

one and absent in the other, which is according to expectation. Because if it were purely cytoplasmic as in Wettstein's *Funaria*, all the back-crossed progeny would show this feature. Since however, it is believed to be a result of the reaction between nuclear genes and cytoplasm, only in those in which the former are in a heterozygous condition in *Spontaneum* cytoplasm, does the phenomenon of male sterility manifest itself. Hence the expectation in the back-crossed progeny is 1 : 1. However, since these are selected seedlings, we have no idea of the large number that would have been rejected in the nursery. That in any case it is cytoplasmic, can be inferred in a negative way by the complete non-occurrence of male sterility in *Officinarum*  $\times$  *Spontaneum*  $\times$  *Officinarum* as also in *Officinarum*  $\times$  *Spontaneum* selfs, because in both cases the concerned nuclear genes though heterozygous (in half the progenies) are in *Officinarum* cytoplasm whereas in the  $F_2$  of what in essence are reciprocal crosses in the sense that *Spontaneum* is the female (e.g., *Spontaneum*  $\times$  *Sclerostachya* and *Spontaneum*  $\times$  *Narenga*; though pollen sterile, a few grains are sometimes available in the  $F_1$ 's to take them to  $F_2$ 's) the phenomenon is present in the few selected seedlings that are available, since it is in *Spontaneum* cytoplasm that the genes are associated in a heterozygous condition. However, if the entire  $F_2$  population is examined the expectation is that half the number would show this feature, the other half being bisexual. It thus appears that nuclear genes and plasmagenes fit one another in heredity in certain ancestral combinations, but fail to do so in certain recombinations produced by crossing. The most common expression of this failure is male sterility. We cannot, however, count upon either absolute constancy or absolute matrilinear descent, as sorting out of the plasmagenes and contamination by pollen cannot be ruled out altogether.

If the cytoplasm of *Spontaneum* is so distinct from that of the other forms as to change the

phenotypic expression of the genes for bisexuality, it may be expected to have at least some effect on the expression of all the other genes. This seems to be the case at least in some cases as for instance in *Spontaneum*  $\times$  *Barberi*; *Spontaneum*  $\times$  *Officinarum*, where there are reciprocal differences as regards habit, stature and thickness of stem, in addition to male sterility. However, only where *Spontaneum* is involved is there the expression of male sterility. In some crosses not involving *Spontaneum*, the reciprocal differences are confined to other characters than male sterility, e.g., *Barberi*  $\times$  *Officinarum*. This would be comparable to the case of tomato<sup>9</sup> where the difference is one of size and expressing itself in  $F_1$  and in the segregating  $F_2$ . It is also conceivable that male sterility alone is the outward expression of this interaction, unassociated with other differences of size and habit, in reciprocal crosses. It may then be that the action of all the genes is affected only in respect of that character while in regard to other characters their action is presumably unchanged.

Further experimental work is in progress. The evidence available at present cannot by any means be said to be conclusive. Further studies that are in progress may or may not substantiate the interpretation herein presented tentatively.

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#### 1851 EXHIBITION SCHOLARSHIP

THE Royal Commissioners for the Exhibition of 1851, London, have awarded the Science Research Scholarship for the year 1951 to

Shri. Kamla Kant Pandey, Research Scholar at the Indian Agricultural Research Institute, New Delhi.