



**UNITWIN/UNESCO CHAIRS  
PROGRAMME**

***PROGRESS  
REPORT***

***2010-2012***

**UNESCO CHAIR**

in Cellular and Molecular Neuroscience.

**at the**  
International Center of Molecular Physiology  
National Academy of Sciences of Ukraine.

**KYIV – Ukraine  
2012**

## **UNITWIN/UNESCO Chairs Programme Progress Report**

**Period of Activity: 01.01.2011 – 31.10.2012**

**Title of UNESCO Chair:**

Cellular and Molecular Neuroscience

**Institution/Country:**

International Center of Molecular Physiology

National Academy of Sciences of  
Ukraine

**Report established by:** Prof. Dr. Oleg Kryshstal

**Function/Title:** Chairholder of the UNESCO Chair, Director of the Bogomolets Institute of Physiology NASU and International Center of Molecular Physiology, academician of the National Academy of Sciences of Ukraine

## Summary

In the progress report of the UNESCO Chair in Cellular and Molecular Neuroscience at the International Center of Molecular Physiology National Academy of Sciences of Ukraine the main information about the results of its activity in 2011-2012 is represented.

The most significant measures in the sphere of academic activity connected with the investigations in excitable tissues physiology, using modern molecular and biological methods, namely:

- explanation of nerve cells excitation molecular mechanisms;
  - studying the process of intercellular and intracellular information transfer;
  - investigation the pathology process evolution mechanisms on molecular level and searching the ways of its correction.
1. Organization the international congresses, schools, meetings devoted to actual molecular physiology problems.
  2. Ukrainian and international senior staff work coordination according to scientific programs design collaboration.
  3. Training (post-graduate course, doctor's degree courses).

Thus, during the reporting period 3 seminars, 2 forums, 2 Workshops and 3 international conferences were carried out and 3 international projects implemented with the participation of the UNESCO Chair.

The UNESCO Chair activity was widely illustrated in periodicals, scientific publications and at the site [http://biph.kiev.ua/en/Main\\_Page](http://biph.kiev.ua/en/Main_Page)

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## I. Address and Contact

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## **II. Available Resources**

### **1. Human Resources**

#### **1. *For the Administration of the UNESCO Chair***

Executive Secretary

Dr. Olga Liubanova, Ph.D

#### **2. *For the teaching/training/research activities***

Sector of Molecular Physiology, **head prof. O.A.Krishtal**

Sector of Neurophysiology, **head prof. N.S.Veselovsky**

Sector of Visceral Systems, **head prof. A.A.Moibenko**

Branch of Molecular Biophysics and Physiology,

Physics and Technic Science and training center of NASU, **head prof. O.A.Krishtal**

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#### **3. *For the information and documentation activities:***

Executive Secretary      *Dr. Olga Liubanova, Ph.D*

[lop@biph.kiev.ua](mailto:lop@biph.kiev.ua), tel: +38 044 256 2048

## 2. Material Resources

**Sources:** Host Institution, Governmental body

□ **FOR THE ADMINISTRATIVE WORK:** Computers, fax machines, xerocopy machines, printer, and storage systems.

□ **FOR THE TEACHING/TRAINING/RESEARCH ACTIVITIES:**  
Lecture rooms, conference halls, video-edition, projector, Book edition.

□ **FOR THE INFORMATION AND DOCUMENTATION ACTIVITIES:**  
Web-site, posters, brochures, Proceedings, Book editions.

### **FOR LABORATORY ACTIVITIES:**

1) Laboratory space equipped with general lab instrumentation: refrigerators, freezers, ovens, pH meters, scales, water purification systems, desk top centrifuges, glass electrode pullers;

2) Cell and tissue culture rooms equipped with hoods, CO<sub>2</sub>-incubators, dewars for low temperature cells storage; vibratomes for tissue slices preparation and instrumentation for native cells isolation; various cellular systems (HEK-293 cells, Xenopus oocytes, acutely isolated native cells from different tissues);

3) Fully equipped (with microscopes, amplifiers, solution exchange systems, micromanipulators) experimental setups for electrophysiological studies of single cells and brain tissue slices (patch-clamp), Xenopus oocytes (double-electrode voltage-clamp), multicellular preparations (sucrose-gap), tensometric measurements of contraction on muscle preparations, animal behavioral tests (plantar test, Randall-Selitto test, hot and cold plate tests). Many electrophysiological setups are equipped with fluorescence microscopes, CCD cameras and sets of optical filters and shutters enabling simultaneous fluorimetric monitoring of intracellular Ca<sup>2+</sup> and other second messengers using specific fluorescence dyes;

4) Equipment for molecular biology studies: regular and real-time PCR

machines, electrophoresis apparatus, transilluminators;

5) Two confocal microscopes (upright Olympus and inverted Zeiss) for the conduct of immunofluorescence and imaging studies with various cellular fluorescence markers

6) Two electron microscopes.



### III. Activities

In recent years the international activity of ICMPh NASU was carried out on the basis of a 5-bilateral agreements on international scientific cooperation between ICMPh and foreign research institutions.

- Continued collaboration with the Center Laboratory of Cellular Physiology Lill University of Science and Technology (France) under the bilateral agreement on cooperation between France and Ukraine (2007-2012) in the field of physiology, biophysics and pharmacology.
- Continued collaboration with the University of the United Arab Emirates, Dubai on modulation of ion channel cell bioactive lipids, including endokannabinoids. With this facility agreement on bilateral cooperation and exchange of young scientists in the years 2011-2015.
- There were exchange staff and consultations on international cooperation between the Centre neuronal Research, Medical School, Central University of the Caribbean.
- Continued collaboration with the group Neurobiologie des Réseaux Moteurs. Modèle Murin de Sclérose Latérale Amyotrophique (supervisor - Dr. Jacques Durand) laboratory Plasticité et Physio-Pathologie de la Motricité, CNRS- Université de la Méditerranée, Marseille.
- At the bilateral agreement on scientific cooperation between ICMPh NASU and the Institute of Physiology. Beritashvili Georgian Academy of Sciences (2009-2014), aimed at studying the role opioids and non-opioids inflammatory receptors in pain tolerance to non-opioids analgetics was investigated in rats of different ages.

## 1. Conferences/Meetings

### 1. 5 Workshop “Biophysical research methods-2011”

**Date and place:** April, 2011, Bogomoletz Institute of NASU, Kyiv, Ukraine

**Partnership:** Moscow Physical and Technical Institute, Russia

**Participants:** 55

- ☐ Undergraduate students
- ☐ Graduate students
- ☐ Academics
- ☐ Public administrators
- ☐ Employees from industry, or other private sector
- ☐ Teachers from primary education
- ☐ Teachers from secondary education
- ☐ Teachers from technical and vocational education
- ☐ Other groups

**Geographical coverage for participants and partners:**

- ☐ National
- ☐ Regional/Interregional/International

Regions	Countries
Africa	
Arab States	
Asia/Pacific	
Eastern and Central Europe	Ukraine, Poland, Russia
Western Europe and North America	
Latin America	

### 2. 6 Workshop “Biophysical research methods-2012”

**Date and place:** April, 2012, Bogomoletz Institute of NASU, Kyiv, Ukraine

**Partnership:** Moscow Physical and Technical Institute, Russia

**Participants:** 60

- ☐ Undergraduate students
- ☐ Graduate students
- ☐ Academics
- ☐ Public administrators
- ☐ Employees from industry, or other private sector
- ☐ Teachers from primary education
- ☐ Teachers from secondary education
- ☐ Teachers from technical and vocational education
- ☐ Other groups

**Geographical coverage for participants and partners:**

- ☐ National
- ☐ Regional/Interregional/International

Regions	Countries
Africa	
Arab States	
Asia/Pacific	
Eastern and Central Europe	Ukraine, Poland, Russia
Western Europe and North America	
Latin America	

### **3/ International school Pathways of intracellular signaling**

**Date and place:** October, 2011, Bogomoletz Institute of NASU, Kyiv, Ukraine

**Partnership:** Fundamental Researches State Fund of Ukraine, National Academy of Sciences of Ukraine.

**Participants: 75**

- ☐ Undergraduate students
- ☐ Graduate students
- ☐ Academics
- ☐ Public administrators
- ☐ Employees from industry, or other private sector
- ☐ Teachers from primary education
- ☐ Teachers from secondary education
- ☐ Teachers from technical and vocational education
- ☐ Other groups

**Geographical coverage for participants and partners:**

- ☐ National
- ☐ Regional/Interregional/International

Regions	Countries
Africa	
Arab States	
Asia/Pacific	
Eastern and Central Europe	Ukraine,
Western Europe and North America	Great Britain, Germany

## **5 Congress Ukrainian Society of Neuroscience**

**Date and place:** June, 2011, Bogomoletz Institute of NASU, Kyiv, Ukraine

**Partnership:** . Ukrainian Society of Neuroscience, European Society of Neuroscience

**Participants: 120**

- ☐ Undergraduate students
- ☐ Graduate students
- ☐ Academics
- ☐ Public administrators
- ☐ Employees from industry, or other private sector
- ☐ Teachers from primary education
- ☐ Teachers from secondary education
- ☐ Teachers from technical and vocational education
- ☐ Other groups

### **Regional Coverage**

- ☐ **National**

☐ **Regional/Interregional/International**

Regions	Countries
Africa	
Asia/Pacific	Japan
Eastern and Central Europe	Ukraine, Russia, Poland, Slovakia
Western Europe and North America	Germany, Gr. Britain
Latin America	

**II International symposium "Molecular mechanisms of synaptic transmission regulation"**, to mark the 80<sup>th</sup> anniversary of Academician V.I. Skok (1932-2003)

**Date and place:** October, 2012, Bogomoletz Institute of NASU, Kyiv, Ukraine

**Participants: 70**

- ☐ Undergraduate students
- ☐ Graduate students
- ☐ Academics
- ☐ Public administrators
- ☐ Employees from industry, or other private sector
- ☐ Teachers from primary education
- ☐ Teachers from secondary education
- ☐ Teachers from technical and vocational education
- ☐ Other groups

**Regional Coverage**

- ☐ **National**
- ☐ **Regional/Interregional/International**

Regions	Countries
Australia	
Asia/Pacific	
America	
Eastern and Central Europe	Ukraine, Russia, Slovakia,
Western Europe and North America	Germany, Gr. Britain

**Brain Awareness Week 2011**

**Date and place:** March, 2011, Bogomoletz Institute of NASU, Kyiv, Ukraine

On March, 15 during the World Brain Week, Kiev House of Scientists will host a roundtable on "Life and mind: the standpoint of contemporary science", organized by Ukrainian Society for Neuroscience, Kyiv branch of Ukrainian Biophysical Society and the Kyiv branch of the American Society for Neuroscience. This event will be open for public and invited leading scientists of the Institute of Physiology, Institute of Theoretical Physics and

the Institute of Philosophy, will deliver six lectures to a wide range of listeners, including politicians, journalists and prominent cultural figures.

**Participants: 150**

- ☒ Undergraduate students
- ☐ Graduate students
- ☐ Academics
- ☐ Public administrators
- ☐ Employees from industry, or other private sector
- ☐ Teachers from primary education
- ☐ Teachers from secondary education
- ☐ Teachers from technical and vocational education
- ☐ Other groups

**Brain Awareness Week 2012**

**Date and place:** March, 2012, Bogomoletz Institute of NASU, Kyiv, Ukraine

**Participants: 125**

- ☒ Undergraduate students
- ☐ Graduate students
- ☐ Academics
- ☐ Public administrators
- ☐ Employees from industry, or other private sector
- ☐ Teachers from primary education
- ☐ Teachers from secondary education
- ☐ Teachers from technical and vocational education
- ☐ Other groups

**COST B30 - Training School “Cellular neuropathology: in vitro models”  
Kiev, Ukraine, 3 – 7 June 2010.**

**Participants: 40**

- ☐ Undergraduate students
- ☐ Graduate students
- ☐ Academics
- ☐ Public administrators
- ☐ Employees from industry, or other private sector
- ☐ Teachers from primary education
- ☐ Teachers from secondary education
- ☐ Teachers from technical and vocational education
- ☐ Other groups

**Regional Coverage**

- ☐ National
- ☐ Regional/Interregional/International

Regions	Countries
Australia	
Asia/Pacific	

America	Canada, Brasil
Eastern and Central Europe	Ukraine, Russia, Slovakia,
Western Europe and North America	Germany, Gr. Britain

## **2 Interuniversity Exchanges/Partnership**

1. Kryshstal Oleg, academician
2. Netherland, Amsterdam
3. 7 Forum of European Neuroscience society
4. Report
5. 02.07-16.07.11

### **2.**

1. Lina Achmad 'El Kury
2. 2-year Postgraduate study
3. University of the United Arab Emirates, Dubai
4. Training in ICMPh
5. July, 2011

### **3.**

1. Boldyrev Oleksiy
2. Postgraduate study
3. Turkey Chapter of Society for Neuroscience and the Physiology Department
4. VI. EGE Biennial International Neuroscience Graduate Summer School
5. June 27 - July 2, 2011

### **4.**

1. Kopach Olga.
2. Young scientist.
3. *Main Meeting of the Physiological Society*
4. Oxford (United Kingdom).
5. July 11-14, 2011,



5.

1. Voitenko Nana V. Ph.D., prof.
2. New Orleans, LA (USA).
3. *42<sup>nd</sup> Annual Meeting of SfN*,
4. report
5. October 13-17, 2012

6.

1. Voitenko Nana V. Ph.D., prof.
2. Warsaw, Poland.
3. VIII Parnas Conference
4. Report
5. 27-31 August, 2011

## **IV. Outcomes**

Research studies in the Institute are concentrated on elucidation of molecular mechanisms underlying ion permeability of the membranes of nerve cells.

The main direction of experimental studies is examination of voltage-operated and chemosensitive ion channels responsible for neuron-to-neuron transmission of information and also for sensory functions. Research programs include also investigation of pathophysiological modulation of synaptic transmission in hippocampal slices.

## **V. Forthcoming Activities**

Members of the Center are scientists from various disciplines - molecular biologists, biochemists, biophysicists, electrophysiologist, most of which are joint research projects with foreign academic institutions and foundations, which center serves as co-executor organization, as well as graduate students and students who are attracted to perform research. Over the years the Center has acquired as development of a comprehensive research and basic research and educational institution, where, together with well-known scientists is acquiring experience and promising young people including those from abroad. There is a powerful material base to conduct research work in the relevant global level in the laboratories of the Bogomolets Institute of Physiology and ICMPh. Every year the ICMPh and Bogomolets Institute of Physiology NASU are planning the international conferences and meetings, school workshops for young scientists, which take part in Ukrainian scientists and scientists from CIS countries, Europe and USA. For such events there is some infrastructure that includes conference halls with multimedia facilities, classrooms and laboratories, guests rooms for living scientists and cafe.

## **VII. Development Prospects**

Further activity of the UNESCO Chair is aimed at the implementation of the main trends of the scientific level in order to increase the role of the Bogomolets Institute and International Center of Molecular Physiology of NASU in Ukraine and international science.

Activities aimed at the increase of the collaboration between specialists, consultants, experts and students in the fields of education and science on the national, international and world levels are planned.

Project records (terms of reference, applications) will be developed and the search for possibilities of getting grants for the educational, research and culture projects as well as for training, student and academic exchanges will be conducted.