

if the candidate puts a lot of rubbish into his paper he runs the risk that his knowledge will be hidden. To the examinee I would say, "Pray don't write a great deal of commonplace in hopes that it will hide your ignorance; it only makes it more apparent and may hide what knowledge you have." There is a matter of great interest from the botanical point of view about the fruit of the strawberry. It is that the fruit of the strawberry is what is called accessory. The meaning of this term will be evident from the following considerations: In the case of the pea the fruit is the matured pistil, which forms a pod containing a number of seeds. In the buttercup there are many fruits for each flower, each carpel maturing and containing a single seed which fills the interior. The fruit when ripe falls off from the receptacle which has changed little, if any, during the process of ripening. Fruit like that of the buttercup is called an achene. What we ordinarily call the seeds of the strawberry are achenes, which, however, remain fixed to the receptacle instead of falling off as in the buttercup. In the strawberry the receptacle grows large and juicy and red, and is what we eat with so much relish. Since this edible part is not the matured pistil the fruit is said to be *accessory*. Apples and pears are accessory fruits of another kind, as will be learned rapidly by looking up a book on botany, or more slowly by examining carefully the changes that take place in an apple as the flower gradually changes to fruit.

A question that has frequently been asked at the examinations is "Give a list of plants with the time of flowering and some peculiarity of the plant." The object of this question is to afford an opportunity to any pupil who has been studying plants, but has not found that the particular things asked in the other questions have given him a chance to show to the full extent his knowledge of the subject. It may be that some of the plants asked about in the other questions are not ones specially studied by the candidate, but here is a question that should elicit an answer. Unfortunately, however, the answers reveal either a misapprehension of the question or a lack of knowledge of the subject-matter. Too often the characteristics given are either incorrect or are indefinite. An example of what I mean by indefinite is "root fibrous." I have seen a list of ten or twelve plants opposite each of which were the words "roots fibrous." Now the roots of plants may be broadly divided into fibrous and tap roots, and no doubt there are a good many more fibrous roots than tap roots, and it is more than likely that when a candidate gives a long list of plants and makes no statement other than "roots fibrous," he knows nothing about the matter, even though he should chance to be right in every case; and the examiner would not be justified in giving many marks. If the list contained fifteen or twenty plants, of which a moderate number scattered through the list have tap roots, and if each plant marked "tap root" in reality has a tap root, and each one marked "fibrous" has a fibrous root, the probability is that the candidate really has made a special study of roots and knows something about

them. I will venture to say, however, that not one in a thousand actually does write an answer similar to the case supposed. It is hardly worth while for the junior student to specialize so minutely, though it is an interesting fact that the roots of the dandelion and sow-thistle are tap. I think most children, not to say grown up people, would, off-hand, give the root of the dandelion as fibrous, notwithstanding they may have many times attempted to weed dandelions out of a grass plot; and the root of the sow-thistle is interesting because it is solid and hard, while the stem is for the most part hollow and less firm in texture.

In a list of plants where some characteristic is asked for, some distinct and definite feature should be given, as for example, that the part of the potato that we eat is a tuber or a portion of the underground stem enlarged. This might of course be shortened in the examination paper to "underground stem tuberous."

The square stem of mint or the self-heal is characteristic of the order and is an important feature; the character of the stamens in the lilac is also peculiar; the absence of the corolla and the colored calyx of the hepatica; the shape of the petals in monkshood or in the Dutchman's breeches; the cluster of radical leaves in the shepherd's purse, or still more the shape of the fruit capsule in the same plant, are very noticeable. The statement of facts like these shows that the candidate has been studying to advance, and wins the approval of the examiner.

I trust that what I have written in this paper may be suggestive and helpful and do something to advance the study of botany in our schools. The points that I have desired chiefly to emphasize are that a training in observation should be given by the study of the science, and that the observation should be *accurate* and directed to the consideration of the features *most important* for the object in view.

### Tentative Course of Nature Study.

(The following course was prepared by D. W. Hamilton, Principal of the Consolidated School to be established at Kingston, N. B., and approved of, with amendments, by the Canadian teachers at the Chicago University).

Progression and co-ordination of subjects should be secured and confusion and unnecessary repetition avoided. The school garden work should become not only a vital part of the child's education, but the great centre of vitalizing interests and influences radiating into nature in every direction. Let each pupil have a plot. The element of individual ownership is of prime importance. To promote an unselfish spirit there should be a common plot for each grade, in addition, where experiments by the grade as a whole may be carried on.