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## The Iowa Liverworts

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*Exposure D.* The shell stratum is not so rich in fossils as in *C*. Above it there are fifteen or twenty feet of clay, in which a few Succineas were found. In the clay below the shell stratum there are several distinct, but irregular, bands of lime nodules,—some very large.

*Exposure E.* Very similar to *D*, but with only one band of nodules.

*Exposure F.* Fossils are very abundant in the shell stratum, which can here be traced for three or four rods. The shell-less loess above is eight or ten feet thick.

*Exposures G, H, I, J and K.* These exposures were all formed from the same ridge, by deep cutting and grading. The shell stratum is distinct in all of them, and, as in all other sections, it follows in general the contour of the surface. It varies in thickness here from six to twenty feet. It is by no means equally fossiliferous throughout.

*Exposures L and M.* These were formed by the grading of High School avenue. The street slopes westward from the high school, and drops about sixty feet in a block. On the north side the shell stratum is nearly parallel to the street grade, and but little above it. On the south side it dips below the street about half-way down the slope.

*Exposures N, O, P, Q, R, S and T* These are all exposures along the road which winds eastward from the Tenth avenue entrance to Fairmount park. At *N* the road is about 185 feet above the river valley, and the shell stratum (which is here very rich in fossils), extends about three feet higher. It dips down toward the west at such an angle that it would connect with the shell stratum at *E*, which is about 100 feet lower. The same layer may be traced, more or less indistinctly, to *O*, where there is a cut about twenty feet deep. The shell stratum rises to about eight feet above the roadbed (here about 200 feet above the river valley), but fossils are not abundant. The remaining exposures along this road are formed by the road cutting the smaller lateral lobes of the greater ridges. The letters apply to the extent of road from bend to bend, not to individual exposures. At the southern bends in the road are the high points, the road sloping down to near the bases of the ridges to the north. Fossils are found in most of the little exposures (which, in but few cases, exceed fifteen feet in height) along the road, but they are nowhere as abundant as in some of the exposures along the bluff fronts. The exposures which are represented on the map, but not lettered, are non-fossiliferous.

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## THE IOWA LIVERWORTS.

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BY B. SHIMEK.

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Among the groups of plants hitherto neglected by Iowa botanists, the liverworts are by no means the least interesting. A few of the large thalloid species have long been familiar objects to botanists working in other fields, but the general lack of economic importance of the group, and the habits and small size of most of the species, no doubt account for the fact that they have attracted less attention than they deserve.

In general, the liverworts prefer moist places. They may

be found upon mud-flats, upon dripping rocks, on moist limestones and sandstones, on the bark of trees, on old logs, in tangled mats of moss, and other similar habitats. But not infrequently they flourish on rocky ledges and sandy or clayey tracts, which are dry and barren during the greater part of the summer. Their power of re-juvenation, however, almost equals that of their near kin, the mosses, and moisture almost instantly revives them,—a fact of much interest to the student of these forms, for dry, unsightly material collected during the most unfavorable seasons of the year, may be rendered fit for study in a few moments.

The following notes on twenty-one species are offered not as a complete and exhaustive report on the *Hepaticæ* of Iowa, but rather as an introduction to this, in Iowa much-neglected, group, with the hope that interest in it may be aroused, and the way paved for a full account of our species and their distribution,—for the list will no doubt be materially increased.

Although its nomenclature is not always strictly correct, the sixth edition of Gray's Manual is followed for convenience, because of its general use.

Unless otherwise stated, the material upon which this report is based, is deposited in the herbarium of the State University, and was personally studied by the writer.\*

Unless special credit is given, the specimens were collected by the writer, Mr. T. E. Savage assisting at Wildcat Den, Muscatine county, and with Mr. P. C. Myers on Muscatine Island, Louisa county.

#### Order JUNGERMANNIACEÆ.

*Frullania virginica* Lehm. On the bark of trees, usually near the base, on low grounds, Muscatine Island, Louisa county; not common.

*F. eboracensis* Lehm. On the bark of trees, near base, in Johnson and Louisa counties, and on both bark of trees, and sandstone, in Wildcat Den, Muscatine county; very common; also reported from Story county by Bessey. †

*F. æolitis* Nees. On sandstone, in Wildcat Den, Muscatine county; not common.

*F. squarrosa* Nees. Common on limestone bluffs at Iowa City, and at Ft. Dodge.

\*Prof. L. M. Underwood kindly assisted in a few of the earlier determinations.

†Bull. Ia., Agric. Coll., Nov., 1884.

*Porella pinnata* L. Thus far collected only in Jackson county, in 1896.

*P. platyphylla* Lindb. Very common on mossy banks, etc., at Iowa City, Mason City and Ft. Dodge; also near Decorah (*P. C. Myers*.) Reported from Story county by Bessey (*l. c.*).

*Ptilidium ciliare* Nees. On rotten logs; Iowa City; not rare.

*Lophocolea heterophylla* Nees. Very common on mossy banks near Iowa City.

*Chiloscyphus polyanthos* Corda. Common in moss on moist banks, rotten logs, etc.; Iowa City, Ft. Dodge, and Wildcat Den, Muscatine county.

*Jungermannia ventricosa* Dicks. On moist banks; in moss at Iowa City and Ft. Dodge, and on *Anthoceros* in Muscatine county, along the Cedar. Also collected at Iowa City by Miss Linder.

*Blasia pusilla* L. Abundant on dripping rocks at Wildcat Den, Muscatine county.

#### Order ANTHOCEROTACEÆ.

*Anthoceros levis* L. On wet clay-banks, Johnson county. Also collected by Miss Linder. Not common. Also reported from Story county by Bessey (*l. c.*).

*A. punctatus* L. On low, wet banks in Muscatine county, along the Cedar river.

#### Order MARCHANTIACEÆ.

*Marchantia polymorpha* L. Usually on rather moist banks and slopes,—sometimes on hard-beaten soil and cinders, as along the streets of Iowa City. Common at Iowa City, Mason City, and Forest City. Also, Emmet county (*R. I. Cratty*) and Decorah (*P. C. Myers*.) Reported from Story county by Bessey (*l. c.*).

*Conocephalus conicus* Dumort. Very common on moist banks at Iowa City, and not uncommon in Muscatine and Louisa counties. Also at Decorah (*P. C. Myers*.) Reported from Story county by Bessey (*l. c.*).

*Grimaldia barbifrons* Bisch. Common on rocky banks and bluffs; sometimes in very barren places. Johnson, Linn, Muscatine, and Lyon counties.

*Asterella hemisphærica* Beauv. Not rare at Iowa City, on mossy, rocky banks, etc.

*Lunularia vulgaris* Raddi. Introduced. Formerly common in the hothouse at Iowa City. Never fruiting here.

Order RICCIACEÆ.

*Riccia frostii* Aust. Not common on mud-flats on Muscatine island in Louisa county.

*R. lutescens* Schwein. Very common on mud-flats on the Mississippi bottoms below Davenport, and on Muscatine island in Louisa county.

*R. fluitans* L. Common in ponds and on mud at Cedar Rapids, Forest City, near Davenport, and on Muscatine island in Louisa county. Also in Emmet county (*R. I. Cratty*).

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A SIMPLE INCUBATOR.

BY L. S. ROSS.

No claim of originality is made in the presentation of the description of the simple apparatus used by me as an incubator. The idea, so far as I know, originated in the mind of Mr. W. D. Frost, assistant instructor in bacteriology in the University of Wisconsin.

The incubator consists of a drygoods box, lined inside and out with asbestos paper, set on a galvanized iron base, and divided by wire netting into a convenient number of shelves. Heat is obtained from a rose burner, and is regulated by a thermostat made in the laboratory. The box I used is thirty-three inches long, nineteen inches wide and twenty-six inches from front to back. The cracks were stopped with rags and then the asbestos paper was pasted on the wood. A door was cut in the front, a window in one side and one in the door. The door is 25x13 inches; the side window is 9x8 inches, and the one in the door is 12x6 inches. A galvanized iron pipe, three inches in diameter, open at the lower end and closed or opened at the top by a circular cut-off, passes through the box from the base and projects six inches above the top. A hole, three and one-half inches in diameter, is cut through the center of the lower end of the box and the iron base, leaving only one thickness of asbestos paper between the chamber containing the burner and the lower compartment of the incubator. This hole may be closed by a galvanized iron slide. The incubator is divided into three compartments, the lower two of which are