

RUBY-EYE, AN EYE COLOUR MUTANT OF CULEX FATIGANS

B. N. CHOWDAIAH, and N. JAYA SHETTY

Department of Zoology, Bangalore University, Bangalore 560 001, India

Genetic studies of mosquitoes, especially of the vector species, have gained importance in recent years. This interest in mosquito genetics has been sustained mainly by the continuing discovery of new mutant forms. At present a few mutants are known in the genus Culex. This paper describes one such mutant, Ruby-eye (ru), in Culex fatigans, one of the members of the Pipiens Complex and an important vector of filariasis in the Oriental region.

MATERIALS AND METHODS

The mutant ruby-eye, was isolated from a laboratory strain originally collected from Kolar, about 40 miles from Bangalore. Adult mutants were sought by visual examination of individual mosquitoes and were examined in detail at 20 X magnification with a stereoscopic microscope.

The ruby-eye adults were crossed with their wild-type sibs collected in and around Bangalore for a few generations to build up a large cage population of pure ruby-eye stock. Since single pair crosses did not yield adequate number of offspring for regular use in genetic experiments, mass matings were made using 5 females and 5 males in a 8"x8"x8" cage made of iron frame covered with nylon net. Rearing of all stages was undertaken in a routine fashion.

RESULTS

In contrast to the wild type eyes which are black in colour, the mutant larvae and pupae have bright, brick-red eyes. In adults with ruby-eyes, the colour of the eyes darkens after emergence and the eyes always lack the greenish lustre typical of the wild type.

The results of the crosses between ruby-eye and wild type are given in Table 1. In crosses 1 and 2, none of the resulting F_1 mosquitoes could be distinguished from the wild type parents. The dominance of the wild type was complete. The F_1 heterozygotes were then back-crossed with the mutants. The results of these crosses (3, 4, 5 and 6) fit the expected 1:1 ratio of wild type to mutants. The F_1 adults were inbred to get F_2 generations. The results of these crosses (7 and 8) also do not deviate from the expected 3:1 ratio of wild type to mutants. It is thus clear that the gene ru is recessive and autosomal.

TABLE I - Mode of inheritance of Mutation Ruby-eye (ru)

Cross No.	Cross	ADULT PHENOTYPE						x ²
		Black eyes		Total with wild eyes	Ruby eyes		Total with ruby eyes	
		♂	♀		♂	♀		
1	Ruby-eye ♂ x Black-eye ♀	624	610	1234	-	-	-	-
2	Ruby-eye ♀ x Black-eye ♂	320	316	636	-	-	-	-
3	Ruby-eye ♀ x F ₁ ♂(Bl. eye ♀ x ru. eye ♂)	316	304	620	326	324	650	0.709 *
4	Ruby-eye ♂ x F ₁ ♀(Bl. eye ♀ x ru. eye ♂)	243	234	477	254	247	501	0.589 *
5	Ruby-eye ♂ x F ₁ ♀(ru. eye ♀ x Bl. eye ♂)	124	119	243	134	118	252	0.099 *
6	Ruby-eye ♀ x F ₁ ♂(ru. eye ♀ x Bl. eye ♂)	216	196	412	230	226	456	2.230 *
7	F ₁ ♂ (ruby-eye ♂ x Bl. eye ♀) x F ₁ ♀ (ruby-eye ♀ x Bl. eye ♂)	436	423	859	135	140	275	0.340 *
8	F ₁ ♂ (ruby-eye ♀ x Bl. eye ♂) x F ₁ ♀ (ruby-eye ♀ x Bl. eye ♂)	362	359	721	113	120	233	0.170 *

* not significant

DISCUSSION

Since the discovery of the first sex-linked 'white-eye' mutant in Culex molestus (Gilchrist and Haldane, 1947), a few more spontaneous mutants affecting eye colour have been isolated in Culex species. These include sex-linked red-eye (Wild, 1963) and white-eye (Laven, 1967) and an autosomal ruby-eye (Iltis et al, 1965) in Culex pipiens; an autosomal white-eye in Culex tarsalis (Barr and Myers, 1966); a sex-linked white-eye (Baker, 1969) and an autosomal red-spotted eye (Rabbani and Baker, 1970) in Culex tritaeniorhynchus.

The mutant ruby-eye of Culex fatigans reported here is similar to that of Culex pipiens both in phenotypic expression and mode of inheritance. The gene ru which is recessive and autosomal is a good marker for Culex fatigans, since it expresses itself in all stages with full penetrance and uniform expression. The gene pool of Culex fatigans is evidently rich in genetic variation which offers significant possibilities for future investigations.

SUMMARY

A gene is described in the mosquito Culex fatigans for ruby-eye colour (ru) which expresses in all stages. The gene is recessive and autosomal with uniform expression and complete penetrance.

ACKNOWLEDGEMENT

This work was supported in part by a grant from the Indian Council of Medical Research.

REFERENCES

- 1 BAKER, R H. (1969). White eye, a female-sterile and sex-linked mutant of Culex tritaeniorhynchus. Mosquito News 29: 571-573.
- 2 BARR, R A and MYERS, C M. (1966). Two spontaneous mutants of Culex tarsalis. Proc. Entomol. Soc. Wash 68 : 49-52.
- 3 GILCHRIST, B M and HALDANE, J B S. (1947). Sex-linkage and sex-determination in a mosquito, Culex molestus. Hereditas 33: 175-190.
- 4 ILTIS, W G, BARR, A R. McCLELLAND, G A H. and MYERS, C M. (1965). The inheritance of yellow-larva and ruby eye in Culex pipiens. Bull. Wld. Hlth. Org 33 : 123-128.
- 5 LAVEN, H. (1967). Formal genetics of Culex pipiens. In : Genetics of Insect Vectors of Disease. Ed. by J W Wright and R Pal Elsevier, Pub. Co. P 17-65.
- 6 RABBANI, M G and BAKER, R H. (1970). Red-spotted eye in the mosquito. An autosomal, conditionally codominant mutant. J. Hered 61 : 135-138.
- 7 WILD, A. (1963). A red eye colour mutations in Culex pipiens after X-irradiation. Nature 200 : 917-918.