Wright, C.P. Western Carolina University, Cullowhee, North Carolina. Oxygen consumption in tyrproless-1, l(1)EN14, a lethal mutant of Drosophila melanogaster.

Tyrproless-1, l(1)EN14, is a sex-linked lethal mutant of Drosophila melanogaster which was X-ray induced by Novitski (1963). Death in this mutant occurs in the larval stage. Both weight and oxygen consumption measurements were made on individual male larvae from the first instar larval stage until about the time of death. 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. Control larvae were y, w, spl, sn males from the stock of Novitski (1963) in which the lethal mutant was induced. Experimental data were tested statistically against control data by use of the Mann-Whitney U nonparametric test (Tate and Clelland, 1957).

Both fresh and dry weights of l(1)EN14 larvae (Table 1) were significantly less than those in controls (Table 2) at every age measured. Rates of oxygen consumption per larva were

Table 1. Average weights and rates of oxygen consumption for l(1)EN14 larvae.

Age in hr. after oviposition	Fresh weight/ larva in mg.		Dry weight/ larva in mg.		O_2 consumption in cu. mm./ larva/hr.		O_2 consumption in cu. mm./mg. dry wt./hr.	
	n	M. ± S.E.	n	M. ± S.E.	n	M. ±S.E.	n	M. ± S.E.
30 hr.	-	Did not weigh	4	0.0014* ± 0.0001	8	0.071** ± 0.010	8	50.447 ± 7.357
48 hr.	-	Did not weigh	4	0.005* ± 0.001	8	0.131** ± 0.011	8	26.100 ± 2.167
72 hr.	8	0.13** ± 0.01	8	0.04** ± 0.01	8	0.552** ± 0.024	8	14.158** ± 1.424
96 hr.	11	0.22** ± 0.02	11	0.08** ± 0.01	11	0.376** ± 0.104	11	4.735** ± 1.143

*Significant at .05 level
**Significant at .01 level

significantly less in l(1)EN14 (Table 1) than in controls (Table 2) at all ages. When calculated per unit dry weight, rates of oxygen consumption in l(1)EN14 (Table 1) were greater than in controls (Table 2) until 48 hours after oviposition. After this the oxygen consumption per unit dry weight in l(1)EN14 larvae dropped sharply until at 96 hours it was at a very

Table 2. Average weights and rates of oxygen consumption for y, w, spl, sn control larvae.

Age in hr. after oviposition	Fresh weight/ larva in mg.		Dry weight/ larva in mg.		O_2 consumption in cu. mm./ larva/hr.		O_2 consumption in cu. mm./mg. dry wt./hr.	
	n	M. ± S.E.	n	M. ± S.E.	n	M. ± S.E.	n	M. ± S.E.
30 hr.	-	Did not weigh	4	0.0039 ± 0.0001	8	0.137 ± 0.004	8	35.192 ± 1.021
48 hr.	-	Did not weigh	4	0.018 ± 0.001	10	0.390 ± 0.015	10	21.689 ± 0.851
72 hr.	10	0.29 ± 0.02	10	0.07 ± 0.01	10	1.456 ± 0.059	10	19.698 ± 0.236
96 hr.	9	1.36 ± 0.05	9	0.31 ± 0.01	9	5.108 ± 0.282	9	16.382 ± 0.441

low level. Some l(1)EN14 larvae lived a good deal longer than 96 hours, but since very few larvae could be found in mixed cultures after this time and since the rates of oxygen consumption had already begun to decrease, no measurements were made beyond this point.

None of the l(1)EN14 larvae formed pupariа; thus, this is a larval lethal. In order to determine more precisely the time of larval death, 58 l(1)EN14 larvae at 48 hours after oviposition were placed in food containers and observed until death. Results of these observations are found in Table 3. The extent of observable gross morphological development in l(1)EN14 larvae can be correlated with the low oxygen consumption measurements. Soon after hatching, l(1)EN14 larvae looked smaller than normal. After about 96 hours, very few live l(1)EN14 larvae could be found in the cultures, and most of those found appeared quite sick in that they were moving around lethargically, if at all. At 96 hours some l(1)EN14 larvae

still had the second-instar cuticle attached to them. In some cases the cuticle was attached at the larval mouth hooks, so that the larvae were dragging the cuticle around with them. In other cases the cuticle was wrapped around the posterior half of the organism. This seems to indicate that the second molt in 1(1)EN14 larvae occurs at a later than usual time or that the larvae have some difficulty in undergoing the molt.

Table 3. Subsequent development of 58 1(1)EN14 larvae separated from non-lethal sibs and placed in food petri dishes 48 hours after oviposition.

Age in hr. after oviposition	Vigorously alive*	Abnormal**	Dead***	Could not find
72 hr.	42	3	2	11
96 hr.	7	30	5	16
120 hr.	0	5	35	18
144 hr.	0	2	38	18
168 hr.	0	0	39	19

*Crawling around quite actively.
**Crawling around lethargically or moved only when pricked with forceps.
***Darkened in color, looked dried out and did not move when pricked roughly with forceps.

References: Novitski, E. 1963, DIS 37:51-53; Tate, M.W. and R.C. Clelland 1957, Non-parametric and Shortcut Statistics in the Social, Biological, and Medical Sciences. Interstate, Danville, Illinois.

Gould-Somero, M., R. Hardy and L. Holland
University of California, San Diego, La Jolla. The Y chromosome and sperm length in D. melanogaster.

It has been reported that the amount of Y chromosome material in male D. melanogaster is directly correlated with the length of the sperm tails. That is, males with two Y chromosomes produce sperm roughly twice as long as males with one Y chromosome (Hess and Meyer, 1963, 1968). This observation interested us because of its obvious implications for the control of protein synthesis and assembly in the developing spermatid. Therefore we tried to repeat the observation but were unable to: motile sperm from XYY males were the same length as those from XY males.

Sperm lengths were measured after teasing motile sperm out of the seminal vesicle in saline (Ephrussi and Beadle, 1936), supplemented with 9% fetal calf serum to reduce stickiness, and spreading them out under a coverslip. The preparations were examined by phase contrast microscopy; motile sperm were selected and photographed when they stopped twitching. The lengths were measured in the photographs. We consciously selected for the longest sperm.

We examined adult males (2 - 9 days after eclosion) of the following sex chromosome constitutions: X/Y (Canton-S males); XY/Y ($Y^{S}X \cdot Y^{L}$, In(1)EN, y B/y^{+}Y); XY/T(Y;3) ($Y^{S}X \cdot Y^{L}$, y/T (Y;3)Df(73AB-D)/In(3LR)TM6, ss^{-} bx^{34e} Ubx^{67b} e); and X/Y/Y (produced by the cross C(1)RM, y pn v/Y; C(4)RM, ci ey ♀♀ x y/y^{+}Y; mei-S332; spa^{pol} ♂♂; the flies for this latter cross were kindly supplied by Dr. Brian Davis).

Genotype	Sperm length (mm)	n
X/Y	1.92 ± 0.014	6
XY/Y	1.86 ± 0.010	5
XY/T(Y;3)	1.85 ± 0.037	5
X/Y/Y	1.69 ± 0.062	7

The results of the sperm measurements are summarized in the table. Clearly the presence of an extra Y chromosome per se is insufficient to double the sperm length in D. melanogaster.

References: Ephrussi, B. and G. Beadle 1936, Amer. Nat. 70:218-225; Hess, O. and G. Meyer 1963, J. Cell Biol. 16:527-539; Hess, O. and G. Meyer 1968, Adv. Genet. 14:171-223.

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