Telephone No. Holborn 5797.

The Eugenics Education Society

Office Hours:
10 a.m. to 12 noon
3 to 5 p.m.
Saturdays excepted.

11, LINCOLN'S INN FIELDS,
LONDON, W.C.2.

8th May, 1922.

My Dear Fisher,

I should be obliged if you would first of all read the enclosed extract frm the address I think of delivering at Edinburgh, and then the following remarks.

I have found the problem too much for me, and I am anxious not to say anything erroneous in Scotland.

The problem is the difference between biological and legal descent, if they may so be described, and I am wondering if the following is a fair way of stating the question.

Assume that a population of 100,000, in 1900 is reduced to 10,000 by the year 2100, because the families are so small; then 100 persons (the persons I am in imagination speaking to) in 1900 would, if kept separate, have 10 descendants in 2100 I now consider two extreme supposations:-

(a) That a human being consists of a single mendelian factor. In this case any 10 persons in 2100 would have had only 20 biological ancestors amongst the existing population of 100,000. If in this 200 years there were an infinite number of generations, it would consequently be 500 to 1 that the audience I was addressing could not claim to be the biological ancestors of any of their 10 legal descendants. (Arithmetic faulty?) But the total number of biological descendants would be 10, ~~But~~ As the number of generations is limited, the odds against their being the biological ancestors of their legal descendants would be less than as above stated.

(b) Secondly assume that a human being is composed of an infinite number of mendelian factors, or, in other words, that inheritance is perfectly blended. In this case, if there were an infinite number of generations in the 200 years, then the 10,000 descendants of the whole population would be equally descended from all the existing population of 100,000, and it would follow that there would be a 100 descendants of my audi-

ence, each deriving one-tenth of their inheritance from my audience. But as the number of generations would be limited, these descendants would be less than 100, many having more than one-tenth of their blood derived from my audience, in a way easily calculable by you!

Now suppose you made these calculations, would it not appear that which ever supposition you took, a or b, single factor or blended inheritance, it would be seen that the probable racial value of the descendants of the existing population would be the same? Is it fair, if that is so, to make such a point of the difference between legal and biological descent? Is not the whole point ~~correct~~ covered by the rate of the decrease of numbers of the good stock? Or, in other words, must one not look to the way in which the descendants of any group marry into bad stock, regardless of the actual number of biological descendants?

This may be all bosh, but I should be glad if you would anyhow read it, and let me know if I ought to modify the part quoted in my address especially.

Yours sincerely,

between [ ]

Leonard Darwin.

I have a great rush of worries, clearing up at Egerton Place, Executorships, &c &c. Hence I may be all off the track. I am sorry to bother you. I wish we had a talk some often.

LD

[Early 1922?]
JHB

(1). The scheme is, I understand, as follows :-
A series of allelomorphs exist, namely,
Aa, Bb, Cc, Dd, etc. Let aa, bb, cc, dd, etc. represent the individual selection picked out as the type for survival. The A, B, C, D, etc. allelomorphs slowly disappear. As each one of them drops out, it is replaced (very roughly simultaneously) by one of another set, a^1 b^1, c^1, d^1 etc. Another choice is open, and a further advance is made.

(2) "A favourable combination which thrives and multiplies". This hardly expresses what happens. All that can be said is that the survival of a combination in an individual makes the reappearance of that combination slightly more probable.

(3) Selection does not pick out for survival the fittest of such types to survive. When a combination is selected for survival, it makes all other combinations closely resembling it also slightly more likely to reappear. Selection picks out a good specimen (? not necessarily the best) of the strongest series of forms, that is of the series containing most fit types.

(4). If a form is exceptional, or lies outside the normal range of variability, there are two possible causes (1) an exceptionally large mutation (2) a combination producing very exceptional results. Let (1) be called a sport, and (2) a freak.

(5) Sports. It is assumed that mutations keep taking place. Hence we may speak of the average magnitude of these mutations. A big mutation, or one forming a sport, is one a good bit above the average. Such a mutation is likely to throw the individual out of any strong series of types. Selection is not very likely to select sports. If the sport shows very unusual beneficial qualities in three or four separate structures, how would that be accounted for? Would a mutation in one allelomorph ever produce this result? I doubt it; for it seems quite opposed to any idea of unity of character. If it were due to simultaneous mutations in several allelomorphs, this would be near a miracle; for such big mutations are very rare, and not necessarily beneficial. Hence I rule out big mutations for adaptation.

(6) Freaks. In the first place, do freaks really exist? I do not feel at all sure that they do. They will anyhow seldom form part of a strong series. When the freak has unusual character in several structures which are not

correlated, and when these characteristics when occurring separately would not be beneficial, then it is still more unlikely to be part of a strong series. Adaptations would seldom be made by the selection of freaks. Even if they do exist. Freaks might breed true if they contained no heterozygous forms.

(7) If all this is on right lines, it follows that evolution usually takes place by the selection of forms within the normal range of variability of the species, or to the results of moderate sized mutations. If so, does it matter whether that range is due to many or to few factors?

(8) If the series of allelomorphs a^1, b^1, c^1, d^1 etc. are formed on the same lines as were formed the a, b, c, d, series, then progress would cease after a time. The nature of the new mutations must bear some relation to the nature of the forms selected for survival for evolution to have been possible.

(9) It may be that all that need be assumed is that mutations centre round the allelomorphs from which they spring. If so, with each mutation the circle of possible forms will have been widened. Selection mustbe keeping every single factor within bounds all the time. Selection has, however, but a limited power of action, and its useful powers will thus be greatly reduced. (My shceme largely partly but not wholly avoids this difficulty).