

SELF-STERILITY ALLELES:
A REPLY TO PROFESSOR D. LEWIS

LETTER TO THE EDITOR

Professor Lewis (1962) cites certain "facts of intensive breeding experiments", which in his opinion disprove the existence of so many non-reciprocal mating types as, in his view, are implied by my proposal (Fisher, 1961) of the origin of new self-sterility alleles. In this he seems to have taken less trouble than might be reasonable to examine these implications.

With only 100 alleles the number of distinct genotypes is 4950. Only one of these, apart from those that contain it, can be expected to check the pollen growth of a given allele, namely that from which this allele supposedly arose by recombination. This genotype may or may not exist in the surviving population. One or both of its constituent alleles may be extinct (especially in *O. organensis* and, indeed, still more with the few alleles of *Prunus avium* which have survived into cultivated varieties). However, assuming that all are available, there is, setting aside some subordinate consequences of my suggestion, just one genotype which will not give reciprocal fertility with the two genotypes containing this allele, together with one of the two from which it arose.

For each of 100 alleles there will be then two such genotypic crosses or 200 in all. The total number of possible crossings between genotypes is:

$$\frac{1}{2} (4950 \times 4949) = 12,248,775$$

of which the 200 non-reciprocating matings supposed constitute only 16.3 per million or .00163%.

Failure to observe such a case in 1%, such as Lewis claims, is not really surprising; with the kind of material he adduces one would expect failure to observe even .01%.

We can, I fancy, be sure, if only from Lewis' own work, that there are many minor causes of irregularity in the action of a self-sterility system. Some of these, when observed, are liable to remain unpublished, if unintelligible to the investigator, and not easily to be confirmed, especially if he is not looking for irregularities. Lewis' suggestion that there should be a deliberate re-examination is obviously a good one. Indeed better material could perhaps be obtained than these two classical antiques. However, the method of searching for such exceptions used by Lewis is not a little inefficient. I still think it would be more worth while to use a planned population such as I have suggested in my previous note, than to repeat the kind of random observation cited by Lewis, even if this could be done on an enormous scale, and with more critical material.

The remainder of Lewis' note misses the point through taking the letters A, B, C to stand for genes. They stand for compound alleles, which may recombine in many ways, which could only be enumerated if the number of active centres were specified. There are already at least ten known antibodies in some of the human blood groups; there might easily be twenty.

RONALD A. FISHER

*Division of Mathematical Statistics, C.S.I.R.O.,
University of Adelaide,
South Australia.*

(Received 22 April 1962)

REFERENCE

- FISHER, R. A. (1961). "A Model for the Generation of Self-Sterility Alleles". *J. Theoret. Biol.*, **1**, 411-414.
LEWIS, D. (1962). *J. Theoret. Biol.* **2**, 69.