NOTES AND COMMENTS

SEX OF PARENT AND VARIATION OF RECOMBINATION WITH AGE IN THE MOUSE

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Differences in recombination between sexes in the mouse occur frequently (see, for example, Castle, 1925 ; Parsons, 1958 ; Bodmer, 1961). Significant effects of maternal age on recombination are, however, less common. It is the purpose of this paper to present evidence for variability of recombination with age which differs between sexes.

In the fifth linkage group, the order of the genes being agouti-undulated-pallid-fidget, Fisher (1949) found that the recombination fraction between agouti and undulated decreased with age in both sexes, with no significant difference between sexes. Wallace (1957), however, found a slight increase in recombination with age of heterozygous males in the segment agouti-fidget which includes the agouti-undulated segment studied by Fisher, with no significant effect in females. Bodmer (1961) found that the recombination fraction between pallid and fidget decreased with age of female heterozygotes ; the data from male heterozygotes being perhaps inadequate to show any trend.

With these observations in mind, some data for linkage group XIII previously analysed by Parsons (1958) were re-examined for age effects in the segment leaden (*ln*)-fuzzy (*fz*). The other mutants used by Parsons, polydactyly and Splotch, were omitted from this analysis as they are both liable to be misclassified. In particular the manifestation of polydactyly varies with the age of the maternal parent (Holt, 1948).

The data for *ln-fz* are presented in table 1. The recombination fraction appears to fall with age of female heterozygous parents, but with male parents, if anything, it increases. To test these trends further it is necessary to compute weighted regressions of the recombination fractions on time. The recombination fractions must be transformed using the angular transformation $a = \sin^{-1}\sqrt{p}$ where p is the percentage of recombinants, and a the transformed value of p (see table 1), then a will have a variance of

$\frac{1}{4n} \left(\frac{180}{\pi} \right)^2$ where n is the number of offspring counted to give p . The variance of a is therefore independent of p . This procedure was used by Fisher (1949) in his analysis of recombination between agouti and undulated.

From the female parents there is a decrease in the regression of a on t of 0.57° per two months which is not significant, but from the males there is an increase of 0.87° per two months sub-significant at the 10 per cent. level. The difference between the two regressions was significant at the $2\frac{1}{2}$ per cent. level and almost at the 1 per cent. level. The mean recombination values also differed as expected from Parsons' (1958) results such that

the overall recombination fraction in the females exceeded that of the males.

It must therefore be suggested that the variability of the recombination fraction with age may differ between sexes. Polani *et al.* (1960) have suggested that the maternal environment of the primary oocytes which are perhaps differentiated before birth will change with age and such developmental changes may affect the efficiency of chromosome pairing at meiosis and hence alter the recombination fraction of the females (see also Parsons, 1962). Perhaps in the case of males where meiosis occurs later the effect of age differs from that in females. Clearly much more data will be needed to analyse differences of this sort in further detail and to assess their biological significance. In particular, data of greater value would be obtained from

TABLE 1
Recombinants between fz and ln

Age in months	Heterozygous females				Heterozygous males			
	Re-combinants	Total <i>n</i>	Percentage recombinants	Angular measure	Re-combinants	Total <i>n</i>	Percentage recombinants <i>p</i>	Angular measure
0-3	129	310	41.61	40.2°	113	392	28.83	32.5°
3-5	265	585	45.30	42.3°	213	642	33.18	35.2°
5-7	280	668	41.92	40.3°	247	718	34.40	35.9°
7-9	227	537	42.27	40.6°	165	464	35.56	36.7°
9-11	100	239	41.84	40.3°	123	324	37.96	38.1°
11-13	30	89	33.71	35.5°	29	98	29.59	33.0°
13-15	17	45	37.78	38.0°	9	21	42.86	40.9°

experiments specifically designed to study age effects, which was certainly not the case in the experiment under discussion, for factors such as genetic background must be controlled, and in mice there is the problem that much of the data may be collected from matings set up many months apart so that seasonal and viability effects differing between matings may obscure trends, or present spurious trends.

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