INFLUENCE OF THE "DIRECT" HEMOLYTIC FACTOR OF SNAKE VENOM ON THE PERMEABILITY OF BIMOLECULAR PHOSPHOLIPID MEMBRANES

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The hemolytic effect of cobra venom is due to the action on erythrocyte membranes of the "direct" hemolytic factor (DHF) and phospholipase A [1]. These substances have been isolated in the pure form from the venom of the Central Asian cobra [2]. The structure of DHF includes a high proportion of hydrophobic and positively charged diamino monocarboxylic amino acids, which impart alkaline properties to it [3]. It has been established that DHF is surface-active and increases the permeability of biological and artificial bimolecular membranes.

In the present work we have investigated how the pH of the medium affects the interaction of DHF with artificial bimolecular membranes (ABMs). In addition, information is given on the investigation and analysis of the permeability of ABMs caused by DHF in the presence of various ions.

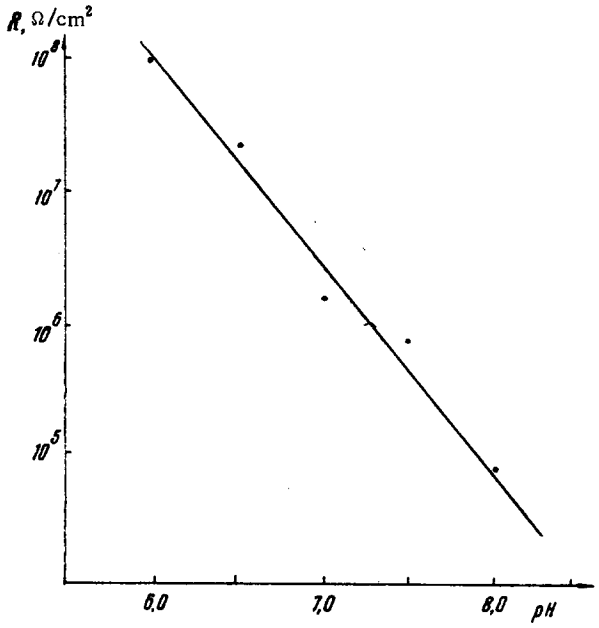

Fig. 1. Action of DHF on an ABM as a function of the pH of the medium (medium: tris-hydrochloride buffer, 0.005 M. DHF – $1 \cdot 10^{-6}$ M).

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The artificial bimolecular membranes were prepared from phospholipids isolated from human erythrocytes [4]. In a cell containing 0.005 M tris-hydrochloride buffer, DHF was introduced on both sides of the membrane in a concentration of 10^{-6} M. It was found that with an increase from both sides of the absolute value of the pH of the buffer solution (6.0-8.0) the permeability of the ABM rose by more than three orders of magnitude (Fig. 1). With a rise in the pH, the ionization of the phosphate groups of the acidic phospholipids apparently increases, which leads to the binding of the positively charged DHF with the membrane.

On measuring the trans-membrane potential in various ionic media (K^+, Na^+, Li^+, Ca^+, Mg^{2+}, Cl^-, SO_4^{2-} in concentrations of $5 \cdot 10^{-1}$ to $5 \cdot 10^{-3}$ M) it was found that DHF induces permeability only for univalent cations, while the permeability for H^+ is substantially smaller than for univalent alkali-metal cations. The permeability for all the cations investigated in the presence of DHF rises with an increase in the pH of the medium.

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