

## NITRITE-IONS OXIDATION BY PHOTOTROPHIC PURPLE SULFUR BACTERIA *THIOCAPSA* SP. YA-2003 UNDER THE INFLUENCE OF INORGANIC POLLUTANTS

**Papska T, Zvir H, Moroz O.**

Ivan Franko National University of Lviv,  
Department of microbiology  
e-mail: [tanya-16-08@meta.ua](mailto:tanya-16-08@meta.ua)

It was established that the addition of hydro- and dihydrophosphate, chloride, cyanide, and sulfate ions to the cultivation medium inhibited biomass accumulation and nitrite ions oxidation by phototrophic purple sulfur bacteria *Thiocapsa* sp. Ya-2003, isolated from Yavorivske Lake. The ability of the studied microorganisms to oxidize nitrite ions and to use nitrate ions indicates the significant impact of purple non-sulfur bacteria in the nitrogen biogeochemical cycle.

Phototrophic sulfur bacteria in the clarified anaerobic zone of reservoirs carry out the anoxygenic photosynthesis using the reduced compounds of sulfur, carbon, nitrogen, in particular,  $\text{NO}_2^-$  as electron donors. Inorganic chemical pollutants change the biological processes of environmental purification, but their impact on the physiological properties of photosynthetic sulfur bacteria is not well known. The effect of the most common inorganic pollutants on the oxidation of nitrites by phototrophic purple sulfur bacteria isolated from Yavorivske Lake was studied.

The bacteria *Thiocapsa* sp. Ya-2003 was cultivated anaerobically in Van Nile medium with  $\text{NaNO}_2$  (4.2 mm) for 10 days. Bacteria were inoculated into tubes (0.1 g/l inoculum), grown in a medium with  $\text{K}_2\text{HPO}_4$ ,  $\text{KH}_2\text{PO}_4$ , KCN, NaCl or  $\text{Na}_2\text{SO}_4$  at threshold limit value (TLV) and concentrations that differed from the TLV in 0.5; 2.0; 3.0; 4.0 times (control - medium without pollutants). After 10 days of growth, the concentration of biomass, nitrite and nitrate ions were determined by photoelectrocolorimetric method.

It was found that  $\text{HPO}_4^{2-}$ ,  $\text{H}_2\text{PO}_4^-$ ,  $\text{CN}^-$ ,  $\text{Cl}^-$ , and  $\text{SO}_4^{2-}$  influences negatively on biomass production. The lowest biomass (0.9 g/l) bacteria accumulated on the tenth day of growth in a medium with 10.416-20.832 mM  $\text{H}_2\text{SO}_4^{2-}$ . The largest biomass (1.9 g/l) bacteria stored in a medium with 0.074-0.148 mM  $\text{H}_2\text{SO}_4^{2-}$ . Nitrite using decreased as the concentration of inorganic toxicants in the bacterial culture medium increased.  $\text{HPO}_4^{2-}$ ,  $\text{H}_2\text{PO}_4^-$ ,  $\text{CN}^-$ ,  $\text{Cl}^-$ , and  $\text{SO}_4^{2-}$  have been shown to cause a 3–9% increase of  $\text{NO}_2^-$  concentration in the medium at concentrations higher than TLV 4-fold. Probably, the deceleration of nitrite ions oxidation by bacteria at high concentrations of inorganic pollutants in the medium is the result of the inhibition of photosynthetic and growing processes under these conditions. It was established that nitrate ions were accumulated in the medium as a result of oxidation of nitrite ions by bacteria. TLV of  $\text{CN}^-$  (0.0019 mm) in the culture medium of *Thiocapsa* sp. Ya-2003 inhibited nitrite oxidation in 1.5 times. The lowest nitrate concentration (0.27 mM) bacteria accumulated with 39,436 mM NaCl. Therefore, inorganic toxicants have been shown to inhibit the growth of *Thiocapsa* sp. Ya-2003.