

the buttercup and strawberry differ in color, but in respect to size, number and shape they are almost exactly alike. Their stamens are alike but the pistil of the strawberry grows into a large fleshy bulb with the seeds on the outside. Their calyxes are the same in size, number and color." There is comparison between the parts of the flower, but it is valueless, for, though we are told that there is a *difference* in color we are not told the color of *either* flower. There is a very imperfect description of one fruit but no comparison, because the other fruit is not even mentioned.

The buttercup belongs to the very important order Ranunculaceæ, and the strawberry to the very important order Rosaceæ, hence it is evident that, at all events, the differences in the flowers of these two orders should be worthy of notice in the comparison.

The flower of the buttercup has all its parts distinct and inserted on the receptacle, the head of the flower stalk, while the parts of the strawberry are not so distinct. The calyx of the buttercup, having its five sepals distinct, is said to be polysepalous, while the five sepals of the strawberry are partly united and the calyx is gamosepalous. In addition to the calyx of the strawberry there are five little bracts alternate with the teeth of the calyx and forming the epicalyx. It is noticeable that the calyx of the strawberry remains after the fruit is ripe, thus being persistent, while the calyx of the buttercup, falling off at an earlier stage, is caducous.

The petals of the buttercup and of the strawberry are five in number, but those of the former are hypogynous, being inserted upon the receptacle, those of the latter are perigynous, being inserted upon the calyx. The corolla is in both cases polypetalous. The many stamens of the strawberry are separate from each other as are those of the buttercup, but differ from the latter in being, like the petals, attached to the calyx. The pistils are in each case separate from each other, are numerous and are inserted in much the same way upon the receptacle.

The fruit of the buttercup consists of the ripened carpels each containing one seed. In the case of the strawberry, the ripened carpels remain attached to the receptacle which grows large and juicy and is ordinarily called the fruit, but as this fleshy part is separate from the seed vessel the fruit is accessory.

No attempt has been made in this comparison to separate the characters distinguishing the two natural orders from other peculiarities, but the points mentioned are important. Should the candidate be able to add peculiarities of shape of the different parts, such as the little sac at the base of the petal of the buttercup, well and good, but the time for writing an examination paper is limited and the differences between the stamens and pistils are details that could hardly be expected from the candidate unless a very small number of plants are prescribed with a view to such minuteness.

When five questions are to be answered in an hour, the examinee could not take so much time as I have done in this comparison, but it could be much shortened while indicating quite clearly the candidate's knowledge. It would be sufficient to say that the flower of the buttercup has all its parts separate and inserted on the receptacle; that the sepals and petals are five in number,

and the stamens and pistils numerous; that the strawberry, in addition to the five sepals of a gamosepalous, persistent calyx, has an epicalyx of five little bracts; that its five separate petals are inserted upon the rim of the calyx tube, upon which are also the numerous stamens, within which there are numerous separate carpels; and to give a similarly condensed comparison of the fruits.

2.—Describe by drawings and otherwise all parts, root, stem, leaf, flower and fruit, of the Dandelion plant, or of the Lady's Slipper, or of the Indian Turnip, or of the Marsh Calla, or of the Blue Flag, or of the Apple tree, or of the Spruce or Pine.

A wide choice is given of plants having marked peculiarities and the candidate should be able to fix upon some one that he could describe in detail, especially as all of them are taken up in the text book.

In describing the dandelion I shall endeavor to make plain some of its peculiarities. The dandelion has a tap root, its stem is very short, supplying a whorl or circle of leaves. The leaves are simple but deeply indented, giving the name to the plant, owing to the similarity to lions' teeth. What is usually called the flower consists of a large number of small flowers in a compact head growing on a long, hollow stalk or scape which must be distinguished from the stem of the plant. Each little flower of the head has its petals joined in a tube, one side of which is much prolonged, and by its five little teeth indicates the union of five petals. The five stamens are inserted upon the corolla and are joined by their anthers forming a ring round the style of the pistil. Because joined in this way they are said to be syngenesious. The pistil has a long style passing through the ring formed by the anthers and dividing into two stigmas, which indicate the existence of two carpels in the ovary. The ovary is inferior being surrounded by the corolla. A tuft of silky hairs, on a short stalk above the ovary, is considered to represent the calyx. As the seeds ripen, the stalk lengthens, the silky hairs spread out forming an umbrella-shaped *pappus* which enables the fruit (an *akene*) to be transported by the wind. Surrounding the head of flowers is an involucre—a circle of bracts often mistaken for a calyx.

3.—Describe the seed, germination and early growth of any plant which you have actually observed, with drawings. How may seeds be classified? What is a striking distinction between a seed and a spore?

If the germination and early growth of a bean is correctly described the examiner may not be able to tell whether the examinee has actually observed it or not, but if it is described in words that would just as well suit a pea, or a morning glory, or a corn seed, it shows that though the candidate may have planted a bean and looked at it occasionally, he has not carefully observed it. Many candidates did not really know what the cotyledons are, not distinguishing them in character from the later leaves, but would make remarks like this: The embryo begins to grow, first sending up two leaves called cotyledons, after which follow other leaves, and thus the plant grows till it bears flowers and fruit. I would suggest that the pupils should plant some seeds, whose early growth is described in the text book, and at the same time plant some other seeds and compare the development in each case. The classification of seeds