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**PALEOZOLOGICAL SCHOOL AT MOSCOW UNIVERSITY:  
WORK OF M.V. PAVLOVA**

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**ПАЛЕОЗОЛОГІЧНА ШКОЛА В МОСКОВСЬКОМУ УНІВЕРСИТЕТІ:  
ДІЯЛЬНІСТЬ М.В. ПАВЛОВОЇ**

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*The current task of modern historical science is the thorough study of the personalities of prominent people who have made a significant contribution to the formation and development of world science. The article is devoted to the analysis and systematic synthesis of a set of scientific facts that objectively characterize various aspects of the work of the outstanding zoologist of the present-day Mariya Vasylivna Pavlova as the head of the Moscow School of Paleozoologist. In the history of science M.V. Pavlova is known as an outstanding biologist who devoted her entire life to the study of the wonderful diversity of the animal world. She belongs to the cohort of those zoological scientists who have made a remarkable contribution to the evolutionary biology. The analysis of the sources allowed us to give an objective assessment of all that was achieved by Paleozoological School of Mariya Vasylivna.*

**Key words:** paleozoology, paleontology, science, biology, scientific school.

**Introduction.** One of the interesting periods in the history of domestic paleozoology is undoubtedly the end of the 19th - the first third of the twentieth century. During this decisive time, very important discoveries were made in Paleozoological Science, which gave a powerful impetus to the development of domestic and foreign paleontology, formed the main paleozoological researches and created the main paleozoological schools. Referring to the history of Paleozoology of this period is dictated by the need for a comprehensive study of the phenomenon of the emergence of new knowledge in science as a complex and multidimensional process.

**General problem setting.** The rapid progress of Paleozoology in the USSR in the 30's and 40's of the twentieth century has led to the emergence of new hypotheses and theories. In the domestic paleozoology, in addition to the study of methodological and theoretical problems, practical work became of great importance. It is strange that the cognitive history of Paleozoology of these years has fallen out of sight of many researchers. Therefore, it is expedient to study and analyze the activity of the Paleozoological School of Moscow University, which was headed by M.V. Pavlova and it is im-

portant for the research study that took place not only on the territory of the Russian lands, but also on the territory of Ukraine as a whole.

**Analysis of previous researches and publications.** In foreign and domestic historiography there is a number of works devoted to paleozoology of this period. Among the most famous foreign studies of this kind, one can mention K. Tsittel (1934) and A. Romer (1939) [1-2]. Among the domestic authors, the issue of the history of Paleozoology 1930-1940 was covered by L.Sh. Davitashvili (1940, 1948, 1958) [3-5]. However, in works of a generalizing nature, the role of scientific schools and collective creativity in the development of theoretical and applied questions of genetics is given an insignificant place. After all, science is a social institution, which includes, first and foremost, scientists with their knowledge and experience, the distribution and cooperation of scientific work; scientific laboratories and institutes; scientific schools and community. The most successful in this respect was the work of «Pavlov's Geological School» [6].

**The purpose and objectives of the research.** The analysis and coverage of the main stages of the scientific activity of the Moscow School of Paleozoologist, headed by M.V. Pavlova.

**Presentation of the basic research material.** The peculiarity of the studied period is the presence of a wide range of different paleozoology schools: M.V. Pavlova, O.O. Borysiak, I.G. Pidoplichko. It is interesting to trace the history of the emergence of these schools and discover the causes that affected their decay. The analysis of the scientific heritage of domestic paleozoology schools clearly demonstrates the processes of continuity within the school and science in general.

Speaking about the phenomenon of the emergence of ideas in the scientific community the concept of personal knowledge of Michael Polanyi should be remembered (1980) [7]. Since the science is a social phenomenon, the product obtained in the course of scientific ac-

tivity can not be de-personified. This means that the identity of scientists can not be separated from the knowledge created by them. In this case, often implicit knowledge embodied in the system of habits and peculiarities of behavior, are transmitted «from hand to hand», that is, not verbally. Actually, implicit knowledge can explain the phenomenon of the birth of ideas for the collective work of researchers.

Science is social in its nature, and research work of scientists, which are often depicted in historical and biographic works as hermits who devote themselves only to science, are deeply collective in their essence. The human activity is a reflection that acts in the continuous interaction of all previous and present generations. The most important element of such a reflexive culture is the adequate and self-organized attitude to himself or herself, as well as the comprehension-cognitive attitude to the surrounding world [8].

This is a rather non-standard approach to scientific knowledge as a product of personal creativity, and not a single individual in the person of a scientist, but a complex system of interpersonal components that make up the arsenal of scientific and cognitive motivation of the researcher. This position, in our opinion, allows us to determine the complex process of constant development of science, without clear spatial and temporal boundaries. The explanation of the birth of a new science is not limited to theories of paradigm shift or gradual cumulative processes. Often in studies on the history of science the subjects of study are forgotten, describing, for example, the chromosomal theory as a product of the abstract mind. But in science not just the chromosomal theory remains to exist, but Thomas Hunt Morgan and his students as a subjective part of their research program. Moreover, the methods of transferring the initiating mechanisms to the emergence of new hypotheses often make us turn to the sphere of irrational. N.I. Kuznetsova notes: «The tradition that civilization calls «the science» can not be reproduced by showing only products (knowledge) and algorithms of actions (techniques and procedures); no less significant constantly reproduced impulse in the new generations of passion for finding the truth, admiration for the beauty of research, the experience of deep existential content of these mental exercises» [9].

In the social history of Paleozoology, there are many studies that deal with the interaction of science and politics, but, in our opinion, there are still insufficient materials that affect the mechanisms of the birth of conceptual discoveries. Consideration of the issues of the history of the national paleozoology of 1890-1940 on different sides – cognitive, historical, philosophical and psychological – seems rather interesting, as any interdisciplinary study. Our research allows us to trace the genesis of the domestic scientific Paleozoological School and to evaluate the contribution of this school to the development of the biology of the twentieth century.

*Some facts about the concept of a school of science.* In most cases, scientific knowledge is a collaborative work of many minds. As early as the beginning of

science, many studies have become the fruit of associations (schools), often headed by leaders. Such leaders have evolved from generators of ideas to symbols of various scientific directions [10]. With the appearing of a leader who possesses a wide range of qualities for the formation of a scientific direction, and a team capable of developing fundamental ideas, there is a scientific school. But is it always possible to name a team of a scientific organization as a science school? One of the problems is the measure of objectivity in the allocation of an independent scientific school. To solve the problem, it is necessary to determine certain criteria of a scientific school. Of course, every school is a unique phenomenon, so it is difficult to find the strict parameters that determine the scientific school. Yet in our study, we tried to isolate the laws in the emergence of the phenomenon of a scientific school in the domestic paleozoology of the late nineteenth – first third of the twentieth century.

Analyzing the causes of the emergence and development of the school, we came to the conclusion that for a scientific school it is necessary to have a leader with creative potential and certain personal qualities, as well as students capable of implementing ideas. The priority in the organization of the work of any team, without a doubt, is the role of a leader. Very often a scientific school is associated with its leader, while the most of the workers in the creative group remains in the shadow. The head of the school must have a high authority both among the leaders of the scientific community and among the students. The authority of the leader is determined by contribution to science, experience, culture, erudition, the ability to make the best decision in a difficult situation and certain human qualities [11].

Undoubtedly, the group leader is a motivator for the work of scientific school scholars. To explain the mechanism of this influence, we tried from the standpoint of the theory of subjectivity by V.A. Petrovskiy [12-13]. Under the «reflected subjectivity» V.A. Petrovskiy means «the representation of one person to another», «personal contribution to another». The leader of a scientific direction acts as a «significant other» for his students and influences their system of values, thereby indirectly determining the peculiarities of their motivation in solving problems.

The second important condition for the organization of a collaborative research is the presence of fruitful ideas for development. K.A. Lange notes that when characterizing the school, they often say «a direction in science, which has certain features, properties associated with commonality or continuity of principles» [14]. According to I.A. Arshavskiy: «The first and main feature of a scholarly school is, first of all, created by a leader who became headed by the team he had gathered, some of the original ideas or theories in connection with which an entirely new research direction is organized, previously unknown in science» [15].

Speaking of the school, however, it should be noted that the problem developed by the group does not have to be new and original. Even if the leader and his

students are united by common principles in the treatment or form of research of a previously developed problem, then in this case the given team can be called a school. Perhaps, in the conditions of collective consciousness of already realized ideas, there can arise fundamentally new and original hypotheses.

Actually implicit knowledge can explain the phenomenon of the birth of ideas in the collective work of researchers. Recently, interest in the problem of irrational science has been particularly intensified. The presence of irrational layers in the human spirit gives birth to the depth from which new ideas appear. The mutual transition of rational and irrational is one of the fundamental foundations of cognition.

According to P.K. Anochin, «a scientific school – ... this is a tradition of thinking, a special scientific atmosphere» [16]. Unfortunately, often interesting hypotheses can not unite talented researchers around them. The evidence of a lack of only one new paradigm for the formation of a school can be the absence of direct students from Charles Darwin and Dmitry Mendeleev. Young people need to develop basic ideas. Very often a scientific school arises in educational institutions (for example: the school of I.P. Pavlov, the school of O.P. Pavlov, the school of M.V. Pavlova, which arose in domestic universities, the school of Thomas Morgan – at Columbia University). With the advent of young researchers in the school there are new tasks: the development and growth of students, their involvement in new ideas. First, young scientists often copy the head of the school, and this should not be feared, because it corresponds to the goals that are facing the research team – rapid enrichment with knowledge, ideas, methods, style of work. A young person can do it all by herself, but with more energy and time. Any scholarly school has both negative sides: it sometimes strangles initiative, creativity, eliminates members of the group. In preventing such phenomena an important role of the leader (first of all, his personality traits). The terms of the existence of a scientific school are one or two generations of students. Then it must necessarily break apart, although there is a phenomenon of continuity of scientific schools.

The reasons for the collapse of scientific schools may be different: a) the leader's departure and the inability of the students to further develop his ideas; b) the creation of new schools due to the high organizational qualities and enormous scientific potential of former students; c) disorder inside a school (due to personal quarrels and hostility); d) loss of the novelty of the fundamental ideas of the school as a result of changes in scientific paradigms.

Considering the phenomenon of a scientific school, it should be emphasized that it can not be explained outside the system of three coordinates: subject-logical, social and psychological [17]. Such an interdisciplinary approach only proves that the formation of a school is a complex phenomenon, which appears as a result of the plexus of many causes and circumstances.

Therefore, the meaning of the term «scientific school» may be multifaceted.

Of all the variety of definitions, the most successful is the definition of R.A. Fando: «A science school is an association of scientists, often associated with a leader, where there is a continuation in the development of tasks and methods of research. Moreover, the scientific school – a unique phenomenon, which is not only different from the entire scientific community of this era, but also unique in the history of science. Scientific school is associated not only with the leading scientist and disciplinary direction, but also with historical time, as well as with the state and national traditions» [18, p. 9].

As a rule, many factors influence the formation of a school, but the school itself has a huge impact on the development of scientific and social thought. In addition, it is impossible to consider the school in isolation from the peculiarities of the development of science of this period and from other scientific schools. According to M.G. Yaroshevskiy, «the struggle of schools ... most often moved forward scientific thought. But the relations of schools imprinted both on the activities of each individual scientist, and on the general state of science in this era» [19, p. 146]. Given this, one can speak about the origin and development of the Paleozoological School by M.V. Pavlova as a complicated process of formation of scientific schools, which follows from the interaction of scientific, social and psychological components.

Particularly interesting is the genesis of M.V. Pavlova School of Paleozoology on the study of fossil vertebrates. Academician M.V. Pavlova is interested not only in her role in the formation of domestic paleozoology, but also in the peculiar qualities of nature, which caused scientists, over several generations, a sense of the process of development of this science.

In this section, the task of our study is not an analysis of her personality. It is very important to find out the features of the scientific school of M.V. Pavlova and her place in the history of domestic paleozoology, as well as analyze the socio-psychological motives that contributed to the formation of the creative team and provided a long longevity of the methodological ideas of this scientific school.

In 1919 M.V. Pavlova has headed the Department of Paleontology at Moscow University. All employees at the department were chosen by Mariya Vasylyvna herself. M.O. Bolkhovitinova, T.O. Dobrolubova, D.M. Rauser-Chernousova, S.V. Semikhatova, Ye.D. Soshkina, M.I. Shulga-Nesterenko, as well as men V.V. Menner, V.O. Teryaev started to work at the department. Let's try to determine the main scientific and methodological basis in which employees of the Paleozoological School of M.V. Pavlova worked. To do this, you should set up the research credo of Mariya Vasylyvna – the founder of the school.

M.V. Pavlova wrote that she began her path in science while studying at the Sorbonne (in 1880). Substantial biological education has led to a combination of dif-

ferent traditions in the scientific views of a young scientist. But, of course, the scholar of such a scale, which for many years was the leader of the creative team and largely determined the further ways of development of the domestic paleozoology, as a rule, «proceeds» to the usual limits and becomes the founder of a new tradition. And the involvement in the scientific arsenal of the traditions of their teachers (A. Gaudry, M. Neumayr, J. Simpson, V.O. Kovalevsky) is logical, because, as G. Bergson said: «... a thought that brings into the world something new, is forced to manifest with the help of already ready ideas that she meets and attracts to her movement ...» [20, p. 43].

Before the establishment of the Paleozoological School in 1919, M.V. Pavlova has been working on the field of Paleozoological Science for over a number of years (more than 20 years). Her works have greatly enriched the knowledge of scientists about the peculiarities of Paleozoological Science. Her greatest fame brought her a series of studies of ancient fossil ungulates. The work of M.V. Pavlova «Essays on the History of Fossil Ungulates» (1887) was the first scientific publication, which subsequently began a series of works as M.V. Pavlova herself, and employees of the Paleontology Department on the problems of the study of ancient ungulates [21]. The work attracted a lot of attention, and the researcher immediately became visible on the scientific skies. This work on the evolution of the ancient ungulates is the first issue of the series, which M.V. Pavlova also called («Etudes sur l'histoire paleontologique des ongules»). In this remarkable series of works published by M.V. Pavlova for more than 20 years, the family ties of investigated mammals on the basis of Method of V.O. Kovalevsky with the observance of the positions of Darwinism.

To restore the history of the main groups of ungulates M.V. Pavlova not only used all the well-known materials from the museums of Western Europe and America, but also, first of all, sought to highlight the development of mammals in the territory of the Russian Empire, which at that time there were no ideas. As is known, all the classical works of V.O. Kovalevsky were written on the basis of the study of foreign material. And Mariya Vasylyvna compared the results of research on fossil materials from Russia, especially from Ukraine. It was not limited to materials stored in the Museum of Moscow University, but used all trips from the O.P. Pavlov at international congresses to visit all the great museums of Western Europe and North America. At home in the country, she visited almost all university and regional lore museums, described in detail and identified bones of fossil vertebrates that kept there, contacted local lore organizations and individual collector lovers, ethnographers, teachers, and watched new discoveries.

Thus, in her hands concentrated great material, which allowed her to first illuminate the development of Tertiary and Quaternary mammals on the territory of the Russian Empire and Ukraine in particular.

The scientific school of M.V. Pavlova managed to raise the rating of Moscow University for a short-term due to a series of paleozoological works. Investigations of the staff of the Department of Paleontology attracted the attention of not only domestic but also foreign scientists. From the moment of its foundation (autumn 1919), the department, having undergone a difficult path of formation, already in the early 1930s, became one of the leading Paleozoological institutions in the world. Especially great was the merit of M.V. Pavlova in the organization of scientific work of the department [22].

In addition to developing a research problem for fossil ungulates, members of the Scientific Paleozoological School M.V. Pavlova spent many years studying other issues of Paleozoology. Particularly interesting for us are the evolutionary views of the Paleozoological School of this school, which gave an answer to a whole range of issues of evolutionary theory. The answer to these questions is further in separate essays on each member of the Paleozoological School of M.V. Pavlova.

Today, the problem of finding a new methodology in fossil vertebrate research has become more acute than ever. Analysis of the evolutionary heritage of the scientific school of M.V. Pavlova allows to reveal the theoretical and methodological prerequisites for further research in modern paleozoology, and also points to the interdisciplinary approach (involving the achievements of ecology, biochemistry, geology, mathematical modeling and other related disciplines) in solving problems set before the fundamental science.

Despite the significant contribution to the development of biology of the twentieth century. the work of the school of science M.V. Pavlova ended in 1930, with her retirement. Many members of the department, members of the school, switched to the Geological Intelligence Institute, the Paleontological Institute of the USSR Academy of Sciences and other educational and research institutions established in 1930. The workers of the department themselves became outstanding scientists and educators, some of them headed the paleontological departments, others after the end of the Second World War became academics and famous scientists.

**Conclusions.** Great merit of M.V. Pavlova is in the formation of talented paleozoologists, her followers in Ukraine: I.G. Podoplychko, V.A. Topachevskiy, L.I. Rekovets.

During the period of 1920-1930 the foundations of the modern network of scientific institutions of the paleontological cycle were laid. This allowed us to quickly expand the research front. And academicians from 1960-1970 became the leaders of new scientific directions in their majority. The emergence of paleozoology in institutions of different fields: research laboratories, paleozoological centers led to the definition of the main features of the national paleozoology 1920-1930 years.

Including:

- significant proliferation of collective forms of organization of research work, the study of various issues of Paleozoological within individual scientific schools;

- the orientation of a number of studies on their practical significance;

- interest in the problems of changing the whole faunas in the process of life on Earth as one of the fundamental issues of Paleozoology;

- Synthesis of Paleozoology and Evolutionary Theory.

Representatives of the school of M.V. Pavlova had to work at the Paleontological Museum over collections. Mariya Vasylivna wanted her subordinates to systematically review the fossil material in order to «set» their sights on hundreds of models in order to learn to identify those bone material samples that were sent from everywhere, were able to clearly invent them.

Each year, during the arrival of the spring Mariya Vasylivna called on her subordinates to go to the expedition. She told what real expeditions are necessary for each Paleozoologist. Today we can confidently assert that it is the students of M.V. Pavlova who determined by the level of Paleozoological Researches in the first half of the twentieth century in Russia, Ukraine, Georgia and other republics of the former USSR.

Among the most prominent representatives of the school of M.V. Pavlova at the Moscow University should be called Academician V.V. Menner, professors M.O. Bolkhovitina, M.I. Shulga-Nesterenko, V.O. Teryaev.

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**Дефорж Г.В. Палеозоологічна школа в Московському університеті: діяльність М.В. Павлової.**

*Актуальним завданням сучасної історичної науки залишається всебічне вивчення персоналій видатних діячів, що зробили вагомий внесок в становлення та розвиток світової науки. Стаття присвячена аналізу та систематичному узагальненню сукупності наукових фактів, які об'єктивно характеризують різні сторони діяльності видатного зоолога сучасності Марії Василівни Павлової, як керівника московської школи палеозоологів. В історії науки М.В. Павлова відома як видатний біолог, яка присвятила все своє життя дослідженню дивовижного розмаїття тваринного світу. Вона належить до когорти тих вчених-зоологів, які зробили непересічний внесок у розвиток еволюційної біології. Аналіз джерел дозволив дати об'єктивну оцінку всього того, що вдалося досягти палеозоологічній школі Марії Василівни.*

**Ключові слова:** палеозоологія, палеонтологія, наука, біологія, наукова школа.

**Дефорж А.В. Палеозоологическая школа в Московском университете: деятельность М.В. Павловой.**

*Актуальной задачей современной исторической науки остается всестороннее изучение персоналій выдающихся деятелей, внесших весомый вклад в становление и развитие мировой науки. Статья посвящена анализу и систематическому обобщению совокупности научных фактов, объективно характеризующих различные стороны деятельности выдающегося зоолога современности Марии Васильевны Павловой, как руководителя московской школы палеозоологов. В истории науки М.В. Павлова известна как выдающийся биолог, посвятивший всю свою жизнь исследованию удивительного разнообразия животного мира. Она принадлежит к когорте тех ученых-зоологов, которые сделали выдающийся вклад в развитие эволюционной биологии. Анализ источников позволил дать объективную оценку всему тому, что удалось достичь палеозоологической школе Марии Васильевны.*

**Ключевые слова:** палеозоология, палеонтология, наука, биология, научная школа.

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