Elens, A. Facultés Universitaires N.D. de la Paix, Namur, Belgium. Influence of aging on behavior of D. melanogaster.

It has been previously reported (DIS 46:81) that the differences in positive phototactism found among flies of the strains "wild" (Canton S), "ebony" (e^{11}), and "white" seem to be much more marked for "old" (30 days) than for "young" (5 days) flies. But it was doubted if such differences were founded on characteristics only phototactic. The process of aging can, e.g., affect diversely the locomotor capacity of flies of the various strains and the weaker phototactism of the "ebony" and "white" in old age could be attributed purely to a lower aptitude to move towards the light.

Therefore "young" and "old" individuals of the strains "wild", "white", and "ebony" were submitted to various tests concerning: 1) positive and negative phototactic reactions of flies in groups (by the "countercurrent distribution method", as previously reported, but with 5 possibilities of choice in place of 15); 2) locomotor activity of flies in a group (in a series of six glass tubes connected by glass funnels); 3) locomotor activity of isolated flies (in a square "arena").

For isolated flies, the locomotor activity is significantly reduced in old age for the three strains, the "wild" flies remaining the most active and the "ebony" flies the least. For the flies in a group, the diminution of locomotor activity with age is evident for the "wild" ones; in the strains "ebony" and "white" the differences between old and young are less marked: the locomotor activity of young "white" and "ebony" flies in a group is already a very low one.

From these observations, it could be concluded that the differences previously reported in positive phototactism are a consequence of a lower locomotor activity of the "ebony" and " "white" flies: the "wild" flies are more "phototactic" only because they move faster towards the light. But the present tests concerning the negative phototactic reactions show that the greater differences between strains in old age could perhaps be attributed to a greater repulsion from light in some cases (especially for the old males "white") or to a lowered one in some other cases (e.g. the old "ebony" females).

The relatively uncomplicated behavior reported in the previous experiences concerning the positive phototactic reactions seems to result from complex interactions of various factors, not at the same level for the three strains.

Elens, A. Facultés Universitaires N.D. de la Paix, Namur, Belgium. Temperature, light intensity, and sexual isolation in function of frequency ratio of both genotypes for various strains of D. melanogaster

The object of this work was to study the effect of temperature and light intensity on mating activity and sexual isolation at various relative frequencies of both genotypes in presence ("white" and wild, or "ebony" and wild).

20 temperature-light intensity combinations were used (4 levels of temperature and 5 levels of light intensity), the relative humidity of the air being kept roughly constant. For each combination the sexual activity was measured according to our previously described method (DIS 39:118, 1964) by direct observation for a period of two and one half hours. Three chambers were in observation at the same time; the total number of flies was the same in the three cases, but the frequency ratio of both genotypes differed. 5 repetitions were done.

The major characteristics in sexual activity can be drawn from the Fig. 1 and 2 which give, for each genotype and sex, the ratio of flies having mated. In Fig. 1, the data concerning the 5 levels of light intensity at the same temperature have been grouped; in Fig. 2 the grouping concerns the data obtained for the same light intensity at 4 different temperatures.

The greater activity of the wild males is evident; it seems even that some can copulate more than once in two and one half hours (this is particularly manifest in the case where rare "wild" flies are in competition with many "white"ones). The activity of the "ebony" females can also be relatively high.

It seems that 20°C is the optimal temperature (25°C for the "ebony" males). The influence of light intensity is not a striking one. But the sexual activity is much more affected by the frequency ratio of both genotypes in presence; the wild males are much more active when rare; a same trend is evident for the "ebony" females (much less for the "white" ones). On the contrary, the "white" and "ebony" males are more active when numerous. Such general behavioural characteristics seem relatively independent from the physical environmental factors (30°C is not far from the critical limit).

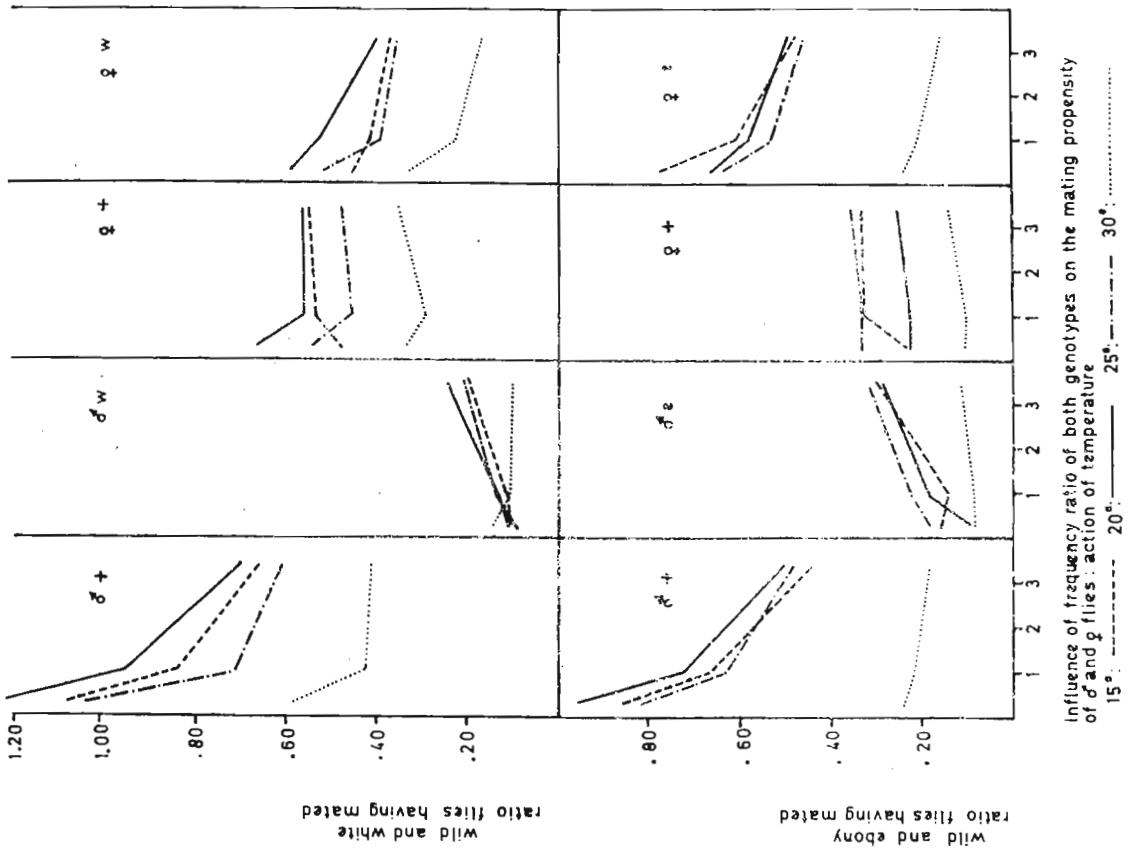

Figure 2

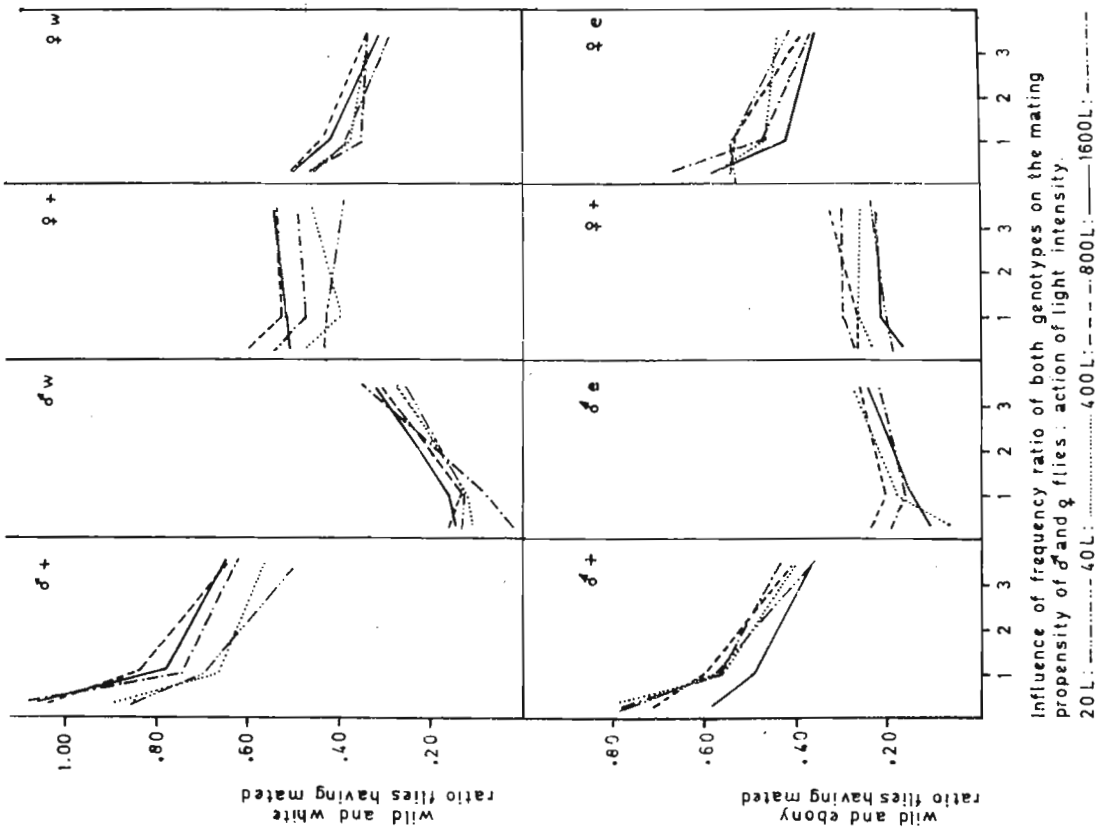

Figure 1

The sexual isolation is not purely a matter of sexual activity; the choice of a partner is of course of primary importance. A first survey, using the coefficients proposed by Petit and Ehrman (Bulletin biologique CII:433, 1968), shows that the "isolation coefficient" between "ebony" and wild is in general higher (approximately 2.0) than the "isolation coefficient" for "white" in competition with wild (roughly 1.0). The "male selection coefficient" is always highly in favour of the wild flies; from its variations it should be difficult to draw general conclusions (concerning e.g. a possible "advantage" for the "rare" males). But, from the variations of the "female selection coefficient" it seems very probable that the "ebony" females (but not the "white" ones) are "advantaged" when they are rarer, being preferred by the numerous wild males. Again, such a characteristic seems to be independent of the physical conditions.

Lakhotia, S.C. University of Calcutta and University of Burdwan, India.

Differential response of polytene X-chromosome of male D. melanogaster to dietary glutamic acid.

Earlier studies by Anders and Anders (1964) and Fahrig et al. (1967) have shown that feeding glutamic acid to developing D. melanogaster prolongs the larval life and the polytene chromosomes of these larvae appear larger. In an attempt to use this method to obtain polytene nuclei in other larval organs (e.g. Malpighian tubules, midgut, etc.) of D. melanogaster suitable for microscopic studies, an interesting effect of dietary glutamic acid was observed on the organization of the male X in salivary glands.

Glutamic acid was mixed with normal Drosophila food (1.5 g/100 g of food). Freshly hatched larvae were transferred and allowed to develop in glutamic acid supplemented food either at 24°C or at 12°-15°C. Salivary gland chromosomes were examined from late third instar larvae (approx. 105-110 hr after hatching at 24°C and 28-30 days after hatching at 12°-15°C). 3L/X chromosome width ratios were considered for comparing the relative width of the X in normal and glutamic acid-fed larvae (for details, see Mukherjee et al., 1968).

Table 1. Effect of dietary glutamic acid on the width of the male X-chromosome in D. melanogaster

	No. of nuclei	Mean 3L/X width ratio ± S.E.
Control male	60	1.10 ± 0.01
GLU male 24°C	31	1.29 ± 0.02*
GLU male 12°-15°C	20	1.04 ± 0.04*
Control female	59	1.00 ± 0.02
GLU female 24°C	30	0.98 ± 0.01

* Ratios significantly different from control male (P 0.01).

At both the developmental temperatures, the chromosomes are wider, condensed in length and better stained than in normal larvae, more so at the lower temperatures. At 24°C, the male X appears narrower than the paired autosomes, unlike the situation in normal male nuclei. At 12°-15°C, the male X shows a reverse effect: the X in male appears much swollen with the banding pattern largely obscured, while the autosomes show clear banding pattern, though much condensed in length. Female nuclei, which too have highly condensed chromosomes, do not show the appearance which male X often displays. The summarized data in Table 1 show the differential effect of dietary glutamic acid on the width of the male X at different developmental temperatures.

Significance of this behaviour of the male X is being analyzed and preliminary observations suggest that with the altered morphology of the X, there are also some changes in the replicative and presumably in the transcriptive activities of the same. It appears that this differential response of the male X is related to the normal hyperactivity of the male X in Drosophila to achieve dosage compensation (Lakhotia and Mukherjee, 1970). It may be noted that under certain other conditions too, as in ltl larvae, the male X assumes a very diffuse and ball-like appearance (Kobel and van Breugel, 1967).

References: Anders, F. and A. Anders 1964 DIS 39:87; Fahrig, R., M. Sieger and F. Anders 1967 Verh. Dtsch. Zool. Ges. in Heidelberg 565-578; Kobel, H.R. and F.M.S. van Breugel 1967 Genetica 38:305-327; Lakhotia, S.C. and A.S. Mukherjee 1970 J. Cell Biol. 47:18-33; Mukherjee, A.S., S.C. Lakhotia and S.N. Chatterjee 1968 The Nucleus, Suppl. 161-173.