

## PREFACE

doi: <https://doi.org/10.15407/ubj97.05.005>

### BIOCHEMISTRY IS THE LANGUAGE OF LIFE. A CENTURY OF RESEARCH AND DISCOVERY

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A hundred years is not merely a span of time - it is a distance measured by generations of scientists and by the depth of knowledge gained in the constant pursuit of truth. During this period, the world has undergone fundamental transformations - from the first radio broadcasts and the discovery of the DNA structure to artificial intelligence and genome decoding. These changes have inevitably influenced the development of science, particularly biochemistry - a field that today combines molecular precision, interdisciplinarity, and the drive to apply knowledge for the preservation of life.

The century-long history of the Palladin Institute of Biochemistry is the story of how the Ukrainian school of biochemistry has been developed - a school that has harmoniously combined fundamental research with the solution of applied biomedical problems. From the first steps in the study of vitamins, enzymes, lipids, and proteins - to modern investigations of cellular signaling, immunomodulation, neurochemistry, molecular oncology, and biomedical innovations - the Institute's path reflects the evolution of science itself.

This jubilee issue of the *Ukrainian Biochemical Journal* presents review articles from all ten departments of the Institute - each not only summarizes their scientific achievements but also outlines the horizons of the future.

The Department of Neurochemistry, tracing its roots back to 1925, has developed the understanding



of the chemical topography of the nervous system, the mechanisms of neurotransmission, and the molecular basis of the action of neuroactive compounds - from classical studies to modern experiments in space biology.

The research of the Department of Molecular Immunology demonstrates how fundamental science, studying the regulation of the immune system, responds to the challenges of our time - the COVID-19 pandemic and the consequences of war - by developing new approaches to treating post-traumatic stress disorders, dangerous bleeding and promoting wound healing.

The Department of Muscle Biochemistry explores the molecular mechanisms regulating ion transport and the role of calixarenes in the controlled modulation of smooth muscle contractility, combining biochemical insight with mathematical modeling.

Continuing a tradition of studying hemostasis, the Department of Protein Structure and Function develops innovative diagnostic tests and prototypes of next-generation antithrombotic agents.

The Department of Protein Structure and Function continues the tradition of studying hemostasis by developing diagnostic tests against the risk of thrombosis and prototypes of a new generation of antithrombotic agents.

The research conducted by the Department of Chemistry and Biochemistry of Enzymes focuses on uncovering the multifaceted functions of plasmino-

gen/plasmin proteins in homeostasis, inflammation, oncogenesis, regeneration, and vascular biology, providing a basis for the development of personalized medical approaches.

The Department of Cellular Signaling Mechanisms shows how a shift in scale - from individual proteins to the network organization of signaling systems - opens new approaches to understanding oncogenesis and cellular plasticity.

A significant contribution to the development of molecular vitaminology has been made by the Department of Vitamin and Coenzyme Biochemistry, where researchers investigate the neurotropic action of vitamins B<sub>1</sub>, B<sub>3</sub>, and D<sub>3</sub> and their derivatives, which hold potential for preventing neurodegenerative disorders.

The history of the Department of Lipid Biochemistry represents a path from the early hypotheses to the discovery of a new class of compounds, N-acylethanolamines that play a vital role in regulating physiological and pathological processes and open the way for the development of new therapeutic agents for a wide range of diseases.

At the Department of Molecular Biology, researchers explore the molecular mechanisms of glioma growth and the role of hypoxia and endoplasmic reticulum stress in regulating gene expression, offering valuable insights into the pathogenesis of the most aggressive brain tumors.

Finally, the Department of Scientific Information and Innovative Research provides a systematic analysis of the achievements of Nobel laureates, showing how great discoveries shape the course of modern life sciences.

Each of these reviews is not merely a scientific summary; it is a testament to living traditions, continuity of generations, and the tireless pursuit of knowledge. Today, as a century ago, biochemistry remains the science of life in its deepest sense. It reveals the mechanisms that sustain health, resilience, and adaptation, helping humanity to understand itself and the world in which it lives. Biochemistry is a science to which all generations of researchers at the Institute of Biochemistry in Kyiv have devoted their lives - where one of the main priorities has always been the constant rejuvenation of scientific community and the training of young scientists.

Ahead lie new challenges, new technologies, and, without doubt, new discoveries. Yet one thing remains unchanged - our faith in the power of scientific thought and in our calling to serve life. It is this spirit that unites the past, present, and future of the ever-young century-old Palladin Institute of Biochemistry of the National Academy of Sciences of Ukraine.