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BIOLOGICAL PROPERTIES OF BACTERIA OF THE GENUS *BACILLUS* –
AROMATIC COMPOUNDS DESTRUCTORS

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Introduction

Pollution of the environment with aromatic hydrocarbons is a worldwide problem. In the process of destroying phenols in the environment, microorganisms play a major role. Microbiological detoxification of aromatic compounds is one of the most promising methods of environmental purification, during which the aromatic ring cleaves and the formation of non-toxic compounds, carbon dioxide and water occurs. Bacteria of the genus *Bacillus* are widespread in soils and reservoirs, play an important role in the processes of mineralization of organic compounds.

The aim of the work is to study biological properties of bacteria of the genus *Bacillus* - aromatic compounds destroyers

Materials and methods

The experimental part of the work was performed at the Scientific and Training Biotechnological Center of the Odesa Mechnykov University . The material for the study was strain *B. Megaterium* ONU 330, isolated from seawater. In this work, the classical bacteriological methods were used. The investigation of phenol-destructive activity was carried out at temperature of 18 and 30 ° C on a liquid mineral medium of M 9 of the following composition: Na₂HPO₄- 6.78 g / L, KH₂PO₄- 3 g / l, NH₄Cl-1 g / l, NaCl- 0.5 g / l with a concentration of phenol 300 mg / l. A photometric method using 4-amino-antipyrine (at a wavelength of 540 nm) was used to determine the residual concentration of phenol.

The results of research

As a result of the research, it was found that strain *B. megaterium*, isolated from seawater, is represented by Gram-positive long rods with rounded ends of the size of 0.629 x 1050 micrometers. In smears, cells are combined into small chains (2-3 cells) with an average length of about 3.5 micrometers, the spore is located in the middle of the cell. The cultural and biochemical properties of the strain are presented in Table 1.

Table 1.

Cultural and biochemical properties of strain *B. megaterium*

The presence	mobility	catalase	lecithinase	hemolysis	mannit	starch	urea	Growth				
								on broth	on milk	on agar	on gelatin	

+	+	-	-	-	-	+	+	clouding of the medium, the film does not form, the precipitate is insignificant	peptonization	colonies of mucous membranes, yellowish white, darken in the presence of tyrosine in the medium	slow funnel-shaped dilution
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The ability of microorganisms to degrade phenol in different temperature regimes has been experimentally confirmed. Degree of degradation of phenol at temperature of 4 ° C throughout the duration of exposure (5 - 40 days) varied from $18.7 \pm 0.1\%$ to $90.0 \pm 2.5\%$ (Table 2).

Table 2.

Phenolic-oxidation activity of strain *B. megaterium* (%)

Strain	t, °C	Exposition, days					
		5	11	18	22	34	40
<i>B. megaterium</i>	30°C	50.6±4.3	75.8±4.9	80.0±5.2	95.0±5.5	100±0	100±0
	18°C	22.4±2	26.7±2.5	53.8±9.8	80.2±4.0	97.0±8.1	100±0
	4°C	18.7±0.1	26.7±1.5	52.4±0.5	73.8±1.3	88.0±1.2	90.0±2.5

At temperature of 18 ° C the increase in destructive activity was recorded to $100 \pm 0\%$.

Conclusions

1. According to the results of the study of biological properties the species belonging to the investigated strain to *B. megaterium* have been confirmed.
2. Strain *B. megaterium* is a destructor of phenol. which exhibits biochemical activity in a wide range of temperatures.

3. The collection culture of *B. megaterium* is resistant to phenolic loading conditions, which allows it to be recommended for application in biotechnologies for water purification from phenol.

Literature

1. *Димитриева Г. Ю. Христофорова Н. К. Дроздовская О. А. Тувелева Е. Е. Димитриев С. М. Шевченко Л. С. Детоксикация фенола микроорганизмами прибрежной зоны моря // Микробиология. – 1999. – Т. 68. № 1. – С. 107-113.*
2. *Плотникова. Е. Г. Алтынцева О. В., Кошелева И. А и др. Бактерии – деструкторы полициклических ароматических углеводов, выделенные из почв и донных отложений района солеразработки // Микробиология. – 2001. – Т. 70. № 1. – С. 61-69.*
3. *Пиневиц А. У. Микробиология прокариотов. – М.: ГОЭТАР–Медиа. 2008. – 350 с.*
4. *Розанова Е. П. Исследование деструкции углеводов микроорганизмами // Успехи микробиологии. – 1996. – Вып. № 4. – С. 61-74.*

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