FURTHER DATA ON THE SELF- AND CROSS-INCOMPATIBILITY OF VERBASCUM PHOENICEUM

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A research into the genotypical nature of self- and cross-incompatibility of *Verbascum phoeniceum* was begun in 1913 and had led to some preliminary conclusions which I published in 1917. This species is a very favourable one for the study of incompatibility; flowers are formed in abundance; the period of flowering is a rather long one; the capsules contain a great many seeds; castration and handling the pollen is very easy; the plant is a perennial, it can be propagated vegetatively and can reach an age of more than fifteen years, so that a comparison of results in succeeding years and in doubtful cases repetition of the same cross on a larger scale is very well possible.

Pseudofertility, i.e. end-season-self-compatibility, as observed by East in *Nicotiana*, does not occur in *Verbascum*; only very young buds, immediately after the opening of the flower, can be self-pollenized with any sort of success; so that if one takes care not to use flowers, which are younger than one day, every possibility of selffertilization is excluded.

In my earlier paper (1917), some statements were derived from the behaviour of an *F*_1-generation, consisting of 46 plants which was the offspring of one pair of self-incompatible parents; they may be summarized as follows:

Crosses between different plants give in most cases a positive result; a number of plants, however, showed to be cross-incompatible.

Reciprocal crosses generally give the same result, but in a rather great number of cases differences between the crosses may be observed, the one pollination being successful, the reciprocal one however unsuccessful.
The constitution of the $F_1$-generation is very complicated; a classification into groups of individuals, the behaviour of which was identical, could not be made. No two individuals were found, which gave the same results in their crosses with the other plants of this $F_1$-generation.

Among the $F_1$-plants there seemed to be some individuals (numbers 1 and 22), which when used as male parents, gave positive pollinations only in exceptional cases, while as female parents these plants were compatible to their sibs in a great number of successful pollinations. Inversely, other plants (numbers 19 and 29) used as males were more compatible to the remaining $F_1$-individuals, while a great many times they failed to fruit as female parents.

These conclusions were rather controversial to those of other writers; the regularities observed by Correns a.o. could not be corroborated. The simple mendelian interpretation which he gave, consequently did not appear to be the right one. My own data, however, were rather incomplete, as they were derived from the $F_1$-generation only. Both in Correns's studies and in my experiments there were moreover a number of doubtful cases; the same pollination of four flowers for instance, gave now two positive and then again two negative results so that a decision as to their real character was very difficult. A further study of the question was therefore desirable.

A very great difficulty, met with in the $F_1$ was the practical impossibility to make all combinations between the 46 individuals on a satisfactory number of flowers. From these 46 plants therefore twenty were selected, and with these twenty plants all the possible crosses and selfings were made on four flowers. When the results of these 4 pollinations were the same, they allowed of a decision as to the character of these pollinations; when however one or two pollinations turned out to differ from the others, the pollination was repeated, in some cases even on as many as ten flowers, The character of practically all combinations could so be determined; in the later generations, however, some crosses remained doubtful even when the number of pollinations was increased to 10, these were then described as „slight success”. The perennial nature of the plants was a very favourable circumstance in such cases; every combination that could not be made in the first year, or gave a doubtful result, could be repeated in later years.