**Oral Presentation**

**Construction of bio-inspired algal-bacterial consortium capable of phosphorus biosequestration from waste waters**

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Phosphorus is a key biogenic element for the maintenance of biochemical processes, information handling and energy storage, and its availability usually is a limiting factor for the growth of agricultural crops. The efficient alternative to the traditional chemical fertilizers is the one based on the biomass of the microalgae that are capable of phosphorus biosequestration from waste waters. Algal-bacterial consortia are shown to be an efficient and stable tool for waste waters treatment [1]. A perspective way to design such system is the bio-inspired approach, that reconstructs useful features of natural microbial communities in biotechnological process.

The aim of this research is to construct the bio-inspired microbial consortium based on photosynthetic microorganisms with potential ability for luxury phosphorus uptake from waste waters [2]. The consortium was constructed around the core of *Micractinium sp.* microalgae obtained from the polluted area near apatite-nepheline ore mine from the Khibiny deposit phosphorus. The constructed consortium was studied in two types of photobioreactors imitating two different cases of phosphorus pollution: ponds near apatite-nepheline ore mines and municipal waste waters. The bio-uptake time in both systems did not exceed two weeks, which was demonstrated by measuring the residual amounts of phosphate by spectrophotometry and chromatography methods. The intercellular accumulation of phosphorus was confirmed with energy-dispersive X-ray (EDX) spectroscopy. The stability of the constructed consortium was estimated by observing microbial dynamics by combination of 16S *rRNA* metabarcoding and scanning electron microscopy (SEM). The results indicated the formation of algal-bacterial consortia capable of efficient phosphorus uptake from waste waters during the long period.

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1. Novoveská L., Zapata A.K., Zabolotney J.B., Atwood M.C. and Sundstrom E.R. Optimizing microalgae cultivation and wastewater treatment in large-scale offshore photobioreactors. Algal research. 2016, 18 86-94.
2. Solovchenko A.E., Ismagulova T.T., Lukyanov A.A., Vasilieva S.G., Konyukhov I.V., Pogosyan S.I., Lobakova E.S. and Gorelova O.A. Luxury phosphorus uptake in microalgae. Journal of Applied Phycology. 2019, 31(5) 2755-2770.