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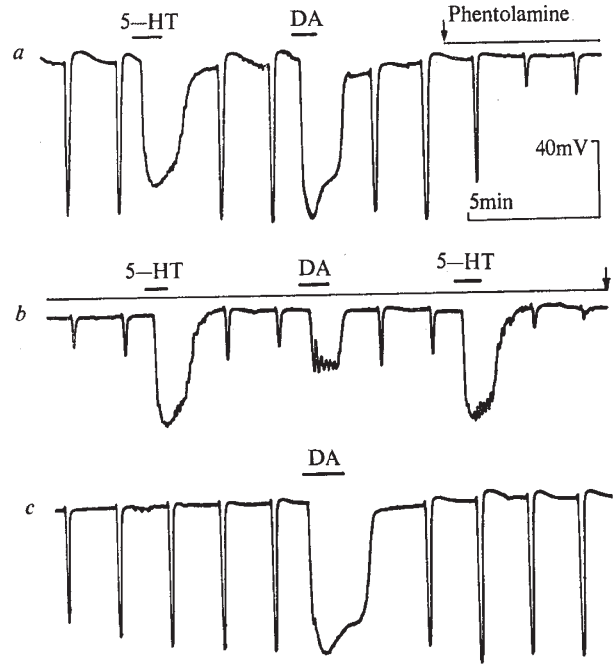

Fig. 1 Intracellular records from a cockroach salivary gland cell. The unlabelled downward deflexions are hyperpolarizations resulting from trains of twenty-five stimuli at 100 Hz applied to the salivary nerve. The bars indicate the periods for which 10^{-6} M 5-HT and 3×10^{-7} M dopamine (DA) were flowing through the bath. Phentolamine, 5×10^{-5} M, was present in (*a*) after the arrow and (*b*) throughout. *a* and *b* are continuous. *c*, Responses 5 min after phentolamine had been washed out of the bath. The resting potential was about −36 mV. The preparation consisted of the isolated glands, ducts and reservoirs. The salivary ducts with embedded nerves were drawn into a suction electrode for stimulation. The preparation was bathed in a solution of composition: NaCl 160 mM, $CaCl_2$ 5 mM, KCl 1 mM, $NaHCO_3$ 1 mM, NaH_2PO_4 1 mM, which flowed at 2 ml min^{-1} through a chamber of 4 ml. The flow rate was changed to 20 ml min^{-1} during the application and washout of 5-HT and DA.

Dopamine Receptors in Cockroach Salivary Gland Cells

THERE is considerable evidence that dopamine is a neurotransmitter in the vertebrate central nervous system, for example, refs 1, 2. It is therefore of interest to have simple preparations available in which "dopaminergic" transmission can be studied[3,4].

The innervated salivary gland of the cockroach[5] may be such a preparation. The presence of a catecholamine in the terminal part of the nerve has been reported[6] and in a related insect, the locust, Klemm has demonstrated the presence of dopamine[7]. Electrical responses of cockroach salivary gland cells to noradrenaline have also been reported[6]. Further experiments although not necessarily excluding other catecholamines have now suggested that a dopamine receptor may be responsible for both these responses and those to nerve stimulation.

Preparations were set up as described in the legend to Fig. 1. Responses have been obtained to adrenaline as well as noradrenaline in concentrations of about 10^{-7} M. The receptor involved, however, is not "adrenergic", at least in the standard sense[8], as no responses were obtained either to α (methoxamine, amidephrine) or to β agonists (isopropylnoradrenaline) in concentrations even as high as 0.1 mM. Figure 1 illustrates responses obtained to low concentrations of 5-hydroxytryptamine (5-HT) and of dopamine (DA). After the addition of phentolamine, the responses to 5-HT were little affected (Fig. 1*b*) but those to dopamine and to nerve stimulation were reduced by about the same extent. In separate experiments, it was established that the blockade caused by phentolamine of the responses to dopamine (and also those to nerve stimulation) was surmountable. The results suggested an affinity constant for phentolamine of the order of 10^6 M^{-1}, at least several hundred times smaller than that for traditional α adrenergic receptors.

The possibility that 5-HT is the transmitter[5,9] has already been questioned on the grounds that its presence in the nerve terminal could not be demonstrated[6]. The records in Fig. 1 show that the 5-HT receptors can be distinguished from those mediating the response to nerve stimulation whereas the dopamine receptors cannot.

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