

January 18, 1939

Dear Mather,

Thanks for the offprint on the dog, which I will keep with the "Dog Committee" material. I should be glad to have a Dog Committee soon, but I think it would be worth while your getting the material from Miss North and drafting a proper report on the scope and the results of the experiment up to date. We can always enlarge and amend it later if further data come in before it is needed, but I should like to circulate such a report to the Committee for their consideration.

On the inversion problem the point is this; if a mutant inversion were wholly neutral in its effects, the result of repeated mutations producing different sequences would be that a certain proportion of populations will be found to be well divided between two different sequences. The effect of selection unfavourable to heterozygotes would be to make the heterogeneous populations fewer and the homogeneous populations more frequent, so that, as for example in polymorphic species, all natural populations might be found to be heterogeneous.

To speak exactly, of course the heterogeneous populations can be divided according to the ratio in which they are divided between two or more sequences, and, if you consider only two sequences, the cases in which less than 1% are in the rarer sequence would not attract attention to the heterogeneity, but would be regarded as homogeneous.

In perfectly neutral mutations the distribution of the frequency ratio between mutant and parent sequence, when this distribution is in equilibrium, has been worked out, and, when one cannot distinguish the parent from the mutant sequence, frequencies are equal in equal intervals of  $z = \log_e \left( \frac{p}{q} \right)$ .

I had thought the position from which Dobzhansky and you started was: - Without favourable selection you would expect populations to be generally homogeneous. Actually, they are often found to be heterogeneous, not very unequally divided between two sequences. Here is a possible explanation of why this condition is found more frequently than we should otherwise expect.

I do not suppose, however, that the frequency otherwise to be expected has been very surely established.

Yours sincerely