



SCIENTIFIC RESEARCH OF THE SCO COUNTRIES: SYNERGY AND INTEGRATION

上合组织国家的科学研究：协同和一体化

Proceedings of the
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Part 2 - Participants' reports in English

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这些会议文结合了会议的材料 – 研究论文和科学工作者的论文报告。它考察了职业化人格的技术和社会学问题。一些文章涉及人格职业化研究问题的理论和方法论方法和原则。

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Foreword

We thank all participants of our conference "Scientific research of the SCO countries: synergy and integration" for the interest shown, for your speeches and reports. Such a wide range of participants, representing all the countries that are members of the Shanghai Cooperation Organization, speaks about the necessity and importance of this event. The reports of the participants cover a wide range of topical scientific problems and our joint interaction will contribute to the further development of both theoretical and applied modern scientific research by scientists from different countries. The result of the conference was the participation of 71 authors from 7 countries (China, Russia, Uzbekistan, Kazakhstan, Azerbaijan, Tajikistan, Kyrgyzstan).

This conference was a result of the serious interest of the world academic community, the state authorities of China and the Chinese Communist Party to preserve and strengthen international cooperation in the field of science. We also thank our Russian partner Infinity Publishing House for assistance in organizing the conference, preparing and publishing the conference proceedings in Chinese Part and English Part.

I hope that the collection of this conference will be useful to a wide range of readers. It will help to consider issues, that would interest the public, under a new point of view. It will also allow to find contacts among scientists of common interests.

Fan Fukuan,

Chairman of the organizing committee of the conference

"Scientific research of the SCO countries: synergy and integration"

Full Professor, Doctor of Economic Sciences

前言

我们感谢所有参加本次会议的“上海合作组织国家的科学研究：协同作用和整合”，感谢您的演讲和报告。代表所有上海合作组织成员国的广泛参与者都谈到此次活动的必要性和重要性。参与者的报告涵盖了广泛的主题性科学问题，我们的联合互动将有助于不同国家的科学家进一步发展理论和应用的现代科学研究。会议结果是来自7个国家（中国，俄罗斯，乌兹别克斯坦，哈萨克斯坦，阿塞拜疆，塔吉克斯坦，吉尔吉斯斯坦）的83位作者的参与。

这次会议的召开，是学术界，中国国家权力机关和中国共产党对维护和加强科学领域国际合作的高度重视的结果。我们还要感谢我们的俄罗斯合作伙伴无限出版社协助组织会议，准备和发布中英文会议文集。

我希望会议的收集对广大读者有用，将有助于在新的观点下为读者提供有趣的问题，并且还将允许在共同利益的科学家中寻找联系。

范福宽，
教授，经济科学博士，中国科学院院士，会议组委会主席“上合组织国家科学研究：协同与融合”

该地区投资活动的财务组成部分
**FINANCIAL COMPONENT OF THE REGION'S INVESTMENT
ACTIVITY**

Maslakova Daria Olegovna

Senior Lecturer

Vladimir State University

SPIN-code: 9123-1070

本文讨论了与该地区发生的投资过程直接相关的财务组成部分。 这些组成部分是通过分析投资领域的现行法律法规而获得的。

关键字：区域投资过程，法律和金融独立性，财政资源。

Abstract. *The article discusses the financial components directly related to the investment process taking place in the region. These components were obtained by analyzing the current legal regulation in the field of investment.*

Keywords: *regional investment process, legal and financial independence, financial resources.*

To ensure reliable conditions for the conduct of commercial and entrepreneurial activities of economic entities of the Russian Federation, first of all, a balanced, stable investment climate is needed, it is this climate that will allow the region to occupy leading positions in the rating lists. A region that has improved the investment climate, as some authors rightly point out, attracts more finance, thereby normalizing the investment process in the region [1].

Within the framework of state regulation processes, the essence of the financial component of regional investment development is based on legislative and regulatory acts [2].

In the Federal Law the Russian Federation "On investment activities in the Russian Federation carried out in the form of capital investments" as amended on 02.01.2000 №22-FZ, investments are defined as "cash, securities, other property, including property rights, other rights that have a monetary value, invested in objects of entrepreneurial and (or) other activities in order to make a profit and (or) achieve another useful effect".

As a clarification of the definition of the concept of "investment" given in the Federal Law, we note:

- target orientation of investments and the need to obtain a beneficial effect

from them;

- taking into account the effect of investments when developing regional regulations governing investment activities within a constituent entity of the Federation;
- the selection as investment objects not only of those that relate to entrepreneurial activity, but also others, the development of which does not imply receiving not profit, but a specific result from the social effect.

The above clarifications make it possible to formulate qualitative requirements for the instruments of financing the investment process for further research.

Let's single out two financial components associated with the investment activity of the region, arising from the above definition. These components relate to entering and exiting the investment process, that is, financial resources and financial results of investment activities.



Figure 1. The process of financing investment activities in the region

Under the investment activity of the region we mean the totality of sources of financing for regional investments and financial consequences from the implementation of the investment process in their close connection and conditionality.

The proposed approach to determining the financial component of the investment process makes it possible to clarify the concept of the investment process itself. I would like to emphasize the definition of the *regional investment process*, in which a set of actions is aimed at creating a set of measures that favorably affect the implementation of *investment processes* within the constituent entities of the Federation through the use of various resource sources, which serves as a guarantee for the socio-economic growth of the region.

Vertical and horizontal relations of investors are regulated by basic legislative and by-laws, which are of a general nature and establish the main provisions in the work of the state and investors. It is worth noting the substantive and framework acts focused on the regulation of investment activity and its specific organizational legal norms on the territory of the Russian Federation.

For the current functioning and provision of opportunities for the strategic socio-economic development of the region, an objective necessity is financial independence, provided by its own financial resources, formed within the framework of budgetary and tax classifiers in the budgetary process of the Russian Federation.

Legal and financial independence of a subject of the Russian Federation allows regional authorities to independently make decisions on regulating the structure and growth rates of not only economic, but also social development [3]. The following measures are directly related to the financial component of increasing investment activity in the region.

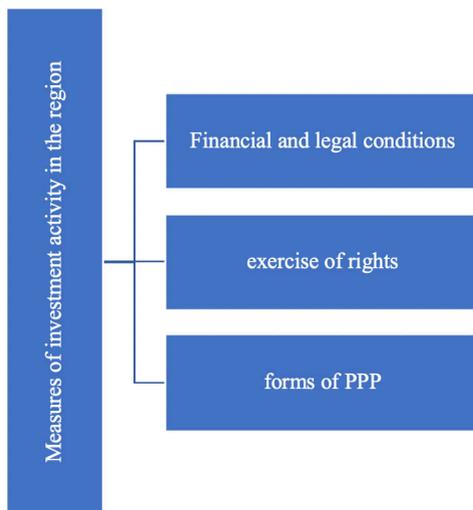


Figure 2- Measures of investment activity of the region.

From the 2 measures presented in the figure, there are:

- financial and legal conditions for increasing the economic growth of regional business entities;
- realization of the rights of various forms of direct financing for the development of the internal regional economic sphere with the help of resources, the use of which is in the department of regional government bodies;
- application of various forms of public-private partnership based on the use of various financial instruments.

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该地区社会经济经济发展的经济安全
**ECONOMIC SECURITY OF THE SOCIO-ECONOMIC DEVELOPMENT
OF THE REGION ¹**

Kuklin Aleksander Anatolievich

Doctor of Economic Sciences, Full Professor

Head Research Officer

Institute of Economics of the Ural Branch of the Russian Academy of Sciences

Okhotnikov Sergey Aleksandrovich

Lecturer in Mathematics and Physics

Autonomous non-profit organization of continuing education "Oxford Language Center"

本文讨论了评估经济安全的各种方法，并提出了作者的快速诊断工具包，该工具包使您可以摆脱使用数十种指标的体积方法，并确定经济安全在该地区社会经济发展中的真正地位。经济安全被认为是一个地区在没有外部支持的情况下自行维持当前状态并为调动资源和选择可能的发展选择提供时间的能力。这是一种“安全垫”。我们选择的该地区经济安全的8个主要指标将显著提高分析工作的效率，清楚地突出反馈并采取具体措施将其定位并消除威胁。该方法学设备已经在乌拉尔联邦区的个别主题的示例上进行了测试。

关键词：经济安全的快速诊断；互相关函数UFD主体的实际状态

Abstract. *The article discusses various approaches to assessing economic security and proposes the author's express diagnostic toolkit, which allows you to get away from volumetric methods using dozens of indicators and determine the true place of economic security in the socio-economic development of the region. Economic security is seen as the ability of a region to maintain its current state on its own without external support and to provide time for maneuvering resources and choosing a possible development option. This is a kind of "safety cushion". The 8 main indicators of the region's economic security that we have selected will significantly increase the efficiency of analytical work, clearly highlight feedbacks*

¹ The article is executed in accordance with the research plan of the FGBUN (Federal Budgetary State Institution of Science) of the Institute of Economics of the Ural Branch of the Russian Academy of Sciences for 2019-2022.

and take specific measures to localize them and neutralize threats. The methodological apparatus has been tested on the example of individual subjects of the Ural Federal District.

Keywords: *express diagnostics of economic security; cross-correlation function; actual state of UFD subjects*

Introduction

Assessment of the level of economic security is one of the most important indicators of the state of the region. One of the main conditions for the reliability and practical usefulness of such an assessment is an adequate selection of indicators used in the assessment, which is a difficult task, especially with a chronic delay in reliable statistical information and an abundance of conflicting sources of economic information.

One of the fundamental problems is the speed of obtaining assessments of economic security, which is especially important during the period of socio-economic and financial crises, intensification of various threats and challenges. The speed of obtaining estimates of the level and dynamics of the economic security of the region directly depends on the time required for making decisions regarding the methods and resources for responding to internal and external disturbances. Reducing the time for assessing the state of the system and responding to its deviations from stationary (in the static and dynamic sense) states involves the use of the technique of express diagnostics of economic security.

Brief overview of related research

Recently, many interpretations of the concept and methods of assessing the economic security of a region have appeared in modern scientific literature. This is due to the strengthening of external economic impacts on national and regional socio-economic systems, as well as the growing role of the regions themselves, as sources of formation of methods and resources to counter threats and challenges.

The category of "economic security" was first introduced into scientific circulation in 1934 as part of the "New Deal" of US President FD Roosevelt. In Russia, research in this direction was stimulated by an article by Academician L.I. Abalkin in the journal "Issues of economics" [1], where three major problems were identified, including the country's economic independence, the stability and sustainability of the national economy, the ability to self-development and progress. The most noticeable contribution to the development of this direction was done by S.Yu. Glazyev, E.A. Oleinikov, V.K. Senchagov, S.V. Stepashin. In particular, Glazyev S.Yu. developed a system of indicative safety indicators, consisting of 22 modules, and a comprehensive study of national economic security was carried out [2]. In the works of Senchagov V.K. in the system of indicators for diagnosing economic security, indicators were identified that characterize the potential,

current and predicted state of the research object, criteria of economic security were substantiated with the allocation of modules of the level and quality of life and their decomposition was proposed with the allocation of resource potential, physical capital and labor [3,4,5] ... Oleinikov E.A. proposed a classification of 39 of the most important indicators according to 5 criteria (the level of the object of economic security, the degree of significance of indicators, the period of action of threats, their scale and probable damage) [6,7].

The most complete definition of the economic security of a territorial entity, which extended to regions, republics and federal districts, belongs to the scientists of the Ural School under the leadership of Academician A.I. Tatarkin [8,9,10]. Under the economic security of a territorial entity (region, republic, federal district), it was proposed to understand a set of conditions and factors that characterize the current state of the economy, a certain stability and sustainability, the degree of independence in the processes of integration with the economy of the Federation [11]. An acceptable level of economic security in this concept is considered to be the ability of the region to pursue its own economic policy within the Russian Federation, the ability to respond to geopolitical changes without loss of stability, the ability to implement (or at least start to implement) major socio-economic measures to respond to urgent generating social tension of the situation in the territory.

Formulation of the problem

The authors set themselves the task of proposing a method for express diagnostics of the economic security of a region and verifying it using the example of diagnosing not only individual modules describing the state and structure of the regional economic system, but integrated specifically regional spheres of life.

The analysis in this article is carried out using time series of economic indicators taking into account cross-correlation and its rate of change, which indicate the ability of the indicators under consideration to change both in modulus and in direction. These characteristics are used to determine the mutual influence of indicators on each other (indicators of the first and second levels), as well as to identify the main scenarios for the development of the main indicator from the side of the influence of other indicators. The following indicators were selected: the degree of depreciation of fixed production assets, the ratio of exports to GRP, the consumer price index, the ratio of the average per capita money income to the subsistence minimum, the level of general unemployment, life expectancy at birth, the ratio of the consumption of basic agricultural products to the standard consumption in accordance with medical food standards, specific emissions of harmful substances into the atmosphere.

Methods and materials

The measurement of the limits of variation of indicators at spline points (with a sharp change in trend) was carried out by calculating the rate of change of the

indicator: $\vartheta_i(t) = \frac{dx_i(t)}{dt} = \frac{\Delta x_i(t)}{\Delta t}$, where $\Delta x_i(t)$ – increment of the indicator x_i over the time interval Δt for each of the selected indicators ($i=1, \dots, 8$) [12,13].

Unlike the previous work of the authors [14], we will use the following formula to calculate the coefficient of mutual influence:

$$C_{ij}(\tau) = \frac{\sum_{t=1}^{k-\tau} (x_i(t) - \bar{x}_i)(x_j(t+\tau) - \bar{x}_j)}{\sqrt{\sum_{t=1}^{k-\tau} (x_i(t) - \bar{x}_i)^2 \sum_{t=1}^{k-\tau} (x_j(t) - \bar{x}_j)^2}} \quad (1)$$

where t – time, $x_i(t)$ — the value of the indicator at time t , $x_j(t)$ — the value of the second indicator different from $x_i(t)$, $x_j(t + \tau)$ — the value of the j -th indicator with a shift in time, τ — the shift in time, k — the maximum value of t , \bar{x}_i — the average value of the i -th indicator (i, j – the number of the indicator).

If we compare two correlation dependences for different components of one system, then we can obtain information about the mutual correlation of these components within the framework of one study [15,16,17]. In this way, you can also determine the differences in the states of the system under consideration in a particular crisis [18, 19].

Based on expression (1), a matrix of coefficients of mutual influence of indicators was calculated (Table 1). The table shows an example of one of the subjects of the UFD, namely the Sverdlovsk Oblast, which is a typical representative of industrial regions.

Table 1

Matrix of coefficients of mutual influence of indicators (on the example of Sverdlovsk Oblast)

	1	2	3	4	5	6	7	8
1	1,000	0,768	-0,513	-0,629	-0,474	-0,808	-0,836	-0,779
2	0,770	1,000	-0,711	-0,854	-0,501	-0,939	-0,929	-0,783
3	-0,513	-0,711	1,000	0,718	0,520	0,674	0,685	0,770
4	-0,629	-0,854	0,718	1,000	0,592	0,806	0,846	0,630
5	-0,474	-0,501	0,520	0,592	1,000	0,581	0,577	0,545
6	-0,808	-0,939	0,674	0,806	0,581	1,000	0,978	0,839
7	-0,836	-0,929	0,685	0,846	0,577	0,978	1,000	0,860
8	-0,779	-0,783	0,770	0,630	0,545	0,839	0,860	1,000

	primary impact indicator		secondary impact indicator
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Note. Used indicators: 1-degree of wear of fixed assets; 2-the ratio of exports to GRP; 3-consumer price index; 4-the ratio of the average per capita money

income to the cost of living; 5-level of general unemployment; 6-life expectancy; 7- the ratio of the volume of consumption of the main types of agricultural products to the standard volume of consumption in accordance with medical nutritional standards; 8-specific emissions of harmful substances into the atmosphere.

Source: authors' calculations

As an illustration, Fig. 1 shows the cross-correlation function (a) and its rate of change versus the shift time of three indicators (b). Analysis of this function reveals a strong interaction between indicators over a long time interval. Starting from a temporary three-year shift, there has been an increased mutual influence between these indicators and this interaction is only intensifying. The rate of change not only confirms this, but also reveals bursts with a sharp change in the trend of mutual influence of indicators.

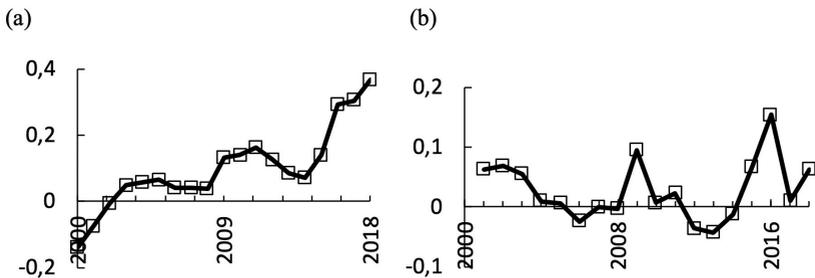


Fig. 1. Cross-correlation of the shift of three indicators "Consumer Price Index" - "The ratio of the average per capita money income to the subsistence minimum" - "The ratio of exports to GRP" (a) and their rate of change (b).

Source: authors' calculations

Analysis of results

The study used a method of normalizing indicators associated with the levels of crises. Crisis levels: N - relatively normal situation (0 or less); PK1 - initial stage (0.001-0.332); PK2 - developmental stage (0.333-0.665); PK3 - critical stage threatening a transition to a crisis zone (0.666-0.999); K1 - unstable stage (1-1,399); K2 - threatening stage (1.4-1.799); K3 - emergency stage (1.8 or more)

The interactions of 8 selected indicators and indicators of the primary and secondary levels (in express diagnostics) make it possible to determine the assessment of economic security, presented in Table 2 (on the example of Sverdlovsk Oblast).

Table 2

Economic security (ES) (on the example of Sverdlovsk Oblast)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
ES as calculated by the authors	1,483 K2	1,338 K1	1,269 K1	1,074 K1	0,987 PK3	0,928 PK3	0,807 PK3	0,602 PK2	0,651 PK2	0,647 PK2

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018
ES as calculated by the authors	0,640 PK2	0,545 PK2	0,441 PK2	0,397 PK2	0,491 PK2	0,585 PK2	0,429 PK2	0,372 PK2	0,333 PK2

Source: authors' calculations

According to express diagnostics, economic security in 2004 moves to the PC3 level and then stabilizes, which has a positive effect on the state of the region as a whole.

Conclusion

In conditions of constantly acting threats, instability of the behavior of the socio-economic system of the region, confusion and an abundance of all kinds of circulars and insufficient study of prospects, the development of tools for assessing the state and balance of the territory comes to the fore. The toolkit should take into account the true state, not be cumbersome and capture both the prehistory of development and the future, while constantly signaling through feedback about the appearance and manifestation of latent characteristics in the socio-economic system:

1. For the first time, it has been suggested that one cannot judge the socio-economic state of the region only by the level of economic security. Economic security is the ability to maintain at a certain level a common set of different manifestations that characterize the state and development of the research object (a kind of "safety cushion").

2. Express diagnostics of the economic security of the region, consisting of 8 indicators, are developed and presented.

3. Management bodies acquire the ability to determine the permissible reserves for stabilizing the socio-economic state of the region, determine the margin of safety of the level of economic security and use the results obtained in the redistribution of financial resources.

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数字领域的老师

THE TEACHER IN THE DIGITAL REALM

Nadtochiy Yuliya Borisovna

*Candidate of Pedagogical Sciences, Associate Professor
MIREA – Russian Technological University,
Moscow, Russian Federation*

Gorelova Lyudmila Igorevna

*student in the Master's Program
«Electronic Educational Technologies»
Moscow Pedagogical State University
Moscow, Russian Federation*

我们的生活条件在变化，对合格专家的要求也在变化。教育系统也不能搁置一边：不断开发和实施各种数字教育发展项目。作为教育体系中的关键人物之一，教师也必须满足现代社会的要求。在这方面，诸如具有数字素养的要求日益凸显。

本文考虑了数字化时代教师素质研究的各种研究成果，并探讨了在数字环境下组织对教师的专业支持。

关键字：教师，数字素养，教育数字化，专业支持，研究成果。

Abstract. *Our living conditions are changing, and the requirements for qualified specialists are changing. The education system does not stand aside either: various projects for the development of digital education are constantly being developed and implemented. And the teacher, as one of the key figures in the education system, must also meet the requirements of modern society. In this connection, such a requirement as having digital literacy comes to the fore.*

The article considers the results of various studies on the study of the qualities of teachers in the era of digitalization, and touches on the organization of professional support for teachers in the digital environment.

Keywords: *teacher, digital literacy, digitalization of education, professional support, research results.*

In modern conditions presented to us by the environment, the teacher has to readjust to a new level of work. The profession of a teacher is already aimed at constant development and improvement, and in the digital environment, also at

meeting new realities. The digitalization of education implies not only the discovery and use of new opportunities (for example, learning opportunities at any time, throughout life), but also certain requirements for teachers: continuous improvement of the teacher's qualifications, as well as the need to apply new approaches to their students, new forms of learning

The digital education system can be represented as a set of information resources, telecommunications and management systems (Figure 1). Information resources are hypercollections (media, video, audio, biblios, photos, graphics, animations), informational data sets, educational portals, Internet sites; telecommunications - network and mobile environments, media, television, telephony, teleconferences, hosting, mail services and management system - user authorization, testing, content, ratings, personal and collective information space (website, blog, chat, forum, mail, database) [3].

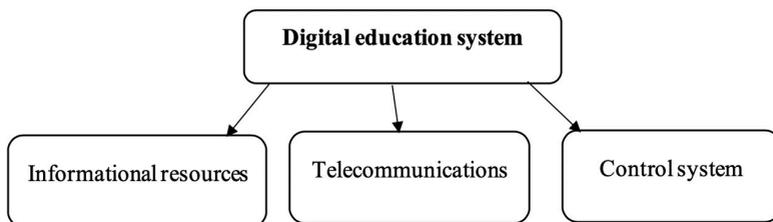


Figure 1. Digital education system.

The digitalization of education involves the use of mobile and Internet technologies by students, expanding the horizons of their knowledge, making them limitless. The productive use of digital technologies, the inclusion of students in an independent search, selection of information, participation in project activities forms their competencies in the XXI century [3].

A modern teacher in a digital environment cannot lag behind his students and must be digitally literate.

Digital literacy of a teacher is a system of basic knowledge, skills and attitudes in the field of everyday use of digital technologies, like people of other professions, this is the ability to navigate the flow of digital information and work with digital technologies and information [3, 4].

The components of digital literacy of an educator are shown in figure 2.

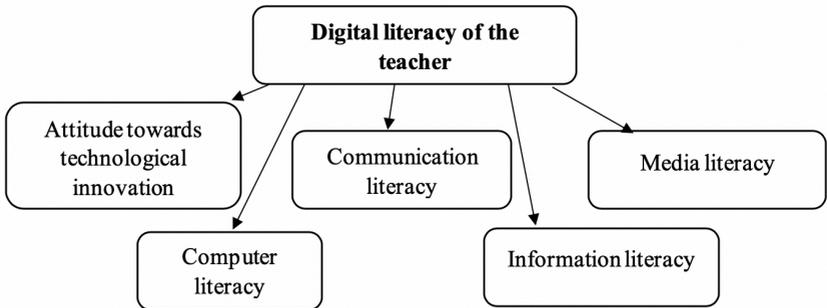


Figure 2. Components of digital literacy of a teacher [4].

Currently, the signs of a literate person (not only a teacher) have been developed within the framework of all these components.

Let us consider some of the results of studies carried out by the analytical center NAFI, dedicated to the study of the readiness of Russian teachers to use the opportunities provided by digital technologies today in their professional activities [1, 4].

In March 2020, the NAFI analytical center conducted a study in order to identify the qualities that a modern teacher should have (1600 people over 18 years old were interviewed in 153 settlements in 53 regions of Russia). According to Russians (Figure 3), the main qualities of a good modern teacher are the ability to clearly and interestingly explain the material (39%) and professionalism (36%). At the same time, a quarter of Russians (23%) believe that modern teachers lack professionalism, by which they understand the presence of sufficient pedagogical experience and broad knowledge in their field [1].

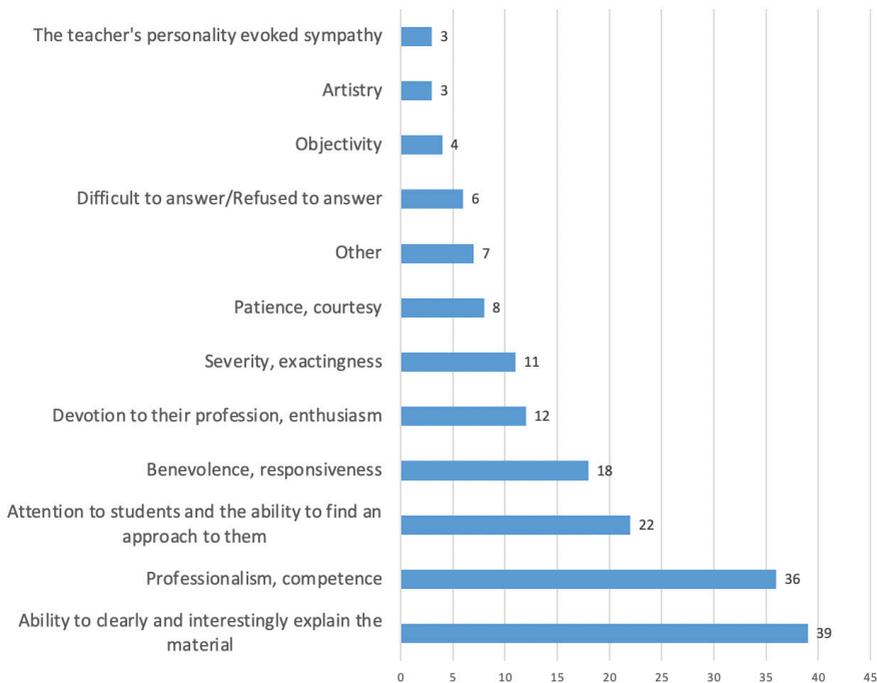


Figure 3. Distribution of answers to the question “What special qualities did the teachers have, whom you remember as great professionals, masters of their craft?”, In% of all respondents (the study “Master of his craft: what qualities a modern teacher should have”, <https://nafi.ru/analytics/master-svoego-dela-kakimi-kachestvami-dolzhen-obladat-sovremennyy-uchitel/>)

In 2018, RTU MIREA conducted a survey of 1st - 4th year students (103 people took part in the survey, studying in the areas: "Innovation", "Management", "Optical engineering" and "Biotechnical systems and technologies"), according to the results of which that one of the main requirements of students is the requirement for the competence of teachers, which, in their opinion, helps to improve the quality of the educational process. The diagram in figure 4 clearly shows how students see a modern professional teacher who is able to carry out high-quality training of future specialists [2].

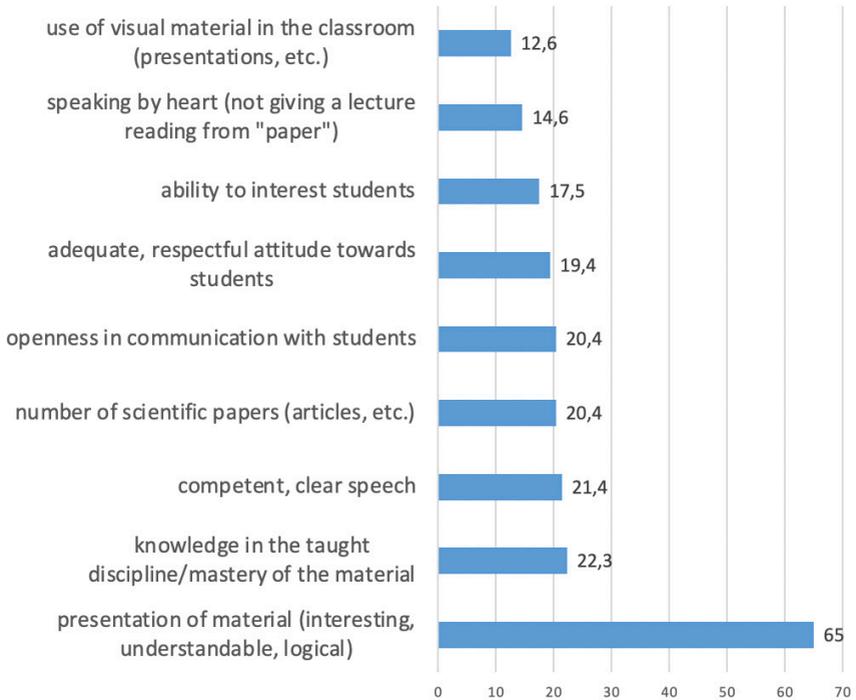


Figure 4. List of qualities and requirements for a qualified teacher (according to students, in% of the total number of respondents).

It is also of interest to study the readiness of teachers to switch to distance learning in connection with the current situation in the world (pandemic). Half of Russian teachers and professors of educational institutions of higher education note that they need serious help to effectively switch to work in the online format. Educators complain about the poor organization of the transition to distance learning and say that the workload on them has increased greatly. This is evidenced by the results of a study conducted by the NAFI analytical center at the end of March 2020 among teachers working in Russian institutions of general and higher education (1100 Russian teachers were interviewed: including 800 school teachers and 300 teachers of educational institutions of higher education from 8 federal districts). The majority of teachers (74%) noted an increase in the workload due to the transition to distance learning, and more than a quarter (26%) complained about the poor organization of the transition from traditional education to online. 60% described the transition as "satisfactory" and only 14% called it well-organized. Almost half of the teachers (47%) noted that they need help to conduct distance

learning effectively [1]. Figure 5 shows the answers (received up to 7% of the votes) to the question “What exactly do you lack to conduct online training effectively? What help do you need? ”

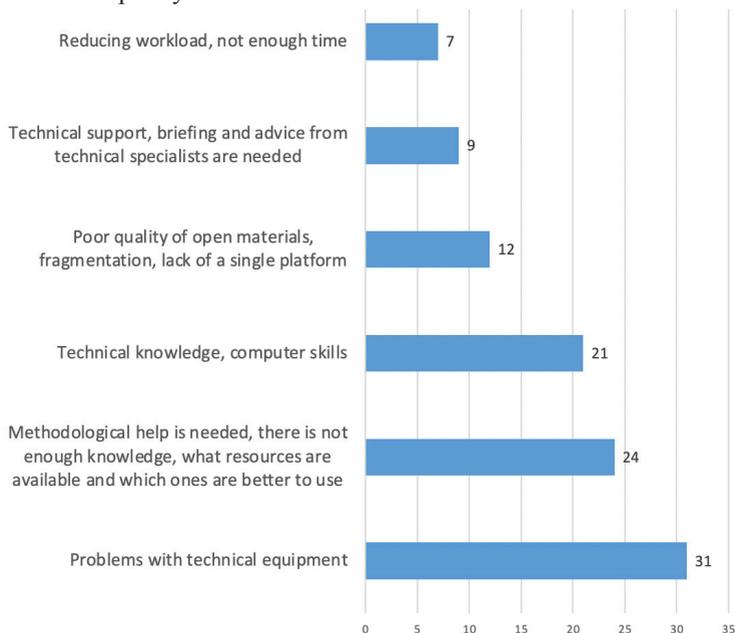


Figure 5. Distribution of answers to the question “What exactly do you lack to conduct online training effectively? What kind of help do you need? ”, In% of the interviewed teachers who noted that they need help for effective remote work (<https://nafi.ru/analytics/polovina-pedagogov-okazalis-ne-gotovy-k-perekhodu-na-distantsionnoe-obuchenie/>)

The results of the research special project "Digital Literacy of Teachers" implemented by the NAFI analytical center in the spring of 2019 (634 teachers (higher education), as well as 555 teachers (general education) took part in the study showed that Russian teachers are well versed in digital technologies in general, but in the matter of using them in the educational process, teachers still have something to learn (the study "The digital future of education: how do Russian teachers integrate technology into the educational process?" <https://nafi.ru/analytics/tsifrovoe-budushchee-obrazovaniya-kak-rossiyskie-pedagogi-integriruyut-tehnologii-v-uchebnyy-protse/>). The data obtained helped to identify which competencies when using information and communication technologies in pedagogical activities need to be developed among teachers in the first place, these are [1, 4]:

- digital communication with students and colleagues;
- sharing and creating materials with fellow faculty members in the cloud;
- using a computer to create new teaching materials and adapt existing ones;
- deepening of knowledge about the methods of information protection;
- assessment of information reliability and identification of false or biased information;
- safe and responsible use of digital technologies;
- creative use of digital technologies to solve educational problems;
- the use of digital technologies in the educational process and tracking the online activity of students;
- using digital tools to assess and track student progress and understand the need for additional support.

Naturally, in the conditions of the new reality, the issues of professional support for teachers also become relevant. How can you support a teacher in a digital environment?

Firstly, it is possible to organize the support of a teacher in his professional activity, that is, to develop a set of organizational, diagnostic, training and development activities implemented in an educational organization. This is an activity aimed at creating a system of conditions in an educational organization that contribute to successful professional and personal development, as well as mastering methods for resolving the most typical problems that a teacher encounters in the process of carrying out professional activities.

To organize such support, you need a qualified specialist, professional or experienced worker, from whom other workers can get advice and recommendations. This person can be one of the fellow teachers who already have experience working in a distance format or an individual specialist from whom other employees can receive professional support.

It is also important to take care of the health of employees, as one of the components of high-quality work performance (a healthy employee is a productive employee who performs his duties efficiently). This will partially help the creation of a health-saving environment for the implementation of pedagogical activities: labor protection and organization of the teacher's workplace, treatment and preventive measures, the formation of a comfortable psychological climate, including for reducing the psycho-emotional load, etc.

Secondly, it is work on identifying and overcoming difficulties that arise in professional activity. For example, for the development of the creative component of teachers (the creation of variable assignments, the selection of interesting examples, as opposed to a simple retelling of the textbook), trainings and master

classes for teachers can be organized and conducted, and in order to exchange opinions and experiences, round tables can be organized and held. and scientific seminars (workshops), used the possibilities of social networks (communication with colleagues from other countries), etc.

In conclusion, it can be noted that the study of the requirements for a modern teacher in a digital environment opens up a wide range for various studies. The modern teacher is no longer only a bearer of knowledge that he transfers to his students (learners), but also a kind of "guide" to digital reality.

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残疾体操运动员的领导潜能
**LEADERSHIP POTENTIAL IN GYMNASTS WITH
DISABILITIES**

Novikov Ivan Vladislavovich

Lecturer

Institute of Sports, Tourism and Service

South Ural State University, Chelyabinsk, Russia

Novikova Ekaterina Andreevna

Student

South Ural State University, Chelyabinsk, Russia

Chervotkin Vladimir Nikolaevich

President of the RPO "Federation of Artistic

gymnastics of the Chelyabinsk region ", Chelyabinsk

文章认为，在违反听觉分析仪的情况下，体操运动员的领导才能表现和发展问题的紧迫性。对领导力概念及其对日常生活行为的影响进行了理论分析，给出了领导素质的主要特征，指出了领导者在任何群体或集体中的作用。提出了残疾儿童的社会化和身体适应问题以及将其纳入现代社会的问题。进行了一项研究和教学实验，目的是弄清和确定领导才能，以及他们与气质和年龄的关系。患有听力障碍的体操运动员参加了该实验，他们参与了根据体操的手段和方法开发的形成协调能力的技术。根据领导者方法和艾森克（Eysenck）测试以质疑的形式进行测试。在实验过程中，我们获得了有关代表儿童队伍的领导素质当前发展的可靠数据。作者得出的结论是，在任何团队或小组中，都会有各种各样的领导者。根据实验结果，我们可以得出结论，领导才能是随时间和地点而变的能力，并伴随着一个人的一生。

作者得出的结论是，有必要进一步研究听力障碍男孩的领导能力发展，以研究使用体操手段和方法的方法的影响。

关键词：领导才能；气质；年龄特征；身体发育；社会化；适应性体育；听力受损的儿童；7-9岁的体操运动员；训练；方法；体操。

Annotation. *The article considers the urgency of the problem of manifestation and development of leadership qualities in gymnasts with a violation of the auditory analyzer. A theoretical analysis of the concept of leadership and its influence on behavior in everyday life is carried out, the main characteristics of leadership*

qualities are given, the role of the leader in any group or collective is indicated. The problem of socialization and physical adaptation of children with disabilities and their inclusion in modern society is presented. A research and pedagogical experiment was carried out aimed at clarifying and identifying leadership qualities, as well as their relationship with temperament and age. The experiment was attended by gymnasts with hearing impairments, engaged in the developed technique for the formation of coordination abilities based on the means and methods of gymnastics. Testing in the form of questioning according to the Leader method and the Eysenck test was conducted. During the experiment, we obtained reliable data on the current development of leadership qualities of the represented contingent of children. The authors come to the conclusion that in any team or group there will be leaders of various kinds. According to the results of the experiment, we can conclude that leadership qualities are making that, depending on time and place, become abilities and accompany a person throughout life.

The authors come to the conclusion that there is a need for further research on the development of leadership abilities in boys with hearing impairments in the direction of studying the influence of methods using the means and methods of gymnastics.

Keywords: *leadership skills; temperament; age features; physical development; socialization; adaptive physical education; hearing impaired children; gymnasts 7-9 years old; training; methodology; gymnastics.*

Introduction

At the present stage of development of society, there is a need to improve the quality of education, including special correctional education. Particular attention should be focused on creating conditions for full inclusion in the educational space and successful socialization of children with disabilities. One of the priority tendencies in solving the problems of the formation, preservation and strengthening of children's health at the present stage of development of society is the search for new, more effective forms, means, methods, technologies of teaching and upbringing, their introduction into the practice of educational, including special correctional institutions. [1,2].

Diseases of the organ of hearing have a biological basis. In children with hearing impairment, there is a violation of the structure of biological structures. As a result, the perception of sound signals coming from the outside world is impaired. This circumstance affects the psycho-emotional development of the child.

Children of different ages possess leadership qualities to one degree or another that help them better adapt to interaction in life. In some children, the ability to lead is already manifested at the age of 4-6 years in the process of relationships with peers; during games and competitions, such children usually take on the main

roles.

Leadership is the ability to influence people by encouraging them to strive, of their own free will, to accomplish certain tasks.

In Russian social psychology, the development of the leadership problem had a rather complex and sometimes contradictory character. The first works in this area were the studies of S.O. Lozinsky, E.A.Arkin, A.S. Zaluzhnog, P.L. Zdgorovsky, and others. These works dealt with issues of leadership, leadership, mainly in children's groups and collectives, organized and natural [3]. There have been no studies of leadership qualities among gymnasts with hearing impairments, which indicates the scientific novelty of our work.

The formation of relationships between athletes in a sports group is influenced by the realization of objective and subjective factors, as well as the role of socio-psychological conditions. One of these factors is the socio-psychological phenomenon of leadership. The conditions and opportunities for the manifestation of leadership qualities in a sports group seem to us especially interesting.

To study special forms and a method of organizing physical culture and health, training sessions and competitions for gymnasts with hearing impairments, which will increase social and labor adaptation, including improving leadership qualities and, ultimately, help integrate them into society, it is necessary to study the current leadership potential of these children [4,5].

In connection with the above, we see great potential in the study of leadership qualities of gymnasts with hearing impairments in solving problems of adaptive physical culture. To test the correctness of our judgments, we conducted this study.

Thus, we are faced with the task of finding out the current characteristics of leadership qualities in gymnasts with hearing impairments and their relationship with temperament [6]. The solution of the set problem, the theoretical and practical component of the research will allow in the future to develop an effective methodology for the development of leadership qualities in gymnasts with hearing impairments, which is an urgent problem. An integrated approach to the problem will make effective the socialization and adaptation of disabled children in modern society [7,8].

Purpose of the research

On the basis of testing, to find out the real possibility of manifestation of leadership qualities in gymnasts with hearing impairments, to reveal the dependence of leadership and temperament.

Research methodology and organization

The experiment was carried out in the form of testing, in an environment favorable to the participants, that is, without the influence of any external factors [9].

The study involved 25 boys of 7–9 years old with hearing impairments. The study was carried out for 2 weeks.

During the research, the following techniques were used [10]:

1. Methodology "Leader" - determination of the degree of expression of leadership qualities, consisting of 50 questions. The subject was asked to select and mark only one of the two suggested answers to each question. In accordance with the key, the degree of expression of the subject's leadership qualities was determined: weak, medium, strong, or this person, as a leader, is inclined to dictate.

2. Eysenck's test - determining the type of temperament. Upon further analysis of the experimental data, we assume that the type of temperament does not affect the formation of leadership qualities, but affects the behavior and style of initiative of the presented leader.

Results and its discussion

Based on the analysis of the age of boys from 7 to 9 years old, it can be concluded that this factor does not greatly affect the formation of leadership qualities.

In this group, 4 boys (16%) have leadership qualities with a weak degree of expression, 18 boys (72%) - with an average degree, in 2 boys (8%) - this quality is strongly expressed and only 1 boy (4%) is inclined to dictate ...

It can be concluded that in any team, group there will be leaders of various kinds. And even if a person is at the head of a group, it is not a fact that he is characterized by the basic qualities of a leader. Most likely, these qualities will exist in him, but he will also have a melancholic type of temperament, and, therefore, as a leader, this personality will be ineffective. The impact of temperament on leadership qualities must be analyzed from the point of view of the individual style of performance [11]. There are three areas of manifestation of temperament: general activity, features of the motor sphere and the properties of emotionality [12].

General activity is determined by the intensity and volume of human interaction with the environment - physical and social. A person can be inert, passive, calm, active, proactive, impetuous.

The motor sphere is a particular expression of general activity. This includes pace, speed, rhythm, and total number of movements.

Emotionality as a manifestation of temperament - impressionability, sensitivity, impulsivity, etc.

Each of the spheres is reflected in all types of temperament, thus, they interact, and as a result, a certain type is obtained, which is inherent in the personality throughout life. A person's temperament influences activity, energy, sociability, restraint, slowness, fatigue [13]. In a sports team, this will be especially evident in competitions.

In the presented group, leadership qualities with an average severity prevail in persons with a melancholic type of temperament, then in persons with a choleric type and an average severity [14,15]. It can be concluded that the struggle for leadership positions will take place between individuals with a choleric type of

temperament, and boys with a melancholic type will recede into the background.

Conclusions. The development of leadership qualities remains an urgent problem, which has a need for a quick and successful solution. Leadership qualities contribute to the formation and development of the personality as a whole, and also have a beneficial effect on the process of socialization and adaptation, which is especially important for children with hearing impairments.

In the course of analyzing literature sources, we come to the conclusion that leadership qualities are innate inclinations that can develop throughout life and the formation and development of a person under the influence of external and internal factors. And they can also be the abilities of a person, which express his effectiveness for the successful implementation of certain types of activities.

Based on the study, it can be concluded that leadership qualities are inclinations that, depending on time and place, become abilities and accompany a person throughout his life.

One of the important results of the manifestation of leadership qualities in boys with hearing impairments is an increase in the level of socialization and adaptation of such children in modern society.

Further study of the problem of the development of leadership abilities in boys with hearing impairments is possible in the direction of studying the influence of the methodology of training in artistic gymnastics.

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解构现代教育背景下的文化自决价值论模型
AXIOLOGICAL MODEL OF CULTURAL SELF-DETERMINATION
IN THE CONTEXT OF DECONSTRUCTION OF MODERN
EDUCATION

Bulankina Nadegda Efimovna

*Doctor of Philosophical and Pedagogical Sciences, Head of Department
Professor of International Languages Department
Novosibirsk Institute for Advanced Training & Retraining of Teachers
Russia, Novosibirsk*

基于价值论方法，正在更新多元文化环境的背景，以提高现代教师的专业技能，能力和动力，以促进教育的文化创造使命。多语种环境的概念领域，人格的概念领域和现象文化的自组织这三种结构的综合模型自决，具有自己的标准和指标，可以在教师的继续教育解构方面为教师提供指导支持。老师。

关键字：综合模式，文化自决（CSD），人道主义自组织，专业发展教育，多元文化

Abstract. *Based on axiological approach the context of the multicultural environment is being updated for upgrading professional skills, competences, and motivation of a modern teacher to promote the culture-creating mission of education. The Comprehensive model of self-determination consists of three constructs concept sphere of the polylingual environment, concept sphere of personality, and phenomenon cultural self-organizations, which has its own criteria and indicators for tutorial support of teachers in terms of deconstruction of continuing education of a teacher.*

Keyword: *comprehensive model, cultural self-determination (CSD), humanitarian self-organization, professional development education, polyculture.*

In modern conditions of intensive exchange and interaction of people at the state and cultural levels, the problem of cultural self-determination and personal development is of particular importance, which is reflected in the studies of the features of the multicultural world, as well as in the works devoted to the value orientations of domestic education. The values are understood as generally accepted ideas of people about the goals, and the ways to be achieved and prescribed

to certain socially accepted ways of behavior. These ideas create the basis for all moral principles, and an individual system of socially and culturally significant values established in each social system. The set of questions presented above is a problem field for the study of cultural self-determination of the individual as a value dominant in the educational environment. Developing new socially important and culturally oriented approaches, scientists and practitioners are in search of meaningful technology in the development and formation of cultural identity. Introduced for the first time in the pedagogical discourse (1995) the author of this article considers cultural self-identity in the multilingual educational environment as a holistic personal value actualized in the information educational environment of polycultures (the phenomenon of multilingual information-educational environment as a value), which manifests itself in the national consciousness under conditions of social and professional choice of the person that owns the language culture (the phenomenon of multilingual conceptual sphere of the individual as a value), and also in readiness to use all the variety of its expressive means of mastering and preserving national cultural values for understanding the meaning of human existence and self-realization in life (the phenomenon of humanitarian self-organization in the cultural environment as a value).

The proposed context of actualization of the cultural approach in theory and practice is associated with the urgent need to consider it as one of the most important strategies and tactics to neutralize the growing negative trends towards the value component of modern human being existence – multilingualism and multiculturalism in education and through education (E. V. Bondarevskaya, 2010, V. p. Borisenkov, A. Ya. Danilyuk, 2006, N. S. Sergeev, V. V. Serikov, 2013, etc). At the same time comprehension of the national value aspects of the educational environment of personality for life in the society (from students to participants of various additional educational programs, including professional, in the context of lifelong learning) is a priority for the professional education of a teacher in the space of alternative educational systems - gamification, the paradox of mass individual education against the diploma !!!!, digital footprint and some others [3, 5; 6; 7; 10; 11]. At the same time, the value component of a teacher's professional readiness is understood as an integrative personal formation based on a deep understanding of the humanistic potential and humanitarian component of education [4; 6;7;10;11]. The increasing role of professional readiness of a modern teacher to fulfill the cultural mission of education, which was also discussed by great scientists and thinkers (I. Ya. Lerner, D. S. Likhachev, V. V. Kraevsky, I. D. Mechnikov, G. N. Filonov and many others), due to the need to improve the quality of domestic education as a value. This phenomenon is reflected in a number of state documents (The law on "Education", 2012, the national project "Education", 2019), and in the works of researchers of modern problems of education, general and professional [1;7;10;11].

The significance of these problems is also stated by domestic researchers of modern education [1; 3; 5], focusing on the development of their holistic vision-philosophical understanding and pedagogical solutions to improve its quality characteristics – the ability of students to reflect, selectivity, responsibility for words and deeds, subjectivity, creativity, recognition of the value of a person, etc [10]. This is the subject of numerous conferences, symposiums, forums and on-line seminars where scientists and practitioners analyze the concept of quality of education, consider new challenges and changes in the perception of the quality of education in the conditions of active digitalization of all spheres of life in a globalizing world. As a result of these studies, a description of the main types of international studies of the quality of education, an analysis of the results of the Russian experience of participation in them and the main directions in the development of domestic practice of assessing the quality of education at both the general and professional levels [1;4;5;6;7;10]. At is the case, in the background of trends and innovations in education, researchers recognize the development of meaningful technology for improving general and professional culture of the individual in the aspect of its axiological component, such value dominants as patriotism, morality, national identity, continuing education as a value, and some others [4;5;6;7;8;10. Moreover, we believe that not the least role in this is played by the solution of the problem of increasing the level of the humanitarian (linguistic and communicative) component of human life, which is the basis of cultural self-determination "through life" [3;4] as a continuous process of enrichment with various expressive means of culture and languages. At the same time, its effective implementation in the educational process is due, on the one hand, to the perception of the native culture, its expressive means (languages), since members of one cultural community, in contrast to a multicultural society, unconsciously perceive a specific culture, sharing its postulates. On the other hand, they simply lack the desire and interest in the peculiarities of their own culture, that leads to a low level of knowledge of the necessary vocabulary for dialogical communication in the aspect of its specificity and to problems of interaction with others [3;5;8].

By the same token, the goals and objectives of the multicultural education should be implemented within the framework of a multicultural educational space (V. P. Borysenkov, O. V. Gukalenko, A. Ya. Danilyuk, 2006), taking into account the educational opportunities of the cultural and educational environment as a whole. Moreover, the key task of multicultural education is to form a tolerant / tolerant attitude of students to representatives of other cultures [1; 5; 8]. In this regard, it is necessary to recognize the need for a systematic formation of a positive attitude to cultural differences, i.e. understanding and acceptance of another culture, involving the study of cultural differences, support for speakers of other cultures, the development of respect and affirmation of cultural differences

through participation in various humanitarian practices, involving the active position of participants in the dialogue [1-5]. The problem of mutual understanding through comprehension of cultural texts also remains relevant to the framework of the topic of this opus, and the pedagogical text as one of the most important elements requires special attention if we consider the formation of the teacher's readiness to implement the main cultural-creative function of education in the multicultural educational environment [4]. Linguists also paid attention to the relevance of the problem of understanding in the hermeneutical aspect (G. I. Bogin, S. A. Goncharov and some others), and science researchers who emphasize the importance of its study for educational systems within the framework of communication processes [2;5;8;10]. Since comprehension is studied as an integral act of co-knowledge-interiorization/inclusion/penetration of new knowledge into the general/personal structure of co-knowledge of the individual plus the "removal" of some part of ignorance against this background. At the same time, the connection of this process with the languages component – therefore different levels of proficiency lead to different levels of depth of understanding of humanitarian knowledge, leading to different interpretation. Moreover, understanding (as a continuous process of awareness/unpacking of different levels of humanitarian knowledge through working with texts, oral or written) occurs in the space of a dialogue with the author. In such a dialogue, the main role belongs to the word [4, 5; 6]. It is proposed to take into account several levels of understanding: 1) understanding at the level of disclosure of the main theme/line of utterance, 2) understanding as the comprehension of symbolic language with insight into the internal logic of the text 3) instant understanding as the comprehension of the essence of images.

In the light of the above concepts, the culture-creating mission of the pedagogical community (scientists and practitioners) is seen in setting such tasks that would work for an effective multicultural component of the new concept of education – the culture of human dignity. Moreover, [3;4] to actualize this important component, discourse-communication becomes necessary as a condition for searching in meaning through penetration into the semantic field of another and the development of one's thinking. For without observing this important condition, education in the form of formalized pedagogical texts loses all significance for a growing person, and the formation of the personality. In turn, discourse inevitably leads us beyond the immediate linguistic and communicative situation to a broader sphere – a situation of super-objective, vital reality that provides integration in the educational space. Moreover, rhetoric and hermeneutics build a semantic field of dialogue-discourse, in which interconnected communicative-rhetorical situations basically consist of ordered signs/images/symbols. In this case, there is a dialogical agreement of meaningful strategies [3; 8], that leads to a harmonious interaction as a condition for the implementation of the cultural methodology "image – mean-

ing – language – text". Therefore, the likely humanitarian practice is supposed to be immersed into the images/positions/thinking models of the participants of the interaction. At the same time, as never before, the importance of solving an extremely urgent task – increasing the level of functional literacy of participants in the educational process must be recognized [8]. Researchers, developing criteria, create models that include a set of conditions for cultural self-determination of students in educational organizations, based on the development of psychological and pedagogical technologies to implement didactic, scientific, and methodological support of innovative processes in educational organizations of various types, taking into account multilingualism and multiculturalism in cross-border and multinational regions [4; 5; 6;8;10].

Thus, the preservation of the cultural values presented above in education and society becomes important for everyone who deals with another person, in our case, teachers. It is intended to fulfill the cultural-creative function of education as a promising task for the development of a creative personality, in the frameworks of informal and informal types of education, and new digital didactics of on-line education platforms. In turn, a philosophical understanding of the ongoing innovation processes in the multicultural and multilingual educational environment of the country, a new trend of co-working and coaching, as well as other innovations, suggested that all these phenomena will also work to improve its quality in the aspect of the formation of a cultural personality and the formation of cultural value dominants in the space of diverse components of the information and educational continuum - education as a value, native language as a value, multilingualism as a value, personality as self-worth, patriotism as a value, historical memory. Methodology and materials cover the author's study of the identified aspects related to the change of the educational paradigm as a whole, with new educational concepts and new promising approaches to the management of information and educational flows in pedagogical science and practice, determines the problem field of this micro-research, its main goal and tasks in terms of adjusting the complex value model of the individual's CSD [2-4], finding support in the works of domestic scientists (E. A. Alexandrova, 2003, M. L. Platonov, 2004; L. M. Lisina, 2008; A. R. Murasova, 2008; E. E. Gornostaeva, 2017, E. V. Yegorova, 2019; V. N. Kartashova, E. A. Isaev, 2012; N. G. Khazhgalieva, 2019; O. D. Fedotova, 2019, and others). This research is organized as a natural continuation of scientific research of educators of the Department of Humanities and International language education, Novosibirsk teachers, participants of the author's project "Cultural self-determination of the individual in the multilingual educational space" (from 1993 to the present) within the framework of axiological, system-activity, competence-based and communicative approaches. In the period from 2015 till present, twenty educational institutions of the region (1000 persons) carried out the study, the purpose

of which is to adjust the integrated model of cultural self-identity under the new conditions of the regional system of additional professional education of teachers, using case methods; theoretical and practical understanding of the results of included observation, subject testing, questionnaires and interviews, content analysis of products of oral and written statements and their statistical processing. As a results of the research and co-working in educational organisations there is presented the most important for educators three constructs of the comprehensive model of CSD of the individual.

Construct One. The phenomenon of poly-linguistic cultural and educational environment [2] as a system of positional lines includes poly-linguistic educational space as a humanitarian phenomenon is a language environment, an environment of expressive means of culture. Languages are used by direct participants of education for interaction, are included in various relations in search of personal meaning of the received knowledge (first of all, meaning in the broad education of the individual). The educational process as a cultural environment of polyphonic interaction of entities at the level of the individual and universal cultures, conceptosphere language of identity, organized for the joint text of "language work" in search of ways and means of expression, in search of his place in the world. Having its own structure, the poly-language space is filled with many systems of relationships, is in the development and interaction of its components; is determined through the attitudes of participants and their self-realization in different activities (cognitive, speech, communication, etc.). Multilingual space as a form of human existence consists of elements of - a system of interrelated a variety of verbal and non-verbal means of/symbolic forms of human mental activity, identifying the concept of multilingual educational space. The main elements include languages, verbal (natural) and non-verbal, to clarify the characteristics of the space, creativity; historicity; locality; social, profile; situations and formalization.

Construct Two. The phenomenon of the multilingual conceptual sphere of the personality suggests a systematic development of the language status of the person as required and integrating cultural components of the educational environment to humanize the educational process; the aim is the enrichment of the space to use the language of human interaction – language personal/subjective in nature and national cultural values; personal multilingual conceptual sphere as a base for the formation of the ability to harmonise relations for understanding others involves a) indicative the person's ability in major life activities; b) formation of leading human competences (social, communication (speech and language), information, etc), for continuing self-education within the framework of cultural and educational practices, i.e. the ability of students to reflect, selectivity, responsibility for words and deeds, the meaning-making, creativity, recognition of the value of the other. In turn, the structural cognitive process of the individual

based on the following elements, that reflect 1. The communicative phenomenon of life - consciousness as a clash meeting with another consciousness in education (teacher and student). 2. Detailed multi-level information in knowledge (the teacher, socio-cultural texts, students) with the meanings encoded and required decompression. This is the purpose of personified education. 3. Socio-cultural texts as priority basis for communication. 4. Development of language codes (language thesaurus) for students to understanding texts. 5. The phenomenon of thinking (language intelligence) as the fact of interaction of minds as a convergence. 6. The Phenomenon of harmonious interaction and interchange (language status) of meanings for productive dialogical communication.

Construct three. The phenomenon of cultural self-organization of the system [4], represented by positive dynamics of program and methodological support of the educational process is becoming an important factor, condition and indicator of quality education. When developing the typology of educational programs, it is necessary to focus on the results of the activities, assuming a high level of education and development in educational institutions of various types (gymnasiums, lyceums, general schools, higher education institutions, and others). Therefore, some programs specify topics, functions, and concepts. Others include a complete list of developmental tasks in a specific sequence ranked by difficulty. The entire software package complements each other, representing a combination of several types of programs that involve different ways of describing the educational process - structural, functional, and discourse levels - reflected in a single curriculum. In the light of the system of humanitarian self-organization of the individual, the following classification of types of programs seems appropriate for use: a) the degree of mandatory development; b) according to the orientation of the training goals; c) depending on the training unit used to expand and supplement. An important condition for the development of modular programs is to take into account the role of each module in achieving the final goals of the whole course; the program is of a cyclical type, involving the use of selected material grouped in cycles. This organization of programming the educational process ensures the repertoire of the material from cycle to cycle and contributes to its more thorough training. When it is built and implemented modular educational technologies in the natural "hierarchiology of education" [2;3] that expects updating the following set of goals and objectives in the conceptual sphere of multilingual student's personality, in this case, the teacher, in other words, the subject of the educational process should a) have an idea about the content, and objectives of learning about the humanitarian approach to realia; b) know the nature and category of a holistic approach to the establishment and development of cultural educational space; its goals, objectives, forms and methods of cultural reproduction in educational systems, the content of existing programs, standards, textbooks and manuals, the logic and stages of

development of the process of mastering the leading educational units of general and professional education, the main ways and means of forming a humanistic attitude to nature, culture, and man; c) structure educational material, and adapt it to the tasks of continuous self – education, planning and designing their work to implement a humane attitude to the surrounding reality, reasonably choose and apply tools, methods and techniques for reproducing personally significant cultural facts and realities in educational practice, measure, analyze and predict the results of training and education, analyze situations and events from the perspective of living knowledge in culture.

As a result of the implementation of the desired model, we have an annually updated corpus of additional educational programs for teachers of the Humanities & Arts (professional development, training and retraining of non-specialists, tutorial support in the format of individual consultations, online seminars of the pedagogical community, internships), that allows creating optimal conditions for teachers to participate in national and regional educational projects. The ongoing systematic work gives the teachers the opportunity to present their own projects on topical issues of education. The preparation of handwritten materials in the format of educational recommendations, manuals and other publications by the staff of the Department together with school teachers of Novosibirsk and the Novosibirsk region (articles, expert opinions, training programs, etc.) for use in cultural practices becomes one of the most important results of successful humanitarian self-organization of the system. The obtained results of the scientific and methodological work made it possible to correct the complex model and its constructs at the final stage of the study, as well as to outline prospects for the teacher's participation in regional events to harmonize interaction in the regional information and educational environment. In particular, we note that the evidence of the effectiveness of the proposed model is real events in the Siberian region (Novosibirsk and the Novosibirsk region), where over the past five years, annual systematic work has been carried out on the dissemination of cultural humanitarian practices in the background of increasing migration processes to solve the problem of cultural interaction. Annual local and large-scale regional events aimed at humanizing and harmonizing interaction are held with the participation of teachers [2-4; 10].

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APPLICATION OF INNOVATIVE METHODS AND TECHNOLOGIES IN THE SUBJECT AREA "TECHNOLOGY" IN SECONDARY SCHOOLS

Ismailov Gafurzhan Mamatkulovich

Candidate of Technical Sciences, Associate Professor

Lomovskaya Sofia Anatolyevna

Student

Nevinitsyna Victoria Sergeevna

Student

Osipkina Yuliya Aleksandrovna

Student

Tomsk State Pedagogical University, Tomsk, Russia

本文讨论与在教学条件下向学生教授“技术”主题相关的问题，涉及使用创新技术。已经对“技术”主题领域中的创新技术应用进行了研究。显示了将现代技术纳入学龄儿童教学过程的必要性，充分证明了使用创新技术保持儿童对现代教育过程的兴趣的重要性。

关键字：技术，创新，教育，学校，教师

Abstract: *This article discusses issues related to the specifics of teaching students the subject "Technology" in educational conditions that involve the use of innovative technologies. Research on the application of innovative technologies in the subject area "Technology" has been carried out. The need to integrate modern technologies into the process of teaching schoolchildren is shown, the importance of maintaining children's interest in the modern educational process using innovative technologies is substantiated.*

Keywords: *technology, innovation, education, school, teacher*

Recently, a new system has been widely developed in the field of education, which is based on technological innovations and modern information technologies. This system is largely built on a solid foundation laid by such an educational field as "Technology". "Technology" remains one of the few subjects that make up the school curriculum, which is able to combine the versatile areas of knowledge acquired by students in school, as well as theory and practice.

In modern Russian education, "Technology" plays an important role. This discipline covers every stage of a schoolchild's education for eleven years and stimu-

lates the child's development of talents and the realization of inclinations, as well as promotes self-determination. During classes, students also get the opportunity to take part in social, non-professional activities, which helps the active development of the individual and the formation of their worldview.

Traditionally, when teaching the discipline "Technology", standard methods are used. First of all - verbal, when the source of knowledge is the word of the teacher or textbook. Verbal methods involve familiarization and consolidation of technical and technological knowledge. The demonstration method is also of great importance in communicating knowledge, skills and abilities to learners. Using this method, it is possible to implement the principle of visibility [1], [5]. Demonstration is widely used in teaching technology - from presenting dynamic objects, working techniques, to static demonstrations, during which students look at layouts, diagrams, etc. The most important methods in teaching technology remain student hands-on methods. When using them, technical knowledge can be repeated and consolidated, as well as technological skills and abilities can be formed. Unfortunately, in the modern world these methods, in their traditional understanding, are not enough to familiarize children with practical skills [4]. The purpose of this work is to study innovative methods and technologies currently used in teaching the discipline "Technology" at school.

The subject "Technology" has always been viewed as the discipline that is more conducive to obtaining a standard set of everyday and social skills. However, now it is difficult to imagine that in labor lessons, classes are limited only to the study of the basics of cooking or woodworking. Modern schoolchildren learn the basics of robotics, master laser cutting. In Russia, there are schools in the practice of which there are even classes on calculating the optimal location of electrical wiring in a "smart home" [3]. As in science, it remains relevant to simplify further work - automation, to which much attention is paid in the classroom. This, among other things, helps to interest children in what is happening, allowing them to come up with devices that can later make work easier and faster. The current situation in schools shows that the methods of teaching the subject "Technology" are undergoing inevitable radical changes, giving impetus to the use of the latest technology and digital equipment. Thus, in schools, in labor classes, students are taught what will actually become useful for them in the future when working in various fields of activity.

In teaching the discipline "Technology" it is important that theory does not diverge from practice [7]. This subject stands out from the rest of the school subjects. "Technology" is not only a field of knowledge that encompasses the scientific knowledge of various sciences - mathematics, physics, biology and chemistry, but is also constantly changing, in contrast to the same disciplines in which changes occur quite rarely. In the field of production, innovative technologies appear every

year, forcing to constantly revise education standards.

So, given that innovation and the introduction of innovations in educational activities are aimed at increasing the effectiveness of teaching and upbringing, the innovation process implies the formation and subsequent development of the content of the subject and the organization of new methods of teaching it. Innovations contribute to the development of skills to motivate their actions, improve orientation in the information received by the student, the development of creative thinking - and all this with the use of the latest achievements of science and practice [4].

In technology lessons, innovative technologies and methods can manifest themselves in different ways, in particular, the use of various multimedia technologies using graphics or video in the educational process has become especially popular in recent years, with the computerization of classrooms [6]. With their help, it is possible to improve the process of strengthening knowledge in theoretical studies and skills in practical ones. So, with the help of films or slideshows, it is possible to visually demonstrate to students some of the techniques of work, their correct sequence, and if necessary, do it several times, which is not always possible without the use of such technologies. An important factor is also the fact that educational films can differ in levels of difficulty, which allows differentiating educational material and tasks regarding the degree of preparedness of students, thereby taking into account the capabilities of each individual student. It is worth noting that these technologies have been used for a long time, so they gradually cease to be of innovative value, being actively used in almost every school in the "Technology" lessons.

However, one cannot but agree that in modern schools the computer does not become a panacea for all problems, acting only as a multifunctional teaching tool that improves the quality of the educational process. More expensive progressive equipment often lacks funding, and it is improved so often that sometimes there is no point in buying it at all, especially in those colossal volumes that are required by schools. Therefore, in many schools of the country, innovative technologies are still something that teachers can only tell their students in theory. Despite this, there are ways to solve these problems, some of which can be considered on the examples of Russian schools.

Thus, in 2015, secondary school № 12 in the city of Obninsk hosted an open technology lesson for boys, at which schoolchildren had the opportunity to use some non-standard equipment for a regular school, for example, a 3D printer, which was provided to the school by the Center for Youth Initiatives. During the lesson, the students had the opportunity to make a lamp from parts made on a 3D printer. After this experience, the school continues to develop an innovative technology teaching program, on the basis of which it is planned to teach schoolchildren in other schools of the region [2]. Thus, despite the fact that schools now

do not have a unified program for teaching labor to boys (since work on machine tools is gradually becoming a thing of the past, without giving the opportunity to replace), cooperation with the centers of innovative development of regions can partially solve the problem of lack of serious equipment for the level of at least some cities.

Active integration of innovative equipment into the process of teaching the discipline "Technology" is also taking place in the Tomsk region. So, in 2018, along with the beginning of the academic year, a project was launched to update the content of the subject area "Technology". Within the framework of the project, students from 15 schools in the Tomsk region study the subject "Technology" in a new format, having the opportunity to attend lessons conducted on the basis of universities and colleges, which have innovative high-tech equipment.

Thus, Tomsk schoolchildren have the opportunity to create 3D models, engage in robotics, computer design. They are also trained to work on programmed machines. Such network interaction certainly remains relevant in the face of a lack of equipment, and also allows a modern technology lesson to combine knowledge from various subject areas.

The current situation demonstrates that in Russia, unfortunately, the basis for the widespread use of innovative technologies in the educational field "Technology" has not yet been sufficiently formed. The reasons for this are largely the lack of high-tech modern equipment for conducting classes on the subject "Technology" [8]. However, this should not become an obstacle to gaining knowledge. Here the teacher plays an important role - his main task should be to maintain students' interest in various developments and the search for new ways and solutions in the conditions of the existing shortage of equipment. In the absence of high-tech equipment, it is possible to develop projects for such equipment, with an explanation of its purpose and intended goals. It is important to focus on independent work, allowing students to independently search for sources of knowledge, work in a team and create their own projects.

Technology teachers must be ready to work in a variety of conditions - both in a school where there is no opportunity to work with high-tech equipment, and in an institution where modern models of technology are presented [9], [10]. And even if the school does not have equipment, the teacher must convey to the children theoretical knowledge at the modern level about certain technological processes.

The use of innovative technologies is accompanied by changes, primarily in pedagogical methods, in the very field of education. At school, the discipline "Technology" - is an integrated educational area that combines knowledge of various sciences. It is necessary to take this into account when preparing teachers in this area and prepare them for possible work in various conditions.

A decent level of technological development of the state can be ensured only

with high-quality technological training of strong personnel capable of coping with the most difficult tasks. The basic knowledge of the younger generation is undoubtedly laid down from technological education in a general education school within the framework of the educational field "Technology" [10].

The use of innovative technologies in the teaching process not only stimulates and motivates children, makes the educational process as diverse and interesting as possible, but also contributes to the teacher's self-development and self-education, speaks of his high qualifications and undoubted talent of the teacher. The image of such teachers in the eyes of schoolchildren and their parents is undoubtedly higher, they deservedly enjoy the respect and love of children.

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培训初期阶段的汉语教学方法的某些方面
**SOME ASPECTS OF THE METHODOLOGY OF TEACHING CHINESE
AT THE INITIAL STAGE OF TRAINING**

Bogdanova Nadezhda Andreevna

Candidate of Historical Sciences, Senior Lecturer

RUDN University

Moscow, Russia

Solntseva Elena Georgievna

Candidate of Philological Sciences, Associate Professor

RUDN University

Moscow, Russia

教师在中文教学过程中面临的重要目标之一是发展学生在语言方面的实践交流能力，以及为将来学习汉语奠定实践和理论基础的需要。

关键词：汉语，方法论，象形文字，学习困难，学习初期，语音，语法。

Abstract: *one of the important goals facing the teacher in the process of teaching Chinese is to develop students' practical communication skills in the language, as well as the need to lay practical and theoretical foundations for learning Chinese in the future.*

Keywords: *Chinese language, methodology, hieroglyphics, learning difficulties, initial stage of learning, phonetics, grammar.*

The complexity, dynamism of the development and functioning of modern language education makes new demands on the teacher, who must not only be fluent in certain technologies for teaching a foreign language, but also understand the essence of the laws that underlie them, see their origins and development prospects. This is especially important at the milestones in the development of methodological science, one of which is undergoing the modern theory of teaching non-native languages. A teacher of a foreign language in modern conditions must not only "translate" the new language code, but also form the student's readiness and ability to participate in intercultural interaction.

The Chinese language is unique in that it has to be studied "in a com-

plex", and not in aspects, like many European languages. All components of the Chinese language are interconnected: phonetics, hieroglyphics, reading, grammar. So, with an incorrect pronunciation of the tone, a word may turn out that carries a different lexical meaning. For example, the word "马"(mǎ - horse), pronounced in the fourth tone, can turn into a curse word "骂" (mà - swear word). Hieroglyphics also play an important role in the basic stage of language learning. That is why, first of all, at the very beginning of training, the main attention is paid precisely to the formation of phonetics and the development of hieroglyphic writing, and then grammar and vocabulary. Unlike most Western languages, learning Chinese requires a lot of patience and a natural ear, since the four-tone system of the language assumes the student's ability to reproduce a word or phrase, observing the tones, and also to hear intonation stress.

The phonetics of the Chinese language is not difficult if the teacher correctly presents the material to the students. Chinese is one of the tonal languages. The syllable of the Chinese language is characterized not only by a certain sound composition, but also by one or another tone, which is called the etymological tone of this syllable. First of all, students should be introduced to the structure, sound composition and tones of the syllables of the Chinese language, while the main attention should be paid to working out the skills of normative pronunciation at the syllable level. First of all, it is necessary to tune the student to the fact that the syllable of the Chinese language does not consist of the usual vowels and consonants, but of structural elements called the initial (consonant part), as well as the rest of the syllable - the final, which is the vowel part of the syllable. There is no comparison of voiceless and voiced consonants in the Mandarin language (common language). Some consonants form pairs that differ in the absence or presence of aspiration. For example, the pairs d-t, g-k cause some difficulty for students in pronunciation, because -t and -k are aspirated, and there are no similar sounds in Russian. The -g sound is pronounced by many students in the manner of the English g sound. Therefore, the teacher's task is to explain and work out the pronunciation of sounds by examples, bringing them to automaticity among students. For this kind of work, listening to audio files is very productive.

At the initial stage of mastering the Chinese language, it is important to pay attention to listening. The student should listen to live Chinese speech every day for at least 1 hour. Along with this, listening classes are also an integral part of classes with a teacher. Listening to audio recordings of texts, dialogues or exercises, the student should try to reproduce as accurately as possible the intonation with which native speakers of the target language pronounce phrases. And the teacher's task is to correct the phonetic error in time, since later it will be more difficult to do it, because the student will get used to pronouncing a word or syllable with the wrong

intonation, tone, etc.

With the help of sound recording of texts and exercises, numerous schemes that clearly reflect the rhythm of sounding phrases, and the necessary explanations, students develop the ability to hear and reproduce the rhythm and intonation of Chinese speech.

Phrasal stress is another important aspect that teachers pay attention to at the initial stage. For this, texts are selected, which are first processed using pinyin (拼音), and then the same text is processed already in its hieroglyphic writing. In addition to the texts, the correct reading of which is one of the main tasks at this stage of learning, it is also necessary to do certain exercises in order to develop the ability of Chinese language learners to understand Chinese speech by ear and answer questions.

Also, one of the main difficulties facing every student of the Chinese language is mastering hieroglyphs, which for 4 thousand years have been the only generally accepted writing system in China. Any hieroglyphic writing differs from alphabetic or syllabic systems in that it includes a greater number of characters. In fact, in the alphabet there can be several dozen characters, in syllabic writing systems - several hundred, in hieroglyphics - several thousand. In Chinese, each morpheme (meaningful syllable) is represented by a separate hieroglyph. From the point of view of hieroglyphics, the teacher is faced with the problem of the correct spelling of the hieroglyph in students. There are 7 rules of calligraphy in Russian Sinology. Based on our own experience, we can note that students of the Chinese language at the initial stage very rarely adhere to general rules, more often choosing their own spellings that run counter to the established ones. The task of the teacher is, first of all, to explain the importance of this order; the student should be told that the rules were not drawn up just like that, but still for the convenience of the students themselves. To practice writing, there are recipes in which the writing of a hieroglyph is given in compliance with the rules. Also, a very effective exercise for memorizing a hieroglyph is to write each new hieroglyph in outline.

Having consolidated the skills of phonetics and hieroglyphics, the teacher devotes a lot of time to translation, using various exercises to consolidate the grammar and vocabulary passed through. Various translation options should be encouraged (and in Chinese it is possible), provided that the student is able to substantiate his point of view. In this case, we are talking about the features of some grammatical topics (for example, modal verbs, etc.), when there may be variants during translation.

Lexical exercises are quite diverse, this is the search for a synonym or antonym, and the compilation of a crossword puzzle, and filling in the gap with a word that is appropriate in meaning, etc.

An integral part of learning is such an aspect as speaking, which synthesizes

the features of dialogical and monologue speech. Therefore, during even the initial stage of training, it is necessary to improve the skills of oral speech. For this, exercises are suitable for drawing up dialogues in the text, a brief retelling of the text, and acting out scenes. In the modern educational process, watching cartoons or educational plots on the topic of the lesson in Chinese with further discussion have proven themselves well.

The first year of learning a foreign language is very important. It is at the initial stage that the foundation of knowledge is laid, proficiency, skills and competencies are formed that will be useful in the future. In the subsequent years of study, great attention will be paid to reading, both literary texts and the media, students will learn how to write business letters, as well as improve their writing skills as a means of preparing oral statements and information processing of text.

This stage of learning is characterized by the improvement of students' skills to use various methods of enriching their vocabulary, expanding their potential vocabulary and linguistic knowledge. At the end of the first year of study, a student can independently use a foreign language as a means of obtaining new information, expanding awareness in various fields of activity and fields of science. In this regard, reading becomes the leading type of speech activity, and the leading type of work is the extraction of information from the text and its processing.

In general, a foreign language at this stage should act as an effective means of contributing to the satisfaction, development and deepening of students' interests in their chosen field of knowledge, in particular as a means of obtaining professionally significant information. This goal is best answered by various options for profile-oriented teaching of a foreign language.

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从idiolect的角度看区域文本

REGIONAL TEXT FROM THE STANDPOINT OF AN IDIOLECT

Kositsyna Natalia Olegovna

*Candidate of Philological Sciences, Associate Professor
Kursk State University*

Pravednikov Sergei Pavlovich

*Doctor of Philological Sciences, Full Professor
Kursk State University*

Frantsova Natalia Vladimirovna

*Candidate of Philological Sciences, Associate Professor
Kursk State University*

本文研究了某些词汇组的特征，从而确定了两位库尔斯克文字艺术家的idiolect的边界。这篇文章分析了对省级高中生至关重要的品质，例如速度，力量，灵巧（以EL Markov的自传小说为例）以及在诗集中发现的人物的正确命名等名称和特征。VV的《盛开的员工》博罗达耶夫斯基（Borodaevsky），地名由各种各样的词首字母代表，既有圣经，神话和历史人物，又有家庭，亲戚，朋友和同事的名字。

关键字：idiolect，区域性，同义词，人类称，E.L. 马尔可夫 博罗达耶夫斯基

Abstract. *The article examines the features of certain groups of vocabulary, allowing to identify the boundaries of the idiolect of two Kursk word artists. The article analyzes the words that name and characterize the qualities vital to a provincial high school student, such as speed, strength, dexterity (on the example of the autobiographical novel by E.L. Markov) and the proper naming of people identified in the collection of poems "A staff in bloom" by V.V. Borodaevsky, where anthroponyms are represented by a wide range of lexemes that name both biblical, mythological and historical characters, and family, relatives, friends and colleagues.*

Keywords: *idiolect, regionalistics, onym, anthroponym, E.L. Markov, V.V. Borodaevsky*

The idiolect of the writer is formed under the influence of many factors and manifests itself in the text of the work at the level of paradigmatic relations and

syntagmatic connections. Unexpected characteristics, detailing, the peculiarities of the compatibility of individual lexemes - all this works to create an individual language education, peculiar only to the given artist of the word. An idiolect is a set of linguistic means, ordered in the author's mind, strictly structured in accordance with his ideological views, where there is no place for accidents, inconsistencies, reservations. Any deviation, any inaccuracy is natural, they perform "a certain artistic function", carry "an additional meaning that helps to fully reveal the world of the author's ideas, his creative intention and moral potential. The higher the skill level of a writer, poet or playwright, the more interesting it is to analyze his text in search of specific features, individual connotations, semantic extensions, and occasional word formations"[Pravednikov, Frantsova 2020: 14].

Let us consider from these positions the work of two Kursk word artists - Evgeny Lvovich Markov and Valerian Valerianovich Borodaevsky, whose life and literary activity are inextricably linked with the Kursk land. It should be noted that the efforts of literary scholars and linguists, united by their work within the framework of the "Kursk Word" research project [Khrolenko 2005], make a significant contribution to the study of the language and idiostyle of Kursk writers.

Let us turn directly to the analysis of the works of the above authors. Let us dwell on the peculiarities of the use of some words that perform a kind of text-forming function. Let's go the way proposed by M.A. Bobunova and tested in a number of works, where individual words are analyzed in detail, and special attention is paid to inter-word connections (see, for example: [Bobunova 2015]).

The autobiographical novel "The School Years of the Old Barchuk" [Markov 1901] is a note by E.L. Markov, which describes in detail the period of the author's stay in a provincial educational institution. The hero of the novel, bred under the name of Grisha Sharapova, goes to the gymnasium, where he spends some time studying, communicating with teachers, inspectors and wardens, fellow students. The description of this period of the author's life is given in sufficient detail, which allows the reader to reproduce as accurately as possible the environment in which the "home" boy, cut off from the carefree life on the estate, was thrown into the thick of difficult events and relations of gymnasium reality. The hero of the novel seems to be a small defenseless child who, by all means, wants to prove to all and everyone, and above all to himself, that he is ready to fight the hostile world around him, that he is able not only to withstand this struggle, but also to prove, that he does it with reckless ease, daring, even some pleasure.

Let us consider some words related to the description of the positive qualities necessary for a little high school student, among which speed, dexterity, strength are in the first place.

The noun *ловкость* is used as a subject (*ловкость делает героями*) and in combinations *быть без ума от ловкости* and *исполнять с ловкостью*

акробата. The epithet *ловкий* applies to both animate (*ловкий лазутчик*), and inanimate nouns (*ловкий толчок коленом*). The adverb *ловко* is very actively used in the text. You can *ловко переноситься* from one tree to another, *отбивать* a blow, *делая* a bandage, *подбросить* a hat. A number of verbs are built that belong to different semantic groups, among them: *вылететь, вытянуть, захлопнуть, отшаркнуть, подставить, поймать, помочь, пустить, работать, соскочить, увертываться, швырять*.

Quickness can be characterized as *автоматическая, невероятная, необыкновенная, непостижимая, неудержимая*. In close proximity to the noun *быстрота* the nouns *точность, увертливость* can appear.

The characters and objects in the novel move with the speed characteristic of young, strong, energetic teenagers. Hence the combination of the noun *быстрота* with the verbs *исчезать, нестись* and *носиться, нырять, обхватить, отвечать, перелетать, спускаться, ударить* etc.

The word-forming nest *сильный* is represented not only by an adjective, which can act as a part of the predicate – *он был сильный* – and combine with the nouns *буря, взмах, рука, удар* etc., but also by the adverb *сильно* and the comparative *сильнее*, formed from both the adjective and adverbs.

Strength – is always in one of the first places among life values in the circle of high school students, and we are talking not only about physical strength, but also about the strength of mind, about the moral temper and stability of a young man. "The ability to fight back in any situation, to withstand, the desire to stand out, to prove oneself, to become the subject of conversations among comrades, the desire for independence, bordering on a disdainful determination to become a violator of the routine - all this was part of the unspoken set of necessary properties and qualities of a student in the then gymnasium" [Pravednikov, Frantsova 2020: 16] (see also [Pravednikov, Frantsova 2016]).

The cult of agility and strength began to take shape in the hero's mind long before his arrival at the gymnasium. All this gradually took shape since the time when the Sharapov brothers lived happily in their father's estate, not knowing that there was a completely different world, where there was no love of parents, no guardianship and no care of courtyards; Kursk "undersized" found pleasure in the constantly changing field of continuous activity, where there is a place for play and work, joy and sadness. At this time, all around were appreciated and evaluated, praised and welcomed exclusively male qualities: agility, fearlessness, skills based on physical capabilities.

Strength becomes of paramount importance much later, when the brothers enter the gymnasium. It was there that the Sharapovs realized that they were at the highest level in the boyish hierarchy and were highly valued. Already from the standpoint of the accomplished, admitted to the gymnasium fraternity, Grisha re-

calls his preschool life, bringing into his memories a respectful attitude towards the veneration of strength that developed later.

Legends, family stories, oral stories serve the "barchuk" E.L. Markov as a kind of nourishment, a reliable support, this becomes especially relevant when the hero finds himself in a new, completely unusual for him and badly perceived environment. The main character of the novel has clearly mastered one of the main rules in force in a closed educational institution; always, and especially at the beginning you need to be on the lookout, every action can lead to a conflict or to an unexpected development of events. And the schoolboy, going through trials every day, soon realizes that an indispensable addition to strength is his vitality, his desire and ability to fight to the end, in no case give up.

A powerful physique, self-confidence - this is what can become protection from all sorts of troubles, the set of which is very wide and varied - from humiliation to beatings. This is understood by all the "inhabitants" of the gymnasium, from first-graders to almost adult repetitives, whose interests include quite "mature entertainment". At the same time, many of the "gladiators", "giants", "lazy heroes", as the author characterizes them, find themselves in a difficult situation, faced with educational, and not everyday difficulties. It turns out that primitive strength does not allow them to take their rightful place in the gymnasium hierarchy. The narrator compares some of the older, empowered students with "medieval barbarians" who emerged "in animal skins from the forest." Due to their underdevelopment, they are unable to conduct a dialogue not only with teachers, but also with their peers, who are more psychologically stable. Understanding what place in a person's life is occupied by strength (and other purely physical qualities) and in what these qualities can be manifested does not immediately come to the hero. Only after going through many stages of a kind of gymnasium "initiation", he begins to understand that the most important thing - is the strength of the spirit, the very strength that combines with human dignity and allows him to gain authority in the team.

Of no less interest are the idiolectic features of another Kursk author - V.V. Borodaevsky, a talented poet, whose work has not yet been studied (for more details: [Kositsyna 2014]. Let us dwell on the role that onyms play in the idiolect of the writer. The onomastic space of any work allows you to better examine the artistic image, to find out the creative intention of the author, to see the features of the individual style of the writer. We turned to the analysis of the proper naming of people functioning in the collection of poems "A staff in bloom" [Borodaevsky 2011].

In the texts of V.V. Borodaevsky, we note the names of biblical and mythological characters, including *Abel, Adam, Eve, Ezekil, Jesus, Joseph, Judas, Cain, Luke, Mary, Moses, Saul, Sardanapalus*, heroes of literary works, such as *Rastignac, Uncle Vanya, Bova*, figures of art and culture - *Andre Chénier, Andrei Bely,*

Apollo Grigoriev, Balzac), scientists, philosophers, historical figures (*Lambert, Swedenborg, Pascal*), etc.

So, in the poem "Today a fog reigns over the soul ..." we fix the onim *Тертуллиан*, who names one of the most prominent early Christian writers, theologians and apologists, the author of numerous treatises. In nascent theology, Tertullian first expressed the concept of the Trinity:

Пестрит в глазах седой Тертуллиан

И бронзовый мерцает Сакья-Муни....

In close proximity we find another proper name – *Сакья-Муни*. This is the most common name (nickname) of the legendary founder of Buddhism, applied to the period of his life when he had already received "enlightenment", i.e. became a Buddha.

In the series of sonnets "Medallions" we are talking about *Blaise Pascal*, a classic of French literature, one of the founders of mathematical analysis, probability theory and projective geometry. To characterize a scientist, the poet uses a number of phrases: *на лоб твой геометра; вручал тебе свой циркуль Архимед; склоняясь к листу, ты числил и чертил*. Religious knowledge is in close proximity to scientific knowledge: for example, a wreath of thorns is laid on the geometer's forehead, the all-good hand touches his eyes, sacred images of the Grail, tablets and Sinai appear, and the scientist's drawings speak of the mystery of crucifixes.

The proper names of the heroes and gods of the myths of Ancient Greece are represented by such lexemes as *Orpheus, Aphrodite, Psyche, Charon*, etc. Onyms from the biblical sphere create a special religious and philosophical meaning of his poems:

Ответ человека на пламенный зов Божества (Cherubims);

Волы священные – Иосиф, Варсонофий, –

Глубоко взрезали вы скитские поля... (Elders);

...Когда Христа постигнул плен,

Что видел в нем надменный Каиафа? (Hades);

Святую Богородицу

Иль трепетную моль? (Guardian song).

In the texts of V.V. Borodaevsky, we noted a significant number of onyms associated with the personal sphere of the writer. These are the names of his wife, son, sister. The poet's biography is layered on a poetic context, which gives us the opportunity to learn the real facts of life from poetic lines. So, for example, the motive of death is layered on the name of the son, which is associated with the loss of the child in real life.

Anthroponymicon of lyric texts by V.V. Borodaevsky is not limited only to a circle of close people. The choice of other proper names is associated with the creative intention of the poet, a name in a poetic text can serve not only to name a

specific person, but also to indicate an era, events, etc. For example, in the poem "The Book in Prison" the poet uses the lexemes *Erkman* and *Shatrian* to indicate real-life persons. It is interesting to note here that there is a pseudonym Erkman-Shatrian - this is a common pseudonym of two French writers Alexander Shatrian and Emile Erkman, who wrote many of their works together:

Романы Эрмана и Шатриана

Читаем здесь. В них прелесть простоты...

Anthroponyms identified in a poetic text can be one-component (name - *Eva*, *Emelya*, *Maria*, *Nelly*, *Nikolay*, last name - *Verkhovsky*, *Zhelyabov*, *Kibalchich*, *Kuzmin*, *Pascal*) and multi-component (*Alexey Tolstoy*).

We can conclude that the group of anthroponyms in the poems of V.V. Borodaevsky is represented by a wide range of lexemes-naming of persons, both close circle and friends, colleagues, etc. We record many of these anthroponyms in the title, dedication, epigraph. This position gives particular importance to the onym used by the author.

As we can see, a wide variety of linguistic phenomena take part in the formation of the artistic idiolect of the artist of the word, most of which function within the framework of the tradition that took shape in a particular region.

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翻译作为一种社会事件：务实的方面

TRANSLATION AS A SOCIAL EVENT: THE PRAGMATIC ASPECT

Karpukhina Viktoriya Nikolaevna

*Doctor of Philological Sciences, Full Professor
Altai State University, Barnaul, Russia*

Savochkina Elena Aleksandrovna

*Candidate of Philological Sciences, Associate Professor
Altai State University, Barnaul, Russia*

Osokina Svetlana Anatolyevna

*Doctor of Philological Sciences, Full Professor
Altai State University, Barnaul, Russia*

本文将翻译视为社会事件。本文从语用学的角度分析了源文本转化为目标文本的社会文化特征。本文旨在分析在俄英和英俄翻译过程中使用的不同译者的策略（适应，现代化，异化等）。所考虑的文字是英语和俄语的小说小说和媒体文字，包括奢侈品和报纸政治漫画的多式联运广告。结果是：尽管在政治上正确的话语的翻译者在寻找等价词时可能会失败，但在翻译文本中大多塑造了当代多极社会的矛盾价值观。本文的结果可用于当代制度化话语翻译和语用学的理论和实践。

关键词：语用学，翻译，政治正确性，翻译策略。

Abstract. *The paper considers translation as a social event. Social and cultural characteristics of a source text transferred into a target text are analyzed in the paper from pragmatic linguistics point of view. The paper aims at the analysis of different translators' strategies (adaptation, modernization, foreignization, etc.) used in the process of Russian-English and English-Russian translation. The texts under consideration are the translated English and Russian fiction and media texts, including multimodal advertisements of luxury goods and newspaper political cartoons. The results: the ambivalent values of the contemporary multi-polar society are mostly shaped in the translated texts, though the translators of the politically correct discourse may fail in their search for the terms equivalents. The results of the paper can be used in theory and practice of contemporary institutionalized discourses translation and text pragmatics.*

Keywords: *pragmatics, translation, political correctness, translation strategies.*

Introduction

Speaking about translation as a social event, we mean all the objective factors which influence a target text pragmatics and which allow us to reveal the cognitive models used by a translator (e.g. [Baker 2006; Baker 2011; Bielsa & Bassnett 2009]). Nowadays, the so called sociocultural model of translation is applied to explain the essence of translation as a cross-cultural communication event. That means, the sociocultural model “does recognize the verbal substratum of translation, but defines translation primarily as an attempt at cross-cultural communication. In this model, texts are seen as unique products of the history and social structure of a particular culture” [Neubert & Shreve 1992, p. 25]. The extreme versions of such a trend in the theory of translation lead to “translation nihilism” [ibid.], and in the practice of translation they lead to the usage of a foreignization strategy (see [Eco 2006; Karpukhina 2018]).

The paper researches translation as a social event. The subject under consideration is social and cultural characteristics of a source text transferred into a target text in the cognitive and pragmatic aspects. The paper analyzes different translators’ strategies (adaptation, modernization, foreignization, etc.) applied in the process of Russian-English and English-Russian translation. Such strategies usage could result in acculturation of a source text in another cultural space, reterritorialization of it [Baker 2011, p. 4] or, vice versa, in a foreigning / estrangement effect produced by a target text. Both polar effects (acculturation and estrangement) are socially determined.

For example, the communicative situation of the politically correct discourse translation requires from the translators their competence in the politically correct terms and their equivalents usage. Otherwise, the target text could not be appreciated as an adequate version of the source text saturated with the specific contemporary terminology of the politically correct discourse. In such a social and cultural situation, moreover, the translators of the politically correct texts from English into Russian should mind that such type of a discourse with its terminology is not yet completely formed in Russia, and sometimes they should invent their neologisms while working with the politically correct discourse terms as with the untranslatables. So, inventing neologisms, the translators try to acculturate the politically correct texts into the culture of the target language.

Or, vice versa, if the postmodernist translators try to show the cultural and linguistic uniqueness of the source text, they use the strategy of foreignization. So, they produce “target texts that are an unnatural hybrid of target language and source text. ... Target text is composed of familiar words and phrases, interspersed with untranslatable borrowings from the original” [Neubert & Shreve 1992, p. 26].

The process of translation suggests that the translator uses some kind of transformation tools to achieve the pragmatic aims of the chosen translation strategy.

It may seem strange, but for the pragmatically opposite translation strategies such as foreignization and acculturation the interpreter may use the same transformation techniques. They include the use of the word with a broader or a narrower meaning, grammatical change of a word form or syntactic change of the whole sentence, omission of words or phrases, and adding the words which the original text lacked. It makes us think that cognitive operations aimed at finding a proper variant in the target language are similar whatever translation strategy you choose.

Materials and Methods

The texts under consideration are the translated English and Russian fiction and publicistics which we analyzed in comparison with the corresponding original texts. They embrace quite a long period of time, from the beginning of the 20th century to the texts of contemporary English and Russian writers and the public speeches of contemporary political leaders. All of the texts analyzed for the paper show the dependence of the translators' strategies on the social and cultural factors of the translation process.

The methods used for the research include the analysis of text semantics, the analysis of text pragmatics, the comparative analysis of the source and target texts.

Results

The pragmatic analysis of the politically correct discourse translation from English into Russian shows the non-equivalency or the partial equivalence of the terms used in such type of a discourse. The terminological challenge for the translators is often complicated with stylistic and structural and semantic problems connected to the adequate translation of the politically correct texts. It leads to the localization of the new discourse terms in Russian and to the shifts of the values in the axiological scale while the new type of a discourse is being institutionalized in the target culture.

The structural analysis of a number of multimodal texts (being advertisements of luxury goods and newspaper political cartoons) shows prevalence of illustrative messages among them – the picture component is explicit and carries no underlying ideas, when the language-facilitated component has additional disguised meanings and has the mission to emotionally disturb the recipient. This peculiarity raises difficulties for the translator. In case the written text component fails to be translated with preservation of its pragmatic potential, the whole multimodal text will fail to meet the initial communicative demand – to set the recipient thinking and making them act.

One of the main strategies used in the feminist discourse to avoid the words *man, woman, girl, boy* is parodied by J. F. Garner at the beginning of his retelling of *Little Red Riding Hood*: *There was once a young person named Red Riding Hood who lived with her mother on the edge of a large wood* [Garner 1994]. This fragment translated into Russian by Sergey Sivko says, *Давным-давно*

существовала юная личность по имени Красная Шапочка, которая жила со своей матерью на самом краю большого леса 'Once upon a time there was a young person named Little Red Riding Hood who lived with her mother on the edge of a large wood' [Garner n.d.]. Here, the feminist formula юная личность 'a young person', quite adequately transferred into Russian, shows the irony to the axiological tolerance of the politically correct discourse.

Even more sarcastic is the introduction of the discursive formulas from the ecologically-oriented politically correct discourse into the traditional text of a fairy-tale. Such an introduction could be seen at the beginning of the *Three Little Pigs* retold by J. F. Garner: *Once there were three little pigs who lived together in mutual respect and in harmony with their environment. Using materials that were indigenous to the area, they each built a beautiful house* [Garner 1994]. When we take different translations of this fragment into Russian, we could see the translators' inventions in the politically correct vocabulary: *Жили-были когда-то три поросенка. Они совместно проживали во взаимном уважении и в гармонии с окружающей средой. Используя экологически чистые материалы, характерные для той местности, каждый из них построил себе по красивому домику* 'Once there were three little pigs who lived together in mutual respect and in harmony with the environment. Using ecological materials that were indigenous to that area, they each built a little beautiful house' (tr. by S. Sivko) [Garner n.d.]; *Жили-были однажды три поросенка, которые жили в атмосфере взаимного уважения и гармонии с окружающим миром* 'Once there lived three little pigs who lived in mutual respect and in harmony with the environment' (tr. by A. Gurochkina) [Gurochkina 2009]; *Жили-были три поросенка, во взаимном понимании и полной гармонии с окружающей средой. Используя природные материалы своего края, каждый из них построил себе по чудному домику* 'Once there were three little pigs who lived together in mutual respect and in absolute harmony with the environment. Using materials that were indigenous to the area, they each built a little nice house' (tr. by S. Ter-Minasova) [Ter-Minasova 2000]. Only the first translation by Sergey Sivko and partially the translation by Svetlana Ter-Minasova give the adequate discursive formulas of the ecologically-oriented discourse (*окружающая среда* 'the environment', *экологически чистые материалы* 'ecological materials'). All the other translation fragments give only approximate equivalents of the discursive formulas (*окружающий мир, природные материалы своего края*), which essentially decreases the comic effect of Garner's fairy-tales. In some ways, S. Sivko and A. Oleksenko, while translating Garner's parody of the politically correct discourse, create a double parody – so to say, a parody of the Garner texts, too. They use the creolized Russian-Ukrainian language to make their parody even brighter and funnier than the source text. So, the translators show the relativity of the polit-

ically correct discourse and its axiological scale.

One more difficulty for the translator is embodied in multimodal texts which contain allusions to the current culture of a particular language or a country. These can be allusions to events of all sorts – from presidential elections to scandalous walk-outs of celebrities. The texts themselves are mostly symbolic messages and their constituents both have a connotative meaning. To properly understand such texts, the translator has to have some cultural background knowledge and should mind the fact that people in the community of the target language lack this knowledge. For example, the political cartoon about the controversies between the Republicans and the Tea Party movement [Tea party n. d.]. The picture is split in halves showing what happened before and after. On the left we see a woodpecker with an inscription “Tea Party” on its wing. It is pecking a tree-trunk. The text reads: “*Must...repeal...Obamacare*”. On the right we see the same woodpecker pecking in frenzy. But what seemed to be a tree-trunk has turned to be an elephant leg. It is covered with Band-Aids but otherwise unshakable. The mission of the translator here is to translate the language element. But if we provide “*Должен... отменить... закон Обамы о доступном здравоохранении*”, we definitely semantically develop the initial utterance still failing to uncover the whole pragmatic potential of the cartoon. If the translator aims to communicate the whole semantic complex of the picture and the text, they have to produce the explaining commentary on it.

As we know, The Tea Party movement is an American political movement known for its conservative positions and its role in the Republican Party. Members of the movement have called for a reduction of the U.S. national debt and federal budget deficit by reducing government spending, and for lower taxes. The movement opposes government-sponsored universal healthcare. The movement began following Barack Obama's first presidential inauguration (in January 2009) when his administration announced plans to give financial aid to bankrupt homeowners. Supporters of the movement subsequently had a major impact on the internal politics of the Republican Party. During the Obama era, Republicans campaigned on promises to restrain federal spending and repeal Obamacare.

Having gained total control of Washington, they have chosen to repeal the Tea Party instead. So we can suggest a commentary like this: *Изображенный на карикатуре дятел символизирует движение чаепития (Tea Party Movement) - консервативно-либертарианское политическое движение в США, возникшее в 2009 году как серия протестов, вызванных в том числе и рядом реформ в области медицинского страхования. Название «Движение чаепития» является отсылкой к Бостонскому «чаепитию» 1773 года — акции протеста под лозунгом «Нет налогам без парламентского представительства». Предвыборная кампания Дональда Трампа, в том числе, оказалась удачной, поскольку республиканцы заручились поддержкой членов Движения чаепития,*

пообещав им отмену Закона Обамы о доступном здравоохранении. Однако обещание не было выполнено. Поэтому ствол дерева на карикатуре оказывается ногой слона, ведь известно, что слон – символ партии Республиканцев. Отсюда мы делаем вывод о делящихся до сих пор разногласиях между республиканцами и «чайвниками». The translator strategy here binds semantic development and extensive commentary on the whole multimodal text.

Conclusion

In conclusion, it can be stated that the ambivalent values of the contemporary multi-polar society are often shaped in the translated texts. New terms and a relative scale of values of this type of a society are being created nowadays in the advertisement, publicistic, and other types of media texts as well as in fiction when they function within the politically correct discourse. The translators and interpreters now mostly fail in searching for the precise equivalents for the politically correct terms working in translation from English into Russian (for example, the terms connected with the ecologically oriented field of the politically correct discourse or the feminist discourse terms). They create loose translation equivalents or work with the politically correct discourse terminology as with the untranslatables creating neologisms or giving the explanatory translation versions. Though, transferring the parody to the politically correct discourse from English into Russian, the translators were a success in pragmatics and managed to keep to the original in its comic effect. It leads to the acculturation of a fragment of the politically correct discourse in the target culture due to the key axiological strategy, adaptation, used in all the translations mentioned.

As for the translation of multimodal texts, it involves a number of difficulties, the major of them being the inseparability of a picture and a text which causes the translator to be very careful about any transformations. Anyway, transformations are inevitable and they appear in target texts as a result of several strategies: adoption of precedent texts; adaption to the language rules of the recipient culture; narrowing the pragmatic potential of a source text through the loss of one of the meanings in translation; semantic development of the source text and translator's commentary. All in all, the strategies above can be referred to as adaptation.

The opposite axiological strategy of the translators and interpreters, foreignization, could be seen as a result of the intended “hybrid” combination of the source and target language words and phrases in the target text.

The results of the paper can be used in theory and practice of contemporary institutionalized discourses translation, text pragmatics, and cognitive modeling of translation. They show the abilities of translated texts reterritorialization and estrangement depended on the key axiological strategies used by translators and interpreters in the process of translation as a social event.

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哈卡斯民间文学作品中的“哈拉赫”概念（以英雄传说“阿比之志”为例）

THE CONCEPT OF "KHARAKH" IN FOLKLORE WORKS OF THE KHAKASS PEOPLE (ON THE EXAMPLE OF THE HEROIC LEGEND "ALBYNZHI")¹

Subrakov Aleksandr Dmitrievich

*Senior Research Officer of the Center for National Education Issues of the Federal Institute for Education Development of the Russian Presidential Academy of National Economy and Public Administration
Moscow, Russia*

本文试图以英雄传说“Albynzhi”为例，揭示哈卡斯人的民俗作品中“Kharakh”“眼睛”概念的含义。要强调的是，眼睛从来不是单纯的视觉器官。它始终是某种符号，具有某些特殊含义。眼睛是情绪和情感的重要表达，它们反映了一个人的情绪状态，他对某物或某人的态度的变化。

关键字：躯体词汇，哈卡斯语言，英雄传说，世界图片，莱克瑟姆，哈拉赫“眼睛”，象征意义，含义。

Abstract. *The article makes an attempt to reveal the meaning of the concept "Kharakh" 'eyes' in the folklore works of the Khakass people using the example of the heroic legend "Albynzhi". It is emphasized that the eyes were never simply organs of vision. It is always some kind of symbol, some special meaning. Eyes are important expressers of emotions and feelings, they reflect changes in the emotional state of a person, his attitude to something or someone.*

Keywords: *somatic vocabulary, Khakass language, heroic legends, picture of the world, lexeme, kharakh "eyes", symbolism, meaning.*

Somatic vocabulary (from the Greek *sōma*, ‘body’) is one of the universal lexical groups in any language and one of the most common objects of study. Domestic and foreign linguists in their works usually single out this vocabulary as "the first in the lexical-thematic system of any language" [2, p.34].

V.A. Vlasova notes: "Until now, no people have been found that would not know how to name some parts of the body: head, arm, leg, eye, ear, mouth ... Somatism is a circle of concepts and relationships that are necessary in any human

¹ The work was performed within the framework of the state task of the Ranepa for the implementation of the project 11.12

society, without which it is difficult to imagine human speech", and emphasizes that somatic vocabulary is distinguished by "high frequency of use and developed polysemy, based on a large number of basic semes." [3, p.5]

Somatic vocabulary constitutes a significant group in the Khakass language. The rich material of this lexical group, presented in folklore and dialects of the Khakass language, is one of the first sources of replenishment of the vocabulary of the literary language.

Among the artistically outstanding folklore works, heroic legends occupy a special place. Studies of the heroic epic of the Khakass people make it possible to reveal the national image and, accordingly, the system of values, ethical norms and psychology of the ethnos - a kind of "picture of the world". "Picture of the world" is a holistic view of a person, society and environment in their interaction. The picture of the world is a reflection of the real world, the linguistic picture of the world is the fixation of this reflection" [5, p.3].

In the oral-poetic creativity of the Khakass people, a special place is occupied by the heroic legend "Albynzhi", told by the remarkable Khaiji S.P. Kadyshhev. Semyon Prokopyevich knew about thirty heroic legends, which can be defined as epic poetic works telling about the exploits of the Alyp heroes. Possessing a rare talent, an outstanding memory, he knew well all genres of oral folk art. The works that he sang (told) are realistic, they reveal various aspects of the life of the Khakass people. From them we learn about the life and household of the Khakass in the past, get acquainted with how people expressed their cherished aspirations and aspirations [1, p.8].

This article examines somatic vocabulary with the allocation of the most frequent component. Based on the material of the heroic epic "Albynzhi" by the method of continuous sampling, 627 somatic units were identified, which were distributed in terms of their frequency. Of these, the most common lexemes are "eyes", "head", "legs", "back" and others.

So, in the analyzed text the lexeme *xapax* "eyes" is found 168 times, *nac* "head" – 74 times, *азax* "leg" – 55 times, *axсы, аac* "mouth" – 39 times, *апра* "back" – 36 times. Also the most frequent lexemes are *хол* "arm" – 25 words; *хан* "blood" - 17 words; *ум* "meat" – 15 words; *имчек* "female chest" – 13 words; *хулах* "ear" – 12 words; *icmi* "belly" - 12 words; *көкci* "chest" – 10 words; *наар* "liver" – 10 words; *хабырға* "rib" - 10 words. The rest of the somatisms, being less frequent, are mentioned in the text less than ten times.

The lexeme *xapax*, denoting human eyes and sight, is the most numerous in the heroic legend "Albynzhi". As already noted, it is mentioned 168 times in the text. It symbolizes both the good qualities of a person and not so much.

The lexeme *xapax* 'eyes' is primarily used to obtain information about the world around the hero.

Харахтың оды читкен чирлер
Харалып, силіп көрінчедірі
Харахтың оды читпен чирлер
Ах тубан, көк тубан оралып көрінчедірі [4, p.15]

Куда ни кинешь орлиный взгляд —
Кругом равнинные земли лежат.
Прожилками синими реки видны.
Ближние земли черным-черны.
Дальние земли с горы крутой
Синей окутаны пеленой [1, p. 13].

There are examples showing the portrait of the hero. So, for example, one of the negative heroes of the heroic legend Yuzut-Aryk, the daughter of Yuzut-Khan, is described.

Ұс азахтың хара пииге алтан салған
Ұс ала чылан сүрбестігі,
Тісче хара тас хуях кис салған —
Хой харахтың, хозан тістігі
үзе тутпа пиллігі
Тірігі ле хорғыстың ниге турыпчададыр [4, p.37]

Стоит внушающая дикий страх
На черной кобыле о трех ногах.
Лицом страшилище земли черней,
Сажени не хватает между ушей,
Пестро змеиные косы у ней,
Глаза лягушачьи раскосы у ней [1, p. 36].

The eyes also reflect the emotional state: joy, anger or anxiety of the heroes of the work. For example, the scene when a newborn son was brought to Yuzut-Aryk:

Ұзұт Арығ абахай амды
Ала харағының оды чайылып одырыбысхан [4,
p. 46]

Юзут-Арыг от восторга
Глаза раскрывши села

The scene when Khulatai the hero learned that his son had been stolen:

От этих слов Хулатай отрезвел.
Поспешно доспехами зазвенел,
За собою их по полу волоча,
Никому ничего не сказав стгоряча.
Был он страшен в порыве своем —
С глазами горящими, с белым лицом [1, p.43].

The eyes are also a symbol of movement, speed of heroic horses. In the legend, the expression "Открытых глаз не успеешь закрыть, закрытых глаз не успеешь открыть" is often used to convey the instantaneousness of action:

У коня такая смелая прыть,
Что трудно скачки его уследить —
Открытых глаз не успеешь закрыть,
Закрытых глаз не успеешь открыть.
Бураном горы вокруг шумят,
Вихрем кружатся, летят назад.
Небо гудело три ночи, три дня
От гулкового топота вихря-коня [4, p.13].

In the text, the presence of eyes and their absence are a designation of a person's inferiority.

Тўн Хара кўрибиссе, сарсых харахтыг тас
Уға чабал сырайлыг пол парыбыстыр
Позы ікі харағы чох тас пол парды:
Улуг пурунныг, чулып алхаң сазы чоғыл
Аргалыг сыннан иніп тўстілер,
Улуг аалға иніп, килділер.
Олган-узах оларнаң хорығып,
ойласчададыр [1, p.66].

Тўн Хара посмотрел и чуть не упал—
До того он грязным и страшным стал,
В овчину одет, одноглазым стал.
— Ладно, мой друг, смотри не тужи, —
Сказал и встряхнулся сам Албынжи.
Стал он противным плешивым слепцом,
С длинным носом, с кривым лицом.
Бредут друг за другом в улус слепцы,
За собой жеребенка ведут под уздцы.
Кто взглянет на них — от страха дрожит.
Уж очень противен у странников вид [4, p.71].

This is very clearly seen when Altyn-Aryҕ makes a choice between one-eyed and eyeless.

Алтын Арыҕ хыс сыхтап, орлап тур:
«Пір айназынаң поэзам паза пір айна
Алар сырбаг полды поэзма,
Че пар, чоохта: харахтыг тасха паргайзым
за» [4, p. 74].

...Алтын-Арыҕ плачет навзрыд:
– «Бедное сердце мое болит.
Видно, мой смертный час настал.
От одного отвязалась, другой пристал.
Как мне исполнить наказ отца:
Одноглазого выбрать или слепца?
Как мне душой не скривить перед ним?
Как я буду жить со слепым?
Как по свету его поведу?
За одноглазого лучше пойду!» [1, p. 77]

In the text, you can see examples when the eyes show the powerlessness of a person. For example, when the hero was bewitched:

И вдруг Хулатай точно во сне,
На грудь голову тихо склонил,
Руки могучие опустил.
Его обманом взяла она.
В глазах туманная пелена.
В голове какой-то неясный шум,
В душе смятенье всех чувств и дум.
Теперь он женою ее зовет,
За грубость себя нещадно клянет... [1, p. 47-48]

In the heroic legend, the eyes are a symbol of a person's life or death. An example of death can be seen when the hero Khulatai turned to stone from the curse of the people:

И вдруг, замороженный, окаменел.
Окаменело могучее тело,
На лице улыбка окаменела.
Глаза закрылись. В одно мгновенье
Окаменели руки, спина, колени.

Стал Хулатай, богатырем рожденный,
С человеческим обликом камнем зеленым [1, p.15].

We see an example of a return to life when Khan-khys revives Chibek-Aryk, Khulatai's bride:

Губы разжались, грудь поднялась,
Открылись ресницы прекрасных глаз.
Вздохом свободным вздохнув глубоко [1, p.41].

Note that the eyes were never just organs of vision. It is always some kind of symbol, some special meaning. Eyes are important expressers of emotions and feelings, they reflect changes in the emotional state of a person, his attitude to something or someone. This is especially evident in folklore texts. Maybe that's why in all languages there are so many different proverbs, sayings, expressions associated specifically with the eyes. Heroic legends in this case are no exception. Expressions with eyes are the most numerous in the text of the heroic epic. Developing over many centuries, the legends are a vivid evidence of the historical development of the ethnos, reflect the moral, aesthetic and value-normative picture of the world of the given ethnos, and contain rich ethnographic and linguistic material. The main value of heroic legends is the assessment, approval or disapproval of human actions, qualities, various phenomena of social reality from the point of view of their compliance or non-compliance with certain moral requirements, norms prevailing in a given era in a given society, or prevailing in its individual social strata.

It should be noted that heroic legends from the point of view of linguistics have been little studied and represent a wide field for research. The question of the role of heroic legends in the vocabulary of the language is also relevant. The linguoculturological study of the heroic legends of the Khakass language will reveal the peculiarities of the worldview and mentality of its speakers, and study individual fragments of the national linguistic picture of the world.

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病原微生物的抗生素敏感性研究-牲畜传染病的致病因素。

**STUDY OF ANTIBIOTIC SENSITIVITY OF PATHOGENIC
MICROORGANISMS - CAUSATIVE AGENTS OF INFECTIOUS
DISEASES OF FARM ANIMALS**

Egorova Natalya Nikolaevna

*Candidate of Veterinary Sciences, Senior Research Officer
LLP "Kazakh Scientific Research Veterinary Institute"*

Sarbakanova Sholpan Taupikovna

*Candidate of Biological Sciences, Lead Research Officer
LLP "Kazakh Scientific Research Veterinary Institute"*

Kerimbaeva Raushan Azizhanovna

*Master of Veterinary Sciences, Research Assistant
LLP "Kazakh Scientific Research Veterinary Institute"*

这篇文章提出了从死活动物身上分离出的各种命名法的微生物对抗生素敏感性的研究结果。 总共研究了从死动物病理材料中分离出的20种微生物培养物和从患病动物中分离出的1种培养物。 研究表明,发现了两种对双球菌感染有致病作用的培养物,它们对抗生素具有抗性。 从死动物中分离出的巴斯德氏菌的三种培养物显示出对抗生素的中等敏感性。 15种李斯特菌培养物和1种沙门氏菌培养物对测试的抗生素具有高度敏感性。 发现在研究的21种微生物培养物中,只有2种显示出对抗生素的抗性。

关键词: 微生物, 抗生素, 敏感性, 耐药性, 家畜, 圆盘扩散法。

Abstract. *The article presents the results of a study of the sensitivity of microorganisms of various nomenclature isolated from a dead and sick animal to antibiotics. In total, 20 cultures of microorganisms isolated from pathological material from dead animals and 1 culture isolated from a sick animal were studied. As a result of the studies, two cultures of the causative agent of diplococcal infection were found that are resistant to antibiotics. Three cultures of Pasteurella isolated from dead animals showed moderate sensitivity to antibiotics. 15 Listeria cultures and one Salmonella culture showed high sensitivity to the tested antibiotics. It was found that out of 21 studied cultures of microorganisms, only 2 showed resistance to antibiotics.*

Keywords: *microorganisms, antibiotics, sensitivity, resistance, farm animals, disk-diffusion method.*

Introduction

The uncontrolled use of antibiotics in veterinary practice contributes to the spread of infectious diseases of farm animals [1, 2]. Recently, the incidence of infectious diseases of bacterial etiology in farm animals has increased, which is due to the acquired resistance of pathogens to antibiotics [3]. Treatment of animals is carried out without preliminary testing of pathogens for sensitivity to antibiotics. Antibiotic resistance of microorganisms is also formed due to the use of antibiotics for the prevention of diseases, as well as stimulants of animal growth. Infectious diseases of bacterial etiology are widespread throughout the republic and cause significant economic damage to animal husbandry. On the territory of the Republic of Kazakhstan, according to veterinary data, 129 nosological forms are registered, including diseases inherent in many types of agricultural and wild animals: cattle, sheep and goats, horses, camels, pigs, birds, fur animals and dogs, bees.

The uncontrolled use of antibiotics leads over time to a decrease in their bactericidal and bacteriostatic action, which is due to the formation of drug resistance in infectious agents. In some populations of microorganisms, multidrug resistance is formed, that is, multiple resistance to several antimicrobial drugs [4, 5].

Research material and methods When performing the work, we used bacteriological, serological, biochemical and genetic research methods. Pathological material (liver, spleen, kidney, heart, lung, bone marrow, lymph nodes) was taken from dead animals, biomaterial - from clinically sick animals and bacteria carriers directly on farms. The cultural and morphological properties of pathogens were studied by inoculating samples of pathological and biological material on the MPB, MPA, and differential diagnostic media. The isolated microorganisms were identified on the basis of the study of cultural-morphological, biochemical, tinctorial, antigenic properties, as well as setting up a bioassay on laboratory animals. The cultures were identified by their biological properties on the basis of "Bergey's Manual of Systematic Bacteriology" 2016 [6].

Microscopy of smears prepared from daily Gram-stained agar cultures was performed. Biochemical properties were studied by sowing crops on Giss media with carbohydrates. Mobility was determined by growth on semi-liquid agar (SLA). To reveal the proteolytic ability, the tested cultures were inoculated on the MPL [7]. To determine catalase, a 1% hydrogen peroxide solution was applied to the surface of a 24-hour agar culture. A 3% solution of hydrogen peroxide was applied to a glass slide, and the bacteriological loop of *Listeria* was carefully distributed in hydrogen peroxide. In the presence of catalase, the release of bubbles of cleaved oxygen is noted. The antigenic structure of *Salmonella* was tested in the Agglutination reaction on glass with polyvalent and monoreceptor O- and H-agglutinating sera produced by the St. Petersburg Research Institute of Vaccines and Serums and an enterprise for the production of bacterial preparations (Petsal).

After identification of cultures, their sensitivity to antibiotics of various groups was studied. The sensitivity of the isolated microorganisms to antibiotics was determined in accordance with the European standard EUCAST, version 8.0, effective from 01.01.2018 by the disk-diffusion method in agar in accordance with the guidelines (MUK4.2 1890-04 Ministry of Health of the Russian Federation, 2004) [8], on Muller-Hinton agar using disks manufactured by NICF (St. Petersburg). The disk-diffusion method is recognized as the standard test recommended by the WHO and EUCAST [9,10]. Parameters of the disk-diffusion method in accordance with the EUCAST recommendations: culture medium: Mueller-Hinton agar; inoculum: 0.5 McFarland turbidity standard; incubation: normal atmosphere, 35 ± 1 °C, 18 ± 2 hours. After incubation with disks, the Petri dish was placed upside down on a dark matte surface so that the light fell on it at an angle of 45° (counting in reflected light) [11]. Antibiotic sensitivity was assessed by the diameter of the growth inhibition zone, on the basis of which the bacteria were characterized as sensitive, moderately sensitive, or resistant. Preparations for determining antibiotic resistance were selected taking into account the spectrum of antimicrobial activity of microorganisms, as well as those available and often used in veterinary practice. The natural resistance of microorganisms to antibiotics was also taken into account.

Results and discussion

The material for bacteriological research was taken at the robotic and dairy farms of "Baiserke-Agro" LLP, Talgar district, Almaty Oblast, Kerbulak and Zhantal departments, the confectionary farm of the Aksai department and other farms in Almaty Oblast. In total, 21 cultures of microorganisms were isolated from pathological and biological material from animals. On the basis of the study of cultural-morphological, tinctorial, biochemical, antigenic properties, as well as the results of setting a bioassay on laboratory animals, the distinguished epizootic isolates were identified. The characteristics of microorganisms are presented in table 1.

Table 1 - Microorganisms isolated from pathological and biological material from animals

№	Name of culture	From which animal it was obtained	Number of cultures
1	Listeria monocytogenes	Abortion fetus of a cow at 9 months of pregnancy	1
		Young bull (blood culture)	1
		Newborn foals	2
		Newborn lamb	1
		Ewe	2
		Young ewe	1
		Cow	1

№	Name of culture	From which animal it was obtained	Number of cultures
		Calves	6
		Total:	15
2	Pasteurella multocida	Calf	1
		Foal	1
		Ewe	1
		Total:	3
3	Diplococci	Calf	1
		Foal	1
		Total:	2
4	Salmonella abortus-ovis	Newborn lamb	1
		Total:	1
		Total selected cultures:	21

Table 1 shows that 15 cultures of *Listeria monocytogenes*, 3 cultures of *Pasteurella multocida*, 2 cultures of diplococci (*Diplococcus*), 1 culture of *Salmonella abortus-ovis* were isolated from the selected samples of pathological material.

A total of 20 cultures of microorganisms were isolated from pathological material from animals and 1 blood culture from the blood of a bull. Figures 1 and 2 show *Listeria* isolated from calf pathology on the Palcam differential diagnostic medium.

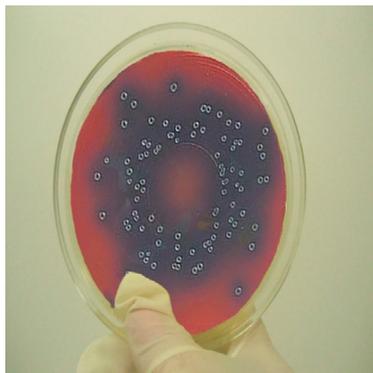


Figure 1 - Growth of *L. monocytogenes* on differential diagnostic medium Palcam

Figure 1 shows the growth of *Listeria* on the Palcam differential diagnostic medium in the form of isolated dark red round colonies. Figure 2 shows *Listeria* in a Gram stained smear.

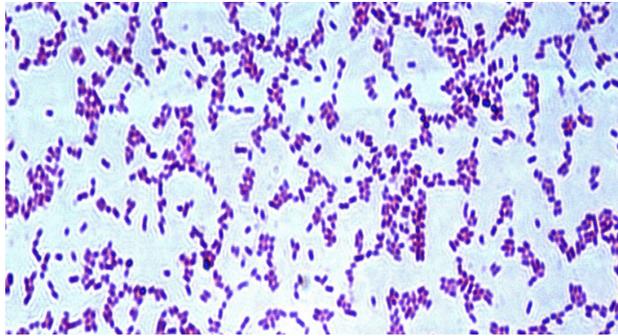


Figure 2 - *L. monocytogenes* in a Gram stained smear

Figure 2 shows small gram-positive thick rods arranged in pairs and in groups, typical of *L. monocytogenes*.

The sensitivity of microorganisms to antibiotics of various groups has been studied. The results are shown in Table 2.

Table 2 - Sensitivity of microorganisms isolated from pathological and biological material from animals to antibiotics

Microorganism type	Number of cultures of microorganisms	Antibiotic sensitivity		
		R	MS	S
<i>Listeria monocytogenes</i>	15	-	-	15
<i>Pasteurella multocida</i>	3	-	3	-
Diplococci	2	2	-	-
<i>Salmonella abortus-ovis</i>	1	-	-	1
Note: R-resistant; MS-moderately sensitive; S-sensitive				

From table 2 it follows that the cultures of diplococci isolated from the calf and foal showed resistance to all antibiotics, had multi-resistance. Moderate sensitivity to the tested antibiotics was observed in *Pasteurella* isolated from calf, foal and ewes. High sensitivity to antibiotics was found in 15 cultures of *Listeria* and 1 culture of *Salmonella* isolated from lamb. Figure 3 shows the antibiotic sensitivity of *Pasteurella* isolated from ewes.



Figure 3 – Antibiotic sensitivity of *P. multocida*

Figure 3 shows the zones of inhibition of the growth of microorganisms around the disks with antibiotics to which *Pasteurella* was sensitive.

The causative agents of diplococcal infection isolated from the pathological material from a calf of 1.5 months of age and a foal of 2 months of age were resistant, i.e. showed resistance to β -lactam antibiotics, vancomycin and meropenem, were resistant to macrolides (erythromycin), which is due to the unjustified use of antibiotics in the treatment of animals. Diplococci isolated from calf patches showed moderate sensitivity to amoxiclav (10 mm). Diplococci sown from both animals showed resistance to second-generation cephalosporin antibiotics, as well as vancomycin and meropenem, which indicates acquired drug resistance. The resistance of diplococci to β -lactam antibiotics is due to the production of β -lactamases by diplococci. *Pasteurella* isolated from calf, foal, and ewes showed sensitivity to β -lactam antibiotics (ampicillin), did not produce β -lactamase, and did not possess drug resistance. The high sensitivity of *P. multocida* to aminoglycosides (amikacin and gentamicin) was established. However, the culture of *Pasteurella* isolated from ewes was resistant to gentamicin (an aminoglycoside), indicating acquired resistance as a result of inappropriate treatment. *Pasteurella* showed high sensitivity to tetracyclines (tetracycline and doxycillin), as well as to chloramphenicol.

15 cultures of *L. monocytogenes* isolated from various animals were highly sensitive to second-generation fluoroquinolones - norfloxacin, enrofloxacin, ofloxacin, and lomefloxacin. *Listeria* isolated from a dead calf were resistant to second generation cephalosporins (ceftriaxone and ceftazidime) due to their natural re-

sistance. High sensitivity of *Listeria* to fluoroquinolones was observed in all 15 epizootic cultures of *Listeria*, which indicates the absence of acquired antibiotic resistance. *Listeria* exhibited high sensitivity to meropenem, an antibiotic of the carbapenem group.

The causative agent of salmonella abortion in sheep *S. abortus-ovis* isolated from a newborn lamb had a high sensitivity to ampicillin, tetracycline, chloramphenicol, gentamicin, fluoroquinolones, which indicates the absence of antibiotic resistance.

As a result of studying the sensitivity of microorganisms to antibiotics, it was found that 2 cultures of diplococci isolated from patmaterial from a calf of 1.5 months of age from LLP "Galitskoye" of the Uspensky district of Pavlodar Oblast and from a 2-month foal from the farm "Kotelnikov" of the Alatau village of Talgarsky district of Almaty Region, turned out to be multi-resistant, i.e. have shown multidrug resistance.

Conclusion The study of antibiotic sensitivity of 21 cultures of microorganisms of various nomenclature (*Listeria*, *Pasteurella*, *Diplococcus*, *Salmonella*) made it possible to identify 2 cultures of diplococcal infection pathogens with resistance to all studied antibiotics (multiresistant). Three cultures of *P. multocida* isolated from calf, foal and ewes were susceptible to β -lactamam antibiotics. The high sensitivity of *P. multocida* to aminoglycosides was established. *Pasteurella* isolated from ewes were resistant to gentamicin, indicating acquired resistance as a result of antibiotic use in the treatment of the animal.

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哈萨克斯坦母马沙门氏菌流产的特别预防
**SPECIFIC PREVENTION OF SALMONELLA ABORTION OF MARES
IN KAZAKHSTAN**

Mussayeva Asia Kyblashevna

*Doctor of Biological Sciences, Head Research Officer
LLP "Kazakh Scientific Research Veterinary Institute"*

Egorova Natalya Nikolaevna

*Candidate of Veterinary Sciences, Senior Research Officer
LLP "Kazakh Scientific Research Veterinary Institute"*

本文讨论了母马沙门氏菌流产预防剂的生产技术和应用。沙门氏菌流产是母马繁殖场中驹损失的主要原因。哈萨克斯坦RVI已开发出一种技术，可以生产母马流产沙门氏菌的疫苗。该疫苗已通过生产批准和注册测试；在哈萨克斯坦共和国兽医生物学注册簿中注册，以介绍兽医实践；已收到注册证书RK-VP-1-3428-17。该疫苗具有高度免疫原性，可保护孕母马免于沙门氏菌病因流产。

针对来自E-841毒株的母马中沙门氏菌流产的干燥活疫苗参加并中标了流行病预防剂的国家供应。

关键词：感染，沙门氏菌，母马流产，疫苗，特异性预防

Abstract. *The article discusses the technology of manufacturing and application of a prophylactic agent against salmonella abortion in mares. Salmonella abortion of mares is the main reason for the loss of foals in horse breeding farms. The Kazakh RVI has developed a technology for the production of a vaccine against salmonella abortion in mares. The vaccine has passed production approbation and registration tests; registered in the Register of Veterinary Biologicals of the Republic of Kazakhstan for introduction into veterinary practice; the Registration Certificate RK-VP-1-3428-17 was received. The vaccine is highly immunogenic and protects pregnant mares from abortions of Salmonella etiology.*

A dry live vaccine against Salmonella abortion in mares from the E-841 strain participates and wins in tenders for state supplies of epizootic prophylactic agents.

Keywords: *infection, salmonella, mare abortion, vaccine, specific prophylaxis.*

Introduction

Salmonella abortion of mares is one of the most widespread infectious diseases of horses, causing significant economic damage to horse breeding in the republic. According to the latest statistics from the Committee for Veterinary Control and Supervision, there are 2,325,000 horses in the republic, of which 1,725,000 are mares. Diagnostics and prevention of infectious diseases, among which Salmonella abortion of mares occupies an important place [1,2,3,4], is essential in increasing the number and productivity of horses.

Horses become infected with salmonellosis through food, bedding, water, and care items. And mares are additionally infected with a pathogen isolated from the birth canal and abortions through the digestive tract during the abortion period. Infected mares have no clinically pronounced symptoms of the disease, Salmonella are localized in the intestines, periodically excreted in feces. Abortions of salmonella etiology occur in the second half of pregnancy (7-11 months) and are massive, aborted mares are seriously ill after abortion. In mares with salmonellosis, the foals become infected in utero and die after birth. In foals, the disease occurs in the form of bacteremia and general toxicosis, enteritis (in newborn foals at an early age), chronic polyarthritis and exhaustion - up to 3 months of age, leading to the death of animals. [3,4,5].

Materials and methods

The Kazakh RVI produces a vaccine against Salmonella abortion of mares from an attenuated strain of Salmonella E-841. The vaccine strain Salmonella abortus - equi E-841 has been deposited in the Republican Collection of Microorganisms (RCM) in the Republican State Enterprise on the RGP "NRTSV" KVKiN SR (Nur-Sultan). A control strain of Salmonella abortus - equi 7/1, which is used to control the immunogenic activity of the vaccine, has also been deposited in the RCM.

The manufacture of a vaccine consists of working with industrial vaccine and control strains: control of biological properties, maintenance and storage; preparation of nutrient media; growing culture of the 1st generation; growing culture of the 2nd generation; industrial cultivation of the vaccine strain; washing off the back mass with a drying medium; preparation of a vaccine batch; packaging; freeze drying; calculation of the immunizing dose according to the number of live Salmonella per mare; calculation of the immunizing dose by the number of live Salmonella in the vial; accounting of production processes; biocontrol of the vaccine.

Thus, a technology for the manufacture of a vaccine has been developed, in the preparation of which the accumulated bacterial suspension diluted with a medium for freeze drying to a concentration of 20 billion \pm 1.0 billion microbial cells in 1.0 cm³ according to the optical turbidity standard of the L.A. Tarasevich GISK

was packaged 4.0 cm³ in sterile vials. Packaging error $\pm 1\%$. After that, the vials with the vaccine were freeze-dried; after freeze-drying of the preparation, the vials were sealed with a lid under vacuum.

The vaccine is highly immunogenic and protects pregnant mares from abortions of Salmonella etiology during the year.

Research results

The produced experimental microseries of the dry live vaccine against salmonella abortion of mares was tested in laboratory and production conditions: the vaccine was biocontrolled on laboratory animals; The vaccine was tested on 28 foal mares of 4-7 fertility in the production conditions of 2 horse breeding farms in Almaty region - in the farm "Arai" in the Karasai region and in the farm "Mukhametkali" in the Enbekshikazakh district. 1 and 2 months after vaccination, blood was taken from vaccinated animals in order to determine post-vaccination antibodies to the injected antigen. Blood was taken from vaccinated mares in order to determine the titer of postvaccinal antibodies in an expanded agglutination reaction in test tubes (using a checkerboard method of reacting dilutions of blood serum and antigen of the virulent strain Salmonella abortus-equi 7/1). In production trials of the vaccine on 28 heads of pregnant mares (12 and 16 heads, respectively), the level of antibodies formed for the vaccine administration was 1: 100 - 1: 200, respectively, on average 1: 150. The antibody titer 1: 150 was tested on 10 white mice. For this, 5 white mice were injected with 0.2 ml of anti-salmonella serum in a titer of 1: 150, 5 white mice were control. Control mice, when administered with a dose of the control Salmonella strain of 2.5 LD₅₀, died in the first two days. Experienced mice resisted the challenge with the introduction of a virulent Salmonella culture at a dose of 2.5 LD₅₀. White mice were protected from infection when injected with a virulent Salmonella culture S. abortus-equi 7/1 due to the preventive properties of post-vaccination antibodies in a titer of 1: 150.

Based on the results of the biological control of the experimental series of the vaccine, testing the vaccine in laboratory and production conditions, the NTD for the dry live vaccine against salmonella abortion in mares was developed and compiled: ST TOO 071240018450-032-2016 approved on June 27, 2017, dry live vaccine against salmonella abortion of mares, made on the basis of the attenuated vaccine strain Salmonella abortus equi E-841, has successfully passed the State approbation approved and agreed with CVCS NTD MA of the RK; the vaccine has successfully passed production registration tests and is registered in the Register of Veterinary Biologicals of the Republic of Kazakhstan for introduction into veterinary practice; the Registration Certificate RK-VP-1-3428-17 was received.

Specific prevention of Salmonella abortion in mares is based on vaccination of pregnant mares. For the prevention of Salmonella abortion in mares, KazRVI has developed and uses a live dry vaccine against Salmonella abortion in mares

from an attenuated vaccine strain of *Salmonella abortus - equi* E -841. The dry live vaccine against salmonella abortion of mares is used for the general vaccination of pregnant mares from 4 months of pregnancy 7 months of pregnancy.

The finished vaccine in a vial after freeze-drying is shown in Figure 1.



Figure 1 - Dry live vaccine against salmonella abortion of mares from strain E - 841

Figure 1 shows the vaccine vials and the vial packaging box. A vial of freeze-dried vaccine contains 20 doses.

Systematic vaccinations with a live vaccine from the E-841 strain protect animals from abortions of *Salmonella* etiology, thereby preserving the livestock of nascent foals, increasing the yield of foals, milk yield, as a result of which farms receive a great economic effect. A dry live vaccine against *Salmonella* abortion is also given to mares for all horses on the farm - stallions, work horses, foals, since they are often salmonella carriers. The vaccine is given to pregnant mares in the period of 4-7 months of pregnancy at a dose of 3 ml in the region of the middle third of the neck; stallions and workhorses also 3 ml each, one-year-old foals - 2 ml.

The dry live vaccine against *Salmonella* abortion in mares protects mares from *Salmonella* abortion. Vaccination of pregnant mares in the period of 4-7 months of pregnancy is carried out for prophylactic purposes once. In mares, 3 cm³ is injected subcutaneously into the upper third of the neck. The vaccine imparts high voltage immunity to the vaccinated animals. Immunity in vaccinated animals occurs in two weeks and lasts for 12 months.

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第三个千年开始时库尔干地区的人口民族组成：动态和领土差异

**THE NATIONAL COMPOSITION OF POPULATION OF KURGAN
REGION AT THE BEGINNING OF 3RD MILLENIUM: DYNAMICS AND
TERRITORIAL DIFFERENCES**

Solodovnikov Alexander Yurievich

Doctor of Geographical Sciences, Associate Professor

The chief of scientific research of ecology department.

Tyumen department of LLC «SurgutNIPIneft»

Solodovnikov Dmitriy Alexandrovich

Magister of ecology

Middle school № 70, Tyumen

Solodovnikova Zlata Alexandrovna

Student

Tyumen State Medical University

在本文中，观察到在2002年至2010年期间固定的国家组成。 研究证明，与塔塔尔人和喀什人相比，大多数人口是俄罗斯人组成的。 所有其他乡亲的人数正在减少。 2010年人口核算的事实之一是，许多人没有名字。

关键词： 库尔干地区人口民族组成母语

Abstract. *In this article the formed national composition, fixed in period of 2002-2010 is observed. The research proved that most of the population is formed by the Russians, than Tatars and Bashkirs. The number of all other folks is decreasing. One of the facts of 2010 population accountings was that lots of people didn't name their ethnicities.*

Keywords: *Kurgan region, population, national composition, mother language.*

Kurgan region is one of the regions of Russian federation, is included in Ural federal district. Its' floor space is 71, 5 thous. km², or 0, 4 % of all countrys' floor space. The number of people living here at the moment of 01.01.2020. is 827, 2 thous. ppl. Among all the subjects of RF, the region takes the 46 place, by the population – 61 place. Administrative center — city of Kurgan.

Geographically the region is located on composition of Ural and West Siberia on the southwestern part of West-Siberian plain. It is 290 km from north to south and 430 km from west to east. Kurgan region has frontiers with Chelyabinsk region on west, Sverdlovsk region on north, Tyumen region on east and Republic

of Kazakhstan on south (state frontier), North-Kazakhstan and Kustanai regions

The distance to Moscow is – 1973 km, the distance to Ekaterinburg, center of the Federal district is 320 km. The closest regional centers are – Tyumen (Tyumen region, 190 km), Ekaterinburg (Sverdlovsk region, 320 km), Chelyabinsk (Chelyabinsk region, 268 km), Petropavlovsk (North-Kazakhstan region, 271 km) and city of Kustanai (Kustanai region, 312 km).

Kurgan region has 2 urban districts and 24 municipal districts [1]. The whole number of population at the moment of 01.01.2020, based of Federal statistics (Rosstat) [2] is 827,2 thous. ppl., 62% are the city citizens and 38 % are rural inhabitants. City population lives in 14 municipal foundations, rural – in 24. In urban districts, 100% of people are the citizens, more than 50% of city population lives in 4 municipal districts. In 12 municipal districts, only the rural population is registered.

The national composition of population is multifarious. There are more than 100 different folks living in this region. Only in Kurgan 90 different nationalities were fixated. The biggest part of the population is formed by 4 folks, it is 95,7 % of the regional population (in 2002 this numbers were 97,6 %). 90 % of all population is formed by the Russians (823,7 thous. ppl.) (table 1). They live all around the region. The biggest number of the Russians is located in Vargashino district (96,8 %) and Mishkino district (96,1 %), the lowest – in Safakulievvo district (21,3 %) and Almenevo district (39,0 %) (table 2). In regional capital the part of the Russian population is 95,3 % (table 3).

Table 1

The amounts of the biggest folks of Kurgan region (at the time of All-Russian accounting)

Nationality	2002		2010	
	Ppl.	%	Ppl.	%
The whole population,	1 019 532	100,0	910 807	100,0
Russians	932 613	91,5	823 722	90,4
Tatars	20 899	2,0	17 017	1,9
Bashkirs	15 343	1,5	12 257	1,3
Kazakhs	14 804	1,5	11 939	1,3
Ukrainians	11 243	1,1	7 080	0,8
Byelorussians	4 175	0,4	2 502	0,3
Azerbaijanians	1 723	0,2	1 781	0,2
Armenians	2 109	0,2	1 750	0,2
Germans	2 706	0,3	1 740	0,2
Udmurts	2 291	0,2	1 579	0,2
Chuvash	1 912	0,2	1 364	0,1
Moldavians	1 064	0,1	815	...
Mordvins	1 089	0,1	691	...
Not provided	391	...	20 017	2,2
All other	7 170	0,7	6 553	0,9

Note: ... - less than 0,1 %

Source: based on: [3].

Table 2

The nationalities dispensation by municipal foundations of Kurgan region (at the time of All-Russian accounting)

Nationality	Number of foundations	Municipal foundation
Russians		
1 Place	25	Almenevo, Belozersk, Vargashino, Dalmatovo, Zverinogolovsk, Kargapolsk, Katai, Ketovo, Kurtamysh, Lebyazhevo, Makushino, Mokrousovo, Petuchovo, Polovino, Pritobol, Celliny, Chastoozerskiy, Shadrinsk, Shatrovo, Shumikhino, Shuchanck, Yurgamish, Kurgan, Shadrinsk
2 Place	0	—
3 Place	1	Safakulievo
Татары		
1 Place	0	—
2 Place	6	Safakulievo, Celliny, Shadrinsk, Shatrovo, Shumikhino, City of Shadrinsk
3 Place	5	Almenevo, Zverinogolovsk, Ketovo, Shuchanck, City of Kurgan
Башкиры		
1 Place	1	Safakulievo
2 Place	2	Almenevo, Shuchanck
3 Place	1	Shumikhino
Казахи		
1 Place	0	—
2 Place	16	Belozersk, Vargashino, Dalmatovo, Zverinogolovsk, Kargapolsk, Katai, Kurtamysh, Lebyazhevo, Makushino, Mishkino, Mokrousovo, Petukhovo, Polovinski, Pritobolny, Chastoozerskiy, Yurgamysh
3 Place	2	Celliny, Shatrovo
Украинцы		
1 Place	0	—
2 Place	2	Ketovo, City of Kurgan
3 Place	17	Belozersk, Vargashino, Dalmatovo, Kargapolsk, Katai, Kurtamysh, Lebyazhevo, Makushino, Mishkino, Mokrousovo, Petukhovo, Polovinski, Pritobolny, Chastoozerskiy, Shadrinsk, Yurgamysh, City of Shadrinsk

Source: based on: [3].

Table 3

**National structure of population of municipal districts of Kurgan region,
% (based on population accounting data)**

Municipal districts	Number of nationalities ¹	The Russians	The Baskirs	The Tatars	The Kazakhs	The Ukrainians	Other nationalities
Districts							
Almenevo	28	39,0	33,0	22,0	1,8	0,5	3,7
Belozersk	35	95,1	0,1	0,2	1,7	0,5	2,4
Vargashino	27	96,8	...	0,3	0,8	0,6	1,5
Dalmatovo	45	94,0	0,1	0,4	1,7	0,6	3,2
Zverinogolovsk	27	84,4	0,1	2,0	8,8	1,6	3,1
Kargapolsk	40	95,2	0,2	0,4	1,3	0,7	2,2
Katai	39	90,4	0,4	0,5	2,3	0,6	5,8
Ketovo	59	94,6	0,2	0,8	0,7	1,0	2,7
Kurtamysh	44	94,9	...	0,4	2,6	0,6	1,5
Lebyazhevo	35	93,0	...	0,2	3,5	0,5	2,8
Makushino	33	88,7	...	0,4	8,0	0,5	2,4
Mishkino	34	96,1	0,2	0,4	0,8	0,4	2,1
Mokrousovo	28	93,4	...	0,2	3,8	0,5	2,1
Petukhovo	30	93,8	...	0,5	3,0	0,7	2,0
Polovinski	31	88,5	0,2	0,5	5,5	1,7	3,6
Pritobolny	32	94,2	...	0,2	2,5	0,8	2,3
Safakuliev	29	21,3	43,0	33,7	0,2	0,3	1,5
Celliny	31	83,9	0,7	6,1	4,5	2,4	2,4
Chastoozerskiy	21	91,4	...	...	4,4	0,5	3,7
Shadrinsk	41	92,2	0,1	3,8	0,8	0,9	2,2
Shatrovo	38	92,1	0,1	5,3	0,7	0,5	1,3
Shumikhino	35	92,9	1,2	3,2	0,4	0,8	1,5
Shuchanck	35	89,6	3,8	3,1	0,2	0,8	2,5
Yurgamysh	34	95,1	0,2	0,5	1,1	0,6	2,5
City districts							
City of Kurgan	90	95,33	0,2	0,59	0,3	1,27	2,31
City of Shadrinsk	65	94,1	0,2	2,0	0,3	0,7	2,7

Note: ¹ Includes people who noted their nationality only.

Source: based on: [3].

Kurgan region takes the 2nd place in number of the Russian population after the Sverdlovsk region (90,6 %) on territory of Ural federal district. After them go Chelyabinsk region (83,8 %), Tyumen region (73,3 %), Khanty-Mansiisk region – Ugra (68,1 %) and Yamal-Nenets autonomous region (61,7 %).

The second folk in numbers is the tatars (17,0 thous. ppl.). This is 2 % of pop-

ulation. The tatars live in districts of the region. The greatest number of them live in Almenevo district (22,0 %) and Safakulievo district (33,7 %). In these regions, there are some communities where the tatars have the leading numbers. The tatars have the 2nd place by population in 6 municipal districts and the 3rd place in 5 municipal districts (table 1).

The 3rd place by population have the Bashkirs. Their population in region is 12,3 thous. ppl. or 1,3 % of population. Most of Bashkirs live in western part of the region. The Bashkirs have the 1 place in one district, 2nd in 2 districts and 3rd in one district (table 1).

One more folk boasts more than 1% of total regions' population. These are the Kazakhs (1,3 %). Most of the Kazakhs live in regions that have their frontiers with Republic of Kazakhstan. In some regions, they live in small settlements – auls and ledgments. The Kazakhs have the 2nd place in 2 municipal districts and 3rd place in 17 districts by numbers.

Based on the All – Russian population accounting in 2010, 20 thous. ppl. (2,2%) didn't mention their nationality (in 2002 . there were just 391 such ppl., 0,04%).

Taking into account the numbers of the Russian population, the Russian language is the most commonly used language in the region (94,9 %). Also the Polens, Germans and Belorussians named the Russian language as the mother language. The second commonly used language is the tTatar language. Also with Tatars the Bashkirs and some other nationalities use that language. The 3rd language is the Bashkir language. It's the mother language for Bashkirs, some Tatars, Chechens, Kazaks and Chuvash. (table 4).

Table 4

**The population by nationalities and language, %
(based on All-Russian population accounting 2010 r.)**

Nationality	National language	Russian	Bashkir	Tatar	Kazakh	Ukrainian	Other
The whole population, including:	94,9	3,2	...	...	...	...	...
Azerbaidjan	86,0	13,2		...			0,8
Armenian	75,0	24,5					0,5
Bashkir	87,9	10,9		1,0	...		0,2
Belorussian	15,3	84,5			...		0,2
Georgian	67,9	31,3					0,8
Jevish	1,8	97,8					0,4
Ingush	67,7	31,2					1,1
Kazakh	66,8	32,8	0,1	0,1		...	0,2
Kirgiz	88,9	9,7		0,2			1,2

Nationality	National language	Russian	Bashkir	Tatar	Kazakh	Ukrainian	Other
Komi-Permyak	25,3	74,1					0,6
Korean	11,8	87,6					0,6
Kurd	99,0	1,0					0,0
Lezgin	69,6	23,6					6,8
Lituanians	24,0	76,0					0,0
Mari	34,7	65,3					0,0
Moldavian	42,9	54,5				0,2	2,4
Mordovian	21,4	78,1					0,5
German	7,0	92,9					0,1
Pole	3,6	94,0				1,3	1,1
Russians	99,9	99,9	...	...	...	...	0,1
Tajik	85,4	12,6					2,0
Tatar	74,0	25,7	0,2	...		...	0,1
Udmurt	26,3	73,6					0,1
Uzbek	73,1	24,6		0,6			1,7
Ukrainian	17,9	81,8		...			0,3
Gipsies	78,9	20,9					0,2
Chechen	84,4	14,8	0,2				0,6
Chuvash	37,9	61,7	0,1	0,2			0,1
Other		50,0	0,2	0,2		...	

Note: ... – less than 0,01 %.

Source: based on: [3].

Main conclusions:

1. During the 2002–2010 period the population of Kurgan region has changed. The number of people who didn't mention their nationality increased by 50 times, and the population of other nationalities has decreased.

2. The Russian population takes leading positions by numbers in 24 municipal districts out of 26. Its' part varies from 21,3 % in Safakulievo district to 96,8 % in Vargashino district. In Ural federal district the Russians have the 2nd place by numbers.

3. The tatars have the 2nd place by population in 6 municipal districts and the 3rd place in 5 municipal districts.

The 3rd place by population have the Bashkirs. Their population in region is 12,3 thous. ppl. or 1,3 % of population. Most of Bashkirs live in western part of the region. The Bashkirs have the 1 place in one district, 2nd in 2 districts and 3rd in one district.

4. The most commonly used language in the region is the Russian language (94,9 %). It's the mother language not only for the Russians but for 14 other folks too. Almost everyone in the district can speak Russian.

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NOVO-SHIROKINSKOYE超热矿床 (ZABAYKALSKY KRAI) 的技术矿物资源
PB-ZN-AG-AU。第1部分。地质特征和技术成因
**TECHNOGENIC-MINERAL RESOURCES PB-ZN-AG-AU OF THE
NOVO-SHIROKINSKOYE EPITHERMAL DEPOSIT (ZABAYKALSKY
KRAI). PART 1. GEOLOGICAL FEATURES AND TECHNOGENESIS**

Goldyrev Vitaly Nikolaevich

engineer

Naumov Vladimir Aleksandrovich

*Doctor of Geologo-Mineralogical Sciences, Full Professor, Director
Natural Science Institut of the Perm State University, Perm*

当前矿床的发展水平导致大量采矿废物的形成。就加工材料的体积而言，固体矿物质的提取是“工业废物”或技术性矿物质地层（TMF）的产生。TMF包含许多有用的组件，这些组件的开发可以延长使用寿命并增加生产的利润。采矿过程中未提取的有用成分是人类环境组成发生负面变化，重金属浓度升高的主要来源。

在研究的第一部分中，以对Novo-Shirokinskoye金多金属矿床的地质数据分析和开发技术为例，介绍了技术矿产资源形成的主要机理（技术成因），数量和形式显示了多金属，稀有和贵金属的存在。

关键词：斑岩表生系统，超热金矿床，Novo-Shirokinskoye, Zabaykalsky Krai, 技术成因。

Abstract. *The current level of development of deposits leads to the formation of a large volume of mining waste. In terms of the volume of processed material, the extraction of solid minerals is the production of "industrial waste" or technogenic mineral formations (TMF). TMF contains many useful components, the development of which prolongs the service life and increases the profitability of production. The useful components not extracted during mining are the main source of negative changes in the composition of the environment for humans, the appearance of increased concentrations of heavy metals.*

In the first part of the study, using the example of the analysis of geological data and the development technology of the Novo-Shirokinskoye gold-polymetallic deposit, the main mechanisms of the formation of technogenic-mineral resources (technogenesis), the volume and forms of occurrence of polymetals, rare and noble metals are shown.

Keywords: *porphyry-epithermal systems, epithermal gold deposits, Novo-Shirokinskoye, Zabaykalsky Krai, technogenesis.*

Introduction

Novo-Shirokinskoye gold-polymetallic deposit is located 500 km from the regional center, near the village Novoshirokinskiy, 85 km from the border with the PRC. At the end of 2019, the subsoil user implemented a project to increase the volume of ore processed and increase the plant's productivity to 1.3 million tons of ore per year. The development of off-balance reserves is not yet envisaged. Gold at this deposit is mined as a by-product. According to the forecast of FSBI "TsN-IGRI", development of the field will last until 2033 (Table 1).

Table 1
Provision of the developed gold reserves of JSC "Novo-Shirokinskoye mine" for 01.01.2020 [4]

Company	Stocks of categories ABC ₁ C ₂ (metal, kg)	Annual production in 2017 (metal, kg)	Production security, years (according to FS)	Depletion of reserves, year (according to FS)
JSC "Novo-Shirokinskoye mine "	28 522	2747	16	2033

The industrial exploitation of deposits has always led to a significant increase in the anthropogenic load on the environmental situation in mining regions. The intensive development of the mining industry in the Gazimuro-Zavodskoy region was expressed not only in the extraction of useful components, but also in the formation of a large volume of dressing wastes or technogenic mineral formations (TMF). These are liquidated mine workings (adits), overburden dumps and tailings.

The formed TMFs are the main source of changes in the composition of the environment, the appearance of increased concentrations of elements and heavy metals unusual for the environment, and the formation of the hydromineral part. TMF, concentrated in the tailing dumps of the study area, are considered by us as large complex technogenic deposits containing significant technogenic and mineral resources of base metals, rare and noble metals.

To assess the prospects for the development of technogenic-mineral resources, it is necessary to identify the main types of TMF in solid and hydromineral forms. Based on the practice of carrying out such works [7], we know that in order to achieve this task, we need to analyze the processes of TMF formation (technogenesis). The most important features of epithermal deposits influencing the processes of technogenesis are the shape and depth of formation of ore bodies, their composition (content of quartz, carbonates, sulfides, noble metals), characteristics of gold (morphology, size, fineness, forms of its occurrence). These features determine the choice of technology for the development and concentration of ores,

which determine the volume, material composition and prospects for industrial development of TMF. The study of the processes of technogenesis is the main goal of this study.

1. GEOLOGICAL FEATURES

1.1. Geological and structural position

The Novo-Shirokinskoye gold-polymetallic deposit is located within the Shirokinskiy ore field. It is located 100 km southeast of the Mongol-Okhotsk collision suture in the Gazimur deep fault zone, which formed parallel to the main suture during the collision of the Siberian and Mongol-Chinese continents [1]

The geological structure of the deposit (Fig. 1) involves the intrusions of the Shakhtama complex (J_{2-3}), effusive rocks of the Shadaron series (J_{2-3}), sedimentary deposits of the Akatuevskaya suite (J_{1-2} ak). The basement of the Shirokino volcano-plutonic structure is the Lower Cambrian deposits (limestone, dolomite, sandstone, quartzite) [1].

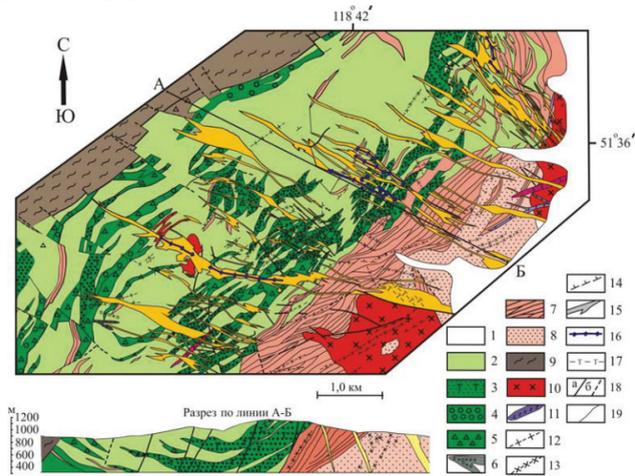


Fig. 1. Scheme of the geological structure of the Novo-Shirokinskoye gold-polymetallic deposit [1]

Legend for fig. 1: 1 – quaternary deposits; 2–5 – Shadaron series J2–3: 2 – upper effusive sequence (andesites, basaltic andesites); 3–5 – lower stratum (tuffaceous sandstones, tuffaceous siltstones, tuff breccias); 6 – quartz diorite porphyrites J2–3; 7 – J1–2: sandstones, siltstones; 8 – J1–2: sandstones; 9 – E1–2 – micaceous siltstones, sandstones, shales; Mesozoic intrusions: 10 – granodiorites; 11 – quartz porphyry; 12 – porphyry granite; 13 – diorite porphyrites; 14 – lamprophyres; 15 – zones of metasomatites; 16 – ore-bearing quartz-sulfide veins; 17 – quartz-tourmaline veins; 18 – tectonic disturbances: a) reliable, b) supposed; 19 – geological boundaries.

The deposit lies in the sub-latitudinal-northwestern zone of a fault with a length of 6 km and a thickness of 10 to 300 m and is a linear-elongated, unevenly mineralized zone. The main ore-bearing structures are en-echelon cracks. The lower limit of mineralization is, obviously, the contact of erupted rocks with pyroclastic and clastic varieties, in which the thickness of the crushing zones sharply decreases as well as in the “blind” stock of granodiorite-porphiry, in which mineralization, although traced, sharply decreases in thickness, which obviously associated with the physical and mechanical properties of these rocks. Ore material was deposited in cracks, less often metasomatically replaced the host rocks along them, forming uneven dissemination and nesting accumulations. [2].

According to Dolomanova-Topol A.A. [2], the deposit belongs to the epithermal (“intermediate sulphidation”) genetic type and is part of PES (together with the Bystrinsky Au-Cu-Fe porphyry skarn deposit).

1.2. The material composition of ores

The Novo-Shirokinskoye deposit stands out among the surrounding ore objects of Eastern Transbaikalia with an unusual, complex composition of ores, with a gold grade of about 4 g/t and silver 86.5 g/t [1].

The ores of the deposit can be subdivided into two natural types: sulphide and mixed (oxide-sulphide). The oxidation zone is extremely poorly developed at the deposit (its average depth is 18 m) and the total amount of mixed ores does not exceed 2% [2].

The sulfide ores of the Novoshirokino deposit are mainly veinlet-disseminated, composed of metasomatic, mainly quartz-mica-dolomite, rocks with dissemination of various sulfides and veinlets of ore and vein minerals, which are in different quantitative proportions. Among the veinlet-disseminated ores, lenses, nests, and veins of ores of massive, brecciated, cockade, and metacolloid texture, as well as quartz-dolomite veins of symmetric-belt and crustification textures, are noted. Veins, nests and lenses of high-grade ores are developed mainly in the central part of the deposit, while they are slightly widespread in the northwestern and southeastern flanks of the deposit. Rich ores form, as it were, a bundle of fan-shaped “streams”, the root of which is confined to the blind stock of granodiorite-porphiry [2].

Mineralogical studies show that the mineralization is mainly disseminated and vein-disseminated. The structure of the ore is porphyroblastic, in places idiomorphic metazeriferous. The texture of the ores is vein-disseminated [5].

Analysis of the research results [5] showed that the studied ore sample is represented by rock-forming minerals by more than 90%. The main ones are: quartz - 41.1%, dolomite - 22.3%, muscovite and illite - 12.4%, orthoclase - 7.9%, albite, kaolinite and chlorite are present in smaller amounts (Table 2).

Sulfide mineralization is represented by pyrite, sphalerite, galena, tetrahedrite, and boulangerite. The ore contains titanium oxides [5].

The ores are 75.5% composed of lithophilic components, among which silicon oxide (46.0%) predominates. In noticeable quantities - 11.2%, 7.2% and 5.8%, there are, respectively, oxides of aluminum, calcium and magnesium. The proportion of potassium oxide is 3.5%. Ore-forming components are represented mainly by iron, sulfur, lead and zinc. The mass fraction of total iron in the ore sample is 5.52%, with the sulfide iron accounting for about 58% of the total content of the element (Table 3).

The share of sulfur is 3.85%; lead - 2.3%; zinc - 0.8%. These elements are in sulfide form. Copper (0.16%), arsenic (0.051%), bismuth (0.046%) are present in tenths and hundredths of a percent. Mass fraction of cadmium <0.001%.

Table 2
Mineral composition of ores of the Novo-Shirokinskoye deposit [5]

Minerals	Distribution, %
Rock-forming:	
Quartz	41,1
Carbonates (dolomite)	22,3
Muscovite + illite	12,4
Feldspars (orthoclase + microcline)	7,3
Albite	4,4
Kaolinite	3,5
Chlorite	2,5
Sulfides:	
Pyrite	5,5
Sphalerite	1,0
Galena	Rare and single grains
Tetrahedrite	
Boulangerite	
Bournonite	
Chalcopyrite	
Gold	
Total:	100

Content of elements in ores: Pb – 0,78–5,77%; Zn – 0,53–1,25%; Cu – 0,1–1,28%; Fe – 4,72–8,9%; S – 1,27–17,2%; Mn – 0,3–7,42%; As – 0,03–1,0%; Sb – 0,06–0,41%; Ni – 0,0001–0,05%; Co – 0,0001–0,003%; Au – 1,0–41,2 g/t; Ag – 49,7–128,05 g/t; In – 1–7 g/t; Cd – 5,0–54,4 g/t; Se – traces – 10 g/t; Te – traces – 10 g/t [3].

The contents of other colored, rare and trace elements are in the range of hundredths, thousandths or less of a percentage unit and are not of practical interest.

Table 3
Chemical composition of ores of the Novo-Shirokinskoye deposit [3]

Components	Mass fraction, %	Components	Mass fraction, %
SiO ₂	46,0	S _{sulfide}	3,85
Al ₂ O ₃	11,2	S _{oxidized}	<0,20
TiO ₂	0,45	As _{general}	0,051
CaO	7,2	As _{oxidized}	<0,0005
K ₂ O	3,5	As _{sulfide}	0,051
Na ₂ O	0,16	Sb	0,006
MgO	5,81	Zn	0,8
MnO	0,71	Cu	0,16
P ₂ O ₅	0,17	Pb	2,3
BaO	0,28	Cd	<0,001
Fe _{general}	5,52	Bi	0,046
Fe _{oxidized}	2,34	CO ₂ carbonate	12,39
Fe _{sulfide}	3,18	Au, g/t	2,58
S _{general}	3,85	Ag, g/t	44,4

The bulk of gold particles (91.6%) does not exceed 25 microns. The shape of small grains of gold, as a rule, is close to isometric - spheroidal; quartz also contains 5-8-sided almost regular cross-sections, while some of the faces are smoothed. The rarer large gold grains are characterized by a complex elongated shape. Sometimes there are relatively short microveins, in places together with acanthite. Among the discovered grains of native gold, isometric (70%) sharply prevail, with a length to width ratio of no more than two, and only 30% are elongated [2]. The results of the phase analysis of gold are shown in Table 4.

Table 4
The results of the phase analysis of gold from the Novo-Shirokinskoye deposit according to [5]

Forms of obtained gold	Distribution	
	g/t	%
Free	0,98	32,56
In open splices	1,32	43,85
Bound with acid-soluble minerals	0,07	2,33
Sulfide bound	0,58	19,27
Bound with rock-forming minerals	0,06	1,99
Content	3,01	100,00

Native gold is characterized by a significant range of fineness (419-884). The silver content of its various precipitates is almost continuous, from 11 to 58 wt% [6]. Gold is confined to two main mineral associations. The first, quartz-hematite-polymetallic, contains gold in quartz in the form of idiomorphic, stably high-grade precipitates. The second is the gold-quartz-polymetallic association, where gold is deposited last after the isolation of all sulfides and sulfosalts [2].

2. TECHNOLOGY OF DEVELOPMENT AND PROCESSING OF ORE

The Novoshirokinskoye field was opened in a centrally doubled pattern with two vertical shafts "Kletyeva" and "Skipova". The shafts were driven from the surface to a depth of 216 m and 244 m, respectively. Three mine horizons were uncovered: 850 m, 800 m and 750 m. Ore with a size of 300 mm is delivered to the factory by a skip hoist.

The ore dressing technology of the deposit provides for a gravity-flotation scheme, which includes the following main operations [5]:

- 1) coarse crushing of the original ore in a jaw crusher to a size of -150 mm;
- 2) grinding crushed ore in wet semi-autogenous grinding mills to a size of 80% of the class minus 1 mm;
- 3) gravitational concentration of ore on diaphragm jigging machines of the DJM type for the extraction of a valuable component from the discharge of wet semi-autogenous grinding mills of the 1st stage of grinding;
- 4) inter-cycle flotation of the tailings of gravity concentration of the 1st stage of grinding;
- 5) regrinding of intercycle flotation tailings in a ball mill to a size of 82% of the class minus 0.074 mm;
- 6) gravitational enrichment of regrind tailings on diaphragm jigging machines of the DJM type to isolate a valuable component from the discharge of ball mills of the 2nd stage of grinding;
- 7) cleaning of jigging concentrates on concentration tables;
- 8) collective flotation to separate the collective lead-gold concentrate;
- 9) flotation beneficiation of collective flotation tailings for zinc concentrate extraction;
- 10) thickening and filtration of lead-gold and zinc concentrates.

The end products of enrichment are lead and zinc concentrates. Refined lead, blister copper and antimony concentrate are obtained from lead concentrate. From the silvery foam obtained during the refining of crude lead, after refining, a Dore alloy is obtained, with further separation of gold and silver by dissolution and electrolysis. When processing zinc concentrate, commercial zinc, metallic cadmium, and zinc white are obtained. By processing concentrates, by-product metals are additionally extracted - copper and bismuth into the corresponding commodity

metals, as well as antimony into commodity antimony concentrate.

In 2014, the following was produced: 2.006 tons of gold; 56 tons of silver; 2 tons of cadmium; 12.9 thousand tons of lead; 5.9 thousand tons of zinc; 1 thousand tons of copper; 2.7 thousand tons of antimony; 21 tons of bismuth. Estimated recovery of metals in concentrate is: lead - 92.3%, zinc - 88.0%, gold - 76.5%, silver - 88.9% [3].

Conclusion

Analysis of the state of the mineral resource base of JSC "Novo-Shirokinskoye mine" leads to the conclusion that economically viable reserves will run out in the next decade. One of the ways to extend the life of a mine is the competent use and processing of man-made mineral resources.

The most important, influencing the processes of technogenesis, are the following features: form (mineralized zone with phenocrysts and sulphide veins, quartz-dolomite veins, aureole of metasomatic changes) and the depth of formation (900-1400 m) of ore bodies; their composition (quartz content about 41%, carbonates - 22%, sulfides - 6.5%, gold - 2-3 g/t); characteristics of gold (size of up to 25 microns prevails, fineness 419-884, the proportion of cyaninated gold - 76.41%). These features have determined the choice of the underground mining method of the deposit and the gravity-flotation processing technology.

The "Intermediate sulfidation" epithermal Novo-Shirokinskoye deposit is part of the large-volume PES. This fact is important not only from the forecasting and search side. In a certain type of PES mineralization, the material composition of ores and the technological characteristics of useful components will be similar. Therefore, the materials, the analytical research algorithm obtained in the analysis of the processes of technogenesis of the Novo-Shirokinskoye deposit, can be used to assess and forecast the development of technogenic and mineral resources of other ore objects of the Gazimuro-Zavodskoy ore region.

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NOVO-SHIROKINSKOYE超热矿床 (ZABAYKALSKY KRAI) 的技术矿物资源
PB-ZN-AG-AU。第2部分。技术成矿矿物的形成, 技术成因和技术成矿的成因

**TECHNOGENIC-MINERAL RESOURCES PB-ZN-AG-AU OF THE
NOVO-SHIROKINSKOYE EPITHERMAL DEPOSIT (ZABAYKALSKY
KRAI). PART 2. TECHNOGENIC MINERAL FORMATIONS,
TECHNOGEOGENESIS AND TECHNOGENIC ORE GENESIS**

Goldyrev Vitaly Nikolaevich

engineer

Naumov Vladimir Aleksandrovich

Doctor of Geologo-Mineralogical Sciences, Full Professor, Director

Natural Science Institut of the Perm State University, Perm

该研究的第二部分致力于确定Novo-Shirokinskoye金基金属矿床的固体和水成矿形式的主要技术成矿层 (TMF) 类型。对预测的资源进行了分析, 并确定了矿山的发展前景, 以延长其寿命并减轻该地区的环境负荷。显示了控制地质过程和TMF沉积物 (技术成因) 的物质组成的方法。

基于多年的经验和对该矿床的地质特征, 选矿技术和Novo-Shirokinskoye矿床的矿石特性的分析, 已确定了两种遗传类型的TMF: 固体和水矿形式的采矿和加工。估计含量并计算其中所含有用成分的量。显示了对TMF固体部分的超生矿物形成的理化参数进行理论预测的结果, 以及工艺水化学成分的变化。估计其中金和其他金属的浓度条件。显示了通过生产精矿和贫瘠沉积物生产高科技产品来分离“现有”和“陈旧”尾矿的可能性。

关键词: 斑岩表生系统, 超热金矿床, Novo-Shirokinskoye, Zabaykalsky边疆区, 成因, 成矿-矿物构造

Abstract. *The second part of the study is devoted to the identification of the main types of technogenic mineral formations (TMF) in the solid and hydromineral form of the Novo-Shirokinskoye gold-base metal deposit. The analysis of the predicted resources was carried out and the prospects for the development of the mine were determined to extend its life and reduce the environmental load on the territory of the region. The ways of controlling geological processes and the material composition of TMF sediments (technogenic ore genesis) are shown.*

Based on many years of experience and analysis of the geological features of the deposit, the beneficiation technology and the properties of ores from the Novo-Shirokinskoye deposit, TMFs of two genetic types have been identified: mining and processing in solid and hydromineral forms. The content is estimated and the

volume of useful components contained in them is calculated. The results of theoretical prediction of physicochemical parameters of hypogene mineral formation of the solid part of TMF and changes in the chemical composition of process waters are shown. The conditions for the concentration of gold and other metals in them are estimated. The possibility of separating "current" and "stale" tailings with the production of ore concentrate and barren sediments for the production of high-tech products is shown.

Keywords: *porphyry-epithermal systems, epithermal gold deposits, Novo-Shirokinskoye, Zabaykalsky Krai, technogenesis, technogenic-mineral formations*

Introduction

Novo-Shirokinskoye gold-polymetallic deposit is located 500 km from the regional center, near the village Novoshirokinskiy, 85 km from the border with the PRC. At the end of 2019, the subsoil user implemented a project to increase the volume of ore processed and increase the plant's productivity to 1.3 million tons of ore per year. The development of off-balance reserves is not yet envisaged. Gold at this deposit is mined as a by-product. According to the forecast of FSBI "TsNIGRI", development of the deposit will last until 2033.

Purpose of work: on the basis of known geological materials, identify the main types of technogenic-mineral formations (TMF) in solid and hydromineral form, assess their predicted resources and development prospects to extend the life of the mine and reduce the environmental load on the territory of the region. Justify the ways of managing geological processes in TMF (technogenic ore genesis).

Based on the practice of carrying out such works, we know that in order to achieve this goal, we need to take into account not only the geological conditions of the formation of the deposit, the forms of finding useful components, the method of development and processing technology of ores, but also the types, composition and conditions of formation of TMF, features of changes in the composition of TMF in new conditions of the geological environment (processes of technogeogenesis) [9].

1. Technogenic - mineral formations

In addition to the production of the main end product (lead and zinc concentrates), in the process of mining and enrichment of the deposit, numerous products of technological processing ("tailings" of enrichment) or man-made mineral formations (TMF) are formed. We consider them as an invaluable mineral resource, which is in solid and liquid form. These are overburden dumps, gravity-flotation tailings, magnetic scrap and various liquid effluents. Among TMF, the following types are distinguished:

1.1 TMF of mining operations

Overburden dumps. The chemical and mineral composition of the bedrock in

the dumps differs from the composition of the ore only in the content of noble metals in them. Hypergene minerals include Fe, Mn hydroxides, covellite, chalcocite, bornite, anglesite, smithsonite, malachite, cerussite, and Pb oxides.

The Novo-Shirokinskoye deposit is being developed underground, therefore the overburden dumps (Fig. 1) occupy a relatively small volume (the area of the dumping facilities is 7.7 hectares).

Off-balance ore warehouse. When market conditions change, processing of substandard ores is possible. Taking into account the cut-off grade, the concentration of conditional gold in the dumps can reach 1 g/t. When exposed to air and atmospheric precipitation, sulfides decompose and form a hydromineral product enriched in metals. This process is described in more detail in chapter 2.

1.2. TMF beneficiation plant

Magnetic scrap (material) resulting from magnetic separation then enters the tailings dump.



Fig. 1. Location of TMF Novo-Shirokinskoye deposit

The main magnetic minerals are magnetite, hematite, pyrrhotite. Magnetic scrap is a promising product for the extraction of Au, since the largest number of small grains of free gold is confined to the quartz-hematite-polymetallic association, in which they are literally sputtered in places, as is often characteristic of placers [7, 10]. Gold in the interstices of various minerals forms at least twice as large crystals and their intergrowths. The subsequent transformation of the gel,

with repeated cracking and bursting with subsequent portions of the solution, leads to the redeposition of gold. As it grows larger, it is deposited, in particular, on magnetite, hematite, and at the contacts of various minerals of this association. The growth of native gold on magnetite was noted [3].

Zones of gold concentration are formed in areas with contrasting values of Eh and pH. These are zones of transition from hematitized quartz to pure, but containing sulfides, contacts of hematitized quartz and siderite, etc. [3].

Gold-bearing magnetic scrap, which is powdery flakes with fine and thin gold riveted in them. Gold is very tightly riveted in the unevenness and cracks of the scrap. The Au content in magnetic scrap can reach several hundred grams per ton, which can be recovered after heat treatment, disintegration and gravity concentration.

Lead flotation tailings (pyrite concentrate). The content of gold in the tailings of lead flotation (pyrite product) of the Novosirokino concentrator can vary from 7 to 12 g/t. The main minerals in the sample are pyrite (73%), pyrrhotite (3.7%), sphalerite (2.4%), galena (0.9%), iron oxides and hydroxides (0.5%), and quartz (15%) [16].

The sample has the composition (%): Pb – 0,47; Zn – 0,99; Cu – 0,29; Fe – 37,69. Gold is represented by particles with a size of less than 0.1 to 25 microns and is concentrated mainly in the size classes 0-5 and 15-25 microns (80% by weight). There is practically no free gold (0.13%) [16].

Data on the forms of gold in the tailings of lead flotation were not found. Presumably, gold is found in these minerals in the nanoscale forms most difficult to access for cyanidation: colloidal dispersed and, probably, isomorphous and cluster, not detected by X-ray diffraction analysis and electron microscopy with additional emission-spectral analysis [13].

Then the tailings of lead flotation go to gravity.

Tailing dump sediments. The tailing dump of the Novo-Shirokinskoye MPP is located in the Pryamaya valley, 3 km from the mine. The tailings storage capacity is fenced off by a dam. The thickness of the dam embankment is 4.8-9.8 m. To prevent water filtration through the tailing dump bed, a depressing loamy soil with a thickness of one meter is provided.

The tailings are composed of quartz, feldspars, micas, carbonates (96–97% of the volume), they also contain pyrite (up to 2.5–3%) and other sulfides (0.5–1%): chalcopyrite, fahlores, hydroxides Fe, Mn and small amounts of gold and silver (Table 1).

Table 1
Chemical composition of enrichment products of the Novo-Shirokinskoye field according to [8, 15]

Element	Lead concentrate (yield 3.38%)	Zinc concentrate (yield 0.95%)	Pyrite concentrate (yield 2.4%)	Enrichment tailings (yield 93.2%)
Pb, %	61,9	1,0	0,34	0,12
Zn, %	2,0	55,3	0,74	0,06
Cu, %	2,93	1,1	0,7	0,02
Fe, %	6,7	5,32	36,4	3,15
As, %	0,28	0,07	0,3	0,02
Sb, %	1,1	0,13	0,04	0,01
Mn, %	0,04	0,12	0,09	0,54
Cd, %	0,015	0,2	0,4	0,001
Ni, %	0,007	0,012	0,05	0,001
Co, %	0,01	0,005	0,02	0,002
Sn, %	0,005	0,005	0,08	0,005
U, %	0,01	0,01	0,01	0,01
Bi, %	0,009	0,001	0,0008	0,0007
In, %	0,012	0,12	0,0008	trace
Se, %	0,001	0,001	0,001	0,01
Te, %	0,001	0,001	0,001	0,001
Ga, %	0,0005	0,0006	0,0006	0,002
TiO ₂ , %	0,07	0,11	0,26	0,34
SiO ₂ , %	3,0	2,3	10,8	54,4
CaO, %	0,44	0,6	0,9	5,2
MgO, %	0,7	0,8	0,9	5,6
Al ₂ O ₃ , %	0,3	0,4	2,6	9,3
S, %	17,5	1,44	42,4	0,28
Au, g/t	67	7,6	13,44	0,4
Ag, g/t	1159,5	143,6	25,6	4,3

When comparing the chemical compositions of tailings and primary ore material, it can be seen that the tailings are significantly depleted in all useful ore metals, especially in contrast to Pb. However, there is a significant concentration of gold in the tailings slurry (Table 2), which flows through pipelines to the tailing dump.

To reveal the nature of Au losses in the process of ore dressing, special mineralogical and chemical studies [14] of tailings in the sludge storage were carried out. The regularities of the distribution of native gold are analyzed depending on three parameters of tailings: 1) on the grain size (granulometry) of the tailings material; 2) on the degree of gravity enrichment of the tailings material; 3) on the

probable degree of opening up of native gold grains in large size classes of tailings material.

Table 2

The content of the main elements and the granulometric composition in the intermediate products of the Novo-Shirokinskoye deposit according to [14]

Contents	"Supply"	Enrichment tailings	Au-Pb concentrate	Pb-flotation tailings
Au, g/t	2,4	0,82	86,4	11,7
Pb, %	1,765	0,0587	18,35	0,31
Ag, g/t	64	9	298	10
Zn, g/t	4660	917	2160	9160
Cu, g/t	2010	159	2500	1935
S, %	3,95	2,77	42,9	45,7
Sb, g/t	621	37	1205	436
Fractions, μm	Share, %			
>500-71	52,8	39,9	66,9	9,51
71-45	8,7	12,2	26,4	34,7
45-10	14,2	8,4	6,7	40,81
<10	24,2	39,5	0,1	14,98

Chemical analyzes have been carried out for the entire complex of productive elements of ore samples prepared from tailings (Table 3).

Table 3

Results of chemical analyzes of samples prepared from the tailings of the Novo-Shirokni deposit [14]

Fraction, μm	Au	Ag	Pb	Cu	Zn
	g/t				
200-125	0,451	3,5	483	152	474
125-71	0,731	3,0	439	125	453
71-10 light	0,852	2,5	381	112	511
71-10 heavy	4,482	7,5	936	292	555
<5 heavy	2,583	16,0	1012	294	838

Tab. 3 demonstrates [14]:

- 1) Au concentration increases in fine fractions of tailings;
- 2) gravity separation (the material is freed from the sludge component) of thin classes of tailings with a particle size of 10-71 microns using HS-11 leads to a contrasting enrichment of them with native gold;
- 3) the concentration of native gold (up to 2.6 g/t Au) was revealed during the grinding of large fractions of tailings (fraction <5 strains) is recorded.

Thus, at least two potential sources of additional gold recovery from tailings are shown. Taking into account the granulometric composition of this product, it seems advisable: 1) to extract additional fine gold (after separation from the tail-

ings of their sludge component) from the thin part of the tailings (10-71 microns); 2) to recover unopened fine gold from a large component of the tailings (after their grinding) - unopened fine native gold [14].

The detection of native gold grains and large free (more than 100 µm) grains of productive sulfides (galena, sphalerite, tetrahedrite) in tailings, as well as a high proportion of the sludge component at the initial stages of ore dressing clearly indicate the presence of shortcomings in the technology of sample preparation (grinding) and dressing of ores. [14].

Based on the above data, as well as known materials [17], the balance of the distribution of conditional gold, as the sum of valuable ore components, was calculated at Novo- Shirokinskoye MPP in 2010-2019 (Table 4). According to the table, the content of equivalent gold in the tail slurry varies from 0.76 to 1.17 g/t (the average grade for the calculated period is 0.90 g/t). The tailings storage facility has been operating since 2010, during this period 6.4 million tons of ore with a grade of 4.90-6.20 g/t was processed with the extraction of equivalent gold 79.5-86.0%. This means that during this period, the tailing dump received about 5.35 tons of conventional gold.

Table 4

Distribution of equivalent gold during ore processing at Novo-Shirokinskoye MPP (2010-2019), according to [17]

Indicator	Year										Amount
	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	
Input and processing of primary ore											
Output, thousand tons	842,4	833,3	825,8	757,9	691,2	582,8	505,1	485,4	438,3	397,1	6359,3
Content, g/t	4,94	5,26	5,61	5,62	5,60	6,20	6,00	4,90	5,90	5,90	5,54
Share, %	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100
Production of lead and zinc concentrates											
Quantity, t	3,03	3,2	3,59	3,33	3,02	2,77	2,31	1,83	1,95	1,68	26,71
Share, %	79,8	80,1	85,0	85,9	86,0	84,9	83,8	83,7	83,5	79,5	83,3
Tail pulp preparation (TMF)											
Output, thousand tons	785,1	776,6	769,6	706,4	644,2	543,2	470,8	452,4	408,5	370,1	5926,9
Content, g/t	0,98	1,02	0,83	0,78	0,76	0,91	0,95	0,79	0,94	1,17	0,90
Quantity, t	0,77	0,80	0,64	0,55	0,49	0,49	0,45	0,36	0,39	0,43	5,35
Share, %	20,2	19,9	15,1	14,1	14,0	15,1	16,2	16,3	16,5	20,5	16,7

The tailings storage area at the end of operation will be 498 thousand m², the capacity is 4707 thousand m³. By this time, taking into account losses and dynamics of ore mining, the reserves in the tailing dump will amount to at least 8 tons of gold; 80 tons of silver, 20 thousand tons of lead; 9.6 thousand tons of zinc; 3.2 thousand tons of copper.

2. Forecast of technological transformation of mineral composition of sediments and chemical composition of process waters

In the formed TMF sludge storage located in the hypergenesis zone, the transformation of unstable minerals occurs due to interaction with atmospheric precipitation, process waters, with the participation of microorganisms, fungi, bacteria. There is a natural geological process of hypergene (technogeogenic) mineral and rock formation, "adaptation" of sediments to new conditions of the geological environment [9].

The territory is located in a zone of continuous distribution of permafrost, the thickness of which ranges from 38 to 123 m. Taliks are found in places where sources exit and in zones of tectonic faults. Frost-resistant weathering will facilitate the removal of useful components from the dump rocks.

The hard part of TMF. The primary composition of the hard part of TMF changes its structure after crushing and abrasion. Its specific surface area increases, and its chemical activity increases. The minerals, ground and released from the rock, become unstable to the processes of physical, chemical and biogenic weathering. In places where ores and rocks are stored (overburden dumps, MPP ore yard, tailing dump sediments) oxidation, leaching, interaction with bacteria and microorganisms occur under the influence of air and atmospheric precipitation; process waters are formed, enriched with metals of primary ores, and hypergene mineral formation takes place.

The behavior of minerals within the tailing dump depends on their hypergene resistance. Silicates resistant to hypergenesis have little change in composition. Sulphides are intensively decomposed. Pyrite decomposes first into crystalline hydrates of ferrous sulfates, then, to hydrogoethite and sulfuric acid. Sphalerite decomposes to zincite, bornite immediately transforms into thenardite, and galena is replaced by hematite and anglesite, respectively, quartz, muscovite, and kaolinite are formed from potassium feldspar [1].

Obvious signs of changes in the sulfide part of the tailings are the presence of newly formed phases and the presence of vertical and lateral zoning. Externally, the zoning is expressed in the fact that in some places the upper part of the TMF consists of a fine-grained jarosite-quartz material of yellow color, which overlaps a gray sulfide fine-grained mass. Newly formed crusts, consisting of crystalline hydrates of iron sulfates, in hot weather, almost completely cover the sulfide mass

[1]. Secondary signs of sulfide mineralization are expressed as decomposition products of sulfides in the form of crystalline hydrates of sulfate iron (rosenite, smolnokite, melanterite, coquimbite) [11]. These zones of hypergene changes and neoplasms are of interest for further study, since gold and other metals are released at the site of the crystalline hydrates of sulfate iron [12]. Metals can be precipitated in the solid phase in the form of micro- and nanoparticles, and also converted into ionic form and solution.

Cryogenic processes of freezing and thawing of TMF intensify the decomposition of sulfides and the release of gold. In a single cycle of freezing and thawing, up to 20% of primary sulfides pass into sulfate phases in the form of crystalline metal hydrates. And gold forms a thin film among small particles of sulfides and metal sulfates [11].

Hydromineral part of TMF can be considered as an independent object and an additional mineral resource. Depending on the place of its formation, the chemical composition and content of valuable components change. Hydromineral resources result from the decomposition and transformation of unstable minerals into TMF.

The decomposition of unrecovered sulphides slows down over time. Films of crystal hydrates of metal sulfates are formed on the surface of sulfides. But the general tendency of the gradual decomposition of primary sulfides, the release of metals and their entry into solutions remains. In Russia, sludge storage facilities are known, in which the content of primary TMF metals has decreased by 40-60%. The hydromineral part of TMF includes the following types of objects.

Tailings water. Tail pulp – is a sludge fraction, entering the sludge storage, will gradually separate into a solid and liquid phase.

The total salinity of technogenic waters in the silicate type of tailings is relatively low. The main elements in the solution are potassium and sulfur, and after a certain time, zinc concentrations are high. The predominant form of occurrence for all metals is ionic, in addition, up to 40% can be in the sulfate form. In stagnant technogenic waters, the main minerals that form the sediment are hematite and anglesite [1].

Despite the sulfide composition of the ores, the waters of the tailing dump have a neutral environment (pH = 7.30), which is determined by the high neutralization potential of the host lead-zinc mineralization of carbonate rocks, as well as the carbonate minerals present in the ores entering the dump [4].

The waters of the Novo-shirokinskiy MPP tailing dump for a near-neutral reaction have a relatively increased mineralization and differ in their sulfate sodium-calcium composition (Table 5). The contents of microcomponents in them are tens (Mn, Fe, Zn, Ni, Al), units (Cu, Pb, Co) and fractions of $\mu\text{g/l}$.

Table 5
Chemical characteristics of the waters of the Novo-Shirokinskiy MPP tailing dump according to [4]

Macrocomponent composition		Metals in waters	
Ions	Content, µg / l	Elements	Content, µg/l
CO ₂	5,3	Mn	13,7
HCO ₃ ⁻	91,5	Fe	94,2
SO ₄ ²⁻	442,0	Zn	16,1
Cl ⁻	7,1	Cu	9,87
F ⁻	0,35	Pb	4,38
Ca ²⁺	104,9	Ni	33,0
Mg ²⁺	17,2	Cd	0,45
Na ⁺	96,2	Co	7,86
K ⁺	15,1	Al	40,4
		Ag	0,10
		As	<0.52
		Cr	0.21

In the sulfuric acid process, gold and accompanying metals are intensively re-distributed, migrating from some horizons and accumulating in others, which is controlled, first of all, by the sulfide content of primary ores, pH and Eh of hypergene solutions.

A set of different geochemical barriers [6] is of great importance for the distribution of gold: biogenic, reducing, electrochemical, alkaline, acidic, and sorption. The most favorable conditions for the secondary concentration of gold are neutral and slightly alkaline media. Weakly acidic and alkaline oxidizing conditions promote active migration of gold [5]. Water migration of gold will be limited by the acid-base properties of the medium.

Spillway structures are designed to discharge from the tailing dump and special storage facilities for industrial and storm water flows, as well as to regulate the water horizons in the settling ponds during operation (Fig. 1). The entire discharge of the tailing dump and special storage facilities is used as recycled water at the factory.

Waste of overburden and off-balance ores are formed during the destruction of hypergenetically unstable minerals during the period of temporary storage of material in the "ore warehouse" and in the overburden dump. Atmospheric precipitation fills the pores and cracks of the dumped rock, crystallizing there. Frost-resistant weathering will facilitate the opening of refractory grains of sulfide and hardly soluble minerals enriched in noble metals. Despite the short period of time of the rocks at the place of temporary storage of ore, the removal of metals into solutions is intensive. The products of the dissolution of the ore substance are carried out by wastewater into the sump of the waters of the dump and tailings facilities.

Mine waters. When mining underground, the conditions for the formation of water flow change. Underground waters, circulating inside the Novo-Shirokin-skoye deposit, dissolve polymetal sulfides, resulting in the formation of acidic sulfate waters carrying large amounts of iron, heavy metals and ore elements. These waters enter the objects of the hydrosphere, creating a natural-man-made system.

Mine waters transform the ultra-fresh bicarbonate-calcium waters characteristic of the region into sulphate-calcium (sodium) waters with increased mineralization (increased relative to natural levels of all cations of the basic salt composition).

Shirokaya River. The river is the final drainage basin of mining process waters (mine waters, waste dumps of overburden and off-balance ores) and integrates various chemical compounds in its composition. Some of them are neutralized and deposited on natural geochemical barriers and sorbents. The useful components contained in these waters are in a dissolved state (liquid filtrate), which forms new mineral phases in solid form (suspension). The suspension is a decomposition product of the original rocks of the deposit. The suspension is sorbed by the silt-clay substance.

The waters of the Shirokaya River concentrate not only the hydromineral part of the TMF of the Novo-Shirokinskiy deposit, but also the runoffs of the waste gold-bearing placers located in the Shirokaya river valley (Fig. 2). According to the available information [2], the development of placers began in the 60s of the XIX century and was completed mainly in the early 40s of the last century. The placer is alluvial, two-layer. The length is about 1.5 km, the width does not exceed 100 m. The thickness of the loose deposits is 3.7-12.5 m. The gold content per weight is from 45 to 1250 mg/m³.



Fig. 2. Spent gold-bearing placers, Pad' Shirokaya

3. Proposals for the management of sediment and process water composition, ecological state of the territory

For "flowing tailings" - TMF, formed by the currently accepted technological scheme of ore dressing, it is necessary to evaluate: 1) gravity separation of sludge material with the release of a gravity concentrate containing heavy minerals and ore aggregates, and a barren product, in which hypogene resistant (to abrasion) minerals (quartz, sericite, alunite); 2) separate storage of ore and barren parts; 3) launching the ore section into technological redistribution with the extraction of useful components; technological solutions can be found through experimental dressing and special mineralogical, chemical and technological research; 4) launching the barren part into technological redistribution with the production of innovative products from the sludge of hypogene-resistant minerals, worn out to a micro-grained state (71-74 microns); 5) the possibility of organizing the enrichment of process waters using sorption-ion-exchange columns, filter systems for the precipitation of metals from process waters; parameters of technological modes, selection of reagents for sorption and ion exchange can be obtained by carrying out a special set of studies.

For "stale tailings" - TMF, accumulated and stored in the tailing dump, the following is necessary: 1) additional study of the material composition of new mineral and rock formations, the chemical composition of sediments and man-made waters, main and rare components; 2) determination of the forms of finding useful products, fundamental methods of their separation; 3) substantiation of the expediency of processing the material of the tailing dump; 4) search and analysis of technological solutions according to the scheme for studying "current tailings" with division into ore and barren parts, separation of process waters and systems for extracting useful products.

Conclusion.

As a result of studying the material composition of ores, mining methods, technological schemes for beneficiation and production of products at the Novo-Shirokniskoye epithermal deposit, various types of TMF were identified, which contain a wide range of useful components. Currently, the tailing dump receives 567 kg of gold and 6545 kg of silver per year. The conventional gold in the TMF of the sludge storage already contains at least 5.35 tons.

The use of the TMF substance from the Novo-Shirokniskoye deposit is possible in various fields of industry and the national economy. And at the tailing dump site, which by the end of mining will contain at least 8 tons of gold, a special set of studies should be carried out to justify the production of an additional range of liquid products, both in solid and liquid form. The extraction of metals from the tailing dump, the use of man-made water as a hydromineral raw material with the associated extraction of dissolved metals, and the management of the decomposi-

tion of sulfides will ensure a decrease in the environmental load on the territory of the deposit area. Reassessment of mineral resources, taking into account the solid and liquid parts of TMF of the Novo-Shirokinskoye deposit, development of technological solutions for the involvement of unaccounted resources in the economic turnover will bring significant economic and environmental benefits.

Additional income for the company will be provided by activities within the framework of the "best available technologies" to reduce emissions, reduce waste charges, income from the sale of other useful components, increased gold and silver recovery, tax incentives and government financial support.

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从G. V. Dobrovolsky和E. D. Nikitin的著作（到罗蒙诺索夫莫斯科国立大学地球博物馆成立70周年），结合俄罗斯土壤科学的发展，探讨行星与宇宙过程的统一

ON THE UNITY OF PLANETARY AND COSMIC PROCESSES IN THE LIGHT OF THE DEVELOPMENT OF RUSSIAN SOIL SCIENCE IN THE WORKS OF G. V. DOBROVOLSKY AND E. D. NIKITIN (TO THE 70TH ANNIVERSARY OF THE MUSEUM OF EARTH OF THE LOMONOSOV MOSCOW STATE UNIVERSITY)

Reg. № AAAA-A16-116042710030-7

Sabodina Evgenia Petrovna

Candidate of Philosophical Sciences, Research Officer

Lomonosov Moscow State University

Melnikov Yuri Sergeevich

Engineer

Lomonosov Moscow State University

本文分析了V. V. Dokuchaev, V. I. Vernadsky, G. V. Dobrovolsky和E. D. Nikitin在科学工作中的意识形态关系，并指出了在行星和空间关系统一的背景下俄罗斯土壤科学的主要成就。

关键词：土壤科学，地球圈，生物圈，土壤的生态功能，土壤红皮书，光圈，协同作用。

Abstract: *the paper analyzes the ideological relationships in the scientific work of V. V. Dokuchaev, V. I. Vernadsky, G. V. Dobrovolsky and E. D. Nikitin, and indicates the main achievements of Russian soil science in the context of the unity of planetary and space relations.*

Keywords: *soil science, geosphere, biosphere, ecofunctions of soils, Red book of soils, noosphere, synergetics.*

The unity of planetary-cosmic processes, in our opinion, is most fully reflected in the soil, which should be considered a node of planetary-cosmic and noospheric connections, because it is their focus and, therefore, the source of the modern development of planet Earth. Cognition of the multifaceted phenomenon of the soil shell of the planet requires a versatile gifted scientist, who V.V. Dokuchaev,

the creator of fundamental soil science and his outstanding student V.I. Vernadsky can rightfully be considered to be. V.I. Vernadsky saw the soil as an irreplaceable component of the entire earth's crust, showed the role of soil in the formation of a number of chemical elements of the earth's crust, developed the doctrine of V.V. Dokuchaev on natural zoning. Especially it is necessary to emphasize the role of "living matter" - living organisms in geochemical processes, when inert matter is captured in life processes, when there is a synthesis of living and nonliving at the level of development of life on the planet. V.I. Vernadsky regularly corresponded with his teacher V.V. Dokuchaev, shared his plans, ideas, and received support. The outstanding soil scientist of the end of the XX and beginning of the XXI century, E.D. Nikitin, drew attention to the process of interaction of scientists equal to each other in the scale of thought, since it is from this interaction that the field of scientific energy arises, which becomes fertile ground for scientific discoveries. E.D. Nikitin understood this well, and reflected in the table he compiled (Table 1) [12, p.116], in which he analyzed the scientific interaction of V.V. Dokuchaev and V.I. Vernadsky.

E.D. Nikitin convincingly shows the complexity and richness of the interconnections of the scientific thought of two Russian geniuses. So, based on the basic components of soil science of V.V. Dokuchaev, V.I. Vernadsky develops a natural-historical holistic approach to the studied objects; based on the doctrine of V.V. Dokuchaev on the genesis of soils, creates genetic mineralogy and works on the history of natural waters; based on the recognition by V.V. Dokuchaev of the special role of living organisms in the formation of the main property of the soil - its fertility and humus content, V.I. Vernadsky substantiated the special importance of living organisms in the formation of near-surface geospheres and introduced the concept of living matter into scientific thinking; proceeding from the ideas of V.V. Dokuchaev about the soil as an organic part of a single natural complex, a product of the interaction of soil formers, V.I. Vernadsky creates the doctrine of the biosphere as a global system of the Earth, etc. In turn, the ideological interaction with V.I. Vernadsky in the work of V.V. Dokuchaev led to the intensification of the historical aspects of studying the soil as a part of the planet, deepening research on the transformation of minerals and rocks in the soil and weathering crust, organizing the supply of factual material for the study of the ecological functions of soils, support of the academic status of soil science, its social and scientific significance and development, etc.

Table 1. Some interactions of soil science of V.V. Dokuchaev and the scientific work of V.I. Vernadsky

<i>The basic components of soil science of V.V. Dokuchaev</i>	<i>The significant influence of soil science of V.V. Dokuchaev for the work of V.I. Vernadsky</i>	<i>The influence of V.I. Vernadsky on soil science of V.V. Dokuchaev</i>
Consideration of soil as a special natural-historical body of nature	Natural-historical holistic approach to the studied objects	Revitalizing the historical aspects of studying soil as part of the planet
The doctrine of the genesis of soils	Creation of genetic mineralogy and works on the history of natural waters	Deepening of the research into the transformation of minerals and rocks in soil and weathering crust
Recognition of the special role of living organisms in the formation of the most important property of the soil - its fertility and humus content	Justification of the special importance of living organisms in the formation of near-surface geospheres, the introduction of the concept of living matter	Stimulation of the development of a biological direction in soil science
Collection and storage of natural soil material and its museum collection	Increased interest in museum business and professionalism of in	Maintenance of natural history museums
Consideration of soil as an organic part of a single natural complex, a product of the interaction of soil formers	Creation of the doctrine of the biosphere as a global Earth system	Supply of factual material for teaching about the eco-functions of soils
Purposeful activity on the use of scientific developments in practice	Creation and management of applied organizations	Work in soil expeditions, etc.
Active interaction with related sciences	A vivid expression of the interdisciplinarity of creativity and scientific practical activity of Vernadsky (creation of biogeochemistry, etc.)	Maintaining the academic status of soil science, its social and scientific significance and development

No less productive results arose in the process of interaction between the followers of V.V. Dokuchaev and V.I. Vernadsky, G.V. Dobrovolsky and E.D. Nikitin (Table 2), who throughout their lives will play the role of locomotives of Russian soil science. So Academician of the Russian Academy of Sciences G.V. Dobrovolsky is the organizer of Russian soil science, for many years he has been the President of the All-Union Society of Soil Scientists, Chairman of the Scientific Council of the Academy of Sciences on Soil Science, Editor-in-Chief of the Academic Journal "Soil Science", Dean of the Faculty of Soil Science of Lomonosov MSU. G.V. Dobrovolsky substantiated the method of sequential mineralogical and micromorphological study of soils, developed the theoretical foundations of the genesis, classification and rational use of alluvial soils of river valleys, revealed the ecological and geochemical patterns of soil formation and evolution of soils in the valleys and deltas of rivers of European Russia and Western Siberia. G.V. Dobrovolskiy developed the concept of the ecological and genetic functions of

soils in the biosphere, revealed the ecological and geochemical patterns of soil formation and evolution of soils in the valleys and deltas of the rivers of European Russia and Western Siberia. In 1973, E.D. Nikitin presented his candidate dissertation on the topic "Genesis and geography of taiga soils on the right bank of the Ob" - scientific adviser G.V. Dobrovolsky. This marked the beginning of a productive collaboration of outstanding scientists. G.V. Dobrovolsky and E.D. Nikitin jointly continued their studies of taiga soil formation in continental conditions, studied the ecological functions of the soil, developed a forecast of changes in the natural conditions of Western Siberia, investigated the functions of soils in the biosphere and ecosystems, revealed the main importance of soil conservation as an irreplaceable component of the biosphere based on a functional-ecological approach. The scientific and organizational work of G.V. Dobrovolsky and E.D. Nikitin led to the development of the main provisions of the Red Book of Soils of Russia, the creation of a classical university textbook: "Soil Ecology". Teaching about the ecological functions of soils", preparation and adoption of Art. 62 FL "On environmental protection". Continuing to independently develop soil science, E.D. Nikitin created a number of outstanding discoveries, which his teacher G.V. Dobrovolsky could be proud of. Creative comprehension of the ideas of V.V. Dokuchaev, V.I. Vernadsky and G.V. Dobrovolsky in the works of E.D. Nikitin made it possible to develop a number of fundamental achievements, partially expressed in the following provisions:

1) "... structurally, the theory of the unity and relationships of nature, man, society should consist of three equal blocks: the doctrine of man as an integral multifunctional bio-social-cosmic system, theoretical generalization about the relationship of various components of nature, most clearly manifested in the biosphere and soil shell Earth, and the doctrine of the general laws of life of natural and socio-natural systems" [8].

2) "... the methodological basis of the philosophical and scientific generalization on the ecological functions of the biosphere and soil is the provision on the universality of feedbacks in natural systems and their ecopolyfunctionality, which is one of the fundamental general laws, including structural, functional, dynamic and evolutionary laws" [8].

3) "... the effectiveness of life of creative systems is carried out during its implementation at all interrelated levels: development, stability, functioning, reproduction, preservation" [8].

4) "... the most important condition for the survival and development of earthly civilization is the preservation and restoration of soils as an irreplaceable structural and functional component of the biosphere and the planetary node of natural and socio-natural relations" [8].

5) "... the tasks of the philosophy of soil science are formulated as an urgent

interdisciplinary direction and the prospects and forms of its interaction with synergetics are shown" [8].

6) Obtained by E.D. Nikitin "philosophical and methodological provisions were used to substantiate new approaches to environmental protection: the development of a comprehensive Red Data Book of nature and the noosphere, the Red Data Book of especially valuable soils, etc." [8].

Table 2. Some interactions between G.V. Dobrovolsky's soil science and E.D. Nikitin scientific works

<i>Basic components of the soil science of G.V. Dobrovolsky</i>	<i>The mutual influence of G.V. Dobrovolsky's soil science on the works of E.D. Nikitin, created jointly and (or) under the leadership of G.V. Dobrovolsky</i>	<i>Basic components of the soil science of E. D. Nikitin</i>
G.V. Dobrovolsky substantiated the method of sequential mineralogical and micromorphological study of soils, developed the theoretical foundations of the genesis, classification and rational use of alluvial soils of river valleys, revealed the ecological and geochemical patterns of soil formation and evolution of soils in the valleys and deltas of rivers of European Russia and Western Siberia.	In 1973, E.D. Nikitin presented his candidate dissertation on the topic Genesis and geography of taiga soils on the right bank of the Ob - scientific adviser G.V. Dobrovolsky [7]. G.V. Dobrovolsky and E.D. Nikitin continued their joint research of taiga soil formation in continental conditions, 1981 [1], studied the ecological functions of the soil 1986 [3]	E.D. Nikitin determined the structure and foundations of the theory of the unity and relationships of nature, man, society and revealed the importance of biosphere science and ecological soil science for its development [8, 10, 16], found that the efficiency of life of creative systems is carried out when it is implemented on all interconnected levels: development, sustainability, functioning, reproduction, conservation [8, 9].
Developed the concept of ecological and genetic functions of soils in the biosphere.	Developed a forecast of changes in the natural conditions of Western Siberia, 1981, 1988 [1], investigated the functions of soils in the biosphere and ecosystems (ecological significance of soils), 1990 [2], revealed the main significance of soil conservation as an irreplaceable component of the biosphere on the basis of the functional-ecological approach 2000 [4].	Developed the methodological foundations of the doctrine of the ecological functions of the biosphere and soil, revealed general natural laws and their manifestations in the soil envelope and the biosphere system as a whole [11, 12].

<p>Revealed ecological and geochemical patterns of soil formation and evolution of soils in the valleys and deltas of the rivers of European Russia and Western Siberia.</p>	<p>Developed the main provisions of the Red Book of Soils of Russia [5] and headed a large team of researchers on the organization of the Red Book of Soil Conservation Movement in the Russian Federation and beyond - the work was awarded the State Prize of the Russian Federation (2002).</p>	<p>Revealed the relationship between philosophy and the sciences of soil and biosphere, revealed the main content of the problem of the efficiency of life in the biosphere with a developed soil cover as its structural and functional component [8,14,16]</p>
<p>G.V. Dobrovolsky - organizer of Russian soil science: President of the All-Union Society of Soil Scientists, Chairman of the Scientific Council of the Academy of Sciences on Soil Science, Editor-in-Chief of the academic journal "Soil Science", Dean of the Faculty of Soil Science of the Lomonosov MSU</p>	<p>Created a classic university textbook: "Soil Ecology. The doctrine of the ecological functions of soils "2006, 2012 [6], developed and prepared for adoption article 62 FL "On environmental protection "[19]</p>	<p>Determined that structurally, the theory of the unity and relationships of nature, man, society should consist of three equal blocks: the doctrine of man as an integral multifunctional bio-socio-cosmic system, theoretical generalization about the relationship of various components of nature, most clearly manifested in the biosphere and soil shell of the Earth, and the doctrine of the general laws of life of natural and socio-natural systems [8,13,15].</p>

The historical significance of the scientific and philosophical activities of G.V. Dobrovolsky and E.D. Nikitin was reflected, first of all, in the monographs [17, 18], created by the staff of the department "Natural zoning and soil formation" of the sector "Space geography and rational nature management" of the Museum of earth of the Lomonosov MSU, as well as in the exposition of the above department, which for many years was successfully led by E.D. Nikitin.

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雅库特KOLYMA-INDIGIRSKAYA低地的狼 - CANIS LUPUS L. 1758
**WOLF OF THE KOLYMA-INDIGIRSKAYA LOWLAND OF YAKUTIA -
CANIS LUPUS L. 1758**

Klimovskiy Aysen Ivanovich

Research Officer

*Academy of Sciences of the Republic of Sakha Yakutia,
Yakutsk, Russia*

头骨被用来描述雅库特东北部的化石灰狼 (*Canis lupus* (L 1758)))。列出了来自雅库特北极地区现代苔原狼 (*Canis lupus albus* (K 1792))) 狼的头骨的测量值和比较表。在雅库特的两个地区-Abyisky和Kolym-sky地区发现了所研究的狼遗骸。这些发现的年龄大概是中新世晚期。根据头骨的比例和牙齿系统的状态, 假定来自雅库特东北部的狼专门从事某些大型食草动物。还假定它比此时居住在相同范围的北极苔原狼略小。

关键字: 新世, 雅库特Kolyma-Indigirskaya低地的狼, 新地区。

Abstract. *The skulls were used to describe fossil gray wolves (*Canis lupus* (L 1758)) from the northeast of Yakutia. Tables of measurements and comparisons with skulls of modern tundra (*Canis lupus albus* (K 1792)) wolves from the Arctic part of Yakutia are presented. The studied bone remains of a wolf were found in two regions of Yakutia - in the Abyisky and Kolym-sky regions. The age of the finds is presumably Middle - Late Neopleistocene. Based on the proportions of the skull and the state of the dental system, it is assumed that the wolf from the northeastern part of Yakutia specialized in certain large herbivores. It is also assumed that it was slightly smaller than the arctic tundra wolf inhabiting the same ranges at this time.*

Keywords: Neopleistocene, wolf of the Kolyma-Indigirskaya lowland of Yakutia, new localities.

The gray wolf (*Canis lupus albus* (K 1792)) - is a well-known predator of Northern Eurasia. In ancient times, it became the progenitor of the domestic dog and at the same time inflicted a lot of harm on pastoralist tribes by exterminating domestic animals. (Aristov, Baryshnikov, 2001).

The largest animals, both in Eurasia and America, inhabit the north of the range - tundra and taiga zones. But the largest wolves live in the northern part

of the forest zone of the Old World, that is, in Russia. With the advancement to the south, the wolves gradually become smaller, and the smallest representatives of the species inhabit dry steppes, semi-deserts and deserts of the subtropics and tropics of Asia and North America. The smallest wolves live in the Middle East and the Arabian Peninsula.

About 1000 years ago, within the modern territory of the CIS and neighboring countries, there were three large, relatively isolated regions of the wolf population: tundra, European-steppe (forest-steppe) and Central Asian. In each of the regions, wolves were associated with certain groups of ungulates, which were hunted: tundra - with reindeer, partly with bighorn sheep, forest-steppe - with ungulates of this landscape, Central Asian - mainly with semi-desert, desert and alpine ungulates. (Bibikov, 1985).

Material and method

We have at our disposal collections of fossil remains of gray wolves from the northeast of Yakutia, in particular from the Abyisky region with field numbers OG-1-15, OG-2-15, the Ogorokha river, 7751 Uyandina river (Fig. 2) and the Kolymsky region of the UK -17-7 creek "Enge", SK-17 river "Muostuur urekh" (Fig. 3) Measurements of the skull elements were made in accordance with the recommendations in the work of Angela von den Driesch. The skulls of the fossil wolf that we found were compared with modern tundra wolves, which occupy the same habitats from the works of G.G. Boeskorova and GF Baryshnikova "Late Quaternary carnivorous mammals of Yakutia". (*C. lupus albus* Kerr 1798), (Tab. 1.2).

Brief description of new locations of wolves

In our fieldwork, we often find skeletal remains of wolves next to other animals of the mammoth fauna. And immediately, a number of serious differences from today's wolves strike our eye. The work was carried out in the Abyisky district in the "Ogorokha" area (68°14.02 N, 146°50.84 E). This small river with an average width of 8 m is the right tributary of the Badarikha River. The river is low-lying, with high banks (30-40 m), typical for this area, the search and collection of bone material was carried out in the left bank on an area about 1500 m long, where the coastal sediments were washed out by flood waters. In addition to the wolf, the remains of the brown bear *Ursus arctos* (Linnaeus, 1758), the cave lion *Panthera leo spelaea* (Goldfuss, 1810), the wolverine *Gulo gulo gulo* (Linnaeus, 1758), and the sable *Martes zibellina* (Linnaeus, 1758) were found. In general, the area amazes with the abundance of not only carnivores, but also other large mammals of the mammoth fauna, such as the woolly mammoth *Mammuthus primigenius* (Blumenbach, 1799), the woolly rhinoceros *Coelodonta antiquitatis* (Blumenbach, 1799), the bison *Bison priscus* (Bojanus, 1827), the reindeer *Rangifer tarandus* (Linnaeus, 1758), small mammals include the hare *Lepus timidus* (Linnaeus,

1758) and the pika *Ochotona* (Link 1795). Apparently wolves visited this area with food interests, actively hunted ungulates grazing in the river floodplain, or came for carrion, because the entire river bank is strewn with bones of large ungulates and mammoths, with woolly rhinos.

"Uyandina 3" (68°33.759 N, 144°45.980 E) The place of finds is located on the right bank of the Uyandina River, the left tributary of the Indigirka River. The search and collection of the bones of large Pleistocene mammals of the mammoth fauna were carried out on the right bank of the river, in an area about 300-400 m in length. The maximum thickness of the modern soil in the studied area does not exceed 15-20 cm. The bones lie either in the loess-like sediments themselves or at the base contact loess deposits and ice. All the collected bones fell on these areas as a result of seasonal thawing and sliding of loose loess-like sediments in the uppermost part of the section, where loess-like loams lie concordantly on the top of icy sediments. The bones of the mammoth *Mammuthus primigenius* (Blumenbach, 1799), the horse *Equus lenensis* (Ruslanov, 1968), the bear *Ursus arctos* (Linnaeus, 1758), the wolf *Canis lupus* (Linnaeus, 1758), the hare *L. timidus*, and a small rodent, presumably a chipmunk, were found at the site. The bones have been observed to form a small cluster and are evenly distributed.

Kolymsky District **"Enghe"** N 68°27.498" E 157°26.573" The Enghe - Yuryakh river flows into the Kolyma river from the left bank through the Sukhanovskoe channel, N 68 ° 26'16.86 "E 157 ° 26'13.47" and enters the territory of the Kolyma natural park. The remains of the mammoth fauna are found in the middle reaches of the river, on a steep slope. The terrain is typically taiga, there is an abundance of dwarf birches and willows in the floodplain, in the forest there is a predominance of larch with rare birch glades. The remains of the mammoth fauna were found at the site and the following species composition was determined: Woolly mammoth *Mammuthus primigenius* (Blumenbach, 1799), woolly rhinoceros *Coelodonta antiquitatis* (Blumenbach, 1799), steppe bison *Bison priscus* (Bojanus, 1827), horse *Equus lenensis* (Ruslanov, 1968), reindeer *Rangifer tarandus*, 1758 (Linnaeus) musk ox *Ovibos moschatus* (Blainville, 1816), presumably brown bear *Ursus arctos* (Linnaeus, 1758), cave lion *Panthera leo spelaea* (Goldfuss, 1810), gray wolf *Canis lupus* (Linnaeus, 1758), common fox *Vulpes vulpes* (Linnaeus, 1758) white hare *L. timidus*, as well as several representatives of rodents (species at the moment is not determined).

Systematic review

Order Carnivora Bowdich, 1821-Carnivores

Family Canidae Fischer von Waidheim, 1817 - canines

Genus Canis L 1758-dogs

Canis lupus L 1758 - Wolf

C. lupus appears in the geological record of Europe in the middle of the Middle

Pleistocene. Its early representative is seen in the small wolf described from the collection from the Lunel-Viel grotto in France as a subspecies of *C. lupus lunellensis* Bonifay (Bonifay, 1971; Brugal, Boudadi-Maligne, 2011). Other authors give this subspecies the status of an independent species of *C. lunellensis*, and consider the find from the Condal Arago grotto in France to be the first European registration of *C. lupus* (Palombo and Valli, 2004).

From the second half of the Middle Pleistocene, the large wolf was already widespread in Eurasia. It is recorded in western Europe, Moldova, Northern Kazakhstan and northeastern Siberia (Chukochya river). In the Middle Pleistocene (late Irvington), it spreads to North America after the extinction of a very large *C. armbrusteri* there (Kurten and Anderson, 1980). In the Late Neopleistocene, *Canis lupus* had a huge Holarctic polyzonal range, which in Eurasia extended from Spain and the British Isles in the west to Chukotka and Japan in the east (Vereshchagin N, K, 1985; Kahlke, 1999).

Spread. On the territory of Yakutia, late Neopleistocene remains of a wolf were found at many localities, such as: Mammoth Mountain in the lower reaches of the Aldan River (Rusanov 1968), Dyuktai Cave (Vangengeim, 1977), at the Ikhime camp (Mochanov, 1977), on the Vilyui River (Verkhnevilyuiskoe) (Lazarev 1980), in the basin of the Olenek River on the Haastaakh River (Vereshchagin 1985), on the Berelyakh River (Vereshchagin, 1977), on the banks of the Khromskaya Bay (Khaptashinsky Yar), on the Alazeya Rivers (Lazarev, Tomskaya, 1987) and Kolyma (Duvanny Yar) (Sher, 1971, Boeskorov 2004), and on the New Siberian Islands (Chersky 1891, Wangenheim 1977). These findings indicate widespread occurrence in the Late Neopleistocene. He was apparently one of the most numerous predators of the mammoth biome. (Boeskorov, Baryshnikov, 2013). Our findings from the Indigirka river basins - the Ogorokha river, the Uyandina river and the Kolyma river - the Enge river, the Muostuur urekh river add new points to the general map of the distribution of the wolf *Canis L.* in the late Neopleistocene of Yakutia. (Fig. 1)

Geological age. All finds from the Kolyma-Indigirskaya lowland come from the Yedomia horizons of the Upper Neopleistocene, where they are found together with the remains of typical representatives of the mammoth fauna. On this basis, as well as in the degree of mineralization, we assigned them to the Late Neopleistocene. Their dense bone substance has a color from yellowish-gray (Abyyskie) to dark brown (Kolyma). Not all skulls have preserved teeth, but the remaining ones have smooth enamel, like their modern representatives. In view of the insignificant material, we are forced to confine ourselves to characterizing only the cranial remains of wolves, as the most indicative for morphological analysis.

Description and comparison. The skulls are light yellowish-gray to dark brown, which is typical of bones buried in loess-like loams or peaty sediments of

the Upper Neopleistocene. The collagen is well preserved, while the loss of organic matter in the bone during the fossilization process led to a strong absorption of moisture in the bones. All these features are characteristic of permafrost bones. There are no traces of circularity (as a result of transport and reburial by water flows) on the studied material.

Skull SK-7-17 (Fig. 3B). Judging by its small size, relatively weak development of the predatory ridge and not worn out the dental system, it belonged to a young, maybe not even sexually mature female. Most of the values of cranial measurements of length and width do not correspond to the minimum indicators of the corresponding measurements in females of a modern wolf from the north of Yakutia. (Table 1.2). But even so, some proportions of the skull in the ancient wolf stand out in width in the canines, in the height of the occiput, and also in the width of the auditory vesicle, lie in the region of average values, like in modern females. The same is in the dental system, namely in the length P1-P4 of the alveolar part is 61.5 mm, for comparison; in modern adult females, it ranges from 59.5-69.4 mm. Four forms of tooth mutation in wolves have been identified that cause teeth to shrink or enlarge: separation or fusion (Yudin, 1989). Skull OG-1-15 (Fig. 2A), judging by the measurements, also belonged to an adult female. It is larger than the SK-7-17 skull. In many respects, this skull approaches the minimum values of similar cranial indicators in females of the modern tundra wolf (length measurements). And in terms of measurements of the width in the canines, in the zygomatic width, the width of the brain capsule and the height of the skull, it exceeds the average values of the latter. The large and broad skull of 7751 (Figure 2B) can be attributed to an adult male. Because according to the values of the main length, nasal bones and condylobasal, it stands out among the fossils we compare and approaches the maximum indicators of males of modern wolves. The length of the P1-M2 skull is impressive; it holds the record for the length of the alveolar part from this sample. The length is 98.7 mm, while the current males are 80.3-93 mm long (Table 1). Skulls SK-17 (Fig. 3A) and OG-2-15 (Fig. 2B) are most likely medium-sized males, while also distinguished by the width of the canines. We note a regularity that, with a relatively small size in length, the skulls described by us are distinguished by a large occipital height, which is characteristic of a modern large tundra wolf (Table 1.2).

Judging by the results of measurements of the skulls, wolves in the Late Pleistocene did not reach the maximum sizes for the species and approximately corresponded to the minimum and average sizes of modern tundra wolves. The noted large length of P1-P4 in the alveolar part gives us reason to assume that the development of the dentoalveolar apparatus in ancient wolves is better than in modern ones. The sizes of carnivorous teeth and their location in the dental arch depend on the type of food consumed (Ivanov, 2009). In all carnivores, the size of the ca-

nine indicates the strength with which prey is held, and here we note that in fossil wolves, the premolar rows are more developed, which are responsible for chewing and tearing food.

In all examined wolf skulls, except for SK-7-17, there is a strong abrasion (flattening) of the crowns of the cone of the premolar teeth and the tops of the canines. The molar and premolar rows also have strong traces of deterioration (Fig. 2.3), in addition, the skulls 7751 and SK-17 are severely damaged (broken off) and worn down to the root P4 (Fig. 2B.3A). Compared to modern wolves, in which, during the eating of prey, the natural abrasive in the form of sand and sandy loam, as well as bones contributes to severe abrasion and damage to the dental system, a similar process in the Neopleistocene wolves took place to a much more extreme extent.

The peculiarity of the proportions of the skull in ancient wolves, expressed in the width of the canines and the height of the occipital bones, testifies to the more powerful development of the cervical and chewing muscles. These facts suggest that in the Late Pleistocene in the northeast of Yakutia, wolves, in the absence of hyenas, being the main carrion creatures, while eating meat and gnawing the bones of such large animals as mammoth, primitive bison and woolly rhinoceros acquired the morphometric features described above.

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Table 1. Comparative table of the sizes of the skulls of *Canis lupus*.

№ in mm	Late neopleistocene					Modern			
	Abyisky district		Kolymsky district			C.lupus albus, tundra zone			
	Academy of Sciences of the RS (Y)					Males, n=17		Females, n=11	
	OG-1-15	OG-2-15	7751	SK-7-17	SK-17	$\frac{limit}{\bar{X} \pm m}$	σ	$\frac{limit}{\bar{X} \pm m}$	σ
1	242,7	248,3	261,8	215,8	252,7	$\frac{239 - 272}{257,41 \pm 2,25}$	5,80	$\frac{228 - 266}{245,92 \pm 4,31}$	14,31
2	233,4	222	244,9	198,2	233,1	$\frac{219 - 253}{232,78 \pm 3,98}$	6,09	$\frac{219 - 253}{232,78 \pm 3,98}$	13,22
3	213	220,1	231,1	186,2	218,7	$\frac{215 - 240,4}{228,26 \pm 1,85}$	7,45	$\frac{208 - 232}{219,83 \pm 2,84}$	9,43
4	137,7	138,6	-	115,5	141,5	$\frac{215 - 240,4}{228,26 \pm 1,85}$	3,45	$\frac{208 - 232}{219,83 \pm 2,84}$	8,25
5	83,9	84,9	90,6	74,6	88,9	$\frac{122 - 149,5}{136,96 \pm 2,49}$	4,43	$\frac{122 - 149,5}{136,96 \pm 2,49}$	4,66
6	117,7	121,7	123,2	104,6	123,5	$\frac{84 - 103}{95,47 \pm 1,38}$	2,89	$\frac{84,5 - 98}{91,50 \pm 1,40}$	5,29
7	49,9	50,3	48,9	44	48,7	$\frac{112 - 128}{121,24 \pm 1,24}$	1,21	$\frac{113 - 129}{118,96 \pm 1,59}$	3,00
8	42,1	46,1	51,2	36,9	44,8	$\frac{41 - 48}{46,07 \pm 0,56}$	3,18	$\frac{40,3 - 49,2}{44,78 \pm 0,90}$	4,40
9	39,4	41,2	45,2	34,7	38,1	$\frac{41,6 - 52,4}{45,77 \pm 0,78}$	1,25	$\frac{40,4 - 51,7}{45,54 \pm 1,32}$	2,51
10	65,2	67,7	66,8	61,6	68,4	$\frac{39,7 - 47}{43,81 \pm 0,52}$	1,48	$\frac{39 - 47,6}{43,15 \pm 0,76}$	1,99
11	-	105,2	-	92,1	-	$\frac{63,4 - 71}{67,38 \pm 0,48}$	1,67	$\frac{63 - 68,3}{66,48 \pm 0,60}$	6,70
12	102,4	104,1	108,4	91,1	105,4	$\frac{98,2 - 116}{109,55 \pm 1,10}$	1,75	$\frac{96,8 - 118}{105,02 \pm 2,02}$	6,61
13	66,5	70,7	72,9	61,5	71,5	$\frac{96 - 112}{107,21 \pm 1,00}$	1,13	$\frac{95 - 115,5}{102,87 \pm 1,99}$	2,81
14	84,9	87,5	98,7	76,5	88,2	$\frac{59,5 - 69,4}{64,83 \pm 0,85}$	1,87	$\frac{59,5 - 69,4}{64,83 \pm 0,85}$	3,19
15	90,3	86,5	95,3	73,1	91,9	$\frac{80,3 - 93}{89,08 \pm 0,93}$	2,75	$\frac{78,5 - 88,8}{83,81 \pm 0,96}$	6,03
16	54,3	55,5	58,7	56,7	56,3	$\frac{75,8 - 94}{84,48 \pm 1,42}$	2,35	$\frac{76 - 93,2}{84,06 \pm 1,82}$	2,57
17	40,6	37,4	44,1	37,3	42,7	$\frac{55 - 67,2}{59,64 \pm 0,86}$	1,39	$\frac{54,2 - 63,4}{60,73 \pm 0,77}$	2,42
18	28	28,5	31,8	23,5	26,5	$\frac{36 - 44}{39,55 \pm 0,56}$	1,57	$\frac{35,5 - 45}{41,39 \pm 0,73}$	1,45
19	21,8	20,2	23,2	19,9	22,4	$\frac{29,2 - 33,4}{31,53 \pm 0,44}$	1,24	$\frac{29,2 - 33,4}{31,53 \pm 0,44}$	1,06

Note: 1-total length, 2-condylobosal length, 3-main length, 4-zygomatic width, 5-length of nasal bones, 6-length of the hard palate, 7-width in canines, 8-interorbital width, 9-postorbital width, 10-width of the cerebral capsule, 11-length C1-M2 coronary, 12-length C1-M2 alveolar, 13- length P1-P4 alveolar, 14-length P1-M2 alveolar, 15-height at the auditory drums, 16-height of the occiput from the lower edge of the occipital foramen, 17 - height of the occiput from the upper edge of the occipital foramen, 18 - length of the auditory drum, 19 - width at the auditory vesicle.

Table 2. Dimensions of the upper teeth of *Canis lupus*.

№ in mm	Late neopleistocene					Modern			
	Abyisky district		Kolymsky district			C.lupus albus, tundra zone			
	Academy of Sciences of the RS (Y)					Males, n=17		Females, n=11	
	OG-1-15	OG-2-15	7751	SK-7-17	SK-17	$\frac{limit}{\bar{X} \pm m}$	σ	$\frac{limit}{\bar{X} \pm m}$	σ
1	76,6	77,8	80,8	69,2	78,2	$\frac{74-94}{83,19 \pm 1,16}$	4,65	$\frac{72,3-77,2}{75,86 \pm 0,45}$	1,42
2	45,3	44,5	46,5	41,3	45,6	$\frac{47-52}{50,34 \pm 0,36}$	1,42	$\frac{42,5-50}{46,82 \pm 0,67}$	2,12
3	23,8	24,4	24,5	22,9	24,6	$\frac{24,6-29}{26,77 \pm 0,34}$	1,36	$\frac{22-24,3}{23,59 \pm 0,27}$	0,86
4	-	-	-	12,4	-	$\frac{14,6-17,6}{16,34 \pm 0,21}$	0,83	$\frac{13,4-16,3}{15,40 \pm 0,27}$	0,84
5	-	9,2	-	7,2	-	$\frac{8,2-10}{9,07 \pm 0,17}$	0,69	$\frac{7,8-10,1}{9,15 \pm 0,23}$	0,72
6	14,8	-	14,6	-	13,5	$\frac{13,4-16,1}{15,04 \pm 0,20}$	0,81	$\frac{13,4-15,1}{14,23 \pm 0,20}$	0,62
7	16,6	16,4	15,8	15,1	15,5	$\frac{15,1-16,7}{16,07 \pm 0,18}$	0,87	$\frac{15,1-16,7}{16,07 \pm 0,18}$	0,58
8	24,6	23,5	24,6	22,8	24,4	$\frac{26,4-27,5}{26,43 \pm 0,30}$	0,93	$\frac{26,4-27,5}{26,43 \pm 0,30}$	0,94
9	7,1	-	6,7	-	6,4	$\frac{6,2-7,4}{6,69 \pm 0,10}$	0,41	$\frac{5,8-6,3}{6,12 \pm 0,05}$	0,15
10	9,1	6,9	7,9	6,1	6,7	$\frac{7,1-8,5}{7,66 \pm 0,10}$	0,42	$\frac{6,5-8,1}{7,05 \pm 0,17}$	0,55
11	15,8	13,2	16,6	10,7	13,5	$\frac{12,5-15,2}{13,92 \pm 0,18}$	0,72	$\frac{11,4-13,8}{13,08 \pm 0,20}$	0,64
12	8,1	8,6	8,7	7,4	8,7	$\frac{9-10,7}{10,02 \pm 0,14}$	0,54	$\frac{8,7-10,2}{9,61 \pm 0,15}$	0,49
13	15,9	15,7	15,4	16,6	15,7	$\frac{16,2-19}{17,54 \pm 0,19}$	0,75	$\frac{14,5-17}{16,07 \pm 0,22}$	0,70
14	12,3	11,5	12,8	11,4	12,5	$\frac{13,2-15,4}{14,38 \pm 0,27}$	0,74	$\frac{13,2-15,4}{14,38 \pm 0,27}$	0,85
15	19,6	19,3	19,8	17,2	20,2	$\frac{20,3-23,8}{22,51 \pm 0,21}$	0,82	$\frac{20,6-23}{22,14 \pm 0,26}$	0,83

Note: 1-length P2-M2, 2-length P4-M2, 3-length M1-M2, 4-length C1, 5-width C1, 6-length P2, 7-length P3, 8-length P4, 9-width P2, 10-width P3, 11-width P4, 12-length M2, 13-length M1, 14-width M2, 15-width M1.

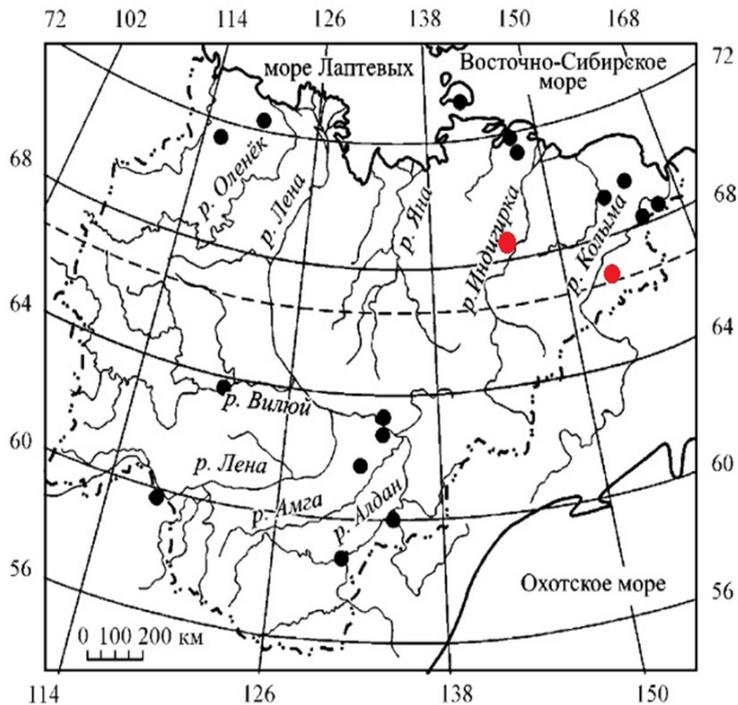


Fig.1. Distribution of the wolf (*Canis lupus*) in the late Neopleistocene of Yakutia (the last localities in the Kolyma-Indigirskaya lowland are marked in red).

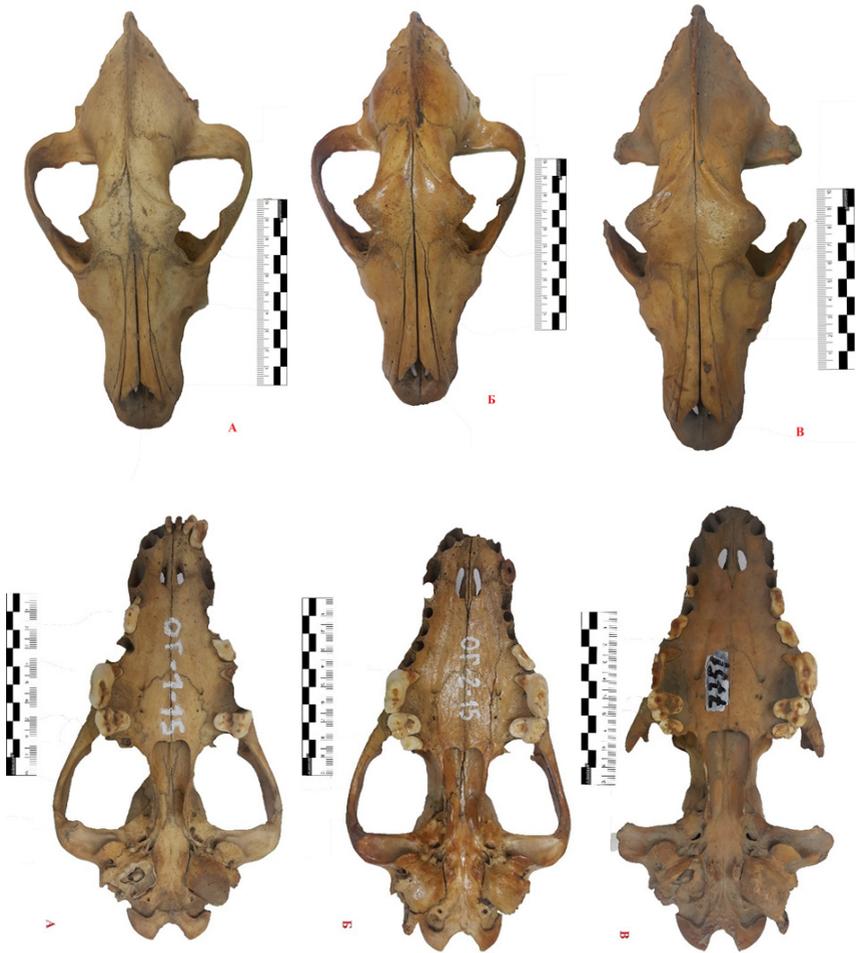


Fig.2. Axial skulls of the Late Neopleistocene wolf (*Canis lupus*) from above (A-B) from the Abyisky region. AS RS (Y); A-OG-1-15 Ogorokha river outcrop 1, B-OG-2-15 Ogorokha river outcrop 2, V-7751 Uyandina river.



Fig. 3. Axial skulls of the Late Neopleistocene wolf (*Canis lupus*) from above (A-B) from the Kolyma region. AS RS (Y); A-SK-17 Muostuur urekh river, B- SK-17-7 Enge brook.

用六边形四面体模型的元素填充平行六面体的最终算法
**THE FINAL ALGORITHM FOR FILLING A PARALLELEPIPED WITH
ELEMENTS OF THE HEXAGONAL TETRAHEDRAL MODEL**

Fomin Denis Vasilyevich

Senior teacher

Amur State University

Eremin Ilya Evgenievich

Doctor of Technical Sciences, Full Professor

Amur State University

回顾了使用根据六边形密堆积结构的四面体模型规则放置的四面体填充由任意平行六面体界定的空间的问题。描述了此任务解决方案的基本和改进算法的缺陷。研究并测试了修复此缺陷的方法。制定了适合构建目标结构模型的算法的最终版本。

关键词：空间堆积，密堆积，六边形堆积，四面体堆积，晶格模型，六边形晶体系统，紧凑矩阵描述。

Abstract: *reviewed the problem of filling of space bounded by an arbitrary parallelepiped using tetrahedrons placed according to rules of the tetrahedral model of the hexagonal close packed structures. Described flaws of the basic and the improved algorithms of this task solving. Researched and tested ways to fix this flaws. Formulated the final version of the algorithm suitable for building targeted structure models.*

Keywords: *spatial packing, close packing, hexagonal packing, tetrahedron packing, crystal lattice model, hexagonal crystal system, compact matrix description.*

Introduction

Different areas of present science include problems that involve describing and studying of spatial close packed structures [1–5]. These includes problems of condensed state physics and physics of plasma [6–18]. Papers [19–20] describe models of the hexagonal spatial close packed structures. In works [21–24] existence of cubic analogy of elementary cell called cube-generator was proved.

To develop effective matrix models of the hexagonal spatial close packed structures the numerical method was created. The numerical method allows

building of three-dimensional matrix description of the cube-generator. However, effective algorithm for filling a parallelepiped with elements of the hexagonal tetrahedral model is needed to implement the method in form of a computer program [24, 25].

Papers [26, 27] contain descriptions of the basic and the improved versions of the algorithm, and reviews of its flaws. These papers conclude impossibility of usage of the basic algorithm for the hexagonal spatial close packed structures research next stages until listed flaws are solved. In addition, the papers conclude applicability of the improved algorithm version for the same purpose and existence of ways for this algorithm improvement.

The purpose of this paper is to develop the final version of the algorithm for filling a parallelepiped with elements of the hexagonal tetrahedral model, optimized and usable for hexagonal spatial close packed structures research. Objectives of the paper are 1) analysis of the basic and the improved versions' flaws 2) development of the final version of the algorithm.

The final version should become a core element of computer programs for visualizing the structures and building its matrix descriptions. That will allow to continue studying of the hexagonal spatial close packed structures. As well as conduct series of computational experiments with the purpose of proving correctness of the developed models and numerical methods, also determining its relative effectiveness and accuracy.

Algorithm excessiveness

As described in papers [26, 27], both the basic and the improved versions of the algorithm lead to occurrence of excessive elements of the tetrahedral model. In particular, stereometric models, that were built using these versions of the algorithm, include tetrahedrons not belonging to studying fragment of the structure (fig. 1).

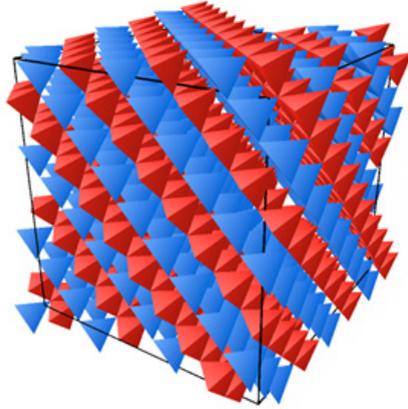


Fig. 1. Defects of stereometric models: the excessive elements.

In papers [26, 27] was shown that existence of the excessive elements can be compensated in the process of building a three-dimensional matrix description through filtering coordinates of points from tetrahedrons' expanded bases [24, 25]. Thus, the flaw in question does not affect the next steps of research. However, it is reasonable to find reasons of this flaw existence and find ways to fix it. This will increase accuracy and efficient of the algorithm.

During the study, it was found that the flaw of excessive elements' existence occurs due to the trait of the basic algorithm's part responding for determining whether the element of the tetrahedral model belongs to the parallelepiped's internal space. In the basic version of the algorithm, this part assumes that current tetrahedron belongs to the parallelepiped's internal space, if at least one of the points of current tetrahedron's extended basis belongs to the internal space, then this tetrahedron should be included into the constructing stereometric model.

This way of determining the belonging of a tetrahedron to the parallelepiped's inside space makes false-positive decision, when only one of the tetrahedron vertexes belongs to the inside space. Taking into account characteristic of mutual arrangement of tetrahedrons, established by the rules of the hexagonal tetrahedral model, it is clear to see that such vertex of the "external" tetrahedron simultaneously belongs to a tetrahedron completely located inside the space.

Thus, the "external" tetrahedron does not actually add any new points to the matrix description constructing on the next stage. Because of rules of the hexagonal tetrahedral model, the extended basis of each tetrahedron contains only one unique point what belongs only to exactly this tetrahedron and to no other – the center of the tetrahedron's circumscribed sphere. Based on this, it is logical to assume: if a tetrahedron's center point does not belong to the internal space of the

parallelepiped and some of the tetrahedron's vertexes belong to the internal space, then at the same time such vertexes belong to other tetrahedrons the centers of which belong to the internal space. Accordingly, including of a tetrahedron, which center does not belong to the internal space, into the stereometric model under construction would be excessive.

This means that it is possible to fix the flaw of excessiveness of the algorithm through changing sub-algorithm responsible for determining whether the element of the tetrahedral model belongs to the parallelepiped's internal space. It must decide that current tetrahedron belongs to the internal space if its center belongs to the surface of the parallelepiped or to the internal space. With this formulation of the condition, the stereometric model of the set size crystal will contain only tetrahedrons that make their own unique contribution to the model. The result of corresponding changes in the algorithm clearly shows disappearance of excessive tetrahedrons (fig. 2).

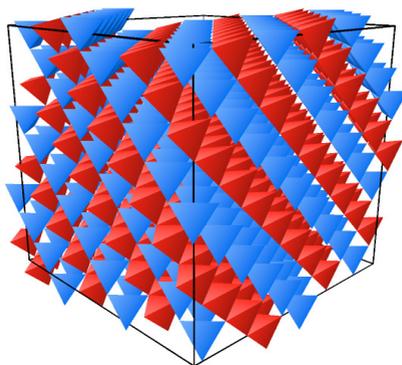


Fig.2. Filling a given parallelepiped with elements of the hexagonal tetrahedral model using the excessiveness flaw fix.

Test construction of the three-dimensional matrix descriptions of the structure under study shows that developed fix for the excessiveness flaw does not affect resulting matrix model. It means that the fix does not lead to decrease of the matrix model accuracy.

More than that, the fix increases efficiency of the algorithm. Both the basic and the improved versions of the algorithm decide on whether add a tetrahedron to the constructing model through checking coordinates from one to five points of its extended basis. The fixed version of the algorithm always makes such decision through checking coordinates of only one point from each tetrahedron's basis.

The final algorithm

Taking into account the proposed corrections, the algorithm for filling a parallelepiped with elements of the hexagonal tetrahedral model can be represented as the interacting units (fig.3). The same as in the improved version, basing on the information about sizes of the given parallelepiped bounding space to fill, “Structure builder” unit adjusts internal parameters of the algorithm and initialize basic elements of the hexagonal tetrahedral model. Then this unit begins sequentially iterate coefficients of the translation vector in the ranges $[0; +\infty)$ and $[-1; -\infty)$.

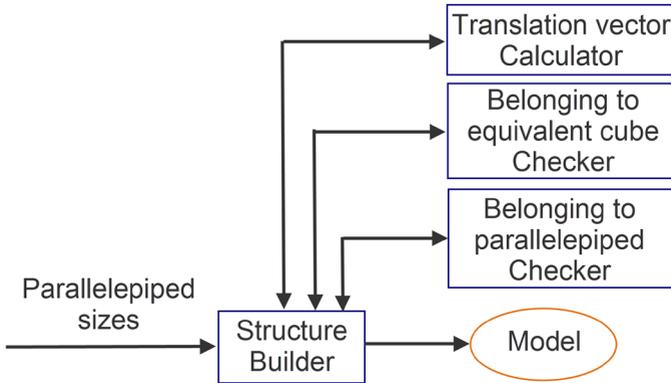


Fig. 3. Interaction of the main units of the final algorithm.

“Structure builder” passes current values of the coefficients to “Translation vector calculator” unit. This unit calculates coordinates of the new translation vector using the fix for central elements offset described in paper [27] and returns the vector to “Structure builder” unit.

Unit “Structure builder” calculates coordinates of the extended basis of current central tetrahedron and passes it to “Belonging to equivalent cube checker” unit. The unit checks whether coordinates of each point of an extended basis belong to the cube equivalent to the filling parallelepiped and returns results to “Structure builder” unit. If the verification result shows that current central element belongs to the cube, then the unit calculates coordinates of extended bases of its descendants and passes it to “Belonging to the parallelepiped checker” unit.

Unit “Belonging to the parallelepiped checker” verifies whether current extended tetrahedron’s basis belongs to the internal space of the filling parallelepiped through checking coordinates of the central point according to the fix described in this paper, and returns the result to “Structure builder” unit. If the verification result is positive, then “Structure builder” adds current tetrahedron to stereometric model under construction, else it disregards current tetrahedron. Then this unit processes next combination of coefficients in the same way.

Thus, the final version of the algorithm includes the fixes described in this paper and in [27]. Together with the method of generating of a three-dimensional matrix description of a cube-generator described in works [24, 25], it allows to begin the development of computer programs for visualizing and matrix descriptions generating of fragments of hexagonal close packed structures.

Conclusion

Effective matrix models of the hexagonal spatial close packed structures are usable in different scientific areas including condensed state physics and physics of plasma [1-18]. The development of such models involves problem of filling a given parallelepiped with elements of the hexagonal tetrahedral model solving. In works [26, 27] described the basic and the improved algorithms for this problem solving. However, these algorithms have some flaws, which should be fixed.

In the course of this research, the flaws of both the basic and the improved versions of the algorithm for filling a parallelepiped with elements of the hexagonal tetrahedral model were analyzed. The influence of the flaws on accuracy of the stereometrical and matrix models of the hexagonal close-packed structures was studied. Reasons of the flaws existence were found as well as ways to fix them. The ways were implemented in the form of the algorithms and computer programs, tested and confirmed through series of modelling and computational experiments.

Based on the obtained results the final version of the algorithm was developed. The final version is more efficient and accurate then both the basic and the improved. The final algorithm for filling a parallelepiped with elements of the hexagonal tetrahedral model allows beginning of the development computer programs for visualizing and matrix descriptions generating for given fragments of hexagonal close-packed structures. It also will serve to verifying corresponding numerical and modeling methods through modeling and calculating known parameters of existing structures of the studying type such as Lonsdaleite and Wurtzite.

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青年心肌梗死患者止血功能的研究
**STUDY OF HEMOSTASIS FEATURES IN YOUNG PATIENTS WITH
MYOCARDIAL INFARCTION**

Kamilova Umida Kabirovna

Doctor of Medical Sciences, Full Professor

Pulatov Olimjon Yarashovich

Applicant

Khusanov Ravshan Axrorovich

Head of the Cardiac Resuscitation Department

Tashkent Medical Academy

这项研究的目的是检查年轻的心肌梗死患者血小板聚集活性和血管性血友病因子（VWF）的指标。检查了74例急性心肌梗死（AMI）患者。在AMI患者中，血浆中血小板聚集和VWF水平增加，这在年轻AMI患者中更为明显。

关键词：心肌梗塞止血血小板凝集von Willebrand因子

Abstract. *The aim of the study was to examine the indicators of platelet aggregation activity and von Willebrand factor (VWF) in young patients with myocardial infarction. 74 patients with acute myocardial infarction (AMI) were examined. In AMI patients, there is an increase in platelet aggregation and VWF levels in blood plasma, which is more pronounced in young AMI patients.*

Keywords: *myocardial infarction, hemostasis, platelet aggregation, von Willebrand factor*

Introduction

One of the most socially significant problems of modern medicine is the treatment and prevention of acute myocardial infarction (AMI). This is determined by both the high mortality directly during this disease, and the subsequent development of severe heart failure, which leads to the disability of patients. The development of thrombosis in the coronary artery is one of the main causes of myocardial infarction. According to angiographic and pathological studies, coronary artery thrombosis is observed with myocardial infarction in 80-90% of cases, especially with myocardial infarction with ST segment elevation and the presence

of a Q wave [1,2]. The development of coronary artery thrombosis is preceded by changes in the endothelium - rupture or tear of an atherosclerotic plaque or its superficial erosion, since adhesion and aggregation of platelets occurs in the area of the damaged atherosclerotic plaque with the release of a large number of biologically active substances, the accumulation of which contributes to an increase in platelet aggregation [3,4]. In the genesis of myocardial infarction, undoubtedly, disorders of the blood coagulation and anticoagulation systems are of particular importance. An important role in the development of thrombosis is assigned to the marker of endothelial dysfunction - von Willebrand factor (VWF), which is involved in the process of platelet adhesion and aggregation, as well as VWF is involved in the binding and stabilization of factor VIII [5,6]. In recent years, there has been an increase in the frequency of myocardial infarction in young people, which is possibly associated with an increase in the number of stressful situations, a decrease in physical activity.

Purpose of the work. Study of indicators of platelet aggregation activity and VWF in young patients with myocardial infarction.

Material and research methods. 74 patients with acute myocardial infarction (AMI) were examined. The study included male patients with primary Q-wave myocardial infarction no more than 6 hours from the onset of anginal pain. The diagnosis was established on the basis of WHO criteria in the presence of the following signs: a characteristic attack of anginal pain or its equivalent lasting at least 30 minutes; the appearance of pathological Q or QS waves in two or more ECG leads. The patients were divided into 2 groups: 38 young AMI patients made up group 1 and 36 AMI patients over the age of 60 years made up group 2. The control group consisted of 16 healthy volunteers. Platelet aggregation activity (PAA) was determined by the method of G.V. Born. ADP was used as an inductor. Platelet aggregation activity (PAA), rate and maximum amplitude of aggregation were determined. The VWF level was determined using a quantitative enzyme-linked immunosorbent assay using "RENAM" SPO reagents. Statistical processing of the research results was carried out on an IBM PC/AT personal computer using the ECXEL 6.0 Windows-95 spreadsheet package. The parameters were described as: arithmetic mean \pm standard deviation (M \pm SD).

Research results and discussion.

The analysis of the obtained results showed that MI of the anterior localization occurred in 43 (41.9%), MI of the posterior wall was observed in 31 (72.9%) patients (Table 1). 54 (72.9%) had arterial hypertension in anamnesis, 38 (51.3%) patients had pre-infarction angina (Table 1).

Table 1

Clinical characteristics of patients

Indicators	Number of patientsn=74	%
Average age (years)	52,34±7,62	
Men	74	100%
Posterior MI	31	41,9%
Anterior MI	43	58,1%
AH in history	54	78,8%
Angina pectoris in history	38	51,3%
1 group (age <45)	38	51,4%
2 group (age > 60)	36	48,6%

Analysis of the data obtained in the study of platelet aggregation ability in patients of group 1 and in patients of group 2, the initial indicators of platelet aggregation activity (PAA) were significantly higher than in healthy individuals, amounting to $1.75 \pm 0.72 \mu\text{mol ADP}$ and $2.78 \pm 1.28 \mu\text{mol ADP}$ versus $4.78 \pm 0.22 \mu\text{mol ADP}$ in healthy subjects ($P < 0.001$) and $P < 0.005$). In group 1 patients, the rates of platelet aggregation (V_{agr}) were also significantly high. In group I they were $2.9 \pm 0.36 \text{ cm/min}$ and in group 2 $1.83 \pm 0.41 \text{ cm/min}$ versus $0.34 \pm 0.5 \text{ cm/min}$ in healthy individuals, respectively, $P < 0, 01$. In patients with MI, the maximum aggregation amplitude (A_{max}) was also significantly higher than in healthy volunteers and was $3.6 \pm 0.55 \text{ cm}$ in group I, $2.94 \pm 0.55 \text{ cm}$ in group II versus $0.5 \pm 0.07 \text{ cm}$ in healthy individuals, respectively ($P < 0.001$) (Table 2).

The study of the platelet aggregation capacity depending on age revealed that the rates of aggregation by 22.4% and PAA by 37% were significantly higher in patients of group 1 compared with these indicators of group 2 ($P < 0.05$).

Table 2.

Baseline values of ADP-induced platelet aggregation in AMI patients, (M±SD)

Patient groups	$V_{agr}, \text{ cm/min}$	$A_{max}, \text{ cm}$	PAA, $\mu\text{mol ADP}$
Control	$0,34 \pm 0,5$	$0,5 \pm 0,07$	$4,78 \pm 0,22$
1 group	$2,9 \pm 0,36^{**}$	$3,6 \pm 0,25^{***}$	$1,75 \pm 0,72^{***}$
2 group	$1,98 \pm 0,20^{***}$	$2,94 \pm 0,55^{**}$	$2,78 \pm 1,28^{**}$

Note: ** $P < 0,005$

*** $P < 0,001$

VWF is an integral marker in the formation of endothelial dysfunction, a triggering mechanism for the formation of a platelet thrombus and its first stage - platelet adhesion [7]. Its initial level in the examined AMI patients was 1.6 times

higher compared to the indicators of the control group in patients of group 1, being $125.6 \pm 5.30\%$ versus $112 \pm 13.9\%$ in healthy individuals and 1.4 times in patients of group 2, accounting for $158 \pm 3.46\%$, while a significant difference was noted between the indicators of patients in groups 1 and 2 (Fig. 1).

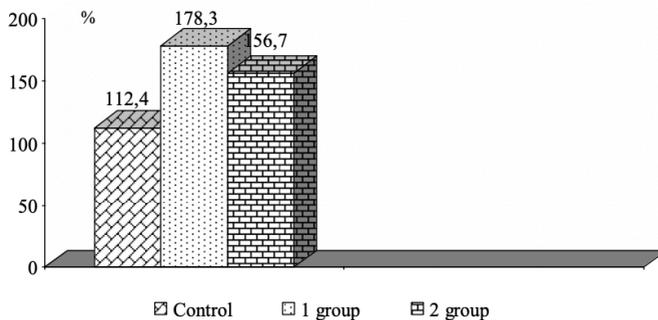


Fig. 1. Baseline values of VWF in AMI patients

Thus, in AMI patients, there is an increase in platelet aggregation capacity and VWF level in blood plasma, which is more pronounced in young AMI patients.

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慢性心力衰竭伴房颤患者左心室收缩和舒张功能的特点研究
**STUDY OF THE PECULIARITIES OF SYSTOLIC AND DIASTOLIC
FUNCTION OF THE LEFT VENTRICLE IN PATIENTS WITH
CHRONIC HEART FAILURE WITH ATRIAL FIBRILLATION**

Shukurov Ali Ahmadovich

Applicant

Avezov Davlat Kurbanboevich

Doctor of Medical Sciences, Head of Department

Yusupova Madina Shukrullaevna

Doctor of Medical Sciences, Full Professor

Khaidarova Feruza Alimovna

Doctor of Medical Sciences, Full Professor

Kamilova Umida Kabirovna

Doctor of Medical Sciences, Full Professor

*Tashkent Medical Academy, Republican Specialized Scientific and
Practical Medical Center for Endocrinology*

本研究的目的是评估慢性心力衰竭伴AF的左心室收缩和舒张功能指标。伴有房颤的CHF患者在心肌收缩力和LV舒张功能障碍方面表现出更明显的变化。

关键词：慢性心力衰竭心房颤动左心室

Abstract. *The purpose of the study was to evaluate the indicators of left ventricular systolic and diastolic function in patients with chronic heart failure with AF. CHF patients with AF showed more pronounced changes in myocardial contractility and LV diastolic dysfunction.*

Keywords: *chronic heart failure, atrial fibrillation, left ventricle*

Introduction

Chronic heart failure (CHF) is not only a medical, but also a social problem due to its high prevalence, high mortality and high treatment costs [1]. Atrial fibrillation (AF) impairs the clinical course and survival of patients with CHF [2], and also affects the effectiveness of CHF treatment. Due to the aging of the population and the development of effective methods for the diagnosis and treatment of many diseases, the number of patients with CHF and AF is steadily increasing

[3]. The prevalence of AF in the general population is around 1-2% and reaches 25% in people over 80 years of age. According to some forecasts, the incidence of AF by 2050 will increase 2.5-4 times, and among people over 80 years of age, it will be diagnosed in every second [4,5]. AF is most often associated with arterial hypertension (AH), ischemic heart disease (IHD), diabetes mellitus and CHF [6]. The prevalence of CHF is comparable to that of AF, and the proportion of patients with CHF and preserved EF is also steadily increasing. In AF and CHF patients with low left ventricular ejection fraction (EF), the efficacy of ACE inhibitors and beta-blockers is lower than in patients with sinus rhythm [6]. The mechanisms of development and the clinical and prognostic value of AF differ in patients with CHF and low or persistent EF.

Purpose of the study was to assess the indicators of systolic and diastolic function of the left ventricle in patients with chronic heart failure with AF.

Material and research methods. 86 patients with CHF were examined. The patients were divided into 2 groups: group 1 consisted of 41 CHF patients with sinus rhythm (CHF without AF) and group 2 - 45 CHF patients with AF. The duration of the disease in group 1 of patients was 3.6 ± 1.1 years, while in group 2 of CHF patients with AF it was 4.1 ± 0.8 years. In patients under SMWT, the assessment of the clinical condition of patients according to the clinical assessment scale (SCS), quality of life parameters, echocardiography (EchoCG) with Doppler ultrasonography was performed initially before treatment.

Results of the study. The results of the assessment of the clinical course by SCS showed that there were significantly high indicators on the SCS scale in patients with CHF against the background of AF, amounting to 11.5 ± 0.21 points versus 5.7 ± 0.17 points ($P < 0.05$). This characterizes the deterioration of the clinical course of CHF with AF attachment. The findings are also supported by the 6 minute walk test (SMWT). The indices of exercise tolerance in the examined patients with CHF without AF according to the results of SMWT were 417.4 ± 17.89 meters, while in patients with CHF with AF, exercise tolerance was reduced by 44% compared with patients without AF and amounted to 237.9 ± 20.55 meters, respectively.

The study of the processes of left ventricular remodeling revealed that in the examined patients at the initial stages of CHF, as a result of the adaptation process, normal parameters of the ejection fraction (EF) were retained with an insignificant increase in the end-systolic and end-diastolic sizes (ESS, EDS). With the progression of CHF, the indicators of EF LV and Fs decreased as the main indicators of systolic function both in patients without AF and with AF. In CHF patients with AF, there was a decrease in EF by 18.1% ($P < 0.05$), compared with the EF indicators in CHF patients without AF, which was also accompanied by a decrease in the fraction of shortening of the anteroposterior LV size in systole (Fs) by 24.8%

($P < 0.01$), respectively. EDS indicators in CHF patients with AF were significantly higher by 35.3% ($P < 0.001$), and ESS by 15.8% ($P < 0.01$), respectively, compared with indicators in the group of CHF patients without AF. An increase in LV EDV in patients after MI at the initial stage of remodeling is an early compensatory response to a decrease in wall contractility and kinetics and allows maintaining stroke volume (SV) and LV EF [7,8]. Indicators of meridional systolic myocardial stress (MS), characterizing the load on the LV walls, in patients with CHF with AF were 25.8% higher ($P < 0.01$), probably due to an increase in intramyocardial LV stress. Despite the increase in intramyocardial ventricular tension, dilatation of the heart chambers, only a tendency towards a decrease in SV was observed.

Analysis of diastolic function indices showed a significant decrease in the maximum rate of early filling of the left ventricle (E) compared to control ($P < 0.05$), an increase in the maximum rate of late filling of the atria (A) ($P < 0.05$), and a decrease in the E/A ($P < 0.01$), the degree of decrease in E and E/A, which were more pronounced in the group of CHF patients with AF ($P < 0.05$, $P < 0.01$) [9]. The development of AF in patients with heart failure with preserved ejection fraction in our study was probably due to an increase in the pulse load on the LV, its hypertrophy, according to the left ventricular myocardial mass index, and the aggravation of diastolic dysfunction. A significant correlation between these parameters and the presence of AF in patients with CHF confirms similar pathogenetic mechanisms of AF as the main cardiac comorbidity. An interesting fact is that the volume overload of the LV myocardium also has a significant effect on all DD LV parameters in patients with sinus rhythm; it loses its significance with the addition of AF. On the contrary, a resistive load contributes to the development of AF, according to E_a . This can be explained by the fact that it is the resistive load on the LV and LA that is characteristic of patients in this group.

Thus, in CHF patients with AF, more pronounced changes in myocardial contractility and LV diastolic dysfunction were detected.

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