

Amylobarbitone abolishes social dominance hierarchies in laboratory rats

M. TOMKIEWICZ (introduced by HANNAH STEINBERG)

Department of Pharmacology, University College, London

Amylobarbitone can, to some extent, reinstate behaviour which has been suppressed by fear (Miller, 1964), and increase aggression in rats (Chance & Silverman, 1964) and in mice (Kršiak & Steinberg, 1969), possibly by decreasing fear. We have carried out experiments to establish whether amylobarbitone can alter dominance hierarchies established by rats which compete for water.

At weaning, male hooded rats were randomly assigned to groups of four with the proviso that there were no litter mates in any group. They were left undisturbed with food and water *ad libitum* for 3 months. They were then deprived of water for 21 h each day and their behaviour was observed for the first 3 min of the daily drinking period, during which they could obtain water from a spout which protruded into the middle of their home cage, and which was specially built in such a way that only one rat could drink at any particular time. This made them compete vigorously, and the rat which spent the longest time drinking during the observation period was considered to be the most dominant and the rat which spent the least time in controlling the source of water as the least dominant.

After approximately 2 weeks from the beginning of restricted drinking the rats in each group established a distinct hierarchy and this tended to remain remarkably stable for long periods of time (c.f. Baenninger, 1970). However, intraperitoneal injections of a moderate dose of amylobarbitone (7.5 mg/kg) 20 min before the rats were given access to water, completely abolished the previously stable hierarchies, so that all the rats spent approximately the same amount of time drinking from the spout.

The injections of amylobarbitone were continued for 14 days but no discernible dominance orders emerged. At the end of this period all rats were injected daily with saline instead of amylobarbitone and, after a further 14 days, the original hierarchies re-emerged.

These results seem to be compatible with the interpretation that fear or conflict play a major role in maintaining dominance orders in rats. Other less likely interpretations seem to have been excluded by our findings that position in the hierarchy was not related to body weight; that amylobarbitone did not increase the amounts of water drunk; that this dose did not depress spontaneous activity (Rushton & Steinberg, 1963) and that after the drug was discontinued the rats restored their predrug dominance orders.

This and similar procedures may prove to be useful for evaluating the effects of drugs which reduce anxiety or fear in a social setting, particularly since the rats can be observed with little disturbance in their 'home' environment.

REFERENCES

- BAENNINGER, L. P. (1970). Social dominance orders in the rat: "Spontaneous", food, and water competition. *J. comp. physiol. Psychol.*, **71**, 202-209.
- CHANCE, M. R. S. & SILVERMAN, A. P. (1964). The structure of social behaviour and drug action. *Animal Behaviour and Drug Action*, ed. Steinberg, H. *et al.*, pp. 65-79. London: Churchill.
- KRŠIAK, M. & STEINBERG, H. (1969). Psychopharmacological aspects of aggression: A review of the literature and some new experiments. *J. psychosom. Res.*, **13**, 243-252.
- MILLER, N. E. (1964). The analysis of motivational effects illustrated by experiments on amylobarbitone sodium. *Animal Behaviour and Drug Action*, ed. Steinberg, H. *et al.*, pp. 1-18. London: Churchill.
- RUSHTON, R. & STEINBERG, H. (1963). Dose-response relations of amphetamine-barbiturate mixtures. *Nature, Lond.*, **197**, 1017-1018.