

A historical overview of the activities of P.G. Kostyuk Ukrainian Physiological Society based on congress materials

Liudmila Klymenko

Bogomolets National Medical University
T. Shevchenko blvd. 13
Kyiv 01601, Ukraine
rpbvrj@ukr.net

Abstract: The aim of this article is to present a periodization of the history of the activities of the P.G. Kostyuk Ukrainian Physiological Society. The article seeks to reveal the significant milestones in the Society's history, from the moment of its creation to the present day, and to highlight its role in the development of physiological science. Its further aim is to highlight the Society's activities in expanding international cooperation.

As in earlier decades, today the Society is directing its scientific potential primarily to modernizing Ukrainian physiological science. The article underlines that the scientific community has done everything possible to integrate Ukrainian science into the world.

To date, there is still no comprehensive study dedicated to the history of the Ukrainian Physiological Society. Therefore, this article analyzes the Society's achievements throughout its existence, reviews its current state, and outlines its prospects and directions of development in Ukraine. The research identified three historical stages in the formation and development of the Ukrainian Physiological Society: the first (1928–1958), the second (1959–1993) and the third stage (1994–present). It emphasizes the role of the Society's Presidium in organizing the Eighth All-Union Congress of Physiologists, Biochemists and Pharmacologists (1956) in Kyiv. The congress became famous for initiating the rehabilitation of physiologists who had been branded as “anti-Pavlovites”.

By analyzing the themes of congresses organized by the Society, the article traces the development of physiological research in Ukraine. Special attention is paid to the international activities of Platon Kostyuk. The article also outlines the current stage of the Society's activities, and its engagement in organizing international forums and supporting young scientists.

Keywords: international cooperation, physiology, congress of physiology, Ukrainian Physiological Society

Introduction

Without a doubt, the Ukrainian Society of Physiologists emerged and developed as a collective endeavor of Ukrainian scientists. Unfortunately, contemporary historians of science have not sufficiently covered the activities of the Ukrainian Physiological Society (UPS) in the literature. This leaves an opportunity for a historical excursion into the history of the activities of the P.G. Kostyuk Ukrainian Physiological Society and its role in shaping physiological science.

A literature review revealed that there are only a few articles discussing the anniversaries of the Society. In particular, I.I. Chentsova, L.M. Shapoval and O.O. Luk'yanets have written short chronological reviews about the history of the Society (Chentsova *et al.*, 2014). A brief overview of the history of the Society was included in the abstracts of the Society's proceedings marking its 90th anniversary (Trokoz, 2019).

In recent years, the Society has published reports on its activities, offering some insights into the society's congresses, grants, and journal publications. Also, the reports inform about the members of the Presidium of the Central Council, the departments of the Society, and about the awards and recognition of scientists for their active contributions to the Society (P.G. Kostyuk Ukrainian Physiological Society, 2012). Detailed information about the Tenth Congress of Physiologists is also publicly available (*XX z'izd...*, 2019).

There are also anniversary articles dedicated to the activities of prominent members of the Society, for example, by Platon Kostyuk (Sagach and Tkachenko, 2024), Oleh Kryshnal (Chentsova *et al.*, 2020) and Mykola Serhiyovych Veselovsky ('Mykola Serhiyovych Veselovsky...', 2025).

The achievements of representatives of Kostyuk's school are highlighted in the monograph *Essays on neurophysiology by Platon Kostyuk and his students*, published in 2020 (Krishtal and Lukyanetz, 2020). The monograph contains articles by Platon Kostyuk as well as contributions from his closest students. The chapters are presented in a chronological order based on Kostyuk's students' collaborations with him and the monograph also includes the recollections of some of his colleagues.

A scientific monograph by O. Zayachkivska *et al.* (2020) sheds light on the activities of the Department of Normal Physiology of the Danylo Halytsky Lviv National Medical University. The authors show that in the past 125 years, the history of the department has been closely intertwined with historical and political events. The authors provide a summary of the scientific activities of the department, reveal previously unknown facts and present unpublished documents and photographs.

The UPS is a member of the Federation of European Physiological Societies (FEPS), whose role has been recognized by the President of the Society David Eisner, Past President Ulrich Pohl and Secretary General Ger van der Vusse (Eisner *et al.*, 2013). The Federation's official academic journal is *Acta Physiologica* and as the authors note, in recent years, it has held meetings with other societies to promote discussion between physiologists from different countries.

Thus, even though the members of the Society have made a significant contribution to the development of physiology, there is still no comprehensive study outlining the activities of the Ukrainian Physiological Society in the literature.

The article therefore seeks to fill that gap by presenting a periodization of the history of the activities of the P.G. Kostyuk Ukrainian Physiological Society. The author also aims to identify the most important events of the Society from its establishment to the present day, position it in the development history of physiological science and outline its efforts to expand international cooperation.

1. The general context and periodization

In the context of a significant expansion of research in various branches of biology, and the spread of the Ukrainian scientific and educational movement, there emerged a need to establish an academic society. Today, the Ukrainian Physiological Society is not only a public organization but also an intellectual center of national importance, which embodies both the national scientific research tradition and the experience of the international physiological community. The Society has more than 700 members who work in various scientific and educational institutions of Ukraine. Until 2014, the UPS had regional departments in Vinnytsia, Volyn, Dnipro, Donetsk, Zaporizhzhya, Ivano-Frankivsk, Kyiv, Crimea, Luhansk, Lviv, Odesa, Poltava, Rivne, Ternopil, Uzhhorod, Kharkiv, Kherson, Cherkasy and Chernivtsi. Donetsk and Luhansk

have been occupied since 2015, and the departments are not currently active as only those scientists who evacuated from the occupied territories have remained active members of the Society. All other departments, of course, have continued their activities.

The organizational achievements of the UPS have been considerable: hosting congresses, initiating international collaboration, publishing activities and creating grants to support young scientists. In the period from 1928 to 2019, twenty congresses were held, drawing participants from various specialties, including clinical medicine, biology, pedagogy, psychology and physiology from Ukraine and abroad. These activities have contributed to the expansion of scientific research in physiology and to the solution of current problems in healthcare, physical education and sports, psychology, pharmacology and other areas.

In the process of research, three major historical stages of the formation and development of the Ukrainian Physiological Society can be identified.

First stage: 1928–1958. The society was originally called the Ukrainian Society of Physiologists, Biochemists and Pharmacologists, as the Ukrainian Society functioned as part of the All-Union Society of Physiologists, Biochemists and Pharmacologists. The year 1928 is considered the date marking the beginning of the activities of the Ukrainian society. The initiative for founding the Society is primarily associated with the famous Ukrainian biochemist O. Palladin, who also became its first president. Members of the Society not only actively participated in All-Union scientific congresses but also organized their own congresses and conferences. From 1928 to 1958, the Society held five all-Ukrainian congresses and one all-Union congress.

Second stage: 1959–1993. In 1959, the organization split into three independent societies: the Society of Biochemists, the Society of Pharmacologists and the Society of Physiologists. The All-Ukrainian Society of Physiologists became a national branch of the I.P. Pavlov All-Union Physiological Society. In 1986, the UPS became a member of the International Union of Physiological Sciences (IUPS).

Third stage: 1994–present. Following the historical events of the early 1990s, which resulted in the collapse of the Soviet Union, Ukraine became an independent state in 1991. Thus, at the Fourteenth Congress in 1994, physiologists adopted a new statute, establishing the UPS as an independent Society under the name

of I.P. Pavlov Ukrainian Physiological Society. Since 1995, the UPS has been a member of the Federation of European Physiological Societies. The Society is productive, developing national physiological science, which, through the efforts of Platon Kostyuk and the Society's leading members, has reached an advanced scientific level, comparable to the rest of Europe. The early twenty-first century saw a certain decline in scientific and publishing activities, which was associated with a decrease in state funding. As many scientists noted, many young people turned away from academia due to low salaries in research. Nonetheless, despite the difficult situation, the Society has found ways to support young people through awards and grants.

2. The main responsibilities of the Society

The Society's main tasks also evolved along the historical developments. The decisions of the first Ukrainian congresses were coordinated with the decisions of the All-Union forums. In the 1920s–1930s, its primary task was to unify scientists across the Soviet Union, promoting scientific exchange and socialist ideals through scientific research. In the 1940–1950s, emphasis was placed on the task of eliminating divides between intellectual and physical labor, between urban and rural populations in the conditions of transition from socialism to communism. In this regard, science organizers recommended expanding work to popularize scientific achievements among workers and peasants. In the 1960s–1980s, the Society pursued already more realistic goals, such as applying the achievements of physiology to healthcare needs.

At the present stage, the Ukrainian Physiological Society has set itself the following tasks: coordination of comprehensive scientific research in the field of human and animal physiology, unification of scientific research and educational work by intensifying scientific research in universities, raising the international prestige of scientific research conducted in Ukraine, and organizing scientific events.

2.1 First stage: the Society's activities in 1928–1958

As mentioned above, Academician Palladin was the organizer and the first president of the Ukrainian Society of Physiologists, Biochemists and Pharmacologists. The decision to establish the Society was announced by Palladin at the Third All-Union Congress of Physiologists, Biochemists and Pharmacologists in Moscow in May–June 1928. The congress participants also decided to hold the Fourth All-Union Congress in Kharkiv.

After returning from Moscow, Palladin convened the First Congress of Physiologists, Biochemists and Pharmacologists of Ukraine. It was held in Kharkiv in July 1928. This moment marked the official establishment of the All-Ukrainian Society of Physiologists, Biochemists and Pharmacologists and became significant as the beginning of a creative association of physiologists, which had a positive effect on the further development of physiology in Ukraine. At the Congress, the participants adopted the Society's Statute and elected its first Presidium. The following scientists were included in the Presidium: O. Palladin, O. Cherkes, Belousov, V. Chagovets, V. Danylevsky, G. Folbort, O. Synelnikov. The governing bodies of the Society were also confirmed: the Congress, the Central Council, the Presidium, and the Audit Commission.

As noted above, the delegates of the Third All-Union Congress assigned Ukrainian scientists the responsibility to organize the Fourth All-Union Congress in Kharkiv (the capital of Ukraine at the time). Therefore, members of the newly established All-Ukrainian Society actively set about to organize this forum, which was held, according to plan, in May 1930. The organizing committee included members of the Presidium of the All-Ukrainian Society and the Berezil Theater in Kharkiv was chosen as the congress venue.

Several features distinguished this Union-wide congress, prepared by the Ukrainian side. First, the event was impressive in its scale, as it drew 559 delegates, including 167 from Ukraine. Second, the organizers invited foreign participants, which was a non-standard approach at the time. In particular, a report was delivered by the German-British biochemist and pharmacologist H. Blaschko (*Tshetvertui Vsesoiuznui sezd...*, 1930, pp. 100–101). Third, students from Ukrainian medical institutes were invited to participate for the first time. As a result, the Resolution of the Congress was recognized for supporting the activities of student scientific circles and promoting the establishment of student forums (The Department of Physiology of the O.O. Bogomolets NMU, 1932).

Understanding their special responsibility for disseminating the achievements of Ukrainian scientists in medicine, physiology, biochemistry and other related disciplines, the Society began to organize its own All-Ukrainian forums from the early days of its existence. At the same time, the organizational committee started publishing the proceedings of the congresses, which highlighted the achievements of domestic scientists in the field of medicine, biochemistry, pharmacology and physiology. The congress materials contain valuable information about the creative activity of various research groups, their developing scientific traditions and emerging directions of research. A historical analysis of the materials reveals that one cannot overestimate the significance of each these congresses. The purpose of the present article, therefore, is to analyze the most influential forums in the history of physiology.

The organization of the Second (Figure 1) and Third All-Ukrainian Congresses coincided with a period of deployment of physiological research in scientific institutions of different regions of Ukraine. The data on the themes of the publications of the first congresses indicate that the physiological groups focused on issues in clinical physiology, the physiology of visceral systems and their regulation, the effects of X-ray radiation on the body, including a few works on electrophysiology (V.I. Vernadsky National Library of Ukraine, 1937; 1939).



Figure 1. O. Palladin (center) and members of the Presidium of the Second Ukrainian Congress of Physiologists, Biochemists, and Pharmacologists. Kyiv, 1937. (Source: Komisarenko, no date.)

Notable contributions came from the teams of the Institute of Physiology, the Institutes of Occupational Hygiene and Occupational Diseases, and the departments of physiology in Kyiv, Dnipropetrovsk, Kharkiv, Donetsk, Odesa

and Lviv medical institutes and Kyiv and Kharkiv State Universities and other institutions.

It should be noted that the thematic scope of the Fourth and Fifth Congresses was quite narrow and focused on the study of higher nervous activity (HNA) and cortico-visceral interrelationships. Thus, many unresolved questions in physiology remained outside the thematic focus. The decade-long interval between these congresses was the result of the notorious events of the 1940s and 1950s in the history of physiology, psychology and medicine, associated with the so-called Pavlovization in science, one of the unfortunate pages in the history of science. During this period, the so-called Pavlovian Council, led by K. Bykov, O. Ivanov-Smolensky and E. Airapetyants, was created to oversee and control research in all leading scientific institutions in the Soviet Union. For ten years, these so-called organizers of physiological science, under the name of the great physiologist I. Pavlov, tried to oppress physiologists pursuing independent, original research and founded their own scientific schools. Ironically, it was during this period that Ukrainian physiologists began to gain international recognition. In particular, Daniil Vorontsov's electrophysiological research attracted considerable popularity, as later recalled by his student Filip Serkov (1986) in a monograph devoted to Vorontsov's scientific activity.

The Pavlovian Council demanded that the Presidium of the Academy of Sciences of the Ukrainian SSR take decisive action against the "anti-Pavlovites". The Presidium thus held several meetings on January 27, 1950 (Protocol 4) and February 17, 1950 (Protocol 8), discussing measures against the anti-Pavlovites. Yet, these documents indicate that the campaign against the anti-Pavlovites in Ukraine was conducted quite formally and without specific criticism of scientists in the Protocols. At a further meeting on May 5, 1950, it was noted that the Presidium had created favorable conditions for physiological research at the Institute of Clinical Physiology (Arkhiv Prezydii NAN Ukrainy, F. R251, op. 1, od. zb. 348).

Due to the activities of the Pavlovian Council, international cooperation was suspended. Scientists lost the opportunity to publish their articles in foreign journals. All scientific teams in the field of medicine, physiology, psychology and biochemistry had to justify their chosen direction of research that did not coincide with Pavlovian teachings. For many scientific teams and individual physiologists, the consequences of such activities turned out to be quite harmful. At one of the meetings of the Pavlovian Council, the activities of the members of the Ukrainian Physiological Society and the editors of the *Medical Journal*

were criticized for allegedly failing to give sufficient recognition to Pavlovian physiology in Ukraine. O. Bogomolets, director of the Institute of Clinical Physiology and the Institute of Experimental Biology and Pathology, was also criticized for departing from the Pavlovian path (Klymenko and Strokina, 2023). Among the Ukrainian scientists who fell under the senseless attack were therapist M. Gubergritz, neuropathologist H. Markelov, physiologist O. Bogomolets, physiologist E. Babsky, physiologist D. Vorontsov and psychologist H. Kostyuk. It should be noted that all the listed scientists responded to undeserved criticism with dignity and confidence. Their persistence and steadfastness in their scientific position and scientific principles allowed research to continue.

The leadership of the Ukrainian Society of Physiologists, Biochemists and Pharmacologists resisted the pressure from some Soviet figures and prevented harmful consequences in Ukraine. However, the Eighth All-Union Congress of Physiologists, Biochemists and Pharmacologists, which was held in Kyiv in 1955 on the initiative of the Presidium of the Ukrainian Society, marked a turning point. Since the congress was organized by the Ukrainian side, it created conditions for the rehabilitation of persecuted scientists. This is not an exaggeration and is proved by two facts. First, Ukrainian physiologists invited foreign specialists from Austria, England, Bulgaria, Hungary, Germany, Denmark, India, China, Mongolia, Poland, Romania and Sweden. Representatives of the Ukrainian Society tried to strengthen the scientific exchange among physiologists from different countries by inviting foreign scientists to the congress. In addition, the presence of foreign specialists created an atmosphere to give legitimacy to the rehabilitation of physiologists. At the final plenary session, Professor Sen (India), speaking on behalf of all foreign guests, warmly addressed everyone present and expressed his gratitude to the Organizing Committee of the Congress and the Academy of Sciences of the Ukrainian SSR for the warm welcome (*VIII Vsesoiuznyi s'ezd...*, 1955). Second, scientists who had been criticized at the Pavlovian Councils, such as L. Orbeli, I. Beritashvili and P. Anokhin, were invited to join the Presidium and continue their original physiological research. The congress also decided to expand the scope of scientific research in the field of physiology, especially electrophysiology ('Postanovlenie...', 1956).

The congress hosted many sections devoted to different branches of physiology. The transcript of the meeting of the 'Electrophysiology' section is of significant historical interest, precisely because this research had been criticized by the Pavlovian Council before the congress. The meeting created all the conditions for open collegial discussion and debate on controversial issues in electrophysiology.

Among the speakers was Vorontsov and at the end of the meeting, physiologist M. Rabinovich spoke in support of him and noted the importance of Vorontsov's research into the electrical reactions of a neuron and its components. Rabinovich regretted that such research was conducted only in the laboratories of D. Vorontsov and I. Beritashvili, adding "this is clearly not enough" (ARAN, F.1818, op.1, od. zb. 101).

2.2 Second stage: the Society's achievements in 1959–1993

This stage began with the reorganization of the Society and its transformation into a scientific center modeled on scientific societies in a particular discipline. Its presidents during this period included D. Vorontsov (1961–1965, see Figure 2) and O. Makarchenko (1965–1968).



Figure 2. Daniil Semenovich Vorontsov. (Source: Liudmila Klymenko's personal archive.)

Physiologists parted from biochemists and pharmacologists and established their own Ukrainian Physiological Society. Considering the overall achievements of the UPS during these times, the Society and its numerous researchers advanced electrophysiological research in the field of physiology and medicine to an internationally recognized level. The publishing of *Fiziologichnyi Zhurnal* was initiated, with the journal now indexed by the Scopus database and published by the Institute of Physiology. Subsequent congresses, starting with the Sixth Congress (1960), were convened as congresses of the Ukrainian Physiological Society. The research focus had fundamentally changed: the scientists' attention, in addition to HNA issues, was once again turned to issues of cell

physiology, membrane science and electrophysiology. D. Vorontsov, P. Kostyuk, F. Serkov, G. Folbort, A. Yemchenko, O. Leontovych, P. Bogach and others were the leading Ukrainian scientists during those years.

The Seventh Congress of the UPS was held in 1964. O. Makarchenko summarized the achievements of Ukrainian physiologists over the previous years and voiced promising perspectives for the development of physiological science. In his opinion, the most promising areas of physiology and the problems of

healthcare, pedagogy and national economy were inextricably linked. That is why he recommended to the director of the O.O. Bogomolets Institute of Physiology to expand its ties with hospitals and universities and provide qualification assistance in training physiologists. Makarchenko also emphasized the need to manufacture devices locally (*VII z'izd...*, 1964).

The activities of scientists in this period were conditioned by certain positive political developments in the Soviet Union. Historians characterize the 1960s as a period of thaw after Stalin's repressions. Therefore, in science in general, and physiology in particular, a noticeable expansion of scientific research was planned. Evidence of that is the Seventh Congress, where reports on the use of cybernetic methods in the study of physiological functions, considered advanced at that time, were presented. In particular, M. Amosov suggested using this approach in the study of cardiac functions. N. Lauer and A. Kolchynska applied this method in the study of oxygen exchange in different age periods and at different partial pressures of oxygen (*VII z'izd...*, 1964).

At the Eighth Congress of the UPS, Kostyuk (Figure 3) was elected chairman of the Society, a position he would hold until his death in 2010.



Figure 3. Platon Kostyuk.
(Source: Liudmila Klymenko's personal archive.)

The reports delivered at the Eighth Congress of the UPS (Figure 4) showed the wide-scale physiological research of the schools of Ukrainian physiologists Daniil Vorontsov and Filip Serkov in the electrophysiology of the central nervous system. Also, interesting contributions were made by P. Bogach to the mechanisms of hypothalamic regulation of the secretory activity of the pancreas, bile secretion, motility of the gastrointestinal tract and absorption processes in the intestine (*Materialy VIII z'izdu...*, 1968). Generally, the Collection of Abstracts of the Eighth Congress is impressive in its volume. All educational and scientific institutes in Ukraine presented their reports. The O.O. Bogomolets Institute of Physiology alone presented around fifty reports.



Figure 4. The Eighth Congress of the Ukrainian Physiological Society, with Platon Kostyuk as the chairman. (Source: Liudmila Klymenko's personal archive.)

The topics of the reports at subsequent congresses showed that Ukrainian physiologists in the 1970s conducted research in many areas of physiology. For example, at the Tenth Congress of the Ukrainian Physiological Society, reports were presented that reflected the work of Ukrainian physiologists in neurophysiology, physiology of higher nervous activity, neurohumoral regulation of respiration, blood circulation, digestion, excretion, etc. (*X z'izd...*, 1977). Studies on the clinical and physiological aspects and those devoted to the physiology of farm animals acquired practical significance.

The main areas of research in the 1980s were the study of nervous processes in the brain and spinal cord and cell physiology, with particularly significant contributions by P. Kostyuk and his scientific school. Extensive research in the field of neurophysiology was carried out by representatives of the school of Filip Serkov, who also was involved in extensive organizational work as the head of the Kyiv branch of the Ukrainian Physiological Society (1981–1995). Serkov was awarded the I.M. Sechenov Prize of the USSR Academy of Sciences in 1989 (Naukovyi arkhiv Instytutu arkhivoznavstva, F. 399, op. 1, l. 179).

The Society achieved notable scientific and organizational progress under Kostyuk's lead. Owing to his innovative research in the field of electrophysiology using microelectrode technology, foreign specialists in this field became interested in the works of Ukrainian physiologists. This, in turn, helped him

establish international ties with scientists from other countries. Kostyuk began inviting foreign physiologists to the congresses, which contributed immensely to the popularization of Ukrainian science. In 1986, the Ukrainian Physiological Society became a member of the International Union of Physiological Sciences.

2.3 Third stage: the Society in the late 20th and early 21st centuries

After the collapse of the Soviet Union in 1991 and restoration of independence in Ukraine, the question of reorganizing the UPS's activities arose. To address this issue, the Fourteenth Congress of the UPS was convened in 1994. The congress delegates adopted a new Statute of the Society, which established it as an independent organization and agreed that subsequent congresses would be held in different cities of Ukraine. Thus, the Fifteenth Congress of the Society was held in Donetsk (1998), the Sixteenth in Vinnytsia (2002) and the Seventeenth Congress, with international participation, was held in Chernivtsi (2006). The latter congress was dedicated to the 125th anniversary of the birth of Academician O.O. Bogomolets.

In 2003, the UPS became a founding member of the Union of Physiological Societies of the CIS. The main goal of this organization was to revive scientific contacts among physiological societies of different countries of the former Soviet Union and to consolidate efforts in support and development of physiological science. Academician O. Gazenko was elected the first president of the UPS–CIS and later Academician Kostyuk succeeded him as the next President of this international organization.

On May 20–22, 2010, the Eighteenth Congress of the UPS was held in Odesa. The congress was organized by the Department of Physiology and Biophysics of the Odessa National Medical University. However, on the eve of May 10, 2010, the famous Ukrainian physiologist and president of the UPS, Platon Kostyuk, died. He was the chairman of the organizing committee and was to be the chairman of the congress. In his absence, V. Kazakov from Donetsk, who was the deputy president of the UPS, presided over the congress. At this Eighteenth Congress, the delegates decided to rename the Society as P.G. Kostyuk Ukrainian Physiological Society. The delegates also decided to establish the Kostyuk Foundation to support talented young scientists in biomedical research.

This decision was motivated by Kostyuk's exceptional contributions to physiological science in Ukraine as well as in the world. An account of Kostyuk's

contribution deserves a separate article. In short, Kostyuk was an outstanding physiologist and biophysicist, member of the National Academy of Sciences and the Academy of Medical Sciences of Ukraine since 1994, of RAS since 1974, the European Academy since 1989, the German Academy of Natural Sciences Leopoldina since 1966, the Academy of Sciences of Czechoslovakia since 1990 and the Hungarian Academy of Sciences since 1990. He was the director of the Institute of Physiology and organizer of science. It was the scientific achievements of Kostyuk and his students that elevated the Institute to the level of a recognized international research center. The scientist founded the International Center for Molecular Physiology of the National Academy of Sciences of Ukraine in 1992, the UNESCO International Chair 'Molecular and Cellular Physiology' in 2000 and also a significant scientific school. Many of Kostyuk's students maintain active cooperation with foreign research institutions. Also, his achievements have been recognized by foreign scientists. For example, Professor Norio Akaike from Kumamoto University in Japan wrote:

I am deeply saddened to hear of the sudden death of the distinguished scholar, Prof. Platon Kostyuk. Accept my sincere condolences on this sad event. I can well imagine what great sorrow it is for all of you at the Bogomolets Institute. He was also my great mentor, who taught me how interesting science is. I will never forget his kindness and attention. (Krishtal and Lukyanetz, 2020, p. 17)

As we can see, Platon Kostyuk was an outstanding figure and the community of physiologists in Ukraine decided to name the society the P. Kostyuk Ukrainian Physiological Society.

In 2015, the Nineteenth Congress of the UPS took place at Danylo Halytskyi Lviv National Medical University. This congress was organized under difficult circumstances, during the second year of the war in eastern Ukraine. Despite these challenges, more than 200 delegates from academicians of the National Academy of Sciences of Ukraine to young scientists participated in the congress. The sessions covered a wide range of physiological research conducted at that time in Ukraine: issues in molecular and cellular physiology, systemic neurophysiology, psychophysiology, physiology of visceral systems, physiology of sports, age-related physiology, immunophysiology, physiology of the reproductive system, environmental physiology, clinical physiology and physiology of farm animals. Understanding the importance of the cooperation of scientists from different countries of the world, the delegates emphasized in the Congress Resolution the need for the integration of Ukrainian scientific community into the European and global physiological community (Shapoval, 2015).

On March 30, 2017, an extraordinary meeting was held, the main purpose of which was to amend the Statute of the public organization Ukrainian Physiological Society. According to the decision of the meeting, a new Statute was adopted. The Statute announced that the main goal of the public organization Ukrainian Physiological Society was to unite the efforts of Ukrainian scientists to solve fundamental and applied scientific problems in various fields of human and animal physiology, to ensure freedom and the implementation of democratic principles in scientific and pedagogical activities. According to the Statute, the supreme governing structure of the public organization Ukrainian Physiological Society was the General Conference, which was to be held once every four years. The Statute also provides for the holding of various meetings for experienced scientists as well as young researchers (Statut..., 2017).

Thus, from May 31 to June 1, 2017, the International Scientific and Practical Conference 'Current Issues in Animal Physiology' was held under the auspices of the P.G. Kostyuk Ukrainian Physiological Society at the Kharkiv State Zoo-Veterinary Academy. (In 2021, the academy became part of the State Biotechnological University). Tragically, in 2022, the building of the Kharkiv State Zoo-Veterinary Academy was damaged during Russian aggression (*Ukrinform*, 2022), and in 2024, its equestrian arena, an architectural monument of the late 19th and early 20th centuries, was destroyed in Russian missile fire, along with the equestrian school and the chemistry building (Savitskiy, 2024).

In recent years, the research of Ukrainian physiologists has focused on clarifying molecular and metabolic processes of the plasma membrane and membranes of subcellular structures (endoplasmic reticulum, mitochondria, nucleus) under normal conditions and in experimental modeling of pathological conditions. Also, physiologists are studying physiological immunology, physiology of visceral systems and psychophysiology, aiming to solve many problems in medicine, particularly in the treatment of ischemia, hypoxia, diabetes and epilepsy. The research also focuses on testing the action of a number of substances that provide good effects on the activity of ion channels and on intracellular regulatory processes, which holds clinical promise in the future.

The Twentieth Congress of the P.G. Kostyuk Ukrainian Physiological Society with international participation was a jubilee event, held in 2019 in Kyiv. Organized by the O.O. Bogomolets Institute of Physiology and the National University of Bioresources and Nature Management of Ukraine, the Congress commemorated the 95th anniversary of the birth of Academician Platon Kostyuk. Two hundred delegates attended, including not only physiologists from



Figure 5. Academician Oleh Kryshnal, chairman of the Twentieth Congress. (Source: *XX z'zd fiziologiv*, 2019.)

Ukraine, but also scientists from Poland, Belarus, Holland, the United States and Australia. At the festive opening of the congress, Oleh Kryshnal (see Figure 5) expressed the opinion of the members of the UPS and emphasized that the Society's mission is, first, advancement of physiology as a scientific discipline, and second, supporting the educational community that educates specialists in biology and medicine. Realization of these tasks will make Ukraine a powerful and fully accepted country.

Well-known foreign scientists delivered greetings. The vice-president of the European Academy, Professor Ole Petersen (Figure 6), addressed the delegates of the congress, emphasizing the persistent high level of research in physiology in Ukraine despite the difficult financial situation.

Professor Senerik Hayrapetyan from Armenia spoke on behalf of UNESCO, delivering a greeting. Video messages by outstanding scientists in the field of physiology and biophysics, Professor Bertil Hille from the University of Washington, USA, the Nobel Laureate Professor Erwin Neyer from Max Planck Institute, Germany and Professor Emilio Carbone from Turin, Italy, introduced interesting facts about Kostyuk's scientific activities and sent good wishes to Ukrainian scientists for prosperity and fruitful scientific interactions.

The following congress, planned for 2023 in Ternopil, did not take place due to the war started by the Russian aggressor.



Figure 6. Professor Ole Petersen, vice-president of the European Academy. (Source: XX z'zd fiziologiv, 2019.)

Nevertheless, regarding grants created by the UPS, in 2010, the Society introduced the P.G. Kostyuk Prize for young scientists. Every year, the UPS announces a competition for young scientists for an annual prize and compensation of travel expenses for internships abroad. According to the Prize announcement, it is advisable to have a recommendation from a branch of the Ukrainian Physiological Society. The award is awarded for an outstanding report at the Congress.

3. International collaboration

As noted above, the Ukrainian Physiological Society is a collective member of international organizations, including the International Union of Physiological Sciences and the Federation of European Physiological Societies.

Understanding the importance of maintaining relations with the world's scientific community, Ukrainian physiologists made efforts to participate in international conferences. Thus, in 1928, Palladin attended a congress in Gothenburg. G. Folbort was a participant in the Thirteenth International Physiological Congress at Harvard University in 1928, and at the Thirteenth International Congress of Physiologists in Boston. In 1929, he also gave a report at the Fifth International Congress of Psychologists in the US. Moreover, he lectured at Mayo Clinic in Rochester and the psychiatry clinic of Johns Hopkins University in Baltimore.

Unfortunately, during the 1940s and 1950s, the Soviet government declared a fight against cosmopolitanism, so Ukrainian physiologists were unable to participate in international conferences. A breakthrough occurred in the 1960s, primarily due to Platon Kostyuk. His scientific research initiated a fundamentally new experimental approach and thus created conditions facilitating closer international activity. Kostyuk was the first in the Soviet Union to introduce the microelectrode technique as the most modern method in the practice of electrophysiological research. His success was reinforced through a fruitful collaboration with Professor J. Eccles, a leading figure in neurophysiology in the world from Canberra, Australia (1960–1961), and in the following years with world-famous American, German and Japanese researchers. As the director of the Institute of Physiology (1966–2010), and head of the UPS, Platon Kostyuk did everything in his power to enhance the prestige of Ukrainian physiologists. With Kostyuk's and his students' scientific achievements, the Institute became an internationally recognized research center.

Various international forums organized by the Society contributed positively to this reputation. In addition to the above-mentioned congresses, numerous meetings were held. In particular, from May 31 to June 1, 2017, the International Scientific and Practical Conference 'Current Issues in Animal Physiology' was held under the auspices of the Ukrainian Physiological Society.

Once conditions were created for cooperation with scientists from around the world, Ukrainian physiologists began to cooperate with foreign specialists. For example, M. Putilin, head of the Department of Normal Physiology at Kyiv Medical Institute, member of the Presidium of the UPS, developed the methodology of functional systems and introduced it in the teaching of physiology in medical institutions in Cuba and Guinea-Bissau (*Arkhiv Natsionalnoho medychnoho universytetu*, F. R352, op. 14, l. 76).

With Kostyuk's assistance, many Ukrainian physiologists received training abroad. Among them, the famous Ukrainian physiologist Volodymyr Skok conducted research at Columbia University in 1959–1960 at the laboratory of the famous neurophysiologist Harry Grundfest. In 1973, he worked at Loyola University, and between 1996 and 1997 at Mayo Clinic in Rochester. For many years, Skok was a member of the editorial board of the international journal *Autonomic Nervous System*.

Today, the O.O. Bogomolets Institute of Physiology of the National Academy of Sciences of Ukraine has compiled an interesting poster illustrating the

structure of the Institute's scientific relations with international organizations from the United States, Germany, Poland, Switzerland and other countries, who cooperate with the Institute's physiologists. For example, G. Skybo, Doctor of Medical Sciences, professor, Corresponding Member of the National Academy of Sciences of Ukraine and head of the Department of Cytology, is known not only in Ukraine but also in leading academic circles in Europe and North America. She has served as a visiting professor in Great Britain, Switzerland, the US, Canada and other countries, has presented reports at authoritative international forums and participated in a number of international research programs.

As noted above, Platon Kostyuk was a member of foreign scientific organizations. He was not the only one, however. For example, O. Palladin was a foreign member of the Polish Academy of Sciences since 1954 and an honorary member of the Academies of Sciences of Bulgaria since 1958, Romania since 1957 and Hungary since 1953 (Naukowyi arkhiv Instytutu arkhivoznavstva, F. 30, op. 1, l. 65). Physiologist V. Frolkis, who specializes in age physiology, was also a member of the New York Academy of Sciences since 1997 (Naukowyi arkhiv Instytutu arkhivoznavstva, F. 341, op. 1, l. 90).

Current members of the Society from different regions try to maintain international ties. For example, the staff of the Department of Normal Physiology of the Danylo Halytskyi Lviv Medical University are members of the British Physiological Society and regularly undertake internships abroad. In particular, Professor O.S. Zayachkivska from the department passed an internship at the American University of Health Sciences in Signal Hill, California, USA. Also, a number of Zayachkivska's research works were supported with grants from the Polish Academy of Sciences and the Physiological Society of Great Britain. She has been representing Ukraine in the international councils of the Global GI Club in FASEB and the IUPHAR-GI section and has co-founded the international SMART LION (Science Medicine Arts Research Translational Lviv International Opportunity Network) scientific conferences dedicated to the development of innovative technologies in medicine (2017–2020). Another fine example is Professor O. Shandra of the Department of Physiology and Biophysics of Odesa National Medical University, who was invited as an honorary lecturer to Venice International University and A. Einstein New York University in 2015. He is an honored reviewer for the international journal *Epilepsy Research*, which is included in many scientometric databases. Also, the employees of the Department of Physiology at the O.O. Bogomolets National Medical University, which the author of this article is affiliated with, as members of UPS, also strive

to strengthen international relations by participating in international conferences and in internships in educational institutions in Finland, Poland, Slovenia and other countries.

The war in Ukraine has made certain corrections in scientific activity, but it has not broken the spirit and determination of Ukrainian physiologists to continue scientific research. A positive point has been the support of foreign scientific organizations. In 2022, the editor-in-chief of the journal *Frontiers in Cellular Neuroscience*, Professor Dirk M. Hermann, invited Oleh Kryshtal, president of the Ukrainian Society of Physiologists and the Ukrainian Society for Neuroscience, to prepare a special issue dedicated to the works of Ukrainian scientists, titled *Global excellence in cellular neuropathology: Ukraine*. In this special issue, Ukrainian physiologists presented their contributions in various areas of physiology and medicine: physiology of the hippocampus, physiology of synaptic impulse transmission, mechanisms of development of epilepsy, Alzheimer's disease, ischemia, hypoxia, brain aging and pain perception, among others.

The close international relations of members of the Society are further demonstrated by certain public statements of support for Ukrainian physiologists by famous physiologists Professor David Paterson, president of the Physiological Society and Dariel Burdass, chief executive of the Physiological Society (The Physiological Society, 2022).

Of course, this article presents only a brief overview of the Society's international cooperation. A more detailed account would require a separate study.

Conclusion

To conclude, the P.G. Kostyuk Ukrainian Physiological Society occupies a worthy place among scientific societies. The history of its formation and development can be divided into three major stages: the first stage (1928–1958), the second stage (1959–1993) and the third stage (1994–now). The Society's activities in the first period are characterized by resilience and endurance under the conditions of political pressure from the authorities. Despite these challenges, the Society supported scientists who were criticized and persecuted, thus contributing to their rehabilitation in the scientific community.

Platon Kostyuk has a particularly important role in the establishment of physiology as a scientific discipline in Ukraine. He directed his personal, scientific and public efforts towards establishing international relations. Owing to Kostyuk, the Society became a member of the International Union of Physiological Sciences in 1986. In 1992, he founded the International Center for Molecular Physiology of the National Academy of Sciences of Ukraine and in 2000, the UNESCO International Chair on Molecular and Cellular Physiology.

In recent years, the UPS has continued the traditions started by Kostyuk and promotes international integration of physiologists. Furthermore, the Presidium of the Society actively supports young scientists. Together with the O.O. Bogomolets Institute of Physiology, it publishes the *Physiological Journal*, indexed in the Scopus database, and helps scientists publish in foreign scientific journals.

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Liudmila Klymenko, Candidate of Historical Sciences in the history of physiology, physiologist and associate professor at the Department of Physiology of the Bogomolets National Medical University. She lectures courses in physiology, cellular physiology, and homeostasis and its regulation. Liudmila Klymenko is the author of 60 scholarly works on the history of physiology and medicine, among them the monograph *History of the formation and the development of Kyiv physiological schools (the late nineteenth and twentieth centuries)*. In recent years, her main research interests have focused on the history of physiological schools, the influence of the political situation in the 1940s and 1950s on the development of physiology, the role of the Ukrainian Society for Physiology in the development of physiology and the history of pathophysiology.