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Academician Pavlova Mariia Vasylivna (1854–1938): life and scientific work

***Abstract.** The article is devoted to the study of dedicated contribution of academician Mariia Vasylivna Pavlova (Gortynskaya) in the development of Paleozoology Science. It is noted that her research was carried out in several directions including studying the causes of extinction of animals in the past geological epochs, investigating the remains of fossil elephants, rhinos, tapirs, notartiodactyls and artiodactyls, describing the remains of mammals in Tiraspol gravel. M. V. Pavlova described hipparions and horses, found mainly in the southern regions of Ukraine and the Crimea. By this new material she proved that horses had originated from American protogippus. The idea of a single trunk development of horses both the Old and New World caused objections, especially in America, as in Europe, there were no finds of ancient forms of horse series – anchitheriinae and protogippus. M. V. Pavlova consistently sought them in Eurasia, and in 1903 she discovered the remains of the bones of the limbs of these ancient horses. Analysis of the scientific heritage of Academician M. V. Pavlova, an outstanding national paleoscientist, a specialist in evolutionary theory, an organizer of Paleozoology science and a teacher, makes it possible to understand the processes of development of national biological science. She takes one of the places of honor in the world of paleontological science. Her name is associated with the development of Paleozoology science of late XIX – the first third of the twentieth century and the scientific outlook on the development of various Paleozoology concepts, laws and ideas. It suggests the urgency and necessity of this research. Its relevance is also caused by significant civil and scientific value of a person M. V. Pavlova in Paleozoology science, the lack of special comprehensive study of her life, scientific, organizational and administrative activities in the history of science, the need to create the most objective biography of M. V. Pavlova, the analysis of creative works and the importance of the introduction of solid scientific use of new sources and facts.*



Scientific activities of Pavlova as the scientific leader and founder of scientific school and her contribution in Paleozoology science has been marginally disclosed yet.

Keywords: *paleontology; paleozoology; fossil animals; science; education; M. V. Pavlova*

Introduction

81 years have passed since the death of Mariia Vasylivna Pavlova, who in the first third of the twentieth century was a brilliant figure in the history of biological science, including Paleontology (Paleozoology). However, her scientific heritage is still not properly studied, analyzed, duly evaluated and not fully communicated to the contemporary. Unfortunately, there are almost no papers devoted directly to the scientific research activities of her. Also her biography is missing. One reason is that the study of M. V. Pavlova's heritage was conducted by specialists from various sciences (biologists, geologists, geographers) who pursued a specific goal. Of course, it was not possible to cover all the multifaceted and interdisciplinary nature of Mariia Vasylivna unique heritage. Although the national historical and biological scientific literature her role in the development of world paleozoologic science sometimes was covered, yet the diversity of her research interests is crushing a complete image into many individual biographical details. Research of M. V. Pavlova's life and scientific activity was illustrated in the Article of R. A. Chaurina (Chaurina, 2000), in the Articles of Z. A. Bessudnova (Bessudnova, 2004 and 2009), biographical reference of the employee from RAS archives in Moscow V. N. Zahrebayeva (Zahrebayeva, 2015) and a monograph summarizing the works of the author of this article (Deforz, 2015). Unfortunately, we have not encountered the examples of M. V. Pavlova's articles reprint in the scientific literature at present time, her epistolary heritage is shown not sufficiently, there is no any analytical publication of her scientific achievements.

The purpose of this article is to analyze the special features and potential of M. V. Pavlova's scientific works, their world importance and influence on the development of paleozoology.

Research methods

Methodological principles are based on the general principles of historical research, including objectivity, continuity, dialectical understanding of the historical process, priority of documents and literary origins that allow analyzing the activity of M. V. Pavlova fully. The important aspect for this study is the use of research methods: general scientific (typology, classification) interdisciplinary (structural and systemic approach), historical facts (problem-chronological, comparative historical and narrative).

Results and Discussion

Mariia Pavlova (1854–1938) is an outstanding Ukrainian and Russian paleozoologist researcher, the academician of Ukrainian Academy of Sciences

(1921), the member of the Academy of Sciences USSR (1925), honorary academician of the USSR (1930), Honored Scientist of RSFSR (1928). She has described the numerous remains of fossil mammals collected in the former USSR. M. V. Pavlova described hipparions and horses, found mainly in the southern regions of Ukraine and Crimea. This new material proved that horses had descended from American protohippus. The idea of a single trunk in horse development of Old and New Worlds was controversial, especially in America, as in Europe there were no finds of ancient forms of horse series – anchitheriinae and protohippus. M. V. Pavlova consistently sought them in Eurasia, and in 1903 she found the remains of the old leg bones of horses. Later, in the 1930s the study of A. A. Borisiak and E. I. Belyaev confirmed the correctness of the conclusions of M. V. Pavlova. Together with her husband, academician A. P. Pavlov, she created Geology Museum at Moscow University with separate paleontological department (until recently the museum was at the Moscow Geological Exploration Institute and was named A.P. and M. V. Pavlovs). The author of the textbook “Paleozoology” (Part.1–2, 1927, 1929).

M. V. Pavlova was born on June 27, 1854 in Kozelets Chernihiv Province. She got initial education and training at home, and then got secondary education at Kiev Institute for Noble Maidens that graduated from together with her sister in 1872 with the title of a home mentor and the right to teach the Russian language and literature, Natural History, Physics, German language and Literature, French language and Literature and Arithmetics. Having received no access to higher education in Russian Empire, she decided to study abroad.

Her choice was Paris. She listened to the lectures at Sorbonne, one of the oldest universities in the world, and worked in the National Museum of Natural History in Paris. Being a free listener Mariia listened to lectures of Botany from Van Tieghem, whom she always remembered with admiration and bright lectures of Zoology from Edmund Perrier. Simultaneously she was working in the laboratory of Milne-Edwards. But mostly she was under the influence of the lectures from the famous paleontologist Albert Gaudry, one of the first French evolutionary paleontologists, who played a special role in the spread of evolutionary theory in France. Along with Mariia, Gaudry’s lectures were attended by Henry Osborn (1857–1935), who later became a prominent paleontologist of North America and a close friend of Mariya Vasylivna. At Sorbonne M. V. Pavlova studied for 4 years. In 1884, when Mariia was preparing for the final examinations at Sorbonne in a family of associate professor zoologist M. A. Menzbier from Moscow, she meets a young geologist Master Alexey Petrovich Pavlov, a friend of Menzbier at Moscow University. This meeting for Mariia Vasylivna was fateful. Further Mariia became his wife, a friend, a colleague and a soulmate of Alexey Petrovich, he invited her to Moscow and since then they worked together at Moscow University and the Geological Museum and created a separate paleontological department. The main contribution of M. V. Pavlova is that she has become a pioneer in our paleontology as an independent biological science, laid the foundation on which Paleozoology could develop. She is the first organizer

of Tertiary and Quaternary mammals of Russia and Ukraine, Moldova and the Volga region. She had a close connection with many museums of the world, she often helped in the scientific work of paleontological collections.

In 1910 M. V. Pavlova became the professor of Paleontology in National University named after A. L. Shanyavsky. Dr Zoology (honoris causa) of Moscow University (1916). From 1919 to 1930 she headed the first department of paleontology at Moscow State University organized by the. In 1919 Mariia was also the head of the Paleontological Museum of the University.

M. V. Pavlova successfully conducted her research in several research areas. She was fond of Paleozoology problems, studying the causes of animal extinction in the past geological eras, she studied fossils of elephants, rhinos, tapirs, and odd-toed artiodactyl, lower ammonit. She described numerous fossil mammals of Tiraspol gravel. Her talent was clearly manifested in the field of natural science. It was extraordinary ability in the history of science, and in promoting paleozoological knowledge. By multifaceted scientific, social and teaching activity M. V. Pavlova made a significant contribution to the world science and education.

Mariia Pavlova (Gortynskaia) was born in Kozelets Chernihiv region, she belongs to the most prominent paleontologists and paleozoologists of Ukraine and the world in general. She has written a number of scientific papers relating to the evolution of fossil mammals on the territory of modern Ukraine, which did not have any existing notions. Specifically, M. V. Pavlova identified the ancestor of the modern horse. She mentioned her opinion about the place of tertiary horse-hipparion in the evolutionary tree of horses. Before her, Hipparion was considered a direct ancestor of the horse. Mariia convincingly proved that it is only the side branch.

It should be noted that the life of Mariia Vasylivna began in feudal Russia when women could not even dream of higher education, let alone be engaged in scientific activities. Instead, she succeeded. Here is how academician A. A. Borisiak and Professor V. V. Menner spoke in the obituary on the death of the scientist:

“December 23, 1938 Mariia Pavlova completed her life way, the oldest paleontologist of the Union, an honorary member of the All-Union Academy of Sciences, the member of the Ukrainian Academy of Sciences, the professor at Moscow State University and the member of many scientific societies of both Soviet and foreign origin.

The death of this Academic specialist completed a stage in the development of national paleontology that was headed for a long time by a prominent representative M. V. Pavlova. An outstanding talent of Mariia made her name very well known not only here but also in the international community of scientists.

The main contribution of M. V. Pavlova is that she has become a pioneer in our paleontology as an independent biological science, laid the foundation, which was able to develop our national Paleozoology” (Borisyak & Menner, 1939).

Outstanding Russian paleontologist R.F. Hecker in the “Preface” to the book “A. A. Borisyak. Selected works: the centenary of the birth” (1973) wrote about

paleontology, “Paleontology, the study of organisms of the past on the Earth, shaped on the basis of geology and remains closely associated with it. For this reason, until recently, most scientists considered paleontology as geological discipline. However, the remains of once living creatures during their study, of course, also require deep biological approach: only the results of research will be valuable. This truth, which seemingly did not require the evidence became public domain in the last decade.

The main proponent of Biological science and evolutionary Paleontology (paleozoology) in the country was Academician Alexey Borisyak” (Hecker, 1973). These words best suit Mariia Vasylivna Pavlova who enjoyed international recognition.

Nature has generously rewarded her with many talents. Therefore, she successfully conducted her researches in several research areas. She was fond of Paleozoology problems, studying the causes of extinction of animals in the past geological eras, Mariia studied fossils of elephants, rhinos, tapirs, and odd-toed artiodactyl, Lower ammonites, described numerous fossil mammals of Tiraspol gravel.

Her talent was clearly manifested in the field of natural science. It was her extraordinary ability in the history of science, and in promoting paleozoological knowledge. By her multifaceted scientific, social and teaching work M. V. Pavlova made a significant contribution to the world of science.

She has invaluable merits in establishing national paleozoological school. Paleozoological work of this school is known worldwide. The notable place among scientific papers of M. V. Pavlova is occupied by those studies that were the result of synthesis, critical reflection of new concepts: (phylogenetic series of ungulates, the impact of the environment on ungulates). The analysis of these concepts allowed her to draw important conclusions that are in tune with our time.

M. V. Pavlova was an outstanding, unique figure in the national Paleozoology at the end of XIX – the first third of the twentieth century. Thanks to good preparation both in Biology and Geology, she was a very broad-minded. The researcher also showed a special interest in the history of science. Hence her proper historical premonition in solving scientific and organizational issues, M. V. Pavlova was a talented scientist and teacher, a tireless organizer of science and a significant public figure. Considering the state of the early Paleozoology century and right identifying ways of further development, M. V. Pavlova was the tribune of Paleozoology as an independent biological discipline.

Simultaneously, M. V. Pavlova worried about the correct setting and increase of paleozoological researches in biological facilities and high level of teaching Paleontology in higher education. It was mostly thanks to participation of Mariia in different geological congresses, meetings on paleozoology where she touched the problems of studying fauna of Cenozoic era in European part of the USSR and the Urals, as well as on paleozoology teaching at universities. Popularization of paleozoological knowledge M. V. Pavlova also considered as one of her tasks. Comprehensive and in-depth coverage of issues related to paleozoology, bold

initiative and abundant experience in organizational matters scientist actually provided one of the best in the industry of Paleozoology in Soviet Ukraine.

The success of her endeavors and how much she has done throughout her academic life have been related to the fact that she did not work alone, but united around her and inspired a great team of paleozoologists. Mariia believed that an in-depth biological study of fossil remains of mammals not only contribute to a better understanding of ancient organisms and biological laws that are based on the development of the organic world, but also to satisfy the needs of geology.

The most productive period of life and activity of M. Pavlova began with the advent of Soviet power in 1917. Her versatile activity found its expression in the publication of paleozoological books and articles, paleozoological textbooks, manuals, reviews of location of fossil mammals, the work program, the final and theoretical content of training courses in Paleozoology and Paleontology for high school, sketches of life and work of prominent scientists, paleontologists and the history of science, popular articles, editing and translation of many publications (Deforz, 2019).

Highlights of the life and work of M. Pavlova are reflected in a number of biographical sketches, which list her scientific papers as well.

Paleozoological researches of M. V. Pavlova were originally dedicated to ammonites, and then ungulates and Tertiary periods. Later, after Crimea finding of hipparionov mammals, she devoted much time to the study of many other forms of tertiary mammals. As a result of these studies, we see that M. V. Pavlova was one of the prominent specialists of the world importance. Her research has laid a solid foundation of paleozoology vertebrates, centered in the paleontology department of Moscow University.

M. V. Pavlova attracted the attention of scientists who began to work in paleozoology vertebrates – from paleozoology mammals, reptiles, amphibians and fish. This had a significant impact on the formulation and execution of works of fossil mammals as well as in other scientific centers of the Soviet Union and Ukraine in particular. As a result of M. V. Pavlova and her staff's activity there were opened and described several faunas of four-Permian, Triassic and Tertiary periods.

Proceedings of M. V. Pavlova, dedicated to fossil mammals, are examples of depth study of fossils of animals of paleozoological research. In these writings she made a detailed morphological description of skeletal remains, applied functional analysis of the structural features of the animals, figured out the ecology of animals that have died, established their phylogenetic relationship, the progress of individual branches of hoofed mammals have suggested centers of formation and direction of migration in tertiary terrestrial faunas.

The remains of vertebrates described by M. V. Pavlova and her staff got to the Museum of Natural History at Moscow University and Paleontology Department of the Geological Museum in Geological Institute. Animal fossil museum of M. V. Pavlova always attached great importance. Some skeletons are collected and displayed in museums by her personal initiative and control. She is always involved

in the matters of searching fossils, excavations and study their location, organization preserving and processing the obtained materials. A lot of articles M. V. Pavlova are especially devoted to evolutionary Paleozoology.

M. V. Pavlova was always interested in the works of classical sciences such as geology, biology and paleontology (paleozoology). She studied it and felt it her duty to acquaint them with the wide range of readers. At the same time, reading classic works disclosed Mariya stages of science and pointed the way for further development. Foremost in historical and scientific legacy of the rank of V. Kovalevsky, A. Gaudry E. Cope, L. Rutimeyer etc. Mariya highly valued achievements of these scientists in front of science and did all that was in her power to continue the case. In her research she guided the ideas of V. Kovalevsky. The collected materials about her proboscidian subsequently played an important role in the dismemberment of Quaternary and Pliocene. She studied history of ungulates (horses, rhinos, tapirs, etc.). She developed exemplary method of paleozoological practical exercises. She is a honorary member of the Union Paleontological Society (since 1931). She received the Gold Medal of A. Gaudry Geological Society of France (1926).

M. V. Pavlova was a researcher enthusiast; she loved her science of paleozoology and actively participated in its development. Her works are written in clear, sometimes even artistic language. Many publications of M. V. Pavlova were recommended for the general readership of her time, but with the same interest they are read today and by future generations of paleozoologists, biologists, geologists, geographers.

M. V. Pavlova was always true to herself, to go where her mind asked. She always risked, she went to a new, unfamiliar sphere of activity. She sought to reveal herself in all the skills that have been released to her by nature; she has sought to serve the sphere of activity in which she believed.

Conclusions

The article contains theoretical generalization and new decision of scientific task that is manifested in discovering the phenomenon of scientific achievements of M. Pavlova. This problem is solved by using managed system approach, modern research methods, theoretical understanding of the processes of science, which demonstrated the urgent need for national science in such an individual as M. V. Pavlova, considering her life and activity in the context of socio-political and cultural life of the Russian Empire and Ukraine, as well as the global research and education process, especially in evolutionary biology and paleozoology as well. Detection of M. V. Pavlova contribution in the development of science and education allowed her to enter as original academic research in paleozoological corporation in the history of not only domestic but also world science. A systematic analysis of life and work of M. Pavlova enables a comprehensive approach to the study of current topics, previous researchers disclosed only partially.

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Дефорж Ганна

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Академік Павлова Марія Василівна (1854–1938): життя та наукові праці

Анотація. Дана стаття присвячена висвітленню внеску академіка Марії Василівни Павлової (Гортинської) в розвиток палеозоологічної науки.

Наголошується, що свої дослідження вона здійснювала за кількома напрямками: вивчала причини вимирання тварин у минулих геологічних епохах, досліджувала викопні рештки слонів, носорогів, тапірів, непарнокопитних і парнокопитних, описала рештки ссавців Тираспільського гравію. М. В. Павлова описала гіппаріонів і коней, знайдених в основному в південних областях України та Криму. На цьому новому матеріалі вона довела, що коні походять від американського протогіппуса. Уявлення про єдиний стовбур розвитку коневих Старого і Нового Світу викликало заперечення, особливо в Америці, тому що у Європі були відсутні знахідки давніх форм коневого ряду – анхітерія і протогіппуса. М. В. Павлова вперто шукала їх у Євразії, і у 1903 р. виявила рештки кісток кінцівок цих давніх коней. Аналіз наукової спадщини академіка М. В. Павлової – видатного вітчизняного палеозоолога, фахівця в галузі еволюційної теорії, організатора палеозоологічної науки і педагога – робить можливим розуміння процесів розвитку вітчизняної біологічної науки. Вона посідає одне з почесних місць у світовій палеонтологічній науці. З її ім'ям пов'язаний розвиток палеозоологічної науки наприкінці ХІХ – першої третини ХХ століть і наукового світогляду стосовно розвитку різних палеозоологічних концепцій, законів та ідей. Це дозволяє стверджувати про актуальність і необхідність проведення даного дослідження. Його актуальність зумовлена також значним громадянським і науковим значенням постаті М. В. Павлової в палеозоологічній науці, відсутністю в історії науки спеціального комплексного дослідження її життя, наукової, організаційної та адміністративної діяльності, необхідністю створення максимально об'єктивної біографії М. В. Павлової, аналізу її творчого доробку, а також важливістю введення до наукового обігу масиву нових джерел і фактів. Досі було мало розкрито діяльність М. В. Павлової як наукового лідера та засновника наукової палеозоологічної школи, її внеску в палеозоологічну науку.

Ключові слова: палеонтологія; палеозоологія; викопні тварини; наука; освіта; М. В. Павлова

Дефорж Анна

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Академик Павлова Мария Васильевна (1854-1938): жизнь и научные труды

Аннотация. Данная статья посвящена освещению вклада академика Марии Васильевны Павловой (Гортынской) в развитие палеозоологической науки. Отмечается, что свои исследования она осуществляла по нескольким направлениям: изучала причины вымирания животных в прошлых геологических эпохах, исследовала ископаемые останки слонов, носорогов, тапиров, непарнокопытных и парнокопытных, описала остатки

млекопитающих Тираспольского гравия. М. В. Павлова описала гиппариона и лошадей, найденных в основном в южных областях Украины и Крыму. На этом новом материале она доказала, что лошади произошли от американского протогиппуса. Представление о едином стволе развития лошадиных Старого и Нового Света вызвало возражения, особенно в Америке, потому что в Европе отсутствовали находки древних форм лошадиного ряда – анхитерия и протогиппуса. М. В. Павлова упорно искала их в Евразии, и в 1903 обнаружила останки костей конечностей этих древних лошадей. Анализ научного наследия академика М. В. Павловой – выдающегося отечественного палеозоолога, специалиста в области эволюционной теории, организатора палеозоологической науки и педагога – делает возможным понимание процессов развития отечественной биологической науки. Она занимает одно из почетных мест в мировой палеонтологической науке. С ее именем связано развитие палеозоологической науки в конце XIX – первой трети XX века и научного мировоззрения по развитию различных палеозоологических концепций, законов и идей. Это позволяет утверждать об актуальности и необходимости проведения данного исследования. Его актуальность обусловлена также значительным общественным и научным значением фигуры М. В. Павловой в палеозоологической науке, отсутствием в истории науки специального комплексного исследования её жизни, научной, организационной и административной деятельности, необходимостью создания максимально объективной биографии М. В. Павловой, анализа ее творчества, а также важности введения в научный оборот массива новых источников и фактов. До сих пор была мало раскрыта деятельность М. В. Павловой как научного лидера и основателя научной палеозоологической школы, ее вклада в палеозоологическую науку.

Ключевые слова: палеонтология; палеозоология; ископаемые животные; наука; образование; М. В. Павлова

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