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Natalya Pasichnyk*
Volodymyr Vynnychenko Central Ukrainian State Pedagogical University
1, Shevchenka Street, Kropyvnytskyi, Ukraine, 25000
E-mail: pasichnyk1809@gmail.com
https://orcid.org/0000-0002-0923-9486

Renat Rizhniak
Volodymyr Vynnychenko Central Ukrainian State Pedagogical University
1, Shevchenka Street, Kropyvnytskyi, Ukraine, 25000
E-mail: rizhniak@gmail.com
https://orcid.org/0000-0002-1977-9048

Hanna Deforzh
Volodymyr Vynnychenko Central Ukrainian State Pedagogical University
1, Shevchenka Street, Kropyvnytskyi, Ukraine, 25000
E-mail: deforzhav@gmail.com
https://orcid.org/0000-0002-1114-3205

*(correspondent-author)

Biographical materials of mathematicians and natural scientists in “Bulletin of Experimental Physics and Elementary Mathematics” (1886–1917): meaningful and content analysis

Abstract. *The article presents the results of a study of the features of biographical and prosopographic materials about famous mathematicians and natural scientists, published in one of the most authoritative journals “Bulletin of Experimental Physics and Elementary Mathematics”, which was published in Kyiv and Odesa during 1886–1917. In fact, the journal was an unofficial periodical printed branch of the Mathematical Department of the Novorossiysk Society of Naturalists. The purpose of the study is to conduct a meaningful and content analysis of the texts of the journal articles, which reveal biographies, features of labor activity and participation in scientific research of famous scientists. At the same time, the authors used scientific methods to conduct a meaningful analysis of the subject of research – analysis and synthesis, generalization and systematization. In the process of quantitative content analysis, text quantification, empirical data collection, their generalization, and mathematical and statistical processing were used. As a result of the study of biographical materials of the journal over the period, its authors came to the following*

conclusions. Firstly, the materials of the journal about famous domestic and foreign mathematicians and natural scientists were both biographical and prosopographic in nature. Moreover, the motives for the appearance of such publications, as a rule, were "round" dates from the moment of birth, from the beginning of creative activity, from the moment an important work was released, or from the moment of death (or the fact of death) of the subject of publication. All such articles in the journal are conditionally classified by the authors into brief biographical and prosopographic notes, detailed biographical and prosopographic articles, and obituaries. Secondly, the total volume of biographical and prosopographic materials for the entire period of publication of the journal was 2.88% of the total volume of the journal. At the same time, the journal contained materials about 84 scientists. The largest journal volume by the editors (more than 5 pages for each) was provided by 27 scientists and this amounted to 72.7% of the total volume of biographical material; this group included 9 domestic scientists and 18 foreigners. In total, the editors allotted an average of 4.89 pages for each domestic scientist, and 5.89 pages for each foreign scientist. The largest volume of materials was about physicists (46.42% of the total volume of biographical materials) and mathematicians (35.44%). Thirdly, the results of a meaningful analysis allow us to conclude that the published biographical and prosopographic materials of the journal are of high quality. This was largely facilitated by the careful selection of the authors of articles (or sources of materials), as well as the special requirements of the editors for documenting sources of materials in paginated links. Fourthly, the "inattention" of the editorial staff of the journal to a number of "round dates" of famous domestic and foreign mathematicians and physicists, as well as the uneven volumes allocated by the journal for biographies, indicate the absence of a clear editorial policy of the journal in the issue of allocating printed volumes for systematic biographical statements and research.

Keywords: *biography; prosopography; meaningful analysis; content analysis; mathematicians; natural scientists*

Introduction.

The article is devoted to the history of the development of popular scientific and scientific-methodical journals in Physics and Mathematics, which were published and distributed on the territory of modern Ukraine (at that time – part of the territory of the then Russian Empire) at the end of the 19th – beginning of the 20th century. One of the most authoritative journals among Mathematics teachers, high school students and amateurs of Mathematics and Physics of that period was the journal "Bulletin of Experimental Physics and Elementary Mathematics", published in Kyiv and Odessa during 1886–1917. A feature of this journal was that, in addition to articles on Mathematics and Physics, the editors paid special attention to the section of problems, which in some issues occupied more than half of the volume of the journal. An important place throughout the entire period of publication of the journal was occupied by biographies – articles about outstanding scientists representing the natural sciences and mathematical branches of knowledge. The study and analysis of biographical

heritage on the example of this journal is of great interest from the point of view of assessing the activities of scientists of the late XIX – early XX century by their contemporaries.

Literature review. The development and role of the journal "Bulletin of Experimental Physics and Elementary Mathematics" in the formation of educational thought in the period of education reforms of the late 19th – early 20th centuries was studied by various scientists. V. S. Savchuk (1994) explored this topic in the context of the development of the society of naturalists in the south of the Russian Empire, D. V. Okhremenko (1973) – as a factor in improving the general educational and pedagogical culture of mathematics teachers of the empire of that time, V. D. Pavlidis (2013; 2016) and N. A. Ternovaya (2012) – as an integral part of the reform of mathematical education in the Russian Empire at the end of the 19th – beginning of the 20th century. A rather original and thorough general description of the contents of the journal throughout the entire period of its publication is presented in the study by S. A. Dahiya (1956). In a scientific study by D. M. Zhivotivska (2015) presents an analysis of the information and journalistic activities of the mathematical department of the Novorossiysk Society of Naturalists, which was directly involved in the publication of the journal. However, it is precisely the articles of a biographical and prosopographic nature, which reveal the features of the life and work of famous scientists, that have not become the subject of research.

Therefore, the purpose of the article is to conduct a meaningful and content analysis of the articles of the journal "Bulletin of Experimental Physics and Elementary Mathematics", which reveals the features of life and details of participation in scientific research of famous mathematicians and natural scientists.

Research methods.

During the study, scientific methods were used – analysis and synthesis, generalization and systematization – to conduct a meaningful analysis of the subject of research. In the process of quantitative content analysis, text quantification, collection of empirical data, their generalization and mathematical and statistical processing were used (Atteslander, 2003; Früh, 2003). At the stage of text quantification, journal issues were used as content units, which were combined by year of publication, and as a unit of account – the number of pages in a particular issue, which revealed the content of the biography or prosopography of the scientist (parts of the page volume were determined from the ratio of the occupied area on the page).

Results and discussion.

The journal *"Bulletin of Experimental Physics and Elementary Mathematics"*, published in Russian during 1886–1917 in Ukraine (first in Kyiv, and then in Odessa), together with its previous version – *"Journal of Elementary Mathematics"* (1884–1886, Kyiv) – is considered the best edition of the popular mathematical and natural science periodicals of the Russian Empire of the late XIX – early XX century. The founder and first editor of the Journal of Elementary Mathematics was Professor of

Kyiv University V. P. Ermakov. Since 1886, the editing of the journal was transferred to E. K. Shpachinskyi, who had previously actively participated in the editorial work of this publication. At the same time, the journal changed its name to "Bulletin of Experimental Physics and Elementary Mathematics" (hereinafter – "BEPhEM"). At the request of E. K. Shpachinskyi V. P. Ermakov remained the ideological leader of its mathematical part. In 1891, the editors of the journal "BEPhEM" moved to Odessa, and the editing of the journal from 1898 (after a short stay as chief editor of Professor V. A. Zimmerman) and until the termination of its publication was transferred to Privatdozent V. F. Kagan and subsequently contacts the mathematical department of the Novorossiysk Society of Naturalists and the teachers of the Novorossiysk (Odessa) University. The publisher of the journal during 1897–1917 (from No. 259) was V. A. Gernet. Historians conditionally call the period 1886–1897 the first period of the existence of the journal and, accordingly, 1898–1917 – the second one (Dahiya, 1956, p. 546). During the entire period of publication of the journal "BEPhEM", scientists from Kyiv, Kharkiv and Odessa were active members of the journal: S. N. Bernstein, E. L. Bunitsky, V. F. Kagan, D. M. Sintsov, I. Yu. Timchenko, I. V. Sleshinsky, S. I. Shatunovskyi, V. A. Zimmerman and others (Dahiya, 1956). In fact, "BEPhEM" was an unofficial periodical printed organ of the mathematical department of the Novorossiysk Society of Naturalists, in which physicists and mathematicians from the territory of present-day Ukraine, as well as from all over the Russian Empire, were involved in cooperation (Dahiya, 1956).

During 1886–1917, the editors published 674 issues of the BEPhEM magazine in 627 books with a total volume of 16,066 pages. Materials revealing the details of the biography and work of famous mathematicians and natural scientists accounted for 2.88% of the total volume of the journal for all the years of its publication. In the content of the journal articles, there were both biographical materials (in the form of a scientific biography) and prosopographic materials, when the personalities of scientists were studied in the totality of their personal qualities, characteristics of their creative path and relationships with others, taking into account the environment and time. Without aiming to classify journal articles into biographical and prosopographic (due to the impossibility and unnecessariness of this action), we will conduct a meaningful analysis and content analysis of this part of the journal material.

The appearance of journal articles of a biographical and prosopographic nature, as a rule, was motivated by a special date in the life of the subject of publication. Among such motifs there were anniversaries of scientists, as well as on the days of memory round dates from the moment of their birth, or from the beginning of their creative activity, or from the moment of the discovery, or from the moment of the release of an important work. In addition to the mentioned facts, the anniversaries (as a rule, multiples of 100) from the day of the death of the scientist or the very fact of death were also motives. All such articles in the journal can be classified as follows: a) brief biographical and prosopographic notes; b) detailed biographical and prosopographic articles; c) obituaries.

Let us preliminarily note that naturally the amount of material presented in the journal depended on the editorial staff's ideas about the degree of greatness of a

scientist. We conducted a meaningful analysis of the articles that have the largest volume (Fig. 1).

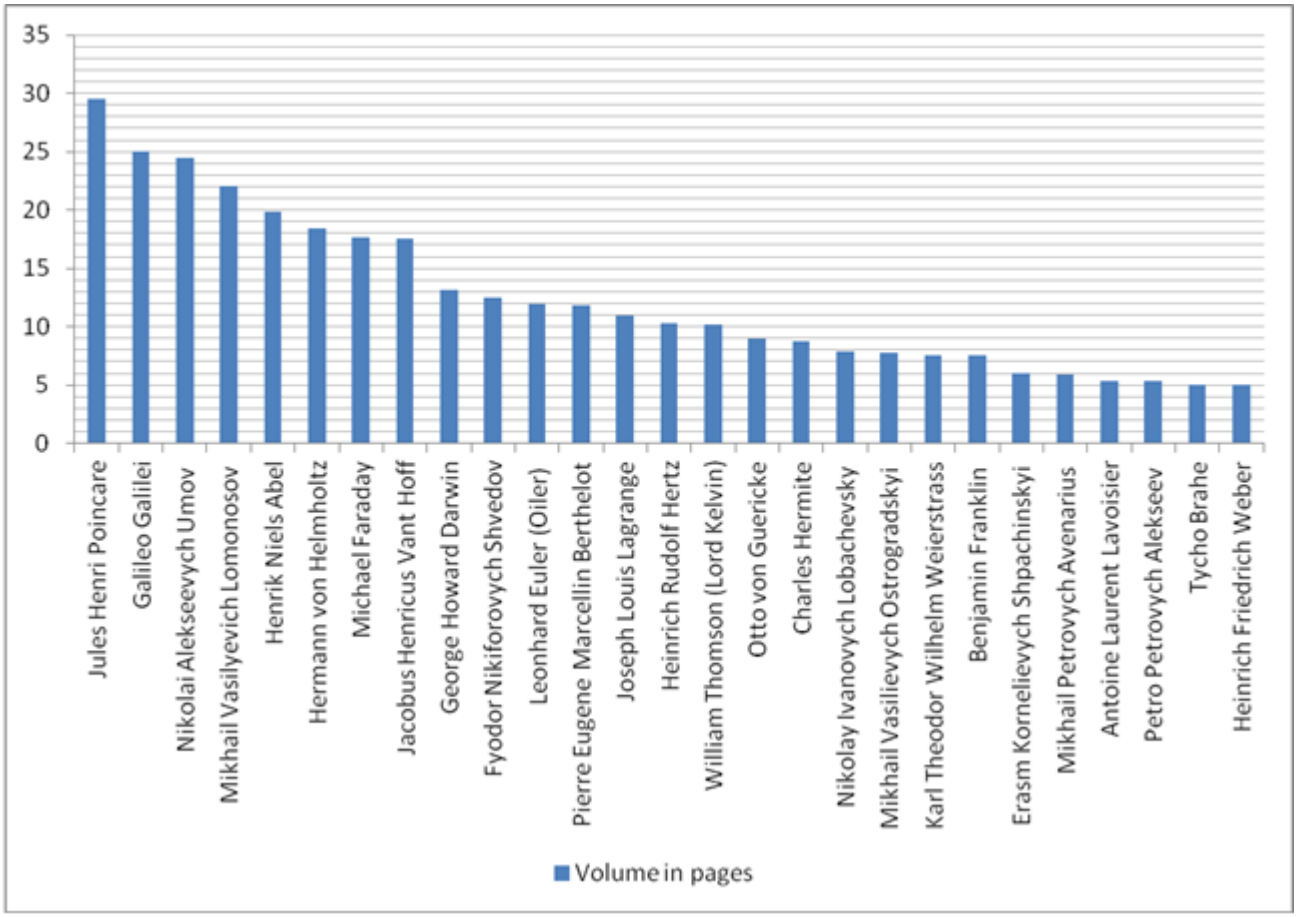

Figure 1. Scientists whose biographical materials had the largest amount of text.

The editors of the journal paid special attention to the famous mathematician *Jules Henri Poincare*, who died at the age of 58 in 1912. The entire 566 issue of the journal was devoted to this scientist, in which excerpts were provided from the speech of F. Masson (Director of the French Academy), from the report of G. Rados to the Hungarian Academy of Sciences, from the speech of G. H. Darwin about the great scientist at a meeting of the Royal Astronomical Society in London, as well as the work of H. Poincare himself "The relationship between matter and ether" (Poincare, 1912). President of the Royal Astronomical Society G. H. Darwin in his speech (Extract from the address, 1912) described three areas of H. Poincare's research in astronomy: research on the dynamic theory of ebbs and flows, on the equilibrium figures of liquid rotating masses, and research on the theory of the motion of planets and their satellites. G. Rados in his report (Extraction from the report, 1912) noted the mathematical achievements of "the undeniably first and most powerful modern researcher in the field of Mathematics and Mathematical Physics" (Extract from the report, 1912, p. 57): development of the theory of automorphic and analytic functions, creation qualitative theory of differential equations and the theory of Topology. F. Masson's speech (Anonymous, 1912) is a vivid example of a parallel presentation of the biography of H. Poincare and prosopographic materials. The author outlined in detail the features of

the scientist's life path and characterized the internal and external conditions. A special place in the issue is occupied by the article by H. Poincare (1912), which fully reveals him as a universal scientist and professional philosopher. By the way, H. Poincare was one of the active authors of the BEPhEM journal – from 1893 to 1912, the journal reprinted and translated into Russian 12 of his articles on various problems of Mathematics, Mechanics, Physics, Astronomy and Philosophy.

In 1892, the 250th anniversary of the death of *Galileo Galilei*, "the titan of thought, whom Mechanics, Astronomy and Physics can fairly call their father and founder" (Pergament, 1892, p. 177), was celebrated. In this regard, a large material of the Odesa lawyer and public figure O. Ya. Pergament (Krasnova & Drozdovskij, 2015) about a scientist – Italian physicist, mechanics, astronomer, philosopher, mathematician (Pergament, 1892). Using a large number of Italian, German, French and Russian sources, the author described the biography of the scientist in great detail, and also studied the personality of Galileo in the totality of his personal characteristics and qualities, details and motives of his creative path and relationships with the outside world and society in the context of conditions in Italy at the end of the 16th century and the beginning of the seventeenth century. The author, summing up the story, concludes that Galileo's scientific activity was successful in all branches of contemporary natural science, and regrets that not all of the scientist's works were published – most of the works were lost and destroyed by the Inquisition (Pergament, 1892, p. 253). However, an analysis of the scientist's letters gives reason to judge the exceptional genius of his ideas, which were confirmed only two centuries after his death (Pergament, 1892, p. 253).

One of the largest materials in terms of volume was the obituary and the text of the speech of V. F. Kagan at a meeting of the Novorossiysk Society of Naturalists in connection with the death of the theoretical physicist, philosopher *Nikolai Alekseevych Umov* (Kagan, 1915). N. A. Umov from 1871 to 1893 was an assistant professor, then an extraordinary and ordinary professor in the department of Physics at Novorossiysk University, and from 1893 he went to Moscow University, where he became its honored professor. Prosopographic material of V. F. Kagan is dedicated specifically to the Odesa period of the life and work of the scientist. The author describes in detail the tolerance of N. A. Umov as a scientist and a person, the formation of his attitude to Physics and Mathematics, passion for a mechanistic worldview, personal experiences of failures in choosing students. A particular problem for the scientist was the difficult perception of new ideas in Physics with the advent of research on quantum mechanics: "The extremely rapidly unfolding picture of natural science revealed such a complexity of living nature that ... reducing it to elementary physical and chemical processes became like a utopia" (Kagan, 1915, p. 86). These lines could be the epigraph of the named prosopographic material.

A large volume of material was devoted to *Mikhail Vasilyevich Lomonosov*, the first Russian physicist and chemist (as the author of the article, the historian of chemistry B. N. Menshutkin, positions it) (Menshutkin, 1905). The article is an extensive prosopographic material about Lomonosov's scientific convictions, about the conditions and environment in which the scientist's activities were carried out. The

author explains the scientist's uncertainty among his contemporaries during his lifetime by the following factors: a) many of the scientist's works were unfinished manuscripts; b) contemporaries did not understand his scientific conclusions; c) his literary activity was better known to his contemporaries (Menshutkin, 1905, p. 67).

In honor of the 100th anniversary of the birth of the famous Norwegian mathematician *Henrik Niels Abel*, the journal published the text of the speech of the leader of the world-famous school of Logics and Mathematics, I. V. Sleshinsky (Rikun, 2015) at a meeting of the Society of Naturalists at the Novorossiysk University (Sleshinsky, 1903). The speech contains a brief biography of the scientist and is an example of professionally structured prosopographic materials that reveal the inner world of a mathematician and the features of external conditions in the context of making the greatest discoveries in 3 areas: in the theory of algebraic equations, in the theory of elliptic functions and in the general theory of integrals of elliptic functions (Sleshinsky, 1903, p. 195).

At the end of 1891, at the solemn meeting of the Novorossiysk Society of Naturalists, dedicated to the 70th anniversary and the 50th anniversary of the creative activity of the German physicist *Hermann Ludwig Ferdinand von Helmholtz*, assistant professor of Novorossiysk University G. G. De-Metz (physicist, rector of Kyiv University (1917) and Kyiv Polytechnic Institute (1919)) presented a report (De-Metz, 1891), which outlined the biography of the scientist and a lengthy "outline of the scientific activity of the culprit ... triumph" (De-Metz, 1891, p. 161). H. von Helmholtz brilliantly conducted scientific research in various fields – in Physics, Physiology, Psychology, Aesthetics, Painting, Music, was a man of exceptional abilities and versatile education, "fair to others, full of the noblest feelings, strict to himself" (De-Metz, 1891, p. 191). The scientist immortalized his name in the history of science with the lion's share of substantiating the truth of the physical law of conservation of energy.

Another article by O. Ya. Pergament was dedicated to the 100th anniversary of the birth of the British physicist *Michael Faraday* (Pergament, 1891), in which the author uses the biographical book of Faraday's student Tyndall as a source. And in this case (as well as in the article about Galileo), the author presented the material in the form of a qualitative scientific biography with elements of prosopography, noted Faraday's merits "in the field of physics in general and in the science of electricity in particular" (Pergament, 1891, p. 71). Among the scientific merits of the scientist are the discovery of magneto-electric induction, the study of chemical phenomena of electric current, the discovery of magnetization of light and diamagnetism, research on the liquefaction of gases. The author concludes: "Every minute of Faraday's life is an epoch for science" (Pergament, 1891, p. 97).

Italian physicist-chemist, professor at the University of Padua, Giuseppe Bruno, published extensive material about the Dutch physicist and chemist, winner of the first Nobel Prize in Chemistry in 1901, *Jacobus Henricus Vant Hoff* (Bruno, 1912) (after the scientist's death). The author focuses attention on Vant Hoff's scientific research in the following areas: stereochemistry, the science of chemical equilibria, the theory of dilute solutions, and research on salt deposits in Stassfurt. The article is a scientific biography of a scientist with a clear selection of the periods of his scientific activity.

The author of the article, emphasizing Vant Hoff's scientific merits, concludes that "of the four major areas developed by him, any one would be enough to bring him the glory of a great chemist" (Bruno, 1912, p. 167).

The article about *George Howard Darwin* – professor of astronomy at Cambridge University, son of Charles Darwin – was written in the form of a detailed analysis of his scientific creativity (Henckel, 1911). G. Darwin is an English astronomer and mathematician, who gained world fame as a scientist who created the tidal theory of evolution, studied tides, low tides and periodic orbits, as well as forms of equilibrium and stability of liquids. The article about the scientist is an analysis of the content and features of the creation of the components of the entire scientific collection written by G. Darwin, published by the Cambridge printing house.

Report of the private associate professor of the Department of Physics and Physical Geography of the Novorossiysk University I. Ya. Tochydlovskyi, which was read at the meeting of the Novorossiysk Society of Naturalists, was dedicated to the memory of the deceased *Fyodor Nikiforovych Shvedov*, a physicist, rector of the university (Tochydlovskyi, 1906). The report contained both the scientist's biography and prosopographic materials about the professor's inner world and external conditions and relationships that influenced his activity and creativity. The author of the report noted that as a scientist F.N. Shvedov established an analogy between electrical and light phenomena, investigated the causes of the formation of various forms of comets and the peculiarities of the conversion of electricity into heat, invented an aiming rangefinder for coastal defense and naval attack.

On the 200th anniversary of the birth of the famous mathematician, native of Basel, director of the Berlin Royal Academy of Sciences, member of the Academy of Sciences in St. Petersburg, member of Paris, London and many other scientific societies, *Leonhard Euler*, the journal publishes a biographical sketch compiled from primary sources and family papers of Schultz-Euler (Schultz-Euler, 1907). L. Euler was the author of more than 800 works on mathematical analysis, differential Geometry, number theory, approximate calculations, celestial mechanics, mathematical physics, optics, ballistics, shipbuilding, music theory. The author of the essay summarizes: "Along with Galileo, Descartes, Leibniz and Newton, Euler's name will die only together with science itself" (Schultz-Euler, 1907, p. 206).

In honor of the 50th anniversary of the beginning of the scientific activity of the French chemist *Pierre Eugene Marcellin Berthelot*, the journal published reports by professors P. G. Melikov (Melikov, 1901) and S. M. Tanatar (Tanatar, 1901) at a meeting of the Novorossiysk Society of Naturalists. In the reports, the authors presented an analysis of the jubilee's scientific achievements in the field of kinetic reactions, organic synthesis, thermochemistry and the history of science, and also noted his activity as a public figure.

The article by W. Ahrens (Ahrens, 1913), dedicated to the 100th anniversary of the death of the French mathematician, astronomer and mechanic *Joseph Louis Lagrange*, is a classic prosopographic material about the work of a scientist, about the factors and personalities influencing his results, about the inner scientific world of the researcher. J. L. Lagrange was the author of variational calculation and the

mathematization of Mechanics, he made a huge contribution to the theory of Differential Equations, Theory of Numbers, Theory of Probability, and Algebra.

In 1906, on the eve of the 50th anniversary of the birth of *Heinrich Rudolf Hertz*, the posthumous unpublished memoir of H. Helmholtz "The Life and Labors of Heinrich Hertz" (Helmholtz, 1906) was published in the magazine (H. Helmholtz was the teacher of H. Hertz, who died in 1894). This material is a professionally made prosopography by a famous physicist of the experimental confirmation by H. Hertz of J. Maxwell's electromagnetic theory of the world.

In 1907, the editors of the magazine published an obituary on the death of the British physicist, mechanic and engineer *William Thomson (Lord Kelvin)* (Editorial, 1907). The obituary presents a brief analysis of the scientist's engineering and scientific achievements: the calculation of the transatlantic cable, the theory of the absolute temperature scale, the theory of energy dissipation, research on the mechanical energy of the solar system and the theory of vortex motion.

The editorial article of 1886 for the 200th anniversary of the death of the German physicist and philosopher *Otto von Guericke* (Editorial, 1896) is the first detailed prosopographic material of the magazine. Being the mayor of Magdeburg for 32 years, the scientist managed to engage in inventive activity – he studied the properties of vacuum (Magdeburg hemispheres) and air (pressure, elasticity, sound conductivity, combustion support), invented a water barometer and an electrostatic generator.

Four relatively large articles were dedicated to mathematicians. In 1893, in honor of the 100th anniversary of the birth of the Russian geometer *Nikolay Ivanovych Lobachevsky* (inventor of non-Euclidean geometry), two articles were published in the journal (Vasiliev, Suvorov, 1893; Bondarenko, 1893), in which biographical information is disclosed about the scientist. His scientific achievements are also analyzed here (it should be added that during 1893–1898, in 20 issues of the magazine, V. F. Kagan's book "Essay on Lobachevsky's Geometric System" was published; it was the only fully printed book during the entire period of the publication's existence). In 1897, in connection with the death of the famous German mathematician (the "father" of mathematical analysis, developer of the theory of special functions, researcher of variational calculations, differential geometry and linear algebra) *Karl Theodor Wilhelm Weierstrass* in "*Bulletin*..." I. V. Sleshinsky's obituary was published (Sleshinsky, 1897), and P.M. Pokrovsky – a note about the scientist (Pokrovsky, 1897). Also, on the occasion of the death of the French mathematician, H. Poincare's teacher, *Charles Hermite* (the author of studies of orthogonal polynomials, the theory of quadratic forms, elliptic functions, the transcendence of the number *e*) in 1901, the journal published an obituary (Editorial, 1901a) and a note about the scientist (Timchenko, 1901). All these articles contain professionally developed biographical and prosopographical material. And to commemorate the 100th anniversary of the birth of the Ukrainian mathematician, mechanic and physicist *Mikhail Vasilievych Ostrogradskyi*, in 1901, the editor's article "Memories of M. V. Ostrogradskyi" (Editorial, 1901b), and in 1903, an article by the professor of Kharkiv University D. M. Sintsov "To celebrate the centenary of the birthday of M. V. Ostrogradskyi" (Sintsov, 1903). Both materials contain a description of the features of the scientist's

life path, an analysis of his scientific research in the field of applied aspects of mathematical analysis, theory of probability, mechanics, and the statement of the scientist's important scientific results (the Ostrogradskyi method for integrating rational functions and the Ostrogradskyi formula for transforming a volume integral into a surface integral). The articles also contain a description of the conditions of the scientist's creativity and the features of celebrating the anniversary of M. V. Ostrogradskyi in Poltava.

Speech by E. K. Shpachinskyi, which he delivered at a meeting of the Kyiv Physical and Mathematical Society, was dedicated to the 100th anniversary of the death of *Benjamin Franklin* and was published in the 101st issue of the journal (Shpachinskyi, 1890). The material has the form of a scientific biography of an American public figure and scientist and contains a description of his main scientific discoveries (the study of the nature of electricity, the invention of the Pennsylvania fireplace and the electric motor, the explanation of the working principle of the Leyden bank, the improvement of the harmonica). The author concludes the report as follows: "No matter how many hundred years have passed since the day of his death, the name of Benjamin Franklin will always occupy one of the most honored places in the history of civilization".

Second material by E. K. Shpachinskyi in the form of a scientific biography was published on the occasion of the death of the professor of Experimental Physics of Kyiv University *Mikhail Petrovych Avenarius* (Shpachinskyi, 1895). The creator of the first experimental Physics laboratory in Ukraine, a researcher of the liquid state and vapor under changes in temperature and pressure, as well as the dependence of the thermoelectromotive force on the temperature of joints, the author of the formula for this dependence, one of the most famous professors of the Kyiv School of Physics.

Another voluminous obituary that is about the death of Kyiv University professor *Peter Petrovych Alekseev* was published in the early period of the magazine's existence (*Volodkevych*, 1891). The article contained elements of biography and prosopography. The scientist-chemist was known for the establishment of a new chemical laboratory at the university's chemical faculty and for the study of nitrogen-containing organic compounds.

One of the magazine's major articles was dedicated to the death of *Erasm Kornelievych Shpachynskyi* himself (Editorial Office, 1913), the founder and editor of the BEPhEM magazine until 1898. In the biographical article, the features of the editor's activities at different stages of the establishment and development of the journal, to which E. K. Shpachinskyi devoted more than 10 years of his life.

The last obituary from among those that occupied 5 or more magazine pages was published on the occasion of the death of the German mathematician, professor of the University of Strasbourg *Heinrich Friedrich Weber* (Shatunovskyi, 1913). In the prosopographic material, Weber is shown as an outstanding student of Riemann and Kronecker, a skillful mentor of university students, the author of mathematical bestsellers (the three-volume Algebra, the two-volume Differential Equations of Theoretical Physics, and the Encyclopedia of Elementary Mathematics) and the editor of the complete collection of Riemann's works.

The editor's prosopographic article "Role of Lavoisier in the history of Chemistry" (Editorial, 1915) is devoted to defining the merits of *Antoine Laurent Lavoisier* as the founder of modern chemistry. This is one of the few magazine articles that was not timed to a certain date of the scientist. The second purpose of this material is to conduct an analysis of sources in the history of Chemistry, which determined the scientist's contribution in different ways. The article reads: "Lavoisier quite rightly used, continued and borrowed the works and thoughts of his predecessors, because he really was in the field of these works and ideas, and it was in this area, thanks to the inclinations of his mind and the conditions of the environment, that he could express his fruitfulness... If other scientists released new currents, then Lavoisier completed an entire era of works with his truly great synthesis" (Editorial, 1915, p. 230).

Another article of a prosopographic nature, the appearance of which was not connected with a round date in the scientist's life, was dedicated to the American inventor and entrepreneur *Thomas Alva Edison* (I.R., 1891). The article had the character of a sharply critical and condemning enthusiasm for Edison's inventions, calling the entire company of support for the American invention "Edisonomania".

In 1901, to the 300th anniversary of the memory of the Danish astronomer, astrologer and alchemist *Tycho Brahe* – "the immortal founder of modern practical astronomy, who was the first to organize and bring astronomical observations to such a degree of accuracy that with their help it turned out to be possible to prove the validity of the Copernican world system" – materials of a prosopographic character are published in the journal (*Srebryanskyi*, 1901).

Among the other materials of a smaller volume of prosopographic nature, we note the appearance in the journal of obituaries on the occasion of the death of outstanding scientists – the creator of the theory of the chemical structure of organic substances *Alexander Mikhailovych Butlerov* (Alekseev, 1886), the researcher of number theory and theory of probability of *Pafnutyi Lvovych Chebyshev* (Vasiliev, 1894), the founder of the theory of real numbers, *Julius Wilhelm Richard Dedekind* (Editorial, 1916a), the English philosopher and sociologist *Herbert Spencer* (Editorial, 1904), the French physicists, the discoverers of radioactivity, *Antoine Henri Becquerel* (*Letnik*, 1908) and *Pierre Curie* (Adamovych, 1906), German researchers of mathematical Physics *Gustav Robert Kirchhoff* (Avenarius, 1887) and theoretical thermodynamics *Rudolph Julius Emanuel Clausius* (Avenarius, 1888), the author of the periodic law of chemical elements *Dmitry Ivanovych Mendeleev* (Editorial, 1906) and a researcher of mathematical analysis and Differential Geometry *Jean Gaston Darboux* (Editorial, 1916b).

However, more than two dozen biographical materials of the magazine are devoted to lesser-known domestic creative personalities who were employees of the magazine, teachers, textbook authors, university professors, and education officials.

Moving on to the results of the content analysis. So, biographical materials revealing the details of the biographies and works of famous mathematicians and natural scientists were published in 120 issues of the magazine, while information was provided to readers about 84 subjects of biographies with a total volume of 462.7 pages. The materials that aroused the interest of the editors (which was expressed in their

volume) and were analyzed in detail by us above (Fig. 1), comprised information about 27 subjects and had a total volume of 336.3 pages (72.7% of the total biographical volume material). This group included 9 domestic scientists (volume of materials – 103.8 pages) and 18 foreigners (volume of materials – 232.5 pages, which was 69.1% of the total number of materials in this group of articles).

The general distribution of materials by year of publication of the journal is shown in fig. 2.

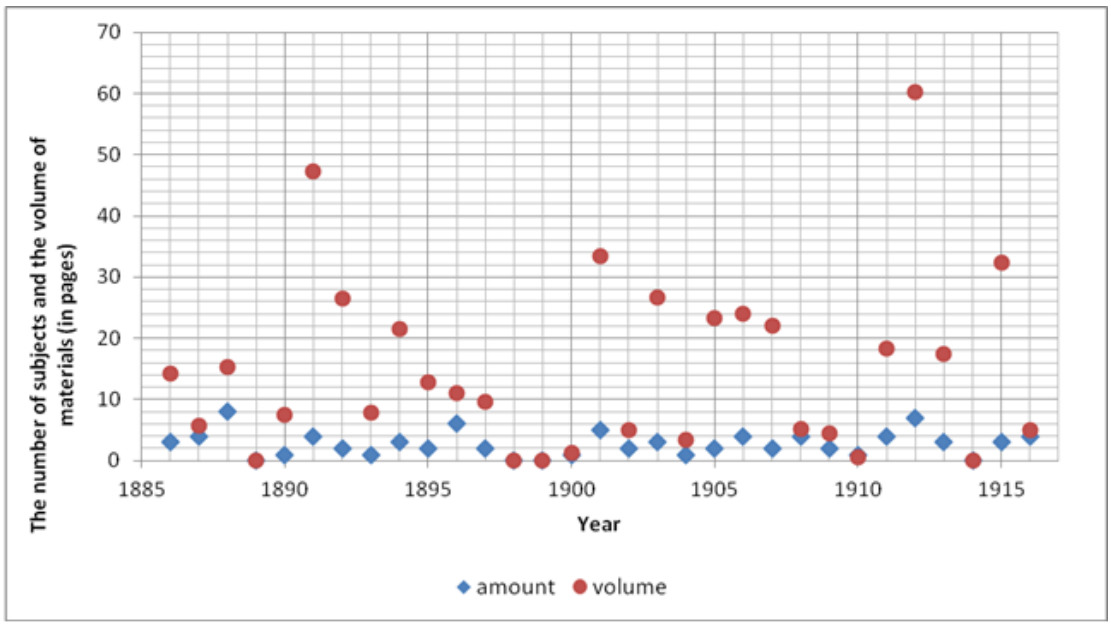

Figure 2. General distribution of biographical materials by years of magazine publication.

Moreover, the number of subjects of biographical materials with distribution by year and differentiation into domestic scientists and foreigners is shown in Figure 3.

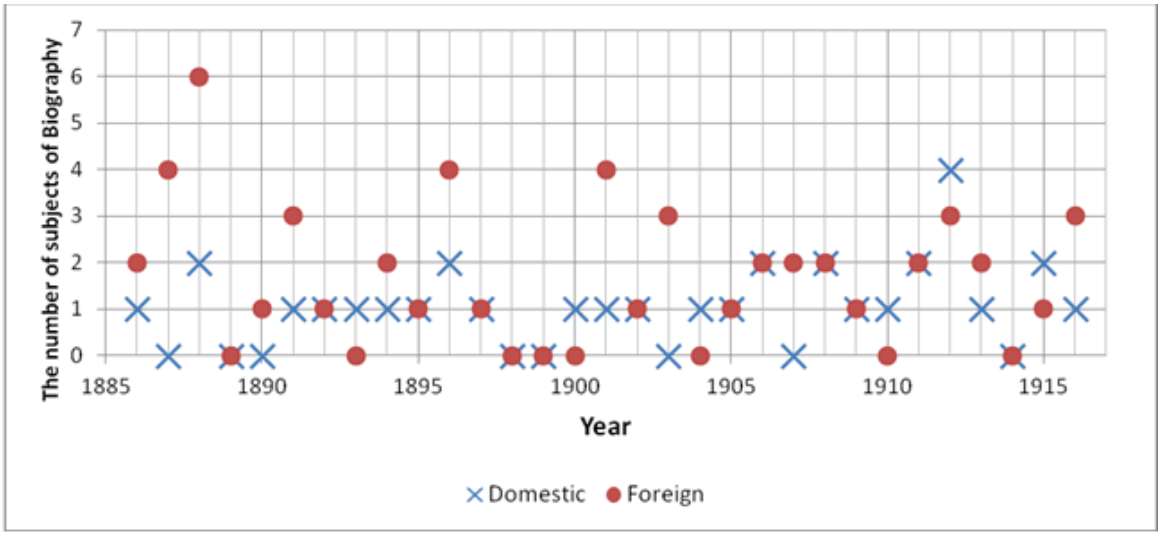

Figure 3. Number of subjects (domestic and foreign) of biographical materials with distribution by year.

And the same distribution by years and subjects, but by the volume of published materials of biographical content – in Figure 4; it can be noted that the editors allocated

an average of 4.89 pages for each domestic scientist, and 5.89 pages for each foreign scientist.

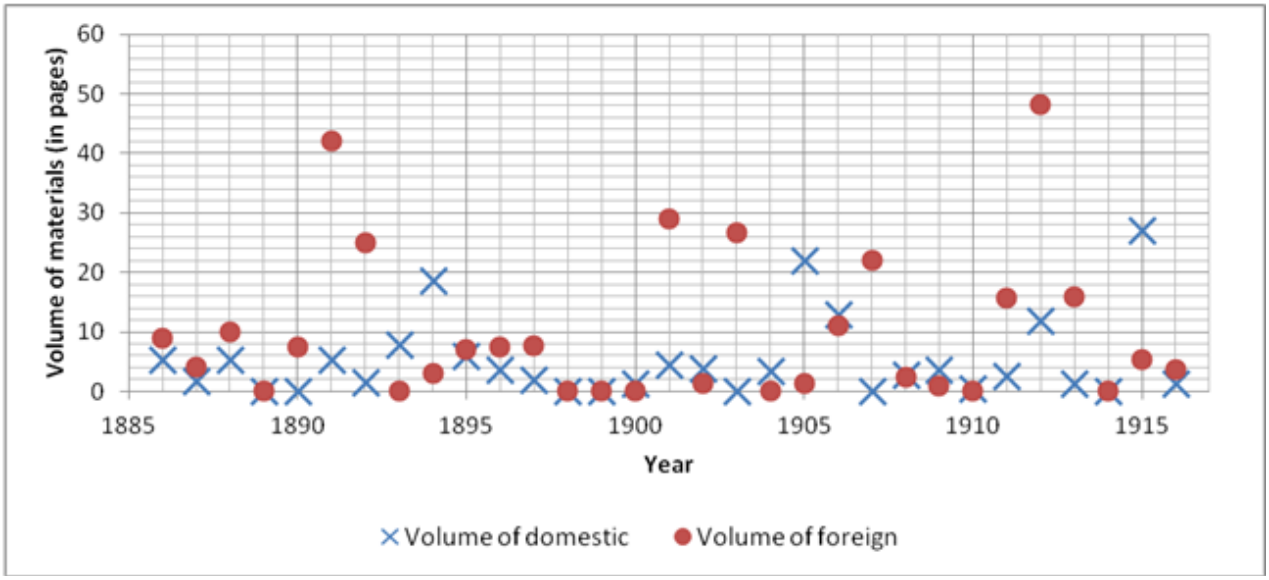

Figure 4. Volume of biographical materials about domestic and foreign scientists with distribution by year.

The percentage distribution of published biographical materials by specialty of scientists, depending on the number of subjects of publications and their volume, is shown in Figure 5.

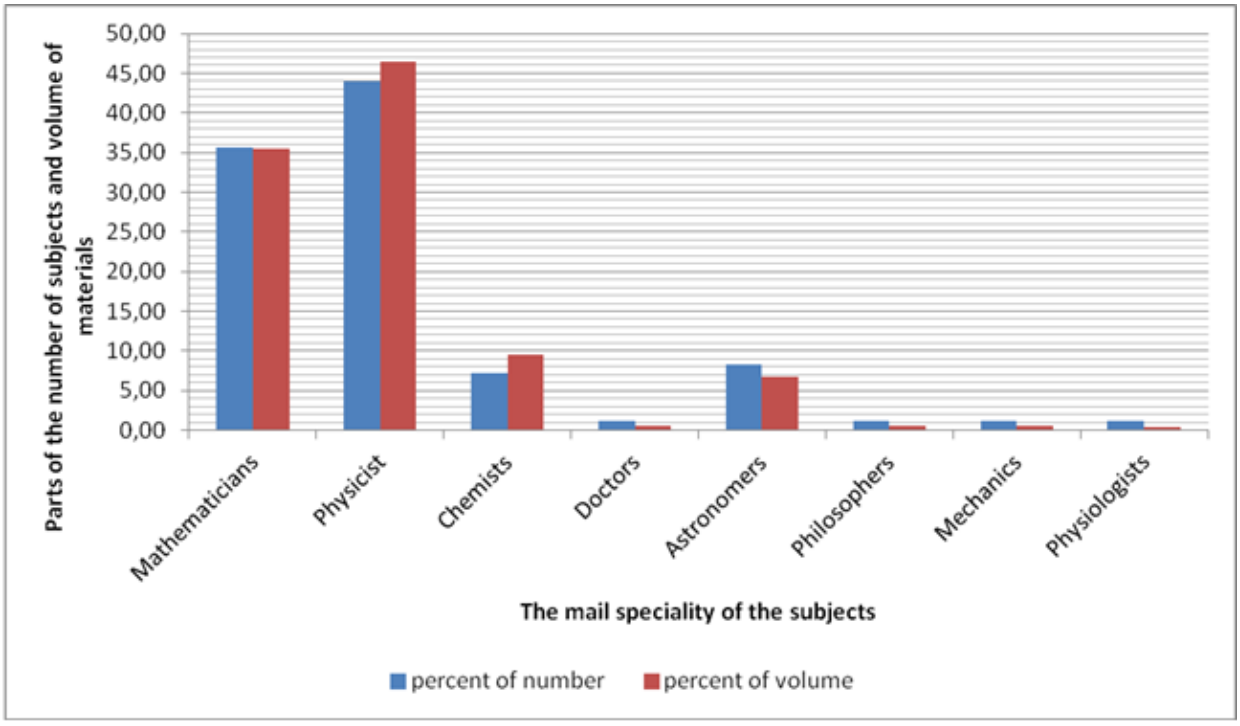

Figure 5. Percentage distribution of the number of subjects of publications and their volume by the specialties of scientists.

In addition, we separately analyzed the indicators of domestic and foreign mathematicians and physicists. Indicators by the number of subjects and by the volume

of materials with the distribution by specified groups of scientists are shown in Figure 6. Note that the largest average volume of materials that the journal published per scientist was devoted to foreign mathematicians (6.5 pages per subject), and the smallest is for domestic mathematicians (4.56 pages). However, among scientists of all specialties, the journal allocated the largest volume of materials per one biographical subject to foreign chemists (11.57 pages).

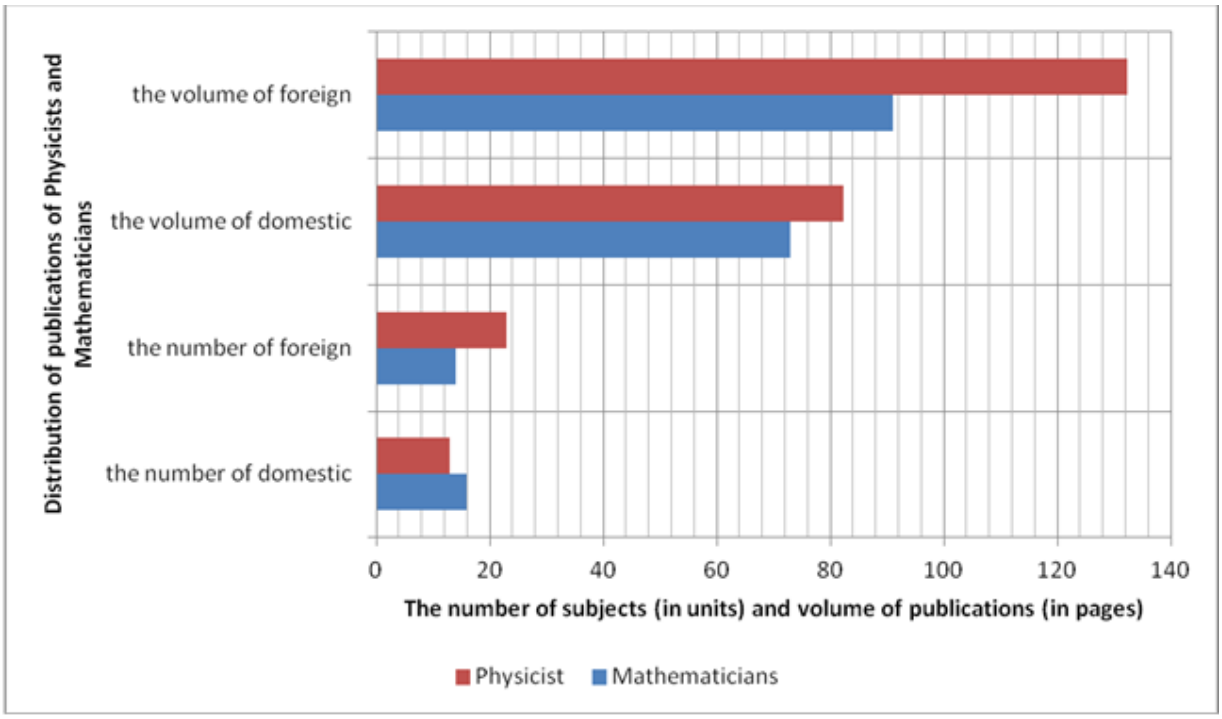

Figure 6. Distribution of domestic and foreign mathematicians and physicists by the number of subjects of biographical materials and their volume.

Discussion.

Several positions that arose in the process of research will be commented. The first thing that catches the attention is the very high quality of the published materials. And here, the selection of the authors (in some cases, the sources) of the publications by the editors of the magazine played a role. And such a "tone" of high-quality presentation of materials was set by one of the first editorial "prefaces" of the journal about *Otto von Guericke* (Editorial, 1896). In this article, the conditions and results of the scientist's creative activity were analyzed with particular care, and the references make it clear what volume of literature (including foreign literature) was used. Other editorial biographical materials can also be characterized in the context of quality (Editorial, 1907; Editorial, 1901a; Editorial, 1901b; Editorial, 1913; Editorial, 1915). When describing the life and work of *Jules Henri Poincare*, the second version of the submission of materials was used – a recording of the speech of the manager of the Academy of Sciences of France and Hungary and the professor of the Royal Astronomical Society (Anonymous, 1912; Extract from the report, 1912; Extract from the address, 1912). A similar algorithm was used in publications, for example, (Sleshinsky, 1903; Sleshinsky, 1897), which were a recording of the speeches of famous domestic scientists at a meeting of the Society of Naturalists at Novorossiysk

University. In addition to the mentioned options for organizing publications, the editors used articles by well-known public figures (Pergament, 1891; Pergament, 1892), well-known domestic (Kagan, 1915) and foreign scientists (Bruno, 1912; Helmholtz, 1906), as well as relatives of scientists (Schultz-Euler, 1907). Some articles were personally written by the editor of the magazine E.K. Shpachinskyi (Shpachinskyi, 1890; Shpachinskyi, 1895). In addition, given the clearly non-historical orientation of the magazine, the quality of the texts is ensured by the practically exemplary documentation of the sources of materials in page references.

The second moment. We noted above that the amount of biographical material presented in the magazine depended on the opinion of the editorial staff or the author of the publication about the "degree of greatness" of the scientist. In general, one can largely agree with the views of the editors. Nevertheless, it is difficult to explain the "minimalism" of the editors in determining the volume of material about *V. E. Weber* (inventor of the telegraph), *U. J. Verrier* (discoverer of Neptune), *I. Newton*, *D. I. Mendeleev*. And if the texts provided about the first two researchers contain certain information about the main achievements of scientists, then a small material related to the 200th anniversary of the publication of his "Principia" is dedicated to *I. Newton*, although in 1893 the entire scientific world celebrated the 250th anniversary of his birth scientist, but there was not a word about it in the magazine. The same "fate" befell many world-renowned mathematicians and physicists, and not only foreign ones (*C. F. Gauss* in 1905, *G. W. Leibniz* in 1896 and 1916, *R. Descartes* in 1896 and 1900, *P. Fermat* in 1907 and 1915, *B. Pascal* in 1912, *G. S. Ohm* in 1889 and 1904, and many others), but also domestic (*S. Kovalevskaya* in 1891, *L.P. Magnytskyi* in 1889). These facts, as well as the absence of mentions of many domestic and foreign scientific celebrities in the years of their "round" dates, most likely indicate the absence of a magazine policy in the matter of allocating printed volumes for systematic biographical statements and research.

Several articles were not timed to the "round dates" of scientists (Editorial, 1915; I.R., 1891). Such articles also include the article about *M. V. Lomonosov* (Menshutkin, 1905), which raised many questions for us. In addition to the features of this material listed above, it notes Lomonosov's "special" friendship with the Swiss mathematician L. Euler (Menshutkin, 1905, p. 27), his authorship in the formulation of the law of conservation of energy (Menshutkin, 1905, p. 64) and a claim to the scientific community due to the assignment of primacy in the formulation of the law by A. L. Lavoisier (Menshutkin, 1905, p. 65). But at the same time, neither in the large magazine material about *L. Euler* (Schultz-Euler, 1907), nor in the editorial article on the scientific merits of *A. L. Lavoisier* (Editorial, 1915) does not have a single mention of Lomonosov. Moreover, neither in 1911 (the 200th anniversary of the scientist's birth) nor in 1915 (the 150th anniversary of his death) in the materials of the BEPhEM magazine was there any information about the "first Russian physicist and chemist" (Menshutkin, 1905, p. 8). And in Russia's first original work on the history of Chemistry, "Essay on the Development of Chemical Views" (1888), N. A. Menshutkin (father of the author of the publication) (Menshutkin, 1905) mention of Lomonosov is

of a formal nature. We think that these questions are a motive for a more detailed study of this problem.

The maximum number of biographical materials in the magazine during each year of its publication never exceeded 8 (Fig. 2). But at the same time, the annual volumes of materials were very different – from 0 to more than 60 magazine pages. Let's consider in more detail – what materials caused such an increase in volumes. The maximum of 1891 was associated with two large materials about *Michael Faraday* (17.6 pages) and *Hermann von Helmholtz* (18.4 pages), which were published in connection with the jubilee dates of the scientists. The maximum of 1901 is associated with materials about the French chemist *Pierre Eugene Marcellin Berthelot* (11.8 pages, jubilee of scientific activity), 1915 is about the professor of Novorossiysk University *Nikolai Alekseevych Umov* (24.5 pages, obituary). The record is the maximum of 1912, when 29.5 pages of posthumous materials about *Jules Henri Poincare* (an entire issue of the magazine was devoted to the famous mathematician) and 17.5 pages about *Jacobus Henricus Vant Hoff* were published. We will also note the maxima of 1892 (*Galileo Galilei*, 25 pages), 1894 (*P. L. Chebyshev*, 18.6 pages), 1903 (*Henrik Niels Abel*, 19.9 pages), 1905 (*Lomonosov M. V.*, 22 pages), 1906 (*F. N. Shvedov*, 12.5 pages; *Heinrich Rudolf Hertz*, 10.3 pages), 1907 (*Leonhard Euler*, 11.9 pages; *William Thomson*, 10.2 p.). In 1889, 1898 and 1914 the journal of biographical materials was not printed (it was not published in 1899). These facts also indicate the absence of a clear editorial policy in the systematic use of biography.

Conclusions.

Researching the content and carrying out a content analysis of the biographical materials of the BEPhEM magazine for the entire period of its publication (1886–1917) allows us to draw such conclusions.

1. The materials of the magazine about famous domestic and foreign scientists and specialists in the field of natural sciences and mathematics were both biographical and prosopographical in nature. Moreover, the motives for the appearance of such publications were, as a rule, "round" dates from the moment of birth, from the beginning of creative activity, from the moment of publication of an important work, or from the moment of death (or the fact of death) of the subject of the publication. We tentatively classified all similar articles in the magazine as follows: a) brief biographical and prosopographical notes; b) detailed biographical and prosopographical articles; c) obituaries.

2. The total volume of biographical and prosopographic materials for the entire period of publication of the magazine was equal to 462.7 pages, which was 2.88% of the total volume of the magazine. At the same time, the magazine contained materials about 84 scientists (only biographical publications were considered; published articles by scientists, their details are open, and the characteristics of the tasks they solved were not taken into account). The largest journal volume of editorials (more than 5 pages for each) was provided by 27 scientists (Fig. 1; this amounted to 336.3 pages or 72.7% of the total volume of biographical material; this group included 9 domestic scientists (volume materials – 103.8 pages) and 18 foreigners (volume of materials – 232.5 pages,

which made up 69.1% of the total number of materials of this group of articles)). In general, the editors allocated an average of 4.89 pages for each domestic scientist, and 5.89 pages for each foreign scientist. For obvious reasons, the largest volume of materials was about mathematicians (35.44% of the total volume of biographical materials) and about physicists (46.42%).

3. The results of the content analysis allow us to draw a conclusion about the high quality of the published biographical and prosopographical materials of the magazine. This was greatly facilitated by the careful selection of authors of articles (or sources of materials), as well as special requirements of the editors to document sources of materials in page references.

4. The "inattention" of the magazine's editors to a whole series of "round dates" of famous domestic and foreign mathematicians and physicists, as well as the uneven volumes allocated by the magazine for biographical studies, testify to the absence of a clear editorial policy in the matter of allocating printed volumes for systematic biographical statements and research.

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Наталя Пасічник
Центральноукраїнський державний педагогічний університет імені Володимира Винниченка, Україна

Ренат Ріжняк
Центральноукраїнський державний педагогічний університет імені Володимира Винниченка, Україна

Ганна Дефорж
Центральноукраїнський державний педагогічний університет імені Володимира Винниченка, Україна

Біографічні матеріали математиків і природодослідників у “Віснику дослідної фізики та елементарної математики” (1886–1917 рр.): змістовний і контентний аналіз

Анотація. *У статті представлені результати дослідження особливостей біографічних та просопографічних матеріалів про відомих математиків та дослідників природи, опубліковані в одному з найбільш авторитетних журналів “Вісник дослідної фізики та елементарної математики”, який видавався в Києві та Одесі протягом 1886–1917 рр. Фактично журнал був неофіційним періодичним друкованим органом математичного відділення Новоросійського товариства дослідників природи. Мета дослідження – проведення змістовного та контентного аналізів текстів статей журналу, в яких розкриваються*

біографії, особливості трудової діяльності та участь у наукових дослідженнях відомих вчених. При цьому авторами стосовно змістовного аналізу предмету дослідження використовувалися наукові методи – аналізу та синтезу, узагальнення і систематизації. У процесі проведення кількісного контентного аналізу використовувалися квантифікація тексту, збирання емпіричних даних, їх узагальнення та математико-статистична обробка. У результаті проведеного дослідження біографічних матеріалів журналу протягом зазначеного періоду його автори дійшли таких висновків. По-перше, матеріали журналу про відомих вітчизняних і зарубіжних математиків і дослідників природи носили як біографічний, так і просопографічний характер. Причому мотивами появи таких публікацій, як правило, були "круглі" дати з моменту народження, початку творчої діяльності, з моменту виходу важливого твору або з моменту смерті (або факт смерті) суб'єкта публікації. Усі подібні статті в журналі умовно класифіковані авторами на короткі біографічні та просопографічні нотатки, розгорнуті біографічні та просопографічні статті, некрологи. По-друге, загальний обсяг біографо-просопографічних матеріалів за період видання журналу становив 2,88 % від загального обсягу журналу. При цьому журнал містив матеріали про 84 вчених. Найбільший журнальний обсяг редакцією (більше 5 сторінок для кожного) був наданий 27 вченим і це склало 72,7 % від загального обсягу біографічного матеріалу; до цієї групи потрапили 9 вітчизняних учених та 18 іноземців. На кожного вітчизняного вченого у загальному розрахунку редакція виділяла в середньому 4,89 сторінки, а на кожного іноземного – 5,89 сторінки. Найбільший обсяг матеріалів був про фізиків (46,42% від загального обсягу біографічних матеріалів) та про математиків (35,44%). По-третє, результати змістовного аналізу дозволяють зробити висновок про високу якість друкованих біографо-просопографічних матеріалів журналу. Цьому сприяв ретельний відбір авторів статей (чи джерел матеріалів) і особливі вимоги редакції до документування джерел у посторінкових посиланнях. По-четверте, "неуважність" редакції журналу до цілого ряду "круглих дат" знаменитих вітчизняних та зарубіжних математиків та фізиків, а також нерівномірні обсяги, що виділялися журналом для біографістики, свідчать про відсутність чіткої редакційної політики журналу щодо виділення друкованих обсягів для систематичних біографічних заяв та досліджень.

Ключові слова: *біографія; просопографія; змістовний аналіз; контент-аналіз; математики; дослідники природи*

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