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Response to a disruptive selection for phototactism.

The present experiments use **D.melanogaster** populations as a model to measure the influence of the selection intensity on the response to selection. Flies of a wild strain, called "Waterloo" because it derives from adults captured on the historic battlefield of this name, have been submitted to a disruptive selection for positive and for negative phototactism using the Benzer method (1967), as modified by Tompkins et al. (1978). In both the negative and the positive directions, three selection intensity levels were used: 5%, 15%, or 25%, respectively, of the flies of each generation were selected. They become the parents of the following generation. The tests were done at 25°C and 60-80% R.H. The flies were 5 days old.

FEMALES toward light

from light	5	4	3	2	1	0
0	240	51	15	24	2	15
1	227	80	16	15	13	7
2	69	43	23	6	9	1
3	36	26	10		5	3
4	9	3	4	1	3	1
5	1	1	1	1		

MALES toward light

from light	5	4	3	2	1	0
0	369	44	14	15	6	5
1	154	53	11	3	2	3
2	88	46	25	4		
3	36	22	14	5	1	
4	15	6	5	1	1	
5	2	2	1	3	1	

Figure 1. Countercurrent distribution test: final distribution of the flies. Initial population "Waterloo".

Figure 1 shows the results of five tests on flies from the original wild population. Figure 2 and 3 show the results of similar tests done (five repetitions) on flies from the 5th generation after the beginning of selection. Even after so short a time, one observes a response in both the selection for negative phototactism and the selection for positive phototactism. In the strains selected for positive phototactism, the best response is obtained with a high selection intensity level (5% of the flies used as parents); for the male flies, the response is however the same at the 5% and the 15% intensity level. The greatest response is also obtained for the highest intensity level in the strains selected for negative phototactism. Strangely enough, no significant response was observed with the medium intensity level (15%) for the female flies. For the male ones, the response was the same at the highest and the medium selection intensity levels (5% and 15%). As in our previously published papers (e.g., Hougouto et al. 1983; Dubucq et al. 1984), chi-square tests were used for the comparison, after grouping data according to the schema given in Figure 4.

Intensity level: 5%

FEMALES toward light

from light	5	4	3	2	1	0
0	150	32	6			
1	35	16	1			
2	10	9	1	1		
3	6	1				
4	1					
5						

MALES towardlight

from light	5	4	3	2	1	0
0	113	35	10	6	2	1
1	82	24	4	2		
2	12	4			2	
3	10	1				
4		1				
5						

15%

from light	5	4	3	2	1	0
0	105	4	2	3		
1	97	29	5	1		
2	22	16	1	1		
3	10	6		2		
4	1	3				
5						

from light	5	4	3	2	1	0
0	139	25	9	1		
1	49	30	4	2		
2	20	13	3	2		
3	7	4	1			
4	1	4				
5		1				

25%

from light	5	4	3	2	1	0
0	207	78	27	8	1	
1	70	50	13	8	1	1
2	30	18	9	6	1	1
3	10	16	3	2	1	
4	4	3	1	1		
5	2	2	1			

from light	5	4	3	2	1	0
0	170	73	31	14	5	
1	78	39	15	12	5	
2	21	29	2	1	3	1
3	7	18	1	9		1
4	1	3	2	1		
5	2			2		

Figure 2. Countercurrent distribution test: final distribution of the flies. Selection for positive phototactism: 5th generation.

Intensity level

FEMALES

from light \ toward light	5	4	3	2	1	0
0	71	27	8			
1	93	14	9	1	2	
2	34	24	1		1	1
3	20	7	2	3		
4	11	6	1	1		
5	8	2				

5%

MALES

from light \ toward light	5	4	3	2	1	0
0	46	34	11	1		
1	98	31	6			1
2	51	12	7	3	1	2
3	19	13	5	1	1	
4	16	4	1		1	
5	9	5		1		

15%

from light \ toward light	5	4	3	2	1	0
0	91	56	14	20	1	1
1	35	22	13	7	1	1
2	30	11	11	1	4	1
3	13	9	3	4	1	1
4	4	7	2	2		1
5	3	5			1	

from light \ toward light	5	4	3	2	1	0
0	60	37	20	11	3	1
1	35	22	13	7	3	4
2	12	17	15	5	5	2
3	10	10	7	6	1	2
4	7	6		1	1	1
5	1	1	2			1

25%

from light \ toward light	5	4	3	2	1	0
0	71	27	8			
1	93	14	9	1	2	
2	34	24	1		1	1
3	20	7	2	3		
4	11	6	1			
5	8	2				

from light \ toward light	5	4	3	2	1	0
0	46	34	11	1		
1	98	31	6			1
2	51	12	7	3	1	2
3	19	13	5	1	1	
4	16	4	1		1	
5	9	5		1		

Figure 3. Countercurrent distribution test: final distribution of the flies. Selection for negative phototactism: 5th generation.

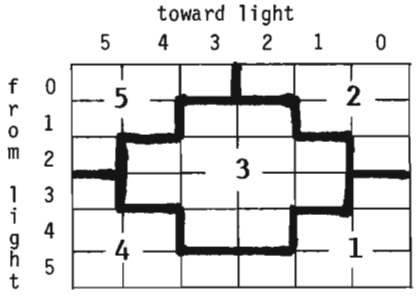

Figure 4. Data grouping before the chi-square test.

References: Benzer, S. 1967, Proc. Nat. Acad. Sci. 58:1112; Dubucq, D., E. Depiereux & A. Elens 1984, DIS 60:87; Hougouto, N. & A. Elens 1982, DIS 58:79; Tompkins, L., J.A. Fleischman & G. Sanders 1978, DIS 53:211.