower part narrowed very gradually into a generally short stem; texture coriaceous; both sides naked, the edges often revolute; veins immersed, often obscure; areolæ and sori in 1-4 rows between the midrib and edge, the







contracted upper part of the frond.—*Hk. Sp. 5. p. 47. G. F. t. 19. P. spissum, Bory, Hk. p. 48.*

Hab. N. India and Chusan to Ceylon and Fiji; Mascaren Isles, Cameroon Mountains.—*N. varium*, Blume, is a large variety with the barren and fertile fronds similar,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., and often nearly naked beneath, and *P. Koenigi*, Bl., a small form with uniform narrow linear fronds.

279. *P. (Niph.) acrostichoides*, Forst.; *rhizome* woody, wide-creeping, clothed with roundish adpressed scales, black in the centre; *st.* 1-3 in. l., firm, erect; *fr.* 1-2 ft. l.,  $\frac{1}{2}$ -1 in. br., ligulate, narrowed very gradually below; *texture* very coriaceous; upper *surface* naked, lower clothed with thin dirty white tomentum; *sori* bright-coloured, not immersed, small, close, covering the whole of the upper part of the frond.—*Hk. Sp. 5. p. 44. (in part).*

Hab. Ceylon, Malaccas, Philippines, New Hebrides, Queensland.—Distinguished from the last by its larger size, more rigid texture, and sori not buried in tomentum. M. Deplanche sends from the Loyalty Isles a form twice dichotomously forked.

280. *P. (Niph.) Lingua*, Sw.; *rhizome* wide-creeping, clothed with spreading lanceolate ferruginous scales; *st.* 3-6 in. l., firm, erect; *fr.* uniform, 4-8 in. l., 1-4 in. br., the apex often cuspidate, the base narrowed or rather rounded, the edge entire; *texture* coriaceous; upper *surface* naked, lower matted with close compact cottony subferruginous down; main *veins* distinct to the edge; *sori* rather large and prominent, in close rows of 4-6 each between them.—*Hk. Sp. 5. p. 49.*

Hab. N. India (up to 5,000 ft.) and Japan to Ceylon and the Malay Isles.—Well marked by its decided stem and comparatively short broad frond.

281. *P. (Niph.) sphaerostichum*, Mett.; *rhizome* woody, wide-creeping, the scales ovate, acuminate, brown, crisped; *st.* 2-3 in. l., firm, erect; *fr.* uniform, 4-5 in. l., 1 in. br., oblong-lanceolate, the apex acuminate, the base narrowed suddenly; *texture* coriaceous; under *surfae* very thinly matted; main *veins* distinct to the edge; *sori* confluent, covering the whole under surface.—*Mett. Polyp. p. 130.*

Hab. Luzon, *Cuming*, 127.—Like the last in habit, but the sori multi- instead of uniserial between the transverse veinlets.

282. *P. (Niph.) tricuspe*, Swz.; *rhizome* stout, the scales grey, lanceolate; *st.* 6-8 in. l., firm, erect; *fr.* hastate, 2-4 in. each way, the central lobe lanceolate-deltoid, the lateral ones spreading, distinctly auricled at the base; *texture* coriaceous; upper *surface* naked, lower densely matted; *sori* minute, in rows of 3-4 between the main veins, of 9-12 between the midrib and edge.—*Hk. Sp. 5. p. 44.*

Hab. Japan and Korea.—The only species of the group of which the frond is not quite entire.

283. *P. (Niph.) stigmatosum*, Sw.; *rhizome* short-creeping, the scales ferruginous, fibrillose; *st.* subtufted, 1-6 in. l., firm, erect; *fr.*  $1\frac{1}{2}$ -2 ft. l., 1-3 in. br.; the apex acuminate, the lower part narrowed gradually, the edge entire; *texture* subcoriaceous; upper *surface* glabrous, the lower coated with thin grey-ferruginous tomentum; main *veins* distinct to the edge; the *sori* in several rows between the transverse veinlets, very small, quite continuous, sometimes covering the whole frond except the very base.—*P. costatum, Wall. Hk. Sp. 5. p. 90. Apalophlebia, Presl.*

Hab. N. India (up to 2,000 ft.), Malay Peninsula and Isles, New Guinea.—This and the next may be readily distinguished from the rest of the group by the much larger size of their fronds. The Himalayan plant (*P. costatum*, Wall.) is less distinctly stalked









thick coat of ferruginous tomentum ; main *veins* distinct to the edge, connected by arched veinlets ; the *areolæ* containing 2 irregular rows of *sori*, with 6 to 12 in each.—*Hk. Sp. 5. p. 53.*

Hab. Bhootan, *Griffith, Booth.*

296. P. (Niph.) *splendens*, Hk. ; *fr.* sessile, 1½-3 ft. l., 3-4 in. br., the point cuspidate, the lower part narrowed very gradually, the edge entire ; *texture* subcoriaceous, upper surface with scattered cottony down, lower matted with ferruginous tomentum and fine silky dark-brown hairs ; main *veins* straight to the edge, connected by nearly straight veinlets ; the *sori* very fine and close, falling short of the edge.—*Hk. Sp. 5. p. 52.* Apalophlebia, *Presl.*

Hab. Philippines, *Cuming, 331.*

§§§§§§§§§§ Phymatodes, *Presl* (including *Pleopeltis, Auct.*). *Areolæ* fine, copious, irregular, the free veinlets spreading in various directions, the *sori* various in position, generally on the back of united veinlets. Sp. 297-389. TAB. 43. fig. n.

\* *Fronds simple.* Sp. 297-344.

† *Main veins not distinct to the edge.* Sp. 297-329.

A. *Substance thick, all the veins obscure.* Sp. 297-313.

A\*. *Under surface naked.* Sp. 297-312.

297. P. (Phym.) *subecostatum*, Hk. ; *rhizome* creeping, matted with tomentum, the scales brown, fibrillose, squarrose ; *fr.* sessile, 4-8 in. l., ½ in. br., narrowed gradually to both ends, the edge entire ; *texture* thick, coriaceous ; *colour* pale-green ; both *sides* naked ; no main *veins*, *areolæ* obscure ; *sori* in single marginal rows.—*Hk. Sp. 5. p. 59. t. 273. A.*

Hab. Borneo, *Lobb.*—Midrib upwards indistinct, and distinguished from all its allies by quite sessile fronds.

298. P. (Phym.) *accedens*, Blume ; *rhizome* threadlike, very wide-creeping, scarcely scaly ; *st.* very short ; *fr.* dimorphous, the sterile ones oblong, obtuse, the fertile ones longer and narrower, 2-4 in. l., ¼-½ in. br., the soriferous portion contracted ; *texture* coriaceous ; both *sides* naked ; *veins* hidden, no distinct main veins, *areolæ* irregular, with free veinlets ; *sori* in single rows close to the midrib.—*Hk. Sp. 5. p. 66.*

Hab. Philippines, Malaya and Polynesian Islands.—Characterized by the *sori* being confined to the narrowed upper fertile part of the frond.

299. P. (Phym.) *rostratum*, Hk. ; *rhizome* filiform, wide-creeping, the scales small, fibrillose ; *st.* 1-2 in. l., firm, naked ; *fr.* 2-4 in. l., ½-1 in. br., narrowed gradually to both ends, the edge entire ; *texture* coriaceous ; both *sides* naked ; *veins* immersed, no distinct main veins, *areolæ* fine, copious, with free veinlets ; *sori* large, in single rows not far from the midrib.—*Hk. Sp. 5. p. 66. 2nd Cent. t. 53.*

Hab. Khasia, Bhootan, and Mishmee ; gathered by Griffith and Drs. Hooker and Thomson.

300. P. (Phym.) *geminatum*, Schrad. ; *rhizome* stout, very wide-creeping, the young scales linear, ferruginous ; *fr.* sessile, usually in distant pairs, uniform, entire, 3-6 in. l., ½-1 in. br., narrowed towards both ends, but the point often blunt ; *texture* coriaceous ; both *sides* naked ; *veins* immersed, the main ones with copious fine *areolæ* between them ; *sori* in a row midway between the midrib and

edge, distinctly immersed, placed on the connected veinlets.—*Hk. Sp. 5. p. 36.* Anapeltis, *J. Sm.*

Hab. Brazil.—Near *P. lycopodioides*, but thicker in texture, and veins less distinct.

301. *P.* (Phym.) *oodes*, Kunze; *rhizome* slender, the scales small, fibrillose, yellowish; *st.* distant, slender, naked, 3-4 in. l.; *fr.*  $1\frac{1}{2}$   $2\frac{1}{2}$  in. l.,  $1-1\frac{1}{2}$  in. br., ovate, entire, the base rounded, hardly decurrent; *texture* coriaceous; both *sides* naked; main *veins* distinct nearly to the edge, with fine areolæ and free veinlets; *sori* rather large, few, scattered.—*Hk. Sp. 5. p. 71.*

Hab. Philippines, *Cuming*, 58.

302. *P.* (Phym.) *Schraderi*, Mett.; *rhizome* firm, short-creeping, the scales black, fibrillose; *fr.* 3-5 in. l.,  $\frac{1}{2}-\frac{3}{4}$  in. br., narrowed gradually upwards and below into a short stem or the base, the edge entire; *texture* subcoriaceous; no main *veins*; *areolæ* fine, irregular, with free veinlets; *sori* large, in a single row on each side close to the midrib.—*Hk. Sp. 5. p. 59.*

Hab. Cape Colony and Natal.

303. *P.* (Phym.) *Cunninghami*, Hk.; *rhizome* short-creeping, the scales large, lanceolate, dull-brown; *fr.* 6-12 in. l.,  $\frac{3}{8}-\frac{3}{4}$  in. br., the point acuminate, the edge entire, the widest part above halfway down, from which it is narrowed gradually to the base or a short stem; *texture* coriaceous, not rigid; *surfaces* naked; *areolæ* uniform, without free veinlets; *sori* large, prominent, not immersed, roundish or oblong, in a row nearer the midrib than the edge.—*Hk. Sp. 5. p. 58.* *P. attenuatum*, *Hk. Ic. t. 409.* *Dictymia lanceolata*, *J. Sm.*

Hab. New Zealand and New Hebrides.

304. *P.* (Phym.) *lineare*, Thunb.; *rhizome* wide-creeping, woody, the scales lanceolate, dull-brown; *st.* varying from almost none to 1-2 in. l.; *fr.* 6-12 in. l.,  $\frac{1}{2}-2$  in. br., entire, narrowed gradually to both ends; *texture* subcoriaceous; both *sides* nearly naked; *areolæ* fine, with copious free veinlets; *sori* distinctly immersed, large, prominent, forming a single row nearer the midrib than the edge, when young covered with copious peltate scales.—*Gard. F. t. 14.* *Pleopeltis nuda*, *Hk. Ex. Fl. t. 63.*— $\beta$ , *P. simplex*, Sw.; *fr.* larger, sometimes 2 in. br., 18 in. l.; *texture* thinner, and veins more distinct. *P. loriforme*, *Wall. Hk. Sp. 5. p. 57.* *P. excavatum*, *Bory.*

Hab. N. India (common, ascending to 10,000 ft.) and Japan to Ceylon and the Malay Islands, Mascaren Isles, Natal, Kaffraria, Angola, Fernando Po.

305. *P.* (Phym.) *tenuilore*, Kunze; *rhizome* slender, woody, scandent; *fr.* 9-18 in. l.,  $\frac{1}{4}-\frac{1}{2}$  in. br., the apex acuminate, the edge entire, the lower part narrowed very gradually into a short stem or the base; *texture* rigid, coriaceous; both *sides* naked; main *veins* none; *areolæ* hidden, fine, irregular, with free veinlets; *sori* minute, copious, scattered, sometimes confluent, and especially so along the edge.—*Hk. Sp. 5. p. 60.* *Diblemma*, *J. Sm.*

Hab. Philippines, *Cuming*, 287, 332.—The only species of the group with small irregularly-scattered sori.

306. *P.* (Phym.) *stenophyllum*, Bl.; *rhizome* moderately thick, wide-creeping, densely clothed with linear pale-brown scales; *st.* distant, 1 in. or more l., firm, erect; *fr.* 4-9 in. l.,  $\frac{1}{4}-\frac{1}{2}$  in. br., entire, narrowed gradually to both ends; *texture* very coriaceous; both *sides* naked; *veins* hidden, immersed, no distinct main veins, and free veinlets few; *sori* completely immersed, and very prominent on the upper side, forming a single row close to the edge.—*Hk. Sp. 5. p. 65.*

Hab. Philippines and Malaccas.



307. *P. (Phym.) soridens*, Hk. ; *rhizome* wide-creeping, the scales squarrose, linear, reddish ; *st.* 1-3 in. l., slender, naked ; *fr.* 4-12 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., narrowed very gradually to both ends, the barren ones entire, the fertile ones repand ; *texture* rigid, coriaceous ; both *sides* glossy ; *areolæ* fine, irregular, free veinlets rare ; *sori* 1 to each lobe, deeply immersed, and forming very distinct papillæ on the upper side.—*Hk. Sp. 5. p. 61. t. 283. B.*

Hab. Borneo, Wallace, Lobb.

308. *P. (Phym.) sinuosum*, Wall. ; *rhizome* forming a crust which enwraps the matrix, clothed with peltate scales, black in the middle and white round the edge, the stem arising from a conical protuberance, 1-2 in. l., firm, naked ; *fr.* dimorphous, the barren ones 3-6 in. l.,  $\frac{1}{2}$ -1 in. br., the edge entire, the fertile ones longer, and the edge repand ; *texture* coriaceous ; both *sides* naked ; *veins* obscure ; *sori* large, immersed, round or oblong, marginal or submarginal.—*Hk. Sp. 5. p. 61. t. 274.*

Hab. Malaccas, Amboyna, New Hebrides, Solomon Isles.

309. *P. (Phym.) longifolium*, Mett. ; *rhizome* woody, short-creeping, the scales linear, nearly black ; *fr.* 1-2 ft. l.,  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. br., the apex acute, the edge entire, often revolute, the lower part narrowed very gradually into a short firm stem ; *texture* coriaceous, the lower surface naked or subfurfuraceous ; main *veins* none ; *areolæ* fine, hidden, with copious free veinlets ; *sori* oblong, quite immersed, placed end to end a space from one another in a line close to the edge, the *caps.* mixed with minute stalked peltate scales.—*Hk. Sp. 5. p. 60. 2nd Cent. t. 87. Fil. Ex. t. 20. Paragramma, Moore.*

Hab. Malaccas and Philippines.

310. *P. (Phym.) Brownii*, Wickst. ; *rhizome* woody, wide-creeping, the scales lanceolate, dull-brown ; *fr.* scattered, 6-18 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., ligulate, the point bluish, the edge entire or slightly repand, the lower part narrowed very gradually to a base or short stem ; *texture* very coriaceous, rigid ; *areolæ* uniform, without free veinlets ; *sori* large, prominent, oblong, immersed, in a single row end to end a space from one another midway between the midrib and edge.—*P. attenuatum, R. Br. Hk. Sp. 5. p. 58. G. F. t. 30 (not H. B. K.). Dictymia, J. Sm.—β, marginatum ; sori* quite marginal.

Hab. Australia, New Caledonia, Fiji ; β, New Caledonia and Isle of Pines.

311. *P. (Phym.) superficiale*, Blume ; *rhizome* woody, wide-creeping, the scales lanceolate, spreading, brown, shining ; *st.* 4-6 in. l., firm, naked, often curved ; *fr.* 6-12 in. l., 1-2 in. br., narrowed gradually at both ends, the edge entire ; *texture* subcoriaceous ; both *sides* naked ; *areolæ* fine, irregular, with free veinlets ; *sori* copious, scattered irregularly.—*Hk. Sp. 5. p. 71.*

Hab. N. India (up to 5-6,000 ft.), Tsus-Sima, Hong-Kong, Malaccas.—Characterized in the group by its large, copious, irregularly-scattered sori.

312. *P. (Phym.) Schomburghianum*, Kze. ; *rhizome*  $\frac{1}{2}$ -1 in. thick, densely clothed with spreading lanceolate scales, with a broad scariose border ; *st.* distant, 1-2 in. l., firm, erect ; *fr.* 12-18 in. l., 1 $\frac{1}{2}$ -3 in. br., entire, narrowed at both ends ; *texture* coriaceous ; both *sides* naked, the margin thickened, no distinct main veins ; *areolæ* copious, fine, with free veinlets ; *sori* large, not immersed, in single rows not far from the midrib.—*Hk. Sp. 5. p. 68.*

Hab. Guiana and Amazon Valley.

A\*\*. Under surface matted or furfuraceous. Sp. 313-318.

313. P. (Phym.) *percussum*, Cav. ; *rhizome* wiry, wide-creeping, the scales lanceolate, adpressed, deciduous ; *st.* 2-3 in. l., distant, firm, erect ; *fr.* 6-12 in. l.,  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. br., entire, narrowed gradually towards both ends ; *texture* very coriaceous, rigid ; under *side* with fine scattered scales ; *areolæ* fine, distinct, free veinlets few and short ; *sori* round, distinctly immersed, forming a row midway between the midrib and edge.—*Hk. Sp. 5. p. 56. Fil. Ex. t. 59.*

Hab. Columbia to Peru and Brazil.

314. P. (Phym.) *lanceolatum*, Linn. ; *rhizome* wiry, wide-creeping, the scales lanceolate, adpressed, bright-ferruginous ; *st.* distant, 1-3 in. l., firm, erect ; *fr.* 3-9 in. l.,  $\frac{1}{4}$ - $\frac{3}{4}$  in. br., narrowed gradually to both ends ; *texture* coriaceous ; both *sides*, especially the under one, more or less thickly coated with fine peltate scales ; *veins* immersed, hidden ; *areolæ* without free veinlets ; *sori* large, uniserial, immersed, often reaching from the midrib to the edge.—P. lepidotum, *Willd. Hk. Sp. 5. p. 56.* Pleopeltis ensifolia, *Hk. Ex. Fl. t. 62.*

Hab. West Indies and Panama to Brazil, Araucania, and Juan Fernandez, Sandwich Isles, Neilgherries, Mascaren Isles, Zambesi-land, Cape Colony, St. Helena, Guinea Coast.—A well-marked plant, with a long list of synonyms. The most remarkable form is *P. polylepsis*, Roem., in which the scales are so dense as to quite cover the under surface.

315. P. (Phym.) *linearifolium*, Hk. ; *rhizome* wide-creeping, densely clothed with second fibrillose ferruginous scales ; *fr.* sessile, 3-4 in. l., 1-1 $\frac{1}{2}$  lin. br., blunt, ligulate, entire ; *texture* subcoriaceous ; upper *surface* slightly, lower densely coated with loose woolly tomentum ; *areolæ* in 2 irregular rows, without main veins ; *sori* in a single row on each side of the midrib.—*Hk. Sp. 5. p. 53. 2nd Cent. t. 58.*

Hab. Tsus-Sima, *Wilford*, 862 ; Formosa, *Oldham*, 54 ; Peel Island, Korea, *Oldham*, 1048.

316. P. (Phym.) *glabrum*, Mett. ; *rhizome* woody, wide-creeping, the scales linear, bright-ferruginous ; *st.*  $\frac{1}{2}$ -1 in. l., firm, wiry ; *fr.* nearly uniform, 4-6 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., ligulate, entire, the point bluntish, the base narrowed gradually ; *texture* very coriaceous ; under *surface* coated with thin dirty-white tomentum ; *veins* hidden ; *sori* marginal, confined to the upper part of the frond, soon confluent so as to form a ridge on both sides extending from the midrib to the edge.—P. rupestre, *Hk. Sp. 5. p. 46. (in part).* P. acrostichoides, *Sieb. (non Forst.).*

Hab. East Australia, Norfolk Island, Lord Howe's Island, New Caledonia.—Very near the next species, but smaller in size, and the sori more confluent.

317. P. (Phym.) *angustatum*, Sw. ; *rhizome* stout, wide-creeping, clothed with whitish, linear, deciduous scales ; *st.* 2-4 in. l., strong, erect ; *fr.* 6-12 in. l.,  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. br., ligulate, entire ; *texture* very coriaceous ; upper *surface* naked, lower clothed with adpressed cottony subferruginous tomentum ; *veins* hidden ; *sori* large, prominent, in rows near the edge of the contracted upper part, and sometimes confluent.—*Hk. Sp. 5. p. 44. G. F. t. 20.* Niphopsis, *J. Sm.*

Hab. North India to Tahiti and N. S. Wales.

318. P. (Phym.) *samarense*, Mett. ; *rhizome* firm, wide-creeping, clothed with deciduous spreading white linear scales ; *st.* 1-4 in. l., firm, erect ; *fr.* 1-2 ft. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., quite entire ; *texture* coriaceous ; upper *surface* naked, lower densely coated with dirty-white or greyish-ferruginous tomentum ; *veins* hidden ; upper half of the *frond* contracted, the dense thick *sori* quite confluent, and occupying the whole surface.—*Mett. Polyp. p. 123.*



Hab. Samar, Philippines, *Cuming*, 323 (in part).—This and the three preceding agree with *Nipholobolus* in the coating of the under surface, but with *Phymatodes* in venation.

B. Substance thinner, and veins distinct. Sp. 319-329.

319. P. (Phym.) *Swartzii*, Baker; *rhizome* wide-creeping, slender, the scales linear, ferruginous; *st.*  $\frac{1}{2}$ -1 in. l., slender, naked; *fr.* nearly or quite uniform, 2-4 in. l.,  $\frac{1}{8}$ -1 in. br., narrowed gradually towards both ends, the edge entire or slightly lobed; *texture* subcoriaceous; both *sides* naked; *areolæ* fine, copious, irregular; *sori* uniserial on free veinlets.—P. *serpens*, *Sw.* *Hk. Sp. 5. p. 35.* (*non Forst.*). *Anapeltis*, *J. Sm.*

Hab. West Indies and Cayenne.—*P. runcinatum*, *Desv.*, is the sinuato-crenate form.

320. P. (Phym.) *zosteræforme*, Wall.; *rhizome* wide-creeping, slender, scaleless; *st.*  $\frac{1}{2}$ -1 in. l., very slender; *fr.* 4-6 in. l., 2 lin. br., the edge entire, the base narrowed gradually; *texture* herbaceous; *colour* dark-green, both sides naked; *veinlets* distinct, no main veins; *areolæ* in 2-3 irregular rows with no free veinlets; *sori* distant in rows close to the midrib.—*Hk. Sp. 5. p. 64.*

Hab. Tenasserim, *Wallich*, 280; Moulmein, *Parish*, 191.

321. P. (Phym.) *stigmaticum*, Presl; *rhizome* slender, wide-creeping, fibrillose; *fr.* subsessile, uniform, 4-5 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., entire, narrowed gradually towards both ends; *texture* subcoriaceous; both *sides* naked; main veins not reaching to the edge; *areolæ* fine, copious, with distinct free veinlets; *sori* uniserial, placed on the connected veinlets.—*Hk. Sp. 5. p. 36.* *Anapeltis venosa*, *J. Sm.*

Hab. Columbia.—Very near the next species, but the texture thinner, and free veinlets copious and distinct.

322. P. (Phym.) *lycopodioides*, L.; *rhizome* wide-creeping, firm, the scales lanceolate-subulate, ferruginous; *fr.* distant, dimorphous, short-stalked or sessile, the barren ones 2-4 in. l.,  $\frac{1}{2}$ -1 in. br., entire, often blunt, narrowed gradually at the base, the fertile ones longer and narrower; *texture* coriaceous; both *sides* naked; *areolæ* in several rows, that containing the uniserial *sori* the largest, the free veinlets few and inconspicuous.— $\beta$ , *P. salicifolium*, Willd.; *fr.* narrower, the sterile and fertile ones nearly or quite uniform.—*Hk. Sp. 5. p. 34.*

Hab. Cuba and Mexico to Peru and South Brazil, Sandwich Isles, Java, Angola, Mauritius, Natal, Guinea Coast.—More rigid and coriaceous in texture than the rest of the group, but the veinlets raised and usually quite distinct.

323. P. (Phym.) *fusco-punctatum*, Hk.; *rhizome* woody, wide-creeping, the scales ovate, bright-brown; *fr.* subsessile, 6-9 in. l., the point acute, the base narrowed very gradually, the edge entire; *texture* subcoriaceous; both *sides* naked, with abundant fine dark-brown points; *areolæ* very distinct, with no main veins and a few included veinlets; *sori* large, uniserial, medial.—*Hk. Sp. 5. p. 69. t. 235. A.*

Hab. Chimborazo, *Spruce*, 5734.

324. P. (Phym.) *Mackenzii*, Baker; *rhizome* epigæous,  $\frac{1}{4}$  in. thick, very wide-creeping, the scales lanceolate-acuminate, pale reddish-brown; *fr.* distant, nearly sessile, 4-5 in. l.,  $\frac{5}{8}$ - $\frac{3}{4}$  in. br., the point subacute, the edge entire, the base narrowed rather suddenly; *texture* subcoriaceous; both *sides* quite naked; *areolæ* in one large central row which contains the *sori*, and one of smaller ones on each side, with free veinlets; *sori* round, in a single row rather nearer the midrib than the edge.

Hab. Natal, *McKen*, 22.—Closely allied to the two following species, but firmer in texture, with a stouter rhizome, and the venation not nearly so complicated.

325. P. (Phym.) *Lindbergii*, Mett.; *rhizome* epigæous, very wide-creeping, the scales lanceolate, adpressed, bright-brown; *fr.* distant, quite sessile, 6-8 in. l., 1-1½ in. br., narrowed gradually to both ends, the edge entire; *texture* thinly herbaceous; *colour* bright-green; both *sides* finely pubescent; main *veins* distinct about halfway to the edge, only the outer areolæ with free veinlets; *sori* round, in a single row nearer the midrib than the margin.

Hab. Brazil, *Lindberg*, 576.—Nearest the next, but the fronds quite sessile, and the sori smaller and round.

326. P. (Phym.) *persicariæfolium*, Schrad.; *rhizome* epigæous, very wide-creeping, the scales linear-subulate, bright-brown; *fr.* distant, 5-8 in. l., 1-2 in. br., the edge entire, the point acute, the lower part narrowed gradually into a short stem; *texture* subcoriaceous; both *sides* naked; main *veins* distinct half-way to the edge, with fine areolæ between them, only the outer ones with free veinlets; *sori* large, oblong, oblique, forming a single row on each side nearer the midrib than the edge.—*Hk. Sp. 5. p. 55.* Microgramme, *Presl.*

Hab. West Indies to Brazil and Ecuador.

327. P. (Phym.) *normale*, Don; *rhizome* woody, scandent, clothed with deciduous black fibrillose scales; *st.* 1-3 in. l., stramineous; *fr.* 1-2 ft. l., 1-2 in. br., entire, narrowed gradually to both ends; *texture* subcoriaceous; both *sides* naked; no distinct main veins, but the fine veinlets slightly raised, forming copious irregular areolæ with free included veinlets; *sori* large, prominent, not immersed, in a row not far from the midrib.—β, *P. longifrons*, Wall.; *fr.* 2-3 ft. l.; *sori* copious, scattered irregularly.—*Hk. & Gr. t. 65. Hk. Sp. 5. p. 70.*

Hab. N. India (up to 6,000 ft.), Malaya, S. China, Natal, and Caffraria.—Not always easy to distinguish from the large forms of *P. lineare*.

328. P. (Phym.) *myriocarpum*, Mett.; *rhizome* firm; *st.* very short; *fr.* 2-3 ft. l., 2-4 in. br., the apex acuminate, the base narrowed very gradually, the edge entire; *texture* papyraceous; both *sides* naked; distinct costal *areolæ* reaching two-thirds of the space to the edge, and beyond these a small distinct row, including copious fine areolæ with free veinlets; *sori* very copious, minute, scattered irregularly.—*Hk. Sp. 5. p. 68.*

Hab. Philippines, Borneo, and Cochin-China.

329. P. (Phym.) *linguæforme*, Mett.; *rhizome* stout, short-creeping; *fr.* quite sessile, 8-18 in. l., 2½-3 in. br., tongue-shaped, narrowed from the centre to three-quarters of the way down, and then dilated again to the broadly-rounded base, the edge entire; *texture* papyraceous; both *sides* naked; *veins* very distinctly raised, the main ones irregular, the areolæ subquadrangular, with a single distinctly immersed sorus on free or joined veinlets in the centre of each.—*Mett. Fil. Ind. p. 225.*

Hab. Amboyna, *P. B. Webb*; Solomon Isles, *J. G. Veitch*.—Well marked by the peculiar shape of the frond and very distinct venation.

†† *Main veins distinct nearly or quite to the edge. Pleuridium, Fée, J. Sm. Sp. 330-344.*

330. P. (Phym.) *lancoala*, Mett.; *rhizome* wide-creeping, the scales dense, ovate-acute, bright-ferruginous; *st.* 1 in. l.; *fr.* 3-5 in. l., ¼-½ in. br., the apex acuminate, the edge entire, revolute, the base shortly narrowed; *texture* coriaceous; main *veins* distinct to the edge, with copious fine areolæ with free veinlets; *sori* in a single row near the midrib.—*Mett. Fil. Nov. Cal. p. 78.*

Hab. New Caledonia, *Vieillard*, 1595.



331. P. (Phym.) *rhynchophyllum*, Hk.; *rhizome* firm, wide-creeping, with copious fibrillose bright-ferruginous scales; *fr.* dimorphous, the barren ones ovate, 1-1½ in. l., with stems about the same length, fertile ones 3-6 in. l., ½-¾ in. br., narrowed very gradually upwards, the edge obscurely toothed, the stem 2-4 in. l.; *texture* coriaceous; both *sides* naked; main *veins* distinct to the edge, with copious fine areolæ between them with free included veinlets; *sori* uniserial, confined to the upper half of the fertile fronds.—*Hk. Sp. 5. p. 65. 2nd Cent. t. 55.*

Hab. N. India (up to 4,000 ft.), and Moulmein (7,000 ft.).

332. P. (Phym.) *Griffithianum*, Hk.; *rhizome* wide-creeping, the scales dense, linear, squarrose, dull-brown; *st.* distant, 3-6 in. l., firm, erect; *fr.* 6-8 in. l., 1½-2 in. br., the point acute, the edge repand, the base rounded or rather narrowed or auricled; *texture* coriaceous; main *veins* very distinct to the edge; *areolæ* fine, hidden, with copious free veinlets; *sori* large, 1 between each main vein in a row near the midrib.—*Hk. Sp. 5. p. 62. 2nd Cent. t. 51.*

Hab. N. India, up to 7,000 ft.

333. P. (Phym.) *Melleri*, Baker; *st.* slender, naked, 1 in. or more l.; *fr.* 2-3 in. l., ½ in. br., lanceolate, narrowed gradually from near the base to the point, the edge thickened, repand and wavy, the base rounded; *texture* subcoriaceous; *surfaces* naked; main *veins* wavy, distinct to the edge, with copious fine areolæ with free veinlets between them, and one *sorus* between each midway between the edge and midrib.

Hab. Madagascar, *Dr. Meller.*

334. P. (Phym.) *triquetrum*, Bl.; *rhizome* stout, woody, the scales dense, ovate, blunt, 1 lin. br., almost scariose; *st.* distant, 4-8 in. l., firm, erect; *barren fr.* 6-9 in. l., 2-3 in. br., the apex acuminate, the edge entire, the fertile one rather longer and narrower; *texture* very coriaceous; both *sides* naked; main *veins* very distinct to the edge, the areolæ hidden; *sori* in two close rows between the main veins, 5-8 between the midrib and edge, not immersed.—*Hk. Sp. 5. p. 63.*

Hab. Java.

335. P. (Phym.) *rupestre*, Blume (not R. Br.); *rhizome* woody, the scales squarrose, dull-brown, linear-acuminate; *st.* 4-8 in. l., firm, erect; *fr.* 4-8 in. l., 1-1½ in. br., the apex acuminate, the edge entire or obscurely repand; *texture* very coriaceous; both *sides* naked; main *veins* very distinct, the areolæ hidden; *sori* in two rows between the main veins, 6-8 between the midrib and edge, not immersed.—*P. saxatile, Mett. Hk. Sp. 5. p. 64.*

Hab. Java and Philippines.—Very near the preceding.

336. P. (Phym.) *ovatum*, Wall.; *rhizome* wide-creeping, woody, the scales lanceolate, dull-brown, deciduous; *st.* 4-8 in. l., firm, erect, slightly scaly below; *fr.* 6-12 in. l., 2-3 in. br., the point acute, the edge entire, the lower part narrowed rather suddenly; *texture* firm-herbaceous; both *sides* naked; main *veins* distinct to the edge, with copious fine areolæ with free included veinlets in the interspaces; *sori* large, varying from irregularly 1 to 3 serial.—*Hk. Sp. 5. p. 64. Hk. & Gr. p. 41.*

Hab. Khasia, Sikhim, and Bhootau, up to 7,000 ft.

337. P. (Phym.) *platyphyllum*, Sw.; *rhizome* woody, the scales dense, long, subulate, nearly black; *st.* 3-4 in. l., strong, erect; *fr.* 12-18 in. l., 2-4 in. br., the point acute, the edge entire; *texture* very thick and rigid; both *sides* naked;

main veins very distinct, the areolæ hidden; upper surface with close small dirty-white dots; sori much immersed, in single rows between the main veins, 8-9 between the midrib and edge.—*P. crassinervium*, Blume. *Hk. Sp. 5. p. 63.*

Hab. Java.

338. *P. (Phym.) crassifolium*, L.; rhizome woody, short-creeping, the scales ovate-acuminate, dull-brown; st. 2-6 in. l., strong, erect; fr. 1-3 ft. l., 1-5 in. br., narrowed gradually to both ends, the edge entire; texture very coriaceous, the upper side with scattered small white dots; main veins very distinct, the intervening areolæ hidden; sori in single rows between the main veins, 2-9 in a row between the midrib and edge.—*Hk. Sp. 5. p. 62.*

Hab. West Indies and Mexico to Brazil and Peru, common.—Very variable in the breadth of the frond and compactness of the sori. *P. anocarpum* (Kze.) and *P. vittaria* (Mett.) are not more than  $\frac{1}{2}$ -1 in. br., with the sori in 2 to 4 rows; *P. albo-punctatissimum*, J. Sm., is a glaucous much-dotted form, with less distinctly-raised veins than usual.

339. *P. (Phym.) membranaceum*, Don; rhizome stout, the scales ovate, spreading, membranous, lurid-green; st. 1-4 in. l., firm, erect; fr. 1-3 ft. l., 2-6 in. br., the edge entire or repand, both ends narrowed gradually; texture very thin, membranous; main veins distinct, with very copious fine areolæ with free veinlets between them; sori mostly in two rather irregular rows near the main veins.— $\beta$ , *P. grandifolium*, Wall.; fr. larger; sori more copious and scattered irregularly.—*Hk. Sp. 5. p. 70.*

Hab. N. India (up to 5-6,000 ft.) to Ceylon, common.

340. *P. (Phym.) heterocarpum*, Blume (non Mett.); rhizome firm, wide-creeping, the scales squarrose, linear, dull-brown; st. 3-4 in. l., firm, erect; fr. 1-2 ft. l.,  $1\frac{1}{2}$ -3 in. br., entire, narrowed to both ends very gradually; texture firm; both sides naked; main veins distinct to the edge; areolæ copious, with free veinlets; sori in rows of 4 to 6 near the main veins.—*P. Zollingerianum*, Kze.— $\beta$ , *P. Zippellii*, Blume; sori smaller, scattered irregularly.—*Hk. Sp. 5. p. 72.*

Hab. N. India, Ceylon, Java, Borneo, Philippines.—Like the last in habit, but firmer in texture, and the two forms of each corresponding to one another.

341. *P. (Phym.) irioides*, Lam.; rhizome stout, the scales dark-brown, ovate, obtuse; fr. sessile or subsessile, 1-3 ft. l., 1-3 in. br., narrowed gradually to both ends, the edge entire; texture subcoriaceous; both sides naked; main veins fine, but distinct to the edge, connected by cross veinlets larger than the others, with copious fine areolæ in the interspaces, including free veinlets; sori very small and copious, scattered irregularly.—*Hk. Sp. 5. p. 67. Fil. Ex. t. 4. Microsorium, Link.*

Hab. N. India and Chusan to Fiji, Isle of Pines, and N. S. Wales, Mascaren Isles, Zambesi-land, Natal, Angola, Guinea Coast.

342. *P. (Phym.) musciformis*, Blume; rhizome woody, the scales ovate, dull-brown; fr. 1-3 ft. l., 3-4 in. br., the point acute or bluntish, the lower part broadly winged to the very base; texture coriaceous; both sides naked; main veins very distinct, connected by distinct arched veinlets, with copious fine areolæ with free veinlets in the interspaces; sori small, very numerous, sometimes covering nearly the whole surface.—*Hk. Sp. 5. p. 68.*

Hab. Malay Isles.—Very near the last, but the veins more distinct.

343. *P. (Phym.) hemionitideum*, Wall.; rhizome woody, hypogæous; st. 1-6 in. l., firm, erect; fr. 9-18 in. l., 2-3 in. br., narrowed to both ends, the edge



entire; *texture* subcoriaceous; both *sides* naked; *veins* very distinct, the main ones branching and becoming lost before they quite reach the edge, including irregular rather large areolæ with a few free veinlets; *sori* in a very irregular row between each main vein, often confluent.—*Hk. Sp. 5. p. 73.* Colysis, *Presl.*

Hab. N. India (up to 6,000 ft.) and Neilgherries.

344. P. (Phym.) *ensatum*, Thunb.; *rhizome* firm, wide-creeping, the scales lanceolate, spreading, dull-brown; *st.* 6-12 in. l., erect, scaly below; *fr.* 6-18 in. l., 1½-3 in. br., narrowed to both ends; *texture* subcoriaceous; both *sides* naked; main *veins* distinct nearly to the edge, the areolæ fine, close, copious and free veinlets abundant; *sori* irregularly uniserial between the main veins, few, but often confluent.—*Hk. Sp. 5. p. 72.*

Hab. Japan and Tsus-Sima.

\*\* *Fronde* variously lobed but not regularly pinnatifid or pinnate. Sp. 345-353.

† *Fronde* not in two halves. Sp. 345-350.

345. P. (Phym.) *crispatum*, Hk.; *st.* tufted, slender, 1-2 in. l., clothed with soft spreading hairs; *fr.* pendent, 6-18 in. l., ½-¾ in. br., ligulate, nearly entire or bluntly lobed a quarter or even halfway down to the midrib; *texture* subcoriaceous; both *sides* thinly clothed with soft hairs; *veins* in pinnated groups, the veinlets forked and uniting with those of the next group; *sori* dorsal, 2-6 to each lobe, small, quite immersed.—*Hk. Sp. 5. p. 1.* Glyphotænum, *J. Sm.*

Hab. Panama, *Seemann*, 995.—Differs from *Phymatodes* by its regular pinnated veins, and from *Goniophlebium* by being without free veins, and by its dorsal sori.

346. P. (Phym.) *Labrusca*, Hk.; *caud.* woody, the scales large, linear, dark-brown; *st.* 4-8 in. l., firm, erect, scaly below; *fr.* 3-4 in. l., 2½-3 in. br., cordate-ovate, with a deep basal sinus, the edge sinuated; *texture* coriaceous; both *sides* naked; main *veins* distinct to the edge; *areolæ* fine, copious, distinct; *sori* small, copious, scattered irregularly.—*Hk. Sp. 5. p. 73. t. 285. B.*

Hab. Borneo, *Lobb.*—A very distinct species, with fronds like the leaves of *Vitis Labrusca*.

347. P. (Phym.) *bifrons*, Hk.; *rhizome* woody, but rather slender, branched, tortuose, nearly naked; *barren fr.* sessile, 3-4 in. l., 1 in. br., elliptical, narrowed at both ends, with blunt lobes, which reach nearly halfway down; *fertile fr.* 4-6 in. l., 2-4 lin. br., short-stalked, entire; *texture* papyraceous; both *sides* naked; a midrib to each lobe, with copious areolæ between, with free veinlets; *sori* large, oblong, placed end to end in a row on each side close to the midrib.—*Hk. Sp. 5. p. 73. Fil. Ex. t. 52.*

Hab. Ecuador, *Jameson*, 789.

348. P. (Phym.) *Spectrum*, Kaulf.; *rhizome* woody, wide-creeping, the scales black, subulate, deciduous; *st.* distant, 3-4 in. l., firm, erect, naked; *fr.* 6-9 in. each way, cordate-hastate, the apex acuminate, the lateral lobes rounded or acute, the basal lobes deep, sometimes imbricated, the edge not toothed; *texture* firm; both *sides* naked; *areolæ* fine, with copious free veinlets; *sori* small, copious, scattered irregularly.—*Hk. Sp. 5. p. 74.* Colysis, *J. Sm.*

Hab. Sandwich Isles and Sumatra.

349. P. (Phym.) *hastatum*, Thunb.; *rhizome* firm, the scales linear, spreading, bright-ferruginous; *st.* 2-4 in. l., firm, erect, glossy; *fr.* 4-6 in. l., simple, lanceolate, ½-1½ in. br., or 3-lobed, with the lateral lobes like the terminal one

but smaller; *texture* coriaceous; both *sides* naked; main *veins* distinct to the edge, parallel, with copious fine areolæ between them, with free included veinlets; *sori* in a single row, nearer the midrib than the edge.—*Hk. Sp. 5. p. 74.*

Hab. Japan to Formosa.

350. P. (Phym.) *pteropus*, Blume; *rhizome* wide-creeping, hypogæous, the emergent portions clothed with blackish lanceolate-subulate scales; *st.* 4-6 in. l., sometimes scaly; *fr.* varying from oblong-lanceolate entire to ternate or pinnatifid, with a large terminal lobe 4-9 in. l., 1-2 in. br., and 2 smaller ones on each side; *texture* thin but firm; *colour* dark-green; both *sides* naked; *areolæ* fine, copious, the main veins not distinct to the edge; *sori* small, scattered.—*P. tridactylon, Wall. Hk. Sp. 5. p. 75.*

Hab. N. India to Ceylon, Malaccas, Philippines, Hong-Kong, Formosa.—Often grows under water.

†† *Dipteris, Reinw. Fronds flabellate, in two halves, which are deeply lobed from the circumference in the direction of the base. Sp. 351-353.*

351. P. (Dipt.) *Dipteris*, Blume; *st.* strong, 3-5 ft. l.; *fr.* 1-3 ft. l., and much broader, the main lobes reaching three-quarters of the way down, the edges sharply toothed; *texture* subcoriaceous; upper *surface* dark-green, lower very glaucous; main *veins* very prominent, dichotomously forked; *areolæ* copious; *sori* very minute, scattered irregularly, especially plentiful near the main veins, confluent, not gummy.—*P. Horsfieldii, R. Br. Hk. Sp. 5. p. 99. P. conjugatum, Kaulf. (not Lam.).*

Hab. Malaccas and Polynesian Islands, as far east as Fiji.—This and the next are very distinct in habit from the rest of the genus.

352. P. (Dipt.) *Wallichii, R. Br.*; *st.* strong, 2-3 ft. l.; *fr.* 1-3 ft. l. and much broader, the main lobes reaching three-quarters of the way down, the edges not toothed, the ultimate lobes acuminate; *texture* coriaceous; upper *surface* dark-green, lower dirty-white or subferruginous; main *veins* very prominent, dichotomously forked; *areolæ* copious; *sori* small, generally in distinct rows, not confluent but distributed equally over the surface, often gummy.—*Hk. Sp. 5. p. 99.*

Hab. N. India, subtropical region.

353. P. (Dipt.) *Lobbianum, Hk.*; *st.* 1 ft. or more l.; *fr.* 1 ft. l. and as broad, the main lobes reaching down to the base, 3 or 4 times dichotomously forked, the ultimate ones linear acuminate, entire; *texture* coriaceous; *midrib* only prominent; *areolæ* principally in one large costal series with 1 sorus in each.—*Hk. Sp. 5. p. 100.*

Hab. Mount Ophir, Malayan Peninsula and Sarawak, Borneo, *T. Lobb.*—A very distinct plant, differing from the preceding by its very deep narrow lobes and few solitary sori.

\*\*\* *Fronds deeply pinnatifid. Sp. 354-383.*

† *Fronds uniform, or the barren ones not drynarioid. Sp. 354-372.*

354. P. (Phym.) *leucosporum, Klotzsch*; *rhizome* woody, wide-creeping, the scales lanceolate, black in the centre, with a scariose border; *st.* 2-3 in. l., firm, erect, furfuraceous; *fr.* 4-8 in. l., 2-3 in. br., the upper part bluntly sinuated, the lower cut more than halfway down into blunt lobes  $\frac{1}{4}$ - $\frac{3}{8}$  in. br.; *texture* coriaceous; upper *surface* slightly, lower densely coated with minute furfuraceous scales; *veins* hidden; *sori* large, prominent, uniserial.—*Hk. Sp. 5. p. 76.*

Hab. Columbia.—Habit and scales of *Lepicystis* and *P. lanceolatum*.



355. P. (Phym.) *trifidum*, Don; *rhizome* stout, the scales linear, squarrose, bright-ferruginous; *st.* 3-6 in. l., firm, erect, glossy; *fr.* 6-12 in. l., 6-8 in. br., with a large linear terminal lobe and 1-5 similar ones on each side, which reach down within  $\frac{1}{4}$  in. of the rachis and are 4-6 in. l.,  $\frac{1}{2}$ - $1\frac{1}{4}$  in. br., narrowed to the point, the edge entire or obscurely repand; *texture* coriaceous; both *sides* naked; main *veins* distinct to the edge, with transverse veinlets and copious fine areolæ between them; *sori* uniserial and 1 only between each main vein.—P. oxylobum, Wall. Hk. Sp. 5. p. 77.

Hab. N. India (up to 7,000 ft.) to Ceylon.

356. P. (Phym.) *malacodon*, Hk.; *rhizome* rather slender, the scales lanceolate-acuminate, brown or nearly black; *st.* 4-6 in. l., slender, glossy; *fr.* 6-15 in. l., 5-6 in. br., with a linear or linear-oblong subentire or repand and finely-toothed acuminate terminal lobe 3-4 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., and 1-4 smaller lateral ones on each side, which are more or less confluent at the base; *texture* papyraceous or subcoriaceous; both *sides* naked; main *veins* fine but distinct, the areolæ fine and clearly visible, with copious free veinlets; *sori* in a single row on each side, nearer the midrib than the edge.—Hk. Sp. 5. p. 87. P. cyrtoloba, J. Sm.

Hab. N. India, up to 12-13,000 ft.—Very near the last, but thinner in texture, the pinnæ deeper, and often finely toothed.

357. P. (Phym.) *incurvatum*, Blume; *rhizome* woody, the scales adpressed; *fr.* dimorphous, the barren ones 6-9 in. each way, deltoid, ternate or pinnatifid, with broad lanceolate-acuminate entire lobes, the stem firm, glossy, 6-9 in. l.; *fertile fr.* larger, cut down nearly or below quite to the rachis into erecto-patent entire distant lobes 4-8 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., the lowest sometimes forked, the st.  $1\frac{1}{2}$ -2 ft. l.; *texture* very coriaceous; both *sides* naked; main *veins* distinct to the edge; the uniserial *sori* quite immersed, and forming prominent papillæ on the upper surface.—Hk. Sp. 5. p. 77.

Hab. Malaccas.—Well distinguished by its very coriaceous usually ternate barren frond, with deltoid lobes.

358. P. (Phym.) *angustum*, Mett.; *rhizome* firm, the scales brown, linear, crisped; *st.* 2-5 in. l., firm, erect; *fr.* 6-9 in. each way, with a linear terminal lobe 4-6 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., and several similar erecto-patent lobes on each side, which reach down nearly or quite to the rachis and are dilated at the base; *texture* coriaceous; *under surface* furfuraceous, with minute scattered peltate scales; *veins* obscure; *sori* prominent, in a row on each side the midrib.—Hk. Sp. 5. p. 76.

Hab. Mexico, Guatemala, W. Indies, S. Brazil.—The original *Pleopeltis* of Humboldt. The typical plant is sometimes subdigitate; *P. sectifrons*, Kze. (*Drynaria elastica*, Fée), is a more fully pinnate form than usual; and *D. stenoloma*, Fée, a form with the lobes only  $\frac{1}{2}$  in. br.

359. P. (Phym.) *insigne*, Blume; *rhizome* slender, the scales linear, dull-brown; *st.* 2-4 in. l., slender, erect, naked; *fr.* 6-9 in. l., 4-6 in. br., with an entire lanceolate-acuminate terminal lobe 2-3 in. l.,  $\frac{1}{2}$  in. or more br., and 2-4 similar ones on each side, which reach down within  $\frac{1}{8}$  in. of the rachis and below them a long narrow decurrent wing to the stem; *texture* firm-herbaceous; both *sides* naked; *veins* fine, irregular, with free veinlets; *sori* small, scattered irregularly.—Hk. Sp. 5. p. 78.

Hab. Java, Philippines, and Malacca.

360. P. (Phym.) *pustulatum*, Forst.; *rhizome* woody, copiously branched, wide-scandent, the scales linear, dark-brown, squarrose; *st.* 1-3 in. l.; *fr.*





Hab. Samoa, *Powell*, 135.—Lobes narrower and more numerous than in *P. nigrescens*, the veins different, and sori not immersed.

366. *P.* (Phym.) *dilatatum*, Wall.; *rhizome* thick, woody, the scales large, ovate, dull-brown; *st.* 1 ft. or more l., with a narrow decurrent wing reaching nearly down to the base; *fr.* 1½-3 ft. l., 1 ft. or more br., cut down within ¼-1 in. of the rachis into acuminate entire erecto-patent lobes 4-8 in. l., ½-1½ in. br.; *texture* papyraceous; both *sides* naked; main *veins* fine, wavy, falling rather short of the edge, with copious fine areolæ with free veinlets; *sori* small, copious, scattered irregularly, often confluent.—*Hk. Sp.* 5. p. 85.

Hab. N. India (up to 6,000 ft.), Malaccas, Samoa.—Habit of the two preceding, but the sori minute and scattered irregularly.

367. *P.* (Phym.) *laciniatum*, Blume; *rhizome* wide-creeping, the scales lanceolate, ciliated, bright-ferruginous; *st.* 6-12 in. l., firm, erect, glossy; *fr.* 12-18 in. l., 1 ft. or more br., cut down throughout to a narrowly-winged rachis into lobes 6-9 in. l., ½-⅝ in. br., the point much acuminate, the edge slightly undulated, the lower ones deflexed; *texture* subcoriaceous; both *sides* naked; main *veins* distinct to the edge; *areolæ* fine, with copious free veinlets; *sori* uniserial, immersed.—*Hk. Sp.* 5. p. 87.

Hab. Java.—*P. violascens*, Mett., is said to differ by its broader entire scales, coriaceous texture, immersed veins, and sori sunk in a deep pit.

368. *P.* (Phym.) *alatum*, Hk.; *rhizome* woody, scaleless; *st.* 12-18 in. l., firm, erect; *fr.* 1½-2 ft. l., 10-12 in. br., cut down nearly to the rachis below, within ½ in. above, into numerous erecto-patent repand linear-oblong acuminate lobes 6-8 in. l., 1 in. or more br.; *texture* papyraceo-herbaceous; both *sides* naked; main *veins* distinct to the edge, with copious fine areolæ with free veinlets; *sori* rather small, in rows of 3-4 near the main veins.—*Hk. Sp.* 5. p. 85.

Hab. Fiji, *Brackenridge*, *Seemann*.—Very like *dilatatum* in habit and texture, but the main veins straight, and the sori, though small, in 2 regular rows near them.

369. *P.* (Phym.) *glaucum*, Kze.; *rhizome* stout, the scales long, dense, fibrillose, dark glossy-brown; *st.* 6-12 in. l., firm, erect, glossy; *fr.* 12-18 in. l., 6-8 in. br., cut down throughout to a broadly-winged rachis into erecto-patent entire acuminate lobes 4-5 in. l., ½-⅝ in. br.; *texture* very coriaceous; both *sides* naked; no distinct main *veins* and areolæ quite hidden; *sori* forming single rows close to the midrib.—*Hk. Sp.* 5. p. 88.

Hab. Philippines.—Resembles some of the forms of *P. aureum* in texture and general habit.

370. *P.* (Phym.) *lomarioides*, Kunze; *rhizome* forming a thick wide-spreading crust, thickly clothed with small peltate scales, ferruginous in the centre, with a broad scariose border; *st.* 2-4 in. l., firm, erect; *fr.* 12-18 in. l., 4-6 in. br., the barren one cut down within ⅛-¼ in. of the rachis into close horizontal oblong entire blunt lobes ¾ in. br.; the fertile one cut nearly to the rachis throughout, with more numerous lobes, ¼-⅓ in. br.; *texture* coriaceous; *surfaces* naked; *veins* immersed, irregular; *areolæ* fine, with copious free veinlets; *sori* completely immersed, round or oblong, forming two close rows near the midrib.—*Hk. Sp.* 5. p. 79.

Hab. Java, Borneo, Philippines.—*Lecanopteris carnosus*, Blume, appears to be an abnormal form of this, with the lobes intermediate in character between those of the typical barren and fertile frond, with large sori in very distinct marginal pits. Agrees with *P. sinuosum* in its very peculiar rhizome, the barren frond having quite the habit of a pinnatifid *Lomaria*.

371. *P.* (Phym.) *ebcnipes*, Hk.; *rhizome* stout, wide-creeping, the scales large,

lanceolate, glossy, nearly black; *st.* 6-9 in. l., naked, glossy; *fr.* 6-18 in. l., 8-12 in. br., cut down to a broadly-winged rachis into nearly entire acuminate lobes 4-6 in. l.,  $\frac{3}{8}$ -1 in. br., the lowest pair deflexed; main *veins* distinct to the edge; *areolæ* fine, with copious free veinlets; *sori* in single rows near the midrib.—*Hk. Sp. 5. p. 88.*

Hab. N. India, up to 10,000 ft.—Resembles *P. trifidum*, but the pinnæ reach down deeper, and the main veins are closer and more distinct.

372. *P. (Phym.) longissimum*, Blume; *rhizome* wide-creeping, the scales large, ovate, brown, adpressed; *st.* 12-18 in. l., firm, glossy; *fr.* 1-4 ft. l., 6-12 in. br., cut down very nearly to the rachis into numerous erecto-patent acuminate linear subentire lobes 4-8 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br.; *texture* coriaceous; both *sides* naked; *veins* forming large distinct costular areolæ and beyond them smaller irregular ones, both with free veinlets; *sori* in close single rows near the midrib, forming distinct papillæ on the upper surface.—*Hk. Sp. 5. p. 89.*

Hab. N. India, Neilgherries, Malaccas, Philippines, Formosa.—M. Deplanche sends from New Caledonia a plant that agrees with this, except that the *sori* are submarginal.

†† *Drynaria, Bory.* *Fronde* with either a separate sterile frond or the base of the ordinary one pinnatifid like a sessile oak-leaf, brownish in colour and rigid in texture. *Sp. 373-383.*

#### A. Sterile frond not separate. *Sp. 373-375.*

373. *P. (Dryn.) Heracleum*, Kze.; *rhizome* stout, the scales long, silky, fibrillose, bright-brown; *fr.* 3-6 ft. l., 2 ft. or more br., the base with a cordate lobed wing 3-4 in. br., the upper part cut down to a broadly-winged rachis into entire acute lobes, which are often 12-18 in. l., 3-4 in. br.; *texture* rigid; both *sides* naked; main *veins* distinct to the edge, with 6-8 irregular quadrangular areolæ between the midrib and edge enclosing smaller ones with copious free veinlets; *sori* small, copious, scattered, slightly immersed.—*Hk. Sp. 5. p. 93. G. F. t. 1.*

Hab. Java and Philippines.

374. *P. (Dryn.) Meyenianum*, Schott.; *rhizome* very stout, the scales  $\frac{1}{2}$  in. l., linear, crisped, bright-ferruginous; *fr.* 2-3 ft. l., 8-12 in. br., the lower part cut down nearly to the rachis into erecto-patent linear-oblong blunt entire lobes 3-6 in. l.,  $\frac{1}{2}$ -1 in. br., the upper part pinnate, with numerous close pinnæ 4-8 in. l., which consist only of a firm midrib, with a row of small round lobes on both sides, each with a sorus that covers it; *texture* of the barren lobes coriaceous, the main veins distinct, the copious areolæ with free veinlets.—*Hk. Sp. 5. p. 94. Aglaomorpha, Schott.*

Hab. Philippines.

375. *P. (Dryn.) conjugatum*, Lam.; *rhizome* very thick, densely matted with long linear crisped bright-brown scales; *fr.* arranged in a circle, 2-4 ft. l., 12-18 in. br., the stem with a lobed wing 2-4 in. br. on each side at the base, which is narrowed and more deeply lobed upwards, passing gradually into the frond, which is cut down nearly to the rachis throughout into entire erecto-patent pinnæ 4-8 in. l., 1-1 $\frac{1}{2}$  in. br.; *texture* rigid; both *sides* naked; main *veins* distinct to the edge, the transverse veinlets forming about 6 quadrangular areolæ between the midrib and edge; the *sori* in a single row close to the anterior main vein, sometimes confluent.—*P. coronans, Wall. Hk. Sp. 5. p. 95. Fil. Ex. t. 91.*

Hab. N. India (subtropical region), Moulmein, Hong-Kong, Formosa.



B. *Sterile frond distinct.* Sp. 376-383.

376. P. (Dryn.) *Fortunei*, Kunze; *rhizome* woody, the scales linear, bright ferruginous; *fr.* dimorphous, the barren ones 2-3 in. l., 1-1½ in. br., the upper lobes deltoid-acute, the fertile ones 12-18 in. l., 4-6 in. br., cut down nearly or quite to the rachis into lanceolate or oblong acute or bluntish entire erecto-patent lobes 2-4 in. l., ¾-1 in. br.; *texture* subcoriaceous; main *veins* distinct, 1-2 lin. apart, connected by prominent transverse veinlets, with a few faint ones in the intervals; *sori* in single rows of 3-4 between the main veins.—*Hk. Sp. 5. p. 95.*

Hab. South China, both the coast and interior.

377. P. (Dryn.) *splendens*, Hk.; *rhizome* woody, the scales grey, fibrillose, adpressed; *fr.* sessile, 2-3 ft. l., 1 ft. or more br., the lower part barren, cut down nearly or quite to the rachis into erecto-patent entire acute lobes 4-8 in. l., 1-2 in. br., the upper fertile pinnæ distant, ligulate, 4-8 in. l., ¼-½ in. br.; main *veins* distinct, with distinct transverse veinlets and copious intermediate ones and free veinlets; *sori* oblong or subquadrangular, filling up the whole of the fertile pinnæ except the midrib.—*Hk. Sp. 5. p. 96.* Dryostachyum, J. Sm.

Hab. Philippines and Singapore.—*D. pilosum*, J. Sm., is a form with the fertile pinnæ slightly pubescent.

378. P. (Dryn.) *Willdenovii*, Bory; *rhizome* thick, woody, the scales ½ in. l., linear, crisped, bright ferruginous; *fr.* dimorphous, the barren one 4-6 in. l., 3-4 in. br., the lobes short, rounded, blunt, the fertile one 1½-2 ft. l., 6-10 in. br., the upper lobes 4-5 in. l., ¼-½ in. br., linear, acute, slightly repand, reaching down to the rachis, the lower ones shorter and blunt, with a narrow wing down the stem to the base; *texture* coriaceous; *areolæ* small, copious; *sori* slightly immersed, uniserial.—*Hk. Sp. 5. p. 97.*

Hab. Mauritius and Bourbon.

379. P. (Dryn.) *propinquum*, Wall.; *rhizome* woody, wide-creeping, the scales linear, bright-ferruginous; *fr.* dimorphous, the barren ones 4-9 in. l., 3-4 in. br., cut half or three-quarters of the way down into bluntish or acute lobes, the fertile ones 1½-3 ft. l., often 1 ft. br., with a distinct stem, the lobes 4-6 in. l., ½-¾ in. br., reaching down nearly or quite to the rachis; *texture* subcoriaceous; *areolæ* copious, the free veinlets few and variously directed; *sori* in a row near the midrib, placed at the point of union of several veinlets.—*Hk. Sp. 5. p. 97.* P. Willdenovii, H. G. F. t. 35. (non Bory).

Hab. N. India (up to 7,000 ft.), Java, and the West African islands.—The typical plant has more or less distinctly toothed fertile pinnæ, but in the Javan P. *pleuridioides*, Mett. (P. *Willdenovii*, Blume, not Bory), they are quite entire.

380. P. (Dryn.) *rivale*, Mett. MSS.; *rhizome* stout, the scales dense, linear, bright-ferruginous; *fr.* dimorphous, the barren ones 4-6 in. l., 2 in. br., cut down three-quarters of the way to the rachis into spreading blunt lobes, the fertile ones 1-2 ft. l., 6-8 in. br., with a distinct stem, the blunt entire lobes 2-3 in. l., ½ in. br., reaching down nearly or quite to the rachis; *texture* of the fertile frond papyraceous; main *veins* not more than ⅓ in. apart; *areolæ* fine, with copious free veinlets, all directed towards the edge, the close *sori* terminal on free veinlets in the costal series.

Hab. N. E. Himalayas.—Distinguished from the last by its much thinner texture, and venation like *Goniophlebium*. The veins of the fertile frond are scarcely at all raised, but are very distinct.

381. P. (Dryn.) *quercifolium*, L.; *rhizome* stout, the scales bright-brown,

$\frac{1}{4}$ - $\frac{1}{2}$  in. l., lanceolate-acuminate, the base cordate; *fr.* dimorphous, the barren ones sessile, 3-12 in. l., 2-6 in. br., brown, rigid, bluntly lobed often halfway down, the fertile ones long-stalked, 2-3 ft. l., 1 ft. or more br., cut down nearly to the rachis into entire erecto-patent lobes 6-9 in. l.,  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. br.; *texture* rigid; both *sides* naked; main *veins* distinct to the edge, with 4-6 quadrangular areolæ between them between the midrib and edge, enclosing each two large *sori* and copious lesser areolæ.—*Hk. Sp. 5. p. 96.*

Hab. N. India and S. China to Ceylon, Queensland, and Fiji.

382. P. (Dryn.) *Linnæi*, Bory; *rhizome* stout, the scales 1-2 lin. l., broadly ovate, with a short acumen from a peltate base; *fr.* dimorphous, the barren ones sessile, brown, rigid, bluntly lobed; the fertile ones long-stalked, 2-3 ft. l., 6-12 in. br., cut down nearly to the rachis into entire erecto-patent lanceolate lobes; *texture* rigid; both *sides* naked; main *veins* distinct to the edge, with copious irregular *areolæ* between them, with copious small scattered *sori*.—P. sparsisorum, *Desv.*

Hab. Ceylon and Malaccas to Tropical Australia and Solomon Isles.—Differs from the last by its small scattered *sori*.

383. P. (Dryn.) *rigidulum*, Sw.; *rhizome* stout, wide-creeping, the scales fibrillose, dark glossy-brown; *fr.* dimorphous, the barren one sessile, 6-9 in. l., 3-4 in. br., cut down  $\frac{1}{3}$ - $\frac{1}{2}$  way down to the rachis into blunt lobes, the fertile one 2-4 ft. l., 12-18 in. br., long-stalked, pinnate; *pinnæ* 1 in. or more apart, narrowed or stalked at the base, 6-12 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., the point acuminate, the edge more or less deeply inciso-crenate; *texture* subcoriaceous; *rachis* and both *sides* naked; main *veins* not distinct to the edge; *areolæ* copious, free veinlets few; *sori* immersed in a single row halfway between the edge and midrib.—P. diversifolium, *R. Br. Hk. Sp. 5. p. 98. G. F. t. 5.*

Hab. Malaccas to Queensland and Fiji.

\*\*\*\* *Fronde pinnate.* Sp. 384-389.

384. P. (Phym.) *palmatum*, Blume; *rhizome* stout, the scales large, lanceolate, full-brown; *st.* 6-12 in. l., firm, erect, glossy; *fr.* 6-18 in. l., 3-12 in. br., with a linear or linear-oblong entire or slightly repand terminal lobe, and 1-6 similar ones on each side, which are 4-6 in. l.,  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. br., narrowed or dilated, always slightly adnate at the base, those of the barren *fr.* the broadest; *texture* subcoriaceous; both *sides* naked; main *veins* distinct to the edge, the *areolæ* fine, hidden; *sori* in a single row midway between the edge and midrib.—*Hk. Sp. 5. p. 89.* Pleuridium, *J. Smith.* P. crenulatum, *Mett.*

Hab. Malaccas and Philippines.—P. *angustatum*, Blume (P. *Lindleyanum*, Wall.), and P. *palmatum*, Blume, appear to be varieties of one species, but the latter has only a very few *pinnæ*, which do not reach down to the rachis.

385. P. (Phym.) *juglandifolium*, Don; *rhizome* stout, woody, the scales large, ovate, bright-ferruginous; *st.* 1 ft. or more l., firm, erect, glossy; *fr.* 1 $\frac{1}{2}$ -2 ft. l., 1 ft. or more br.; *pinnæ* in pairs 1-2 in. apart, 4-8 in. l., 1-1 $\frac{1}{2}$  in. br., the apex acuminate, the edge thickened and wavy, the base rounded; *texture* subcoriaceous; both *sides* naked; main *veins* distinct to the edge; *areolæ* copious, hidden, with free veinlets; *sori* large, one between each main vein, forming a row nearer the midrib than the edge.—P. capitellatum, *Wall. Hk. Sp. 5. p. 90.*— $\beta$ , P. *tenuicauda*, *Hk.*; *pinnæ* narrower, very acuminate, narrowed at the base, and the lower ones often a little stalked.—*Hk. l. c.*

Hab. N. India, up to 10,000 ft.—*Pleopeltis Moulmeinensis*, *Beddome*, *Fil. Brit. Ind. t. 205*, is either a form of this or very closely allied.



386. P. (Phym.) *Lehmanni*, Mett.; *rhizome* woody, wide-creeping, the *scales* long, rigid, fibrillose, yellowish-brown; *st.* 6-9 in. l., firm, erect, naked; *fr.* 1-2 ft. l., 8-10 in. br.; *pinnæ* in distant pairs, 4-5 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., the apex acuminate, the edge entire or slightly repand, the base rounded; *texture* subcoriaceous; *rachis* and both *sides* naked; main *veins* distinct to the edge, with two rows of *sori* 3-4 deep between them.—*Mett. Polyp. p.* 117.

Hab. Burmah and Darjeeling, *Griffith*.

387. P. (Phym.) *himalayense*, Hk.; *rhizome* woody, wide-creeping, the *scales* linear, squarrose, bright-brown; *st.* 1 ft. or more l., firm, glossy; *fr.* 1-2 ft. l., 8-12 in. br., the *pinnæ* in pairs 1-2 in. apart, 4-8 in. l.,  $1\frac{1}{2}$ -2 in. br., the point acuminate, the edge scarioso, wavy, the base rounded or even cordate; *texture* subcoriaceous; under *surface* finely pubescent; main *veins* very distinct; *areolæ* fine, close, with copious free veinlets; *sori* in 1-2 rows of 3-4 each between the main veins.—*Hk. Sp. 5. p.* 91. P. venustum, *Wall*.

Hab. N. India, up to 7,500 ft.—*Mettenius* unites this with *P. juglandifolium*, but the *pinnæ* are much broader, with prominent veins and a distinct scarioso wavy edge.

388. P. (Phym.) *leiorhizon*, *Wall.*; *rhizome* very thick, clothed with ovate adpressed peltate scales; *st.* 1-2 ft. l., firm, erect; *fr.* 2-4 ft. l., 1-2 ft. br.; *pinnæ* narrowed at the base, the lower ones stalked, 6-12 in. l.,  $\frac{3}{4}$ - $1\frac{1}{2}$  in. br., the apex acuminate, the edge entire; *texture* subcoriaceous, surfaces naked; *areolæ* fine, uniform, with copious free veinlets; *sori* slightly immersed, in a row near the midrib on each side.—*Hk. Sp. 5. p.* 91. *Fil. Ex. t.* 25.

Hab. N. India, up to 5-7,000 ft.

389. P. (Phym.) *albo-squamatum*, *Blume*; *rhizome* woody, the *scales* long (sometimes 1 in. l.), dense, fibrillose, dark-brown; *st.* 6-12 in. l., firm, erect, glossy; *fr.* sometimes simple, usually pinnate, 1-2 ft. l., 1 ft. or more br., with several distant erecto-patent *pinnæ* on each side, which are 6-10 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., the apex much acuminate, the edge slightly repand towards the point, the base narrowed, the lower ones stalked; *texture* subcoriaceous; upper *surface* with small white dots at the edge or all over; main *veins* usually indistinct; *sori* in a single row midway between the midrib and edge.—*Hk. Sp. 5. p.* 92. *G. F. t.* 47.

Hab. Malay Isles and Philippines.—*P. varians*, *Blume*, is a form with narrow *pinnæ* and more distinct main veins.

#### TRIBE 12. GRAMMITIDÆ.

*Sori* on the back of the lobes, more than twice as long as broad, usually linear. GEN. 49-59.

#### GEN. 49. JAMESONIA, Hk. & Gr.

*Sori* oblong, placed on the flabellate veins on the back of the *pinnæ* remote from the edge. A single Andine species, placed by *Mettenius* in *Gymnogramme*. TAB. 6. f. 49.

1. *J. imbricata*, H. & G.; *rhizome* woody, creeping, black, tortuose; *st.* wiry, ebeneous, slender, 3-4 in. l.; *fr.* 6-18 in. l., 2-3 lin. br., simply pinnate; *pinnæ* close, roundish, often spreading horizontally, the edge much incurved; *texture* coriaceous; *rachis* and under *surface* slightly villose.— *Ic. t.* 178.— $\beta$ , *J. canescens*, Kze., habit stouter, the long, silky, yellowish-brown hairs of the upper part of the frond often so dense that they quite hide the *pinnæ*.— $\gamma$ , *J. verticalis*, Kze.; *st.* 1 ft. l., rigid, wiry; *fr.* 6-9 in. l.,  $\frac{1}{2}$  in. br.; *pinnæ* oblong-deltoid, 3 lin. l.,

2 lin. br. ; tomentum of the *rachis* very short, and the *pinnæ* naked.—*Hk. Sp. 5. p. 105.*

Hab. Andes, from New Granada southward to Peru.—Mettenius admits our three varieties as species, and also *J. scalaris*, Kze., and *J. rotundifolia*, Fée, the latter a robust plant, most like  $\gamma$ , but with closer and rounder *pinnæ*.

GEN. 50. NOTHOCHLÆNA, *R. Br.*

*Sori* marginal, at first oblong or roundish, soon confluent into a continuous marginal line, without a distinct involucre, but with the edge of the frond frequently inflexed. *Veins* free in all the species. *A small widely-dispersed genus, differing from Cheilanthes only by the absence of a distinct involucre, and connected with it by gradual intermediate stages.* TAB. 6. f. 50.

§ Eunothochlæna. *Fronde*s not farinose beneath. Sp. 1-16.

\* *Fronde*s densely matted beneath ; *stems* robust. Sp. 1-11.

1. *N. Rawsoni*, Pappe ; *rhizome* woody, wide-creeping, the scales dense, adpressed, linear, black in the centre and ferruginous towards the edge ; *st.* 3-4 in. l., wiry, erect, naked, dark chesnut-brown ; *fr.* 6-9 in. l.,  $\frac{1}{2}$  in. br., simply pinnate ; *pinnæ* in distant pairs, nearly as broad as long, deeply pinnatifid ; *texture* subcoriaceous ; upper *surface* pale-green, naked, lower densely matted with ferruginous tomentum ; *sori* black, the edge not inflexed.—*Hk. Sp. 5. p. 110.*

Hab. Namaqua-land, *Rev. Mr. Whitehead.*

2. *N. sinuata*, Kaulf. ; *rhizome* very thick, densely clothed with linear bright ferruginous scales and bearing bulbs ; *st.* subtufted, 2-4 in. l., firm, erect, chesnut-brown, matted ; *fr.* 1-2 ft. l., 1-2 in. br., simply pinnate ; *pinnæ* short-stalked,  $\frac{1}{2}$ -1 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., ovate or oblong, varying from entire to deeply pinnatifid ; *texture* thick, coriaceous ; upper *surface* green and slightly villose ; lower *surface* and *rachis* densely coated with small linear ferruginous scales ; *edge* slightly inflexed.—*Hk. Sp. 5. p. 108. Bot. Mag. t. 4699.*

Hab. New Mexico, along the Andes to Chili.

3. *N. ferruginea*, Hk. ; *rhizome* thick, bearing bulblike scaly buds, the scales very dense, fibrillose, dark-brown ; *st.* subtufted, 2-4 in. l., wiry, erect, black, slightly matted ; *fr.* 6-12 in. l.,  $\frac{1}{2}$ -1 in. br., simply pinnate ; *pinnæ* sessile,  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., ovate, deeply pinnatifid, with blunt lobes ; *texture* coriaceous ; upper *surface* pale-green, villose, lower densely matted with ferruginous or nearly white tomentum ; *edge* inflexed, slightly membranous ; *sori* black.—*Hk. Sp. 5. p. 108. 2nd Cent. t. 52.*

Hab. West Indies and Mexico, along the Andes to Chili.—This and the two preceding may be distinguished from the rest of the group by having even the lower *pinnæ* pinnatifid only.

4. *N. lanuginosa*, Desv. ; *st.* densely tufted, woolly, wiry, very short ; *fr.* 6-9 in. l., 1-1 $\frac{1}{2}$  in. br., oblong-lanceolate, bipinnate ; *pinnæ* close, lanceolate, the central ones the largest, with close, roundish or oblong, entire or 3-lobed *pinnl.* ; *texture* herbaceous but thick ; both *sides*, especially the lower one, coated with whitish or subferruginous tomentum ; *rachis* bright chesnut-brown, more or less woolly.—*Hk. Sp. 5. p. 119.*

Hab. South Europe, from Spain to Syria, Greece, Madeira, Teneriffe, Cape Verde Isles, Algiers, Temperate and Tropical Australia.—Distinguished from the rest by its dense white woolly tomentum.



5. *N. Brackenridgii*, Baker; *rhizome* thick, clothed with lanceolate ferruginous scales; *st.* 3-4 in. l., chesnut-brown, glossy, nearly naked; *fr.* 4-5 in. l., oblong-lanceolate, tripinnatifid; lower *pinnæ* distant, stalked, oblong-deltoid, cut down to the rachis into oblong-deltoid *pinnl.* with rounded lobes; *texture* thick, coriaceous; upper *surface* dark-green, nearly naked; lower and *rachis* densely clothed with small, linear, dark chesnut-brown scales.—*N. sinuata*, *Brack. p.* 19 (*non Kaulf.*).

Hab. Peru, *Brackenridge*.

6. *N. inæqualis*, Kze.; *rhizome* stout, the scales long, dense, fibrillose, bright-ferruginous; *st.* 3-6 in. l., firm, erect, naked, stout, ebeneous; *fr.* 4-6 in. l., 2-3 in. br., lanceolate or subdeltoid, tripinnatifid; upper *pinnæ* lanceolate, lower deltoid, with blunt lanceolate pinnatifid *pinnl.*; *texture* thick; both *surfaces* densely coated with ferruginous woolly tomentum; the *rachis* nearly naked.—*Hk. Sp.* 5. *p.* 118.

Hab. Macalisberg, near Natal, *Burke*; Angola, *Welwitzsch*, 147, 197.—A larger plant than the last, almost as woolly, but the tomentum brown.

7. *N. Aschenhorniana*, Kze.; *st.* tufted, 2-3 in. l., wiry, ebeneous, densely scaly; *fr.* 8-12 in. l., 2-3 in. br., oblong-lanceolate, tripinnatifid; *pinnæ* lanceolate, 1-1½ in. l., ¾ in. br., cut down to the rachis into linear-oblong crenate or pinnatifid *pinnl.*; *texture* subcoriaceous; upper *surface* pale-green and slightly hispid, lower densely matted with linear, ciliated, bright-ferruginous scales, beneath which it is subfarinose; *sori* black, the edge not inflexed.—*Hk. Sp.* 5. *p.* 117. *t.* 287. *B.*

Hab. Mexico.—This and the next three are very near to one another.

8. *N. squamosa*, Baker; *st.* tufted, 1-4 in. l., densely clothed with ovate-acuminate pale-brown scales; *fr.* 3-4 in. l., 1 in. or more br., ovate-lanceolate, bipinnate; *pinnæ* opposite, the lowest ½ in. l., ¼ in. br., ovate, blunt, cut down to the rachis below into several linear-oblong *pinnl.*; *texture* thick, subcoriaceous; *rachis* and under *surface* densely covered with ovate- or lanceolate-acuminate ciliated ferruginous scales; *sori* brownish, the edge subscariosa.—*Cheil. Hk. Sp.* 2. *p.* 82. *H. & G. t.* 151.

Hab. Mexico and Guatemala to Peru and the Argentine territory.—Probably this is *N. peruviana*, Desv., and if so, that name is the oldest. Mettenius distinguishes from this *C. brachypus*, Kze. (*Nothochlæna*, J. Sm.), by its shorter stem, and the presence of long flaccid hairs as well as scales on the under surface.

9. *N. Marantæ*, R. Br.; *rhizome* woody, the scales dense, fibrillose, bright-ferruginous; *st.* strong, wiry, 3-6 in. l., more or less matted; *fr.* 4-12 in. l., 1½-3 in. br., oblong-lanceolate, bipinnate; *pinnæ* lanceolate, cut down to the rachis into close, oblong, entire *pinnl.* 1 lin. br.; *texture* thick, coriaceous; upper *surface* pale-green, naked, lower and *rachis* densely coated with lanceolate, bright-ferruginous scales.—*Hk. Sp.* 5. *p.* 120.

Hab. Himalayas (up to 15,000 ft.), Syria, and Tauria, to Ardeche and Portugal; Barbary States, Abyssinia, Azores, Madeira, Canaries, Cape Verde Isles.

10. *N. Eckloniana*, Kunze; *rhizome* woody, the scales lanceolate, dense, bright-ferruginous; *st.* 3-6 in. l., strong, erect, scaly; *fr.* 6-12 in. l., 2-3 in. br., bitripinnatifid; upper *pinnæ* close, the lower ones subsistant, deltoid; *pinnl.* close, lanceolate, pinnatifid or pinnate, with short, oblong *segm.*; *texture* thick, coriaceous; upper *surface* pale-green, lower and *rachis* densely clothed with bright-ferruginous scales.—*Hk. Sp.* 5. *p.* 116.

Hab. Cape Colony and Natal.—Usually more divided than the last, but very doubtfully distinct.

11. *N. mollis*, Kunze; *rhizome* woolly, very thick, the scales fibrillose, black; *st.* 2-3 in. l., strong, erect, matted; *fr.* 8-12 in. l., 1½-2 in. br., tripinnate; upper *pinnæ* close, the lower ones distant, lanceolate, with a very thick rachis, and often upcurled; the *segm.* small, roundish; *texture* thick, rigid; upper *surface* dark-green, naked, lower and *rachises* woolly, with close thick short subferruginous tomentum.—*Hk. Sp. 5. p. 120.*

Hab. Chili and Andes of Guatemala.—A well-marked species, more rigid and robust than any of the preceding, with dense woolly tomentum beneath.

\*\* *Fronde thinner in texture, and not so much matted; stems slender.*  
Sp. 12-19.

12. *N. fragilis*, Hk.; *st.* 3-4 in. l., very slender, wiry, naked, glossy, dark chesnut-brown; *fr.* 1½-3 in. each way, deltoid; lower *pinnæ* much the largest, deltoid, with the lowest *pinnl.* pinnate, with oblong pinnatifid *segm.* ¼-½ lin. br.; *texture* herbaceous; both *surfaces* rather densely coated with grey spreading hairs; *sori* small, the *edge* slightly recurved.—*Hk. Sp. 5. p. 114. t. 287. A.*

Hab. Arnheims-land, Tropical Australia, *Dr. Mueller.*

13. *N. hirsuta*, Desv.; *st.* tufted, 3-6 in. l., glossy, dark chesnut-brown, slightly villose; *fr.* 6-8 in. l., 1½-3 in. br., lanceolate-oblong, tri- or quadripinnatifid; lower *pinnæ* 1-1½ in. apart, subdeltoid, with lanceolate *pinnl.* and oblong blunt entire or slightly-lobed *segm.* 1-2 lin. br.; *texture* herbaceous; *rachis*, and especially the under *side*, finely villose and glandular; *sori* brown.—*Hk. Sp. 5. p. 116.*

Hab. Hong-Kong and Polynesian Islands.—The Philippine *N. densa*, J. Sm., is probably a less-divided form. In habit this closely resembles *Cheilanthes tenuifolia*, to which *N. nudiuscula*, *glabra*, and *semiglabra* of Sp. Fil. must probably be referred.

14. *N. distans*, R. Br.; *st.* densely tufted, 1-3 in. l., castaneous, wiry, clothed with ferruginous linear scales; *fr.* 6-9 in. l., ¾-1 in. br., bipinnate; lower *pinnæ* distant, deltoid, cut down to the rachis into oblong obtuse entire or slightly-lobed *pinnl.*; *texture* subcoriaceous; upper *surface* pale-green and slightly villose, lower *surface* and *rachis* more or less densely coated with long linear ferruginous scales; *pinnæ* often much curled together, and the *edge* incurved.—*Hk. Sp. 5. p. 114. 2nd Cent. t. 80.*

Hab. Australia, New Zealand, New Caledonia.

15. *N. hypoleuca*, Kunze; *rhizome* bulbiferous, the scales rigid, fibrillose, dark-brown; *st.* tufted, slender, 2-4 in. l., dark chesnut-brown; *fr.* 4-6 in. l., ¾-1 in. br., bipinnatifid; *pinnæ* ½-¾ in. l., ¼-¾ in. br., ovate, cut down nearly or quite to the rachis below into blunt lobes; *texture* subcoriaceous; upper *surface* nearly naked, pale-green, lower densely matted with white or slightly ferruginous tomentum; *edge* slightly inflexed.—*Hk. Sp. 5. p. 110.*

Hab. Chili.—This is the most matted of any of the group, but the stem is almost or very nearly naked.

16. *N. Pohliana*, Kunze; *st.* tufted, 3-4 in. l., slender, wiry, naked, ebeneous; *fr.* 3-4 in. l., 1½ in. br., lanceolate, bipinnate; *pinnæ* in numerous pairs, the lowest the largest, lanceolate, with several sessile oblong crenated *pinnl.*; *texture* subcoriaceous; both *surfaces*, especially the lower one, with long silky hairs; *rachis* ebeneous; *sori* brown.—*Hk. Sp. 5. p. 118. t. 286. B.*

Hab. Brazil, *Pohl, Gardner.*

17. *N. eriophora*, Fée; *st.* tufted, wiry, 3-4 in. l., slender, dark chesnut-brown, more or less villose; *fr.* 2-3 in. each way, deltoid, with 3-4 blunt linear-oblong



entire lobes on each side, the lowest pair much the largest, deeply pinnatifid on the lower side; *texture* very thick; under *surface* densely matted with yellowish-brown tomentum; *veinlets* forked; *sori* copious, marginal.—Polypodium, *Hk. Sp. 4. p. 229. Ic. t. 991.*

Hab. South Brazil, *Gardner*, 2390.—A very distinct species, with the habit of *Doryopteris*.

18. *N. Buchanani*, Baker; *st.* tufted, slender, villose, bright chesnut-brown, 3-4 in. l.; *fr.*  $1\frac{1}{2}$ -2 in. l.,  $1-1\frac{1}{2}$  in. br., subdeltoid, with 2-3 pairs of distinct *pinnæ* below the deeply-pinnatifid apex, the lowest much the largest, cut down to the rachis at the base into oblong blunt repand *pinnl.*, that on the lower side  $\frac{1}{4}$ - $\frac{3}{8}$  in. l.; *texture* herbaceous; *rachis* and both *sides* densely clothed with spreading whitish or ferruginous hairs; *sori* copious, brownish, quite marginal.

Hab. Natal, *Buchanan* and *McKen*, 32.—This is very like the last in outline, but is more deeply divided, not so thick in texture, and though very hairy, yet not matted.

19. *N. tenera*, Gill.; *st.* densely tufted, 4-6 in. l., chesnut-brown, naked, glossy; *fr.* 3-6 in. l.,  $1\frac{1}{2}$ -2 in. br., ovate, tripinnate; *pinnæ* distant, the lower ones deltoid; the *pinnl.* long-stalked, with blunt oblong *segm.*  $\frac{1}{2}$ -1 lin. br.; *texture* subcoriaceous; *rachises* rigid; both *surfaces* naked; *sori* brown.—*Hk. Sp. 5. p. 112. Bot. Mag. t. 3055.*

Hab. Chili and Andes of Bolivia.—Very doubtfully distinct from *N. nivea*, from which it differs only by being without white powder beneath.

§§ Cincinalis, *Desv.* *Fronde coated beneath with white or yellow powder.*  
Sp. 20-27.

20. *N. (Cinc.) trichomanoides*, R. Br.; *rhizome* thick, bulbiferous, the scales black, fibrillose; *st.* tufted, 2-4 in. l., firm, erect, chesnut-brown, slightly scaly; *fr.* 6-12 in. l.,  $\frac{3}{4}$ - $1\frac{1}{2}$  in. br., simply pinnate; *pinnæ* sessile, ovate-oblong, blunt, pinnatifid, with blunt lobes; *texture* subcoriaceous; upper *surface* pale-green, nearly naked, lower clothed with white powder and fine ferruginous woolly hairs, the *edge* inflexed.—*Hk. Sp. 5. p. 109.*

Hab. Jamaica and Cuba.—Differs from all the following by being tomentose as well as farinose, and sometimes the powder is quite hidden beneath the tomentum.

21. *N. (Cinc.) affinis*, Hk.; *st.* tufted, 2-3 in. l., wiry, glossy, naked, nearly black; *fr.* 4-5 in. l.,  $\frac{3}{4}$ - $\frac{7}{8}$  in. br., bipinnatifid; *pinnæ* short-stalked, deltoid-oblong,  $\frac{3}{8}$  in. l.,  $\frac{1}{4}$  in. br., deeply pinnatifid, with close entire lobes, the lower ones distant and dwindling down gradually; *texture* subcoriaceous; upper *surface* and *ebeneous rachis* naked, lower densely matted with sulphur-coloured meal; *sori* marginal, brownish.—*Hk. Sp. 5. p. 109.*

Hab. Mexico and Guatemala.—Our description is taken from a set of specimens gathered by Messrs. Salvin and Godman, and does not entirely agree with that of Mettenius. In habit our plant agrees with the preceding, but is perfectly without tomentum. Specimens from Cuba (*C. Wright*, 1075-6) are very similar, but are rather more slender, and the farina is pure-white.

22. *N. (Cinc.) sulphurea*, J. Sm.; *rhizome* creeping, the scales dense, rigid, linear, nearly black; *st.* tufted, 4-6 in. l., ebeneous, wiry, naked; *fr.* 2-3 in. each way, deltoid; upper *pinnæ* simple, central ones lanceolate, cut down to the rachis at the base into oblong lobes; lowest pair with the lowest *pinnl.* much prolonged,  $\frac{1}{2}$  in. or more l., pinnatifid or pinnate; *texture* subcoriaceous; upper *surface* naked, pale-green, lower coated with white or yellow powder, the *ribs* ebeneous; *sori* black.—*Pteris, Cav. Cheil. pulveracea, Hk. Sp. 2. p. 78. N. candida, Hk. Sp. 5. p. 111.*

Hab. California and New Mexico along the Andes.—We include here four species of Mettenius. His *C. Borsigiana*, Reich., has the pinnæ very close, and the lower pair much larger than the others, with the powder bright-yellow. From this *C. cretacea* seems to differ only by its white powder, and there are various intermediate stages. In *C. candida* and *monosticha* the pinnæ are not so close and less unequal, the powder being white in the first and yellowish in the latter.

23. *N.* (Cinc.) *flavens*, Moore; *st.* densely tufted, 4-8 in. l., glossy, naked, chesnut-brown; *fr.* 4-9 in. l., 2-4 in. br., oblong-deltoid, tripinnate; *pinnæ* distant, the lower ones deltoid; the *pinnl.* stalked, with oblong *segm.* 1-1½ lin. br.; *texture* subcoriaceous; *rachises* wiry, castaneous; upper *surface* naked, lower densely coated with bright-yellow powder; *sori* brown, extending from the edge nearly to the midrib.—Gymnogramme, *Hk. Sp. 5. p. 146. Fil. Ex. t. 47.*

Hab. Central America.—Habit of the next, but the powder bright-yellow, and the sori in a broader band.

24. *N.* (Cinc.) *nivea*, Desv.; *st.* densely tufted, 4-6 in. l., chesnut-brown, naked, glossy, the scales linear, bright-ferruginous; *fr.* 3-6 in. l., 1½-2 in. br., ovate, tripinnate; *pinnæ* distant, the lower ones deltoid; the *pinnl.* long-stalked, with blunt oblong or roundish terminal *segm.* 1-2 lin. l., ½-1 lin. br.; *texture* subcoriaceous; *rachises* wiry, glossy, castaneous; upper *surface* naked, pale-green, lower coated with pure-white powder; *sori* brown.—*Hk. Sp. 5. p. 111.*

Hab. Andes, from Mexico to Peru.—*N. Hookeri*, Lowe, t. 13, is a form known only in cultivation, with close dilated segments and sessile pinnules.

25. *N.* (Cinc.) *chilensis*, Hk.; *st.* tufted, 3-4 in. l., stout, glossy, chesnut-brown, nearly naked; *fr.* 3-4 in. l., 2 in. br., ovate, tripinnate; *pinnæ* distant, the lower ones deltoid; *pinnl.* sessile, deltoid; the lower *segm.* linear-oblong, ⅓ in. l., sometimes pinnatifid; *texture* subcoriaceous; *rachises* polished; upper *surface* naked, pale-green, lower densely coated with white powder; *sori* brown.—*Hk. Sp. 5. p. 112. t. 286. A.*

Hab. Juan Fernandez.—Probably this should be joined with the last.

26. *N.* (Cinc.) *dealbata*, Kunze; *st.* densely tufted, 4-6 in. l., slender, wiry, chesnut-brown, the scales linear, ferruginous; *fr.* 3-4 in. each way, deltoid, tripinnate; *pinnæ* distant, the lower deltoid; the lowest *pinnl.* deltoid; *lobes* oblong, obtuse, 1 lin. or less l. by half as broad; *texture* subcoriaceous; *rachises* slender, castaneous; upper *surface* naked, pale-green, lower coated with pure-white powder.—*Hk. Sp. 5. p. 113.*

Hab. Missouri.—Very near *N. nivea*, but more slender, with closer and more numerous pinnæ and smaller lobes.

27. *N.* (Cinc.) *Fendleri*, Kunze; *st.* densely tufted, 2-3 in. l., wiry, chesnut-brown, naked, the scales linear, bright-ferruginous; *fr.* 2-3 in. each way, deltoid, tripinnate; all the *rachises* very zigzag; *pinnæ*, *pinnl.*, and *segm.* all stalked, deltoid; *lobes* close, oblong, blunt, not more than 1 lin. l. by half as broad; *texture* subcoriaceous; upper *surface* naked, lower with fine white powder.—*Hk. Sp. 5. p. 113.*

Hab. New Mexico, *Fendler*, 1017a.—Very near the last, from which it differs principally by its very zigzag rachises.

#### GEN. 51. MONOGRAMME, *Schk.*

*Sori* linear, close to the midrib on one or both sides. *Small grass- or rush-like plants, the simplest in structure of all the Ferns.*



§ Eumonogramme. *Fronde with a central vein only.* Sp. 1-7.

1. *M. dareocarpa*, Hk. ; *rhizome* slender, wide-creeping ; *scales* linear ; *fr.*  $\frac{3}{4}$ -1 in. l.,  $\frac{1}{2}$  lin. br. upwards, narrowed gradually downwards into a short slender stem ; *texture* subcoriaceous ; *sori* sunk in a deep cleft on one side of the midrib, the wing which covers it reaching nearly to the edge.—*Hk. Sp. 5. p. 121. t. 287. A.*

Hab. Labuan, Borneo, *Barber*.

2. *M. graminea*, Schk. ; *rhizome* slender, wide-creeping, clothed with squarrose fibrillose brown scales ; *fr.* 1-2 in. l.,  $\frac{1}{4}$  lin. br., flaccid, grass-like ; the *costa* indistinct ; the *sori* in a line 2-3 lin. l. near the apex, where the edges are incurved. *M. linearis*, *Klf. Hk. Sp. 5. p. 122.*

Hab. Cape Colony, Mauritius, and Bourbon.

3. *M. subfalcata*, Hk. ; *rhizome* slender, wide-creeping ; *fr.* 1 in. l.,  $\frac{1}{2}$  lin. br. towards the point, tapering gradually downwards into an indistinct stem ; *texture* subcoriaceous ; *sori* sunk in an unequal-sided longitudinal furrow, extending about  $\frac{1}{2}$  in. from the apex.—*Hk. Sp. 5. p. 122. t. 219. A.*

Hab. New Hebrides, *C. Moore*.

4. *M. trichoides*, J. Sm. ; *rhizome* very slender ; *fr.* 3-4 in. l., densely cæspitose, threadlike, the fertile one dilated in two or three places for a space of  $\frac{1}{4}$  in., and there bearing the *sori* in a longitudinal furrow, with a high raised edge on both sides.—*Hk. Sp. 5. p. 123. Vaginularia, Fée.*

Hab. Philippines, *Cuming*, 160.

5. *M. rostrata*, Hk. ; *fr.* densely cæspitose, 3-4 in. l., 1 lin. br., tapering to the point and gradually downwards into an indistinct stem ; *texture* coriaceous ; the *surface* naked ; the *midrib* very distinct ; the *sori* quite sunk in a longitudinal furrow 1-2 in. l.—*Hk. Sp. 5. p. 122. t. 287. B.*

Hab. Nicaragua, *C. Wright*.

6. *M. Junghuhnii*, Hk. ; *rhizome* slender ; *fr.* densely cæspitose, grass-like, flaccid, 6-12 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  lin. br. ; *texture* herbaceous ; *sori* deeply sunk in a furrow on one, or, according to Brackenridge, on both sides of the midrib.—*Hk. Sp. 5. p. 123. t. 289. B. Diclidopteris angustissima, Brack.*

Hab. Ceylon, Java, Philippines, and Polynesian Islands.

7. *M. graminoides*, Baker ; *fr.* tufted,  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  lin. br., simple or once dichotomously forked, narrowed below to an indistinct stem ; *texture* coriaceous ; *midrib* prominent ; *sorus* linear-oblong, arising from the midrib near the dilated point ; the *edge* scarcely incurved.—*Grammitis, Sw. M. furcata, Desv., Hk. Sp. 5. p. 121. Cochlidium, Kaulf.*

Hab. Jamaica, Brazil, St. Helena, and reported from Chili by *C. Gay*.

§§ Pleurogramme, *Fée. Fronds with indistinct simple lateral veins in addition to the midrib.* Sp. 8-9.

8. *M. (Pleur.) seminuda*, Baker ; *fr.* cæspitose, 4-8 in. l., 1 $\frac{1}{2}$ -2 lin. br., tapering downwards into an indistinct stem ; *texture* coriaceous, rigid ; *veins* simple, oblique, not reaching the edge ; *sori* not sunk in a cavity, originating as 2 rows close to the midrib, which are ultimately confluent, covering the whole of the

upper part of the frond, the edges of which are more or less inflexed.—*Blechnum*, Willd. *M. graminifolia*, *Hk. Sp. 5. p. 124.*

Hab. West Indies and Guatemala to South Brazil.

9. *M. (Pleur.) immersa*, Fée; *fr.* caespitose, 2-3 in. l.,  $1\frac{1}{2}$  lin. br., tapering downwards into an indistinct stem; habit and veins of the preceding, but the *sori* sunk in a deep central longitudinal cavity, and in all our specimens confined to the central third of the triquetrous frond.—*Hk. Sp. 5. p. 125.*

Hab. Cuba, Venezuela, and Guiana.—*P. myrtillifolia*, Fée, supposed to be from Mexico, has a subspathulate frond 7-8 lin. l., with the short sorus in a depression near the point.

GEN. 52. GYMNOGRAMME, *Desv.*

*Sori* arising from the veins over the under surface of the frond, linear or linear-oblong, simple or forked. *A considerable genus, principally tropical, including plants of very various habit and venation.* TAB. 6. f. 52.

*Series 1.* Habit and mode of growth of *Aspidiæ*. *Sori* oblong or linear-oblong, not forked. *Sp.* 1-13.

§ *Leptogramme*, *J. Sm.* *Veins free.* Differs from *Euphegopteris* only by its elongated *sori*. *Sp.* 1-11.

\* *Fronde bipinnatifid.* *Sp.* 1-9.

1. *G. (Lept.) pilosa*, Mart. & Gal.; *st.* 3-4 in. l., slender, villose, scaly at the base; *fr.* 6-8 in. l.,  $1\frac{1}{2}$ -2 in. br., lanceolate; *pinnæ* lanceolate, 1 in. l.,  $\frac{1}{2}$  in. br., the lower ones slightly bluntly lobed, the lowest scarcely reduced; *texture* herbaceous; *rachis* and both *sides* pilose; *veins* pinnate in the lobes, with 3 simple veinlets on a side; *sori* irregular.—*Hk. Sp. 5. p. 141.*

Hab. Mexico.—A doubtful plant; perhaps a small slender form of *G. diplazioides*, more hairy than usual.

2. *G. (Lept.) asplenioides*, Kaulf.; *caud.* stout, suberect; *st.* tufted, 2-6 in. l., villose, and the lower part scaly; *fr.* 6-12 in. l., 3-4 in. br., bipinnatifid; *pinnæ*  $1\frac{1}{2}$ -2 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., horizontal, sessile, linear, varying from subentire to cut more than halfway down to the *rachis* in the lower part, the lowest lobe on the upper side produced and the lower side rather truncate; *rachis* and both *sides* slightly pubescent; *texture* firm-herbaceous; *veinlets* slightly pinnate in the lobes; *sori* oblong.—*Hk. Sp. 5. p. 132.*

Hab. Panama to Peru and S. Brazil.

3. *G. (Lept.) Totta*, Schlecht; *rhizome* decumbent; *st.* subtufted, 6-12 in. l., slightly scaly below; *fr.* 12-18 in. l., 6-10 in. br., bipinnatifid; *pinnæ* lanceolate, 3-5 in. l.,  $\frac{3}{4}$ -1 in. br., with blunt entire lobes  $1\frac{1}{2}$ -2 lin. br., which reach about halfway down; *texture* herbaceous; *rachis* and both *sides* finely villose; *veinlets* pinnate in the lobes, with 5-6 veinlets on a side, with the linear-oblong *sori* medial.—*Hk. Sp. 5. p. 138.* *G. Lowei*, *Hk. & Gr. Ic. t. 138.*

Hab. Cape Colony, Guinea Coast, Madeira, Azores, Abyssinia, Himalayas, Neilgherries, Ceylon, Java, Japan, Hong-Kong, Corea.

4. *G. (Lept.) villosa*, Link; *st.* 6-9 in. l., firm, stramineous, densely clothed with soft spreading greyish hairs; *fr.* 12-18 in. l., 6-10 in. br., bipinnatifid; *pinnæ* 3-5 in. l.,  $\frac{3}{4}$  in. br., cut more than halfway down into subfalcate entire lobes 2 lin. br., the lower ones not reduced, narrowed at the base; *texture*



herbaceous; *rachis* and both *sides* densely villose; *veins* pinnate in the lobes, with 8-10 simple veinlets on a side, the sori in the lower part of each.

Hab. Brazil.

5. G. (Lept.) *polypodioides*, Spreng.; *rhizome* creeping; *st.* 6-9 in. l., firm, glossy, naked; *fr.* 1 ft. l., 6-9 in. br., bipinnatifid; *pinnae* lanceolate, 3-5 in. l., 1 in. br., cut two-thirds of the way down into entire falcate lobes  $\frac{1}{4}$  in. br., the lower ones not reduced and with an entire wing at the base; *texture* herbaceous; *rachis* and both *sides* naked; *veins* pinnate in the lobes, with 8-10 simple veinlets on a side, with the linear-oblong *sori* down the centre of each.—*Hk. Sp.* 5. p. 140.

Hab. Brazil.

6. G. (Lept.) *diplazioides*, Desv.; *st.* tufted, 3-4 in. l., glossy, scaly below; *fr.*  $1\frac{1}{2}$ -2 ft. l., 6-8 in. br., bipinnatifid; central *pinnae* 3-4 in. l.,  $\frac{3}{4}$ - $\frac{7}{8}$  in. br., cut half to two-thirds of the way down into blunt entire lobes 2 lin. br., the lower *pinnae* reduced gradually; *texture* herbaceous; *rachis* and both *sides* naked or slightly pilose; *veins* pinnate in the lobes, with 6-9 simple veinlets on a side, the *sori* oblong, often reaching nearly from the midrib to the edge.—G. Linkiana, *Kze. Hk. Sp.* 5. p. 140. G. rupestris, *Kze. Hk. l. c.*

Hab. Mexico and West Indies to Peru and South Brazil.—*Pheg. Duchassagniana*, Fée Mem. 11-12. t. 14, must probably be referred here.

7. G. (Lept.) *grandis*, Baker; *st.* tufted,  $1\frac{1}{2}$ -2 ft. l., strong, naked, scaly only at the very base; *fr.* 3-4 ft. l.,  $1\frac{1}{2}$ -2 ft. br., bipinnatifid; *pinnae* 8-12 in. l.,  $1\frac{1}{2}$  in. br., cut three-quarters of the way down to the rachis into oblong falcate finely serrated lobes 3-4 lin. br.; lowest *pinnae* not reduced; *texture* subcoriaceous; *rachis* and both *sides* naked; *veins* pinnate in the lobes, with about 12 simple veinlets on a side; *sori* linear, close to the midrib.

Hab. Andes of Columbia, *Holton* 29, *Linden* 540; Ecuador, *Spruce* 5286.

8. G. (Lept.) *gracilis*, Heward; *st.* 2-4 in. l., glossy, scaly; *fr.* 2-4 ft. l., 1 ft. or more br., bipinnatifid; central *pinnae* 4-8 in. l., 1- $1\frac{1}{2}$  in. br., cut down very nearly to the rachis throughout into entire slightly falcate lobes  $1\frac{1}{2}$ -2 lin. br., the lower *pinnae* distant and dwindling down very gradually; *texture* herbaceous or subcoriaceous; *rachis* and both *sides* naked; *veins* pinnate in the lobes, with 10-15 veinlets on a side; *sori* nearer the edge than the midrib.—*Hk. Sp.* 5. p. 139. t. 292.— $\beta$ , *G. consimilis*, Fée; *fr.* smaller; *texture* herbaceous; *veinlets* 6-8 on a side.

Hab. Jamaica;  $\beta$ , Guadeloupe, *L'Herminier*.

9. G. (Lept.) *aurita*, Hk.; *rhizome* creeping; *st.* 1 ft. l., naked, glossy, chesnut-brown; *fr.*  $1\frac{1}{2}$ -2 ft. l., 8-12 in. br., bipinnatifid or bipinnate; *pinnae* in distant pairs, cut down nearly or quite to the rachis into lanceolate entire or crenate lobes, the lowest on one or both sides longer than the rest and pinnatifid; *texture* subcoriaceous; *rachis* glossy, castaneous; both *sides* naked; *veinlets* forked; *sori* oblong, sometimes produced on both forks.—*Hk. Sp.* 5. p. 141. *2nd Cent.* t. 74.

Hab. North India, up to 6,000 ft.—This has altogether the habit and texture of *Polypodium distans*.

\*\* *Fronde tripinnatifid.* Sp. 10-11.

10. G. (Lept.) *decurrenti-alata*, Hk.; *st.* 18 in. l., brown, weak, slightly scaly downwards; *fr.* 18 in. l., 1 ft. br., subdeltoid; lower *pinnae* the largest, lanceolate, 6 in. l., 2 in. br., cut down to the rachis below into oblong bluntly lobed

*pinnl.*; texture herbaceous; colour deep-green; *rachis* and both *sides* naked; *veins* pinnate in the lobes of the *pinnl.*, with the *sori* near the main veins.—*Hk. Sp. 5. p. 142. t. 294.*

Hab. Japan, *Oldham*, 374.

11. *G. (Lept.) opaca*, Spreng.; *st.* 1½-2 ft. l., strong, stramineous, glossy; *fr.* several ft. l., often 2 ft. br.; lower *pinnæ* often 1 ft. l., 6 in. br.; *pinnl.* close, lanceolate, cut down nearly to the *rachis* below into close oblong, slightly-toothed lobes; texture herbaceous; *rachis* and both *sides* naked; *veinlets* forked; *sori* oblong, irregular, close to the midrib.—*G. obtusata, Bl. Hk. Sp. 5. p. 143.*

Hab. North India and Java.

§§ Digrammaria, *Presl. Main veins and lower ones of the same group forming costular areolæ, as in Pleocnemia. Sp. 12.*

12. *G. (Digram.) ambigua*, *Hk.*; *st.* slender, nearly naked; *fr.* 1½-2 ft. l., 1 ft. br., oblong-deltoid, bipinnatifid; *pinnæ* lanceolate, 5-6 in. l., 1-1½ in. br., the lower ones slightly stalked, cut halfway down to the *rachis* or more into linear-oblong lobes, the fertile ones contracted; texture thinly herbaceous; colour dark-green; *rachis* and both *sides* thinly clothed with long jointed hairs; *veinlets* of the lobes often forked, the lower ones forming costular areolæ; *sori* oblong, confluent when the veins fork.—*Hk. Sp. 5. p. 150. Heterogonium aspidioides, Presl.*

Hab. Philippines, *Cuming*, 154-321.

§§§ Stegnogramme, *Blume. Veinlets of contiguous groups uniting as in Euenphrodium and Goniopteris. Sp. 13.*

13. *G. (Steg.) aspidioides*, *Hk. (non Kaulf.)*; *st.* tufted, 6-9 in. l., deciduously villose; *fr.* 12-18 in. l., 6-10 in. br., oblong-lanceolate, simply pinnate; *pinnæ* lanceolate, 3-5 in. l., ¾-1¼ in. br., bluntly lobed a quarter or third of the way down to the midrib, truncate at the base; texture herbaceous; *rachis* and both *sides* more or less villose; *veins* pinnate in the lobes, with 6-9 veinlets on a side.—*Hk. Sp. 5. p. 150. 2nd Cent. t. 50.*

Hab. Khasya, Ceylon, and Java.—The East Indian is less villose than the Malayan plant, with narrower *pinnæ* and fewer veins, and is *S. asplenioides*, *J. Sm.*

*Series 2. Habit and mode of growth of Cheilanthes. Sori linear, usually forked. Sp. 14-57.*

§§§§ Eugymnogramme. *Veins free, under surface not powdery. Sp. 14-50. Fig. 52 a.*

\* *Fronde simple. Sp. 14-16.*

14. *G. reniformis*, *Mart.*; *st.* densely tufted, 1-2 in. l., wiry, ebeneous; *fr.* 1-1½ in. each way, the outer edge round, faintly crenated; texture coriaceous; *veins* flabellate; *sori* simple, linear, at last forming a broad line parallel with the outer edge ½ in. within it.—*Hk. Sp. 5. p. 126. 2nd Cent. t. 9. Pterozonium, Fée.*

Hab. Brazil and Peru.

15. *G. marginata*, *Mett.*; *fr.* simple, ligulate-oblong, 8-16 in. l., ¾-1¼ in. br., narrowed towards both ends, at the base gradually into a short stem, the edge slightly repand; texture coriaceous; both *sides* naked; *veins* prominent, usually forked; *sori* linear.—*Hk. Sp. 5. p. 127.*

Hab. New Caledonia, *Viellard*, 1642.—A very distinct plant, with the habit of *Thamnopteris*.



16. *G. pumila*, Spreng; *rhizome* filiform; *fr.* tufted,  $1\frac{1}{2}$ -2 in. l., palmately forked at the apex, the ultimate lobes narrow and acute, the blade narrowed below to an indistinct stem; *texture* subcoriaceous; upper *surface* dark-green and glossy; *veins* flabellate; *sori* linear, irregular.—*Hk. Sp. 5. p. 126.* Hecistopteris, *J. Sm.*

Hab. West Indies and Guatemala to the Amazon Valley.

\*\* *Fronde* simply pinnate. Sp. 17-19.

17. *G. Muelleri*, Hk.; *st.* tufted, 3-4 in. l., wiry, densely clothed with small linear ferruginous scales; *fr.* 4-6 in. l.,  $1-1\frac{1}{2}$  in. br., simply pinnate; *pinnæ* sessile, alternate, roundish or oblong, sometimes  $\frac{3}{4}$  in. l.,  $\frac{1}{2}$  in. br., entire or the lower ones auricled; *texture* thick, coriaceous; *rachis* and under surface densely matted with scales like those of the stem, upper surface pale-green, with scattered scales; *veins* flabellate; *sori* linear.—*Hk. Sp. 5. p. 143. t. 295.*

Hab. N. E. Australia; and gathered lately in Queensland by Mr. Hill.

18. *G. vestita*, Hk.; *st.* tufted, 3-6 in. l., wiry, more or less matted, the scales at the base densely tufted, silky, bright-ferruginous; *fr.* 6-12 in. l.,  $1-1\frac{1}{2}$  in. br., simply pinnate; *pinnæ* in distant pairs, oblong or cordate-ovate, entire, bluntish, the lower ones distinctly stalked; *texture* thick, but flaccid; both *sides* and *rachis* densely coated with fine velvety ferruginous hairs; *veins* flabellate; *sori* forked.—*Hk. Sp. 5. p. 143. Ic. t. 115.*

Hab. N. W. Himalayas (up to 8,000 ft.) and Pekin.—Veins sometimes anastomosing towards the edge.

19. *G. rufa*, Desv.; *st.* tufted, 4-12 in. l., firm, erect, chestnut-brown, clothed with soft spreading hairs; *fr.* 12-18 in. l., 3-5 in. br., simply pinnate; *pinnæ* distant, stalked, rounded or cordate at the base,  $1-2\frac{1}{2}$  in. l.,  $\frac{1}{2}$ -1 in. br., acute or bluntish, the edge entire; *texture* herbaceous; castaneous *rachis* pilose, and both *sides* slightly so; *veins* close, forked, or the lower ones subpinnate, the narrow *sori* running along all of them all over the surface.—*Hk. Sp. 5. p. 145.* Neurogramme, *Link.*

Hab. West Indies and Panama southward to the Amazon Valley and Peru.

\*\*\* *Fronde* bipinnatifid or bipinnate. Sp. 20-35.

20. *G. cordata*, Schlecht; *st.* tufted, 1-2 in. l., glossy, ebeneous, more or less scaly; *fr.* 3-6 in. l.,  $1\frac{1}{2}$ -2 in. br., ovate-lanceolate, bipinnatifid; *pinnæ* oblong, with a broad centre and suborbicular deeply-toothed lobes; *texture* subcoriaceous; *veins* flabellate; upper *surface* naked, lower densely coated with ovate acuminate ferruginous scales; *sori* linear, ultimately subconfluent.—*Hk. Sp. 5. p. 131.*

Hab. Cape Colony to Macalisberg and Angola.—The less-divided forms resemble *Asplenium Ceterach* in habit.

21. *G. Pozoi*, Kunze; *st.* tufted, slender, clothed with soft brownish spreading hairs; *fr.* 2-3 in. l., 1 in. br., ovate-oblong, bipinnatifid; *pinnæ* oblong-deltoid, unequal-sided,  $\frac{1}{4}$ - $\frac{3}{8}$  in. each way, with a few deep blunt lobes, and obliquely truncate at the base on the lower side; *texture* herbaceous; *rachis* and both *sides* clothed with long soft hairs like the stem; *veins* flabellate; *sori* linear.—*Hk. Ic. t. 935.* Hemionitis, *Lag.* Grammitis hispanica, *Cosson.*— $\beta$ , *G. rutæfolia*, *Hk. & Gr. Ic. t. 90*; *fr.* larger and stouter, some of the hairs glandular.—*Hk. Sp. 5. p. 137.*— $\gamma$ , *G. papaverifolia*, *Kze.*; *pinnæ* cut down to the rachis into roundish or spatulate lobes, with a space between them, the lowest sometimes slightly toothed.—*Hk. Sp. 5. p. 138.*

Hab.  $\alpha$ , Spain;  $\beta$ , Australia and New Zealand;  $\gamma$ , Chili.

22. *G. Andersoni*, Beddome; *st.* tufted, 1-2 in. l., densely clothed with soft golden hairs; *fr.* 1-2 in. l.,  $\frac{1}{2}$  in. br., oblong, bipinnatifid, with a terminal *pinna* and 4-5 lateral pairs, all sessile, roundish-oblong, bluntly lobed from  $\frac{1}{4}$ - $\frac{1}{3}$  of the way down to the rachis; *texture* thinly herbaceous; *rachis* and *surfaces* clothed with hairs like those of the stem; *veins* fine, pinnate; *sori* linear.—Beddome, *Fil. Brit. Ind. t.* 190.

Hab. Kumaon, at 13,000 ft., *Dr. Anderson.*

23. *G. tomentosa*, Desv.; *st.* tufted, 6-12 in. l., firm, erect, chesnut-brown, villose; *fr.* 6-12 in. l., deltoid and bipinnate when fully developed; upper *pinnae* simple, stalked, rounded or cordate at the base, 1-2 in. l.,  $\frac{1}{2}$ -1 in. br., entire or lobed, lower *pinnae* 1-4 in. l., with several similar *pinnae*; *texture* herbaceous; castaneous *rachis* pilose and both *sides* slightly so; *veins* close, the *sori* running along all of them all over the surface.—*Hk. Sp. 5. p.* 144.

Hab. S. Brazil and Peru.—Habit of *G. rufa*, but more divided. They resemble *Hemionitis* in habit, but the *sori* are not at all reticulated.

24. *G. angustifrons*, Baker; *st.* tufted, flexuose, 2-4 in. l., wiry, glossy, dark chesnut-brown; *fr.* 6-12 in. l.,  $\frac{1}{2}$  in. br., ligulate, bipinnatifid, enrolled at the point; *pinnae* with usually a space between them, oblong-deltoid,  $\frac{1}{4}$ - $\frac{3}{8}$  in. l., 2-3 lin. br., with blunt rounded lobes, the lowest of which reach nearly or quite down to the rachis; *texture* subcoriaceous; *rachis* and both *sides* pilose; *veins* flabellate; *sori* oblong.—*G. elongata*, *Hk. Sp. 5. p.* 135. (*non Swartz*). Jamesonia, *Féc.*

Hab. Andes of Ecuador and Peru.

25. *G. hirsutula*, Mett.; *st.* tufted, flexuose, 1-2 in. l., wiry, glossy, castaneous; *fr.* 1 ft. l.,  $\frac{1}{2}$ -1 in. br., ligulate, bipinnatifid, not enrolled at the point; *pinnae* close, spreading, ovate or ovate-oblong, cut down nearly to the rachis on each side into 2-5 obovate-cuneate lobes; *texture* subcoriaceous; *rachis* and both *sides* slightly hairy; *veins* not reaching the edge.—*Mett. Fil. Nov. Gran. p.* 209.

Hab. New Granada, *Lindig*.—Differs from the preceding by being less hairy, and not circinate at the point.

26. *G. Karstenii*, Mett.; *st.* 2 in. l., wiry, glossy, castaneous; *fr.* 1 ft. l.,  $\frac{1}{2}$  in. br., ligulate, bipinnatifid, the apex enrolled; *pinnae* numerous, lax, spreading, stalked, ovate-rhomboidal, cuneate at the base, cut down nearly to the rachis on each side into 1-3 obovate-cuneate lobes; *texture* subcoriaceous; *rachis* and both *sides* nearly naked; *veins* seldom reaching the edge.—*Mett. Fil. Nov. Gran. p.* 210.

Hab. New Granada, *Lindig*, 15a.

27. *G. incisa*, Mart. & Lind.; *st.* tufted, wiry, 3-4 in. l., ebeneous, slightly pilose; *fr.* 3-4 in. l.,  $1\frac{1}{2}$  in. br., bipinnatifid; *pinnae* close, lanceolate, cut down to a broadly-winged centre into oblong entire or forked lobes; *texture* subcoriaceous; *rachis* densely villose and both *sides* less so; *veins* one to each lobe; *sori* linear-oblong.—*Hk. Sp. 5. p.* 134.

Hab. New Granada, *Linden*, 1044.

28. *G. mohriæformis*, Mett.; *st.* tufted, wiry, 3-4 in. l., dark purplish-brown, slightly villose; *fr.* 2-3 in. l., 1 in. br., lanceolate-deltoid, bipinnate; lower *pinnae* the largest,  $\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., cut down nearly or quite to the rachis into orbicular crenate lobes; *texture* coriaceous; *rachis* and both *sides* hispid; *veins* conspicuous, flabellate; *sori* small, oblong.—*Hk. Sp. 5. p.* 128.

Hab. Peru.



29. *G. Ottonis*, Klotzsch; *st.* tufted, 4-6 in. l., glossy, wiry, ebeneous; *fr.* 5-8 in. l., 1 in. br., bipinnate; *pinnæ* distant, the lowest  $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. br.; *pinnl.* suborbicular, entire or slightly cleft; *texture* subcoriaceous; *rachis* ebeneous; both *sides* naked; *veins* flabellate; *sori* irregular, of few capsules.—*Hk. Sp. 5. p. 128.*

Hab. Venezuela, *Otto*, 630.

30. *G. Lindigii*, Mett.; *st.* 1-4 in. l., castaneous, hispid, glossy; *fr.* 4-9 in. l.,  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. br., flexuose, bipinnatifid or bipinnate; *pinnæ*  $\frac{1}{2}$ - $\frac{3}{4}$  in. l., ovate-oblong or subdeltoid, cut down nearly or quite to the rachis on each side into 3-8 ovate-rhomboidal or roundish imbricated lobes; *texture* subcoriaceous; *rachis* and both *sides* hispid; *veins* not reaching the edge.—*Mett. Fil. Nov. Gran. p. 210.*

Hab. New Granada, *Lindig*.—This and the six preceding are closely allied.

31. *G. decipiens*, Mett.; *st.* subtufted, 6-9 in. l., wiry, dark chesnut-brown, naked; *fr.* 6-9 in. l., 2-3 in. br., deltoid, bipinnatifid; *pinnæ* imbricated, stalked, the lowest the largest, 1-1 $\frac{1}{2}$  in. l.,  $\frac{1}{2}$ - $\frac{5}{8}$  in. br., lanceolate-deltoid, obliquely truncate at the base below, cut down nearly or quite to the rachis into cuneate or oblong entire or toothed lobes; *texture* herbaceous; *rachis* and both *sides* naked; *veins* flabellate; *sori* linear, conspicuous.—*Hk. Sp. 5. p. 132. t. 291.*

Hab. Aneiteum and New Caledonia.—Resembles *Asplenium marinum* in habit.

32. *G. ferruginea*, Kze.; *st.* tufted, 6-12 in. l., stout and densely clothed with ferruginous woolly tomentum; *fr.* 1 ft. or more l., 3-4 in. br., ovate-lanceolate, bipinnate; *pinnæ* 2-3 in. l.,  $\frac{1}{2}$ -1 in. br., cut down to the rachis below into oblong or linear-oblong entire or slightly toothed lobes; *texture* subcoriaceous; upper *surface* naked; lower and *rachis* densely coated with tomentum; *veins* flabellate; *sori* lax, simple or forked.— $\beta$ , *G. lanata*, Klotzsch; less woolly beneath; *pinnl.* larger, and the lower ones bluntly lobed halfway down.—*Hk. Sp. 5. p. 130.*

Hab. Peru; and gathered also by Seeman in Panama.

33. *G. Haughtoni*, Hk. MSS.; *st.* densely tufted, 1-2 in. l., black, glossy; *fr.* 3-4 in. l., 1-1 $\frac{1}{2}$  in. br., ovate-lanceolate, bipinnate; *pinnæ* close, the central ones lanceolate-deltoid, cut down nearly or quite to the rachis below into suborbicular irregularly crenated lobes; *texture* subcoriaceous; *veins* flabellate; *colour* dark-green, only the lower surface slightly scaly; *sori* oblong, thick, at last often filling up nearly the whole surface.—*G. cordata*, *Hk. Sp. 5. p. 131. (in part). 2nd Cent. t. 7.*

Hab. St. Helena.—Perhaps should be joined with *G. cordata*, from which it differs by being more deeply cut and hardly at all scaly.

34. *G. Hookeri*, J. Sm.; *st.* tufted, 4-6 in. l., firm, dark chesnut-brown, glossy, clothed when young with ferruginous tomentum; *fr.* 9-15 in. l., 4-5 in. br., oblong-lanceolate, bipinnate; *pinnæ* numerous, lanceolate, cut down to the rachis into entire or slightly toothed linear-oblong *pinnl.*, the longest  $\frac{1}{4}$ - $\frac{3}{8}$  in. l., with enrolled edges and about their own breadth between them; *texture* coriaceous; upper *surface* and castaneous rachis naked; lower clothed with ferruginous tomentum.

Hab. Andes of New Granada, *Purdie*, *Schlim* 609, and Bolivia, *Mandon* 1547.—Habit of *G. ochracea*, but the under surface and young stems coated with ferruginous tomentum, and not powdery.

35. *G. javanica*, Blume; *rhizome* creeping; *st.* naked, glossy, 1-4 ft. l.; *fr.* 1-4 ft. l., varying from 1 to 2 pinnate; *pinnl.* sessile or slightly stalked, 3-12 in. l.,  $\frac{1}{2}$ -3 in. br., oblong-lanceolate, the apex acuminate, the edge entire or finely toothed; *texture* firm-herbaceous; *rachis* stramineous, and both *sides* glossy,

sometimes slightly pubescent; *veins* close, simple, or once forked, the *sori* running along all of them, but stopping a space short of the edge.—*Hk. Sp. 5. p. 145.* Coniogramme, *Fée*.

Hab. N. India (up to 8,000 ft.) and Japan to the Sandwich Isles, Fiji, Malayan Islands, and Ceylon, Fernando Po, Cameroon Mountains, and St. Thomas, West Tropical Africa.—We include here three species of *Fée*, *C. serrulata*, *javanica*, and *serra*, and *G. pilosa*, Brack., as a hairy form. *Diplazium frazineum*, Don, appears to be the oldest name.

\*\*\*\* *Fronde tripinnatifid.* Sp. 36-45.

36. *G. Schomburgkiana*, Kze.; *st.* tufted, 6-9 in. l., naked, glossy, dark chesnut-brown, flexuose; *fr.* 2-5 in. l., 1-1½ in. br., ovate-lanceolate, tripinnatifid; lower *pinnæ* deltoid, cut down to the rachis into spatulate cleft or pinnatifid *pinnl.*; *texture* subcoriaceous; *rachis* wiry like the stem; *veins* flabellate; upper *surface* with a few firm hairs on the veins; *sori* irregular.—*Hk. Sp. 5. p. 127. 2nd Cent. t. 92.*

Hab. British Guiana, *Richd. Schomburgk 1196, Appun 1091.*

37. *G. aureo-nitens*, Hk.; *st.* stout, densely clothed with deciduous dark-ferruginous tomentum; the rachis very flexuose and zigzag; *pinnæ* on stalks ½-1 in. l., lanceolate-deltoid, the largest 4-6 in. l., 2-3 in. br., cut down to the rachis below into blunt irregular subdeltoid *pinnl.* with broad blunt lobes; *texture* thick; under *surface* and *rachis* densely matted with bright ferruginous tomentum; *sori* hidden, elongated, simple or forked.—*Hk. Sp. 5. p. 130. Ic. t. 820. Eriosorus, Fée.*

Hab. Peru.—A fragment from Ecuador resembles this in cutting and habit, but is much less woolly, with naked ebeneous rachises.

38. *G. Matthewsii*, Hk.; *st.* tufted, 4-6 in. l., glossy, dark chesnut-brown, clothed with deciduous dense brown hairs; *fr.* 12-15 in. l., 4-5 in. br., oblong-lanceolate, tripinnatifid; lower *pinnæ* distant, lanceolate-deltoid, 2 in. l., 1 in. br., cut down to the rachis below into oblong-deltoid blunt *pinnl.* with broad rounded lobes, lowest *pinnæ* distant and reduced; *texture* coriaceous; *rachis* densely matted with brown hairs, and both *sides* pilose; *veins* conspicuous, flabellate; *sori* brown.—*Hk. Sp. 5. p. 128. t. 290.*

Hab. Peru, *Matthews, 1814.*

39. *G. Warcewiczii*, Mett.; *st.* 6-8 in. l., reddish, slightly hairy, at last naked; *fr.* 6-15 in. l., 2-4 in. br., oblong-lanceolate, tripinnatifid; *pinnæ* 2½ in. l., lax, sessile or stalked, ovate-rhomboidal or ovate-oblong obtuse, cut down nearly or below quite to the rachis into ovate-rhomboidal obtuse pinnatifid *pinnl.*, lower *pinnæ* distant, reduced; *texture* coriaceous, rigid; upper *surface* naked, the lower and reddish flexuose *rachis* slightly hairy; *veins* flabellate.—*Mett. Fil. Nov. Gran. p. 211.*

Hab. New Granada.

40. *G. cheilanthoides*, Kaulf.; *st.* tufted, 3-6 in. l., wiry, slender, glossy, dark chesnut-brown; *fr.* 6-10 in. l., 1 in. br., ligulate, tripinnatifid; *pinnæ* close, deltoid, ½ in. l., nearly as broad, the upper lobes simple, linear-oblong, the lower ones forked or trifid, the largest ult. divisions 1 lin. l., ¼ lin. br.; *texture* herbaceous, the glossy castaneous rachis and both *sides* slightly pilose; *veins* 1 to each ult. division; *sori* oblong.—*Hk. Sp. 5. p. 135. Hk. & Gr. Ic. t. 24.*

Hab. Mauritius and Tristan d'Acunha.

41. *G. flabellata*, Hk.; *st.* 3-4 in. l., wiry, glossy, dark chesnut-brown; *fr.*



8-12 in. l.,  $1\frac{1}{2}$ -2 in. br., elongate-oblong, tripinnatifid; *pinnæ* distant, alternate, erecto-patent,  $1-1\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., the lower *pinnl.* stalked, as broad as long, cuneato-flabellate, deeply lobed, the lobes oblong, blunt; *texture* herbaceous; both *sides* and the castaneous *rachis* pilose; *veins* and *sori* one to each lobe, the latter confluent in the centre of the pinnules.—*Hk. Sp. 5. p. 134.*

Hab. Andes of Ecuador, *Jameson.*

42. *G. myriophylla*, Sw.; *st.* 6-12 in. l., reddish-brown, more or less villose; *fr.* 12-18 in. l., 4-6 in. br., oblong-lanceolate, tripinnatifid; *pinnæ* distant, lanceolate, 2-3 in. l., 1 in. br.; *pinnl.* lanceolate, cut down to the rachis below into suborbicular or oblong toothed or pinnatifid *segm.*; *texture* herbaceous; *rachis* and both *sides* pubescent; *veins* 1 to each ult. division; *sori* oblong, confluent in the centre of the segments.—*Hk. Sp. 5. p. 134.*

Hab. Brazil.

43. *G. pedata*, Kaulf.; *rhizome* creeping; *st.* distant, 6-12 in. l., fragile, glossy, bright chesnut-brown; *fr.* 4-6 in. each way, lower *pinnæ* much the largest, the upper ones lanceolate, with linear-oblong entire or slightly toothed lobes  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.,  $\frac{1}{4}$  in. br.; lowest *pinnl.* 1-2 in. l., with similar divisions; *texture* herbaceous; upper *surface* slightly hispid, lower pubescent, especially on the midrib; *sori* confluent, forming an intramarginal band.—*Hk. Sp. 5. p. 131.*

Hab. Mexico and Guatemala.—Distinguished by its pedate habit.

44. *G. leptophylla*, Desv.; *st.* 1-4 in. l., tufted, slender, glossy, chesnut-brown; *fr.* 2-4 in. l.,  $1-1\frac{1}{2}$  in. br., ovate or deltoid, bi- or tripinnate, the barren ones smaller and on shorter stems; *segm.* cuneato-flabellate, cut from the circumference to the centre into linear or oblong lobes  $\frac{1}{2}$  lin. br.; *texture* pellucido-herbaceous; a single *vein* and line of fruit carried into each ult. lobe.—*Hk. Sp. 5. p. 136. B. F. t. 1. Hk. & Gr. t. 25.*

Hab. Jersey and shores of the Mediterranean, Barbary States, Azores, Madeira, Canaries, Abyssinia, Cape Colony, Persia, Neilgherries, New South Wales, Van Diemen's Land, New Zealand, Andes of Mexico and Ecuador.—This and the two next are annual, and form the genus *Anogramma* of Link.

45. *G. Ascensionis*, Hk.; *st.* 1-2 in. l., tufted, slender, almost filiform, greenish or chesnut-brown; *fr.* 2-3 in. l.,  $1-1\frac{1}{2}$  in. br., deltoid, bi- or tripinnatifid; lower *pinnæ* deltoid; *segm.* rhomboidal, flabellately cut, the lobes short and rather acute; *texture* thin-herbaceous; *veins* and linear *sori* 1 to each ult. lobe.—*Hk. Sp. 5. p. 137.—2nd Cent. t. 67.*

Hab. Ascension Island, *Dr. Hooker, Dr. Curror.*—This comes very near some of the forms of the next species.

\*\*\*\*\* *Fronds quadripinnatifid. Sp. 46-50.*

46. *G. chærophylla*, Desv.; *st.* tufted, slender, 3-6 in. l., green upwards, chesnut-brown near the base; *fr.* 3-6 in. l., 2-4 in. br., ovate or deltoid, quadripinnatifid; lower *pinnæ* and *pinnl.* deltoid; *segm.* flabellately cut, the ult. divisions short, oblong, subacute; *texture* pellucido-herbaceous, a *vein* and *sorus* to each ult. division, the latter confluent in the centre of the segments.—*Hk. Sp. 5. p. 131. Hk. & Gr. t. 45.*

Hab. Cuba and Guatemala to Buenos Ayres and Paraguay.

47. *G. microphylla*, Hk.; *st.* densely tufted, 2-4 in. l., slender, fragile, glossy, chesnut-brown; *fr.*  $1\frac{1}{2}$ -3 in. l.,  $1-1\frac{1}{2}$  in. br., deltoid, quadripinnatifid; *pinnæ* close, the lower ones deltoid; *pinnl.* deltoid; *ult. divisions* under 1 lin. l., half as

broad; *texture* pellucido-herbaceous; *veins* and *sori* one to each ult. division, the latter oblong.—*Hk. Sp. 5. p. 129. 2nd Cent. t. 15.*

Hab. Khasya, *Griffith.*—Habit of the three preceding, but not annual.

48. *G. hirta*, Desv.; *st.* tufted, 6-12 in. l., glossy, dark chesnut-brown, slightly pilose; *fr.* 6-12 in. l., 4-8 in. br., ovate-deltoid, quadripinnatifid; lower *pinnæ* and *pinnl.* deltoid; *segm.*  $\frac{1}{8}$ - $\frac{1}{4}$  in. each way, cuneato-flabellate, with blunt oblong lobes; *texture* firm-herbaceous; *rachis* castaneous, often slightly flexuose, like both sides more or less pilose; *veins* and *sori* 1 to each lobe, the latter confluent in the centre of the segments.—*G. laserpitifolia, Kze. Hk. Sp. 5. p. 133.*

Hab. Columbia.—*G. hispidula*, Klotzsch (*Jamesonia*, Kze.), is apparently a reduced form. *G. glandulosa*, Karst., differs from the type by being less divided and densely glandular.

49. *G. flexuosa*, Desv.; *st.* 6-18 in. l., glossy, chesnut-brown, flexuose, slender; *fr.* 3-4 ft. l., scandent, tri- or quadripinnate; *rachises* zigzag, branched; *pinnæ* reflexed, subdeltoid in general outline; *segm.* flabellately branched; *ult. divisions* linear or oblong,  $\frac{1}{2}$  lin. br., with 1 vein and oblong sorus to each; *texture* firm-herbaceous.—*Hk. Sp. 5. p. 129. G. retrofracta, Hk. & Gr. Bot. Misc. 3. t. 112.*

Hab. Nicaragua to Peru.

50. *G. Pearcei*, Moore; *st.* 6-9 in. l., glossy, chesnut-brown; *fr.* about 1 ft. each way, deltoid, quadripinnatifid; lower *pinnæ* the largest, 4-6 in. l., subdeltoid; *pinnl.* imbricated; *ult. divisions*  $\frac{1}{8}$  in. l.,  $\frac{1}{4}$  lin. br., simple or forked; *texture* herbaceous; *rachis* and both *sides* naked; one *vein* and *sorus* to each ult. division.—*Moore, G. C. 1864, p. 340.*

Hab. Peru; discovered by Mr. Pearce.—Allied to the preceding, but the divisions much narrower, and rachis not flexuose. The crown of the root is slightly powdery.

§§§§ Ceropteris, *Link.* Differs from Eugymnogramme only by the fronds being coated beneath with white or yellow powder. *Sp. 51-57.*

51. *G. (Cerop.) trifoliata*, Desv.; *st.* tufted, 8-12 in. l., stout, erect, dark chesnut-brown, the lower part scaly; *fr.* 2-3 ft. l., 6-8 in. br., pinnate; lower *pinnæ* ternate, the upper ones simple, petiolate, 2-4 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., linear-oblong, nearly entire; *texture* herbaceous, the under side usually naked in the barren fronds, clothed in the fertile ones with white or yellowish powder.—*Hk. Sp. 5. p. 149. G. F. t. 4.*

Hab. Cuba, southward to Peru and Brazil.—A variable plant. We include here three species of Fée,—his *Trismeria argentea*, *aurea*, and *microphylla*.

52. *G. (Cerop.) triangularis*, Kaulf.; *st.* densely tufted, 6-12 in. l., dark chesnut-brown, glossy, nearly naked; *fr.* 3-4 in. each way, deltoid; lower *pinnæ* much the largest, deltoid, unequal-sided, the others lanceolate, deeply pinnatifid, with oblong obtuse lobes; *texture* subcoriaceous; *powder* varying from deep orange to white.—*Hk. Sp. 5. p. 146. Hk. & Gr. t. 153. Fil. Ex. 2. 153.*

Hab. Vancouver's Island and Oregon southward to Ecuador.

53. *G. (Cerop.) tartarea*, Desv.; *st.* tufted, firm, 6-12 in. l., dark chesnut-brown, scaly towards the base; *fr.* 1-2 ft. l., 6-12 in. br., oblong-deltoid, bipinnatifid; *pinnæ* lanceolate, the lowest the largest; *pinnl.* oblong, obtuse, entire or nearly so, united or the lower ones free; *texture* subcoriaceous; *powder* dense, pure white.—*G. dealbata, Link.*— $\beta$  *G. ochracea*, Presl; *pinnl.* very regular and



only the lowest toothed; *powder* bright-yellow.— $\gamma$ , *G. ornithopteris*, Klotzsch; *texture* more coriaceous, edges of the divisions incurved; *powder* white or yellow.—*Hk. Sp. 5. p. 148.*— $\delta$ , *G. Steltzneri*, Koch; *fr.* elongated, flaccid; *pinnæ* lanceolate, subdistant; *powder* yellow, thin; *st.* and *rachis* pubescent.

*Hab.* Tropical America.—There is no clear line of distinction between this and the preceding. The forms associated here differ mainly from those placed under *calomelanos* by being firmer in texture and less divided. *G. guianensis*, Klotzsch, comes between  $\alpha$  and  $\gamma$ , and *G. adiantoides*, Karst., is said to differ from  $\beta$  by its sublanceolate outline and acuminate pinnules. We cannot distinguish from *G. ochracea* a plant gathered by Gerrard in Natal.

54. *G.* (Cerop.) *calomelanos*, Kaulf.; *st.* tufted, firm, 6-12 in. l., nearly black; *fr.* 1-3 ft. l., 6-12 in. br., oblong-deltoid, tripinnatifid; *pinnæ* close, lanceolate, the lowest the largest, sometimes 6 in. l.,  $1\frac{1}{2}$ -2 in. br.; lower *pinnl.* distinct, lanceolate or subdeltoid, often cut down nearly to the rachis; *texture* subcoriaceous or herbaceous; *powder* white.—*Hk. G. F. t. 30.*— $\beta$ , *G. peruviana*, Desv.; *fr.* smaller; *st.* and *rachis* castaneous; lower *pinnæ* deltoid; lower *pinnl.* often cut down to the rachis.— $\gamma$ , *G. chrysophylla*, Kaulf.; size and habit of  $\beta$ , but the rachis darker and the powder bright yellow.—*Hk. Sp. 5. p. 148.*

*Hab.* West Indies, southward to Rio Janeiro, Peru, and Samoa; Tropical West African Islands.—We include here a wide range of forms connected by very gradual intermediate stages. *G. L'Herminieri*, *Martensii*, and *Massoni* of Link, and *C. intermedia*, Fée, are all intermediate between  $\alpha$  and  $\gamma$ .

55. *G.* (Cerop.) *pulchella*, Linden; *st.* tufted, firm, 6-9 in. l., dark chesnut-brown, powdery; *fr.* 6-12 in. l., 4-6 in. br., oblong-deltoid, tripinnatifid; lower *pinnæ* the largest, lanceolate-deltoid; *pinnl.* imbricated, the lower ones subdeltoid; *segm.* flabellato-cuneate, often  $\frac{1}{8}$  in. br.; *texture* herbaceous; *powder* pure white.—*Hk. Fil. Ex. t. 74.*

*Hab.* Venezuela.—Joined in "Sp. Fil." to *G. sulphurea*, from which it differs by its more robust habit, white powder, and frond broadest at the base. It comes very near *G. peruviana*. Var. *Wettenhalliana*, Moore, is a garden variety, with pale sulphur-coloured powder.

56. *G.* (Cerop.) *sulphurea*, Desv.; *st.* densely tufted, 1-6 in. l., generally short, slender, chesnut-brown, often powdery; *fr.* 6-12 in. l., 3-4 in. br., ovate-lanceolate, tripinnatifid; *pinnæ* lanceolate, the lower ones gradually reduced; *pinnl.* flabellately cut, with entire or cleft cuneate *segm.* 1-1 $\frac{1}{2}$  lin. br.; *texture* herbaceous; *powder* bright yellow.—*Hk. Sp. 5. p. 147.*

*Hab.* West Indies.—Distinguished by its cutting, small size, herbaceous texture and frond narrowed in the lower third.

57. *G.* (Cerop.) *rosea*, Desv.; *st.* tufted, slender, 3-6 in. l., dark chesnut-brown, glossy; *fr.* 6-12 in. l., subdeltoid, quadripinnatifid; *pinnæ* not numerous, often distant, deltoid, the lower ones 3-4 in. l., 2 in. br.; *pinnl.* and *segm.* deltoid, the ult. divisions small, flabellato-cuneate; *texture* herbaceous; *powder* white or tinged with red; *sori* pale-brown.—*G. conspersa*, Kze. *Hk. Sp. 5. p. 147.* *G. farinosa*, Bojer.

*Hab.* Mascaren Isles and Natal.—*G. conspersa*, Kze., appears to be a slender flaccid form of the Mascaren species. A plant from Bourbon, received from the Paris Museum under the name of *G. aurea*, is more robust in habit, with broader and closer divisions and yellow powder, and Dr. Welwitzsch has gathered similar examples in Angola.

Series 3. Habit and mode of growth of *Eupolypodium*. Sp. 53-84.

§§§§§§ Syngramme, *J. Sm.* Veins close, subparallel, united only by transverse veinlets near the margin. Fig. 52. d. Sp. 53-65.

58. G. (Syn.) *borneensis*, Hk.; *rhizome* creeping, woody, densely clothed with nearly black fibrillose scales; *fr.* subsessile, 4-6 in. l.,  $\frac{1}{4}$ - $\frac{3}{4}$  in. br., ligulate, narrowed to both ends, the edge very slightly toothed, the barren ones the broadest; *texture* coriaceous; both *sides* naked; *veins* immersed, once or twice forked, connected by indistinct transverse veinlets close to the edge.—*Hk. Sp. 5. p. 154. t. 301.*

Hab. Borneo, *T. Lobb.*

59. G. (Syn.) *cartiligidens*, Baker; *rhizome* slender, creeping, clothed with very small black fibrillose scales; *st.*  $\frac{1}{4}$ - $\frac{1}{2}$  in. l.; *fr.* 4-6 in. l.,  $\frac{1}{2}$ - $\frac{3}{8}$  in. br., ligulate, the point acuminate, the lower half narrowed very gradually, the edge thickened and fringed with close small distinctly cartilaginous linear teeth; *texture* subcoriaceous; both *sides* naked; *veins* fine, close, very distinct when the frond is held up to the light, connected only just within the edge and the connecting vein not always distinct from the thickened border; *sori* fine, close, separated by a space from the midrib.

Hab. Borneo, *Signor Beccari*; communicated by Mrs. Lyell.—Differs from the last by its thinner texture, finer veins and sori, and very peculiar teeth.

60. G. (Syn.) *obtusifolia*, Hk.; *rhizome* creeping, fibrillose; *st.* 2-3 in. l., naked, greenish, flexuose; *fr.* 6-9 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., ligulate, the point blunt, the lower part narrowed very gradually; *texture* coriaceous; both *sides* naked; *veins* prominent, simple or forked, connected near the edge; *sori* linear-oblong, medial.—*Hk. Sp. 5. p. 153. t. 299.*

Hab. Java, *De Vriese.*

61. G. (Syn.) *Lobbiana*, Hk.; *st.* tufted, 2-3 in. l., glossy, ebeneous; *fr.* 6-10 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., linear-oblong, entire, the apex acuminate, the base narrowed or slightly rounded; *texture* coriaceous; both *sides* naked; *veins* parallel, simple or forked, united by a series of transverse veinlets a short distance from the edge, which bound the copious *sori*.—*Hk. Sp. 5. p. 153. t. 300.*

Hab. Borneo, *T. Lobb.*

62. G. (Syn.) *vittæformis*, Hk.; *st.* subtufted, 12-18 in. l., naked, flexuose, dark-brown; *fr.* 8-12 in. l.,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. br., spathulate-oblong, the edge irregularly repand, the point acute; *texture* subcoriaceous; both *sides* naked; *veins* fine, parallel, forming one or two rows of distinct areolæ near the edge; *sori* extending from the midrib to the margin.—*Hk. Sp. 5. p. 154.*

Hab. Philippines, *Cuming*, 329.

63. G. (Syn.) *Wallichii*, Hk.; *st.* subtufted, 6-18 in. l., firm, glossy, chesnut-brown, slightly fibrillose towards the base; *fr.* 6-10 in. l.,  $1\frac{1}{2}$ -2 in. br., oblong-lanceolate, quite entire, the apex acuminate, the base narrowed rather gradually; *texture* subcoriaceous; both *sides* naked; *veins* fine, parallel, uniting ones near the edge and indistinct beyond where they join; *sori* extending on all the veins from the midrib to where they unite.—*Hk. Sp. 5. p. 155. t. 302.*

Hab. Singapore and Borneo.

64. G. (Syn.) *alismæfolia*, Hk.; *st.* subtufted, 6-18 in. l., firm, glossy, chesnut-brown; *fr.* 5-8 in. l., 2-3 in. br., oblong, the apex acuminate, the base rounded, the edge entire; *texture* subcoriaceous; both *sides* naked; *veins* fine,



parallel, uniting only near the edge, and indistinct beyond where they join; *sori* extending on all the veins from the midrib to where they join.—*Hk. Sp. 5. p. 154.*

Hab. Singapore and Philippines.

65. G. (Syn.) *quinata*, Hk.; *st.* 6-12 in. l., glossy, naked, straw-coloured or chestnut-brown; *fr.* 6-12 in. l., 4-8 in. br., quinate, the terminal *pinna* the largest, 6-12 in. l., 1½-2 in. br., oblong-lanceolate acuminate, the edge entire, the lower part narrowed gradually to the base, the lowest pair deflexed and originating from the base of the lateral pair; *texture* subcoriaceous; both *sides* naked; *veins* fine, parallel, uniting near the edge, with long *sori* upon all of them.—*Hk. Sp. 5. p. 152. t. 297.*

Hab. Borneo, Vanecolla, and Solomon Isles.—Fronde like the leaf of a horse-chesnut.

§§§§§§§§ Selliguela, Bory. *Veins anastomosing variously and usually copiously. Differs from Phymatodes only by the elongated sori.* Fig. 52. e. f. *Sp. 66-84.*

\* *Fronde simple.* *Sp. 66-79.*

† *Main veins hidden.* *Sp. 66-70.*

66. G. (Sell.) *lanceolata*, Hk.; *rhizome* wide-creeping, the scales small, linear, dull-brown; *fr.* 6-12 in. l., ½-¾ in. br., the point acute, the edge entire, the lower third narrowed gradually to the base or a short stem; *texture* thick, coriaceous but flaccid; both *sides* naked; *veins* obscure, the midrib much more slender than in *G. involuta*, the *sori* more oblique and falling considerably short of the edge.—*Hk. Sp. 5. p. 156.* Grammitis, *Hk. & Gr. t. 43.*

Hab. Japan, China, Himalayas, Neilgherries, Ceylon, Fiji, Samoa, Mascaren Isles, Natal, Guinea Coast.

67. G. (Sell.) *mexicana*, Baker; *rhizome* wide-creeping, the scales large, lanceolate-acuminate, dull-brown; *fr.* subsessile, 6-10 in. l., 1-1¼ in. br., the point acute, the lower half narrowed very gradually to the base; *texture* coriaceous but flaccid; both *sides* naked; *veins* obscure, the midrib broad and fleshy at the base but almost vanishing upwards; *sori* linear-oblong, few and not close, almost in one row on each side, not far from the midrib.—Selliguela, *Fée. G. Salvini*, *Hk. Sp. 5. p. 157.* 2nd Cent. t. 71.

Hab. Mexico and Guatemala.

68. G. (Sell.) *elongata*, Hk.; *rhizome* wide-creeping, tomentose; *st.* distant, ¼ in. l., naked, ebeneous; *fr.* 4-8 in. l., ¼-½ in. br., narrowed gradually to both ends, the edge entire; *texture* coriaceous; both *sides* thinly clothed with small scales; *veins* obscure; *midrib* black in the lower part; *sori* linear-oblong, placed end to end in single rows midway between the midrib and edge.—*Hk. Sp. 5. p. 157.*

Hab. Cuba to Rio Janeiro and Juan Fernandez.—Habit and scales of *Polyp. lanceolatum.*

69. G. (Sell.) *involuta*, Don; *rhizome* creeping, the scales large, lanceolate, dull-brown; *fr.* 8-12 in. l., 1-2 in. br., the point acuminate, the edge entire, the lower part narrowed very gradually to the base or a short broad compressed stem; *texture* thick, coriaceous but flaccid; both *sides* naked; *areolæ* obscure, without free veinlets; *sori* in long parallel very oblique lines reaching from the midrib nearly to the edge.—*Hk. Sp. 5. p. 155.* Grammitis, *Hk. & Gr. t. 53.* S. Wallichiana, *Hk. Ic. t. 204.*

Hab. N. India, Neilgherries, Ceylon, Malaccas, Solomon Isles.

70. G. (Sell.) *avenia*, Baker; *rhizome* creeping, the scales linear, dull-brown; *fr.* 12-18 in. l., 1-3 in. br., the point acuminate, the edge entire, the lower half narrowed gradually to the base or a short stout black stem; *texture* subcoriaceous; both *sides* naked; *areolæ* distinct, with free veinlets; *sori* in long parallel oblique lines nearly touching the midrib but falling short of the edge.—Grammitis, *Blume*.

Hab. Malayan Peninsula and Isles.—Habit of the last, but thinner in texture, not wrinkled when dry, the areolæ finer, and furnished with free veinlets.

†† *Main veins distinct nearly or quite to the edge.* Sp. 71-79.

A. *Main veins fine, texture of the frond papyraceous.* Sp. 71-75.

71. G. (Sell.) *membranacea*, Hk.; *rhizome* wide-creeping, the scales small, linear, nearly black; *st.* 2-6 in. l., nearly naked; *fr.* 6-12 in. l.,  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. br., the point much acuminate, the edge entire, the lower part narrowed very gradually; *texture* papyraceo-herbaceous; both *sides* naked; primary *veins* distinct to the edge, but zigzag and very slender, united by similar transverse veinlets so as to form large hexagonal areolæ; *sori* in oblique parallel interrupted lines, one between each main vein.—*Hk. Sp. 5. p. 159.*

Hab. Malay Isles and Philippines.

72. G. (Sell.) *Wrightii*, Hk.; *rhizome* firm, wide-creeping, the scales small, linear, dull-brown; *st.* 3-4 in. l., firm, naked; *fr.* 12-18 in. l., 1-1 $\frac{1}{2}$  in. br., the apex acute, the edge irregularly repand, narrowed suddenly about the middle and below this very gradually into the stem; *texture* papyraceo-herbaceous; both *sides* naked; main *veins* distinct to the edge, but zigzag and very slender; *areolæ* copious, with free included veinlets; *sori* in continuous oblique parallel rows one between each main vein.—*Hk. Sp. 5. p. 160. t. 303.*

Hab. Loo Choo and Formosa.

73. G. (Sell.) *regularis*, Baker; *rhizome* creeping, the scales  $\frac{1}{2}$  in. l., ovate-lanceolate, subferruginous; *st.* 1-6 in. l.; *fr.* dimorphous, the barren ones 15 in. l., 2 $\frac{1}{2}$  in. br., elongate-oblong, narrowed gradually to both ends, the edge entire, the fertile ones 8 in. l., 2 in. br.; *texture* papyraceous; both *sides* naked; main *veins* 2-3 lin. apart, the areolæ copious, subquadrate, the main ones divided into distinct secondary ones with free veinlets; *sori* in single interrupted or continuous rows between the main veins.—*Polyp. Mett. Fil. Ind. 2. p. 225.*

Hab. Borneo, *Korthals*.

74. G. (Sell.) *macrophylla*, Hk.; *rhizome* creeping, the scales lanceolate, dull-brown; *st.* 2-6 in. l., naked; *fr.* 12-18 in. l., 3-4 in. br., narrowed gradually to both ends, the edge entire; *texture* papyraceous; main *veins* distinct but slender and zigzag, with copious uniform subquadrangular areolæ with free veinlets between them; *sori* in single continuous or slightly interrupted rows between the main veins.—*Hk. Sp. 5. p. 159.*

Hab. Malay and Philippine Isles and New Guinea.

75. G. (Sell.) *spuria*, Baker; *rhizome* creeping, the scales ovate-acuminate, brown; *st.* 9 in. l., reddish-brown, margined upwards; *fr.* 1 ft. l., 3 in. br., ovate-oblong, the base cuneate, the point bluntish, the edge subrepand; *texture* papyraceous; both *sides* naked; main *veins* straight, prominent, 3-4 lines apart; *areolæ* irregular, the main ones divided, and those again sometimes subdivided with free veinlets; *sori* in single interrupted rows.—*Polyp. Mett. Fil. Ind. 2. p. 226.*

Hab. Celebes, *Forsten*.



## B. Main veins prominent, texture coriaceous. Sp. 76-79.

76. G. (Sell.) *Féei*, Hk.; *rhizome* firm, wide-creeping, the scales bright-brown, fibrillose; *fr.* dimorphous, the barren ones 3-4 in. l., 1½-2 in. br., ovate-oblong, on stems 1-3 in. l., the fertile ones 3-6 in. l., ¾-1¼ in. br., on shorter stems, both acute and entire; *texture* coriaceous; both *sides* naked; main *veins* distinct, the intermediate veinlets obscure; *sori* linear-oblong, immersed, in single rows between the main veins, not reaching either to the midrib or edge.—*Hk. Sp. 5. p. 158.*

Hab. Malay Peninsula and Isles.—*P. vulcanicum*, Blume, is said to be like this, but to have the barren and fertile fronds uniform.

77. G. (Sell.) *heterocarpa*, Blume; *rhizome* woody, wide-creeping, the scales dense, ¼ in. l., linear, full-brown; *st.* 6-9 in. l., firm, erect, naked; *fr.* 6-12 in. l., 1-2 in. br., the point much acuminate, the edge entire, the lower part narrowed very gradually; *texture* subcoriaceous; both *sides* naked, glossy; main *veins* distinct to the edge, the veinlets hidden; *sori* linear-oblong, immersed, one between each main vein, not extending either to the edge or midrib.—*Hk. Sp. 5. p. 160.*

Hab. Java.

78. G. (Sell.) *Hamiltoniana*, Hk.; *rhizome* wide-creeping, woody, the scales linear, dull-brown; *fr.* dimorphous, the barren ones 1 ft. l., 3-4 in. br., spatulate, the stem 2-3 in. l., the fertile ones 4-6 in. l., 1½ in. br., the stems more than 1 ft. l., slender, naked; *texture* subcoriaceous; both *sides* naked; main *veins* distinct to the edge, with copious intermediate areolæ with free included veinlets; *sori* in broad continuous rows, one between each main vein.—*Hk. Sp. 5. p. 160.* Ceterach pedunculata, *Hk. & Gr. t. 5.*

Hab. East Himalayas (subtropical region).

79. G. (Sell.) *caudiformis*, Hk.; *rhizome* woody, creeping, the scales large, pale-brown, lanceolate; *st.* 6-9 in. l., firm, erect, glossy, pale-brown; *fr.* 6-9 in. l., ovate-oblong acuminate, the sterile ones 3-4, the fertile ones 1-2 in. br.; *texture* coriaceous; both *sides* naked; main *veins* distinct to the edge, the veinlets obscure; *sori* in one continuous or interrupted row between the main veins.—*Hk. Sp. 5. p. 158. Bot. Mag. t. 5328.*

Hab. Mergui, Moulmein, and Malayan and Polynesian Isles to Tahiti and New Caledonia.

\*\* *Fronds compound.*—Sp. 80-84.

80. G. (Sell.) *palmata*, Baker; *st.* 6-9 in. l., polished, naked, ebeneous; *fr.* 6-9 in. each way, cut down palmately very nearly to the base into five divisions, the central one 4-6 in. l., 1-1½ in. br., oblong-lanceolate, slightly sinuated, the others similar but shorter, and often unequal-sided; *texture* thin-herbaceous; both *sides* nearly naked; main *veins* wavy and falling short of the edge; *areolæ* fine, irregular, with a few free veinlets; *sori* fine, irregular in shape, united on the uniting veinlets.

Hab. San Christoval, Solomon Isles, *Milne, 508.*

81. G. (Sell.) *elliptica*, Baker; *rhizome* woody, wide-creeping; *st.* 1 ft. or more l., firm, erect, naked, stramineous; *fr.* 12-18 in. l., 6-9 in. br., cut down nearly to the rachis in the upper and quite in the lower part into 4-6 linear-oblong *pinnæ* on each side, which are 6-8 in. l., ½-1½ in. br.; *texture* herbaceous; *rachis* and both *sides* naked; main *veins* slender, not distinct to the edge; *areolæ* large and unequal, with free veinlets; *sori* linear, oblique, reaching the midrib, but not the edge.—*Polyp. Thunb. G. decurrens, Hk. Sp. 5. p. 161.*

Hab. Himalayas (up to 6,000 ft.) and Japan southward to Moulmein, the Philippines, and Queensland.—Oldham gathered in Formosa a form with the fronds quite entire.

82. *G.* (Sell.) *pinnata*, Hk.; *st.* subtufted, 6-12 in. l., firm, erect, glossy; *fr.* 1. ft. or more l., nearly as br., simply pinnate; *pinnæ* erecto-patent, 6-9 in. l.,  $\frac{1}{2}$ -1 in. br., narrowed gradually to both ends, the lower ones stalked, the edge nearly entire; *texture* coriaceous; *rachis* and both *sides* naked; *areolæ* narrow, irregular, usually in two rows between the midrib and edge; *sori* oblong or linear, irregular, often confluent.—*Hk. Sp. 5. p. 151.* Dictyogramme, *Moore.*

Hab. Fiji and Queensland to the Malay Isles.—*G. ? subtrifoliata*, Hk. *Sp. 5. p. 152. t. 298.* from Fiji, is like this in habit and the shape of the *pinnæ*, but they are only three in number, and the veins join hardly at all. The fruit is not known.

83. *G.* (Sell.) *japonica*, Desv.; *rhizome* creeping; *st.* 6-12 in. l., glossy, stramineous or chesnut-brown, naked; *fr.*  $1\frac{1}{2}$ -2 ft. l., 1 ft. br., simply pinnate or bipinnate at the base; *pinnæ* 6-12 in. l., 1-2 in. br., linear-oblong, acuminate, entire, the lower ones stalked; *texture* herbaceous; *rachis* and both *sides* naked; *veins* close, usually twice forked, and joining once, the *sori* often on all of them and extending from the midrib to the edge.—*Hk. Sp. 5. p. 151.* Dictyogramme, *Presl.*

Hab. Japan and Formosa.—Probably not really distinct from *G. javanica*.

84. *G.* (Sell.) *podophylla*, Hk.; *st.* tufted, 6-8 in. l., dark chesnut-brown, glossy; *fr.* 4-6 in. each way, deltoid; lower *pinnæ* much the largest, cut down nearly to the rachis into oblong-lanceolate lobes, the lowest only prolonged and pinnatifid; *texture* herbaceous; under *surface* finely pubescent; *veins* copiously reticulated; *sori* in the outer half of the lobes.—*Hk. Sp. 5. p. 152. t. 296.*

Hab. Mexico and New Mexico.—Probably a form of *G. pedata*, with which it quite agrees in everything except venation.

#### GEN. 53. BRAINEA, *Hk.*

*Sori* continuous along transverse veins near the midrib and also produced along the veins in the direction of the edge of the frond. *A single subarborescent Indian and Chinese species resembling Blechnum in general habit, but with naked sori and the veins forming costular areolæ.* TAB. VI. f. 53.

1. *B. insignis*, Hk.; *trunk* 3-4 in. thick, the scales linear, ferruginous,  $\frac{3}{4}$ -1 in. l.; *st.* firm, 3-4 in. l., naked, scaly only at the base; *fr.* 2-3 ft. l., 8-12 in. br., simply pinnate; *pinnæ* close, numerous, linear, finely serrated; *texture* coriaceous; *rachis* and both *sides* naked.—*Hk. Sp. 5. p. 162. Fil. Ex. t. 33.*

Hab. Hong-Kong and Khasya.

#### GEN. 54. MENISCIUM, *Schreb.*

*Sori* oblong or linear, occupying the connivent transverse veinlets. *Fronds simple or once pinnate. A small genus, almost confined to the tropics, with the venation of Polypodium § Goniopteris, from which it differs only by its elongated or confluent sori.* TAB. VI. f. 54.

\* *Fronds simple.* Sp. 1-2.

1. *M. simplex*, Hk.; *rhizome* firm, wide-creeping; *st.* stramineous, slightly pubescent, of the barren frond 4-6 in., of the fertile 1 ft. or more l.; *barren*



*fr.* 6-9 in. l., 2-3 in. br., oblong-lanceolate acuminate, the base cordate and sometimes auricled, the edge crenate; *fertile fr.* similar, but smaller; *texture* subcoriaceous; *veins* beneath pubescent, main veins  $\frac{1}{2}$  in. apart; *areolæ* 8-12 between the midrib and edge.—*Hk. Sp. 5. p.* 162. *Fil. Ex. t.* 83.

Hab. Chusan, Hong-Kong, and Formosa.—Kunze considers this a simple form of *M. triphyllum*.

2. *M. giganteum*, Mett.; *st.* 1 ft. l., dark-brown, slightly pubescent; *fr.*  $1\frac{1}{2}$ -2 ft. l., 4 in. br., elongate-oblong, narrowed rather suddenly at both ends, the edge slightly repand; *texture* papyraceous; *veins* beneath nearly naked, main veins  $\frac{1}{4}$  in. apart; *areolæ* 30-40 between the midrib and edge.—*Hk. Sp. 5. p.* 163.

Hab. Peru, *Lechler*, 2292.

\*\* *Fronde pinnate.* Sp. 3-10.

3. *M. triphyllum*, Sw.; *rhizome* firm, wide-creeping; *st.* slender, stramineous, slightly pubescent, of the barren frond 4-6 in., of the fertile frond 1 ft. or more l.; *fr.* with an oblong-lanceolate terminal *pinnæ* 4-6 in. l.,  $1-1\frac{1}{2}$  in. br., the base cuneate or rounded, the edge repand, and 1-2 similar but smaller ones on each side, the fertile ones smaller than the barren ones; *texture* subcoriaceous; *veins* beneath slightly pubescent, main veins  $\frac{1}{8}$  in. apart; *areolæ* 6-9 between the midrib and edge.—*Hk. Sp. 5. p.* 163. *Hk. & Gr. t.* 120.

Hab. Himalayas to Ceylon, S. China, and Malaccas.

4. *M. Thwaitesii*, Hk.; *rhizome* firm, wide-creeping; *st.* 9-12 in. l., stramineous, nearly naked; *fr.* 8-10 in. l., 4-5 in. br., subdeltoid, the apex acuminate, crenato-pinnatifid, below this several blunt linear-oblong subentire *pinnæ*, the lowest the largest, distinctly stalked, 2-3 in. l.,  $\frac{3}{4}$  in. br., the edge bluntly, not deeply, lobed, the base narrowed suddenly; *texture* herbaceous; *colour* dark-green; midrib beneath pubescent; main *veins* 1 lin. apart; *areolæ* and *sori* 4-5 in the lower *pinnæ* between the midrib and edge.

Hab. Ceylon, *C. P.* 3145.

5. *M. pauciflorum*, Hk.; *st.* tufted, 6-12 in. l., glossy, brownish; *fr.* 12-13 in. l., 6-8 in. br.; *pinnæ* numerous, spreading,  $\frac{1}{2}$ - $\frac{3}{4}$  in. apart, 3-4 in. l., 2-3 lin. br., narrowed very gradually from the middle to both ends, the edge sharply toothed; *texture* subcoriaceous; *rachis* and both *sides* naked; *areolæ* in 1-2 rows between the midrib and edge.—*Hk. Sp. 5. p.* 164.

Hab. Sierra del Crystal, West Tropical Africa, *Mann*, 1672.

6. *M. salicifolium*, Wall.; *st.* 1 ft. or more l., stramineous or pale-brown, glossy; *fr.* 12-18 in. l., 1 ft. br.; *pinnæ* numerous,  $\frac{3}{4}$ - $1\frac{1}{2}$  in. apart, 4-8 in. l.,  $\frac{1}{4}$ - $\frac{3}{4}$  in. br., narrowed very gradually from the middle to both ends, the edge nearly entire, the lowest the largest; *texture* subcoriaceous; *rachis* and both *sides* glabrous; main *veins* oblique, 1 lin. apart; *areolæ* 4-5 between the midrib and edge.—*Hk. Sp. 5. p.* 164. *2nd Cent. t.* 90.

Hab. Penang and Singapore.

7. *M. angustifolium*, Will.; *st.* subtufted, 6-18 in. l., firm, erect, slightly pubescent; *fr.*  $1\frac{1}{2}$ -2 ft. l., 1 ft. br.; *pinnæ* spreading, 4-6 in. l.,  $\frac{1}{4}$ - $\frac{3}{4}$  in. br., narrowed gradually to a long acuminate point, the edge subentire, the base cuneate, the lower ones often stalked; *texture* subcoriaceous; *rachis* and *veins* beneath pubescent; *fertile pinnæ* much narrower than the barren ones; main *veins* 1 lin. apart; *areolæ* 4-6 between the midrib and edge.—*Hk. Sp. 5. p.* 164.

Hab. West Indies to Peru.

8. *M. serratum*, Cav.; *st.* 1-3 ft. l., stout, brownish, glossy; *fr.* 3-4 ft. or more l., 1 ft. or more br.; *pinnæ* 1-3 in. apart, 6-12 in. l.,  $\frac{1}{2}$ -2 in. br., oblong-lanceolate, the base cordate or cuneate, the apex acuminate, the edge finely toothed; *texture* subcoriaceous; both *sides* naked; main *veins*  $\frac{1}{2}$  in. apart; *areolæ* 12-20 between the midrib and edge.—*Hk. Sp. 5. p. 165.* *M. palustre*, Raddi.

Hab. Mexico and West Indies to Brazil and Peru.—Doubtfully distinct from *M. reticulatum*.

9. *M. cuspidatum*, Blume; *st.* 1-2 ft. l., stout, naked; *fr.* 2-4 ft. l., 1 ft. or more br.; *pinnæ* 6-9 in. l., 1-3 in. br., the point acuminate, the edge nearly entire, the base cuneate or rounded, often slightly stalked; *texture* subcoriaceous; *rachis* and both *sides* naked or nearly so; main *veins*  $1\frac{1}{2}$  lin. apart; *areolæ* 6-20 between the midrib and edge.—*Blume, t. 45.*

Hab. Himalayas, Malaccas, Philippines.—Very probably a Meniscioid form of *Polyp. urophyllum*, with which Hooker united it. *M. villosum*, J. Sm., and *M. Parishii*, Beddome, have pubescent and more herbaceous *pinnæ* than the form described above, and *M. Cumingii*, Fée, is a glabrous form, with narrower and thinner *pinnæ*, the lateral ones few or sometimes absent.

10. *M. reticulatum*, Sw.; *st.* tufted, 1-3 ft. l., stout, brownish, glossy; *fr.* 2-4 ft. l., 1 ft. or more br.; *pinnæ* 6-12 in. l., 1-4 in. br., the apex acuminate, the edge entire or subrepand, the base rounded or cuneate; *texture* subcoriaceous; *rachis* and both *sides* naked or slightly pubescent; main *veins*  $1-1\frac{1}{2}$  lin. apart; *areolæ* 8-12 between the midrib and edge.—*Hk. Sp. 5. p. 165.*

Hab. Mexico and West Indies to Brazil and Peru.—*M. macrophyllum*, Kze., appears to be a form with a few large *pinnæ*. *M. molle*, Mett., gathered in New Granada by M. Triana, has the *rachis* and under surface softly hairy, and quite entire *pinnæ* 1 ft. l., 1 in. br., truncate on the upper and rounded on the lower side at the base. *M. sorbifolium*, Willd. (*M. Kapplerianum*, Fée), is a form with narrower *pinnæ* than usual, the lower ones slightly stalked.

#### GEN. 55. ANTROPHYUM, Kaulf.

*Sori* carried along the veins, imperfectly reticulated. *A small genus of closely allied species almost restricted to the tropics, all with simple fronds of firm but fleshy texture and copious uniform hexagonal areolæ.* TAB. VI. fig. 55.

\* *Sori* sunk in a distinct groove. Sp. 1-8.

1. *A. lineatum*, Kaulf.; *fr.* 6-12 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., the point acute, the edge entire, the lower half narrowed very gradually to the base; a distinct slender raised *midrib* throughout; *areolæ* very long and narrow; *sori* in 2-3 almost continuous lines on each side of the *midrib* parallel with it, sunk in deep furrows with raised edges.—*Hk. Sp. 5. p. 175.* *Polytænium*, Desv.

Hab. Cuba and Mexico to Ecuador and Brazil.—Habit of *Vittaria*, but the *sori* multi-serial.

2. *A. subfalcatum*, Brack.; *fr.* 6-12 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., the point acute, the edge entire, the lower part narrowed very gradually to the base or a short stem, an indistinct *midrib* in the lower part; *areolæ* vertical, about two on each side the *midrib*, several times longer than broad; *sori* moderately immersed, in 2-4 long interrupted lines, hardly uniting.—*Hk. Sp. 5. p. 175.* *A. Brookei*, *Hk. 2nd Cent. t. 79.*

Hab. Borneo, Fiji, and Samoa.



3. *A. immersum*, Mett. MSS.; *fr.* 2-4 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., narrowed gradually to an acute point and at the base to a short stem; *texture* thick; no distinct *midrib*; central *areolæ* vertical, long and narrow; *veins* distinctly raised on the upper surface; *sori* quite immersed, often forked.—Hemionitis, *Bory.* *A. pumilum*, Kaulf. *Hk. Sp.* 5. p. 170.

Hab. Mauritius and Bourbon.

4. *A. coriaceum*, Wall.; *fr.* 6-8 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., narrowed very gradually from the centre to the base and an acute point; *texture* very thick; no *midrib*; the *areolæ* very long and narrow, very distinctly raised on the upper surface; the *sori* quite immersed, sometimes confluent.—*Hk. Sp.* 5. p. 163.

Hab. Himalayas, the Philippine and Malayan Isles.—*A. nanum*, Fée, is as coriaceous in texture, but not so plicate. In our specimens the fronds are oblong-spathulate, and only 1 in. l., so that it is very doubtful whether the plant be not an undeveloped condition of some of the other species.

5. *A. plantagineum*, Kaulf.; *fr.* 6-9 in. l.,  $1\frac{1}{2}$ -2 in. br., broadest one-third of the way down, the point acute, the lower part narrowed gradually into a stem 1-4 in. l.; no *midrib*; *areolæ* 1-3 in. l.,  $\frac{1}{8}$  in. br.; the *sori* copious, deeply immersed, often uniting.— $\beta$ , *A. angustatum*, Brack.; *texture* thinner; *fr.* ligulate, 1 ft. l.,  $\frac{3}{4}$  in. br.; *st.* 6 in. l.—*Hk. Sp.* 5. p. 170. *A. Lessoni*, *Bory.* *Hk. Sp.* 5. p. 168.

Hab. Ceylon, Himalayas, and Malay; Philippine and Polynesian Isles.—*A. parvulum*, Blume, looks like a small narrow-fronded form of this.

6. *A. Cumingii*, Fée; *fr.* 18 in. l.,  $1-1\frac{1}{4}$  in. br., ligulate, about equal in width in the central half, narrowed very gradually to the base and an acute point, with a black *midrib* in the lower quarter, the central *areolæ* several inches long and not more than  $\frac{1}{2}$  lin. br.; *sori* very slender, deep-sunk, often joining, the edge of the furrow rather raised.—*Hk. Sp.* 5. p. 167.

Hab. Philippines, *Cuming*, 416.—The Javan *A. latipes*, Kze., appears to be nearest to this.

7. *A. reticulatum*, Kaulf.; *fr.* 6-15 in. l.,  $1\frac{1}{2}$ -2 in. br., broadest about one-third of the way down, the point blunt or acute, the lower part narrowed very gradually to the base or a short compressed stem; *midrib* scarcely any; *areolæ* several in. l.,  $1-1\frac{1}{2}$  lin. br., very distinctly raised on the upper surface; *sori* copious, often joining, raised above the surface.—*Hk. Sp.* 5. p. 163.

Hab. Himalayas, Ceylon, and Malaccas to Aneiteum and Queensland.—*A. callæfolium*, Blume, does not seem to be clearly distinguishable.

8. *A. semicostatum*, Blume; *fr.* 6-18 in. l., 2-4 in. br., broadest about one-third of the way down, narrowed to an acute point and very gradually to the base or a short stem, the edge entire, with a distinct blackish *midrib* in the lower half, the central *areolæ* often 2-3 in. l.,  $\frac{1}{8}$  in. br.; *sori* copious, often joining, rising above the surface.—*H. Sp.* 5. p. 168.

Hab. Ceylon, Malaccas, Philippines and Polynesian Isles.—Species 2 to 8 come very near to one another, and cannot be regarded as clearly distinct.

\*\* *Sori superficial or but slightly immersed.* Sp. 9-16.

9. *A. ensiforme*, Hk.; *fr.* 6-12 in. l.,  $\frac{1}{2}$ - $\frac{7}{8}$  in. br., ligulate, the point acute, the edge entire, the lower part narrowed very gradually from halfway down to the base; *midrib* broad, obscure, lost upwards; *veins* sunk, forming 3-4 rows of irregular hexagonal *areolæ* between the *midrib* and edge; *sori* raised above the

surface, oblique, linear-vermiform, often forked.—*Hk. Sp. 5. p. 174. Ic. t. 394. 2nd Cent. t. 70. Scoliosorus, Moore.*

Hab. Mexico and Guatemala.—Connects *Antrophyum* with the *Selligueæ* of the *lanceolata* group.

10. *A. lanceolatum*, Kaulf.; *fr.* 1 ft. or more l.,  $\frac{1}{4}$ – $\frac{1}{2}$  in. br., the point acute, the edge entire, the lower half narrowed very gradually to the base; *texture* papyraceous, a distinct slender raised *midrib* throughout; *areolæ* vertical, hexagonal, 2-3 times as long as broad, about three rows between the *midrib* and edge; *sori* slender, superficial, often joining.—*Hk. Sp. 5. p. 176.*

Hab. West Indies and Mexico to New Granada.—The Mexican *A. Féci*, Schaff., is a short broad variety of firmer texture, with a slightly repand margin.

11. *A. subsessile*, Kunze; *fr.* 6-12 in. l., 1-1 $\frac{1}{2}$  in. br., broadest one-third of the way down, narrowed gradually to the base and an acute point; *texture* firm; *midrib* raised, distinct from the base to the apex; *areolæ* oblique, hexagonal, about twice as long as broad; *sori* subsuperficial, often forked.—*Hk. Sp. 5. p. 171.*

Hab. Cuba and Guatemala to Peru.

12. *A. cayennense*, Kaulf.; *st.* 1-4 in. l.; *fr.* 6-9 in. l., 1-1 $\frac{1}{2}$  in. br., lanceolate-oblong, narrowed at both ends, the edge thickened, entire; *texture* rather firm, a distinct prominent *midrib* extending from the base to the apex; *areolæ* oblique, hexagonal, half as broad as long; *sori* subsuperficial, often forked.—*Hk. Sp. 5. p. 171.*

Hab. Guiana and the Amazon Valley.—Closely allied to the preceding. The two may be readily distinguished by their raised *midribs* and short oblique *areolæ*.

13. *A. latifolium*, Blume; *st.* 3-6 in. l., stout, compressed, widening into the frond gradually; *fr.* 4-6 in. l., 3-4 in. br., oblong or obovate, the apex cuspidate, the edge entire or slightly repand towards the point, the base narrowed very gradually; *texture* thick; no distinct *midrib*; *areolæ* vertical, 2-3 in. l.,  $\frac{1}{3}$  in. br.; *sori* stout, copious, rarely joining.—*Hk. Sp. 5. p. 172.*

Hab. Java and Bootan.

14. *A. Mannianum*, Hk.; *st.* 6-9 in. l., slender, blackish, curved; *fr.* 6-9 in. l., nearly as broad, obovate or roundish, the apex cuspidate, the edge repand, the base broad-cuneate; *texture* thin, no distinct *midrib*; the *areolæ* 1-2 in. l.,  $\frac{1}{8}$  in. br., radiating from the base to the circumference; *sori* slender, copious, often joining.—*Hk. Sp. 5. p. 173. 2nd Cent. t. 73.*

Hab. Guinea Coast.

15. *A. Boryanum*, Kaulf.; *st.* 1-4 in. l., stout, compressed, passing into the frond gradually; *fr.* 6-12 in. l., 2-4 in. br., broadest a third or halfway down, the point acute or blunt, the edge entire, the lower part narrowed very gradually; no distinct *midrib*; *areolæ* numerous, vertical, hexagonal,  $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. br.; *sori* slender, often joining.—*Hk. Sp. 5. p. 172. Hk. & Gr. t. 74.*

Hab. Mauritius, Bourbon, and Johanna Island.—*A. obtusum*, Kaulf., does not appear to be clearly distinguishable.

16. *A. giganteum*, Bory; *fr.* 12-18 in. l., 3-4 in. br., broadest a third of the way down, narrowed very gradually to a short very stout paleaceous stem, the edge with a broad entire cartilaginous border; *texture* very thick; *areolæ* close and fine, vertical, about  $\frac{1}{2}$  in. l., 1 lin. br.; *sori* slender, often joining.—*Hk. Sp. 5. p. 174.*

Hab. Mauritius and Bourbon.



## GEN. 56. VITTARIA, Sm.

*Sori* in continuous marginal or slightly intramarginal lines. A small genus, almost entirely tropical, with free veins and grass-like fronds of subcoriaceous texture. It has considerable claim to be placed in the involucrate series near *Lindsaya*. The species are very difficult of discrimination, and we have admitted here considerably fewer than M. Fée, who has published an elaborate illustrated monograph of the genus, in which he relies to a large extent upon microscopic characters (the shape of the spores and abortive capsules) to characterize them. TAB. VI. fig. 56.

§ *Euvittaria*. *Sori* sunk in a two-lipped marginal groove. Sp. 1. Fig. 56. a.

1. *V. elongata*, Sw.; fr. 6-18 in. l.,  $\frac{1}{8}$ - $\frac{1}{4}$  in. br., the point acute or bluntish, the lower part narrowed very gradually to the base; texture subcoriaceous; midrib faint or distinct; veins simple, oblique, immersed, parallel, connected by an intramarginal veinlet; *sori* quite sunk in a marginal groove with two nearly equal lips which open outwards.

Hab. Himalayas and Benin to Sandwich Isles, New South Wales, and Ceylon; Mascaren Isles, Seychelles, and Guinea Coast.—We cannot separate from this clearly *V. zosterifolia*, *bisulcata*, *isoetifolia*, *ovariensis*, *rigida*, *ensiformis*, *intermedia*, *plantaginea*, and *anodontolepis* of authors. The two first are said to have a distinct midrib, the others none.

§§ *Tæniopsis*, J. Sm. *Sori* in a slightly intramarginal line, with the unaltered edge of the frond produced beyond and often rolled over it. Sp. 2-9. Fig. 56. b. c.

2. *V.* (*Tæniop.*) *scabrída*, Klotzsch; fr. 2 in. l., 1 lin. br., the point blunt, the lower half tapering gradually to the base; texture fleshy, when dry wrinkled; midrib lost in the upper half; *sori* sunk in an intramarginal groove, with the flattened thick edge of the frond produced beyond it.—*Hk. Sp. 5. p. 182.*

Hab. Mexico and Brazil.

3. *V.* (*Tæniop.*) *falcata*, Kunze; fr. 4-5 in. l.,  $\frac{1}{8}$  in. br., the point blunt, the lower part narrowed gradually to the base; texture leathery and very thick; a distinct raised midrib attaining the apex in the barren fronds, but lost in the fertile ones; veins short, oblique, parallel, immersed; *sori* quite sunk in slightly intramarginal grooves.—*Hk. Sp. 5. p. 182.*

Hab. Malaccas and Ceylon (*C. P. 3807*).—The Malayan and Philippine *V. minor*, Fée, is like this, but smaller in size, with the habit of *Polyp. australe* and *gramineum*.

4. *V.* (*Tæniop.*) *Gardneriana*, Fée; fr. 1 ft. or more l.,  $\frac{1}{4}$  in. br., the point acute, the lower part narrowed gradually to the base or a short slender stem; texture thin, the young fronds translucent; a slender immersed midrib extending from the base to the apex; veins fine, distant, oblique; *sori* in a broad superficial slightly intramarginal line, with the edge produced beyond, but not wrapped over it.—*Hk. Sp. 5. p. 178. (in part).*

Hab. Organ Mountains, Brazil, *Gardner*, 147.

5. *V.* (*Tæniop.*) *stipitata*, Kunze; fr. 1 $\frac{1}{2}$ -2 ft. l., 3-4 lin. br., tapering gradually below into a long slender stem; texture firm; midrib indistinct, except towards the base; veins distant, fine, oblique, immersed; *sori* sunk in a groove within the margin, with the flattened thickened edge of the frond produced beyond it.—*Hk. Sp. 5. p. 179.*

Hab. Columbia to Peru.—*V. Moritziana*, Mett., is said to have the *sori* less distinctly

immersed, and the edge of the frond not thickened; *V. Karsteniana*, Mett., to have sessile fronds and more distant veins; and *V. Ruiziana*, Fée, superficial sori and a flattened stem.

6. *V. (Tæniop.) stricta*, Carm.; *fr.* 18 in. l.,  $\frac{1}{8}$  in. br., narrowed below to a compressed stem; *texture* thick; *midrib* stout, continued to the apex; the *sori* occupying the whole space between it and the much reflexed edge.—*Hk. Sp. 5. p. 182.*

Hab. Tristan d'Acunha.

7. *V. (Tæniop.) lineata*, Sw.; *fr.* 6-18 in. l.,  $\frac{1}{8}$ - $\frac{3}{8}$  in. br., narrowed gradually downwards to a stout compressed stem, which passes into the frond gradually, the edge often reflexed; *texture* firm, a distinct raised *midrib* running from the base to the apex; *veins* immersed, parallel, very oblique; *sori* in a broad slightly intramarginal line in a slight furrow, the edge of the frond at first wrapped over it.—*Hk. Sp. 5. p. 178.*

Hab. Japan, West Indies, and Florida to Peru and Brazil; Himalayas, Neilgherries, Malaccas, Mascaren Isles, Guinea Coast, Zambesi-land, Natal, Cape Colony.—Of M. Fée's species we include here *lineata* and *filifolia* (Tropical America), *flexuosa* (Hindustan), *tenera* and *sarmentosa* (South Africa), and *guineensis* (Guinea).

8. *V. (Tæniop.) remota*, Fée; *fr.* 12-18 in. l.,  $\frac{3}{8}$ - $\frac{1}{2}$  in. br., narrowed gradually to the base or a short compressed stem; *texture* moderately firm; *midrib* dark-coloured and distinct below, but often lost before it reaches the apex; *veins* immersed, very oblique; *sori* in a broad superficial distinctly intramarginal line, with the edge not at all wrapped over it.—*Hk. Sp. 5. p. 185.*

Hab. West Indies to Ecuador.—Distinguished from the other American species by its broader flat frond and the position of the sori. It is very like *Tænitis angustifolia* in general habit, but the veins are free.

9. *V. (Tæniop.) scolopendrina*, Thw.; *fr.* 12-18 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., the point acute, the edge entire, the lower part narrowed very gradually to the base; *texture* thick; *midrib* thick, blackish, grooved in front below, sometimes nearly lost upwards; *veins* oblique, fine, simple, parallel; *sori* in broad continuous submarginal lines, with the firm unaltered edge of the frond at first wrapped over it.—*V. Forbesii* and *zeylanica*, Fée. *Hk. Sp. 5. p. 177.*

Hab. New Guinea, Philippine and Malayan Isles, Neilgherries, Ceylon, Seychelles, Mozambique.—*V. lorica*, Fée, appears to be closely allied, but the Himalayan plant mentioned in "Sp. Fil." is referred to *V. scolopendrina* by Mettenius. The largest and finest of the group.

#### GEN. 57. TÆNITIS, Sw.

*Sori* linear, but the line sometimes interrupted, central or submarginal. *A small genus of not very closely allied species, all tropical. Some of the species scarcely differ from Tæniopsis in fruit, but in all those placed here the veins anastomose.* TAB. VI. fig. 57.

\* *Fronds simple.* Sp. 1-3.

1. *T. obtusa*, Hk.; *rhizome* creeping; *st.* 2-3 in. l., slender, glossy, naked; *fr.*  $1\frac{1}{2}$ -2 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., ovate-oblong, the point blunt, mucronate, the edge entire, the base rounded; *texture* coriaceous; *areolæ* large, oblique; *sori* in a continuous line  $\frac{1}{8}$  in. from the edge.—*Hk. Sp. 5. p. 186. 2nd Cent. t. 94.*

Hab. Borneo, *T. Lobb.*

2. *T. angustifolia*, R. Br.; *fr.* 12-18 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., narrowed very gradually



to an acute point and below to the base or a short stem; *texture* subcoriaceous, flaccid; *midrib* distinct; *veins* immersed, forming 2-3 rows of vertical hexagonal *areolæ*, 3-4 times as long as broad between the midrib and edge; *sori* sunk in a groove a short distance from the edge.—*Hk. Sp. 5. p. 187. Pteropsis, Desv.*

Hab. Cuba to N. Brazil and the Galapagos.

3. *T. lanceolata*, R. Br.; *rhizome* creeping, very stout; *st.* 1-2 in. l., firm, erect; *fr.* 6-12 in. l., 1-2 in. br., narrowed gradually from the centre to both ends, the edge entire but often crisped; *texture* firm, coriaceous, naked; *midrib* distinct; *areolæ* immersed, copious, small, with copious free veinlets; *sori* in continuous or interrupted lines near the edge of the contracted upper third or quarter of the frond.—*Hk. Sp. 5. p. 186. Paltonium, Presl. Neurodium, Fée.*

Hab. West Indies and Guatemala.—The Javan *T. marginalis*, Moore (*T. Blumei*, Hk.), is said to be like this, but smaller in size, and without a midrib.

\*\* *Fronds compound. Sp. 4-5.*

4. *T. furcata*, Willd.; *rhizome* subrepent, densely tomentose; *fr.* 6-18 in. l., once or twice dichotomously forked or subpinnatifid, the lobes linear, erectopatent, much acuminate, entire, 4-8 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br.; *texture* coriaceous; under *surface* thinly clothed with minute scales; *veins* anastomosing without free veinlets; *sori* submarginal, continuous or interrupted.—*Hk. Sp. 5. p. 188. Cuspiaria, Fée.*

Hab. West Indies to Ecuador and the Amazon Valley.—*T. Desvauxii*, Klotzsch (*C. semipinnatifida*, Fée), is a small variety with narrow lobes, unbranched primary veins, and only a single row of *areolæ*.

5. *T. blechnoides*, Swz.; *rhizome* creeping; *st.* 8-12 in. l., firm, naked, glossy; *fr.* 1-2 ft. l., 8-12 in. br., simply pinnate; *pinnæ* of barren frond 2-3 on each side, 6-9 in. l., 1-2 in. br., oblong-lanceolate, the point acuminate, the edge thickened and wavy, the base cuneate, the lower ones stalked; *fertile pinnæ* narrower and more numerous; *texture* coriaceous; *areolæ* copious, oblique, without free veinlets; *sori* in a continuous line about midway between the edge and midrib.— $\beta$ , *T. interrupta*, Wall.; *pinnæ* smaller; *sori* interrupted and much nearer the edge.—*Hk. & Gr. t. 62. Hk. Sp. 5. p. 188.*

Hab. Malaccas and Philippines.

#### GEN. 58. DRYMOGLOSSUM, *Presl.*

*Sori* scarcely differing from those of *Tænitis*, but the fronds dimorphous. TAB. VI. fig. 58.\*

1. *D. carnosum*, Hk.; *rhizome* filiform, wide-creeping; *fr.* dimorphous, the barren ones suborbicular or elliptical, 1-2 in. l.,  $\frac{3}{4}$ -1 in. br., the fertile ones linear-spathulate, 2-3 in. l.,  $\frac{1}{3}$  in. br., both narrowed to the base or a short stem; *texture* coriaceous; *areolæ* small, with copious free veinlets; *sori* in a line midway between the edge and midrib, when young covered with stalked peltate scales.— $\beta$ , *D. subcordatum*, Fée; *fr.* smaller, the barren ones roundish, sessile; *texture* thinner; *caps.* mixed with hairs, not scales.—*Hk. Sp. 5. p. 189.*

Hab. Japan to Formosa, Hong-Kong, and the Himalayas.

\* It would be better to make two genera only out of this and the two preceding, placing in one those species in which the line in front is submarginal, and in the other those in which it is remote from the edge.

2. *D. piloselloides*, Presl; *rhizome* filiform, wide-creeping; *fr.* dimorphous, the barren ones roundish or obovate-elliptical,  $\frac{1}{2}$ -2 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., the fertile ones linear-oblong, 2-4 in. l.,  $\frac{1}{3}$ - $\frac{1}{4}$  in. br., both narrowed to the base or a short stem; *texture* coriaceous; *veins* immersed, anastomosing, with copious free veinlets; *sori* in a broad continuous submarginal line, the capsules mixed with stalked peltate scales.—*Hk. Sp.* 5. p. 190. *G. F. t.* 46.

Hab. Himalayas, Neilgherries, Ceylon, Malaccas.

3. *D. rigidum*, Hk.; *rhizome* firm, wide-creeping; *fr.* dimorphous, the barren ones 1-1 $\frac{1}{4}$  in. l., half as br., obovate, entire, with thickened edges, on firm erect stems 1 in. l., the fertile one 4-5 in. l.,  $\frac{1}{8}$  in. br., narrowed into a stem about as long as itself; *texture* very thick and rigid; *areolæ* copious, immersed, without free veinlets; *sori* in a deep groove between the broad midrib and edge.—*Hk. Sp.* 5. p. 190.

Hab. Borneo, *T. Lobb.*—An anomalous species, which Moore places in *Schizolepton* of Fée, a genus founded on our *Lindsaya cordata*.

#### GEN. 59. HEMIONITIS, Linn.

*Sori* continuous along the veins and copiously reticulated, sometimes also developed slightly between them. *A small genus, as now restricted, almost confined to the tropics. Veins anastomosing copiously.* TAB. VI. fig. 59.

#### § Euhemionitis. *Sori confined to the veins.* Sp. 1-6.

1. *H. lanceolata*, Hk.; *caud.* stout, ascending; *st.* 6-9 in. l., firm, erect, glossy, castaneous; *fr.* 6-9 in. l., 1 $\frac{1}{4}$ -2 $\frac{1}{2}$  in. br., ovate or oblong-lanceolate, the apex acuminate, the edge subentire, the base narrowed; *texture* coriaceous; both *sides* naked; *areolæ* copious, oblique, about  $\frac{1}{2}$  in. l., 1 lin. br.—*Hk. Sp.* 5. p. 191. *2nd Cent. t.* 55.

Hab. Fiji, *Seemann*, 716, *Milne*.

2. *H. cordata*, Roxb.; *caud.* erect; *st.* of the barren frond 2-4 in. l., of the fertile frond often 1 ft. l., dark chesnut-brown, glossy, densely fibrillose towards the base; *fr.* 2-3 in. each way, cordate-hastate, the barren ones bluntnish at the point, with rounded basal lobes and a deep sinus, the fertile ones with the lobes more produced and sharper; *texture* herbaceous or subcoriaceous; under *surface* subvillose; *areolæ* oblique,  $\frac{1}{8}$ - $\frac{1}{4}$  in. l.,  $\frac{1}{2}$  lin. br.—*Hk. Sp.* 5. p. 192. *Hk. & Gr. t.* 64.

Hab. Peninsular India, Ceylon, Moulmein, Philippines.

3. *H. palmata*, L.; *caud.* erect; *st.* of barren frond 2-4 in., of the fertile frond 6-12 in. l., glossy, dark chesnut-brown, clothed with soft yellowish hairs; *fr.* 2-6 in. each way, palmate, with five nearly equal lanceolate divisions, those of the fertile frond the sharpest, varying from subentire to lobed one-third of the way down, those of the barren frond shorter, blunter, and less divided; *texture* herbaceous; both *surfaces* villose; *areolæ* oblique,  $\frac{1}{8}$ - $\frac{1}{4}$  in. l.,  $\frac{1}{2}$ -1 lin. br.—*Hk. Sp.* 5. p. 192. *Ex. Fl. t.* 53.

Hab. West Indies and Mexico to Peru.

4. *H. hederæfolia*, J. Sm.; *caud.* decumbent; *st.* nearly 1 ft. l., ebeneous, naked; *fr.* about 3 in. each way, palmate, with 5 lobes, the three central ones about equal, lanceolate, the lateral ones spreading, shorter and blunter, all



entire; *texture* herbaceous; both *surfaces* densely matted with short silky yellowish-grey hairs; *areolæ* small, oblique.—*Bot. Her. p.* 339.

Hab. Mexico, *Liebold*.

5. *H. pinnatifida*, Baker; *st.* tufted, 1-2 in. l., glossy, chesnut-brown, clothed with soft yellowish hairs; *fr.* 2 in. each way, deltoid in general outline, with a large oblong-lanceolate subcrenate terminal lobe and two spreading ones on each side, which reach down within  $\frac{1}{4}$  in. of the rachis, both blunt, the lowest 1 in. l. and auricled at the base; *texture* subcoriaceous; both *sides* densely coated with yellowish hairs; *areolæ* small, copious.

Hab. Central America, *Wendland*, 438.

6. *H. pinnata*, J. Sm.; *st.* 6-9 in. l., glossy, dark chesnut-brown, clothed with soft yellowish hairs; *fr.* 5-6 in. l., 3-4 in. br., the apex deeply pinnatifid, below this 2-3 pairs of distinct *pinnæ*, the upper ones oblong-lanceolate, 1-1 $\frac{1}{2}$  in. l.,  $\frac{3}{8}$ - $\frac{1}{2}$  in. br., the lowest larger and forked at the base, all repand; *texture* herbaceous; both *sides* thinly clothed with soft yellowish hairs; *veins* oblique, 2-3 times dichotomously forked, anastomosing principally near the midrib.—*J. Sm. Gen. Fil. p.* 33. (*name only*).

Hab. Jamaica, *Wiles*.—This is not very far from *Gymnogramma rufa*, but the *pinnæ* are adnate, and the groups of veins join slightly. Our descriptions of this and the two preceding are taken from J. Smith's specimens, now in the British Museum.

7. *H. Griffithii*, Hk. fil. & Thoms.; *st.* 8-12 in. l., scaly towards the base, villose throughout; *fr.* 1 ft. or more l., 6-10 in. br., subdeltoid, pinnatifid or pinnate, with 2-4 distinct *pinnæ* on each side, which are 3-4 in. l., 1-1 $\frac{1}{2}$  in. br., entire, acuminate, the lower ones stalked; *texture* herbaceous, thick; *rachis* and both *sides* villose; main *veins* barren and pinnate, the veinlets fertile and copiously reticulated.—*Hk. Sp. 5. p.* 192. *H. Wilfordii*, Hk. *Fil. Ex. t.* 93. (*the pinnatifid variety*).

Hab. Khasya, *Hk. fil. & Thomson*; Formosa, *Wilford*.—This differs from the foregoing by its barren main veins, and constitutes the genus *Dictyocline* of Moore.

§§ Anetium, *Splitg.* *Sori lax*, placed both on the veins and scattered also in the spaces between them. *Sp.* 7.

8. *H. (Anet.) citrifolia*, Hk.; *rhizome* creeping; *st.*  $\frac{1}{2}$ -9 in. l., weak, compressed; *fr.* pendent, 6-24 in. l., 1-4 in. br., oblong or subspathulate, narrowed gradually to both ends, the edge entire; *texture* thick but flaccid; *colour* pale-green; *midrib* often lost in the upper part, winged on the back below; *areolæ* vertical, long-hexagonal.—*Hk. Sp. 5. p.* 193.

Hab. West Indies to North Brazil.—An anomalous species, with the habit of *Antrophyum*, in which genus it is placed by Fée, and in the fruit connecting *Grammitidæ* with *Acrosticheæ*.

### TRIBE 13. ACROSTICHEÆ.

*Sori* spread in a stratum over the under surface or rarely over both surfaces of the frond, not confined to the veins only. GEN. 60-61.

### GEN. 60. ACROSTICHUM, L.

*Sori* spread over the whole surface of the frond or upper *pinnæ*, or occasionally over both surfaces. A large genus, almost entirely tropical, including groups with a wide range in venation and cutting. TAB. VII. & VIII. fig. 60.

§ *Veins free.* Sp. 1-87.

\* *Elaphoglossum*, Schott. *Fronds simple.* Sp. 1-65. Fig. 60. a, b.

† *Both surfaces of the barren frond nearly or quite naked, the edge not fringed.*  
Sp. 1-19.

1. *A. petiolosum*, Desv.; *rhizome* woody, the scales dense, fibrillose, nearly black; *st.* 4-6 in. l., firm, slender, erect; *barren fr.* 2-3 in. l.,  $\frac{3}{4}$ - $\frac{7}{8}$  in. br., ovate-oblong, narrowed suddenly to a point, which is sometimes 1 in. l.; *texture* coriaceous; both *sides* nearly naked; *veins* immersed, subparallel; *fertile fr.* smaller than the barren one.—*Hk. Sp. 5. p. 207.* *A. caudatum*, *Hk. Ic. t. 215.*

Hab. Ecuador and Peru.—Well marked by the small size and very distinct caudate apex of its fronds, and the rigid nearly black scales of the rhizome.

2. *A. tambillense*, Hk.; *rhizome* stout, the scales dense, linear, crisped, chesnut-brown; *st.* tufted, 2-3 in. l., firm, slender, naked; *barren fr.* 2 $\frac{1}{2}$ -3 in. l., 1-1 $\frac{1}{4}$  in. br., the point cuspidate, the base rounded or even slightly cordate; *texture* coriaceous; both *sides* quite naked; *veins* distant; *fertile fr.* considerably smaller than the barren one.—*Hk. Sp. 5. p. 207. Ic. t. 856.*

Hab. Ecuador, Jameson; Guatemala, Salvin & Godman.—Like the last, but the frond not caudate, and the scales different.

3. *A. micradenium*, Fée; *rhizome* slender, wide-creeping, the scales small, linear-subulate, squarrose, dark chesnut-brown; *st.* 1 in. or more apart, 3-6 in. l., firm, erect, naked, stramineous; *barren fr.* 5-6 in. l., 1-1 $\frac{1}{2}$  in. br., the point acuminate, the base narrowed gradually; *texture* herbaceous; both *sides* naked; *veins* raised, conspicuous, usually once forked; *barren fr.* much smaller than the fertile ones.—*Hk. Sp. 5. p. 216.* *E. nitidum*, *Brack. t. 9.*

Hab. Sandwich Isles and Sumatra.

4. *A. simplex*, Sw.; *rhizome* woody, short-creeping, the scales rather large, lanceolate, dark-brown; *st.* 1-4 in. l., firm, erect, naked; *barren fr.* 4-12 in. l.,  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. br., the point very acute, the lower part narrowed very gradually; *texture* coriaceous; both *sides* quite naked; *margin* distinct, cartilaginous; *veins* immersed, usually once forked; *barren fr.* narrower than the fertile one, and on a longer stem.—*Hk. Sp. 5. p. 205.*— $\beta$ , *A. martinicense*, Desv.; *fronds* narrower, very coriaceous, *Hk. Sp. 5. p. 218.* *A. durum*, *Kze.* *E. glabellum*, *J. Sm.*

Hab. Cuba to Brazil.—Characterized by its firm fronds, narrowed very gradually to both ends. A plant gathered by Barter at Sierra Leone probably belongs here.

5. *A. nigrescens*, Hk.; *caud.* stout, erect, not scaly; *barren fr.* tufted, sessile, 6-9 in. l.,  $\frac{1}{2}$  in. br., the point bluntish, the base narrowed very gradually; *texture* coriaceous; both *sides* naked; *veins* simple or once forked, distant, not reaching the edge; *fertile fr.* 2-3 in. l.,  $\frac{1}{4}$  in. br., on long slender naked stems 1 ft. l.—*Hk. Sp. 5. p. 214.*

Hab. British Guiana, Schomburgk.

6. *A. leptophyllum*, Fée; *rhizome* firm, creeping, the scales "soft, fulvous;" *st.* of barren frond 3-4 in. l., firm, erect, stramineous, nearly naked; *barren fr.* 6-8 in. l.,  $\frac{1}{2}$ - $\frac{5}{8}$  in. br., the point bluntish, the lower part narrowed gradually; *texture* subcoriaceous; both *sides* naked; *veins* fine, rather raised, simple or once forked; *fertile fr.* similar to the other, but the stem three or four times as long.—*Hk. Sp. 5. p. 218.*

Hab. Venezuela and Brazil.—Characterized by its ligulate barren frond and very long-stalked similar fertile one.



7. *A. conforme*, Sw.; *rhizome* woody, wide-creeping, densely clothed with large lanceolate brownish membranous scales sometimes  $\frac{1}{4}$  in. l., 1 lin. br.; *st.* 1-12 in. l., firm, erect, stramineous, naked or slightly scaly; *fr.* 2-9 in. l.,  $\frac{1}{2}$ -2 in. br., the point acute or bluntish, the base cuneate or spatulate, the edge cartilaginous, entire; *texture* coriaceous; both *sides* naked or nearly so; *veins* subparallel, usually once forked; *barren fr.* usually narrower than the fertile one, the edge inflexed.—*Hk. Sp. 5. p. 198.*

Hab. Mexico to Chili and Brazil, Sandwich Isles, Samoa, Fiji, Java, Queensland, Himalayas (up to 6,000 ft.), Neilgherries, Ceylon, Tristan d'Acunha, Mascaren Isles, Cape Colony, St. Helena, Guinea Coast.—From this we cannot distinguish clearly *A. Lepervanchii* (Bory), *A. didymanum* (Fée), *A. laurifolium* (Thouars), *A. angulatum* (Blume), *A. impressum* (Fée), *A. marginatum* (Wall.), *A. obtusifolium* (Brack.), and *A. vagans* (Mett.). The Polynesian *A. Feejeense*, Brack., is thinner and darker green than usual, and narrowed downwards more gradually; *A. alatum*, Fée (*Hk. Sp. 5. p. 204*), has a more distinct haft to the frond; and the Sandwich Island *A. emulum*, Kaulf., and Andine *A. Gayanum*, Fée, and *A. unitum*, Bory (*A. affine*, M. & G.), and probably the Brazilian *A. minutum*, Pohl., are small narrow-fronded varieties. *Vittaria acrostichoides*, Hk. & Gr. t. 186, is an abnormal form, with the fruit in two submarginal lines.

8. *A. Wrightii*, Mett.; *rhizome* wide-scandent; *st.* 1-2 in. apart, 1-1 $\frac{1}{2}$  in. l., firm, erect, clothed throughout with ovate-acuminate membranous scales; *fr.* 6-9 in. l., 1-1 $\frac{1}{2}$  in. br., the point cuspidate, the lower part narrowed very gradually, the edge thickened, white, and crisped; *texture* coriaceous; both *sides* naked; *midrib* scaly in the lower part; *veins* stout, immersed, subparallel, usually once forked; *fertile fr.* much smaller, the edge entire and inflexed.—*Hk. Sp. 5. p. 195.*

Hab. Cuba, *Wright*, 965.—Perhaps a form of the last.

9. *A. flaccidum*, Fée; *rhizome* short-creeping, woody, the scales small, lanceolate, dull-brown; *st.* tufted, those of the barren frond very short; *fr.* 6-12 in. l.,  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. br., the point very acute, the lower part narrowed very gradually; *texture* subcoriaceous; both *sides* quite naked, colour dark-green, edge not thickened; *veins* not close, simple or forked; *fertile fr.* smaller than the barren one, and on a distinct *st.* 3-4 in. l.—*Hk. Sp. 5. p. 204.* *A. Karstenianum*, *Kze.*

Hab. Panama to N. Brazil.—This is thinner in texture than the preceding, and in the shape of the frond is most like *A. simplex* on a larger scale, with sessile barren fronds but long-stalked fertile ones. *A. oxyphyllum*, Brong., appears to be a large form; the Peruvian *A. Lechleri*, Mett. differs only by its stout wide-scandent rhizome; and a plant labelled by Mettenius *A. pallidum*, Beyr., is thinner and more glossy than the type, with the costa and long stem of the fertile frond ebeneous.

10. *A. Burchellii*, Baker; *rhizome* short, woody, the scales small, linear, dark-brown; *st.* 8-12 in. l., erect, nearly naked; *fr.* 1-2 ft. l.,  $\frac{3}{4}$ -1 $\frac{1}{4}$  in. br., the point very acute, the lower part narrowed very gradually; *texture* subcoriaceous; both *sides* naked and glossy; *veins* fine, close, usually once forked; *fertile fr.* much smaller than the other.—*A. punctulatum*, *Mett. MSS. (not L.)*.

Hab. Brazil, *Burchell*, 5155.—Very near the last, differing mainly in the finer veins and long stem of the barren frond.

11. *A. Norrisii*, Hk.; *caud.* stout, woody, the scales long, linear, dull-brown; *barren fr.* sessile or nearly so, tufted, 12-18 in. l.,  $\frac{3}{4}$ -1 in. br., the point blunt, the lower half narrowed very gradually; *texture* coriaceous; both *sides* nearly naked; *veins* immersed, indistinct; *fertile fr.* much narrower than the other.—*Hk. Sp. 5. p. 215.*

Hab. Penang, *Sir W. Norris, Maclier*.—Not unlikely identical with the Javan *A. melanostictum*, Blume. It is like *flaccidum* in the shape of the barren frond, but the texture is that of *conforme* and *latifolium*, and the fertile frond also is subsessile.

12. *A. Schlimensse*, Fée; *rhizome* thick, woody, wide-scandent, the scales broad, ovate, dull-brown; *st.* 4-8 in. l., firm, erect, slightly scaly; *barren fr.* 9-12 in. l.,  $1\frac{1}{4}$  in. br., the point bluntish, the lower third narrowed very gradually; *texture* subcoriaceous; both *sides* naked, the edge narrow, cartilaginous, quite distinct from the frond; *veins* fine, very close, usually once forked; *fertile fr.* similar to the barren one.—*Hk. Sp.* 5. p. 202.

Hab. N. Granada, *Schlim*, 622; Ecuador, *Spruce*.—Resembles *flaccidum* in texture, but the fronds are much less narrowed in the upper part, and distinctly stalked.

13. *A. palustre*, Hk.; *rhizome* wide-creeping, not thick but woody, the scales long, linear, bright-brown; *st.* 1-2 in. l., firm, clothed with linear scales; *barren fr.* often 1 ft. l., 1-2 in. br., the point acute, the lower part narrowed very gradually; *texture* herbaceous; both *sides* naked; *veins* raised, close, simple or once forked; *fertile fr.* (in all our specimens) soriferous only in the upper part, much narrower than the others.—*Hk. Sp.* 5. p. 214.

Hab. Guinea Coast; gathered by Barter and Mann.—Distinguished by its herbaceous texture and very prominent veins. A plant collected in Berbice by Schomburgk is perhaps the same, but our specimens are barren only.

14. *A. stenopteris*, Klotzsch; *rhizome* woody, the scales small, ovate, dull-brown; *st.* scarcely any; *barren fr.* 12-18 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., the point acute, the lower part narrowed very gradually; *texture* papyraceous; both *sides* naked, except that the lower part of the midrib beneath has a few small dark-brown linear scales; *veins* fine, simple or forked, often 1 line apart, falling short of the edge; *fertile fr.* narrower, and on a longer stem than the barren one.—*Hk. Sp.* 5. p. 213.

Hab. Columbia, *Moritz*, 234; Venezuela, *Fendler*, 282.—Distinguished by its thin texture, long narrow frond, and distant veins. An authentic specimen of *A. brachyneuron*, Fée, from Guadeloupe, is smaller in size, but does not otherwise differ.

15. *A. Herminieri*, Bory; *rhizome* stout, woody, short-creeping, the scales dense, linear, reddish-brown,  $\frac{1}{2}$ -1 in. l.; *st.* tufted, very short or none; *barren fr.*  $1\frac{1}{2}$ -3 ft. l., 1-1 $\frac{1}{2}$  in. br., the point acuminate, the lower part narrowed very gradually; *texture* coriaceous; both *sides* naked, the upper one with a metallic gloss; *veins* immersed, indistinct, usually once forked; *fertile fr.* short-stalked, 3-4 in. l., 1-1 $\frac{1}{2}$  in. br.—*Hk. Sp.* 5. p. 216.

Hab. Cuba to Brazil.—Distinguished by its very large sword-shaped barren fronds of coriaceous texture, a striking contrast to its small sessile oblong fertile ones.

16. *A. Lingua*, Raddi; *rhizome* firm, wide-creeping, the scales small, ovate, dark-brown; *st.* 6-12 in. l., stramineous, firm, erect, nearly naked; *barren fr.* 6-9 in. l., 2-3 in. br., the point acute, the base narrowed suddenly; *texture* coriaceous; both *sides* nearly naked, the edge thickened; *veins* subparallel, simple or once forked; *fertile fr.* much narrower than the barren one.—*A. latifolium*, *Hk. Sp.* 5. p. 202 (*in part*).

Hab. West Indies to Brazil and Peru.—Differs from *latifolium* in the rhizome, scales, and shape of the frond. We cannot distinguish from this an authenticated specimen of *A. scandens*, Fée, though a plant from Linden (74) is thinner in texture, with finer veins and a satiny gloss.

17. *A. luridum*, Fée; *rhizome* woody, the scales linear, dark-brown, crisped; *st.* of barren frond 1-2 in., of the fertile 3-4 in. l.; *fr.* 6-12 in. l., 2-3 in. br., oblong-spathulate, blunt or subacute, the edge thickened and slightly scaly, the haft narrowed very gradually into the stem; *texture* very coriaceous; both *sides* nearly naked; *veins* subparallel, usually once forked; *edge* of fertile frond flat or slightly inflexed.—*A. Schomburgkii*, *Hk. Sp.* 5. p. 200. (*in part*) & *Griseb. non Fée*.



Hab. Trinidad and Guiana.—Differs only from *A. latifolium* by its blunter fronds of subspathulate outline, with the edge slightly scaly.

18. *A. Sieberi*, Hk. & Gr.; *rhizome* stout, woody, the scales  $\frac{1}{2}$  in. l., linear-subulate, nearly black; *st.* 3-6 in. l., firm, erect, stramineous, hardly at all scaly; *fr.* 3-12 in. l., 1-3 in. br., the lower part narrowed very gradually, the edge cartilaginous, entire; *texture* coriaceous; *veins* immersed, usually once forked; *fertile fr.* smaller than the barren one.—*Hk. Sp.* 5. p. 197. *H. & G. t.* 237.

Hab. Mauritius and Bourbon; and a similar plant, but with shorter and browner scales, gathered by Mann at Fernando Po.—This has quite the habit of the next, but the scales are different.

19. *A. latifolium*, Sw.; *rhizome* thick, woody, often creeping, the scales lanceolate, crisped, dark or light-brown; *st.* 6-12 in. l., firm, erect, stramineous, naked or slightly scaly; *barren fr.* 9-18 in. l., 2-4 in. br., the point acute, the lower part narrowed gradually, the edge entire, thickened and cartilaginous; *texture* very coriaceous; both *sides* naked or nearly so; *fertile fr.* considerably narrower than the barren one.—*Hk. Sp.* 5. p. 202.

Hab. Mexico and Cuba to Brazil and Peru.—From this we cannot distinguish clearly *A. longifolium*, Jacq., *A. Sartorii*, Liebm., *A. Blanchetii* and *Tovarense*, Mett., *A. scapellum*, Mart., *A. alismacfolium*, Schomburgkii, Funckii, and *andicola*, Fée, and the Javan *A. callafolium* of Blume. A plant from the Seychelles is probably the same.

\*\* *Both surfaces nearly or quite naked, the edge of the frond fringed.*  
Sp. 20-24.

20. *A. stramineum*, Mett.; *rhizome* short, stout, the scales lanceolate-subulate, often  $\frac{1}{2}$  in. l., bright-brown; *st.* 5-9 in. l., stramineous, finally naked; *barren fr.* 3-5 in. l.,  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. br., narrowed gradually to both ends; *texture* subcoriaceous; the margin ciliated but the scales deciduous; *fertile fr.* 1 $\frac{1}{2}$ -2 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., the *st.* 2-4 $\frac{1}{2}$  in. l.—*Mett. Fil. Nov. Gran.* p. 200.

Hab. N. Granada, *Lindig*, 251.—Very near the next species.

21. *A. melanopus*, Kze.; *rhizome* short-creeping, densely clothed with small reddish-brown linear scales; *st.* 2-3 in. l., densely clothed with linear spreading dark chesnut-brown scales; *barren fr.* 5-8 in. l., 2 in. br., the apex acuminate, the base rounded or subcuneate; *texture* coriaceous; *veins* lax, the margin ciliated with similar scales; *fertile fr.* 3-4 in. l.,  $\frac{3}{4}$  in. br., on a longer stem.—*Mett. Fil. H. Lips.* p. 19. t. 1.

Hab. Venezuela.—This comes near the small forms of the next, and there are a few scales on the lower part of the midrib beneath.

22. *A. hybridum*, Bory; *rhizome* woody, the scales dense,  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., linear, crisped, dark chesnut-brown; *st.* subtufted, 6-9 in. l., firm, erect, with scattered squarrose linear dark scales; *barren fr.* 6-12 in. l., 1 $\frac{1}{2}$ -2 in. br., the point acuminate, the base rather rounded; *texture* subcoriaceous; both *sides* naked except the midrib beneath, the edge ciliated with linear-subulate scales; *veins* immersed, usually once forked; *fertile fr.* much smaller than the others.— $\beta$ , *A. Vulcani*, Leperv.; *fr.* ovate-oblong, cuspidate, 3-4 in. l., 1 $\frac{1}{2}$  in. br.—*Hk. Sp.* 5. p. 231.

Hab. Mascaren Isles, Natal, Tristan d'Acunha, Cameroon Mountains, Fernando Po, Mexico to Brazil.—The scales here are from 1 to 1 $\frac{1}{2}$  line long, and often fall quite away as the frond matures. *A. Lindbergii*, Mett., from Brazil, appears to be identical with this.

23. *A. decurrens*, Desv.; *rhizome* woody, the scales large, ovate, dull-brown;

*st.* 1-4 in. l., firm, erect, scaly; *fr.* 1 ft. or more l., 2-3 in. br., the apex very blunt, the lower part narrowed into the stem very gradually; *texture* very thick; both *sides* naked, but the edge densely fringed with minute ovate-acuminate brown scales; *veins* immersed, nearly hidden.—*Hk. Sp. 5. p. 203.*

Hab. Philippines, *Cuming*, 144.—This is referred by J. Smith to *A. obtusifolium*, Willd.

24. *A. decoratum*, Kze.; *caud.* very stout, the scales  $\frac{1}{2}$ - $\frac{3}{4}$  in. l., linear, bright-brown, crisped; *st.* 4-8 in. l., firm, erect, densely clothed with blunt squarrose scales often  $\frac{1}{4}$ - $\frac{3}{8}$  in. l., 2 lin. br.; *barren fr.* 1 ft. or more l., 3-4 in. br., the point acute, the base rounded, the edge densely fringed with scales like those of the stem, but small; *texture* coriaceous; *veins* subparallel, usually once forked, sometimes anastomosing; *fertile fr.* nearly as large as the other.—*Hk. Sp. 5. p. 195.*

Hab. West Indies, Guiana, Peru.

\*\*\* *Surface of the frond slightly scaly. Sp. 25-45.*

*A. Fronds 1-4 inches long. Sp. 25-32.*

25. *A. Feei*, Bory; *rhizome* filiform, very wide-creeping, the scales linear, reddish-brown, scarcely spreading; *st.*  $\frac{1}{2}$ - $1\frac{1}{2}$  in. l., slightly scaly; *barren fr.* 1-2 in. l.,  $\frac{1}{4}$  in. br., the point bluntish, the edge conspicuously repand, the lower part narrowed gradually; *texture* subcoriaceous; both *sides* with a few small ovate-acuminate scales; *fertile fr.*  $\frac{1}{4}$ - $\frac{1}{2}$  in. l.,  $\frac{1}{8}$  in. br., on longer stems than the others.—*Hk. Sp. 5. p. 222. 2nd Cent. t. 92.*

Hab. West Indies to Ecuador.

26. *A. cardiophyllum*, Hk.; *rhizome* wide-creeping,  $\frac{1}{8}$  in. thick, densely clothed with rather large lanceolate dark-brown scales; *st.* 1- $1\frac{1}{2}$  in. l., slightly scaly, the upper part winged; *barren fr.*  $\frac{3}{4}$ - $1\frac{1}{4}$  in. l.,  $\frac{3}{4}$ - $\frac{7}{8}$  in. br., the point blunt, the base cordate, with a narrow decurrent haft; *texture* very thick; under *side* with a few small linear dark chesnut-brown scales; *veins* immersed; *fertile fr.* similar to the other, but the stem longer.—*Hk. Sp. 5. p. 229. Ic. t. 715.*

Hab. Andes of Quito, *Jameson*, 212, 395.

27. *A. squamipes*, Hk.; *rhizome* firm, but not woody, wide-creeping, clothed with adpressed lanceolate acuminate bright-brown scales; *st.* 1-2 in. apart,  $\frac{1}{2}$ - $1\frac{1}{2}$  in. l., clothed with similar scales; *barren fr.*  $\frac{1}{2}$ -1 in. l.,  $\frac{2}{3}$ - $\frac{1}{2}$  in. br., the point blunt, the base rounded to a slight haft; *texture* coriaceous; under *side* with a few small linear reddish-brown scales; *veins* raised beneath; *fertile fr.* rather smaller than the other, and the stem much longer.—*Hk. Sp. 5. p. 228. Ic. t. 197.*

Hab. N. Granada and Peru.—We cannot distinguish from this the Mexican *A. ovatum*, Liebm., not Hk. *A. humile*, Mett. (N. Granada, *Lindig*, 167), is said to be like this, but to have an oblong fertile frond ( $1\frac{1}{4}$  in. l., 4 lin. br.) larger than the barren one.

28. *A. Lindenii*, Bory; *rhizome* short, firm, the scales dense, fibrillose, nearly black; *st.* tufted, 4-9 in. l., very slender, with a few scattered linear scales; *barren fr.* 1-4 in. l.,  $\frac{3}{4}$ - $1\frac{1}{2}$  in. br., the point bluntish or acute, the base rounded; *texture* subcoriaceous; the *edge* thinly ciliated with subulate bright-brown scales, which are sometimes scattered over the under surface; *veins* visible, terminating within the edge; *fertile fr.* much smaller than the other.—*Hk. Sp. 5. p. 223. A. venustum, Liebm.*

Hab. Mexico to Ecuador and Brazil.—The scales of the frond are longer and more hair-like than its allies.



29. *A. squarrosus*, Klotzsch; *rhizome* wide-creeping, the scales dense, linear, dark chesnut-brown; *st.*  $\frac{1}{2}$ - $1\frac{1}{2}$  in. l., slender, slightly scaly; *barren fr.* 2-3 in. l.,  $\frac{1}{2}$  in. br., narrowed gradually to both ends; *texture* herbaceous, the under *surface* with scattered linear dark-chesnut scales; *veins* visible; *fertile fr.*  $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. br., the stem 2 in. l.—*Hk. Sp. 5. p. 224.*

Hab. Columbia, Moritz, 319.—Most like the last, but the scales different, and the frond a different shape.

30. *A. Lloense*, Hk.; *rhizome* slender, wide-creeping, the scales adpressed, lanceolate-acuminate, ferruginous; *st.* 1-2 in. apart, 2-5 in. l., slender, slightly scaly; *barren fr.* 2-4 in. l.,  $\frac{1}{2}$ - $1\frac{1}{2}$  in. br., the point blunt or acute, the base narrowed suddenly or rather rounded; *texture* subcoriaceous; under *surface* with a few small linear dark chesnut-brown scales; *veins* visible, not reaching the edge; *fertile fr.* much smaller than the other, on a longer stem.—*Hk. Sp. 5. p. 229. Ic. t. 657.*

Hab. Mexico, along the Andes to Peru.

31. *A. heteromorphum*, Klotzsch; *rhizome* filiform, wide-creeping, the scales small, scattered, lanceolate-acuminate, brown; *st.* 1-3 in. l., slender, slightly scaly; *barren fr.*  $1\frac{1}{2}$ -2 in. l.,  $\frac{3}{4}$ -1 in. br., the point bluntish, the base rounded; *texture* thin but firm; both *sides* scattered over with linear dark castaneous scales; *veins* conspicuous, raised and darker in colour than the rest of the frond; *fertile fr.* much smaller and the *st.* much longer.—*Hk. Sp. 5. p. 224.*

Hab. Columbia and Ecuador.

32. *A. Huacsaro*, Rinz.; *rhizome* woody, wide-creeping, the scales short, black, fibrillose; *st.* of barren frond 1 in. l., clothed with small furfuraceous scales; *barren fr.* 3-4 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., the point very blunt, the lower part narrowed very gradually; *texture* coriaceous; the lower *surface* viscid, the upper with scattered minute furfuraceous scales; *veins* fine, close, indistinct; *fertile fr.* narrower than the other and the *st.* much longer.—A. Calaguala, Klotzsch. *Hk. Sp. 5. p. 218.* A. Ruizianum, Moore.

Hab. Columbia to Peru.—Distinguished from all the preceding by its ligulate fronds and very coriaceous texture.

#### B. Barren fronds 6-18 inches long. Sp. 33-45.

33. *A. Gardnerianum*, Fée; *caud.* woody, erect, the scales large, ovate-lanceolate, pale-brown; *st.* tufted, 1-2 in. l., firm, erect, densely clothed with similar spreading scales; *barren fr.* 4-6 in. l.,  $\frac{3}{4}$ -1 in. br., the point blunt, the base rather rounded; *texture* coriaceous; upper *surface* nearly naked, lower with small thickly scattered furfuraceous scales; *veins* raised beneath, fine, usually once forked; *fertile fr.* narrower than the other, narrowed at the base on a stem 6-8 in. l. *Hk. Sp. 5. p. 233.*

Hab. Brazil and Venezuela.—Texture and general habit of *conforme*, but the scales almost dense enough to entitle it to a place in the next group.

34. *A. alpestre*, Gardn.; *rhizome* wide-creeping, densely clothed with lanceolate acuminate bright-chesnut scales; *st.* of barren frond 4-5 in. l., erect, slightly scaly; *barren fr.* 6 in. l.,  $\frac{5}{8}$  in. br., bluntish at both ends; *texture* subcoriaceous; *surface* rather thickly scattered over with small linear bright-chesnut scales; *veins* distant, prominent; *barren fr.* 2-3 in. l.,  $\frac{1}{2}$  in. br., the *st.* 1 ft. l.—*Sert. Pl. t. 25.* A. eximium, Mett.

Hab. Organ Mountains, Brazil, Gardner, 5924; N. Granada, Lindig, 318.—Differs from the next principally by its shorter fertile frond rounded at the base.

35. *A. lineare*, Fée; *rhizome* short-creeping, the scales dense, linear, glossy-brown; *st.* of barren frond 1-3 in. l., slender, thinly clothed with squarrose linear scales; *barren fr.* 8-12 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., narrowed very gradually to both ends; *texture* thin, midrib beneath with a few linear scales and under surface slightly furfuraceous; *veins* distant, not reaching the edge; *fertile fr.* not more than 2-3 in. l., on a slender stem 4-8 in. l.—*Hk. Sp.* 5. p. 221.

Hab. Brazil, Gardner, 98, 5927; and a plant from Bourbon differs only by its more distinct raised veins.—This is very likely a narrow-fronded variety of the next, with which it agrees in clothing and texture.

36. *A. Aubertii*, Desv.; *rhizome* woody, short-creeping, the scales dense, linear, bright-brown; *st.* of barren frond 1-6 in. l., clothed with squarrose linear brown scales; *barren fr.* 1 ft. or more l.,  $\frac{1}{2}$ -1 in. br., the point acute, the lower part narrowed gradually, the edge entire or subrepand; *texture* thin; *midrib* and *edge* slightly ciliated with scales like those of the stem; *veins* fine, conspicuous, usually simple, 1 lin. apart; *fertile fr.* 2-3 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., narrowed suddenly at the base, the stem 6-9 in. l.—*Hk. Sp.* 5. p. 219.

Hab. Bourbon, Natal, Zambesi-land, Fernando Po, Venezuela (*A. Klotzschii*, Moritz), Guatemala.—A well-marked species, differing from *viscosum* in texture, clothing, and veining.

37. *A. dimorphum*, Hk. & Gr.; *rhizome* stout, horizontal, the scales lanceolate, dark-brown; *st.* close, 4-6 in. l., slender, erect, slightly scaly throughout; *barren fr.* 3-5 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., the point bluntish, the edge deeply and irregularly crenate; *texture* subcoriaceous; both *sides* covered with minute white dots; *veins* subparallel, simple or forked; *fertile fr.* much smaller than the barren one, nearly entire.—*Hk. Sp.* 5. p. 208. *Hk. & Gr. t.* 145. *2nd Cent. t.* 90.

Hab. St. Helena.—The only *Elaphoglossum* that has the fronds distinctly incised or crenated.

38. *A. viscosum*, Sw.; *rhizome* woody, short-creeping, the scales dense, fibrillose, dark chesnut-brown; *st.* 3-6 in. l., firm, erect, furfuraceous, often viscous; *barren fr.* 6-12 in. l.,  $\frac{1}{2}$ -1 in. br., the apex acute, the lower part narrowed gradually; *texture* subcoriaceous; both *sides* more or less viscid and minutely furfuraceous; *veins* close and fine; *fertile fr.* smaller, and on longer stems than the others.—*Hk. Sp.* 5. p. 220. *Hk. & Gr. t.* 64.

Hab. Cuba to Brazil and Peru; Himalayas to Ceylon, Java, and Philippines; Seychelles, Mascaren Isles, Fernando Po, Angola.—From the large forms of this we cannot distinguish clearly *A. xanthoneuron*, *Karstenianum*, *dissimile*, and *curvans*, Kze. The two latter are described as squamulose, but both our authentic specimens are nearly naked. The frond often becomes quite naked in an old state, and then the plant is difficult to recognize. *A. stigmatolepis* and *falcatum*, Fée, we cannot separate clearly.

39. *A. ciliatum*, Presl; *rhizome* woody, wide-scandent, the scales short, dense, deciduous, linear, dark chesnut-brown; *st.* of barren frond 6-9 in. l., firm, erect, slightly scaly; *barren fr.* 12-18 in. l.,  $\frac{3}{4}$ -1 $\frac{1}{4}$  in. br., the point acute, the base narrowed gradually; *texture* subcoriaceous; both *sides* nearly naked; the *edge* deciduously furfuraceous; *veins* fine, close, indistinct; *fertile fr.* smaller and on much longer stems than the others.—A. Preslianum, Fée. *Hk. Sp.* 5. p. 220. (*not p.* 265).

Hab. Columbia to Peru.—Probably a variety of the last, from which it differs chiefly by its woody wide-scandent rhizome and larger barren fronds.

40. *A. pilosum*, H. B. K.; *rhizome* woody, the scales large, dense, lanceolate, pale-brown; *st.* 6-8 in. l., firm, flexuose, slightly scaly; *barren fr.* flexuose, 6-8 in. l.,  $\frac{3}{4}$  in. br., the point acute, the base narrowed gradually; *texture* herbaceous; both *sides*, especially the under one, clothed with small bright-



brown scales, each like a tuft of stellate hairs; *veins* conspicuous, very close.—*Hk. Sp. 5. p. 241.*

Hab. Mexico to Columbia.—Easily distinguished by its texture and clothing.

41. *A. samoense*, Baker; *rhizome* short, woody, the scales long, dense, fibrillose, glossy, dark chesnut-brown; *st.* 4-6 in. l., clothed with squarrose woolly deciduous hairs; *barren fr.* 6-12 in. l., 1-1½ in. br., the point bluntish and the base narrowed rather suddenly; *texture* herbaceous; *surfaces* and especially the *midrib* clothed with soft bright silky brownish hairs; *veins* sometimes twice forked; *barren fr.* much smaller than the other.—*Elaphoglossum, Brack. t. 9.*

Hab. Polynesian Islands.—Very like the last in texture and general habit, but the scales both of the rhizome and surface are very different. Judging from the figure, the Chilian *A. Webbii*, Bory, may be identical with this.

42. *A. apodum*, Kaulf.; *caud.* thick, woody, the scales dense, linear, bright-brown, crisped; *st.* tufted, none or short, when present densely clothed with squarrose fibrillose bright-brown scales; *barren fr.* 1 ft. or more l., 1½-2 in. br., the apex acuminate, the lower part narrowed very gradually; *texture* subcoriaceous but thin; the *edge* and *midrib* densely fringed with soft short brown hairs; *veins* fine, simple or once forked; *fertile fr.* much smaller than the barren one.—*Hk. Sp. 5. p. 213. Hk. & Gr. t. 99.*

Hab. West Indies to Brazil and Peru.—The West Indian specimens are thinner and less ciliated than the Continental ones.

43. *A. scolopendrifolium*, Raddi; *rhizome* woody, short-creeping, the scales long, linear, dark chesnut-brown, crisped; *st.* 4-12 in. l., firm, erect, densely clothed with spreading, nearly black, long fibrillose scales; *barren fr.* often 1 ft. l., 1½-3 in. br., the apex acute, the base narrowed gradually; *texture* subcoriaceous; *edge* and *midrib* more or less densely ciliated with scales like those of the stem, but smaller; *veins* subparallel, usually once forked; *fertile fr.* much smaller than the barren one.—*Hk. Sp. 5. p. 211. A. barbatum, Karst. A. erinaceum, Fée.*

Hab. Guatemala, along the Andes to Peru.—A plant from Fendler has the veins not unfrequently joining. *A. Hystrix*, Kze., seems nearly allied. An Ecuador plant from Jameson is densely ciliated not only on the edge, but over the surface. The scales are like those of *A. hybridum*, but much more copious.

44. *A. Cumingii*, Fée; *rhizome* woody, the scales large, ovate, dull-brown; *st.* 6-8 in. l., firm, erect, clothed in the lower part with similar scales; *barren fr.* 8 in. l., 1½ in. br., the point blunt, the base narrowed gradually, the edge densely fringed with minute scales; *texture* very thick; the upper surface clothed all over with very minute scattered scales; *veins* quite hidden; *fertile fr.* as long but narrower than the barren one.—*Fée, Acrostich. 34.*

Hab. Philippines, *Cuming*, 193.—Perhaps a subfurfuraceous variety of *decurrens*, with which it agrees in texture and general habit.

45. *A. Boryanum*, Fée; *rhizome* woody, the scales dense, linear-subulate, nearly black; *st.* tufted, 3-9 in. l., more or less densely clothed with ovate-acuminate or lanceolate pale-brown scales; *barren fr.* often 1 ft. l., 3 in. br., the point acute, the base rounded; *texture* almost papyraceous, flaccid; both sides thinly clothed with small ovate or peltate furfuraceous scales, which fringe the edge densely; *veins* immersed, very distinct, simple or once forked, ending in black dots within the edge; *fertile fr.* much smaller and on longer st. than the barren one.—*Hk. Sp. 5. p. 210.*

Hab. West Indies.—The Ecuador plant mentioned in "Sp. Fil." seems to belong to *A. scolopendrifolium*.

\*\*\*\* *Surface of the frond densely scaly.* Sp. 46-65.

A. *Fronde* 1-4 inches long. Sp. 46-52.

46. *A. ovatum*, Hk.; *rhizome* filiform, very wide-creeping, with slender fibrillose bright-brown scales; *st.* distant,  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., clothed with spreading scales; *barren fr.*  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.,  $\frac{3}{8}$ - $\frac{1}{2}$  in. br., roundish or broadly ovate; *texture* subcoriaceous; both *sides* often densely clothed with fimbriated ferruginous scales; *veins* hidden; *fertile fr.* the largest, and on longer stems.—*Hk. Sp. 5. p. 228. Hk. & Gr. t. 140.*

Hab. Mexico to Ecuador and South Brazil.—Best distinguished from the small forms of *spathulatum* by its wide-creeping rhizome.

47. *A. procurrens*, Mett.; *rhizome* slender, wide-creeping, with squarrose linear-subulate bright-brown scales; *st.* 0-1 in. l., slender, ciliated; *barren fr.* 1-3 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., spatulate, the point blunt, the haft narrowed very gradually; *texture* subcoriaceous; both *sides* scattered over and the edge ciliated with long, linear, dark chesnut-brown scales; *veins* distant, slender; *fertile fr.* much smaller than the others.—*Hk. Sp. 5. p. 226.*

Hab. Cuba, *Fendler*, 793.—Most likely a small form of *villosum*. The scales of the frond are the same, but that has the stems tufted.

48. *A. spathulatum*, Bory; *st.* densely tufted, 1-2 in. l., firm, erect, clothed with soft spreading brown fibrillose scales; *barren fr.*  $\frac{1}{2}$ -4 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., obovate-spatulate, the point blunt, the base tapering narrowly or gradually; *texture* coriaceous; both *sides* scattered over and the edge usually densely ciliated with small linear-subulate reddish-brown scales; *veins* hidden; *fertile fr.* smaller than the other and the stem longer.—*A. piloselloides, Presl. Hk. Sp. 5. p. 227. Fil. Ex. t. 29.*

Hab. Cuba and Mexico to Brazil and Peru; Tristan d'Acunha, Ceylon, Natal, Mascaren Isles.—*A. obtusatum*, Carm. Hk. & Gr. t. 22, from Tristan d'Acunha, and *A. Rad-dianum*, Hk. & Gr. t. 4, are forms, the latter with the stem especially densely clothed with dark-brown fibrillose scales, and the frond 3-4 in l.,  $\frac{1}{4}$  in. br.

49. *A. Matthewsii*, Fée; *rhizome* woody, wide-creeping, the scales small, dense, linear, nearly black; *st.* 2-3 in. l., wiry, clothed throughout with small lanceolate scales, nearly black in the middle, with a grey border; *barren fr.* 2-3 in. l.,  $\frac{1}{2}$ - $\frac{5}{8}$  in. br., both ends narrowed gradually; *texture* coriaceous; *scales* small, dense, peltate or ovate, brown or nearly black in the middle, with a pale sometimes silvery border; *veins* hidden; *fertile fr.* larger than the others, on longer stems.—*Hk. Sp. 5. p. 230. A. Hartwegii, Fée, Hk. l. c.*

Hab. Andes, from Mexico to Peru.—This should probably be regarded as a more scaly variety of *A. Huacsaro*, with which it agrees in texture and mode of growth.

50. *A. acrocarpon*, Mart.; *rhizome* woody, often 1-2 ft. l., clothed with slender squarrose subulate dark-brown scales; *st.* distant, those of the barren fr. 2-3 in. l., fibrillose throughout; *barren fr.* 3-4 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., the point blunt, the base narrowed gradually; *texture* coriaceous, the edge inflexed, the upper *surface* clothed with minute peltate furfuraceous scales, the lower scaly on the elevated midrib throughout; *veins* simple; *fertile fr.* like the barren one, but the stem longer.—*Hk. Sp. 5. p. 208.*

Hab. N. Granada, Ecuador, Brazil.—The fronds of this are like those of the last in texture and shape, but are not scaly over the surface beneath.

51. *A. succisæfolium*, Thouars; *rhizome* woody, the scales dense, linear-subulate, nearly black; *st.* 2-3 in. l., firm, erect, densely clothed with spreading



linear scales, dark chesnut in the centre, grey at the edge; *barren fr.* 3-4 in. l., 1-1½ in. br., blunt at both ends; *texture* coriaceous; both *sides* densely clothed with pale-brown linear scales; *veins* hidden; *fertile fr.* smaller than the other and on a much longer stem.—*Hk. Sp. 5. p. 241. Hk. & Gr. t. 2.*

Hab. Tristan d'Acunha, and reported also from Bourbon and Mauritius.—Habit of *A. conforme*.

B. *Fronde* 6-18 inches long. Sp. 52-65.

52. *A. cinnamomeum*, Baker; *rhizome* short-creeping, the scales dense, linear, bright reddish-brown; *st.* 3-4 in. l., firm, densely clothed with similar but narrower squarrose scales; *barren fr.* 4-6 in. l., ¾-½ in. br., narrowed gradually to both ends; *texture* coriaceous; both *sides*, especially the lower one, densely clothed with long bright-yellow hair-like scales, which are scarcely at all flattened or ciliated; *veins* hidden; *fertile fr.* shorter and blunter than the other, the stem longer.

Hab. Cameroon Mountains and Clarence Peak, Fernando Po, *G. Mann.*—This agrees with the next in size and habit, but the scales are quite different.

53. *A. lepidotum*, Willd.; *rhizome* thick, woody, the scales very dense, linear, glossy, black; *st.* 1-3 in. l., firm, scaly throughout; *barren fr.* 3-6 in. l., ¾-¾ in. br., the point usually blunt, the base cuneate or rather rounded; *texture* coriaceous; scales furfuraceous and white on the upper surface, large, dense, ovate, ciliated, and ferruginous on the lower one, those on the midrib with a black middle; *veins* hidden; *fertile fr.* similar to the other, but the stem longer.—*Hk. Sp. 5. p. 238.*

Hab. Andes, from Columbia to Peru.—To this appear to belong *A. Engelii*, Karsten, *A. Dombeyanum*, Fée, the West Indian *A. vestitum*, Schlecht., and Mexican *A. fulvum*, M. & G., and probably *A. rufescens*, Liebm. It may be a dwarf mountain variety of *A. muscosum*.

54. *A. strictum*, Raddi; *rhizome* woody, short-creeping, densely clothed with small lanceolate dark chesnut-brown conspicuously ciliated scales; *st.* 1-2 in. l., clothed with similar scales; *barren fr.* 4-6 in. l., ½-¾ in. br., narrowed to both ends; *texture* subcoriaceous; *veins* mostly simple; upper *surface* nearly or quite naked when old, lower densely clothed with bright reddish-brown scales, which are almost reduced to stellate tufts of hairs; *fertile fr.* about equal to the other, but the stem longer.—*Hk. Sp. 5. p. 225.*

Hab. Brazil and Columbia.—This bears the same relation to *auricomum* that *lepidotum* does to *muscosum*.

55. *A. villosum*, Sw.; *rhizome* woody, but not thick, densely clothed with bright-brown soft fibrillose scales; *st.* tufted, 2-4 in. l., slender, densely clothed with spreading scales like those of the base; *barren fr.* 6-9 in. l., 1-1½ in. br., the point acute, the lower part narrowed gradually; *texture* thin and flaccid; both *sides* with scattered scales like those of the stem, and the edge usually densely ciliated; *veins* distant, usually once forked, clubbed at the point and not reaching the edge; *fertile fr.* much smaller than the other.—*Hk. Sp. 5. p. 225. Hk. & Gr. t. 95.*

Hab. Mexico and Cuba to Peru.—A plant gathered by Barter at Sierra Leone is like this, but more robust and more scaly. *A. undulatum*, Willd., *Hk. Sp. 5. p. 212*, is evidently a form. It is larger and thinner than the type, with main veins two lines apart. *A. setosum*, Liebm., is a small form, less scaly than usual, and *A. Plumieri*, Fée, *Hk. Sp. 5. p. 226*, a thin variety, with the edge of the frond repand. This may be known from all its neighbours, except *cinnamomeum*, by the scales, however dense, being uniform, and not at all flattened.

56. *A. tectum*, Willd.; *rhizome* thick, woody, the scales dense, linear, rigid, black; *st.* 3-4 in. l., firm, erect, clothed with small furfuraceous adpressed and a few spreading scales; *barren fr.* 6-12 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., narrowed gradually to both ends; *texture* coriaceous; lower or both *sides* clothed with small thin scales, which are brown, darker in the centre, ultimately bleached; *veins* hidden; *fertile fr.* narrower than the others, on longer stems.—*A. rubiginosum*, Fée. *Hk. Sp.* 5. p. 222.

Hab. Mexico and West Indies to South Brazil and Peru.—Distinguished by its long narrow frond, the upper surface of which is nearly or quite naked, with the scales beneath, though dense, thin and closely adpressed. *A. Schiedei* and *nivosum* of Kunze appear both to belong here.

57. *A. Bellermanianum*, Klotzsch; *rhizome* woody, the scales dense, linear, glossy, reddish-brown; *st.* 3-6 in. l., firm, erect, densely clothed with large spreading ovate-lanceolate pale-brown scales; *barren fr.* 4-6 in. l.,  $1\frac{1}{4}$ - $1\frac{1}{2}$  in. br., the point very blunt, the base cuneate or rather rounded; *texture* coriaceous; both *sides* with small scattered furfuraceous scales, those on the midrib beneath black in the middle; *veins* slightly raised, usually once forked; *fertile fr.* much narrower than the others and on longer stems.—*Hk. Sp.* 5. p. 236.

Hab. Columbia and Ecuador.—Habit and texture of *A. conforme*.

58. *A. muscosum*, Sw.; *rhizome* woody, short, the scales dense, glossy, linear, bright chesnut-brown; *st.* 4-6 in. l., firm, clothed with large ovate spreading pale-brown ciliated scales; *barren fr.* 6-12 in. l.,  $1$ - $1\frac{1}{2}$  in. br., narrowed at both ends; *texture* coriaceous; upper *surface* slightly scaly, at last often naked, lower quite hidden by imbricated ovate-acuminate short-ciliated ferruginous scales, which are often dark chesnut-brown in the middle; *barren fr.* much smaller than the other, the *st.* longer.—*Hk. Sp.* 5. p. 231. *A. Langsdorffii*, H. & G. t. 234.

Firmer in texture than *A. squamosum*, and often glabrous above when mature, but even more densely scaly beneath, but the cilia of the scales much shorter. *A. polylepis*, Kze., *A. rupestre*, *deorsum*, *caulolepia*, and *truncicola*, Karst., are either this or closely allied.

59. *A. obductum*, Kaulf.; *rhizome* woody, the scales dense, rigid, fibrillose, black; *st.* 3-4 in. l., firm, erect, the scales small, peltate, and also linear, with a black centre and grey edge; *barren fr.* 12-15 in. l.,  $1$ - $1\frac{1}{4}$  in. br., the point acute, the base narrowed gradually; *texture* subcoriaceous; upper *surface* naked, lower thinly matted with small pale peltate scales; *veins* conspicuous; *fertile fr.* much smaller than the other.—*Hk. Sp.* 5. p. 237.

Hab. Mauritius and Bourbon.—Most like the large forms of *viscosum* in habit and texture. The scales are altogether peltate and very minute, and the coating, though close, is very thin, and easily rubs away. The American *A. elongatum*, Kze., gathered in Peru by Poppig, and in Brazil by Lindberg, does not appear to be safely separable from this.

60. *A. auricomum*, Kunze; *caud.* erect, woody, the scales linear, reddish-brown; *st.* 2-3 in. l., densely clothed with spreading linear and soft fibrillose scales like those of the base; *barren fr.* 12-18 in. l.,  $1\frac{1}{2}$  in. br., the point acuminate, the lower part narrowed very gradually; *texture* subcoriaceous; upper *surface* naked or slightly scaly, lower thinly matted with minute bright-brown scales, densest and longest on the midrib; *veins* close, mostly simple; *fertile fr.* 1 ft. l.,  $\frac{3}{8}$  in. br., the *st.* 5 in. l.—*Hk. Sp.* 5. p. 239.

Hab. Andes, from Columbia to Peru, and reported by Fée from Mexico.—Probably a variety of *squamosum*. The scales are bright reddish-brown, and reduced down, except on the midrib, to mere stellate tufts of hair. *A. meridense*, Klotzsch, is like this, except that the stem is longer, and the scales of the stem and midrib are not so narrow or so dense.



61. *A. tomentosum*, Bory; *rhizome* woody, the scales dense, black, fibrillose; *st.* 3-5 in. l., rigid, erect, densely clothed with linear short-ciliated scales, of which the upper ones are quite white, the lower ones black in the middle; *barren fr.* 1 ft. or more l., 1-1½ in. br., the point bluntish, the lower part narrowed very gradually; *texture* thick but flaccid; both *sides* matted with scales like those of the stem and small adpressed white furfuraceous ones; *veins* distant; *fertile fr.* narrower than the other, on a stem 1 ft. or more l.—*A. heterolepis*, Fée. *Hk. Sp.* 5. p. 234.

Hab. Bourbon.—Not unlike *A. Sieberi* in texture and general habit, but densely scaly, and the scales peculiar.

62. *A. cuspidatum*, Willd.; *rhizome* thick, woody, the scales dense, linear-subulate, black, or nearly so; *st.* 6-15 in. l., firm, erect, clothed with deciduous adpressed dark-coloured scales; *barren fr.* 1-2 ft. l., 3-4 in. br., the point cuspidate, the base not narrowed very gradually; *texture* coriaceous; upper *surface* nearly naked, lower densely matted with small furfuraceous ciliated brown scales; *veins* fine and close; *fertile fr.* rather smaller than the other, the stem about the same.—*Hk. Sp.* 5. p. 235. *A. Lindigii*, Karst. t. 3.

Hab. West Indies to Peru.—The representative of *A. latifolium* in this group. The scales, though dense, are altogether adpressed and peltate, as in *obductum*. *A. lamina-rioides*, Bory, seems to be closely allied.

63. *A. perelegans*, Fée; *rhizome* woody, the scales linear, dark-brown; *st.* 6-8 in. l., firm but slender, slightly scaly; *barren fr.* 8-12 in. l., 1¼-1½ in. br., the point subacute, the base narrowed rather suddenly; *texture* subcoriaceous; lower *surface* matted all over with small bright-brown scales, which are scattered over the upper surface; *veins* conspicuous, usually simple; *fertile fr.* linear.—*Hk. Sp.* 5. p. 232.

Hab. Dominica, *Imray*, 101, and reported also from Brazil and Peru.—Most like the last, but not so coriaceous. The scales beneath are not matted so densely, and though all small, as compared with those of *squamosum* and *muscosum*, are some of them lanceolate and ciliated.

64. *A. Sprucei*, Baker; *rhizome* woody, short-creeping, the scales dense, fibrillose, bright reddish-brown; *st.* 1 ft. or more l., rather slender, thickly clothed throughout with decurved pale-brown linear scales, some ½ in. l.; *barren fr.* 2 ft. l., 3 in. br., narrowed to both ends; *texture* herbaceous; *veins* distinct, usually simple, ⅓ in. apart; upper *surface* thinly clothed with scales like those of the stem but smaller, the lower more thickly with pale scales, which are cordate, broad and distinctly ciliated in the lower half, then narrowed suddenly to a linear point; *fertile fr.* unknown.

Hab. Foot of Mount Chimborazo, *Spruce*.—The peculiar scales of the lower surface are enough scattered to be each seen as a distinct object.

65. *A. squamosum*, Sw.; *rhizome* woody, the scales dense, rigid, linear, nearly black; *st.* 2-4 in. l., densely clothed with unequal lanceolate ciliated pale or dark-brown scales, the lower ones often nearly black; *barren fr.* 6-12 in. l., ¾-1 in. br., the point acute, the base narrowed gradually; *texture* thick but flaccid; both *sides* matted and the edge densely ciliated with bright reddish-brown ciliated linear or lanceolate scales; *veins* hidden; *fertile fr.* as long as the other but much narrower, the stems much longer.—*Hk. Sp.* 5. p. 240. *A. vestitum* (paleaceum on the plate), *Hk. & Gr.* t. 235.

Hab. Mexico and West Indies to Ecuador and the Amazon Valley; Sandwich Isles, Sumatra, Ceylon, Neilgherries, Mascaren Isles, Guinea Coast, Madeira, Azores—Distinguished by its soft texture and copious long-ciliated scales. *A. plumosum*, Fée, and probably *A. Wageneri*, Kze., may be placed here with confidence.

\*\* *Stenochlæna*, J. Sm. *Barren fronds simply pinnate, the pinnæ like those of Lomaria in their shape, coriaceous texture, and fine close venation.* Sp. 66-70. Fig. 60. f. g.

66. A. (Steno.) *sorbifolium*, L.; *rhizome* thick, woody, often 30-40 ft. l., clasping trees like a cable, sometimes prickly; *fr.* 12-18 in. l., 6-12 in. br., simply pinnate; *barren pinnæ* 4-8 in. l.,  $\frac{3}{4}$ - $\frac{1}{2}$  in. br., 3 to 20 on each side, articulated at the base, the edge entire or toothed; *texture* coriaceous or subcoriaceous; both *sides* naked; *rachis* often winged; *fertile pinnæ* 1-2 in. apart, 2-4 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br.—*Hk. Sp.* 5. p. 241.

Hab. West Indies to Peru and South Brazil; Fiji, Samoa, New Caledonia, Philippines, Malaccas, Cochin China, Seychelles, Mascaren Isles, Angola, Guinea Coast.—This corresponds to the genus *Lomariopsis* of Fée, who makes 17 species. The type has 12 to 20 pairs of pinnæ about 2-3 in. l.,  $\frac{3}{4}$  in. br., the edge slightly and irregularly crenato-serrate; *S. longifolia*, J. Sm. (*Lomaria*, Kaulf.), fewer pinnæ, the edge more distinctly toothed, and the base cuneate; *A. yapurense*, Mart. (Gard. F. t. 57), pinnæ sometimes  $1\frac{1}{2}$  in. br., 3 to 6 on a side, almost entire, the texture not so coriaceous, and the veining not so close; *L. fraxinea*, Willd., short-stalked, entire, pinnæ often 5-6 in. l., 1-1 $\frac{1}{4}$  in. br.; *L. Wrightii*, Eaton, oblong-obovate pinnæ remarkably narrowed at the base, and cuspidate at the apex; and *L. cuspidata*, Fée, long-stalked, ligulate-cuspidate pinnæ sometimes 8 in. l. Here also, as abnormal forms, probably belong *A. buxifolium*, Kze., pinnæ sessile, coriaceous, dark-green, oblong, very obtuse, under 1 in. l.,  $\frac{1}{2}$  in. br.; *L. variabilis*, Fée, lower pinnæ deeply pinnatifid, with round crenated lobes; *Polyp. ? binerve*, Hk., and *L. Smithii*, Fée, frond sessile, deltoid, tripinnatifid, the pinnules small, dichotomously forked, or with 2 ligulate lobes on each side.

67. A. (Steno.) *decrescens*, Baker; *rhizome* woody, wide-scandent; *st.* 2-3 in. l., firm, slightly scaly; *barren fr.* 18 in. l., 4 in. br., with about 40 pinnæ on each side, those about a third of the way down the longest, and from this narrowed very gradually down to mere auricles at the base; *pinnæ* close,  $\frac{3}{8}$  in. br., the edge obscurely crenulate; *texture* coriaceous; both *sides* naked; *rachis* slightly winged upwards; *fertile pinnæ*  $\frac{1}{8}$  in. br., cuneate at the base or subpetiolate.—*A. polyphyllum*, *Hk. Sp.* 5. p. 243. (not p. 269).

Hab. Cameroon Mountains, West Tropical Africa, *Mann*, 1391.

68. A. (Steno.) *scandens*, J. Sm.; *rhizome* woody, wide-scandent, scaleless; *st.* 3-4 in. l., firm, erect, naked; *fr.* 1-3 ft. l., 1 ft. or more br., simply pinnate; *barren pinnæ* 4-8 in. l.,  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. br., the point acuminate, the edge thickened and serrulate, the base cuneate, sessile, or slightly stalked, articulated, and with usually a gland on the upper side; *texture* coriaceous; *rachis* and both *sides* naked; *veins* fine and close; *fertile pinnæ* 6-12 in. l., 1 $\frac{1}{2}$ -2 lin. br., the lower ones 1-1 $\frac{1}{2}$  in. apart.—*Hk. Sp.* 5. p. 249.

Hab. Himalayas and South China to Ceylon, Queensland, and Fiji.—The veins here spring from a line (see fig. 60. f.) which runs parallel with the midrib, either quite close to it or with a very narrow space between. *Davallia achilleifolia*, Wall. (*Hk. Sp.* 1. p. 195. t. 56. D.), seems to be a deltoid tripinnatifid abnormal form.

69. A. (Steno.) *laurifolium*, Hk.; *st.* firm, erect, naked; *fr.* 2-3 ft. l., 12-18 in. br., simply pinnate; *barren pinnæ* 6-9 in. l., 1 $\frac{1}{2}$ -1 $\frac{3}{4}$  in. br., narrowed gradually from the cordate base to the apex, the edge sharply but finely toothed, the base sessile, not articulated and without a gland; *texture* coriaceous; *rachis* and both *sides* naked; *veins* fine and close; *fertile pinnæ* 6-10 in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., the lower ones 1-2 in. apart.—*Hk. Sp.* 5. p. 251.

Hab. Philippines, *Cuming*, 2261; Solomon Isles, *Milne*, 518.—Like the last, but larger, and the pinnæ not articulated.

70. A. (Steno.) *tenuifolium*, Baker; *rhizome* wide-scandent, woody, slightly



scaly; *barren fr.* simply pinnate, the *st.* 4-6 in. l., naked, firm, erect, the *fr.* 3-5 ft. l., 12-18 in. br.; *pinnæ* 6-12 in. l.,  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. br., the point acuminate, the edge thickened and serrulate, the base short-stalked, with a gland on the upper side, not articulated; *fertile fr.* bipinnate, on a longer stem; *pinnæ* long-stalked, with numerous distant *pinnl.* 2-3 in. l.,  $\frac{1}{2}$ -1 lin. br., spreading from the rachis at right angles; *texture* coriaceous; *rachis* and both *sides* glossy; *veins* fine and close.—*Lomaria*, *Desv.* A. Meyerianum, *Hk. Sp. 5. p. 250. G. F. t. 16.*

Hab. Mascaren Isles and Natal.—Well distinguished from all the others by its compound fertile *pinnæ*.

\*\*\* Polybotrya, *H. B. K.* *Barren frond not lomarioid in habit, variously pinnatifid or pinnate, with the veins, except in the first species, pinnate in the ultimate divisions of the barren frond.* Fig. 60. c, d, e. Sp. 71-83.

71. A. (Polyb.) *bifurcatum*, Swz.; *st.* densely tufted, 2-4 in. l., slender, stramineous, naked; *fr.* 3-4 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., pinnate; lower *pinnæ* of barren fr. usually 2- sometimes 3-cleft, with linear divisions, those of the barren *pinnæ* broader and not so deep; *texture* herbaceous; both *sides* naked; a single *vein* carried into each ult. division.—*Hk. Sp. 5. p. 209. 2nd Cent. t. 91. Microstaphyla, Presl.*

Hab. St. Helena.

72. A. (Polyb.) *articulatum*, Hk.; *st.* firm, erect, nearly naked; *fr.* ample, probably several feet long, bipinnate; *barren pinnæ* (in our specimens) 9 in. l.,  $1\frac{1}{2}$  in. br.; *pinnl.* close, oblong, the point bluntish, the edge crenate, the upper side distinctly auricled, and the lower obliquely truncate at the base; *texture* subcoriaceous; *rachis* and both *sides* naked; *fertile pinnæ* 3-4 in. l., stalked, linear-cylindrical, auricled on the upper side at the base.—*Hk. Sp. 5. p. 247.*

Hab. Philippines, *Cuming*, 296.

73. A. (Polyb.) *Wilkesianum*, Hk.; *rhizome* woody, wide-scandent, naked; *st.* 6-9 in. l., firm, erect, naked, stramineous; *fr.* bipinnate, 1-2 ft. l., 8-12 in. br., upper *pinnæ* of the barren fr. entire in one of our specimens, usually all cut down to the rachis into numerous unequal-sided rhomboidal *pinnl.*, which are cuneate, especially below at the base, the rest of the edge deeply toothed; *texture* glossy, subcoriaceous; *rachis* and both *sides* naked; *fertile pinnl.* stalked, linear-cylindrical or oblong-subdimidiate.—*Hk. Sp. 5. p. 247.*

Hab. Society Isles and New Caledonia.—This comes near the preceding, with which Mettenius unites it. Both have the *pinnæ* and *pinnules* distinctly jointed at the base.

74. A. (Polyb.) *apiifolium*, Hk.; *caud.* stout, woody, erect; *st.* of barren fr. 2-3 in. l., erect, densely clothed with tomentum; *barren fr.* 4-6 in. each way, deltoid, tripinnate; *pinnæ* close, only the lowest pair with pinnatifid *pinnl.*; *ult. divisions* oblong-rhomboidal,  $\frac{1}{4}$ - $\frac{3}{8}$  in. l., the base equally cuneate, the outer edge slightly toothed; *texture* herbaceous; *rachises* tomentose; *fertile fr.* on a slender naked *st.* 6-8 in. l., the *fr.* paniced with a few distant slender simple or compound beaded branches.—*Hk. Sp. 5. p. 243.*

Hab. Philippines, *Cuming*, 26, *Lobb.*—This has altogether the habit of an *Anemia*, with the fertile segments ball-like, with the sori all over the surface.

75. A. (Polyb.) *plumbicaule*, Baker; *rhizome* woody, wide-scandent, scaly; *st.* of barren fr. 9-10 in. l., firm, erect, glossy, naked; *barren fr.* 1 $\frac{1}{2}$ -2 ft. l., nearly 1 ft. br., simply pinnate, with about 12 *pinnæ* on each side below the point, the lower ones sessile, 5-6 in. l., 1 in. br., the point acuminate, the edge in the upper part sharply toothed, the base broadly rounded on the upper, truncate

on the lower side; *texture* coriaceous; *rachis* and both *sides* naked; *veins* fine, in close pinnated groups, with two veinlets on each side; *st.* of barren fr. 1 ft. l.; *barren pinnæ* pinnate, the lower ones 2-3 in. l., 2-3 lin. br., the pinnl. oblong.

Hab. Tarapota, North Peru, *Spruce*, 4090.

76. A. (Polyb.) *fractiseriale*, Baker; *st.* (of fertile fr.) 2 ft. l., naked; *barren fr.* 4 ft. l., 2 ft. br., simply pinnate, with 16 *pinnæ* on each side, the lower ones short-stalked, 1 ft. l.,  $1\frac{1}{2}$ - $1\frac{3}{4}$  in. br., the apex acuminate, the edge toothed, the base rounded on the upper, truncate on the lower side; *texture* coriaceous; *rachis* and both *sides* naked; *veins* distinct, in pinnate groups of 3-4 on a side, with a simple vein springing from the rachis midway between each group; *fertile pinnæ* distant, simply pinnate, the lower ones 6 in. l.,  $\frac{3}{4}$  in. br.

Hab. Monte Campana, North Peru, *Spruce*, 4337.—This and the preceding are two interesting novelties, easily recognisable from the other South American species by their quite simple pinnæ.

77. A. (Polyb.) *aspidioides*, Baker; 1 ft. high; *st.* densely clothed with lanceolate-acuminate scales; *fr.* bipinnatifid; upper *pinnæ* united at the base, lower  $2\frac{1}{2}$  in. l., 1 in. br., cut down nearly to the rachis into blunt linear-oblong falcate subserrulate lobes; *texture* subcoriaceous; *surfaces* naked; *fertile fr.* narrower, bipinnatifid, the lobes fertile on both sides.—Polybotrya, *Griseb. Cat. Pl. Cub. p.* 276.

Hab. Cuba, *Wright*, 1827.—This we have not seen, and the description is compiled from Grisebach, who compares the general habit of the plant to that of *N. Filix-mas*.

78. A. (Polyb.) *pubens*, Baker; *rhizome* woody, wide-scandent, scaly; *st.* 6-9 in. l., firm, erect, villose, scaly below; *barren fr.* 2-3 ft. l., 1 ft. or more br., the lower *pinnæ* 5-6 in. l.,  $1\frac{1}{4}$ - $1\frac{1}{2}$  in. br., cut more than halfway down to the midrib into close blunt subentire oblong lobes  $\frac{1}{4}$ - $\frac{3}{8}$  in. br.; *texture* subcoriaceous; all the *rachises* villose and the under *surface* slightly so; *fertile pinnæ* 1 in. or more apart, the upper ones simple, 3-4 in. l.,  $\frac{1}{8}$  in. br., the lower ones with a few short branches spreading at right angles from the lower part.—Polyb. *Kze. Linnæa*, 9. p. 23.

Hab. Brazil, *Martius*; Peru, *Poppig*, *Spruce*, 3880, 4740.—This is much less compound than the next, with which it is united in "Sp. Fil.," the lower pinnæ being not larger than the central ones and pinnatifid only.

79. A. (Polyb.) *acuminatum*, Hk.; *rhizome* thick, woody, wide-scandent, densely scaly; *st.* 4-6 in. l., firm, erect, scaly throughout; *barren fr.* 1-2 ft. l., often 1 ft. br., deltoid, bipinnate; upper *pinnæ* oblong-lanceolate, slightly lobed, truncate on the lower side at the base, 2-3 in. l.,  $\frac{3}{4}$ -1 in. br.; lower *pinnæ* 6-8 in. l., 4-5 in. br., with several similar pinnl. on each side; *texture* subcoriaceous; *rachis* and both *sides* naked; *fertile fr.* 1 ft. l., deltoid, tripinnate; *segm.* short, linear-oblong.—*Hk. Sp.* 5. p. 245.

Hab. Brazil.—This resembles the least divided forms of the next in its barren frond, but the fertile frond is more compact and more compound, with much shorter ultimate divisions. The Peruvian *P. nutans*, Kze., seems to come near to this, but the fertile frond is said to be subquadripinnatifid at the base.

80. A. (Polyb.) *caudatum*, Hk.; *rhizome* woody, wide-scandent, often 1 in. thick; *st.* woody, erect, with long linear scales at the base; *fr.* bipinnate or tripinnatifid, 3-4 ft. l., 1-3 ft. br., the upper barren *pinnæ* lanceolate, pinnatifid, the lower ones sometimes 18 in. l., 6-10 in. br.; *pinnl.* 3-5 in. l.,  $\frac{3}{4}$ - $1\frac{1}{4}$  in. br., the edge entire, with oblong-falcate lobes reaching halfway down to the midrib; *texture* subcoriaceous; *rachis* and both *sides* naked; *fertile pinnl.* 2-3 in. l., 1 lin. br., continuous or beaded,  $\frac{1}{4}$ -1 in. apart.—*Hk. Sp.* 5. p. 244.



Hab. Mexico and West Indies to Peru and Brazil.—This and *A. pubens* may be distinguished from the rest by their long dangling narrow-cylindrical fertile pinnules.

81. *A.* (Polyb.) *osmundaceum*, Hk.; *rhizome* woody, wide-scandent, clothed with long linear scales; *st.* 12-18 in. l., firm, erect, stramineous, scaly only at the base; *fr.* ample, tripinnatifid or tripinnate, the lower *pinnæ* 1-2 ft. l., 4-8 in. br.; *barren pinnl.* stalked, lanceolate, cut down nearly or quite to the rachis below into close subentire lobes; *texture* subcoriaceous; both *sides* naked; *fertile fr.* and *pinnæ* nearly or quite as large as the barren ones; *segm.* linear, cylindrical,  $\frac{1}{4}$ – $\frac{1}{2}$  in. l., with a space between them.—*Hk. Sp. 5. p. 246.* *A. cylindricum*, *Hk. l. c.*

Hab. Cuba to Ecuador and South Brazil.

82. *A.* (Polyb.) *canaliculatum*, Hk.; *rhizome* woody, wide-scandent, spinulose and densely clothed with linear scales; *st.* 1 ft. or more l., scaly throughout; *fr.* 2-3 ft. l., 12-18 in. br., tripinnate; lower *barren pinnæ* 6-9 in. l., 4-5 in. br.; *pinnl.* lanceolate, stalked, cut down to the rachis below into oblong lobes; *texture* subcoriaceous; both *sides* naked; *fertile pinnl.* close, the branches  $\frac{1}{4}$  in. l., spreading at right angles and bearing 3-4 sessile balls of sori.—*Hk. Sp. 5. p. 247.*

\* Hab. Venezuela.—Very near the last, but the fertile segments moniliform.

83. *A.* (Polyb.) *Lechlerianum*, Hk.; *rhizome* woody, wide-scandent, scaly; *st.* 6-12 in. l., firm, erect, scaly downwards; *fr.* 3-4 ft. l., 12-18 in. br., the barren one quadripinnatifid; lower *pinnæ* 6-9 in. l., 4-5 in. br.; *pinnl.* close, lanceolate; *segm.* oblong, cut down nearly to the rachis into ligulate lobes; *texture* subcoriaceous; *rachises* pubescent; *fertile pinnl.* narrower, distant, the *segm.* between oblong and cylindrical, with a space between them, the lower ones rather beaded.—*Hk. Sp. 5. p. 246.* *2nd Cent. t. 97.*

Hab. Peru, *Lechler*, 2156, *Spruce*, 4744; Ecuador, *Jameson*.—Much more divided than any of the preceding.

\*\*\*\* Egenolfia, *Schott.* Differs from *Polybotrya* only by the presence of a seta in the sinus of the lobes of the ultimate divisions. Fig. 60. h, i, j. Sp. 84.

84. *A.* (Egenol.) *appendiculatum*, Willd.; *rhizome* firm, woody; *barren fr.* 6-18 in. l., 4-8 in. br., simply pinnate, sometimes rooting at the apex; *st.* 3-6 in. l., erect, naked or slightly scaly; *pinnæ* 2-4 in. l.,  $\frac{3}{8}$ – $\frac{3}{4}$  in. br., the edge varying from subentire to cut halfway down to the midrib into blunt lobes, the upper side often auricled, the lower one obliquely truncate at the base; *colour* dark-green; *texture* papyraceous or subcoriaceous; both *sides* naked; *rachis* often rather scaly; *fertile fr.* narrower, on a longer st., the *pinnæ* roundish or oblong, often distinctly stalked.— $\beta$ , *A. Hamiltonianum*, Wall.; *pinnæ* large, lanceolate, acuminate, equal-sided, subentire, the fertile ones with the sori in bead-like clusters without any connecting leafy membrane.— $\gamma$ , *P. ludens*, Wall.; *barren pinnæ* 1 in. or more br., equal-sided, deeply pinnatifid, with crenulate lobes, the lowest pair with several distinct pinnatifid *pinnl.* on the lower side; *fertile pinnæ* linear-oblong, blunt, entire.—*Hk. Sp. 5. p. 251.* *Ex. F. 2. t. 198.*

Hab. Himalayas to Hong-Kong, Ceylon, the Malaccas, and Philippines.—Fée enumerates eight species, and makes of the forms with moniliform fertile *pinnæ* a sub-genus (*Granulina*, Bory), but the extremes appear to pass into one another quite gradually. *P. Helferiana*, Kze., is a small form with beaded fertile *pinnæ* and blunt slightly-lobed barren ones a little truncate at the base beneath.

\*\*\*\*\* Rhipidopteris, *Schott.* Venation flabellate, the fertile fronds small, suborbicular, uncut. Sp. 85. Fig. 60. k, l.

85. *A.* (Rhip.) *flabellatum*, H. B. K.; *rhizome* slender, wide-creeping; *st.* distant, 1-3 in. l., slender, slightly scaly; *sterile fr.* cuneato-flabellate,  $\frac{1}{2}$ – $\frac{3}{4}$  in. br.,

entire or cleft, the outer edge crenate or dentate; *texture* subcoriaceous; *fertile fr.*  $\frac{1}{2}$  in. br., orbicular.—*Hk. Sp. 5. p. 252. Ic. t. 96.*— $\beta$ , *A. tripartitum*, Hk.; *barren fr.* 2-3 times dichotomously forked, with cuneate or ligulate ult. divisions.—*Hk. & Gr. t. 118.*

Hab. New Granada to Peru.

86. *A. (Rhip.) peltatum*, Sw.; *rhizome* slender, wide-creeping; *st.* distant, slender, 1-3 in. l., scaly throughout; *barren fr.* 1-2 in. each way, repeatedly dichotomously forked, with narrow linear ultimate divisions  $\frac{1}{4}$ - $\frac{1}{2}$  lin. br.; *texture* subcoriaceous; *fertile fr.*  $\frac{1}{2}$  in. br., often 2-lobed.—*Hk. Sp. 5. p. 252.*

Hab. Mexico and West Indies to Peru and Brazil.

87. *A. (Rhip.) fœniculaceum*, Hk.; *rhizome* slender, wide-creeping; *st.* distant, slender, 2-8 in. l., scaly throughout; *sterile fr.* 1-2 in. br., very often dichotomously forked, with filiform ultimate divisions; *texture* subcoriaceous; *fertile fr.*  $\frac{3}{8}$  in. br., 2-lobed.—*Hk. Sp. 5. p. 253. Hk. & Gr. t. 119.*

Hab. Andes of Ecuador, Jameson, Spruce.

§§ *Veins anastomosing.* Sp. 88-132.

\* *Veins united only near the margin.* Sp. 88-90.

† *Fronds simple.* Aconiopteris, Presl. Sp. 88-89. Fig. 60. p. 9.

88. *A. (Acon.) subdiaphanum*, Hk. & Gr.; *caud.* woody, erect; *st.* tufted, 2-6 in. l., firm, erect, scaly; *barren fr.* 4-8 in. l., 1-1 $\frac{1}{2}$  in. br., both ends narrowed, the edge entire; *texture* subcoriaceous; *veins* beneath very prominent, united by a zigzag veinlet just within the edge; *fertile fr.* much narrower, on a longer stem.—*Hk. Sp. 5. p. 256. Hk. & Gr. t. 105.*

Hab. St. Helena.

89. *A. (Acon.) gorgoneum*, Kaulf.; *st.* tufted, firm, erect, 1-2 in. l., passing gradually into the *barren fr.*, which is 6-15 in. l., 2-3 in. br., the point acute, the lower two-thirds narrowed very gradually, the edge entire; *texture* subcoriaceous; *surfaces* naked; *veins* united by a straight veinlet just within the margin; *fertile fr.* smaller, narrower, on a st. 6 in. or more l.—*Hk. Sp. 5. p. 254.*

Hab. Sandwich and Society Isles.—Habit of *A. latifolium*.

†† *Fronds pinnate.* Olfersia, Raddi. Sp. 90. Fig. 60. m, n, o.

90. *A. (Olf.) cervinum*, Sw.; *rhizome* woody, creeping, densely clothed with long linear scales; *st.* 1 ft. or more l., scaly downwards; *barren fr.* 2-4 ft. l., simply pinnate; *pinnæ* 4-9 in. l., 1-2 in. br., entire or nearly so, unequal at the base; *texture* coriaceous, naked; *veins* prominent, united just within the edge by a straight veinlet; *fertile pinnæ* distant, linear-lanceolate, bipinnate, with short spreading subcylindrical *pinnl.*—*Hk. & Gr. t. 81. Fil. Ex. t. 43.*— $\beta$ , *O. corcovadensis*, Raddi; *fertile fr.* simply pinnate only, the *pinnæ* unbranched.—*Hk. Sp. 5. p. 254.*

Hab. Cuba and Mexico to South Brazil and Peru.—The extremes look very different, but are connected by intermediates. There is a form with the barren *pinnæ* deeply pectinato-pinnatifid.

\*\* Stenosemia, Presl. *Veins forming one or two rows of areolæ against the midribs, the rest free.* Sp. 91. Fig. 60. r, s.

91. *A. (Steno.) auritum*, Sw.; *caud.* erect, woody; *sterile fr.* with a *st.* 6-9 in. l., deltoid, 8-12 in. each way, ternate, the central *segm.* deeply pinnatifid,



with lanceolate entire lobes, the lateral ones unequal-sided, with elongated lobed lanceolate-oblong lower *pinnl.* not reaching down to the rachis; *texture* papyraceous; both *sides* naked; *fertile fr.* with a *st.* 12-18 in. l., deltoide, with distant linear *pinnæ*  $\frac{1}{2}$  lin. br., the upper ones simple, the lower pinnatifid.—*Hk. Sp.* 5. p. 257. *Fil. Ex. t.* 81.

Hab. Philippine, Malay, and Solomon Isles.—*S. cicutaria*, Presl, known only in a barren state, is more deeply divided, with narrower lobes and more conspicuous main veins, which are fulvo-villose on the under surface.

\*\*\* Soromanes, *Fée. Veins pinnate, a few of those of contiguous groups usually joining.* Sp. 92. Fig. 60. t. u.

92. A. (Soro.) *Cænopteris*, Kze.; *rhizome* woody, wide-creeping, densely clothed with long linear ferruginous scales; *st.* 6-12 in. l., stramineous, scaly below; *fertile fr.*  $1\frac{1}{2}$ -3 ft. l., 1 ft. or more br., simply pinnate; *pinnæ* 4-8 in. l., 1- $1\frac{1}{2}$  in. br., oblong-lanceolate, entire or toothed, especially towards the point, or sometimes pinnatifid; *texture* subcoriaceous; both *sides* naked; *fertile fr.* smaller and narrower, with pinnate *pinnæ*  $\frac{1}{4}$ -1 in. br.—*Hk. Sp.* 5. p. 256. *S. serratifolium* and *integrifolium*, *Fée.*

Hab. Mexico to South Brazil.—The venation is that of *Cyclodium*, and in some of the forms the veins hardly unite at all.

\*\*\*\* *Veins anastomosing copiously.* Sp. 93-132.

† Gymnopteris, *Bernh. Fronds dimorphous. Main veins distinct nearly or quite to the edge.* Sp. 93-107. Fig. 60. v-x. aa. bb.

A. *Barren frond entire.* Sp. 93-95.

93. A. (Gym.) *Linnæanum*, Hk.; *rhizome* wide-creeping; *st.* 1-2 in. l., slightly fibrillose below; *barren fr.* 4-8 in. l.,  $\frac{1}{2}$  in. br., narrowed gradually to both ends, sometimes rooting at the point, the edge entire; *texture* papyraceous; *colour* dark-green; main *veins* fine, rather zigzag but distinct nearly to the edge; *areolæ* copious, without free veinlets; *fertile fr.* 3-4 in. l.,  $\frac{1}{4}$  in. br., the *st.* slender, 4-5 in. l.—*Hk. Sp.* 5. p. 278. *2nd Cent. t.* 26.

Hab. Malay Isles.

94. A. (Gym.) *gaboonense*, Hk.; *rhizome* firm, wide-creeping; *st.* of barren fr. 4-6 in. l., firm, erect, slightly scaly; *barren fr.* 1 ft. l., 3-4 in. br., narrow-oblong, the apex sometimes proliferous, the edge subentire, the base narrowed suddenly; *texture* subcoriaceous; *surfaces* naked; main *veins* very distinct, reaching nearly to the edge, with transverse veinlets, with copious intermediate *areolæ* with a few free veinlets; *fertile fr.* 4-6 in. l.,  $\frac{3}{4}$ -1 in. br., narrowed at both ends, the edge sinuated, the *st.*  $1\frac{1}{2}$ -2 ft. l.—*Hk. Sp.* 5. p. 270.

Hab. Guinea Coast, *Mann* 1049; Angola (1,000-2,400 ft.), *Welwitsch.*—Barren frond very like that of the next, but the fertile one not Lomarioid.

95. A. (Gym.) *variabile*, Hk.; *rhizome* wide-creeping; *st.* of barren fr. 0-6 in. l.; *barren fr.* 6-18 in. l.,  $1\frac{1}{2}$ -3 in. br., oblong-spathulate, with a very long gradually-narrowed haft, the point blunt or acute, the edge entire; *texture* papyraceo-herbaceous; *surfaces* naked; main *veins* raised, zigzag, reaching nearly to the edge, with copious fine *areolæ* with free veinlets between them; *fertile fr.* 6-12 in. l., 2-3 lin. br., the *st.* often 1 ft. l.—*Gym. decurrens*, *Hk. G. F. t.* 6.— $\beta$ , *laciniatum*, Hk.; *barren fr.* deeply irregularly pinnatifid; *fertile fr.* pinnate, with a few Lomarioid *pinnæ.*—*Hk. Sp.* 5. p. 277.

Hab. Himalayas (up to 3,000 ft.) to Ceylon and Java.

B. Barren fronds sometimes simple, but one or two pairs of distinct pinnae when fully developed. Sp. 96-100.

96. A. (Gym.) *oligarchicum*, Baker; rhizome woody, short-creeping; st. of barren fr. 6-8 in. l., firm, scaly; barren fr. 8-12 in. l., 3-6 in. br., broad-oblong, the edge nearly entire, the base subcuneate, simple or with a single pair of small spreading oblong pinnae at the base; texture herbaceous; main veins  $\frac{1}{4}$ - $\frac{3}{8}$  in. apart, raised beneath, distinct to the edge, with abundant areolæ with free veinlets between them; fertile fr. simple, 3-4 in. l., 1 in. br., or ternate, the st. 6-12 in. l.

Hab. North Peru, Spruce 4737, 4636.—Most like *A. panduriforme*, but the veining different.

97. A. (Gym.) *quercifolium*, Retz.; rhizome stout, wide-creeping; st. of barren fr. 1-2 in. l., clothed with soft spreading ferruginous hairs; barren fr. 3-4 in. l.,  $1\frac{1}{2}$ -2 in. br., the terminal pinna with blunt rounded lobes, reaching sometimes  $\frac{1}{4}$  of the way to the rachis; below this usually a single pair of small sessile ovate blunt auriculate lateral ones; texture thin-herbaceous; veins beneath hairy; main veins distinct to the edge, with copious areolæ with free veinlets between them; fertile fr. with a terminal pinna 1-2 in. l., 1 lin. br., and a pair of smaller lateral ones, the st. slender, 6-9 in. l., naked except at the base.—Hk. Sp. 5. p. 279. Ic. t. 905. Fil. Ex. t. 80.

Hab. Peninsular India, Ceylon, South China, Cochin-China.

98. A. (Gym.) *Harlandii*, Hk.; caud. woody; st. 1-1 $\frac{1}{2}$  ft. l., firm, glossy, chesnut-brown, scaly at the base; barren fr. simple or with an oblong-spathulate entire terminal pinna, sometimes 1 ft. l., 3 in. br., and 1-2 smaller similar ones on each side, usually connected at the base, all acuminate; texture coriaceous; main veins distinct, connected by transverse veinlets with copious areolæ with free included veinlets between them; fertile fr. similar, but the pinnae much smaller.—Hk. Sp. 5. p. 274. G. decurrens, Hk. Fil. Ex. t. 94. (not G. F. t. 6).

Hab. Hong-Kong and Formosa.

99. A. (Gym.) *taccaefolium*, Hk.; caud. woody, with copious dark reddish-brown linear scales; st. of barren fr. 1-4 in. l., scaly downwards; barren fr. varying from simple oblong-lanceolate, entire, 1 ft. or more l., 2-3 in. br., to 1 $\frac{1}{2}$ -2 ft. l., more than 1 ft. br., copiously pinnate, with oblong-lanceolate pinnae 6-9 in. l., 1 $\frac{1}{2}$  in. br., the upper ones narrowly decurrent, the lower ones forked at the base on the under side; texture papyraceous; rachis and surfaces naked; main veins distinct nearly to the edge, with regular transverse veinlets and copious fine areolæ with abundant free veinlets between them; fertile fr. simple, 6-12 in. l.,  $\frac{1}{8}$  in. br., or pinnate, with forked linear pinnae.—Hk. Sp. 5. p. 279. Ic. t. 907.

Hab. Philippines.—Though so variable in cutting, the forms coincide in texture and venation. The simple form is *L. hilocarpus*, Fée, and the 3-lobed form *Gymn. trilobata*, J. Sm.

100. A. (Gym.) *flagelliferum*, Wall.; rhizome woody, creeping, scaly; st. of barren fr. 6-12 in. l., nearly naked, the latter simple or with 1-3 pairs of pinnae, the terminal one ovate-lanceolate, entire or repand, and often very much elongated and rooting at the point, the lateral ones 3-6 in. l., 1-2 in. br., sometimes also prolonged; texture herbaceous; rachis and both sides naked; main veins pinnate, with copious areolæ between them, with few or no free veinlets; fertile pinnae 2-3 in. l., about  $\frac{1}{2}$  in. br.—Hk. Sp. 5. p. 258. Hk. & Gr. t. 23. A. heteroclitum, Presl.

Hab. Himalayas to Java and the Philippines.



C. *Barren fronds copiously pinnate.* Sp. 101-107.

101. A. (Gym.) *repandum*, Blume; *st.* of barren fr. 6-12 in. l., naked; *barren fr.* 1-2 ft. l., 8-12 in. br., sometimes elongated and rooting, with numerous *pinnæ* on each side, the lower ones 4-6 in. l.,  $\frac{3}{4}$ -1 in. br., the edge with entire blunt lobes reaching a quarter of the way down; *texture* herbaceous; *rachis* and both *sides* naked; main *veins* distinct; *areolæ* copious, without free veinlets, the sinuses often setose; *fertile pinnæ* 2-3 in. l., 2-3 lin. br., stalked, entire or repand.—*Hk. Sp.* 5. p. 260.— $\beta$ , *A. Quoyanum*, Gaud.; *pinnæ* lobed halfway down or more, the lobes toothed.—*Hk. Sp.* 5. p. 259.

Hab. South China, Bonin, Philippine, Malay, and Polynesian Isles, New Caledonia, Queensland, Seychelles.—The two varieties seem to be connected by gradual intermediates. *N. argutum*, Fée, is probably this in an undeveloped condition.

102. A. (Gym.) *punctulatum*, L.; *rhizome* firm, wide-creeping; *st.* of barren fr. 6-12 in. l., slightly scaly, the latter 12-18 in. l., often 1 ft. br. with a terminal *pinna* and 1 to 8 on each side, which are 4-9 in. l., 1-2 in. br., lanceolate or oblong, narrowed at both ends, the edge entire or repand; *texture* papyraceous; *rachis* and both *sides* naked; main *veins* pinnate, with copious hexagonal *areolæ* between them without free veinlets; *fertile fr.* on a longer slender stem with similar but much smaller *pinnæ*.—*Hk. Sp.* 5. p. 258.

Hab. Mascaren Isles, Zambesi-land, Guinea Coast, Angola.

103. A. (Gym.) *subrepandum*, Hk.; *rhizome* woody, wide-creeping; *st.* of barren fr. stout, erect, nearly naked; *barren fr.* varying from simple, 1 ft. l.,  $1\frac{1}{2}$ -2 in. br., to 2 ft. l., 1 ft. br., copiously pinnate, with several linear-oblong entire or subrepand *pinnæ* on each side, which are sometimes 6-9 in. l., 2 in. br.; *texture* subcoriaceous; *surfaces* and *rachis* naked; main *veins* distinct nearly to the edge, with copious *areolæ* with free veinlets between them; *fertile fr.* like the others, but smaller.—*Hk. Sp.* 5. p. 275.

Hab. Luzon, *Cuming* 225; Penang, *Sir W. Norris*, *Mactier*.—Very near the last, but firmer in texture.

104. A. (Gym.) *alienum*, Sw.; *rhizome* woody, short-creeping; *st.* 6-18 in. l., scaly downwards; *barren fr.* 1-2 ft. l., often 1 ft. br., the upper part deeply pinnatifid, with lanceolate lobes, the lower part pinnate, with entire or deeply pinnatifid lower *pinnæ*, the lobes sometimes reaching more than halfway down to the *rachis*; *texture* papyraceous; *rachis* and *surfaces* naked, a distinct midvein in each of the lobes; *areolæ* copious, irregular, with free veinlets; *fertile fr.* much smaller, with distant narrow linear or pinnatifid leafy *pinnæ*.—*Hk. Sp.* 5. p. 272.— $\beta$ , *A. subpinnatifidum*, Hk.; *areolæ* with few or no free veinlets.—*Hk. Sp.* 5. p. 273.

Hab. Cuba and Mexico to North Peru and the Amazon Valley.—This and the next are the American analogues of the three preceding. Mettenius (*Annales*, 5. ser. vol. 2. p. 204) has two closely allied species from New Granada under the names of *Chrysodium opacum* and *pellucens*.

105. A. (Gym.) *nicotianæfolium*, Swz.; *rhizome* woody, wide-creeping, scaly; *st.*  $1\frac{1}{2}$ -2 ft. l., scaly below; *barren fr.* 1-3 ft. l., often 1 ft. br., with a large terminal *pinna* and 1-3 lateral pairs, which are 6-12 in. l., 1-3 in. br., the apex acuminate, the edge entire or nearly so, the base slightly rounded or subcuneate; *texture* papyraceous or subcoriaceous; *rachis* and *surfaces* naked; main *veins* distinct to the edge, with transverse veinlets, with copious fine *areolæ* with free veinlets between them; *fertile pinnæ* distant, 3-4 in. l.,  $\frac{3}{4}$ -1 in. br.—*Hk. Sp.* 5. p. 275. *G. F. t.* 26.

Hab. Cuba to the Amazon Valley.

106. A. (Gym.) *Preslianum*, Hk.; *rhizome* woody, short-creeping; *st.* 4-8 in. l., firm, erect, naked; *barren fr.* 1 ft. l., 6 in. br., with numerous erecto-patent *pinnæ* on each side, which are 2-3 in. l.,  $\frac{3}{8}$  in. br., the edge entire, narrowed to both ends, the lower ones short-stalked; *texture* subcoriaceous; *rachis* and both *sides* naked; venation of *Goniophlebium*; *fertile pinnæ* 1 in. l.,  $\frac{1}{2}$  in. br., blunt, stalked.—*Hk. Sp. 5. p. 265. (not p. 220).*

Hab. Philippines, *fide Presl*; Concan, *Mr. Law*.—Habit resembling that of the narrow-leaved forms of the next, but the venation peculiar. There are two plants given under the same name in "Sp. Fil."

107. A. (Gym.) *virens*, Wall.; *rhizome* woody, short-creeping; *st.* of barren fr. 1-2 ft. l., firm, erect, naked, the latter 1-3 ft. l., often 1 ft. br., with numerous sessile *pinnæ* on each side, which are 4-8 in. l.,  $\frac{3}{4}$ -1 in. br., the edge repand or bluntly lobed, the terminal one sometimes elongated and rooting at the point; *texture* subcoriaceous; *rachis* and both *surfaces* naked; *veins* pinnate, main veins distinct, the veinlets of opposite groups joining, with usually a single quadrangular areole between them, free veinlets none; *fertile fr.* on longer stems, the *pinnæ* 2-4 in. l.,  $\frac{1}{2}$ - $\frac{1}{2}$  in. br., linear or ligulate, entire or lobed.—*Hk. & Gr. t. 221.* A. *terminans* and *contaminans*, Wall. Bolbitis, *Schott*.— $\beta$ , *A. crispatum*, Wall.; *pinnæ* narrow, coriaceous, crisped, the *veins* anastomosing principally in costal arches.— $\gamma$ , *A. proliferum*, Hk.; *pinnæ* broad; main *veins* close, distinct, the veinlets of contiguous groups joining at an angle, as in *Goniopteris*, from which proceed one or in the lower areolæ two free veinlets, terminal pinna usually elongated and rooting.—*Hk. Ic. t. 631-2.*— $\delta$ , *A. costatum*, Wall.; *pinnæ* 8-12 in. l., 2-3 in. br., tinged with red; main *veins* very distinctly raised beneath,  $1\frac{1}{2}$ -2 lin. apart, the transverse veins joining at an angle, with 2-3 free veinlets or areolæ between them.—*Hk. Sp. 5. p. 262.*

Hab. Himalayas to Ceylon, Formosa, and Moulmein; Angola, Fernando Po, Sierra Leone.—We cannot draw any clear line of separation between the plants here placed as varieties. There are two remarkable abnormal states,—one, *Meniscium deltigerum*, Wall., with the fertile *pinnæ* nearly as broad as the barren ones, and the sori in triangular, often confluent, patches between the main veins; and the other, *Notholæna undulata*, Wall. (*Jenkinsia*, Hk. Gen. Fil. 75), with the sori in a broad band along the edge of the *pinnæ*, which is sometimes lobed between the main veins.

†† Chrysodium, *Fée*. *Fronde dimorphous, or in A. aureum, the upper pinnæ like the others and fertile; main veins none or indistinct.* Sp. 108-128.

A. Barren fronds entire. Sp. 108-114.

108. A. (Chrys.) *minus*, Mett.; *rhizome* wide-creeping, firm; *st.* of barren fr. 1-2 in. l., naked, stramineous; *barren fr.*  $1\frac{1}{2}$ -2 in. l.,  $\frac{3}{8}$ - $\frac{1}{2}$  in. br., the point bluish, the edge quite entire, the base tapering gradually; *texture* herbaceous; *surfaces* naked; no main *veins*; *areolæ* copious, with copious free veinlets, bounded by a wavy intramarginal line; *fertile fr.*  $1\frac{1}{2}$ -2 in. l.,  $\frac{1}{8}$  in. br., the *st.* slender, naked, 3-4 in. l.—*Hk. Sp. 5. p. 277. 2nd Cent. t. 78.*

Hab. Philippines, *Cuming*; Khasya (2-3,000 ft.), *Hk. fl. & Thomson*.

109. A. (Chrys.) *lanceolatum*, Hk.; *rhizome* woody, wide-creeping; *st.* of barren fr. 1-6 in. l.; *barren fr.* 6-12 in. l.,  $\frac{1}{2}$ -2 in. br., the point blunt or acute, the edge entire, the lower part narrowed very gradually; *texture* herbaceous; *surfaces* naked; main *veins* raised, but falling considerably short of the edge; *areolæ* copious, with free veinlets; *fertile fr.* 6-12 in. l.,  $\frac{1}{8}$ - $\frac{1}{4}$  in. br., the *st.* as long.— $\beta$ , *G. normalis*, J. Sm.; *barren fr.* sessile, 2-4 in. l.—*Hk. Sp. 5. p. 157.*

Hab. Peninsular India, Ceylon, Malaya, Philippines.

110. A. (Chrys.) *axillare*, Cav.; *rhizome* wide-scandent; *barren fr.* 6-18



in. l.,  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. br., the point bluntish, the edge entire, the lower half tapering very gradually to the base or a short stem; *texture* papyraceous; *surfaces* naked; no main *veins*; *areolæ* very copious, with abundant free veinlets; *fertile fr.* 6-12 in. l., 1-3 lin. br., flexuose, on a stem 1-6 in. l.—*Hk. Sp. 5. p. 276.*

Hab. Himalayas to Ceylon and the Philippine and Malay Isles.

111. A. (Chrys.) *aureo-nitens*, Hk.; *st.* tufted, that of the barren fr. very short, the latter oblong-spathulate, 3-4 in. l., 1 in. br. a short distance from the blunt apex, thence narrowed gradually to the base, the edge entire; *texture* coriaceous; under *surface* densely clothed with ovate-acuminate ferruginous scales; *areolæ* fine, copious, hexagonal, without free veinlets; *st.* of fertile fr. 3-5 in. l., firm, erect, scaly; *fertile fr.* pinnate, with 2-3 distant ligulate-oblong pinnae on each side.—*Hk. Sp. 5. p. 270. Ic. t. 933.*

Hab. Galapagos.—A very distinct species, remarkable for the combination of an entire barren with a pinnate fertile frond.

112. A. (Chrys.) *reticulatum*, Kaulf.; *caud.* erect, woody, with large narrow lanceolate ferruginous scales; *st.* of barren fr. 1-3 in. l., firm, erect; *barren fr.* 6-9 in. l., 1 $\frac{1}{2}$  in. br., the point bluntish, the edge entire, the base subcuneate; *texture* coriaceous; *surfaces* naked; *veins* indistinct, fine, anastomosing copiously; *fertile fr.* like the other, but the *st.* 6-9 in. l.—*Hk. Sp. 5. p. 267.*

Hab. Sandwich Isles.

113. A. (Chrys.) *pachyphyllum*, Kze.; *st.* nearly 1 ft. l., strong, erect; *barren fr.* 2 ft. l., 6 in. br., oblong-lanceolate, narrowed to both ends, the edge entire; *texture* very coriaceous; *surfaces* naked; *veins* fine, subparallel, anastomosing in *areolæ* several times as long as br.; *fertile fr.* 9 in. l., 2 $\frac{1}{2}$  in. br.—*Hk. Sp. 5. p. 268.*

Hab. Peru, *Pæppig.*—This and the preceding have quite the habit and texture of *Elaphoglossum*.

114. A. (Chrys.) *crinitum*, L.; *caud.* woody, erect; *st.* of barren fr. 4-8 in. l., densely clothed with long, slender, squarrose fibrillose purplish-brown scales; *barren fr.* often 12-18 in. l., 6-9 in. br., broad-oblong, the apex blunt, the base rounded, the edge entire; *texture* subcoriaceous; the *edge* densely fringed and both *sides* scattered over with scales like those of the stem; *areolæ* large, hexagonal, without free veinlets; *fertile fr.* like the other but much smaller, the *st.* longer.—*Hk. Sp. 5. p. 267. Hk. & Gr. t. 1. Fil. Ex. t. 6. Hymenodium, Fée.*

Hab. West Indies and Mexico.

B. *Barren fronds sometimes simple, but forked, or pinnatifid or pinnate at the base when fully developed.* Sp. 115-118.

115. A. (Chrys.) *bicuspe*, Hk.; *rhizome* woody, short-creeping, densely clothed with yellowish silky hairs; *st.* of barren fr. 1 ft. l., firm, naked; *barren fr.* 5-6 in. br. in the entire portion, the base rounded, the apex consisting of two broad divaricated acuminate lobes with a broad rounded sinus between, the edge entire; *texture* coriaceous; *surfaces* naked; main *veins* radiating from the apex of the stem to the upper edge, with copious *areolæ* (the larger ones distinct, the smaller ones less so) between them; *fertile fr.* 6-9 in. l.,  $\frac{1}{2}$  in. br., narrowed to both ends with 2-3 prominent subparallel ribs from the apex to the base, the *st.* 18 in. or more l.— $\beta$ , *integrifolium*, Eaton; *fr.* ovate-acuminate, not forked.—*Hk. Sp. 5. p. 271. Cheiroleuria, Presl.*

Hab. Java, Formosa, and Loo Choo Isles.

116. A. (Chrys.) *tricuspe*, Hk.; *rhizome* woody, wide-creeping; *st.* of barren fr. nearly 1 ft. l., firm, naked; *barren fr.* composed of three entire oblong lobes, the terminal one 6 in. l., 2 in. br., the lateral ones spreading, rather smaller; *texture* coriaceous; *surfaces* naked; main *veins* fine, not distinct to the edge, connected by transverse veinlets with copious small *areolæ* between them, with free veinlets; central lobe of *fertile fr.* 13 in. l.,  $\frac{1}{4}$  in. br., the lateral ones erecto-patent, rather shorter, the *st.* 1 $\frac{1}{2}$  ft. l.—*Hk. Sp. 5. p. 272. t. 304.*

Hab. Sikkim, *Mrs. Atkinson*.—One of the specimens has the upper half of two out of the three lobes contracted and soriferous, thus connecting this group with *Hymenolepis*.

117. A. (Chrys.) *fluviatile*, Hk.; *rhizome* firm, wide-creeping; *st.* 12-18 in. l., slightly scaly; *barren fr.* varying from narrow-oblong, entire, 1 ft. l., 3 in. br., to 2 ft. l., 1 ft. br., deeply pinnatifid, with a large lanceolate terminal lobe and 1-3 pairs of lateral ones, which are 2-6 in. l., 1-1 $\frac{1}{2}$  in. br., the apex acuminate, the edge entire; *texture* papyraceous; *surfaces* naked; main *veins* not distinct more than halfway to the edge; *areolæ* copious, without free veinlets; *fertile fr.* like the other, but smaller, the *st.* 2 ft. l.—*Hk. Sp. 5. p. 274.*

Hab. Guinea Coast; gathered by Curror, Barter, and Mann.—Most like *A. punctulatum*, but less divided, with main veins less distinct.

118. A. (Chrys.) *pandurifolium*, Hk.; *rhizome* firm, wide-creeping; *st.* of barren fr. 6-12 in. l., firm, slightly scaly; *barren fr.* 9-12 in. l., 3 in. br., narrow-oblong, the edge entire, and below this sometimes a pair of small round or oblong spreading sessile *pinnae*; *texture* papyraceous; *surfaces* naked; principal *veins* zigzag, not distinct to the edge; *areolæ* copious, with abundant free veinlets; *barren fr.* similar, but the principal division 4-6 in. l., 1 in. br., the *st.* 12-18 in. l.—*Hk. Sp. 5. p. 271. Gymnopteris, Hk. 2nd Cent. t. 87.*

Hab. Andes of Peru, *Spruce 4741, 5684.*

#### C. Barren fronds copiously pinnate. Sp. 119-127.

119. A. (Chrys.) *Heudelotii*, Hk.; *rhizome* firm, wide-creeping; *st.* 6-9 in. l., firm, erect, naked; *barren fr.* 12-18 in. l., 6-10 in. br., with numerous erecto-patent *pinnae* on each side, which are 2-6 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., narrowed to both ends, the point blunt or acute, the edge nearly entire, all sessile; *texture* subcoriaceous; *rachis* and both *sides* naked; *veins* very fine, the main ones not straight to the edge, with copious irregular *areolæ* between them, with a few free veinlets; *fertile fr.* similar, but the *pinnae* narrower.—*Hk. Sp. 5. p. 264.*

Hab. Senegambia, Sierra Leone, Zambesi-land.—A plant gathered by Barter, growing under water at Sierra Leone, may be a form. The texture is pellucid, the whole plant much smaller, and the *pinnae* are deeply toothed.

120. A. (Chrys.) *salicinum*, Hk.; *rhizome* stout, short-creeping; *st.* of barren fr. 4-9 in. l., firm, erect, naked, the latter 1 ft. or more l., 6-8 in. br., with numerous erecto-patent *pinnae* on each side, which are 3-4 in. l.,  $\frac{1}{2}$  in. br., narrowed to both ends, the edge repand, the lower ones stalked; *texture* subcoriaceous; no distinct main *veins*, the *areolæ* in 2-3 rows between the midrib and edge, almost without free veinlets; *fertile fr.* similar.—*Hk. Sp. 5. p. 265.*

Hab. Sierra Leone, *Barter*; Fernando Po, *Mann*.—Like the last in habit, but the *areolæ* much fewer and larger.

121. A. (Chrys.) *semicordatum*, Baker; *rhizome* woody, short-creeping; *st.* of barren fr. 6-8 in. l., erect, nearly naked; *barren fr.* 8-12 in. l., 3-4 in. br., sometimes proliferous at the apex; lower *pinnae* 2-3 in. l.,  $\frac{1}{2}$ - $\frac{3}{8}$  in. br., the edge inciso-crenate throughout, the base cordate on the upper, truncate on the lower side; *texture* herbaceous; *surfaces* naked; *veins* fine, the main ones distinct



about halfway to the edge, the *areolæ* in 3-4 rows, with free veinlets; *barren pinnæ* distant, 1-1½ in. l., 1 lin. br.—*Pœcilopteris semicordata*, Moore. *Hk. 2nd Cent. t. 88.*

Hab. Concan, *Law*; Neilgherries, *McIvor*.

122. A. (Chrys.) *Blumeanum*, Hk.; *rhizome* woody, wide-scandent; *st.* of barren fr. 6 in. l., deciduously scaly; *barren fr.* 1-3 ft. l., 1 ft. or more br., with numerous sessile *pinnæ* on each side, which are 4-6 in. l., 1 in. br., the apex acuminate, the edge slightly toothed, the base rounded; *texture* membranous; *rachis* and midrib beneath slightly scaly; *areolæ* hexagonal, without free veinlets; *fertile fr.* with distant *pinnæ* 4-8 in. l., ½-¾ in. br.— $\beta$ , *samoense*; *st.* of barren fr. 1 ft. l., the central *pinnæ* 2½ in. l., ½ in. br., more distinctly toothed.—*Hk. Sp. 5. p. 268.*

Hab. Assam, Java, Philippines, and Samoa.—*Lomagramme pteroides*, J. Sm. Hk. Gen. Fil. t. 97 (Luzon, *Cuming*), is apparently an abnormal form of this, with the sori in a line along the edge of *pinnæ* rather narrower than the usual barren ones. *A. Requinianum*, Gaud., should not unlikely also be referred here.

123. A. (Chrys.) *Raddianum*, Kze.; *rhizome* woody, wide-scandent; *st.* of barren fr. 4-6 in. l., firm, naked; *barren fr.* 1-2 ft. l., 8-15 in. br., with numerous *pinnæ* on each side, which are 4-8 in. l., ½-1 in. br., the apex acuminate, the edge toothed, especially towards the point, the base cuneate, the lower ones often stalked; *texture* firm-herbaceous; *surfaces* and *rachis* naked; no main *veins*; costal *areolæ* large, triangular, the others small, without free veinlets; *fertile fr.* like the other, but much smaller.—*Hk. Sp. 5. p. 264.*

Hab. Brazil and North Peru.—Near the next, but distinguished by its wide-scandent rhizome and more uniform veining.

124. A. (Chrys.) *serratifolium*, Mert.; *rhizome* woody, short-creeping; *st.* of barren fr. 12-18 in. l., slightly scaly; *barren fr.* 1-2 ft. l., 6-12 in. br., with numerous sessile *pinnæ* on each side, which are 3-8 in. l., ¾-1½ in. br., the edge inciso-crenate, the base cuneate; *texture* subcoriaceous; *rachis* and *surfaces* naked; main *veins* distinct halfway or more to the edge; costal *areolæ* large, triangular, the others smaller, without free veinlets; *fertile pinnæ* distant, 2-3 in. l., ¼-½ in. br., blunt, entire.—*Hk. Sp. 5. p. 263.*

Hab. Venezuela, Brazil, Peru.

125. A. (Chrys.) *Lindigii*, Baker; *rhizome* woody, scandent; *barren fr.* 2 ft. l., 1 ft. br., with about a dozen spreading subsessile *pinnæ* on each side, the lower ones 6-8 in. l., 1½ in. br., the apex acuminate, the edge crenate upwards, the base cuneate; *texture* herbaceous; *rachis* and *surfaces* naked; main *veins* distinct more than halfway to the edge, the costal *areolæ* shallow, all without free veinlets; *fertile pinnæ* distant, 4-5 in. l., ¼-⅓ in. br., entire, narrowed gradually upwards.—Chrys. *Mett. Fil. Nov. Gran. p. 204.*

Hab. New Granada, *Lindig 258.*

126. A. (Chrys.) *præstantissimum*, Bory; *caud.* erect; *st.* 1 ft. or more l., firm, naked; *barren fr.* 2-4 ft. l., 1-1½ ft. br., with numerous sessile *pinnæ* on each side, which are 6-10 in. l., 1½-2 in. br., the point acute, the edge entire, the base rounded; *texture* subcoriaceous; *rachis* and *surfaces* naked; *areolæ* copious, hexagonal, without free veinlets; *fertile pinnæ* 4-8 in. l., ¼-⅓ in. br., distant.—*Hk. Sp. 5. p. 269. G. F. t. 58. Neurocallis, Fée.*

Hab. West Indies.—In this, as in *A. Blumeanum*, the sori are sometimes tænitoid.

127. A. (Chrys.) *aureum*, L.; *caud.* erect; *st.* 1-2 ft. l., tufted, strong, erect,

glossy; *fr.* 2-6 ft. l., 1-2 ft. br., the upper *pinnae* fertile, slightly smaller than the barren ones, which are usually stalked, ligulate-oblong, 3 in. to more than 1 ft. l.,  $\frac{1}{2}$ -3 in. br., the point acute or blunt, sometimes retuse with a mucro, the edge quite entire, the base subcuneate; *texture* coriaceous; *rachis* and *surfaces* naked; *areolae* very small and copious, without free veinlets.—*Hk. Sp. 5. p. 266.*

Hab. Florida and Bermudas to Peru and South Brazil; Polynesia; Bengal, Hong-Kong, and Formosa to Queensland, Seychelles, Mascaren Isles, Zambesi-land, Natal, Angola, Guinea Coast.—Includes five species of Fée.

#### D. Frond bipinnate. Sp. 128.

128. A. (Chrys.) *polyphyllum*, Hk.; *rhizome* woody, wide-scandent; *st.* 6-12 in. l., firm, naked, jointed at the base; *barren fr.* sometimes simply pinnate, more usually several feet long, with pinnate *pinnae* 6-12 in. l., 2 in. br.; *pinnl.* numerous on each side, 1 in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., sessile, lanceolate, sharply toothed; *texture* herbaceous; *rachis* and *surfaces* naked; *areolae* hexagonal, without free veinlets; *fertile pinnl.* stalked,  $\frac{3}{8}$ - $\frac{1}{2}$  in. l.,  $\frac{1}{8}$  in. br.—*Hk. Sp. 5. p. 269.* Lomagramme, *Brack.*

Hab. New Hebrides and Fiji.—In general habit and in its articulated *pinnae* this quite agrees with *A. Wilkesianum*. *A. pteroides*, R. Br., from Tropical Australia, has an ebeaneous naked stem 1 ft. l., and distant Lomarioid fertile *pinnae*, the lower ones again sparingly pinnate, but the barren frond is not known.

\*\*\*\*\* *Hymenolepis*, Kaulf. *Fronde* simple, uniform, bearing the fruit on the contracted apex. Sp. 129-130.

129. A. (Hymen.) *spicatum*, L.; *rhizome* woody, short-creeping; *st.* 1-2 in. l., short, firm; *fr.* 6-18 in. l.,  $\frac{1}{2}$ -1 in. br., the upper part for 4-6 in. contracted and fertile, the edge entire, the lower part narrowed very gradually; *texture* subcoriaceous; *surfaces* naked; *areolae* uniform, hexagonal, with copious free veinlets; *caps.* mixed with peltate scales.—*Hk. Sp. 5. p. 280. Fil. Ex. t. 78.*— $\beta$ , *H. brachystachys*, J. Sm.; *fr.* broader, the fertile spike thick, 1-1 $\frac{1}{2}$  in. l.—*G. F. t. 3.*

Hab. Himalayas (to 6,000 ft.) to Madagascar, Mascaren Isles, Ceylon, South China, Philippines, Queensland, Society Isles.—*H. validinervis*, Kze., is a strong broad form.

130. A. (Hymen.) *platyrhynchos*, Hk.; *st.* tufted, scarcely any; *fr.* 12-16 in. l., 1 in. br., the *sori* in a patch at the apex 1-2 in. l.,  $\frac{3}{8}$  in. br., which does not reach to the edge, the edge entire, the lower part narrowed gradually; *texture* very coriaceous; *surfaces* naked; *areolae* copious, fine, hidden, uniform, with copious free veinlets.—*Hk. Sp. 5. p. 280. Ic. t. 999.* Macroplethus, *Presl.*

Hab. Philippines, *Cuming* 196.

\*\*\*\*\* *Photinopteris*, J. Sm. *Fronde* pinnate or deeply pinnatifid, the fruit on the Lomarioid upper *pinnae*. *Habit and venation* of *Drynaria*. Sp. 131-132.

131. A. (Photi.) *rigidum*, Wall.; *rhizome* woody, wide-scandent; *st.* short, firm, erect; *fr.* several feet long, often 1 ft. br., the lower *pinnae* several on each side, barren, stalked, jointed at the base, ovate-acuminate, entire, 3-6 in. l., 1 $\frac{1}{2}$ -3 in. br.; above this several pair of distant fertile *pinnae* 4-6 in. l.,  $\frac{1}{8}$  in. br.; *texture* very coriaceous; *surfaces* and *rachis* naked; main raised veins connected by raised transverse veinlets with copious small areolae between them with free veinlets.—*Hk. Sp. 5. p. 281.*

Hab. Philippines and Malay Peninsula and Isles.—*P. simplex*, J. Sm., has the fertile *pinnae* reduced to one.



132. A. (Photi.) *drynarioides*, Hk. ; *fr.* sessile, several ft. l., 1 ft. or more br., the upper part with numerous distant Lomarioid *pinnae*, sometimes 1 ft. l., 1 lin. br., below this pinnatifid, with numerous close entire lanceolate-acuminate lobes 4-6 in. l.,  $1\frac{1}{4}$ - $1\frac{3}{4}$  in. br., which reach down nearly to the rachis, the lower ones passing down gradually into a mere undulated wing to the rachis, which is continued to its very base ; *texture* very coriaceous ; main *veins* raised, with transverse veinlets, and between them copious small areolæ with free veinlets.—*Hk. Sp. 5. p. 282.*

Hab. Penang, Sir W. Norris, Mactier ; Solomon Isles, Milne.—The leafy *pinnae*, though adnate to the rachis, break away from it very readily.

### GEN. 61. PLATYCERIUM, Desv.

*Sori* forming large patches on the upper part of the lower surface of the fertile fronds. A small widely-diffused genus, well marked by its dichotomously forked fertile fronds with stags'-horn-like divisions. TAB. IX. f. 61.

1. *P. alcicorne*, Desv. ; *barren fr.* rounded, convex, downy when young, the edge sinuated, the lobes spreading ; *fertile fr.* 2-3 ft. l., clustered, erect, 2-3 times dichotomous ; *ult. divisions* ligulate, bluntish, the fruit in the last forks and at their base in very irregular patches ; under *surface* covered with thin white cottony down.—*Hk. Sp. 5. p. 282.*

Hab. Temperate Australia, and a larger form in the Mascaren Isles and Seychelles ; and a similar plant has been gathered by Dr. Spruce in Peru.

2. *P. aethiopicum*, Hk. ; *barren fr.* rounded, convex, downy when young, the edge more or less lobed, the lobes spreading ; *fertile fr.* 2-3 ft. l., clustered, pendent, twice dichotomous, the disk and first division broader than in the preceding, the patch of fruit surrounding the sinus and passing into the fork so as to be shaped like the letter V ; under *surface* covered with thin white cottony down.—*Hk. Sp. 5. p. 283. G. F. t. 9. A. stemaria, Beauv.*

Hab. Guinea Coast and Angola.—Dr. Welwitsch has furnished us with a plant (*P. angolense*, Welw. MSS.) which is most like this, but has a broad-cuneate fertile frond 9 in. br. at the top, without either forks or horns, and with a patch of fruit nearly as broad as the lamina.

3. *P. grande*, J. Sm. ; *barren fr.* very large, suborbicular, convex, or the upper ones erect, deeply lacinated with spreading or inflexed divisions ; *fertile fr.* 4-6 ft. l., pendent, in pairs, the disk broad-cuneate, with the sorus against the upper edge, occupying the disk only, with an elongated dichotomously forked division beyond it at each corner ; both *surfaces* green and smooth.—*Hk. Sp. 5. p. 284. Fil. Ex. t. 86.*

Hab. North Australia, Philippines, and Singapore.—There is only one soriferous patch to each frond, and it is sometimes nearly a foot broad.

4. *P. Wallichii*, Hk. ; *barren fr.* deeply lobed, with inflexed forked divisions ; *fertile fr.* in pairs, pendent, each in two divisions, in each of which the cuneate disk has a rounded upper edge occupied by a sorus, from each side of which a once-forked division is produced ; *texture* thick, the under surface matted with yellowish woolly pubescence.—*Hk. Sp. 5. p. 284. Fil. Ex. t. 97.*

Hab. Malay Peninsula.—Here the two soriferous patches are only 3-4 in. br., and occupy a semicircular projection with the forks spreading almost from its base.

5. *P. biforme*, Blume ; *barren fr.* imbricated, very thick, especially towards the base, the edge sinuato-lobate ; *fertile fr.* 6-15 ft. l., repeatedly dichotomous

from a subcuneate disk, the barren divisions narrow-ligulate, the fertile ones quite different in shape, reniform, stalked, 6-8 in br., the outer edge rounded, entire.—*Hk. Sp. 5. p. 285.*

Hab. Philippines and Malay Peninsula and Isles.—The only species with a distinct uniformly fertile segment, which in a specimen from Mr. Prout is nearly a foot broad.

### SUB-ORD. III. OSMUNDACEÆ.

*Caps.* two-valved, opening across the apex, furnished with a short horizontal ring. *Vernation* circinate. GEN. 62-63.

#### GEN. 62. OSMUNDA, L.

*Sori* quite distinct from the leafy part of the frond, forming a panicle made up of copious thyrsoïd clusters. *A genus of striking ferns, very clearly marked by habit, containing few species, hardly at all tropical, and only one known in South temperate regions.* TAB. VIII. fig. 62.

1. *O. javanica*, Blume; *st.* tufted, 6-12 in. l., firm, erect, naked; *fr.* 1-3 ft. l., 8-12 in. br., simply pinnate, the lower or central pinnæ fertile; *barren pinnæ* 4-8 in. l.,  $\frac{3}{8}$ - $\frac{3}{4}$  in. br., cuneate at the base, and often slightly stalked, the edge entire or sharply toothed; *texture* coriaceous; *rachis* and both *sides* naked; *fertile pinnæ* shorter, made up of numerous close but distinct oblong sessile clusters.—*Kunze, t. 3.* *O. Vachellii*, *Hk. Ic. t. 15.* *O. Presliana*, *J. Sm.*

Hab. Kamschatka to Java and Ceylon.

2. *O. Claytoniana*, L.; *st.* tufted, 1 ft. or more l., clothed with loose woolly ferruginous tomentum when young, naked when mature; *fr.* 1-2 ft. l., 8-12 in. br., the upper, central, or lower pinnæ fertile; *barren pinnæ* lanceolate, 4-6 in. l., 1 in. or more br., cut down nearly to the rachis into close oblong entire lobes; *texture* herbaceous; *fertile pinnæ* similar but shorter; *pinnl.* dense, cylindrical.—*O. interrupta*, *Michx.* *O. pilosa* and *monticola*, *Wall.*

Hab. Canada, Newfoundland, and throughout the United States, Himalayas up to 10,000 ft.—The station of Rio Janeiro, which rests on Wallich's authority, is perhaps given by some confusion with *O. cinnamomea*. *O. glaucescens*, Link, is the form with a terminal panicle.

3. *O. cinnamomea*, L.; *st.* densely tufted, the barren and fertile ones distinct, the young plants densely clothed with ferruginous tomentum; *barren fr.* simply pinnate, naked when mature, the *st.* 12-18 in. l., the *fr.* 2-3 ft. l., 6-9 in. br.; *pinnæ* close, ligulate-lanceolate, 3-4 in. l.,  $\frac{3}{4}$ -1 in. br., cut down nearly to the rachis into close entire blunt oblong lobes; *texture* subcoriaceous; *fertile fr.* much smaller, the *pinnæ* lanceolate, with close dense cylindrical *pinnl.*

Hab. Canada and Newfoundland to Mexico, West Indies, Guatemala, New Granada, and Organ Mountains (*O. imbricata*, Kunze, Fil. 2. t. 112), Japan, Mantchuria, Amurland.—There is a form (var. *frondosa*, A. Gray) with some of the fronds sterile below and sparingly fertile above.

4. *O. bipinnata*, Hk. (not Linn.); *st.* tufted, 1 ft. or more l., rather slender, glossy, stramineous; *fr.* 1 $\frac{1}{2}$ -2 ft. l., 6-10 in. br., bipinnate, the upper *pinnæ* barren, the uppermost linear-oblong, simple, below these several pinnate, 3-4 in. l., 1 in. br., with a winged rachis and numerous entire oblong imbricated *pinnl.* on each side, and lowest of all, 3-4 opposite pairs of fertile pinnæ with several cylindrical *pinnl.* on each side,  $\frac{1}{4}$ - $\frac{3}{8}$  in. l., 1 $\frac{1}{2}$ -2 lin. apart; *texture* subcoriaceous; *rachis* and both sides naked.—*Fl. Ex. t. 9.*

Hab. Hong-Kong, *Dr. Harland.*



5. *O. lancea*, Thunb. ; *barren and fertile fr.* distinct, the former about 1 ft. l., oblong, shortly acuminate ; *pinnæ* oblong-acuminate, about 5 in. l., stalked, the lowest rather reduced ; *pinnl.* narrowly lanceolate,  $1\frac{3}{4}$  in. l.,  $\frac{1}{4}$  in. br., narrowed at both ends, sessile, distinct, slightly toothed upwards ; *texture* subcoriaceous ; *surfaces* naked ; *fertile fr.* ternato-decompound.—*Milde. Fil. Eur. p. 311.*

Hab. Japan.

6. *O. regalis*, L. ; *st.* tufted, 12-18 in. l., firm, erect, naked ; *fr.* 2-4 ft. l., 1 ft. or more br., bipinnate, the apex fertile ; *barren pinnæ* 6-12 in. l., 2-4 in. br., *pinnl.* sessile or slightly stalked, 1-2 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., oblong, blunt, often unequal at the base, the edge finely serrulate ; *texture* subcoriaceous ; *rachis* and both *sides* naked ; *fertile pinnl.* cylindrical, forming a copious panicle.—*Hk. B. F. t. 45.* *O. palustris*, Sturm, t. 12.

Hab. Sweden to Siberia, Japan, Azores, Barbary, Himalayas, Bombay, Neilgherries, Cochin, and Hong-Kong ; Mascaren Isles, Zambesi-land, Angola, Natal, Cape Colony ; Canada and the Saskatchewan to Rio Janeiro.—Of Presl's species we place here without hesitation *spectabilis*, Willd., *capensis* and *Hugeliana*, Presl, *Hilsenbergii*, H. & G., *gracilis*, Link, *obtusifolia*, Willd., and *Leschnaultiana*, Wall. *O. japonica*, Thunb. (*O. speciosa*, Wall.), is a curious variety from Japan and the Himalayas, with the fertile and barren fronds often quite distinct, the former being developed the earliest and soon disappearing ; and it also occasionally happens that some of the lateral pinnæ become fertile, whilst the terminal ones remain barren. Mr. McKen sends a similar form from Natal.

#### GEN. 63. TODEA, Willd.

*Sori* on the back of the leafy part of the frond. *A small genus, almost confined to the South Temperate Zone, with the capsules of Osmunda, but the ordinary habit of Polypodiaceæ.* TAB. VIII. fig. 63.

§ Eutodea. *Texture of the frond coriaceous.* Sp. 1. Fig. 63. a. b.

1. *T. barbarica*, Moore ; *caud.* subarborescent ; *st.* 1 ft. or more l., stout, erect, quadrangular, quite naked ; *fr.* 3-4 ft. l., often 1 ft. br. ; *pinnæ* close, erecto-patent, 6-9 in. l.,  $1\frac{1}{2}$ -2 in. br. ; *pinnl.* close, linear, erecto-patent, 1- $1\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., the edge more or less distinctly toothed, the upper ones connected at the base ; *texture* coriaceous ; both *sides* naked ; *sori* dense, when mature filling up the whole under surface of the pinnules on which they are placed.—*Acrostichum*, L. *T. africana*, Willd. *Hk. fil. Fl. Tasm. t. 168.* *T. rivularis*, Sieb.

Hab. New Zealand, Temperate Australia, as far north as Queensland, Van Diemen's Land, Natal, Cape Colony.

§§ Leptopteris, Presl. *Texture of the frond like that of Hymenophyllum.* Fig. 63. c. d. Sp. 2-4.

2. *T. (Lept.) Fraseri*, H. & G. ; *caud.* erect, woody,  $1\frac{1}{2}$ -2 ft. high,  $1\frac{1}{2}$ -2 in. thick ; *st.* 6-9 in. l., firm, erect, naked ; *fr.* 1-2 ft. l., 8-12 in. br., bipinnate ; *pinnæ* close, lanceolate, 4-6 in. l.,  $\frac{3}{4}$ - $\frac{7}{8}$  in. br., with a narrowly-winged rachis, the lowest about equal to the others ; *pinnl.* linear-oblong,  $\frac{1}{2}$  in. l.,  $1\frac{1}{2}$ -2 lin. br., sharply toothed ; *rachises* naked.—*H. & G. t. 101.*— $\beta$ , *T. Wilkesiana*, Brack. ; *fr.* larger ; *lower pinnæ* rather shorter than the others and deflexed ; *rachises* slightly pilose.—*Brack. t. 43.*

Hab. Blue Mountains, Australia, rare ; New Caledonia, *Vieillard 2152* ;  $\beta$ , Fiji.

3. *T. (Lept.) hymenophylloides*, Rich. & Less. ; *st.* tufted, 6-12 in. l., firm, erect, naked ; *fr.* 1-2 ft. l., 8-12 in. br., tripinnatifid ; *pinnæ* close, lanceolate, 4-6 in. l.,  $\frac{3}{4}$ - $1\frac{1}{4}$  in. br., the rachis winged only towards the apex, the lowest about equal to the others ; *pinnl.* close, linear-oblong,  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.,  $\frac{1}{4}$  in. br., cut down

nearly to the rachis into erecto-patent, simple or forked linear *segm.*; *rachises* naked or slightly tomentose.—*Hk. G. F. t.* 54. *T. pellucida*, *Hk. Ic. t.* 8.

Hab. New Zealand.—There is a form which quite agrees with this in the size and cutting of the pinnæ, but which has the lower ones reduced very gradually, thus receding from the type in the direction of the next species.

4. *T. (Lept.) superba*, Col.; *caud.* erect, woody, 12-18 in. high; *st.* 2-3 in. l., firm, erect, naked; *fr.* 2-4 ft. l., 6-10 in. br., tripinnatifid; *pinnæ* close, narrow-lanceolate, the central ones 4-5 in. l.,  $\frac{5}{8}$  in. br., the lower ones gradually reduced; *pinnl.* close, linear-oblong,  $\frac{1}{4}$ - $\frac{3}{8}$  in. l.,  $1\frac{1}{2}$ -2 lin. br., cut down nearly to the rachis into erecto-patent simple or forked linear *segm.*; *rachises* densely tomentose.—*Hk. Ic. t.* 910.

Hab. New Zealand.—Pinnæ and pinnules more numerous and denser than in the last, often crisped.

#### SUB-ORD. IV. SCHIZÆACEÆ.

*Caps.* two-valved, opening down the side, crowned by a complete operculiform ring. *Vernation* circinate. GEN. 64-68.

#### GEN. 64. SCHIZÆA, Smith.

*Caps.* sessile, in 2-4 rows, which cover one side of close distichous spikes, which form separate fertile segments at the apex of the fronds. *A small widely-diffused genus very distinct in habit.* TAB. VIII. fig. 64.

§ *Euschizæa*. *Fertile segment pinnate; frond terete or subterete. Caps. biserial.* Sp. 1-9.

\* *Fronde not forked.* Sp. 1-7.

1. *S. australis*, Gaud.; *st.* dense, very short, dark chesnut-brown, passing gradually into the wiry subterete *fr.*, which is 1-2 in. l., about  $\frac{1}{4}$  lin. thick, simply channelled in front; *fertile segm.* suberect,  $\frac{1}{4}$  in. l., unilateral, with about 6 short stout nearly spreading spikes on each side, the lowest  $\frac{1}{2}$  in. l.—*S. palmata*, *Homb. & Jacq. t.* 43.

Hab. Falkland and Auckland Isles.

2. *S. pusilla*, Pursh; *st.* dense, the barren *fr.* much shorter than the fertile ones, much twisted and slightly flattened; *fertile fr.* 3-4 in. l., terete, wiry, very slender; *fertile segm.* suberect,  $\frac{1}{4}$  in. l., unilateral, with about 6 rather stout erecto-patent spikes on each side, the lowest  $\frac{1}{2}$  in. l.—*Hk. & Gr. t.* 48. *A. Gray Man, t.* 13.

Hab. Pine barrens of New Jersey, U. S. A.

3. *S. malaccana*, Baker; *st.* dense, not distinguishable from the *fr.*, which is 4-8 in. l., weak, flexuose, subterete, simply channelled in front, not more than  $\frac{1}{6}$  lin. thick, the barren and fertile ones similar; *fertile segm.* erect, often bilateral,  $\frac{1}{4}$  in. deep, with 3-6 slender spreading spikes on each side, the lowest 2-2 $\frac{1}{2}$  lin. l.—*S. propinqua*, *Presl (in part)*.

Hab. Philippines, *Cuming* 379; Malay Peninsula and Isles, gathered by Griffith, Lobb, &c.

4. *S. tenella*, Kaulf.; *st.* dense, chesnut-brown, passing gradually into the *fr.*, which is 6-8 in. l., not very rigid, subcompressed, with a broad distinct midrib and two equal wings, the whole about  $\frac{1}{4}$  lin. br.; *fertile segm.* suberect,  $\frac{1}{4}$ - $\frac{3}{8}$  in. l., unilateral, with 4-8 rather stout erecto-patent spikes on each side, the lowest  $1\frac{1}{2}$ -2 lin. l.—*Kaulf. Enum. t. 1. f. 7. Kunze, t. 1. 97. f. 2.*

Hab. Cape Colony and Natal.



5. *S. fistulosa*, Labill.; *st.* dense, chesnut-brown, passing gradually into the *fr.*, which is 4-12 in. l., rigid, rush-like, subterete, simply channelled in front; *fertile segm.* suberect, unilateral,  $\frac{1}{2}$ -1 in. l., with 10-20 close slender erecto-patent spikes on each side, the lowest  $\frac{1}{8}$  in. l.—*Lab. Fl. Nov. Holl. t. 250. f. 3.* *S. valdiviana*, *Phil.* *S. propinqua*, *A. Cunn. (in part).*

Hab. Australia, Tasmania, New Zealand, New Caledonia, Chili.—*S. propinqua* is in part this, and in part unbranched *S. bifida*.

6. *S. robusta*, Baker; *st.* not very dense, dark-chesnut, passing gradually into the *fr.*, which is 6-10 in. l., rigid and rush-like in texture, with a broad central midrib and two narrow thick revolute edges, the whole under  $\frac{1}{2}$  lin. thick; *fertile segm.* suberect, unilateral,  $\frac{1}{4}$ - $\frac{3}{8}$  in. l., with 4-6 stout erecto-patent spikes on each side, the lowest  $\frac{1}{4}$  in. l.—*S. australis*, *Brack. p. 302?*

Hab. Sandwich Isles, *Hillebrand*.—This may be a tropical form of *S. australis*, as Brackenridge seems to consider it. If his plant be the same, it grows also in the Society Isles.

7. *S. pectinata*, Sm.; *st.* very dense, chesnut-brown, passing gradually into the *fr.*, which is 4-8 in. l., rigid and rush-like in texture, with a broad central midrib and two narrow thick revolute edges, the whole under  $\frac{1}{2}$  lin. thick; *fertile segm.* nearly horizontal,  $\frac{1}{2}$ - $\frac{5}{8}$  in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. deep, with 10-15 slender vertical spikes on each side.—*Schk. t. 136.*

Hab. Cape Colony.

\*\* *Fronde forked.* Sp. 8. 9.

8. *S. incurvata*, Schk.; *st.* dense, chesnut-brown, passing gradually into the *fr.*, which is 6-18 in. l., forked below the middle and sometimes forked again, very wiry and rush-like in texture, smooth, subterete, simply channelled in front, the whole  $\frac{1}{3}$  lin. thick; *fertile segm.* erect,  $\frac{1}{2}$ -1 in. deep, with 10-20 slender spreading spikes on each side, the lowest 2-2 $\frac{1}{2}$  lin. l.—*Schk. t. 137.* *S. bifida*, *Meyer (non Sw.).*

Hab. Guiana and North Brazil.—Very near the next, but more slender, with a panicle like that of *S. fistulosa*.

9. *S. bifida*, Sw.; *st.* dense, chesnut-brown, passing gradually into the *fr.*, which is 6-18 in. l., forked generally below the middle, sometimes forked again, casually simple, very wiry and rush-like in texture, with a prominent scabrous midrib and two narrow thick wings, the whole  $\frac{1}{2}$  lin. thick; *fertile segm.* suberect or recurved, unilateral,  $\frac{1}{2}$ - $\frac{3}{4}$  in. l., with 10-20 slender erecto-patent spikes on each side, the lowest  $\frac{1}{4}$ - $\frac{3}{8}$  in. l.

Hab. New Zealand and Temperate and North Australia.

§§ *Lophidium*, *Rich.* *Fertile segment pinnate; frond flattened; caps. biserial.* Sp. 10-14.

10. *S. (Loph.) rupestris*, R. Br.; *st.* lax, about 1 in. l., subterete, passing gradually into the *fr.*, which is grass-like and flattened, almost fleshy in texture, 3-4 in. l., 1 lin. br., with a slender midrib; *fertile segm.* solitary, suberect,  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., with 6-10 slender spreading serrated spikes on each side.—*Hk. & Gr. t. 47. G. F. t. 42.*

Hab. Temperate Australia.

11. *S. (Loph.) fluminensis*, Miers; *st.* passing gradually into the *fr.*, which is 4-12 in. l., slender, wiry, naked, once forked at the top, and each fork bearing usually two stalked *fertile segm.*, which are  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., the rachis slightly curved, with 6-10 close-spreading slender spikes on each side, the point either not at all

flattened or slightly so either before or after the first fork.—*Sturm in Mart. Fl. Bras. fasc. 23. p. 184. t. 13.*

Hab. Guiana and Brazil.—Perhaps this should be considered a reduced variety of *elegans*.

12. *S. (Loph.) Sprucei*, Hk. MSS. ; *caud.* woody, suberect ; *st.* 9-12 in. l., firm, dense, erect, clothed, especially below, with squarrose fibrillose brownish scales ; *fr.* 6-8 in. l., very thick in texture, naked, channelled,  $\frac{3}{8}$  in. br. at the widest part, narrowed gradually downwards, bearing at the apex 1-6 long-stalked fertile *segm.*, which are  $1\frac{1}{2}$ -2 in. l., the rachis spirally recurved, the spikes very numerous,  $\frac{5}{8}$ - $\frac{3}{8}$  in. l., tomentose beneath.—*Hk. Ic. t. 1016.*

Hab. Banks of the Rio Negro, *Spruce 3752.*—A very distinct new species.

13. *S. (Loph.) dichotoma*, Sw. ; *st.* 6-18 in. l., firm, erect, glossy, channelled on the face above ; *fr.* fanlike in general outline, 6-9 in. each way, many times dichotomously forked, the ultimate divisions  $\frac{1}{2}$ -1 lin. br., with 1 fertile *segm.* to each,  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., the rachis often curved, with 4-10 close, spreading spikes on each side.—*Hk. & Gr. t. 17. Beddome, t. 65. S. Forsteri, Spr. S. cristata, Willd. S. Poppigiana, Sturm.*

Hab. Cuba, Venezuela, Peru, Polynesia, Australia, New Zealand, Philippines, Malaccas, Neilgherries, Mascaren Isles.—The Polynesian *S. cristata*, Willd., is a large form with broader divisions than usual. The American plant is *S. occidentalis*, Griseb., and is said to have the fertile segment twice as long as in the type ; but we do not find the character to always hold good.

14. *S. (Loph.) elegans*, Sw. ; *st.* 6-12 in. l., firm, erect, naked ; *fr.* like the letter V in outline, 4-8 in. each way, dichotomously forked or cleft, the divisions varying greatly in number and breadth ( $\frac{1}{4}$ -2 in.), surface glossy ; *fertile segm.* copious, distinctly stalked,  $\frac{1}{4}$ - $\frac{3}{8}$  in. l., the rachis often recurved with 6-15 close spreading linear-cylindrical spikes on each side.—*Hk. G. F. t. 54.—β, S. flabellum, Mart. ; fr. almost or quite undivided.—Mart. t. 55. L. latifolium, Rich. S. spectabilis, Mart. Sturm. Fl. Bras. fasc. 23. t. 14.*

Hab. West Indies and Mexico to Brazil.—*S. attenuata*, Beyr., appears to be a form with unusually narrow divisions. *S. pacificans*, Mart. Icon. Crypt. t. 56, has two entire divisions, each 6 in. br.

§§§ Actinostachys, *Wall. Fertile segment digitate rather than pinnate ; caps. quadricerial. Sp. 15-16.*

15. *S. (Actin.) pennula*, Sw. ; *st.* dense, 1-2 in. l., subterete, brownish, passing gradually into the *fr.*, which is 1 ft. or more l., nearly 1 lin. thick, triquetrous, with 3 sharp angles, crowned at the apex with 6-12 subtriquetrous fertile spikes, which are  $\frac{1}{2}$ - $1\frac{1}{2}$  in. l., pilose beneath, with the *caps.* usually in 4 rows.—*S. trilateralis, Schk. Hk. & Gr. t. 54. S. penicillata, H. B. K. S. lævigata, Mett.—β, S. subtrijuga, Mart. ; fr. 6-9 in. l., much more slender, the spikes often reduced to 3 or 4.—Kunze, t. 97. f. 1. A. Germani, Fée, Fil. Ant. t. 29.*

Hab. West Indies to Rio Janeiro, New Caledonia, Isle of Pines.—We cannot distinguish the Polynesian *S. lævigata* from the American plant. The New Caledonian *S. intermedia*, Mett., is intermediate between our two varieties.

16. *S. (Actin.) digitata*, Sw. ; *st.* dense, 1-2 in. l., brownish, subterete, passing gradually into the *fr.*, which is 1 ft. or more l., 1-2 lin. br., flattened, the midrib beneath prominent, crowned at the apex with 6-15 subtriquetrous fertile spikes, which are  $1\frac{1}{2}$  in. l., naked beneath, with the *caps.* in 4 rows and the edge much inflexed.—*Hk. G. F. t. 54.*

Hab. Himalayas to Ceylon, Bonin, Philippines, Malay Isles, and Fiji.



## GEN. 65. ANEMIA, Sw.

*Caps.* small, very abundant, forming a copiously-branched panicle quite distinct from the leafy part of the frond. *A well-marked genus, almost confined to Tropical America.* TAB. VIII. fig. 65.

§ Euanemia. *Panicle and leafy portion united in the same frond; veins free.* Sp. 1-18. Fig. 65a.

\* *Pinnæ of barren segment entire or nearly so.* Sp. 1-12.

† *Barren segment lanceolate or lanceolate-oblong.* Sp. 1-8.

A. *Pinnæ 6-8 or less on each side.* Sp. 1-3.

1. *A. Gardneri*, Hk.; *st.* 3-4 in. l., firm, erect, naked; *barren segm.* short-stalked, 4 in. l.,  $2\frac{1}{2}$  in. br., with 4 imbricated nearly round *pinnæ* on each side, the lowest 1 in. br., short-stalked, the edge crenulate; *texture* coriaceous; *rachis* and both *sides* naked; *veins* quite flabellate; *panicle* 2 in. l., with elongated spreading lower branches, the peduncle about equalling it.—*Hk. Ic. t.* 190 (not *A. Gardneriana*, Presl).

Hab. South Brazil, *Gardner* 4.

2. *A. filiformis*, Presl; *st.* 1-3 in. l., slender, slightly villose; *barren segm.* sessile, 3-4 in. l.,  $1-1\frac{1}{2}$  in. br., with 6-8 sessile linear-obovate *pinnæ* on each side, which are 2-3 lin. br., with nearly their own breadth between them, the edge rather deeply toothed; *texture* almost herbaceous; *rachis* and *surfaces* finely villose; *veins* flabellate; *panicle* 2-3 in. l., the branches short, with a peduncle 3 or 4 times its own length.—*A. dentata*, *Gardner*.

Hab. Mexico and West Indies to Brazil.—This may be a variety of the next, with which it coincides in its short stem and very long peduncle; but the texture is much less coriaceous, and the *pinnæ* are narrower and distinctly toothed. Mettenius refers the synonym of *A. filiformis*, Swartz, to our *A. Breuteliana*.

3. *A. oblongifolia*, Sw.; *st.* 2-4 in. l., firm, erect, slightly villose; *barren segm.* sessile, 3-4 in. l.,  $1\frac{1}{2}$  in. br., simply pinnate, with 6-8 pairs of sessile *pinnæ*, which are oblong, blunt, subentire, the base on the upper side parallel with the stem, on the lower obliquely truncate; *texture* coriaceous; *rachis* and *surfaces* finely villose; *veins* flabellate; *panicle* 1-2 in. l., the lower branches short, the peduncle 5-6 in. l.—*Schk. t.* 142.— $\beta$ , *A. humilis*, Sw.; smaller, *pinnæ* close, 3-4 only on each side. *A. Seemanni*, *Hk. Lond. Journ.* 7. t. 16.

Hab. Mexico to Brazil and Peru.—*A. pilosa*, Presl (*A. pumila*, Klotzsch), appears to be a form intermediate between our two varieties. Characterized by its close coriaceous *pinnæ* and barren segment nearly equal in width throughout.

B. *Pinnæ more than 6-8 on each side.* Sp. 4-8.

4. *A. Dregeana*, Kze.; *st.* 8-12 in. l., firm, slightly villose; *barren segm.* subsessile, 8-12 in. l., 2-3 in. br., about equal in width in the lower half, with 8-12 *pinnæ* on each side, which are  $1-1\frac{1}{2}$  in. l.,  $\frac{1}{2}-\frac{3}{4}$  in. br., ovate-deltoid, unequal at the base, the upper side subcordate, the edge inciso-crenate; *texture* subcoriaceous; *rachis* and *surfaces* finely villose, a distinct midrib often halfway to the apex; *panicle* 3-4 in. l., the lower branches elongated, on a peduncle about as long as itself.—*Kze. t.* 20. *Hk. Ic. t.* 236.

Hab. Natal; and a plant collected by Seemann in N. W. Mexico, referred in Bot. Herald. to *A. collina*, is so near this that we do not venture to separate them.

5. *A. rotundifolia*, Schrad.; *st.* 6-9 in. l., deciduously villose; *barren segm.* 8-12 in. l., often prolonged and rooting at the extremity, 1-2 in. br. below, with 8-12 pairs of distant *pinnæ*, which are 1 in. l.,  $\frac{2}{3}$ - $\frac{3}{4}$  in. br., very blunt, the lower side obliquely truncate at the base, the outer edge finely toothed; *texture* subcoriaceous; *rachis* and *surfaces* finely villose; *veins* flabellate; *panicle* 2-3 in. l., the peduncle slender, 3-4 in. l.—*A. radicans*,  $\beta$  *Raddi, Fil. Bras. t. 11.*

Hab. South Brazil.

6. *A. caudata*, Kaulf.; *st.* 6-9 in. l., slightly villose; *barren segm.* 8-12 in. l., often prolonged and rooting at the apex, 2 in. br. at the base, narrowed very gradually upwards, with 20 or more pairs of close sessile subdimidiate *pinnæ*, which are  $\frac{3}{4}$ -1 in. l.,  $\frac{1}{4}$  in. br., the point blunt, the edge finely toothed; *texture* subcoriaceous; *rachis* and *surfaces* finely pilose; *veins* flabellate; *panicle* 2-3 in. l., lax, on a peduncle 3-5 in. l.—*A. radicans*, *Raddi, Fil. Bras. t. 10.*

Hab. Brazil.

7. *A. mandioccana*, Raddi; *st.* 6-12 in. l., deciduously villose; *barren segm.* 1 ft. or more l., 2-3 $\frac{1}{2}$  in. br., oblong-lanceolate, the lower half about equal in width; *pinnæ* in 20 or more close pairs, the point narrowed, but scarcely acute, the edge finely serrulate, the base on the upper side parallel with the stem, on the lower obliquely truncate; *texture* subcoriaceous; *rachis* and *surfaces* finely pilose; *veins* flabellate; *panicle* very compound, 3-4 in. l., with a peduncle longer than itself.—*Raddi, t. 9. Hk. G. F. t. 36 (non Gen. Fil. t. 90).*

Hab. Brazil.—Very doubtfully distinct from the preceding.

8. *A. collina*, Raddi; *st.* 8-12 in. l., firm, erect, densely clothed with fine ferruginous spreading hairs; *barren segm.* sessile, 6-12 in. l., 2-3 in. br., with about 12 sessile *pinnæ* on each side, which are 1-1 $\frac{1}{2}$  in. l.,  $\frac{3}{8}$ - $\frac{1}{2}$  in. br., unequal-sided, obliquely truncate below, blunt, subentire; *texture* subcoriaceous; *rachis* clothed with hairs like the stem; *venation* flabellate; *panicle* 2-3 in. l., close, the peduncle 4-6 in. l.—*Raddi, Fil. Bras. t. 12. Hk. Fil. Ex. t. 1. A. vellea, Schrad. A. hirta, J. Sm. (non Sw.).*

Hab. Brazil.—This comes near to the two preceding, but the stem is densely ferrugineo-tomentose, and the *pinnæ* are distant and less numerous.

†† *Barren segment subdeltoid.* Sp. 9-12.

9. *A. glareosa*, Gardner; *st.* 4-5 in. l., firm, erect, with adpressed ferruginous hairs; *barren segm.* sessile, under 2 in. l., 1-1 $\frac{1}{4}$  in. br., ovate-deltoid, with a terminal lobe and 3-4 oblong blunt *pinnæ*  $\frac{1}{4}$  in. br. on each side, only the lowest pair, which are sometimes lobed on the lower side at the base, reaching down to the rachis; *texture* subcoriaceous; *rachis* and *surfaces* finely villose; *veins* flabellate; *panicle* 3-4 in. l., with dense short erecto-patent branches, the peduncle under 1 in. l.—*Gard. Sert. Pl. t. 70. A. Gardneriana, Presl.*

Hab. South Brazil, *Gardner 4086, Burchell 6594-2.*—Most like *oblongifolia* in texture, but the peduncle much shorter, and remarkable for the barren segment being truly pinnate only at the base.

10. *A. Breuteliana*, Presl; *st.* 6-12 in. l., slightly villose; *barren segm.* sessile, 4-9 in. l., 1 $\frac{1}{2}$ -4 in. br., subdeltoid, with 6-9 pairs of sessile *pinnæ*, which are oblong, obtuse, rather unequal-sided, entire or pinnatifid in the lower part, and grow smaller gradually upwards; *texture* subcoriaceous; *rachis* and both *sides* nearly naked; *panicle* 2-4 in. l., lax, the peduncles 3-6 in. l.—*A. mandioccana, Hk. Gen. Fil. t. 90. and Griseb. (non Raddi).*

Hab. Mexico and West Indies to Brazil and Peru.—A well-marked and widely-distrib-



buted plant with a confused synonymy. Probably it is *A. hirta*, Sw.; but Plumier's figure (t. 157) is much stronger and more hairy than any of our specimens. Mettenius refers here *A. filiformis*, Swz., but we have thought it best to drop both names. *A. incisa*, Schrad., and *A. pallida*, Gardn., are apparently a subpinnatifid variety, and *A. hispida*, Kze., and *Pohlana*, Sturm, either belong here or are closely allied.

11. *A. Langsdorffiana*, Presl; *st.* 8-12 in. l., rather densely villose; *barren segm.* sessile, subdeltoid, about 6 in. l. by nearly as br., with 6 pairs of sessile *pinnæ*, with nearly their own breadth between them, the lowest the largest,  $2\frac{1}{2}$  in. l.,  $\frac{3}{4}$ - $\frac{7}{8}$  in. br., the two sides nearly equal at the base, the apex acuminate, the edge serrulate; *texture* subcoriaceous; *rachises* finely pilose; a *midrib* nearly to the point; *panicle* 2-3 in. l., with a peduncle about equalling it in length.—*Lang. & Fisch. t.* 28.

Hab. South Brazil, as figured by Langsdorf.—We have a specimen gathered in Bahia by Salzmann, and a similar one, but with the lower *pinnæ* deeply lobed, gathered by Fendler (No. 12) in Venezuela. Probably it is a free-veined form of *A. Phyllitidis*, which it resembles closely in habit.

12. *A. mexicana*, Klotzsch; *st.* 6-12 in. l., firm, naked; *barren segm.* on a stalk 1 in. or more l., 6-9 in. l., 4-6 in. br., with 4-6 *pinnæ* on each side, the lowest the largest, distinctly stalked, ovate-lanceolate, 2-3 in. l.,  $\frac{5}{8}$ - $\frac{3}{4}$  in. br., rounded on both sides at the base, the edge very slightly crenate; *texture* coriaceous; *rachis* and *surfaces* quite naked; a distinct *midrib* from the base to the apex; *panicle* 3-4 in. l., with dense short erect-patent branches; *peduncle* 1-4 in. l.—*Hk. Ic. t.* 988. *Kunze, t.* 131.

Hab. New Mexico and Texas to Guatemala.—*A. speciosa*, Presl (Hk. 2nd Cent. t. 65), is a reduced form, with only a single pair of *pinnæ*. This is well marked by its naked coriaceous *pinnæ*, with a very distinct *midrib*.

\*\* *Pinnæ* of *barren* segment *pinnatifid* or *bipinnatifid*. Sp. 13-18.

13. *A. hirsuta*, Sw.; *st.* 6-12 in. l., slender, naked; *barren segm.* 2-6 in. l., 1-3 in. br., sessile, oblong-deltoid, bipinnatifid; *pinnæ* in 6-8 opposite pairs, 1- $1\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{3}{4}$  in. br., varying from oblong, obtuse, subentire, truncate at the base on the lower side, to deeply pinnatifid with narrow divisions; *texture* subcoriaceous; *rachis* and *surfaces* slightly pilose; *panicle* 1-2 in. l., close, the peduncle 2-6 in. l., slender.—*Plum. t.* 162. *A. repens*, *Raddi, t.* 9. b. *A. ciliata*, *Presl.*— $\beta$ , *A. tenella*, Sw.; *pinnæ* cut down to the *rachis* into linear divisions, with a considerable space between them, the lower ones forked or trifid. *A. dissecta*, *Presl.*

Hab. Cuba and Mexico to Peru and South Brazil.—*A. coriacea*, Griseb. (Cuba, *Wright* 1798), is said to be like this, but naked and shining, the barren segments only  $1\frac{1}{2}$  in. l., 1 in. br., with only the lower *pinnæ* pinnatifid at the base. *A. gracilis*, Schrad. (*A. humilis*, Hk. Ex. Fl. t. 28. non Sw.), appears to be a reduced form with subentire *pinnæ*.

14. *A. tomentosa*, Sw.; *st.* 6-12 in. l., strong, erect, clothed with deciduous ferruginous hairs; *barren segm.* 6-12 in. l., half as br., ovate-deltoid, bipinnatifid or bipinnate; lowest *pinnæ* the largest, the blunt lobes often  $\frac{1}{2}$ - $\frac{3}{4}$  in. l.,  $\frac{1}{4}$  in. br., nearly uncut; *texture* subcoriaceous; *rachis* and *surfaces* densely pilose; *veins* fine, flabellate; *panicle* 4-9 in. l., lax, the peduncle 1-2 in. l.—*A. flexuosa*, Sw. *Raddi, t.* 13. *Hk. Fil. Ex. t.* 30. *A. villosa*, H. B. K. *A. deltoidea*, Sw.— $\beta$ , *A. fulva*, Sw.; smaller, more coriaceous; *barren segm.* tri- or even quadripinnatifid, the ult. divisions much smaller and sharper.—*Hk. F. Exot. t.* 26. *A. anthriscifolia*, Schrad.

Hab. Mexico and West Indies to Peru and Monte Video.—The two varieties look very different in the extreme forms, but appear to slide into one another gradually. The

original *A. tomentosa* and *deltoides* are the less-developed forms of the less-divided variety, with which agree the Neilgherry *A. Wightiana*, Gardn. (Beddome, t. 66), and Abyssinian *A. Schimperiana*, Presl. The former has an unusually strong stem, both that and the rachises densely ferrugineo-tomentose; whilst a plant gathered by Dr. Welwitsch in Angola is like  $\beta$ , but nearly naked, with the divisions blunter than in the extreme form. Besides the synonyms already quoted, we appear to include the following, which are given as distinct by Sturm; viz. *rubrostipes*, Pohl, *ferruginea*, H. B. K., *Raddiana*, Link, *oblonga* and *imbricata*.

15. *A. trichorhiza*, Gardn.; *caud.* with a dense tuft of bright red-brown fibrillose scales  $\frac{1}{2}$  in. l. at the crown; *st.* 1-2 in. l., densely clothed with white woolly tomentum; *barren segm.* ovate-deltoid, 2-3 in. l., 1-1 $\frac{1}{2}$  in. br., bipinnate; *pinnæ* close, spreading, lanceolate, with several close roundish or oblong *pinnl.*; *texture* coriaceous; both *sides* when young completely enveloped in dense woolly tomentum; *panicle* subsessile from the base of the barren segm.—*Hk. Ic. t.* 876.

Hab. South Brazil, Gardner 4080, Burchell 7043, 1881.—A very distinct species.

16. *A. rutæfolia*, Mart.; *st.* 6-9 in. l., firm, naked; *barren segm.* short-stalked, 2-3 in. l., 1-1 $\frac{1}{2}$  in. br., oblong, bi- or tripinnatifid; *pinnæ* subdistant, lanceolate, cut down nearly to the rachis into narrow toothed or slightly pinnatifid divisions; *texture* subcoriaceous; *surfaces* slightly hairy; *panicle* subsessile, close, 1-1 $\frac{1}{2}$  in. l.—*Mart. t.* 55. *A. glareosa*, Gard. MSS.

Hab. South Brazil, Martius, Gardner 5339.—This may be a variety of the next, from which it seems to differ principally by its subsessile panicle.

17. *A. adiantifolia*, Sw.; *rhizome* creeping; *st.* 12-18 in. l., firm, naked; *barren segm.* short-stalked, 6-9 in. l., 4-6 in. br., deltoid, bi-tripinnate; *pinnæ* close, lanceolate, the lowest the largest; *ult. divisions* oblong or linear-cuneate, the outer edge toothed; *texture* coriaceous; *rachises* slightly pilose; *veins* fine, channelled, flabellate; *panicle* 3-4 in. l., the peduncle 1-3 in. l.—*Plum. t.* 158.

Hab. Cuba, Bahamas, Florida, and Mexico to Bahia.—*A. asplenifolia*, Sw. (Hk. & Gr. t. 16), is a reduced bipinnate form. This forms the genus *Anemirhiza* of J. Smith, characterized by an elongated rhizome, from which the stems arise in a single row. *A. caruifolia*, Presl, is a finely-cut variety.

18. *A. cuneata*, Kze.; *rhizome* creeping; *st.* 3-4 in. l., slender, naked; *barren segm.* long-stalked, 3-4 in. l., tripinnatifid, with distant *pinnæ* and *pinnl.*, the *ult. divisions* linear-cuneate,  $\frac{1}{2}$  lin. br., cleft at the apex; *texture* subcoriaceous; *rachis* and *surfaces* naked; *panicle* slender, lax, the lower branches elongated, the peduncles slender, 1 $\frac{1}{2}$  in. l.—*Kze. Anal. Pter.* 8. t. 5.

Hab. Cuba, Pæppig.—Perhaps a small finely-cut form of the preceding.

§§ Anemidictyon, *J. Sm.* *Panicle and leafy portion united in the same frond; veins anastomosing.* Sp. 19-21. Fig. 65. e.

19. *A.* (Anemid.)  *Tweediana*, Hk.; *st.* 3-4 in. l., naked or slightly pilose; *barren segm.* 1 $\frac{1}{2}$ -2 in. l., 1 in. br., ovate-oblong, simply pinnate; *pinnæ* in 2-3 sessile pairs, oblong,  $\frac{3}{8}$  in. l.,  $\frac{3}{8}$  in. br., the point blunt, the edge crenulate, the base rounded; *texture* subcoriaceous; *main vein* not distinct to the apex; *panicle* 1-2 in. l., dense, the lower branches short, the peduncle 1-2 in. l.—*Hk. Ic. t.* 906.

Hab. Uruguay and South Brazil.

20. *A.* (Anemid.) *Schraderiana*, Mart.; *st.* 6-9 in. l., villose below; *barren segm.* 3-5 in. each way, with 1-3 nearly equal *pinnæ* on each side, which are 2-2 $\frac{1}{2}$  in. l., 1 in. br., ovate-acuminate, the edge subentire, the base cuneate, the terminal *pinnæ* with 2 divergent lanceolate lobes; *texture* subcoriaceous; *main vein*



distinct to the apex, the veinlets oblique, slightly joining; *panicle* 1-2 in. l., the peduncle 1-4 in. l.—*Mart. Ic. t. 58.* *A. diversifolia* and *Vespertilio*, *Schrad.*

Hab. South Brazil.—With this we are not acquainted. The description is compiled principally from Martius.

21. *A.* (Anemid.) *Phyllitidis*, Sw.; *st.* 6-18 in. l., stramineous, naked or fibrillose; *barren segm.* sessile, 4-12 in. l., 2-8 in. br., ovate-oblong, simply pinnate; *pinnæ* in 4-12 sessile pairs, the lowest the largest, ovate, 1-6 in. l.,  $\frac{1}{2}$ -2 in. br., the apex acute, the edge crenulate, the base rounded or cuneate or unequal; *texture* subcoriaceous; *main vein* distinct to the apex, the veinlets oblique, forming numerous long narrow areolæ; *rachises* naked or pilose; *panicle* dense, 3-9 in. l., the branches short, the peduncle 3-8 in. l.—*Plum. t. 156.* *Raddi, Fil. Bras. t. 8.*

Hab. Cuba and Mexico to Peru and South Brazil.—We appear to include here eight species of Sturm, of which *A. obliqua* and *sorbifolia*, *Schrad.*, *A. fraxinifolia*, *Raddi*, and *A. macrophylla*, have the terminal pinna more or less joined to those below, whilst in his *A. Phyllitidis*, *longifolia*, *Link*, and *densa*, *Raddi*, it is distinctly separated. *A. laciniata*, *Link*, has the lower pinnæ inciso-lobate. Villose forms of this are often labelled *A. hirta*, *Sw.*; but that synonym appears to belong properly to our *A. Breuteliana*.

§§§ *Coptophyllum*, *Gardn. Barren and fertile fronds distinct.* Sp. 22-26.

22. *A.* (Copt.) *aurita*, Sw.; *st.* of the barren frond 2-3 in. l., firm, erect, slightly pilose; *barren fr.* 3-6 in. l.,  $1\frac{1}{2}$ -2 in. br., oblong-deltoid, bipinnate, the lower *pinnæ* the largest, stalked, simple, or with 1 or 2 roundish sessile entire or slightly toothed *pinnl.* on each side; *texture* coriaceous; *surface* glossy; *veins* finely channelled, flabellate; *panicle* 2-3 in. l., interrupted, the lower branches short, the *st.* 6-8 in. l.—*Hk. Ic. t. 903.*

Hab. Jamaica.

23. *A.* (Copt.) *Wrightii*, Baker; *st.* of barren frond 1-5 in. l., slender, naked, stramineous; *barren fr.* 2-3 in. l.,  $1\frac{1}{2}$  in. br., subdeltoid, tripinnatifid; *pinnæ* few, distant, the lower ones deltoid, the upper pinnules cuneate, simple,  $\frac{1}{8}$  in. br., the lower ones deeply cleft from the circumference inwards; *texture* subcoriaceous; *rachis* and *surfaces* naked; *veins* flabellate; *panicle* 2-3 in. l., very lax and few-branched, stem 8-12 in. l.

Hab. Cuba, *Wright* 1812.—In habit not unlike *A. cuneata*, or a small slender form of *adiantifolia*.

24. *A.* (Copt.) *bipinnata*, Moore; *st.* of barren frond 1-2 in. l., slender, naked; *barren fr.* 2-3 in. l.,  $\frac{3}{4}$ -1 in. br., oblong-deltoid, tripinnatifid; lower *pinnæ* the largest, subdeltoid, with cuneate pinnatifid *pinnl.*; *texture* subcoriaceous; *veins* flabellate; *rachis* and *surfaces* slightly hairy; *panicle* lax, close, elongated, the *st.* slender, 2-3 in. l.—*Osmunda*, *Linn. Herb. A. cicutaria*, *Kze. Anal. Pter. 9. t. 5.*

Hab. Bahamas and West Indies.—The figure of Plumier which Linnæus quotes is evidently *Osmunda cinnamomea*.

25. *A.* (Copt.) *dichotoma*, *Gardn.*; *st.* of barren frond densely tufted, firm, erect, slender, naked; *barren fr.* 1-2 in. l., about 1 in. br., oblong, tripinnate, the segments filiform, dichotomously forked, the divisions 2-3 lin. l.; *texture* subcoriaceous; *surfaces* and *rachis* naked; *panicle* 2-3 in. l., the lower branches elongated, the *st.* 3-4 in. l.—*Sturm, in Mart. Fl. Bras. fasc. 23. fig. 16. t. 4.* *Copt. buniifolium*, *Gard. Hk. Ic. t. 477.*

Hab. Brazil.—*A. tenuifolia*, *Presl* (*Sturm, l. c. t. 16. f. 2*), is probably a smaller and more slender form of this species. Leaf in cutting resembling that of *Bunium flexuosum*, the divisions much longer and fewer than in the next.

26. A. (Copt.) *millefolia*, Gard.; *st.* of barren frond 1-1½ in. l., dense, erect, pilose; *barren fr.* 2-3 in. l., ¾-1 in. br., oblong, tripinnate; *pinnæ* close, oblong, the *segm.* slightly flattened, under 1 lin. l.; *texture* subcoriaceous; *rachises* pilose; *panicle* 2-3 in. l., with copious erecto-patent branches, the stem 3-4 in. l.—*Sturm in Mart. Fl. Bras. fasc. 23. fig. 16. t. 4. Copt. Gardn. Hk. Ic. t. 478.*

Hab. South Brazil.—Barren frond in shape and cutting resembling a leaf of *Achillea millefolium*.

GEN. 66. MOHRIA, Sw.

*Caps.* sessile, placed on the back of the leafy frond near the edge. *A single species, combining the capsules of the sub-order with the habit of Cheilanthes.* TAB. VIII. fig. 66.

1. *M. caffrorum*, Desv.; *st.* tufted, 3-4 in. l., slightly scaly; *fr.* 6-18 in. l., 2-4 in. br., tripinnatifid; *pinnæ* close, lanceolate-oblong, cut down to a narrowly-winged rachis into oblong *pinnl.*, which are pinnatifid and deeply toothed in the barren frond, less divided in the fertile one; *texture* herbaceous or subcoriaceous; *rachises* and under *surface* more or less clothed with linear subulate pale-brown scales.—Polyp. *Linn. M. thurifraga, Sw.*

Hab. Cape Colony to Natal, Mauritius, Bourbon, and Madagascar.—Fragrant when bruised. *M. achilleæfolia* of the gardens (Lowe, N. F. t. 42. B.) is a finely-cut variety, almost quadripinnatifid, and is said to have a different scent, and grow in more open places.

GEN. 67. TROCHOPTERIS, Gardn.

*Caps.* small, sessile, placed irregularly round the edge on the under side of the slightly-contracted lower lobes of the leafy frond. *A single species, like a dwarf Anemia, but with the fertile and barren parts of the frond not distinct.* TAB. VIII. fig. 67.

1. *T. elegans*, Gard.; *st.* densely tufted, very short; *fr.* 1 in. l., ½-⅝ in. br., lyrato-pinnatifid, the upper lobes rounded, not deep, the lowest pair reaching down nearly to the rachis, and bearing the *sori* on its lacinated edge; *texture* herbaceous; *venation* flabellate, free; both *sides* villose.—*Gardn. in Hk. Journ. 1. p. 74. t. 74. Anemia, St. in Mart. Fl. Bras. t. 16.*

Hab. South Brazil.—The fronds resemble the leaves of a *Geum*, and form a dense rosulate tuft.

GEN. 68. LYGODIUM, Sw.

*Caps.* solitary (or casually in pairs), in the axils of large imbricated clasping involucre, which form spikes either in separate *pinnæ* or in lax rows along the edge of the leafy ones. *A small widely-diffused genus, well characterized by its wide-scandent twining stems.* TAB. IX. f. 68.

§ Eulygodium. *Veins free.* Sp. 1-13.

\* *Fully-developed barren pinnules palmate or dichotomously forked.*  
Sp. 1-6.

1. *L. palmatum*, Sw.; primary *petiole* slender, ⅛-¼ in. l., each fork in the lower part of the stem bearing a single cordato-palmate *pinnl.* 1½-2 in. br., not so deep, bluntly 4-6-lobed more than halfway down, the slender *petiole* ½-¾ in. l.; *fertile pinnl.* subdeltoid, 3-4-pinnatifid, formed only of winged rachises and short spike-like fertile ultimate divisions, the latter linear, 1-1½ lin. l.; *surfaces* naked; *texture* thin-herbaceous.—*Hk. Fil. Ex. t. 24. Schk. t. 140. A. Gray, Man. t. 13. Gisopteris, Bernh.*

Hab. Massachusetts to Florida.



2. *L. dichotomum*, Sw. ; primary *petiole* so much reduced that the fork seems almost to spring from the main rachis, secondary 1-2 in. l., firm, naked ; *pinnl.* digitate, with 5-6 lobes reaching nearly down to the base, or once or even twice forked ; ult. barren *divisions* 4-8 or even 12 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., the fertile ones contracted, sometimes so much so that the lamina is nearly lost ; the *spikes* 1-2 lin. l., in close marginal rows ; *texture* subcoriaceous ; *surfaces* naked.—*Hk. & Gr. t. 55. Beddome, t. 62.* *L. circinatum* and *pedatum*, and probably *flexuosum*, Sw. Ugena, Cav.

Hab. Chusan, Hong-Kong, Philippines, Ceylon, Malay Peninsula and Isles.—If, as seems likely, this is *L. flexuosum*, Swz., that is the oldest specific name.

3. *L. digitatum*, Eaton (not Presl) ; primary *petiole* short or obsolete, secondary 1 in. or more l. ; *pinnl.* palmate, cut down nearly to the base or once forked, the lobes 6-12 in. l.,  $\frac{3}{4}$ -1 in. br., the point acute or bluntish, the base narrowed, the edge of the barren ones crenulate or finely toothed ; *texture* subcoriaceous ; *surfaces* glossy, naked ; *spikes* 1-2 lin. l., in close rows along the edge of the lobes.—*Eaton, Fil. Wright & Fend. p. 217.*

Hab. Gathered about Panama and in New Granada by Seemann, Cuming, and Hayes, and in Guatemala by Salvin and Godman. Apparently larger and less divided than the preceding, which is Presl's *digitatum*, but very doubtfully distinct.

4. *L. semihastatum*, Desv. ; primary *petiole* nearly or quite obsolete, secondary 1 in. or more ; *pinnl.* once forked, each short-stalked, divisions (in our specimen) simple, ligulate, 6-8 in. l., nearly 1 in. br. without the spikes, the base unequal, one side very cordate ; *texture* coriaceous ; *surface* naked ; *spikes*  $\frac{1}{4}$  in. l., in close rows along the edge of the segments.—Ugena, Cav. *H. auriculatum*, Cav.

Hab. Philippine and Marianne Isles, Cuming, &c.—The sterile pinnules are described as palmate. The fertile ones, except that they are in pairs instead of being numerous and arranged pinnately, are like those of *pinnatifidum*.

5. *L. articulatum*, Rich. ; primary *petiole*  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., secondary 1 in. or more l. ; barren *pinnl.* twice forked, each bearing 4 ligulate-oblong *segm.*, which are 2-3 in. l., about  $\frac{1}{2}$  in. br., blunt at the point, very distinctly articulated at the base on a short petiole ; *texture* subcoriaceous ; *rachis* and *surfaces* naked ; *fertile pinnl.* many times dichotomous, the short *spikes* in dense clusters, which are often almost destitute of lamina.—*A. Rich. Fl. t. 15.*

Hab. New Zealand.—A very well-marked species.

6. *L. trifurcatum*, Baker ; primary *petiole* obsolete or very short, secondary 1-1 $\frac{1}{2}$  in. l. ; *pinnl.* twice dichotomously forked, and each division bipartite nearly to the base, the ult. barren divisions 4-6 in. l.,  $\frac{3}{4}$ - $\frac{7}{8}$  in. br., the point acute or bluntish, the edge crenulate, the petioles not articulated ; *texture* subcoriaceous ; *rachis* and *surfaces* naked ; *fertile divisions* contracted, cut down nearly to the rachis, the short *spikes* in clusters of 3-6 upon the lobes.

Hab. Solomon Isles, Milne 511, 591, J. G. Veitch ; Louisiade Archipelago, McGillivray.—This seems a very distinct species. In one of our specimens the spikes are 1 to 3 together, and the portion of the lamina that supports them is only linear.

\*\* Fully-developed barren pinnules pinnate. Sp. 7-13.

7. *L. scandens*, Sw. ; primary *petiole* very short, secondary  $\frac{1}{4}$ - $\frac{1}{2}$  in. l. ; *pinnl.* 4-8 in. l., 2-4 in. br., with a terminal *segm.* and 4-5 on each side, which are very variable in shape, usually simple, ovate or ligulate-oblong, with a rounded or cordate base, sometimes hastate or even slightly pinnate below, always articulated on a short petiole, spreading from the rachis at right angles ; *texture* firm ; *sur-*

faces naked or nearly so ; spikes 1-3 lin. l., in close rows along the edge of the segments.—*Beddome, t. 61.*

Hab. South China and Himalayas to Queensland, Malay Isles, and Ceylon ; Guinea Coast.—*L. microphyllum*, Br., is a common form with short broad segments ; *L. semi-bipinnatum*, Br., the form with the segments pinnate at the base. We do not venture to separate the Mexican *L. mexicanum*, Presl, which is quite like this in habit, but is said to be not articulated at the apex of the petiole, a character which our specimens leave in doubt.

8. *L. venustum*, Sw. ; primary petiole very short, secondary  $\frac{1}{4}$ - $\frac{1}{2}$  in. l. ; pinnl. 6-12 in. l., 4-6 in. br., with a terminal segm. and 4-12 on each side, which are simple, ligulate-oblong, the lower ones usually hastate, or pinnate below, all articulated at the base, bluntly lobed at the edge when barren, the upper ones sessile, the lower ones on a spreading petiole  $\frac{1}{8}$ - $\frac{1}{4}$  in. l. ; texture firm ; rachis and surfaces densely villose ; spikes 1-4 lin. l., in close rows.—*L. polymorphum*, H. B. K. Ugena, Cav. *H. hirsutum*, Willd.

Hab. West Indies and Mexico to Brazil and Peru.—Near the preceding, but larger and constantly villose, with the edge of the barren segments crenato-pinnatifid. *L. cubense*, H. B. K., probably belongs here.

9. *L. volubile*, Sw. ; primary petiole nearly or quite obsolete, secondary about 1 in. l. ; pinnl. 8-12 in. l., 6-10 in. br., with a simple ligulate-oblong terminal segm. 3-6 in. l., 1-1 $\frac{1}{4}$  in. br., and 3-5 like it on each side, truncate or subcuneate, and articulated at the base, and all distinctly stalked ; texture subcoriaceous ; rachis and surfaces naked or slightly pubescent ; spikes 1-3 lin. l., in close rows along the edge of the leafy segments.—*L. scandens*, Schk. t. 138. (*non Sw.*). *L. hastatum*, Mart. t. 57.

Hab. Cuba to Brazil.—From this we cannot separate by any clear character *L. hastatum* and *expansum*, Desv., *hirtum* and *lucens*, Kaulf., *Pœppiganum*, Presl, *Wrightii*, Eaton, *surinamense*, Miquel, *acuminatum*, *puberulum*, and *micans*, Sturm. Segments of several of these are figured by Sturm (Mart. Fl. Bras. fasc. 23. t. 13-14). In some of the forms they have a pair of pinnæ at the base, and in others they are slightly villose.

10. *L. pinnatifidum*, Sw. ; primary petiole none or very short, secondary often 1 in. l. ; pinnl. 8-12 in. l., 6-12 in. br., with a ligulate-oblong terminal segm. 3-6 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., and 3-4 like it on each side, usually rounded or cordate, all articulated at the base, the lower ones, or all, short-stalked, and sometimes hastate or pinnate below ; texture subcoriaceous ; rachis and surfaces naked or slightly pubescent ; spikes 1-3 lin. l., in close rows along the edge of the leafy segments.—*L. flexuosum*, Bedd. t. 63, but scarcely of Swartz.

Hab. Himalayas, Philippines, Malaccas, South India, Ceylon, Angola, Guinea Coast.—Here belong *L. longifolium* and *pubescens*, Wall., the latter a slightly pubescent form, and *L. salicifolium*, Presl (a form with small neat long-stalked segments), and Smith's Congo plant, called *L. Smithianum* by Presl.

11. *L. polystachyum*, Wall. ; primary petiole short or obsolete, secondary  $\frac{1}{4}$ - $\frac{1}{2}$  in. l. ; pinnl. 8-12 in. l., 4-6 in. br. ; the segm. uniform, 9-12 on each side, 2-3 in. l.,  $\frac{3}{4}$  in. br., articulated at the base, pinnatifid more than halfway down to the rachis into close entire blunt lobes  $\frac{1}{8}$  in. br. ; upper segm. sessile, lower ones short-stalked ; texture subcoriaceous ; rachis and surfaces pubescent ; the fruit in the fertile ones occupying the back of the scarcely modified lobes.—*Hk. 2nd Cent. t. 76.*

Hab. Malay Peninsula ; gathered by Wallich, Griffith, Parish, &c.—Well distinguished by its numerous uniform deeply and regularly pinnatifid segments.

12. *L. subalatum*, Bojer ; primary petiole obsolete or very short, secondary  $\frac{1}{4}$  in. l. ; pinnl. 6-9 in. l., 4-6 in. br., subdeltoid, bipinnate, the apex pinnatifid ;



upper *segm.* sessile, ovate-deltoid, pinnatifid, lower short-stalked, deeply pinnatifid or pinnate in the lower part, the divisions pinnatifid, the base not articulated; *texture* herbaceous; *surfaces* naked or slightly villose; *spikes* 1-2 lin. l., terminating the ultimate lobes.

Hab. Madagascar and the Comoro Isles; collected by Bojer, Kirk, and Speke.—The segments are very close, often imbricated, and in well-developed pinnules six on each side below the pinnatifid apex. This is midway between *japonicum* and *polystachyum*, and has the pinnatifid barren segments of the latter.

13. *L. japonicum*, Sw.; primary *petiole* very short, secondary  $\frac{1}{2}$ -1 in. l.; *pinnl.* 4-8 in. l., nearly as broad, deltoid; the terminal *segm.* pinnatifid or hastate, the lateral ones 2-3 on each side, very unequal, not articulated at the base, the lower ones long-stalked and pinnate in the lower part, the divisions entire or crenulate; *texture* herbaceous; *surfaces* naked or slightly villose; *spikes* 1-2 lin. l., the lamina of the fertile divisions often much reduced.—*Beddome*, t. 64.

Hab. Japan and the Himalayas to Ceylon, Java, Philippines, Hong-Kong, and Loo Choo Isles.—*L. Finlaysonianum*, Wall., and *L. tenue*, Blume, both appear to be forms of this with the lamina of the fertile divisions nearly obsolete.

§§ Hydroglossum, *Presl. Veins anastomosing*. Sp. 14-16. Fig. 69. c. Lygodictyon, *J. Smith*.

14. *L.* (Hydro.) *heterodoxum*, Kze.; primary *petiole* obsolete or very short, secondary  $1\frac{1}{2}$  in. l.; *pinnl.* with 2-3 bipartite *segm.*, the ult. divisions 4-6 in. l.,  $\frac{3}{4}$  in. br., the petioles not articulated, the lowest often  $\frac{1}{2}$  in. l.; *texture* thin; *rachis* and *surfaces* naked; *veins* joining copiously; *spikes* 1 lin. l., in close rows along the edge of the leafy divisions.—*Kunze*, t. 113. *H. spectabile*, *Liebm.* *L. Lindeni*, *Hort.*

Hab. Mexico and Guatemala.

15. *L.* (Hydro.) *reticulatum*, Schk.; primary *petiole*  $\frac{1}{2}$ - $\frac{1}{4}$  in. l., secondary  $\frac{1}{4}$ - $\frac{1}{2}$  in. l.; *pinnl.* 6-9 in. l., 4-6 in. br., with a terminal *segm.* and 4-6 nearly uniform ones on each side, which are cordate-hastate or ligulate-oblong, rounded or cordate at the base, 2-3 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., all articulated at the base, the lower ones short-stalked; *texture* subcoriaceous; *rachises* naked or slightly villose, sometimes ebeneous; *spikes* 1-3 lin. l., in close rows along the edge of the segments.—*Schk.* t. 139. *H. polycarpum*, *Willd.* *H. scandens*, *Presl.* *L. Schkuhri* and *Forsteri*, *J. Sm.*

Hab. Polynesian Isles and East Tropical Australia.

16. *L.* (Hydro.) *lanceolatum*, Desv.; primary *petiole* short or obsolete, secondary 1 in. l.; *pinnl.* 8-12 in. l., 6-10 in. br.; *segm.* 3-4 on each side, uniform, 4-6 in. l.,  $\frac{3}{4}$ -1 in. br., all stalked, articulated at the base, the base rounded or cuneate, never cordate; *texture* coriaceous; *rachis* and *surfaces* glossy; *spikes* 1-2 lin. l., in close rows along the edge of the segments.—*H. madagascariensis*, *Poir.*

Hab. Madagascar, *Bojer*, *Forbes*, *Meller*, &c.

#### SUB-ORD. V. MARATTIACEÆ.

*Caps.* opening by a slit down one side or a pore at the apex, without a ring, usually joined together in concrete masses (synangia). *Vernation* circinate.\*  
GEN. 69-72.

\* An elaborate illustrated monograph of the sub-order (excluding *Danawa*) was published by De Vriese and Harting at Leyden in 1853. They define altogether ninety-four

GEN. 69. ANGIOPTERIS, *Hoffm.*

*Caps.* opening by a slit down the side, sessile, very close to one another but not concrete, arranged in linear-oblong or boat-shaped *sori* near the edge of the frond. TAB. IX. fig. 69.

1. *A. evecta*, Hoffm. ; *caud.* erect, 2-6 ft. high,  $1\frac{1}{2}$ -2 ft. thick ; *st.* swollen and articulated at the base, furnished with two large leathery auricles, which remain attached to the caudex after it falls ; *fr.* 6-15 ft. l., bipinnate ; *pinnae* 1-3 ft. l., spreading, the lowest the largest, the rachis swollen at the base ; *pinnl.* 4-12 in. l.,  $\frac{1}{2}$ - $1\frac{1}{2}$  in. br., linear-oblong, sessile or short-stalked, the point acuminate, the edge entire or slightly toothed ; *texture* subcoriaceous ; both *sides* naked, smooth, shining ; *veins* subparallel ; *sori* consisting of 8-15 caps., in close rows near the edge, almost hiding the inferior fimbriated involucre. — *Hk. & Gr. t.* 36. *Hk. Fil. Ex. t.* 75.

*Hab.* Himalayas and Japan to Ceylon, Madagascar, New Caledonia, Queensland, and Society Isles. — We cannot determine more than one clearly-marked species, but Presl defines ten, and De Vriese sixty. There is a considerable range of variation in the texture of the pinnae and closeness of the veins and sori, and the number of capsules which compose the latter ; and in many of the forms there is a free veinlet, which is very variable in length and distinctness, which begins at the edge of the frond in the interspace between the veins proper. *Psilodochea salicifolia*, Presl, is an entirely obscure plant, supposed to have been gathered in Lahore, said to be like *Angiopteris*, but without an involucre.

GEN. 70. MARATTIA, *Sm.*

*Caps.* sessile or stalked, 4-12, concrete in boat-shaped synangia, which consist of two opposite rows of capsules, and open by slits down their inner faces. *A well-marked genus, extending all round the world within the Tropics, and a little beyond the southern one.* TAB. IX. fig. 70.

§ Eumarattia. Synangia furnished with an obscure fimbriated inferior involucre. Sp. 1-2.

1. *M. fraxinea*, Smith ; *st.* 1-2 ft. l.,  $1-1\frac{1}{2}$  in. thick, smooth, deciduously scaly and swollen in the lower part ; *fr.* 6-15 ft. l., bipinnate or casually tripinnate ; *pinnae* 1-2 ft. l., often 1 ft. br. ; *pinnl.* oblong-lanceolate, 4-6 in. l.,  $\frac{1}{2}$ - $1\frac{1}{2}$  in. br., the apex acuminate, the edge entire or serrulate, the base cuneate or slightly rounded ; *texture* coriaceous ; *surfaces* naked ; *veins* simple or forked, the rachis of the pinnae sometimes slightly winged ; *synangia* usually submarginal, in close rows,  $\frac{1}{2}$ - $1\frac{1}{2}$  lin. l., the sides vertical, the receptacle linear, with 6-12 caps. on each side.

*Hab.* Guinea Coast, Angola, Zambesi-land, Mascaren Isles, Natal, Cape Colony, Neilgherries, Ceylon, Philippines, Malaccas, Polynesia, New Zealand, Queensland, Norfolk Island. — The typical plant (Smith, Ic. inedit. t. 48 ; Beddome, t. 79) has pinnules  $1-1\frac{1}{2}$  in. br., serrulate principally at the apex, numerous forked veins, and submarginal synangia, with 10-12 caps. on each side. To this belong *M. sorbifolia*, Bory, and *M. elegans*, Endl. From this we cannot separate clearly many plants which have been regarded as distinct ; of which the principal are *M. salicifolia*, Schrad. (Kze. t. 38), including *M. Dreghiana* and *natalensis*, Presl (South Africa), pinnules sharply toothed throughout, often only  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., veins more distant, synangia with about 6 caps. on each side, not so close or so near the edge ; *M. salicina*, Sm., De Vriese, tab. 3. fig. 18 (Society Isles),

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species, and give nine large folio plates to illustrate the characters of these and the anatomical structure of the genera. In all of them the caudex is a succulent irregularly-shaped tuberous mass, upon which the stems are articulated, and the latter are furnished at the base with a pair of large flap-like auricles, which are leathery in texture when dry.



colour dark-green, veins and synangia very close, the former all simple, the latter long, narrow, marginal; a plant from Fiji, coriaceous in texture, colour dark-green, veins simple, much raised,  $\frac{3}{4}$  line apart, synangia a third or nearly halfway from the edge to the midrib; *M. purpurascens*, De Vriese, t. 3. f. 19 (*M. Ascensionis*, J. Sm., Hk. G. F. t. 65, from Ascension Island), a reduced fleshy form, as if grown in a very exposed situation, the fronds not more than 3-4 ft. high, lurid-purple in the wild plant, lower pinnl. often cut down to a distinctly-winged rachis, the auricles at the base of the stem sometimes producing soriferous lobes like the frond in texture; and *M. sambucina*, Blume (Java), pinnl. 2-3 in. l.,  $\frac{3}{8}$ - $\frac{1}{2}$  in. br., narrowed to both ends, very pale beneath, with distant simple veins, small synangia placed half as far from the edge as from the midrib, and the rachis of the pinnæ more distinctly winged than usual. The Philippine *M. pellucida*, Presl, comes very near this last, and *M. sylvatica*, Blume (De Vriese, t. 3. f. 23), appears to differ only by having the lower pinnules again pinnatifid.

2. *M. attenuata*, Lab.; st. 3-4 ft. l., smooth; fr. 3-4 ft. l., tripinnate; pinnæ  $1\frac{1}{2}$ -2 ft. l., the lower ones with a stalk 6 in. l. and 2-3 pinnl. on each side, the latter with a terminal segm. and 3-4 on each side, which are 4-6 in. l., 1 in. or rather more br., the apex serrated, the base cuneate, the lower ones short-stalked; texture subcoriaceous; surfaces naked; rachis not winged; veins usually once forked; synangia 1-1 $\frac{1}{2}$  lin. l., submarginal, the sides vertical, the receptacle linear.—*Lab. Sert. Austro-Cal. p. 9. t. 13-14.*

Hab. New Caledonia.—This may not be more than a more compound variety of the preceding, but examples received recently from Vieillard quite agree with Labillardière's specimens and figures.

§§ Gymnotheca, Presl. *Synangia sessile without an involucre.*  
Sp. 3-6.

3. *M. (Gymno.) cicutæfolia*, Kaulf.; st. 1-2 ft. l., 1 in. thick, smooth; fr. 5-6 ft. l., bipinnate; lower pinnæ 12-18 in. l., often 1 ft. br.; pinnl. oblong-lanceolate, 4-6 in. l.,  $\frac{3}{4}$ -1 in. br., the edge entire or serrulate, the base cuneate or slightly rounded; texture subcoriaceous; surfaces naked; veins distant, usually in pairs that join at the base, one often forked; rachis of the pinnæ slightly winged towards the apex; synangia a short distance from the edge, 1-1 $\frac{1}{2}$  lin. l., deep cleft, the sides ultimately spreading, the attachment linear.—*Mart. Ic. t. 70. M. fraxinea, Raddi, t. 82. (non Smith).*

Hab. Brazil.—De Vriese and Sturm define six Brazilian species, which we cannot distinguish clearly,—*Raddiana, polyodon, obtusidens, cicutæfolia, Verschaffeltiana*, and *podolepis*. The latter is the most unlike the type, and has herbaceous pinnæ only 2-3 in. l.,  $\frac{3}{8}$  in. br., and very small synangia.

4. *M. (Gymno.) laxa*, Kze.; st. 1-2 ft. l., smooth; fr. several ft. l., bipinnate; lower pinnæ  $1\frac{1}{2}$ -2 ft. l., often 1 ft. br.; pinnl. oblong-lanceolate, 4-6 in. l.,  $\frac{3}{4}$ -1 in. br., the edge inciso-crenate, the base cordate; texture subcoriaceous; surfaces naked; veins in pairs that join at or near the base, both sometimes forked; rachis slightly winged towards the apex; synangia quite close to the edge,  $\frac{3}{4}$ -1 lin. l., the sides always erect, the attachment linear.—*Kunze, t. 95. Presl, Suppl. tent. p. 15. Lowe, 8. t. 77. M. macrophylla, Hort.*

Hab. Mexico, *Liebold 62.*—This and the preceding have entirely the habit of *M. fraxinea*.

5. *M. (Gymno.) Douglasii*, Baker; st. 3-5 ft. l., thick, smooth; fr. 6-8 ft. l., tripinnatifid, the lower pinnæ much the largest, all except the lowest pair simply pinnate, 6-8 in. l., 2-3 in. br., the rachis flattened and narrowly winged throughout, the pinnl. usually under 1 in. l.,  $\frac{1}{4}$  in. br., linear-oblong, with broad blunt teeth, the base cuneate; pinnl. of the lowest pinnæ again pinnatifid; texture thick-herbaceous; surfaces naked; synangia 1 to each lobe of the pinnules, sub-

marginal,  $\frac{1}{2}$ - $\frac{3}{4}$  lin. l., the sides ultimately spreading, the attachment oblong.—*Stibasia*, *Presl. De Vriese, tab. 3. f. 24.*

Hab. Sandwich Isles.

6. *M.* (Gymno.) *alata*, Smith; *st.* 1-2 ft. l., 1 in. or more thick, deciduously scaly; *fr.* 3-4 ft. l., tripinnatifid, the lower *pinnæ* the largest, all except the lowest pair usually simply pinnate, the ultimate divisions  $\frac{1}{2}$ - $\frac{3}{4}$  in. l., about  $\frac{1}{4}$  in. br., oblong, blunt or acute, the base cuneate, the edge serrate or crenate, the rachises with a very distinct wing; *texture* herbaceous; under *surface* more or less chaffy; *synangia* copious, submarginal,  $\frac{1}{2}$ - $\frac{3}{4}$  lin. l., the sides erect, the attachment oblong or roundish.—*Smith, Ic. inedit. t. 46. (non Raddi).* *Discostegia*, *Presl. M. lævis, Smith, Ic. t. 47. M. weinmanniæfolia, Liebm.*

Hab. West Indies, Mexico, and Guatemala.—*Presl* and others assign to this an involucre, which we are not able to detect. *M. lævis*, Sm., is a form with the rachis smooth and teeth of the segments blunt.

§§§ *Eupodium*, *J. Sm. Synangia short-stalked without an involucre.*  
Sp. 7.

7. *M.* (Eupod.) *Kaufussii*, *J. Sm.*; *st.* 2-3 ft. l., thick, naked; *fr.* 3-4 ft. l., quadripinnatifid, the lowest *pinnæ* much the largest, all except the lowest pair bipinnatifid, 1 ft. or more l., 6-8 in. br.; *pinn.* 3-4 in. l., the rachis very distinctly winged; *segm.* oblong, deeply and bluntly toothed, those of the lowest *pinnæ* again pinnatifid; *texture* herbaceous; *surfaces* naked; *synangia*  $\frac{1}{2}$ - $\frac{3}{4}$  lin. l., not marginal, deeply cleft, the sides ultimately spreading.—*Hk. 2nd Cent. t. 95. M. alata, Raddi, t. 83-4. (non Sm.)*

Hab. West Indies and Columbia to Ecuador and Rio Janeiro.

#### GEN. 71. DANÆA, *Sm.*

*Caps.* sessile, concrete in rows, which cover the whole under surface of the *pinnæ* on which they are placed, opening by pores at the apex. *A well-marked genus restricted to Tropical America.* TAB. IX. fig. 71.

1. *D. simplicifolia*, *Rudge*; *st.* of the barren *fr.* 2-12 in. l., with 0-2 nodes, slightly scaly below; *barren fr.* 6-12 in. l., 2-4 in. br., ovate-oblong, the apex acuminate, the edge entire, the base rounded or cuneate; *texture* subcoriaceous; *midrib* beneath naked; *veins* close, usually once forked; *fertile fr.* similar but smaller, and the *st.* longer.—*Rudge, t. 36. Kunze, t. 50.*

Hab. Guiana and North Brazil.—One of our specimens is partially fertile only. There are about 100 capsules in the central *synangia*, and 30,000 to an entire frond.

2. *D. trifoliata*, *Reich.*; *st.* of barren *fr.* about 1 in. l., with 1 node, slightly scaly below; *barren fr.* with an oblong-lanceolate entire terminal *pinna* 8-12 in. l., 3 in. br., and one or two pairs of similar but smaller lateral ones; *texture* coriaceous; *surfaces* glossy, the *rachis* naked, not winged, swollen at the nodes; *veins* close, usually once forked, casually anastomosing; *fertile fr.* on a longer *st.*, the *pinnæ* smaller.—*Kze. Anal. 4. t. 2.*

Hab. Guiana; gathered by *Hostmann* and *Schomburgk.*—Perhaps not really distinct from the preceding.

3. *D. trichomanoides*, *Spruce, MSS.*; *st.* of barren *fr.* under 1 in. l., furfureaceous, continuous; *barren fr.* 3-4 in. l., 1 in. br., with about 12 *pinnæ* on each side, the central ones  $\frac{1}{2}$  in. l., 2 lin. br., oblong, short-stalked, the base rounded; *colour* dark-green; *texture* pellucido-herbaceous; *veins* simple; *rachis* with a



distinct crisped wing throughout; *fertile fr.* on longer *st.* than the barren ones, and the pinnæ more distinctly stalked and not so close.—*Moore, Ind. Fil. p.* 288.

Hab. Tarapota, East Peru, *Spruce* 4710.

4. *D. Leprieurii*, Kze.; *st.* 6-9 in. l., slender, nearly naked, with 3-4 distinct articulations; *barren fr.* 6-9 in. l., 3-4 in. br., with about 6 sessile pinnæ on each side, which are  $1\frac{1}{2}$ -2 in. l.,  $\frac{3}{4}$  in. br., oblong-falcate, the edge crisped, the lowest pair nearly equalling the others; *texture* subcoriaceous; *veins* very fine and close, usually once forked; *rachis* slender, swollen at the nodes, slightly winged upwards; *fertile fr.* on a longer *st.* than the barren one, the pinnæ similar, but smaller.—*Kze. t.* 60.

Hab. Guiana and the Amazon Valley.—This forms the section *Arthrodanæa* of Presl, characterized by a distinctly articulated stem.

5. *D. humilis*, Moore; *st.* of barren fr. 2-4 in. l., furfuraceous, with 0-1 node; *barren fr.* about 1 ft. l., 2-3 in. br., with 15-25 close pinnæ on each side, the central ones  $1\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{3}{8}$  in. br., distinctly stalked, the point blunt, the edge slightly crisped, the base on both sides rounded or subcordate; lower pinnæ rather shorter than the others; *texture* fleshy-herbaceous; *rachis* furfuraceous, distinctly winged throughout; *veins* fine and close; *fertile fr.* like the other, but smaller.—*Moore, Ind. Fil. p.* 286.

Hab. El Ecuador, *Seemann* 996; and a plant gathered by Dr. Spruce in East Peru (4769) is probably the same. Some of Dr. Seemann's specimens are proliferous at the apex.

6. *D. alata*, Smith; *st.* of barren fr. 2-6 in. l., densely furfuraceous, with 0-1 node; *barren fr.* 12-18 in. l., 6-8 in. br., with 8-10 pinnæ on each side, the central ones short-stalked, 3-5 in. l.,  $\frac{3}{4}$  in. br., the apex acuminate or cuspidate, serrated, the base rounded, the lowest pair distant and much reduced; *texture* subcoriaceous; *rachis* and midrib beneath furfuraceous, the former distinctly winged in the upper half; *veins* conspicuous, usually simple; *fertile fr.* on a longer *st.*, the pinnæ stalked more distinctly, 1-3 in. l., acute or obtuse, 3-4 lin. br.—*Plum. t.* 109. *Hk. & Gr. t.* 18.

Hab. West Indies.

7. *D. Augustii*, Karst.; *st.* of barren fr. 3-4 in. l., slender, naked, with 1-2 nodes; *barren fr.* about 1 ft. l., 6-8 in. br., with 4-5 pinnæ on each side, which are 3-4 in. l.,  $\frac{1}{2}$ - $\frac{3}{4}$  in. br., the upper ones sessile, the lowest stalked and slightly reduced, all narrowed to the base, the upper part inciso-crenate; *texture* herbaceous; *colour* dark-green; *veins* not very close, usually once forked; *rachis* naked, slightly winged upwards; *fertile pinnæ* similar.—*Sturm in Mart. Fl. Bras. fasc.* 23. *p.* 159.

Hab. Venezuela, *Karsten*.

8. *D. Moritziana*, Presl; *st.* of barren fr. 8-12 in. l., slightly furfuraceous, with 1-2 nodes; *barren fr.* 12-18 in. l., 6-10 in. br., with 10-12 pinnæ on each side, all sessile or nearly so, 3-5 in. l.,  $\frac{1}{2}$ -1 in. br., the apex acuminate or cuspidate, sharply toothed, the base cuneate, the lowest pair not distant or reduced; *texture* subcoriaceous; *veins* close, mostly once forked; *rachis* nearly naked, slightly winged towards the apex; *fertile pinnæ*  $1\frac{1}{2}$ -2 in. l.,  $\frac{1}{4}$  in. br.—*Presl, Suppl.* 6. *p.* 35.

Hab. Columbia to Peru.—Midway between *alata* and *elliptica*.

9. *D. stenophylla*, Kze.; *st.* of barren fr. about 1 ft. l., naked, with 2-3 nodes; *barren fr.*  $1\frac{1}{2}$ -2 ft. l., 6-10 in. br., with 12-15 pairs of pinnæ, the upper sessile,

the central ones short-stalked, 4-5 in. l.,  $\frac{1}{2}$  in. br., the apex sharply toothed, the base rounded, the lowest shorter; *texture* subcoriaceous; *veins* mostly simple; *rachis* furfuraceous, slightly margined towards the apex; *fertile pinnae* distinctly stalked, 2-4 in. l., 2-3 lin. br.—*Kze. t.* 28. *Heterodanæa*, Presl.

Hab. Guadeloupe, *L'Herminier*.—Our description is taken from an authentic specimen communicated by M. Fée. Moore gives the Mexican *D. cuspidata*, Liebm., with which we are not acquainted, as probably the same.

10. *D. elliptica*, Sm.; *st.* about 1 ft. l., nearly naked, with 2-5 nodes; *barren fr.*  $1\frac{1}{2}$ -2 ft. l., 8-12 in. br., with 6-9 pairs of *pinnae*, the upper sessile, 4-6 in. l., 1- $1\frac{1}{2}$  in. br., the apex acuminate, entire or slightly toothed, the base cuneate or slightly rounded, the lowest stalked, not reduced; *texture* subcoriaceous; *veins* fine and close; *rachis* naked, slightly winged at the top; *fertile pinnae* similar, but narrower and more distinctly stalked.—*Hk. & Gr. t.* 51. *D. geniculata*, Raddi, *t.* 5.

Hab. West Indies to South Brazil.—The commonest species. *D. Sellowiana*, Presl, is probably a nodeless variety.

11. *D. nodosa*, Sm.; *st.*  $1\frac{1}{2}$ -2 in. l., strong, erect, nodose; *barren fr.* 3-4 ft. l.,  $1\frac{1}{2}$ -2 ft. br., with 10-15 pairs of *pinnae*, the upper ones sessile, the lower ones short-stalked, not reduced, 6-12 in. l., 1-2 in. br., the apex acuminate, the edge entire or subrepand, the base cuneate or slightly rounded; *texture* subcoriaceous; *rachis* naked, the upper part slightly winged; *veins* fine, close, simple or once forked; *fertile pinnae* 4-6 in. l.,  $\frac{3}{4}$ -1 in. br.—*Plum. t.* 108. *Hk. & Gr. t.* 51.

Hab. Cuba and Mexico to Brazil.—*D. dubia*, Presl, and *D. longifolia*, Desv. (figured by Sturm in Mart. Fl. Bras. fasc. 2. 3. t. 11), are probably nodeless varieties. Presl and Sturm make two sections of the genus, characterized by the absence or presence of those nodular swellings of the stem, but the character seems to be a very unsafe one. The genus *Danceopsis* of Presl is founded upon a pinna figured by Raddi (Fil. Bras. t. 5) with irregular anastomosing venation, under the name of *D. palaeacea*.

#### GEN. 72. KAULFUSSIA, Blume.

*Caps.* sessile, 10-15, quite concrete in raised circular masses, which are hollow in the centre, with the oblong apertures on the inner face. TAB. IX. fig. 72.

1. *K. œsculifolia*, Blume; *st.* 12-18 in. l., herbaceous, auricled at the base; *fr.* ternate or quinato-digitate, the central *pinna* the largest, oblong-spathulate, 6-12 in. l., 3-4 in. br., the edge subentire, the others similar but smaller, often unequal-sided or lobed; *texture* fleshy-herbaceous; *main veins* pinnate, with copious immersed areolæ, with free included veinlets between them; *sori* copious, scattered.—*Hk. & Gr. t.* 229. *K. assamica*, Griff.

Hab. Assam, Philippines, and Malay Isles.—A curious plant, with a frond like a chesnut-leaf, and the under surface dotted over with copious stomata-like pores. De Vriese makes four species.

#### SUB-ORD. VI. OPHIOGLOSSACEÆ.

*Caps.* deeply two-valved, opening down the side nearly to the base, without a ring. *Vernation* erect. Gen. 73-75.

#### GEN. 73. OPHIOGLOSSUM, L.

*Caps.* sessile, arranged in two rows so as to form a narrow close spike. TAB. IX. fig. 73.



§ Euophioglossum. Fertile spike single, arising from the base of the barren segment. Sp. 1-6.

1. *O. lusitanicum*, L.; rootstock slightly tuberous; fr. 1-3 in. l., the sterile division placed below the centre,  $\frac{1}{2}$ -1 in. l.,  $1\frac{1}{2}$ -2 lin. br., linear-lanceolate, the point bluntish, the base narrowed; texture thick, no midrib, and the veins indistinct; fertile spike  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., the peduncle firm,  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. l. when mature.—*Hk. B. F. t. 47.* *O. azoricum*, *Presl.*

Hab. Shores of the Mediterranean, and as far north as Guernsey, Azores, Madeira, Guinea Coast.—The European plant is developed in winter, whilst in Britain *O. vulgatum* is not mature till June. *O. gramineum*, Willd., from North and Peninsular India, is probably identical, and the same may be said of the Australian and New Zealand *O. gramineum*, R. Br. The New Zealand *O. minimum*, Colenso, is not more than 1 in. high, with the barren segment 3 lin. l. by half as broad; and three closely-allied forms have been gathered by Dr. Welwitsch in Angola.—*O. gomesianum*, Welw., 1-1 $\frac{1}{2}$  in. l., barren segm. near the base,  $\frac{1}{2}$ - $\frac{3}{4}$  in l., 2 lin. br.; *O. luso-africanum*, Welw., 4 in. l., barren segm. central, 1 $\frac{1}{2}$  in. l., 2 lin. br.; and *O. gracillimum*, Welw., 1 $\frac{1}{2}$  in. l., barren segm. central, truly linear, acute, 1 in. or less l., under 1 lin. br.

2. *O. rubellum*, Welw. MSS.; rootstock slightly tuberous; fr. 1-2 in. l., the sterile division placed very near the base, roundish,  $\frac{1}{4}$  in. each way, without a haft, often adpressed to the surface of the ground, thick in texture, the veining hidden; fertile spike  $\frac{1}{4}$ - $\frac{3}{8}$  in. l., the reddish peduncle  $\frac{3}{4}$ -1 in. l. when fully matured.

Hab. Pungo Andongo, Angola, 2,400-3,800 ft.; Welwitsch 33.—Most like *O. bulbosum* but smaller, with the barren segment sub-basal.

3. *O. bulbosum*, Michx.; rootstock tuberous,  $\frac{1}{4}$ - $\frac{3}{8}$  in. thick; fr. 2-4 in. l., the sterile division placed considerably below the middle,  $\frac{1}{2}$ -1 in. l.,  $\frac{1}{2}$  in. br., ovate, without a haft; texture stouter than in *O. vulgatum*, the midrib and veining quite indistinct; fertile spike  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., the peduncle 1 $\frac{1}{2}$ -2 in. when fully developed.—*O. crotalophoroides*, *Walt.* *O. tuberosum*, *Hk. & A.* *O. opacum*, *R. Br. Hk. & Gr. t. 50.*

Hab. Louisiana and Florida to Chili and Tristan d'Acunha; and a Malay specimen from Prof. De Vriese agrees with the American plant.

4. *O. nudicaule*, L. fil.; rootstock slightly tuberous; fr. 2-4 in. l., the sterile division placed not far from the base,  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., ovate or oblong, without a haft or with only a slight one, the texture thin but the veins not distinct; fertile spike  $\frac{1}{2}$  in. l., the peduncle often 2-3 in. l., very slender.—*Swartz, Synop. t. 4. f. 2. Kze. t. 29. fig. 29. t. 3. b.* *O. parvifolium*, *Hk. & Gr. Beddome, t. 71.*

Hab. America from the Southern United States southward to Brazil; New Caledonia, Malaccas, Peninsular India, Guinea Coast, Angola.—Whether this be the original *nudicaule* is not quite clear, but it is the plant figured under that name by Swartz and Kunze. To the type belong *O. ypanemense*, Mart. t. 73, *O. surinamense*, Reich., and *O. flavicaule*, Klotzsch, and probably *O. moluccanum*, Schlecht. Kunze's fig. a, *O. Wightii*, Hk. & Gr., and *O. ellipticum*, Hk. & Gr. t. 40, are larger in size, with the sterile segment as thin and the venation as plain as in *reticulatum*, 2 in. or more l.,  $\frac{3}{8}$ - $\frac{3}{4}$  in. br., and the stem longer. *O. macrorhizum*, Kze. t. 29. fig. 1 (from Guiana and Brazil), is a much-reduced variety, not more than 1 $\frac{1}{2}$ -2 in. high, with the sterile division not more than  $\frac{1}{2}$  in. l.,  $\frac{1}{4}$  in. br. The Sandwich Island *O. concinnum*, Brack. t. 44, is most like this, but the barren segment is farther from the base of the stem; and this also appears to be the case with the Chilean *O. melipillense*, Remy.

5. *O. vulgatum*, L.; rootstock not tuberous; fr. 6-9 in. l., the sterile division generally placed about the middle, 2-4 in. l.,  $\frac{1}{2}$ -2 in. br., ovate or ovate-oblong

without a distinct haft; *texture* stouter than in the others, the midrib usually indistinct; *fertile spike* 1 in. or more l., upon a peduncle 2-4 in. l., and considerably overtopping the sterile division when the plant is fully mature.—*Hk. B. F. t.* 46.

Hab. Lapland to Japan and the Himalayas; Azores, Guinea Coast, Angola, St. Helena, Abyssinia, Cape Colony, Mascaren Isles, Australia, New Zealand, Sandwich Isles, Temperate North America.—From the type *O. coriaceum*, Hk., *O. elongatum*, R. Cunningham, and *O. ovatum*, Bory, scarcely diverge at all. The Cape plant (*O. capense*, Schlecht.) has sometimes, but not always, a more distinctly-marked midrib than the European one. The Azorean *O. polyphyllum*, A. Br., is a small form with often several fronds from the same root. *O. costatum*, R. Br. (*Hk. fil. Fl. Tasm. t.* 169), is also smaller, with the midrib sometimes clearly marked. There is a tropical variety (*O. pedunculosum*, Desv., Kze. p. 58. t. 29; *O. petiolatum*, Hk. Ex. F. t. 56, and Blume) which occurs in Peninsular India, Java, and Guiana, with the barren division like that of the type in form and size, but thinner in texture, and with a distinct haft, which is not clearly separable from the large forms of *O. nudicaule*; and near to this come *O. brevipes*, Beddome, t. 72, from the Neigherries, with a stem under 1 in. l., a peduncle 5-6 in. l., very distinct areolation and copious free veinlets; and the Angolan and Guinean *O. aphrodisiacum*, Welw. MSS., with a bulbous rootstock  $\frac{1}{4}$ - $\frac{3}{8}$  in. thick, and a distinct flattened midrib extending nearly to the apex of the sterile segment.

6. *O. reticulatum*, L.; *rootstock* not tuberous; *fr.* 6-12 in. l., the sterile division placed about the middle, 2-3 in. l.,  $1\frac{1}{2}$ -2 in. br., with a distinct haft and distinctly cordate basal lobes, the point blunt or subacute; *texture* thin, the veins distinct, usually no midrib; *fertile spike* 1 in. or more l., on a slender peduncle 2-4 in. l., much overtopping the sterile segment.—*Hk. & Gr. t.* 20. *Beddome, t.* 70.

Hab. Tropical America, from Cuba to Peru and South Brazil; Polynesian, Malayan, and Philippine Isles; East India, as far north as the Himalayas, Guinea Coast, Angola, Zambesi-land, Mascaren Isles, Cape Colony.—To this appear to belong *O. cordifolium*, Roxb., *O. Cumingianum* and *peruvianum*, Presl, and probably *O. cognatum*, Presl, is a form with a rudimentary midrib.

§§ Ophioderma, *Endl.* *Fertile spikes usually single, arising from the centre of the barren segment.* Sp. 7-8.

7. *O.* (Ophiod.) *intermedium*, Hk.; *fr.* erect, 6-8 in. l., the flattened stem passing gradually into the leafy part, which is  $\frac{3}{8}$  in. br. not far from the point; *texture* fleshy; *veins* indistinct; *fertile spike*  $1\frac{1}{2}$  in. l., erect, on a peduncle which about equals it and just reaches to the point of the barren segment.—*Hk. Ic. t.* 995.

Hab. Borneo, *T. Lobb.*

8. *O.* (Ophiod.) *pendulum*, L.; *fr.* pendulous, ribbon-like, without a distinct stem, 1-15 ft. l., 1-3 in. br., simple or forked; *texture* fleshy; no *midrib*, and the veining not distinct; *fertile spike* usually low down, 2-6 in. l., on a peduncle shorter than itself, usually solitary.—*Hk. & Gr. t.* 19. *G. F. t.* 33.

Hab. Polynesian Isles to N. S. Wales, Assam, Malaccas, Philippines, Ceylon, and Mascaren Isles.

§§§ Cheiroglossa, *Presl.* *Fertile spikes numerous, arising from the base of the barren segment.* Sp. 9.

9. *O.* (Cheir.) *palmatum*, L.; *st.* 6-12 in. l., fleshy, flaccid; *fr.* like the letter V, 6-12 in. l., 4-8 in. br., more or less cut from the circumference towards the centre into deep blunt lobes; *texture* fleshy; *fertile spikes* 2-12 in number, 1-2 in. l., arising from the stem or edge of the lower part of the frond, on short nodding or spreading peduncles.

Hab. Cuba to South Brazil; and it has been gathered also in Bourbon.



§§§§ Rhizoglossum, Presl. *Fertile and barren fronds distinct.*  
Sp. 10.

10. O. (Rhiz.) *Bergianum*, Schlecht ; *rhizome* slightly tuberous, one bearing several fronds of both kinds, the barren ones  $\frac{1}{2}$ -1 lin. l.,  $\frac{1}{2}$  in. br., linear, fleshy, the fertile spike slender,  $\frac{1}{4}$  in. l., on a slender peduncle 1-1 $\frac{1}{2}$  in. l.—*Hk. Ic. t. 263.*

Hab. Cape Colony, rare.—A very delicate and distinct little plant.

GEN. 74. HELMINTHOSTACHYS, *Kaulf.*

*Caps.* in small crested clusters which form a long loose spike. TAB. IX. fig. 74.

1. H. *zeylanica*, Hk. ; *rhizome* thick, fleshy, creeping ; *st.* often 1 ft. l. ; *barren segm.* palmato-pinnate, often in three principal divisions, which are stalked and again forked or pinnate, the ult. divisions linear-oblong, 3-4 in. l.,  $\frac{3}{4}$ -1 in. br., the apex acuminate ; the edge slightly toothed ; *texture* subcoriaceous ; *fertile spike* solitary, arising from the base of the barren segm., 3-4 in. l.,  $\frac{1}{2}$  in. br., the firm peduncle about as long as itself.—*Hk. 2nd Cent. t. 94. G. F. t. 28. Beddome, t. 69. Osmunda, L. H. dulcis, Klf.*

Hab. Himalayas, Cochín and Philippines to Ceylon, New Caledonia, and Queensland.—Presl makes three species, and published the plant from Mexico by mistake under the name of *Botryopteris mexicana*.

GEN. 75. BOTRYCHIUM, *Sw.*

*Caps.* sessile, arranged in two rows on the face of spikes which form a compound panicle. TAB. IX. fig. 75.

\* *Texture thick.* Sp. 1-4.

1. B. *simplex*, Hitch. ; *st.* slender, 1-4 in. l. ; *sterile segm.* short-stalked,  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. l.,  $\frac{1}{4}$ - $\frac{1}{2}$  in. br., ovate or oblong-lanceolate, cut down to a flattened rachis into 1-3 oblong or obovate pinnæ on each side, which are toothed or pinnatifid, with usually their own breadth between them ; *panicle* elongated,  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. l., with a few distant branches, the lowest sometimes branched again, the peduncle about as long as itself.—*Hk. & Gr. t. 82. B. Kannenbergii, Klins.*

Hab. United States and British North America ; North Europe.

2. B. *rutaceum*, Sw. ; *st.* stout, 1-4 in. l. ; *sterile segm.* sessile, 1-2 in. l., ovate-deltoid, broadest at the base, cut down to a flattened rachis into several close obovate-rhomboidal pinnæ on each side, the lower ones deeply pinnatifid ; *fertile peduncle* equalling the sterile segm. when mature ; *panicle* close, 1-2 in. l., lanceolate-deltoid, bipinnate.—*Newm. Phyt. 5. p. 133. B. matricariæfolium, A. Br. Koch.*— $\beta$ , B. *lanccolatum*, Angst. ; *st.* more slender ; *pinnæ* linear-lanceolate, with a space between them, the lower ones sharply toothed, panicle smaller.—B. *palmatum*, Presl.

Hab. Scandinavia to Unalaschka ;  $\beta$  also in the United States.—Figures of the two varieties and all the other European forms will be found in a paper by Milde in vol. 26. pt. 2. of the Nova Acta N. C. Swartz seems to have confused this with the small forms of species 4. B. *crassinervium* and *boreale*, Milde, come very near to the typical form.

3. B. *Lunaria*, Sw. ; *st.* stout, 1-4 in. l. ; *sterile segm.* sessile or nearly so, 1-3 in. l.,  $\frac{1}{2}$ -1 in. br., not much broader at the base than the middle, cut down to a flattened rachis into several distinct, close, entire, or notched cuneato-flabellate pinnæ on both sides ; *fertile peduncle* equalling or exceeding the sterile segm.

when fully developed; *panicle* close, 1-2 in. l., lanceolate-deltoid, bipinnate.—*Hk. Br. F. t.* 48.

Hab. Arctic Europe and Iceland to Spain, Italy, Kamschatka, and the Himalayas; South Australia, Tasmania, Patagonia, N. W. America, Greenland.

4. *B. ternatum*, Sw.; *st.* 1-2 in. l.; *petiole* of the sterile segm. 2-4 in. l., the latter 3-6 in. each way, deltoid, tri- or quadripinnatifid; lower *pinnæ* much the largest, and *pinnl.* of the lower side larger than the others, oblong or subdeltoid, stalked, the ult. divisions oblong or obovate, often  $\frac{1}{2}$  in. br., blunt or acute, slightly toothed; *fertile peduncle* 6-9 in. l., considerably overtopping the sterile segm.; *panicle* 1-6 in. l., deltoid, very compound.—*Kunze, t.* 121. *Osmunda, Thbg. Fl. Jap. f.* 32.

Hab. Nootka and Hudson's Bay territory southward to New Granada, Australia, Tasmania, New Zealand, Lapland, to Siberia, Japan, Pyrenees, and Hungary.—Of this the European *B. matricarioides*, Willd. (*B. rutæfolium*, A. Br. & Koch), and the American *B. lunarioides*, Sw. (A. Gray, *Man. t.* 13), appear to be smaller, and the Australian *B. australe*, R. Br., and the American *B. obliquum*, Muhl, and *B. decompositum*, M. & G., larger and more divided forms. *B. silaifolium*, Presl, seems also to belong here. *B. dissectum*, Muhl, is a curious form or variety, thinner in texture than the type, with the ultimate divisions acute and sharply inciso-serrate, which occurs both in the United States and New Zealand.

\*\* *Texture thinner.* Sp. 5-6.

5. *B. daucifolium*, Wall.; *st.* stout, 6-12 in. l.; *petiole* of sterile segm. 1-6 in. l., the latter 6-12 in. each way, deltoid, tripinnatifid or tripinnate, the lower *pinnæ* much the largest; *segm.* lanceolate-oblong,  $\frac{1}{2}$ - $\frac{3}{8}$  in. br., finely toothed; *fertile peduncle* about equalling the sterile segm. when mature; *panicle* 2-4 in. l., tripinnate, not very close.—*Hk. & Gr. t.* 161. *B. subcarnosum*, *Wall. Moore, Beddome, t.* 78. *B. subbifoliatum*, *Brack. t.* 44.

Hab. Himalayas, Neilgherries, Ceylon, Japan, Java, Sandwich and Society Isles.—Distinguished from the next by its much less finely-cut fronds and stalked sterile segment. The Polynesian and Japanese specimens are forked considerably lower down than the Indian ones, and Brackenridge's plate represents a pair of barren segments to the stem.

6. *B. virginianum*, Sw.; *st.* 3-18 in. l.; *sterile segm.* sessile, 4-12 in. each way, deltoid, quadripinnatifid; lower *pinnæ* much the largest; *pinnl.* ovate-oblong, close, cut down to a broadly-winged rachis into finely cut linear-oblong *segm.*; both *sides* naked; *fertile peduncle* equalling or overtopping the sterile segm. when mature, arising from its base; *panicle* 1-4 in. l., lax, oblong, generally not more than bipinnate.—*Hk. G. F. t.* 29. *B. cicutarium*, *Sw.* *B. anthemoides*, *Presl.* *B. brachystachys*, *Kze.* *B. lanuginosum*, *Hk. & Gr. t.* 79.— $\beta$ , *B. lanuginosum*, Wall.; *surface* slightly hairy, *fertile peduncle* arising from the centre of the sterile segm., which the panicle scarcely overtops.—*Beddome, t.* 77.

Hab. Oregon and North United States to Ecuador and Brazil; Norway to Austria, the Himalayas, and Tsus-Sima;  $\beta$ , Himalayas (up to 6,000 ft.), Neilgherries, Ceylon.—The leaf in cutting resembles that of *Anthriscus sylvestris*.



## ADDENDA ET CORRIGENDA.

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Page 9, line 26, for *Dictyoxiphium* read *Dictyoxiphium*.

„ 12, § *Mertensia* = *Mecosorus*, Hassk. The former name is preoccupied by a genus of *Boraginaceæ*.

„ „ species 7, *glauca* (Sw.), the oldest specific name.

„ 13, species 17. *G. pallescens* and *rubiginosa*, Mett. in Fil. Nov. Gran. p. 266, are varieties of *pubescens*, as the species is here understood.

„ 19. *Cyathea equestris* appears to be a synonym of *divergens*.

*C. hirtula*, Mart., appears to be a form of *vestita*. The species is distinguished by its ultimate segments not more than a line broad, very hairy frond and rachises, and very fragile involucre.

*C. Beyrichiana* appears to be *Alsophila setosa*, Kaulf., and a *Hemitelia*, and therefore should be called *H. setosa*, Mett. MSS.

„ 25, species 46, for *Mr. Lindsay* read *Mount Lindsay* (in Queensland).

„ 27, species 27. The Australian plant is probably *C. medullaris*.

„ 29, species 9, Brazil, *Burchell*.

„ „ species 10, for *Copensis* read *capensis*.

„ „ second line from bottom, for *A. read H.*

„ 30, species 14. *H. Moricandiana*, Kze. MSS., was previously published by Presl (Die Gefass, p. 44) under the name of *H. macrocarpa*.

„ 32, species 3. Two quite distinct plants are here confounded. That to which the name and diagnosis quoted from Martius refer is tripinnate, and probably identical with species 11. The other appears to be undescribed, and may be characterized as follows:—

*A. pubescens*, Baker; *caud.* 6-10 ft. high; *st.* 15-18 in. l., densely pubescent, not muricated, clothed below with rigid ovate-acuminate scales; *fr.* oblong-deltoid, bipinnate, 3 ft. l., more than 1 ft. br.; lower *pinnæ* 6-8 in. l., 1½ in. br., cut down nearly to the rachis into close blunt lobes ¼ in. br.; *texture* herbaceous; *rachis* and both *sides* densely pubescent; *veinlets* about 10 on a side, forked near the base; *sori* at the fork.

Hab. Peru, *Lechler* 2190, *Spruce* 4712; New Granada, *Purdie*.

„ 33. Species 8\*. *A. præincta*, Kunze; *st.* 1½ ft. high, unarmed, glabrous, dark-castaneous; *fr.* subdeltoid, 4-5 ft. l., 3 ft. br., tripinnatifid; *pinnæ* oblong-lanceolate, 1½ ft. l., 6-7 in. br., subequal below; *pinn.* linear, 3-3½ in. l., 9-10 lin. br., broadest at the base, cut down below to a narrow wing, the point acuminate; *segm.* linear-oblong, 2-2½ lin. br., subobtusate, nearly straight, the barren ones crenulate; *texture* papyraceo-herbaceous; both *sides* quite naked; *veins* 7-8 on each side

in a segment, simple or forked at the point, all soriferous; *sori* submarginal; *recept.* naked.

Hab. Bahia, *Blanchet.*—General habit of *Hemitelia guianensis*. Well marked in the genus by its broad segments, subsimple veins, and nearly marginal *sori*.

Page 33, species 10. Apparently the same as species 21, which is the original *Cyathea aculeata*, Willd. Herb. Spreng.; but *armata* is an older name.

„ 34, species 16. Omit the synonyms quoted from Klotzsch and Martius. Probably this is identical with species 24, and it only differs from 23 by the frond being subglabrous.

„ 35, line 37, for *arillare* read *axillare*.

„ „ species 23, for *Klf.* read *Kze.*, the plant of Kaulfuss, according to Mettenius, being our species 16.

„ 40, species 43. *A. Macarthurii*, Hk. In consequence of Sir W. Hooker's death, this sheet was in print nearly a year before it was issued, and this plant was published by Dr. F. Mueller (*Fragm.* 5. p. 53) under the name of *A. Leichhardtiana*, and by J. Smith (*Brit. and For. Ferns*, p. 245) as *A. Moorei*. The former of the two has priority.

„ „ Species 45\*. *A. Robertsiana*, F. Muell.; *caud.* 6 ft. high; *fr.* ample, oblong-deltoid, quadripinnatifid; lower *pinnæ* oblong-lanceolate, 12-18 in. l., 4-6 in. br.; *pinnl.* linear, 2-3 in. l.,  $\frac{3}{8}$  in. br., cut down to a narrowly-winged rachis into deeply-pinnatifid linear-oblong *segm.*  $\frac{1}{2}$  in. br.; *texture* herbaceous; *rachis* and both *surfaces* densely villose; *sori* 1 to each lower ult. lobe.—*Fragm.* 5. p. 54.

Hab. Queensland, *Messrs. Dallachy & Hill.*—Nearest *A. Colensoi*, the segments the same size, but here deeply pinnatifid, the rachises of the *pinnæ* and *pinnules* without scales, and the whole plant more hairy.

*A. Rebecca*, F. Muell.; *caud.* slender, 8 ft. high; *fr.* ample, bipinnate; lower *pinnæ* oblong-lanceolate, 12-15 in. l., 4-5 in. br.; *pinnl.* 20-30 on each side, the lower ones stalked, linear, 2-3 in. l.,  $\frac{3}{8}$  in. br., the apex acuminate, the upper part deeply, the lower less deeply incisocrenate, the base rounded on both sides, slightly auricled above; *texture* subcoriaceous; *rachises* reddish-brown, slightly fibrillose, the main one rough, with raised points; upper *surface* naked, lower scattered over with small membranous scales; *veins* fine, 4-5 in a group; *sori* principally in 2 rows midway the midrib and edge.—*Fragm.* 5. p. 53. *Hk. Ic. t.* 1015.

Hab. Rockingham Bay, *Messrs. Hill & Dallachy.*—Very near *A. podophylla*, but the veins few, and under surface with small scattered scales.

„ 47. Species 4\*. *Woodsia scopulina*, Eaton; *st.* tufted, not articulated, castaneous at the base, stramineous upwards, 2-3 in. l., the scales brown, ovate-acuminate; *fr.* lanceolate, bipinnate, 3-4 in. l., 1-1 $\frac{1}{2}$  in. br.; *pinnæ* oblong-lanceolate, cut down to the rachis below into 6-10 narrow-oblong crenate *pinnl.* on each side; *texture* herbaceous, the whole plant pubescent and glandular; *inv.* with both cup and cilia almost hidden by the sorus.—*Canad. Nat. April*, 1865.

Hab. Rocky Mountains and British America.

*W. oregana*, Eaton, is our *obtusæ*  $\beta$  *Lyallii*, but evidently a distinct species, with the involucre of *Eurwoodsia*, general habit of *obtusæ*, but smaller, and not so hairy.—*Can. Nat. l. c.*

Hab. Oregon and Rocky Mountains.—This and the preceding differ from species 1-4 by their articulated stems.

„ „ Species 7 is *Dicksonia fragilis*, Trev. (1816), *Woodsia*, Moore. See Milde, *Fil. Eur. p.* 167.



Page 55. *Deparia producta*, Baker; *fr.* ample, tripinnate; *pinnæ* broad-lanceolate,  $1\frac{1}{2}$ -2 ft. l., 8-10 in. br.; *pinnl.* 3-5 in. l.,  $\frac{3}{4}$ -1 in. br., cut down to the rachis, except at the apex, into subquadragular deeply incisopinnatifid *segm.*; *texture* subcoriaceous; *rachis* and both *sides* nearly naked; *sori* 6-8 to a segment, quite extramarginal but sessile.—Dennstædia, *Mett. Fil. Nov. Gran.* p. 260.

Hab. New Granada, *Lindig.*—Closely allied to *concinna*, of which we have received better specimens since the description at page 55 was drawn up, and find to be subtripinnate. In that the segments are closer than in *producta*, and only reach down below to the midrib of the pinnules, and are not at all toothed.

58. Species 8\*. *H. microphyllum*, *Mett.*; *st.* under 1 in. l., slender, naked; *fr.*  $\frac{3}{4}$  in. l., under  $\frac{1}{2}$  in. br., ovate-deltoid, tripinnatifid; main *rachis* winged nearly or quite down to the base; *pinnæ* crowded, the lower ones deltoid, only the lowest *pinnl.* more than forked; the *segm.* linear, blunt,  $1-1\frac{1}{2}$  lin. l.; *sori* 6-12 to a frond, cut about half down, the lip broad-oblong, entire, terminating the upper segments, the upper two-thirds free.—*Fil. Nov. Gran.* p. 196.

Hab. New Granada, *Lindig* 245.

Species 8\*\*. *H. emersum*, Baker; *st.* 1 in. or less l., slender, naked; *fr.* 1-2 in. l.,  $\frac{3}{4}$ -1 in. br., ovate-deltoid, tripinnatifid; main *rachis* winged down to the base; *pinnæ* close, the lowest deltoid; *pinnl.* simple, or the lowest forked or 3-cleft; *segm.* blunt,  $\frac{1}{2}$  lin. br., with a space between them; *sori* 6-8 to a pinna, terminal; *invol.* round, quite free and cut down to the base, the receptacle often protruded.—*H. macroglossum*, *V. D. B. (in part).*

Hab. Ceylon, *C. P.* 3360; Mauritius, *Lady Barkly.*—Nearest *rarum*, but erect and more compound, and the fruit different.

59, line 20, for 106 read 107.

61, line 31, for 109 read 104.

63. *H. hirsutum*, discovered by Dr. Meller in Madagascar

63. *H. ciliatum*, discovered by Capt. Bulger in Sikkim.

64, line 2, for 98 read 93.

64. line 13, for Capt. Carmichael read Dupetit Thouars.

64. species 38. *H. subtilissimum*, *Kze.*, oldest name.

68. Species 55\*. *H. japonicum*, *Miquel*; *st.* hairy upwards, and narrowly winged; *fr.* oblong, bipinnatifid,  $1\frac{1}{2}$ - $1\frac{3}{4}$  in. l.,  $\frac{3}{4}$ -1 in. br.; *pinnæ* 3-5 on each side,  $\frac{1}{4}$ - $\frac{1}{2}$  in. l., erecto-patent, close, ovate-oblong, with broad short close lobes, the upper simple, the lower ones bifid or trifid; *rachis* and *veins* hairy; *sori* few, terminal; *invol.* ovate, the lips toothed, hairy when young.—*Ann. Mus. Bat.* vol. 3. p. 383.

Hab. Japan, *Keiske & Buerger.*

69. Species 63\*. *H. flaccidum*, Baker; *st.*  $1\frac{1}{2}$ -3 in. l., wiry, naked; *fr.* 4-6 in. l., 1 in. br., lanceolate, bipinnate, the rachis distinctly winged throughout; *pinnæ* deltoid; *pinnl.* close, linear, strongly toothed, the lowest sometimes forked; *sori* 4-6 to the lower pinnæ, terminal, quite free, the valves serrulate, roundish, reaching down nearly to the base.—*Lept. V. D. B. Suppl.* p. 65.

Hab. Khasi, *Griffith, Hk. fil. & Thoms.*—Very near *H. Smithii*, but the fruit different.

- Page 76. Species 26\*. *Trichomanes Armstrongii*, Baker; *rhizome* wide-creeping; *st.* very slender, naked, 2-3 lin. l.; *fr.*  $\frac{1}{2}$ - $\frac{3}{4}$  in. l., irregular in general outline, between pinnately and flabellately divided, the divisions few,  $\frac{3}{4}$  lin. br., with only a midrib in each, and a distinct strongly ciliated border similar to the midrib in texture; *sori* 2-4 to a frond, terminal, obconical, ciliated.
- Hab. New Zealand, *Armstrong*.—Branching as in *T. Powellii*, scarcely flabellate, but the alliance for the rest entirely with the *digitatum* group, from all the other species of which it may be known by its very distinct border.
- „ 85, line 38, omit 2.
- „ 89. Species 6 is *Adiantum repens*, Linn. Suppl. p. 446 = *Davallia*, Kuhn. Fil. Deck. p. 27; but we have a *D. repens* already (Sp. 27). It is also a plant of Japan and Queensland.
- „ 90. Species 13 should be *D. hymenophylla* = *Acrophorus hymenophyllus*, *Parish*, *MSS.* *Beddome*, *Fil. Ind. t.* 96.
- „ 92, species 20. According to Moore, this is the original *D. pulchra*, Don; and if so, species 17 must be called *D. pseudo-cystopteris*, Kze. Probably they should both be regarded as varieties of one species.
- „ 93. Species 36 should be called *D. assamica* = *Acrophorus assamicus*, *Beddome*, *Fil. Ind. t.* 94, and should follow species 13.
- „ „ Species 40 is *Adiantum denticulatum*, *Burm.* *Fl. Ind.* p. 236 = *Davallia*, *Mett.* *MSS.*
- „ 97. Species 47\*. *D. Lorrainei*, *Hance*; general habit of *bullata*, but the scales rigid, erect, dark-coloured, densely grey plumoso-ciliated.—*Ann. Sc. Nat.* 5. ser. 5. p. 154.
- Hab. Malaya.
- „ 98. Species 54 is *D. hirsuta*, *Sw.* *Syn.* p. 131, which name, of course, takes precedence of ours.
- „ „ Species 56 should be *D. marginalis* = *Polypodium marginale*, *Thunb.*
- „ 105, species 8. Synonyms *L. crenulata* and *multifrondulosa*, *Fée*, *Gen. Fil.* t. 28.
- „ 106, line 8, for 287 read 206-7.
- „ „ Species 13\*. *L. parvula*, *Fée*; *st.* 6-8 in. l., smooth, stramineous; *fr.* about as long, bipinnate when fully developed, with a few distant spreading *pinnæ* 2-3 in. l.,  $\frac{3}{8}$  in. br.; *pinn.* close, not imbricated, under  $\frac{1}{4}$  in. br., subrhomboidal, upper line slightly curved; *texture* pellucido-herbaceous; *sori* continuous, the outer valve protruded beyond the inner one.—*Fil. Ant.* p. 17. t. 7.
- Hab. Trinidad, *Germain*.—Near *filiformis*, but the rachis different, and habit more erect.
- „ 109, species 25. Probably one of the very curious abnormal forms of *Acrostichum sorbifolium*.
- „ 111, line 8, for 112 read 212.
- „ 112, species 41. *L. lanceolata*, *Lab.*, oldest name.
- „ 114. Species 3\*. *Adiantum grossum*, *Mett.*; *st.* 4-9 in. l., naked, ebeneous; *fr.* 12-18 in. l., 3-3 $\frac{1}{2}$  in. br., simply pinnate; *pinnæ* 1 $\frac{1}{4}$ -1 $\frac{3}{4}$  in. br.,  $\frac{3}{4}$ -1 $\frac{1}{4}$  in. deep, broad-ovate, blunt, with a third of the lower half cut away,



the lower petioles  $\frac{1}{2}$  in. l.; *veins* flabellate; *texture* firmer than in species 3, the sori similar.—*Fil. Nov. Gran. p. 114.*

Hab. New Granada, *Lindig 373.*

Page 114. Species 4 proves to be *A. Capillus-junonis*, Ruprecht, and that name must take precedence. See Dr. Hance's remarks in Seemann's Journ. 57. p. 261.

„ 118, line 7 from bottom, for 43 read 45.

„ 119, line 4 from bottom, for 28 read 8.

„ 126, line 5, for 55 read 28.  
line 17, for 29 read 28.

„ 131. Species 1\*. *Cheilanthes Lindigii*, Mett.; *st.* densely tufted, 1-4 in. l., castaneous, naked; *fr.* 4-8 in. l.,  $\frac{3}{4}$ -1 in. br., broadest about the middle, narrowed gradually both ways; *pinnæ* close, deltoid,  $\frac{3}{8}$ - $\frac{1}{2}$  in. l. by about half as broad, deeply pinnatifid; *texture* firm-herbaceous; *rachis* and both *sides* naked; *sori* minute, copious.—*Fil. Nov. Gran. p. 218.*

Hab. New Granada, *Lindig 257.*

„ 132. Species 8\*. *C. propinqua*, Mett.; *st.* 3-6 in. l., firm, erect, naked, ebenous; *fr.* 8-10 in. l., 5-6 in. br., lanceolate-deltoid, tripinnatifid; lower *pinnæ* the longest, 3-4 in. l., 1 in. br., lanceolate; *pinnl.* lanceolate, blunt, cut down to the rachis in the lower part into oblong obtuse entire *segm.*; *texture* firm-herbaceous; *rachis* and both *sides* naked; *sori* copious.—*Fil. Nov. Gran. p. 219.*

Hab. New Granada, *Lindig 93.*

„ 137. Species 28\*. *C. Kuhnii*, Milde; *rhizome* suboblique, the scales broad-ovate; *st.*  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. l., naked, castaneous; *fr.*  $3\frac{1}{2}$ -6 in. l.,  $1\frac{1}{2}$ - $1\frac{3}{4}$  in. br., oblong-lanceolate, bipinnatifid; *pinnæ* lax, the central ones ovate-oblong, obtuse, the lowest remote and rather reduced; *pinnl.* oblong, cut down to a narrow wing, those of the lower side not larger than the others; *texture* herbaceous; *rachis* and both *sides* finely glandular.—*Fil. Eur. p. 35.*

Hab. China, *Fischer.*—Smaller and less divided than *C. subvillosa*, and the pubescence glandular.

„ 141. Species 50\*. *C. aurea*, Baker; *st.* tufted, 2-3 in. l., deep chesnut-brown, glossy, densely clothed towards the base with large ovate-acuminate reddish-brown scales; *fr.* 3-4 in. l., 2-3 in. br., subdeltoid, tri-quadrupinnatifid; *pinnæ* deltoid, the lowest much the largest, with the *pinnl.* on the lower side nearly 1 in. l., cut down to the rachis into roundish or pinnatifid *segm.*; *texture* herbaceous; *rachis* castaneous and powdery; under *side* densely coated with bright-yellow powder; *invol.* broad, membranous, yellow.

Hab. Guatemala, *Salvin & Godman.*

„ 142, line 17, for 97 read 76.

„ 145. Species 4 should be *P. Stelleri*=*Pteris Stelleri*, Gmel., and Siberia added to its localities.

„ 152, species 38, *Pteris viridis*, Forsk. Fl. Ægypt. p. 186, oldest name.

„ 163. Species 41\*. *P. acclivis*, Mett.; *rhizome* wide-creeping; *st.* 6-9 in. l., firm, erect, naked; *fr.* ample, deltoid, tripinnate; *pinnæ* lanceolate, the lower ones sometimes 1 ft. l., 4-6 in. br.; *pinnl.* lanceolate, 2-3 in. l.,  $\frac{3}{4}$ - $\frac{7}{8}$  in. br., cut down to the rachis into lanceolate or oblong entire or

slightly toothed blunt or acute *segm.*; *rachis* often flexuose, naked like both surfaces; *texture* subcoriaceous; *invol.* double.—*Fil. Hort. Lips.* p. 59.

Hab. Columbia and Guiana.—Habit like that of *P. viscosa*, but not at all glandular.

Page 165, line 8, for 120 read 177.

- „ 166, last line but one, for *Syn.* read *Sp.*
- „ 196. Species 37\*. *A. Newmanni*, C. Bolle, from the Cape Verdes, regarded as distinct both by Mettenius and Milde, is said to differ from *Trichomanes* by its conspicuously ribbed rachis, pinnæ sessile from a broad base, with a few adpressed linear and fibrillose scales on the under surface, and broader scales destitute of a spurious nerve.—Vide *Milde, Fil. Eur.* p. 69.
- „ 198, line 6 from bottom, for *Siebold* read *Leybold*.
- „ 200, species 56, discovered by Rev. T. Powell in Samoa.
- „ 203, species 67. In “2nd Cent. Ferns” this is figured under the name of *lugubre*, but *fuliginosum* has priority.
- „ 208, line 9 from bottom, for 198 read 162.
- „ 213. Species 118\*. *A. lepidum*, Presl, is said by Milde, *Fil. Eur.* p. 81, to differ from *fissum* by its fimbriated, not crenate, involucre, and thinner and glandular, not ebeneous, stem; and he considers it a distinct species.  
Hab. Italy.
- „ 214. Species 122. The Japan plant should probably go with *sepulc. rale*.
- „ 217, line 7, for 178 read 190.
- „ 222, line 6 from bottom, for 205 read 209.
- „ 224. Species 177 should be called *A. crenatum*, Ruprecht.
- „ 225, species 178, for Baker read Miquel (*Ann. Mus. Bat.* 3. p. 174).
- „ 227, line 30, for 227 read 222.
- „ 232. Species 214\*. *A. nicotianæfolium*, Mett., has pinnæ twice as broad as in *flavescens*, and is no doubt distinct. *A. caucense*, Karst., has more distant veins, thinner texture, and pinnæ slightly toothed, and is most likely also a distinct species.
- „ 247, species 2, add Algeria to the localities, on the authority of Mrs. Lyell.
- „ 262. Species 19\*. *Nephrodium* (Last.) *inæquilaterale*, Baker; *caud.* tufted?; *st.* 4-8 ft. l., including the frond, firm, erect, naked, glossy; lower pinnæ 6-8 in. l., 1 in. br., cut down three-quarters to the rachis into close falcate lobes  $\frac{1}{2}$  in. br., those of the lower side of the pinnæ shorter than those of the upper, and more oblique, especially towards the base; *texture* firm-herbaceous; *rachis* and both *surfaces* naked; *veinlets* 12-18 on a side; *sori* near the midrib.  
Hab. Fiji, *Milne*; Samoa, *Powell*.
- „ 263, species 25. Dr. Kuhn points out the identity of this with *Aspidium cirrhosum*, Schum. & Thonn. *Besk. Guin.* p. 457.



Page 278, species 105, for *Chinense* read *subtripinnatum* = *Aspidium*, *Miquel. Ann. Mus. Bat.* 3. p. 179.

„ 305, species 7. Specimens just received from Dr. Thwaites show this to be a *Nephrodium*.

„ 310, species 37, for *platyphyllum*, Hk., read *polystichoides*, Klotzsch, the former name being preoccupied (page 359).

„ 307. Species 22\*. *Polypodium* (Pheg.) *Fischerianum*, Baker; *st.* 1 ft. l., nearly naked; *fr.* 1½-2 ft. l., 1 ft. br., oblong-deltoid, bipinnatifid; lower *pinnæ* 6-7 in. l., 1¾ in. br., cut down nearly to the rachis into blunt oblong slightly falcate lobes 4-5 lin. br., lowest *pinnæ* reduced; *texture* herbaceous; *rachis* and both *sides* naked; lower *veins* forked or subpinnate; *sori* medial.—*Alsophila Fischeriana*, *Regel MSS.*

Hab. Brazil.—Received at Kew from the Imperial Gardens at St. Petersburg.

„ 315. Species 66\*. *P.* (Goniop.) *mascarense*, Baker; *st.* 6-8 in. l., green, naked; *fr.* subdeltoid, 9 in. l., 6 in. br., with a lanceolate terminal *pinna* 1 in. br. below, with rounded lobes reaching one-quarter down, and 6 similar but rather narrower pairs, the apex acuminate, the lower part narrowed; *texture* herbaceous; *rachis* and *surfaces* naked; *veins* 4-5 on a side; *sori* near the main veins.

Hab. Ampassimba, Madagascar, *Mrs. Higginson*; received from Lady Barkly.

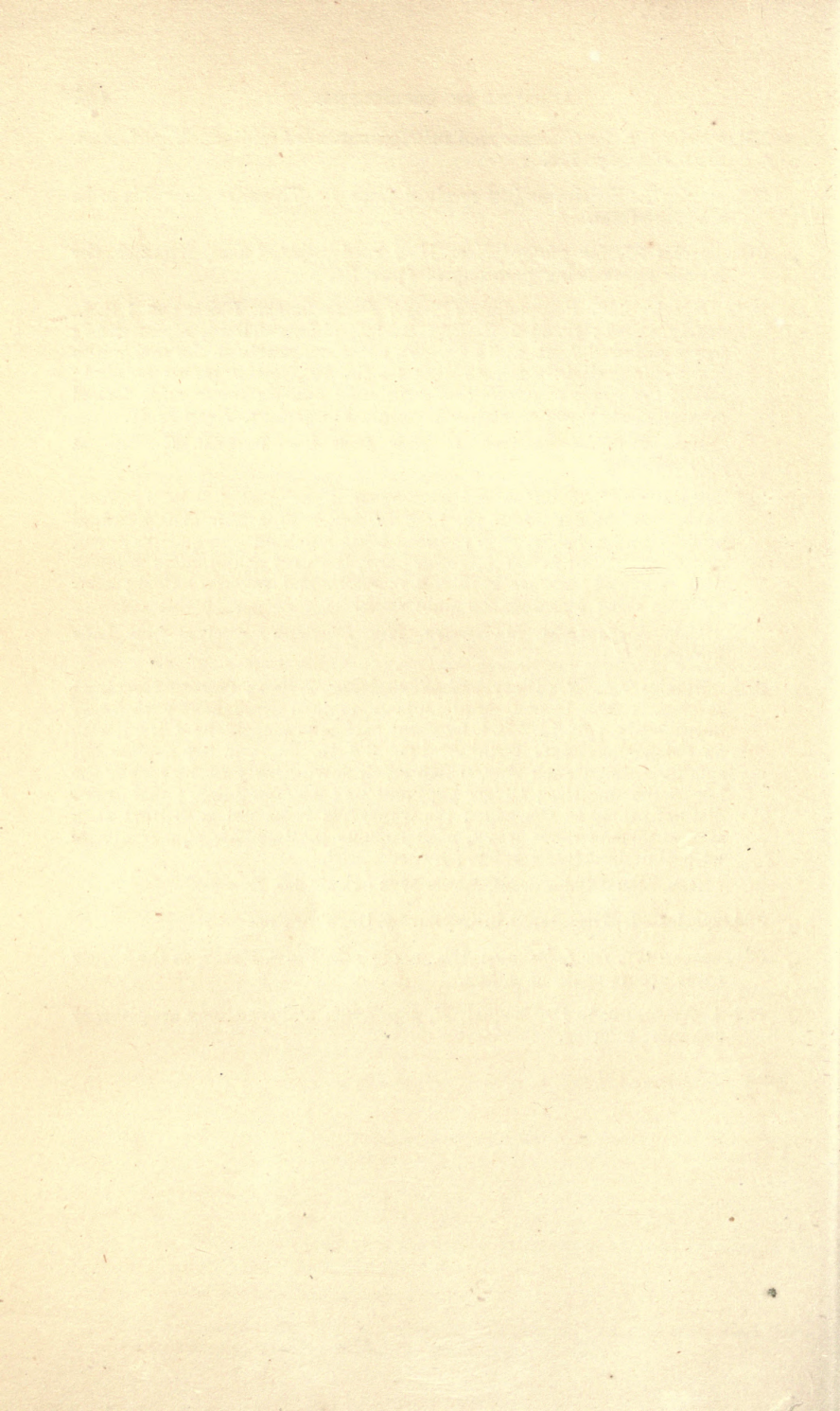
„ 319. Species 90\*. *P.* (Dicty.) *nicotianæfolium*, Baker; *rhizome* creeping; *st.* about 1 ft. l., brown, deeply sulcate, clothed throughout with linear brown scales; *fr.* 1½-2 ft. l. by about half as broad, oblong-deltoid, with an oblong-lanceolate terminal lobe 3-4 in. br., and 3-4 similar but smaller ones on each side, which reach down nearly to the rachis, the lowest the smallest; *texture* papyraceous; *surfaces* naked; main *veins* distinct nearly to the edge; the transverse veins not so distinct as in species 90 and more wavy, with copious intermediate square areolæ with abundant free veinlets; *sori* scattered.

Hab. Mount Chimborazo, *Spruce 5723*; *Chontales, Seemann.*

„ 320, species 98. Discovered in Ceylon by Dr. Thwaites.

„ 331, species 170, for *Lobbianum*, Hk., read *pediculatum*, Baker, as the former name occurs again at p. 362.

„ 332-4. According to Dr. Miquel, *P. papillosum* and *venulosum* are given as Japanese in error.





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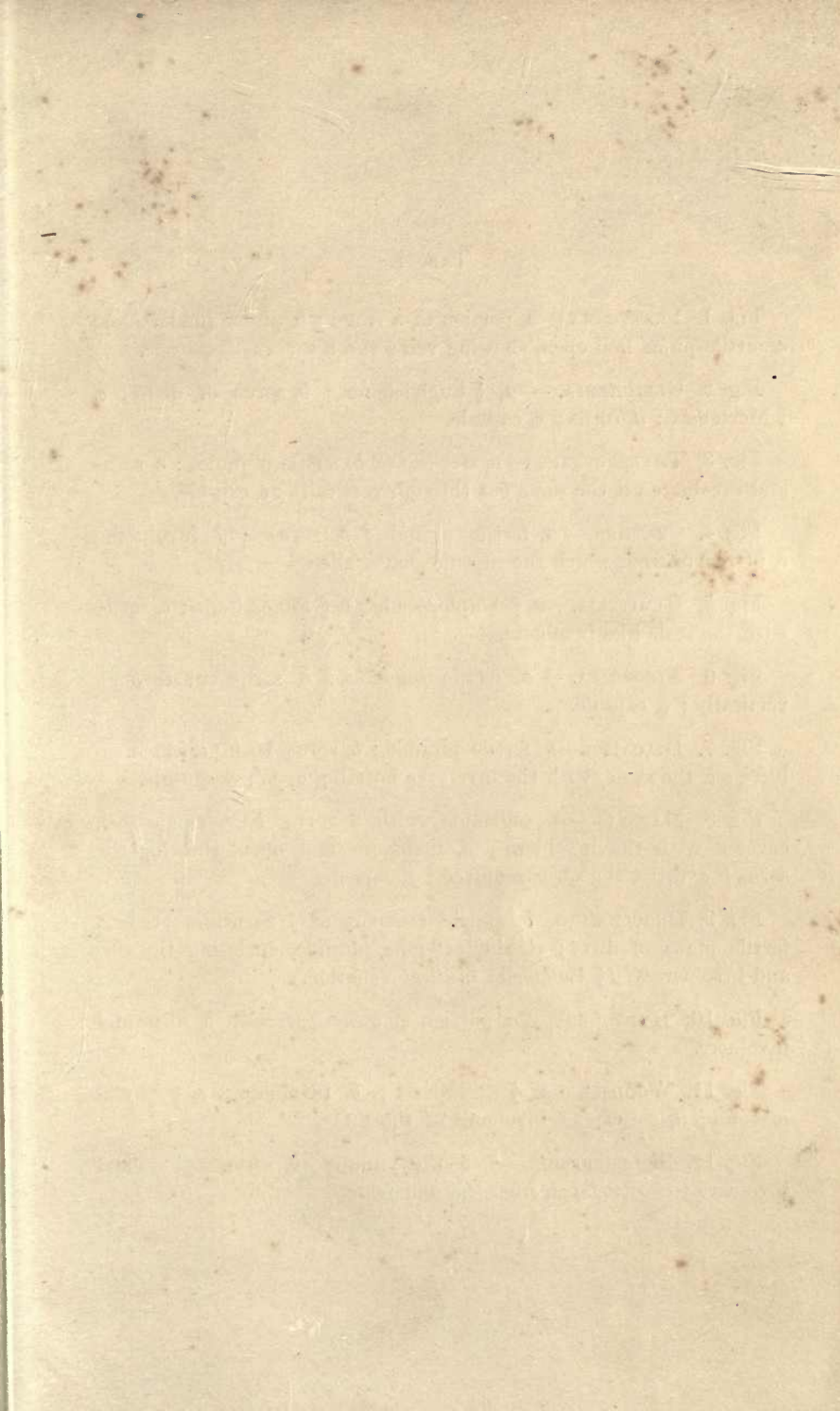
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Part	1	page	1 to 32, July 24, 1865.
"	2	"	33 — 64, Dec. 11, 1866.
"	3	"	65 — 112, Jan. 22, 1867.
"	4	"	113 — 160 ditto.
"	5	"	161 — 208, July 8, 1867.
"	6	"	209 — 256 ditto.
"	7	"	257 — 304, Oct. 4, 1867.
"	8	"	305 — 352, Nov. 8, 1867.
"	9	"	353 — 402, Jan. 29, 1868.
"	10	"	403 — 482, April, 1868.





TAB. I.

Fig. 1. PLATYZOMA.—*a*, portion of a frond ; *b*, pinnæ (underside) ; *c*, fertile pinna laid open, showing veins and a sorus ; *d*, capsule.

Fig. 2. GLEICHENIA. — *a*, § Egleichenia ; *b*, sorus of ditto ; *c*, § Mertensia ; *d*, sorus ; *e*, capsule.

Fig. 3. THYRSOPTERIS. — *a*, sterile, and *b*, fertile pinnules ; *c*, sorus and involucre ; *d*, the same cut through vertically ; *e*, capsule.

Fig. 4. CYATHEA.—*a*, fertile pinnule ; *b*, sorus and involucre ; *c*, involucre from which the capsules have fallen.

Fig. 5. HEMITELIA.—*a*, § Amphicosmia ; *b*, § Euhemitelia ; *c*, sorus, with the scale-like involucre.

Fig. 6. ALSOPHILA. — *a*, fertile segment ; *b*, sorus cut through vertically ; *c*, capsule.

Fig. 7. DIACALPE.—*a*, fertile pinnule ; *b*, sorus, with perfect involucre ; *c*, the same, with the involucre bursting open ; *d*, capsule.

Fig. 8. MATONIA.—*a*, segments, with 2 sori ; *b*, *c*, single sori, covered with the involucre ; *d*, involucre laid open, showing the sorus ; *e*, ditto, the sorus removed ; *f*, capsule.

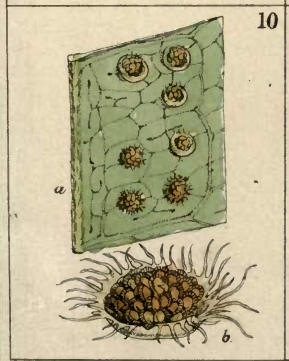
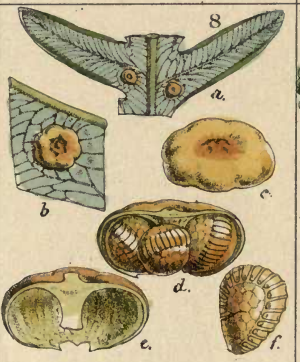
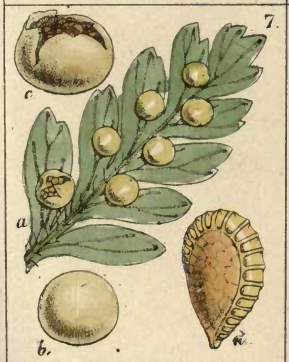
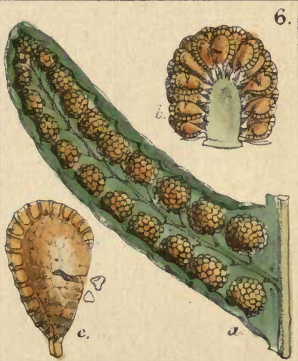
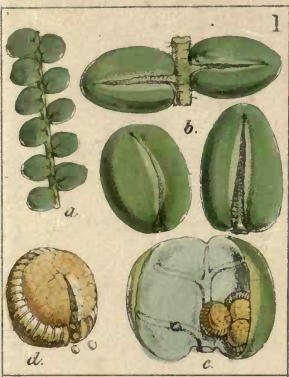
Fig. 9. ONOCLEA.—*a*, *b*, sterile segment of § Struthiopteris ; *c*, fertile pinna of ditto ; *d*, single fertile pinnule, enclosing the sori and involucre. (§ Euonoclea has free venation.)

Fig. 10. HYPODERRIS.—*a*, portion of a fertile frond ; *b*, sorus and involucre.

Fig. 11. WOODSIA.—*a*, § Euwoodsia ; *b*, involucre ; *c*, § Phymatium ; *d*, sorus and involucre of the same.

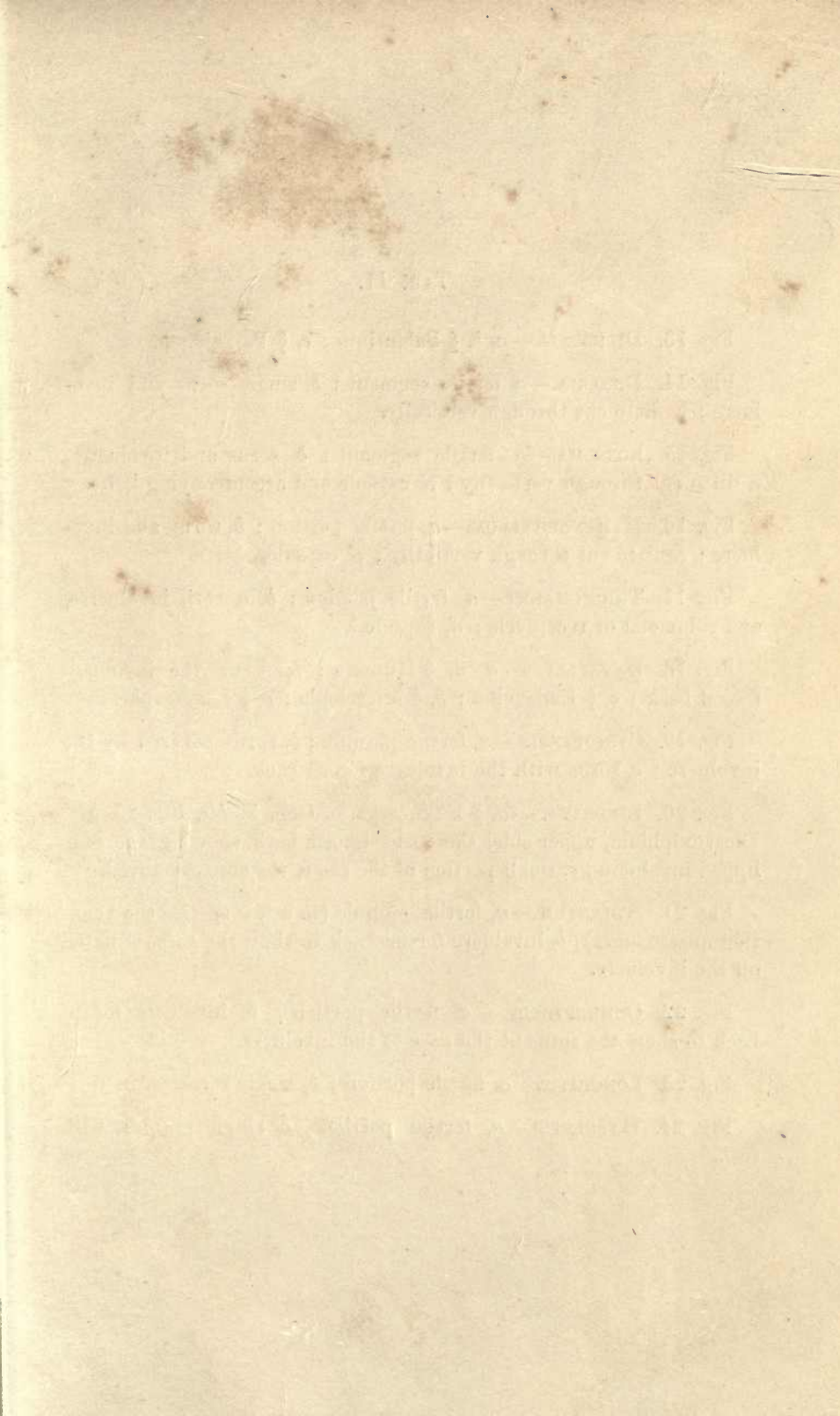
Fig. 12. SPHÆROPTERIS.—*a*, fertile pinnule ; *b*, sorus and stalked involucre ; *c*, ditto, seen from the underside.





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TAB. II.

✓ Fig. 13. DICKSONIA.—*a*, *b*, § Balantium ; *c*, § Patania.

Fig. 14. DEPARIA.—*a*, fertile segment ; *b*, single sorus and involucre ; *c*, ditto cut through vertically.

Fig. 15. LOXSOMA.—*a*, fertile segment ; *b*, sorus and involucre ; *c*, ditto cut through vertically ; *d*, capsule and accompanying hairs.

Fig. 16. HYMENOPHYLLUM.—*a*, fertile portion ; *b*, sorus and involucre ; *c*, ditto cut through vertically ; *d*, capsule.

Fig. 17. TRICHOMANES.—*a*, fertile portion ; *b*, *c*, sori, involucre, and columella or receptacle ; *d*, capsule.

Fig. 18. DAVALLIA. — *a*, *a*, § Humata ; *b*, sorus, the involucre forced back ; *c*, § Eudavallia ; *d*, § Microlepia ; *e*, § Loxoscapha.

Fig. 19. CYSTOPTERIS.—*a*, fertile pinnule ; *b*, sorus covered by the involucre ; *c*, sorus with the involucre forced back.

Fig. 20. LINDSAYA. — *a*, § Eulindsaya. — Gen. 20 *bis*. Fig. 20. *b. c*. Dictyoxiphium, upper side, the sorus forced back showing the one-lipped involucre ; *c*, small portion of the same, the sorus removed.

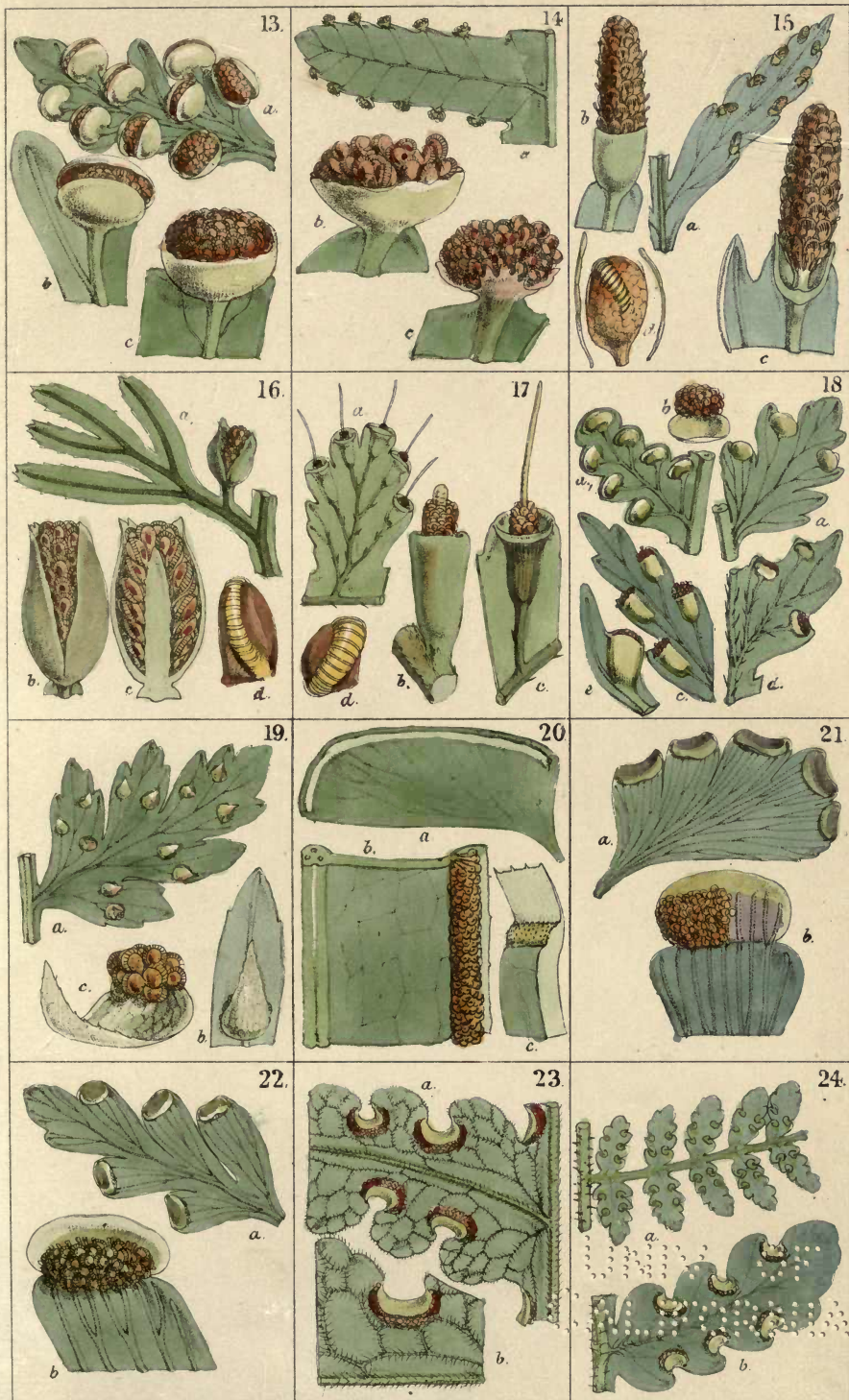
✓ Fig. 21. ADIANTUM.—*a*, fertile pinnule (in a few species the venation anastomoses) ; *b*, involucre forced back to show the sorus situated on the involucre.

Fig. 22. OCHROPTERIS. — *a*, fertile portion ; *b*, involucre forced back to show the sorus at the base of the involucre.

Fig. 23. LONCHITIS.—*a*, fertile portion ; *b*, single sorus.

Fig. 24. HYPOLEPIS.—*a*, fertile portion ; *b*, single pinnule, with sori.





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Tab. III.

Fig. 25. CHEILANTHES.—*a*, fertile pinna ; *b*, portion of the same, one involucre turned back.

Fig. 26. CASSEBEERA.—*a*, fertile pinna ; *b*, portion of the same, with sorus.

Fig. 27. ONYCHIUM.—*a*, fertile segment ; *b*, portion of the same, with involucre turned back.

Fig. 28. LLAVEA.—*a*, barren segment ; *b*, portion of the fertile frond ; *c*, the same, unrolled.

Fig. 29. CRYPTOGRAMME.—*a*, segment of barren frond ; *b*, segment of fertile frond ; *c*, section of the same, unrolled.

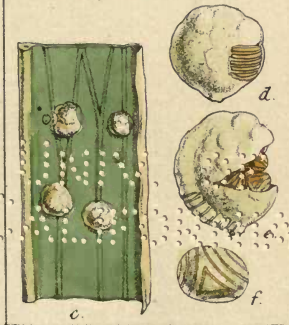
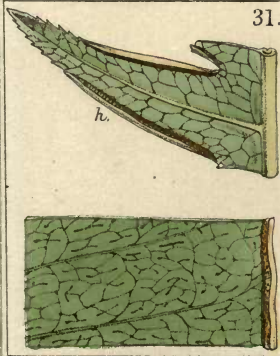
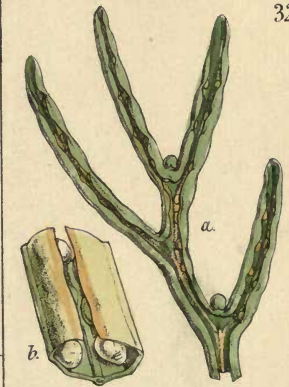
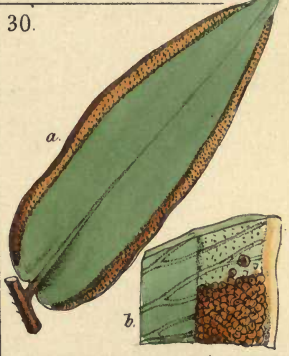
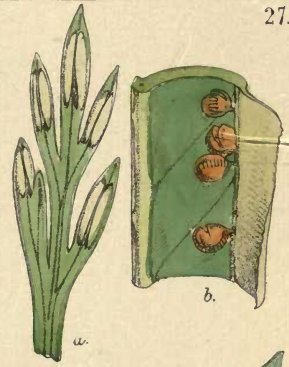
Fig. 30. PELLÆA.—*a*, pinnule of § *Platyloma* ; *b*, portion of the same.

Fig. 31. PTERIS.—*a*, *b*, § *Eupteris* ; *c*, § *Heterophlebium* ; *d*, *e*, § *Pœsia* ; *f*, occasional double involucre of the same ; *g*, § *Campteria* ; *h*, § *Litobrochia* ; *i*, § *Amphiblestra* : all, portions of the frond selected to show both fructification and venation.

Fig. 32. CERATOPTERIS.—*a*, *b*, portion of the fertile frond ; *c*, section of the same, unrolled ; *d*, *e*, capsules ; *f*, spores.

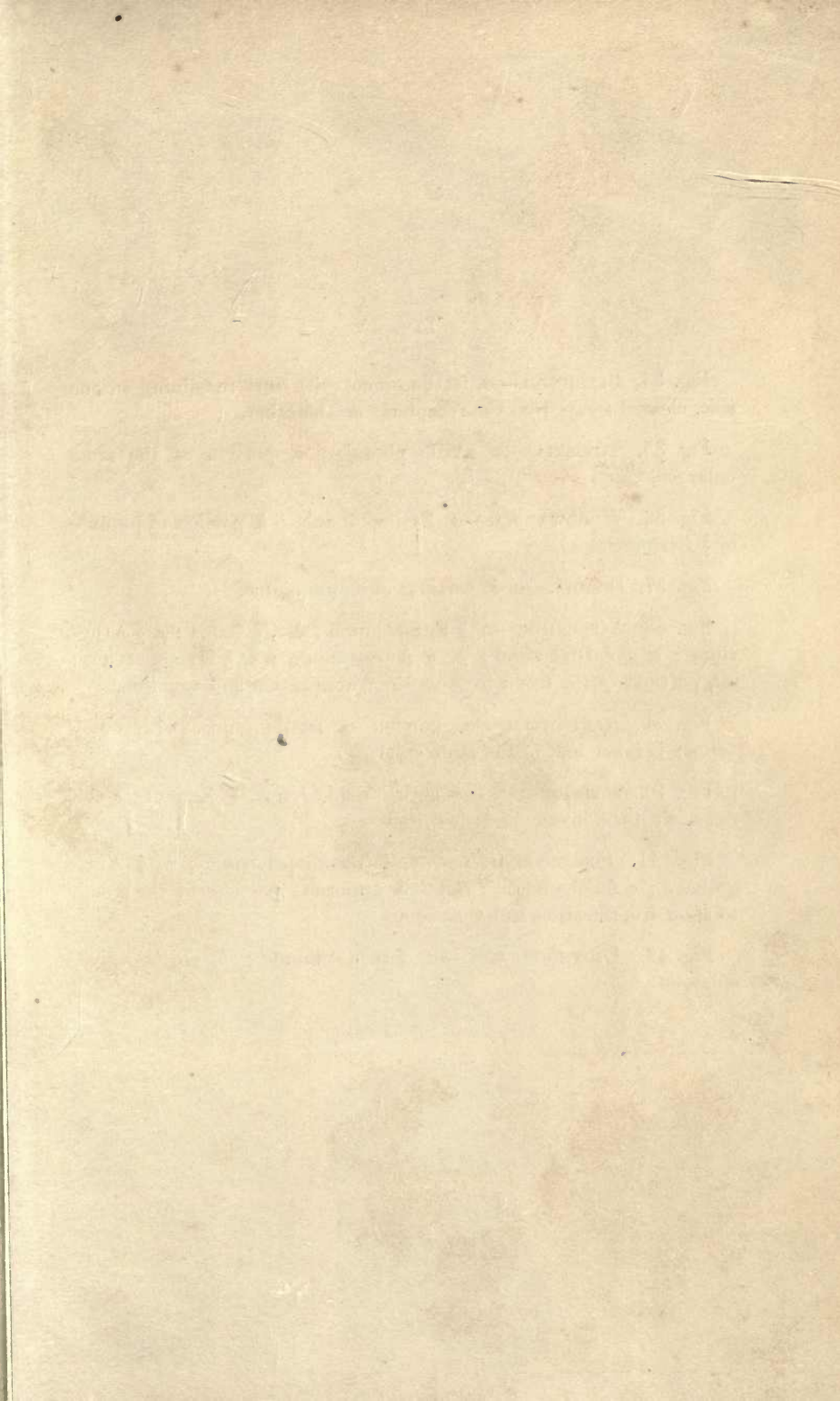
Fig. 33. LOMARIA.—*a*, barren pinna ; *b*, fertile pinna ; *c*, the same, with the involucre partially unrolled.





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TAB. IV.

Fig. 34. BLECHNUM.—*a*, fertile pinna, with sori remaining on one side, cleared away from the receptacle on the other.

Fig. 35. SADLERIA.—*a*, fertile pinnule ; *b*, portion of the same enlarged.

Fig. 36. WOODWARDIA.—*a*, fertile pinnule ; *b*, portion of pinnule of § Lorinseria.

Fig. 37. DOODIA.—*a*, *b*, portions of fertile pinnae.

Fig. 38. ASPLENIUM.—*a*, § Euasplenium ; *b*, *c*, § Darea ; *e*, § Athyrium ; *d*, *f*, § Diplazium ; *g*, § Anisogonium ; *h*, § Hemidictyum : all, portions of the frond to show the fructification and venation.

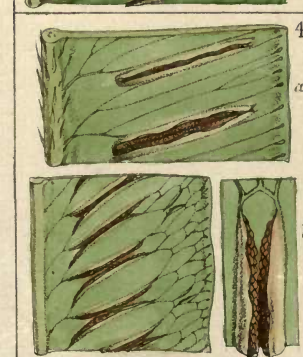
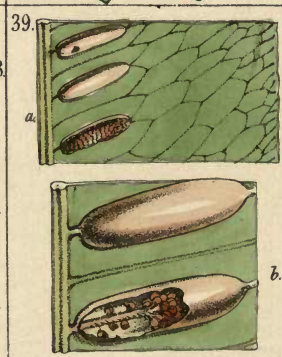
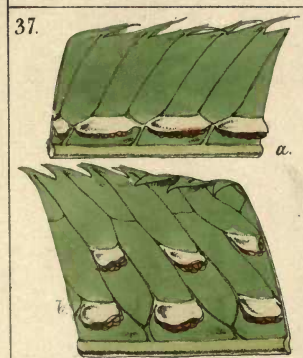
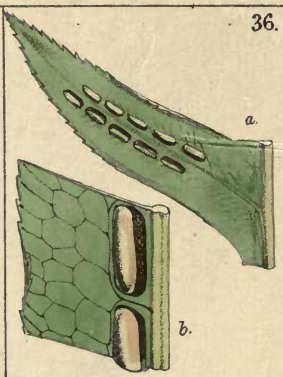
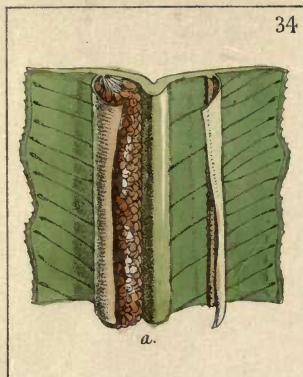
Fig. 39. ALLANTODIA.—*a*, portion of fertile pinna, with outer veins ; *b*, inner half of the same enlarged.

Fig. 40. ACTINIOPTERIS.—*a*, entire frond ; *b*, fertile segment ; *c*, the same, with the involucre rolled back.

Fig. 41. SCOLOPENDRIUM. — *a*, § Euscolopendrium ; *b*, § Antigramme ; *c*, § Schaffneria ; *d*, § Camptosorus ; portions of the frond, to show fructification and venation.

Fig. 42. DIDYMOCHLÆNA.—*a*, fertile pinnule ; *b*, single sorus, enlarged.





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Faint, illegible text, possibly bleed-through from the reverse side of the page. The text is arranged in several paragraphs and is mostly obscured by the paper's texture and color.



TAB. V.

Fig. 43. ASPIDIUM.—*a, b*, § *Polystichum*, fertile pinna and sorus ; *c*, § *Cyrtomium*, portion with sori ; *d*, § *Euaspidium*, with sori.

Fig. 44. NEPHRODIUM.—*a, b*, § *Eunephrodium*, fertile portions ; *c, d*, § *Lastrea*, fertile portions.

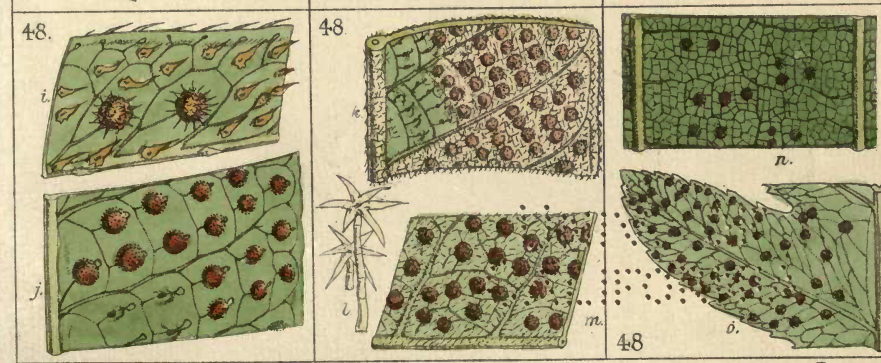
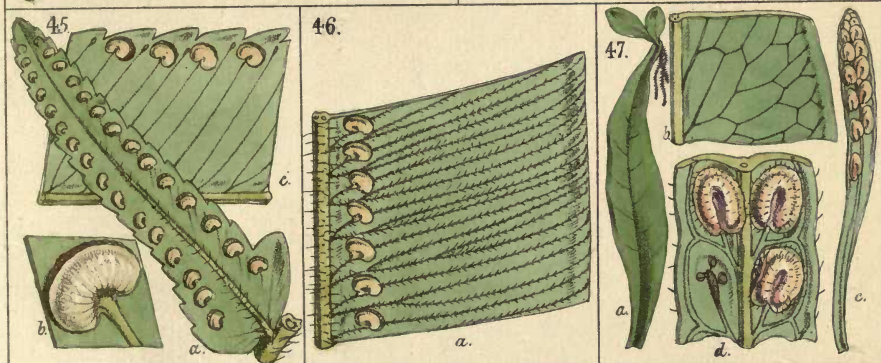
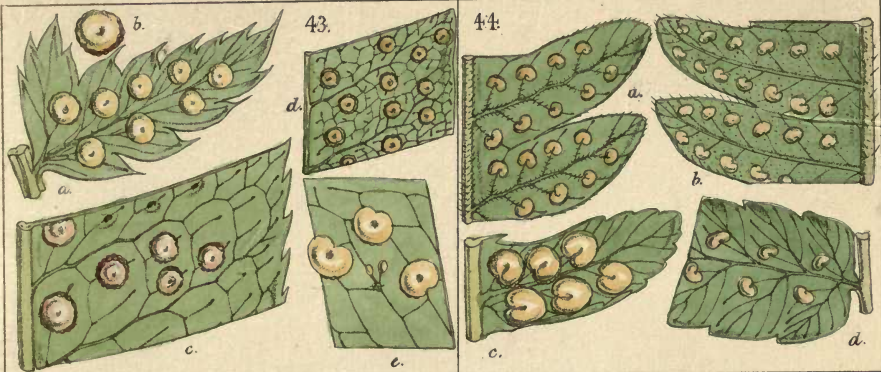
Fig. 45. NEPHROLEPIS.—*a*, fertile pinna ; *b*, sorus ; *c*, portion of a fertile pinna, showing the venation.

Fig. 46. OLEANDRA.—*a*, fertile portion of a frond.

Fig. 47. FADYENIA.—*a*, sterile (but prolificiferous frond), much reduced ; *b*, venation of the same ; *c*, fertile frond, much reduced ; *d*, portion of the same, magnified.

Fig. 48. POLYPODIUM.—*a*, § *Eupolypodium*, fertile segment, and *b*, small portion of the same magnified ; *c*, § *Phegopteris*, portion of fertile pinnule, and *d*, smaller portion of the same magnified ; *e*, § *Goniopteris*, fertile portion ; *f*, § *Cyrtomiphlebium*, fertile portion ; *g*, § *Phlebodium*, fertile portion ; *h*, § *Goniophlebium*, fertile portion ; *i*, § *Craspedaria*, fertile portion ; *j*, § *Campyloneuron*, fertile portion ; *k*, § *Niphobolus*, fertile portion, and *l*, branched and stellated hairs from the same ; *m*, § *Phymatodes*, fertile portion ; *n*, *Dipteris*, fertile portion ; *o*, § *Dictyopteris*, fertile portion.











TAB. VI.

Fig. 49. JAMESONIA.—*a*, portion of a frond, seen from above ; *b*, fertile pinna, seen from beneath ; *c*, jointed hair from among the sori.

Fig. 50. NOTHOCHLÆNA.—*a*, *b*, fertile portions ; *c*, smaller portion of *a* more magnified.

Fig. 51. MONOGRAMME.—*a*, § Eumonogramme, fertile portion ; *b*, transverse section of the same through the sorus ; *c*, § Pleurogramme, fertile portion ; *d*, small portion of the same magnified, and showing the venation.

Fig. 52. GYMNOGRAMME.—*a*, § Eugymnogramme, fertile pinnule ; *b*, § Stegnogramme, fertile portion ; *c*, § Dictyogramme, fertile portion ; *d*, § Syngramme, fertile portion ; *e*, *f*, § Syngramme, sterile and fertile portions.

Fig. 53. BRAINEA.—*a*, *b*, sterile and fertile portions.

Fig. 54. MENISCIMUM.—*a*, *b*, fertile portions.

Fig. 55. ANTROPHYUM.—*a*, *b*, fertile portions, showing the sori sunk in a groove ; *c*, fertile portion, with the sori not sunk in a groove.

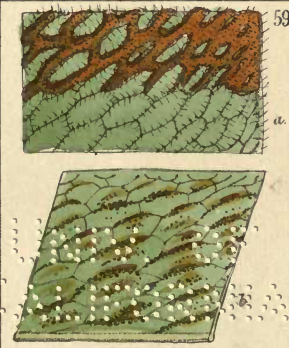
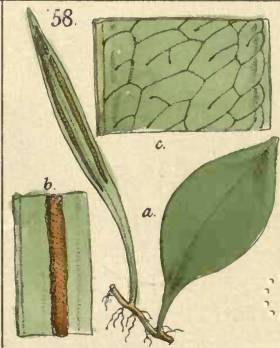
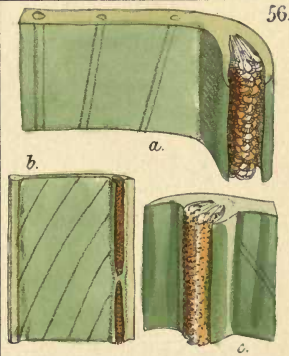
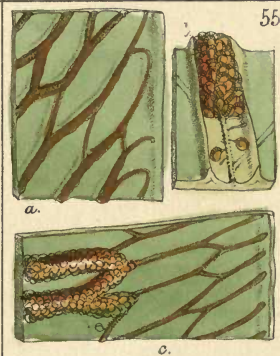
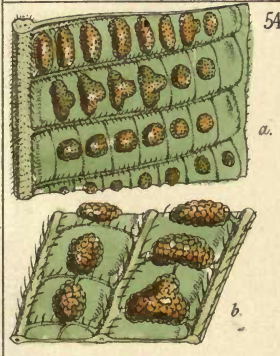
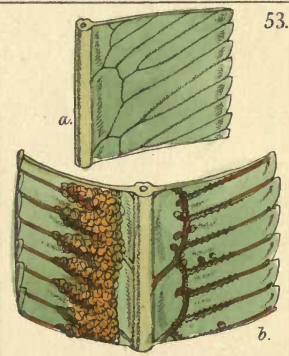
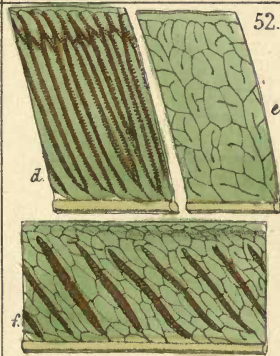
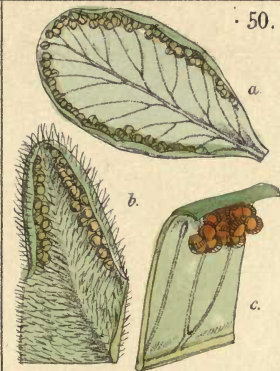
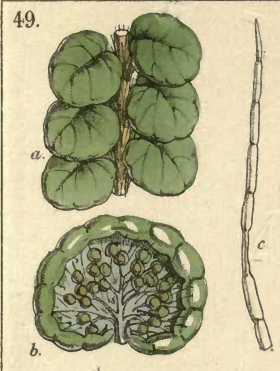
Fig. 56. VITTARIA. — *a*, § Euvittaria, fertile portion ; *b*, *c*, § Tæniopsis.

Fig. 57. TÆNITIS.—*a*, fertile pinna ; *b*, magnified portion, showing the venation.

Fig. 58. DRYMOGLOSSUM.—*a*, sterile and fertile frond ; *b*, portion of the fertile, and *c*, portion of the sterile frond magnified.

Fig. 59. HEMIONITIS. — *a*, § Euhemionitis, fertile portion ; *b*, § Anetium, fertile portion.









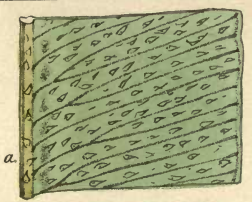


TAB. VII.

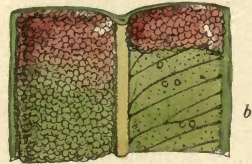
Fig. 60. ACROSTICHUM.—Portions selected to show venation and fructification of

- § Elaphoglossum, *a, b.*
- § Polybotrya, *c, d, e.*
- § Stenochlæna, *f, g.*
- § Egenolfia, *h, i, j.*
- § Rhipidopteris, *k, l.*
- § Olfersia, *m, n, o.*
- § Aconiopteris, *p, q.*
- § Stenosemia, *t, u.*
- § Soromanes, *r, s.*
- § Chrysodium, *y, z.*
- § Gymnopteris, *v-x, aa, bb.*





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b.



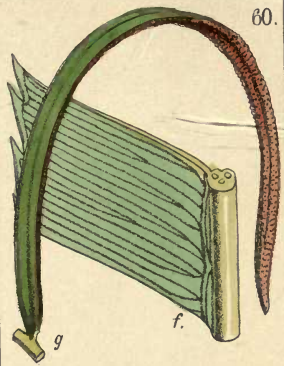
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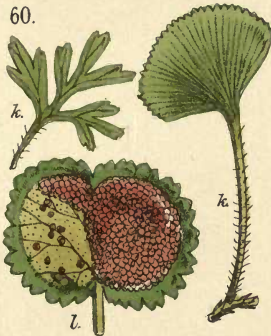
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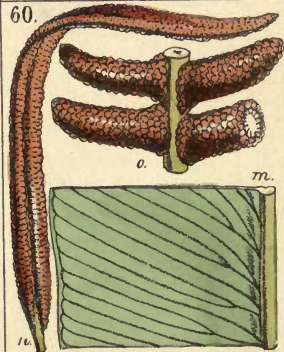
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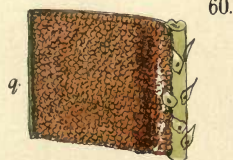
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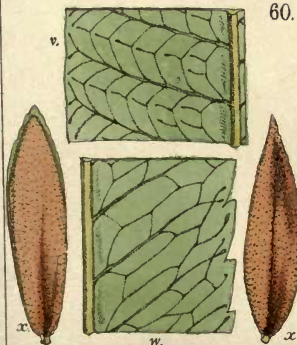


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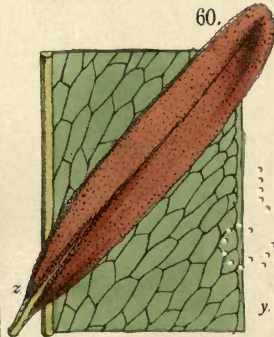


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TAB. VIII.

Fig. 60. ACROSTICHUM.—§ Hymenolepis, *cc*, portion of barren frond ; *dd*, *ee*, portions of fertile frond. § Photinopteris, *ff*, portion of barren frond ; *gg*, *hh*, fertile portions.

Fig. 61. PLATYCERIUM.—*a*, barren portion ; *b*, section, showing part of patch of fructification.

Fig. 62. OSMUNDA.—*a*, pinna in part barren and in part fertile ; *b*, pinna entirely fertile ; *c*, detached capsules ; *d*, spores.

Fig. 63. TODEA.—*a*, *b*, § Eutodea, portion of fertile and detached capsule ; *c*, *d*, the same of § Leptopteris.

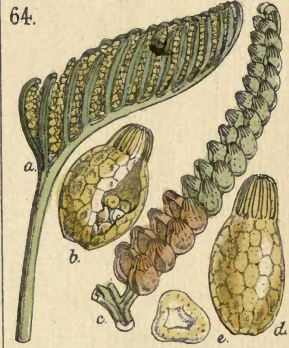
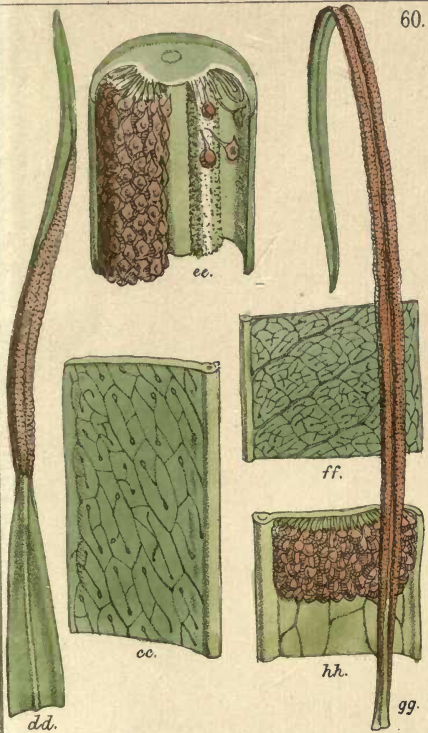
Fig. 64. SCHIZÆA.—*a*, fertile segment ; *c*, fertile pinna ; *b*, *d*, detached capsules ; *e*, spore.

Fig. 65. ANEMIA.—*b*, entire frond ; *a*, portion of barren frond, with simple venation ; *c*, fertile portion ; *d*, detached capsule ; *e*, § Anemidictyon, barren portion.

Fig. 66. MOHRIA.—*a*, barren portion ; *b*, fertile portion ; *c*, detached capsule.

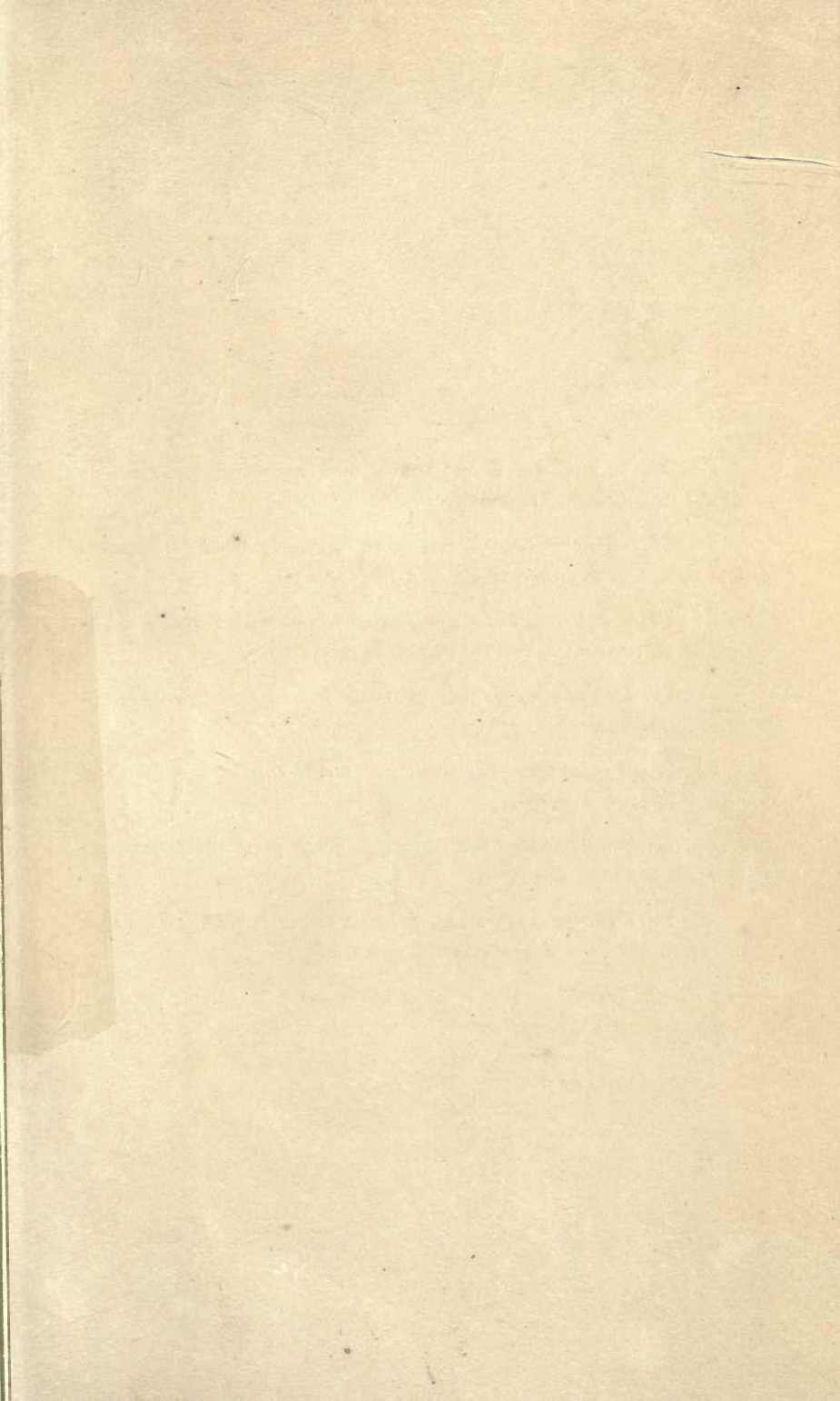
Fig. 67. TROCHOPTERIS.—*a*, entire tuft ; *b*, entire frond ; *c*, fertile portion ; *d*, detached capsule.











Tab. IX.

Fig. 68. LYGODIUM.—*a*, portion of barren frond ; *b*, *d*, portions of fertile frond ; *c*, § Lygodictyon, barren portion.

Fig. 69. ANGIOPTERIS.—*a*, cluster of capsules ; *b*, pair of capsules and section of frond ; *c*, single detached capsule.

Fig. 70. MARATTIA.—*a*, *b*, portions of frond, with a single multilocular receptacle ; *c*, vertical section of receptacle.

Fig. 71. DANÆA.—*a*, portion of fertile frond ; *b*, section of receptacle ; *c*, spores.

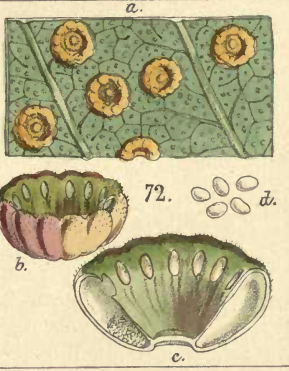
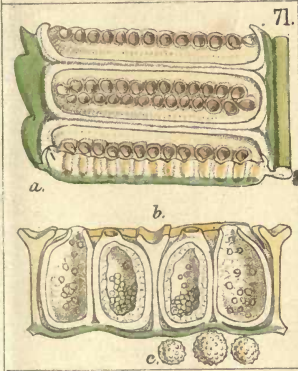
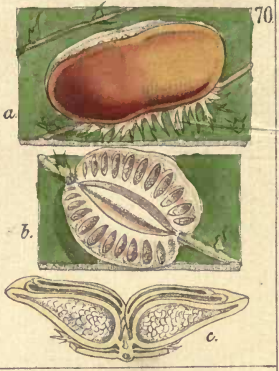
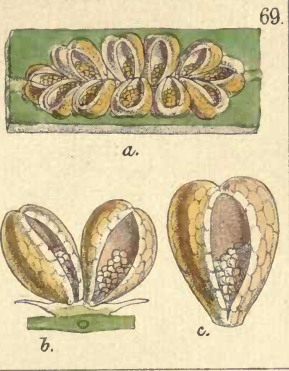
Fig. 72. KAULFUSSIA.—*a*, portion of fertile frond ; *b*, *c*, detached receptacles ; *d*, spores.

Fig. 73. OPHIOGLOSSUM.—*a*, complete plant ; *b*, barren portion ; *c*, fertile portion ; *d*, spores.

Fig. 74. HELMINTHOSTACHYS.—*a*, nearly complete plant ; *b*, portion of barren frond ; *c*, *d*, portions of fertile frond.

Fig. 75. BOTRYCHIUM.—*a*, complete plant ; *b*, barren portion ; *c*, fertile portion ; *d*, spores.



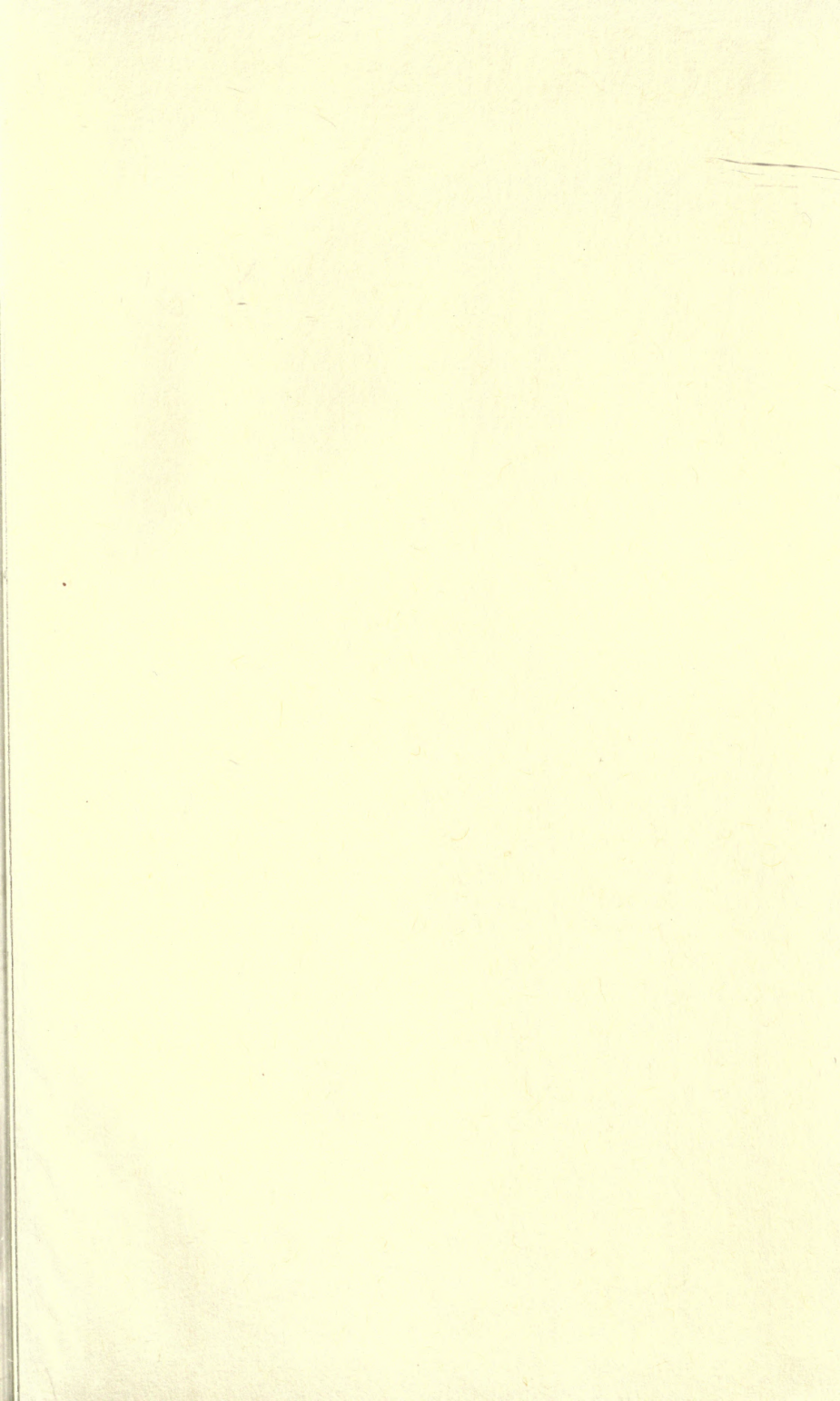




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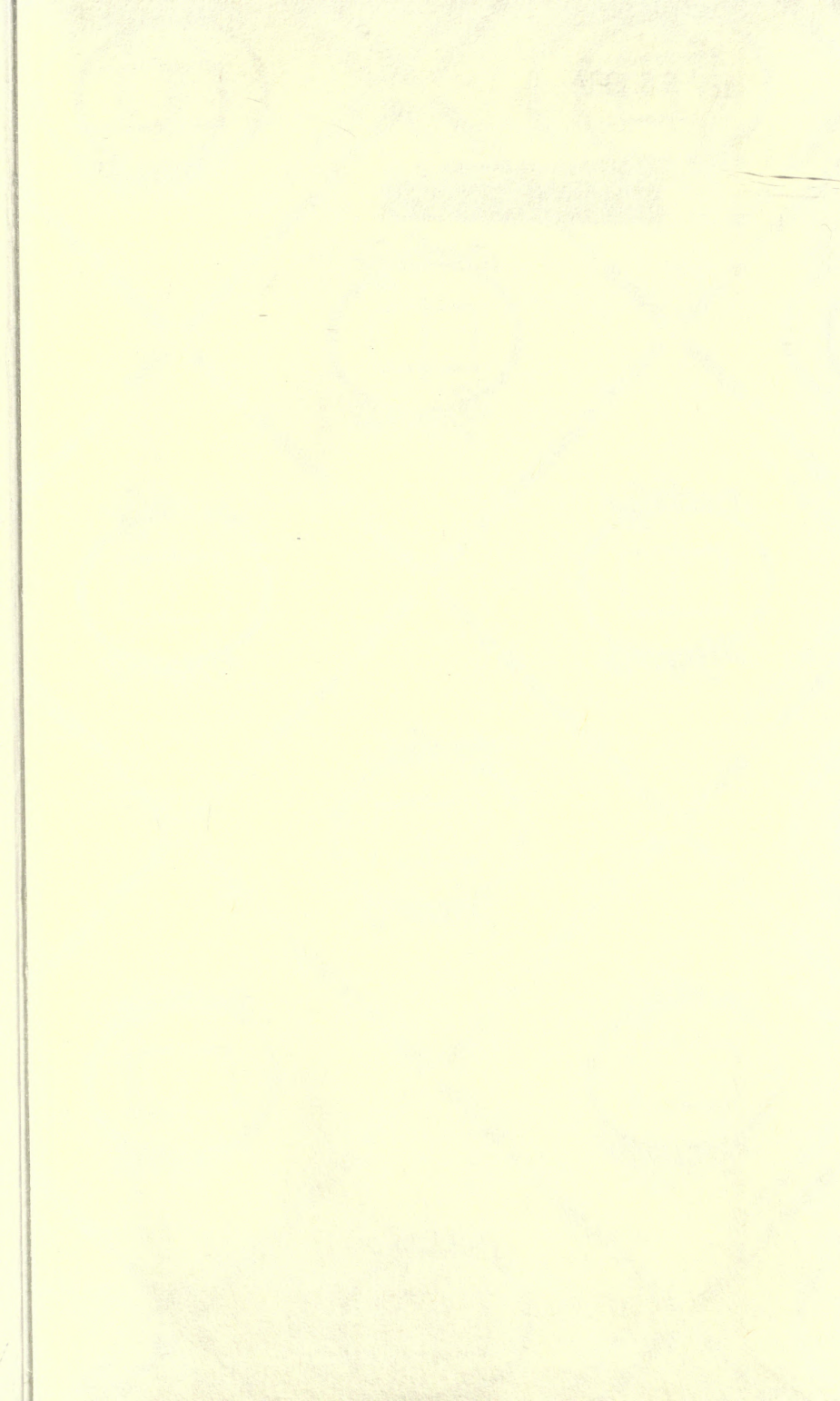
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