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Volume I contains descriptions of over 200 genera, and of more than 1200 species, chiefly natives of Southern California.

Volume 2 is largely devoted to an enumeration of the Californian flora, with synonymy and bibliographical references.

The plan is to reprint the earliest published description of every genus, species and variety of plant credited to the North American continent, and such excerpts from later works as supplement the original records.

Authority as a rule is to be cited for every name that has been referred to the synonymy of any other species.

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We are preparing lists as follows, which will be sent free on request as issued.

I.—BOOKS, new and old.
 II.—SHELLS, Marine, Land and Fresh Water.

III.—SEEDS.

IV.—CACTI and succulents.

V.—REAL ESTATE.

C. R. Orcutt, San Diego, California.

MEXICAN GRASSES.

Collected in Mexico by C. R. Orcutt during 1910, and determined by Dr. A. S. Hitchcock, of the United States Department of Agriculture.

AEGOPOGON GEMINIFLORUS HBK.

Orcutt 3925; Pachuca, Hgo, 5 S 1910.

Orcutt 4248; Xochimilco, DF, 3 O 1910.

AGROSTIS XIEMALIS subsp.

Orcutt 3744 et 4441; Tres Marias, Mex, 23 Ag 1910.

Orcutt 3953; Teziutlan, Pue. 6 S 1910.

AGROSTIS TOLUCENSIS HBK.

Orcutt 3789; Cima, Mex, 24 Ag 1910.

ANDROPOGON BAERINODIS Lag.

Orcutt 3687; S Angel, DF, 18, Ag 1910.

ANDROPOGON BREVIFOLIUS Sw.

Orcutt 4681; Alzada, Col, 4 N 1910.

ANDROPOGON INCOMPLETUS Presl.

Orcutt 4707; Tuxpan canyon, Col, 3 N 1910.

ANDROPOGON

Orcutt 4632; Alzada, Col, 4 N 1910.

ANTHOPHORA KERMAPHRODITA (L.) Kuntze.

Orcutt 4567; Colima, Col, 24 O 1910, 4709; Tuxpan canyon, Col, 3 N 1910.

ARISTIDA BEOMOIDES HBK.

Orcutt 4130; Telles, Hgo, 21 S 1910.

ARISTIDA KUMBOLDIANA Trin & Rupr.

Orcutt 3676; Olivar, DF, 17 Ag 1910.

ARISTIDA MANZANILLOANA Vasey.

Orcutt 4569; Colima, Col, 24 O 1910.

ARISTIDA SCABRA Kunth.

Orcutt 4463; Manzanillo, Col, 20 O 1910.

Orcutt 4633; Alzada, Col, 4 N 1910.

ARISTIDA TRINII Scribn.

Orcutt 3732; Ajusco, DF, 20 Ag 1910.

Orcutt 3863; Alarcon, Mor, 31 Ag 1910.

ARUNDINELLA DEPPEANA Nees.

Orcutt 3062; Sanborn, VC, 4 Mr 1910.

BLEPHARONEURON TRICHOLEPIS (T) Nash.

Orcutt 3796; Cima, Mex, 24 Ag 1910.

BRACHIARIA MEZIANA Hitchc.

Orcutt 3692; S Angel, DF, 18 Ag 1910.

BRACHIARIA PLANTAGINEA (Link) Hitchc.

Orcutt 3890; Cuernavaca, Mor, 31 Ag 1910.

Orcutt 4616; Colima, Col, 24 O 1910.

BRACHYPODIUM MEXICANUM Link.

Orcutt 3738; Tres Marias, Mex, 23 Ag 1910.

Orcutt 4005; Teziutlan, Pue, 7 S 1910.

BROMUS LACINIATUS Beal.

Orcutt 3722; Ajusco, DF, 19 Ag 1910.

BROMUS PROXIMUS Shear.

Orcutt 4037; Teziutlan, Pue, 7 S 1910.

BULBILIS DACTYLOIDES (Nutt) Rafin.

Orcutt 4148; Telles, Hgo, 21 S 1910.

BOUPELOUA BROMOIDES (HBK) Lag.

Orcutt 3675; Olivar, DF, 17 Ag 1910.

Orcutt 3885; Cuernavaca, Mor, 31 Ag 1910.

BOUPELOUA CURTIPENDULA (Michx) T.

Orcutt 3666; Olivar, DF, 17 Ag 1910.

3690; S Angel, DF, 18 Ag 1910.

BOUPELOUA FILIFORMIS Fourn.

Orcutt 3255; Coatbacoalcos, VC, 21 Mr 1910.

Orcutt 4568; Colima, Col, 24 O 1910.

BOUPELOUA OLIGOSTACHYA (Nutt) T.

Orcutt 3641; Tlalpam, DF, 16 Ag 1910.

BOUPELOUA PROSTRATA Lag.

Orcutt 3608; Olivar, DF, 15 Ag 1910.

Orcutt 3903; Pachuca, Hgo, 5 S 1910.

Orcutt 4153; Telles, Hgo, 21 S 1910.

BOUPELOUA REPENS HBK.

Orcutt 4459; Manzanillo, Col, 20 O 1910.

BOUPELOUA SCOREIODES Lag.

Orcutt 4107; Mexico, DF, 20 S 1910.

CATEPTECHUM STOLONIFERUM

Orcutt 4166; Rio Balsas, Gro, 26 Ag 1910.

CENCRUS CAROLINIANUS Walt.

Orcutt 4446; Tecoman, Jal, 20 O 1910.

CENCRUS VIRIDIS Spreng.

Orcutt 3074; Sanborn, VC, 10 Mr 1910.

CHAETOCHELOA CRIBBACHII S & M.

Orcutt 4342; Xochimilco, DF, 6 O 1910.

Orcutt 4481; Manzanillo, Col, 20 O 1910.

Orcutt 4428; Las Amates, Mor, 25 Ag 1910.

Var: AMPLEA S & M.

Orcutt 3697; S Angel, DF, 18 Ag 1910.

CHAETOCHELOA IMBERBIS (Poir) Scribn.

Orcutt 3861; El Parque, Mor, 31 Ag 1910.

Orcutt 3534 et 3535 Contreras, DF, 9 Ag 1910.

Orcutt 3237; Sanborn, VC, 24 F 1910.

Orcutt 3613; Olivar, DF, 15 Ag 1910.

Orcutt 4624; Alzada, Col, 4 N 1910.

CHAETOCHELOA SETOSA (Sw) Scribn.

Orcutt 4194; Rio Balsas, Gro, 26 Ag 1910.



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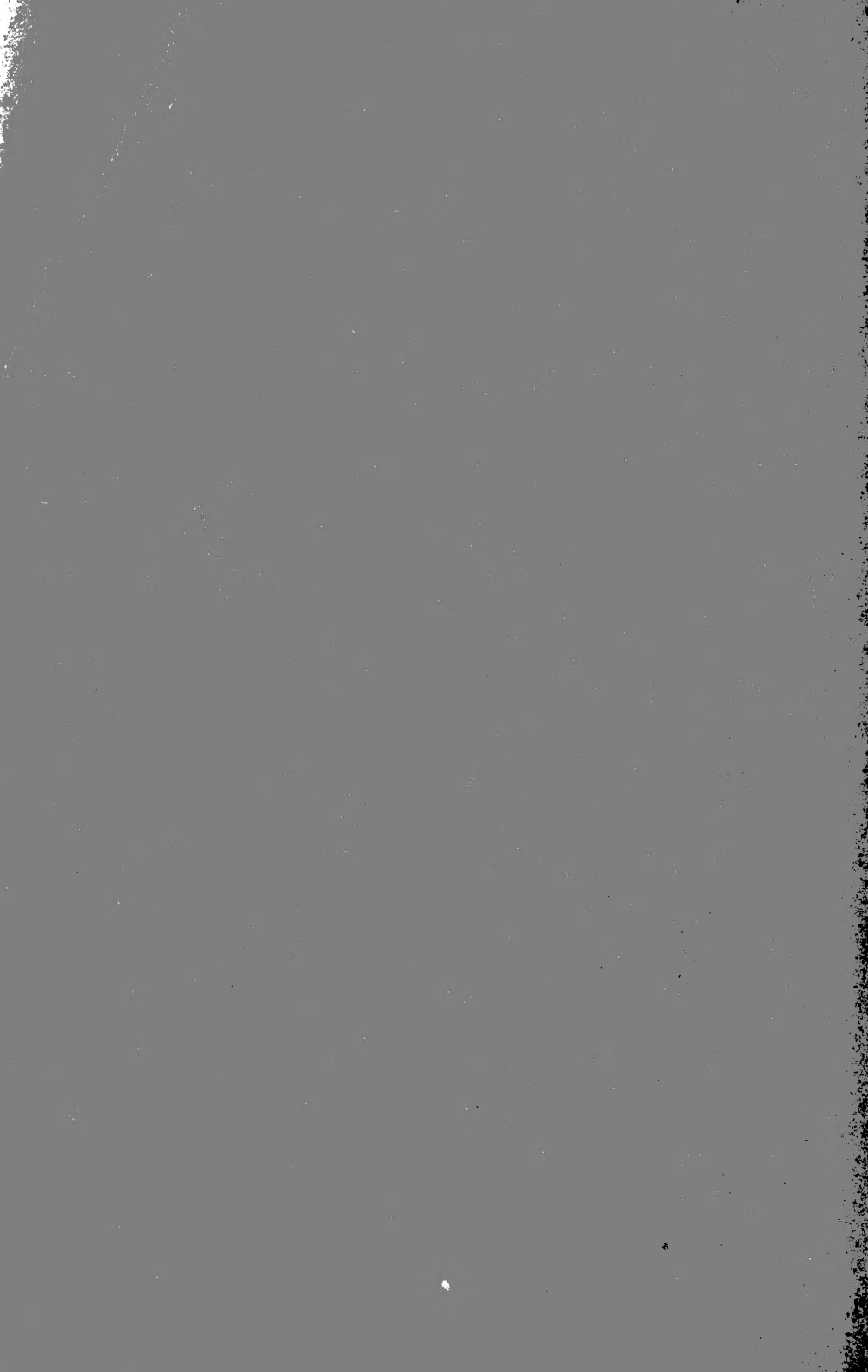
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FLOWERLESS PLANTS OF THE UNITED STATES

CRYPTOGAMOUS or flowerless plants, never bearing true flowers with stamens or pistils, are reproduced by minute homogenous bodies, called spores, in which there is nothing of the nature of an embryo. Botanists divide them into two classes, Acrogens and Thallogens.

ACROGENOUS PLANTS are those growing from the apex of a distinct axis, mostly with distinct leaves.

THALLOGENS are distinguished by having a growth chiefly peripheral and horizontal, without definite axis, mostly without leaves, and composed wholly of cellular tissue: the spores not developing a prothallus. The Thallogens include the three large orders, Lichenes, Fungi, and Algae, characterized from each other as follows:

LICHENES. Not parasite, on exposed surfaces, prostrate and crustaceous or frondose, or erect, containing chlorophyllose granules. Reproductive organs of two kinds, apotheca and spermatogonia.

FUNGI. Parasitic, wholly without chlorophyll, the organs of vegetation (mycelium) mostly subterranean or concealed, the reproductive very various in form and structure.

ALGAE. Aquatic, mostly submerged, not parasitic, always containing chlorophyll and usually highly colored. Reproductive organs very various.

ACROGENS are divided into two subclasses:

PTERIDOPHYTA, or **VASCULAR ACROGENS.** Plants with both woody and cellular tissue: reproductive organs of one or both sexes produced upon a prothallus developed from the spore.

CELLULAR ACROGENS. Plants with cellular tissue only: reproductive organs borne upon the stem or branches. These are commonly divided into four large orders, characterized as follows:

*Capsules mostly opening by a lid, containing num spores without spiral fibres.

MUSCI. Branches not regularly fasciated along the stem. Tissue of the leaves homogeneous. Spores of one kind.

SPHAGNACEAE. Branches regularly fasciated. Tissue formed of colorless cells and intermediate green linear ducts. Spores of two kinds. Pale flaccid bog plants.

**Capsule not opening by a lid: spores mixed with spiral fibres (elaters).

HEPATICAE. Stems procumbent, leafy with alt or distichous lvs, or thalloid.

***Sporangium consisting of a single spore surrounded by spirally arranged tubes.

CHARACEAE. Submerged aquatics, with whorled branches, consisting of tubular cells placed end to end.

PTERIDOPHYTA Cohn. Vascular Acrogens.

These are placed in two divisions.

I.—ISAPOROUS VASCULAR ACROGENS. Spores only of one kind, the prothallus bearing organs of both sexes. This group comprises the following orders:

EQUISETACEAE. Cylindric jointed hollow-stemmed plants, with toothed sheaths. Fructification in a terminal spike.

OPHIOGLOSSACEAE. Fronds often fern-like, erect in veneration. Sporangia globose, coriaceous, in special spikes or panicles.

FILICES. Ferns, with fronds circinate in veneration, bearing the fructification on the under surface or beneath the margin.

LYCOFODIACEAE. Club-Moss or Ground-Pine. Moss-like, terrestrial plants with small lanceolate or subulate, sometimes oblong or roundish, simple lvs, arranged in 2 to many ranks on trailing or sometimes erect, usually branching stems.

II.—HETEROSPOROUS VASCULAR ACROGENS. Spores of two kinds, one producing a prothallus with archegonia, the other smaller and containing antherozoids. This group contains the following orders:

SELAGINELLEAE. The two kinds of spores borne separately upon the upper side of the base of linear grass-like radical lvs or in the axils small lvs arranged in 4 ranks upon a stem.

MARSILIACEAE. Spores of both kinds together in peduncled capsules borne upon a rhizome. Lvs filiform or pedately quadrifoliate.

SALVINIACEAE. Small floating plants, the spores borne in separate capsules at the base of the frond.

ISOETACEAE. Lvs awl-shaped, tubular, containing the sporangia in their axils.

Order **OPHIOGLOSSACEAE** Lindley.

BOETRYCHIUM Swz. Grape-fern.

Sporangia in pinnate or compound spikes or panicles. Veins free. Spores copious, sulphur-yellow.

Section **EUBOTRYCHIUM** Bud enclosed in the base of the stalk.

*Vernation wholly straight.

E: SIMPLEX E. Hitchcock.

Plant 2-7' hi, fleshy; sterile seg stalked, varying in insertion from near the rtstalk to two-thirds the height of st. ovate, obovate or oblong, entire, incised, or pinnately parted into 1-3 pairs of roundish or semi-lunate lobes; fertile spike long-stalked, simple or ½-pinnate; spores largest of genus, closely covered with small points; bud smooth; apex of both sterile and fertile seg erect. New England, NY, northward.

Variety **COMPOSITUM** Lasch.

Sterile seg composed of 2 or 3 pinnately incised divisions. Wyo; Cal.

**Vernation partly inclined in one or both portions. 1—Buds smooth; sterile seg sessile or short-stalked; plant small, fr'ng in early summer.

E: LUNARIA Swz.

Moonwort. Plant 5-8' hi, fleshy; sterile seg nearly sessile, borne near the middle of stalk, oblong, simply pinnate with 5-15 lunate or fan-shaped lobes which are crenate, incised, or entire, close and overlapping, or distant; fertile seg bi-tri-pinnate, panicle, about the height of the sterile. Apex only of sterile seg bent over and outside of the nearly straight fertile seg in veneration; divis-

ions of sterile frond arranged nearly perpendicularly. Ct; NY; Mich; Colo; BC.
B: BOREALE Milde.

Plant 2½-7' hi, smooth, fleshy; sterile seg placed above the middle, sessile, cordate, ovate or deltoid, pinnately parted, acute; lowest seg spreading from a narrower base, ovate or cordate-ovate, acute, all entire, or here and there flabellately incised with acute lobes, or pinnately parted; secondary seg from a narrowed base, ovate, acute, serrate, the upper spreading, quickly decreasing, finally elliptical, acute; fertile seg bi-tripinnate, panicle. Apex of sterile seg bent over inside of the nearly erect fertile one in veneration; division of the sterile seg arranged on an angle. Un-Alaska.

B: NEGLECTUM Wood.

Plant 2-12' hi, usually fleshy; sterile seg placed above the middle, short stalked or sessile, ovate or oblong, pinnately parted into ovate-oblong, obtuse, rounded, entire, incised, pinnatifid, or pinnately parted seg, the narrow divisions linear; fertile seg 1-3-pinnate, panicle, often very much branched; spores thickly covered with large rounded warts. Apex of both segments turned down in veneration; sterile seg clasping the fertile with its apex overlapping the whole. New England; NY; Ohio; Mt Peddo, Washington (Suksdorf). Synonym: *B. matricariaefolium* A. Br. fide recent authors.

**II.—Buds pilose; sterile seg usually long-stalked; plant larger, fr'ng in autumn.

B: TERNATUM Swz.

Frond fleshy, the common stalk very short; sterile seg broadly pentagonal or triangular, ternate; the 3 primary divisions also stalked, as broad as long, pinnately decompound; ultimate divisions varying from round-reniform to triangular-lanceolate, entire or variously toothed and incised; fertile seg long-stalked, bi-quadrifid. Apex of both seg bent down, with a slight curve inward in veneration. New England; Canada; BC; Fla; Wash; Cal. Synonyms: *B: australe* R. Br.—*B: lunarioides* Swz.—*B: fumarioides* Willd.—*B: decompositum* Mart & Gale.—*Osmunda ternata* Humboldt.—*Botrychium lunarioides* Mich.

Variety **OBLIQUUM** Milde.

Form 6-17' hi, with more compound fructification and with divisions of sterile seg oblong or lanceolate and obtuse or oblique at base.

Variety **DISSECTUM** Milde.

Form with divisions of sterile seg laciniately cut into narrow teeth.

**Vernation wholly inclined, in the fertile seg recurved.

B: LANCEOLATUM Angst.

Plant 3-9' hi, somewhat fleshy; sterile seg closely sessile at top of a long common stalk, in the smallest forms 3-lobed, in larger ones broadly triangular, twice pinnatifid, the divisions lanceolate, entire or toothed, all set at an oblique angle; fertile seg short-stalked, slightly overtopping the sterile, bi-tripinnate. Bud smooth; fertile seg recurved its whole length, the shorter sterile seg

reclined upon it. New England; Colo; Alaska.

Section **OSMUNDOPTERIS**. Bud pilose, enclosed in a smooth upright cavity at one side of the lower part of the stalk.
B: VIRGINIANUM Swz.

Rattlesnake fern. Plant from a few inches to 2' hi; sterile seg sessile above the middle of the stalk, broadly triangular, thinly herbaceous, ternate; the short-stalked primary divisions once to twice pinnate, thence once or twice pinnatifid; lobes oblong, cut-toothed toward apex; fertile seg long-stalked, bi-tripinnate. Bud pilose, enclosed in a smooth upright cavity at one side of the lower part of stalk; fertile seg recurved its whole length, the longer sterile segs reclined upon it. New Brunswick to Fla; Arizona; Cal. Synonyms: *B. gracile* Pursh (a reduced form). *Botrychium Virginica* Michx.—*Osmunda Virginica* L.

Other species of *Botrychium* credited to North America north of Mexico, are the following:

B: BITERNATUM (Lam.) Underwood.

B: COULTERI Underwood.

B: DISSECTUM Spreng.

B: MATRICARIAE (Schrank) Spreng.

B: OBLIQUUM Muhl.

Variety **INTERMEDIUM** (D. C. Eaton) Underwood.

B: OCCIDENTALE Underwood.

B: PUMICOLA Coville.

B: SILAIFOLIUM Presl.

B: TENEROSUM A. A. Eaton.

CHEIROGLOSSA Presl.

Fertile spikes several, arising from the base of sterile seg. Treated in the past by many botanists as a section of *Ophioglossum*, and monotypic, based on the Linnaean *Ophioglossum palmatum*.
C: PALMATA (L.) Presl.

Rootstalk fleshy, tuberous, covered with fine wool-like chaff; plant fleshy, 6'-2° hi, the sterile seg cuneate at base, 2-6-lobed or rarely entire, lobes elongate and tapering; fertile spikes ¼ or more, borne on the sides of the stipe just below the sterile seg on its margin. Fla.
OPHIOGLASSUM L.

Fertile spike single, arising from the base of sterile seg.

*Sterile portion near the middle of stalk.

O: VULGATUM L.

Rtstalk short, oblique; stalk 6-12' hi, sterile seg ovate or elliptical-oblong, 1½-4' long, somewhat fleshy, somewhat narrowed at base, sessile; fertile spike 1' or more long. Me to Ky; Tenn; Tex; Arizona; Alaska. Synonym: *O. Engelmanni* Prantl (fide Underwood). Adder-Tongue.

**Sterile portion near base of stalks.

O: CROTALOPHOROIDES Walt.

Rtstalk tuberous, 3-5" thick; stalk 3-6' hi, sterile seg ½-1' long, ovate, slightly petioled, veins somewhat indistinct; fertile spike short and thick, 3-6" long. Fla to La. Synonyms: *O. bulbosum* Michx.—*O. vulgatum* *Crotalophoroides* D. C. Eaton (all fide Underwood).

O: NUDICAULE Linnaeus f.

Rtstalk slightly tuberous; stalk 1-4' hi, sterile seg ½-1½' long, ovate or oblong,

veins indistinct; fertile spike linear-acuminate, 6" long, peduncle very slender. Ha; Fla; Cal. Synonyms: *O. ellepticum* H. & G.—*O. Californicum* Prantl.—*O. vulgatum nudicaule* D. C. Eaton (all fide Underwood).

O: CALIFORNICUM Prantl.

Considered by Underwood as *O. nudicaule*.

"Plants small, only 2-6 cm hi; rtstalk cylindric, tuberous, elongated with num large rts; lvs $\frac{1}{2}$ sheathed at base by the old ones of the previous year; petioles entirely subterranean, 1-2 cm long; sterile lamina 1-2 cm long; 0.4-0.7 mm wide, lanceolate or ovate-acute, rarely obtuse, or apiculate; fleshy, rugose when dry; basal veins 3, median the stronger, lateral ones branched; transverse veinlets oblique, forming long narrow areolae with few or no free veinlets near the margin; epidermis wrinkled, cells flexuous, stomata straight; peduncle arising from the base of the sterile lamina, only 5-15 mm long; spike 5-10 mm long; sporangia 10-15 pairs, apex short; spores .05 mm lg, reticulate, areolae 20-25, rounded, striae unequal, not elevated."—E. G. Britton. Torr Cl b 24:555 (30D 1897). near SD.

Other species credited to North America north of Mexico are the following:

O: ALASKANUM E. G. Britton.

O: ARENARIUM E. G. Britton.

O: ENGELMANNI Prantl.

"Plants 8-22 cm hi; rtstalk clindric with long, brown rts, oft bearing 2-3 fr'ng and 1 sterile lf on the same plant with the sheathing base of the old lvs frequently persistent; petiole subterranean or partly exserted, 4-10 cm long; sterile lf elliptic or lanceolate-elliptic, obtuse but sharply apiculate, 3-9 cm lg, 1.5-5 cm broad; fleshy, becoming pellucid when old and dry, slightly paler beneath; basal veins 13 or more, median one slightly stronger and unbranched below the middle of the frond, forking and anastomosing with the lateral ones above; lateral inner veins parallel and approximate, outer ones arcuate-erect; transverse veinlets oblique and large, forming broad oblong-hexagonal areas with num anastomosing or free veinlets included; cells of the epidermis flexuous, much elongated in the middle beneath, stomata num; peduncle starting from the petiole or the base of the sterile lamina, 3-9 cm long; spike 1.5-2.5 cm long, apiculate, sporangia 12-27 pairs; spores .045-.05 mm in diam, areolae 15-20, angular, striae not elevated."—E. G. Britton. Torr Cl b 24:554 (30D 1897).

Considered by Underwood as *O. vulgatum*.

Order **MARSILIACEAE** R. Br.

Genus **MARSILIA** Linnaeus.

Sporocarps ovoid; lvs quadifoliolate. A genus of 40 or more species.

*Sporocarps 2-6 on each peduncle.

M. QUADRIFOLIA L.

Plant com slender, 5-12 cm hi; lfts variable, 4-14 mm wide, 5-15 mm long, margins entire, smooth, or rarely with

2 (rarely 3) on a branching peduncle, scattered hairs when young; sporocarps which is com attached to the stipe near its base, but sometimes as much as 2 cm above; young sporocarp with short y'ish-brown hairs, later becoming naked and dark p; lower tooth obtuse, upper small, acute or obtuse; sori 8-9 in each valve. Bantam Lake, Litchfield Co. Conn (Dr. T. F. Allen). La (Dr. Hale), fide Wood, Cl-bk bot 810.

M: MACROPODA Engelmam, Am J Sci, sr 2, 3: 56 (1847).

Plant robust, 10-25 cm hi; lfts large, 2-5 cm lg, 2 cm wide or less, com undulate, clothed with w hairs on both sides when young, becoming smoother with age; sporocarps 2-6, on erect branching peduncles, ascending, densely villous, 6-8 mm lg, 5-6 mm wide; raphe short, lower tooth obtuse, upper inconspicuous or 0; sori 10 in each valve. Tex; NM. Synonym: *M. macropus* A. Br. (fide Underwood).

**Sporocarps 1 (rarely 2) on each peduncle.

M: UNCINATA A. Br.

Plant 6-20 cm hi; lfts nearly smooth, entire, 10-16 mm lg; sporocarps 6 mm wide, 8 mm lg; peduncles 15-30 mm lg, 2-4 times as long as sporocarps; raphe long, terminating in 2 approximate teeth, upper longer and mostly uncinately curved; sori 13-14 in each valve. La (Hale) Tex (Reverchon).

MARSILIA VESTITA H. & G.

Plant 3-6 cm hi; lfts entire or slightly toothed; sporocarps 4-7 mm long, 3-5 mm wide; raphe short, lower tooth short and blunt, upper acute, a little longer, sometimes curved; paleae varying from soft, dense and spreading to short and appressed, in mucronata forms, where it is sometimes 0; sori 6-11 in each valve; a very variable species. Ark; Ar; Tex; Kans; Nev; Ore; Wash; Mont; Dak; SD. Synonym: *M. mucronata* A. Br.

M: TENUIFOLIA Engelmam.

Plant somewhat slender, 5-15 cm hi; lfts 2-4 mm wide, more or less falcate, apex often somewhat truncate and unequally toothed, villous with appressed hairs; sporocarps single, 5-8 mm long, 4-5 mm wide, teeth divergent, subequal; sori 9-11 in each valve. Texas. Synonym: *M. vestita tenuifolia*. Underwood & Cook.

Genus **PILULARIA** Linnaeus.

Sporocarps globose, lvs filiform. Six species.

PILULARIA AMERICANA Al. Br.

Lvs setiform, 1' long; sporocarps 1" in diam, attached by the side to a short, descending peduncle, com 3-celled; macrospores 13-17 in each cell, not constricted in middle. S Bar (Mrs. Cooper) Ark (Nuttall); SD!

SALVINIACEAE.

SALVINIA Schreb.

Lvs 6-9" long, with a distinct midrib. Named for Salvini, a Florentine professor. Contains 13 species.

S: NATANS Hoffm.

Lvs oblong, horizontal, rounded or slightly cordate at base, $\frac{1}{2}$ -1' long, bright g above, the under surface matted with brown, pellucid hairs; sporo-

carps 4-8 in a cluster. Bois Brule Bot-toms, Perry Co, Mo (Demetrio). NY (Pursh). Synonym: *Marsilia natans* L. **AZOLLA** Lam. A1:380d.

Lvs minute, num, closely imbricate, deeply lobed. Small moss-like plants, with pinnately branched sts. Five species.

A: CAROLINIANA Willd, sp pl 5:541. B 2:352 Da 20. Z 1:100. A 1:380d.

Plant 4-12" broad, much branched; lvs with ovate lobes, the lower reddish, the upper g with a r'ish border; macrospores with a minutely granulate surface; masses of microspores barbed at tip. Synonyms: *A. microphylla* Kaulf.—*A. Mexicana* Schlecht.

A: FILICULOIDES Lam. A 1:38d. Z 1:101.

"La Honda, San Mateo Co. Cal, 1890 (Brandegee), the plants so crowded as to stand upright. A larger and coarser plant than *A. Caroliniana*, easily distinguished in fr by the non-septate appendages to the massulae. Baker (Hand-book of Fern Allies 137), gives its habitat as 'South America, mainly on the west side.' This adds another Chilean plant to the Cal flora."—Underwood, Zoe 1:101.

A: SONOMENSIS Greene.

Description not set by the writer.

Order **EQUISETACEAE** DC.

EQUISETUM L.

Horse-tail or scouring-rush, the only genus known in this order. Section **EUEQUISETUM**. Sts ann, stomata scattered.

*Sts of 2 kinds, the pale or brownish fertile sts appearing earlier than the herbaceous sterile ones; fr'ng in spring.

I.—Fertile sts simple, soon withering.

E: ARVENSE L.

Horsetail sterile sts g, rather slender, 1-2° hi, 6-19-furrowed; branches num, long, mostly simple, 4-angled, minutely roughened, lowest joint com longer than sheath of st; fertile sts 4-10° hi, light brown, the loose scarios sheath mostly distant, w'ish, ending in about 12 brown acuminate teeth; spike rarely over 1' long. Va to Cal; Greenland. Synonym: *E. boreale* Bong.

E: TELMATEIA Ehrh. B 2:330.

Sterile sts ivory w or g'ish, stout, 2-6° hi, 20-40-furrowed; branches very num, erect-spreading, simple, 4-5-angled, the ridges rough and sulcate, lowest joint shorter than sheath of st; fertile sts 10-15° hi, w, many-furrowed, the loose brownish sheaths elongate, deeply 20-30-toothed. Cal; Ore; north. Synonyms: *E. fluviatile* Sm.—*E. eburneum* Schreb.—*E. maximum* Und. not Lam.

II.—Fertile sts when older producing herbaceous branches, only the naked apex withering.

E: PRATENSE Ehrh.

Sterile and finally fertile sts produc-ing straight, simple branches; sheaths of st with about 11 short, ovate-lanceolate teeth, those of branches 3-toothed. Mich; Wis; north. Synonyms: *E. umbrosum* Willd.—*E. triquetrum* Bory.—*E. Drummondii* Hooker.

E: SILVATICUM L.

Sterile and fertile sts com 12-furrowed,

producing compound branches, branch-lets curved downward; sheaths loose, those of st with 8-14 bluntish teeth, those of branches with 4-5, of branch-lets with 3 divergent teeth. Va; Mich; Labrador.

**Sts of 1 kind, herbaceous; branches simple or o; fr'ng in summer.

I.—Sheaths somewhat loose.

E: PALUSTRE L.

Sts slender, 10-18' hi, very deeply 5-9-grooved, the grooves separated by narrow, wing-like ridges, roughish; sheaths with about 8 loose-awl-shaped, whitish margined teeth; branches few in a whorl, with mostly 5-toothed sheaths. NY; Wis; BC; north. Synonym: *E. pratense* Reicheb.

E: LITORALE Kuhl.

Sts slightly roughened, 6-19-grooved, the carinae convex; sheaths sensibly dilated above, the uppermost bell-shaped; lvs convex, angled beneath, separate at the commissural groove; teeth herbaceous, membranous at margin, narrow, lanceolate; branches of 2 kinds, the 4-angled hollow, the 3-angled solid, first joint a little longer or shorter than sheath of st; spores abortive, elaters com o. Br of Quinte, Canada (Macoun); Vt (Pringle); Oswego river, NY (Wible).

II.—Sheaths appressed.

E: FLUVIATILE L.

Sts 2-3° hi, slightly to many-furrowed, smooth, com producing upright branches after fructification; sheaths appressed, with about 18 dark brown, short, acute, rigid teeth; air-cavities o under the grooves, small under the ridges. Va to Wash; north. Synonyms: *E. limosum* L.—*E. uliginosum* Muhl.—*E. heliocharis* Ehrh.

Section **HIPPOCHAETE**. Sts per, ever-g; spikes tipped with a rigid point; stomata in regular rows; fr'ng in summer.

*Sts tall and stout, com many-grooved.

I.—Branches num, regularly whorled.

E: RAMOSISSIMUM Desf.

Sts grooved, more or less roughened, 6-26-furrowed; sheaths dilated, toothed; teeth not grooved, persistent or decid, leaving only a triangular, very rarely a truncated margin; lvs more or less distinct, 3-4-carinate; branches, when present, 4-9-angled; series of stomata in 1-4 lines; inner bark of ridges higher than grooves; ridges convex, marked with bands, never with 2-rowed tubercles. Cuba; Mexico; B C.

II.—Branches few and irregular or wholly o.

E: ROBUSTAM A. Braun. B 2:330.

Sts 3-11° hi, sometimes nearly 1' thick, 20-48-furrowed; ridges roughened with a single series of transversely-oblong, siliceous tubercles; sheath short, cylindrical, marked with black girdles at base, and at base of caducous teeth; ridges of sheaths tricarinate. O; La; Cal; north.

E: NIEMALE L.

Scouring-rush. Sts 1-4° hi, rough, 8-34-furrowed; ridges with 2 indistinct lines of tubercles; sheaths rather long, cylindrical, marked with 1 or 2 black girdles; ridges of sheath obscurely quadricarinate; teeth membranous soon decid.

NA in general.

E: LAEVIGATUM A. Br.

Sts not tuberculate, 1-5' hi, pale g, 14-30-furrowed; ridges almost smooth; sheaths elongate, enlarged upward, marked with a black girdle at base of the com decid w-margined teeth, and rarely also at base of sheath; ridges of sheath with a central carina and sometimes with faint short, lateral ones. NC; O; La; Cal; Ore.

*Sts slender, tufted, 5-10-grooved.

E: VARIEGATUM Schleich.

Sts ascending, 6-18' long, com simple from a branched base, 5-10-furrowed; sheaths g, variegated with black above, teeth 5-10, tipped with a decid bristle; central air-cavity small. NH; Ill; Alk; Greenland.

E: SCIEPOIDES Michx.

Sts filiform, very num. 3-6' hi, flexuous and curving, mostly 6-furrowed, with acute ridges; sheaths 3-toothed, bristle-tips more persistent; central air-cavity 0. New England; Pa; Ill; north.

Order **LYCOPODIACEAE** Lindley.

PSILOTUM R. Br.

Lvs minute, abortive; sporangia 3-celled; 4 mostly tropical species.

P: TRIQUETRUM Swz.

Sts erect 8-10' hi, triquetrous at base, many-times forked at apex; ultimate divisions triquetrous-winged; lvs remote, awl-shaped, less than 1" long; sporangia in spikes. Fla; SC. Synonyms: *P. Florida* Michx.—*P. dichotomum* Link.—*Bernhardia dichotoma* Willd.—*B. pedunculata* Desv.—*Lycopodium nudum* L.

LYCOPODIUM L.

Lvs well developed, in 4-many ranks; sporangia 1-celled. Near 100 species. Section **PLANANTHUS** Beauv. Sporangia borne in axils of lvs which are similar to those of sterile and fertile sts. *Sporangia com 0 in axils of upper lvs; lvs dark g, shining, about 8-ranked.

L: SELAGO L.

Sts 3-6' hi, thick, rigid, erect, 2-3-times forked, forming a level-topped cluster; lvs elongate-lanceolate, mucronulate, entire or spinulose-denticulate, nerved above, convex below. NC; Mich; New England; Alk; Greenland. Synonyms: *L. recurvum* Kit.—*L. suberectum* Lowe.—*Planantus selago* Beauv.

L: LUCIDULUM Michx.

Sts ascending, thick, 2-3-times forked, branches 6-12' hi; lvs widely spreading or reflexed, flat, one-nerved, acute, minutely toothed. NC, northward. Synonyms: *L. reflexum* Swz.—*L. serratum* Desv.—*Planantus reflexus* Beauv.

**Sporangia only in axils of upper lvs which form spikes; lvs many-ranked.

L: INUNDATUM L.

Sterile sts creeping, flaccid, forking; fertile sts erect, simple, 1-4' hi, bearing a short, thick spike; lvs lanceolate or lance-awl-shaped, acute, entire, soft, spreading or curved upward on prostrate sts. New England; Mich; southward. Synonyms: *L. palustre* Lam.—*Planantus inundatus* Beauv.

Variety **FINNATUM** Chapm.

Sts pinnately branched; lvs bristly-fringed below middle, unequal, the upper and lower shorter and somewhat

appressed, the lateral widely spreading; fertile sts 1' hi, very leafy; spike thick, cylindric, 2-3' long. Western Fla. Variety **BIGELOVII** Tuckerm.

A form having fertile sts 5-7' hi, with more pointed, often tooth-bearing lvs. Synonym: *L. Carolinianum* Bigel.

L: ALOPECUROIDES L.

Sts stout, densely lfy thruout; sterile branches flaccid, procumbent, creeping; fertile branches rigid, erect, 6-20' hi, bearing a single spike; lvs narrowly linear-awl-shaped, spinulose-pointed, spreading, conspicuously bristle-toothed below the middle, nerved above, those of the cylindric spike with long, setaceous tips. NJ to Fla; Miss. Synonyms: *L. longipes* H & G.—*Planantus alopecuroides* Beauv.

Section **EULYCOPODIUM** (Lepidotis Beauv.). Sporangia borne in the axils of yellowish, scale-like, imbricated, ovate or cordate lvs which form a distinct spike; lvs of sterile branches very unlike those of the spikes.

*Sts lfy to base of spikes, or nearly so. I.—Spikes nodding.

L: CERNUUM L.

Sts erect, branching, branches similar; lvs crowded, awl-shaped, incurved, terete in middle, spreading, grooved below; bracts 8-ranked. Fla; Ala. Synonyms: *L. marianum* Willd.—*L. curvatum* Blume.—*L. Borganum* Richard.—*L. bryifolium* Vent.

II.—Spikes erect, closely sessile.

L: ANNOTINUM L.

Sts much branched, prostrate, creeping, 1-4' long; ascending branches similar, 5-8' hi, sparingly forked; lvs equal, spreading, 5-ranked, rigid, linear-lanceolate, minutely serrulate, nerved below; spike oblong, cylindric, thick. New England; NJ; Wash; Alk; Greenland. Synonyms: *L. juniperifolium* Lam.—*L. bryophyllum* Presl.—*Lepidotis annotina* Beauv.

Variety **PUNGENS** Desv.

A mt form with shorter and more rigid, pointed lvs. Synonym: *L. reclinatum* Michx.

L: OBSCURUM L.

Ground-pine. Sts erect, 6-9' hi, from a subterranean creeping rtstock, densely branched above, the crowded branches spreading fan-like; lvs 4-6-ranked, lanceolate-linear, acute, entire; spikes 4-10 on each plant; bracts many-rowed. Canada; NC; Ind; Mich. Synonym: *Lepidotis dendroidea* Beauv.—*Lycopodium dendroideum* et var. *obscurum*.

L: ALPINUM L.

Sts elongate, creeping, with ascending densely clustered branches; lvs 4-ranked, erect, imbricated, adnate-decurrent, of 2 forms; those of lateral rows lanceolate, falcate, acute, carinate, concave within; those of intermediate rows scarcely 1-third smaller, lance-awl-shaped, the upper and lower rows not different. Lake Superior; Rocky Mts; Wash; Alk.

III.—Spikes erect, short-peduncled.

L: SABINAEFOLIUM Willd.

Ground-fir, sts elongate, creeping, com underground; branches erect, short, dichotomous, clustered; lvs 4-rowed, small,

appressed, lanceolate, mucronate, entire, apparently terete; spikes cylindrical, solitary, with cordate, acuminate bracts. NY; NJ; north and west. Synonyms: *L. alpinum* Michx.—*L. armatum* Desv.

**Fertile branches with minute lvs, so that the spikes appear long-peduncled.

I.—Lvs uniform, many-ranked; sts terete.

L: CLAVATUM L.

Running-pine. Sts extensively creeping; branches similar, ascending, short and lfy, the fertile terminated by a slender peduncle bearing 1-4 linear, cylindrical spikes; lvs much-crowded, linear-awl-shaped, tipped like bracts with a fine bristle. Canada; NC; Wash; Alk. Synonyms: *L. officinale* Neck.—*L. vulgare* Vaill.—*L. inflexum* Swz.—*L. serpens* Presl.—*Lepidotis inflexa* Beauv.

II.—Lvs of 2 forms, few-ranked; sts flattened.

E: CAECOLINIANUM L.

Sterile sts and their few short branches entirely creeping; lateral lvs broadly lanceolate, acute, and somewhat oblique, 1-nerved, widely spreading in 2-ranks; upper row of lvs shorter, appressed; peduncle simple, slender, 2-4' hi, clothed with small bract-like lvs, bearing a single cylindrical spike. NJ; Fla; Ala; La. Synonyms: *L. repens* Swz.—*L. affine* Bory.—*Lepidotis repens* Beauv.

L: COMPLANATUM L.

Sts extensively creeping, with erect or ascending fan-like branches several times forked above; branchlets crowded, flattened; lvs minute, imbricate-appressed, 4-ranked; lateral rows with somewhat spreading tips; intermediate smaller, narrower, wholly appressed; peduncle slender, bearing 2-4 cylindrical spikes. New England; NC; Mich; northward. Synonyms: *L. thyroides* Humb & Bonpl.—*L. tristachyon* Pursh.—*L. anceps* Walls.—*L. chamaecyparissus* A. Br.—*Lepidotis complanata* Beauv.—Some botanists unite *Lycopodium alpinum* L. and *L. sabinaefolium* with this species.

Descriptions of the following species have not been seen by the writer.

E: ADPRESSUM (Chapm) Lloyd and Underwood.

L: CHAMAECYPARISSUS A. Br.

E: FINNATUM (Chapm) Lloyd and Underwood.

Based on *L. inundatum* pinnatum?

E: POROPHILUM Lloyd and Underwood.

E: SITCHENSE Rupr.

ISOETACEAE.

Genus ISOETES Linnaeus.

Quillwort. About 50 species. Section I. Submerged, rarely above water in driest seasons; lvs quadrangular, without peripheral bast-bundles; velum incomplete.

*Stimata absent.

I: LACUSTRIS L.

Lvs 10-25, stout, rather rigid, obtusely quadrangular, acute but scarcely tapering, dark or olive-g, 2-6' long; sporangia orbicular—broadly-elliptic, with a narrow velum; ligula triangular, short or

somewhat elongate; macrospores 0.5-0.8 mm in diam, marked all over with distinct or somewhat confluent crests; microspores smooth, 0.035-0.046 mm long. NY; NH; Mass; Vt.

Variety **PAUPERCULA** Engelm.

Lvs fewer, shorter, thinner; spores smaller, microspores somewhat granulate, 0.026-0.036 mm long. Synonym: *L. macrospora* Durien. Grand Lake, Middle Park, Colo (Engelm.); Castle Lake, near Mt Shasta, Cal (Pringle).

I: PYGMAEA E. B2:351.

Lvs 5-10, stout, rigid, bright g, ½-1' long, abruptly tapering to a fine point, with very short often almost square epidermal cells; sporangia orbicular with a narrow velum; macrospores 0.36-0.5 mm thick, marked with minute, rather regular, distinct or rarely confluent warts; microspores brown, almost smooth, 0.024-0.029 mm long. Mon Pass, Cal. (Bolander).

I: TUCKERMANI A. Br.

Lvs 10-30, very slender, tapering, olive g, 2-3' long, outer recurved; sporangia mostly oblong, w or rarely brown-spotted, upper third covered by thin velum; macrospores 4.44-0.56 mm thick, the upper segs marked with prominent, somewhat parallel and branching ridges, lower half reticulate; microspores smooth or nearly so, 0.026-0.032 mm long. Mass.

I: ECHINOSPORA Durien, Soc bot Fr b 8:164.

One of the smaller species, with 10-30 or 40 soft bright g or sometimes r'ish lvs, gradually and regularly tapering from a thick base to a very slender elongated point absolutely without stomata, 2-4 or sometimes 5' long; sporangia orbicular to broadly oval, unspotted with a narrow, erect, truncate, or slightly forked spinules; microspores 0.03-0.034 mm long, almost smooth. Italy, France, Germany, England, Lapland, Iceland, apparently not in America. **Stomata present.

Variety **BRAUNII** E. St. Louis ac tr 4:379 (1882).

Rather small, with 13-15 g or r'ish-g, erect or spreading, rather short (3-6' long), tapering soft lvs, generally with few stomata towards the tip only; sporangia orbicular to broadly elliptical, spotted, generally ½ or even ¾ covered by a broad velum; macrospores 0.4-0.5 mm thick, rather a little longer, covered with broad, retuse spinules, sometimes somewhat confluent, and then dentate or incised at tip; microspores 0.026-0.03 mm long, smooth. Nova Scotia; New England; Pa; Mich; Utah; Greenland. Synonym: *I. Braunii* Durien, Soc bot Fr b 11:101.

Variety **ROBUSTA** Engelm.

Similar to var. *Braunii*, but much stouter, with 25-70 lvs, 5-8' long, with abundant stomata all over their surface; velum covering about ½ of the large, spotted sporangium; macrospores 0.36-0.55 mm thick, with the sculpture and microspores the same as of var. *Braunii*. North end of Isle of La Motte, Lake Champlain (C. G. Pringle). Variety **BOOTTII** Engelm.

Lvs erect, soft, bright g, fewer (12-20) short (4-5' long); stomata mostly few, near the tip; sporangia nearly orbicular, pale-spotted, two-thirds or more covered by the broad velum; macrospores 0.39-0.5 mm thick, with longer and slender, delicate, generally simple spinules; microspores 0.026-0.03 mm long. Mass (Boott). Synonym: *I. Boottii* A. Braun in litt.

Variety **MURICATA** Engelmann.

Lvs (15-20) long (6-12'), flaccid, bright g, with very few stomata; sporangium broadly oval, pale-spotted, about $\frac{1}{2}$ covered by velum; macrospores 0.4-0.53 mm thick, with shorter and more confluent, therefore sometimes almost crest-like spinules; macrospores slightly rough on the edges, 0.028-0.032 mm long. Near Boston, Mass (Boott). Synonym: *I. muricata* Durien, Soc Bot Fr b 11:101.

I: BOLANDERII E, Am nat 8:214. B2:350, Und Z 1:98 Sber mts. 101 Brit Am.

One of the smaller species, with erect, soft, bright g lvs tapering to a fine point, 5-20 or 25 in number, 2-4 $\frac{1}{2}$ ' long, with thin walls and partitions, and generally not many stomata; sporangium broadly oblong, mostly without any spots, with a narrow velum; ligula triangular; macrospores 0.3-0.4 or rarely 0.45 mm thick, marked with minute low tubercles or warts, rarely confluent to wrinkles; microspores 0.026-0.031 mm long, generally spinulose; rarely, in the Rocky Mt form, smooth, deep brown. Colo; Ut; Wash. Synonym: *I. Californica* E, ex G, Man (nomen nudum).

Section II.—Amphibious, partially emerged, submerged only in the earlier period of their growth or temporarily; stomata always present.

*Peripheral bast-bundles 0.

I.—Velum partial.

I: SACCHARATA Engelmann, Gray's Man, ed 5, 676 (1868).

Plant small, com with a flat, depressed trunk; lvs subulate, olive-g, spreading, 10-20 in number, 2-3' long; sporangium oblong, spotted, with a narrow velum; ligula triangular; macrospores 0.4-0.47 mm thick, covered with very minute distinct or sometimes a little confluent warts; microspores papillose, 0.024-0.028 mm long. Md Canby).

I: RIPARIA Engelmann.

Lvs 15-30, slender, rather rigid, deep g, 4-8' long, with num stomata; sporangia mostly oblong, distinctly brown-spotted, 1-fourth or 1-third covered by the velum; macrospores 0.45-0.65 mm thick, marked with isolated or anastomosing, jagged crests; microspores more or less tuberculate, 0.028-0.032 mm long. mm long. Md; (Canby).

II.—Velum complete.

I: MELANOSPOEA Engelmann, St. Louis ac tr 3:395, note.

One of the smallest species, with a flat, only slightly bilobed trunk; lvs few (5-10, 2-2 $\frac{1}{2}$ ' long), distichous, slender, tapering, light g, spreading; sporangium orbicular or almost orbiculate, $\frac{1}{2}$ -1" lg, entirely covered by the velum, unspotted; ligula short-triangular, obtuse, or about semi-orbicular; microspores 0.35-0.45 mm in diam, roughened with distinct or rare-

ly somewhat confluent warts, dark-colored; microspores 0.028-0.031 mm long, smoother or slightly papillose. Stone Mt, Ga.

**Peripheral bast bundles present.

I.—Velum partial.

I: ENGELMANNI A. Braun, A 1:33.

Lvs 25-100, light g, 9-20' long or more, with abundant stomata; sporangia oblong to linear-oblong, unspotted; velum narrow; ligula elongated from a triangular base; macrospores 0.4-0.52 mm thick, delicately honeycomb-reticulated; microspores 0.024-0.028 mm long, generally smooth. New England; NY; Mo; Ill.

Variety **GRACILIS** E, Ex G, Man, ed 5, 676.

Often submerged, lvs 8-12, 9-12' lg; bast-bundles oft quite sm, or only 2. New England; NJ.

Variety **VALIDA** E, Ex G, Man, ed 5, 676.

Lvs 50-100 or even 200, 18-25' lg, keeled on upper side; sporangia oft linear-oblong (4.9" lg), 1-third or oft $\frac{1}{2}$ or even 2-third covered by the broad velum; macrospores rather smaller, 0.32-0.48 mm thick; microspores 0.024-0.027 mm lg, spinulose, Pa; Dela.

Variety **GEORGIANA** Engelmann.

Similar to type; lvs few (15), 10-12' long, rather slender; oval sporangium with narrow velum; macrospores 0.48-0.56 mm thick; microspores 0.028-0.031 mm long, smooth. Ga.

I: HOWELLII Engelmann.

Middle-sized, lvs (10-25) bright g (5-8' long) with thick dissepiments; sporangium oval (1 $\frac{1}{2}$ -2 $\frac{1}{2}$ " long), unspotted, $\frac{1}{4}$ - $\frac{1}{2}$ covered by velum; subulate ligula as long as sporangium; macrospores 0.43-0.48 mm in diam, rough, with prominent rounded single or sometimes confluent tubercles. Ore. Synonyms: *I. nuda* Engelm.—*I. Underwoodii* (fide Heller).

I: NUDA Engelmann.

Lvs 10-15, bright g, 6-9' long; sporangia oval, light-brown, attached to base of lvs by median line only, velum entirely 0; ligula somewhat triangular; macrospores 0.366-0.4 mm thick, slightly tuberculate, tubercles somewhat confluent. Hood river, Ore (Howell).

II.—Velum complete.

I: FLACCIDA Shuttleworth.

Lvs 10-35, bright g, 15'-2 $\frac{1}{2}$ ' long, submerged, floating on the surface, or wholly emerged; sporangia oval, 2-3' long, entirely covered by velum; macrospores 0.3-0.42 mm thick, covered with many or rarely few, large flattish tubercles, distinct, or confluent into labyrinthiform wrinkles. Fla.

Variety **RIGIDA** Engelmann.

A smaller form with still more slender, erect, dark g lvs (about 10-15 in number, 5-6' long). Lake Flint, Fla (A. P. Garber).

Variety **CHAPMANI** Engelmann.

Lvs about 30, floating, 18' long; sporangia orbicular; macrospores 0.44-0.55 mm thick, almost smooth on upper side; microspores slightly papillose, 0.027-0.03 mm long. Near Mariana, Fla (Chapman).

Section III.—Terrestrial species, maturing entirely out of water, with abundant stomata and peripheral bast-bundles, thick dissepiments, and small air-cavities in the nearly triangular lvs.

*Trunk bilobed.

1.—Velum partial or almost wanting.

ISOETES MELANOPODA J. Gay.

Al:32d.

Variety **CALIFORNICA** A. A. Eaton.

Al:32 fdr.

Variety **PALLIDA** Engelm.

Al:32 fdr.

I: MARITIMA Underwood.

Monoecious; trunk sm, only slightly bilobed; lvs 8-15, rigid, g. $\frac{1}{2}$ ' long, $\frac{1}{2}$ to 2-thirds li wide; sporangia oval, 2" lg, $1\frac{1}{2}$ " wide, brownish w, 1-third to $\frac{1}{2}$ covered by velum; ligule small; macrospores 0.42-0.48 mm thick, densely spinulose, the spines blunt, rarely confluent; microspores smooth, w, 0.32-0.35 mm thick. In salt marsh, Alberni, Vancouver Island (Macoun).

I: EUTLELI Engelm.

Diocious; trunk sub-globose; lvs 8-12, rigid, bright g. 3-7' long; sporangia com oblong, spotted, with a very narrow velum or none; ligula awl-shaped from a triangular base; macrospores 0.5-0.63 mm thick, marked with knobs or warts, distinct or sometimes confluent; microspores papillose, dark brown, 0.028-0.38 mm long. "In saline flats, near Limestone Gap, Indian Territory."

Variety **IMMACULATA** Engelm.

Larger, with unspotted sporangia, and spinulose microspores, the macrospores 0.4-0.56 mm. Cedar barrens near Nashville, Tenn (Gattinger).

II.—Velum complete.

I: TUTTALLII A. Braun. B2:351.

Trunk almost globose, slightly grooved; lvs 20-60, slender, bright g. 3-9' lg, with only 3 peripheral bast-bundles; sporangia oblong or oval, entirely covered by velum; macrospores variable, 0.25-0.5 mm thick, densely covered with minute but rounded warts, or rarely almost smooth; microspores papillose, brown, 0.025-0.028 mm long. Ore; Wash; Idaho; Vancouver Island. Synonym: *I. pacifica* Nuttall.

*Trunk trilobed; velum complete.

I: SUKSDORFII Baker.

Lvs 12-20, firm, bright g, very slender, arcuate, deeply channelled, along the face, 2-3' long, less than $\frac{1}{2}$ " wide; sporangia orbicular, 2" long and broad; ligula deltoid; macrospores grayish-w, faintly granulated. Wash (Suksdorf).

Other species of *Isoetes* within our region are the following, of which descriptions have not been seen by the writer, except as noted.

ISOETES MEXICANA Underw.

Und, bot gaz 13:93, Chili; Z 1:98, 99, 101, Al:31d.

I: DODGEI A. A. Eaton.

I: EATONI Dodge.

I: FOVEOLATA A. A. Eaton.

I: MACCOUNII A. A. Eaton.

I: MINIMA A. A. Eaton.

ISOETES ORCUTTHI A. A. Eaton.

Al:33 fdr.

Species not American, but cited in our literature.

I. GARDNERIANA A 1:34.

I. GUNNII A 1:34.

I. HOOKERI A 1:34.

I. HOWELLII A 1:33.

I. MULLERI A 1:34.

I. NIGRITANA A 1:34.

I. SACCHARATA E. Parry Wyo 24.

I. STUARTI A 1:34.

I. WELWITSCHII A 1:34.

SELAGINELLACEAE.

SELAGINELLA Beauv.

The only genus known in the order, largely tropical, containing over 300 species.

A 1:380d.

Section **EUSELAGINELLA**. St lvs of 1 kind, many-ranked; bracts uniform.

*Sts prostrate or spreading, somewhat rigid.

S. RUPESTRIS Spreng. B 2:350. Da 20. Br 1:205 Cruz. A 1:380d.

Al:380d.

Sts densely tufted, prostrate or ascending, much-branched, 2-12' long; lvs appressed-imbriate, linear to linear-lanceolate, convex and sulcate dorsally, rigid, bristle-tipped, ciliate; spikes strongly quadrangular, 6-12" long; sporangia of both sorts in the same axils; macrosporangia abundant; bracts ovate-lanceolate. New England to Fla; Texas; Cal; north. Synonyms: *Lycopodium rupestre* L.—*L. bryopteris* Wall. Variety **TORTIFILA** Underwood.

Lvs sub-entire, gibbous dorsally near apex; terminal bracts tipped with a long, twisted, w awn; macrospores loosely reticulate. NC; SC.

Variety **FENDLERI** Underwood.

Description not seen.

S: SELAGINOIDES Link.

Sterile sts prostrate or creeping, small and slender; fertile sts thicker, ascending, simple, 1-3' hi; lvs lanceolate, acute, spreading, sparsely spinulose-ciliate; bracts lax, ascending, lanceolate or ovate-lanceolate, strongly ciliate. Greenland; NH to Colo. Synonyms: *S. spinosa* Beauv.—*Lycopodium selaginoides* L.—*L. ciliatum* Lam.

**Sts pendent, flaccid.

S. OREGANA Eaton. B 2:350.

Sts 1-6' long, pinnately much branched; lvs loosely imbricate, scarcely 1" lg, linear-lanceolate, convex and grooved on back, acute, sparsely spinulose-denticulate, not bristle-tipped; spikes quadrangular, very slender; macrosporangia scarce. Ore.

Section **STACHYGYNANDRUM** Baker.

St lvs of 2 kinds, spreading in 2 planes, those of upper plane smaller and more ascending; bracts uniform.

*Main sts decumbent; rt fibres extending to upper nodes.

I.—Sts persistent; lvs rigid, firm in texture.

S. DOUGLASSII Spring. B 2:350.

Sts decumbent, 3-12' long; branches 2-6' long, bi-tri-pinnately divided; lvs of lower plane 1" long, obliquely oval, obtuse, faintly nerved; lvs of upper plane $\frac{1}{2}$ as long, oval, incurved, ending in a

short point, both sparingly ciliate at base; spikes 6-12" long, quadrangular, terminal; bracts deltoid-cuspidate, strongly imbricate. Cal; BC. Synonyms: *Lycopodium Douglasii* H & G.—*L. ovalifolium* H & G.

II.—Sts mostly ann, fugacious; lvs mostly membranous, flaccid.
S: AFUS Spring.

Sts 1-4' long, slender, angled on face, prostrate, creeping, much branched flaccid; lvs of lower plane spreading above, lower reflexed, ovate, acute, serrulate, not distinctly ciliate; lvs of upper plane ovate, shortly cuspidate; spikes 3-6" lg; bracts ovate, acute, membranous, strongly serrulate, acutely keeled in upper half. Canada; Rocky Mts; Fla; Texas.

S: LUDOVICIANA A. Br.

Sts slender, copiously pinnate, flat on both sides, 4-6' long, lower branches slightly compound; lvs of lower plane rather distant except at tips of branches, spreading, ovate-oblong, subacute, finer in texture than in *S. apus*, serrulate, not distinctly ciliate; lvs of upper plane ½ as long, obliquely oblong, cuspidate; spikes 3-6" long; bracts ovate-lanceolate, strongly keeled. La; Fla. synonym: *S. apus* denticulata Spring.

**Sts densely tufted, rolling into a nest-like ball when dry; sts confined to base of sts.

S. LEFIDOPHYLLA Spring. Baja. Ar. B 2:350.

Sts 2-4' long, densely tufted, pinnately branched to base, pinnae ascending, subfimbriately compound; lvs of lower plane closely imbricate, ascending, obliquely ovate, obtuse, thick, rigid, minutely ciliate, g above, paler below, becoming r'ish-brown in age; lvs of upper plane nearly as long, obliquely ovate, obtuse; spikes 3-6" long, quadrangular; bracts deltoid, acutely keeled. Tex; Arizona; Cal?

S: FILIFERA A. Braun.

Primary branching varies from flabellate to pinnate, lvs cuspidate and serrulate. Mexico; Texas?

Descriptions of the following have not been seen by the writer.

S: ARENICOLA Underwood.

S: BRYCIDES (Nuttall) Underwood.

Synonym: *S. cinerascens* A. A. Eaton.

S: MUTICA D. C. Eaton.

S: PRINGLEI Baker.

S: RUBIN COLA Underwood.

S: STRUTHIOLCIDES (Presl) Underwood.

S: TORTIFILA A. Br.

Order **FILICES** Juss.

A large order of 70 to more than 200 genera (according to different botanists), and 3000 or more species. It contains six well-marked sub-orders (considered as orders by some recent authors).

Sub-order **OSMUNDACEAE** R. Br.

Sporangia naked, globose, mostly pedicelled, with no ring or mere traces of one around apex, opening into halves by a longitudinal slit.

OSMUNDA L.

Fertile fronds or fertile portions very much contracted, bearing short-pedicelled, naked sporangia on the margin of the rachis-like divisions. Sporangia large, globose, opening by a longitudinal cleft into halves, bearing near apex a few parallel striae, the rudiment of a transverse ring. Spores g. Named for Osmunder, a Saxon name for the divinity Thor. Six species, mostly north temperate.

*Fronds bipinnate, fertile at apex.

O: BEGAIS L.

Canada to Fla; Miss. Synonyms: *O. spectabilis* Willd.—*O. glaucescens* Link. *Sterile fronds bipinnatifid.

O: CLAYTONIANA L.

Stipes tufted, 1' or more long, clothed with loose woolly tomentum when young, naked when mature; fronds 1-2' long, 8-12" broad; pinnae oblong-lanceolate with oblong, obtuse divisions; 2-5 pairs of central pinnae fertile, fertile pinnules dense, cylindrical; texture herbaceous. Canada; Ky; northward. Synonym: *O. interrupta* Michx.

O: L. AMOMEA L.

Cinnamon-fern. Stipes densely tufted, 1' or more long, sterile and fertile fronds distinct, clothed when young with ferruginous tomentum; sterile fronds smooth when mature, the pinnae bearing a tuft of tomentum at base beneath, lanceolate, cut into broadly oblong, obtuse divisions; fertile fronds contracted, bipinnate, with cinnamon-colored sporangia. New England; Wis; Fla. Synonym: *O. claytoniana* Conrad.

Variety **FRONDOSA** Gray.

Fronds in part sterile below, sparsely fertile at summit.

Sub-order **HYMENOPHYLLACEAE** Endl.

Sporangia borne on an elongate, often filiform, receptacle, surrounded by a complete transverse ring, opening vertically. Sori terminal or marginal from the apex of a vein. Indusium inferior, com of same texture as frond. Fronds delicately membranous and pellucid.

TRICHOMANES Sm.

Indusia tubular, cup-shaped, or funnel-shaped, sometimes 2-lipped. Filmy fern. Near 100 species, of the tropics.

Section **EUTRICHOMANES**

T: PETERSII Gray.

Stipes 1-2" long; fronds 3-10" long, 1-2" broad, oblong-lanceolate or obovate, entire or variously pinnatifid, the younger ones with a few black hairs along the margins; indusium solitary, terminal, funnel-shaped, the mouth expanded and slightly 2-lipped, the receptacle included. Winston Co, Colo (Peters).

T: RADICANS Swz.

Rtstock wiry, tomentose; stipes ascending, 1-3' long, naked or nearly so, com broadly winged; fronds 2-8' long, 1-1½" wide, lanceolate or ovate lanceolate, bipinnatifid; pinnae ovate, obtuse, upper side of base parallel and appressed to the winged rachis, lower side cuneate; divisions toothed or divided into linear lobes; indusia terminal on short lobes, tubular or funnel-shaped, the mouth slightly 2-lipped; receptacle

exserted little or very much. Ala; Tenn; Ky. Synonym: *T. speciosum* Willd.

Sub-order **SCHIZAEACEAE** Presl.

Sporangia ovate, sessile, arranged in spikes or panicles, having a complete, transverse, articulated ring at apex, and opening by a longitudinal slit.

LYGODIUM Swz.

Sts scandent. Sporangia borne in a double row on narrow fertile segs, each on a separate veinlet and provided with a special indusium. Includes 16 species.

L: PALMATUM Swz. Climbing-fern. Mass; NY; Ky; Fla. Synonym: *Hydroglossum palmatum* Willd.

CRANTHOPTERIS (Aneimia Swz.).

Sts not scandent. Sporangia naked, attached by their bases to the narrow divisions of the panicle fertile segs of frond. Near 30 species, chiefly tropical.

O: ADIANTIFOLIA Bernh.

Rtstock creeping; stipes 1-1½° lg, firm, naked; fronds sparingly pubescent, the 2 lower branches elongate, pinnately decomposed, fertile; sterile portion deltoid-ovate, bi-tri-pinnate; ultimate seg obovate or cuneate, entire or lobed, striate above with num flabellate veins. Fla. Synonym: *Aneimia adiantifolia* Swz.

O: MEXICANA Underwood.

Rtstock creeping, covered with narrow blackish chaff; stipes slender, scattered, 6-12' long; the 2 lower branches of frond fertile, long-stalked, glandular, bi-pinnate with densely clustered fructification; the rest of the frond like the sterile ones, deltoid-ovate, simply pinnate; pinnae about 6 pairs and a rather large terminal one, short-stalked, ovate-lanceolate, subcoriaceous, smooth and somewhat glossy; midrib distinct, veins free, oblique, parallel, closely placed, once or twice forked. Western Texas. Synonym: *Anemia Mexicana* Klotzsch.

SCHIZAEA Sm.

Sts not scandent. Sporangia naked, fixed in a double row to the midrib of the narrow fertile segs. Sterile fronds simple or dichotomously forked. Includes 16 species.

S: FUSILLA Pursh.

Sterile fronds linear, very slender, flattened and tortuous; fertile ones equally slender, 3-4' hi, and bearing at top the fertile appendage consisting of about 5 pairs of crowded pinnae, forming a distichous spike. NJ; Nova Scotia; Newfoundland.

Sub-order **POLYPODIACEAE** Presl, Tent Pterid 167 (1836).

Sporangia pedicelled, surrounded more or less completely by a jointed vertical, and elastic ring, bursting transversely. Sori dorsal or marginal, borne on a leafy frond, with or without indusia.

Tribe **ACROSTICHEAE**. Sporangia spread in a stratum over the under surface, or rarely over both surfaces of frond; indusia 0.

ACROSTICHUM L. sp PI 1067 (1753).

Sori covering entire surface of upper pinnae. Near 200 species.

A: AUREUM L. Sp PI 1069 (1753).

Stipes 1-2° long, tufted, strong, erect,

glossy; fronds 2-6° long, 1-2° broad, upper pinnae fertile, slightly smaller than the barren ones; texture coriaceous; areolae small, copious, without free veinlets. Southern Fla.

A: LOMARIOIDES Jenman, Bot Dept Jam b 11, 5:154 (1898).

Description not seen. Southern Fla. *Chrysodium lomariodes*, Jenm, Timehri 4:314 (1885).

Tribe **POLYPODIEAE**. Sori dorsal, borne at or near ends of veinlets, indusia 0.

POLYPODIUM L.

Sp PI 1082 (1753).

Characters of the tribe, as formerly treated; 350 or more species. Sections *Phelbodium*, *Campyloneuron* and *Phymatodes* are considered as distinct genera by recent writers.

Section **EUPOLYPODIUM**. Veins free; fronds in one species pinnate.

*Sori Large.

P: VULGARE L.

Stipes 2-4' long, firm, erect; fronds 4-10' long, 1-3' broad, cut nearly or quite to rachis into entire or slightly toothed, com blunt pinnae; veins once or twice forked. New England; Ore; Ala. Variety **OCIDENTALE** Hooker.

Fronds larger, pinnae sharply serrated, long-pointed.

P: FALCATUM Kellogg.

Stipes 5-8' long, stramineous; fronds 12-15' long, 4-8' broad; pinnae num, tapering to a slender point, sharply serrate; sori nearest midrib; veins with 2-4 veinlets. Cal; Wash. Synonym: *P. glycyrrhiza* D. C. Eaton.

**Sori smaller, often minute.

P: PLUMULA H B K.

Stipes 1-4' long, bk, slender; fronds narrowly lanceolate, 9-18' long, 1-2° broad; pinnae num, narrow, entire, blunt, lower gradually reduced; surfaces naked except the bk wiry rachis; veinlets forked, obscure. Fla. Synonym: *P. elasticum* Rich.

P: PECTINATUM L.

Stipes rigid, 2-6° long; fronds elliptical-lanceolate, 1-2½° long, 2-6° broad, cut to rachis into horizontal, entire or toothed pinnae, lower ones much reduced; rachis naked or finely villose; veinlets pellucid, once or twice forked; sori in long rows, of medium size. Fla.

Section **GONIOPHLEBIUM** Blume. Veins forming ample regular areolae (sometimes almost imperceptible), each with a single distinct free included veinlet, bearing a sorus at its terminus.

*Under surface squamous.

P: INCANUM Swz.

Rtstock woody, wide creeping, covered with small brown scales; stipes 1-4' lg, erect, densely scaly; fronds 2-6° long, 1-1½° broad, cut to rachis into entire pinnae; texture coriaceous; sori small; veins indistinct, united or frequently free. Va; Ill; southward.

P: THYSANOLEPIS A. Br.

Rtstock slender, firm, densely covered with minute lanceolate scales; stripes 3-12' long, erect, scaly; fronds ovate, 3-9' long, 2-3° broad; pinnae distinct, ascending, blunt, dilated at base (except lowest), thick, subcoriaceous, covered below

with ciliate scales with brown center and broad scarious border; areolae and sori in one series. Huachuca mts. Ariz; Mexico.

**Under surface mostly smooth.

P: CALIFORNICUM Kaulf, B 2:234.

Rtstock creeping, chaffy; stipes 2-6' long, stramineous when dry, naked; fronds ovate to oblong-lanceolate, 4-9' long, 1-5' broad, cut nearly or quite to midrib into finely-toothed pinnæ; texture papyraceo-herbaceous; sori large; veinlets 4-6 to each vein. Cal; Baja. Synonym: *P. intermedium* H. & A.

P: SCOLERI H. & A.

Rtstock stout, creeping, scaly; stipes 2-4' long, erect, naked; fronds thick, 3-12' long, 2-6' broad, cut down to rachis into from 5-29 close, blunt pinnæ; texture coriaceous, fleshy when recent; sori very large; veinlets regularly anastomosing forming a single series of large areolae. Cal; northward. Synonyms: *P. carnosum* Kellogg.—*P. pachyphyllum* D. C. Eaton.

Section **PHLEBODIUM** R. Br. Veins forming ample areolae, each with 2 or more distinct, free, included veinlets bearing sori on their united points.

P: AUREUM L. Sp Pl 1087 (1753).

See *Phlebodium aureum*.

Section **CAMPYLONEURON** Presl. Primary veins distinct from midrib to edge, connected by parallel transverse veinlets; areolae similar, containing 2 or more sori.

P: PHYLLITIDIS L. Sp Pl 1083 (1753).

See *Campyloneuron phyllitidis*.

Section **PHYMATODES** Presl. Areolae fine, copious, irregular, the free veinlets spreading in various directions; sori various in position.

P: SWARTZII Baker, in Hooker & Baker, Syn Fil ed 1, 357 (1868).

See *Phymatodes Swartzii*.

PHLEBODIUM J Sm, I Bot 4:58 (1842).

See *Polypodium*, section *Phlebodium*, for characters.

P: AUREUM J Sm, I Bot 4:59 (1842).

Rtstock stout, densely scaly; stipes 1-2' long, castaneous, naked; fronds 3-5' long, 9-18' broad, cut nearly to rachis into broad entire or slightly undulate pinnæ; areolae copious. Fla. Synonym: *Polypodium aureum* L.

CAMPYLONEURON Presl, Tent Pterid 189 (1836).

See *Polypodium*, section *Campyloneuron*, for characters.

C: PHYLLITIDIS Presl, Tent Pterid 190 t 7 f 18 (1836).

Rtstock stout, scaly; stipes short or 0; fronds simple, 1-3' long, 1-4' broad, the point acute, lower part gradually narrowed; texture rigid, coriaceous, areolae in rows of 6-12 from midrib to edge. Fla. Synonym: *Polypodium phyllitidis* L.

PHYMATODES Presl, Tent Pterid 195 (1836).

See *Polypodium*, section *Phymatodes*, for characters.

P: SWARTZII Underwood, Our Native Ferns, ed 6, 84 (1900).

Rtstock wide creeping, slender, covered with linear ferruginous scales; stipes ½-1' long, slender, naked; frond simple, 2-4' long ¼ to ¾' broad, narrowed gradually toward both ends, edge entire, undulate,

or slightly lobed; sori uniserial on free veinlets. Key Largo, Fla (Curtiss). Synonyms: *Polypodium serpens* Swz.—*P. Swartzii* Baker.

Tribe **GRAMMITIDAE**. Sori dorsal, variously arising from the veins, com linear. *Indonesia* 0.

GYMNOPTERIS Bernh, Schrad J Bot, 1799 1: 297 (1799).

Sori oblong or linear, following course of veinlets.

G: HISPIDA Underwood. Our Native Ferns, ed 6, 84 (1900).

Rtstock creeping; stipes grayish, puberulent, 3-6' long; fronds 5-angled, 1-3' each way, hispid above, tomentose beneath, pinnate; lower pinnæ much the largest, unequally triangular, pinnate; upper pinnæ lobed or crenate. Tex; Arizona. Synonym: *Gymnogramme hispida* Mett in Kuhn, *Linnaea* 36:72 (1869-70).

G: TRIANGULARIS Underwood. Our Native Ferns, ed 6, 84 (1900).

Stipes densely tufted, slender, blackish-brown, polished, 6-12' long; triangular, bipinnatifid; upper pinnæ more or less pinnately lobed; lower surface covered with yellow or white powder, finally more or less obscured by the fr. Ariz; Baja; Cal; BC. Synonym: *Gymnogramme triangularis* Kaulf, *Enum Fil* 73 (1824).

Genus NOTHOLAENA R. Brown.

Sori on the veins or near their extremities, roundish or oblong, soon confluent into a narrow marginal band.

Section **EUNOTHOLAENA**. Fronds not farinose beneath, scaly, hairy or tomentose.

*Frons simply pinnate.

N: SINUATA Kaulf.

Rtstock short, thick, very chaffy; stipes 2-4' long, erect; fronds 6-2' long, 1-2' broad; pinnæ num, short-stalked, roundish or ovate, entire to pinnately lobed, lower surface densely scaly. Tex; Ariz. **N: FERUGINEA** Hooker.

Rtstock creeping, covered with dark rigid scales; tufted, 2-4' long, wiry, blackish, woolly at first; fronds 8-12' lg, ½-1' broad, narrowly lanceolate; pinnæ num, ovate, pinnatifid, hairy above, densely tomentose beneath, the wool at first wish, but becoming ferruginous. Tex.—Ar. Synonym: *N. rufa* Presl.

**Frons bi-quadrinate.

I.—Frons silky-hairy above.

NOTHOLAENA PARRYI Eaton.

Rtstock short, scaly, stipes 2-4' long, dark brown, pubescent with wish jointed hairs; fronds 2-4' long, oblong-lanceolate, tripinnate, lower pinnæ distinct; seg crowded, roundish-obovate, 1" broad, densely covered above with entangled w hairs, beneath with a heavier pale-brown tomentum. Ut; Ar; CD; Baja!

NOTHOLAENA NEWBERRYI Eaton.

Rtstock with very narrow dark bristly scales; stipes tufted, 3-5' long, blackish-brown, woolly when young, with pale ferruginous tomentum; fronds 3-5' long, lanceolate-oblong, covered most densely beneath with fine wish hairs, tri-quadrinate; ultimate seg roundish-obovate, one-third to ½" broad. SD; Baja!

Cotton fern, Southern and Baja Cal.

II.—Frons slightly hispid above.

N: ASCHENBOENIANA Klotzsch

Rtstock short, creeping; stipes tufted, 2-3' long, wiry, ebeneous, densely scaly; fronds 4-10' long, 2-3' broad, oblong-lanceolate, tripinnatifid; pinnae lanceolate, cut into linear-oblong, crenate or pinnatifid pinnules; upper surface pale g, the lower densely matted with linear, ciliate, bright ferruginous scales, beneath which it is subfarinose; sori black. Huachuca mts., Ar (Lemmon); Texas (Drummond); Mex.

Section **CINCINALIS** Desv. Fronds farinose with w or y powder (in 1 sp naked).

*Frons farinose below.

I.—Fronds deltoid or pentagonal, barely bipinnate.

N: CANDIDA Hooker.

Rtstock creeping, with narrow, rigid, nearly black scales; stripes tufted, 3-6' long, wiry, black and shining; fronds rather shorter than stipe, deltoid-ovate, pinnate; lowest pinnae with the lowest inferior pinnules elongate and again pinnatifid, the 3 or 4 succeeding pairs lanceolate, pinnatifid into oblong segs, the uppermost pinnae like the segs of the lower; upper surface g; lower surface w'ish farinose; margin slightly revolute. Southwestern Tex. (Reverchon); NM (Wright). Synonyms: *N. sulphurea* J. Sm.—*N. pulveracea* Kunze.

NOTHOLAENA CRETACEA Liebm.

Rtstock short, oblique, scales rigid, lanceolate, with a narrow membranous margin; stipes 2-7' long, brownish, wiry, scaly when young; fronds 1-2' long, broadly deltoid-ovate to pentagonal, tri-quadrripinnatifid at base, gradually simpler above; ultimate segs oblong or triangular-oblong, num, crowded; upper surface more or less covered with decid glands; lower surface copiously farinose with y or w'ish powder except on the prominent dark brown rachises; margins more or less recurved, not covering the sporangia; spores globose, bk. SD Co! Baja! Ar (Parry, Lemmon). Synonyms: *N. Californica* D. C. Eaton.—*N. candida* of collectors.

N: HOOKERI D. C. Eaton.

Rtstock short, densely covered with rigid lanceolate dark-brown scales; stipes tufted, 4-8' long, r'ish-brown, wiry, shining; fronds 2-3' each way, nearly pentagonal, composed of 3 divisions; middle one slightly stalked, rhomboid-ovate, pinnatifid into a few toothed segs, the 2d pair larger than the 1st; the side divisions sessile, deltoid, pinnatifid on upper side as in middle division, but each bearing on the lower side a single large pinnatifid basal seg, and above it smaller segs like those of the upper side; lower surface covered with pale y powder. Tex.; Ar. Synonyms: *N. cretacea* of check-lists, not of Liebm.—*N. candida* var. 5-fido-palmato Hooker.

II.—Fronds lanceolate or linear-oblong, bipinnate or tripinnatifid.

N: GRAYI Dav.

Stipes tufted, 1½-3½' long, terete, chestnut-brown, with nearly bk, rigid, linear-acuminate scales below, paler, decid scales above; fronds 2-4' long, ¼-1¼' broad, oblong-lanceolate, once or

twice pinnate, upper surface sparingly, under thickly covered with w powder; rachises brown like the stipes, coated with a granular substance extending down the stipes, and clothed with long, slender, entire or ciliate, pale or w'ish scales; pinnae short-stalked, oblique, unequally triangular-ovate, ovate-lanceolate, or lanceolate, deeply pinnatifid or pinnately divided into 1 or 2 pairs of short-stalked or sessile, oblong, pinnatifid obtuse pinnules, the remaining portion obliquely pinnatifid with alt, lobed or entire segs; margins unchanged, reflexed; sori brown in a continuous line at the ends of the free veins. southeastern Ar.

N: LEMMONI D. C. Eaton.

Rtstock short, scaly with narrow, pointed, rigid, dark-brown chaff; stalks dark r'ish-brown, wiry, 4-6' long, chaffy at base with scales a little wider and more scarious margined than those of rtstock, otherwise smooth; fronds 6-7' long, 1-1½' wide, linear-oblong, pinnate with num deltoid or ovate, 1 or 2 pinnatifid pinnae, lowest ones a little shorter than middle ones; upper surface herbaceous-g, smooth; lower surface covered with w or slightly y'ish ceraceous powder; sori forming a narrow sub-marginal line; margins of segs very slightly recurved. Ar.

III.—Fronds deltoid-ovate, tri-quadrripinnate at base.

N: NIVEA Desv.

Rtstock short, chaffy with narrow scales; stipes tufted, 4-6' long, wiry, bk, polished; fronds 3-6' long, 1½-2' broad, ovate, lanceolate, triangular-ovate or deltoid, tripinnate; primary pinnae mostly opp, rachises nearly straight; pinnules long-stalked; segs roundish, nearly as broad as long, terminal ones larger, entire or 3-lobed; upper surfaces g, smooth, lower densely coated with pure w powder; sori brown, often descending the free veins half-way to midvein. Ar; NM.

Variety **DEALBATA** Dav. Segs smaller, more num, longer than broad, terminal ones rarely lobed. Upper Missouri to NM; Ar. Synonyms: *N. dealbata* Kunze *Cheilanthes dealbata* Pursh.

N: FENDLERI Kunze.

Stipes densely tufted, dark-brown, 3-5' long; rachis and all its branches zigzag and flexuous; fronds broadly deltoid ovate, 3-5' each way, quadrripinnate below, gradually simpler above; pinnae alt; ultimate pinnules oval or elliptical, simple or 3-lobed. Colo; NM; Ar.

**Fronds naked below.

NOTHOLAENA TENERA Gillies.

Stipes tufted, brownish, smooth and shining; fronds 3-4' long, ovate-pyramidal, bi-tripinnate; pinnae mostly opp, distant, lower ones somewhat triangular; ultimate pinnules ovate, often subcordate, obtuse, smooth and naked on both surfaces; considered as possibly only a form of *N. nivia* by Underwood.

Southern California; Arizona; Utah.

TAENTIS Swz.

Sori linear, central or submarginal; veins reticulate. Five tropical species.

T: LANCEOLATA R. Br.

Rtstock creeping; stipes 1-2' long; fronds simple, 6-13' long, $\frac{1}{2}$ - $\frac{3}{4}$ ' broad, tapering both ways, edge entire or sometimes crisped, midrib prominent; veins immersed, exterior free and clubbed at apices; sori anti-marginal, in a continuous line near apex. Old Rhodes Key, Fla (Curtiss). Synonyms: *Lingua cervina* Plum.—*Pteris lanceolata* L.—*Pteropsis lanceolata* Desv.—*Neurodium lanceolata* Fee.

Tribe **VITTARIEAE**. Sporangia borne in a continuous marginal or intramarginal furrow.

VITTARIA J. E. Smith, Ac Roy Sci Turin mem 5:413 (1793).

Fronds simple, linear, grass-like. Grass-fern. Thirteen tropical sp.

V: LINEATA J. E. Smith, Ac Roy Sci Turin mem 5:413 (1793).

Fronds 6-18' long, 1-5" broad, narrowed gradually downward to a stout compressed st, edge often reflexed; sori in a broad intramarginal line in a slight furrow, edge of frond at first wrapped over it. Fla. Synonym: *V. angustifrons* Michx.—*Pteris lineata* L. Sp Pl 1073 (1753).

Tribe **PTERIDEAE**. Sori marginal or intramarginal, provided with an indusium formed of the reflexed margin of frond, opening inwardly.

*Sporangia borne on a reflexed portion of margin of frond. *Adiantum*.

**Sporangia borne on a continuous vein-like receptacle which connects apices of veins. *Pteris*.

***Sporangia at or near the ends of unconnected veins, borne on under surface of frond. *Cheilanthes*; *Cryptogramme*; *Pellaea*.

Genus ADIANTUM Linnaeus.

Sp Pl 1094 (1753).

Sori com num and distinct. Midrib of pinnules near lower margin or 0. Over 80 sp mostly tropical Am. Maidenhair. Section **EUADIANTUM**.

*Fronds at least bipinnate, pinnules flabellate or cuneate.

L.—Fronds smooth.

A. CAPILLUS-VENERIS L. Sp Pl 1096. Da 20. B 2:342 d. Greene, Cal ac b 2:415. Cruz. P. 1:208. Cedros.

Stipes nearly bk, polished, very slender; fronds ovate-lanceolate, delicate, bipinnate, upper half or third simply pinnate; pinnules and upper pinnae wedge-obovate or rhomboid, rather long-stalked, upper margin rounded and more or less incised, crenate, or acutely dentato-serate, except where margin is recurved to form the lunulate parted indusia. Va; Ky; Fla; Ut; Baja! CD! SD Co!

Venus-hair or black maidenhair fern. United States. Mexico.

A. TENERUM Swz, Fl Ind Occ 3:1719 (1806).

Stipes 1° hi, erect, glossy; fronds 1-3° long, 9-18' broad, deltoid, tri-quadrinate; pinnules articulated to their petioles, falling off at maturity, cuneate, upper edge rounded or somewhat angular, broadly often rather deeply lobed; sori num, roundish, or transversely oblong. Fla.

A. JORDANI Muell, in bot zeit 22:25 t 1 f 1. B 2:485 as *A. emarginatum*.

Stipes rather stout, nearly bk, polished; fronds ovate or deltoid-pyramidal, bi-tripinnate; pinnules and upper pinnae ample, smooth or nearly so, rounded or even reniform, upper margin rounded, slightly incised; sori 2-5, transversely linear-oblong, subcontinuous. Cal; Ore; NM; Nev; SD! Baja! Synonyms: *A. emarginatum* Hooker.—*A. tenerum* Torrey.

California; Nevada; N. M.; Oregon.

II.—Fronds pilose, with w'ish hairs.

A. TRICHOLEPIS Fee. 8 me Mem Fam Fong 72 (1854-57).

Stipes smooth, polished, deep bk; fronds oval; pinnules roundish, moderately long-stalked; sori 3-7, of unequal size; indusia very velvety. West Tex; NM. Synonym: *A. dilatatum* Nuttall.

**Fronds dichotomously forked, with num pinnae springing from upper side of the two branches.

A. PEDATUM L. Sp Pl 1095. B 2:342. Z 1:148; 2:131. Greene, Cal ac b 2:415, Cruz.

Stipes 9-15' long, dark chestnut-brown, globose fronds nearly circular in outline; central pinnae 6-7' long, 1-2' broad; pinnules triangular-oblong, short-stalked sori roundish or transversely oblong. Maidenhair. Nova Scotia; BC; Alk; Ga; Miss; Ark; Kans; Ut; Cal.

Venus-hair fern; Black Maidenhair.

Variety **KANGIFERINUM** Burgess.

Pinnules longer-stalked and deeply cleft into narrow-toothed lobes on upper side. Mt. Findlayson BC.

A. AETHIOPICUM, Baker, Syn Fil 123. B 2:342, in part as *A. emarginatum*.

A. AMERICANUM Carnatus, Can Pl Hist 7 t 6. B 2:343 as *A. pedatum*.

A. CHILENSE Kaulfuss. Of American authors=*A. emarginatum* fide. B 2:342.

A. CONCINNUM Z 2:151.

A. DILATATUM Nutt, in Hook hb. B 2:342. Identity doubtful.

A. EMARGINATUM Hook, Sp Fil 2 t 75. Da 20. B 2:342, 485. Z 2:131, 382. Br 1:205. Cruz; 218 Rosa.

PTERIS L. Sp Pl 1073 (1753).

Sori continuous; indusium delicate, w'ish; midribs of pinnules central. A cosmopolitan genus of over 100 species (including *Pteridium*).

Section **EUPTERIS** Veins free stipes tufted, indusium single.

*Lower pinnae linear, undivided.

P: LONGIFOLIA L. Sp Pl 1074 (1753).

Stipes 6-12' long, clothed more or less below with pale brown scales; fronds 1-2° long, 4-9' broad, oblong-lanceolate; pinnae sessile, 2-5" broad, linear, entire; veins close and fine, com once branched; indusium y'ish-brown. Fla.

**Lower pinnae forked or slightly pinnate below.

P: CRETICA L. Mant 1:130 (1767).

Stipes 6-12' long, erect, stramineous or pale brown; fronds 6-12' long, 4-8' broad, lateral pinnae com in 2-6 opp sessile pairs, sterile ones considerably the

broadest and spinulose-serrate, lower pairs often cleft nearly to base, into 2 or 3 linear pinnules; veins fine, parallel, simple or once forked; indusium pale. Fla.

P: SERREULATA L, f, Suppl Pl 445 (1781).

Ribbon-fern, spider-fern, saw-leaved bracken. Stipes 6-9' long, naked, pale or brownish; fronds 9-18' long, 6-9' broad, ovate, bipinnatifid, main rachis margined with a wing which is 1-2" broad at top and grows narrower downwards; pinnae in 6 or more distinct opp pairs, upper ones simple, lower ones with several long linear pinnules on each side, edge of barren ones spinulose-serrate; veins simple or once forked. Ala (Mohr); Macon, Ga (Farnell); SC. Probably an escape from cult.

Section **PAISIA** St. Hilaire. Veins free, rtstock creeping, stipes substiant, indusium more or less double. See *Pteridium*.

PTERIDIUM Scop Fl Com ed 1, 169 (1760).

Section *Palsia* of *Pteris*.

P: AQUILINUM Kuhn in Deckins Reisen III, Bot Ost-Afrika II (1879).

Brake, Bracken, Eagle fern, Umbrella fern, Hog brake. Rtstock stout, wide-creeping, subterranean; stipes 1-2° hi, erect, stramineous or brownish; fronds 2-4° long, 1-3° wide, ternate, the 3 branches each bipinnate; upper pinnules undivided, lower more or less pinnatifid. Newfoundland; Quebec to Ala; Mo; Manitoba. Synonym: *Pteris aquilina* L, Sp Pl 1075 (1753).

Variety **PSEUDOCAUDATUM** Clute, Fern b 8:39 (1900), as syn.

Long Island, NY, to Fla, Ala and Tex, mainly near coast.

Variety **PUBESCENS** Underwood, Our Native Ferns, ed 6, 91 (1900).

Fronds silky-pubescent or tomentose, especially on under surface; otherwise as type. Ar. Cal; Ut; BC. Synonym: *Pteris aquilina lanuginosa* Hooker, and American authors—not Bory, Willd, Sp Pl 5:403 (1810).

P: CAUDATUM Maxon, US Na MU pr 3:631 (1901).

Pinnules sometimes linear and entire, or with less crowded segs than *P. aquilina*; terminal lobe linear and entire. NJ; Fla; Tex. Synonyms: *Pteris caudata* L, Sp Pl 1075 (1753).—*Pteris aquilina caudata* Hook. (Sp Fil 2:196 (1858)).

Genus CHEILANTHES Swartz.

Syn Fil 126 (1806).

Sori minute, at ends of veins; indusium continuous or interrupted. Near 70 temperate and tropical sp.

Section **ADIANTOPSIS** Fee. *Indusia* distinct, roundish, confined to apex of a single veinlet.

CHEILANTHES CALIFORNICA Mett. cheil 44. B 2:336. Da 20. Z 1:147. 2:131. Greene, Cal ac b 2:415 Cruz.

Rtstock short, creeping chaffy; stipes densely tufted, dark brown, glossy, 4-8' long; fronds 4' or less each way, broadly deltoid-ovate, smooth on both surfaces, quadripinnatifid; lower pinnae largest, triangular; upper ones gradually smaller and simpler; ultimate segs lan-

ceolate, acute, incised or serrate; *indusia* membranous. Cal; Baja! SD Co! Synonyms: *Aspidotis Californica* Nuttall, Hooker, Sp Fil 2:71 (1858) as syn.—*Hypolepis californica* Hook sp Fil 2:71 (1858).

Lace fern. Southern and Baja Cal.

C: PRINGLEI Davenport, Torr cl b 10:61 t 34 (1883). Z 2:150.

Rtstock slender, creeping, clothed with linear-lanceolate scales; stipes 1½-4½' long, r'ish or chestnut brown, scaly at base and sparingly above; fronds 1-2½' long, nearly as broad, triangular or ovate-deltoid, 2-3-pinnately divided into 5-7 pairs of pinnae, opp and spreading in the smaller sterile fronds, alt and erecto-patent in the larger fertile fronds, naked, dark-g; pinnae 5-eights to one and one-eighth inch long, lower unequally deltoid or ovate, bipinnate, uppermost oblong, pinnate or deeply pinnatifid; pinnules ovate or oblong, pinnately divided or cleft into oblique segs, which are again deeply cleft into cuneate strap-shaped divisions, those of largest segs again deeply cut into narrow, obtuse, cuneate lobes, recurved tips in fertile fronds forming distinct herbaceous inv with entire or crenulate margins; sori one to each ultimate lobe on apex of a free veinlet. Southeastern Ar (C. G. Pringle).

Section **EUCHEILANTHES**. *Indusia* more or less confluent, com extending over apices of several veinlets, but not continuous all round segs; segs mostly flat, not bead-like.

*Segs of frond smooth.

I.—Pinnae few, not more than 5-6 pairs.

C: WRIGHTII Hooker.

Stipes castaneous, slightly chaffy at base, 1-2' long; fronds 2-3' long, ovate-oblong, 3-pinnatifid, segs more or less incised; indusium subcontinuous or interrupted, similar to frond in texture. Tex; Ar.

II.—Pinnae num.

C: MICROPHYLLA Swz.

Rtstock short, creeping; stipes dark brown, glossy, rusty pubescent on upper side, 4-6' long; fronds 4-6' long, ovate-lanceolate, 2-3-pinnate; pinnae lanceolate, lowest ones com largest and more deltoid; pinnules oblong or deltoid-ovate, deeply incised or pinnate; indusium similar in texture to frond, interrupted or subcontinuous. Fla; NM.

C: ALABAMENSIS Kunze.

Rtstock creeping, clothed with slender brown scales; stipes bk with scanty ferruginous wool; fronds 2-10' long, narrowly lanceolate, 2-pinnate; pinnae close, ovate-lanceolate, lowest ones not enlarged, com smaller than those above; pinnules com acute, often auriculate on upper side at base; *indusia* pale, membranous, interrupted only by the incisings of pinnules. Va; Ala; Tenn; Tex; Ar. Synonyms: *Pellaea Alabamensis* Baker.—*Pteris Alabamensis* Buckley, Am J sci 45:177 (1843).

**Segs of frond glandular viscid.

CHEILANTHES VISCIDA Davenport.

Torr cl b 6:191. B 2:337.

Stipes 3-5' long, wiry, bk'ish, chaffy at

base with narrow ferruginous scales; fronds 3-5' long, $\frac{3}{4}$ -1' broad, narrowly oblong, pinnate, with 4-6 distant pairs nearly sessile, deltoid, 2-pinnatifid pinnae; segs toothed, minutely glandular and everywhere viscid; teeth of seg recurved, forming indusia. Cal; CD!

Colorado Desert near Whitewater.

***Fronds somewhat hairy and glandular. Not tomentose.

I.—Fronds deltoid-ovate; stipes stramineous.

C. EUCOPODA Link.

Stipes 3-4' long, stout, chaffy at base; fronds 2-4' long, deltoid-ovate, 4-pinnate at base, gradually simpler above, everywhere glandular-puberulent; lowest pair of pinnae unequally deltoid-ovate, upper ones oblong; pinnules short-stalked; ultimate pinnules divided into minute rounded lobules, strongly revolute when fertile. Tex.

II.—Fronds ovate-lanceolate; stipes brownish.

C. VESITIA Swz, Syn Fil 128 (1806).

Stipes tufted, 2-4' long, wiry, chestnut brown; fronds 4-9' long, 1-2' broad, 3-pinnatifid; pinnae somewhat distant, lanceolate-deltoid; segs more or less thickly covered with acute hairs; sori copious; indusia formed of ends of roundish or oblong lobes. Conn; NY; Kans; Ga; Tex. Synonyms: *Nephrodium lanosum* Michx, Fl B or Am 2:270 (1803).—*Cheilanthes lanosa* Watt, J Bot Brit and Foreign 12: 48 (1874).

CHEILANTHES COOPERAE Eaton.

B 2:337. Da 20.

Stipes densely tufted, fragile, hairy with straightish nearly w articulated hairs which are com tipped with a glandular and viscid enlargement; fronds 3-8' long, 2-pinnate, pinnae rather distant, oblong-ovate; pinnules roundish-ovate, crenate and incised, ends of lobules forming herbaceous indusia.

Central and southern California.

Section **PHYSAPTERIS** Presl. Ultimate segs minute, bead-like, indusium com continuous all round the margin; fronds in one sp 2-4-pinnate, lower surface scaly or tomentose or both.

*Fronds hairy or tomentose beneath, not scaly.

I.—Upper surface naked or nearly so.

C. GRACILLIMA Eaton. B 2:337. Z 2: 131.

Lace fern. Stipes densely tufted, 2-6' long, dark brown; fronds 1-4' long, narrowly ovate-lanceolate, bipinnate; pinnae num, crowded, pinnately divided into about 9 oblong-oval pinnules, at first slightly webby above, soon smooth, heavily covered beneath with pale ferruginous matted wool; indusia yish-brown, formed of the continuously curved margin. Cal; Ore; Idaho; BC. Synonym: *C. vestita* Brack, in Wilkes' US Exp 16:71 (1854), not Swz.

C. LENDIGERA Swz.

Rtstock cord-like, creeping, covered with narrow scales; stipes rather distant, 4-8' long, at first loosely tomentose at length nearly smooth; fronds 4-8' long, ovate-oblong, 3-4-pinnate; ultimate pinnules small, cuneate-obovate, pouch-like from the recurved margins; g above,

hairy below. Huachuca mts. Ar (Lemon).

II.—Upper surface decidedly pubescent.

A.—Stipes tomentose or smooth.

C: FEEI Moore, Index Fil XXXVIII (1857).

Stipes densely tufted, slender, at first clothed with woolly hairs, at length nearly smooth fronds 2-4' long, ovate-lanceolate, 3-pinnate or 3-pinnatifid, rarely bipinnate; pinnae deltoid below, oblong-ovate above, lowest distant; ultimate pinnules minute, terminal one slightly largest, crowded; upper surface scantily tomentose, lower densely matted with wish-brown woolly hairs; indusia narrow, formed of the unchanged margin. Ill; Tex; Ar; Minn; BC. Synonyms: *C. lanosa* D. C. Eaton.—*C. vestita* Hooker in part.—*C. gracilis* Mett, Abh Senck Nat Gesell 3:80 (1859-61) not Kaulf.—*C. lanuginosa* Nuttall, Hooker, Sp Fil 2:99 (1858) as syn.—*Myriopteris gracilis* Fee, Gen Fil 150 (1850-2).

C: IOMENTOSA Link, Hort Berol 2:42 (1833).

Woolly lip-fern. Stipes tufted, 4-6' long, rather stout, covered with pale brown tomentum; fronds 8-15' long, oblong-lanceolate, everywhere but especially beneath tomentose with slender, brownish-w, obscurely articulated hairs, 3-pinnate; pinnae and pinnules ovate-oblong; ultimate pinnules $\frac{1}{2}$ - $\frac{3}{4}$ " long, terminal ones twice as large; indusium pale, membranous, continuous. Va; Mo; Ga; Tex; Ar. Synonym: *C. Bradburii* Hooker.

II.—AA.—Stipe and rachises covered with very narrow scales.

C: EATONI Baker, Hook & Baker, Syn. Fil 6:1, 140 (1868).

Differs from *C. tomentosa* chiefly in having scaly rachises, and reduced to a *Cheilanthes* (*Eatoni*) by Davenport, Cat Dav Hb suppl 49 (1883). Maxon restores it to specific rank. Ar.

CHEILANTHES FIBRILLOSA Davenport.

Plant 3-6' hi; rtstock forming dense, entangled clumps of short rhizomes, clothed with dark linear-lanceolate scales, passing gradually into lighter brown scales, mixed with coarse fibres and tomentum at base of stipes; stipes 2-3' long, chestnut brown, terete, at first tomentose with fibrous scales and wool, becoming smooth with age; fronds 2-3' long, $\frac{3}{4}$ -1 $\frac{1}{2}$ ' wide, 3-pinnate, loosely covered with decid tomentum, that along the rachises beneath persistent, mixed with coarse fibres. Synonym: *C. lanuginosa fibrillosa* Dav.

San Jacinto mts, California (Parish).

CHEILANTHES PARISHII Davenport.

Rtstock creeping, short, clothed with deep brown linear-lanceolate scales, with darker nearly bk mid-nerves; stipes 2-3' long, approximate, light to lark brown, clothed at base with scales similar to those on rtstock, passing gradually into broader pale brown or nearly w nerveless scales, with more or less decid, slender, pale scales and chaff above; fronds 3-4' long, 1-1 $\frac{1}{4}$ ' broad, oblong-lanceolate, 3-4-pinnate, with both sur-

faces scantily clothed with a coarse tomentum; pinnae alt, oblong-ovate, obtuse, lowermost somewhat distant; segs roundish, terminal ones largest, 3-lobed; indusia very narrow, only partially enclosing the sori. Type locality: Riverside (formerly part of SD) Co, Cal (Parish).

**Fronds covered beneath with imbricated scales, not tomentose.

C. FENDLERI Hooker.

Stipes 2-5' long, chaffy with minute slender scales; fronds 3-4' long, ovate-lanceolate, 3-pinnate; scales of primary rachis like those of stipe, those of secondary and ultimate rachises larger, broadly-ovate, entire or nearly so, combed with w. imbricate and overlapping the (one-fourth to one-third line broad) subglobose ultimate segs; these are naked above, com bear at center a broad scale; indusium formed of the much incurved margin. Tex; Colo; Cal.

CHEILANTHES CLEVELANDI Eaton. B 2:338.

Stipes scattered, 2-6' long, dark brown, scaly when young, at length nearly smooth; fronds 4-6' long, ovate-lanceolate, 3-pinnate, smooth above, deep fulvous brown below from the dense covering of closely imbricate, ciliate scales growing on the ultimate segs as well as on the rachises; segs nearly round, 1-3d to 1/2' broad, terminal ones larger, margin narrowly incurved. Named in honor of Daniel Cleveland.

Southern and Baja California.

***Under surface both tomentose and scaly.

C. ELEGANS Kuhn Beitr 8. B 2:338 as myriophylla.

CHEILANTHES MYRIOPHYLLA Desv. B 2:338. Z 2:131. Br 1:205 Cruz; 218 Rosa.

Rtstock very short, scaly; stipes tufted, 2-6' hi., castaneous, covered with pale brown scales and woolly hairs intermixed; fronds 3-8' long, oblong-lanceolate, 3-4-pinnatifid, smooth or pilose above, beneath matted-tomentose and densely clothed with pale brown, narrowly ovate-lanceolate, ciliate scales, those of ultimate segs with long, tortuous cilia; pinnae deltoid-ovate, narrower upwards; ultimate segs minute, 1/2" broad, crowded, innumerable, margin unchanged, much incurved; very variable. Synonyms: *C. elegans* Desv.—*C. villosa* Dav.

Texas; Arizona; southern and Baja Cal.

C. LINDHEIMERI Hooker.

Rtstock long, slender, chaffy, stipes scattered, 4-7' hi, bk'ish-brown, at first covered with scales and woolly hairs; fronds 3-5' long, ovate-lanceolate, 3-4-pinnate; ultimate segs 1/4" long, crowded; upper surface w-tomentose, lower surface very chaffy, those of midrib ciliate at base, those of segs more and more ciliate, passing into entangled tomentum. Tex; Ar.

Section **ALEURITOPTERIS** Fee. Indusia more or less confluent; fronds farinose below.

C. ARGENTEA Kunze.

Stipes densely tufted, 3-6' long, castaneous; fronds 3-4' long, 2' broad, deltoid, 2-3-pinnatifid; lower pinnae much

the largest, cut nearly to rachis; rachis polished like stipe; upper surface naked, lower thickly covered with w powder; sori num, very small. Alk. Synonym: *Pteris argentea* S. G. Gmel, Nov Comm Ac Sci Petrop 12:519 t 12 f 2 (1768).

CRYPTOGRAMME R. Br, App Frankl J 767 (1823).

Sporangia on back or near ends of veins forming oblong or roundish sori, which are at length confluent and cover back of pinnules; sterile and fertile fronds unlike, smooth. Two boreal species.

C. ACROSTICHOIDES R. Br, App Frankl J 767 (1823).

Parsley fern. Stipes densely tufted, stramineous; fronds dimorphous, sterile ones on shorter stalks, 3-4-pinnatifid, with toothed or incised segs; fertile ones long-stalked, less compound, with narrowly elliptical or oblong-linear pod-like segs. Alk, Mackenzie south to Cal; Colo; Lake Huron. Synonyms: *C. Crispa forma americana* Hook.—*Allosorus acrostichoides* Spreng.

C. STELLERI Prantl, Englers Bot Jahr 3:413 (1882).

Stipes scattered, slender, 2-3' long, stramineous or pale brown; fronds 2-4' long, 1-2' broad, ovate, 2-3-pinnatifid; pinnae lanceolate, deltoid, cut to rachis into a few broad, blunt, slightly-lobed pinnules; texture thinly herbaceous flaccid; indusium broad, continuous membranous; veins of fertile fronds mostly only once-forked. Labrador; Alk; Mass; Ill; Ia; Pa; Colo.

Synonyms: *Pteris stelleri* S. G. Gmel Nov Comm Ac Sci Petrop 12:519 t 12 f 1 (1768).—*Pellaea stelleri* Watt, Can Fil No. 2 (1869-70).—*Pteris gracilis* Michx, Fl Bor Am 2:262 (1803).—*Pellaea gracilis* Hooker, sp Fil 2:133 t 133 B (1858).—*Allosorus crispus stelleri* Milde.—*A. gracilis* Presl.

Genus PELLAEA Link.

Link, Fil Sp Hort Berol 59 (1841).

Sori on the upper part of veins distinct, or mostly forming a marginal band of sporangia; sterile and fertile fronds com similar, smooth. Over 50 species.

Section **CHEILOPLECTON** Fee. Texture herbaceous or subcoriaceous, veins clearly visible, indusium broad, in most of the species rolled over the sori till maturity.

F. BREWERI D. C. Eaton.

Stipes densely tufted, covered with narrow, crisped, fulvous chaff; fronds 2-6' long, simply pinnate, pinnae short-stalked, 6-8 pairs, membranous, mostly 2-parted, upper seg larger; segs obtuse, in fertile frond narrower; indusium continuous, pale; veins repeatedly forked. Colo; Cal.

Section **ALLOSORUS** Baker. Texture coriaceous, veins not perceptible; indusium broad, conspicuous.

*Pinnules or segs obtuse or barely acute.

I.—Fronds pinnate or bipinnate.

P. ATROPURPUREA Link.

Stipes tufted, 2-6' long, dark p; fronds 4-12' long, 2-6' broad, lanceolate or

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