MICE REARED WITH RATS: EFFECTS OF PREWEANING AND POSTWEANING SOCIAL INTERACTIONS UPON ADULT BEHAVIOUR

by

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For the past several years we have carried out a series of experiments in which we have manipulated the social context within which mice have been reared (DENENBERG, HUDGENS, & ZARROW, 1964, 1966; HUDGENS, DENENBERG, & ZARROW, 1967). The variables we have investigated are three in number: (1) the type of mother which has raised the mice to weaning, (2) the characteristics of the peer group between birth and weaning, and (3) the characteristics of the mouse's postweaning peer group. Both rat and mouse mothers and rat and mouse peers have been used in these experiments. Our purpose in doing these studies has been to try to separate the prenatal-genetic contributions to behaviour from the postnatal-experiential contributions. This paper is concerned only with postnatal contributions. If the behaviour patterns of mice reared by rat mothers or with rat peers are quite different from the patterns obtained when mice are reared in the standard laboratory manner, this would suggest that the social context within which the animal lives plays a significant role in shaping that animal's future behaviour. Further, by systematically varying several aspects of the social environment, we are able to evaluate the influence that each of these social stimuli has upon the behaviours under investigation.

Our first study (DENENBERG et al., 1964) established that mice reared by and with rats would be less aggressive, would be less active in the open field and would spend more time in the vicinity of a stimulus rat than a stimulus mouse. However, because of the nature of the experimental design it was

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not possible to separately evaluate the effects of the rat mother, preweaning rat peers, and postweaning rat peers.

In the second study, whole litters of mice were fostered to rat mothers whose own young were discarded (DENENBERG et al., 1966). Mice reared by rat mothers were less active in the open field and were also less aggressive in a fighting box test. Thus, these data establish that the rat mother is an important mediator influencing subsequent activity and aggression. The effects of the rat mother, however, could not be separated from the effects of the fostering procedure since the control mice were reared by their natural mother rather than being fostered.

The fostering variable was controlled in the third paper (HUDGENS et al., 1967) by fostering all the mice either to rat or mouse mothers who had previously been classified as either high active or low active on the open-field test. Again, the rat-reared mice were found to be less aggressive. The open-field activity difference was not significant, though the mean difference was in the appropriate direction (i.e., mouse-reared mice more active than rat-reared mice). In addition, the fighting behaviour of mouse-reared animals was found to be related to the mother’s activity level.

Although these studies clearly show that the rat mother can markedly influence the mouse’s behaviour, no systematic assessment of the influence of the preweaning and postweaning peers has been carried out. That the peer group composition should have a major effect upon later behaviour is strongly suggested by SCOTT’s (1962) critical period hypothesis concerning the formation of basic social relationships. Our previous finding that mice reared with rats spend more time in the vicinity of rats (DENENBERG et al., 1964) is in agreement with SCOTT’s hypothesis. Thus, in the present study the characteristics of the mother, of the preweaning peer group, and of the postweaning peer groups were systematically varied in a factorial design which allowed us to determine the relative influence of each of these variables separately as well as their interactive effects. In addition, the experiment included mice reared by natural and foster mothers so that the effects of fostering could be assessed. Finally, the experiment provided at least a partial replication of all of our previous studies.

METHOD

Subjects.

The subjects (Ss) were C57BL/10 Jax mice. They were born in 6.5-inch by 11-inch by 5-inch plastic mouse cages, the floors of which were covered with wood shavings. Removable metal tops held externally refillable food and water supplies. Shavings were not changed after a litter was born.