Harper, A.A. Auckland University, New Zealand. Rhythmicity of mating activity in "Dark" and "Light" strains of D. melanogaster.

Populations maintained under different environmental conditions have been shown to exhibit a high degree of isolation from control lines (Kilias et al. 1980). The following experiments suggest that non-random mating preferences and therefore apparent isolation may be due to non-synchronisation between the mating phases of two populations and not differences in mating behaviour. The environmental variable was total exclusion of light. The two wild strains, Oregan-RS and Tokyo, were derived from wild strain stocks held at Kyoto University, Japan. Oregon-RS had been maintained under darkness since 1954, and the Tokyo strain since 1956.

All the control lines had been maintained under natural light conditions for the same period of time. Stocks were supplied by T.K. Watanake of the National Institute of Genetics, Mishima, Japan. When received, Oregan-RS lines had been cultured for 699 generations, Tokyo-p for 649 generations, and Tokyo-c for 640 generations. Experiments were conducted approximately fifteen generations later.

All lines were compared with respect to their mating activity, by assessment of mating propensity. The light control lines were cultured, collected as virgins and aged in LD 12:12 cycle. For the derived "dark" lines, these experimental procedures were conducted in complete darkness. They were then exposed to light, three hours before the dark phase began on day

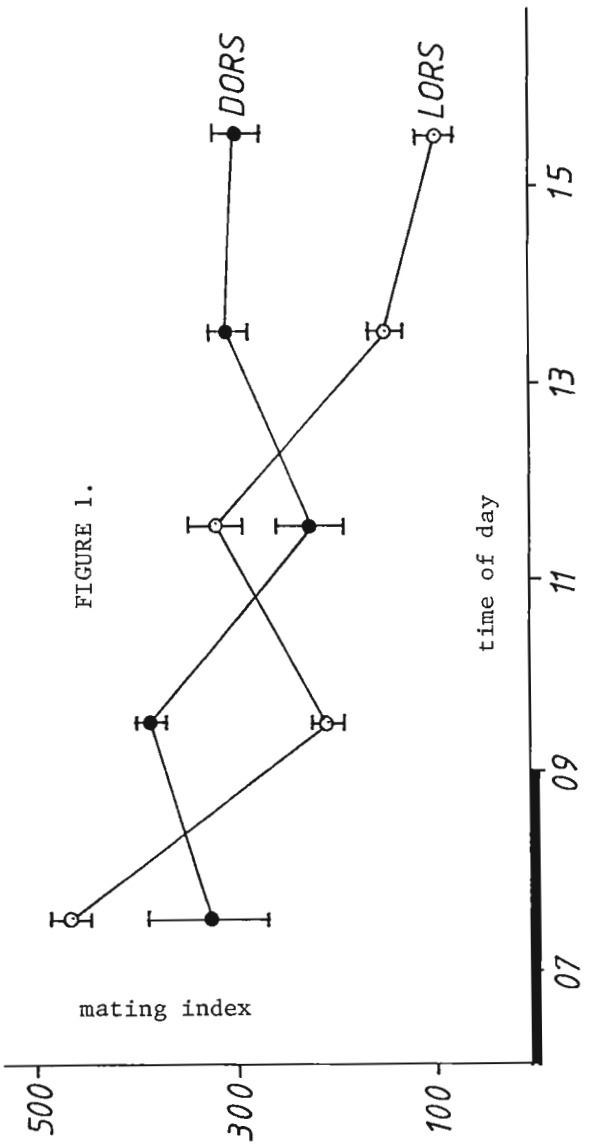

FIGURE 1.

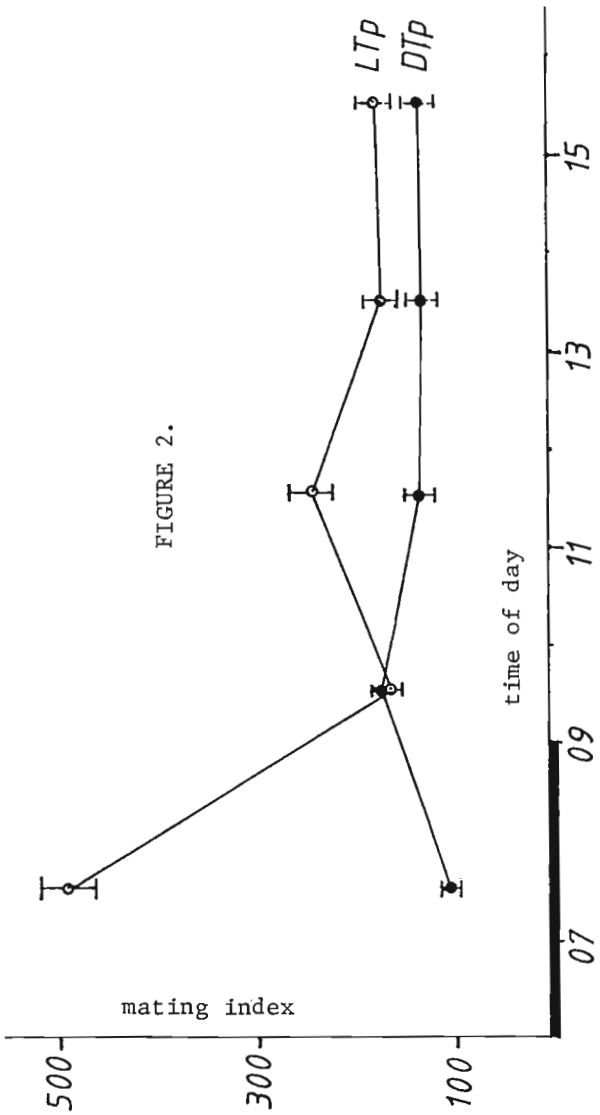

FIGURE 2.

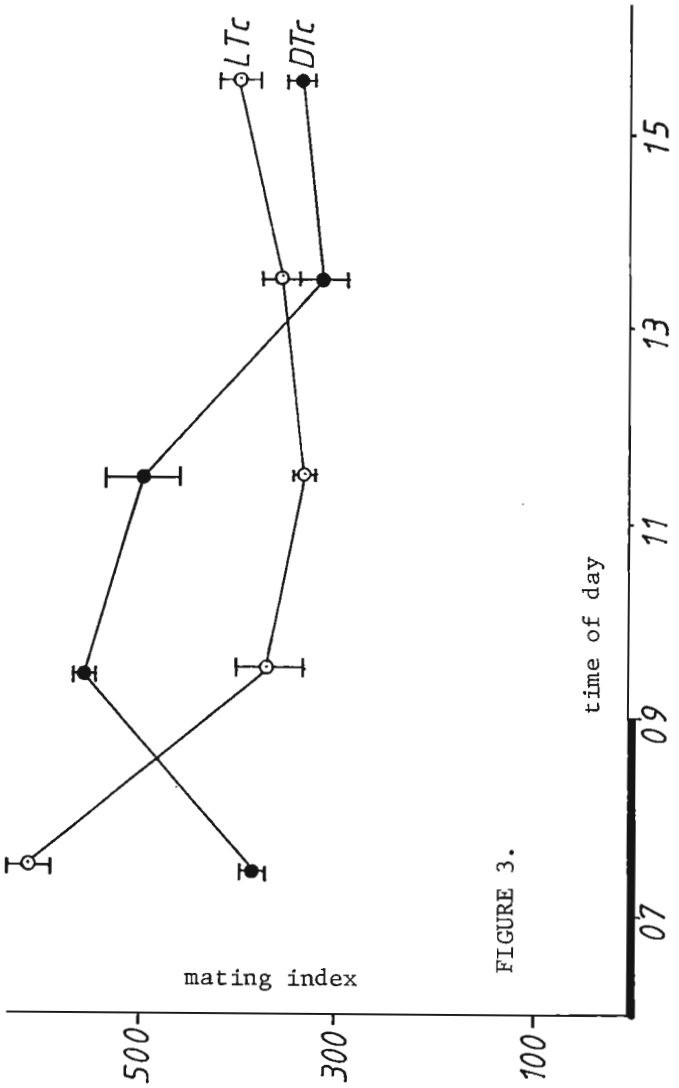

FIGURE 3.

Figures 1-3. Mean changes in mating propensity depending on the time of day at which observations were carried out for each derived "dark" line and its "light" control. Dark lines are denoted DORS (dark Oregon-RS); DTp (dark Tokyo-p); DTc (dark Tokyo-c). Light lines are LORS (light oregan-RS); LTp (Light tokyo-p); LTc (light Tokyo-c).

two of their aging to allow entrainment of mating rhythm. This allowed completion of one L:D cycle prior to experimentation. Observations of matings were carried out in the light.

The mating rhythm for each line was determined by measuring their mating propensity (Spiess et al. 1966), at two-hourly intervals during the light phase. For each time period, 20 four day old males, and 20 four day old females were introduced into a mating chamber similar to that designed by Elens & Wattiaux (1964), under constant conditions at a temperature of 20°C. The number of matings per five minutes interval was scored during a thirty minute observation period. This was repeated about 8 times for each line. Mating propensity was estimated as an average index of mating speed (Spiess et al. 1966). Mating propensity results were used to construct a mating activity rhythm for each line and its control as shown on Figures 1, 2 and 3.

Each dark population and the stock population from which it was derived have distinct rhythmicities. This data is relevant in multiple-choice experiments where crosses are performed between the light and dark-derived populations after 24 years of isolation. Such experiments may be used to calculate time periods when an estimation of the isolation index will be unlikely to be influenced by different mating propensities of the two populations.

References: Elens, A.A. & J.M. Wattiaux 1964, DIS 39:118-119; Kilias, G., S.N. Alahiotis & M. Pelecanos 1980, Evolution 34:730-737; Spiess, E.B., B. Langer & L.D. Spiess 1966, Genetics 54:1139-1149.

Harper, A.A. & D.M. Lambert. Auckland University, New Zealand. Disruptive selection for homogamy in mutant strains of Drosophila melanogaster.

Selection for increased homogamy in the mating of two mutant Drosophila melanogaster strains was conducted according to experimental procedures of Koopman (1950). Two laboratory mutant strains of D. melanogaster were used. Orange (or^{49h}), in which the phenotype is distinguished by bright orange eye colour and purpleloid (pd) which has a maroon eye colour. The progeny of an orange/purpleloid heterogamic mating are phenotypically the red of wild type.

Selection experiments (of two lines A1 and A2) were maintained at a temperature of 25±1°C and in a constant LD12:12 cycle. The virgin flies, collected within six hours of eclosion, were all aged for three to four days before mating. A glass bottle (300ml) was used as a mating chamber. Fifty virgin females and fifty virgin males of each mutant strain were mated.