

Chemosynthesis: a history of innovation

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Conflict of interest: none

BACKGROUND. Despite the fact that the process of chemosynthesis has been known for more than a hundred years, its significance and importance are still relevant today in the transformation of chemical elements in biogeochemical cycles. Today, the vital processes of nitrifying bacteria, which lead to the oxidation of ammonia to nitric acid, require scientific substantiation and additional research. The ability of bacteria to convert inorganic substances into organic ones suggests that chemosynthetics can accumulate valuable resources for human needs.

OBJECTIVE. To analyze the history of the discovery of chemosynthesis and identify the main ways of its implementation in innovative technologies.

MATERIALS AND METHODS. Generalization, analysis and synthesis of thematic scientific publications.

RESULTS AND DISCUSSION. The article presents the history of the discovery of the process of chemosynthesis and its author Serhiy Winogradsky. Peculiarities and conditions of transformation of chemical elements in biogeochemical cycles are given. The main directions of scientific research are the analysis of the peculiarities of the process of chemosynthesis, the reasons for their occurrence, as well as the definition of the main possibilities of chemosynthesis in innovative technologies. The relevance of chemosynthesis in life processes and innovative technologies of today is confirmed.

CONCLUSIONS. Chemosynthetic communities in different environments are important biological systems in terms of their ecology, evolution and biogeography, as well as their potential as indicators of the availability of permanent hydrocarbon-based energy sources. In the process of chemosynthesis, bacteria produce organic matter where photosynthesis is impossible. Isolation of thermophilic sulfate-reducing bacteria *Thermodesulfovibrio yellowstonii* and other types of chemosynthetics provides prospects for further research. Thus, the importance of chemosynthesis remains relevant for use in innovative technologies, conservation of ecosystems, human life in general. The role of Serhiy Winogradsky in discovering the phenomenon of chemosynthesis is underestimated and needs further research and popularization.

KEY WORDS: chemosynthesis, microorganisms, biogeochemical cycle, hemophthora, Serhiy Winogradsky, oxidation, innovation.