March 13, 1939

Dear Mr Todd,

I am enclosing, as you may not have kept a copy, a transcriber of the 3rd page of your letter of March 7th. You will perhaps see from your own statement that, if the zygotic value of the heterozygote is 0 and that of the homozygotes +\( \chi \) and -\( \chi \), your difficulty is completely removed. This corresponds with an average effect \( \chi \) for the gene substitution in question. The corresponding gametic value would be \( \frac{1}{2} \chi \) and -\( \frac{1}{2} \chi \) in accordance with your first proposal.

After having reached, as I think you must have done in that letter, a clear notion of what is meant by substituting one gene for another, it does seem to me a little perverse to find on page 3 onwards of your letter of March 10th discussions of other possible meanings, which do not correspond with, and which you find awkward to reconcile with what I say in the book, i.e., the substitution of a small proportion of the genes of one kind by the genes of another cannot be taken to mean making all the A's into a's. It could, however, and would naturally be taken to mean what you took it to mean in your first letter.
I expect it is now clear to you that the mean value of \( Xx \), where \( X \) is the sum of the \( Con \) contributions of all the genes in the zygote, must be the sum, for all factors of \( 2pqax \). It was evidently this that misled you in the values of \( x \) you deduced in your first letter.

Yours sincerely,