greater ambulation and in the shuttle-box in greater presessional and inter-trial activity—suggestions of which were in fact detected, and which may also have contributed to the poorer learning[13]. But the problem of the mechanism of the decrease in open-field defaecation, so clearly demonstrated by Gray and Levine[3], and which our results to some extent support, remains unresolved.

We thank the Medical Research Council for a studentship awarded to one of us (A. W. B.), and Prof. S. Levine for his advice. This investigation was in part supported by research grant *MH*–08712 from the National Institute of Mental Health, U.S. Public Health Service.

A. W. Burke
P. L. Broadhurst*

Department of Anatomy,
University of Birmingham.

* Present address: Department of Psychology, University of Birmingham.

[1] Ball, J., *Amer. J. Physiol.*, **78**, 533 (1926).
[2] Slonaker, J. R., *Amer. J. Physiol.*, **68**, 294 (1924).
[3] Gray, J. A., and Levine, S., *Nature*, **201**, 1198 (1964).
[4] Laboratory Animals Centre, *Catalogue of Uniform Strains of Laboratory Animals Maintained in Great Britain*, second ed. (Laboratory Animals Centre, Carshalton, 1958).
[5] Broadhurst, P. L., in *Experiments in Personality*, 1, *Psychogenetics and Psychopharmacology*, edit. by Eysenck, H. J. (Routledge and Kegan Paul, London, 1960).
[6] Mandl, A. M., *J. Exp. Biol.*, **28**, 576 (1951).
[7] Blandau, R. J., Boling, J. L., and Young, W. C., *Anat. Rec.*, **79**, 453 (1941).
[8] Broadhurst, P. L., and Levine, S., *Brit. J. Psychol.*, **54**, 121 (1963).
[9] Kuehn, R. E., and Beach, F. A., *Behaviour*, **21**, 282 (1963).
[10] Broadhurst, P. L., and Watson, R. H. J., *Anim. Behav.*, **12**, 42 (1964).
[11] Barrett, A. M., *Acta Endocrin.*, **34**, Suppl. 51, 421 (1960).
[12] Wang, G. H., *Comp. Psychol. Monogr.*, 2 (1923).
[13] Broadhurst, P. L., and Wallgren, H., *Quart. J. Stud. Alcohol.*, **25**, 476 (1964).

Locomotor Activity in *Drosophila* as a Function of Food Deprivation

Under conditions of constant temperature, *ad-libitum* food and a 12-h light–dark cycle locomotor activity in *Drosophila* follows a circadian rhythm with a peak of activity soon after light onset. Green[1], working with *Phormia regina*, has recently suggested that spontaneous locomotor activity is controlled by a hormone released from the corpus cardiacum. The release of this factor is thought to be under the control of receptors in the foregut capable of monitoring the presence or absence of food.

The present experiment was designed to investigate the effect of food deprivation on the rhythm of locomotor activity described here. Two groups, an experimental and a control, each containing five male and five female *Drosophila melanogaster* (Pacific strain), were used. Activity was measured in an open field apparatus which consisted essentially of a box made from white 'Perspex', 10 × 10 × 0·5 cm. In one side of the box was a small aperture fitted with a plug through which the flies could be introduced by tapping them from a funnel. The lid of the box, made from clear 'Perspex', was marked off into 1-cm squares. An activity score was obtained by counting the number of squares crossed by an animal in the course of a 5-min test period. All measurements were carried out at a constant temperature of 25° ± 1° C, in constant light conditions. The control group, on an *ad libitum* feeding schedule, were kept individually in vials containing yeasted agar-molasses media, while the experimental, food-deprived group were kept in vials containing cotton wool soaked in distilled water. Measurements were made every hour on each fly by tapping it into the apparatus, allowing 1 min for the animal to settle down and then measuring locomotor activity over 5 min. Measurements were made over an 8-h period from 1 h after onset of light. Fig. 1 shows the activity scores for the two groups. There is no significant change in the scores of the deprived group at the beginning of the experiment compared with their scores at the end, nor are the fluctuations significant. Initially there is no significant difference in activity between the two groups but after 7 h deprivation the difference is highly significant at $< 0{\cdot}001$ level (t test). The control animals show a steady decline in activity; however, the deprived animals show no drop in activity and continue to perform around the peak of the circadian rhythm. If the control flies are taken as a baseline, it can be argued that in fact the activity of the deprived flies increases. Fig. 2 shows the percentage change in activity of the deprived animals as the experiment progresses. Flies in the experimental group spent increasingly less time preening as deprivation progressed; no such change was observed in the control animals. The effects of food deprivation in *Drosophila* appear to be similar to those found in rodents by Thompson[2] and Fehrer[3]. Experiments are in progress to investigate the genetic basis of spontaneous activity.

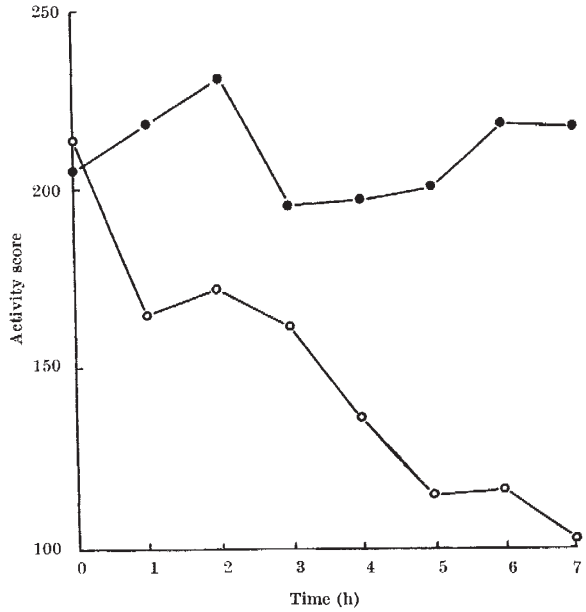

Fig. 1. Activity scores of food-deprived (●—●) and control groups (○—○)

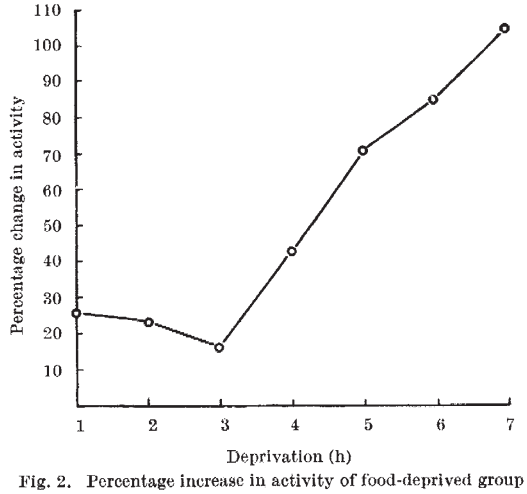

Fig. 2. Percentage increase in activity of food-deprived group

The work was supported by a grant from the Kittay Foundation.

K. J. Connolly*

Department of Psychology,
Birkbeck College,
University of London.

* Present address: Department of Psychology, University of Sheffield.

[1] Green, G. W., *J. Insect Physiol.*, **10**, 711 (1964).
[2] Thompson, W. R., *J. Comp. Physiol. Psychol.*, **46**, 323 (1953).
[3] Fehrer, E., *J. Comp. Physiol. Psychol.*, **49**, 549 (1956).