DEPARTMENT OF
ZOOLOGY AND COMPARATIVE ANATOMY,
UNIVERSITY MUSEUM, OXFORD.

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My dear Fisher,

It was very nice to see you the other day. I have not heard if Julian is back yet. However I have two of his chapters, and he said he was going to let me know as soon as he returned. I will then send him Hutchinson's paper, telling him to let Hutchinson know what he writes, as you suggested. It is very good of you to pass the paper on, but the work is really rather important.

By the way, in reading something the other day, I was led to think over the idea of optimum environment. Clearly any animal has an optimum environment, and it is its business to keep as close to it as possible. It is therefore tending to live in a constant environment: which is, of course, one of the reasons why the earlier geneticists associated genes necessarily with particular characters. Now it struck me that not only do the effects of the genes tend to be constant because animals tend to live in an optimum (and therefore constant) environment, but that animals must be less

variable at the optimum than in any other environment.

The chances of any random change being beneficial must be much smaller in optimum conditions than when things are going badly. Of course that work out because the gene-complex has been selected to favour e.g. the least extreme effects of disadvantageous genes in the usual environment. In rarer conditions - away from the optimum - it may have very little experience of what a gene does.

Thus Komai, who studied crippled in D. melanogaster, found that this autosomal recessive (which seriously affects the legs) is rarely expressed even as a homozygote at 20° to 25°C, the optimum temperature for Drosophila. However it affects most of the homozygotes at high (28°) and at low (8° to 15°) temperatures. Clearly this is not a simple temperature effect: to me it suggests selection. And we know that Paramecium does not conjugate when the conditions are good, but when the culture medium is becoming unfavourable.

But the point which really struck me is this. The effect of crossing-over is to increase the genotypic variability of the organism. You remember that in 1917

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Plough, working on the time at which crossing-over takes place, showed that, in the genes he worked on, the C.O.V. is high at low and high temperatures, and lowest from 22° to 27°, which includes the optimum temperature for Drosophila. I wonder how far this idea is already familiar, if you agree with it, and if it has at all a general application.

I wonder if you have had a chance yet to look at those data on the numbers of moths caught at sugar on the island of Cara. If it has been possible to extract any information on absolute numbers from the marking and recaptures, I should be ever so grateful.

Yours sincerely,

E. B. Ford