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POSTER ABSTRACT PRESENTATIONS

SESSION TITLE: STRUCTURE OF MEMBRANE PROTEINS

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Abstract P-8: Properties of Light-Driven Proton Pump from *Exiguobacterium sibiricum* with Amphipathic Polymers

Anatolii E. Mikhailov[1], Pavel K. Kuzmichev[1], Lada E. Petrovskaya[2], Dmitro V. Soloviov[1,3], Vladimir V. Chupin[1]

[1]Research Center for Molecular Mechanisms of Aging and Age-Related Diseases, Moscow Institute of Physics and Technology (National Research University), Dolgoprudnyi, Moscow Region, Russia; [2]M. M. Shemyakin–Yu. A. Ovchinnikov Institute of Bioorganic Chemistry, Russian Academy of Sciences, Moscow, Russia; [3]Joint Institute for Nuclear Research, Dubna, Moscow Region, Russia

Background: Rhodopsins are chromoproteins, which contain retinal, with various necessary functions for energy or photoreception of a cell. Many homologues of rhodopsins were found in the microorganisms of different taxa. Siberian permafrost is a unique biological community, unifying microorganisms adapted to long-term frosts, high osmolarity and lack of light. *Exiguobacterium sibiricum* is one of the microorganisms that can withstand a wide range of growth conditions. For a long time, the possible role of the found rhodopsin remained unclear in adaptation to extreme environmental conditions.

Methods: In this work, we studied complexes of rhodopsin ESR (*Exiguobacterium sibiricum* rhodopsin - ESR) solubilized in amphipathic polymers (amphipols) A8-35 and PMAL-C12. ESR was expressed in *E. coli*, purified and inserted in amphipols by standard protocols. The complexes were characterized using the dynamic light scattering method and flash-photolysis, which was the author's designed device for measuring photocycles.

Results: Diameters were 4.8 and 5.4 nanometers, all samples were monodisperse and stable for long period. This size indicates the monomericity of the protein. The photocycle of ESR in amphipols was about 150 milliseconds, which was 1.5 times longer than the photocycle of ESR in DDM micelles. This difference could be accounted for by decreasing the conformational mobility of rhodopsin solubilized with into amphipols, rather than detergent micelles.

Conclusion: According to this study, the amphipols is a good membrane mimetic for ESR. The protein is stable and functionally active as a light-driven proton pump, which makes it a good candidate for an optogenetic tool. This method could be used for other retinal proteins and lead to the understanding of the physiological necessity of rhodopsin ESR expression by the microorganism *E. sibiricum*.

Key Words: bacteriorhodopsin • amphipol • photocycle • proton transport

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