

Nearly all animals are dependent on some particular kind of plant, or at least live on it in preference to others. Even poisonous plants have their votaries, and are particularly preferred by some animals, while the same food would cause the death of most others. This phenomenon is found most remarkable among the insects, as for instance, a great many of the caterpillar species would sooner starve than eat any other food than that to which they are used.

It is, therefore, but natural that a kingdom in nature, to which we are indebted for so many advantages—even for our very existence—should for ages have drawn the most serious attention to its study.

Plants have, therefore, been both scientifically and practically examined, described, and classified in many, more or less, serviceable systems. They have been divided into classes, orders, families, genera, and species, and each described with two names, the first denoting the genus and the last the species.

On dividing the classes, orders, and genera, the calyx, the shape of the corolla, the number and situation of the filaments, and the number of pistils, and, finally, the shape of the fruits and seeds, are generally used as characteristics; in the determination of the species, however, the shape and position of the leaves are mostly used for this purpose.

Before concluding, I wish to say something about cultivated plants, hybridizing or producing new varieties. Among the great number of plants cultivated for some purpose or other, hardly any exist in their original natural state. Some of them have largely extended in size by proper management and manuring, others yet have to undergo an alteration by change or admixture of ground; by far the most of them, however, have gained a more constant character—namely, they have been improved by hybridizing.

In order to explain this interesting process more satisfactorily, I feel called upon to remark once more that each flower contains certain organs indispensably necessary for the production of fertile seed. These organs are the filaments and styles. In most flowers these organs are combined, and they are, therefore, called hermaphrodites. The styles stand usually in the centre of the flower upon the germ and the filaments around them. In other plants the filaments and styles, though being both on the same plant, are separated from each other by different flowers; and there are still other plants where they are so entirely separated that each of them appears as a different individual, one bearing none but female, the other none but male flowers. The filaments bear on their top a little bag, the anther, filled with fine dust called pollen. This little bag bursts, when ripe, and thereby the pollen is communicated to the somewhat sticky stigma of the styles. In cases where flowers turn into the double state by one cause or other, the sexual organs change into petals, and, therefore, of course, they are not fit to produce any seed. The fructification of flowers is very much assisted by the aid of insects, as flies, bees, wasps, and by the wind, particularly in plants of separated sexes.

Experiments have frequently been made, and with a uniform result, to show that no fruit at all, or at least, no fertile seed will be gained, if the style or filaments, or both of them have been carefully taken from the flower before the pollen had reached the styles.

Since we have become aware of this process by attentively watching nature, and experience has convinced us of its sure success, we make use of the same process for our own advantage. When in the ordinary course of nature the style is fructified with the pollen of the same plant, the new individuals produced by the seed of them must of course, be of the same character.

If it is, however, our intention to raise new varieties or hybrids in an artificial way, then we have to proceed as follows: Suppose we are in possession of two apple trees, one of which bears small, green, sour apples; the other one, however, large, red and sweet ones. But we like neither sour nor sweet apples, but would prefer to possess some mixed varieties. Then let us take the pollen of the sour apple with a little brush, and bring it to the stigma of the flower of the sweet apple tree, or *vice versa* before the stigma of the latter has become impregnated by another pollen, and then we have done what is called crossing or hybridizing. This act does not produce an immediate effect or change on the fruit growing next after the crossing. When, however, the kernels of the fruit are sown, the new trees produced by them, when cultivated, will generally furnish about the following phenomenon:

Most of the trees will bear fruits similar to those of their mother, but many others will be similar to their father; frequently they stand between both of them. Sometimes, however, some few trees will produce fruits which have not the remotest similarity to either of their parents, or any other variety of apples known. These we call a new variety, which will be named by the raiser, and frequently command very high prices. In this way, all the innumerable varieties of apples, pears, peaches, cherries, camellias, roses, dahlias, carnations, potatoes, carrots, cabbages, &c., were produced; and the larger number of good varieties is already, the more difficult it becomes to produce something new, which shall differ from all existing varieties, and surpass them in beauty or usefulness.

The law according to which these changes take place has not been discovered yet. In order to meet with a certain success we have to work on a large scale, and leave to our good luck what it has in store for us.

One certain condition of the act of hybridizing is, that the two plants operated on must belong to the same kind, genus, or at least to the same family or tribe.

The preceding statements will suffice to prove the high importance of the vegetable kingdom in regard to our bodily wants, as well as our spiritual employments.

I cannot omit to recommend strongly to the rising generation the importance of forming collections of natural objects, particularly plants, in the shape of a so-called herbarium.

Love for such objects drives young people into the free and pure air, forces them into healthy