Artificial Selection for Short and Long Attack Latencies in Wild *Mus musculus domesticus*

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Artificial selection for short and long attack latency levels in wild male *Mus musculus* over 11 generations was successful for short latencies. The realized heritability of 0.30 is comparable to those found in other selection studies on aggression. In part selection may have been for faster ontogenetic development of short attack latencies. Four attempts to select for longer attack latencies failed because the lines died out immediately or within two generations for unknown reasons. But neither the physical condition of the animals nor their behavior appeared to have been the cause. Female aggressiveness as measured in female–female encounters was not affected by the selection exerted on the males. This suggests that no genetic correlation exists between aggressiveness of males and females, confirming results of P. D. Ebert and J. S. Hyde [(1976). Behav. Genet. 6:291–304] obtained in a selection experiment on aggression using females.

KEY WORDS: artificial selection; *Mus musculus*; aggression; attack latency; mice.

INTRODUCTION

Although aggressive behavior has been a favorite topic in behavior studies during recent years, only little is known about the genetics of this behavior. One of the means to study the genetics of a character is artificial selection. Apart from ascertaining whether observed individual differences stem from genetic differences or not, it often provides information about the amount of genetic variation present, the limits to selection, and

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the number of loci involved. Furthermore, it may create strains differing genetically for the selected trait and possibly for correlated traits. Such strains are very useful for further behavior-genetic research (DeFries, 1967).

Selection experiments on aggressive behavior in house mice have been carried out by Lagerspetz (1964) on aggressiveness in males of laboratory strains and by Ebert and Hyde (1976) on aggressiveness in wild females. In both studies a complex rating scale has been used to measure aggressiveness. The scale of Lagerspetz included attack behavior and flight behavior, so that it may be regarded as a measure of agonistic behavior (Manning, 1972, p. 100) instead of aggressive behavior. Although clear flight elements were not included in the Ebert and Hyde scale, some elements of avoidance behavior seem to have been included, according to the description of the scale. If so, experiments using either scale select for two opposing tendencies, a tendency to attack and a tendency to flee. If flight and attack are extreme manifestations of one causal mechanism, nothing is wrong in doing so. However, the existence of two separate mechanisms, one for aggression and one for flight, cannot be excluded. Some studies indeed showed that a tendency to flee may vary independently from a tendency to attack (for examples, see Manning, 1972, p. 101), suggesting that selection using bidirectional rating scales may not provide adequate estimates of the genetic influences on either aggression or flight. These considerations led to the present selection experiment in which attack behavior, a pure measure of aggression by definition, served as the criterion.

MATERIALS AND METHODS

The mice came from a colony of wild mice maintained in our laboratory since 1971. This colony descended from 4 males and 3 females caught in a mansion situated near the town of Groningen (The Netherlands) at latitude 53°11' N and longitude 6°36' E. The colony was bred at random. Every generation 15 to 20 pairs were taken to be parents for the next generation. In the summer of 1973 selection was started with 21 males and 21 females. The original colony was used as a control. It was tested as such at the 4th, 9th, 10th, and 11th generations of selection.

All animals were housed in small Plexiglas cages (17 x 11 x 13 cm³) in a room with a reversed day–night cycle (darkness from 11 AM to 11 PM). Temperature varied between 18 and 21°C; humidity, from 45 to 60%. At weaning age (3–4 weeks), the litters were transferred to larger cages (32 x 17 x 13 cm³). At the age of sexual maturity (7–9 weeks), the animals were set up in pairs in the smaller cages. Cages were cleaned at