7. The kind of scientific training necessary to make such zoological knowledge practically economic, practically applicable to the individual welfare, is training in observation, recollection, analysis, inference and experiment. An economic course must be strongly scientific, for the method of science is economically more important than any scientific facts.

8. The high-school course which shall meet these requirements must be different from any now commonly taught. It must be a composite of a biological and an ecological course, with morphology mostly omitted, and with instruction, training and practice in the method of science carried to the limit of time and opportunity. It ought to make a strong, good and popular course—one whose practical utility, directly as this is aimed at, will not surpass its value as an element in scientific education.

9. If I were to undertake to apply these suggestions in a secondary school, I would modify the existing course, of whatever kind it might be, by the gradual introduction of economic elements, feeling my way experimentally, and proceeding only so fast and so far as the results should justify. I would do this, however, with careful reference to what I have called the unit of instruction, making sure that these economic elements were incorporated into the course in complete and unbroken units, to the end that the full benefit of the innovation might begin to appear from the very first, and I would do my best that no really material element of a liberal preparation for the life of an educated man should be sacrificed to the economic advantages aimed at, but would seek to apply faithfully that fundamental principle of all rational progress, "to prove all things," whether old or new, "and to hold fast that which is good."

DISCUSSION.

By MISS ROUSSEAU MCCLELLAN,
Shortridge High School, Indianapolis.

The question before us is whether we wish to study plants and animals with reference to their value for the purposes of man. We need to get away from the old idea that everything centers about man. We must decide our question from the standpoint of the high-school teacher and his opportunities. There is relatively little time given to the study of biology in secondary

schools. In Indiana zoology is usually an elective subject, if offered at all. In Illinois it is more generally required for graduation, and the course usually covers one year. Botany receives about the same amount of time. If we remember also the age of the high school boy or girl who does the work we can, perhaps, judge whether it is wise to make the economical phase of biology the basis of the course. Suppose we study useful or harmful forms exclusively. The impression would be left that biology is of importance only when studied with reference to the needs of man.

Another question that confronts us is whether boys and girls of the high school age could work out economical problems with their limited information. We often hear that zoology, especially, is not interesting as now taught. It is certainly easy to awaken interest in insect-eating birds, either in the city or the country, by explaining their value to man, or to introduce the study of insects with a few statements in regard to the insect destruction of field crops. The boy in the city needs something entirely different from the country boy to arouse his enthusiasm. The courses most approved today include a knowledge of the structure, physiology and ecology of types of the great groups. Ecology cannot be taught without some knowledge of structure, neither can economical biology. It certainly seems wise to begin our work in a logical way with the study of a simple alga or protozoan, thus giving a clear conception of the simple forms and making less difficult the study of the more complex.

The economical and industrial phase of biology, if emphasized, will add interest, but is not adapted to form the basis of a course in zoology or botany for most schools.

DISCUSSION.

By THOMAS LARGE,
Oak Park Township High School.

From a biological point of view, the high school period of education is, more than any other, recapitulatory—at this time the youth is learning the things of worth which the race has learned, or he is acquiring the intellectual furnishing which shall make him as nearly as possible equal to the mature man. Because the idea of organic evolution dominated the thought of the past century