temperature shock of 33.5 °C applied to adult flies for 24 h[4], and shows on average the worst emergence for larvae grown at 30.5 °C. On the other hand, strains 1 and 3 are more resistant to the temperature shock of 33.5 °C, and also being grown from larvae at 30.5 °C. Thus, this seems to suggest the possibility that genes controlling temperature sensitivity act in a similar way at different stages in the life cycle of *Drosophila*.

Sensitivity to irradiation by Co^{60} γ-rays was assessed by exposing virgin flies in batches of 50 per sex to doses of Co^{60} γ-rays of 90,000 and 110,000 rads at an intensity of 486,000 rads per hour[5]. The percentage mortalities at 3 days following exposure are given in Table II for the 18 strains. There is a significant difference between strains showing that the base population is polymorphic for genes controlling this trait[5].

Two of the most sensitive strains were 2 and 23, and 2 of the most resistant were 3 and 29. Referring to Table I, there is a correspondence in that strains 2 and 23 are temperature sensitive, and 3 and 29 are resistant. After summing the angular values of the percentages given in each of Tables I, and II, a correlation coefficient was computed between strains for Tables I, and II. This came to 0.776 which differs significantly from 0 at the 0.001 level of probability (17 degrees of freedom). This suggests the possibility of an association between sensitivity to high temperatures and irradiation with Co^{60} γ-rays. There is some limited published evidence suggesting this, namely OGAKI and NAKASHIMA-TANAKA's[8] observation that 2 strains of *D. melanogaster* were found to be both radio-sensitive and temperature-sensitive, and 3 strains were resistant to both temperature and radiation.

At this stage, it is difficult to interpret the correlation between resistance to temperature and irradiation. However, studies in mice on chromosome aberrations in liver cells have shown a correlation between the rate at which chromosome aberrations accumulate in animal cells and the life span of animals[9]. Thus short-lived animals may die because their chromosome structure is unstable, and so they develop degenerative diseases sooner. Similarly those strains sensitive to temperature and γ-rays may be more susceptible to chromosome upsets as a result of the environmental stress imposed, than those resistant to temperature and γ-rays, but more work is needed on this point[10].

Table II. Percentage mortalities of 50 flies at 3 days following irradiation with Co^{60} γ-rays (PARSONS, MACBEAN and LEE, 1969)

Strain	90,000 r		110,000 r	
	♀	♂	♀	♂
1	2	0	54	100
2	4	58	100	100
3	0	0	6	44
20	4	8	46	72
21	2	12	36	48
22	0	0	22	100
23	22	46	60	100
24	8	16	60	100
25	0	2	34	72
26	8	12	8	38
27	18	24	24	66
28	0	10	10	68
29	0	2	0	30
30	10	2	4	72
31	4	12	56	64
32	0	2	94	88
33	0	0	72	74
34	2	2	72	80

Résumé. Dans une étude sur 18 races de *D. melanogaster* une corrélation a été trouvée entre les facultés de résistance aux températures élevées et à l'irradiation γ du Co^{60}.

P. A. PARSONS

Department of Genetics, La Trobe University, Bundoora 3083 (Victoria, Australia), 22 April 1969.

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Melanocyte-Stimulating Hormone and Learned Appetitive Behavior

Melanocyte-stimulating hormone (MSH), secreted by the pituitary gland, is known to produce pigmentary changes in amphibians. Its function in mammals is not known, but the possible extra-pigmentary roles of MSH have been recently reviewed[1].

No studies have been reported concerning the effects of MSH on learned appetitive behavioral tasks, although the maintenance of a conditioned avoidance response has been observed[2–5]. The appetitive task in the present study was an instrumental response made to obtain the positive reward of food. Accordingly, acquisition and extinction of the learned appetitive response for food were evaluated after the administration of MSH to rats.

Material and methods. 45 adult male albino rats were matched for weight (approximately 170 g) and then randomly assigned to one of 9 groups. 4 groups of rats received 10 µg of MSH i.p. for 5 days. The 4 preparations employed were highly purified bovine α and β MSH[6,7]

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Summary of Mean Responses (± standard error of the mean) to MSH

	Extinction		Acquisition		Intake	
	% Correct responses	Running speed (sec)	% Correct responses	Running speed (sec)	Water (ml/day)	Food (g/day)
α MSH	70 ± 0.3[a]	9.1 ± 1.3[a]	70 ± 1.4	8.4 ± 2.4	22 ± 1.8[a]	9 ± 0.7
Controls (combined)	56 ± 0.3	11.1 ± 1.1	68 ± 0.7	10.6 ± 2.1	16 ± 0.7	7 ± 0.4

[a] $p < 0.02$ when compared with control values.

and synthetic α and β MSH (Ciba). Both the purified and the synthetic α MSH preparations contained the activity of 1×10^7 units/mg and both the purified and synthetic β MSH preparations contained 5×10^6 units/mg. 2 groups served as vasopressin controls and received an amount of vasopressin equivalent to that contained in the natural preparations (α MSH: 0.02 pressor units/mg; β MSH: 0.05 pressor units/mg). Of the remaining 3 groups, 2 served as uninjected controls and 1 group as a saline injected control.

The T-maze apparatus and method employed were similar to those of MOLTZ[8]. All of the rats were given 35 acquisition trials over 4 days. Following adaptation, the rats were maintained on a 22 h food deprivation schedule. Injections were administered 15 min prior to entry into the starting box.

Results and discussion. 3 types of acquisition were examined: percentage of correct responses, number of trials to reach criterion, and the number of animals in each group reaching criterion. In no type was any significant difference among the groups detected by analysis of variance and comparisons analysis.

Extinction of the responses was measured in 2 ways: immediate extinction trials were conducted 30 sec following the last correct acquisition response and delayed extinction trials were made 24 h after the immediate extinction trials. The results with the immediate extinction trials were not statistically significant. Examination of the results of the delayed extinction trials, however, revealed that rats injected with α MSH exhibited a significant inhibition in extinction of the acquired behavior when compared with the controls not receiving hormonal treatment ($p < 0.02$), or the vasopressin control groups ($p < 0.02$). That is, the adult rats receiving MSH made more correct responses than did the controls. Preliminary experiments indicate that infant rats injected with MSH demonstrate facilitated acquisition as well as prolonged extinction trials[9].

Running speed was also tested in both acquisition and extinction trials. The results during acquisition were not statistically significant, though the rats receiving α MSH ran the fastest. During the extinction trials, however, significant differences in running speed were observed. Most of the variance was due to the effect of the combined MSH groups which ran faster than did the control groups ($p < 0.01$).

It was incidentally noted that rats injected with MSH exhibited bizarre behavior characterized by sporadic hyperactivity. The drowsiness of rats reported by SAKAMOTO[10] was not observed.

Rats receiving α MSH drank significantly ($p < 0.01$) more water (22 ml/day) than did those not receiving hormonal treatment (16 ml/day) or those injected with the small dose of vasopressin (15 ml/day). Although rats injected with α MSH consumed more food (9 g/day) than the non-injected (7.5 g/day) or vasopressin injected (7 g/day) rats, the results were not statistically significant.

The failure of β MSH to cause effects as great as those observed with α MSH may be due to its inherently smaller MSH activity on a weight basis. In a pilot study, a larger dose of purified porcine β MSH resulted in findings similar to those reported here for α MSH.

The results, summarized in the Table, are consistent with goal directed behavior. It would seem that different motivation systems might be involved in acquiring food than in escaping from shock, although the extinction results are in general agreement with those reported by DE WIED[2-4] in conditioned avoidance experiments.

The mechanism by which α MSH inhibited the extinction process and caused the rats to run faster in the extinction trials is not clear. A motivational hypothesis is tempting but avoidance tasks[2-4] demonstrate a similar inhibition of extinction. Furthermore, it might be expected that highly motivated animals would achieve the criterion more quickly than normal animals. There was, however, no difference in acquisition. The present study indicates that the administration of MSH to rats causes retention of a learned appetitive task. This implies an affect on perseveration or memory[11,12].

Résumé. Cette étude indique que l'administration de α MSH aux rats les fait retenir une tâche appétitive. Un effet sur la persévération ou la mémoire est impliqué.

C. A. SANDMAN, A. J. KASTIN and A. V. SCHALLY

Psychology Service, Endocrinology Section of the Medical Service, and Endocrine and Polypeptide Laboratories, Veterans Administration Hospital and Tulane University School of Medicine, New Orleans (Louisiana 70140, USA), 11 April 1969.

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