THE STUDY OF PLANT DISEASES IN THE HIGH SCHOOL.¹

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It is unnecessary to review the difficulties which beset the path of the high school teacher of botany. We are all familiar with the fact that the pupils, parents and many of the teachers look up to the course in botany as a filler which must be tolerated, an aimless playing with flowers, the learning of Latin names, a course without relationship to other subjects and without application to the affairs of everyday life. This idea of botany is emphasized by the increasing number of vocational subjects for those who cannot or do not intend to pursue a college course.

These difficulties were partly overcome by the rise of plant physiology and ecology; the former directing the attention of the pupil to the life characters of the plant by means of experimental work in the laboratory, and the latter to the habits of growth and relationship of the plant to its environments. Unfortunately, the full value of these two phases of botany could not be realized because of the lack of well-trained teachers and shortness of time devoted to the subject. However, the rise of agriculture in the high schools promises to give botany a new inheritance.

If agriculture is to reach its highest development in the high school, it must recognize that botany is the foundation upon which it must build. In fact, botany must necessarily merge into agriculture so that the line of demarcation between the two will be almost imperceptible or largely arbitrary. This should result in a new viewpoint and a renewed interest in botany as a pure and applied science. It should result in the full appreciation of the fact that horticulture, agronomy and forestry are highly specialized branches of applied botany, and that a knowledge of the fundamental principles of botany are essential to the highest development of these specialized subjects.

The year in which botany shall be given, the phase of the subject to be presented, the manner of presentation, and the amount of time to be devoted to the subject, are questions on which there is a wide range of opinions. The line of demarcation between

¹Resume of paper read at the nineteenth meeting of the New Jersey Science Teachers' Association, Battin High School, Elizabeth, N. J., December 11, 1915.

botany and agriculture introduces another factor into the already complicated problem which we may be long in solving.

However, if we fully appreciate the importance of botany as a foundation for agriculture, it will, no doubt, result in two things—(1) the placing of botany in the first part of the high school course; and (2) a greater appreciation of the importance of the subject. The change in viewpoint which must accompany this readjustment must necessarily bring about a change in methods of teaching. Botany must be taught as other subjects are taught, i. e., in its relation to other subjects and to everyday life. Reading is taught because it opens the door to other subjects. Reading, writing and arithmetic are taught because they can be and are used in affairs of everyday life. Every boy and girl in the high schools of our country sees the application of both chemistry and physics, and they are studied from this viewpoint, although not necessarily with the idea of an immediate application. The botany of the future will, no doubt, be taught more and more in the light of its relation to agriculture and its usefulness in our everyday affairs.

The rise of agriculture will, no doubt, lead to changes in subject matter presented to the pupils and in the method of presentation. Corn and beans cannot be planted and grown with a compound microscope to any better advantage than cloth can be measured with a set of surveyor's instruments. Aside from a few demonstrations, the compound microscope is almost as useless in teaching high school botany as a set of surveyor's instruments in the teaching of arithmetic and algebra. Very few high school pupils can interpret the compound microscope, and the time frequently devoted to this complicated piece of apparatus can be used to a much better advantage in the study of simple experiments illustrating the relation of light, temperature, water, soils and fertilizers to plant growth.

Thus far I have said nothing about plant diseases: My first impulse is to say that the study of plant pathology has no place whatever in the high school. Plant pathology is a highly specialized branch of botany and cannot be taught in the same manner as fundamental botany. In fact, it may, in some cases, be taught more properly as a part of agriculture. However, it can be used to show the viewpoint of modern botany, just as the electric doorbell and electric light can be used to emphasize the importance of the study of physics.

* The agricultural losses due to plant diseases are enormous and

if presented properly will make a lasting impression on the minds of most pupils. The appreciation of the fact that these diseases are just as real as those which attack animals, that they are due to definite and, in many cases, well-known organisms, that they are infectious, and that they can in many cases be prevented, or controlled, is worthy of the ambition of any teacher of high school botany. These facts may be illustrated by simple experiments and demonstrations (with the microscope if necessary). If properly presented, they will serve to show the necessity of a more extended study of botany than can be given in the high school. The many agricultural experiment station bulletins on the control of plant diseases will serve as guides for the immediate application of botany to the local problems of agriculture and gardening.

The limitations of botany in the high school, and its position as a pure and applied science, will depend more on the teacher than on all other factors combined. Botany is a study of plants and not of books, and the most successful teachers will be those who can direct laboratory and field experiments to the best advantage.

CANCER DOES NOT RETURN!

The general impression that cancer is an absolutely hopeless disease and that surgery is a futile means of cure is often expressed by the not too well informed or the unfortunate. "What's the use? It always returns." In fact, it had long been believed, even by good surgeons, that a recurrence was, as the name implies, a return of the cancer after it had been completely removed. The present and more hopeful belief, and undoubtedly it is the correct one, is that the original malignant growth was not entirely removed. In other words, the recurrence is a definite and direct continuation of the original growth, of which at least a microscopic part was not removed. When the original growth is removed completely there is positively no danger of recurrence. In modern operations for cancer in order that the removal may be complete or that no tissue containing the dangerous microscopic cancer cells may remain, the organs or parts in which the growth is located are removed as widely as anatomical relations will allow. In the early stages cancer is a strictly local disease and the surrounding tissue only becomes involved as the disease progresses. If the growth is discovered and removed very soon after its inception the operation can hardly be classed even as "dangerous." If, through ignorance or fear, one procrastinates and does not permit operation until the growth has spread through the adjacent glands and tissue, the uncertainty of getting out all the malignant cells is greatly increased. So it is very easy to see that in the early removal of cancer lies the hope of cure—and the earlier the removal, the stronger the hope.