9 January 1931.

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My dear Jackson,

Many thanks for your long and interesting letter. I am sure that the method is right in principle, but there are a number of practical points which I am not clear about.

In one place you speak of subtracting from the number of flies recaptured on any day the number marked on the 1st, 2nd, 3rd day etc. This implies that the marking is different for <u>every day</u>, which seems to amount to about 100 different colours or marking combinations. Is this possible?

When you speak of a reconnaissance you mean, I take it, to catch a great number; not an attempt to exhaust the fly population in a given area. The total record of captures would be something like

b_{np} flies caught on the $n^{th.}$ day, and marked or first marked on $(n - p)^{th.}$ day

b_n total caught on the $n^{th.}$ day including unmarked.

a_n released marked on the $n^{th.}$ day.

with complete
Then, survival within the area from the $(n - p)^{th.}$ day to the $n^{th.}$ day ~~is given by~~

$$\frac{b_n \, a_{n-p}}{b_{np}}$$

would be the population flying on day n if none of those marked on day $n - p$ had died. Taking the values of

$$k_n \frac{b_{np}}{a_{n-p}}$$

for different values of p, we should have a decreasing curve, representing survival for p days, which would be brought about by adjusting k_n to be approximately unity for $p = 0$. Using all available values of n, the series

$$k \frac{\sum_n b_{np}}{\sum a_{n-p}} = c_p \qquad c_0 = 1$$

should become very smooth, and well determined; then for any particular n we could take

$$\frac{c_1 + c_2 \cdots}{\frac{b_{n1}}{a_{n-1}} + \frac{b_{n2}}{a_{n-2}} + \cdots}$$

so using all the recaptures to determine the constant, k_n, and $b_n k_n$ would be the population at day n.

If the marking and re-capturing were continued as routine one would then have a continuous record of population, and survival curves c_p for different times of year.

In this calculation death includes diffusion, and the

population is determined if one may put it so over the diffusion range of the fly, rather than over a measured area.

Yours sincerely,