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SHORT COMMUNICATION

A Red-eyed Mutation in *Sitotroga cerealella* (Olivier) (Lepidoptera, Gelechiidae)

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RARELY have red-eyed Angoumois grain moths been observed in the culture strain maintained since 1960 by the Department of Entomology, Kansas State University. The character apparently is similar to that reported for another gelechiid, *Phthorimaea operculella* (Zeller), by CHAMP and SHEPHERD (1971).

In 1967, the second author, conducting other mating studies, discovered he had paired an unmated red-eyed (*RE*) male with a virgin black-eyed (*BE*) female. Only 16 adult progeny were produced from the mating, all *BE*. These F_1 moths were permitted to interbreed and produced approximately 900 progeny. An error in recording precluded knowing the ratio of *BE*–*RE* in the F_2, but *RE* moths were numerous.

In 29 pairings of *RE* × *RE* moths, all progeny were *RE* and through several generations all moths produced were *RE*. A population of the *RE* moths is being maintained in the laboratory.

In 1968 (Table 1), fifteen crosses were made between *RE* males and *BE* females and 9 reciprocal crosses made. The F_1 progeny were allowed to mate indiscriminately

TABLE 1. 1968 AND 1969 CROSSES BETWEEN RED-EYED AND BLACK-EYED (WILD) ANGOUMOIS GRAIN MOTHS WHICH INDICATE THAT THE MUTANT IS AN AUTOSOMAL RECESSIVE

	Parent crosses (♂)		(♀)	No. pairs	Offspring: Wild type	Offspring: Red-eyed	χ^2 Calculations
1968							
Single-pair crosses	*re/re*	×	+/+	15	F_1 1512	1	
	+/+	×	*re/re*	9	F_1 668	0	
Mass-crosses	+/*re*	×	+/*re*	–	F_2 5016	1602	$\chi^2 = 2{\cdot}22$ P = 0·2–0·05
1969							
Single-pair crosses	*re/re*	×	+/+	9	F_1 680	0	
	+/+	×	*re/re*	6	F_1 451	1	
Mass-crosses	+/*re*	×	+/*re*	–	F_2 2505	807	$\chi^2 = 0{\cdot}71$ P = 0·5–0·2
Single-pair crosses	+/*re*	×	+/*re*	13	F_2 950	297	$\chi^2 = 0{\cdot}93$ P = 0·5–0·2
Back-crosses	*re/re*	×	+/*re*	11	567	603	
	+/*re*	×	*re/re*	11	437	473	$\chi^2 = 2{\cdot}49$ P = 0·2–0·05

(mass-cross) in the rearing containers as all were assumed to be heterozygous (black-eyed).

The F_2 progeny were sexed and counted, tha last being collected 30 days after the first F_2 progeny appeared, to ensure that no F_3 progeny were included.

In 1969 (Table 1), similar crosses were made: 9 between *RE* males and *BE* females and 6 reciprocal crosses.

Most F_1 progeny were allowed to intercross in the rearing containers where they were produced, as with the 1968 crosses; however, 13 pairs were individually paired and kept separate. Twenty-two backcrosses were made between F_1 (heterozygous) individuals and *RE* individuals from a pure-breeding stock population.

Chi-square tests were performed, assuming the red-eyed character to be a homozygous recessive. Probability values were then obtained for each Chi-square value.

F_2 offspring from all *BE* × *RE* parent crosses gave the expected ratio of *BE* (+/+ or +/*re*) to *RE* moths (*re*/*re*), 3 : 1. Crowding 'mass-crossed' moths in rearing containers did not appear to affect this ratio. Backcrosses between F_1 individuals (heterozygous, i.e. +/*re*) and red-eyed individuals gave the expected 1 : 1 ratio of black-eyed to red-eyed moths. Female-to-male ratios were approximately 1 : 1 for progeny of each eye color in all crosses.

Of interest were 2 F_1 red-eyed moths from *BE* × *RE* crosses, one in the 1968 and one in 1969 crosses. They may have resulted from alleles for black-eyed mutating to the red-eyed condition. GARDNER (1960) referred to similar situations of 'mutable genes', which are very unstable. Non-disjunction of a chromosome is another possibility.

The testes of mature male larvae and pupae of *BE* individuals have obvious dark pigmentation visible through the dorsal integument. Red-eyed males show no such pigmentation of testes.

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