
INSTITUTE OF MOLECULAR BIOLOGY AND GENETICS
NATIONAL ACADEMY OF SCIENCES OF UKRAINE (NASU)

Administrative staff



Director

Anna V. Elska

Professor (mol.biol.), Dr.Sci. (mol.biol.), Full Member of NASU
Tel: +38 (044) 526-07-49;
Fax: +38 (044) 526-07-59;
E-mail: elskaya@imbg.org.ua



Deputy Director in Scientific Work

Dmytro M. Hovorun

Professor (biophys.), Dr.Sci. (mol.biol.)
Tel: +38 (044) 526-20-14;
Fax: +38 (044) 526-07-59;
E-mail: dhovorun@imbg.org.ua



Deputy Director in Scientific Work

Yaroslav I. Korpan

Ph.D. (biotech.), Senior Staff Scientist
Tel/fax: +38 (044) 522-28-24;
Fax: +38 (044) 526-07-59;
E-mail: korpan@imbg.org.ua



Deputy Director in Common Issues

Valeriy M. Kharchenko

Staff Scientist
Tel: +38 (044) 526-11- 59;
Fax: +38 (044) 526-07-59;
E-mail: kharchenko@imbg.org.ua



Science Manager

Yanina R. Mishchuk

Ph.D. (mol.biol.), Senior Staff Scientist
Tel: +38 (044) 526-11-29;
Fax: +38 (044) 526-07-59;
E-mail: mishchuk@imbg.org.ua

150 Zabolotny Str., Kyiv, 03143, Ukraine
Tel: +38 (044) 526 11 69 (reception), Fax: +38 (044) 526 07 59
www.imbg.org.ua

SCIENTIFIC COUNCIL

Chair

Anna V. Elska, Professor (mol.biol.), Dr.Sci. (mol.biol.), Full Member of NASU

Deputy Chairs

Dmytro M. Hovorun, Professor (biophys.), Dr.Sci. (mol.biol.)

Yaroslav I. Korpan, Ph.D. (biotech.), Senior Staff Scientist

Scientific Secretary

Yanina R. Mishchuk, Ph.D. (mol.biol.), Senior Staff Scientist

Scientific Council Members:

Gennadiy Kh. Matsuka, Professor (mol.biol.), Dr.Sci. (mol.biol.), Full Member of NASU

Vadym M. Kavsan, Professor (mol.biol.), Dr.Sci. (mol.biol.), Corresponding Member of NASU

Vitalii A. Kordium, Professor (mol.genetics), Dr.Sci. (microbiol.),

Corresponding Member of NASU, Full Member of AMSU

Viktor A. Kunakh, Professor (genetics), Dr.Sci. (genetics), Corresponding Member of NASU

Stanislav S. Maliuta, Professor (genetics), Dr.Sci. (genetics), Corresponding Member of NASU

Alla V. Rynditch, Professor (mol.biol.), Dr.Sci. (mol.biol.), Corresponding Member of NASU

Olexander I. Kornelyuk, Professor (mol.biol.), Dr.Sci. (mol.biol.)

Ludmyla A. Livshits, Professor (mol.genetics), Dr.Sci. (mol.genetics)

Olexiy P. Soldatkin, Professor (biotech.), Dr.Sci. (biotech.)

Mykhaylo A. Tukalo, Professor (mol.biol.), Dr.Sci. (mol.biol.)

Olexander P. Solomko, Professor (mol.genetics), Dr.Sci. (mol.genetics)

Eduard A. Kozlov, Professor (mol.biol.), Dr.Sci. (mol.biol.)

Anatoliy D. Shved, Dr.Sci. (mol.biol.), Senior Staff Scientist

Lubov L. Lukash, Dr.Sci. (mol.genetics), Senior Staff Scientist

Boris S. Negrutskii, Dr.Sci. (mol.biol.), Senior Staff Scientist

Sergiy M. Yarmoluk, Dr.Sci. (bioorg.chem.), Senior Staff Scientist

Valeriy V. Filonenko, Dr.Sci. (mol.biol.), Senior Staff Scientist

Anatoliy I. Potopalsky, Ph.D. (med.sci.), Senior Staff Scientist

Valeriy M. Kharchenko, Deputy Director in Common Issues

Iryna A. Tikhonkova, Chair of Young Scientists Council

Vasyl I. Bobyk, Chair of Trade-Union Committee

INTRODUCTION

The Institute of Molecular Biology and Genetics of the National Academy of Sciences of Ukraine (IMBG) was founded in 1973 on the basis of the Sector of Molecular Biology and Genetics of the Academician Zabolotny Institute of Microbiology and Virology of NASU. The Sector was headed by Full Member of NASU Professor Sergiy M. Gershenzon. From 1973 to 2003 the Institute was directed by a well-known scientist Professor Gennadiy Kh. Matsuka, Full Member of NASU, at present the Honourary Director of the Institute. In 2003 Professor Anna V. Elska, Full Member of NASU, became Director of the Institute.

IMBG initiated the collaboration of scientists and specialists in molecular biology, biochemistry, biophysics, microbiology, biotechnology, chemistry, and genetics. Presently its personnel is comprised of 429 employees, including 192 scientists, among them 25 Doctors of Sciences (Dr.Sci.) and 115 Doctors of Philosophy (Ph.D.), 2 Full Members of NASU and 1 Full Member of Academy of Medical Sciences of Ukraine (AMSU), and 5 Corresponding Members of NASU.

Scientific research programme of the Institute is focused on the central trends of molecular biology, genetics and biotechnology:

- structural and functional genomics;
- proteomics and protein engineering;
- regulatory systems and signal transduction mechanisms;
- bioinformatics and computational modelling;
- gene and cell biotechnologies, gene therapy and diagnostics.

Core Competencies:

- genomics;
- proteomics;
- bioinformatics;
- gene and cellular engineering.

Presently 122 young employees (under 35 years old) are working at IMBG and their number is currently growing. Annually more than 20 young researchers take a post-graduate course at IMBG. As a branch of the Biochemistry Department, IMBG provides several courses on molecular biology and genetics for students of Kiev National Taras Shevchenko University.

IMBG actively participates in many national scientific programmes, e.g. "Urgent Measures for Liquidation of the Chernobyl Disaster Consequences"; "Protection of Genetic Fund of the Ukrainian Population"; "Chemical Therapy and Chemical Prophylactics of Viral Infections"; "Sensor Systems and Technologies", "Biotechnology".

For many years the scientists of IMBG have been successfully cooperating with their foreign colleagues from Germany, France, USA, Great Britain, Poland, Italy, Greece, Japan, Russia, Belarus and other countries. They maintain long-term collaboration with leading research laboratories of the world and participate in international projects, supported by INTAS, NATO, INCO-COPERNICUS, Howard Hughes Medical Institute, Wellcome Trust and others.

From 1967 to 1986 IMBG published the Journal of Cytology and Genetics ("Tsitologiya i genetika"), and since 1985 it has been publishing a scientific and theoretical journal "Biopolymers and Cell" in Ukrainian, Russian and English (www.biopolymers.com.ua). In 2004, IMBG began publishing the first Ukrainian scientific electronic journal - Ukrainica Bioorganica Acta (www.bioorganica.org.ua).

In 2002 IMBG created and launched the first version of Web portal in bioinformatics, genomics, structural biology, and molecular medicine as its inner bioinformational resource (www.bioua.org.ua).

SCIENTIFIC DEPARTMENTS

The Institute of Molecular Biology and Genetics is represented by 15 scientific departments and 6 laboratories.

Department of Cell Regulatory Mechanisms

Founded in 1969
Head - Vitalii A. Kordium,
Professor (mol.genetics),
Dr.Sci. (microbiol.),
Corresponding Member of NASU,
Full Member of AMSU

Department of Molecular Genetics

Founded in 1978
Head - Stanislav S. Maliuta,
Professor (genetics),
Dr.Sci. (genetics),
Corresponding Member of NASU

Department of Nucleic Acids Biosynthesis

Founded in 1983
Head - Vadym M. Kavsan,
Professor (mol.biol.),
Dr.Sci. (mol.biol.),
Corresponding Member of NASU

Department of Molecular and Quantum Biophysics

Founded in 1990
Head - Dmytro M. Hovorun,
Professor (biophys.),
Dr.Sci. (mol.biol.), Deputy Director
in Scientific Work

Department of Protein Engineering and Bioinformatics

Founded in 2001
Head - Olexander I. Kornelyuk,
Professor (mol.biol.),
Dr.Sci. (mol.biol.)

Department of Cell Signal Systems

Founded in 1973
Head - Valeriy V. Filonenko,
Dr.Sci. (mol.biol.),
Senior Staff Scientist

Department of Human Genetics

Founded in 1980
Head - Lubov L. Lukash,
Dr.Sci. (mol.genetics),
Senior Staff Scientist

Department of Cell Population Genetics

Founded in 1989
Head - Viktor A. Kunakh,
Professor (genetics),
Dr.Sci. (genetics),
Corresponding Member of NASU

The Department of Functional Genomics

Founded in 1992
Head - Alla V. Rynditch,
Professor (mol.biol.),
Dr.Sci. (mol.biol.),
Corresponding Member of NASU

Department of Human Genomics

Founded in 2002
Head - Ludmyla A. Livshits,
Professor (mol.genetics),
Dr.Sci. (mol.genetics)

Department of Translation of Genetic Information

Founded in 1978
Head - Anna V. Elska,
Professor (mol.biol.),
Dr.Sci. (mol.biol.),
Full Member of NASU

Department of Biochemical Genetics

Founded in 1982
Head - Olexander P. Solomko,
Professor (mol.genetics),
Dr.Sci. (mol.genetics)

Department of Protein Synthesis Enzymology

Founded in 1989
Head - Mykhaylo A. Tukalo,
Professor (mol.biol.),
Dr.Sci. (mol.biol.)

Department of Synthetic Bioregulators

Founded in 1998
Head - Anatoliy D. Shved,
Dr.Sci. (mol.biol.),
Senior Staff Scientist

Department of Combinatorial Chemistry

Founded in 2003
Head - Sergiy M. Yarmoluk,
Dr.Sci. (bioorg.chem.),
Senior Staff Scientist

Department of
Cell Regulatory Mechanisms



Head

Vitalii A. Kordium

Professor (mol.genetics), Dr.Sci. (microbiol.),
Corresponding Member of NASU,
Full Member of AMSU

Tel: +38 (044) 526-55-96; Fax: +38 (044) 526-07-59;
E-mail: kordium@imbg.org.ua

Scientific research programme includes the central themes:

Development of the technology for gene therapy of insulin-dependent pancreatic diabetes and atherosclerosis (Toporova O. K.)
Plant-associated bacteria and their application for plant growth including growth under extraterrestrial conditions (Kozyrovska N. O.)
Stem cells biology (Deryabina O. G.).

Our recent activity:

- Development of the technology of target gene delivery into cells for therapeutic purposes.
- Conceptual investigation on the growing of pioneer plants in the lunar greenhouse with involvement of microbial communities.
- Studies on the mechanism of genetic material transfer between mammalian cells.
- Investigation on the influence of different cells of mice embryo tissues on an adult organism.

Selected publications:

1. Kordium V., Suhorada E., Ruban T., et al. Information conditioning as the mechanism of permanent organism regeneration //Journal of Artificial Organs - 2003. -V.26. №9, P.832.
2. Kordium V., Deryabina O. Stem cells and their therapeutic potential// Cure art. - 2004. - №2. -P.7-9.
3. Kordium V., Sukhorada O., Ruban T., et al. Transfer of genetic information in an organism// Abstracts of I Ukrainian congress for cell biology. Lviv, April 25-28, 2004. -P.146.
4. Kozyrovska N. O., Korniiichuk O. S., Voznyuk T. M., et al. Microbial community in a precursory scenario of growing *Tagetes patula* in a lunar greenhouse //Kosmichna nauka i technologiya.-2004.-10, N5-6.- P. 221-225.
5. Toporova O.K., Novikova S.N., Lihacheva L.I. et al. Non-viral gene delivery of human apoA1 into mammalian cells *in vitro* and *in vivo*// Biopolymers and cell (rus.). -2004.-V.20, №1-2.-P.25-32.
6. Kordium V., Shpylova S., Andrienko V., et al. Genetic conditioning - new system for self-supporting and self-saving of an organism //Journal of Artificial Organs - 2005. - V.28. №4, P.315.

Laboratory of *Modification of Biologically Active Compounds*



Head

Anatoliy I. Potopalsky

Ph.D (med.sci.),

Tel. +38 (044) 526 11 39

Fax +38 (044) 526 07 59

E-mail: potopalsky@imbg.org.ua

www.potopalsky.kiev.ua

Scientific direction:

The development of methods for modification of biologically active substances and the study on the molecular aspects of their action.

Current scientific research:

- The mechanisms of alkylation of amines, nucleic acids and their components by the ethyleneimine derivatives are studied. The products of alkylation were purified and characterized, their biological activity being studied in different systems, and antitumoral, antiviral, and immunomodulating effects were found.
- Novel medications were obtained and the ways of their application in medicine, veterinary, and agriculture for the influence on biological processes have been developed. The preparation Izatizon which has a wide range of antiviral, antitumoral and antibacterial effects, was registered in veterinary for treatment and prevention of viral diseases of birds and agricultural livestock, it was also recommended to cure people of viral diseases and tumors. New medicinal Izatizon forms (e.g. Izatizoniy) are being developed and tested.
- The preparations of stimulators of plants growth are being developed on the basis of nucleic acids and their components. The methods of using native and modified nucleic acids to change the genetic apparatus are being developed. The genetic effects of alkyl DNAs were determined and new forms of rye, millet, and tomatoes with valuable features were obtained. Special kind of feed lupine with high protein content *Industrialnuy* (i.e. industrial) and a kind of pumpkin *Kavbuz Zdorovjaga* (i.e. watermelon/pumpkin, giant) were registered at State sorts register of Ukraine.
- Experimental study on modified products of alkaloids, their analogues and derivatives with wide range of activity is being conducted. The results of these research are used for improvement of human health and environment.
- Prof. A.I. Potopalsky together with former colleagues V.Novytsky (Austria) and M.Oliyovska were nominated to Nobel Prize in medical chemistry in 2004 for the development of antitumoral medications based on celandine alkaloids modification. Amitozyn, antitumoral medication of this kind, passed State clinical testing on the patients with malignant tumors of 3rd and 4th degrees and was recommended to the application in medicine.

Selected publications:

1. Potopalsky A. I., Celadine Preparations in Biology and Medicine, Kyiv, Naukova Dumka, -1992. -200P.
2. Potopalsky A. I., Lozyuk L.V., Antiviral, antitumoral medicine IZATIZON. -Lviv, Naukova Dumka -1995. -P.90.
3. Potopalsky A. I., Yurkevych L.N., May the Third millennium have new plants for health, welfare, beauty, and longevity. - Kyiv, Kolobig - 2005. - P. 168.
4. Potopalsky A. I. The development of phytochemical antitumoral medicine of amitozyn with antiviral and immunomodulating effect is the beginning of new scientific direction of molecular sanitation of humans and the environment//Materials of international scientific and practical forum The Basis of molecular and genetic sanitation of humans and the environment. - Kyiv, - May 31- June 1, -P.163-166.

Department of *Cell Signal Systems*



Head

Valery V. Filonenko

Dr.Sci. (mol.biol.), Senior Staff Scientist

Tel: +38 (044) 526- 20-16, 522-61-00;

Fax: +38 (044) 526-07-59;

E-mail: filonenko@imbg.org.ua

The research programme covers the areas:

Studies on the peculiarities of PI3K/S6K dependent signal transduction pathway in mammalian cells under normal and pathological conditions (malignant transformation of cells).

Identification and characterisation of human tumour-associated antigens using the SEREX analysis (Serologic Identification of Recombinant Expressed Antigens).

Investigation of the molecular mechanism of pathogenesis of dilated cardiomyopathy (DCM) as an autoimmune cardio-specific pathology with mitochondrial dysfunction.

Studies on the properties of common cytoplasmic and mitochondrial molecular chaperons at malignant and non-malignant neoplasms in humans, as well as at autoimmune and autoimmune-dependent pathologies.

Ongoing research projects:

- The peculiarities of two isoforms of ribosomal protein S6 kinase (S6K1 and S6K2) in both normal tissues and malignant tumours (adenocarcinoma of mammary gland of human) are under investigation. The analysis of expression level and the features of subcellular localisation is being performed.
- Identification of novel protein-partners of the components of PI3K/S6K dependent signalling pathway (S6K, PTEN, TSC1/TSC2) using the method of yeast two-hybrid system and the analysis of intermolecular interactions.
- Cloning of CoA synthase gene. Analysis of the interaction between CoA synthase and S6K1.
- Expression and subcellular localisation of molecular chaperons of Hsp60, Hsp70, Hsp90 and Hsp27 at oncological and autoimmune diseases of humans are under examination.
- Monoclonal antibodies for the components of signal pathways and molecular chaperones have been obtained.

Selected publications:

1. Gout I., Minami T., Hara K., et al. Molecular cloning and characterization of a novel p70 S6 kinase, p70 kinase b, containing a prolin-rich region // J.Biol.Chem - 1998. -V.273, N°46. - P.30061-64.
2. Zhyvoloup A., Nemazanyy I., Babich A., et al. Molecular cloning of CoA Synthase. The missing link in CoA biosynthesis // J. Biol. Chem. - 2002. - V.277, N°25. - P.22107-10.
3. Ponomarenko N. A., Durova O. M., Vorobiev I.I., et al. Catalytic antibodies in clinical and experimental pathology: Human and mouse models // J.Immunol.Methods. - 2002. - v.269. - P.197-211.
4. Vigontina O. G., Efimenko O. A., Yakovenko L. F., et al. Chaperon Hsp60 as autoantigen in development of dysghormonal breast diseases // Experimental Oncology. - 2002. - Vol.24, N°2. - P.112-115.
5. Zhyvoloup A., Nemazanyy I., Panasyuk G., et al. Subcellular localization and regulation of coenzyme A synthase // J. Biol. Chem. - 2003. - V.278, N°50. - P.50316-21.
6. Savinska L. O., Lyzogubov V. V., Usenko V. S., et al. Immunohistochemical analysis of S6K1 and S6K2 expression in human breast tumours // Experimental Oncology.-2004.-V.26, N°1. - P.24-30.

Department of

Translation of Genetic Information



Head

Anna V. Elska

Professor (mol.biol.), Dr.Sci. (biol.),
Full Member of NASU, Director of the Institute

Tel: +38 (044) 526-07-49; Fax: +38 (044) 526-07-59;

E-mail: elskaya@imbg.org.ua;

www.elskaya.org.ua

The fundamental research of the Department encompasses:

- The mechanism of protein synthesis and its regulation in higher eukaryotes.
- The development of novel analytical systems, bio- and chemosensors, on the basis of different electrochemical transducers and biological objects or synthetic biomimics.

Laboratory of

Biomolecular Electronics



Head

Olexiy P. Soldatkin

Professor (biotech.), Dr.Sci. (biotech.)

Tel: +38 (044) 526-43-97; Fax: +38 (044) 526-07-59;

E-mail: a_soldatkin@imbg.org.ua;

www.soldatkin.org.ua

The investigation is pursued in the areas:

Scientific and technological aspects of the development of novel analytical systems, bio- and chemosensors, based on the electrochemical or optical transducers and biological material, development of artificial biomimics as sensitive elements.

Current research activities:

- Study on the molecular basis of the interaction of immobilized enzymes with substrates and inhibitors using electrochemical sensors. The core kinetic characteristics of enzymes are being determined.
- Development of the test-systems for the determination of trace concentrations of some toxins, on the basis of electrochemical biosensors. Potentiometric and conductometric enzymatic biosensors have been designed and their laboratory prototypes created for direct or inhibitor analyses of herbicides, pesticides, steroid glycoalkaloids, formaldehyde, heavy metal ions and other substances in food and environment.

- Design of novel microbiosensors for the determination of main metabolites and monitoring some neurotransmitters. Amperometric biosensors have been created for detection: i) glucose, ethyl alcohol and lactic acid *in vitro* (especially, in the Crimean wines), ii) acetylcholine, choline and glutamic acid in the brain of experimental animals.
- Development of the synthetic analogues of biological receptors using the method of molecular imprinting and their application in sensor technology, solid-phase extraction and chromatography. The methods of polymers-biomimics synthesis in the form of thin films and membranes have been elaborated. The polymers-biomimics were used as a basis for development of electrochemical (conductometric, capacitive and amperometric) sensors for detection of triazine herbicides, aminoacids, toxins, etc.
- Development of electrochemical and optical immuno- and DNA-sensors. Conductometric and potentiometric sensors for IgG and recombinant $\alpha 2$ -interferon detection have been designed. The immunosensor devices have been successfully tested in blood serum analysis and cultural media analysis.

Selected publications:

1. Soldatkin A. P., Montoriol J., Sant W., Martelet C., Jaffrezic-Renault N. Creatinine sensitive biosensor based on ISFETs and creatinine deiminase immobilised in BSA membrane//*Talanta*. - 2002. - V. 58, - P. 351-357.
2. Dzyadevych S. V., Soldatkin A. P., Korpan Y. I., Arkhypova V. N., El'skaya A. V., J.-M. Chovelon, Martelet C., Biosensors based on enzyme field effect transistors for determination of some substrates and inhibitors//*Analytical and Bioanalytical Chemistry*.- 2003.- 377.- P. 496-506.
3. Arkhipova V. N., Dzyadevich S. V., Soldatkin A. P., El'skaya A. V., Martelet C., Jaffrezic-Renault N. Development and optimisation of biosensor based on pH-sensitive field effect transistors and cholinesterases for sensitive detection of solanaceous glycoalkaloids//*Biosensors & Bioelectronics*, - 2003. - V. 18, - P. 1047-1053.
4. Soldatkin A. P., Montoriol J., Sant W., C. Martelet, N. Jaffrezic-Renault. A novel urea biosensor with extended dynamic range based on recombinant urease and ISFETs//*Biosensors & Bioelectronics*, - 2003 V. 19. - P. 131-135.
5. Dzyadevych S. V., Arkhypova V. N., Soldatkin A. P., El'skaya A. V., Martelet C., Jaffrezic-Renault N., Enzyme biosensor for tomatine detection in tomatoes//*Analytical Letters*, -2004. V. 37, - No 8, - P. 1611-1624.
6. Arkhypova V. N., Dzyadevych S. V., Soldatkin A. P., Korpan Y. I., El'skaya A. V., J.- M. Gravouelle, Martelet C., Jaffrezic-Renault N., Application of enzyme field effect transistors for fast detection of total glycoalkaloids content in potatoes//*Sensors and Actuators B*, - 2004.- V.103, -P. 416-422.
7. Biloivan O.A., Dzyadevych S.V., Boubriak O.A., Soldatkin A.P., El'skaya A.V. Development of enzyme biosensor based on ISFETs for quantitative analysis of serine proteinases//*Electroanalysis*, - 2004. - V. 16, №22, - P. 1883-1889.
8. Dzyadevych S. V., Arkhypova V. N., Martelet C., Jaffrezic-Renault N., Chovelon J.-M., El'skaya A.V., Soldatkin A. P. Potentiometric biosensors based on ISFETs and immobilised cholinesterases// *Electroanalysis*, - 2004. - V. 16, №22, - P.1873-1882.
9. Soldatkin A. P., Arkhypova V. N., Dzyadevych S. V., El'skaya A. V., Gravouelle J.-M., Jaffrezic-Renault N., Martelet C. Analysis of the potato glycoalkaloids by using of enzyme biosensor based on pH-ISFETs//*Talanta*, - 2005. - V. 66, - P. 28-33.
10. Dzyadevych S. V., Soldatkin A. P., Arkhypova V. N., El'skaya A. V., Chovelon J.-M., Georgiou C., Martelet C., Jaffrezic-Renault N. Early-warning electrochemical biosensor system for the environmental monitoring based on enzyme inhibition effect//*Sensors and Actuators B* - 2005.- 105, -P. 81-87.
11. Schuvailo O. N., Dzyadevych S. V., El'skaya A. V., Gautier-Sauvigne S., Csoregi E., Cespuglio R., Soldatkin A. P., Carbon-fibre-based microbiosensors for *in vivo* measurements of acetylcholine and choline//*Biosensors & Bioelectronics*, - 2005. - V. 21, - P. 87-94.

Laboratory of *Protein Biosynthesis*



Head

Boris S. Negrutskii

Dr.Sci. (mol.biol.), Senior Staff Scientist

Tel: +38 (044) 526-43-97; Fax: +38 (044) 526-07-59;

E-mail: negrutskii@imbg.org.ua

www.negrutskii.org.ua

Current research activities:

The studies are focused on the factors and molecular mechanisms ensuring the high efficiency and accuracy of higher eukaryotic genome expression at the transcription and translation stages.

- I) Analysis of the mechanisms of dynamic compartmentation of protein synthesis apparatus in mammals. Investigation of the role of translation elongation factor 1A (eEF1A) in protein biosynthesis and other processes in mammalian cells.

Recent achievements:

- The concept of vectorial transfer of tRNA during the translation elongation process in mammalian cells has been established.
- The channeling of deacylated tRNA has been found to occur via the formation of non-canonic complexes of eEF1A*GDP with tRNA and aminoacyl-tRNA synthetases.
- The evidence has been found that eEF1A belongs to the family of partially unstructured proteins.
- eEF1A and ribosomes have been found to possess chaperon-like properties which are important for maintaining active conformation of protein components of translation apparatus.

- II) Investigation of the molecular processes involved into the transition of undividable cells to proliferation. Studies on the mechanisms regulating the activity of detoxication system in human placenta.

Recent achievements:

- We have proposed time-scale of regeneration process based on the proliferative activity and cytokine synthesis by both parenchymatic and non-parenchymatic liver cells.
- We were the first to show the involvement of interferon alpha into transition of cells of regenerating liver from "rest" (from proliferation point of view) to active proliferation.
- Efficiency of detoxication in human placenta has been found dependent on the effect that environmental hazards have on mother's organism and on polymorphism type in placenta detoxication genes.

Selected publications:

1. Obolenskaya M. Yu., Schulze-Specking A., Plaumann B., et al. Nitric oxide production by cells isolated from regenerating rat liver//Biochem.Biophys. Res. Comm. - 1994. - V. 204, №3. -P. 1305 -1311.
2. Negrutskii B. S., Budkevich T. V., Shalak V. F., et al. Rabbit translation elongation factor 1 alpha stimulates the activity of homologous aminoacyl-tRNA synthetase//FEBS Lett. -1996.-V.382, -P18-20.
3. Obolenskaya M. Yu. Cytokines and liver regeneration//J. Immunology and Immunopharmacology. - 1997. -V.17, №2. - P. 51 -58.
4. Petrushenko Z. M., Negrutskii B. S., Ladokhin A. S., et al. Evidence for the formation of an unusual ternary complex of rabbit liver EF-1a with GDP and deacylated tRNA//FEBS Lett. -1997. -№407,- P.3-17.
5. Negrutskii B. S., El'skaya A. V. Eukaryotic translation elongation factor 1 alpha: structure, expression, functions, and possible role in aminoacyl-tRNA channeling//Progr. Nucl. Acids Res. Mol. Biol. - 1998, - V. 60. -P. 47 - 78.
6. Negrutskii B. S., Shalak V. F., Kerjan P., et al. Functional interaction of mammalian valyl-tRNA synthetase with elongation factor EF-1A in the complex with EF-1H//J.Biol. Chem. -1999. - V. 274, -P. 4545-4550.
7. Obolenskaya M. Yu., Samoylenko A. A. Does nitric oxide regulate the transduction of TNF signal// J. Immunology and Immunopharmacology. -2000. - V.20, №1. - P. 13-20.
8. Budkevich, T.V., Timchenko, A. A., Tiktopulo, et al. Extended conformation of mammalian translation elongation factor 1A in solution//Biochemistry -2002. - V.41. - P. 15342-15349.
9. Petrushenko Z.M., Budkevich T.V., Shalak V.F., et al. Novel complexes of mammalian translation elongation factor eEF1A*GDP with uncharged tRNA and aminoacyl-tRNA synthetase. Implications for tRNA channeling. Eur//J. Biochem. -2002. -V. 269. -P. 4811-4818.
10. Sergeeva T. A., Piletsky S. A., Piletska E. V., Brovko O. O., Karabanova L. V., Sergeeva L. M., Turner A. P. K., El'skaya A. V. *In situ* formation of porous molecularly imprinted polymer membranes//Macromolecules, - 2003. -V. 36, №19. - P. 7352-7357
11. Lukash T. O., Turkivska H. V., Negrutskii B. S., El'skaya A. V. Chaperone-like activity of mammalian elongation factor eEF1A: renaturation of aminoacyl-tRNA synthetases//Int. J. Biochem. Cell Biol. - 2004. -V. 36. №7. - P. 1341-1347.

Department of
Molecular Genetics



Head

Stanislav S. Maliuta

Professor (genetics), Dr.Sci. (genetics),
Corresponding Member of NASU

Tel: +38 (044) 526-07-29;
Fax: +38 (044) 526-07-59;
E-mail: maliuta@imbg.org.ua
www.maliuta.org.ua

Research mainly concerns:

- Malignant transformations in humans.
- Structural and functional organization of genome.

Our current research projects:

- Studies on chronic myeloid leucaemia (CML) used as a basic model, the elucidation of the transition mechanism from chronic into acute pathology, the elaboration of the methods of molecular diagnostics of CML and acute lymphoblastic leucosis (ALL), the search for the remedies of their prophylaxis and therapy.
- Search for and studies on genes as components of evolutionary and conservative Notch-signal system in *Drosophila* and the modifiers of their activity.
- The physical mapping of plant genome and studies on the fine structural organization of individual chromosomes.

Selected publications:

1. Telegeev, Gennady D., Dubrovska, Anna M., Dybkov, Mykhaylo V. and Maliuta, Stanislav S. Influence of BCR/ABL fusion proteins on the course of Ph leukemias//Acta Biochim. - 2004.- Pol.51, 3. - P. 845-849
2. Kozeretska I. A., Gubenko I. S., Gorb S. Novel unusual miniature-like wing mutation in *Drosophila Viriles*//I. Morphology. -2004.- v.261, -P. 270-275
3. Alkhimova O., Mazurok N., Potapova T., et al. Diverse patterns of the tandem repeats organization in rye chromosomes//Chromosoma, - 2004.- 113, №1, -P. 42-52.

Department of *Human Genetics*



Head

Lubov L. Lukash

Dr.Sci. (mol.genetics), Senior Staff Scientist

Tel: +38 (044) 526- 07-39;

Fax: +38 (044) 526-07-59;

E-mail: lukash@imbg.org.ua

www.lukash.org.ua

Research interest of the Department mainly concerns:

Biological mutagenesis and a role of reparative systems in the renovation of genetic damages in cells of both pro- and eukaryotic origin.

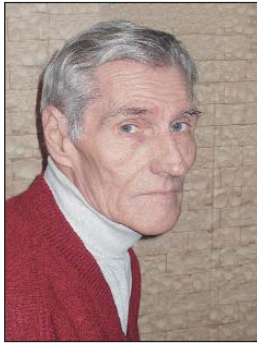
Ongoing research projects:

- Studies on regulatory mechanisms of cytotoxic and mutagenic activity of alkylating compounds with the aim of optimisation of the chemotherapy of oncological diseases.
- Elaboration of technology for isolation, cultivation and differentiation of human stem cells for further application in gene and cell therapy.
- New approaches to enhancing the resistance of biosystems to environmental and professional hazards.
- Design of mutation process models and experimental samples for computer programmes of data base processing.

Selected publications:

1. Lukash L. L., Buzhievskaya T. I. Role of early viral genes in mutagenesis//Biotechnology Current Progress. - Lancaster-Basel.: Technomic Publishing Co., Inc., 1991. - P.119 - 131.
2. Lukash L. L., Boldt J., Pegg A. E., et al. Effect of O6-alkylguanine-DNA-alkyltransferase on the frequency and spectrum of mutations induced by N-methyl-N'-nitro-N-nitrosoguanidine in the HPRT gene of diploid human fibroblasts//Mutation Research. - 1991. - P.397 - 409.
3. Kordyum V. A., Frolkis V. V., Lukash L. L., et al. Gene therapy of mass pathologies//Biopolymers and cell. - 1993. - 9, №4. - P.63 - 104.
4. Lukash L. L., Karpova I. S., Miroshnichenko O. S., et al. The effect of the lectin from Sambucus nigra inflorescences on spontaneous and alkylating agent-induced mutagenesis in mammalian somatic cells //Cytology and Genetics- 1997. - 31, №5. - P.52 - 60.
5. Karpova I. S., Pidpala O. V., Lukash L. L. The DNA of recombinant plasmids acquires mutagenic activity in a *Bacillus subtilis* culture after the insertion of the human genome Alu repeat//Cytology and genetics. - 1999. - 33, №4. - P.3 - 8.
6. Lukash L. L., Vasilovskaya S. V. Mammalian stem cells *in vitro* as a basis for the development of a new biotechnologies//Biopolymers and cell - 2001. - 17, №3. - P.203 - 211.
7. Lukash L. L., Lylo V. V., Man'ko V. G., Terentev A. G. The increasing mutagenic effect of nitrosoguanidine under influence of modified bases during inhibition of repair AGT enzyme in mammalian somatic cells *in vitro*//Cytology and Genetics. - 2002. - 36, №3. - P.41 - 50.
8. Chernenko V. Yu., Lukash L. L., Macewicz L. L., et al. Application of DNA microelectrophoresis for estimation of genotoxic effects of mutagens in the culture of human haemopoietic cells//Cytology and Genetics. - 2004. - 38, №1. - P.31 - 35.
9. Lukash L. L. The regulation of variability of somatic mammalian cell genome under the influence of exogenous biological factors//Biopolymers and cell. - 2004. - 20, №1-2. - P.93 - 105.
10. Macewicz L.L., Suchorada O.M., Lukash L.L., Influence of *Sambucus nigra bark* lectin on cell DNA under different *in vitro* conditions//Cell Biology International. - 2005.- 29 - P.29-32.

Department of *Biochemical Genetics*



Head

Olexander P. Solomko

Professor (mol.genetics), Dr.Sci. (mol.genetics)

Tel: +38 (044) 526-07-09;

Fax: +38 (044) 526-07-59;

E-mail: solomko@imbg.org.ua

www.solomko.kiev.ua

Scientific research is conducted in the following directions:

Molecular biology of eukaryotic viruses. Study on regulatory mechanisms, operating at the preimplantation stage of mammalian development.

Current research projects:

- Investigation on baculoviral envelope proteins, required for viral penetration into a cell, is under way. Structural and functional properties of baculoviral structural protein pif, one of the key factors of the above-stated process, are being studied. On the basis of a nuclear polyhedrosis virus and insect cell culture, the expression vector system, providing commercial quantities of biologically active eukaryotic and viral proteins, has been developed. Biologically active human recombinant prolactin and a number of other recombinant proteins have been synthesized. In close collaboration with the scientists from France and Poland we are studying the role of viral genome-linked protein VPg of potato virus (PVY) with eukaryotic factor 4E(eLF4E) of translation initiation. Also, we explore structural and functional aspects of these proteins interplay and its effect on host cells.
- Influence of different genotypes interaction on the development potential of mice chimeric embryos at pre- and postimplantation stages is currently being studied. The understanding of molecular mechanism of asynchronous or genetically different blastomeres interaction will provide a clear picture of regulatory processes of preimplantation development that occur on the intercellular level. The scientists of the Department were the first to discover experimentally the phenomenon of "chimeric heterosis" at the preimplantation stages of the chimeric mice development.

Selected publications:

1. Evsikov A. V., Solomko A. P. Changes in the cavitation start time in chimeric CB6F1-BALB/c embryos//Tsitol.Genet. -1998. - 32. - №3. - P. 84-87.
2. Evsikov A.V., Solomko A.P. The Levels and Patterns of Translation in Preimplantation Mouse Embryos with Repressed Cytokinesis.//Ontogenez. - 1999.- Vol.30, №2. -P. 103-109.
3. Strokovskaya L., Bartoszewicz Z., Kikhno I., et al. Expression and one-step purification of intracellular human prolactin in insect cells// Protein Expr.Purif. -2001.-22. -№2. -P 242-248.
4. Strokovskaya L. I., Meleshko R. A., Kikhno I. M., Solomko A. P. Comparative investigation of the effectiveness of expression of human recombinant prolactin in two baculoviral models//Biopolymers and cell. -2002. - 18, №5. - P. 423-428.
5. Vagina I. N., Evsikov A. V., Solomko A. P., Genetic control of early embryogenesis of mammals.// Biopolimers and cell -2003. - 19. №1. - P. 3-10.

Department of
Nucleic Acids Biosynthesis



Head

Vadym M. Kavsan

Professor (mol.biol.), Dr.Sci. (mol.biol.),
Corresponding Member of NASU

Tel: +38 (044) 526-34-98;
fax: +38 (044) 526-07-59;
E-mail: kavsan@imbg.org.ua
www.kavsan.org.ua

Scientific research programme includes two central themes:

Gene organization and expression in higher organisms.
Determination of genes responsible for appearance and progression of glial tumours of human brain.

Our recent accomplishments:

- Isolation of genes, the expression of which alters in human glial tumours, and determination of their functions.
- Characterisation of tumour-specific genes as potential biomarkers of glial tumours, the use of which will greatly facilitate the accuracy of malignant tumours classification, their early diagnostics and elaboration of new approaches to the individual therapy of these tumours.

Selected publications:

1. Shostak K., Labunskyy V., Dmitrenko V., et al. HC gp-39 gene is upregulated in glioblastomas// Cancer Lett. - 2003. - 198. -P 203-210.
2. Shostak K. O., Dmitrenko V. V., Garifulin O. M., et al. Downregulation of putative tumour suppressor gene TSC-22 in human brain tumours//J. Surg. Oncol. - 2003. - 82. - P. 57-64.
3. Kavsan V., Shostak K., Dmitrenko V., et al. Peculiarities of molecular events in human glial tumours revealed by serial analysis of gene expression (SAGE)//Experimental Oncol. - 2004. -26, 3, -P.196-204.
4. Dmitrenko V. V., Shostak K. O., Khomenko O.V., Rozumenko V. D., Malisheva T. A., Shamayev M. I., Kavsan V. M. Reduction of the transcription level of mitochondrial genome in human glioblastoma// Cancer Lett. - 2005.- 218. №1. -P. 99-107.

Department of
Cell Population Genetics



Head

Viktor A. Kunakh

Professor (genetics), Dr.Sci. (genetics),
Corresponding Member of NASU

Tel: +38 (044) 526-07-98;
Fax: +38 (044) 526-07-59;
E-mail: kunakh@imbg.org.ua
www.kunakh.org.ua

The main area of research:

Investigation of peculiarities, determinants, mechanisms and ways of regulation of structural and functional genome variability in the populations of cultured plant cells.
Development of the genetic basis for plant biotechnologies.

Ongoing projects and recent achievements:

- Structural organisation of chromatin, peculiarities of DNA variability during dedifferentiation and morphogenesis of plant cells are being studied.
- Search for molecular and genetic markers of the potentiality for morphogenesis and regeneration of plants *in vitro* is in progress.
- Department has generated unique high productive tissue culture strains of rare medicinal plants such as *Rauwolfia serpentina*, *Panax ginseng*, *Rhodiola rosea* (golden root), the producers of important cardiovascular alkaloids, immunomodulating glycosides, and other compounds.
- Development of antimutagenic and gene-protective preparations of plant origin, based on cultured cell extracts, and the systems of their fast screening is in progress.
- A new test system "*Escherichia coli* - bacteriophage λ " has been elaborated to study the effect of plant preparations at the level of induced mutations.

Selected publications:

1. Melnichuk M. D., Novak T. V., Kunakh V. A. Plant biotechnology. - Kyiv: Poligraphconsulting. - 2003. -P. 520.
2. Kunakh V. A., Mozhilevskaya L. P., Adonin V. I., Gubar' S. I. Productivity and genetic structure of *Panax ginseng* C. A. Mey cell populations during the *in vitro* cultivation//Biotechnology. -2003. - №3. -P. 25-35.
3. Andreev I. O., Spiridonova K. V., Kunakh V. A., Solov'yan V. T. Ageing and loss of germination in rye seeds is accompanied by a decreased fragmentation of nuclear DNA at loop domains boundaries// Russian Journal of Plant Physiology, 2004. - V.51, №2. - P 241-248.
4. Andreev I.O., Spiridonova K.V., Kunakh V.A. Plant genome rearrangements in cell culture *in vitro*// Biopolymers and Cell. - 2004. - V.20, №1-2. - P. 42-49.
5. Andreev I.O., Spiridonova K.V., Solovyan V.T., Kunakh V.A. Variability of ribosomal RNA genes in *Rauwolfia species*: parallelism between tissue culture-induced rearrangements and interspecies polymorphism//Cell Biology International. - 2005. - 29. - P. 21-27.

Department of *Protein Synthesis Enzymology*



Head

Mykhaylo A. Tukalo

Professor (mol.biol.), Dr.Sci. (mol.biol.)

Tel: +38 (044) 526-55-89

Fax: +38 (044) 526-07-59

E.mail: mtukalo@imbg.org.ua

www.tukalo.org.ua

The fundamental research programme of the Department is focused on:

Studies on the structural basis of the RNA-protein recognition and enzymatic catalysis.

Our current research and recent achievements:

The current area of focus is the specific recognition of aminoacyl-tRNA synthetases for their cognate amino acid and tRNA, mechanisms of catalysis and editing.

Using biochemical methods, site-directed mutagenesis and X-ray crystallography, the work is carried out on different prokaryotic (including important pathogenic bacteria *Enterococcus faecalis*, *Mycobacterium tuberculosis* and *Streptococcus pneumoniae*), eukaryotic and archaeal systems.

The crystal structures of six synthetases (seryl-, lysyl-, histidyl-, prolyl-, leucyl- and tyrosyl-tRNA synthetases) have been determined in collaboration with Dr. S. Cusack at EMBL, Grenoble, France, with various combinations of the substrates, including five tRNA complexes.

The study on structures of the complexes of SerRS, TyrRS and LeuRS with cognate tRNAs has provided the first information on the structures of tRNAs with a long variable arm and elucidated the details of how enzymes interact with cognate tRNA and discriminate uncognate one.

The aim of the project is studying the molecular mechanisms of editing during aminoacyl-tRNA synthesis of aminoacyl-tRNA synthetases of two different classes: leucyl- (class I) and prolyl-tRNA (class II) synthetases.

The data on differences between human and prokaryotic synthetases are used for development of novel classes of antibiotics against *Enterococcus faecalis* and *Mycobacterium tuberculosis*.

Selected publications:

1. Fujinada M., Berthet-Colominas C., Yaremchuk A. D., et al. Refined crystal structure of the seryl-tRNA synthetase from *Thermus thermophilus* at 2.5 Å resolution//J .Mol.Biol. -1993.- 234, -P. 222-233.
2. Biou V., Yaremchuk A., Tukalo M., Cusack S. The crystal structure of a complex between seryl-tRNA synthetase and tRNA^{Ser} from *Thermus thermophilus* at 2.9 Å resolution//Science - 1994.- 263, -P. 1404-1410.
3. Cusack S., Yaremchuk A., Krikliiviy I., Tukalo M. tRNA^{Pro} anticodon recognition by *Thermus thermophilus* prolyl-tRNA synthetase//Structure-1998.- 6, -P 101-108
4. Egorova S. P., Yaremchuk A. D., Krikliiviy I. A., Tukalo M. A. Comparative analysis of interaction sites of *Thermus thermophilus* and *Escherichia coli* tRNA^{Tyr} with homologous aminoacyl-tRNA synthetases by means of chemical modification and nuclease hydrolysis//Bioorg. Khim. -1998.- 24, -P. 593-600

-
5. Kovalenko O. P., Petrushenko Z. M., Krikliivyi I. A., et al. A comparative study of phosphate reactivities in tRNA^{Ser} and tRNA^{Leu} from *Thermus thermophilus*//Bioorg. Khim. -1999.- 25, -P 768-773
 6. Cusack S., Yaremchuk A., Tukalo M. The 2A crystal structure of leucyl-tRNA synthetase and its complex with a leucyl-adenylate analogue//EMBO J. - 2000. - 19, -P. 2351-2361.
 7. Yaremchuk A., Cusack S., Tukalo M. The crystal structure of a eukaryote/archaeon-like prolyl-tRNA synthetase and its complex with tRNA^{Pro}(CGG)//EMBO J. - 2000. -19, - P. 4745-4758
 8. Yaremchuk A., Tukalo M., Grotli M., Cusack S. A succession of substrate induced conformational changes ensures the amino acid specificity of *Thermus thermophilus* prolyl-tRNA synthetase: comparison with histidyl-tRNA synthetase//J. Mol Biol. - 2001.- 309, -P 989-1002
 9. Yaremchuk A., Krikliivyi I., Tukalo M., Cusack S. Class I tyrosyl-tRNA synthetase has a class II mode of cognate tRNA recognition//EMBO J. -2002.- 15, -P. 3829-3840.
 10. Lincecum T. L, Tukalo M., Yaremchuk A., et al. Structural and Mechanistic Basis of Pre- and Posttransfer Editing by Leucyl-tRNA Synthetase//Molecular Cell - 2003. - 11, -P. 951-963.
 11. Tukalo M., Yaremchuk A., Fukunaga R. et al. The crystal structure of leucyl tRNA synthetase complexed with tRNA^{Aeu} in the post-transfer-editing conformation//Nature Struct.Mol.Biol. - 2005. - 12, - P. 923-930.

Department of

Molecular and Quantum Biophysics



Head

Dmytro M. Hovorun

Professor (biophys.), Dr.Sci. (mol. biol.),
Deputy Director in Scientific Work

Tel: +38 (044) 526-11-09; 526-20-14;

Fax: +38 (044) 526-07-59.

E-mail: dhovorun@imbg.org.ua

www.hovorun.kiev.ua

The fundamental research programme is focused on:

Search for universal physical and chemical foundations of the specificity of interaction between components of nucleoprotein complexes and the determination of the role, that prototropic tautomerism of nucleic acids and proton transmission play in elementary processes of protein - nucleic and nucleic-nucleic recognition.

Our current research and recent achievements:

- Using the methods of molecular spectroscopy (IR, UV, Raman Spectroscopy, NMR) and quantum-chemical calculations of different range of accuracy, the changes in the tautomeric state of nucleotide bases under the effect of oxygenic bonding or interaction with ligands of peptide nature and cations of alkali metals are being investigated. Similar changes in the tautomeric state of nucleotide bases, expected under the influence of heterogeneous environment in cells, are postulated to be a mechanism responsible for the structural-dynamic transformations in protein-nucleic complexes.
- Theoretical and experimental investigations of the tautomeric state of nucleotide bases in model complexes of protein-nucleic recognition provide grounds to support the concept that high-energy tautomers play a significant role in biochemical processes.
- The regularities of spatial organisation such as secondary and tertiary structures of cellular and viral RNA and their signal sequences are being studied using modern methods of electrophoresis, proton buffer capacity, molecular modelling and bioinformatics.
- Applied branch of research is related to experimental and theoretical studies on structural-dynamic and physical-chemical properties of some pharmaceutically important compounds.
- Recently, a novel original technique, covered by the patent of Ukraine, has been elaborated in the Department and offered for experimental use. According to this technique, a multi-induced full reflection of light can be used to obtain a high-quality IR spectrum of fine films of nucleic acids and nucleoprotein complexes.

Selected publications:

1. Samijlenko S. P., Krechkivska O. M., Kosach D. A., Hovorun D. M. Transitions to high tautomeric states can be induced in adenine by interactions with carboxylate and sodium ions: DFT calculation data// J. Mol. Struct. - 2004. - V.708. - P. 97-104.
2. Stepanyugin A. V., Samijlenko S. P., Martynenko O. I., Hovorun D. M. ATR-IR Spectroscopy as applied to nucleic acid films//Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy. - 2004. -N61.- P.2267-2269.
3. Danilov V. I., Anisimov V. M., Kurita N., Hovorun D. M. MP2 and DFT studies of the DNA rare pairs: The mechanism of spontaneous substitution mutations conditioned by tautomerism of bases// Chem. Phys. Letts. - 2005. - V.412. - N°4-6. - P. 285-293.

Department of
Functional Genomics



Head

Alla V. Rynditch

Professor (mol.biol.), Dr.Sci. (mol.biol.),
Corresponding Member of NASU

Tel: +38 (044) 526-34-98;
Fax: +38 (044) 526-07-59;
E-mail: rynditch@imbg.org.ua
www.rynditch.org.ua

Scientific research is conducted in the areas:

Molecular retrovirology.
Investigation of the alternative splicing.
Regulation of gene expression under normal and pathological conditions.

Recent activity:

- Identification and comparative characterization of transcriptional isoforms of intersectin - mammalian gene, which encodes a multidomain protein, involved in endocytosis and signal pathways of the cell, with the aim to determine their role in modulating these processes. We investigate the impact of alternative splicing in regulation of expression of intersectin gene in Down syndrome which is dependent on trisomy of human chromosome 21 where this gene has been mapped.
- Elucidation of transcription of α -globin domain in leukemic cells led to identification of giant intergenic full domain transcripts. We involved in investigation the nature of these transcripts in order to define their structure and their significance in relation to globin gene expression.
- We participate in development of diagnostic, prognostic and predicting tools for different epithelial tumors. Search for specific markers based on a usage of unique Not-I microarrays which allow to detect genetic and epigenetic changes in the genome and expression patterns of the genes at the same time. This will help to understand the risk of the development of a particular type of tumors and suggest the optimal way of treatment.
- Studies on localization and expression of endogenous retroviruses in a host genome are being conducted in order to determine their role in the neoplasm formation. The investigation of the correlation between HIV-1 location in human genome and the peculiarities of disease proceeding is in progress.

Selected publications:

1. Tsyba, L. O., Skrypkinia I. Ya., Rynditch A. V., et al. Alternative splicing of mammalian Intersectin 1: domain associations and tissue specificities//Genomics. - 2004.- 84, -P. 106-113.
2. Tsyba L., Rynditch A., Boeri E., et al. Distribution of HIV-1 in the genomes of AIDS patients//Cell. Mol. Life Sci. - 2004.- 61, -P. 721-726.
3. Razin S., Rynditch A., Borunova V., et al. The about 33 kb-long Full Domain Transcript of the Chicken α -Globin Gene Domain is a Structural Component of the Nuclear Matrix// J. Cell Biochem. - 2004.- 92, -P. 445-457.
4. Borisenko L. and Rynditch A. V. Complete nucleotide sequences of ALV-related endogenous retroviruses available from the Draft Chicken Genome Sequence//Folia Biologica. - 2004. - 50, -P. 136-141.

Department of
Synthetic Bioregulators



Head

Anatoliy D. Shved

Dr.Sci. (mol.biol.), Senior Staff Scientist

Tel: +38 (044) 526-07-09;

Fax: +38 (044) 526-07-59;

E-mail: shved@imbg.org.ua

The main area of research:

Design and development of biologically active compounds that are promising in the strategy of combating severe and fatal diseases.

Our ongoing scientific projects:

- Development of novel chemotherapeutic preparations, using modern methods of computer simulation and non-empirical quantum chemical calculations.
- Further design of these compounds aimed at obtaining effective substances possessing a wide spectrum of activity.
- Molecular testing and selecting AIDS resistant cord blood samples for subsequent clinical use in AIDS patients.

Selected publications:

1. Palchikivska L. G., Platonov M. O., Alekseeva I. V., Shved A. D. Composite bioregulators based on the derivatives of phenazine -1 -carboxylic acid and triazine. Synthesis and structural characteristics. //Biopolymers and cell. - 2003. - 19, №3, - P. 281-286.
2. Palchikivska L. G., Platonov M. O., Alekseeva I. V., Shved A. D. Design of potential inhibitors of transcription based on the derivatives of 6 aza- cytosine and 6 aza-iso-cytosine. Non-empiric quantum and chemical analysis, synthesis and physical-chemical investigation//Biopolymers and cell. - 2004. - 20, №1-2, - P. 131-142.
3. De Logu A., Palchykovska L. I., Kostina V. G., et al. Phenazine-1-carboxylic acid derivatives suppressing the RNA polymerase as potential agents for the treatment of infections sustained by drug-resistant and MDR *Mycobacterium tuberculosis*//25th Annual Congress of the European Society of Mycobacteriology, Algero-Sardinia, Italy, June, 27-30, 2004, Abstract Book, - P. 125.

Department of

Protein Engineering and Bioinformatics



Head

Olexander I. Kornelyuk

Professor (mol.biol.), Dr.Sci. (mol.biol.)

Tel: (38 044) 526-55-89;

Fax: (38 044) 526-07-59;

E-mail: kornelyuk@imbg.org.ua

Scientific directions:

Protein engineering.
Structural bioinformatics.

The ongoing research projects:

- The methods of protein engineering are being used, aimed at the design of new proteins with modified and unique properties. Structure-functions studies of mammalian tyrosyl-tRNA synthetase are performed and novel cytokine function of isolated TyrRS C-module has been discovered.
- The expression of recombinant EMAP II and C-TyrRS cytokines and their mutant forms have been developed at the department.
- Structural bioinformatics has been intensively developing as a novel research direction. The computational methods are widely employed in the modelling of 3D protein structures and their conformational dynamics.
- The experimental investigations of protein dynamics are performed by fluorescence and NMR spectroscopy. The dynamic model of protein-RNA recognition by aminoacyl-tRNA synthetase is being elaborated.
- The first web-portal BioUA (www.bioua.org.ua) as bioinformatics resource of the Institute of Molecular Biology and Genetics has been established in order to facilitate the research in bioinformatics, genomics and structural biology.
- Molecular dynamics of several mutants of HIV-1 protease has been analysed in order to understand the mechanism of HIV-1 resistance to inhibitors.

Selected publications:

1. Kornelyuk A. Protein engineering//Biopolymers and Cell. (Ukr.) - 2001, Vol.17, N6, - P 520-532.
2. Odynets K. O., Ivakhno S. S., Kovalsky D. B, Tokovenko B. T., Kornelyuk A. I. Structural bioinformatics in post-genomic era//Biopolymers and Cell. (Ukr.) 2004.-Vol. 20, N 1-2, - P 78-91.
3. Ivakhno S. S., Kornelyuk A. I. Cytokine activities of some aminoacyl-tRNA synthetases and auxiliary p43 cofactor of aminoacylation reaction and their role in oncogenesis//Experimental Oncology -2004 - Vol.26, N 6, - P 250-255.
4. Kovalsky D., Dubyna V., Mark A. E., Kornelyuk A. A molecular dynamics study of the structural stability of HIV-1 protease under physiological conditions: The role of Na⁺ ions in stabilizing the active site//Proteins.-2005.-Vol.58, N2, - P 450-458.

Department of *Human Genomics*



Head

Ludmyla A. Livshits

Professor (mol.genetics), Dr.Sci. (mol.genetics)

Tel: +38 (044) 526-55-97;

Fax: +38 (044) 526-07-59;

E-mail: livshits@imbg.org.ua

www.livshits.org.ua

The research mainly concerns:

Study of origin, genetic nature, and distribution of mutations in expressive and non-expressive regions of human genome.

The major topics of current research:

- Studies on the nature, origin and prevalence of the mutations causing monogenic hereditary diseases. The activity is aimed at the development of new methods of DNA diagnostics (including prenatal diagnostics) of severe hereditary diseases with early infantile mortality and grave disablement, such as cystic fibrosis, phenylketonuria, spinal muscular atrophy, Duchenne's and Becker's muscular dystrophy, haemophilia A, Huntington's disease, Martin-Bell syndrome, hemochromatosis, corneal dystrophy etc. The DNA diagnostics obtained have been offered for practical use. The nature of genetically-related damages of reproductive health (male and female sterility) is also a subject of investigations.
- The exploration of the genetic structure and biological history of regional human populations in Ukraine is under way.
- New techniques and molecular markers for DNA-analysis for genotypic identification are being elaborated and offered for practical use in forensic medical examination. They are used for the identification of personality and affiliation.

Selected publications:

1. Reznik B. Ya., Livshits L. A. Mucoviscidosis in children and young people. Kiev. Zdorov'a, 1994. -P. 144.
2. Livshits L. A., Kravchenko S. A., Gryshko V. I., et al. DNA-diagnostics of common mutagenic hereditary diseases of monogenic nature in Ukraine. (10-year experience of DNA-diagnosytics in Ukraine)// Perinatology and pediatrics. - 2000. - №1 -P 3-7.
3. Rosser Z., Zerjal T., Hurles M., et al. Y-Chromosomal Diversity in Europe Is Clinal and Influenced Primarily by Geography, Rather than by Language//Amer.J. Hum. Gen. - 2000. - vol. 67, №6. - P. 1526-1543.
4. Livshits L. A., Malyarchuk S. G., Kravchenko S. A. et al. Children of Chernobyl Cleanup Workers Do Not Show Elevated Rates of Mutations in Minisatellite Alleles//Radiat Res. - 2001. - vol.155, №1. - P. 74-80.
5. Tighe O., Dunican D., O'Neill C., et al. Genetic diversity within the R408W phenylketonuria mutation lineages in Europe//Hum. Mut., 2003, - V. 21, - P. 387-393.
6. Pampukha V. M., Drozhyna G. I., Livshits L. A. TGFBI gene mutation analysis in families with hereditary corneal dystrophies from Ukraine//Ophthalmologica. - 2004, №216, -P 411-414.

Department of
Combinatorial Chemistry



Head

Sergiy M. Yarmoluk

Dr.Sci. (bioorg.chem.), Senior Staff Scientist

Tel: +38 (044) 526-34-49;

Fax: +38 (044) 526-07-59.

E-mail: sergiy@yarmoluk.org.ua

www.yarmoluk.org.ua;

www.biochemweb.org.ua;

www.bioorganica.org.ua

Scientific research programme includes two central themes:

Design of fluorescent probes for protein and nucleic acid detection.

Development of anticancer drugs, based on computer simulation, combinatorial chemistry and biological testing.

Ongoing research projects and accomplishments:

- The group of design of fluorescent dyes is engaged in the development of novel fluorescent probes for application in diagnostic systems, the elaboration of new methods for oligonucleotides and proteins labelling by polymethine dyes. The mechanism of interaction of cyanine dyes with DNA, RNA and proteins is also being studied.
- The group of chemistry of proteinkinase inhibitors is involved in an active search for potential inhibitors of CK2 kinase as anticancer drugs, based on the synthesis of combinatorial libraries of chemical compounds.
- The group of molecular design is working at *in silico* design of proteinkinase inhibitors.
- The Department coordinates the Ukrainian scientific network for anticancer drugs, using modern techniques of computer simulation, combinatorial chemistry and biological testing.

Selected publications:

1. Yarmoluk S. M., Lukashov S. S., Ogul'chansky T. Y. et al. Interaction of cyanine dyes with nucleic acids. XXI. Arguments for half-intercalation model of interaction//Biopolymers. - 2001. - Vol. 62, № 4. - P. 219-227.
2. Ogul'chansky T. Yu., Losytskyy M. Y., Kovalska V. B., et al. Interaction of cyanine dyes with nucleic acids. XXIV. Aggregation of cyanine dyes in presence of DNA and its manifestation in absorption and fluorescence spectra//Spectrochimica Acta Part A. - 2001. - Vol. 57. - P. 1525-1527.
3. Wetzl B. K., Yarmoluk S. M., Craig D. B., and Wolfbeis O.S. Chameleon labels for Staining and quantifying proteins//Angew. Chem. Int. Ed. - 2004. - Vol.43. - P. 5400-5402.

BIOTECHNOLOGIES
Institute of Molecular Biology and Genetics,
National Academy of Sciences of Ukraine

Test systems for gene diagnostics of severe hereditary diseases and hereditary susceptibility to mass pathologies

(Ludmyla A. Livshits, Professor, Dr.Sci.)

The elaboration of diagnostic methods and individual components of the kits for DNA analysis of mutant genes that cause the development of the most widespread monogenic hereditary diseases in Ukraine (cystic fibrosis, phenylketonuria, spinal muscular atrophy, Duchenne muscular dystrophy, Martin-Bell syndrome (fragile X), hemophilia A, Huntington's disease) hereditary chromatosis, Charcot-Marie-Tooth neuropathy (CMT), hereditary corneal dystrophies, Stargardt's macular dystrophy), hereditary susceptibility (phase II detoxification system genes) to mass pathologies (oncological, cardiovascular, endocrine pathologies) and genetical forms of men (azoospermia, oligospermia) and women (Premature ovarian failure (POF)) infertility is being held. These diagnostic kits can be used for genetic testing during prenatal diagnostics, presymptomatic diagnostics, specification of the diagnosis, selective and mass screening of heterozygous carriers in the high risk groups and in the general population. The results of the genetic testing are the necessary requirement for prophylaxis and precise treatment for the improvement of the gene pool state in Ukraine and the demographic setting.

The list of the institutions, where the elaborated methods of the DNA-analysis for the clinical diagnostics of 1100 patients with cystic fibrosis, Martin-Bell syndrome (fragile X), genetical forms of men infertility (azoospermia, oligospermia), hereditary chromatosis and associated secondary pathologies are used: Institute of Pediatrics, Obstetrics & Gynecology of the Academy of Medical Science of Ukraine, Scientific Center of Radiation Medicine of the Academy of Medical Science of Ukraine, Institute of Neurosurgery of the Academy of Medical Science of Ukraine, the Filatov Institute of Eye diseases and Tissue Therapy of the Academy of Medical Science of Ukraine, Institute of Occupational Medicine of the Academy of Medical Science of Ukraine, Institute of Hereditary Pathology (Lviv) of the Academy of Medical Science of Ukraine, Crimean Republican Center of Medical Genetics and Human Reproduction (Symferopil), Ukrainian Center of Diagnostics and Treatment of Cystic Fibrosis (Odesa); Inter-regional centers of medical genetics in: Kyiv, Donetsk, Kharkiv, Odesa, Kryvyi Rig; Regional medicogenetic consultations: Ternopil'ska, Rivnens'ka, Poltav'ska, Khmelnyts'ka, Vinnyts'ka, Volyn'ska, Ivano-Frankiv'ska, Chernigiv'ska, Zakarpats'ka, Lugans'ka; "Isida-IVF" clinic (Kyiv).

The development of complex molecular diagnostics of chronic myelogenous and acute lymphoblastic leukemias using PCR and specific polyclonal antibodies

(Stanislav S. Maliuta, Professor, Dr. Sci., Corresponding Member of NASU)

The method was tested on more than 200 patients from different regions of Ukraine after the corresponding assignment from the Institute of Hematology and Transfusiology of the Ministry of Public Health of Ukraine and from regional hematological departments. Entire correlation with other diagnostic tests and high sensitivity (10^{-4} - 10^{-5} of malignant cells) were obtained. This method gives the possibility to detect the type of translocation as well as to exclude false results completely. It is very important for prognosis and therapy protocols.

Large-scale search for biomarkers of epithelial tumors

(Alla V. Rynditch, Professor, Dr. Sci., Corresponding Member of NASU)

The creation of different diagnostic and prognostic tools for cancer research. For this purpose we use unique NotI-microarrays that permit to determine genetic and epigenetic changes in genome and patterns of gene expression at different stages of tumor development. NotI-microarrays consist of clones, which preferentially contain genes and could be used for the detection of deletions and amplifications in DNA derived from tumors as well as determination of loss of heterozygosity and changes in DNA methylation. We perform analysis of 300 DNA samples derived from epithelial tumors by hybridization with NotI-microarrays.

The identification of tumour-associated antigens for the development of modern immunological approaches to cancer diagnostics and treatment

(Valeriy V. Filonenko, Dr.Sci., Senior Staff Scientist)

The identification of novel tumour-associated antigens (TAA) is a prerequisite for the creation of modern anti-tumour vaccines and specific antibodies against TAA.

While using SEREX methodology (serological identification of antigens by recombinant expression cloning) more than 60 tumour-associated antigens of melanoma, colon cancer, cancer of thyroid gland and breast cancer have been identified. The listed antigens could be used in future for the generation of humanized antibodies with the following application in clinics for cancer treatment.

Up-to-date a number of mouse monoclonal antibodies have been generated against TAA and signalling molecules that undergo alteration at carcinogenesis. These are antibodies to S6K1, S6K2, TSC1, TSC2, Ki67, PTEN, mTOR, CK2. These antibodies could be used for detailed diagnosis and prognosis of oncological pathologies by immunohistochemical and serological approaches.

New anticancer and antiviral medications

(Anatoliy I. Potopalsky, Ph.D., Senior Staff Scientist)

Medications amitozyn and izatizon with antiviral, antitumor and immunoregulating activity have been elaborated. Amitozyn manifests antitumoral action and antimetastasis activity, but in comparison with existing medications it does not depress the hematosis processes, also it does not cause allergic reactions and has low toxicity. Amitozyn has undergone clinical tests in the system of the Ministry of Health of Ukraine. Izatizon has been approved in veterinary institutions and is studied in medicine. By using elaborated medications the technologies of diagnostics, prevention and treatment of plants agrobacterial cancer, non-vaccine prevention and treatment of mass virus diseases, increase in productivity of plants, mushrooms, useful insects (such as bees, silkworms, and oak silkworms), fish, poultry and animals have been worked out.

The molecular modeling and drug design: development of protein kinase inhibitors

(Sergiy M. Yarmoluk, Dr.Sci., Senior Staff Scientist)

Nowadays, drug development starts from identification of biological macromolecule target (DNA, or, in most cases, enzyme) responsible for certain disorder. By altering target activity with drug-like organic compounds it is possible to prevent or treat target-associated disorder(s). Among human proteins, protein kinase family is of the greatest medical and biological significance.

Protein kinases constitute at least 2% of the human genome and represent one of the most fundamental intracellular signalling mechanisms. Imbalances in kinase activity are a major factor in many disease states, especially those involving inflammatory and proliferative responses. Hence, protein kinases are attractive targets for drug research.

The goal of proposed project is the development of protein kinase inhibitors.

The approach used to develop protein kinase inhibitors is based on combined application of computer

modeling techniques, directed organic synthesis and biological *in vitro* screening. The main points of the project are:

- The virtual screening of combinatorial libraries for hit compounds using docking and molecular dynamics simulation techniques, homology modeling (if required)
- Chemical synthesis of promising compounds
- *The in vitro* testing of synthesized compounds and QSAR
- Lead compound identification
- Lead optimization

We have been developing the inhibitors of Casein Kinase 2 (CK 2) for about a year. At the time we have founded 3 lead compounds with IC_{50} up to $10^{-7}M$ and now perform their chemical optimization.

The structural-based drug discovery against pathogenic bacteria

(Mykhaylo A.Tukalo, Professor, Dr.Sci.)

The key role of Aminoacyl-tRNA synthetases in protein synthesis and other essential cellular activities has distinguished this family as an ideal antibiotic target (Schimmel et al., 1998; Kim et al., 2003). We are using the differences between human and prokaryotic prolyl-, tyrosyl- and leucyl-tRNA synthetases for the development of the inhibitors as potential drugs against *Mycobacterium tuberculosis*, *Enterococcus faecalis* and *Streptococcus pneumoniae*. Our strategy is based on the combination of several approaches: an X-ray crystallography, a small molecular docking (virtual screening) and a target-specific chemical screening. Recently we have obtained crystals of *E. faecalis* prolyl-tRNA synthetase (ProRS) and in collaboration with Dr. S.Cusack (EMBL Grenoble Outstation, France) have determined structure of enzyme in complex with substrates (Cusack, Tukalo and Yaremchuk, unpublished result). This structure reveals the differences in the active sites of ProRS from pathogenic bacteria compared to human, which we are exploiting for novel antibiotic design.

The production of a novel antiangiogenic cytokine - C-module of tyrosyl-tRNA synthetase (Cendomap)

(Olexander I.Kornelyuk, Professor, Dr.Sci.)

A novel biotechnological product - Cendomap cytokine has been obtained and tested *in vitro*. The bacterial expression system and purification scheme of cendomap cytokine permit to acquire a recombinant protein at preparative scale of about 10 mg from 1 liter of bacterial culture. Cendomap cytokine may be used as a mediator of procoagulant and antiangiogenic action, an inductor of apoptosis and for other biomedical applications.

The baculovirus expression system for obtaining recombinant proteins

(Olexander P. Solomko, Dr.Sci., Senior Staff Scientist)

The system for an expression of recombinant proteins on the basis of a virus of nuclear polyhedrosis *Malacosoma neustria* (Mane) and cultures of insect cells was designed in the department of biochemical genetics. The designed system is the first and the only baculovirus expression system for recombinant proteins in Ukraine. At present the similar systems find wide application in the world for obtaining recombinant proteins, including effective antiviral vaccines. The laboratory procedure of obtaining biologically active recombinant human Prolactin in both our system and commercial one was designed in cooperation with the Institute of Biological Chemistry and Biophysics (Poland). The method is covered by the patent of Poland. Human Prolactin is a multifunctional hormone, which participates in many physiological processes. Recombinant Prolactin is needed for effective test-systems for detection of some pathologies (ischemia, renal failure, brain tumour). The protein can be used in therapy.

Biotechnology of the plant secondary metabolites production

(Stanislav S. Maliuta, Professor, Dr.Sci., Corresponding Member of NASU)

An efficient method for the increase in Glycyrrhizin (Gl) and flavonoids production from Ri-plasmids transformed licorice *Glycyrrhiza sp.* cells and hairy roots was developed. An endophyte mycorrhizal fungus was isolated from intact roots of the medical plant *Potentilla alba L.* as a potential elicitor to stimulate the total biosynthesis of the secondary metabolites in transformed licorice cells and roots by 1.5 fold.

Glycyrrhizin (triterpen saponin) production through biotechnological way is very perspective source of the natural sweetener for the diabetes patients, moreover, its aglycone Glycyrrhizic acid inhibits II- β -dehydrohynase (hepaproductive effect in liver and kindneys tissues *in vitro* and *in vivo*). Flavonoids, 18-dehydroglycyrrhizic acid and Glycyrrhizinic acid have shown antioxidation effect. It is their anti-inflammatory capacity which is responsible for their positive therapeutic effect on lungs injured by irradiation and liver pathology. The anti-sclerotic, anti-inflammatory, anti-cancer, and anti-ulcer activity of licorice metabolites is stated.

The application of lectins from medicinal plants for biomedical research

(Iryna S. Karpova, Ph.D., Senior Staff Scientist)

The lectins is a new group of biologically active proteins, which can specifically recognize receptors exposed on cellular membranes in all types of living organisms. In humans endogenic lectins play their role in fertilization, immune response, antiviral and antibacterial protection, clearance, apoptosis etc. Plant exogenic lectins have been widely used as a tool in the investigation of animal membranes which differ in their surface sugars: in the case of immuno-haematological and endocrine diseases, developing infection or neoplastic process and other pathological changes. In the United States some lectins are commercially used for purging of bone marrow for transplantations in leukemia patients. An original technology of medicinal plant lectins isolation and purification has been developed. The new approach to receptor diagnostics of different pathologies (such as acute radiation sickness and thyroid gland diseases) using a panel of lectins isolated from medicinal plants in reaction of haemagglutination with data processing has been proposed. The method is based on the unique properties of lectins to indicate the deviations in membrane structure. The endogenous misbalance of lectins occurs in a pathological state and the lectino-test as its indicator has been proposed. The application of herbal lectins in diagnostics and individual approaches to therapy is being developed. Contemporary research is devoted to the further studying of peculiarities of medicinal plants lectins: their adhesive, immunomodulating and antitumour activity, and possible usage for stem cell identification and separation.

The production of *Rauwolfia serpentina* benth cultured cells biomass with high content of ajmaline as a source of antiarhythmic & hypotensive medications

(Viktor A. Kunakh, Professor, Dr.Sci., Corresponding Member of NASU)

Highly productive callus and suspension cell lines of *R.serpentina* accumulating about 1.5% of ajmaline have been generated. The amount of ajmaline is 8 to 12 times as much as in plant roots. *Rauwolfia serpentina* cell biomass is produced by continuous technology with the cell maintenance on artificial nutrient medium under the controlled conditions preventing the environment pollution. Cell culture growth cycle is 20 to 30 days for a suspension culture and 50 to 60 days for a callus culture. The technology of the production of biomass with ajmaline content of about 1.0% and ajmaline recovery from it was tested under the industrial conditions.

Cell biotechnology of *Ungernia victoris*

(Viktor A. Kunakh, Professor, Dr.Sci., Corresponding Member of NASU)

Ungernia victoris, endemic plant of Pamyр, provides a source of galantamine and lycorine. Galantamine-based medications are used for therapy of myasthenia, progressive muscle dystrophy (myopathia), radiculitis. Lycorine derivatives are useful during chronic and acute inflammation in lungs and bronchial asthma. An environmentally friendly technology of *U.victoris* cell biomass production and accelerated clonal propagation of plants have been developed.

The production of *Panax ginseng* cell biomass

(Viktor A. Kunakh, Professor, Dr.Sci., Corresponding Member of NASU)

Ginseng preparations offer the highly effective tonic remedies and are advised in the treatment of hypotony, overstrain, neurasthenia, atherosclerosis, leucocytosis, effects of ionizing radiation. We have developed an environmentally friendly technology for the production of *P.ginseng* cell biomass, which can be used as a raw material for manufacturing medicinal form ("Biozhen'shen"), nutrient additives and cosmetics.

Techniques to control the biosynthesis of ginsenosides, their amount and qualitative composition within the cell biomass were elaborated.

Antimycobacterial agents

(Anatoliy D. Shved, Dr.Sci., Senior Staff Scientist)

Sharp increase in human morbidity and mortality caused by tuberculosis becomes a worldwide problem. It is mainly associated with the advent of *Mycobacterium tuberculosis* strains, which are resistant to one or more agents commonly used in the treatment.

We have synthesized a new class of derivatives of phenazine-1-carboxylic acid as potential antimycobacterial agents capable to inhibit *in vitro* RNA synthesis. Their antimycobacterial activity has been investigated by Italian researchers headed by Prof. A. Delogou. A number of chemicals have shown antimycobacterial activity at the concentrations, which are equal or even lower than those for well-known medications isoniazid, rifampicin, and ethambutol. Moreover, some derivatives have shown high activity against clinical isolates with multiple-drug resistance. We plan to study the most promising chemicals *in vivo* using laboratory animals.

The development of skin equivalents on the base of human stem cells cultivated on special carriers *in vitro* for treatment of massive burns

(Lubov L. Lukash, Dr.Sci., Senior Staff Scientist)

The development of biotechnology of skin equivalents with the usage of adult human stem cells isolated from blood (mesenchymal stem cells) has been started. Particularly the creation of database of characterized cell lines originated from samples of embryonic and adult human tissues and compositions of cultural mediums, carriers and hydrogel substrates applied at the production and optimization of skin transplantants is in progress. We are also creating a cellular bank, which will be connected with Euro Skin Bank as a central provider of biomaterials for treatment of burns in the USA and Europe, and the international organization Bone Marrow Donor Worldwide which supplies the transplantations of bone marrow. The joint activity with the Center of Thermal Burns and Plastic Surgery of the Ukrainian Ministry of Health has been initiated aimed at application of the developed by the Institute skin equivalents, based on human fibroblasts, into medical practice.

Gene and Cell Therapy

(Vitalii A. Kordium, Professor, Dr.Sci., Corresponding Member of NASU, Full Member of AMSU)

The main directions of the Department activity are the study of fundamental basis for aged and sick organism renewal, the development and usage of gene and cell technologies for damaged cells and hereditary material replacement, as well as biotechnological obtaining therapeutic recombinant proteins.

Scientific approaches for gene therapy of multifactor diseases have been developed. They are based on the introduction of recombinant genetic material into an organism with the aim of pathologies correction. Effective non-viral systems for target therapeutic genes delivery to the cells and organs were created. Positive results of gene therapy for pathologies, namely artificially induced insulin-dependent diabetes mellitus and atherosclerosis - were obtained in laboratory animals.

Significant success was achieved in gene-engineering biotechnology. The scientists of the Department developed the unique method of recombinant proteins obtaining in *E.coli* with the use of λ phage. This method has no world analogues, it provides the target product obtaining in high concentration in active soluble form directly in culture medium. Its effectiveness for obtaining both pro- and eukaryotic proteins was shown. Industrial technologies for obtaining such products as β -galactosidase, human α -2a and α -2b interferon, human growth hormone, etc. were developed according to this method. Preparation of recombinant human α -2a interferon, under the trademark "Laferon" is being produced in Ukraine for more than 10 years, and is successfully used in medical practice.

Theoretical basis for damaged hereditary material substitution due to exchange of genetic material between organism cells, including stem cells, is created. Now it is under experimental examination.

Bacterial inoculant KLEPS®

(Nataliya O.Kozyrovska, Ph.D., Senior Staff Scientist)

The first developed and registered in Ukraine bacterial inoculant KLEPS® provides the plant with biological nitrogen, phytohormones, and induces systemic plant resistance to diseases. The inoculant is recommended for pre-treatment of seeds before sowing. KLEPS® improves the yield of cereals and vegetables to 10-40 %, strengthens the seedling vigor, enhances root branching, provides earlier flowering and ripeness of the crop, increases protein content, reduces plant diseases. Using KLEPS®, farmers reduce application of mineral nitrogenous fertilizers and pesticides by 70%, preserve their health and protect the environment.

Express-method of the authentication of *Klebsiella oxytoca* on the PCR basis

(Nataliya O.Kozyrovska, Ph.D., Senior Staff Scientist)

The uniqueness of sequence of the *pehX* gene of industrial culture of bacterium of *Klebsiella oxytoca* cloned by us, enabled to use this sequence for the development of the method of authentication of this bacterium by the PCR. The rapid, sensitive and specific test is recommended for the discrimination of *K. oxytoca* from other *Klebsiella* under the establishment of a precise taxonomic position of bacteria and for ecological monitoring *K. oxytoca*.

The development and design of electrochemical and optical biosensors for medicine

(Anna V. Elska, Professor, Dr. Sci., Full Member of NASU, Olexiy P. Soldatkin, Professor, Dr. Sci.)

- Development of potentiometric and conductometric biosensors specific to urine and creatinine -for the monitoring of hemodialysis;
- Development of amperometric microbiosensors for *in vivo* determination of main metabolites (glucose, lactic acid) and monitoring some neurotransmitters (acetyl choline, choline, glutamine acid and D-serine) in brain of mammals;
- Development of immuno- and DNA-sensors based on interdigitated thin-film planar electrodes and sur-

face plasmon resonance; their application for revealing some mutations and pathogenic microorganisms.

The development and design of electrochemical biosensors for control of biotechnological processes

(Anna V. Elska, Professor, Dr. Sci., Full Member of NASU, Olexiy P. Soldatkin, Professor, Dr. Sci.)

- Development of amperometric biosensors for determination of glucose, ethyl alcohol and lactic acid in wine samples;
- Development of potentiometric and conductometric biosensors for penicillin determination.

The development and design of test-systems on the basis of electrochemical mono- and multibiosensors for environment monitoring and foodstuff control

(Anna V. Elska, Professor, Dr. Sci., Full Member of NASU, Olexiy P. Soldatkin, Professor, Dr. Sci.)

- Development of potentiometric and conductometric enzyme mono- and multibiosensors and elaboration of their laboratory prototypes for direct and inhibitor analyses of separate toxicants and their mixtures (herbicides, pesticides, steroid glycoalkaloids, formaldehyde, heavy metal ions, etc.);
- Development of the potentiometric enzyme sensor based on inhibitor analysis for determination of neurotoxic substances - glycoalkaloids - in potato, tomatoes and other foodstuff of solanaceous type;
- Elaboration of the technology of production of synthetic analogues of biological receptors (polymers-biomimics) and creation on their basis of a number of electrochemical (conductometric, capacitive and amperometric) sensors for determination of herbicides of triazine type.

INTERNATIONAL AND FOREIGN ORGANIZATIONS GRANTS

Supporter (fund, programme, organization)	Project	Ukrainian project director	Organizations - partners	Date of performance
1. Deutsche Forschungsge meinschaft (DFG)	Ein neuartiger tRNA Zyklus der ribosomalen Elongation in Saugetierzellen /Novel characteristics of translation elongation in mammals	Elska A. V.	Max Planck Institute of Molecular Genetics, Berlin, Germany	2002-2005
2. NATO SCIENCE PROGRAMME	Enzyme biosensors/protein chips for determination of peptides and proteins	Elska A.V.	Ecole Centrale, Lyon (France), Barcelona University (Spain)	2004-2006
3. The Wellcome Trust	Two-faced Janus: mammalian translation elongation factor 1A and its isoforms	Elska A. V. Negrutskii B. S.	Edinburgh University (United Kingdom).	2004-2007
4. NATO SCIENCE PROGRAMME	Development of enzyme micro-biosensors based on carbon-fibers for in vivo determination of the main neurotransmitters	Soldatkin O. P.	Claude Bernar University, Lyon, France	2003-2005
5. NATO SCIENCE PRGRAMME	Development of novel conductometric biosensors	Dzyadevich S.V.	Claude Bernar University (Lyon, France)	2003-2005
6. CNRS	New technology for development of test systems for estimation of medical preparations based on alkaloids	Soldatkin O. P.	Claude Bernar University (Lyon, France)	2006-2007
7. NATO SCIENCE PROGRAMME	Novel Biological and Chemical Sensors for Formaldehyde Monitoring in Wastewaters, Foodstuffs and Pharmaceuticals	Korpan Y. I.	Ecole Centrale, Lyon, France; Institute of Applied Science and Technology, Tunisia; Institute of Cell Biology, Ukraine	2004-2007
8. INTAS	Novel biosensors and analysis kits based on genetically engineered biomolecules for formaldehyde assay	Korpan Y. I.	SciTech Link HB, Sweden; Ruhr-Universitat Bochum, Germany; Institute of Cell Biology, Ukraine; A.N.Bach Institute of Biochemistry, Russia; Institute of Chemical Problems, NAS of Azerbaijan Republic, Azerbaijan; Institute of Chemical Problems, NAS of Azerbaijan Republic, Azerbaijan	2004-2007
9. INTAS	NotI microarrays for identification of new cancer-causing genes	Rynditch A. V.	Karolinska Institute - Sweden Russian State Genetics Center - Russia Engelhardt Institute of Molecular Biology - Russia University of Cambridge - United Kingdom Institut de Genetique Humaine - France University of Birmingham - United Kingdom	2004-2005

Supporter (fund, programme, organization)	Project	Ukrainian project director	Organizations - partners	Date of performance
10. Ministry of science and education, Academy of Sciences of France.	Grant "Dnipro" Molecular mechanisms of establishment of chromatin domains in development and cancerogenesis	Ryndytch A. V.	Gustava Rossi Institute, (France)	2005-2006
11. UNESCO	Advance and practical courses on DNA and protein expression	Ryndytch A. V.	-	September 18-23, 2005
12. INTAS	The genomic structural organization and physical mapping of the terminal regions of individual rye chromosomes	Alkhimova O. G.	Institute of Experimental Botany - Czech Republic, University of Leicester - United Kingdom, Institute of Cytology and Genetics - Russia	2004-2007
13. INTAS 01-0517	Comparative and monitoring investigation of penguin population <i>Pygoscelis papua</i> in Antarctica	Teleheev G. D.	University of Zurich (Institute of molecular biology) (Zurich, Switzerland); Antarctic institute of Bulgaria (Sofia, Bulgaria); Institute of molecular biology (Sofia, Bulgaria); Institute of nuclear research (Sofia, Bulgaria).	2002-2005
14. Ludwig Institute For Cancer Research (USA)	Identification and characterization human of tumour-associated antigens	Filonenko V. V. Gout I. T.	Ludwig Institute For Cancer Research (New York and London branch)	2004-2007
15. CRDF	Conditional knockout of N-cadherin as a model for study of heart arrhythmia	Kostetsky I. Y.	University of Pennsylvania, Medical School, Center of women's health and reproduction, Philadelphia, USA	2005-2006
16. NATO International scientists support programme	Grant № PDD(CP)- (LST.CLG 979764) Interaction of viral Protein VPg with eukaryotic factor of translation 4E(eIF4E) initiation	Strokovskaya L. I.	Institute of Structural Biology Grenoble, France	2003-2005
17. Ministry of science and education (Germany)	Construction of an unambiguous taxonomy for <i>Klebsiella</i>	Kozyrovskaya N. O.	University of Bayreuth (Germany)	2004-2005
18. Fluka GmbH	Scientific collaboration programme on fluorescent nucleic acid strains development	Yarmoluk S. M.	Fluka Chemie GmbH (Buks, Switzerland)	2003-2005
19. Fluka Chemie GmbH	Development of fluorescent probes for Real Time PCR.	Yarmoluk S. M.	Fluka Chemie GmbH (Buks, Switzerland)	2005-2006
20. STCU	Development of photochemically safe two-photon excited fluorescent probes for biological objects detection and imaging	Yarmoluk S. M.	Center for Single Molecule Biophysics and Department of Microbiology, University at Buffalo	2005-2007

PATENTING AND LICENSING SERVICE

is engaged in obtaining and protecting the rights for the objects of intellectual property, created at IMBG. During the years since the Institute was founded, the achievements of the scientists have resulted in two discoveries, certified by the State Committee of Discoveries and Inventions of the USSR.

The notable scientists, Full Members of NASU, are the authors of these discoveries.

1. Certificate for invention N 340 "Property of exogenous DNA (desoxyribonucleic acids) to induce selective mutations of genes" by Sergiy M. Gershenson.

2. Certificate for invention N 367 "Property of specific proteins producent cells to change the synthesis of transport RNA in course of differentiation" by Gennadiy Kh. Matsuka, Anna V. Elska.

The advanced achievements cover the following fields:

1. Genetic engineering and novel biotechnologies.
2. Cells - producents of biologically active compounds, drugs and others.
3. Synthetic compounds - antiviral, antitumoural, immunomodulating and other therapeutic agents.
4. Biosensors.
5. Varieties/Lines and technologies for agriculture.

In the course of thirty years the scientists of IMBG have received over 150 provisional patents (inventor's certificates, patents of Ukraine, international applications, submitted according to the Patent Cooperation Treaty). Also, a number of innovations, proposed to upsurge scientific research efficiency, have been registered.

The preparations and approaches for their obtaining, developed at IMBG, received world recognition and were patented. They were introduced into production and scientific research work. These patented inventions are as follows:

- INTERFERON - an immunity enhancing preparation, developed by Yu. A. Ovchinnikov, Ye. D. Sverdlov, S. A. Tsaryov, G. S. Monastyr's'ka, S. G. Arsenyan, I. S. Solomatina, S. V. Belyaev, G. Kh. Matsuka, V. A. Kordium, S. I. Chernykh, I. Yu. Slavchenko, Yu. I. Gorlov, T. V. Sorochyn's'ka. (IMBG has elaborated the technological process of interferone production).
- ISATIZONE -an antiseptic and anti-inflammatory preparation, developed by A. I. Potopalsky, L. V. Lozyuk, B. P. Bessarabov, A. M. Mirolubova, V. I. Kyt, A. Alekseenok.
- The strain of plant cultivated cells *Rauwolfia serpentine Benth* - AJMALINE producent, developed by O. N. Kuklin, I. E. Kauhova, O. G. Vollosovich, S. O. Minina, V. A. Kunakh, O. V. Zakhlenyuk, O. G. Alkhimova, L. K. Alpatova.
- Approach for preparation of reverse transcriptase, by N.A.Graev's'ka, V.M.Kavsan, A.V.Rynditch, G. N. Dobrovols'ka, I. D. Ishchenko, O. V. Stavars'ka, V. P. Stolyarenko, L. Livoshenko, A. L. Dumina, A. T. Kovalenko, V. D. Lukyanenko.

In the course of recent years, according to the Patent Cooperation Treaty (PCT), IMBG has submitted several international applications, in particular, "Synthesis, pharmaceutical composition and method of application of (2'-5') oligoadenylate analogues", by Z. Yu. Tkachuk, E. Kvasyuk, G. Kh. Matsuka, I. Michaylopulo. The Ukrainian patent N 4418A "Biological preparation for plant growing and protection KLEPS[®]" was a prize-winner of "Discovery 2002" contest (Ukraine), and its authors N. O. Kozyrovska and V. V. Negrutska were awarded the medal of the International Organization of Intellectual Property as women-inventors. The biological preparation KLEPS[®] is being used in the agricultural complex in Ukraine, it insures a rise in grain, vegetables and industrial crops up to 10-20 per cent.

Recently, IMBG has received the following patents of Ukraine:

1. Patent N 42150A, "The strain of plant cultivated cells *Rauwolfia serpentina Benth* - ajmaline producer", by V. A. Kunakh, L. P. Mozhylevska, L. K. Alpatova, V. A. Katsan, V. I. Adonin.
2. Patent N 42151A, "The strain of plant cultivated cells *Arnebia euchroma* (Royle) Jonst - shikonin producer", by V. A. Kunakh, O. O. Poronnik.
3. Patent N 61626A, "The structures of active antitumour compounds, in the row of derivatives 1-benzyl-3-chloro-4 anilino-2,5-dihydro-1h-2,5-pyrolidion" by S. S. Tarnavskiy, S. M. Golovach, G. G. Dubinina, S. M. Yarmoluk.
4. Patent N 65186A, "The approach for obtaining the infra-red spectrum of polymer absorption" by D. M. Hovorun, S. P. Samijlenko, A. V. Stepanyugin, O. I. Martynenko.

"BIOPOLYMERS AND CELL" JOURNAL



Editor-in-Chief:

Anna V. Elska (Ukraine)

Associate Editors:

Dmytro M. Hovorun (Ukraine)

Olexander I. Kornelyuk (Ukraine)

Executive secretary of Editorial Staff

Natalia I. Morgunova

Scientific Editors

Dmytro M. Hovorun

Olexander I. Kornelyuk

Editor

Iryna I. Silan

Editorial office address:

Tel: +38 (044) 526-07-89

Fax: +38 (044) 526-07-59

E-mail: bpcell@imbg.org.ua

www.biopolymers.com.ua

Editorial Board:

I. T. Gout (Ukraine)

L. B. Drobot (Ukraine)

E. A. Kozlov (Ukraine)

V. A. Kordium (Ukraine)

V. A. Kunakh (Ukraine)

L. A. Livshits (Ukraine)

S. S. Maliuta (Ukraine)

B. P. Matselukh (Ukraine)

A. A. Sybirny (Ukraine)

Yu. M. Syvolap (Ukraine)

O. P. Solomko (Ukraine)

O. Yo. Cherepenko (Ukraine)

S. M. Yarmoluk (Ukraine)

Y. I. Korpan (Ukraine)

Guest editorial members:

I. R. Baryliak (Ukraine)

A. I. Bozhkov (Ukraine)

G. M. Butenko (Ukraine)

A. N. Veselkov (Ukraine)

P. Volpe (Italy)

Yi. M. Drannik (Ukraine)

B. S. Drach (Ukraine)

S. G. Inge-Vechtomov (Russia)

V. M. Kavsan (Ukraine)

I. Karube (Japan)

V. K. Kibirev (Ukraine)

E. Kuyl-Yeheskiely (Netherlands)

V. P. Kukhar (Ukraine)

M. O. Lozinskii (Ukraine)

L. L. Lukash (Ukraine)

V. Ya. Maleev (Ukraine)

I. A. Mikhailopulo (Byelorussia)

E. B. Paton (Ukraine)

M. O. Pilinskaya (Ukraine)

A. M. Romanenko (Ukraine)

E. D. Sverdlov (Russia)

O. V. Turov (Ukraine)

V. P. Khyliya (Ukraine)

"UKRAINICA BIOORGANICA ACTA" JOURNAL

Executive secretary of Editorial Staff

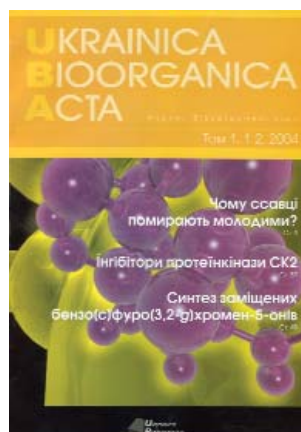
L.V. Pletnyova

Tel: +38 (044) 522-24-58

Fax: +38 (044) 522-24-58

E-mail: bioorganica@ukr.net

www.bioorganica.org.ua



New journal "Ukrainica Bioorganica Acta" presents scientific investigations from all branches of bioorganic chemistry. Scientific topics of the journal include synthesis and study of biologically important organic compounds, investigation of the natural bioregulators, proteins, nucleic acids, lipids and carbohydrates. Both natural compounds and their synthetic analogues are considered. Significant attention is pointed to the bioconjugate problems. The journal may be of interest for specialists in bioorganic, organic and medical chemistry, biochemistry, pharmacology and biotechnology.

We hope that this novel project will work for the noble aim of the representing of Ukrainian bioorganic school achievements, assist our bioorganic chemistry scientists' integration into European scientific association.

Electronic version of the edition (www.bioorganica.org.ua) is included in the Directory of Open Access Journals (DOAJ, www.doaj.org).

The journal appears twice a year, the accepted languages are Ukrainian and English.

Editor-in-Chief

V. P. Kukhar (Institute of Bioorganic Chemistry & Petrochemistry, NAS of Ukraine, Kyiv)

Deputy Editor

S. M. Yarmoluk (Institute of Molecular Biology & Genetics, NAS of Ukraine, Kyiv)

Editorial Board

S. A. Andronati (A.V. Bogatsky Physicochemical Institute, NAS of Ukraine, Odesa)

V. S. Brovarets (Institute of Bioorganic Chemistry & Petrochemistry, NAS of Ukraine, Kyiv)

A. I. Vovk (Institute of Bioorganic Chemistry & Petrochemistry, NAS of Ukraine, Kyiv)

Yu. M. Volovenko (Department of Organic Chemistry National Taras Shevchenko University, Kyiv)

D. M. Hovorun (Institute of Molecular Biology & Genetics, NAS of Ukraine, Kyiv)

G. V. Donchenko (Palladin Institute of Biochemistry, NAS of Ukraine, Kyiv)

B. S. Drach (Institute of Bioorganic Chemistry & Petrochemistry, NAS of Ukraine, Kyiv)

I. Ya. Dubey (Institute of Molecular Biology & Genetics, NAS of Ukraine, Kyiv)

A. V. Elska (Institute of Molecular Biology & Genetics, NAS of Ukraine, Kyiv)

V. K. Kibirev (Institute of Bioorganic Chemistry & Petrochemistry, NAS of Ukraine, Kyiv)

O. I. Kolodiaznyi (Institute of Bioorganic Chemistry & Petrochemistry, NAS of Ukraine, Kyiv)

A. I. Kornelyuk (Institute of Molecular Biology & Genetics, NAS of Ukraine, Kyiv)

M. O. Lozinsky (Institute of Organic Chemistry, Kyiv)

G. Kh. Matsuka (Institute of Molecular Biology & Genetics, NAS of Ukraine, Kyiv)

D. M. Fedoryak (Institute of Bioorganic Chemistry & Petrochemistry, NAS of Ukraine, Kyiv)

V. P. Khilya (Department of Organic Chemistry, National Taras Shevchenko University, Kyiv)

V. P. Chernykh (National University of Pharmacy, Kharkiv)

SCIENTIFIC LIBRARY

Head

Olga O. Luk'yanenko

Tel: +38 (044) 526 07 39

Fax: +38 (044) 526-07-59;

E-mail: library@imbg.org.ua

The library was founded in 1969. It counts about 83,000 volumes of home and foreign books and journals, more than 14,000 units of foreign periodical editions on microfiches.

The fund of the library covers different fields of natural sciences - genetics, molecular biology, biochemistry, biophysics, organic chemistry, medical and agricultural sciences. There are a number of dictionaries and reference books.

The literature is classified in the alphabetical and systematic catalogues.

The work of the library is aimed at efficient assistance in the professional and informational needs of the scientists. Weekly expositions of the recent acquisitions, subject-matter selection of the literature and bibliographical consultations are realised by the library.

The staff of the library attends readers of scientific institutions and receives the literature from many libraries by Interlibrary Loan System.

THE ALPHABETIC DIRECTORY OF SCIENTIFIC COUNCIL

Bobyk V. I. +380 (044) 526-55-89 inform@imbg.org.ua
Elska A. V. +380 (044) 526-07-49 elskaya@imbg.org.ua
Filonenko V. V. +380 (044) 526-20-16, 522-61-00 filonenko@imbg.org.ua
Hovorun D. M. +380 (044) 526-11-09, 526-20-14 dhovorun@imbg.org.ua
Kavsan V. M. +380 (044) 526-34-98 kavsan@imbg.org.ua
Kharchenko V. M. +380 (044) 526-11-59 kharchenko@imbg.org.ua
Kordium V. A. +380 (044) 526-55-96 kordium@imbg.org.ua
Kornelyuk O. I. +380 (044) 526-55-89 kornelyuk@imbg.org.ua
Korpan Y. I. +380 (044) 526-43-97, 522-28-24 korpan@imbg.org.ua
Kozlov E. A. +380 (044) 526-11-39 inform@imbg.org.ua
Kunakh V. A. +380 (044) 526-07-98 kunakh@imbg.org.ua
Livshits L. A. +380 (044) 526-55-97 livshits@imbg.org.ua
Lukash L. L. +380 (044) 526-07-39 lukash@imbg.org.ua
Maliuta S. S. +380 (044) 526-07-29 maliuta@imbg.org.ua
Matsuka G. Kh. +380 (044) 526-20-14 inform@imbg.org.ua
Mishchuk Ya. R. +380 (044) 526-11-29 mishchuk@imbg.org.ua
Negrutskii B. S. +380 (044) 526-43-97 negrutskii@imbg.org.ua
Potopalsky A. I. +380 (044) 526-11-39 potopalsky@imbg.org.ua
Rynditch A. V. +380 (044) 526-34-98 rynditch@imbg.org.ua
Shved A. D. +380 (044) 526-07-09 shved@imbg.org.ua
Soldatkin O. P. +380 (044) 526-43-97 a_soldatkin@imbg.org.ua
Solomko O. P. +380 (044) 526-07-09 solomko@imbg.org.ua
Tykhonkova I. A. +380 (044) 526-20-16 conference@imbg.org.ua
Tukalo M. A. +380 (044) 526-55-89 mtukalo@imbg.org.ua
Yarmoluk S. M. +380 (044) 526-34-49 sergiy@yarmoluk.org.ua

CONTENTS

<i>Sections</i>	<i>Pages</i>
Administrative staff	1
Scientific Council	2
Introduction	3
Departments	4
Department of Cell Regulatory Mechanisms Vitalii A. Kordium	5
Laboratory of Modification of Biologically Active Compounds. Anatoliy I. Potopalsky	6
Department of Cell Signal Systems Valeriy V. Filonenko	7
Department of Translation of Genetic Information. Anna V. Elska	8
Laboratory of Biomolecular Electronics Olexiy P. Soldatkin	8
Laboratory of Protein Biosynthesis Boris S. Negrutskii	10
Department of Molecular Genetics Stanislav S. Maliuta	12
Department of Human Genetics Lubov L. Lukash	13
Department of Biochemical Genetics Olexander P. Solomko	14
Department of Nucleic Acids Biosynthesis. Vadym M. Kavsan	15
Department of Cell Population Genetics Viktor A. Kunakh	16
Department of Protein Biosynthesis Mykhaylo A. Tukalo	17
Department of Molecular and Quantum Biophysics Dmytro M. Hovorun	19
Department of Functional Genomics Alla V. Rynditch	20
Department of Synthetic Bioregulators Anatoliy D. Shved	21
Department of Protein Engineering and Bioinformatics Olexander I. Kornelyuk.	22
Department of Human Genomics Ludmyla A. Livshits	23
Department of Combinatorial Chemistry Sergiy M. Yarmoluk	24
Biotechnologies	25
International Grants	32
Patenting and Licensing Service	34
"Biopolymers and Cell" Journal	36
"Ukrainica Bioorganica Acta" Journal	37
Scientific Library	38
The alphabetic directory of Scientific Council	39