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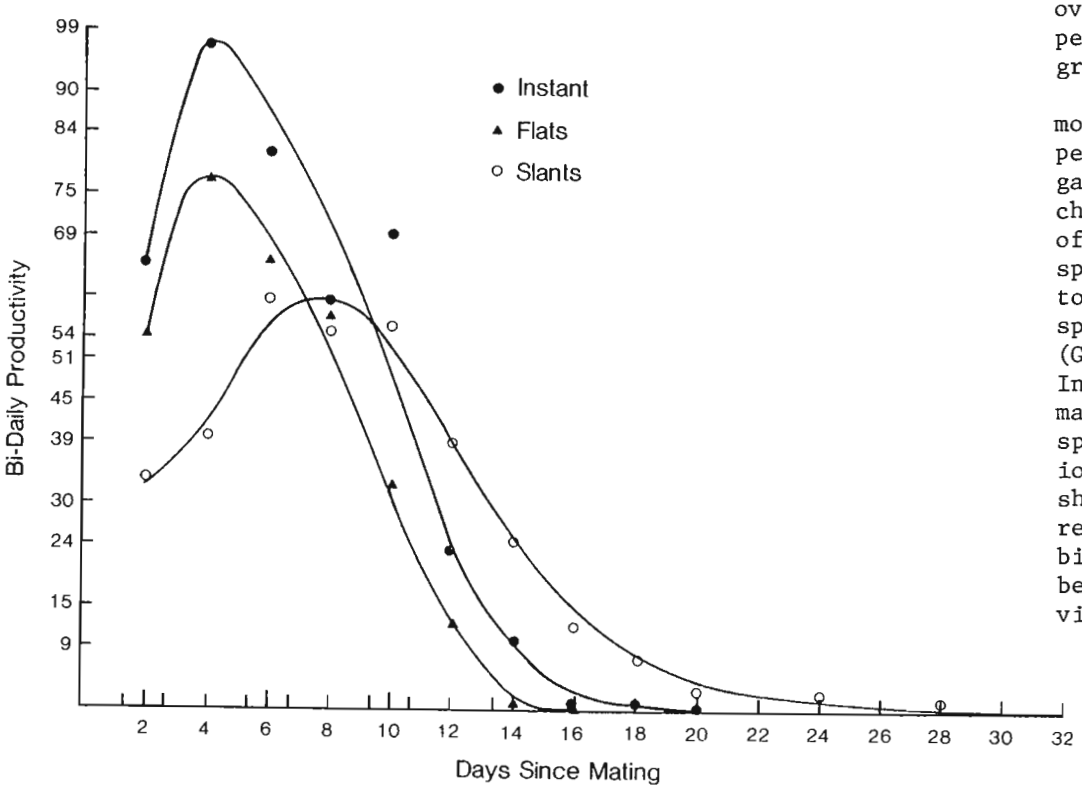
Gromko, M.H. & M. Jensen. Bowling Green State University, Ohio. The effects of culture medium on productivity.

Many experiments on sperm competition make use of successive broods of individual females. Curves of "progeny produced" vs. "time since mating" found in such experiments have a characteristic shape (Pyle & Gromko 1978; Gilbert et al. 1981). Daily productivity rises rapidly to a peak at about 3 to 8 days from mating; thereafter productivities decline, gradually approaching zero. Here we note that some of the characteristics of productivity curves can be manipulated by changing the culture medium. The results of sperm competition studies are expected to vary as a consequence of variation in the shape of the productivity curve.

Virgin female and male D. melanogaster were collected from a wild type strain previously described (Pyle & Gromko 1978). Three to five day old flies were pair-mated in 8 dram food vials, with males removed within 30 min of the completion of copulation. There were three experimental groups with 24 mated females per group. Group A females were kept on cornmeal-molasses-agar food poured on a slant. Group B females were kept on cornmeal-molasses-agar poured flat. Group C females were kept on instant food (Carolina Biological Supply, Formula 4-24®) poured flat. All three groups had a few grains of live yeast and a small square of Kim wipes added to the food. Females in all groups were transferred to new vials every other day for 20 days and then every 4 days for 16 more days. All progeny were counted and recorded.

Analysis of variance reveals significant difference among the groups in total progeny produced ($p<.005$). Duncan's multiple range test shows that total productivity on instant food (406.46±S.E.23.53) is significantly higher than productivity on slants (340.53±21.60) and flats (301.96±20.51), which are not significantly different from each other. Furthermore, differences in the shape of the productivity curves are apparent (Fig. 1). Group B (cornmeal food poured flat) and C (instant) show the same shape: peak productivity was at a high level and was reached at the second transfer. Productivity dropped off rapidly from that point, declining to zero by the eighth transfer. In contrast, peak productivity in group A (slants) was at a lower level but maintained that level for several transfers. Progeny were produced over a much longer period of time in group A.



At least one model of sperm competition in D. melanogaster predicts that changes in patterns of productivity and sperm use will lead to differences in sperm competition (Gromko in prep.). In particular, females which store sperm for longer periods (as in group A) should be slower to remate and might exhibit higher P_2 values because of decreased viability of stored

sperm. Manipulation of the shape of the productivity curve through manipulation of culturing conditions should make it possible to test some predictions of the nature of sperm competition, as detailed elsewhere (Gromko in prep.).

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Guest, W.C. University of Arkansas, Fayetteville. Chlorpromazine delays D. melanogaster larval development.

Chlorpromazine (CPZ) is a widely used tranquilizer that is thought to block dopamine neuroreceptor sites in the brain of vertebrates (Gale 1980) and may act in other ways as well. Dopamine is an intermediate in the synthesis of the tanning pigment sclerotin involved in the molting of insects (Karlson & Sekeris 1966). When D. melanogaster first instar larvae were fed 0.2 mg/ml CPZ in laboratory food pupation was delayed approximately three days. At a concentration of 0.3 mg/ml there was a delay in pupation of five and one-half days although at this concentration only three percent of the larvae survived to pupate.

When second instar larvae were treated with CPZ the delay in pupation increased with the concentration of CPZ. The delay varied from four days at 0.2 mg/ml to seven days at 0.1 mg/ml. There was no reduction in survival at 0.2 mg/ml but at 0.6 mg/ml only 47 percent of the larvae survived and at 1.0 mg/ml there was only a six percent survival rate. When third instar larvae were treated there was a delay in pupation of approximately three days at all concentrations up to 2.0 mg/ml and the percent survival varied directly with the concentration from 80 percent survivaly at 0.2 to 16 percent at 2.0 mg/ml.

There are no reports in the literature on the effects of CPZ on insect larvae. Studies with vertebrates indicates that the drug may interfere with steroid hormone function (Wakabayashi et al. 1980), block dopamine receptors (Gale 1980), as well as decrease membrane permeability (Maoi 1979). Most investigators have indicated that a block in dopamine utilization occurs and this appears to be a reasonable explanation of the action of CPZ in insect development. The availability of dopamine to form sclerotin would have an adverse effect on pupation.

References: Gale, K. 1980, Nature 280:576-580; Karlson, P. & C. Sekeris 1966, Acta Endocrin. 53:505-518; Maoi, M., T. Suzuki & K. Tagi 1979, Biochem. Pharmacol. 28:295-299; Wakabayashi, I., M. Kanda, N. Miki, H. Miyoshi, E. Ohmura, D. Demura & K. Shizume 1980, Neuroendocrinology 30:319-322.

Gupta, A.P. Instituta Biologica da UFRJ, Rio de Janeiro, Brasil. Molecular evidence for developmental stability in species crosses and backcross progeny of D. pseudoobscura and D. persimilis.

Prakash & Merritt (1972) reported that at the adult acid phosphatase-6 (AP-6) locus, two alleles determining the presence (+) or the absence (-) of the enzyme are found in D. pseudoobscura, but this locus is monomorphic for the absence in the adults of D. persimilis (Prakash 1977). AP-6 is sex linked and the + allele is dominant over the - allele. In D. pseudoobscura, the frequency of the + allele is 30-40% in standard arrangement, whereas this allele is absent in the sex ratio arrangement.

Even though these two species are similar in morphology, they show significant genetic differences. The F_1 males of the species cross are sterile and backcross progeny have very low viability. The sterility in F_1 males is caused by abnormal spermatogenesis. A breakdown of developmental stability in species crosses and backcrosses occurs due to unfavorable interactions of chromosomes from the two species.

The present experiment was designed to examine the level of enzyme activity at the adult acid phosphatase-6 locus in interspecific crosses and backcrosses. Two strains of D. pseudoobscura homozygous for + allele and two strains of D. persimilis homozygous for the - allele were used. Virgin females and males were collected to make F_1's and various backcrosses. The species identity of strains was confirmed by demonstrating the sterility of both classes of F_1 hybrid males. Ten replicates each of parental, F_1's (in both directions) and four backcross classes (only F_1 females could be used for making backcrosses) were reared concurrently at 17.5°C. Fifty individual females from each of the parental, F_1's and various backcross