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CULTIVATION OF HALOPHILIC ARCHAEA HALOBACTERIUM SALINARUM.

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Halobacterium salinarum is a rod-shaped motile extremely halophilic archaea, capable of living in saturated salt solutions. It is believed to be extremophile as its natural habitat is characterized by extreme UV radiation and inconsistent nutritional conditions. Although *Halobacterium salinarum* is an aerobic chemoorganotroph, it can also survive in anaerobic conditions by utilizing light energy. It becomes feasible due to the large amount of bacteriorhodopsin (BR), which transduces light energy to generate proton gradient for ATP synthesis, in their membranes (Eichler, 2023). Bacteriorhodopsin is known to form 2-dimensional clusters in the native membrane; such membrane fraction carrying BR is called purple membranes (PMs). PMs isolated from *Halobacterium salinarum* features BR:lipid weight ratio up to 4:1 (Oesterhelt & Stoeckenius, 1974). The other native membrane fraction is red membranes, rich with caronenoid bacterioruberin.

Cultivation of *Halobacterium salinarum* has a significant value both for scientific and practical applications: biomass with anti-oxidative and radio protective properties can be used as dietary additives, cosmetic bioactive compounds and others; BR is a promising material for information storage systems, optical switches, ultra-speed light detectors, etc. (Kalenov et al., 2016). Moreover, PMs are used as a model object for membrane proteins crystallization optimization, e. g. for investigation of morphological transformations in crystallization matrix and mechanisms of membrane fusion (Bogorodskiy et al., 2015; Murugova et al., 2022).

As long as PMs are of interest to our further research, in this work we investigated the influence of growth conditions on the resulting purple/red membranes ratio in two different *Hbt. salinarum* strains. First of the used strains was SGS (Kalenov et al., 2016), the second –S9. The used protocol of cultivation in flasks with minor changes (Kalenov et al., 2016) implies the addition of adsorbents, such as activated charcoal, to the growth medium. *Hbt. salinarum* were grown at +42℃ in the presence of light. In this study we compared cultivation of both strains with and without charcoal in the medium in terms of the biomass colour. While other conditions were the same, in the presence of charcoal SGS strain had purple colour, S9 strain –reddish; in the absence of charcoal both strains were reddish.

Activated charcoal has a positive effect on BR synthesis as it adsorbs metabolites, inhibiting cell growth, and products of oxidative stress, inducing carotenoid synthesis. As a result, it helps to obtain a larger amount of cells that express less carotenoids, therefore, purple/red membranes ratio increases. Our investigation shows, that in case of S9 strain such approach does not allow to achieve prevalence of PM fraction, though in case of SGS strain it is effective.

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