

Tobari, I. National Institute of Radiological Sciences, Japan. Effects of temperature on the pre-adult viability of lethal heterozygotes in D. melanogaster.

With the aim of clarifying the mechanism through which deleterious genes are retained in natural populations, viabilities of heterozygotes for lethal genes were examined under different temperatures.

Three hundred fifty-five second chromosomes were extracted at random from a laboratory population which had been kept in a constant temperature room at 25°C for about one year before the experiment. Cy/Pm viability test showed that of these 355 chromosomes 15.5 percent were lethal, 8.7 percent semi-lethal, 9.9 percent subvital and 65.9 percent normal. The allelic rate of the lethal chromosomes was 8.8 percent and the number of nonhomologous lethal chromosomes was 24.

Pre-adult viabilities of lethal heterozygotes relative to normal heterozygotes were tested at three different temperatures (17°C, 25°C and 29°C) by using the 24 lethals obtained and 31 normal chromosomes taken at random. Every lethal chromosome was tested in combination with 10 different normal chromosomes. The testing scheme employed is as follows:

P	Cy/1 _k ♀♀	N _i /N _i	Cy/N _j ♀♀	N _i /N _i
F ₁	Cy/N _i	1 _k /N _i	Cy/N _i	N _j /N _i
Frequency (1-q)		q	(1-q')	q'

1: lethal chromosome N: normal chromosome

k = 1,2, ... 24. j = 1,2, ... 15. i = 1,2, ... 10.

The relative viability (v) of a lethal heterozygote is estimated by $q(1-q')/q'(1-q)$ and the selection coefficient for viability by 1-v.

The mean selection coefficients obtained for 17°C, 25°C, and 29°C were 0.0245, 0.0253 and - 0.0148 respectively. These figures indicate that lethal heterozygotes are at a selective disadvantage at 17°C and 25°C, but they are selectively favoured at 29°C on the average.

From the result of analysis of variance for selection coefficient, it can be seen that the effect of temperature is significant at the 5% level. The effect of interaction between lethals and temperatures is also significant. These results show that the degree of dominance of lethal genes are highly dependent on the temperature at which flies are cultured.

Nagle, James J. North Carolina State. Studies on experimental sympatry between two sibling species.

The effects of experimental sympatry involving the sibling species D. arizonensis and D. mojavensis baja were studied. Five population cages were analyzed. Cages 1 through 4 were initiated with equal numbers of males and females of both species. Cage 5 was initiated with

male and female interspecific F₁ hybrids. Cages 1, 2, and 5 were analyzed cytologically using salivary gland chromosomes, and Cages 3 and 4 were analyzed by use of mutant eye markers.

In Cages 1 through 4 both species coexisted for the duration of the experiment (approximately 11 generations). Only in Cage 1 did a trend toward replacement seem imminent. The dominant species was baja, which represented 90.8% of the population.

Interspecific F₁ hybrids and recombinant backcross types were produced in low frequencies in the mixed populations, even though a choice of mates was available. However, a hybrid swarm was not produced. This is attributed to a lack of luxuriance in the hybrids. Hence, a non-coadapted hybrid complex was in competition with the coadapted complexes of the parental species. This non-coadapted hybrid complex obviously had a lower adaptive value than either parental complex.

In Cage 5 a "hybrid" population flourished for more than 12 generations. It is hypothesized that heterosis exists in certain recombinant types which, once formed, constitute the initiators of a hybrid swarm such as that demonstrated by Mettler (1957) using different races of the same two species.

Sterility and semi-sterility were found to exist among the males of F₁ hybrids. This reduced reproductive capacity is no doubt a contributing factor to the low adaptive value of the hybrids when they are competing with the parental species.