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Essay on the life and activities of V. Lihin (1846-1900)

Abstract. *The article deals with the facts of the life and work of the prominent Odessa scientist, doctor of mechanics, professor of the Novorossiisk University Valerian Lihin (1846-1900). At the present stage of development of the history of science and technology, a comprehensive analysis of the scientific work of V. Lihin, presented in the field of mechanics and mathematics, while work in other directions remained beyond the curiosity of historians. The role of Lihin in the organization of the scientific school of theoretical and applied kinematics is shown. As a teacher, Valerian Mykolayovych formed a new approach to teaching applied mechanics, constantly emphasizing the important influence of this science on the development of technical progress and the industrial complex of the economy. And his activities in the number of scientific, technical and charitable societies are almost unknown. Thus, Valerian Lihin was a member and held management positions in the three most famous scientific and technical societies of Odessa. Their influence on the socio-economic development of the city and region is analyzed. The basic directions of activity of Lihin in the structure of the Association are established and their expediency from the point of view of historical retrospective is considered. Particular attention is paid to the Odessa branch of the Russian Technical Society, which Lihin has been managing for 15 years. This time has become a period of intensive and extensive development, and its activity has actively contributed to the development of the city and the economic prosperity of the region. Equally important, in our opinion, is the research and organizational work of Valerian Lihin in the Society of Naturalists, which contributed to the dissemination of the results of his research work in broad circles. Also the work of a scientist within the Society of Horticulture is noted, where he demonstrated his talent as an organizer of the educational process. The gardening school, created on the initiative of Lihin, contributed to the transformation of Odessa into a flowered garden among the steppe. The article highlights his role in the organization and development of special technical education in the South of Ukraine. It was this talent that contributed to his rapid career growth.*

Keywords: *Novorossiisk University; mechanics; kinematics; Odessa branch of the Russian Technical Society; Society of Naturalists; Gardening Society*



Introduction

Valerian Mykolayovych Lihin – one of the forgotten names of national history. A scientist, a public figure, a person of progressive thinking, whose activity is difficult to overestimate for the development of science and education in Odessa, the region as a whole. And, if for historians of science and technology he was known as a mechanic scientist, who first developed the questions of kinematics in domestic science, then other aspects of his life and activities remained unknown for a long time. The purpose of the article is to highlight its teaching, scientific, organizational and public activities within the Novorossiysk University and in Odessa.

Research methods

The basis of this work is the general scientific principles of research, such as objectivity, scientific, historicism, systemic, complexity. When writing the work was applied: historical, problem-chronological, historiographical and biographical methods. Widespread use of analysis and comparative-historical methods allowed identifying and tracking the main milestones of Valerian Lihin's life and work.

Results and discussion

Valerian Mykolayovych Lihin was born on July 26, 1846 in St. Petersburg. Subsequently, in 1854 his family moved to Odesa. In 1864 Valery Mykolayovych Lihin entered the Reshylevskyi Lyceum, and then, in connection with the opening of the Novorossiysk University in 1865, he was enrolled as a student of the Faculty of Physics and Mathematics of the same university. In 1869, V. Lihin graduated it with the Candidate of Mathematical Sciences degree and received a gold medal for the work "On the gravity of ellipsoids". Valerian Lihin spent the whole year at the Zurich Polytechnic School for the study of practical mechanics. In 1872 V. Lihin passed an examination for a master's degree in applied mathematics and soon he was elected assistant professor at the Department of Mathematics at the Novorossiysk University. V. Lihin in 1874 defended a thesis at the Kharkiv University for a doctor's degree and was elected an extraordinary professor. (Oven, Rishavi & Zanchevskiy, 1900, p. 44-49).

V. Lihin was an outstanding scientist and talented teacher. He lectured on all sections of theoretical mechanics, taught the theory of transfer mechanisms, the theory of regulators, the mechanical theory of heat and the theory of thermal machines, hydrostatics and hydrodynamics, descriptive geometry. His "Lectures on Applied Kinematics", "Theory of gear wheels" were published in 1884. For the first time in the program of the university in the 1874-1875 academic year, they introduced a descriptive geometry and machine drawing.

Under the leadership of Lihin formed a new direction in the research and teaching of mechanics at the university. The questions of applied mechanics began to occupy an important place in the university curriculum and the scientific activities of its students. The number of training hours for teaching mechanics courses was increased. Valerian Mykolayovych insistently introduced practical and seminars on

mechanics, on which the tasks were solved and difficult theoretical questions were considered (Bogolyubov & Shtoklo, (Eds.), 1987, p. 217).

Teaching and research activities V. Lihin at the university were extended to mathematics. In particular, he paid attention to the problems of the mechanical solution of algebraic equations (1877). From the beginning of the 70's he began to read at the university the descriptive geometry and provided a high level of teaching. (Bukatevich et al., 1968, p. 271).

Valerian Mykolayovych conducted a rather thorough methodical work during the preparation of the disciplines he read. I was preparing methodical manuals for students, translated the most relevant textbooks. The translations made by V. Lihin of Descriptive Geometry and Sonne's textbook "Basic Principles of Applied Mechanics" are known. He also prepared bibliographic manuals on various issues of mechanics and mathematics. (Lihin, 1883, p. 1-15).

Professor of Novorossiysk University V. Lihin created in Odessa a scientific school on theoretical and applied kinematics, the most striking representatives of which were Kh. Hokhman, I. Zanchevskiy, D. Zeiliher, M. Vasyliiev. It should be noted that the works of V. Lihin and his students on the theory of gear and hinge mechanisms, the theory of interconnections, the theory of structure and synthesis of mechanisms, the theory of screw computing were of a priority nature.

Most of scientific work of V. Lihin had a single direction - the study of theoretical and applied kinematics. To develop the geometric theory of the motion of a point and the unchanging system, the scientist proposed in 1872, in the paper "Geometric theory of the motion of a point and the unchanging system," a new approach to the description of kinematics, dividing it into geometrical and mechanical parts. In the geometric part, the laws of finite and infinite displacements of points were investigated without the concept of time, and in the mechanical - the laws of changing the velocities and accelerations of the points that were deduced as a consequence of the geometric part. In addition, the scientist has greatly summarized the ideas of M. Shale. In his work "Generalization of some geometric properties of the motion of systems" (1873), he proved the new general properties of the acceleration of the "n" – order of points of the immutable system in its motion, and studied the flat motion of the collinear-variable system.

V.M. Lihin first showed the general properties of accelerations of any order of points of the unchanging system while moving in parallel with a fixed plane, with its most general spatial motion, as well as moving around a fixed point, determined the geometric points of points with unit, normal and full acceleration "n" is the order of the specified types of motion of the unchanging system, which summarized the previous results of A. Rezal and O. M. Somov.

In the work "The Classification of Toothed Wheels" (1874), the scientist, based on the most general geometric theories of the theory of engagement, developed the theory of gear transmissions and created the first classification of both existing and non-existent, but theoretically possible gear wheels based on their characteristic

parameters. Unfortunately, this scientific fact remained almost unseen in the scientific literature on applied mechanics.

In 1878, the scientist published a paper "An Essay on the New Views of Relo on the mechanism", which represented the first critical review of the theory of Relo in Ukraine. V. Lihin clarified this Relo definition of the machine, proposed his own method of kinematic and geometric synthesis of hinged mechanisms on the basic introduction of the concepts of pair with double and three-way mobility.

V. M. Lihin was the first in Ukraine interested in the theory of plane hinge mechanisms, created (1883) a generalized bibliography of works on this theory. In the writings "On Hinge Rod Systems" (1885) and On the Hinge Systems of Poselie, Hart, Kempe, he developed the theory of hinged guiding mechanisms, and deduced the relation between the kinematic characteristics of this and the transformed movements in each of the mechanisms of Poselie-Lipkin, Hart, and Kempe.

He was a profound connoisseur of the latest ideas of the European machine science, and he constantly acquainted the domestic scientific community with the works of its founders, and stimulated the development of applied mechanics in Ukraine.

After 25 years of dedicated work at the University, in 1895 Valerian Mykolayovych left teaching work. He was elected to the position of mayor, instead of and after the recommendation of Hryhorii Hryhorovych Marazli, who resigned for health reasons (Reshetov & Izik, 2012, p.141-147).

In the second half of the nineteenth century in the South of the Russian Empire began rapid industrial and economic development. In particular, the pace of growth was amazing Odessa. During this period, the seaport and railways are rapidly developing, various workshops and factories are being built in the city, a unique water supply and sewage system, active electrification, a large number of public and residential buildings are being built. All these transformations would be hard to imagine without the participation of the Odessa branch of the Imperial Russian Technical Society.

The creation and development of the OB IRTS was due to the enthusiasm of a number of prominent engineers, scientists, technicians, and culture. The Society operated in Odessa from 1871 to 1920, but the flourishing of its activities was associated with Valerian Mykolayovych Lihin, who was the chairman of the Branch from 1882.

By joining the Society in 1874, Valerian found him not in the best condition: in the four departments of the Society there were 73 members, the meetings were held not regularly. Lihin joined the IV-mechanical department and proved to be very active and effective. A year later he was elected as the head of the IV department. But his effective nature required even more. Through his hard work, he quickly gained recognition among the members of the society, his progressive thinking and attempts to popularize science and technology, his sincere love for his native land contributed to his election in 1882 to the post of the leader of the OB IRTS.

It is from this time that active intense and extensive development of the company begins. For 15 years, that Lihin was the chairman of the OB IRTS, the company expanded to 350 members. The range of issues that the Odessa Branch was doing so broad that there was a need for the creation of divisions. Some departments - building, architectural and mechanical - existed since the opening of the Odessa Branch of IRTS. Subsequently, chemical, marine, mining, military, photographic, Standing Committee on Technical Education, factory, sanitary-technical, and electrical engineering departments were formed. In addition, the directions of activity have become very diverse:

- since 1882 OB IRTS began to participate in various industrial and scientific exhibitions, and subsequently to hold its own (photo exhibition 1890, exhibition of professional education dedicated to the 100th anniversary of Odessa in 1894, 1895 military exhibition and exhibition is devoted to questions of a house-building);

- since 1883, the society, together with the Kiev branch of the Russian Technical Society, began to conduct excursions to various industrial objects;

- since 1885, the society begins its own publishing activity, the "Notes of the Department" are published;

- in 1891 a school of tenants of the building industry was founded;

- In 1892, the opening of its own OB IRTS house;

- 1892 arrangement of 2 laboratories in the premises of the house: chemical and photographic;

- In 1893 handicraft courses were opened;

- In 1895 the courses of photography were opened.

On May 6, 1892, the ceremony of the ceremonial laying of the building of the Odesa branch of the Imperial Russian Technical Society took place. And already on November 29, 1892 the house was opened. (*Zapysky Odesskoho Otdelenyia Imperatorskoho Russkoho Tekhnycheskoho obshchestva*, 1893, p.17-18) This was the first case of possession of immovable property in the history of the Russian Technical Society.

He brought many benefits to the Permanent Commission on Technical Education (*Otchet o deiatelnosti Odesskoho Otdelenyia Imperatorskoho Russkoho Tekhnycheskoho obshchestva za 1891, 1892*, p. 1-4), headed by Lihin from 1891 to 1896. This commission carried out enormous work: in 1894 the First Exhibition of Technical and Vocational Education was held, the materials of the exhibition "Technical and Professional Schools of Odessa" were published, the School of Construction Tenants was created (*Otchet o deiatelnosti Odesskoho otdelenyia Imperatorskoho russkoho tekhnicheskoho obshchestva za 1896 hod, 1897*, p. 2-53).

Immediately after the opening in 1856, the Novorossiyskiy University became a center for the development and dissemination of progressive scientific ideas. Therefore, it is logical that a number of scientific societies were founded on the basis of the University: the Society for History and Antiquities, the Society of Naturalists there were also charitable societies: Society for the Relief of Graduates of the University.

V. Lihin was a member of the Society of Naturalists from November 27, 1876.

Since November 20, 1876, the Society has a Mathematical Branch, chaired by one of the vice presidents, who have traditionally been chosen from mathematicians. Thus, the first chairman was Professor M. Umov from 1876 to 1880, Professor V. Lihin occupied this post in 1880-1889 (Markevich, 1890, p. 724).

His activities within the framework of the Mathematical Department were very active and diverse: he delivered reports and abstracts (*Zapysky Novorossyiskoho obshchestva estestvoispytatelei*, 1877; *Zapysky Matematycheskoho otdeleniia Novorossyiskoho obshchestva estestvoispytatelei*, 1881; *Zapysky Matematycheskoho otdeleniia Novoros-syiskoho obshchestva estestvoispytatelei*.1883; *Zapysky Matematycheskoho otdeleniia Novorossyiskoho obshchestva estestvoispytatelei*, 1885; Lihin, 1885), conducted correspondence with leading mathematicians and mechanics on actual scientific problems – the results were immediately reported to members of the society. In 1880, Valerian Mykolayovych was elected Vice-President of the Society and chairman of the Mathematical Department. On behalf of the department, he established cooperation with the world's famous mathematical organizations.

In 1887, the Novorossiysk Society of Naturalists consisted of 133 members, among them 17 honorary, 108 active and 8 employee members. President of the Society V. V. Zalenskyi, vice-presidents – V. M. Lihin, A. O. Kovalevskyi, N. A. But the administrative work of Lihin made itself felt, the activity in the Mathematical Department is significantly reduced in comparison with the first decade of the department's existence. In 1886 the Mathematical Branch of the Society held only 1 meeting, where 3 reports were heard.

1889 Valerian Mykolayovych Lihin left the post of vice-president of the Society of Naturalists and the manager of the Mathematical Department, having left the work at the Novorossiysk University, due to the heavy burden of public activity.

Valerian Lihin's life forces were devoted to one more Society. In 1884, the department of the Imperial Russian Gardening Society was founded in Odessa. The Society was headed by Hryhorii Hryhorovych Marazli. Valerian Mykolayovych Lihin was a deputy chairman of the Odessa Department of the Imperial Russian Gardening Society and held this post until 1897, when he was forced to leave the city in connection with the increase.

Over the first two years of its existence, more than 300 members joined it. The Society's activities took place on a unique schedule – in the winter the Gardening Society held a meeting, where discussions were held on various branches of the gardening industry. In the spring, summer and fall, members of the Society conducted excursions to explore the gardens and get acquainted with the various techniques of care for fruit trees and other plants.

Almost immediately, among the members of the community, there was the idea of creating a school for the training of qualified gardeners. The initiator of the school, according to the memoirs of the members of the society, was V. M. Lihin.

On October 10, 1886, a school was opened. The school course consisted of a two-year preparatory class and a three-year specialized course. In the preparatory class there was a course of elementary folk college, low-literate or non-writing young men aged 13-14 years were taken to it.

We know about the history of the origin and existence of the school thanks to the work of P. S. Shesterikov. The publication of the 25th anniversary of the Odessa gardening and gardening school is dedicated to the bright memory of the initiator of the school - V. M. Lihin (Shesterikov, 1912, p. 1-3).

In 1889 Valerian Lihin left the teaching staff – he was elected to the post of Comrade of City Mayor. Under his guidance and with the direct participation, a number of educational institutions were opened. The number of popular schools increased almost twice, the female gymnasium turned into a professional. The city's 6-year school was organized, which in 1897 gave the name of V. M. Lihin (Stoletye Odessy, 1894, p. 65-67).

Valerian Mykolayovych also took care of the creation of the Polytechnic Institute in Odessa. It was he who raised this question back in 1895 at the meetings of the Odessa branch of the Imperial Technical Society. In his address, V. Lihin analyzed the needs of the South of the Russian Empire in qualified personnel and the possibility of their training by local educators. Such ideas of Lihin were actively supported by his patron and friend, even from the student's years – Serhii Yuliyovych Vitte (Vitte, 1924, p. 57-60).

On the initiative of S. Yu. Vitte, the Ministry of Finance contributed to the promotion of higher technical and commercial education in Russia. Thus, in the opinion of Vitte, one could solve a number of problems in the national economy of the country. According to the estimates, the Ministry of Finance annually released significant amounts of money for the maintenance of polytechnic institutes. With the direct participation of the Ministry of Finance, Kyiv and Warsaw (both in 1898) and St. Petersburg (in the fall of 1902) polytechnic institutes were established. (Ilyin, 2006, p. 128-130).

In 1895, Valerian Mykolayovych became a mayor, replacing the previous one who left this post because of a poor health condition. Position of city mayor V. M. Lihin occupied until 1897.

1897 became a turning point in the career of Valerian Mykolayovych. He was recommended as one of the candidates for the post of Minister of Education. But he did not get this post. He was appointed ad the Trustee of the Warsaw School District, where he actively contributed to the opening of the Warsaw branch of the Imperial Russian Technical Society (1897) and the Warsaw Polytechnic Institute (1898).

Valerian Mykolayovych died in the beginning of 1900. He was buried in Odessa on January 25 with all possible honors as one of the greatest citizen.

Conclusions

Occupying an active public position, V. Lihin took care of the general state of education and literacy of the inhabitants of Odessa and the country. He was a member

of a variety of scientific, non-governmental organizations and charitable foundations. Its contribution to the development of the city and region cannot be overestimated.

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Нарис життя та діяльності В. М. Лігіна (1846-1900)

Анотація. В статті розглянуто факти життя та діяльності видатного одеського науковця, доктора механіки, професора Новоросійського університету Валеріана Лігіна. На сучасному етапі розвитку історії науки і техніки, комплексний аналіз наукової діяльності В. Лігіна, представлений в галузі механіки та математики, в той час, як робота в інших напрямках залишилась поза межами цікавості істориків. Показано роль Лігіна в організації наукової школи теоретичної та прикладної кінематики. Як педагог, Валеріан Миколайович сформував новий підхід до викладання прикладної механіки, постійно наголошуючи на важливий вплив цієї науки на розвиток технічного прогресу та промислового комплексу економіки. А його діяльність в складі чисельних науково-технічних та благодійних товариств є майже не відомою. Так, Валеріан Лігін був членом та займав керівні посади в 3 найвідоміших науково-технічних товариствах Одеси. Проаналізовано їх вплив на соціально-економічний розвиток міста та регіону. Встановлено основні напрямки діяльності Лігіна в складі Товариств та розглянуто їх доцільність з точки зору історичної ретроспективи. Особливу увагу приділено Одеському відділенню Російського технічного товариства, яким Лігін керував впродовж 15 років. Цей час став періодом інтенсивного та екстенсивного розвитку, а

його діяльність активно сприяла розбудові міста та економічному процвітанню регіону. Не менш важливими, на нашу думку, є науково-дослідна та організаційна роботи Валеріана Лігіна в складі Товариства Природознавців, що сприяла поширенню результатів його дослідницької роботи в широких колах. Також розглянута робота науковця в складі Товариства Садівництва, де проявив себе його талант, як організатора освітнього процесу. Школа садівництва, створена за ініціативи Лігіна сприяла перетворенню Одеси на квітучий сад серед степу. В статті висвітлено його ролі в організації та розвитку спеціальної технічної освіти на Півдні Україні. Саме цей талант сприяв його стрімкому кар'єрному зростанню.

Ключові слова: Новоросійський університет; механіка; кінематика; Одеське відділення Російського технічного товариства; Товариство природодослідників; Товариство садівництва

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Очерк жизни и деятельности В.М. Лигина (1846-1900)

Аннотация. В статье рассмотрены факты жизни и деятельности выдающегося одесского ученого, доктора механики, профессора Новороссийского университета Валериана Лигина. На современном этапе развития истории науки и техники, комплексный анализ научной деятельности В. Лигина, представленный в области механики и математики, в то время, как работа в других направлениях осталась за пределами интереса историков. Показана роль Лигина в организации научной школы теоретической и прикладной кинематики. Как педагог, Валериан Николаевич сформировал новый подход к преподаванию прикладной механики, постоянно подчеркивая важное влияние этой науки на развитие технического прогресса и промышленного комплекса экономики. А его деятельность в составе многочисленных научно-технических и благотворительных обществ почти неизвестной. Так, Валериан Лигин был членом и занимал руководящие должности в 3 самым известных научно-технических обществах Одессы. Проанализировано их влияние на социально-экономическое развитие города и региона. Установлены основные направления деятельности Лигина в составе обществ и рассмотрены их целесообразность с точки зрения исторической ретроспективы. Особое внимание уделено Одесскому отделению Русского технического общества, которым Лигин руководил в течение 15 лет. Это время стало периодом интенсивного и экстенсивного развития, а его деятельность активно способствовала развитию города и экономическому процветанию региона. Не менее важными, по нашему мнению, является научно-исследовательская и организационная работы Валериана Лигина в

составе Общества естествоиспытателей, которая способствовала распространению результатов его исследовательской работы в широких кругах. Также рассмотрена работа ученого в составе Общества Садоводства, где проявил себя его талант, как организатора образовательного процесса. Школа садоводства, созданная по инициативе Лигина способствовала превращению Одессы в цветущий сад в степи. В статье освещена его роль в организации и развитии специального технического образования на Юге Украины. Именно этот талант способствовал его стремительному карьерному росту.

Ключевые слова: *Новороссийский университет; механика; кинематика; Одесское отделение Русского технического общества; Общество естествоиспытателей; Общество садоводства*

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