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A Manual of the Ferns and "Fern-Allies" of Grinnell and Vicinity

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A MANUAL OF THE FERNS AND "FERN-ALLIES" OF GRINNELL AND VICINITY.

HENRY S. CONARD

The writer believes that for every floristic district of the State there should be a simple and convenient manual of the local flora. As a first attempt to meet this need, the following manual is presented. The other vascular plants should be similarly covered.

Each species herein is briefly described by means of its most obvious recognition characters. There follows in some cases a more technical description. We then give the habitat, the name of some locality in or near Grinnell, the distribution, and the month in which spores may be found. The notes inserted in various places are intended to offer interesting bits of information. The keys and descriptions are avowedly artificial and are intended for the use of beginners. They are especially adapted for use in the region designated, but they will be found applicable to most of the State.

The names (excepting *Pteridium*) are as given in Gray's Manual. Authorities for the names are therefore omitted. The larger and more technical manuals should be consulted after the species have been identified by the aid of this little guide. Acknowledgment is made to the labors of many collectors whose records have made this compilation possible, and to several students who have tried out the keys and text.

TRACHEATA Vascular Plants

Plants with root, stem and leaf, containing tracheary tissue, that is, definite thick-walled water-conducting cells. The spore-producing stage is large and plainly seen, the gamete-producing stage being small or microscopic. Trees, shrubs and herbs. Fern plants and Seed plants.

Series 1. LYCOPSIDA: Herbs with small lvs., crowded in spiral order or whorled. No flowers or seeds. Spores borne in small cases one in the axil of a leaf, or few on the inner side of an umbrella-shaped body, usually in crowded, conelike groups.

Order 1. LYCOPODIALES

Lvs. crowded in spiral order, sometimes appearing 4-ranked,

green, 2-5mm. long, 1-2mm. wide, spreading or like scales on the stem.

Sporangia single in the axils of ordinary or slightly modified lvs., usually forming a terminal strobilus or conelike group.

Family 1. LYCOPODIACEAE Club Moss Family

Lvs. spirally arranged, many ranked. Spores all alike.

Lycopodium Club moss; ground pine.

(Lycos, wolf; pous, foot; from a fancied resemblance)

Characters of the family.

1. L. LUCIDULUM Shining L.

Lvs. all alike, nearly at right angles to stem, sometimes a group bearing sporangia at base, finely toothed at apex.

Cool shaded rocks, very rare here.

Eldora

Nfd. to Minn., Ia., and S. C.

July

Note: Other species of *Lycopodium* are commonly imported at Christmas time for wreaths under the name of ground pine. Druggists usually have spores of these plants under the name of *Lycopodium* powder. The related genus *Selaginella* is often seen as a flat-sprayed delicate greenhouse plant, with two kinds of spores, large and small. Two species 2-5cm. tall grow wild in neighboring regions. In the coal period, the predecessors of these plants grew to the size of trees, with heavy woody trunks and roots. Their fossil prints occur in Iowa coal, and are known as *Stigmaria*, *Sigillaria*, and *Lepidodendron*.

Order 2. EQUISETALES

Stems jointed, with a sheathlike whorl of united minute lvs. at each node. Spores green, cottony, in conelike heads at the ends of stems.

Note: In the coal period, plants resembling *Equisetum* grew to the size of trees, with woody stems and cambial growth. Their huge jointed stems, 2-4 dm. thick, are sometimes found in coal.

Family 8. EQUISETACEAE Horsetail Family.

Characters of the Order.

Equisetum Horsetail

(Equus, horse; seta, bristle)

Scales of cone hexagonal, with 6 or 7 sporangia beneath. Spores with 4 slender, broad tipped "elaters" (threads) which coil and uncoil when moist or dry. Stems hollow, grooved, with large air canals in the cortex, and a small one in each vascular bundle.

Note: The elaters are extremely sensitive to moisture; the breath breathed over them causes great activity, especially as seen with a microscope. These plants are evidently the reduced herbaceous remnants of a once large and wide-spread family, the Calamites and Sphenophyllales.

1. Stems delicate, soft, annual; some of them much branched 2
1. Stems stiff, evergreen, little if at all branched 3

- | | |
|--|-------------------------|
| 2. Spore-bearing shoot brown, soon withering | 1. <i>E. arvense</i> |
| 2. Spore-bearing shoot developing whorls of green branches | 2. <i>E. sylvaticum</i> |
| 3. Shoots scattered about, 3-7 mm. thick | 3. <i>E. laevigatum</i> |
| 3. Shoots clustered, 5-12 mm. thick, 1 m. tall | 4. <i>E. hyemale</i> |

1. *E. ARVENSE* Field E. Common horsetail

Spore-bearing shoots 1-3dm. tall, light brown, juicy, withering, preceding the much branched green shoots, which become 2-3dm. tall.

Cone 2-5cm. long, narrowly ellipsoidal; sheaths of stem loose, 8-12 toothed. Branches of green shoot 3-4-angled, whorled, rough, easily breaking at the nodes. Rhizomes long and slender, black, with frequent globular bulbs.

Moist ground, common

Railway on campus; Botanic Garden.

General over northern Eurasia and America

April

2. *E. SYLVATICUM* Woodland E.

Cone-bearing shoot at first branchless, later developing whorls of slender drooping green branchlets; 1-3dm. tall, slender and delicate.

Ridges of stem 8-14; branches 3-5-angled. Sheaths loose, with several rusty-colored teeth.

Moist thickets, very rare here.

Richland Twp. Jasper Co. (locality destroyed); Eldora?

Entire north temperate zone north of 40 degrees.

May-June

3. *E. LAEVIGATUM* Snake grass

Shoots all alike, dark green, 4-8dm. tall, stiff and harsh, 3-5mm. thick, unbranched or with a few slender erect branches, often ending in a hard cone 1-2cm. long.

Evergreen. Sheaths green, with narrow black edge, the teeth soon falling off. Spreading by running rhizomes.

Prairie banks, common

North track; Arbor Lake

Ohio to B. C. and Tex.

June, July

4. *E. HYEMALE* Winter E. Scouring rush

As above, except stems 5-10mm. thick, 6-12dm. tall; tufted in dense sods to the exclusion of everything else.

Evergreen. Sheaths with 2 black rings separated by an ashy ring. Cones rarely seen.

Wet ground, rare.

Railroad bank one mile west of Turner.

N. Europe and n. e. N. America

Note: Like other species of *Equisetum*, this species is very rich in silica, that is, the hard material of sand and glass. The outer surface is covered with almost pure silica. Our grandmothers used a bundle of the dried stalks to scour pots and pans; hence the common name. The local form is var. *robustum*.

Series 2. PTEROPSIDA: Herbs, shrubs or trees, with primarily large lvs. whose attachment to the stem greatly modifies the structure of the latter at the nodes. Sporecases primarily numerous, borne on the underside of a leaf. The lower forms are reproduced by spores; the higher ones by seeds, resulting from flowers with pollen and ovules.

Class 1. ASPERMAE Seedless Pteropsidans. Ferns.

Propagation by means of minute spores, borne in small cases (sporangia) on the backs or surfaces of ordinary or modified lvs.

Stems always (in our species) under ground, only the lvs. coming up. Without cambium (except in *Botrychium*); vascular bundles variously disposed, concentric in structure. Veining of lvs. forked, occasionally the forks uniting into a network.

Key to the Genera of Aspermae

- | | |
|--|--------------------|
| 1. Sporangia on a naked stalk rising from the leaf | <i>Botrychium</i> |
| 1. Sporangia on much contracted lvs. or lflts., without any green part | 2 |
| 1. Sporangia on the backs of ordinary lvs. | 3 |
| 2. Sporangia exposed all over the modified lflts. | <i>Osmunda</i> |
| 2. Sporangia enclosed in podlike rolled-up lflts. | <i>Onoclea</i> |
| 3. Lvs. simple | <i>Camptosorus</i> |
| 3. Lvs. compound | 4 |
| 4. Lvs. once pinnately divided | 5 |
| 4. Lvs. twice or more divided | 6 |
| 5. Lflts. contracted to a short stalk | <i>Polystichum</i> |
| 5. Lflts. broadly attached to midrib | <i>Polypodium</i> |
| 6. Sporangia covered by turned-back margin of leaf | 7 |
| 6. Sporangia not covered by margin of leaf | 9 |
| 7. Sporangia in separate patches | <i>Adiantum</i> |
| 7. Sporangia all around lflt. | 8 |
| 8. Plant 5 cm. to 2 dm. tall | <i>Pellaea</i> |
| 8. Plant 3-10dm. tall | <i>Pteridium</i> |
| 9. Spore dots elongate, straight or curved | <i>Asplenium</i> |
| 9. Spore dots circular | 10 |
| 10. Lvs. 3-8 times longer than wide | 11 |
| 10. Lvs. triangular, as wide as long | <i>Phegopteris</i> |
| 11. Lvs. 4-8 cm. wide; stalks 2-3 mm. thick | 12 |
| 11. Lvs. 8-15 cm. wide; stalks scaly, 3-5 mm. thick | <i>Aspidium</i> |
| 12. Lvs. hairless | <i>Cystopteris</i> |
| 12. Lvs. finely downy | <i>Woodsia</i> |

Order 1. OPHIOGLOSSALES

Sporangia lmm. across, in groups on a contracted segment of the leaf which appears on a naked stalk above the green leaf.

Stem erect, with very slow cambial growth, producing one leaf per year. A single plant may live for 30 years or more.

Family 1. OPHIOGLOSSACEAE Adder's tongue family

Characters of the Order

Botrychium

Moonwort

(Botrys, a bunch of grapes, from the groups of sporangia)

Characters of the Order

1. B. VIRGINIANUM Virginia B. Rattlesnake fern

Lvs. 3-pinnately divided, broadly triangular in outline, 15-25 cm. across, 2-4dm. tall to top of spore bearing segment; green leaf attached about half way up stalk. Veins forking from a midvein, not netted.

Rich woods, rather rare.

County line near west track; Eldora.

All round n. temp. zone.

June.

Order 3. OSMUNDALES

Sporangia 0.5-0.7 mm. across, on much contracted lfts. of an ordinary or specialized leaf. Lvs. in a circle from the tip of a stout rhizome, which is matted with hard wiry black roots. Veins forked, not netted, running to margin of lft. Spores green.

Family 4. OSMUNDACEAE Flowering fern family

Characters of the Order

Osmunda

Flowering fern

(Osmunder, the Saxon name for Thor)

Characters of the Order

1. Entire lf. brown and spore-bearing, preceding green lvs.

1. Lfts. at tip of lf. spore-bearing

1. Lfts. near middle of lf. spore-bearing

3. *O. cinnamomea*

1. *O. regalis*

2. *O. Claytoniana*

1. O. REGALIS Royal O. Flowering fern

Lvs. 4-12dm. tall, twice pinnate, smooth; lfts. veiny, stiff. Spore bearing lfts. 8-12, pale brown, at tip of every lf.

Swamps or wet woods, very rare here.

Eldora (*vide* C. B. Frazier).

Native all round the n. temp. zone.

June-July.

2. *O. CLAYTONIANA* Clayton's *O.* Interrupted fern
 Lvs. 3-12dm. long, 1-2.5dm. wide, pinnately divided, the lflts. deeply pinnately divided into broad rounded lobes. Sporangia on 2-4 pairs of lflts. in middle of lf.

Moist woods, common.

Sugar Creek; Moore.

Nfd. to N. C., Minn. and Mo. Also in India.

May-June.

3. *O. CINNAMOMEA* Cinnamon fern

Spore-bearing lvs. 4-8dm. tall, 8-12cm. wide, clothed with brown wool, withering after shedding spores. Green lvs. 8-12dm. tall, 15-25cm. wide, pinnate, the pinnae deeply pinnately lobed; lflts. veiny, stiff.

Swamps; very rare here.

Eldora (*vide* C. B. Frazier), Steamboat Rock (coll. Reppert).

Native all round the n. temp. zone.

May.

Order 4. FILICALES

Sporangia minute, scarcely visible, on the backs of ordinary lvs., or covered by inrolled lflts., or on slightly contracted green lflts., usually in groups called sori (singular sorus), often with a membranous covering called indusium.

Family 9. POLYPODIACEAE Fern family

Characters of the Order.

1. *Polypodium* Polypody

(Poly, many; pous, foot; from the branching rhizome)

Lf. 1-2dm. long, 4-6cm. wide, simply pinnate, the lflts. attached to midrib by a broad base. Sori circular, large, without indusium. Lvs. shedding from rhizome by a neat scar.

1. *P. VULGARE* Common P.

Our only species.

On rocks or rocky bluffs, rare here.

Eldora.

All over N. America, Europe and Asia.

July-Sept.

2. *Phegopteris* Beech fern

Small ferns with delicate annual lvs. Spore dots small, round, without indusium, borne on the back of a vein, not marginal.

1. *P. DRYOPTERIS* Oak fern

Lvs. 1-1.5dm. long and wide, of 3 nearly equal 1-2-pinnate parts; stalk slender, 1-3dm. tall, chaffy at base.

In rich rocky woods; very rare here.

Eldora.

Nfd. to Oreg. and Alaska; also Eurasia.

July.

Note: *P. hexagonoptera* is reported from Steamboat Rock.

3. *Adiantum* Maidenhair

(A, without; diainein, to be wetted; the lflts. shed water)

Lvs. very thin, on slender, shiny, black stalks. Sporangia in groups on margin of lflt., covered by the turned back margin of the lflt.

1. *A. PEDATUM* Bird-foot A. Common M.

Leaf standing horizontally on top of a stalk which is 2-4dm. tall; stalk forking at summit, bearing the lflts. on one side of each fork.

Lower margin of lflt. smooth, the veins all coming from this edge; sori on opposite margin.

Rich woods, frequent.

Moore; Sugar Creek.

Ga. to Cal., N. S., and Alaska; also in Asia.

July.

4. *Pteridium* Bracken fern

(Pteris, the ancient Greek name for ferns; from pteron, a wing, the lvs. being usually pinnate)

Lflts. firm, 1-2cm. long, the margins turned back all round to cover the sporangia. Lf. 6-10dm. tall, 3-6dm. wide, broadly triangular, at right angles to stalk.

Rhizome 5-10mm. thick, several meters long, black, with 2 bands of black fibrous tissue inside.

1. *P. AQUILINUM* Eagle fern

Characters of the genus.

Dry wooded hills, rare here.

3 miles west of Tama; Eldora.

World wide in range.

July-Aug.

Note: The rhizomes of this fern furnish edible starch to the aborigines in our northwest, in New Zealand, and elsewhere. The leafstalk is remarkable for having 2 deep nectar glands at the top.

5. *Asplenium*

Spleenwort

(A, without; splene, spleen; for supposed medicinal virtues)

Lvs. in circular groups, 1-3-pinnate. Sporangia in elongate dots roofed over by a membrane (indusium) rising from one side of dot; or, the dot curved, and the indusium appearing centrally attached.

1. A. FILIX-FOEMINA Female A. Lady fern

Lvs. twice pinnate, the leaflets sharply toothed; 4-10dm. tall, 8-12cm. wide. Spore dots often curved, and finally covering the whole lft. Indusium visible only in young specimens.

Woods, common.

Sugar Creek; Jones Grove; Moore.

All over n. temp. zone.

July.

6. *Camptosorus*

Walking leaf.

(Kamptos, flexible; sorus, fruit dot; from the connected crooked lines of fruit dots)

Lvs. simple, smooth edged, heart shaped at base, 1-2cm. wide tapering to a very long slender tip, and rooting again at tip; 6-15 cm. long; thick and firm.

Sori oblong or linear, irregularly scattered on the netted veins, with indusium as in *Asplenium*.

1. C. RHIZOPHYLLUS

Root-leaf C.

Characters of the Genus.

Limestone rocks, rare.

Eldora.

N. S. to N. Car., Minn. and Kan.

7. *Polystichum*

(Poly, many; stichos, row; the spore dots of some species being in several rows)

Lvs. in circular groups, thick and firm, evergreen, once pinnate; stalks very chaffy. Spore dots circular, the indusium circular and attached precisely by the middle.

1. P. ACROSTICHOIDES Acrostichum-like P. Christmas Fern

Lvs. 3-5 times longer than broad (2-5dm. x 6-10cm.); lfts. narrow, with a lobe on one side at base, margins bristle toothed. Spore-bearing lfts. at top of lf., distinctly contracted in size; spore dots in 2 rows, becoming continuous when old.

Rocky woods, very rare here; common eastward.

Muscatine, Ia.; rarely cult. in Grinnell.

N. B. to Fla., Wis. and Miss.

8. *Aspidium*

Shield Fern

(*Aspidion*, a small shield; from the indusium.)

Lvs. 3-10dm. long in circular groups, 1-3-pinnate. Sporangia in circular dots, covered by a nearly circular membrane (indusium) which is attached by its center. Lf. stalks with brown scales, especially near base.

- | | |
|---|-------------------------|
| 1. Lfts. cut into bristle-pointed teeth | 3. <i>A. spinulosum</i> |
| 1. Lfts. without sharp teeth | 2 |
| 2. Spore dots close to margin of lft. | 1. <i>A. marginale</i> |
| 2. Spore dots close to midrib of lft. | 2. <i>A. Goldieanum</i> |

1. *A. MARGINALE*

Marginal A.

Lvs. twice pinnate or pinnatifid, stiff and firm, evergreen, 2-6dm. long, 6-12cm. wide. Spore dots 1-2mm. across, with conspicuous indusium, touching edge of lft.

Shaded rocky woods, rare.

Eldora.

N. S. to Ga., Minn. and Ark.

July-Sept.

2. *A. GOLDIEANUM*

Goldie's A.

Lvs. twice pinnate or pinnatifid, firm in texture but not stiff or evergreen, 6-10dm. long, 3-5dm. wide, broadly ovate. Spore dots 1-2mm. across, thin and flat, very near the midrib.

Rich woods, rare.

Eldora.

N. B. to Minn. and N. Car.

July.

3. *A. SPINULOSUM*

Spiny A.

Lvs. 3-pinnate, thin, the lfts. sharply cut-toothed; 2-6dm. long, 6-12cm. wide. Spore dots about 1mm. across, the indusium early withering away.

Rich rocky woods, rare.

Eldora.

Nfd. to Va. and across the continent; also Greenland and

Europe.

July-Aug.

Note: Lvs. of this fern are gathered in great numbers in autumn and kept in cold storage for floral decorations during the winter. All florists have them. Our form is var. *intermedium*.

9. *Cystopteris*

Bladder Fern

(*Cystis*, bladder; *pterus*, fern; from the saclike indusium)

Lvs. few on stalks 1-2 mm. across, 2-3 pinnate, with fine lfts.

Spore dots circular, 1mm. across; indusium on one side of dot, attached beneath and arching over (like a cup lying on its side), difficult to find. Plants spreading freely by rhizomes, forming large solid beds.

1. Lvs. (without stalk) 4-6 times longer than wide, bearing bulblets
 along midrib 1. *C. bulbifera*
 1. Lvs. 2-3 times longer than wide, without bulblets 2. *C. fragilis*

1. *C. BULBIFERA* Bulb-bearing C.

Lvs. long and narrow, 2-3-pinnate, 3-6dm. long, 4-8cm. wide, thin and soft, bearing bulblets along midrib underneath.

Moist shaded banks, rare.

2m. n. w. of Montour, Ia.

Queb. to Wis., Tenn. and Ark.

June-July.

Note: I have seen this delicate and beautiful fern flourishing in great profusion on the north side of a small house in Knoxville, Iowa. It might well be often cultivated.

2. *C. FRAGILIS* Fragile C. Prairie Fern

Lvs. narrowly oval in outline, 1-3dm. long, 3-8cm. wide, firm in texture.

Woods, common.

Jones Grove; Sugar Creek; Botanic Garden.

General in n. temp. zone.

July-Aug.

10. *Woodsia*

(In honor of Joseph Woods, a British botanist.)

Small ferns with narrow 1-2-pinnate lvs., usually downy. Fruit dots round. Indusium attached under the dot all the way round, completely covering the sporangia at first, but early disappearing.

1. *W. OBTUSA* Obtuse W.

Lvs. broadly lanceolate, pinnate, the flts. pinnately divided, downy with glandular hairs; flts. rather far apart, broad at base.

Indusium of a few broad spreading pointed lobes.

Rocky woods, very rare here.

Eldora.

Maine to Ga., Ariz. and B. C.

July.

11. *Onoclea*

(This name was first recorded by Dioscorides for some flowering plant)

Large coarse ferns with spore bearing lvs. much contracted into podlike bodies. Sori within the podlike bodies, on upraised

FERNS AND FERN-ALLIES

327

stalks, "imperfectly covered by very delicate hood-shaped indusia" (Gray).

1. Spore-bearing lvs. pinnate, the podlike lfts. long and narrow
1. Spore-bearing lvs. twice-pinnate, the parts globular ^{2. *O. Struthiopteris*}
_{1. *O. sensibilis*}

1. *O. SENSIBILIS* Sensitive *O.* Sensitive fern

Lvs. scattered, from a creeping rhizome, the lamina as broad as long, with a network of veins, deeply divided into wavy-edged lfts., 3-5dm. tall. Spore-bearing lf. twice-pinnately divided bearing inrolled globular bodies containing the sporangia.

Wet meadows and thickets, common.

Jones Grove; Violet Hill; Botanic Garden.

Entire U. S.; also e. Asia.

July-Nov.

2. *O. STRUTHIOPTERIS* Ostrich Fern Well-fern

Lvs. in circular, funnel-shaped groups, pinnately divided into many narrow pinnately lobed lfts.; 4-7dm. tall, 8-12cm. wide. Spore-bearing lvs. rising in center of cluster, pinnate, the rolled back lfts. long and slender, containing sporangia. Spreading by runner-like rhizomes.

Cult., frequent.

1217 Fifth Ave.; Botanic Garden.

All round n. temp. zone, n. of 40 degrees; very local.

Aug-Oct.

Note: Easily cult., and attractive in appearance.

GRINNELL COLLEGE,
GRINNELL, IOWA.