line, but his interest seldom extends to the flowerless plants. In time he is likely to settle down in a home of his own and then he is interested in how to make a lawn, what kind of shrubbery to plant, how to trim his trees, how to cultivate his garden crops, how to circumvent his insect and plant foes, how to protect his plants from frost, how to improve both vegetable and flower garden, how to multiply choice specimens and a hundred other questions which his botany in school will not enable him to answer. A course in agronomy would make him a more useful as well as a more intelligent citizen. Moreover, the practical work connected with such a course, forms a safe outlet for much of the spirit that otherwise results in mischief. Why we should insist upon his taking morphology instead of the more useful study is beyond comprehension unless it is because we have gotten into a rut. If we can give but a year to botany in the high school it would seem best to make this a study of structural botany and agronomy, leaving to the college the treatment of the spore-plants. But even this is not necessary. So long as Latin, German, French, and other studies have more than a year devoted to them there seems to be no valid reason why botany should not be as well treated. In this case, morphology and systematic botany need not be deferred until college is reached but may be given in school to those whose other botanical work has shown them to have an aptitude for such things.

PHYSICAL GEOGRAPHY VERSUS BIOLOGY IN THE FIRST YEAR OF THE HIGH SCHOOL.[1]

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(Abstract.)

The question is: which science is the most helpful to all first year students?

Biology requires expensive equipment, small classes or sections, longer laboratory hours, a larger teaching force, and the use of many technical words.

In biology specimens can be placed in the hands of the pupil and there is a splendid chance for the development of observational power, but here arises the question of material for large classes.

[1]Read before the Earth Science Section, C. A. S. and M. T., Cleveland, 1910, meeting.

The course in geography at the School of Commerce, Columbus, begins with a short course in the elements of physics and chemistry—very helpful in the year's work in geography. The main topics included are: matter—its states and properties; gravity; inertia; diffusion; molecules and atoms; water—its forms, properties, freezing effects, uses, and methods of purification; convection; et cetera. This portion of the work is largely experimental and notes are kept for reference.

The text-book is now taken up in the light of the previous work and certain topics, for example, eclipses, magnetism, et cetera, are illustrated by additional experiments.

A month is spent on the atmosphere with accompanying study of weather conditions and weather maps. The oceans are illustrated by lantern slides of shore lines, harbors, et cetera. The tides are further illustrated by apparatus.

About two weeks are spent on rocks, minerals, and ores. This proves very helpful in later studies, such as mountains and erosion.

In the study of land forms, for example, mountains, location and naming exercises are introduced to give the regional idea. Also the effects of topography on industry are noted.

Four weeks or more are devoted to the geography of Ohio, its rocks, rock structures, land forms, river basins, divides, glaciation, cities, and industries.

The reasons for placing such a study in the first year are these:

(1) To reach as many future readers, travelers, and citizens as possible.

(2) Large classes can be handled without expensive individual apparatus.

(3) The work is varied and general and requires few technical terms.

(4) It teaches the proper relations of the atmosphere, water, and soil to each other and thus lays the foundation for biology, and the other sciences, and for history as well.

DEEP MINE SHAFT.

The deepest vertical shaft in the world is the No. 3 shaft of the Tamarack, near Houghton, Mich. It lacks 27 feet of being one mile deep. Another shaft at the Tamarack and the Red Jacket of the Calumet & Hecla are, respectively, 5,089 and 4,920 feet down. The deepest gold mine shaft in America is that of the Kennedy at Jackson, Cal., this being 3,450 feet deep.