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Professor R. A. Fisher
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My dear Professor Fisher,

If I may do so, I am writing to ask your reaction and advice concerning a bit of research in which we are at present engaged, and which I hope may be of interest to you in its own right.

For the past several years, I have been very much impressed with the extraordinarily interesting possibilities for studies in population genetics and in the structures of populations which appear to be offered by the distribution of the viviparous Poeciliid fish Lebistes reticulatus (the "guppy") in the streams of the Northern Range in Trinidad, where it is native.

A particularly attractive feature of this situation seems to be the possibilities which it offers for the study of the rate of dispersion of a single gene or gene complex through a population which is essentially of a one-dimensional character (provided reasonably small streams are used.) For such a study Lebistes is almost ideal, since, as you know, many of the sex-linked color factors of the male behave as simple Y-linked dominants, and are moreover extremely easily physically detected among captured fish, or indeed, with a little practice can often be picked out at large in the streams. On the other side of the picture, the topography of the northern part of Trinidad, with its main east-west-flowing river the Caroni and its dozen or more north-south flowing tributaries which follow almost parallel courses as well-isolated mountain streams, later becoming confluent in the flood-plain of their lower reaches, offers opportunities for the study both of the natural dispersion of various of these color genes, and of the course of introduced genes, which seem too good to be missed.

I have been much interested in this situation for a number of years, and have been doing some preparatory work on it, largely in terms of genetic analyses in the laboratory of stocks from a number of the streams tributary to the Caroni, since 1935. Until recently, however, it has not been possible for me to spend much time in Trinidad to make the fairly extensive collections from the various streams which will form a necessary preliminary to the work of gene introduction. Recently, however, thanks to the kindness of Dr. K. S. Dodds at the Imperial College of Tropical Agriculture (whom I believe you know) and of others there, and to the possibility of spending a reasonable length of time in Trinidad in 1946, 1947, and 1948, the problem has progressed consider-

ably.

Not to burden you with detail, may I summarize the work and come to the question which is particularly bothering me by saying that there seems good, though preliminary, evidence that a considerable proportion of the color-factors which occur among the Lebistes of the various mountain tributaries of the Caroni behave as Y-linked dominants, and that certain of them seem to show marked discontinuities of distribution which I think may make an interesting picture as it is further developed. A fairly good analysis has been made of the populations of two rivers (the Arima in the Caroni drainage, and the Marianito of the northern watershed) and in these I feel that we now know the situation well enough to undertake experiments in the introduction of specific "marker" genes and in the measurement of their dispersion.

For this purpose, stocks have been prepared here in which a single "marker" gene (Maculatus, described by Winge, and introduced from stocks which he most kindly furnished) has been placed against the general genetic background of fish from these two streams, and a fairly large supply of males has been built up for introduction. At the same time, preliminary experiments have been made here in the release of populations of Lebistes in streams during the summer months and a study has been completed of their mode of dispersal which indicates that it may be of satisfactorily random character provided stream intervals of as much as fifty feet are taken as the unit of measurement, to avoid local irregularities caused by the marked tendency of Lebistes to form clusters about quiet indentations of the stream banks. It has also indicated that the total range of dispersal of a group of 650 individuals during the three months that they were studied was somewhat less than half a mile. The dispersion of a gene for xanthic coloration which was impressed upon this initial population by introducing 100 males carrying it at the point of release of the original population was about 1200 feet in the two months that it was studied. (Studies were made by dissecting embryos of captured females of the original population.) Finally, preliminary work has been undertaken to determine the practicability of estimating the resident populations of various sections of the Trinidad streams by releasing genetically or physically marked individuals and recapturing random samples containing a percentage of them--essentially the method described by you and by Ford, and adapted directly therefrom. The method seems to be entirely practicable for Lebistes provided certain precautions are taken physically to delimit the area of stream which is being measured.

It would seem, then, that a very preliminary groundwork, at least, has been laid on which to begin an experiment in the introduction of "marked" fish to one of these Trinidad streams and the measurement of its rate and extent of dispersal. It is in this connection, if I may, that I should like to ask

the specific question on which I have been able to reach no satisfactory conclusion. The streams in which the Ma marker will be used do not, of course, contain this gene in the wild state, so far as we have been able to determine (although it is present in some other streams of the Caroni drainage.) In effect, therefore, the event of introduction should be comparable to the occurrence of a mutation in that population. Would it, therefore, be of greater theoretical interest to introduce a single male carrying the marker gene, or to introduce a fairly large population of such males--some function, perhaps, of the estimated normal population at that point? This, I am sure, is an exceedingly elementary question, but, since once the introduction has been effected the stream will thereafter be useless so far as this marker is concerned, and since the opportunity offered by the circumstances seems so good, I have been reluctant to proceed without your advice or comment on this point, if you would be willing to give it.

I hope that you will forgive my burdening you with so long and involved a letter as this. I have been encouraged to write it largely because I understood from Dr. Dodds that you also are much interested in this problem and its possibilities, and that, in fact, you had on one occasion lectured at the College concerning it--but a few days before I arrived. The longer I work with Lebistes as material for population studies, and the more I have investigated the topography of the Northern Range streams, the greater the force with which its potentialities for this investigation strike me, and the more anxious I am to be perfectly certain that mistakes shall not be made in the early phases that could be costly in terms of sections of the environment needlessly sacrificed.

Any comments which you may care to make on the whole problem will be most eagerly welcomed, I can assure you, and will be very greatly appreciated.

Most sincerely,

Cyril P. Haskins

CPH/hh