ENVIRONMENTAL FACTORS OTHER THAN TEMPERATURE AFFECTING FACET NUMBER IN THE BAR-EYED MUTANT OF DROSOPHILA.*

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In a recent paper the author[1] has undertaken to show the relation between temperature and the facet number in the bar-eyed mutant of *Drosophila melanogaster* Meig. Since it was essential to know the part played by other environmental factors the experimental evaluation of some of these was carried out. While these experiments were not as critical as was desired, they give some idea as to the respective value of food, humidity, and evaporation as these are commonly represented in *Drosophila* culture technique. The following data are submitted, then, not as a final analysis, but rather as a basis for further work.

The work in all cases was carried out on the Ultra-bar mutant. For a direct comparison the data on the effect of temperature are given in Table I. The temperature data are for the interval 23–29°C., as the experiments involving the other factors were carried out at these temperatures.

An interesting suggestion for further work appeared in the analysis of the few experiments dealing with different kinds of foods. Since consistent results were obtained in three successive experiments it may be that they have some significance.

It is the experience of nearly all investigators rearing *Drosophila*, that fermented banana rapidly becomes acid at the high temperatures and that oviposition is much retarded. In an attempt to eliminate

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[1] Krafka, J., Jr., The effect of temperature upon facet number in the bar-eyed mutant of *Drosophila*, *J. Gen. Physiol.*, 1919–20, ii, 409, 433, 445.

the acidity, I tried raising mass cultures on pure Fleischmann's yeast made into a paste and covered with cotton-wool. To my surprise the cultures hatched 1 day earlier than did the banana control and an examination of the facet counts showed an appreciable difference in

TABLE I.

Effect of Temperature upon Facet Number in the Ultra-Bar Mutant of Drosophila melanogaster.

Temperature at which flies developed.	Mean facet number. Females.	Difference in facets per °C.	Mean facet number. Males.	Difference in facets per °C.
°C.				
23	28.30±0.24		31.43±0.24	
		1.53		1.91
25	25.24±0.09		27.60±0.10	
		1.98		1.95
27	21.27±0.10		23.70±0.11	
		2.02		2.34
29	17.23±0.08		19.02±0.08	
Average.....		1.84		2.07

TABLE II.

Effect of Various Foods upon Facet Number in the Ultra-Bar Mutant of Drosophila melanogaster.

Food on which larvæ were reared.	Experiment 55. Temperature 23°C.		Experiment 61. Temperature 23°C.		Experiment 71. Temperature 27°C.	
	Females.	Males.	Females.	Males.	Females.	Males.
Fleischmann's yeast..	23.72±0.34	27.37±0.27	22.40±0.18	25.01±0.18	18.28±0.24	19.85±0.74
Yeast foam...	27.53±0.73	28.80±0.82	24.04±0.26	26.92±0.32		
Banana..	26.69±0.62	32.20±0.48	29.54±0.34	32.50±0.27	20.80±0.34	22.96±0.12

the mean. A repetition of the experiment at 23 and again at 27°C. gave consistent results. What the actual factor is that underlies this phenomenon is still uncertain. The data are given in Table II.

Humidity has been one of the factors to receive considerable attention in the past few years. Since the apparatus for humidity and

temperature control were at hand several experiments were planned to test the action of that factor on development. Culture bottles, fitted up in the ordinary manner, were inclosed in humidity cases, one in which the humidity remained practically constant at 35 per cent, while the other was set for 60 per cent. Little or no difference was noted in the rate of development, or in the facet count (Table III).

Direct evaporation was next tried. Ordinary culture bottles were fitted with cork stoppers. A piece of glass tubing, extending through the cork to the surface of the banana, admitted air from the humidity control pipes. Another short tube with a cotton plug permitted

TABLE III.

*Effect of Humidity and Evaporation on Facet Number in the Ultra-Bar Mutant of Drosophila melanogaster.**

Atmospheric conditions under which immature stages were passed.	Mean facet number.		Range in facet number.	
	Females.	Males.	Females.	Males.
Culture bottle in 35 per cent humid air	26.59±0.32	28.86±0.37	21 to 32	23 to 38
Culture bottle in 60 per cent humid air	28.32±0.34	30.14±0.35	22 to 35	24 to 35
Direct evaporation 35 per cent humid air	Dried out. No larvæ.			
Direct evaporation 60 per cent humid air	32.21±0.71	34.48±0.90	16 to 47	26 to 49

* Temperature 23.5–25°C.

the escape of the air. The culture bottle, into which a stream of 35 per cent humid air was passed, dried up at the end of the 2nd day and no larvæ developed. The cultures into which 60 per cent air was admitted dried out rather rapidly, but not before many of the larvæ had pupated. Some of these emerged from pupation at the expected time but the majority was about 5 days late. The effect on the facet count is striking both as to the mean and the range. The upper range for the 23°C. stock counts is 39;[1] in this culture it has gone to 49, which is even above the upper range for 20°C. Unfortunately an atmometer test is impracticable, and no quantitative measure can be applied to this factor.

The foregoing experiments are of value in showing that when a consistent procedure is followed and plenty of good moist food is present, the environment is practically constant except for variations in temperature and need not be taken into consideration in the interpretation of the bulk of breeding data now available for *Drosophila*.