

state. Until such collection can be otherwise provided for, the Academy will designate certain public or private collections where accumulated material may be deposited temporarily. Material sent to the directors will be thus held for the future disposition of the Academy.

It is earnestly requested that all persons interested in any department of biological work will place themselves in relation with the directors of the survey at once, in order that their work may be made to contribute the most effectively to the public good, and in order that the directors may know on whom they may depend for gaining information from various portions of the state. All contributions from persons interested will be properly credited in the reports of the survey. Correspondence is solicited with the director of the particular branch in which any one is interested, and such directions in regard to collecting and sending material will be given on application. By the assistance of the Smithsonian Institution, the directors are able to send printed directions for collecting to such as apply for them. (In ordering these it will be necessary to specify in what particular branch information is desired.)

LUCIEN M. UNDERWOOD, Greencastle, Ind.,
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1 July 1893.

Directors of the Biological Survey of Indiana.

In addition to the above the following was sent out by the Botanical Division:

SPECIAL ANNOUNCEMENT OF THE DIVISION OF BOTANY.

It is the purpose of this Division during the present year to make such additions and corrections to the published "Catalogue of the Plants of Indiana" as are possible, and to secure definite information regarding the distribution of such rare forms as are there published. Specimens illustrating the distribution or occurrence of any plant within the limits of the state must be deposited with the survey before any notice of their belonging to the state flora can be published. This will insure the ability to verify in future any fact published by the survey. In sending such material it is desirable that notes on the station, habitat, range and abundance of the plant be noted, together with any other information that will be of value.

In addition to the flowering plants and ferns covered in the above, it is the intention of the Division to commence the study of the distribution of the lower cryptogams, concerning which almost nothing has been published from Indiana. While collections will be made of all forms, special attention will be given at present to the study of (1) Mosses, (2) Hepaticæ, and (3) Parasitic Fungi. Specimens are earnestly desired of all species,

even those that are most common, from all portions of the state. It is desirable to state with each species the data indicated above, with particular reference to the habitat. In the case of parasitic fungi, it is necessary to indicate the host, and to include sufficient quantity of the host plant, that doubtful determinations may be verified. The director has been promised the assistance of specialists in the study of material accumulated.

LUCIEN M. UNDERWOOD, Director,
Greencastle, Ind.

The Bibliography called for by the Academy has been prepared and is presented with this report as Appendix A. It has involved the actual page to page examination of large files of journals and while doubtless incomplete will when published serve as a basis for periodical additions.

As far as possible, personal collections have been made; but with the demands of a full laboratory upon the director there has been little time for either extensive field work or opportunity to fully determine the material collected. The season also was especially unfavorable from the long drought that lasted from June to September. In addition to the spring excursion to Vigo county I made a second trip to the same region in late October. One trip was made to Lake Maxinkuckee and the tamarack swamps in the vicinity of Kewanna, Fulton county. Another was made to Brown county in May. Two trips were made to Eel River Falls in Owen county, one in May and the other in October. Some collecting was done in the vicinity of Crawfordsville but the greater amount has been accomplished in the vicinity of Greencastle in Putnam county. While all groups of cryptogams have been collected, special attention has been given to those mentioned in the circular. Of the parasitic fungi the fullest collections were made in the Erysiphææ. Of these we have doubtless an almost complete collection and a few comparisons with the flora of adjoining states may be to the point. In Illinois, the report by Burrill and Earle* includes 27 species. Of these all but one have been found in Indiana (*Spherotheca pruinoso* C. & P., on *Rhus glabra*). In Ohio the report of Selby† includes 24 species. Of these all have been found in Indiana except the unique *Uncinula Columbiana* on *Scutellaria lateriflora*. The entire number found in Indiana is 33 which exceeds the Illinois list by 6 species and the Ohio list by 9 species. Of other groups, the Uredineæ have been most abundantly collected. So far, the Ustilagineæ and Peronosporæ have not been found abundant.

* Burrill and Earle, Parasitic Fungi of Illinois. Part II. Bull. Illinois State Lab. Nat. Hist. 2: 387-432, 1887.

† Selby. The Ohio Erysiphææ. Bull. Ohio Agric. Exp. Sta. 1: 213-224. Ap. 1893.

In addition to the personal collections above noted, there has been a reasonable amount of willingness expressed on the part of botanists elsewhere in the state to co-operate in making known the cryptogamic flora of their respective localities. The most serviceable aid in this direction has been rendered by Professor M. B. Thomas, and his assistant, Mr. E. W. Olive. During the past autumn they have collected and identified 120 species of parasitic fungi from the vicinity of Crawfordsville. It is likely that during the present winter season and especially during the coming summer we may hope for much local work of this character. So long as the survey is conducted on a purely voluntary basis this local work is a necessity and it is to be hoped that by this means much will be accomplished in the direction of determining the extent and range of our flora. One great lack among local workers is the lack of literature. So far as the colleges are concerned only three, perhaps, offer more than minimum opportunities in this direction. So far as I am aware there is only one copy of Saccardo's *Sylloge Fungorum* in any library in the state, and other literature is almost equally lacking, even in libraries where more is expected. There has also been a seeming fear on the part of some that work in systematic botany would prove an injury if attempted in connection with a course of botanical study, and that anything short of work in cytology was undignified in a botanical laboratory. It is certain that the swing of the pendulum has reached its outward limit in this direction and that systematic botany, particularly that of the cryptogams is likely to demand more serious and general work than it has hitherto been accorded in America. So far as the laboratory with which the director is concerned, we will say that the fullest opportunities will be given to any local workers who may wish to use its library *and collections.

In order to make representative species more accessible to local workers, the survey has planned the issue of a series of exsiccatae of Indiana cryptogams for distribution among public and private collections, where they may become serviceable. The conditions of this gratuitous distribution will be given privately, though it may be here stated that sets will be placed in at least four of the colleges of the state that maintain a permanent herbarium. Of course the labor involved in preparing these sets

*Ample works are here accessible for ordinary systematic reference in the fungi, hepaticae and musci. The literature of the algae and lichens though considerable is not so extensive. The same is even more true of the collections, as may be seen in the note below.

makes the number to be issued very limited. The first two fascicles of Parasitic Fungi (100 species) are nearly ready for distribution. If the matter receives sufficient encouragement, succeeding fascicles will illustrate the Musci, Hepaticæ, Hymenomyces, Pyrenomycetes and Lichenes, respectively.

Turning now to the higher plants, we find them, of course, better known but their local distribution is a matter of great interest and one on which little definite information is at hand. In the only published state flora* 1,475 species are recorded. Many additions have been made to this list by more or less reliable collectors, and the thorough examination of the unexplored portions of the state will doubtless reveal many others. The accompanying map will show how much of Indiana is yet a *terra incognita* botanically.† As an illustration of how common plants may be passed by, I will cite the case of the common cockle-bur. In the state flora *Xanthium strumarium* and *X. spinosum* are recorded. Growing with the former in Putnam county though less common is the allied *X. Canadense* and we have also found it in the vicinity of Crawfordsville. The two, quite similar in appearance, though common weeds, have evidently been confused together though both are doubtless more or less widely distributed, especially in the northern portions of the state.

The revision of the higher flora we have placed in the hands of Professor Stanley Coulter to whom all material will hereafter be referred. Professor Coulter has at our request prepared a paper on the present status of the Phanerogamic Flora of the state. It is desired in this connection (1) To ascertain what plants have been added to the flora since the catalogue was published, by securing either from those who originally reported them or otherwise a set or sets of these plants that may be placed in some herbaria for future reference. A list of these will be published later but it is the intention of the survey to admit no empty names to the list; until the plants themselves accompany the name as a voucher, they will be rigorously excluded. (2) To verify the plants of the catalogue itself either by material now in some existing collection or by the collection of new material in the original or other localities. It is thus intended to have some-

*Catalogue of the Phænogamous and Vascular Cryptogamous Plants of Indiana. By editors of the Botanical Gazette and Prof. Charles R. Barnes, Crawfordsville. Indiana, 1881. Supplement I. April, 1882.

†The map presented with this report is not reproduced here. It showed that less than one-third of the counties had been entered by a field botanist, and that not over a dozen could be said to have been botanically explored.

where an accessible set of the plants of the entire state which may serve as the basis of a complete catalogue.

In regard to the assistance that local and amateur botanists can render the survey we will say that their work can be made of inestimable value if properly directed. The publication of county lists with nothing back of them except the opinions of persons whose general acquaintance with the flora of the country is slight, is not to be encouraged. Back of every note and every local list there ought to be a well kept collection, and in the case of rare plants there should be duplicates placed in some one of the larger public collections so that the identity of the plant in question can be placed beyond the danger of being lost as soon as the novelty of the first collection wears off. The colleges at least where botany is made a subject of some importance ought to have a collection of state plants for constant reference. In some of the larger high schools also the collection of the local flora can be made a useful adjunct of the year's study of botany and the town high school can thus serve as a local centre of botanical interest that will keep alive the local development of the subject among many who would otherwise drift away from botany into something else. Nor should this interest be confined to "manual" plants. Mosses, lichens, fungi and algae should also form a rational part of the field study even in the high school period.

Finally we invite a thorough co-operation of all the workers of the state to assist in placing the definite record of the Indiana flora in safe keeping, and develop as widely as possible the knowledge of the extent and distribution of the plants of the state.

It is deemed advisable to present as complete a list as possible of the Indiana cryptogams that have been collected already in order that it may serve as the starting point for further work. In this list nothing is admitted unless accessible specimens exist in some collection that is likely to become permanent.* We include therefore the following material:

* Most of the specimens herein named are deposited in the Underwood Herbarium as probably the largest cryptogamic collection in the state. This collection so far as the plants below the Pteridophytes are concerned contains the various groups as follows:

Musci—About 900 species represented by about 3,000 specimens.

Hepaticæ—About 1,300 species represented by about 7,000 specimens.

Fungi—About 3,500 species represented by about 9,000 specimens.

Lichenes—About 300 species represented by about 800 specimens.

Algae—About 200 species represented by about 300 specimens.

With the Pteridophytes of the collection the herbarium contains nearly 8,000 species represented by some 25,000 specimens. Except the ferns, this collection has been accumulated mainly since 1887 and contains numerous rare exsiccata.

1. Material collected mostly about Lafayette by Dr. J. C. Arthur and H. L. Bolley. This is preserved in their own private collections and in most cases duplicates have been placed at my disposal.

2. Some mosses collected by W. S. Blatchley in Monroe and Vigo counties.

3. Material collected by E. M. Fisher mostly in Montgomery and Johnson counties and deposited in the herbarium of the Department of Agriculture (Division of Vegetable Pathology).

4. Material collected by M. A. Brannon illustrating a paper on "Some Mildews of Indiana," read before the Academy 1889. Duplicates of most of this material have also been placed at my disposal.

5. Material collected in the vicinity of Crawfordsville in 1893 mainly by E. W. Olive. Duplicates of this material have been contributed to the survey.

6. Material collected by the writer in various counties of the state, 1891-1893, including that collected since the organization of the survey.

7. Occasional miscellaneous species collected by various individuals and in our possession.

The above represents all the cryptogamic material that is known to belong to the state flora that is accessible at present. Some few additional lists have been published but as they are not represented by accessible specimens they are not considered here.

Thanks are due to the following who have identified certain materials in the line of their specialties: Prof. D. C. Eaton, Prof. R. Thaxter, Prof. G. F. Atkinson, Prof. C. E. Cummings, Prof. C. R. Barnes, Charles H. Peck, J. B. Ellis, E. W. D. Holway. Much assistance has been rendered by various students in my laboratory in the preliminary determination of material.

Thanks are also due to the managers of the Vandalia road for various favors that have made more extensive collections possible.

LUCIEN M. UNDERWOOD,

Greencastle, Indiana, December 5, 1893.