

Small eyes—a new dominant eye mutant in the mouse

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In the latest issue of *Mouse News Letter* (No. 35, July, 1966), a comprehensive listing of mutant gene symbols classifies twenty different mutants as being most readily recognized by their effects on the eye. A new eye mutant has been found in this laboratory, and the first problem is to decide whether it is different from the ones already known. The new mutant is dominant, which conveniently distinguishes it from sixteen of the known twenty. Judging from the descriptions of the effects of the remaining four, which are dominant, it is also clearly different from three of them. The new mutant described here bears several superficial resemblances to *Blind*, described by Vankin (1956). However, *Blind* has its eyelids open at birth, whereas the one reported in this note has its eyelids closed until the normal age. It thus appears to be a mutant not previously reported.

Since the new mutant has no obvious effect on the mouse other than to reduce the size of the eye, it has been called *Small eyes*. This distinguishes it from other named mutants in the mouse, and by the same criterion, the symbol *Sey* is proposed for it.

The mutant first arose in a line of mice previously selected for low body weight in which selection had been suspended for nine generations. In one mating, a first litter of seven mice contained two females and one male whose eyes were obviously smaller than normal. No further litters were obtained from this mating; both parents had normal-looking eyes. The affected progeny were mated together and to their normal sibs. When these matings generated suggestive segregation ratios, the stock was expanded and further test matings were made, with results as shown in Table 1.

Table 1

Phenotype of		No. of offspring classified	Phenotype of offspring	
♀ parent	♂ parent		<i>Sey</i>	+
<i>Sey</i>	<i>Sey</i>	154	96	58
+	<i>Sey</i>	33	18	15
(a) <i>Sey</i>	+	74	34	40
(b) <i>Sey</i>	+	32	14	18

(a) unaffected males from same stock

(b) unaffected males from unrelated stock

The following conclusions can be made from the data:

1. The mutant is dominant; this is confirmed in the table from the matings of *Sey* ♀♀ by males from an unrelated stock.

2. The mutant is lethal in its homozygous state. Though the embryology has not so far been examined, no other postulate will explain the following combination of facts:

(a) *Sey* × *Sey* gives a segregation ratio that differs from expectation based on a 3:1 ratio at the 0.1% level. But it shows excellent agreement with a 2:1 ratio.

(b) No matings have yet been found which give all *Sey* progeny.

(c) Pooled matings of *Sey* by normal give a segregation ratio of 1:1.

3. Agreement with the expected ratios is such that it arouses no suspicion concerning the viability of *Sey* heterozygotes.

The expressivity of the mutant phenotype is variable. Often, one eye is more seriously affected than the other. Sometimes, there is but little reduction in the size of the eye compared with the normal; at the other extreme, the eye is very small and remains tightly closed. But from preliminary investigations, it never quite reaches a stage that could be described as anophthalmia.

Matings between unaffected animals from the stock gave all normal offspring, as expected from a dominant gene, with one troublesome exception. This mating was between supposedly unaffected animals, but produced twelve *Sey* progeny and seventeen normal ones. When the parents were re-examined later, it was easy to imagine that the female parent had at least one of its eyes smaller than normal. However, the technician in charge of the stock disagreed, and reclassified this female as normal when she was mixed with other mice of similar phenotypes, from the same stock, the mixed lot containing normal and slightly affected animals. There is therefore a slight doubt about the full penetrance of mutant. But errors of classification on this account cannot be serious, otherwise the segregation ratios in all of the backcross matings would not have fitted so well.

Sey has not been tested systematically for linkage. It was, however, tested against *microphthalmia*, (*mi*), using the dominant allele Mi^{wh} . The recombination frequency was 0.55 ± 0.04 .

This short note describes the preliminary findings. The mutant has now been taken over by Mrs R. M. Clayton and her collaborators for a more detailed investigation of its effects.

SUMMARY

A new mutant, *Small eyes* (symbol *Sey*), that reduces the size of the eye in the mouse, is described. It is dominant, and lethal when homozygous.

I am indebted to Miss Carol Sergeant, who found the mutant in a stock of mice under her care.

REFERENCE

VANKIN, L. (1956). The embryonic effects of 'Blind', a new early lethal mutation in mice. *Anat. Rec.* **125**, 648.