made up 29% and 32%, and orange individuals were only 23% and 19% of the total. The high number of heterogamic matings in the population at generation 21, is not supporting evidence that selection has increased homogamic tendencies. However, a significant difference is apparent between the total matings for each strain.

Reference: Koopman, K.F. 1950, Evolution 4:135-148.

Harper, A.A. & D.M. Lambert. Auckland University, New Zealand. Modified experiments which select for homogamy in mutant strains of Drosophila melanogaster.

Selection for homogamy in which progeny from heterogamic matings are discarded is a case in which these individuals have an artificially lowered fitness. Under these conditions, changes in frequencies of the homogamic individuals may be modelled according to the population genetical process of heterozygote disadvantage (Li 1955). With heterozygote disadvantage there is an unstable equilibrium and the frequency of either homozygote goes to 0 or 1, depending on the initial frequency. This outcome is not observed in previous experiments where heterogamic matings suffer a disadvantage because parity of numbers between the two pure strains is artifically maintained(Paterson 1978). Modified experiments which allowed this alternative outcome to act were conducted.

The Koopman (1950) experimental procedure which selects for an increase in homogamic matings was redesigned. The relative proportions of progeny types each generation were used to determine initial parental numbers for the following generation. Consequently, equal numbers were not necessarily returned each generation. Two mutant strains, orange (or^{49h}) and purpleloid (pd) were used. Under selection, individuals of each mutant strain were progeny from heterogamic matings. Where the two strains mated heterogamically, individuals were wild type (red eye) due to inter-allelic complementation. This provided an accurate means to determine progeny types throughout the duration of the experiment. Experiments were conducted

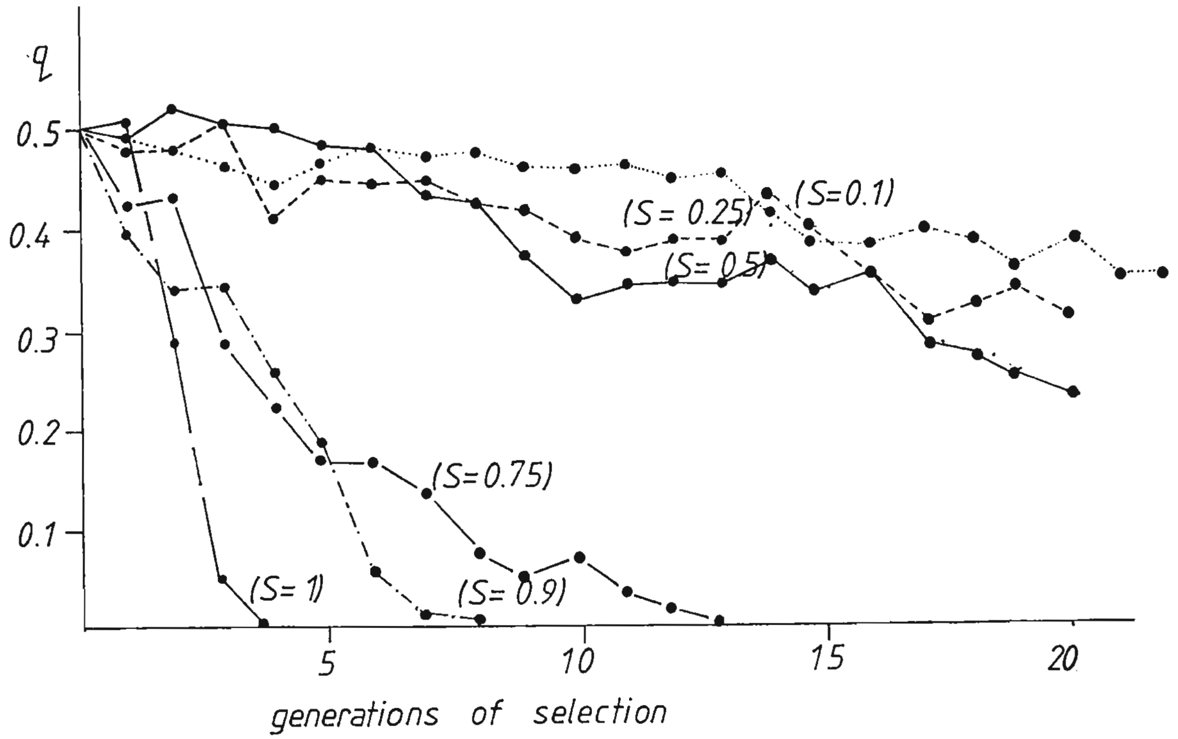

Figure: Summary graph of the change in frequency of allele q causing the heterozygote disadvantage. Selection coefficients for the heterozygotes are indicated.

with selection coefficients ranging from 0.1 to 1.

A summary graph illustrates the decline in frequency of one of the mutant alleles causing the disadvantage with time, for the various coefficients of selection and therefore heterozygote disadvantage. All populations at the beginning of the experiment were equal, i.e., the frequency of the two mutant alleles or^{49h} and pd was 0.5. Whichever allele became rarer was allowed to decline without interference. For s=1, elimination occurred at generation four, s=0.9 at generation eight and s=0.75 at generation thirteen. At other selection pressures (s=0.1, 0.25, 0.5) there is also a decreasing trend apparent for the frequency of one allele. It is unlikely that selection for increased homogamy would occur under these modified experimental conditions. This is apparent because concurrent experiments using the same stocks but unmodified, therefore with parity of numbers, did not have a significant result after twenty-one generations of selection.

For selection coefficients less than unity, continuous introgression was facilitated between the two "pure strain" populations thus allowing mixing of a considerable proportion of the background genomes of the two populations. This effective gene flow that occurs between the two populations has important implications and will be expounded elsewhere.

References: Koopman, K. 1950, Evolution 4:135-148; Li, C.C. 1955, Population Genetics; Paterson, H.E.H. 1978, South African Jrl of Science 74:369-371.

Henderson, N.R. & D.M. Lambert. Auckland University, New Zealand. A study of geographic variation in the mate recognition systems of individuals from Australian and New Zealand populations of Drosophila melanogaster.

Table 1. Collection details of Australian and New Zealand populations of Drosophila melanogaster used in the study.

Collector	Date Collected	No. of Females	Site
J. Oakeshott			
A1	2/81	36	Cooktown, QLD
A2	2/81	19	Daintree, QLD
A3	2/81	18	Cairns, QLD
A4	2/81	>100	Townsville, QLD
A5	2/81	>100	Bowen, QLD
A6	2/81	30	Rockhampton, QLD
A7	9/81	> 50	Frazer Island
A8	1/81	>100	Stawell, N.S.W.
A9	2/81	21	Adelaide
N. Henderson			
N1	2/82	20♀	Auckland, N.Z.
N2	2/82	25♀♀	30k from Gisborne
N3	2/82	25♀♀	Gisborne
N4	2/82	25♀♀	Napier
N5	2/82	25♀♀	Blenheim
N6	2/82	25♀♀	Nelson

It is well known that Drosophila melanogaster has a cosmopolitan distribution. The species is found in all continents and is commonly associated with human activities (Bock & Wheeler 1972). Some populations of this species have obviously recently been transported via humans. Many of these populations have become genetically differentiated however in that studies have shown chromosomal, electromorphic (Girard et al. 1977), morphological (Teissier 1958; David and Bocquet 1975a), ecological (Parsons 1939) and physiologically (David & Bocquet 1975b) divergence between geographical localities. This study was initiated in order to measure the degree of divergence in the mate recognition system (Paterson 1980) of individuals from different populations.

Populations of the species were derived from nine localities in Australia and six from New Zealand. Populations were all derived from a large number of wild caught females. These localities are shown in Fig. 1 and collection details in Table 1.

In order to measure any possible divergence in the mate recognition systems of individuals, multiple choice experiments were performed using individuals from pairs of localities. Both within Australia and within New Zealand crosses were performed together with Australia-New Zealand crosses. Divergence from random mating was tested for by Chi Square analysis and divergence in mate recognition was also measured using Levenes Joint Isolation Index ZI.

Results from 24 mating experiments are recorded in Table 2. Only 4 of the 24 crosses yielded significant results. Of the two crosses N6/N4 and N4/A3, the females of N4 gained a larger proportion of the overall matings than those females in the other respective populations. In cross N3/N2 the females of N2 had an enhanced mating success over their counterparts. Finally, in cross A5/A8 the males of A5 gained more mates than those of population A8. All the results appear to be due to differences in mating propensity, with no evidence to suggest assortative mating among any of these populations.