

2nd November, 1953.

Dear Allison,

I was glad to get your letter. The point you raise was discussed briefly in The Genetical Theory of Natural Selection, (p.101). It will not be worth your while to look it up for no difficult proof is required. I will assume that the intensity of selection can be adequately expressed in terms of an equivalent viability. Then if genotypes GG, Gg, gg have viabilities a, b, c, with b the biggest, there will be a stable equilibrium when

$$(b-a)p_G = (b-c)p_g$$

when  $p_G$ ,  $p_g$  are the frequencies of the two genes. 40% heterozygotes and no viable gg would mean

$$\frac{2p_G p_g}{p_G^2} = \frac{2}{3} \quad \text{whence} \quad p_G = 3p_g$$

compatible with

$$\frac{a}{9} = \frac{b}{10} = \frac{c}{7}$$

This is inconsistent with no *gg* survivors; but

$$\frac{a}{8} = \frac{b}{12} = \frac{c}{0}$$

would balance. i.e. if it is reasonable to suppose that 1/3 of those who, if heterozygous, would have survived will, if *GG*, either perish, or to an equal extent be debilitated so far as reproduction is concerned. Are there not, however, some surviving *gg*?

Sincerely yours,