

**“BACTERIA OF STREPTOMYCES AND PSEUDOMONAS
GENERA PRODUCING THE ANTIMICROBIAL SUBSTANCES
AND BASED ON THEM PREPARATIONS”**

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Monograph

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«Бактерії родів *Streptomyces* та *Pseudomonas* – продуценти антимікробних речовин та препарати на їх основі». Монографія. – Київ: КПІ ім. Ігоря Сікорського, вид-во «Політехніка», 2021. – 184 с.
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The search and development of new antibiotics remain relevant almost 100 years after penicillin creation. The growth of antimicrobial resistance, the threat of pandemics and accompanying bacterial complications dictate the need to improve and create new effective antimicrobial drugs, using the most modern approaches and molecular genetic methods for these purposes. The monograph under review demonstrates this approach on the example of two large groups of microorganisms – bacteria of the *Streptomyces* genus, successfully studied at the Department of Biotechnology of the KPI, and bacteria of the *Pseudomonas* genus studied at the Antibiotics Department of the IMV NASU for several decades of years.

The first part of the monograph under review is devoted to streptomycetes, a large group of aerobic microorganisms that produce 80% of antibiotics known to date. An interesting review of the modern taxonomy of the genus *Streptomyces* and the formed antimicrobial products, includes not only antibiotics, but also bacteriolytic enzyme complexes. The description of the structure of antibiotics widely used in medicine is accompanied by an analysis of the radicals responsible for the antimicrobial activity, the spectrum, and the mechanism of the antimicrobial action of the compounds under consideration.

The main part of the first part of the monograph is devoted to the results of the study of antimicrobial products, and first of all, bacteriolysins of *S. albus* – the typical species of the genus *Streptomyces*. Lysoenzymes of the selected *S. albus* mutant strains showed high activity against staphylococci,

Pseudomonas aeruginosa and other major causative agents of nosocomial infections.

Among the metabolic products of *S. albus*, antibiotics active against both fungi and bacteria, derivatives of phthalic aldehyde and cyclopolic acid, were found. Based on the work carried out, antiseptics for medical purposes have been created as well as immobilized preparations for veterinary medicine, agriculture, and other areas of the national economy.

The contribution to medicine of bacteria of the genus *Pseudomonas*, the antibiotic substances of which are discussed in the second part of the monograph under review, is much smaller than that of streptomycetes; however, it indicates the possibility of discovering among them of interesting new antibiotic substances unique in their spectrum of action and areas of use. Though many different compounds with a wide variety of structures have been isolated from pseudomonads, the main attention in this work is paid to two objects of study – phenazines and the polyketide antibiotic batumin, isolated from a new species of bacteria described by the authors.

And if for the first object, the task of research was to establish the peculiarities of the structure of the phenazine operon in various species of the genus *Pseudomonas*, to study the biological activity of phenazines and their role in ecology, then the new antibiotic batumin was studied comprehensively both from the point of view of the structure, active centers of the molecule, and the spectrum and mechanism of antimicrobial action, biosynthesis conditions and possibilities

of application in medicine. Of particular interest are the results of the complete sequence of the *P. batumici* genome, which indicate the origin of the region responsible for antibiotic synthesis.

Analyzing the microbial strains and their products both among streptomycetes and pseudomonads, the authors use modern methods and generally similar approaches for genome analysis,

establishing the structure of the formed compounds and elucidating various aspects of their use in biotechnology.

The monograph gives an idea of antibiotics in general and of individual substances currently being investigated, and can be useful for students, teachers and researchers working in the field of biotechnology, as well as medical professionals interested in antibiotic problems.

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