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Development of phenfultyrless-1, 1(1)EN11, a lethal mutant of Drosophila melanogaster.

Phenfultyrless-1, 1(1)EN11, is a sex-linked, lethal mutant of Drosophila melanogaster which was induced by Novitski (1963). Death in this mutant occurs in either the late larval or prepupal stage. Both weight and oxygen consumption measurements were made on individual larvae from the first-instar larval stage until the time at which oxygen uptake ceased. Oxygen consumption measurements were made with small respirometers in a 25°C water bath. A 20% NaOH solution was used to remove CO_2 from the respirometers which caused movement of the NaOH drop. By measuring the volume of the droplet displacement the oxygen consumption of a larva was determined.

Neither weights nor rates of oxygen consumption in phenfultyrless-1 larvae were significantly different from those in controls until 96 hours after oviposition. Beginning at 96 hours, weights of phenfultyrless-1 larvae began to decrease gradually, and rates of oxygen consumption began to decrease sharply. Control larvae formed puparia at about 110 hours. Most phenfultyrless-1 larvae failed to form puparia, remaining in the larval stage and showing increasing deterioration until death of all larvae had occurred by 240 hours. A few phenfultyrless-1 larvae did form puparia, but pupation never occurred. Phenfultyrless-1 individuals in this stage will be called pseudopupae. Oxygen consumption of these pseudopupae decreased until 40 hours after puparium formation, after which it increased sharply, reaching a peak at 80 hours which was even higher than that at the highest point of the control U-shaped curve. Then oxygen consumption dropped sharply, until at 128 hours none could be detected. Dry weights of pseudopupae dropped sharply, until at 128 hours they were less than half those at puparium formation.

Since they showed no signs of metamorphosis, it seems unlikely that the sharp rise in oxygen consumption was caused by metabolic activity of the pseudopupae themselves. It appeared that the pseudopupae died soon after puparium formation. The sharp rise in oxygen consumption was probably caused by rapid growth of microorganisms within the dead pseudopupae.

Reference: Novitski, E. 1963, List of biochemical mutants. DIS 37:51-53.

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Possible stable equilibrium for D. melanogaster and D. simulans.

Ayala (1971) described a case of interspecific competition where D. pseudoobscura and D. willistoni were maintained in a stable equilibrium for a period of six months. The maintenance of the equilibrium was attributed to frequency-dependent progeny production observed in a one generation test. In this study one generation tests have indicated that under certain conditions D. melanogaster and D. simulans might also be maintained in a stable equilibrium because of frequency-dependent progeny production.

Table 1. Mean percentage of melanogaster and mean number of flies emerging per vial. Simulans was given a two day head start and counts were made through 18 days. Values are based on six replicates.

	% melanogaster parents	% melanogaster progeny	No. progeny mel.	No. progeny sim.	Total
16 pairs of parents	100.0	-	101.7	-	101.7 ± 11.9
	87.5	72.7	90.8	30.5	121.3 ± 11.5
	50.5	42.0	46.3	61.3	107.6 ± 4.9
	12.5	26.7	23.3	69.0	92.3 ± 5.4
	0.0	-	-	80.7	80.7 ± 4.2
32 pairs of parents	100.0	-	141.0	-	141.0 ± 11.8
	87.5	80.0	98.0	23.3	121.3 ± 12.8
	50.0	60.2	63.0	35.8	98.8 ± 11.2
	12.5	26.3	19.5	55.2	74.7 ± 2.5
	0.0	-	-	93.7	93.7 ± 9.5