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DEVELOPMENT OF MYCOLOGY AND PHYTOPATHOLOGY AT BOTANY DEPARTMENT OF NOVOROSSIYSK UNIVERSITY (XIX – BEGINNING OF XX CENTURY)

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Abstract. The article considers the history of initiating and conducting research in mycological and phytopathological areas at Novorossiysk University from the moment of its foundation to the beginning of the twentieth century. The preconditions for the origin of the studying fungal flora by scientists of the Russian Empire and the achievements in this field are shown. The interrelation between activities of natural scientists from various scientific and educational institutions of that period is emphasized. The works of the heads and employees from Botany Department at the mentioned university, in particular L.S. Tsenkovsky, I.F. Koshchug, M.K. Sredinsky, Ya. Ya. Waltz, L.V. Reinhard, F.M. Kamensky, I.L. Serbinov, etc are analyzed. It is shown that the ontogenetic method developed by Tsenkovsky in relation to saprophytic fungi was essential for the studying pathogenic forms, which expanded the possibilities for further development of the parasitic direction in phytopathology. It is proved that the study of the stages in development of saprophytic forms in mucous fungi by scientists was a prerequisite for the discovery by Tsenkovsky's student M.S. Voronin of parasitic representatives from Mycetozoa that can cause diseases of agricultural plants. The significance of contemporary achievements for the further development of phytopathology as a separate branch of applied mycology, as well as for the emergence of new areas of research is revealed. Thus, the priority results of Botany Department were morphological and ontogenetic approach in mycology, elucidation of the process of symbiosis between fungi and higher plants, the development of mycorrhiza theory and the study of mixed infection. In such way, the work summarizes achievements of natural scientists from Novorossiysk University and reveals their importance for the further development of phytopathobacteriology and mycology.

Key words: ontogenetic method, saprophytic fungi, parasitic phytopathology, applied mycology, mycorrhiza, mixed infection.

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РОЗВИТОК МІКОЛОГІЇ ТА ФІТОПАТОЛОГІЇ НА КАФЕДРІ БОТАНІКИ НОВОРОСІЙСЬКОГО УНІВЕРСИТЕТУ (XIX – ПОЧАТОК XX СТ.)

Анотація. У статті розглядається історія започаткування та проведення досліджень мікологічного і фітопатологічного напрямів у стінах Новоросійського університету від моменту його

заснування до початку XX століття. Показано передумови зародження вивчення грибної флори вченими Російської імперії та отримані досягнення в цій сфері. Підкреслюється взаємозв'язок діяльності дослідників-природознавців різних наукових та освітніх установ того періоду. Проаналізовано роботи очільників та співробітників кафедри ботаніки зазначеного університету, зокрема Л.С. Ценковського, І.Ф. Кощуга, М.К. Середінського, Я.Я. Вальца, Л.В. Рейнгарда, Ф.М. Каменського, І.Л. Сербінова тощо. Показано, що онтогенетичний метод, розроблений Ценковським стосовно сапрофітних грибів, мав суттєве значення для вивчення патогенних форм, чим розширив можливості подальшого розвитку паразитарного напряму у фітопатології. Доведено, що саме дослідження вченим стадій розвитку сапрофітних форм слизневих грибів стало передумовою відкриття його учнем М.С. Вороніним паразитних представників міксоміцетів, які здатні викликати захворювання сільськогосподарських рослин. Розкрито значення тогочасних розробок для подальшого розвитку фітопатології як окремої галузі прикладної мікології, а також для виникнення нових напрямів досліджень. Так, пріоритетними результатами роботи кафедри ботаніки стали морфолого-онтогенетичний підхід у мікології, з'ясування процесу симбіозу грибів із вищими рослинами, розвиток вчення про мікоризу та вивчення явища змішаної інфекції. Таким чином, у роботі узагальнені досягнення вчених-природничників Новоросійського університету і розкрито їх значення для подальшого розвитку фітопатобактеріології та мікології.

Ключові слова: онтогенетичний метод, сапрофітні гриби, паразитарний напрям фітопатології, прикладна мікологія, мікориза, змішана інфекція.

Introduction. The first information about the mycological flora of Ukraine appeared in the late eighteenth century as a result of expeditions organized by the St. Petersburg Academy of Sciences to study the natural resources from little-explored regions of the Russian Empire. The German naturalist Johann Gildenstedt (1745–1781) was the first, who visited New Russian steppes in 1774 as a member of Samuel Gottlieb Gmelin's academic expedition (1745–1774). In his travel records among the lists of flowering plants, mosses, ferns and horsetails there are notes about fungi. In 1788–1796, Karl Ivanovich Gablitz (1752–1821), also a participant in one of S.G. Gmelin's expeditions, was appointed as vice-governor of the Tavria province. He owns the first natural-historical description of the Crimea, where is also information about fungi.

More thorough data on the mycoflora of Ukraine appeared in the first half of the XIX century. In 1830 I. Yundzil published a work in Vilno, which contained a list of mushrooms collected by him in the Volyn and Podolsk provinces. In 1836 the work of I.A. Weinman was published, in which 1123 species of fungi were described, in particular from Ukraine. A. Demidov, who traveled through Ukraine in the 1840s, compiled a large collection of mushrooms and passed it on to the French mycologist J. Leveier. After studying it Leveier described 197 species of fungi found in Ukraine, mainly in the Crimea. But the regular study of mycoflora from Ukraine began only after the opening first universities [14].

At Kharkiv University mycological research began since the founding of the Botany Department (1822) and was associated with the beginning of V.M. Cherniaev (1793–1871), professor of natural history and botany. The main merit of V.M. Cherniaev in mycology is that he was the first in Ukraine turned to the development of this field, initiating regular mycological research. He was one of the first in Russia and Ukraine to introduce drawing (color watercolor images of fungi) as one of the methods of research and scientific documentation in mycology. He held mass gatherings of objects in various geographical areas, aiming to find a comparative method of research. He also did much to promote scientific knowledge in the field of botany, including mycology.

On May 17, 1872, L.S. Tsenkovsky (1822–1887) was confirmed an ordinary professor of the Botany Department. Mycological topics of the Kharkiv period include two articles by the scientist, the first of which was published in the bulletin of the Academy of Sciences. The second article is devoted to tracing the genetic links between different representatives of the fungi that form white film in the production of wine, vinegar, sauerkraut and cucumbers, and was presented at a meeting of the Fourth Congress of Naturalists in Kazan.

At the beginning of the 20th century, A.O. Potebnya (1870–1919), the son of the well-known Ukrainian linguist O.O. Potebnya, began working at Kharkiv University. On

November 16, 1908, A.O. Potebnya defended his master's dissertation on the history of the development of some lower and higher fungi. According to T.D. Strakhov, the most characteristic feature of A.O. Potebnya's work was the experimental establishment of genetic links between different forms of fungi by studying the history of their development [18]. The result of A.O. Potebnya's research was his proposed classification of fungi, later supported by well-known mycologists. It was more perfect than adopted abroad (P.A. Saccardo). He was one of the first to establish a phylogenetic link between sexual and asexual forms of certain fungal species.

At Kyiv St. Volodymyr University during the first three decades after its establishment in 1834, no mycological research performed, except floristic expeditions of O.S. Rogovich (1812–1878), who headed the Botany Department from 1859 to 1868. Starting from 1870 the Botany Department of Kyiv University was headed by I.G. Borshchov (1838–1878). His most interesting and extensive work in the field of mycology contained a description of the fungal flora of the Chernihiv province. It describes 173 species of fungi and myxomycetes, their ecological and physiological data: this was one of the first attempts in Russia to describe fungi without limitation, but with establishment of their links betweem environmental conditions and physiological properties.

Novorossiysk University, opened in Odessa in 1865, became the third in Ukraine after Kharkiv and Kyiv. From the moment of its establishment, the Botany Department was organized in it, many employees of which performed research in the field of mycology.

Historiography. A number of works are devoted to the history of mycology and phytopathology, some of which analyze the contribution of Ukrainian universities to the development of these fields [5, 7, 12, 14, 16].

However, it should be noted that, despite the significant contribution of Novorossiysk University staff in the development of mycological and phytopathological areas, consideration of their works remains a little-studied topic in native historiography. This is a main reason for the choice of article subject. Special methods were used in writing the work, among them historical-biographical, historical-chronological, retrospective and methods of source analysis.

Thus, **the aim of the article** is a more complete reproduction of scientists' activities at Novorossiysk University in the field of mycology and phytopathology.

Basic material and results. The main direction of mycological research at Novorossiysk University in the second half of the XIX century was studying lower fungi. It was promoted by the success of microscopy and the introduction of new research methods. The predominance of floristic works in this direction was explained by the necessity to study the mycological flora in large areas. At the same time, the field of applied mycology began to develop quite rapidly – phytopathology, which studied fungi caused diseases of wild and cultivated plants. And soon, it left theoretical mycology far behind in terms of the number of works [17].

The first head of the Botany Department at Novorossiysk University was the famous scientist Lev Semenovich Tsenkovsky, who was born on October 1, 1822, in Warsaw, in a poor family of a Polish worker. In 1839, after successfully graduating from the Warsaw Provincial Gymnasium, he was sent to study at the University of St. Petersburg, where he received a scholarship from the Kingdom of Poland [13, p. 360]. After graduating from the Faculty of Physics and Mathematics of St. Petersburg University and heading the Botany Department (1854), he was the first in Russia to introduce practical classes for students with a microscope, which at that time was not always used even in Western European universities.

In St. Petersburg, L.S. Tsenkovsky performed classic works on the history of the mucous fungi development – myxomycetes, which marked the beginning of a new stage in the development of mycology in Russia. He found the presence of mucous fungi at different stages of development, which was evidence of incorrect description concerning lower organism in an eternally stable form. Along with describing the forms of fungi and determining their place in the systematization of issues related to the development of their biology, they have become an integral part of both mycological and phytopathological research. Despite L.S. Tsenkovsky was not a mycologist, meanwhile he became one of the main creators of morphological and ontogenetic direction in mycology. The ontogenetic method developed by him in relation

to saprophytic fungi proved to be fruitful in relation to pathogenic forms, expanding the possibilities for development of the parasitic direction in phytopathology. L.S. Tsenkovsky's discovery related to stages of development in saprophytic forms of mucous fungi led to the revelation by his student M.S. Voronin of parasitic representatives from myxomycetes that can cause diseases of agricultural crops [18].

After moving to Odessa in 1865, L.S. Tsenkovsky devoted much energy to the organization of the Botany Department entrusted to him, which he headed for six years (1865–1871). Despite the constant lack of funding, the scientist managed to equip it with microscopes and other necessary equipment, move it to a more appropriate room (from Dvoryanska Street to the house on Preobrazhenska Street). Being excellent lecturer, he was supported and respected by students, as it was noted by the historian of Novorossiysk University O.I. Markevich [12, p. 422–423].

Working in Odessa, L.S. Tsenkovsky initiated a systematic natural and historical study of the Novorossiysk and North Caucasus regions, especially microscopic organisms, including algae and fungi. He himself was practically not engaged in floristic research in the field of mycology, but promoted their conduct every way, involving his scholars and students to do the same investigations. Thanks to this, the staff and students of Novorossiysk University surveyed Kherson, Dnipropetrovsk and Odessa regions, the North Caucasus region, Bessarabia, the Dnieper strip of Ukraine and Moldova and partly the Caucasus. A significant number of microscopic fungi that cause diseases of wild and cultivated plants have been identified. In 1871 L.S. Tsenkovsky was invited to head the Botany Department at Kharkiv University and left Odessa.

In 1870, one of the first students of Novorossiysk University, I.F. Koshchug (1844–1878), became a lecturer of botany [14]. Ivan Fedorovich Koshchug, a native of Bessarabia, graduated from university in 1869. During his hard work he attracted the attention of professors Tsenkovsky and Yanovich, and on their presentation on January 1, 1870 he was left at the university to prepare for a professorship in botany. Two months later he defended his work on mucous fungi, gave two test lectures and was approved as a private associate professor. In May 1872, I.F. Koshchug defended his master's thesis in botany and was approved as a full-time associate professor. He taught plant morphology and taxonomy, and after L.S. Tsenkovsky left for Kharkiv, he studied plant anatomy and physiology. Continuing his scientific activity, he studied the development of mucous fungi, started by his teacher. In September 1873, I.F. Koshchug resigned and entered the Military Medical Academy on a scholarship from Baron Ville. After graduating from the academy, he was appointed military doctor and, participating in the war on the Balkan Peninsula, became seriously ill. Shortly after the war he died in Odessa.

Almost at the same time another student of L.S. Tsenkovsky, Nikolai Konstantinovich Sredinsky (1843–1907), was left at Novorossiysk University to prepare for a professorship in botany. As far back in his student days, he attracted the attention of professors, and in 1870, when he was in his fourth year, the Faculty of Physics and Mathematics applied to leave him a fellow from May 1, 1871. After graduating from university and receiving a Ph.D. on September 1, 1871 he was appointed as a professor's fellow for 2 years, during which he passed the master's exam.

M.K. Sredinsky is an author of several works on botany. His book summarizes the results of floristic research conducted in the Novorossiysk region and Bessarabia, describes flowering, higher and lower spore plants, including fungi. At the end of the book is a summary list of fungi collected by him in the lower reaches of the Dnieper (south of Kakhovka), in the lower reaches of the Dniester (in Bessarabia), in Kherson and Odessa provinces, in the Crimea and other regions. In total, it contained about 250 names of species and forms of fungi and myxomycetes. In addition to his own collection, M.K. Sredinsky also mentioned the collection of Leverier and other botanists who visited Ukraine and the Crimea. Interestingly, among other species of fungi, he named parasitic fungi of cultivated plants, including head, rusty and powdery mildew, and described the nature of the diseases caused by them.

M.K. Sredinsky was among the botanists of Novorossiysk University, who initiated the creation of mycological and phytopathological herbarium at the botanical office. In 1872 he presented to the Novorossiysk Society of Naturalists a collection of fungi, which contained 96 forms, including parasitic. In 1874 M.K. Sredinsky was sent to St. Petersburg to defend his dissertation, but he never became a university lecturer, although he continued to engage in botanical research.

After L.S. Tsenkovsky left Odessa, the Botany Department of Novorossiysk University was headed by Yakov Yakovlevich Waltz, who was born in Kyiv in 1841, graduated in 1857 with a medal from the 1st Kyiv Gymnasium and the Faculty of Physics and Mathematics of Kyiv University. After that in 1861 he received the title of candidate for a well-executed dissertation. In 1866, after passing the examination for a master's degree in botany and defending his master's dissertation on November 15, he went abroad for 2 years under the direction of the Ministry of Education. He worked first in Berlin with Hanstein, Brown and Pringsheim, and then in Freiburg with A. de Barry.

After returning to his homeland on December 18, 1865, Ya. Ya. Waltz defended his doctoral dissertation at Kyiv University and began lecturing on plant anatomy and physiology there as a private associate professor. For the first time at this university he introduced practical classes on the study of lower plants. In 1868, Ya. Ya. Waltz was elected extraordinary professor in place of O.S. Rogovich, who retired and taught morphological botany. From 1868 to 1871 he headed the Botanical Garden of Kyiv University. He took an active part in the work of the Kyiv Society of Naturalists, was its president. On October 4, 1871, at the suggestion of I.M. Sechenov, Ya. Ya. Waltz was elected an ordinary professor at Novorossiysk University and moved to Odessa. Together with the leadership of the Botany Department (1871–1879), acting as dean of the Faculty of Physics and Mathematics and teaching, he performed a lot of scientific work on the ontogenetic study of algae and fungi, and became one of the pioneers in the development of ontogenetic methods in Russian Empire.

Two works that can be attributed to the field of phytopathology belong to the Odessa period of Ya. Ya. Waltz's activity. The first of them is lectures on diseases of cultivated plants caused by fungi, published in 1871 in several issues of the journal «Russian Agriculture» [19], as well as separate issues. One of them was devoted to the so-called «bags of plums» – a disease of fungal nature, which is observed in plums, thorns, cherries, mirabels, peaches [21]. Ya. Ya. Waltz solved this problem by finding out the role of the fungus Exoascus pruni as a pathogen [1]. The second of Waltz's works on the importance of fungi in the economy of nature is written in a popular style. It explains in accessible language what is higher and a lower fungi, saprophytes and parasites, as well as what is the harmful effects of the latter [20, p. 9].

After Ya. Ya. Waltz Botany Department was occupied by L.V. Reinhard (1847–1920), who headed it from 1880 to 1885. Ludwig Vasyliovych was born in Kyiv, studied at the 1st Kyiv, and then at the Kursk Gymnasium and Kharkiv University. After graduation he remained to work as a private associate professor, teaching at the Kharkiv Veterinary Institute at the same time. After becoming a master of botany, in the autumn of 1880 he became an associate professor of botany at Novorossiysk University. Taking into account the degree of preparation of L.V. Reinhard's doctoral dissertation, on January 1, 1885 he was appointed extraordinary professor, and after successfully defending it in Kharkiv on January 2, 1886 he took the place of ordinary professor at Kharkiv University. L.V. Reinhard gained popularity in the scientific world as an algologist, but among the works of the Odessa period is known one dedicated to fungi – parasites of cultivated plants [15].

In 1886–1887, Vikentiy Ferdinandovych Khmelevsky (1880–1933), who was engaged in mainly algological research, as well as the study of the simplest fungi in Bessarabia, was appointed as professor at the Botany Department. In 1889 he was offered the position of head of the Botany Department of the New Alexandria Institute of Agriculture and Forestry, and left Odessa.

With starting work at the Botany Department of the famous morphologist, florist, systematizer F.M. Kamensky morphological and systematic and floristic studies of higher

and lower plants became much more active. Franz Mikhailovich Kamensky was born on October 9, 1851, in Lublin, graduated from the Warsaw Real Gymnasium and the University of Warsaw. A year after entering the university, he went abroad, where as a student he attended university lectures at the Department of Natural Sciences of the Faculty of Philosophy and studied in laboratories in Strasbourg with A. de Barry and in Breslau with Ferdinand Kon. In 1875, after passing his doctoral examination and defending his dissertation at the University of Strasbourg, F.M. Kamensky was awarded the degree of Doctor of «Philosophiae naturalis». Starting from 1877 he worked as a private associate professor of botany at the University of Lviv and at the same time as an associate professor gave lectures at the Lviv Polytechnic Academy and the Veterinary Institute. In 1882 he passed the examination for a master's degree in botany at Novorossiysk University, the following year he defended his master's dissertation in St. Petersburg and gave two test lectures, recognized by the Faculty of Warsaw University as deserving for the title of associate professor of botany. In 1886, after defending his doctoral dissertation, he was awarded the degree of Doctor of Botany at St. Petersburg University and, at the suggestion of L.V. Reinhard, was invited to read a private associate professor's course at Novorossiysk University. On October 27, 1888, he was appointed extraordinary professor of this university. The synopsis of F.M. Kamensky's lectures on the general course of botany was compiled with his permission by one of his students, a senior student A.A. Sapegin, a future professor at Novorossiysk University [10].

F.M. Kamensky's works on the symbiosis of fungi have left a deep mark in science. As far back in the 70's of the XIX century, he noted that the names of fungi «brown cap boletus» or «orange-cap boletus» have an understandable origin: they reflect the observation of the people, who noted that each species of fungus usually grows under a particular tree. After carefully examining the plant Monoptora hipohitis, Kamensky found that its roots were covered with a very dense cover of intertwined hyphae – fungal threads. Hyphae are close to the epidermis of the root, physiologically replacing the root hairs. The researcher realized that the plant can get all the food it needs with the help of a fungus, and the plant, in turn, supplies the fungus with certain substances (as later studies have shown, these substances are mainly carbon compounds). He described this combination of fungal hyphae with the roots of the division as a mutualistic (mutually beneficial) symbiosis. In his experiments, the seeds of the divider did not germinate without the presence of fungi.

Not limited to the case of the monotropa, F.M. Kamensky spread his idea of the symbiosis between the fungus and the higher plant for other members of the plant kingdom. For example, beech had a symbiosis with 12 species of fungi, but there are plants that are capable of a strictly specific symbiosis – with only one species of fungus.

The first report on the results concerning the study of symbiosis in plants and fungi F.M. Kamensky published in 1879 in Polish, then in 1881 – in the German Botanical Journal, in 1883–1891 – in a number of Odessa publications, and in 1886 – in St. Petersburg [8]. Studying the vegetation around Odessa, the southern coast of Crimea and Poland, F.M. Kamensky also described several new species of fungi. Sent by the Novorossiysk Society of Naturalists in the summer of 1887 and 1888 to the Crimea for studying the flora of the southern coast, he presented a study on fungal diseases of grapes [9]. As an active participant in a number of informal scientific organizations, in 1888 he was elected secretary of the Odessa branch of the Russian Horticultural Society, as well as a permanent member of the phylloxera and entomological commissions, and in 1889 – vice president of the Novorossiysk Society of Naturalists. F.M. Kamensky died in Warsaw on September 16, 1912, from an accident before the age of 61.

In 1916 I.L. Serbinov was invited to the Botany Department of Novorossiysk University. Ivan Lvovich came from the nobility of the Kherson province, was born in St. Petersburg on July 12, 1872. He received his primary education at the Historical and Philological Gymnasium, then entered the Department of Natural Sciences, Faculty of Physics and Mathematics, St. Petersburg University [6, p. 56]. After graduating from the university on May 1, 1899, he was appointed freelance curator of the Botanical Cabinet of St. Petersburg University and assistant professor at the Botany Department. At that period professor Kh. Ya. Gobi

created a cryptogamic laboratory here, from which came a galaxy of famous mycologists and phytopathologists: V.A. Tranchel, M.M. Voronikhin, N.A. Naumov. Here I.L. Serbinov studied lower plants and began to publish his first scientific works on lower fungi.

In 1900, I.L. Serbinov was appointed full-time assistant professor of botany at the Military Medical Academy, but soon, on September 17, 1902, by order of the Ministry of Agriculture and State Property, he was transferred to the position of botanist-gardener in the Nikitsky Botanical Garden instead of A.O. Potebnya. At the same time, I.L. Serbinov lectured a special course in viticulture and winemaking at the Higher Courses of Viticulture and Enology during 1902–1905, before transferring these courses to Odessa. I.L. Serbinov's scientific interests in the Yalta period changed markedly from the study of morphology and development of lower fungi into direction of studying their parasitism on plants. Thus, he studied the filamentous disease of potatoes (1902), root rot of grapes (1902), diseases of tobacco and tobacco seedlings (1906). The results were published in a monthly periodical entitled «Bulletin for combat diseases and damage of cultivated and wild useful plants», published by the Central Phytopathology Station of the Main Botanical Garden in St. Petersburg on the initiative of A.A. Yachevsky.

After defending his dissertation «Organization and development of some fungi Shtridineae Schröter», which took place on May 5, 1907, the scientist was approved for a master's degree in botany. For 10 years I.L. Serbinov lectured courses at the University of St. Petersburg «Agricultural Bacteriology» and «Phytopathology». At the same time he worked as a lecturer at the Department of Microbiology at the St. Petersburg Agricultural Courses, where he created a microbiological laboratory and a museum dedicated to fish diseases. On November 1, 1913, I.L. Serbinov was appointed assistant head of the Central Phytopathology Station of the Main Botanical Garden, founded in 1901, which was the first institution in Russia to begin a systematic study of phytopathology. In a short time he became head of the department worked with bacterial and functional plant diseases. He studied bacterial diseases of cucumber, cabbage, sugar beet, bacterial cancer of vines, fruit trees and shrubs (1913–1915); discovered a number of bacteria previously unknown to science: Bacillus Omelianskii Serb., which causes sorghum gum, and Bacillus beticoli Serb., which affects beet roots [3]. From May 1 to June 15, 1914 I.L. Serbinov was sent to Austria-Hungary and Germany to get acquainted with the work of foreign phytopathological stations, and on March 19, 1916 he began to head the Department of Phytopathology at the Odessa Wine Station. In addition, at the Higher Courses of Viticulture and Enology, which existed at the station, he began lecturing on general microbiology and diseases of the vine.

In the autumn of 1916 I.L. Serbinov was accepted by the Faculty of Physics and Mathematics at Novorossiysk University as a private associate professor at the Botany Department, where he lectured two courses: «Fundamentals of Phytopathology» and «Practical Course of Mycology». It should be noted that, since 1917, phytopathology has been taught as a compulsory subject in all institutes of agricultural profile, as well as in the cycle of botanical disciplines at the biological faculties of universities [2]. The course of phytopathology I.L. Serbinov lectured in the agronomic laboratory of the Agronomy Department and there conducted practical classes with students in microbiology. Besides I.L. Serbinov himself, the positions of private associate professor were held by Yakiv Yuliyovych Bardakh, who in 1895 for the first time in Russia introduced courses in general and special bacteriology for students of the natural sciences; future academician of the Ukrainian Academy of Sciences, zoologist Danylo Semenovych Vorontsov and others.

In 1918, after the founding of the Odessa Higher Agricultural Institute, I.L. Serbinov was elected professor at two departments: agricultural microbiology and phytopathology. Therefore, he left his job at Novorossiysk (Odessa) University, although he still held the position of director of the Botanical Garden for some time [7].

At the Odessa Agricultural Institute I.L. Serbinov gave lectures and conducted practical classes with the using visual aids from the «Museum of Phytopathology» created by him. Annually about 60 students took exams and practical tests in phytopathology [16]. Continuing his scientific work, he paid special attention to bacterial diseases of plants: eggplant, Sudan

grass, sweet peppers, corn, wheat, cotton. A valuable contribution to the theoretical and practical arsenal of microbiology was his doctrine of mixed infection. I.L. Serbinov died on October 26, 1925.

Conclusions. Thus, the period of the late XIX – early XX century was characterized by the consistent development of mycological research performed at the Botany Department in Novorossiysk University. At the same time, almost every researcher did not ignore the field of practical mycology, an essential part of which is the study of fungi that parasitize on plants related to the field of phytopathology. With the arrival of I.L. Serbinov at the Botany Department, who initiated the foundations of the doctrine of plant bacteriosis in Russian Empire, phytopathology, which has already established itself as an independent branch of science, began to develop in this new direction.

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АМАТОРСЬКА АСТРОНОМІЯ ТА ВНЕСОК ЇЇ ПРЕДСТАВНИКІВ У РОЗВИТОК АСТРОНОМІЧНИХ ДОСЛІДЖЕНЬ У ХАРКОВІ У 1920–1930-ті РОКИ

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Анотація. Розглянуто діяльність представників аматорської астрономії в Харкові у визначений період щодо організації загальнодоступних осередків непрофесійної науки, які спрямовували свою діяльність на поширення астрономічних знань. Метою роботи є узагальнення результатів комплексного історико-наукового дослідження розвитку аматорської астрономії в Харкові у 20-ті-30-ті роки XX ст. та участі її представників в астрономічних спостереженнях у Харківській астрономічній обсерваторії. З'ясовано передумови виникнення у Харкові об'єднань астрономів-аматорів, створення «Народної обсерваторії» та формування її інструментальної бази; наведено приклади участі та впливу університетських астрономів, переважно проф. М.П. Барабашова, в організації аматорського руху в першій столиці України. Конкретизовано персональний внесок харківських астрономів-аматорів, зокрема Л.Л. Андренка та В.В. Каргера, щодо популяризації астрономічної науки серед широких верств населення. Проаналізовано етапи розвитку аматорської астрономії в Харкові у визначений період, розглянуто організаційні форми, тематичну спрямованість та напрями діяльності аматорських астрономічних