

## BEES IN RELATION TO FLOWERS AND FRUIT CULTURE.

The primary object of this chapter is to bring under the notice of our orchardists and others interested in fruit-growing the immense value of the cross-fertilization of fruit-blossoms in the production of fruit, and to show the important part the hive-bee plays in bringing this fruit. In order the better to realize the complex mechanism of flowers, and the wonderful process of fertilization, and so to appreciate the effects of cross-fertilization in the orchard, I deem it necessary to touch upon these points before dealing directly with the main object.

Insect-life and plant-life are almost entirely interdependent upon each other. Insects obtain sustenance and, in most cases shelter from the vegetable world, while plants of most kinds are mainly dependent upon insects for the propagation of their species. A host of insects, large and small, of which the hive-bee is the most important, feed chiefly on the saccharine matter secreted in the nectaries of blossoms; and some of them (the hive-bee in particular) require for their own food or for that of their young a good deal of farinaceous matter supplied by the fecundating dust of the anthers of the same blossoms, termed "pollen." On the other hand, it is necessary for the proper fertilization of the plant that such fecundating dust be brought from some other plant, of the same species should come in contact with its pistils, and this is effected by the agency of insects chiefly.

### Sexual Organs in Flowers.

In flowers there are organs analogous to, though widely differing from, those indicative of sex in the animal kingdom. The functions at least are the same; and the combined action of the two sets is essential to the propagation of the race by seed.

In this connection it is interesting to note the remarks of the late F. R. Cheshire. He said:

Blooms are produced by plants in order that seeds may flower, and so the race be continued. Two parts are essential to this reproduction—the anther and the pistil, the latter very generally occupying the central position. The anther is usually a double-celled pouch, the contents of which by segmentation break up into a number of perfectly similar parts called "pollen-grains," which though minute are complex in structure. When these are mature the anther splits or dehisces (to open) and the pollen escapes, but it needs in some way to be applied to the termination of the pistil, called the "stigma." When this application is effected, the pollen-grain absorbs moisture, its interior portion swells, and actually throws out the tube which often grows to a great length in making its way towards the unimpregnated nucleus of the ovule, which is situated in the ovary at the base of the pistil. In this nucleus a large cavity filled with protoplasm has developed, called the "mother-cell," within which we find the embryonal vesicle to which the contents of the pollen-grain is transferred by the channel of the pollen tube. This is fertilization, and upon it depends the production of seed, for the new individual plant has its beginnings from this interfusion.

Most flowers are hermaphrodite, or double-sexed—they contain both the stamens (anther-bearers) and pistils within the same calyx or on the same receptacle; but there are some species where the sexual organs, male and female, are found by different individual plants, so that some agency for the transference of the fructifying pollen-grains is absolutely necessary, or the species would soon die out. Many of the latter are anemophilous (wind-fertilizing plants), with inconspicuous flowers yielding no nectar, therefore not attractive to insects. In these cases

nature p  
an abund  
wafted b  
tances, a  
blossoms  
tion.

Darwin  
"cross-fert  
factor in  
species of  
advantage  
where the  
favorable."  
double-sex  
is possible,  
cases some  
vent it, a  
by the tra  
grains from  
species.

The adap  
work of  
marvellous  
separate ex  
and pollen  
same species  
of no servic  
detrimental

On the st  
ers, Cheshire

An exami  
show that t  
ferred to a  
placed that  
transfer of  
and where  
not found it  
anthers riper  
or not util  
has so matur  
ation. In th  
observe in the  
(Tropæolum  
ried away by  
stigma presen  
tion be effect  
bringing of po  
still shedding