calculated as eggs : zygotes, the reciprocal of fertility. Incidental observations on natural and artificial fertilisations convince me that the fertility of eggs is usually greater than 90 per cent during the normal breeding season for several species of sea-squirts, sea-urchins, amphibians and birds, and is over 70 per cent in most laboratory insects. Egg redundancy thus approximates to the minimum value of one, as is assumed in the present estimates of sperm redundancy. Even if this were only approximately true, and the chiasma frequencies only roughly known to occupy the range 7-100, the two characteristics are so obviously not correlated that we can reject their hypothetical association out of hand.

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STATISTICAL APPENDIX

By Kenneth Mather

The regression of log R *on* C

The relation between sperm redundancy (R) and chiasma frequency (C), as shown by the observations set out in fig. 1, can conveniently be considered in three parts, the relation within the insects (I), the relation within the mammals (M) and the relation between the groups (G). In the first two of these parts the relation is measured by the coefficients of regression of R (or to be more precise of $\log_{10} R$) on C presented by Dr Wallace in his table 1, viz. $b_I = 0{\cdot}147$ and $b_M = 0{\cdot}074$ for insects and mammals respectively. Dr Wallace further shows that these two regression coefficients do not differ significantly and so may be replaced by a common estimate of regression within the groups, $b_J = 0{\cdot}089$. We may also note that the remainder, or error, variances (0·274 and 0·991) within the two groups are also homogeneous and may be replaced by a pooled estimate 0·792 for 18 d.f.

There remains the relation of R to C between the groups and this can be measured by the regression of $\log_{10} R$ on C for the group means. There are, of course, only two such group mean points and the regression line must pass through both of them. The regression of $\log_{10} R$ on C will therefore account for the whole of the SS for $\log_{10} R$ between the groups, and there can be no remainder SS springing from scatter round the regression line. This regression line between the groups has a slope of $b_G = 0{\cdot}185$ and the SS of $\log_{10} R$ between the groups (for which the regression wholly accounts, as we have already noted) is 176·717. The question now is whether $b_G = 0{\cdot}185$ is homogeneous with b_I and b_M, which we have seen to be homogeneous with each other; for only if all these regression coefficients agree with one another, within the limits of sampling error, can a single rectilinear regression describe the relation of R to C over the whole of the data.

The three regression coefficients and the SS of $\log_{10} R$ for which they account are

	SS	d.f.
$b_G = 0{\cdot}185$	176·717	1
$b_I = 0{\cdot}147$	10·498	1
$b_M = 0{\cdot}074$	10·092	1
Total	197·307	3

Thus fitting separate regressions to the three partial relations of R to C takes up a total SS of 197·307 for 3 d.f., leaving a residual SS of 14·256 for 18 d.f., from which the error M.S. of 0·792 is derived. Now, fitting a single overall regression line to the whole set of data gives $b_0 = 0{\cdot}156$ accounting for a SS of 180·655 for 1 d.f. (see Dr Wallace's table 1). Fitting two regressions, b_G and b_J (the joint regression for I and M), accounts for a SS of $176{\cdot}717 + 18{\cdot}543 = 195{\cdot}260$ for 2 d.f., which gives a SS of $195{\cdot}260 - 180{\cdot}655 = 14{\cdot}605$ for 1 d.f. as stemming from the heterogeneity of b_G and b_J. Heterogeneity of b_I and b_M accounts for the remaining 1 d.f. with a SS of 2·046, so completing the tally of 3 d.f. and SS = 197·307 for the three regressions.

We can hence set out the analysis of variance of $\log_{10} R$ in the form

Item	d.f.	SS	M.S.	t	P
Overall regression, b_0	1	180·655	180·655		
Heterogeneity of b_G and b_J	1	14·605	14·605	4·29	<0·001
Heterogeneity of b_I and b_M	1	2·046	2·046	1·61	0·20-0·10
Error	18	14·256	0·792		
Total	21	211·562			

It is now clear that while there is no good evidence of b_I and b_M differing from one another, their joint estimate b_J and the inter-group regression b_G differ significantly. Thus the data cannot be fitted by a single straight regression line. In particular, while the regression lines for I (the insects) and M (the mammals) may be regarded as having the same slope, they must be displaced with respect to one another, as is shown by the significant discrepancy between b_J and b_G.