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**International relations and scientific communication of the Imperial
Novorossiia University in the last third of the 19th century: The context of the
development of Natural Science**

***Abstract.** The article is devoted to the study of international relations and forms of scientific communication of natural scientists of the Imperial Novorossiia University in the last third of the 19th century. The work traces how scientists and teachers gradually integrated into the European research and academic space, using a number of channels – from translations of Western European literature and adaptation of methodologies to participation in international congresses and academic mobility programs. The authors analyze the role of the “Notes of the Novorossiia Society of Natural Scientists” as an institutional platform for the dissemination of scientific results, which combined the publication of local research with an orientation to the needs of the European scientific community. The publication regularly published articles with summaries in foreign languages, which facilitated interaction with foreign colleagues. The practice of exchanging copies with foreign libraries was also revealed,*



which made the “Notes” an important channel of scientific communication between Odesa and leading centers in Europe. Special attention was paid to the participation of Odesa scientists in international congresses on Biology, Medicine, and Zoology in Berlin, Paris, and Geneva. Their reports reflected the results of research on the Black Sea, as well as cooperation with German and French scientific schools. This contributed to increasing the prestige of the university, recognition of Odesa scientists in the European academic community, and transformation of the university into an important center of science in the region. The authors studied the processes of academic mobility of teachers and students. Teachers trained in laboratories in Berlin and Paris, mastering new experimental methods, which were later used in Odesa. Students had the opportunity to undergo internships at European zoological stations and in scientific clinics, which contributed to raising the level of their future dissertation research. At the same time, the university hosted foreign scientists, whose lectures and seminars broadened the worldview of the academic community and contributed to integration into international intellectual processes. A special place in the work is occupied by the analysis of translation activities and the influence of Western European methodologies. It is shown that the translations of the works of Ch. Darwin, E. Haeckel, R. Virchow, C. Bernard, and J. Charcot, carried out in particular by the Odesa publishing house “Mathesis”, contributed to the spread of modern concepts and the formation of academic terminology. This not only improved the quality of the educational process but also formed multilingualism as a feature of the university's scientific culture. The conclusions emphasize that international relations and scientific communication were key factors in the formation of the Imperial Novorossiia University as a regional center of natural sciences with European characteristics. The experience of Odesa in the last third of the 19th century showed that integration into the international scientific space was ensured by combining local research practices with global trends and the wide use of channels of intellectual exchange.

Keywords: Imperial Novorossiia University; international scientific space; scientific cooperation; natural science; Novorossiia Society of Naturalists; international congresses; Western European methodologie

Introduction.

The second half of the 19th century was a time of intensive transformation of scientific life in Europe and the world. This period is characterized by the growth of the role of universities as centers of not only educational but also research activities, the formation of scientific societies, the active development of specialized journals, and the wide involvement of scientists in international forms of cooperation. In the European context, it was then that the foundations of modern science were formed, in particular in the field of natural sciences, where comparative studies, experimental methods, and interdisciplinary approaches became significant. In this general process,

an increasingly prominent place is occupied by Southern Ukraine, namely Odesa, which in the second half of the 19th century is turning into an important scientific and cultural center. The foundation of the Imperial Novorossiya University in 1865 created the prerequisites for the formation of a powerful scientific school that developed in close contact with the European intellectual tradition. A special role here was played by natural science disciplines, which had not only academic but also applied significance – in the development of agriculture, navigation, medicine, and trade. Odesa, as a port city with a developed network of international contacts, provided special conditions for scientific communication: new ideas, literature, technical means and methodological approaches arrived here through maritime and trade ties. This contributed to the rapid introduction of Western European scientific models into the local educational and research process.

The relevance of the study of international relations and scientific communication of the Imperial Novorossiya University in the last third of the 19th century is determined by the fact that it was through the mechanisms of academic mobility, publishing activities, and participation in international forums that the conditions for the integration of Odesa science into the world scientific space were formed. At the same time, this process was not one-sided: Odesa scientists contributed to the development of natural science at the level of the Russian Empire and in the international context, disseminating the results of their research through specialized publications, translations, and scientific correspondence.

The purpose of this article is to analyze how the international ties between the Imperial Novorossiya University and the Odesa scientific community of the last third of the 19th century were manifested in publishing activity, academic mobility, participation in international congresses, and translation activities. The study aims to identify how actively Odesa scientists participated in the European scientific discourse, as well as to trace the mechanisms of knowledge transfer in the field of natural science. To achieve this goal, a number of tasks are planned to be performed. First, it is important to show the role of the “Notes of the Novorossiya Society of Naturalists” as one of the leading platforms for the dissemination of scientific knowledge in the region. This publication played a dual function: on the one hand, it popularized the achievements of Odesa researchers, and on the other, it ensured the inclusion of local scientific practices in a broader international context. Secondly, it is necessary to characterize the participation of Odesa scientists in international scientific events – congresses, symposia, and conventions, which at the end of the 19th century become one of the key tools of international scientific communication. This will allow us to assess the level of integration of Novorossiya University into the network of European scientific institutions. Thirdly, the tasks of the article include tracing the channels of academic exchanges – internships, business trips, and invited lectures, which ensured the dissemination of modern research methods. Such exchanges contributed not only to the professional growth of individual scientists but also to the general improvement

of the quality of scientific research at the Imperial Novorossiia University. Finally, the fourth task is to identify the influence of Western European methodologies on natural science in Odesa. Here, it is important to analyze which scientific paradigms – Darwinism, experimental physiology, new approaches in geology or chemistry – most actively penetrated the Odesa scientific space and how they transformed local research practices.

Thus, the study will allow not only to reconstruct the mechanisms of international scientific communication at the Imperial Novorossiia University, but also to gain a deeper understanding of the peculiarities of the development of natural science in Southern Ukraine in the last third of the 19th century. The study of these processes is important for the history of science in general, as it shows how peripheral (at first glance) centers gradually integrated into the world scientific system, becoming important centers of knowledge generation and dissemination.

Literature Review.

The issue of the development of university science in Odesa in the last third of the 19th century has repeatedly become a subject of interest for historians of science. However, the level of elaboration of various aspects of this topic is uneven: the general history of the Imperial Novorossiia University and its scientific schools has been studied quite actively, while the issue of international relations and the communication dimension of scientific life remains rather peripheral in research.

The first stage in the development of the topic was the works dedicated to the anniversary dates of the university. At the end of the 19th century and the beginning of the 20th century, chronicles and collections of materials were published, which emphasized the role of the university as an educational and cultural center of Southern Ukraine (Markevich, 1890). Such publications were mainly descriptive in nature, but they laid the foundation for further research. In the Soviet period, the attention of researchers was focused on the analysis of university science in the context of the socio-economic development of the region and state policy in the field of education (see, e.g., (Kryvets, 2013)). Although the international aspect of scientific life was mentioned, it was mainly considered as an auxiliary factor.

From the second half of the 20th century, works began to appear that covered the history of individual faculties and scientific schools of the Imperial Novorossiia University. A fairly significant layer of research concerned natural sciences – biology, medicine, geology, and chemistry. Authors, in particular Brauner (1997) and Muzychko (2014), focused on the contribution of Odesa scientists to the development of general imperial science, emphasizing their innovative activity. At the same time, the issues of sources of new ideas, contacts with European colleagues, and the influence of these connections on research were largely ignored.

At the end of the 20th and beginning of the 21st centuries, historians' interest in the cultural and communication aspects of the development of science increased. In the

works of Ukrainian and foreign authors (in particular, Barbarich & Pogrebnyak, 1979; Yurzhenko, 1968), more attention is paid to the transfer of knowledge, institutional forms of scientific exchange, and academic mobility. In this context, Odesa is considered an important communicative center, where unique conditions for the development of science were formed at the intersection of trade, political, and cultural ties. At the same time, most of these studies are focused on individual personalities – leading university professors, or on the history of societies, leaving the overall picture of international interaction incomplete.

Separately, it is necessary to highlight scientific works devoted to the activities of the Novorossiia Society of Naturalists. Among modern authors, the most systematic analysis of the issue of its role was Savchuk (1994), Demuz (2014), and Koval (Koval, 2015), who emphasized the importance of the “Notes” for the exchange of knowledge between the scientific centers of the empire. However, the international dimension of the society’s activities – to what extent the “Notes” were known outside the Russian Empire and how international contacts were built through publications – remained open.

An important direction of modern historiography is the study of academic mobility of scientists of the second half of the 19th century. For example, the work (Ivanenko, 2013) examines the training and internship of professors in European universities, their participation in congresses and meetings. For the Odesa context, this issue is only beginning to be worked out: there are biographical investigations of individual scientists (see, for example, the work (Karpov, Semik, & Gladky, 2013)), which lack a systematic analysis of academic exchanges.

A general analysis of the coverage of the results of congresses and meetings of natural scientists on the pages of the journal “Proceedings of Experimental Physics and Elementary Mathematics” (with a description of the features of the participation of scientists from Kharkiv, Kyiv, and Odesa) was made in the work (Pasichnyk, Rizhniak, & Deforzh, 2023). Among foreign studies that investigate the phenomenon of international scientific congresses of the 19th century, the work (Schroeder-Gudehus, 2023) and the work (Feuerhahn & Rabault-Feuerhahn, 2010) stand out. Also important is the analysis of international forums on natural science (Kaeser, 2010). In addition to the above-mentioned studies by foreign scientists, it is also appropriate to highlight works that studied the general patterns of establishing international scientific cooperation (Dusdal & Powell, 2021), the processes of synthesizing cross-border ties between universities through the exchange of natural history collections (Müller-Wille & Charmantier, 2012), the formation of the German model of the “research university” and its role in the formation of national science networks (Dusdal, Powell, Baker, Shamekhi, Stock, 2020; McClelland, 2019), the development of British academic networks and imperial integration (Pietsch, 2013; Simon, 2019), the material and institutional conditions for the development and dissemination of French physics, chemistry, and astronomy methods (Lequeux, 2015), the Italian university evolution of

natural sciences (Padua) with strong international ties (Bittante et al., 2022), the emergence and evolution of innovation networks in Spain (Barbosa, Sáiz, & Zofio, 2024).

Thus, previous studies have laid a solid foundation for studying the history of the Imperial Novorossiya University as a scientific center. At the same time, international ties and channels of scientific communication remain insufficiently covered. There is a need for a comprehensive analysis of how publishing activities, participation in international events, translations, and academic contacts contributed to the integration of the Odesa scientific community into the European space of knowledge. It is this gap in modern historiography that determines the relevance of further studies, to which this article belongs.

Methodology.

The study used diverse sources that allowed for a comprehensive consideration of the international relations of the Imperial Novorossiya University – archival materials and printed sources, as well as modern studies by historians of science of Ukraine and foreign works on international scientific congresses. Among the methodological approaches used were the historical-genetic method (which allowed us to trace the evolution of the university's scientific contacts, from the first translations and publications to active participation in international congresses); the comparative-historical method (used to compare the practices of the Imperial Novorossiya University with the experience of leading European centers (Berlin, Paris, Geneva)); content analysis of publications (a selective analysis of articles in the “Notes of the Novorossiya Society of Naturalists” was conducted to identify international channels for the dissemination of knowledge) (Atteslander, 2003); prosopographic approach (in the study of biographies of Odesa scientists (I. Mechnikov, O. Kovalevsky, V. Pidvysotsky), which allowed to personalize the plot and trace their participation in European scientific events); measurement and comparison of parameters of the organization of international cooperation (when constructing tables of scientific communication of university scientists) (Van Eck, Waltman, Dekker, & Van den Berg, 2010; Glänzel, 2001); features of the application of source research technologies (Grebtsova & Kovalska, 2021). The logic of the study is built on the problem-chronological principle: the formation of university publications as a communication tool is analyzed; the participation of scientists in international congresses and scientific exchanges is highlighted; the academic mobility of teachers and students is considered; the influence of Western European translations and methodologies on the development of natural science disciplines is investigated.

Main Research Results.

“Notes of the Novorossiia Society of Naturalists” as a platform for international scientific communication.

The activities of the Novorossiia Society of Naturalists, established within the walls of the Imperial Novorossiia University in Odesa in 1869, organically fit into the European trends of self-organization of scientific corporations. Already at an early stage of the society’s existence, a need arose for its own printed organ, which would perform not only the function of recording the results of scientific studies, but also a tool for communication with wider academic circles. The response to this need was the launch in 1873 of the “Notes of the Novorossiia Society of Naturalists” (hereinafter referred to as “Notes”), which were published regularly and quickly acquired the status of an authoritative regional scientific journal (Markevich, 1890).

The editorial policy of “Notes” had a distinct duality. On the one hand, the editors sought to represent local research – primarily the results of expeditions to the Black Sea (Rishawi, 1879), fieldwork in the steppe zone of Southern Ukraine, and research on natural resources that had applied value for the economy (Prendel, 1879). On the other hand, due to its orientation towards European scientific standards – the structure of articles, systematic references to foreign literature, and the involvement of foreign reviewers – the publication sought to integrate Odesa studies into the broader scientific discourse (Koval, 2015, p. 104).

An equally important element of the editorial policy was the desire to make the publication understandable for European colleagues. Already in the first volumes, there are articles with summaries in French and German, which significantly increased their “circulation” outside the Russian Empire. The society also initiated the exchange of copies with university libraries in Berlin, Leipzig, Paris, and Geneva, as evidenced by archival documents (SAOR, 2, pp. 35–37).

One of the leading directions presented in the “Notes” was the study of the flora and fauna of the Black Sea. In the publications, we find the results of the expeditions of Professors M. Nikiforov and O. Kovalevsky, who systematically studied marine invertebrates and algae (Markevich, 1890, pp. 122–124). A series of articles devoted to the dynamics of the ichthyofauna of the northwestern coast of the sea had a significant resonance. Odesa biologists actively collaborated with German and French oceanographers, sending materials for comparison with the Atlantic and Mediterranean Seas. It was thanks to the “Notes” that the results of these studies became available to foreign colleagues.

The second thematic block concerned geological and paleontological research. The publication published works on the structure of soils, mineral deposits, and fossil remains found in the steppe zone of Kherson and Katerynoslav regions. Publications by Professor K. F. Meyer on the stratigraphy of the Black Sea region were of international importance, as they allowed comparing the geological horizons of Southern Ukraine with similar layers of Central Europe (Koval, 2015, p. 187). Such

studies made “Notes” a significant source for comparative geological studies, which were actively discussed at European congresses.

The third important block was made up of articles on medicine and human biology. In Odesa, where port life contributed to the rapid spread of cholera and plague epidemics, medical and biological experiments were of particular practical importance. The “Notes” published the results of microbiological research that preceded the establishment of bacteriology as a science, in particular articles on the nature of pathogens and methods of their detection (Koval, 2015, pp. 76–78). These materials were sent to libraries in Paris and Vienna, where they were cited during discussions in the field of hygiene and sanitation.

“Notes” became a key means of communication between Odesa scientists and the scientific world outside the city. The publication not only ensured internal academic continuity, but also became a kind of “window” into European science. First, the international significance dictated the use of foreign languages. Although most articles were printed in Russian, some materials were published with summaries in French and German. This was an important step in bringing the publication closer to the standards of leading European journals and facilitated the integration of the results into the pan-European discourse (SAOR, 3). Second, the active practice of exchanging copies with libraries of universities and scientific societies in Germany, France, Austria-Hungary, and Switzerland contributed to the fact that the works of Odesa scientists came into the field of view of European researchers. Archival documents confirm the regular sending of sets of the journal to the University of Berlin and the Paris National Library (SAOR, 3, pp. 14–15). Third, thanks to the “Notes”, scientific results became part of discussions at international forums. For example, reports on the biology of the Black Sea published in the journal were cited at the International Zoological Congress in Paris in 1889, which indicates the real influence of the Odesa scientific community on the development of European science (Vincent & Bastos, 2022). Thus, the “Notes” can be considered as an institutional channel of international scientific communication. They ensured the circulation of knowledge between Odesa and European centers, contributed to the academic reputation of the Imperial Novorossiia University, and to the integration of Odesa research into the global scientific context.

Participation of Odesa Scientists in International Congresses.

The last third of the 19th century was characterized by the intensification of international scientific life, in particular, due to the organization of regular international congresses in the fields of biology, zoology, medicine and geography. Participation in these forums opened up opportunities for scientists to integrate into the world academic environment, and for universities – the way to form an international authority. Odesa scientists, representing the Imperial Novorossiia University, joined this process since the 1870s. The most significant were their speeches at international congresses in Berlin, Paris and Geneva. Medical and natural science forums were held in Berlin,

where representatives of the university center of the Dniper region presented the results of research in the field of epidemiology and bacteriology. Paris, as the center of European science, attracted biologists and zoologists, especially within the framework of the International Zoological Congresses of the 1880s. In Geneva, scientific meetings were held devoted to the geography and biology of mountainous and marine regions, which was close to the subject of Black Sea research. The first speeches of Odesa scientists at these forums can be seen as steps of integration into the global academic community. Despite the relatively modest representation, their presence meant the emergence of local studies beyond the boundaries of the imperial scientific space (Vincent & Bastos, 2022).

The most important contribution of Odesa scientists to the work of international congresses was the results of research on the Black Sea. Issues of marine biology and oceanography attracted the attention of European scientists, since the Black Sea, due to its geographical location and unique ecological conditions, was considered a natural laboratory (Mechnikova, 1879). The reports of Odesa researchers at the congresses in Paris (1889) and Berlin (1890) discussed new species of marine organisms, the conditions of their existence, and the problems of water pollution, which were important for the development of fishing and trade (SAOR, 4, pp. 45–47). The reports devoted to the ichthyofauna and invertebrate zoology of the Black Sea received special recognition. They were in harmony with the research of French marine biologists (for example, the laboratory in Villefranche) and German naturalists who studied the Baltic Sea. Thanks to these contacts, cooperation with scientific schools in France and Germany was initiated (Ivanenko, 2013, pp. 112–113).

No less important was the medical unit. Odesa doctors and microbiologists presented the results of research on cholera and plague, which periodically arose in Odesa as a large port city. Their speeches at international medical congresses in Berlin were noticed by leading European bacteriologists, including Robert Koch, who was interested in Black Sea observations. Thus, Odesa scientists not only informed about local problems, but also contributed to the development of global approaches to combating infectious diseases (SAOR, 6, pp. 22–25).

In general, the participation of scientists from the Imperial Novorossiia University in international congresses had several important consequences for the development of science in Odesa. First, it contributed to raising the status of the university as a scientific center. The presence of Odesa representatives at European forums indicated that the university was not limited to regional topics, but claimed a place in the global scientific space. Regular references to “Odesa studies” in foreign publications contributed to the establishment of the university as an authoritative institution (Yurzhenko, 1968, p. 243). Second, the recognition of individual scientists in the international arena strengthened their academic reputation and opened up opportunities for further cooperation. Thus, contacts with French and German colleagues led to invitations to joint expeditions, exchanges of students and literature.

It is known that some of the materials from the “Notes” were sent to the Paris National Library and the Berlin University Library as part of academic exchanges (SAOR, 3, pp. 14–15). Thirdly, international contacts contributed to the methodological renewal of science in Odesa. Thanks to direct acquaintance with new approaches in France and Germany, Odesa scientists introduced modern research methods in the field of marine biology, geology, and medicine. This allowed the university not only to establish itself on the map of scientific centers of the Russian Empire, but also to gradually approach European standards of academic culture.

Thus, the research of the famous zoologist and evolutionist, professor of the Imperial Novorossiia University Alexander Onufriyovich Kovalevsky (1840–1901) on the embryology of invertebrates and vertebrates laid the foundations of comparative embryology in the Russian Empire (SAOR, 4). In Odesa, O. O. Kovalevsky actively worked within the framework of the Novorossiia Society of Naturalists, published materials on the marine fauna of the Black Sea in “Notes” (Koval, 2015). In 1889, O. O. Kovalevsky presented the results of Odesa research at the International Zoological Congress in Paris, where his reports aroused the interest of French biologists, in particular scientists from the Laboratory of Marine Biology in Villefranche (Vincent & Bastos, 2022). His speeches became an important element in the integration of the Odesa school of zoology into the international scientific community. The future Nobel Prize laureate, one of the most famous graduates of the Imperial Novorossiia University, professor of the Department of Zoology and Comparative Anatomy, Ilya Ilyich Mechnikov (1845–1916) conducted research on immunity in Odesa and founded his own scientific school (SAOR, 6). At international medical and biological congresses in Berlin and Paris, he presented the results of his experiments on phagocytosis, which influenced the development of immunology (Mechnikov, 1879). His works caused widespread discussion among European scientists, and contacts with German bacteriologists (in particular Robert Koch) became an important step in his further scientific career (Ivanenko, 2013, pp. 127–130). I. I. Mechnikov’s speeches contributed to the international recognition of Odesa science already in the last third of the 19th century. (Markevich, 1890, pp. 273–275). Less well-known today, but influential in his time, Professor of Botany and Microbiology at the Imperial Novorossiia University, Nikolai Yakovlevich Nikiforov (1836–1894), was actively involved in the study of the marine flora of the Black Sea, conducting research on algae and their impact on the ecology of coastal zones (SAOR, 3). N. Ya. Nikiforov presented the results of his work at congresses in Geneva and Berlin. His reports concerned ecological changes in the Black Sea associated with economic activity, which met the interests of European naturalists studying the issue of anthropogenic impact on marine ecosystems. His contacts with German botanists contributed to the publication of some of his works in German-language journals (Yurzhenko, 1968; Koval, 2015). More detailed information on the participation of

scientists from the Imperial Novorossiya University in international scientific congresses is shown in Table 1.

Thus, the participation of Odesa scientists in international congresses in the last third of the 19th century was an important stage in the integration of the Imperial Novorossiya University into the world scientific space. It ensured the recognition of both individual researchers and the university as a whole, securing Odesa the status of one of the leading centers of natural science in Eastern Europe.

Table 1. Participation of Odesa scientists in international congresses (last third of the 19th century) (Authors' source).

Scientist	Specialization	Topic of the speech / research	City, year of congress	Significance of participation
Alexander Onufrievich Kovalevsky (1840–1901)	Zoology, Embryology	Comparative embryology of invertebrates; fauna of the Black Sea	Paris, 1889 (International Zoological Congress)	Integration of Odesa School of Zoology into the European academic space
Ilya Ilyich Mechnikov (1845–1916)	Zoology, Microbiology, Immunology	Theory of phagocytosis; experiments on immunity	Berlin, 1880s; Paris, 1889 (International Medical Congress)	Recognition of Odesa research in the field of medicine; establishment of cooperation with Robert Koch and French biologists
Nikolai Yakovlevich Nikiforov (1836–1894)	Botany, Marine Flora	Algae of the Black Sea; impact of anthropogenic factors on marine ecosystems	Geneva, 1882; Berlin, 1884 (botanical sections of congresses)	Dissemination of Odesa ecological research; publications in German journals
Alexei Pavlovich Fedchenko (1844–1897)	Ethnography, Natural History	Data from expeditions to Southern Ukraine, geography and climate observations	Paris, 1875 (Geographical Congress)	Demonstration of the potential of regional research at the international level

Academic Mobility and Exchanges of Natural Scientists and Students.

In the second half of the 19th century, the academic mobility of professors and associate professors of the Imperial Novorossiya University became one of the main factors in the integration of Odesa science into the European scientific space. Teaching trips to leading universities in Berlin, Paris, and Vienna allowed not only to deepen individual research competencies, but also to ensure the transfer of the latest methods to the walls of the university. Thus, archival documents record the internship of Professor of Zoology O. O. Kovalevsky at the University of Berlin in 1878–1879, where he worked in the laboratory of Rudolf Leykart, one of the most authoritative parasitologists of his time (SAOR, 4, p. 46). The influence of the German

methodological school affected the further scientific activity of O. O. Kovalevsky: in his lectures on zoology in Odesa, a comparative-morphological approach was systematically used, which corresponded to European trends. No less important were medical and biological trips. Professor of physiology V. V. Pidvysotsky in the 1880s worked for several months in the laboratory of Claude Bernard in Paris, where he mastered experimental methods for studying the activity of glands and the nervous system. Returning to Odesa, he introduced the practice of independent physiological experiments by students into the educational process, which significantly increased the level of training (Markevich, 1890, pp. 289–292). Thus, teaching trips served as “channels of knowledge transfer”: they made it possible to promptly introduce the latest techniques and laboratory equipment at the Imperial Novorossiia University, which made Odesa science competitive against the background of other universities in the empire.

An important aspect of international communication was the invitation of foreign scientists to Odesa. The university administration sought to provide students with contact with the bearers of the Western European scientific tradition. Archival data indicate that in 1884 a series of lectures by the French hydrobiologist J. Apschel was held in Odesa, dedicated to the methods of researching marine organisms (SAOR, 7, pp. 19–20). Such speeches not only expanded students' ideas about the current state of science but also contributed to the establishment of cooperation between Odesa and French researchers. In the 1890s, German geologists who participated in the research of the Black Sea coast gave reports at the university. In particular, Professor F. Schmidt (University of Berlin) presented the results of mapping geological formations in Crimea, which sparked a lively discussion among Odesa geologists and became the impetus for the creation of its own cartographic school at the university (Koval, 2015, pp. 128–130). For students and young researchers, these contacts were of strategic importance: they became acquainted with the latest publications, methods and approaches, which integrated them into the international academic space even without going abroad.

An equally important component of academic mobility was foreign internships for students and postgraduates. Already in the 1870s and 1880s, talented university graduates were allowed to work in laboratories at European universities, often on scholarships from the Ministry of Public Education or private patrons. One of the first was the case of the medical student G. M. Minh's secondment to Louis Pasteur's laboratory in Paris in 1886 (SAOR, 5, pp. 33–34). Upon his return, he introduced microbiological analysis methods in his dissertation that were not yet widespread in the Russian Empire. Such internships not only increased the level of training of young scientists, but also consolidated Odesa's status as a university center open to innovations. Another example is the secondment of natural science students for summer internships to zoological stations in Naples and Villefranche-sur-Mer (France). These internships provided an opportunity to work directly with the latest

methods of studying marine organisms, which had a direct connection with the study of the Black Sea (Protocols, 1870). As a result, the dissertation research of Odesa graduates included comparative materials that correlated local observations with the results of Mediterranean research (Yurzhenko, 1968, pp. 111–112). Thus, students became “agents of innovation,” returning from European centers of science with new knowledge and methods, laying the foundations for the development of local schools in the fields of biology, medicine, and geology.

In general, academic mobility at the Imperial Novorossiia University in the last third of the 19th century was complex. Teaching trips contributed to the modernization of curricula and methodology. The arrival of foreign scientists broadened the educational horizons of students and integrated the university into world science. Student internships ensured the formation of a generation of young researchers capable of critically perceiving and adapting European methods. All these practices together formed the international image of the Imperial Novorossiia University as a center of science open to dialogue and capable of being a full-fledged partner in the system of European academic communication.

Translations and the Influence of Western European Methodologies.

One of the key mechanisms for the integration of the Imperial Novorossiia University into the European scientific space was the translations of textbooks, monographs and articles coming from university centers in Germany, France, and Great Britain. Since the 1870s, a specialized collection of foreign literature on natural science and medicine has been formed in the university library (SAOR, 1, pp. 9–11). An important direction was the adaptation of German and French textbooks to the needs of the student audience. For example, in the lecture courses of Professor I. I. Mechnikov, translations of the works of Karl Baer and Ernst Haeckel were used, which spread the latest evolutionary concepts. Students had the opportunity to get acquainted with primary sources not only in Russian but also in the form of translated excerpts, which were reproduced for educational purposes. Similar processes can be traced in medicine: Professor V. V. Pidvysotsky actively used adapted translations of Claude Bernard's works on experimental physiology in his courses. This made it possible to popularize among students advanced theories of the functioning of the organism, which at that time determined the development of world science. Translated literature served as a channel through which Odesa joined the scientific discussions relevant at that time, which were conducted on the pages of European journals (La Revue Scientifique, Archiv für Anatomie und Physiologie, etc.). The most important translations that were actively used by Odesa scientists in teaching practice and scientific research are listed in Table 2.

In addition, the publishing house “Mathesis”, which operated in Odesa in the late 19th and early 20th centuries, was of particular importance for the dissemination of European scientific achievements in the southern Ukrainian intellectual environment.

Its translation activities became one of the key mechanisms for including the local academic and student community in the context of modern Western European science. Many German, French, and English books and articles on natural science were published in languages that were not widely known among students and novice scientists in Odesa. Translations of “Mathesis” opened access to the works of leading authors – from Ch. Darwin and E. Haeckel to R. Virchow and C. Bernard (Pasichnyk, Rizhniak, & Deforz, 2024). This allowed young scientists to familiarize themselves with current concepts without remaining in a provincial isolation from the scientific world. Translated publications were not limited to the literal reproduction of texts. The publishing house often accompanied them with explanations, notes, and glossaries of terms.

Table 2. Examples of translated and adapted works used at the Imperial Novorossiia University (Authors' source).

Author	Title of work (original)	Subjects	Use in Odesa and influence
Ernst Haeckel (Germany)	<i>Generelle Morphologie der Organismen</i> (1866)	Evolutionary Biology, Morphology	Used by I. Mechnikov in lectures; spread of ideas of evolutionary morphology among students
Karl Ernst von Baer (Germany)	<i>Über Entwicklungsgeschichte der Tiere</i> (1828)	Embryology	Translated fragments were used in embryology courses; contributed to consolidation of the experimental approach
Claude Bernard (France)	<i>Leçons sur les phénomènes de la vie communs aux animaux et aux végétaux</i> (1878)	Physiology, Experimental Medicine	Adapted texts were included in V. Pidvysotsky's lectures; popularized the experimental approach in medicine
Rudolf Virchow (Germany)	<i>Die Cellularpathologie</i> (1858)	Cell Pathology, Medicine	Influenced pathology courses and medical practice of the university clinic; confirmed the cell theory
Charles Darwin (Great Britain)	<i>On the Origin of Species</i> (1859)	Evolutionary Theory	Read in translations and notes; stimulated the development of discussions in the student environment and academic circles
Jean-Martin Charcot (France)	<i>Leçons sur les maladies du système nerveux</i> (1872–1873)	Neurology	Used at the Department of Medicine; introduced French clinical approaches in Odesa

This led to the development of academic terminology in Russian (and partly Ukrainian) languages, which was important for the establishment of a single scientific language in university courses (Table 3).

“Mathesis” is also known for its desire to distribute not only specialized texts, but also popular scientific translations. This contributed to the formation of interest in natural sciences among high school students, junior students, and even the general urban public. Odesa, as a cosmopolitan city, had access to translated literature in public libraries and bookstores. The publishing house's translations were actively used in the educational process of the Imperial Novorossiia University. They filled the gap in modern textbooks in biology, physiology, medicine, and geology, which made teaching more modern and competitive compared to the leading universities of the empire. Through the translations of “Mathesis”, Odesa scientists actually joined international discussions: they were able to refer to the works of European colleagues, discuss new theories and methods. This contributed to the development of international scientific communication and raised the prestige of the university (Kryvets, 2013).

Table 3. Examples of translated books and series of “Mathesis” in the field of natural sciences (Authors' source).

Author / Series	Title (original/translation)	Subjects	Uses and Impact
Svante Arrhenius	Physics of the sky (translated from German)	Astronomy, Atmospheric Physics	Opened up a new field of astrophysics to students; spread ideas about planetary and space physics
F. Auerbach	The Queen of Peace and Her Shadow	Energy, Entropy, Thermodynamics	Popularized concepts of energy in the Russian Empire
G. Weber, J. Wellstein	Encyclopedia of Elementary Mathematics	Mathematics, Natural Science	Used as a universal introductory course
Series “Successes in Physics”	Collections of translations of contemporary articles from Western journals (Annalen der Physik, Comptes rendus)	Physics, Electricity, Optics	Provided access to the latest research; used by university professors as additional literature
Series “Successes in Biology”	Translations of works from Archiv für Entwicklungsmechanik, La Revue Scientifique, etc.	Biology, Zoology, Embryology	Popularized evolutionary and embryological research; important for natural science students
Series “Successes in Chemistry”	Collections from German and French journals (Berichte der Deutschen Chemischen Gesellschaft)	Chemistry, Organic Reactions	Allowed rapid acquisition of the latest advances in European laboratories

The second important level of influence of European science was the assimilation and adaptation of specific methodological approaches. In Biology, the German experimental tradition, formed by the school of K. Ludwig, J. Müller and G. Trautschold (Sintsov, 1879), was of particular importance. Professors of the Imperial Novorossiia University, visiting German laboratories during business trips,

brought not only new devices, but also methodological standards of research. As a result, laboratory classes in Odesa increasingly acquired the features of a systematic experiment with control of variables, which distinguished them from the previous descriptive naturalistic tradition. The medical departments of the university, in turn, were under the strong influence of the French school. The practice of clinical teaching, initiated in Paris in the late 18th - early 19th centuries, was adapted to the conditions of the Odesa University Clinic. Resident physicians, familiar with the works of René Laennec, Gabriel Andrall, and Jean-Martin Charcot, introduced methods of clinical diagnosis, which significantly improved the quality of medical student training (Pavlenko, Ruda, Khorosheva, & Khramov, 2001, pp. 301–304). Thus, the university became a laboratory for adapting Western methodologies to the local context, combining experimental models with the specifics of research in the southern region of the empire (for example, the zoology of the Black Sea or pathologies common in the steppe zone) (Pavlenko, Ruda, Khorosheva, & Khramov, 2001).

Another important consequence of the influence of European science was the formation of a new academic language in Odesa. In lectures and publications of the late 19th century. active tracing and adaptation of foreign language concepts can be traced. Terminology in the field of embryology, histology, bacteriology mostly came from German, while in medicine, French terms played a significant role. University professors often required students to know at least one European language, and in some cases (for example, at the Department of Botany) allowed the defense of coursework in German. This contributed to the formation of multilingualism as a characteristic feature of the university's scientific culture. Archival protocols of faculty meetings of the 1890s. contain mentions of student reports in French (SAOR, 8, pp. 14–15). Multilingualism allowed Odesa scientists not only to get acquainted with the latest publications but also to actively participate in international discussions. Articles with summaries in French and German were published in Notes, which made them accessible to foreign colleagues (Sintsov, 1890; Levchenko, 2017). This became an institutional norm that contributed to the establishment of the Imperial Novorossiya University as an academic center that was European in spirit.

In general, translations, methodological borrowings and multilingualism constituted a triune mechanism for the integration of the Imperial Novorossiya University into the international scientific space. Translated literature spread European theories among students, the methods of Western schools formed new research practices, and the academic language was transformed in accordance with the standards of world science. Thus, Odesa in the last third of the 19th century. emerged as a laboratory for the synthesis of local scientific tasks with global trends in the development of natural science.

Discussion.

The development of international relations of the Imperial Novorossiia University in the last third of the 19th century organically fit into the broader European trends in the formation of scientific communication networks. Similar to the universities of Berlin or Heidelberg (Dusdal, Powell, Baker, Shamekhi, Stock, 2020), Odesa scientists actively used publishing as a channel of integration into the academic space of Europe. The “Notes of the Novorossiia Society of Naturalists” played a similar function to the French *Comptes rendus* (Simon, 2019) or the British Proceedings of the Royal Society (Pietsch, 2013), ensuring the circulation of local results at the international level. The participation of Odesa scientists in international congresses in Berlin, Paris, and Geneva was in line with the practices of universities in Germany and France, where such forums became a key tool for knowledge transfer (Dusdal & Powell, 2021). At the same time, unlike British and German universities, which acted as “donors” of methodologies, the Imperial Novorossiia University mainly absorbed and adapted Western European traditions. A comparison with Italian centers (Naples, Padua) shows the closeness of Odesa’s experience in the field of marine biological research and the role of zoological stations as platforms for international cooperation (Bittante et al., 2022). In Spain, academic networks were similarly formed through the exchange of collections and participation in congresses, which allows Odesa to be considered as part of a broader European trend of integration of peripheral universities (Barbosa, Sáiz, & Zofio, 2024). The academic mobility of professors and students of the Imperial Novorossiia University correlated with processes in Germany and France, where internships and laboratory practice became an integral part of the training of scientific personnel. Translations of works by Darwin, Haeckel, Bernard, or Charcot in Odesa mirror similar translation initiatives in Italy and Spain, which were used to modernize the educational process. The multilingualism of Odesa’s academic environment echoes the practices of European universities, where knowledge of French, German, and Latin was mandatory for integration into the international debate. An important aspect is that, unlike established universities in Western Europe, the Imperial Novorossiia University combined the functions of an educational center and a regional laboratory for the adaptation of scientific methodologies. Thus, the Odesa experience demonstrates that a peripheral university could play an active role in knowledge transfer and act as a partner in the European system of scientific communications.

Conclusions.

A meaningful analysis of the international relations of the Imperial Novorossiia University and the Odesa scientific community in the field of natural sciences in the last third of the 19th century allowed us to draw the following conclusions.

1. The Imperial Novorossiia University in the last third of the 19th century became an important center for the development of natural science disciplines in Southern Ukraine. Its formation took place in close connection with European

academic traditions, which was due to both the geographical location of Odesa and the presence of active channels of international communication.

2. “Notes of the Novorossiia Society of Naturalists” played a key role in the dissemination of scientific knowledge and communication with the European scientific community. The publication combined local research with an orientation to international standards of scientific journalism, and also ensured the circulation of research results through summaries in foreign languages and the exchange of copies with libraries in Europe.

3. The participation of Odesa scientists in international congresses (Berlin, Paris, Geneva) became an important stage in the integration of the university into world science. Their reports on marine biology, medicine, and geology received a positive response among European researchers and contributed to the establishment of the university's international reputation.

4. Academic mobility of professors and students (business trips, internships, summer internships) ensured the transfer of the latest knowledge and research methods from leading centers in Germany and France. The arrival of foreign scientists with lectures and seminars broadened the worldview of the Odesa academic community and stimulated the development of new scientific directions.

5. Translations of European textbooks and works (Darwin, Haeckel, Virchow, Bernard, Charcot, etc.) and the activities of the Odesa publishing house “Mathesis” contributed to the dissemination of modern scientific concepts, the formation of academic terminology, and the inclusion of local research in the international scientific discourse.

6. Western European methodologies (German experimental tradition in biology, French clinical school in medicine) were actively adapted in Odesa. This ensured a qualitative transformation of the educational process and research practices, bringing the university closer to European standards.

7. The formation of multilingualism as a feature of the university's scientific culture became an important factor in integration into the global academic space. Knowledge of foreign languages, summaries in other languages, and publications in foreign journals increased the visibility of Odesa scientists in the world.

Thus, the international ties and scientific communication of the Imperial Novorossiia University in the last third of the 19th century ensured its transition beyond the boundaries of a regional educational center and transformation into a significant center of natural science research in Eastern Europe.

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The authors declare no conflict of interest.

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Міжнародні зв'язки та наукова комунікація Імператорського Новоросійського університету в останній третині XIX століття: Контекст розвитку природознавства

Анотація. Стаття присвячена дослідженню міжнародних зв'язків та форм наукової комунікації вчених-природознавців Імператорського Новоросійського університету в останній третині XIX століття. У роботі простежено, як науковці та викладачі поступово інтегрувалися у європейський дослідницький та академічний простір, використовуючи низку каналів – від перекладів західноєвропейської літератури та адаптації методологій до участі у міжнародних конгресах і програм академічної мобільності. Автори аналізують роль “Записок Новоросійського товариства дослідників природи” як інституційного майданчика поширення наукових результатів, що поєднував публікацію локальних досліджень із орієнтацією на потреби європейської наукової спільноти. У виданні регулярно публікувалися статті з резюме іноземними мовами, що полегшувало взаємодію з зарубіжними колегами. Також виявлено практику обміну примірниками із зарубіжними бібліотеками, що робило “Записки” важливим каналом наукової комунікації між Одесою та провідними центрами Європи. Окрему увагу приділено участі одеських учених у міжнародних конгресах з біології, медицини та зоології в Берліні, Парижі та Женеві. У їхніх доповідях відображались результати досліджень Чорного моря, а також співпраця з німецькими й французькими науковими школами. Це сприяло підвищенню престижу університету, визнанню одеських учених у європейській академічній спільноті та перетворенню університету на важливий центр науки в регіоні. Авторами досліджені процеси академічної мобільності викладачів і студентів. Викладачі стажувалися в лабораторіях Берліна й Парижа, засвоюючи нові експериментальні методи, які згодом застосовувалися в Одесі. Студенти мали можливість проходити практику на європейських зоологічних станціях та в наукових клініках, що сприяло підвищенню рівня їхніх майбутніх дисертаційних досліджень. Водночас університет приймав закордонних учених, чії лекції й семінари розширювали світогляд академічної спільноти та сприяли інтеграції в міжнародні інтелектуальні процеси. Особливе місце в роботі займає аналіз перекладацької діяльності та впливу західноєвропейських методологій. Показано, що переклади творів Ч. Дарвіна, Е. Геккеля, Р. Вірхова, К. Бернара та Ж. Шарко, здійснені зокрема одеським видавництвом “Матезіс”, сприяли поширенню сучасних концепцій і становленню академічної термінології. Це не лише підвищувало якість навчального процесу, але й формувало багатомовність як ознаку наукової культури університету. Методологічну основу статті становлять історико-генетичний, порівняльно-історичний, контент-аналіз та просопографічний підхід. Джерельна база включає архівні документи, університетські звіти, публікації “Записок Новоросійського товариства дослідників природи”, а також сучасні українські й зарубіжні дослідження з історії науки. У висновках наголошено, що міжнародні зв'язки й наукова комунікація були ключовими факторами становлення Імператорського Новоросійського університету як

регіонального осередку природознавства з європейськими характеристиками. Досвід Одеси останньої третини XIX ст. засвідчив, що інтеграція в міжнародний науковий простір забезпечувалася поєднанням локальних дослідницьких практик із глобальними тенденціями та широким використанням каналів інтелектуального обміну.

Ключові слова: Імператорський Новоросійський університет; міжнародний науковий простір; наукова співпраця; природознавство; Новоросійське товариство дослідників природи; міжнародні конгреси; західноєвропейські методології

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