

DOPAMINERGIC TRANSMISSION IN RELATION TO MECHANISMS UNDERLYING STEREOTYPED BEHAVIOUR

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STEREOTYPED behaviour as continuously sniffing, gnawing, bizarre social behaviour in rats, pecking in birds, head-shaking in monkeys, "pudning" in man, etc. occurs in all animal species as a result of a disease (rabies, psychosis) or the administration of certain drugs such as amphetamine and apomorphine (RANDRUP and MUNKVAD, 1970).

Neuroleptic drugs selectively inhibit stereotyped behaviour in all animal species because of their dopamine antagonizing properties presumably on neurons that are excited by dopamine (COOLS, 1973; STRUYKER BOUDIER *et al.*, 1973). On the other hand ergometrine, a potent dopamine antagonist on neurons where dopamine acts inhibitory does not abolish stereotyped behaviour but rather induces a strong increase of a kind of stereotyped locomotor activity when injected in the N. accumbens of the rat (PIJENBURG *et al.*, 1973).

Stereotyped behaviour depends on the behavioural repertoire of the individuals and species involved, the environmental setting and the past experience of the individual. The common characteristic of stereotyped behaviour is that it is built up of behavioural elements which recur in an abnormal high frequency. In behaviouristic terminology it could be stated that a drug which induces stereotyped behaviour, reinforces particular behavioural elements to an abnormal high frequency of occurrence. The dopaminergic system may be involved in the reinforcement of behaviour as it can support self-stimulation (PHILLIPS and FIBIGER, 1973; CROW, 1972). We therefore investigated the reinforcing action of apomorphine with regard to the reinforcing action of electrical stimulation in rats with electrodes in the dopaminergic cell groups of the midbrain (A9-A10). Apomorphine (0.2 mg/kg s.c.) increased the rate of self-stimulation in 7 out of 13 rats up to 270 per cent of the base line rate,

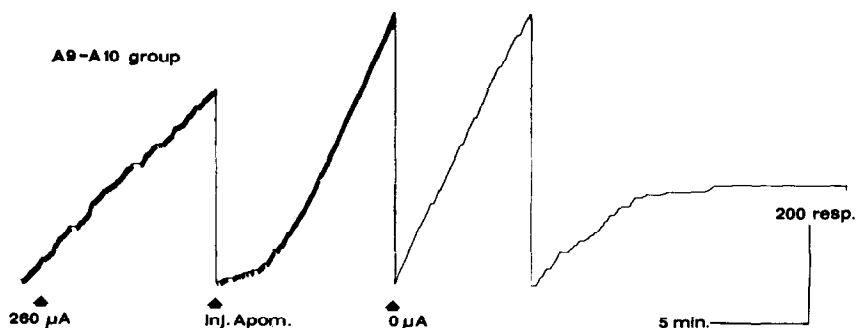


FIG. 1.—Apomorphine (0.2 mg/kg s.c.) on lever pressing for electrical stimulation in the A9-A10 cell group. The rat continued to press the lever when the current is switched off.

but in 5 rats the stimulation rate decreased substantially. Such individual differences were found to be highly reproducible.

In contrast to untreated rats in which reduction of the current to zero resulted in a rapid extinction of lever pressing for the stimulation, the apomorphine treated rats continued to press the lever when the current is switched off.

In conclusion the hypothesis is proposed that the apomorphine induced stereotyped behaviour is based in part on the reinforcing action of apomorphine by activation of dopamine receptors. The behavioural elements that are in operation accidentally or by other effects of the drug, during the onset of the apomorphine action will be reinforced and due to the continuing reinforcement repeated in a stereotyped manner.

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