January 15th, 1936

Dear Professor Dufrenoy,

Thank you for sending me the two notes entitled (1) *Quantite d'Information de Fisher* and (2) *Relation entre densite (m) des Parantes dans une population proportion (q) des individus reconnus parasites dans les echantillons examines*.

In respect of the first, it may be worth noting that I habitually estimate the variance of a normal population from which a set of discrepant observations are supposedly drawn, using the formula

$$s^2 = \frac{D^2}{N - 1}$$

since N - 1 is the number of degrees of freedom, or independent comparisons on which the estimated variance s^2 is based, and that I prefer to use σ^2 for the true variance of the population.

On your second page you speak of the "~~eclat~~ ecart relatif" having the formula $\frac{D}{N}$. Should not this be $\frac{D}{m}$, where m is the mean of observation. This affects some of the subsequent formulae.

With respect to the quantity of information of the mean of N observations, each having a true variance σ^2, it is known that the mean has a true variance $\frac{\sigma^2}{N}$, and the information given by a single mean normally distributed with its variance would be $\frac{N}{\sigma^2}$. In practical application for agricultural field trials, it is useful to consider the estimated relative variance

$$\frac{s^2}{Nm^2}$$

and, since a single agricultural plot usually has an experimental error, principally due to soil heterogeneity, of the order of 10%, this makes a convenient unit of measurement of the information supplied by experiments of different sizes, or arranged in different ways, so that these amounts of information may be compared with the expense and labour involved in carrying them out. For other types of work I do not think there is any special merit in taking a standard error of 10% as the unit of precision.

Perhaps I should mention here, since quantity of information is not used only for rough practical comparisons, in which no great refinement is required, but is an exactly defined mathematical quantity, essential to the development of the theory of estimation, especially when small samples or, more properly, finite samples, are involved, that in Section 74 I give an investigation showing more precisely what precision is to be attached to an experimental result having estimated variances s^2, when this estimate is based on a finite number n of independent comparison$

With respect to the second note I am not sure on what point you want my opinion. The hypothesis treated has been a good deal discussed also in this country, especially owing to the fact that it produces an equilibrium between host and parasite, which is always unstable. It has, consequently, been adduced as a probable cause of the great fluctuations in numbers ascertained in many insect pests.

I should suggest that it would be wise to maintain an open mind on this point, since the essential part of the hypothesis is that all hosts are exposed to the danger of parasitism in an equal degree, e.g., if a parasite searches for the eggs of the host and parasitises those that are found, the essential assumption is that all such eggs are equally well, or badly, hidden, and so have an equal chance of being parasitised. Once attention is called to it, this assumed equality is seen to be not a little improbable. What should be noted is that the instability of the equilibrium disappears when it is assumed, on the contrary, that some hosts have a greater probability of being parasitised than have others.

With many thanks for your interesting communication,

I remain,

Yours sincerely,