

МАТЕРИАЛЫ КОНФЕРЕНЦИИ
И ШКОЛЫACTIVATION OF IP3 RECEPTORS IS A COMPONENT
OF PHOTOTRANSDUCTION IN GASTROPODS RETINA© 2020 г. V. V. Zhukov^{1,*} and M. V. Saphonov¹¹ Immanuel Kant Baltic Federal University, Kaliningrad, Russia

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The bulk of information on the molecular mechanisms of light signal conversion in photoreceptors has so far been obtained in studies of eye of insects and vertebrates, as well as bivalves. Studies in this direction of gastropods, representing the most numerous class of Mollusca, have not been conducted yet.

In the present research, a pharmacological analysis of the light reactions of the retina of the freshwater mollusc *Lymnaea stagnalis* and the land snail *Achatina fulica*

was carried out. The effect of the substances influencing the inositol-3-phosphate and guanylate cyclase signaling pathways on the amplitude of the slow wave of the electroretinogram (ERG) of the isolated eye was studied. For analysis, the following substances were selected: 1) 2-aminoethyl diphenyl borate (2-APB, IP3 receptor blocker, activation of which is a component of phototransduction in rhabdomeric photoreceptors of flies); 2) (+)-cis-diltiazem hydrochloride (DTZ, blocker of CNG channels, the control of which is a link in phototransduction in vertebral ciliary receptors); 3) methylene blue (MB) as a guanylate cyclase inhibitor. The substances were introduced into physiological saline to a concentration of 10^{-5} – 10^{-4} M.

The studies were carried out in the range of LED flash durations ($\lambda_{\max} = 525$ nm) from 1 ms to 1.5 s. The results are presented in the form of a histogram for the duration of the light stimulus of 500 ms, in response to which the ERG reaches a value close to the maximum for a given light intensity. In molluscs of both species, only 2-ADB caused statistically significant changes in the ERG amplitude in response to light flash with duration more than 1 ms. The obtained suppression of the ERG amplitude was reversible and disappeared several hours after the restoration of the initial saline solution. On the contrary, DTZ and MS up to 10^{-4} M did not have a significant effect on ERG.

It is supposed that the inositol-3-phosphate phototransduction pathway is realized in the photoreceptors of the retina of the studied molluscs.

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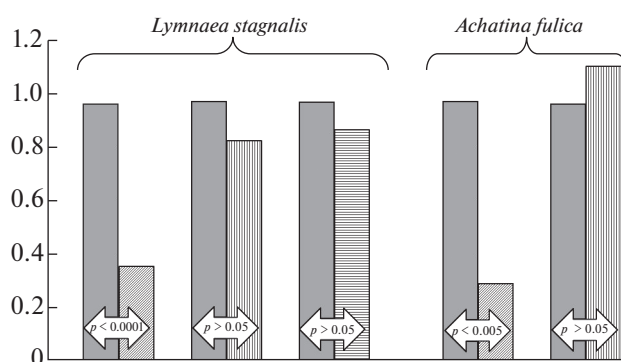


Fig. 1. Effects of pharmacological drugs (10^{-5} M) on the electroretinogram of isolated mollusc eyes. Filling the columns: solid – physiological saline; lines: oblique – 2-aminoethyl diphenyl borate; vertical – (+) – cis-diltiazem hydrochloride; horizontal – methylene blue. Parameters of stimulation: $\lambda_{\max} = 525$ nm, light flash duration – 500 ms. The height of the columns is the average values of the ERG amplitudes normalized to the maximum recorded in physiological saline in this experiment ($n = 10$). The probability of the absence of differences (ANOVA test, control/drug) is indicated on the arrows.