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THE
ILLINOIS STATE LABORATORY
OF
NATURAL HISTORY,

NORMAL, ILL.

CIRCULAR OF INFORMATION.

JULY, 1878.

SPRINGFIELD:
STATE REGISTER PRINTING HOUSE.

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JULY 1912
STATE BOARD OF NATURAL HISTORY
1912

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THE ILLINOIS STATE LABORATORY OF NATURAL HISTORY.

Prof. S. A. Forbes, Curator of the Laboratory, by vote of the Board, read his annual report, as follows:

To the State Board of Education:

This is an institution whose chief objects are the prosecution and aid of original work on the natural history of the State, (preference being given to subjects having special educational or economical value,) the publication of the results of such work for the information of the people, the training and instruction of teachers of botany and zoology for the public schools, and the supply of the necessary scientific material to these schools, to the State Museum, and to the State educational institutions. It affords a place to which any specialist or scientific student may come, with the assurance that he will find everything necessary for special study or original work on the natural history of Illinois, to which any teacher may come for preparation to teach these subjects intelligently, and upon which the officers of any school may draw for material to illustrate the scientific work of their school.

Its operations are guided by the conviction that the spread of the knowledge and discipline of science among the people is essential to their highest prosperity; that this is a matter of public rather than of personal concern, and that it must be provided for by public rather than by private measures.

To encourage the spontaneous and gratuitous labors of our scientific men, to assist them at least to the extent of supplying them with such facilities for work as are beyond the reach of individuals, and to furnish them a means of adding the results of their labors to the common stock of human knowledge, is obviously sound public policy. Without this class of workers, devoted to science for its own sake, no solid and valuable progress in science is possible.

Received 16 Apr. 43 Van Horneman 1878

From them comes the initiative, the incitement. They are the root of the tree by which the raw elements of the natural world have been in all ages drawn together and made ready for the nourishment of the organism.

It is also of great importance to the public welfare that the methods of work and habits of thought by which the achievements of modern science have been made, should be brought to bear as far as possible upon the daily life of all. For this, trained and intelligent teachers of science are necessary, able to comprehend the work of specialists, and to assimilate and adapt it to the needs of the community at large,—able also to translate the spirit and methods of science into the work of the school, and through the school into the pursuits of business and labor.

But a practical knowledge of nature cannot be imparted by books or by word of mouth alone. The distinctive discipline of science can only be got by the immediate exercise of the mind upon objects and upon ideas directly derived from objects. Materials for study, and named cabinets as the standards of reference, are the *sine qua non* of work worth doing. To incite and reward natural history work, nothing has been found more effective than *skeleton cabinets* of representative species, which can afterwards be filled up by the collections of teachers and pupils. The cost of these is slight, the value very great. An easily accessible medium of mutual exchanges,—a center of authority to which difficult questions can be referred for solution, are also indispensable to success.

The pressing needs of these three classes, specialists in science, the teachers and the pupils of the public schools, it is the principal function of the State Laboratory to supply.

It is also evident that the large collections needed by the State Museum, and in the work of the great State educational institutions can be made more rapidly and much more economically by one thoroughly equipped central laboratory than by the separate institutions themselves, since one set of apparatus, materials and men can thus do the work which would otherwise require several. It is not intended to take from those institutions any work of special educational value, but to do for them in the least expensive way what each cannot do separately without considerable special outlay.

HISTORY.

The institution had its origin in the transfer to the State of the museum of the Illinois State Natural History Society, made in 1871.

This museum had been established at Normal, in rooms of the Normal University offered to the society by the State Board of Education, and it was therefore directed that the transfer be made to this board, "for the use and benefit of the State." The title of the institution was changed to "The Illinois Museum of Natural History," and its purposes were declared by a resolution of the Board to be "the prosecution of a natural history survey of the State, the encouragement and aid of original research and the diffusion of scientific knowledge and habits of thought among the people."

The rooms being furnished as a museum, full of exhibition cases crowded with material, it was impossible to provide properly for work even by the curators of the collections, and much less by specialists pursuing original investigations or students desiring a general knowledge of biology.

The embarrassments arising from want of room and other accommodations sufficient to provide at once for general laboratory work and study, and for the public exhibition of natural history almateri finally became so great as virtually to put a stop to further progress in either direction. It was consequently proposed to establish in rooms of ample size in the new State house at Springfield, a general exhibit of the natural history of the State in connection with the collections of the State Geological Survey, leaving to the institution at Normal the work of a biological laboratory, and an act was passed by the last General Assembly giving effect to this plan. By sections 8 and 9 of the act it was directed that the Illinois Museum of Natural History at Normal be converted into a State Laboratory of Natural History, at which, under the direction of the curator thereof, the collection, preservation and determination of all zoological and botanical material for said State Museum should be done. It was made a part of the duty of said curator to provide, as soon as possible, a series of specimens illustrating the zoology and botany of the State, to deposit them from time to time in the museum established by the act, and to furnish, as far as practicable, all zoological and botanical material needed by

the State educational institutions for the proper performance of their work. It was also directed that one set of the duplicate zoological and botanical specimens then on hand in the Illinois Museum of Natural History, at Normal, which were not needed to illustrate the natural history work of the State Normal University, should be deposited, as soon as practicable, in the museum established by the act.

At the next meeting of the State Board of Education, directions were given for the necessary refurnishing and reorganization of the rooms and collections, the title of the Museum was changed to the Illinois State Laboratory of Natural History, and sufficient appropriations were made to carry out the directions of the law in a liberal way. About two-thirds of the room was cleared of cases, those remaining were adapted to the systematic arrangement of specimens without reference to their display, and the space vacated was filled with the work tables and large cases of drawers to be hereafter described. Further details of the changes made will be found under their appropriate heads.

LOCATION.

The Laboratory occupies a room 98 feet long by 32 feet wide, on the third floor of the State Normal University, at Normal, Illinois. Fifteen feet of one end of this room is cut off by a half partition for a library and office. An abundance of light is given by sixteen windows, and the room is heated by steam, and thoroughly ventilated.

FURNITURE.

The west side of the room is occupied by wall-cases, the upper part of which contain 596 square feet of shelving, for alcoholic specimens, enclosed behind glass doors; the lower part 432 drawers, giving 750 square feet of surface, one-half dust-tight and provided with glass covers, for insects; the other open, for herbarium specimens.

Opposite these are 10 high alcove cases, one-half of which are left without shelving, for skeletons and mounted groups, while the other half, intended for duplicates, contains 965 square feet of shelving.

In the south half of the middle of the room are three twelve-foot cases, containing 440 drawers, closing dust-tight, affording 1,050 square feet of surface, and locked by fifteen locks. These drawers are of various depths, from one and a half to seven inches, but so constructed as to be entirely interchangeable, any drawer fitting anywhere in the case. Between these cases are five tables for work in botany and conchology.

The remainder of the room is occupied by an aquarium table (with sink and running water) 12 feet by three, two microscope tables, each six feet by three, one low, for work while sitting, the other high, for standing work, and eighteen tables four feet by two, arranged in sets of three, one set each for entomology, alcoholic specimens, plaster casting, taxidermy, osteology and dissecting. The high microscope table contains 48 drawers of different depths, affording 98 square feet of surface. The tables are of various kinds in each set, and each is provided with the tools and materials proper to the work for which it is intended. Small tables (with drawers) for the laboratory microscopes, are placed before the windows. The shelf-room in the laboratory consequently amounts to 1561 square feet, and the drawer-room, exclusive of the work-tables, to 1898 square feet.

The Library contains the usual book-cases and tables with drawers for cards, catalogues, stationery, &c.

At the ends of the room are diagram cases and cupboards for tools and materials. Two closets afford storage room for collecting apparatus, packing-boxes, and the like.

APPARATUS, TOOLS AND EQUIPAGE.

These include a large Smith & Beck's binocular microscope, with four oculars and seven objectives, ranging from a three-inch glass to a one-thirteenth-inch, and six laboratory microscopes, from Verick, of Paris; with powers from 18 to 380 diameters. The microscopes are provided with all the accessories necessary to first-class work in the preparation, mounting and study of specimens. Besides these are one large and several small aquaria, breeding cages for insects, guns, seines, dredges, towing nets, a wall tent and complete camping equipage, and full collecting apparatus generally, for botanical and zoological field work.

COLLECTIONS.

The botanical collection, thanks to the indefatigable labors of DR. GEORGE VASEY while here, and to his munificent generosity since his transfer to the National Department of Agriculture, and thanks to the like qualities of MR. JOHN WOLF, of Canton, Ill., is unusually rich in Illinois specimens, the collections of named cryptogams being, in the present state of botanical science, especially worthy of notice. The private herbarium of DR. VASEY, containing large numbers of duplicates, has nearly all been given to the institution. The collections of birds, fishes, insects and crustaceans are also very large. The following table will convey a correct general idea of their size and scope:

TABLE OF ILLINOIS SPECIES IN LABORATORY.

CLASSES.	Species occurring in the State.	Illinois species in the collection.
PLANTS:—		
Phanogams.....	1,376	1,367
CRYPTOGAMS:—		
Ferns.....	36	31
Mosses.....	170	110
Liverworts.....	48	41
Lichens.....	217	175
Fungi.....	.....	148
Miscellaneous.....	14	8
ANIMALS:—		
Mammals.....	.....	34
Birds.....	310	279
REPTILES:—		
Turtles.....	13	12
Lizards.....	6	4
Serpents.....	47	26
Amphibians.....	29	8
Fishes.....	159	140
Mollusks.....	.....	176
INSECTS:—		
Mymenoptera.....	.....	175
Lepidoptera.....	.....	360
Diptera.....	.....	100
Coleoptera.....	.....	700
Hemiptera.....	.....	160
Orthoptera.....	.....	50
Neuroptera.....	.....	30
Myriapoda.....	25	17
Arachnida.....	.....	75
RECAPITULATION.		
Phanogams.....	1,367	
Cryptogams.....	513	
Total plants.....		1,880
Vertebrates.....	513	
Invertebrates.....	1,657	
Total animals.....		2,170
2 Grand total of Illinois species.....		4,050

A considerable amount of marine material, nearly all in alcohol, amounting, as nearly as it can be estimated, to 3,000 specimens, a good collection of western birds, mammals and plants, and 1100 species of fossils and minerals, complete the general features of the collection.

For the general student, the following exhibit of the families of animals represented will be of interest:

TABLE OF FAMILIES OF ANIMALS REPRESENTED IN THE LABORATORY COLLECTION.

CLASSES.	Skeletons.	Skins and other dried specimens.	Alcoholic specimens.
Mammals.....	14	23	10
Birds.....	3	48	5
Amphibians.....			16
Reptiles.....			80
Fishes.....	4	7	37
Mollusks.....		26	45
Insects.....		122	6
Myriapods.....			5
Arachnids.....			41
Crustaceans.....		10	25
Worms.....			16
Echinoderms.....			7
Cœlenterates.....			2
Sponges.....		5	
Total.....	21	304	298

A characteristic of the collections is indicated by the fact that all the material is prepared and arranged for study. Everything is preserved entire in alcohol where this method of preparation will serve. The birds are in the form of skins, in drawers. Nearly all of these specimens are named, labeled, catalogued, arranged and indexed. The catalogues are on cards, and show the position of each specimen in the cases, and give references to specific descriptions in the library.

LIBRARY.

Although the library of natural history is too small to allow of original work in more than two or three classes, it has been carefully selected, volume by volume, with reference to the collections, and answers therefore most of the purposes of the ordinary student.

It contains 475 bound volumes and 315 pamphlets, containing descriptions of about nine-tenths of the genera and species of Illinois plants and animals in the collections.

All the books and papers containing zoological matter are indexed upon cards as one volume, according to the following general plan:

Whenever matter of any value occurs relating to any species or other group of animals, reference to this matter is made upon a card bearing the name of the *family* to which the given group belongs according to certain standard authors. This reference gives, in compact form, a description of the paper, and cites to the work, volume and page on which it is to be found. The cards bearing these family names are then arranged alphabetically, in drawers made to contain them. In special cases the genera of a family are entered similarly on separate cards, but of another color. By the use of these indices everything in the library bearing upon any group of animals can be brought together with readiness and dispatch. This plan of indexing will soon be extended to the botanical literature also.

The most pressing need of the institution at present is a better library, without which many opportunities for work must be unimproved.

PUBLICATIONS OF THE LABORATORY.

In October, 1876, was commenced the publication of a series of papers embodying the results of new work on the natural history of the State. These it was determined to issue in the form of irregular bulletins, to be open to all naturalists working on the local fauna and flora.

The first of these bulletins was issued in December, 1876, and the second in June, 1878. Fourteen papers in all have been published to date, of which the following six were prepared at the Laboratory, and are based upon its collections:

List of Illinois Crustacea, by S. A. Forbes; (mentions, with its appendix, 25 species, of which 12 are described as new, and 2 are redescribed, and gives one plate with 31 figures.) A key to the species of the preceding paper, by S. A. Forbes. A Partial Catalogue of the Fishes of Illinois, by E. W. Nelson, 1876, (156 species, of which 9 are described as new.) A Catalogue of the Fishes of

Illinois, by D. S. Jordan, 1878, (177 species, of which 9 are new.) The Food of Illinois Fishes, by S. A. Forbes, (giving the details of food, determined by examining the stomachs of 149 specimens, belonging to 54 species), and on the Crustacea Eaten by Fishes, by S. A. Forbes (12 species, 6 new to the State). The remaining eight include important papers on Orthoptera and Plant Lice, by Prof. Cyrus Thomas; on Parasitic Fungi, by Prof. T. J. Burrill; on the Mosses, Liverworts and Lichens of Illinois, by John Wolf and Elishu Hall; and on the distinguishing characters of leafless trees (The Tree in Winter), by Dr. F. Brendel. The papers by Dr. Brendel and Prof. Burrill were profusely illustrated.

These bulletins are supplied free to all Illinois naturalists, and to all other applicants from this State. To those outside the State they are sent in exchange for other publications, or for a stated price. They will be continued at such intervals as the activity of our naturalists may determine.

ORIGINAL WORK.

Continuous work is now going forward upon the food of birds, the food of fishes, the copepoda of Illinois, the anatomy of Ophisaurus, and a list of the lepidoptera of Illinois. Besides the articles published in the bulletins already mentioned, a paper prepared at the Laboratory, on the food of birds, giving the results of the examination of the stomachs of 225 specimens, was printed in the transactions of the State Horticultural Society for 1876.

DISTRIBUTIONS TO SCHOOLS, ETC.

From the duplicates of the collection, and also in part from material bought for the purpose, sets of representative specimens are issued to such public schools as need them in their school work, on condition that assurance is given that the material will be properly cared for. It is also requested that beneficiaries of the Laboratory shall collect from their separate localities such material as may be made useful in subsequent distributions, and shall send this to the Laboratory in exchange for the specimens received.

The material issued consists largely of alcoholic specimens of marine animals, the purpose being to supply to each school needing it, a small cabinet of the most essential animals which cannot be readily obtained otherwise by the school itself. Since January 1, 1878, such sets have been sent to the schools of Oak Park, Cook

county; Shelbyville, Shelby county; Macomb, McDonough county; Carrollton, Jersey county, and Kankakee, Kankakee county. The total value of all the material thus supplied to the schools will reach some thousands of dollars.

Larger collections have been sent to the Southern Illinois Normal University, and to the Industrial University at Champaign (the latter paying the first cost of part of the material).

WORK FOR THE STATE MUSEUM.

Beside the supply of the series of duplicates to this institution directed by law, large collections of birds, fishes, reptiles, amphibians, insects, and cryptogamous plants of the State are now being made for this Museum, under the management of the Director of the Laboratory. All zoological and botanical material is sent from the Laboratory to the Museum ready for the shelves of the exhibition cases.

FACILITIES FOR STUDENTS.

The Laboratory is at all times open to students, who, for a small fee for incidentals, will be allowed to enter for special study of such subjects as each may select. Regular courses in general botany and zoology, and in comparative anatomy, histology and microscopy, are prepared for the especial benefit of teachers and of medical students who may wish a more liberal and thorough preparation for their professional studies than the ordinary institutions open to them are prepared to furnish. The satisfactory completion of one of these courses, or its equivalent in other work, will entitle the student to a certificate to that fact.

SUMMER SCHOOLS OF SCIENCE.

Vacation classes are organized each year for systematic field and laboratory work, and have thus far met with good success. They are intended chiefly for teachers and specialists, of which from twenty-five to fifty are convened at each session.

DESIDERATA.

Those disposed to help forward a work so successfully begun and carried so far towards completion, will be interested to know in which direction their assistance can be made to contribute most to the progress of science in this State. The library lacks nearly all standard European works except the Catalogue of Fishes of the

British Museum, and works on crustacea. It also lacks the Journal of the Philadelphia Academy, the Transactions of the American Philosophical Society, the publications of the Boston Society, (except the Boston Journal of Natural History,) the Proceedings of the American Association, and the American Journal of Science and Arts.

The chief gaps in the collections are among mammals, serpents and amphibians, mollusks (in alcohol), diptera, hymenoptera, arachnida, mosses and fungi. Skeletons and skulls of any vertebrates would also be of the greatest value. The distribution of cabinets to schools affords a means of utilizing large numbers of duplicates, even of the commonest species.

S. A. FORBES.

The following report and resolution was read by Judge Caton, as Chairman of the Committee on Natural Science, and on motion was unanimously adopted.

The Committee on Natural Science and Mathematics to whom was referred the report of Prof. Forbes, beg leave to report that they have examined said report, and also the improvements mentioned therein, and express their entire approval thereof, and recommend the following resolution:

Resolved, That the report of Professor Forbes be accepted, and that two thousand copies thereof be printed for distribution.

S. M. ETTER,
Secretary.



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