

who is seeking for novelties with which to adorn his grounds and make home pleasant. Trees and shrubs are the cheapest ornament.

Many of our native trees and shrubs are preferable to those from distant countries. The shrewdest men have long since discovered that no money pays a better interest than that used by skillful hands in making a home pleasant. If you wish to sell a place, it is sure to pay more than 20 per cent on the investment; if you want it for a permanent home, who dare say it pays less? More attention to these subjects is one of the greatest wants of our thrifty Western people.

THE FERTILIZATION OF PLANTS.

On Thursday evening, January 24, in Representative Hall, Professor Beal was called upon to make some explanations about the fertilization of flowers. He responded as follows:

Suppose my hat, with these papers stuck upon it, represents a strawberry blossom. There are the showy petals, and there the slender stamens, each bearing a pouch at the tip full of dust called pollen, and in the center or top of the flower other small bodies called pistils, the top of which are naked and sticky, without epidermis. That the vines bear fruit, it is necessary for the dust to fall upon the naked portion of each pistil. This is the structure of the Wilson strawberry; but some of our cultivated varieties bear no pollen in the pouches. These will produce no fruit without receiving pollen from other plants. Insects transfer this pollen from flower to flower. In Indian corn the pollen is all on the tassels at the top of the stalk. The threads of silk on the young ear run down, each to what is to become a kernel. A speck of pollen falls on the end of each silk, and grows down several inches to fertilize the embryo kernel; else there will be no corn formed.

Cucumber vines and vines of melons, squashes, pumpkins, all like Indian corn, have two kinds of flowers on different parts of the same plant. A small part of these flowers (may be one in five) has a large bunch at the base of the flower which becomes the fruit if it be fertilized. The vines are low, the pollen slightly sticky, and situated down deep in the yellow part of the flower. This dust cannot get to the pistil unless insects carry it there. The little striped bugs, considered such pests on the young squashes, when first out of the ground, are found covered all over with the pollen as they go about for the honey in the flowers of older plants. If there were no insects, there would be no melons, squashes, nor cucumbers. They would perish. Each helps the other. Insects eat the young plants and honey of flowers, but help in reproducing plants to pay for their food. Bees carry pollen as well as the striped beetles.

It has been suggested that the Yellows in the peach are transmitted by insects visiting the flowers. This seems to me quite probable, though I have not proved it. There is an idea, which some physicians have some testimony to sustain, that diseases, like the small-pox, are transmitted by the common house-fly. Then why not transmit the Yellows to the naked tip of the pistil? Mr. Charles Darwin, an eminent English experimenter as well as theorizer, proved some years ago that there would be no seed in our common flax plants without the aid of insects to carry the pollen. This seemed incredible, because each flower has pollen and pistil close to each other, so that they always meet. Insects do the work. Our common garden beans would only be half a crop without the aid of insects, though the flowers all have both stamens and pistils touching each other. Our common blue flag, and all cultivated plants called *Iris*, have the flowers so constructed—which I cannot well explain without

diagrams—that it is impossible for the pollen of a flower to get to the intended place without help from insects or other artificial means. Wind can not do it in this case. This is exceedingly strange, when we see the stamens full of pollen within a quarter of an inch of the tip of the pistil. Large numbers of plants, as the orchids and milkweeds, have the same peculiarity. This brings up a vast field for experiment and study.

I have experimented with many hundreds of flowers of different plants, repeating what others had done, and making new discoveries. You can make squashes come true to seed every time, I do not care how many kinds there are together, if you carry the pollen yourself to a young flower and then tie it up to keep off the insects.

Many flowers are known to be self-fertilizing. A few rare cases are known in which plants will have good seeds which will grow, even without any fertilizing by pollen. In one case a plant was taken from Australia to England. It was of a kind which bears only pistillate flowers on one plant and only staminate flowers on others. Our willows and poplars all have such flowers, and the different sexes are often some distance from each other.

The pistillate plant spoken of had no stamens nearer than Australia, yet it bore seeds which grew. The plant was carefully hunted over repeatedly by good observers, without ever finding a stamen. Seeds from this plant in England produced plants which were nearly all pistillate, whereas seeds raised on plants which had been fertilized were about equally pistillate and staminate.

This brings up the whole matter of hybridizing and crossing plants artificially at the will of the experimenter. There are real principles in such experiments, as important for the horticulturist to know as for the agriculturist to understand the principles of stock-breeding. Both will experiment at random with little chance of success unless he understands these principles.