IOWA STATE COLLEGE
OF AGRICULTURE AND MECHANIC ARTS
AMES, IOWA

STATISTICAL LABORATORY

December 3, 1954

Sir Ronald A. Fisher, F.R.S.
Department of Genetics
44 Storey's Way
Cambridge, England

Dear Sir Ronald:

You may recall that I wrote to you some months ago about the role of the genetic (or additive genetic) variance in non-random mating populations, and you very graciously sent me some comments on the situation.

I have been pursuing the matter further and have clarified my mind on some of the points. The results are a direct extension of your 1941 paper and I would appreciate greatly your comments on them. They are contained in the enclosed manuscript and the basic result is given on page 9, where the change in population mean is expressed in terms of effects and changes in the λ 's (the generalization of your quantity Q^2/PR).

To this is added a short section relating to Wright's work, which I think explains a point not understood by Wright's adherents at least.

The last section on fitness worries me because I do not get exactly your result in the following way. You showed that the change in mean is proportional to the additive genetic variance and later in 1941 added, I believe, as a rider that the quantity Q^2/PR must be constant in order that the effect of a change Δ p in gene frequency is the change in the mean by a Δ p. The more general equation on page 9 of my paper leads, however, to the result that the change is proportional to the total variance. The two results would be the same if the quantities I denote by y_{ij}, which are I believe fitnesses according to your definition, are additive with respect to gene effects. Perhaps the point of view should be taken that the fitnesses are additive and in that case there is no difficulty. This, however, would imply that a natural population would change only in such a way that the λ 's are constant. Also it would imply, I believe, that effect and excess are equal for fitness.

I would be extremely grateful if you could shed some light on this for me. Also supposing that the section on fitness is essentially correct or made correct, or if entirely wrong deleted, would you accept the main body of the manuscript for your journal?

With best personal regards.

Sincerely yours,

Oscar Kempthorne

Oscar Kempthorne
Professor

OK:mk
Enclosure