ON THE NECESSITY FOR INSECT AGENCY IN THE FERTILISATION OF CORYDALIS CAVA.

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THERE are some plants in which fertilisation, without the help of insects, is thought to occur, because, either in the bud or in the open flower, the opened anthers touch the stigma and press the pollen against it. Some of these plants, for instance the species of *Canna*, produce good seeds though protected from insects, but there are certainly others that require the crossing of different individuals to produce good seeds. I experimented this spring with *Corydalis cava*, and was very much surprised by the decided results which I obtained. The experiments, and their results, were as follows:—

1. I crossed the flowers of several individuals with the flowers of other individuals of the same colour, and got—

From 3 fertilised flowers, 3 capsules with 6, 7, 7 good seeds.
,, 4 ,, ,, 4 ,, ,, 1, 3, 3, 1 ,,
,, 4 ,, ,, 4 ,, ,, 7, 6, 6, 5 ,,
,, 4 ,, ,, 3 ,, ,, 2, 3, 6 ,,
,, 3 ,, ,, 3 ,, seeds not counted.
,, 6 ,, ,, 6 ,, ,, ,,
,, 5 ,, ,, 4 ,, ,, ,,
,, 4 ,, ,, 4 ,, ,, ,,
,, 9 ,, ,, 8 ,, ,, ,,

2. I fertilised flowers of the red variety with flowers of the white variety, and got—

From 3 fertilised flowers, 3 capsules with 6, 7, 7 good seeds.
,, 2 ,, ,, 1 ,, seeds not counted.
,, 4 ,, ,, 4 ,, ,, ,,

3. From individuals of the white variety, fertilised with the red, I obtained—

From 3 fertilised flowers, 3 capsules with 6, 1, 1 good seeds.
,, 5 ,, ,, 4 ,, seeds not counted.
,, 4 ,, ,, 4 ,, ,, ,,

4. On five racemes produced by distinct plants, I fertilised on each two flowers, one with pollen from another individual, and one with pollen from the same individual. From the first I got seeds, 5, 5; 0, 3; 6, 7; 1, 3; 1, 1: from the last I obtained from the 10 flowers only 1 capsule, and that was bad.

5. I crossed the flowers of the same raceme with each other, and got—

From 3 fertilised flowers, 1 capsule with 2 good seeds.
,, 5 ,, ,, 1 ,, ,, 1 bad seed.
,, 4 ,, ,, 0 capsule.
,, 4 ,, ,, 1 ,, ,, 2 bad seeds.

6. I rubbed the pollen of each flower on its own stigma, and never got any capsule from 27 flowers.

7. I left 57 flowers quite untouched, and got not a single capsule, though the pollen tubes penetrated into the styles.

From the results of these experiments we see clearly, first, that the flowers of *Corydalis cava*, when protected from insects (fertilised with their own pollen) give no capsules; secondly, capsules are very seldom produced when the flowers of the same raceme are crossed with each other; and thirdly, it is only by crossing flowers produced by distinct individuals, that almost every flower sets good seeds. There seems to be no difference in the results when like-coloured and dissimilarly-coloured flowers are crossed.

This seems to me a most interesting case, where self-fertilisation does not take place, though the pollen immediately touches the stigma of the flower. The help of insects is here a necessity, and I actually observed the bees working with great activity; when putting their heads into the upper spurred petals, they removed the two inner petals from the stigma and the anthers, which were thus rubbed against the insects' abdomen. I seldom observed a flower in the open air, open some time, without the pollen having been removed from its original place, where it is accumulated round the stigma. Humble bees also visited the flowers, but they never entered them from the front, but, biting a hole into the spur, they sucked the nectar without touching the organs of fertilisation.

Besides *Corydalis cava*, I had a few plants of *Corydalis solida* in my room; here also the intercrossing of individuals seemed necessary to produce seeds; but of some plants of *Corydalis ochroleuca*, that were in my room, protected from insects, I got a few good capsules.