
МАТЕРИАЛЫ КОНФЕРЕНЦИИ
И ШКОЛЫ

**DARK ADAPTATION IN THE EYES OF LAKE AND SEA POPULATIONS
OF MYSID RELICTA SHRIMP: DYNAMICS OF CHANGES IN THE ISOMERIC
COMPOSITION OF RETINALS, RETINOLS, AND RETINAL ESTERS**

© 2020 г. T. Feldman^{1,2}, M. Yakovleva^{1,*}, M. Lindström⁴,
M. Viljanen³, K. Donner³, and M. Ostrovsky^{1,2}

¹ *Institute of Biochemical Physics, RAS, Moscow, Russia*

² *Lomonosov Moscow State University, Moscow, Russia*

³ *Molecular and Integrative Biosciences Research Program, Faculty of Biological and Environmental Sciences,
University of Helsinki, Helsinki, Finland*

⁴ *Tvärminne Zoological Station, Faculty of Biological and Environmental Sciences, University of Helsinki, Helsinki, Finland*

*e-mail: lina.invers@gmail.com

DOI: 10.31857/S0044452920071717

The object of the study was shrimp of the genus *Mysid* (*Mysis*; *Mysida*, Crustacea), namely, *Mysis relicta*. About 10 000 years ago, shrimps of this species were isolated from each other in various Arctic aquatic environments, which include a transparent, fairly well-lit, salty marine environment, and a cloudy, almost dark, brackish freshwater environment, resulting in the formation of marine and lacustrine populations. A comparative study of the mechanisms of visual pigment regeneration during dark adaptation was carried out in the eyes of shrimps *Mysis relicta* of marine and lacustrine populations previously adapted to light. The dynamics of changes in the isomeric composition of the retinal chromophore, its precursor retinol and retinyl esters after irradiation and during dark adaptation was studied by HPLC. It was shown that as a result of irradiation, the content of 11-cis retinal decreases many times (11–18 times), while the amount of all-trans-retinal changes slightly (1.5 times). It is assumed that the all-trans-reti-

nal resulting from the photoisomerization of 11-cis retinal is rapidly reduced to retinol, similar to how it occurs in the visual cycle of vertebrates. In addition, during irradiation, there is a sharp increase in the content of all-trans-retinyl esters, which during the dark adaptation turn into the form of 11-cis retinyl esters, which are the precursors (source) of 11-cis retinal, necessary for the regeneration of rhodopsin in the dark. At the same time, the efficiency of the rhodopsin photoregeneration process in these shrimps is very low. Based on the results obtained, it can be assumed that the main way of visual pigment regeneration in *Mysis relicta* shrimp is the dark regeneration process, i.e., mainly synthesis of rhodopsin de novo molecules in their photoreceptor cells (rhabdomy) takes place, and not the process of photoregeneration.

Supported by RFBR 18-54-11002.