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THE PRODUCTION PHENAZINE COMPOUNDS BY SOME STEMS OF *PSEUDOMONAS AERUGINOSA*

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The work was carried out in the Biotechnology Research and Training Center I. I. Mechnikov National University. The various *Pseudomonas* phenazine synthesis intensity and the compound production dependence on the forms of microbial existence were compared.

Key words: *Pseudomonas genus, phenazine-1-carboxylic acid, oxychlororaphine, pyocianine, planktonic culture, biofilm*

One of the most important tasks of modern biotechnology is the creation of highly productive strains of microorganisms capable of super-synthesis biologically active substances [1]. Especially promising for solving the corresponding problems turned out to be bacteria of the genus *Pseudomonas*, which has a natural ability to synthesize more than 300 different antimicrobial substances. The most diverse group of antimicrobial compounds produced by bacteria of the genus *Pseudomonas* constitutes phenazine pigments. Different strains of the bacteria *Pseudomonas* produce oxychlororaphine, blue pigment – pyocyanin and phenasine-1-carboxylic acid [3, 9].

The research was carried out in the Biotechnology Research and Training Center I. I. Mechnikov National University. The work was used *Pseudomonas* strains: *Pseudomonas chlororaphis* ONU 305, *P. fluorescens* (ONU 303, 13225 ATCC) and *P. aeruginosa* (ATCC 9027, ATCC 15692). Cultivation of bacteria was performed in liquid culture medium King B a duration of 8 days at 37 °C in the first

variant, experiments were carried out on the swing to obtain planktonic cultures, and the second in the wells of polystyrene tablet for the formation of their biofilm [5, 6].

Researches have shown that phenazine-1-carboxylic acid, which is the precursor of all other derivatives of the phenazine pigments, is synthesized by all used *Pseudomonas* strains [8]. The cells of the studied microorganisms during the transition from the exponential to the stationary phase of development produced the highest number of phenazine compounds.

As for oxychlororaphine, it was found that it is synthesized in large quantities in the absence of oxygen. The highest rates were found in strains *P. chlororaphis* ONU 305 and *P. aeruginosa* ATCC 15692 in biofilm. The highest rates of the amount of compounds formed by the strains *P. fluorescens* ONU 303, ATCC 13225 and *P. chlororaphis* ONU 305 corresponded to the second (for pyocyanine) and the third (for phenazine-1-carboxylic acid and oxychlororaphine) added.

The bacteria, which present in the biofilm, produced more intensively the corresponding metabolite in comparison with the planktonic way of existence. During the formation of biofilm, the studied strains formed, on average, 1.5 to 15 times more than phenazine-1-carboxylic acid and oxychlororaphine, than planktonic cultures. In the case of the synthesis pyocyanine was recorded the opposite trend: the planktonic form of existence of microorganisms more active, 1.3 – 2.7 times more intensively produced is derived [7]. In general, the formation of this metabolite by strains of the *Pseudomonas* that do not belong to the species *P. aeruginosa* is uncommon. Therefore, it was suggested that the investigated strains of *P. fluorescens* ONU 303 and *P. chlororaphis* ONU 305 received a gene responsible for the synthesis pyocyanine, when interacting with other microorganisms; it was isolated from the rhizosphere [4].

Therefore, the study of environmental factors and mechanisms of intercellular interaction, as defined by numerous studies, significantly affects the biosynthesis of phenazine compounds is a very important direction of modern biotechnology [2].

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