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CHRONICLE

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ALL-UKRAINIAN CONFERENCE ON MOLECULAR AND CELL BIOLOGY WITH INTERNATIONAL PARTICIPATION, DEDICATED TO THE HEROIC STRUGGLE OF THE UKRAINIAN PEOPLE AGAINST THE RUSSIAN INVADERS

On February 24, 2022, Russia invaded Ukraine and brought the war to our territory, accompanied by the terror of civilian people and destruction of civil infrastructure, including cultural, educational, and scientific objects. Scientific work was interrupted, and a lot of scientists were displaced within Ukraine or abroad. The latter has become possible due to great support from our foreign colleagues who reacted to the situation in Ukraine during the first several days of war and created a lot of opportunities for Ukrainian scientists in their countries. However, most of the scientists stayed in Ukraine, some of them even ended up in temporarily occupied territories. Regarding all these factors, the idea of an All-Ukrainian conference with international participation has arisen in the Young Scientist Council and the Scientific Council of the Institute of Molecular Biology and Genetics (IMBG) of the National Academy of Sciences of Ukraine. The main aims of this event were to encourage Ukrainian scientists wherever they are, to give the opportunity to colleagues from abroad to demonstrate their staunch support to Ukraine, and to keep the scientific process ongoing even in the background of the war. We decided to dedicate the Conference to the heroic struggle of the Ukrainian people against the Russian invaders.

The All-Ukrainian Conference on Molecular and Cell Biology with international participation was held as an online event on the Zoom platform, from the 15th to the 17th of June 2022. Three types of participation were available for registered scientists: oral presentation, poster presentation, and abstract publication only, aiming to give every scientist the possibility to participate, regardless of their personal situation (e.g., internet access or its quality). Scientists of every career stage could take part in any way convenient to them. Seven sections of bioscience were available at the Conference, namely:

- Microbiology and Biotechnology,
- Genetics and Epigenetics,
- Molecular biology and Bioorganic chemistry,
- Molecular oncology,
- Molecular physiology and Biophysics,
- Cell biology,
- System biology and Bioinformatics.

123 scientists from Ukraine and abroad have registered for participation in the conference before the deadline. The percentage distribution of participants among sections is demonstrated in Fig. 1. 38 Oral presentations, 14 Poster presentations, 10 Keynote Lectures, and 1 Special Lecture were included in the Conference program.

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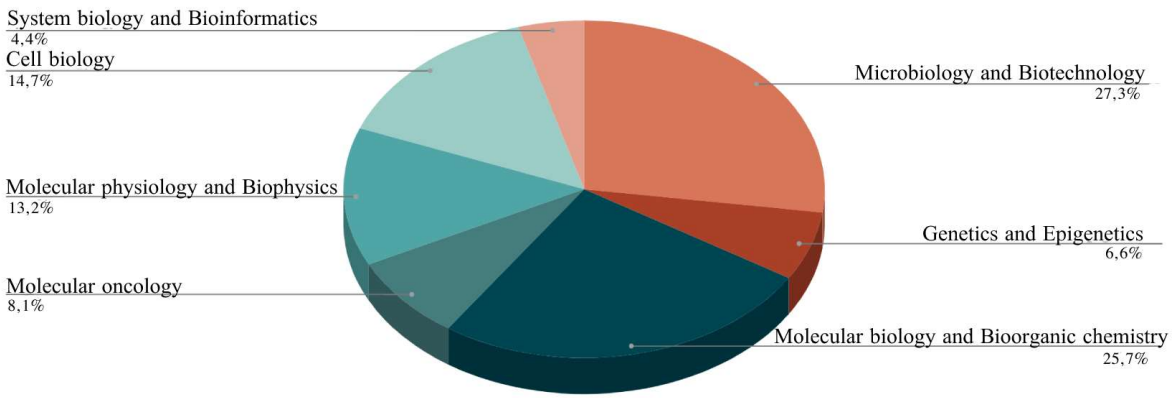

Fig. 1. Percent distribution of participants among sections (including all types of participation).

Scientists from the 13 Ukrainian cities from different regions of Ukraine registered for participation in the Conference: Kyiv, Kharkiv, Ivano-Frankivsk, Lviv, Melitopol, Kherson, Odesa, Uzhhorod, Poltava, Nizhyn, Chernivtsi, Ternopil, Cherkasy. The largest number of representatives was from Kyiv and Kharkiv. Foreign participants, including 10 Keynote Speakers, represented several European countries and USA (Fig. 2).

Fig. 2 Countries of affiliation of Conference participants including Keynote Speakers (Ukraine, Poland, Czech Republic, Germany, Italy, Sweden, Finland, USA).

The Conference was started with Opening remarks by the Director of the Institute of Molecular Biology and Genetics of the NAS of Ukraine Mykhailo Tukalo, who welcomed everybody to the Conference and stressed on the importance of such events in this challenging time for Ukraine. Three Keynote speakers presented their lectures on June 15th. Pernilla Wittung-Stafshede from the Chalmers University of Technology, Gothenburg, Sweden was talking about protein misfolding, with special attention to α-synuclein and its role in Parkinson's disease. Cecilia Lanny Winata from the International Institute of Molecular and Cell Biology, Warsaw, Poland, who is studying the nature of the interaction between

transcription factors and epigenomic landscape and how it translates into the resulting diversity of cardiac cell identity in zebrafish model, told the participants about the construction of the gene regulatory network underlying heart development using genomics. Petr Svoboda (Institute of Molecular Genetics ASCR, Prague, Czech Republic), who devoted his research to the understanding the epigenetic regulation of the mammalian genome presented an excellent lecture about the diversity of the small RNA pathways in mammals.

After the Keynote Lectures, the **"Microbiology and Biotechnology"** section of the Conference started. The innovative and significant topics were discussed in this section, including the development of biosensors for different purposes, the investigation of novel biomaterials and modern technologies for skin regeneration, and wound healing, which are extremely actual today. **Irena Hlushchuk** (University of Helsinki, Finland) shed more light on the α-synuclein aggregation process. Three talks given by **Olena Moshynets (**Institute of Molecular Biology and Genetics, NAS of Ukraine, Kyiv, Ukraine**)**, **Taras Baranovskyi** (Kyiv Regional Clinical Hospital, Kyiv, Ukraine), and **Kateryna Rudnieva** (Kyiv Regional Clinical Hospital, Kyiv, Ukraine) were devoted to the epidemiology of *Klebsiella pneumonia* as a nosocomial infection, the problems with this infection caused by the biofilm formation, and the ways to solve this problem. Also, their works demonstrated a productive and successful collaboration between academic scientists and clinicians. Several interesting works on microbial biotechnology were presented by the participants from the D. K. Zabolotny Institute of Microbiology and Virology of the NAS of Ukraine.

In the next section, **"Genetics and Epigenetics",** which consisted of three talks, the great interest of the Conference attendees attracted the talk of **Taras Oleksyk** from Oakland University (MI, USA), who described the results of the investigation of Genome Diversity in Ukraine, the unique variation, structure, and admixture in whole genome sequences of Ukrainians. The first day of the conference was finished with the **Poster Session, part I**, where excellent works of scientists from Kharkiv, Ivano-Frankivsk, and Kyiv were presented.

On June 16, the second day of the Conference was opened by the Keynote Lecture of **Michał Komorowski** from the Institute of Fundamental Technological Research of Polish Academy of Sciences, Warsaw, Poland. He told the audience about the signaling complexity, making a deep dive into the understanding, that the single ligand activates multiple different effectors, as well as a distinct effector is being activated by numerous different ligands, which results in cross-wired signaling, which also differs even between remarkably similar cells (Fig. 3). He introduced the listeners to information theory, which helps to understand and describe these complex processes.

The talk of the next Keynote Speaker, **Andrii Domanskyi** (University of Helsinki, Orion Pharma Turku, Finland) was devoted to targeting pathological protein aggregation in neurodegeneration, in particular to the further perspective of the usage of this knowledge in clinical practice.

Volodymyr Berest from the V. N. Karazin Kharkiv National University, Department of Molecular and Medical Biophysics in his Keynote talk presented the incredible results that the molecular interactions of the antimicrobial peptide with nano-sized delivery vehicles potentiate their action and broaden its therapeutic efficiency.

The section on "**Molecular biology and bioorganic chemistry"** was started with one more talk devoted to neurodegenerative conditions, presented by **Anastasiia Nefodova** (Taras Shevchenko National University of Kyiv, Ukraine), which points out that this topic is broadly studied and some steps were taken forward in western countries and in Ukraine, as well. She was talking about hematological markers of low-grade systemic inflammation in rats with different models of Alzheimer's disease. In general, all 9 talks in this section demonstrated a prominent level of research in different fields of molecular biology and biochemistry. There

were presenters with applied research, namely **Maksym Sobolevskyi** and **Daryna Mruga** (Kyiv, Ukraine) with their talks about novel biosensors **Volodymyr Prokopiuk** and **Anton Tkachenko** (Kharkiv, Ukraine) with the studies with potential clinical relevance connected with the effects and behavior of nanoparticles of different nature with living cells: **Bohdana-Myroslava Briantseva** (Kyiv, Ukraine) with her research about the potential of MGMT inhibitors to modulate the action of alkylating compounds; more fundamental molecular biology research was presented by **Daria Biliai** (Chernivtsi, Ukraine), **Dmytro Gerasymchuk** (Kyiv, Ukraine)**,** and **Ausra Domanska** (Helsinki, Finland)**.**

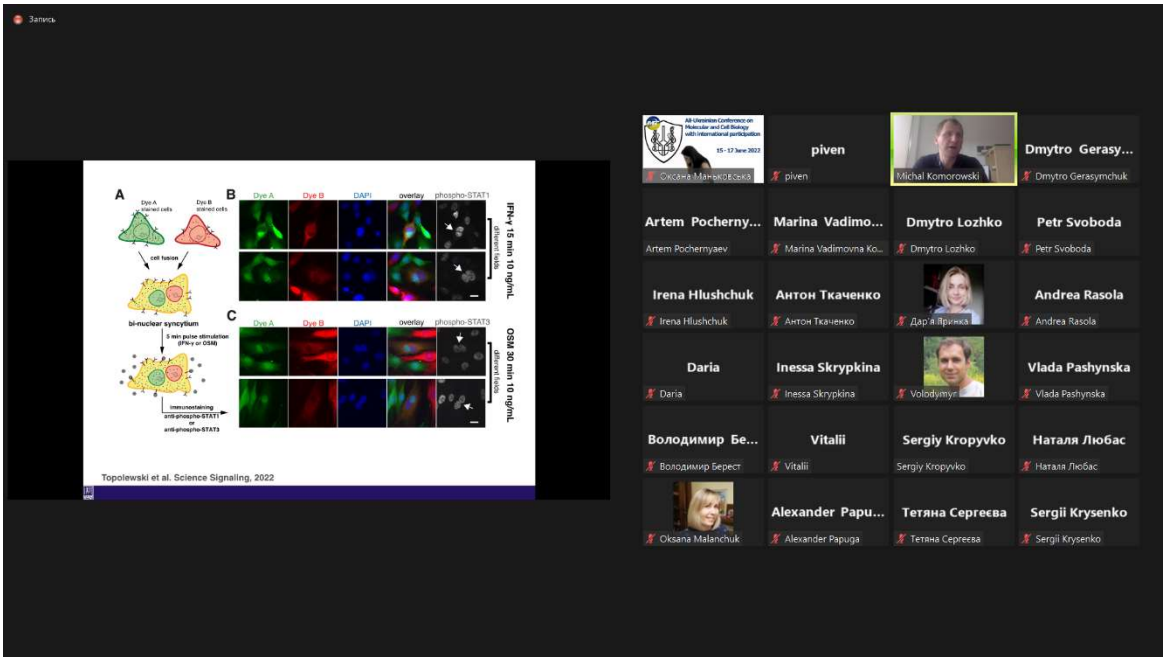

Fig. 3. A presentation fragment of Michał Komorowski's "Making sense of signaling complexity".

The section of "**Molecular oncology**" consisted of 4 talks, two of which were in the field of anticancer drug development. Indeed, **Nadiia Lypova** (Loisville, USA) presented her excellent study of the PFKFB3 as a target of compensatory cell signaling in response to EGFR inhibition in non-small cell lung carcinoma, and **Sergii Konovalenko** (Kyiv, Ukraine) talked about the combined effects of doxorubicin and laser irradiation on the survival of MCF7 and MCF7-DOX (doxorubicin resistant) cell lines, which can be useful for decision in therapeutic strategies choice for breast cancer. Two other talks were devoted to underlying the mechanisms of cancer formation and development. **Andrea Rasola** (Padova, Italy) made incredibly interesting presentation about the role of chaperone TRAP1 in cancer metabolic switch and **Anastasiia Hubiernatorova** (Kyiv, Ukraine) presented her work on the controversial role of tristetraprolin in breast cancer. Part II of the **Poster Session** was held at the end of the second Conference Day.

17th of June was the last closing day of the All-Ukrainian Conference on Molecular and Cell Biology with international participation. The program of this day was planned in an unusual way in comparison to previous ones. **Anton Nekrutenko,** a Keynote speaker from the Penn State University, USA, gave a deep and comprehensive introduction to GalaxyProject.org, which represents an open global system for the analysis of biological information. The next Keynote Lecture of Friday, presented by **Andreas Ladurner** (Ludwig-Maximilians-Universität, Munich, Germany), continued the topic about cancer therapy and novel targets for fighting this disease. He told the auditory about the role of ALC1 helicase in DNA repair and

the strategy of producing synthetic lethality using ALC1 inhibitors. We had the opportunity to listen to 6 talks from the section of **"Molecular physiology"** with interesting and important results obtained by Ukrainian scientists. Briefly, **Viktor Martyniuk** (Taras Shevchenko National University of Kyiv, Kyiv, Ukraine**)** reported his observations of the influence of electromagnetic radiation of millimeter range on the optical properties of the hemoglobin; **Mariia Ursatyi** (Yuriy Fedkovych Chernivtsi National University, Chernivtsi, Ukraine**)** was talking about the impact of dietary protein deficiency on the state of the glutathione system in the liver of rats of reproductive age under toxic injury with acetaminophen; the presentation of **Olga Tarnopolska** (Bogomoletz Institute of Physiology, NAS of Ukraine, Kyiv, Ukraine) was dedicated to the influence of trivalent metal ions on LCC-channels of the nuclear membrane of the cerebellar Purkinje neurons; **Sonia Nevelchuk** (Kyiv Academic University, Kyiv, Ukraine) and **Oleksandra Fedchenko** (Kyiv Academic University, Kyiv, Ukraine) talked about hippocalcin calcium-dependent insertion and its distribution between different subcellular compartments, respectively; and **Yuriy Danylovych** (O. V. Palladin Institute of Biochemistry, NAS of Ukraine, Kyiv, Ukraine) closed the section, presenting his results of the investigation of the properties of mitochondrial NO-synthase activity in smooth muscle.

Section **"Cell Biology"** was the last section of Conference. Unfortunately, one of the participants, who was in the Conference program, **Serhii Beschasnyi** from Kherson State University Kherson, Ukraine, was not able to be present online due to the absence of internet connection in temporary occupied Kherson. Therefore, only two talks were presented in this section. **Tetiana Bukreieva** (Kyiv, Ukraine) presented her work on T cell response in patients with COVID-19. Her results demonstrated the association of the behavior of T-cell population with levels of cytokines and miRNAs in the cohort studied. **Yuriy Kolupaev** (Kharkiv, Ukraine), reported the results of his work on cell biology of plants, namely about the participation of a signal molecule H_2S in induction of wheat seedlings heat tolerance.

After the last section, the special event of the Conference, the **Panel Discussion "Viruses, evolution, and the struggle for survival. Human progress in diagnosis, therapy, and prevention"**, was performed (Fig. 4).

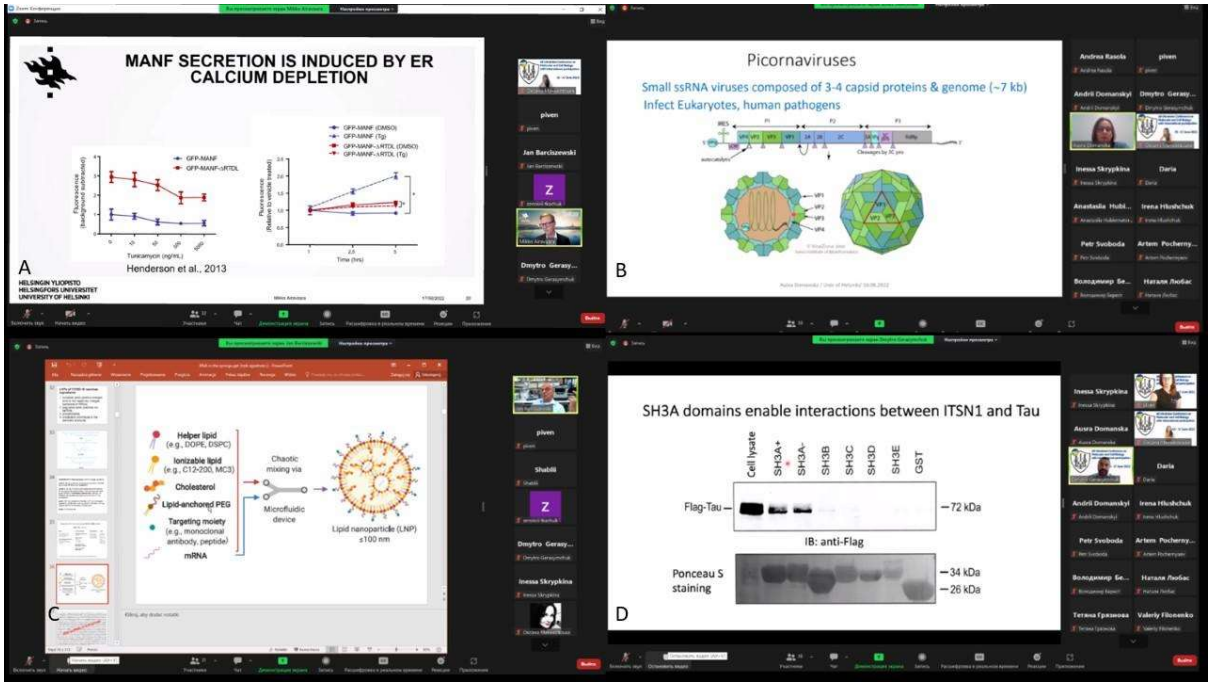

Fig. 4. Mikko Airavaara (A), Ausra Domanska (B), Jan Barciszewsky (C) and Dmytro Gerasymchuk (D) presentations fragments.

Moderated by **Dmytro Gerasymchuk** and **Oksana Piven** from the IMBG, the discussion brought the participants to the exciting journey to the world of viruses. **Olena Moshynets, Mykhailo Tukalo, Zenovii Tkachuk, Jan Barciszewski, Andrii Domanskyi** actively participated in the discussion, in particular, on the strategies of the novel antiviral therapies development.

After the **Panel discussion**, the participants and attendees of the Conference had the opportunity to listen to two more Keynote Lectures and the Special Lecture **Jan Barciszewski** (NanoBioMedical Centre at Adam Mickiewicz University, Institute of Bioorganic Chemistry of the Polish Academy of Sciences, Poznan, Poland) shared with colleagues his vast experience in the development of mRNA constructs for the introduction them inside the living cells, particularly in the context of RNA vaccine development. He mentioned all the necessary components of such constructs and talked about potential issues in this field of research. **Mikko Airavaara** (University of Helsinki, Finland) performed an outstanding lecture on Reporter pharmacology and the potential of these new tools in drug development and quantification of therapeutic efficacy. Finally, **Vitaliy Kordium** (Institute of Molecular Biology and Genetics, NAS of Ukraine, Kyiv, Ukraine) made his Special Lecture with the covert purpose to make scientists always think deeper about their research and results.

Making a summary, the **All-Ukrainian Conference on Molecular and Cell Biology with international participation, dedicated to the heroic struggle of the Ukrainian people against the Russian invaders**, was held at a high scientific level, demonstrated the diversity and high quality of research of scientists from Ukraine as well as their incredible willing to continue their work and professional development even on the background of the war and, on the other side, the outstanding support of foreign scientists to Ukrainian scientific community. The next event was pre-planned to be held in person in Ukraine when it is possible. The abstract book [1] based on the Conference proceedings is published online.

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CONFLICT OF INTERESTS

The author declares that there is no conflict of interest.

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ALL-UKRAINIAN CONFERENCE ON MOLECULAR AND CELL BIOLOGY WITH INTERNATIONAL PARTICIPATION, DEDICATED TO THE HEROIC STRUGGLE OF THE UKRAINIAN PEOPLE AGAINST THE RUSSIAN INVADERS

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The All-Ukrainian Conference on Molecular and Cell Biology with international participation was held as an online event on the Zoom platform, from the 15th to the 17th of June 2022. The purpose of this event was to encourage Ukrainian scientists, to give the opportunity to colleagues from abroad to demonstrate their support to Ukraine, and to keep the scientific process ongoing even in the background of the war. Scientists of every career stage could take part in any way convenient to them. Seven sections of bioscience were available at the Conference, namely: Microbiology and Biotechnology, Genetics and Epigenetics, Molecular biology and Biorganic chemistry, Molecular oncology, Molecular physiology and Biophysics, Cell biology and System biology, and Bioinformatics. 123 scientists from Ukraine and abroad have registered for participation in the conference. 38 oral presentations, 14 poster presentations, 10 Keynote Lectures, and 1 Special Lecture were included in the Conference program. Scientists from all over Ukraine, several European countries Poland, Chech Republic, Germany, Italy, Sweden, Finland), and USA participated in the Conference. On the third day the Panel Discussion on the topic "Viruses, evolution, and the struggle for survival. Human progress in diagnosis, therapy, and prevention", was performed. The abstract book, based on the Conference materials is published online.
KEY WORDS: molecular biology; cell biology; genetics; biophysics; scientific conference.

ВСЕУКРАЇНСЬКА КОНФЕРЕНЦІЯ З МОЛЕКУЛЯРНОЇ ТА КЛІТИННОЇ БІОЛОГІЇ З МІЖНАРОДНОЮ УЧАСТЮ, ПРИСВЯЧЕНА ГЕРОЇЧНІЙ БОРОТЬБІ УКРАЇНСЬКОГО НАРОДУ ПРОТИ РОСІЙСЬКИХ ЗАГАРБНИКІВ

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Всеукраїнська конференція з молекулярної та клітинної біології з міжнародною участю проходила як онлайн-захід на платформі Zoom з 15 по 17 червня 2022 року. Метою цього заходу було надихнути українських науковців та дати можливість колегам з-за кордону продемонструвати свою підтримку Україні, щоб продовжувати науковий процес навіть на тлі війни. Науковці будь-якого кар'єрного рівня могли взяти участь у конференції. На конференції працювало сім тематичних секцій, а саме: мікробіологія та біотехнологія, генетика та епігенетика, молекулярна біологія та біоорганічна хімія, молекулярна онкологія, молекулярна фізіологія та біофізика, клітинна біологія та системна біологія та біоінформатика. Для участі в конференції зареєструвалися 123 науковці з України та з-за кордону. До програми конференції було включено 38 усних доповідей, 14 стендових доповідей, 10 ключових лекцій та 1 спеціальну лекцію. У конференції взяли участь науковці з усієї України, ряду європейських країн (Польща, Чехія, Німеччина, Італія, Швеція, Фінляндія) та США. На третій день відбулась Панельна дискусія на тему «Віруси, еволюція та боротьба за виживання. Прогрес людини в діагностиці, терапії та профілактиці». Збірник тез, складений за матеріалами конференції, опубліковано онлайн.
КЛЮЧОВІ СЛОВА: молекулярна біологія; клітинна біологія; генетика; біофізика; наукова конференція.