

of the same flower or is carried to another flower. That this plant is self-fertile was proved by Darwin and others, who found that when plants were covered so as to exclude insects only very rarely was a bean formed, yet by moving the wing-petals with a pin fertilization took place and beans formed.

It will thus be seen that beans cannot be formed unless the flowers are visited by bees or some other insect sufficiently powerful to depress the wing-petals. The bees are, of course, quite unaware of the presence of the flowers until they see them. Bees do not detect flowers until a considerable number have expanded, presumably because they are not sufficiently conspicuous to attract their attention. The bees may not observe the first flowers on runner-beans, as they are near the ground and to some extent concealed by the foliage. But they soon detect and visit them when many flowers are out, and at once beans are formed. This clearly explains why the first flowers fail to set beans. If bees perforated the corollas instead of visiting the flowers in the proper manner no beans would be formed, because the necessary movement of the wing-petals would not occur.

BROAD BEANS.

Although not quite sure on this point, I believe the agency of bees is necessary to secure fertilization of broad beans (*Faba vulgaris*). If that is the case the reason why the perforated flowers fail to set beans is explained. It is the first flowers usually that are found perforated, and the question arises, Why is it? The explanation is quite simple. I have previously mentioned my observations regarding antirrhinums and how they were constantly visited by humble-bees. About the middle of March in my garden a plant known as "blue spiræa" (*Caryopteris mastocanthus*) began to open flowers. The bees soon found it, and after a day or two had abandoned the antirrhinums and concentrated their attention on the caryopteris. I counted as many as twenty-four large banded humble-bees on the plant at one time. Since that time, so far as I have seen, not a single bee has visited the antirrhinums, which is not strange, as bees always confine their attention to one species while they can, and evidently the nectar of the caryopteris (natural order Verbenaceae) is preferred to that of the antirrhinum (natural order Scrophulariaceae).

The first flowers on an early crop of broad beans open at a time when flowers of any kind are scarce, and the humble-bees make use of them. Later on, when more flowers of the beans have expanded, there are also many other flowers out, and the bees probably abandon the beans in favour of something more to their liking. So that an observer may watch in vain for more visitations by humble-bees on beans.

DWARF BEANS.

The flowers of dwarf beans (*Phaseolus vulgaris*) are entirely self-fertile without the aid of insects, as is abundantly proved by their being grown in greenhouses where bees are not present. Yet they are capable of cross-fertilization by bees, and it undoubtedly occurs. The extent of cross-fertilization is not, however, great, and different varieties grown in close proximity will remain fairly pure, but not entirely so.