

## General chemical characteristics of polysaccharides and amino acids of cyanobacterium *Nostoc commune* Vauch. from the Arctic latitudes

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### Abstract

The general chemical characteristics of the polysaccharides and amino acids extracted from the biomass of the cyanobacterium *Nostoc commune* collected at high latitudes on the soil surface in the Svalbard archipelago were studied. The strain of *N. commune* (SYKOA C-021-11) selected from field material is contained in the collection of microalgae and cyanobacteria of Institute of Biology of Komi SC UB RAS (<http://ib.komisc.ru/sykoa>). Using HPLC and GLC, the molecular weights, qualitative and quantitative composition of neutral monosaccharides in the water- and alkali-soluble fractions of polysaccharides of *N. commune* were determined. The content of glycuronic acids in the fractions of polysaccharides is determined by reaction with 3,5-dimethylphenol in the presence of the concentrated H<sub>2</sub>SO<sub>4</sub>, protein content – by the Lowry method. It is shown that the polysaccharides extracted by 2% NaOH have a higher molecular weight (514.4 kDa) in comparison with the polysaccharides extracted by hot water (155.3 kDa). The neutral monosaccharides xylose, galactose and glucose in the polysaccharide composition of *N. commune* is dominated. It is established that the content of glycuronic acids in water and alkaline polysaccharide fractions of *N. commune* is respectively 9.8 and 13.7%, protein content – 7.8 and 18.2%. Total nitrogen was determined by gas chromatography, amino acid composition of protein in colonies of cyanobacterium that live in the Arctic latitudes, were studied using liquid chromatography on the amino acid analyzer. The studied cyanobacterium is rich in protein, the mass fraction of crude protein is in the range of 14.7 to 23.8%, which is close to the values obtained for the other species of the genus *Nostoc*. For *N. commune* found a relatively high content of total nitrogen (3.066%) which is associated with the capacity for nitrogen fixation, while the *Nostoc* is one of the most effective types of cyanobacteria fixing molecular nitrogen. The content of amino acids in the studied colonies of *Nostoc* is in the range of 10.5 to 19.3 g per 100 g of dry matter. The highest concentration was observed in the following amino acids: aspartic acid, glutamic acid, threonine, leucine and alanine. The proteins investigated cyanobacterium least contains the amino acid histidine.