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THE FERN FLORA OF NORTHEASTERN IOWA.

T. J. FITZPATRICK.

The writer spent the months of June and July, 1895, in this portion of Iowa, camping and traveling along Oneota or Upper Iowa and the Mississippi rivers. While all available botanical specimens were collected special attention was given to the ferns and a good representation was secured. In the following year Mr. Herbert Goddard, then a resident of Decorah, Winneshiek county, sent the writer a collection he had secured in the vicinity of his home. During the years from 1899 to 1902 the writer had a valued correspondent, Mr. Ellison Orr, who resided at Waukon, Allamakee county. Mr. Orr's fine specimens were accompanied by many valuable critical notes. From these sources of information the following article has been written.

This portion of Iowa possesses for Iowans a peculiarly quiet scenic beauty, being the most broken or rolling and the most wooded of any portion of the state. Iowa as a whole is a broad expanse of gently undulating prairie with the characteristic flora modified by civilization. In northeastern Iowa there are more high hills, rugged cliffs, deep ravines, perennial springs, pine woods, rapid flowing streams than there are to be found in any other region of the same size in the state. Being the least affected by cultivation many natural park sites are available, some of which are destined to be utilized in the near future.

In the region under consideration Winneshiek and Allamakee counties are bounded on the north by Minnesota; and Allamakee, Clayton, and Dubuque counties lie along the west bank of Mississippi river. Most of the region lies in what is known as the driftless area, that is an area of rounded hills with no drift mantle or debris while all the surrounding region is heavily drift covered.

Geologically this region, generally speaking, is the oldest in the state. The Saint Croix sandstone of the Cambrian era, the Oneota limestone, the Saint Peter sandstone, the Trenton limestone, the Galena limestone, and the Maquoketa shales are successively exposed from the state line southward.

A locality with so varied a topography readily gives many favorite habitats for ferns. Almost every fern native of Iowa may be found and many of them are quite abundant in occurrence.

OPHIOGLOSSACEÆ.

Botrychium virginianum (L.) Swartz. Rich woods; numerous; Winneshiek, Allamakee, Clayton, and Dubuque counties.

OSMUNDACEÆ.

Osmunda claytoniana L. Rich woods; common; Winneshiek, Allamakee, Clayton, and Dubuque counties.

POLYPODIACEÆ.

Onoclea sensibilis L. In rich moist soil; plentiful; Winneshiek, Allamakee, Clayton and Dubuque counties. This species is very abundant on the high islands in Mississippi river, east of Waukon Junction; there is also a small colony in a springy slough near Postville.

Onoclea struthiopteris (L.) Hoffm. (*Matteuccia struthiopteris* (L.) Todaro.) The specimen was collected in Allamakee county by Mr. Ellison Orr who reports that the species is abundant in rich soil at the foot of bluffs along the Mississippi river at Waukon Junction and north of Lansing, also north of McGregor and near Beulah, Clayton county; there are also occasional plants along Village creek and Oneota river, in Allamakee county, in suitable localities. The species has been collected also in Dubuque county.

Woodsia obtusa (Spreng.) Torrey. The specimen from Allamakee county was collected by Mr. Orr who found it growing on great fragments of rock at the foot of the bluff, one-half mile east of Ion, on Yellow river. The species has also been found in Winneshiek county.

Woodsia ilvensis (L.) R. Br. Professor B. Shimek reports finding this species in two localities northeast from Hesper, Winneshiek county.

Woodsia scopulina D. C. Eaton. In 1900 Mr. Herbert Goddard, of Decorah, sent the writer a specimen found nearby which at the time was reluctantly referred here, but on further examination it is considered to belong to the preceding species.

Cystopteris fragilis (L.) Bernh. (*Filix fragilis* (L.) Underwood). Rich calcareous or moist soil in woods; common; Winneshiek, Allamakee, Clayton, and Dubuque counties.

Cystopteris bulbifera (L.) Bernh. (*Filix bulbifera* (L.) Underwood). Rich calcareous soil; common; Winneshiek, Allamakee, Clayton, and Dubuque counties.

Aspidium goldianum Hook. (*Dryopteris goldiana* (Hook.) A. Gray). Winneshiek and Allamakee counties, in rich woodsy

soil in timber growing on bluff sides near Decorah and south of Waukon Junction and north of Lansing, and other similar localities. The species is rather rare even in localities where found.

Aspidium thelypteris (L.) Sw. (*Dryopteris thelypteris* (L.) A. Gray.) Winneshiek and Allamakee counties; wet soil; plentiful. This species is common on marshy islands of Mississippi river and occasionally is found in sloughs in this region. The writer also has a specimen from the neighboring county of Fayette.

Aspidium marginale (L.) Sw. (*Dryopteris marginalis* (L.) A. Gray). The only specimen the writer has from this region is from Allamakee county, sent by Mr. Ellison Orr who writes: "growing on a timbered, shady, steep north slope of a sandstone bluff capped by limestone, about seven miles northeast of Postville on Yellow river, only one colony—a fine one—discovered so far in the county." This is a rare fern for Iowa.

Phegopteris dryopteris (L.) Fee. (*Dryopteris dryopteris* (L.) Britton). The writer has specimens from Winneshiek and Allamakee counties which are referred here. The habitat is moist rocky woods.

Phegopteris robertiana (Hoffm.) A. Br. (*Phegopteris calcarata* Fee. *Dryopteris robertiana* (Hoffm.) C. Chr.) This species closely simulates the preceding of which it may be a variety or only a form. Specimens are at hand from Winneshiek and Allamakee counties. The specimens from Allamakee county are from Mr. Orr who writes: "very abundant where collected on mossy, partly shaded, rocky talus at foot of, and on north side of high and steep bluff along south side of Yellow river, the only station I know in Allamakee county."

Phegopteris hexagonoptera (Michx.) Fee. (*Dryopteris hexagonoptera* (Michx.) C. Chr.). Allamakee county, the writer's specimen is from Mr. Orr who reports: "a few scattering plants on north side of wooded bluff, Waukon Junction, Iowa."

Camptosorus rhizophyllus (L.) Link. Winneshiek, Allamakee, Clayton, and Dubuque counties; rocky limestone soil in woods; abundant; often growing on the tops of large detached boulders at the bottom of deep, shaded ravines.

Asplenium angustifolium Michx. (*Asplenium pycnocarpon* Spreng.) Allamakee county; in rich shaded wood soil on slopes and at the foot of timbered bluffs at Waukon Junction and at

Lansing; uncommon or rare; seemingly preferring the bluffs near Mississippi river. A specimen from Jackson county also is at hand.

Asplenium filix-foemina (L.) Bernh. (*Athyrium filix-foemina* (L.) Roth). Winneshiek, Allamakee, Clayton, and Dubuque counties. Woods and thickets, the most abundant fern and very common throughout this region as well as all the wooded portions of the state.

Asplenium acrostichoides Sw. (*Asplenium thelypteroides* Michx. *Athyrium thelypteroides* (Michx.) Desv.) Allamakee and Dubuque counties. Mr. Orr writes: "two small colonies near Waukon, one at Lansing, probably rare in the county."

Adiantum pedatum L. Winneshiek, Allamakee, Clayton, and Dubuque counties; rich woods; common.

Pteris aquilina L. (*Pteridium aquilinum* (L.) Kuhn). Winneshiek, Allamakee, Clayton, and Dubuque counties; quite common. The habitat is medium dry or moist soil along hillsides covered with thickets or woods.

Pellaea atropurpurea (L.) Link. Winneshiek, Allamakee, Clayton, and Dubuque counties. Found also in the neighboring counties of Fayette and Delaware. This species prefers limestone cliffs but grows on sandstone. Mr. Orr notes: "Abundant throughout Allamakee county on all limestone rocks. Shows most luxuriantly where rocks are moist and shaded. Grows abundantly in rock cuts of C. M. & St. P. R. R. west of McGregor. I have seen very fine specimens near Harpers Ferry, Iowa."

Pellaea stelleri (S. G. Gmel.) Watt. (*Pellaea gracilis* Hook. *Cryptogramma stelleri* (Gmel.) Prantl.) Winneshiek, Allamakee, Clayton, and Dubuque counties. Frequent to common in limestone or sandstone cliffs. Mr. Orr writes for Allamakee county: "very abundant in moist soil in pockets and crevices of a ledge of St. Peter sandstone, three miles east of Waukon, Iowa, also found at stations near Myron on Yellow river, growing in moist soil in crevices of Trenton limestone".

Cheilanthes lanuginosa Nutt. (*C. Féei* Moore. *C. gracilis* (Fée) Mett.) Winneshiek, Allamakee, Clayton, and Dubuque counties; exposed dry ledges of Oneota limestone, common. This species is abundant on the face of rocky cliffs of a prominent hill in Allamakee county known locally as "Big Elephant".

Polypodium vulgare L. Allamakee and Clayton counties. Cliffs, frequent, even common on shaded outcrops of St. Peter sandstone in Allamakee county and on the "pictured rocks", at McGregor, Clayton county. The species has been reported also from Winneshiek county.

SALVINIACEÆ.

Azolla caroliniana Willd. This species is found floating in quiet waters. It was found by Miss King in Allamakee county (Plant World, 5:225). The writer has specimens from Muscatine and Louisa counties, from bayous along Mississippi river, farther south than the region under consideration. There are in hand, also, specimens collected by J. P. Anderson from Lake Wabonsi in Fremont county, the southwest corner county of the state. This species is rarely collected but it is probably more frequent than collections indicate, being overlooked.

EQUISETACEÆ.

Equisetum arvense L. Moist sandy or clay soils, waysides and waste places, common; Winneshiek, Allamakee, Clayton, and Dubuque counties. This species is extremely abundant on islands of Mississippi river, in many cases growing in the water.

Equisetum laevigatum A. Br. Common in moist clayey soil, along waysides and banks; Winneshiek and Allamakee counties.

Equisetum robustum A. Br. This species has been found in Winneshiek, Clayton, Dubuque, Clinton, and Jackson counties. It occurs abundantly in moist to wet soil, along banks.

Equisetum hyemale L. Specimens from Winneshiek, Allamakee, and Dubuque counties have been referred here.

LYCOPODIACEÆ.

Lycopodium lucidulum Michx. This species has been found in moist woods near Hesper, Winneshiek county.

SELAGINELLACEÆ.

Selaginella rupestris (L.) Spring. Dry rocky soil; plentiful at least locally; Winneshiek and Dubuque counties.

ISOETACEÆ.

Isoetes melanopoda J. Gay. This species has been collected in Clinton county.

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