

Scientists from Krasnoyarsk have identified a new strain of acetic acid bacteria

Scientists of the Siberian Federal University and scientists of the Institute of Biophysics of the Siberian Branch of the Russian Academy of Sciences deduced and described a strain of acetic acid bacteria which are capable of producing bacterial cellulose.



An acetic acid bacterium exists in different forms in nature. There are some ways to get bacteria from nectar flowers or fermented fruits. Due to this feature, the product of alcoholic fermentation is the traditional nutrient medium for them. An acetic acid bacterium receives energy, oxidizing monohydric alcohol ethanol to acetic acid. Having a stick-like shape, the bacteria are quite mobile, and the growth of bacteria can be determined by the layer which is formed on the surface of the substrate.

A new strain of bacteria was isolated in a pure culture from a natural source that is known as "tea mushroom" (*Medusomyces gisevi*), in which different types of acetic acid bacteria are found.

This strain is more productive in comparison with analogues, which were distinguished earlier by foreign and Russian scientists. By synthesizing a large amount of cellulose in a standard and modified environment, it can grow on different carbon sources. It is not limited to substrates containing glucose and ethanol.

The scientists have studied the effect of conditions (carbon sources, temperature and pH) of growing the strain on production and the properties of the produced bacterial cellulose carefully.

"Glucose is the best substrate for obtaining bacterial cellulose from the spectrum of sugars; ethanol at a concentration of 3 % (w / v) stimulates the synthesis of cellulose. The maximum production (up to 17.0 g / l) was obtained by surface static cultivation of the strain for 7 days at pH 3.9 on a modified environment with ethanol additives with a minimum layer of environment", says the paper published in the journal Biology.



Ivan Shidlovsky, a graduate student of the Institute of Fundamental Biology and Biotechnology of SibFU, commented on his research: *"Bacterial cellulose which is produced by the bacterial strain can help in the treatment of many diseases. It is able to save a person with large area lesions and trophic ulcers, or can be used as a bandage in the treatment of abdominal hernia, as well as for controlled delivery of drugs. There are many ways to use this material, so I think that our work is promising."*

The deduced strain of bacteria has showed high results of cellulose synthesis. The scope of the material is really wide: chemical (wood pulp is used), paper, food, textile, and, undoubtedly, medicine. Bacterial cellulose (unlike vegetative) does not contain pollutants: lignin, accumulating on the stiff walls of plant cells, and vegetable carbohydrates of various structures, from which it is difficult to clean the necessary

substance. Environmental friendliness and safety allows using bacterial cellulose in biomedicine for the production of wound coverings, blood vessel prostheses and bone grafts.

"Due to the high biological compatibility of bacterial cellulose with animal cells, it can be used as a substrate for the cultivation of fibroblasts, osteoblasts, keratinocytes and it is possible to use the resulting tissue engineering designs to restore skin, organs and tissues," notes Dr. of Biological Sciences, Professor of the Basic Biotechnology Department **Svetlana Prudnikova**.



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