material of the utmost value, had the adoption of inbreeding programmes not been delayed by prejudice and inertia, reinforced perhaps by superstitious fear. The example of their success in plant breeding is, however, now so overwhelming that serious steps will certainly be increasingly taken to make similar improvements in the breeding of livestock.

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II

SEGREGATING INBRED LINES

1. Formal Structure

For genetical purposes it is important that a line can be inbred while still maintaining segregation in one or more manifest factors. In each generation matings are selected so that a heterozygote is mated to a recessive

$$Aa \times aa.$$

Such a mating will reproduce the genotypes of the parents in equal numbers. The progress of inbreeding depends only on the mating of close relatives, so that if a male and female of different genotypes are selected, the segregation will be maintained and the inbreeding continued. With animals such as mice bearing several at a birth, such selection is easy. Half the possible matings in the long run will be between mice of complementary types, and such matings may be spoken of as eligible for the continuation of the line.

The possibility of maintaining such a line with a number of different factors segregating simultaneously depends on the prospect of obtaining eligible matings. We shall first give a calculation of the number of eligible matings to be expected in a line producing N genotypes of each sex in equal numbers.

2. The Number of Eligible Matings Expected

Of s mice (or whatever the organism may be) bred let t be males, and let these comprise g of the N genotypes available for each sex; then, supposing each male can be used with any number of females, each of the $s-t$ females has a probability g/N of finding a