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**Zur Wirkung des Juvenilhormons:
Elektrophysiologische Messungen an der
Zellmembran der Speicheldrüse von
Galleria mellonella**

ABHANDLUNG

zur Erlangung der Würde eines Doktors der Naturwissenschaften

der

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ZUR WIRKUNG DES JUVENILHORMONS: ELEKTRO- PHYSIOLOGISCHE MESSUNGEN AN DER ZELLMEMBRAN DER SPEICHELDRÜSE VON *GALLERIA MELLONELLA**

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Abstract—Experiments were carried out on the salivary gland cell membrane of the wax moth *Galleria mellonella*. The dependence of its resting potential on the ionic composition of the extracellular medium was investigated. The results for a sodium-free medium were compared with the potassium equilibrium potential, and those for a sodium-containing medium compared with calculated values according to the electrical membrane scheme of HODGKIN and HUXLEY (1952), but ignoring the chloride current. This comparison allows for a relatively high sodium permeability of the membrane. In a second approach the experimental results were compared with calculated values derived from the constant field theory (GOLDMAN, 1943) according to HODGKIN and KATZ (1949). This formula includes the chloride ion flow. The relationship of the permeability coefficients $P_K-P_{Na}-P_{Cl} = 1 : 0.175 : 0.35$ was found empirically to be the best means of expressing the experimental results. Then the effects of the following substances on this membrane were investigated: (a) oil extracted by ether from the abdomens of male *Hyalophora cecropia* moths, (b) a similar extract from allatectomized moths, used as a control, (c) three compounds with high juvenile hormone activity (dodecyl methyl ether, farnesyl methyl ether, farnesyl diethylamine), and (d) a commercial preparation of only slightly active farnesol, used as a control. The measurements taken with a registering intracellular electrode showed that the substances which were active in the biological test also had a depolarizing effect on the cell membrane. This was in contrast to the control substances, which were only slightly active or inactive in the test and did not influence the resting potential. With a second intracellular polarizing electrode it could be shown in the case of the hormone-active oil that the primary effect of the hormone is to raise the conductivity of the membrane, causing it to be strongly depolarized. It was also shown that the membrane had an outward-going rectification. The physiological meaning of the changes in membrane properties under hormone influence is still unknown.

EINLEITUNG

DAS HOLOMETABOLE Insekt entwickelt sich über eine Reihe von Larvenstadien und ein Puppenstadium zur Imago, wobei beim Übergang von einem Stadium zum

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