HAWAIIAN FERNS;

A SYNOPSIS

TAKEN MOSTLY FROM HOOKER AND BAKER,

WITH ADDITIONS AND EMENDATIONS,

Adapting it More Especially to the Hawaiian Islands.

BY EDWARD BAILEY.

PRICE, SEVENTY-FIVE CENTS.

HONOLULU, H. I.
THOS. G. THRUM, PUBLISHER, "SATURDAY PRESS" OFFICE.
1883.

SOCIAL SE.. V .. DEPARTMENT
QUEEN'S HOSPITAL
DIRECTOR

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Honolulu, Hawaiian Islands, 1882.

Thos. G. Thrum, Printer, Honolulu.

NOTE.

ALL known Hawaiian Ferns are embraced in these descriptions. Some, however. are accredited to these Islands which the compiler has not seen. All such are marked *. Of some of these he considers the origin still doubtful, but others of the class may be found here.

A long residence at the Islands enables him to study our ferns in their localities and in their seasons, which vary, with different species, through the entire year. It is only thus that they can be seen in perfection and properly studied. He has this advantage over the transient collector and the student of dried specimens.

The descriptions will be understood to apply especially to Hawaiian ferns, which often vary considerably from those of the same species found elsewhere.

It cannot be expected that a mere novice in Pteridology should improve on the work of old botanists of world-wide reputation and opportunities, unless in certain exceptionable cases as above hinted applicable only to the Hawaiian Islands.

E. B.

HONOLULU, H. I.,
March, 1882.

DEFINITION OF TERMS USED IN THIS WORK.

Acuminated .....Drawn out to a point.
Anastomosing.....Forming a net-work.
Areola (pl. *areolæ*)...Spaces surrounded with veins.
Aristate.....Having sharp points.
Auricled .....Having appendages like ears, or having the base of a pinna or pinnule much lengthened.
Caudate.....Tail-like.
Caudex .....The trunk of a fern.
Ciliated.....Set round with hairs.
Cordate.....Heart-shaped.
Coriaceous .....Firm or leathery.
Costate.....Having ribs, or raised veins.
Crenate.....Notched in scollops.
Cuneate.....Wedge-shaped.

Decumbent .....Leaning.
Decurrent.....Spread along the rachis or stem.
Deltoid .....Triangular, with a broad base.
Dentate, or *denticulate*Toothed.
Diplazoid.....On both sides of a vein, or double.
Dimidiate.....Divided into two equal parts, one-half of which remains.
Dimorphous.....Of two different characters.

Ebeneous.....Blackish and usually polished.

Falcate .....Scythe- or sickle-shaped.

Ferruginous.....Having the color of iron rust.
Fibrillose.....Covered with fibrous scales.
Flabellate.....Fan-shaped.
Flaccid.....Of a soft, loose texture; hanging down.
Free veinlets.....Those veins which terminate before meeting other veins.
Fugacious.....Soon obliterated or lost.
Furfuraceous.....Like bran or scurf.

Glabrous.....Smooth, having a surface without hairs or any unevenness; shining.
Glaucous.....Covered with bloom-like grapes.
Germniferous.....Having glands from which proceed young plants.

Herbaceous.....Thin and fragile in texture.

Imbricated.....Lapping like scales one upon another.
Indusium.....The covering of the sorus.

Jugate.....Branching off in pairs equally; opposite of alternate.

Laciniated.....Cut jaggedly into deep, narrow lobes; slashed.
Lanceolate.....Oblong and tapering both ways like a lance's head.
Ligulate.....Strap-shaped.
Linear.....Long, with parallel edges.

Mucronate.....Having short, strong thorns.

Ovate.....Egg-shaped.

Pilose.....Covered with long, distinct hairs.
Pinna (pl. *pinnæ*)....The primary division of a frond or fern-leaf.
Pinnate.....Divided quite down to the rachis.
Pinnatifid.....Cut down part way.
Pinnules.....One division of a pinna.
Proliferous.....Producing young plants on the frond, or taking root from the top.
Pubescent.....Covered with down.

Rachis.....Midribs of a fern above the stipe.
Recurved.....Bent or curved outward or backward.
Reticulate.....Veins like network.
Rhizome.....The creeping root of a fern.
Rufous.....Of a brownish red color.
Scabrous.....Rugged, rough.
Scales.....Appendages covering rhizome, caudex, stipe or rachis of a fern.
Scandent.....Climbing.
Scariose.....Tough, dry, thin, membranaceous.
Segments.....Ultimate divisions.

Sessile.....Having no stalk or stem.
Setose.....Bristly.
Sinnated.....Deeply indented with bay-shaped indentations.
Sorus (pl. *sori*).....Fruit spots.
Spathulate.....Paddle-shaped.
Spores.....Seeds of cryptogams.
Stipe.....The stem of a frond or fern-leaf.
Stramineous.....A light straw-color.
Sub.....Partly.
Subsessile.....Nearly sessill.

Terete.....Cylindrical and slightly tapering.
Tomentose.....Covered with a close down; nappy.
Truncate.....Cut off part way down.
Tufted.....Growing up together in a tuft without a regular caudex.

Uniserial.....Having only a single row or series.

Villose.....Hairy.
Winged.....Having a narrow portion of the frond extending along the rachis or stipe.

LIST OF ABBREVIATIONS WITH EXPLANATIONS.

BOTANICAL TERMS.

Caud......Caudex, or trunk from which the stipes arise.
St. .....Stipes, or stipites, which support the frond.
Fr.....Frond or fronds, or leaves.
Pinnl. ....Pinnule, or pinnules, the second division of the frond, as the pinnæ are the first.
Invol......Involucre, called also *indusium.*
Recept. ...Receptacle, to which are fixed the sori or capsules.
Caps. ....Capsule, or capsules, containing the spores or seeds.
Segm. ....Segment, segments or lobes, ultimate divisions.

MEASURES OF LENGTH.

Ft......Foot, or feet.
In. .....Inch, or inches; thus: 1–3, from 1 to 3 inches.
Lin.....line, 1-12th of an inch.
L. .....long; 1 in. l., 1 ft. l.
W., br. ...Wide or broad; thus: 1 lin. w., or 1 in. br.

AUTHORS' NAMES.

W., Willd. ..Willdenow.
Sw. .....Swartz.
Schk. .....Schkuhr.

Kze. .....KUNZE.
Hk. .....HOOKER.
Hk. et Gr. ..HOOKER and GREVILLE.
Hk. fil. .....HOOKER SON.
L. .....LINNÆUS.
Kaulf. .....KAULFUSS.

HAWAIIAN FERNS.

GLEICHENIA § MERTENSIA.

Genus Gleichenia, *Sm.*

Sori of few (2-4 rarely 8-10) capsules, situated on a lower, exterior *veinlet*, opening vertically, surrounded by a broad, transverse, complete ring. No involucre. *Stipe* mostly creeping, often dichotomously divided. *Frond* rigid, dichotomously divided, often proliferous from the axils of the forks; *vernation* circinate; *pinnae* deeply pinnatifid, with the segments small and concave, pectinate with elongated lobes.

§ Mertensia. *Sori near the middle of, or at the forking of the veinlets; the ultimate pinnae pectinate; segments linear or oblong, sometimes emarginate.*

1. G. (Mertensia) *longissima*, Blume; large, often many feet long; *stipe* stout, forked (very rough;) *branches* very long, bearing numerous, close-placed *pinnae* 4-6-8 in. long, 1-2 in broad, deeply pinnatifid to the rachis; the *segments* linear, acuminated, 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. M. glabra, *Brack.* G. excelsa, J. *Smith.*

Found at an elevation of 2-3000 feet.

2. G. (Mert.) *Hawaiiensis*,* Hooker; *st. and rachises* cylindrical, rough; *fr.* subcoriaceous 3-4 times or more dichotomously divided at acute angles; *pinnae* lanceolate, acuminate, a span to 1 ft. l., 2-2½ in. w.; *segments* linear, horizontal, tapering and acute, cobwebby on the costa and veins beneath; *caps.* 2-4. Mert. Hawaiiensis, *Brack.*

*Changed from *Owhyhensis* Hk—E. B.
Found at an elevation of 3-4000 feet.

3. G. (Mert.) *dichotoma*, Willd.; st. 2-6-8 ft. l., dark brown, smooth, forked at nearly right angles; *fr.* 2-3 times forked; with an additional pair of small pinnae spreading from the base of each fork; ultimate *pinnae* 4-8 in. l., 1½-3 in. br., lanceolate; *seg.* linear, tapering, often emarginate; *caps.* 3-15; *costa* and *segments* often densely tomentose beneath.

Found at an elevation of 1-3000 feet, much impeding the traveller.

GEN. DICKSONIA, *L'Herit.*

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. *All the Hawaiian species are aborescent and sometimes grow 30-40 feet high, with a spread of 15-20 feet.*

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

1. D. (Cibotium) *glauca*, Smith; *Caudex* upright, 8-10 in. or more thick, its centre soft and fleshy, surrounded by the persistent bases of the stipes.

DICKSONIA § CIBOTIUM.

St. spreading at an angle of 45° with the line of the caud., stout. 2-5 ft. l., densely clothed, especially at the base, with a fine, silky, ferruginous hair, which is the pulu of commerce; *fr.* ovate-lanceolate, 5-6 ft. l., 3-4 ft. br.; *pinnae* 18-24 in.

l., 8-12 in. br., oblong ovate; strong-stalked, spreading; *pinnl.* linear acuminate, 1 in. br., cut down nearly to the rachis into blunt falcate lobes ½ in. l., 2 l. br., entire or slightly crenate, falcate; *texture* coriaceous; *surface* naked, glaucous below and glabrous above; *veins* prominent, pinnate, lateral veins of the infertile segm. once or twice forked, with no intermediate at the base between the lobes; *sori* 8-12 to a lobe at the extreme end of those veinlets which are not forked; inner *valve* oblong, narrower than the outer.

This and the next are probably the same with modifications common to the genus.

2. D. (Cibotium) Menziesii, Hook. and Baker; *fr.* tripinnate; *lower pinnae* 12-18 in. l., 6-9 in. 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* 2-8, rows with a broad space between them; *inner valve* narrower than the outer, oblong. Var. *pruinata*, Baker; under *surface* glaucous; *lobes* of pinnules denticulate. *Brack.* and Hillebrand.

3. D. (Cibotium) *Chamissoi*, Hk. and Baker; *caudex* 6-10 ft. high, 9 in. thick; *st.* stout, 4-6 ft. l., densely covered at the base with dark or ferruginous scales, varying from soft, silky, to stiff and sharp hairs of a dark brown color; *fr.* ovate lanceolate, 6-8 ft. l., 3-5 ft. br., bipinnate; *pinnae* lanceolate, 1½-3 ft. l., 8-12 in br.; *pinnl.* linear acuminate, 4-6 in. l., ¾-1 in. br., cut nearly down to the rachis into obtuse scarcely falcate *segm.* § in. l., 2 lin. br.; *rachises* covered sparsely in the lower part with the same kind of scales as the stipe; under *surface* not glaucous, thickly covered with minute glands, sometimes furfuraceous; *veins* very distinct, pinnate 7-8 on each side, forked, and one arising from the main rachis near the base of each lobe; *texture* coriaceous; *sori* 2-12 to a lobe; outer *valve* largest, suborbicular.

All the Dicksonia's are found at considerable elevation,—1-3000 feet. There is variety of nearly all parts of these Ferns, and it is yet doubtful whether four distinct species exist, or whether all should not be included under two.

GEN. DEPARIA. Hook. and Grev.

Sori protruded from the margin of the frond or even stipitate. *Invol.* shallowly-cup-shaped, membranaceous, not 2-valved.

D. *prolifera*, Hk.; *fr.* once fully pinnate, oblong, deltoid; *lower pinnae* 6-9 in. l., 1-1½ 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 simple except the lowest; *texture* herbaceous; *sori* 4-12 to a lobe, extra-marginal, sessile or stipitate.

Found on Oahu.

GEN. HYMENOPHYLLUM, *Linn.*

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. *Receptacle* 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 Ferns, frequenting trunks of trees and damp rocks, the fronds delicately membranaceous in texture, of a lurid or olivaceous green, simple or compound, costate or with simple or branched (never anastomosing) veins. Caudex frequently long-creeping and filiform.*

HYMENOPHYLLUM.

1. H. *Recurvum*, Gaud.; *st.* 2-4 in. l., winged above; *fr.* 4-12 in. l., 2-3 in. br., flaccid, 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. ¼-⅜ in. l., ½ line br.; *sori* 2-6 to a pinna, generally axillary; *invol.* divided about half way down; *valves* rounded, slightly forked.

Found at an elevation of 2-3000 feet.

2. H. *obtusum*, Hk. and Arn.; *st.* ½-2 in. l., slender, ciliated; *fr.* 2-4 in l., ½-1 in. br., lanceolate or ovate-lanceolate, nearly square; tri-pinnatifid; *main rachis* winged throughout; *lower pinnae* lanceolate or triangular-rhomboidal, cleft nearly to the rachis into several ilnear s imple, or forked; *pinnules* on both sides the surface and margin copiously clothed with pubescence; *sori* 2-6 to a pinna, terminal on the lateral segments; *invol.* as broad as the segments, divided about half way down; valves rounded, strongly ciliated.

3. H. *lanceolatum*, Hk. and 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 pinnul.* 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* 2-8 to a pinna, placed at the side or top of the lateral segments; *invol.* divided more than half way down; *valves* rounded and copiously ciliated.

Found about 3000 feet above the sea.

4. H. *Baldwini*, Eaton; *st.* subtufted, ½-1½ in. l., erect, wiry, thickly set with reddish-brown hairs, especially below; *fr.* 3-6 in. l., ½-1½ in. br., lanceolate or ovate-lanceolate, bi- or tripinnatifid, *color* bright green; *texture* delicately membranaceous; main *pinnae* obliquely divergent; *rachis* narrowly winged, free below; *pinnae* simple or divided into a few oblong, obtuse or emarginate *segments*, which are naked, entire; *sori* at the apex of some of the short lower segments; *invol.* roundish from its base to its short, entire lips; *recept.* columnar; the short stipe and rachis thickly hispid with reddish-brown hairs.

Found in a little valley on Oahu, at an elevation of 2,500 feet, by D. D. Baldwin, Esq.

Much resembles *Trichomanes apiifolium*, but is smaller.—E. B.

GEN. 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 exserted 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 very nearly equal halves.*

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

1. T. *parvulum*, Poiret; *rhizome* wide-creeping, interlaced; *st.*, ¼-½ in. l., wiry, slender, tomentose below; *fr.* ¼-½ in. each way, orbicular in general outline, cuneate or truncate at the base, flabellately cut about half way down from the outer edge in the direction of the base into narrow irregular segments; *veins* close, prominent, so that the frond when dry appears channelled, dichotomous at a very small angle; spurious venules numerous; *sori.* 4-6, terminal on the central segments, the tube quite sunk in the frond, the mouth dilated at the sides.

2.* *Mannii*, Hk. Mss.; *rhizome* wide-creeping; *st.* ½-1 in. l., slender, tomentose below; *fr.* ½-1 in. each way, suborbicular in general outline, deeply flabellately divided into narrow dichotomous.

TRICHOMANES § EUTRICOMANES.

Linear *segments;* spurious *venules* few; *sori* 4 to 8, shaped by the forking of a vein, on the central lobes, the mouth much dilated and spreading, but not two-lipped.

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.

3. T. *humile*, Forster; *rhizome* creeping, deeply intermatted; *st.* ¼-½ in. l., slender, winged above; *fr.* 1-2½ in. l., ½-1 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. T. Draytonianum.

Found at an elevation of 2-4000 feet.

"Probably a mere variety of T. *pyxidiferum*."

4. T. *radicans;* Swartz, *rhizome* wiry, wide-creeping, tomentose with filiform unjointed hairs; *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 *pinnae* 1-4 in. l., ovate-rhomboidal, cut down to a narrowly-winged rachis; *pinnules* again deeply pinnatifid; ovate-rhomboidal, with deep-toothed lower *segments*; *texture* membranaceous but firm; a single *vein* only carried into each ultimate segment; *sori* lateral, 1-4 to a pinnule, the tube small, subcoriaceous, more or less decidedly exserted, the mouth very slightly two-lipped; *recept.* slender, elongated.—B. T. *Luschnatianum*, Presl.; *fr.* lanceolate, quite sessile, (hairy scales jointed; *rachises* narrowly winged throughout, veins in the segments close.)—*T. speciosum.* Willd., *rhizome* and *rachises* covered more or less thickly with reddish jointed hairs; *st.* 3-8 in. l., narrowly winged throughout; *fr.* 4-10 in. l., 3-8 in. br., deltoid or ovate-deltoid; *pinnae* short-stalked, lower pinnae 2-4 in. l., lanceolate, divided down to the narrow-winged rachis into distant lanceolate *pinnl.*, which are again divided half way down or more below into obovate *segm.*, which latter are often deeply incised; *veins* close, one

to each ultimate point; *sori* small, exserted, with somewhat dilated lips, *recept.*

All three are found in damp woods from 300.2000 feet elevation or more. T. *Superbum*, V. D. B.

Variety *T. Mauiensis*, E. B *rhizome* short-creeping wiry, tomentose with very distinctly-jointed ferrugineous hairs; *st.* 1-4 in. l., erect and with the main rachis winged throughout; *fr.* 2-8 in. l., 1-6 in. br., tripinnatifid broadly ovate; *pinnae* ovate-lanceolate, short-stalked; *lower pinnae* ½-3 in. l., pinnatifid down to a winged rachis- *pinnules* divided part way to the rachis into incised blunt lobes; main and secondary midribs slightly tomentose; *lateral veins* numerous; *venules* none; *text.* firmly membranaceous; *sori* 1-6 to each lobe; *involl.* cylindrical, exserted, mouth somewhat dilated; *recept.* long filiform.

Found at an elevation of 200-2000 feet or more, in damp, shady places on the side of high banks, or cliffs near the bottom. *Name ventured;* no name appearing for this well-marked species.

5. T. *Apiifolium*, Presl; *st.* tufted, 4-6 in. l., strong, erect, more or less fibrillose, and the tuft densely so at the crown; *fr.* 9-14 in. l., 4-8 br., ovate, quadri-pinnatifid, the main rachis only slightly winged towards the apex; *lower pinnae* 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* sub-rigid, surface naked, a single *costa* only in each segment; *sori* 2-12 to a pinnule, small, the involucre short, turbinate. *T. meifolium edit, 1.*

Found in damp and very shady situations at an elevation of 2-3000 feet.

6. *? T. *intramarginale*, Hk, and Gr.; *rhizome* slender, wide-creeping, tomentose; *st.* very short; *fr.* 1-2 in. l., ¼-½ in. br., oblong-rhomboidal, bi-pinnatifid, 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 seg-

ment, but the margin thickened; *sori* 1-4 to a frond, terminal or axillary on the upper segments, tubes sunk, mouth not dilated.

This may be the same as *T. pyxidiferum* L. It is more like a skeletonized form of T. *humile*, Forster. It is claimed by some that we have T. pyxidiferum L., but Hooker's description does not answer to it.

All the species of Trichomanes vary greatly in form and size, with circumstances, hence there is much confusion in descriptions.

GEN. DAYALLIA. § Odontoloma.

Sori intra- or sub-marginal, 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. Fronds *various in size and division, herbacious or coriaceous;* veins *always free;* rhizome *usually wide-creeping and scaly.*

§ Odontoloma. *Invol. attached by a broad base, small, narrow and thin, with a tendency to become confluent, and the pinnules pellucido-herbaceous in texture and dimidiate in shape. A small natural group very near the dimidiate Lindsayae.*

1. D. (Odont.) *repens*, Desv.; *rhizome* wide-creeping, paleaceous, climbing; *fr.* simply-pinnate, 8-18 in. l., ½-1½ in. br.; *pinnae* ½-1 in. b., 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 crenated form. O. macraeana, *Brack.*

Found at an elevation of 3000 feet, on trunks of trees, etc.

§§ Microlepia. *Invol. membranaceous, shallowly half cup-shaped, attached at the sides as well as the base. Fronds very various in size, texture and cutting. Stems continuous with the caudex.*

DAVALIA MICROLEPIA.

2. D. (Micro.) *hirta*, Kaulf.; *st.* strong 12-24 in. l.; *fr.* 1-2 ft. l., 8-15 in. br., deltoid, tri- or quadri-pinnatifid; lower pinnae 5-10 in. l., 2-4 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* 2-20 to a segment, placed one or more together at the base of the teeth.

Found at an elevation of 200-6000 feet; much used in decoration. Description in Hooker very imperfect,—two or three distinct species being confounded together. It is really only about half as large, or less, than Hooker's described species.—E. B.

3. D. (Micro.) *Speluncae*, Baker; *st.* strong 12-24 in. l.; *fr.* 3-6 ft. l., 12-24 in. br., deltoid, tri- or quadripinnatifid; lower *pinnae* 5-15 in. l., 3-5 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* 2-20 to a segment, placed one or more together at the base of the lobes.

Found at an elevation of 1500-3000 feet.

§§§ Stenoloma, Fee. *Invol. forming a compressed suborbicular or cup-shaped pouch on the termini of the legments. Fronds very various in size, but the ultimate segments always cuneate, growing gradually wider from the base to the apex.*

4. 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 *pinnae* 4-8 in. l., ¾-1 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 2-12 to a pinnule, small, placed at the base of the sinuses. D. polypodioides r & s *Ak. Sp. Fil.*

Elevation 3-8000 feet.

5. 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 *pinnae* ovate-lanceolate 4-6 in. l., 2-3 in. br.; *pinnl.* lanceolate, their segments cut down to the rachis below with toothed cuneate lobes, 1-1½ lin. across at the apex; *texture* subcoriaceous, both surfaces naked, the upper shining; *sori* terminal, usually solitary, often rather broader than deep.

Found at all elevations below 3000 feet, and in very various situations.

6. D. (Steno.) *Mannii*, Eaton; *st.* tufted, 3-6 in. l., castaneous, matted with adpressed, fibrillose scales like the straight primary rachis; *fr.* lanceolate. 1 ft. or more l., 2-8 in. br., narrowed from middle on both ends, tri-pinnatifid; *pinnae* close, oblong-lanceolate, subsessile: *pinnl.* ascending, upper simple or forked, lower rhomboid, pinnatifid, with distant ligulate 1-veined *segm.* 1-1½ lin. l.; texture subcoriaceous; *surfaces* naked; *sorus* usually terminali, free, twice as broad as the tip of the segm.

Found on the island of Kauai.

7. D. (Steno.) *Alexandri*, Hillebrand; *st.* tufted, 6-12 in. l., erect, clothed with deciduous hairy down; *fr.* 1-3 ft. l., 2-3 in. br., linear-lanceolate; pinnate, the middle *pinnae* the longest; 3-4 lin. w., acuminate, cut down nearly to the rachis in cuneate *pinnl; texture* coriaceous; *sori* solitary on the end of the *segm.*, large.

Hab. E. Maui 3-4000 feet elevation. It seems a variety of D. Mannii, and often approaches very near Lindsay a.—E. B.

GENUS LSTOPTERIS. LINDSAYA.

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 likc a hood. Fronds *small, two or three times divided, thin in texture, veins free.*

C. *fragilis.* Bernh; *st.* 2-4 in. l.; *fr.* 4-8 in. l., 1-2 or 3 in. br., ovate-ianceolate, tripinnatifid; main *rachis* slightly winged above; largest *pinnae* 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* 2-12 to a pinnule.

Found commonly at an elevation of about 1000 feet, and its character varies with its situation, being sometimes quite stiff in texture and more finely cut when exposed.—E. B.

GEN. LINDSAYA.

Sori marginal or sub-marginali, 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. Most of the species have one-sided pellucido-herbaceous or coriaceous pinnae, approximating in shape to a quarter of a circle.

§ 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.*

L. (Diellia) *pumila,* Hk. Mss. *St.* tufted, 1-2 in. l., wiry, blackish, polished; *fr.* 4-9 in. l.. ¾-1 in. br., simply pinnate; *pinnae* 4-6 lin. l., 1½-2 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.

A very distinct plant, with the habit of a large form of *Asplenium trichomanes*. Grows on the damp side of gulches.—E. B.

2. 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., ¼–⅜ 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* two to three times as long as broad, falling short of the margin. *Diella erecta, Brack.*

3.* 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., ¼–⅜ 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.*

ADIANTUM.

It seems marvellous that ferns so nearly alike as the last three species, all of whose habits are much the same, and whose forms are very erratic, should be separated, while others of constant forms, but differing in habit as well as form under the same circumstances must be united.—E. B.

GEN. ADIANTUM.

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.

1. A. *Capillus-Veneris*, L.; *st.* suberect, rather slender, 4–9 in. l., polished, blackish, naked; *fr.* with a short terminal and numerous erecto-patent lateral branches on each side, the lowest slightly branched again; *segm.* ½–1 in. br., the base cuneate, the outer edge rounded, deeply lobed from the circumference in the direction of the centre, and the lobes again bluntly crenated, lowest petioles ¼ in. l.; *texture* pellucido-herbaceous; *rachis* and both surfaces naked; *sori* roundish or obreniform, placed in roundish sinuses of the crenations.

Found on banks or rocks overhanging running water.

2.* A. *Bennettii*, Carruth.; *st.* and rachises black, naked; *fr.* 1 ft. l., deltoid, 2–3 pinnate; *pedicels* 3–4 lin. l.; *segm.* broader than deep, ¼–¾ in. br., entire, hemispherical or round-cordate; *texture* membranous; upper *surface* glabrous, lower densely bristly; *sori* reniform, 6–10, crowded round the outer borders of the segment, ½–2 lin. br.

Hab. Sandwich Isles, *Lieut. Strickland.* Very near to or perhaps identical with *A. scabrum*, Kze.

GEN. CHEILANTHES.

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.

Veins free. It differs from Pellea *and* Pteris, *by its more or less interrupted involucres. It is very difficult to draw the line between* Cheilanthes *and* Nothochlaena *which is the corresponding non-indusiate genus.*

*C. *Lidgatii*, Baker; *rhizome* creeping; *st.* naked, 1 ft. l., stramineous like rachises; *fr.* deltoid, 1½–2 ft. l.; lowest *pinnæ* largest, with three deeply-pinnatifid *pinnl.* from lower side, all the others lanceolate, 1½–2 in. br., cut down to a narrow wing into close ligulate blunt lobes 3–4 lin. br., barren slightly toothed; *texture* rigidly coriaceous; *surfaces* naked; *invol.* ¾ lin. br., crowded, glabrous, rigid, persistent.—Schizopteris Lidgatii, *Hillebrand* Mss.

Hab. Oahu, *Hillebrand.* Very distinct, with habit resembling *Woodwardia radicans.*

GEN. PELLEA. (§ Allosorus.)

Sori intramarginal, terminal on the veins, at first dot-like 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. *Differs from* Cheilanthes *by the continuous involucre. Veins free.*

§ 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.*

P. (Allo.) *ternifolia*, Fee; *st.* tufted, densely fibrillose at the base, 2–4 in. l., strong, erect, dark chestnut-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-colored 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.

Found mostly in the crevices of rocks at an elevation of 5000–6000 ft.

GEN. PTERIS. § Eupteris.

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.

§ Eupteris. *Veins all free. Stems caespitose, involucre single.*

1. P. (Eup.) *Cretica*, L.; *st.* 6–12 in. l., erect, wiry, naked, straw-colored, 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., ⅛–¾ in. br., the sterile ones considerably the broadest and spinuloso-serrated, the lower pairs often cleft down nearly to the base into 2 or 3 linear *pinnl.*; *rachis* and both surfaces naked; *texture* coriaceous; veins fine, close, parallel, simple or once forked; *invol.* pale, membranous.

Found at an elevation of 3–7000 ft.

2. P. *irregularis*, Kaulf.; *st.* 1–2 ft. l., strong, angular, naked, polished, brownish, (or stramineous—E. B.); *fr.* 12–24 in. l., often 1 ft. br.; *main rachis* with a wing throughout which is ⅜–½ in. br.; *upper pinnæ* linear, simple, lower ones 2 or 3 in. apart at the base, with several long, linear, erecto-patent *pinnules* on each side, which are sometimes again slightly compound; longest simple *segm.* 3 or 4 in. l., ⅜–½ in. br.; *rachis* and both surfaces naked; *texture* subcoriaceous; *veins* about 1 lin. apart at the base, usually once forked; *invol.* narrow, membranous.

N. B.—I have not seen the main rachis winged as above described, except

in the upper part, and the stipe and rachises are brightly stramineous. A very different plant not elsewhere described appears to have furnished part of the description. It may be described as follows:

P. *regularis?* E. B.; *st.* 1-2 ft. l., strong, erect, sulcate, brownish or bright straw-color, naked, polished; *fr.* 1-3 ft. l., 1-2 ft. br., deltoid, tripinnatifid; all the *rachises* broadly winged throughout; *pinnate* divisions commencing near the extreme point and increasing in size regularly downward, becoming more divided downward and their lobes again strongly pinnatifiid; *pinnæ*, *pinnules*, and ultimate *segm.* lanceolate or deltoid-lanceolate, every part most remarkably regular in its divisions to the extreme acuminate points; *ultimate lobes* $\frac{1}{8}$-$\frac{3}{4}$ in. l., deltoid, often falcate; *texture* thinly coriaceous; *veins* $\frac{2}{3}$ lin. apart, mostly forked; all the divisions form an angle of about 45° with the rachis, and leave a wide space between each; *Involl.* narrow, membranous, extending nearly to the points.

3. 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.

Found in the bottom of ravines at an elevation of 300-3,000 feet.

§§ Pæsia, *St. Hilaire; Veins free, rhizome creeping, stems subdistant, involucre more or less distinctly double.*

4. P. (Pæsia) *aquilina*, L.; *rhizome* stout, wide-creeping, subterraneous; *st.* 1 ft. or more l., strong, erect, naked, straw-colored or pale-chestnut; *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 rachi

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, *invol.* double or the inner one obsolete. β. P. *caudata*, L.; *pinnl.* sometimes linear and entire or with less crowded *segm.* than in α, and the terminal lobe linear entire, 1-2 in. l. ——γ, *P. esculenta*, Forst.; ult. divisions narrower and not contiguous, suddenly decurrent at the base, so that the bases are connected by a narrow lobe.

Found at elevations 500-4,000 feet or more, and 3 inches to 12 feet high or more.

§§§ Doryopteris, *J. Smith. Fronds small, sagittate or subpedate, veins copiously anastomosing, without free included veinlets.*

5. 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.—β. P. Var. *intermedia* E. B. cut much like the above but narrower; much prolonged between the lowest two pairs of pinnæ, glossy dark-brown.

Found 300-2,000 feet elevation.

§§§ Doryopteris. *Blechnum.*

6. P. (Dory.) *decora*, Bracken.; *st.* 6-8 in l., erect, naked, dark chestnut-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 two inches long, less than 1 lin. br.; *texture* coriaceous; *rachis* and both surfaces naked; veins quite hidden; *sori* reaching to the apex of the segments.

P. decipiens is found plentifully in Wailuku valley, *P. decora* is found about Lahainaluna, and all grades between the two may be found between the two places, the type approximating to that found in the nearest place.

GEN. BLECHNUM.

Sori linear, continuous, or nearly so, parallel with and usually contiguous to the midrib. *Invol.* membranaceous, distinct from the edge of the frond, of the same shape as the sorus, opening toward the midrib.

(B. *Souleytianum*, Gaud.) E. B.; *caudex* 2-6 ft. l., 4-6 in. thick, formed by a soft fleshy core surrounded by the persistent bases of the stipes intermatted with masses of ferruginous scales and wiry roots; *st.* few, 3-4 ft. l. 1 in. thick, erect, densely clothed at the base with light ferruginous scales; *fr.* 3-6 ft. l., 1½-3 ft. br., oblong-ovate, closely set with lanceolate *pinnæ* 12-22 in. l., 1½-3 in. br., which are divided down to the rachis into linear, blunt, falcate *pinnl.* ⅛ in. br., the edges rolled inward; *rachis* very strong, sparsely clothed with scales, as are the rach. of the pinnæ; texture strongly coriaceous; veins immersed, once or twice forked.

Like Sadleria in habit and general appearance. Elevation 2-4000 feet.

GEN. SADLERIA.

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.*

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., ½-¾ in. br., cut down to the rachis into very numerous connected linear *pinnl.*, ⅜-½ in. l., ⅛ in. br., acute or bluntish; coriaceous; *veins* immersed and inconspicuous; *rachis* stout, naked.

Found at an elevation of 1 or 200 to 3000 feet.

2. S. *pallida* (Hk. and Arn.), E. B.; *caudex* 2-8 ft. high, 2 in. thick or less, soft, clothed with scales; *st.* 1-2 ft. l., erect, densely-clothed at the base with light-ferruginous, adpressed acute-lanceolate scales; *fr.* 2-3½ ft. l., 10-16 in. br., oblong-ovate, blunt; *pinnae* numerous 6-10 in. l., ¾-1 in. br., linear-lanceolate, acute, cut down to the *rachis* into numerous connected linear *pinnl.* ½ in. l., ⅛–$\frac{3}{16}$ in. br., blunt, wide at the base; *texture* coriaceous;

rachis thick, soft, covered thinly throughout with pale yellowish scales; veins conspicuous, often once or more forked; *sori* broad, covering more than half the width of the pinnl.

This plant differs from *S. cyatheoides* in its taller and thinner candex, the more abundant covering of stipe and rachis, the lighter colored and softer scales, the softer texture and broader and wider apart pinnules and sori, as well as pinnæ. It is also found at a greater elevation, viz: 3-4,000 feet.

3. S. *squarrosa*, Gaud.; *St.* 6-8 in. l., non-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., ½-¾ in. br., cut down to the rachis into quite distinct oblong sub-falcate *pinnl.* ¼-⅜ in. l., ¼ in. br.; texture coriaceous; *veins immersed, main rachis* and that of the pinnæ densely clothed throughout with ovate-acuminate dark-brown scales. Blechnum polystichoides, *Brack.*

Found at an elevation of about 5000 feet. It has very little caudex.

GEN. DOODIA.

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 pinnate or pinnatifid.*

1. D. *media*, R. Br.; *St.* 4-6 in. l., erect, not very smooth, usually nearly black; *fr.* 12-18 in. l., 1½-4 in. br., lanceolate, with numerous spreading linear *pinnæ* on each side, which are 1¼ in. l., ¼-¾ 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.

2. D. *Kunthiana* (Gaud), E. B.; *St.* ¼-1 in. l., dark-brown or blackish, clothed with very dark linear-acuminate scales; *fr.* 3-6 in. l., ½-1 in. br., lanceolate, often with a long acuminate point; *pinnæ* numerous, closely placed, the margin toothed, those in the centre ¼-⅝ in. l., 1 lin. br., becoming shorter above and below,

lower ones shortly stalked, those above spreading more on the rachis as they ascend; *texture* coriaceous; *rachis* sparsely clothed with dark-brown scales; *sori* in two close lines entirely covering the midrib and joined in one; *invol.* folding over the sori and meeting above the midrib, or spreading where the lower side of the pinnæ are nearly covered by the sori in one broad band.

Found at an elevation of about 2000 feet; D. media is found mostly lower down.

ASPLENIUM § Thamnopteris.

ASPLENIÆ.

Sori attached to the veins, oblique with regard to the costa, ar occasionally sub-parallel with it, linear or oblong. Invol. the same shape as the sorus, when single opening towards the midrib, sometimes double.

GEN. ASPLENIUM.

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. *Veins free in a large proportion of the species.*

§ Thamnopteris, *Presl. Veins connected at the apex by an intramarginal line. Fronds undivided.*

1. A. (Tham.) *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 half way towards the margin, 500-3000 feet.

§§ Euasplenium. *Veins free, simple or branched; sori linear, or linear-oblong, straight, discoidal.*

2. A. *fragile*, Presl; *st.* tufted 2-4 in. l., slender, flexuose, green or brownish, sometimes gemmiferous; *fr.* 6-9 in. l., ⅜-½ in. br., with 12-20 sessile *pinnæ* on each side, which are ¼ 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.

"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."

(It is densely tufted. E. B.) 7000 feet elevation.

3. A. *trichomanes, st.* densely tufted, 1-4 in. l., naked, glossy, chestnut-brown, polished; *fr.* 6-12 in. l., ½ in. or rather more broad, with 15-30 opposite pairs of sessile horizontal *pinnæ*, which are ⅛-⅜ in. br., 1½-2 lin. deep, the edge slightly crenate, the two sides unequal, the upper one 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.

Elevation 5-7000 feet.

4. A. *monanthemum*, Linn.; *st.* densely tufted, 3-6 in. l., naked, polished, chestnut-brown; *fr.* 12-18 in. l., ¾-1 in. br., with 20-40 horizontal sessile subdimidiate *pinnæ* on each side, which are ⅜-½ in. l., ¼ 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.

Found at an elevation of 7-8000 feet.

5. A. *extensum*, E. B.; *st.* tufted, 2-4 in. l., strong, erect, blackish, nearly naked; *fr.* 8-14 in. l., 1-1¼ in. *br.* linear-lanceolate, proliferous near and at the apex, with very numerous *pinnæ* on each side, which are ½ in. l., ¼ in. br., blunt and entire, the upper side much the broadest and broadly auricled, partly covering the rachis, the lower side very obliquely truncate at the base; *texture* coriaceous; veins inconspicuous; *rachis* thinly covered with hairy scales; *sori* oblong, 3 to 5 to a pinna, mostly on the lower side of the midrib.

Very near to *A. extensum*. Fee. Found at an elevation of 5-6000 feet.

6. A. *lunulatum, Sw.; st.* tufted 2-4 in. l., firm, nearly naked, gray or ebeneous; *fr.* 6-18 in. l., 1½-2 in. br., narrowly lanceolate-

oblong, with 12-20 horizontal *pinnæ* on each side, which are ½-1 in. l., ¼-½ 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 a right angle, the lower one obliquely truncate; lower pinnæ often deflexed; *texture* herbaceous; rachis firm, grayish; *veins* simple or once forked; *sori* falling short of both edge and midrib.

Found at an elevation of 2-3000 feet.

A. *lunulatum*, Var. *proliferum*, Hk. (A. pavonicum, Brack.; E. B.; *st.* tufted, dark chestnut-brown or blackish, polished, wiry; *fr.* linear-lanceolate, 6-12 in. l., ¾-1 in. br., often procumbent, copiously proliferous, rooting at the apex; *pinnæ* numerous, ⅜-½ in. l., 1-2 lin. br., sub-stalked, the two sides unequal, blunt, serrate, upper side suddenly narrowed at the base which is extended to an acute point, lower side obliquely truncate; *texture* firm; *rachis* like the st.; *veins* subflabellate; *sori* oblong, 6 to 8 to a pinna, more on the upper than on the lower side.

Found growing in spreading masses at an elevation of 3-4000 feet.

A. *lunulatum*, Var, *subpinnatifidum*, Hk.; (description by E. B) *st.* 2-4 in. l., firm, nearly naked, gray or ebeneous; *fr.* 12-18 in. l., 3-5 in. br., tripinnatified, lanceolate, with numerous distant *pinnæ* on each side, lower ones distant, stalked, central ones 2-3 in. l., ½-¾ in. br. lanceolate or deltoid-lanceolate, cut down to the *rachis* into numerous cuneate or oblong *pinnl.*, which are again deeply cut down into distant, linear *segm.* which are about 1 lin. l., ½ lin. br., blunt; lower pinnæ deflected; *texture* herbaceous; *rachis* firm; *veins* one to each ultimate *segm.; sori* oblong, one to each segm. which it nearly covers.

The above are the two extremes under the head of *A. lunulatum* or *A. erectum* (Bory); every intermediate form between the two is found.

7. A. *persicifolium*, J. Sm.; *st.* and *rachis* gray, with a few scattered minute gray scales; *fr.* oblong-lanceolate, 2-3 ft. l., often gemmiparous at apex; *pinnæ* distant, ascending, 15-30-jugate, subpetiolate, 4-5 in. l., linear-ligulate-acuminate, ½-¾ in. br., distinctly inciso-crenate throughout, more cuneate on the lower than

the upper side at the base, the lowest not reduced; *texture* thin, but firm; *surfaces* dark-green, naked; *veins* erecto-patent, fine, forked, not close; *sori* regular, parallel, 3-4 lin. l., reaching nearly to midrib and edge.

Found on Kauai.

8. A. *contiguum*, Kaulf.; *st.* tufted, 6-9 in. l., firm, erect, chestnut-brown, naked; *fr.* 12-18 in. l., 4-10 in. br., with 20-30 horizontal subfalcate *pinnæ* on each side, which are acuminated 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, chestnut-colored; *veins* oblique, obscure; *sori* close, copious, falling considerably short of the margin.

Found at an elevation of 400-2000 feet, of varying form and size, distinguished by the closeness of its sori near the midrib.

9. 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., ½-¾ 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 two regular rows, falling short of the edge.

From the somewhat protean form of this fern appears to have arisen ambiguity in its description. When growing it is highly glabrous, the pinnæ are stalked, erecto-patent, often 6 in. l. or more and 1 in. br., sides not very unequal; the lines of sori are oftener irregular, and the whole under surface is gemmiferous. It seems to answer better to the description of *A. Gemmiferum* Schrad. than to that of *A. enatum*, being oftener 2 ft. l. than 1 f.. and 6-15 in. br., but as the Hawaiian Islands are credited with the latter and not with the former, I have so put it. *A. persicifolium*, J. Sm., is very near.

10. A. * *obtusatum.* Forst.; *st.* tufted, 3-6 in. l., firm, grayish, densely clothed at the base with large, thin, gray, 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., ½-¾ in. br., obtuse at the point, the edge crenate, the base trunco-cuneate, especially on the lower side, and shortly stalked; *texture* cartilaginous; *rachis* firm, broad, often compressed and channeled, both surfaces naked; *color* pale-green; *veins* immersed and inconspicuous; *sori* copious, broad, linear-oblong, falling short of the edge.

I put this down as a Hawaiian Islands fern on the authority of Horace Mann, probably Var. *obliquum*, Hook. It cannot be very far from *A. enatum* and *A. gemmiferum* or *A. persicifolium*. It may be a small form of *A. falcatum*.

11. A. *falcatum*, Lam.; *st.* tufted, 6-9 in. l., firm, erect, grayish, 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., ½-1 in. br., the point acuminated, 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.—A. spathulinum, *J. Sm.*

Found at an elevation of 2-4000 feet. Often it is 12 in. br. and more deeply lobed.

12. 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., ½-1 in. br., the point acuminated, the edge deeply toothed, sometimes lobed more than half way 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.

Doubtfully distinct from *A. falcatum* (and *A. contiguum*, E. B.), the best character is in the sori, which are more confined to the center of the pinnæ, being often restricted to two parallel rows close to the rachis.—Hk.

Any description of *A. falcatum*, *A. caudatum*, *A. spathulinum*, and *A. lobulatum*, which impinges on *A. affine*, will lap from one extreme to the other, covering parts of two or three species, and *A. contiguum* is not very distant.

13. A. *lobulatum*, Mett.; rhizome short-creeping (subtufted, E. B.) *st.* 6-9 in. l., gray, nearlv naked; *fr.* lanceolate, 1-1½ ft. l., 5-6 in. br.; *pinnæ* 15-20 jugate, lanceolate, subpetiolate, 3-4 in. l., 1-1¼ in. br., narrowed from base to acute or acuminate point, inciso-pinnatifid in upper half, deeply pinnatifid in lower, basal anterior lobe much produced, base on lower side cuneate-truncate; *texture* subcoriaceous; *surfaces* naked; *veins* fine, pinnate in many lower lobes (?); *sori* reaching nearly from midrib to edge, lower ½-¾ in. l.

Midway between *A. caudatum* and *A. affine*. The above species, beginning with A. falcatum are found in forests at an elevation of 500-5000 feet.

14. A. *resectum*, Smith; *st.* scattered, slender, naked, dark chestnut-brown, polished, or gray 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., ¼-½ 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.

Found on steep, moist slopes in shade, usually near running water, at an elevation of 300-1,000 feet.

15. 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 2-6 in. l., ¾ in. br. at the base, narrowed gradually to a blunt or acuminated point, cut down throughout part way 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; *rachis* stout, clothed with reddish-brown wooly 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.

A variety A. *horridum* has the st. and rachis naked, and is more deeply cut, the lobes wider apart. Found at an elevation of 1500-2000 feet in forest.

16. A. *adiantum-nigrum*, Linn.; *st.* tufted 6-9 in. l., nearly naked, polished, chestnut-brown; *fr.* 3-12 in. l., 2-6 in. br., subdeltoid, with numerous *pinnæ* on each side, the lower ones deltoid, 2-3 in. l., 1½-2 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 spathulate segments, sharply toothed round the outer edge; *texture* coriaceous; *rachis* polished and chestnut-colored below, upwards winged and compressed; *veins* obscure, oblique; *sori* copious, at last occupying the whole under surface of the segm.—β. *Gaudi-chandianum*, Hk.; *texture* very thick; *pinnl.* distant, lanceolate, with small distant oblong-spathulate ult. segm.

Found at an elevation of 500-6000 feet.

17. A. *dissectum*, Brack.; *st.* 6-9 in. l., firm, erect, grayish, naked; *fr.* 6-18 in. l., 2-6 in. br., cut down to the rachis into numerous lanceolate-deltoid *pinnæ* on each side, the lowest of which are 3-6 in. l., 1-2 in. br., *pinnl.* and *segm.* distant, subdeltoid, the latter cut into narrow linear ult. divisions, 1½ lin. l., ½ lin. br., acute or acutely toothed at the apex; *texture* subcoriaceous; *rachis* firm, grayish; *veins* one in each ult. division; *sori* usually solitary.

Fonnd at an elevation of 5-7000 feet.

18. 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., 1-1½ 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, grayish, nearly naked; *veins* fine, conspicuous on the upper surface; *sori* linear, subflabellate.

A form of this plant is every way larger than the above and more divided, having ultimate segm. smaller. Found at an elevation of about 5000 feet.

19. A. *furcatum*, Thunb.; *st.* tufted 4-8 in. l., firm, erect, clothed with deciduous woolly hairs; *fr.* 3-18 in. l., 2-6 in. br., with 12-20 *pinnæ* on each side, which are lanceolate-deltoid in general outline, 1-3 in. l., ¾-1 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.

Found at an elevation of 500 to 8000 feet.

20. A. *affine*, Swartz; *st.* 6-12 in. l., firm, erect, gray, naked; *fr.* 12-30 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., 1½-2 in. br. (i. e. the pinnæ), which are again inciso-serrate or deeply lobed; *texture* subcoriaceous; *rachis* firm, naked, rough; *veins* subflabellate; *sori* copious, linear.

Found at an elevation of 3-4000 feet. Caudex black, small, rigid and rough. Various in cutting.

21. A. *varians*, Hk. and 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., ¼-¾ 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; *vcins* one carried into each tooth; *sori* copious, when mature covering nearly the whole under surface of the pinnl.

Found at an elevation of 3 or 4000 feet.

22. A. *acuminatum*, Hk. and Arn.; *st.* subtufted, 6-9 in. l., strong, erect, grayish, deciduously-paleaceous; *fr.* 1-3 ft. l., 9-18 in. br., with very numerous close placed lanceolate-oblong *pinnæ* on both sides, which are 4-9 in. l., 1½-2 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, grayish; *veins* fine, close, deep-channeled; *sori* in two rows in the upper part of the pinnl., often diplazoid.

Found in dense forest.

Asplenium §§§ Darea §§§§ Athyrium.

Darea, Juss, (*Coenopteris*, Bory). *Veins simple, ultimate divisions of the frond narrowly linear; sori linear or linear-oblong, marginal or submarginal.*

23. * 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.

§§§§ Athyrium, Roth. *Veins free, sori more or less curved, sometimes horse-shoe shaped.*

24. A. (Athyr.) *deparioides*, Brack.; *st.* 12-18 in. l., firm, erect, smooth, grayish; *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 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, curved.

Found near streams in deep gulches.

25. (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.; (segm. again deeply divided) *texture* herbaceous; color dark-green; *both surfaces* naked; *rachis* stramineous, slender; *sori* copious, oblong, the lower ones curved (!) β. *A. scandicinum*, Presl; *frond* larger and more finely cut; *segm.* deeply pinnatifid, with narrow linear divisions, the whole breadth of which the sori sometimes occupy.—*A. multisectum*, *Brack.*

A. aspidioides a cannot be common, as I have never seen it as described, but think it should be taken as qualified by what is included in parenthesis, then *B.* finishes the two varieties. It is probably *A. multisectum* of Brack. Found at an elevation of 2-4000 feet. A. multisectum is found only on Kauai.

ASPLENIUM §§§§§ Diplazium.

26. (Athyr.) *brevisorum*, Wall.; *st.* 12-18 in. l., erect, slender, naked, grayish; *fr.* 2-3 ft. l., 9-18 in. br.; *lower pinnæ* 1 ft. or more l.; *pinnl.* lanceolate, distant, 2-3 in. l., 1-1½ in. br.; *segm.* lanceolate, ¾ 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 regular rows near the midrib, the lower ones curved, often double.

This is a very imperfect description of the fern supposed to be meant—one of the most common in the islands. In fact *A. arborescens*, Mett., comes nearer. It is not in the catalogue of S. I. ferns by H. Mann. It is often double the size given above; *st.* stout; ult. *segm.* rhomboidal; veins simply-pinnate. It is widely disseminated, and resembles in habit and general appearance *A. Sandwichianum, A. Arnottii, and A. latifolium.* It is distinctly diplazoid.

§§§§§ Diplazium, Swartz. *Veins free, the sori and involucres extending to both sides of some of them.*

27. A. (Dipl.) *sylvaticum*, Presl.; *caud.* decumbent; *st.* 1 ft. l., firm, erect, brownish, naked, scaly at the base; *frond* 1-2 ft. l., 6-10 in. br., ovate-lanceolate, with numerous spreading *pinnæ*, the largest 3-6 in. l., ½-¾ in. br., the point acuminated, the edge broadly lobed half way to the rachis, 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* reaching nearly to the edge.

Found in deep gulches and dense forests 400-3000 feet.

28. A. (Dipl.) *Shepherdi*, Spring.; *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., 1-1½ in. br., the point acuminate, the edge lobed above, the lobes at the base sometimes reaching down to the rachis, ¼ in. br., and somewhat toothed; *texture* herbaceous; *color* bright-green; *rachis* rather slender, greenish, naked; *veins* pinnate in the lobes; *sori* long, linear, not reaching the edge.

Our plant does not fully answer to this description, is smaller and more fragile, middle and lower *pinnæ* distictly stalked; one series of long curved sori near the rachis, another series short, extending near the edge of the lobes. Found in sharp gulches at various elevations.

29. A. (Dipl.) *latifolium*, Don; *caud.* erect, subarborescent; *st.* tufted, strong, erect, 1 ft. or more l., livid, smooth, clothed towards the base with linear-crisped 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., ⅝ 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.

The fr. is often 2 ft. or more br., the largest *pinnæ* sometimes 18 in. l., 6-8 br.; largest *pinnl.* 3-4 in. l., 1 in. br.; sori curved. Found at an elevation of 3000 feet.

30. A. (Dipl.) *Arnottii*, Baker; *st.* smooth, angular, brownish; *fr.* ample; *lower pinnæ* 9-12 in. l., 6-8 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 ½ in. deep, ¼ in. br., with a space between them; *texture* herbaceous; *rachis* slender, naked; *veinlets* 5-8 on a side, nearly all branched, the lower ones subpinnate; *sori* copious, nearly all diplazoid and filling up when mature nearly the whole surface of the lobes.

Found along with *A. latifolium*, etc.

31. A. (Dipl.) *Sandwichianum*, Mett.; *st.* 2 ft. l., firm, dark-brown, tomentose, furnished at the base with ovate-lanceolate scales, dark-brown in the center, and a broad margin suddenly scariose; *fr.* 2-3 ft. l., 1½-2 ft. br., *lower pinnæ* 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; *color* 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.

The sori of this plant are supposed to be nearer the edge than midrib, those of *A. brevisorum* are nearer the midrib than the edge, and those of *A. Arnottii* about equally distant from both midrib and edge. No Sandwich Island plant answers fully to the description of any one of them, and it is difficult to draw a line between several of the species—if indeed they are distinct.

32. * A. *parallelum*, Baker; *st.* naked 2-2½ ft. *fr.* deltoid, 1½-2 ft. l., bipinnate; *rachises* gray, naked; *lower pinnæ* deltoid, stalked, 7-8 in. l.; *pinnl.* linear, entire, 2-3 in. l., gradually narrowed to a cuneate sessile base, and an acute point, slightly cut away on the lower side; *texture* subcoriaceous; *surfaces* naked, gray-green; *sori* erecto-patent, simple, parallel, nearly touchlng both edge and midrib; *inv.* broad, persistent. A. bipinnatum Hill, M. S. S.

33. * A. (Dipl.) *grammitoides*, Hk.; *rhizome* wide-creeping; *scales* copious, lanceolate, brown, membranous; *st.* gray-stramineous, 3-4 in. l., scaly throughout; *fr.* lanceolate, 6-9 in. l., bipinnatifid; *rachis* stramineous, copiously scaly, winged in upper half; lower *pinnæ* distant, free, subpetiolate, lanceolate ¾-1 in. l., ¼ in br., much reduced on lower side, cut down to a broad wing into close subentire lobes, lower anterior largest; *texture* moderately firm; *ribs* below rather scaly; *veins* pinnate in lower lobes; *sori* oblong, most in a row oblique close to midrib of pinnæ.

D. Solanderi, Carruth, from the Sandwich Islands, differs by its nearly naked stem and rachis.

34. A. (Dipl.) *sorzogonese*, E. B.; *st.* tufted, 4-6in. l., erect, fibrillose; *fr.* 2-3 ft. l., lanceolate; middle *pinnæ* 3-4 in. l., ¾ in. br., linear-lanceolate, acuminate, cut down regularly throughout two-thirds of the way to the rachis into spreading, subentire blunt or rhomboidal lobes, which are about 2 lin. br.; *texture* herbaceous; *rachises* erect, fibrillose; veinlets of the lobes simple; *sori* oblong, in regular rows, reaching neither midrib or edge.

This is very near *A. sorzogonese*, Presl.; from which it differs by its greater size, and the difference in position of the sori. Found at an elevation of 7000 feet.

ASPIDIUM § Polystichum.

ASPIDIEÆ.

Sori dorsal, subglobose, rarely elliptical. Involucre superior, similar in shape to the sorus, fixed either by the center or a sinus.

GEN. ASPIDIUM.

Sori subglobose, dorsal or terminal on the veinlets. Invol. orbicular or cordato-reniform, attached by the centre or sinus. The two genera, Aspidium and Nephrodium, are both included under this genus, otherwise many species might be placed in either with equal propriety.

§ Polystichum, *Roth. Veins all free. Texture more or less coriaceous in most, and teeth usually awned.*

1. 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., ½-¾ in. br., *pinnl.* ovate-rhomboidal, unequal-sided, auricled on the upper side at the base; *teeth* aristate; *texture* subcoriaceous; *rachis* straw-colored, more or less scaly; upper surface naked, glabrous; under *surface* slightly fibrillose; *sori* principally in two rows nearer the midrib than the edge.

Found at an elevation of 5-8000 feet.

2. A. (*Polyst.*) *Haleakalense* (Hilleb?) E. B.; *st.* tufted, 3-5 in. l., flaccid, densely clothed with ovate-lanceolate acuminate and fibrillose very pale-brown scales; *fr.* 6-12 in. l., 1¼-3 in. br., lanceolate; *pinnæ* oblong-lanceolate, acuminate, ⅝-1½ in. l., ¼-½ in. br.; *pinnl.* rhomboidal, deeply incised, aristate; *texture* herbaceous; *rachis* light straw-colored, densely clothed with scales like the stipe; both *surfaces* and the rachis also densely fibrillose; *sori* usually covering the whole under surface of the pinnules.

This plant is to be distinguished from *A. aculeatum* by its much smaller size, flaccid character, herbaceous texture, lighter color, by both surfaces being fibrillose, and the genarally greater elevation at which it grows—7-9000 feet, though both are often found in the same locality.

§§ Cyrtomium, *Presl. Veins sometimes, but not invariably uniting slightly towards the edge.*

3. A. (Cyrt.) *Boydiæ*, Eaton; *st.* small, tufted; *fr.* somewhat spreading, chartaceous, bare, simply pinnate; *pinnæ* 8-9 lin. l., 2-2½ lin. br., lanceolate, crenate, obtuse, lower side cuneate at the base, upper somewhat dilated, almost auriculate; terminal pinnæ deeply cut; *veins* pellucid, mostly joined in a series of arches as in Cyrtomium, but some are free; *sori* large and remote from the margin; indusium round, smooth, with a crenate margin, fixed by the centre where it is depressed; *sporanges* circular, with 15-16 articulations.

Found in the valleys of Oahu at an elevation of 80-100 feet above the sea.

4. 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. hr., 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; β A. *caryotideum* (or carytoideum), Wall.; *pinnæ* sometimes larger, sharply toothed, slightly lobed, sometimes auricled on both sides at the base; upper *surface* opaque.

Found in forest at 500-3000 feet elevation.

§§§ Lastrea, *Presl. Veins all free.*

5. * A. (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., ¼-¾ 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.

N. B.—This is doubtful, but another (Aspidium patens. Sw. Syn. Fil., p. 49, Haw. Is.) is given on the authority of H. Mann.

6. A. (Last.) *globuliferum*, Hk.; *st.* tufted, smooth, naked, glossy; *fr.* 1½-2 ft. l., 1 ft. br.; *pinnæ* 4-6 in. l., ¾ in. br., cut down to a broadly-winged rachis into close, distinctly-crenated lobes 1½-2 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.

Found on the steep sides of gulches at 500-3000 feet elevation, and from 3-4 inches to 8 feet in length, of beautiful bright-green color.

7. A. (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., ¾-1¼ in. br., cut down very nearly to the rachis into close, blunt, regular subentire lobes 1½-2 lin. br., lower ones rather shorter than the others; *texture* herbaceous; *rachis* more or less scaly, under surface naked; lower *veins* subpinnate; *invol.* large, convex.

There is considerable diversity in color, size, and even form of this species, and some are very densely clothed with light scales, possibly the Var. *paleaceum* of Mann and Brigham, which is found at an elevction of 7-8000 feet, while the *a* is found lower down—4-6000 feet.

8. A. (Last.) *aristatum*, 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.

Found at an elevation of 5-7000 feet.

9. A. (Last.) *rubiginosum*, Hk.; *st.* 1 ft. l., densely clothed with large linear scales at the base, and upwards with spreading smaller ones *(cilia)*; *fr.* 12-18 in. l., 1 ft. br., subdeltoid; *pinnæ* 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* fibril lose; *sori* close to the midrib.

N. B.—The stipe, when young, densely bristling with cilia. Found at an elevation of 4-5000 feet.

10. A. (Last.) *squamigeram*, Hk. and Arn.; *st.* tufted, 1 ft. l., clothed throughout with pale lanceolate scales; frond 12-18 in. l., 6-9 in. br., ovate-deltoid; *pinnæ* 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.

Found in deep gulches at an elevation of about 500 feet.

11. A. (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.* ½ in. br., close, lanceolate-acuminate, cut down about half way to the rachis into blunt, entire *lobes* ¼ in. or more br.; *texture* herbaceous; under *surface* mealy, with fine glands; rachises slightly scaly; *veinlets* of the lobes simple; *sori* large; *invol.* ¾ lin. br.

Found along with the last. Usually smaller than the description gives it.

12. A. (Last.) *viscidum*, E. B.; *st.* subtufted, about 1 ft. l., erect, grayish or brown, clothed with brown lanceolate scales, especially below; *fr.* 8-14 in. l., 6-12 in. br., deltoid, tripannatifid; lower *pinnæ* largest, deltoid-lanceolate, stalked; *pinnl.* distant, deltoid-lancelate, the lowest ones largest, cut down below into oblong, blunt *segm.* which are again deeply cut into blunt lobes with aristate teeth; *texture* herbaceous; *color* bright green; the rachises veins and both *surfaces* are thickly laid with minute viscid glands, and when young with cilia; *sori* one near each sinus between the lobes; indusium kidney-shaped.

This has been called *A. aristatum*, and A. glabrum, but it is very different, and well merits the above description. Found at an elevation of 2-4000 feet.

13. A. (Last.) *glabrum*, E. B.; *st.* 4-8 in. l., erect, grayish, densely clothed with dark chestnut-brown scales, which are broadly lanceolate, acuminate; *fr.* 10-20 in. l., 4-12 in. br., lanceolate, deltoid, ovate or rhomboidal in shape, tripinnatifid; *pinnæ* numerous, spreading, deltoid-lanceolate, the lowest ones longest, stalked, sometimes erecto-patent and much elongated; *pinnl.* sub-

distant, spreading, deltoid-ovate, blunt, cut down below into linear-oblong, blunt *segm.* with 2-3 aristate points on the end; *texture* subcoriaceous; *color* light-green; rachises channeled on the upper side, densely clothed on the lower side with dark chestnut-brown scales, which are lanceolate, subulate; both *surfaces* naked; *veins* dark, prominent, branched; *sori* in rows nearer the midrib than the edge; *invol.* attached by the sinus; sporangia with 15-16 rings. β. A. *hirsutum*, E. B.; *st.* brownish, flaccid, 6-10 in. l., densely clothed with very dark-brown linear scales; *fr.* ovate-lanceolate, 6-10 in. l., 3-5 in. br., bipinnatifid; *pinnæ* somewhat distant, lanceolate, middle pinnæ longest, 2-3 in. l., ⅝-1 in. br. cut down to the rachis below into rhomboidal more or less crenated, broad, blunt *pinnl.*; *texture* herbaceous, both surfaces naked; all the rachises channeled above, and densely fibrillose on the under side with very dark scales; color dark livid-green; *veins* dark, prominent, branching; *sori* midway between midrib and edge; *invol.* fugacious; sporangia with 15 rings.

A is found in the open edge of the forest at an elevation of 4-6000 feet; *B* at about the same elevation, in very dense forest, near streams. It seems unaccountable they should not have been commonly described, being abundant and very accessible, especially the former, but they answer to no fern hitherto described.

14. A. *unitum*, R. Br.; *st.* 12-18 in. l., brownish, naked; *fr.* 2 ft. or more l., 6-8 in. br.; *pinnæ* 4-5 in. l., ½ in. br., the edge cut from a third to half-way 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.

Grows mostly in wet places, often in running water, from 2-300 feet to 3000 feet elevation.

ASPIDIUM §§§§§ SAGENIA.

15. A. *cyatheoides*, Kaulf.; *st.* 1-2 ft. l., strong, naked, glossy, grayish; *fr.* 2-3 ft. l., 1 ft. or more br.; *pinnæ* close, spreading, 4-6 in. l., ¾-1 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.

Found in moist situations at various altitudes.

16. A. *truncatum*, Presl.; *st.* tufted, stout, erect, 2 ft. l., grayish, 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 of the distance or more 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. *N. Hudsonianum*, Brack.

Found in shady forest at an elevation of 500-1000 feet.

§§§§§ Sagenia *Presl. Veins anastomosing copiously, usually with free included veinlets. Pinnæ and segments ample.*

17. A. (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 *pinnæ* 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.—β. A. apiifolium, Hk. & Arn.; larger and more compound; lower *pinnæ* deltoid, 1 ft. or more l.; *rachis* broad-winged above, often free below; *sori* sometimes immersed.

I know not why one particular form should be designated as a variety while the forms are numerous, and the mature fronds vary from 2 in. l., almost entire to 3 ft. l., with fine divisions. Found on damp rocks near water —often in caves.

Gen. Nephrolepis.

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 pinnæ articulated at the base and often very deciduous in the dried plant* (made to ad-

here by plunging in boiling water E. B.) *with white cretaceous dots on the upper surface.*

1. N. *cordifolia*, Presl.; *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.; *pinnæ* close, often imbricated, about 1 in. l., ½-⅝ 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.

N. B.—The pinnæ are rather linear than cordate, and blunt and ¼ in. br.; *st.* and rachis often densely paleaceous.

Found at about 2000 feet elevation.

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, 1½-3 in. l., ¼-½ 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.—β *N. hirsutula*, Presl; *rachis* densely and both surfaces more or less coated with ferruginous down.

Found in a great variety of situations and altitudes, some of which effect a change in its coat probably, whence *B.*

POLYPODIEÆ.

Sori on the back of the lobes, round or rarely oblong, not more than twice as long as broad.

Gen. Polypodium.

Has the same character with the tribe. (Non indusiate).

§ Phegopteris. Venation of Lastrea i. e. veins free.

1. * 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.

Found on a Kauai mountain.

2. 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, 5-9 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.

Found at an elevation of 1-3000 feet.

3. 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* one to each lobe near the upper edge.

Found at an elevation of 2-3000 feet. Much more finely cut in some places than others.

4. P. (Pheg.) *Hillebrandi*, Hk.; *st.* 2 ft. or more l., stout, clothed below with deociduus 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 pinnatified *segm.* 3-4 in. l., ¾ in. br.; ult. entire lobes ¼ in. br., blunt; *texture* papyraceo-herbaceous; *color* dark-green; under *surface* sprinkled over with pellucid glands; *veinlets* of the lobes 6-8 on one side, mostly forked; *sori* large, submarginal.—Most like *N. Latifrons* in general habit.

Found at an elevation of about 3000 feet.

5. P. (Pheg.) *punctatum*, Thun.; *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.

Found at an altitude of 3-6000 feet. It has the general appearance of a robust *Pteris aquilium.*

6. P. (Pheg.) *Sandwicense*, 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., 1½ 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 near the base of each lobe.

Found at about 3000 feet elevation.

7. P. (Pheg.) *Keraudrenianum*, Gaud.; *st.* ¼ in. thick or more, stramineous or brownish, polished; *fr.* 12-15 ft. l., subscandent; *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.

Found at an elevation of 500 to 3000 feet.

§§ Goniopteris, Presl. *Veins pinnate, with the lower veinlets of contiguous groups joining.*

8. P. (Goniopt.) *stegnogrammoides*, Baker; *caud.* subarbonescent; *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. Sandwicense, Hk.*, Sp.—*Stegnogramma, Brack. P. microdendron*, Eaton. (Sometimes 4-7 ft. l.)

§§§ Eupolypodium. *Veins free.*

9. P. *Hookeri*, Brack.; *st.* tufted 1 in. or less l., clothed with soft spreading hairs; *fr.* 3-5 in. l., ¼-⅜ 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.—*B* P. *stipatum; st.* 2-3 in. l., and with the whole plant more densely clothed with hairs 1 lin. l.

a found on the trunks of trees at an elevation 3-5000 feet. *B* is found in tufts on steep banks at about the same elevation.

10. 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.

Found growing in imbeded moss on the trunks of trees at 2-3000 feet elevation.

11. *serrulatum*, Mett.; *rhizome* wide-creeping fibrillose; *st.* tufted, short, slender, naked; *fr.* 3-6 in. l., 2-3 lin. br. (1-1½ lin. br.), the upper part, sometimes the whole, subentire, but more usually pectinato-pinnatifid with erecto-patent lobes; *rachis* subrigid, flexuose; *texture* coriaceous; *both sides* nearly naked; *sori* oblong, confluent.

This has the habit of *P. gramineum*. Found on the upper part of branches of tree-trunks at an elevation of 4-5000 feet.

12. P. *subpinnatifidum*, Bl.; *fr.* tufted, subsessile, 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.

13. P. *sarmentosum*, Brack.; *st.* subtufted, 1 in. or less l.; *fr.* 3-6 in. l., 1-2 in. or less br., the point caudate, cut down nearly to the rachis into erecto-patent blunt entire or slightly crenated *pinnæ* ⅛ 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.

Grows on tree-trunks at an elevation of 3-5000 feet.

14. P. *adenophorus*, Hk. and Arn.; *fr.* subsessile, flaccid, pendulous, 6-12 in. l., ¾-1 in. br., cut down nearly or quite to the rachis into acute slightly sinuated horizontal or even rather decurved pinnæ ⅛ 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.

Very near the preceding in locality, make and habit.

15. *P. *decorum*, Brack.; *rhizome* creeping, densely clothed with linear scales; *st.* 1 in. or less l., rigid, naked; *fr.* 6-12 in. l., ½-1 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 two rows of 4-6 each, filling up the whole space between the midrib and edge.

16. 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* ¼-⅜ in. br.; *texture* coriaceous; *rachis* and both sides naked; *veinlets* pellucid, subpinnate; *sori* large, prominent.—*P. myriocarpum* Hk. is a form with pinnatifid pinnæ.

Sometimes the pinnæ are subdistant and sometimes closely imbricated and tortuous. Found from 1 to 5000 feet elevation. The smooth varieties are found climbing, whereas the imbricated var. grows in the ground.

17. P. *hymenophylloides*, Kaulf.; *rhizome* fibrous, very slender; *st.* one inch or less l., densely tufted, very slender; *fr.* 2-4 in. l., ¼-⅜ in. br.; *pinnæ* 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* one to each lobe; *sori* terminal.

Found on trunks of trees at an elevation of 3-4000 feet.

18. P. (Adenophorus) *abietinum*, Eaton; small, delicate, sprinkled with reddish glandular points; *caudex* paleaceous, short, recumbent; *rachis* hairlike, flexuose; *fr.* 1-3 in. l., very delicate, conspicuously bipinnate, ovate-oblong; *pinnæ* oblong, finely divided to the costa; *pinnl.* less than a lin. l., 1/6 lin. br. with a *vein* in each having a sorus near the end, which is much broader than the segm.

Perfectly distinct from *P. hymenophylloides* and much more delicate than *P. tamariscinum*, from which its hairlike, flexuose rachis will also distinguish it. Found on trees on Oahu at an elevation of 3000 feet, and at Hanalei, Kauai.

19. P. *tamariscinum*. Kaulf.; *rhizome* stout, creeping, scaly; *st.* 2-3 in. l., naked, wiry, flexuose; *fr.* 4-8 in. l., 1½-3 in. br., ovate-lanceolate; *pinnæ* close, erecto-patent, ¼-⅜ in. br., cut down to the rachis into simple or forked linear or oblong lobes; *texture* subcoriaceous; both *surfaces* naked; *veinlets* one to each lobe; *sori* copious, placed near the apex of the lobes. Adenophorus, *Hk.* and *Gr.*

A. tripinnatifidus Gaud., is a form with forked or subpinnatifid lobes; "*P. Hillebrandii* is probably a luxuriant form of this species."

NOTE.—The above descriptions of *P. tamariscinum*, etc., confound two or three very distinct plants, which in general appearance are somewhat alike. One of them is mostly fixed in its character, the other is more varied. Assuming *P. tamariscinum* for the name, the description of one of them is thus:

P. tamariscinum; *rhizome* stout, densely clothed with ferruginous scales; *st.* ¼ in. l., stout, erect, furfuraceous; *fr.* 2-5 in. l., ¼-1 in. br., lanceolate, bipinnate; *pinnæ* close, oblong ¼-⅝ in. l., ⅛ in. br.; *pinnl.* ½-⅔ lin. l., 1/6 l. br., oblong-ovate; *texture* coriaceous; rachises covered with brown, close-pressed furfuraceous scales; both *surfaces* covered over with minute viscid glands; *veinlets* one to each lobe, immersed; *sori* very large, placed one at the end of each pinna.

Grows on tree-trunks or large branches at an elevation of 3-5000 feet.

20. *Var. Hillebrandi*, *rhizome* wiry, very dark-colored, scaly; *st.* scattered ½ in. apart on the rhizome, 2-5 in. l., erect, wiry,

slightly covered with very minute adhering scales; *fr.* 6-12 in. or more l., 1½-3 in. br., ovate or oblong-lanceolate; *pinnæ* close, erecto-patent, ¼-⅜ in. br., cut down to the rachis into linear-oblong lobes which are sometimes again cut down nearly to the rachis into similar lobes; *texture* subcoriaceous; rachises covered like the st.; both *surfaces* naked; *veinlets* one to each lobe; *sori* small, placed one to each lobe a little short of the end.

§§§§ 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.*

21. 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., ¼-¾ 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. A small marked plant with a long list of synonyms.

Found in almost any situation sufficiently damp below 6000 feet, but there are at least two marked varieties.

22. * 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., ½-1 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. β, *P. salicifolium*, Willd.; *fr.* narrower, the sterile and fertile ones nearly or quite uniform.

More rigid and coriaceous in texture than the rest of the group, but the veinlets raised and usually quite distinct.

23. (Phym.) *spectrum*, Kaulf.; *rhizome* woody, wide-creeping, the scales black, subulate, diciduous; *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.

Found in damp forest at 500-3000 feet elevation.

GEN. GYMNOGRAMME.

Sori arising from the veins over the under surface of the fronds linear or linear-oblong, simple or forked.

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., ½-3 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.

Found in open forest at an elevation of 2-4000 feet.

GEN. VITTARIA.

Sori in continuous marginal or slightly intra-marginal lines. *A small genus almost entirely tropical, with free veins and grass-like fronds of subcoriaceous texture. The species are very difficult of discrimination.*

V. elongata Sw.; *fr.* 6-18 in. l., ⅛-¼ 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 intra-marginal veinlet; *sori* quite sunk in a marginal groove, with two nearly equal lips which open outwards.

Found mostly growing in the large forks of tree-trunks at an elevation of 500-2500 feet.

GEN. ACROSTICHUM.

Sori spread over the whole surface of the frond or upper pinnæ, or occasionally over both surfaces, not confined to the veins only. Fronds dimorphous in all the Sandwich Island varieries.

1. A. *micradenium*, Fee; *rizome* slender, wide-creeping, the scales small, linear-subulate, squarrose, dark chestnut-brown; *st.* 1 in. or more apart, 3-6 in. l., firm, erect, naked, stramineous; *barren fr.* 5-6 in. l., 1-1¼ in. br., the point acuminate, the base narrowed gradually; *texture* herbaceous; both *sides* naked; *veins* raised conspicuous, usually once forked; *fertile fr.*, much smaller than the barren ones.

Found among mosses on tree-trunks at an elevation of 3-4000 feet.

2. A. *conforme*, Sw.; *rhizome* woody, wide-creeping, densely clothed with large lanceolate-brownish membranous scales, sometimes ¼ in. l., 1 lin. br., *st.* 1-12 in. l., firm, erect, stramineous, naked or slightly scaly; *fr.* 2-9 in. l., ¼-2 in. br., the point acute or bluntish, the base cuneate or spathulate, 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. *A. æmulum*, Kaulf, etc., are small, narrow-fronded varieties.

Found at an elevation of 4-8000 feet.

3. 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.

Found at an elevation of 1500-8000 feet. All the Sandwich Island species of Acrostichum are epiphytic, though some are also epigæous.

4. A. (Aconiopteris, Presl.) *gorgoneum*, Kaulf.; *st.* tufted (!) (*rhizome* stout), firm, erect, 1-2 in. l., passing gradually into the *barren fr.*, which is 6-15 in. l., 2-3 in. br., (1½-3 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.

Found at an elevation of 2-4000 feet.

5. **A.** (Chrysodium, Fee) *reticulatum*, Kaulf.; *caud.* (*rhizome*) erect, woody, with large, narrow lanceolate ferruginous scales; *st.* of barren fr. 1-3 in. l., firm, erect; *barren fr.* 6-9 in. l., 1½ in. br., the point bluntish, the edge entire, the base subcuneate; *texture* (thick) coriaceous; *surfaces* naked; veins indistinct, fine, anastomosing copiously; *fertile fr.* like the other, but the st. 6-9 in. l.

Elevation from 1500-3000 feet.

GEN. SCHIZEA.

Caps. two-valved, opening down the side, crowned by a complete operculiform ring, sessile, in 2-4 rows, which cover one side of close distichous spikes, which form separate fertile segments at the apex of the fronds.

S. *robusta*, Baker; *st.* not very dense, dark-chestnut, 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 ½ lin. thick; *fertile segm.* suberect, unilateral, ¼-⅜ in. l., with 4-6 stout erecto-patent spikes on each side, the lowest ¼ in. l.

This may be a tropical form of *S. australis*. Found in very elevated, damp situations, growing in the ground.

SUB-ORD. MARRATTIACEÆ.

Caps. opening by a slit down one side, or a pore at the apex, without a ring, usually joined together in concrete masses (synangia).

GEN. MARRATTIA, Sm.

Caps. sessile or stalked, 4-12, concrete in a boat-shaped synangia, which consists of two opposite rows of capsules, and opens by slits down their inner faces.

§ Gymnotheca, *Presl.* *Synangia sessile, without an involucre.*

MARRATTIA—OPHIOGLOSSUM.

M. (Gymno.) *Douglasii*, Baker; *st.* 3-5 ft. l., thick, smooth or rough; *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., ¼ 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, submarginal, ½-¾ lin. l., the sides ultimately spreading, the attachment oblong.

Found at an elevation of 3-5000 feet, growing in rich soil. The base is fleshy and very sweet and nutritious when roasted. It was a resource with the people in time of famine.

SUB-ORD. OPHIOGLOSSACEÆ.

Caps. deeply two-valved, opening down the side nearly to the base, without a ring.

GEN. OPHIOGLOSSUM.

Caps. sessile, arranged in two rows so as to form a narrow, close spike.

1. O. *nudicaule*, L. fil.; *rootstalk* slightly tuberous; *fr.* 2-4 in. l. the sterile division placed not far from the base, ½-1½ in. l., ¼-½ in. br., ovate or oblong, without a haft or with only a slight one, the *texture* thin, but the veins not distinct; *fertile spike* ½ in. l., the peduncle often 2-3 in. l., very slender. Var. *O. concinnum*, Brack., of the Sandwich Islands, is most like this, but the barren segment is farther from the base of the stem.

The fertile segm. but partly overtops the barren one. Found on the side of a grassy sandhill not far from the sea. The rootstalk is more woody than tuberous.

2. O. *vulgatum* L.; *rootstalk* not tuberous; *st.* 6-9 in. l., the sterile division generally placed about the middle, *fr.* 2-4 in. l., ¾-2 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.

Found on the grassy slope of mountains.

§ Ophioderma, Endl. *Fertile spikes, usually single, arising from the centre of the barren segment.*

3. O. (Ophiod.) *pendulum*, L.; *fr.* pendulous, ribbon-like, without a distinct stem, 1-5 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.

Found growing from tree-trunks not far above the ground in a very damp atmosphere, such as is found in the bottoms of deep valleys.

GEN. BOTRYCHIUM, Sw.

Caps. sessile, arranged in two rows on the face of spikes which form a compound panicle.

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, ¼-⅜ in. br., finely toothed; *fertile peduncle* about equaling the sterile segm. when mature; *panicle* 2-4 in. l, tripinnate, not very close; *texture* thin.

Found growing in the ground, in forests, at an elevation of 500-2000 feet.

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