

Table 3. Components of variation and heritability of phototaxis in *D. melanogaster* estimated from a 4x4 diallel with 3 replicates in 6 different Hirsch-Hadler mazes with 4 light-dark choices. In the last row the pooled data were used (4x4 diallel with 18 replicates). Nomenclature according to Mather and Jinks (1971).

Maze	D	F	H1	H2	E	$\bar{uv}$	$h_n^2$	$h_b^2$	$h_{CA}^2$
KK1	2.50	-0.18	0.55	0.39	0.09	0.17	0.88	0.94	0.69
KK2	1.88	-0.11	0.46	0.32	0.08	0.17	0.87	0.94	0.68
KK3	1.46	-0.15	0.32	0.21	0.09	0.17	0.86	0.91	0.64
KK4	1.31	-0.46	0.18	0.13	0.13	0.17	0.85	0.88	0.53
KK5	1.50	-0.09	0.16	0.10	0.13	0.15	0.84	0.86	0.66
KK6	1.62	-0.23	0.76	0.52	0.09	0.17	0.83	0.94	0.55
Total	1.71	-0.21	0.39	0.27	0.10	0.17	0.86	0.91	0.63

$h_n^2$ ,  $h_b^2$  heritability in the narrow and broad sense,  $h_{CA}^2$  heritability of Crumpacker and Allard (computer program of Lee and Kalisikes, Univ. of Manitoba, Winnipeg)

It is clear cut that the additive component D compared with E (error) and H<sub>1</sub> and H<sub>2</sub> (dominance components) is extremely high. This leads to heritability estimates between 83% and 88% in the narrow sense and between 86% and 94% in the broad sense. There exist only slight differences between the estimates from the data in the 6 mazes so that these could be handled as one diallel with 18 replicates. The negative F values indicate that there are more recessive alleles present in the 4 lines than dominant alleles, irrespective of whether these have photopositive or photonegative effects. The average frequencies of the alleles for increasing or decreasing phototactic behavior are about 40% if we assume that they are equally distributed ( $\bar{uv} > 0.16$ ).

These extremely high heritabilities of a behavioral trait are probably a result of using selected and control lines in a diallel cross and therefore these estimates are not valid to describe the heritability of phototactic behavior in a normal population. Similarly the estimates of Hadler (1964) were computed from differences in the variances of selected ("isogenic") lines and their control. Furthermore, there exists a scale effect in the Hirsch-Hadler mazes (variance depends on the mean in a binomial distribution). In summary, heritabilities of phototactic behavior in *Drosophila* are low in general and the higher estimates may depend on the computational method in connection with the strains used.

References: Ashburner, M. and T.R.F. Wright 1978, *The Genetics and Biology of Drosophila*, Academic Press, New York; Falconer, D.S. 1970, *Quantitative Genetics*, Ronald Press, New York; Hadler, N.M. 1964, *Genetics* 50:1269-1277; Köhler, W. 1977, *Genetica* 47:93-104; Mather, K. and J.L. Jinks 1971, *Biometrical Genetics*, Chapman and Hall, London.

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Mainardi (1968) has shown that the females of *D. melanogaster* (Oregon) are able to (1) distinguish between food sites "scented" by previous exposure to adult males of their strain and intact ones, and (2) prefer to lay eggs in the former ones.

Ayala and Ayala (1968) have repeated Mainardi's experiment. They found that the females are able to recognize the previous presence of males, but their females showed an egg-laying

Table 1. Number of eggs scored during 12 hours by females and virgins of 2 different strains of D.m. In each experimental unit females could choose between 4 food vials, 2 scented by male presence and 2 unscented ones.

Strain	No.	Number of ♀♀ tested	Number of eggs			
			Scented		Unscented	
			1	2	3	4
Berlin wild ♀♀	1	10	12	215	60	141
	2	10	323	169	6	8
	3	10	266	132	46	60
	4	10	114	218	88	40
	5	9	195	196	0	11
Berlin wild ♂♂	1	8	40	21	7	0
	2	9	32	6	14	0
	3	6	58	1	0	0
	4	7	8	58	0	0
	5	6	21	0	0	0
Grunewald ♀♀	1	10	38	199	9	222
	2	10	342	70	105	24
	3	10	144	140	73	108
	4	10	111	209	58	83
	5	10	113	51	98	227
Grunewald ♂♂	1	9	39	0	0	0
	2	8	30	66	0	0
	3	9	55	0	0	0
	4	10	88	142	0	0
	5	10	17	17	0	0

Table 2. Pooled data of Table 1. Each distribution of eggs between scented and unscented vials was tested for a 1:1 relation.

Strain	Number of ♀♀ tested	Number of eggs		Chi <sup>2</sup>
		Scented	Unscented	
Berlin wild ♀♀	49	1840	460	828,0
	36	245	21	188,6
Grunewald ♀♀	50	1417	1007	69,4
	46	454	0	454,0

preference of scented cups is very strong for the virgins of both strains, whereby in nearly all cases, even within the two scented cups, one is clearly preferred. These results support the findings of Mainardi although our experimental design was different from hers.

References: Ayala, F.J. and M. Ayala 1969, DIS 44:120; Mainardi, M. 1968, Boll. Zool. 35:135-136; Mainardi, M. 1969, Boll. Zool. 36:101-103.

preference for the intact food vials. Mainardi (1969) could reproduce her results as well for Oregon and D.m. wild strains from Italy as for D.s.

We have recently investigated the egg-laying behavior of D.m. Our experiment was conducted with the strains Berlin wild (old laboratory wild strain) and Grunewald (freshly captured wild strain). Directly after emergence 10 virgin females and 10 pairs, respectively, were put into fresh food vials. They remained therein without removal of dead ones and without changing the food vials for 4 days. After this period the surviving virgins or inseminated females were used for the test. They were shortly anesthetized with CO<sub>2</sub> and then put into a glass container (11 cm diameter, 6 cm height). Into these glasses 4 small food cups (3.5 cm diameter, 2.5 cm height) were placed, filled with standard medium, which was covered with carbon paper and sprinkled with a thin yeast solution. Two of these cups had been "scented" and 2 served as controls. Each had previously been coupled with glass cylinders for 24 hours. The cylinders either contained 10 males for "scenting" the cups or were empty for the controls.

The females were allowed to lay eggs for 12 hours in complete darkness at 25°C. For every group of females 5 replicates were made. The results are shown in Table 1. Table 2 shows the pooled data of every group of females and the Chi<sup>2</sup> values calculated for an expected 1:1 relation. In each case they are highly significant. The females of both strains prefer to lay eggs into the food vials which had been scented by the previous presence of males. This tendency is stronger for "Berlin wild" than for "Grunewald". The