fection spreads from a very small number of insect feeding sites, and the amount of inoculum introduced into the plant is so minute that after 2 days any increase in enzymatic activity is still immeasurably low.

The hitherto accepted view, though with some reservations, that cereal plants do not contain polyphenoloxidases, and that the activity which has nevertheless been recorded in such plants is attributable to fungus spores or mycelia[2], appears to be an overstatement in the light of the present results.

Zusammenfassung. Der Wirkungsgrad der Polyphenoloxydase gesunder Maispflanzen blieb während der Gesamtdauer ihres Wachstums praktisch unverändert. Er verdreifachte sich hingegen in jungen Pflanzen, die mit dem Virus der Rauhverzwergung des Maises systematisch infiziert wurden.

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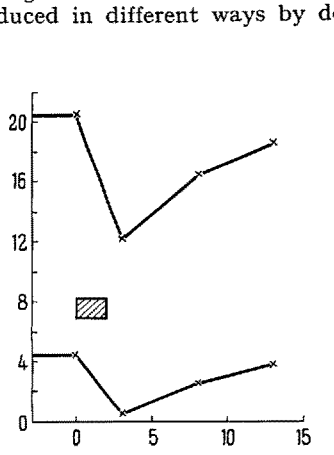
Action of Acetylcholine on the Responsiveness of Effector Cells

The responsiveness of submaxillary gland cells to chemical stimuli increases gradually when the gland has been disconnected from the central nervous system by section of the chorda tympani[1] or treatment with ganglion blocking agents[2]. Lack of secretory impulses seems to be responsible for this effect, for some supersensitivity can be brought about simply by reducing the inflow of secretory impulses to the salivary nuclei; this is attained by cutting afferent fibres of the secretory reflex[3]. This regulatory function of the secretory impulse on the responsiveness of the gland cell is exerted by acetylcholine, as shown by the facts that supersensitivity develops when the transmitter is prevented from being released by the nerve impulse, after administration of botulinum toxin[4], or from acting on the glandular cells because of prolonged treatment of the experimental animal with atropine or atropine-like drugs[5]. The supersensitivity created by these procedures, or by postganglionic parasympathetic denervation[6], is more pronounced than that following section of the preganglionic chorda fibres, suggesting that the responsiveness of the gland cells is dependent not only on transmitter released by the secretory impulse but also on acetylcholine leaking from the endings of the postganglionic parasympathetic fibres[7].

In the investigations described so far, supersensitivity has been produced in different ways by depriving the gland for a long time of some action of acetylcholine. In the present experiments the gland has, instead, been subjected to the action of acetylcholine in excess, and the consequential effect on the responsiveness studied. The sensitivity of the submaxillary gland of cats to adrenaline was examined using a method which permits repeated observations at intervals of some days[8]. By injecting eserine sulphate subcutaneously for two days (0.5 mg/kg in the morning and 1.0 mg/kg in the evening), the gland was exposed to increased concentrations of endogenous acetylcholine. 24 h after the last injection the responsiveness of the gland was estimated, and again repeatedly during the following days. Eserine treatment was found to lower the sensitivity of the gland, as shown in the Figure. This was the case in a normally innervated gland, and also in a gland previously decentralized by section of the chorda. When the treatment with eserine was discontinued, the sensitivity gradually rose again.



Responses (drops of saliva as ordinates) of the submaxillary glands of a cat to 5 μg/kg adrenaline, given intracardially on four different occasions (abscissa: time in days). Lower line: normal gland. Upper line: contralateral gland, decentralized three weeks earlier by section of the chorda-lingual nerve. The rectangle demonstrates the time of treatment with eserine, as described in the text.

The acetylcholine preserved by the eserine probably originated from the gland, leaking from the postganglionic endings and, in the case of the normal gland, also liberated by the secretory impulse. It cannot be excluded, however, that in the presence of eserine some acetylcholine reached the gland from extraglandular sources by way of the blood stream.

The experiments support the view that the concentration of acetylcholine in contact with the effector cells determines the responsiveness of these cells; even the so-called 'normal' level of sensitivity is variable and dependent on the amounts of acetylcholine acting on the cells.

Zusammenfassung. Bei der Katze wird die Empfindlichkeit der Submaxillarisdrüse gegenüber chemischen Reizen verringert, wenn während zwei Tagen subkutane Eserininjektionen verabreicht werden. Damit ist bewiesen, dass das Empfindlichkeitsniveau der Drüse von der Acetylcholinkonzentration abhängig ist.

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