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## TEACHING OF BIOLOGY IN JUNIOR COLLEGES AND HIGH SCHOOLS

L. H. PAMMEL

Not very long ago I was in the city of Decatur, Illinois, where I made a little talk on the subject of conservation to the students in botany. I asked the instructor in charge of the work in the high school about the teaching of biology and he promptly said,

“We have not changed our plan of teaching Botany in the high school. We are following the old method of giving a strong course in botany and one in zoology, and we believe that these courses fit the needs of our students better than general courses in biology or in general science.”

I promptly replied that I was glad to see that they had not changed in the methods of teaching botany.

Let us ask the question, “Why should we lay emphasis on general courses in botany and zoology and other sciences in the high schools and junior colleges? First, there is that fundamental educational need of training the powers of observation. A man or a woman who can clearly differentiate an object when it is seen will be a greater success in life than a person who can not. Secondly, courses in botany and zoology should give a broad cultural outline of life. Thirdly, courses in botany and zoology are immensely valuable to those who seek recreation in the great out-of-doors. Fourth, a knowledge of the usefulness of plants; how they serve as food for man and lower animals. Fifth, the diseases affecting animals and plants. Sixth, the use of animals in the world; for instance, the beneficial birds and reptiles. Seventh, the injuriousness of animals, especially insects.

An eminent zoologist, Dr. Galloway, says, in regard to the value of the study of zoology:

*The student, on taking up a new subject has a perfect right to ask whether that subject is worth while. A subject may have a great deal of value in practical ways and not mean much in education; or it may have a high value in educating human beings and have very little of practical worth. Zoology is strong in both particulars. Animals constitute one of the most interesting and important features in the surroundings of man. They arouse our interest, they appeal to our sense of beauty, they furnish us with food and*

*clothing, they attack our crops, they produce diseases* in us and in those animals we most use. In the second place, *zoology* adds to our *knowledge* of the *structure* and *activities* of *man* himself since we are enabled through it to *study ourselves* in proper *relation* to other *animals*. We may gain much light on the means of *preserving human health* and making right adjustments by the study of animals. Finally, the very *method* by which we study Zoology is of the greatest *value* in our *mental growth*. The *scientific method* demands that we observe at first hand as many facts as possible; that we compare and contrast these facts *with one another and with those which other people have observed*; that we *discriminate* between *important facts*; that we learn to draw *right conclusions* from our facts; and that we always *hold our minds open for new facts* even after we have reached our conclusions. It is worth while to get these ideals and form these habits.

The courses in general biology, as generally taught, take up the lower forms of plants and animals. It is well enough to know something about spirogyra and volvox and the amoeba and other lower forms of plant life. It is well enough to know that spirogyra is not "frog spittle" as many people think, but is a living organism. It is well to bear in mind that the largest use that one can get out of the world from a knowledge of botany and zoology is the knowledge of the common things we meet every day in our lives. Let me illustrate. Sometime ago while Mrs. Pammel and I were standing on a street corner in St. Augustine, Florida, a stylishly dressed lady from New York remarked what a wonderful tree that was in front of her; and she called it the live oak when it happened to be not a live oak but a plain sycamore tree which occurs in the state of New York. If the young lady had had a little knowledge about plants this mistake would not have been made. On another occasion, I happened to be on a train on my way to Arizona. I was seated in a comfortable Pullman; across the aisle from me were two gentlemen, one a drug salesman from the city of New York, and the other a large manufacturer from Los Angeles, California. The latter gentleman remarked about the wonderful array of "cacti" everywhere about us in New Mexico. The drug salesman from New York hastened to interrupt the man from California, saying: "They are not cacti but yuccas." It seems to me that the humble drug salesman had a far finer appreciation of the great out-of-doors than the large manufacturer of Los Angeles had.

On one other occasion it was my pleasure to take a jaunt in the Yellowstone National Park. I was walking down a stream with a vasculun thrown over my shoulder and was picking up plants here and there. I came across a gentleman who was picking up plants;

he looked at them and seemed to enjoy the plant life. I said to him, "You seem to be interested in botany." He replied immediately, "Yes, I enjoy the great out-of-doors. You know, it is interesting for me to be able to identify a few of the plants I find when I travel through the country, especially during my summer vacations." Then I asked him, "Where did you study Botany?" The reply came back, "When I was a student in the high school in the city of New York, and do you know that the botany I had in the high school has given me an infinite amount of pleasure."

I merely want to emphasize this fact, that many of our citizens are going to travel, and, in order to get the fullness out of life, they should be able to recognize a few of the common plants and animals. No matter where you go there will be something enticing and beautiful. I care not what you do, he who knows the plants, flowers, birds and animals will get a greater appreciation out of life than it is possible for him who does not know them.

I am reminded of the fine stories and poems that have been written by novelists and poets who got their experiences from nature. They wrote well because they were familiar with the plants and animals. Take that wonderful story by Herbert Quick, "Vandemark's Folly;" no one could have given us a better description than Herbert Quick, who thoroughly appreciated the great out-of-doors, who knew something about botany. A recent novelist, Prof. V. E. Rolvaag, who has just written a wonderful story on the "Giants of the Earth," tells us of the sad condition of the people who trekked across the plains of southern Minnesota into the Dakotas in pioneer times. They were sad and depressed, no doubt, because they did not have a true appreciation of the great out-of-doors.

A knowledge of the birds and their use to man and their songs will make every heart glad and especially so if they are familiar with the birds. There is no one in this room who does not appreciate the beautiful songs of the mocking bird and the brown thrasher. Many a time did I as a boy rest under a tree and admire the song of the brown thrasher.

Has our interest in the great out-of-doors increased? I have had considerable contact with the people of Iowa during my residence in the state. There was a time when I could answer my letters by long hand but so many of our people desire to know something about our wild flowers and plants that the correspondence has increased enormously. Thousands of letters are answered every year in contrast with a few hundred in the late eighties. Our people are

interested in knowing what the plants which they see are. It should be the duty, therefore, of our high schools, junior colleges and colleges to impart information about our wild life. I want to stress the importance of doing field work in botany and zoology. The students should become familiar with the plants in the field. No one but a competent guide is able to do this in such a way that it will leave a lasting impression on the youth. May I urge upon the teachers of natural history that they stress this fundamental work and that the instruction be such that botany be taught as botany and zoology as zoology; that we take up the subjects from the standpoint of culture as well as of economic use. If we do this rightly we will develop a sound, healthy citizenship.

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