

**EDUCATIONAL PAPERS  
BY ILLINOIS SCIENCE  
TEACHERS, 1. 1889-1890**

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Educational Papers by illinois science teachers, 1. 1889-1890 by Various

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I. 1889-1890

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1891

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## INTRODUCTION.

The Natural Science Section of the Illinois State Teachers' Association was organized during the session of the thirty-fifth annual meeting of the State Association, held in Springfield, Dec. 27, 28, 1888. At a preliminary meeting of teachers interested in science work, which was held in the office of State Superintendent Richard Edwards Dec. 27, a committee consisting of S. A. Forbes, of Champaign, B. P. Colton, of Normal, and Fernando Sanford, of Englewood, was appointed to report a plan of organization of a Science Teachers' Section of the State Association.

At another meeting held in the same room on the following day, Dec. 28, the committee submitted the following report, which was unanimously adopted:

*Resolved*, That we organize as the Natural Science Section of the general Association.

That the section be limited, as to its subjects, to courses of study and methods of instruction in the following natural and physical sciences: Chemistry, Physics, Zoölogy, Botany, Physiology, and Geology, and as to its voting membership, to members of the general Association who teach any one or more of the above subjects.

That the President, Secretary, and Treasurer of the section act as an executive committee."

The officers elected at this session, and reelected in 1889 and 1890, were S. A. Forbes, President, Fernando Sanford, Secretary, and B. P. Colton, Treasurer.

The papers read and discussed at the session of 1889 were:

President's Address,—History and Status of Public School Science Work in Illinois, by S. A. Forbes.

Pedagogical Function of Natural Science in Elementary Schools, by Chas. De Garmo.

High School Botany, by W. H. Hatch.

At this session a committee consisting of E. A. Gastman, Chas. De Garmo, B. P. Colton, W. H. Hatch, and Fernando

Sanford, was appointed to act in concurrence with the President of the section in preparing a course of study in elementary science for the different grades of the public school.

At the session of 1890, the papers read before the section were:

President's Address,—Pedagogical Contents of Zoölogy, by S. A. Forbes.

The Natural Sciences in Relation to the other Studies of the Common Schools, by F. M. McMurry.

At the request of a committee from the section that some phase of science work should be represented on the general program of the Association, Mr. Sanford was invited to read a paper on "A Course of Science Study for the First Four Years, its Aim, Material, and Method."

The committee on course of study appointed at the former session submitted the following report, which was discussed at length, and laid on the table for one year:

The Committee on Elementary Course of Science Study appointed by the Natural Science Section of the Illinois State Teachers' Association, met in the Harper House at Rock Island, April 24, 1890. There were present Messrs. Gastman, Forbes, Hatch, Colton, and Sanford. The members of the committee were practically unanimous as to the aims of elementary science instruction. Some of the purposes agreed upon were as follows:

Training to accurate observation, to careful comparison and generalization, and to correct and fluent expression;

To develop a sympathetic interest in Nature, for its moral effect as well as for its influence upon the intellectual activities;

To develop the causal idea, and to teach the uniformity of natural processes;

To furnish material for reading and language training.

It was the unanimous opinion of the committee that elementary science should be taught in some form in all the grades.

It was also unanimously agreed that zoölogy is, of all the sciences, best adapted for beginning this work with young children.

It was the opinion of the committee that for the first three years of school, ninety-five per cent. of the science time should be devoted to life studies, that for the next four years the science work should be related as closely as possible to the geography work, and that for the last year the physical sciences should be made more prominent, probably occupying one third of the science time.

E. A. GASTMAN, Chairman.

FERNANDO SANFORD, Secretary.

The papers included in the present volume are those which have been read before the section, and the paper read by Mr. Sanford before the general Association.

S. A. FORBES, President,

Champaign, Illinois.

FERNANDO SANFORD, Secretary,

Lake Forest, Illinois.



## HISTORY AND STATUS OF PUBLIC SCHOOL SCIENCE WORK IN ILLINOIS.

S. A. FORBES, PH. D., PROFESSOR OF ZOÖLOGY,  
UNIVERSITY OF ILLINOIS.

It is the purpose of this Society, as I understand it, to systematically investigate, discuss, and formulate methods of instruction in natural science, with a view to working out a body of sound doctrine and rational method, in respect to which we shall, if possible, become substantially agreed. These doctrines and methods we shall then try to bring to bear on the public school work of Illinois, in the hope that science work may be done here, in time, on rational principles and by methods approved by general experience. It is a work of progress and reform to which we have pledged ourselves; progress in the knowledge of principles and in the method of applying them, and reform in the science work in the public schools under our charge or immediate influence, and ultimately, as we hope, in those of the state at large.

In beginning a work we may very naturally ask ourselves, first, what has been done; and, second, what is next to do,—the answer to the second question dependent on that to the first,—and I have taken it for my part in the present program to prepare a brief outline of the condition of the science work in the public schools of Illinois at the present time; to explain and describe, as well as I can and as far as I understand the matter, the basis upon which it actually rests, and the forces which have built it up and hold it in position, and to sketch the history of its development. I very much wish that this task might be performed in a thorough-going and exhaustive manner, and I hope that this may yet be done by some one; but in the time allowable here for such a discussion I can only undertake to pick out a few items from the record, and to present them, if possible, in a way to make them available for our guidance.

The history of public school science work in this state is remarkable for one prominent and critical occurrence,—the

sudden introduction, by law, in 1872, of four new sciences into the list required for a county teacher's certificate. Although this legal enlargement of the public school course seems at first blush unwisely and even absurdly abrupt, and although it was unquestionably followed by many unfortunate immediate consequences, yet a study of the situation at the time, and of the previous history of the agitation of the subject and of the progress of science teaching in the state, will show that it was not as sudden and revolutionary a procedure as might be supposed. Many incitements to progress in this direction had long been at work in the public schools. A leaven of intelligence and awakening ambition had made itself felt for many years and in many ways,—through the reports and action of the State Superintendent of Public Instruction; through the State Normal School, opened in 1857; through the operations of the State Natural History Society, organized in 1858, and including many teachers in its active membership; through the young Industrial School, now the University of Illinois, established in 1867; and, long before that (in 1850 to 1854), through the remarkable educational campaign which gave origin to the University; through the more progressive teachers themselves—a few of whom, in city and village schools, were doing science work which it would be difficult to parallel for scope and thoroughness at the present time; through papers and discussions in the meetings of the State Teachers' Association and the State Association of Principals and County Superintendents; and through the educational periodicals of the day.

The first State Superintendent, Ninian W. Edwards, had declared, in 1854, in his first report, that the teachers of the state should have a "practical education, in which should be included not only what is commonly embraced in the common school course, but a practical knowledge of the sciences in their application to the ordinary pursuits of life."

Dr. Bateman, in his first report, the third of the office, had said, in 1860, "The senses are the pioneers of all knowledge. The dawn and activity of the perceptive powers are always antecedent to those of the reflective. The eye is the child's first teacher; the ear its next; and for several years the chief work

of education is to cultivate these organs." And, again, "It is the facts of the outer or material world, with which we must first deal, and the formation of habits of close and accurate observation is the great work of the elementary teacher." In 1862, he admonished the teachers of the state to "Keep the schools in close and living contact with the objective, the real; with nature and men and things; with the whole outer world and its moving panorama of events, as the theatre on which the pupils are to live and move and act." In his first announcement of the requirements for the state certificate, made in 1861, while omitting the natural sciences from the list of branches necessary for the diploma, he commended especially vegetable and animal physiology, physics, chemistry, and geology, as subjects with which the professional teacher should by all means have some acquaintance,—without which he must suffer great loss of power. In 1868 he foreshadowed the general introduction of the sciences, and directly paved the way for it, by making the state certificate conditional upon a satisfactory knowledge of physiology, botany, zoölogy, and chemistry. The new law of 1872 merely extended to the county examination the condition which had thus been for four years applied to that for the state certificate, except that physics was substituted for chemistry.

So far, then, as the State Superintendency is concerned, the development of the public school course towards a knowledge of nature and a preparation for science teaching, was a gradual and methodical one, proceeding by slow steps to an end held long and steadily in view.

Nor was the share of the first State Normal School in this work of progress an insignificant or indifferent one. Organized in 1857 under a law placing the elements of the natural sciences on the same footing as the other studies of its course, it had contributed its powerful influence, directly and indirectly, for fifteen years, to the education of the teaching body towards this end. By 1860, physiology, chemistry, botany, and geology were taught,—in a somewhat tentative way, it is true, and each but a term, while mathematics got five terms, geography three, and vocal music nine,—but the attempt was clearly regarded as an experiment. Says Principal Hovey, "We have