Genet. Res., Camb. (1963), **4**, *pp.* 151–153
Printed in Great Britain

SHORT NOTES

Striated, a new sex-linked gene in the house mouse

By RITA J. S. PHILLIPS

Medical Research Council Radiobiological Research Unit, Harwell, Berkshire, England

(*Received* 29 *September* 1962)

A mutant female, phenotypically similar to a *Tabby* heterozygote (Falconer, 1952, 1953), was found among the progeny of a male which had received 600 r. X-irradiation (Phillips, 1961). The new mutant was shown to differ from *Tabby* in that the striations of the female

Table 1. *Single factor segregation from* Striated *females crossed to unrelated males*

	Phenotypes of offspring					
	Females			Males		
Genotype of parents	*Str*+	++	u/c*	*Str*	+	u/c*
$\frac{Str}{+} \times \frac{+}{-}$	65	93	8	0	91	3

* Died prior to classification for *Str*/+.

Table 2. *Classification of embryos from* Striated *females and their normal sisters*

	Classification of embryos				
Genotype of parents	Viable	Dead 14+ days	Dead 11½–13 days	Moles	Dead* preimplantation
$\frac{Str}{+} \times \frac{+}{-}$	44	0	19	4	2
$\frac{+}{+} \times \frac{+}{-}$	57	1	0	6	3

* Calculated by subtracting the total number of implants from the number of corpora lutea.

were less well marked and often not distinguishable until 16–18 days, and on breeding all the male offspring were wild-type (Table 1). This latter observation suggested that the new gene, called *Striated* (*Str*), was lethal in the male. To test this hypothesis *Str*+ females were crossed to normal males, and then killed at 14–17 days' gestation. Their embryos

were classified, and the data, given in Table 2, indicate that *Striated* males die between 11½ and 13 days' gestation. The data in Table 1 indicate also a shortage of *Str*+ females. There is no evidence of excess death of females prior to classification, so that it seems unlikely that *Str*+ has a reduced viability; on the other hand some were very difficult to distinguish from normal and it is concluded that the shortage is due to incomplete penetrance. On this hypothesis the penetrance of *Striated*, calculated from the data in Table 1, is approximately 80%.

Heterozygous *Striated* females were also mated to *Tabby* males to test for an interaction with *Tabby*. The results are given in Table 3 and indicate that animals carrying both *Tabby* and *Striated* in repulsion are indistinguishable phenotypically from *Ta*+. To test for both linkage and allelism all females from the first five litters were kept and crossed to normal males. All the females should be *Ta*+ and half also *Str*+. The presence or absence of *Striated* was deduced from the sex ratio of the offspring; those giving a 2:1 sex ratio being assumed to carry *Striated*. Of the twenty-two females tested, ten were discarded because they failed to produce more than nine male offspring, and of the remaining twelve adequately tested females, six were judged to be *Str*+ on the basis of the sex

Table 3. *Interaction and linkage data between* Striated *and* Tabby

Genotype of parents	Phenotypes of offspring: Females *Ta Ta*	Females *Ta*+ or *Str*+	Females ++	Males *Ta*	Males +
$\frac{Str}{+} \times \frac{Ta}{-}$	1*	40	0	0	25
$\frac{Str+}{+Ta} \times \frac{++}{-}$	0	121	29	63	13
†$\frac{Str\ Ta}{+\ +} \times \frac{+Ta}{-}$	[3	7	0]	2	10

Recombination value calculated from female offspring assuming only 80% penetrance in females = 23·3%
Recombination value calculated from male offspring = 17·0 ± 4·0%

* Died, without breeding, at 15 weeks; presumably mutant overlap for *Tabby*, or possibly an XO animal.

† Data kindly supplied by Dr M. F. Lyon, data in brackets not of use in linkage calculations.

ratio of their progeny. The data from the proved double heterozygotes are given in Table 3. The shortage of normal males was attributed to linkage of *Str* and *Ta* and constitutes the evidence that *Str* is sex-linked; in females, the linkage value is likely to be biased by the incomplete penetrance of *Str* suggested by Table 1. Assuming this penetrance is 80%, we obtain a recombination value from the female progeny of about 23%, which is in fair agreement with the estimate from males of 17%. Evidently the recombination frequency between *Str* and *Ta* is of the order of 20%. Some data, kindly given to me by Dr M. F. Lyon, with *Tabby* and *Striated* in coupling are also included in Table 3.

As further confirmation of the sex-linkage of *Str*, linkage matings were also set up with

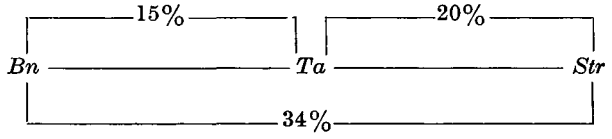
Bent (Garber, 1952) (Table 4). The recombination value of 34% is based on male offspring only as *Bent* is incompletely penetrant in the female.

Table 4. *Linkage data between* Striated *and* Bent

Genotype of parents	Phenotypes of offspring: Females *Str*+ *Bn*+	*Str*+ ++	++ *Bn*+	++ ++	Males *Bn*	+
$\frac{Str+}{+Bn} \times \frac{++}{-}$	2	63	56	39	23	12

Recombination value, calculated from male offspring only, $34{\cdot}3 \pm 8{\cdot}0\%$.

The indicated order of genes on the sex chromosome is therefore:



Although heterozygotes for *Striated* look similar to *Tabby* heterozygotes, Lyon (1963) found that the black-striped regions of the coat of agouti animals were due to the shortening of hairs and not to a lack of zigzags as Falconer (1953) found in *Ta*+ females.

My thanks are due to Mrs H. Smith for technical assistance with this work, and to Mrs M. Miller, who found the first *Striated* mouse.

REFERENCES

Falconer, D. S. (1952). A totally sex-linked gene in the house mouse. *Nature, Lond.*, **169**, 664–665.

Falconer, D. S. (1953). Total sex-linkage in the house mouse. *Z. indukt. Abstamm.- u. VererbLehre*, **85**, 210–219.

Garber, E. D. (1952). A dominant, sex-linked mutation in the house mouse. *Science, Lancaster, Pa.*, **116**, 89.

Lyon, M. F. (1963). Attempts to test the inactive-X theory of dosage compensation in mammals. *Genet. Res.* **4**, 93–103.

Phillips, R. J. S. (1961). A comparison of mutation induced by acute X and chronic gamma irradiation in mice. *Brit. J. Radiol.* **34**, 261–264.